VTA'S BART SILICON VALLEY PHASE II EXTENSION PROJECT

Draft Supplemental Environmental Impact Statement/ Subsequent Environmental Impact Report and Draft Section 4(f) Evaluation

Volume I

December 2016

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

VTA BART SILICON VALLEY

SANTA CLARA VALLEY TRANSPORTATION AUTHORITY

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Phase II Extension Project

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DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT/ SUBSEQUENT ENVIRONMENTAL IMPACT REPORT AND DRAFT SECTION 4(f) EVALUATION

PREPARED PURSUANT TO:

National Environmental Policy Act of 1969, § 102 (42 U.S. Code [U.S.C]. § 4332); and Public Law 112-141; 49 U.S.C. § 303 (formerly Department of Transportation Act of 1966, §4(f)); National Historic Preservation Act of 1966, § 106 (16 U.S.C. § 470f); Clean Air Act (42 U.S.C. § 7401 et seq.); Clean Water Act, Section 404 (33 U.S.C. § 1344); Endangered Species Act (7 U.S.C. § 136; 16 U.S.C. § 1531 et seq.); 49 Code of Federal Regulations (CFR) § 622.101; 23 CFR Part 771 and 774; 40 CFR Parts 1500 - 1508; Executive Order 11990 (Protection of Wetlands); Executive Order 11988 (Floodplain Management); Executive Order 12898 (Environmental Justice); California Environmental Quality Act (CEQA), Public Resources Code § 21000 et seq.; and the State of California's CEQA Guidelines, California Administrative Code, § 15000 et seq.

The Federal Transit Administration (FTA) may issue a single Final Supplemental Environmental Impact Statement/Record of Decision document pursuant to Public Law 114-94 and 23 U.S.C. 139 (n)(2), unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document. In that case, FTA would issue a Final Supplemental Environmental Impact Statement followed by an amendment to the Record of Decision, as needed.

by the

FEDERAL TRANSIT ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION

and the

SANTA CLARA VALLEY TRANSPORTATION AUTHORITY

Cooperating Agencies:

San Francisco Bay Area Rapid Transit District

Edward Carranza, Jr. Deputy Regional Administrator Federal Transit Administration	DEC 20 2016 Date of Approval
Nuria I. Fernandez General Manager Santa Clara Valley Transportation Authority	12/19/16 Date of Approval

ABSTRACT

VTA's BART Silicon Valley Program consists of a16-mile extension of the Bay Area Rapid Transit (BART) system from BART's Warm Springs Station in southern Fremont in Alameda County into Santa Clara County through the Cities of Milpitas, San Jose, and Santa Clara. BART's Warm Springs Station is currently under construction and scheduled to open in 2017. VTA's BART Silicon Valley Program is being implemented in two phases: the Phase I Berryessa Extension Project (Phase I) and the Phase II Extension Project (Phase II). Phase I is a 10-mile extension currently under construction and scheduled to be open in late 2017. The remaining approximately 6-mile extension of VTA's BART Silicon Valley Program, called Phase II, is the subject of this combined Draft Supplemental Environmental Impact Statement and Subsequent Environmental Impact Report (SEIS/SEIR), which includes both a National Environmental Policy Act (NEPA) and a California Environmental Quality Act (CEQA) analysis.

This Phase II NEPA SEIS is being prepared to address the remaining 6 miles of the 16-mile SVRTP Alternative that was studied in the 2010 Final EIS but not approved. In 2010, FTA issued a Record of Decision for the Phase I 10-mile extension that is currently under construction. Considerable time has passed since the prior EIS was prepared in 2008–2009; therefore, this document evaluates changes in existing conditions, regulatory requirements, and project design to the remaining 6 miles of the Silicon Valley Program from Berryessa to Santa Clara since the 2010 EIS.

A CEQA SEIR is being prepared to address substantial changes in the proposed project, including new alternatives considerably different from previous EIRs, and to consider new circumstances and information, such as new existing conditions, regulatory requirements, potential impacts, and mitigation measures. The VTA Board of Director's certified the Final EIR and approved the 16-mile project on December 9, 2004. As preliminary engineering progressed, a number of design changes were identified, and a supplemental document was prepared to evaluate the environmental impacts. The VTA Board of Directors' considered these changes and certified the Final Supplemental EIR and approved the revised project on June 7, 2007. The VTA Board of Directors' certified a second Supplemental EIR and approved the Phase I 10-mile extension (phasing of VTA's BART Silicon Valley Program) on March 3, 2011.

The alternatives analyzed in this Draft SEIS/SEIR were prepared in accordance with NEPA and CEQA and are described below. There are two alternatives evaluated in this document in accordance with NEPA: the No Build Alternative and the BART Extension Alternative. The NEPA No Build Alternative consists of planned and programmed transit improvements, but does not include the 6-mile BART extension to Santa Clara. The NEPA BART Extension Alternative consists of a 6-mile extension of the BART system from the Berryessa BART Station, currently under construction, through downtown San Jose to the vicinity of the Santa Clara Caltrain Station. The SEIS is intended to satisfy the requirements of the National Environmental Policy Act of 1969 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.

There are three alternatives evaluated in this document in accordance with CEQA: the No Build Alternative, the BART Extension Alternative, and the BART Extension with Transit-Oriented Joint Development (TOJD) Alternative. The CEQA No Build Alternative is the same as the NEPA No Build Alternative described above. The CEQA BART Extension Alternative is the same as the NEPA BART Extension Alternative described above. The CEQA BART Extension with TOJD Alternative consists of the 6-mile BART Extension as described above (see CEQA BART Extension and NEPA BART Extension Alternatives) as well as TOJD at the BART Extension's four stations and two tunnel ventilation structure sites. The TOJD has independent utility and is included to support ridership and to be consistent with local and regional land use

planning. No federal dollars would be used to design or construct the TOJD, and no federal approvals are required. Because no federal action is involved, VTA's TOJD, which is consistent with City general plans and approved area plans, would be considered in the cumulative conditions for NEPA purposes.

This Draft SEIS/SEIR evaluates and discloses the environmental effects of the alternatives. Topics of concern include transportation, air quality, cultural resources, and noise and vibration, among other topics. Mitigation measures to reduce or avoid adverse effects are identified in the document.

The project is included in the current Metropolitan Transportation Commission's financially constrained regional plan (Plan Bay Area 2035). The current financial plan in the Draft SEIS/SEIR is based on financial projections and governmental actions that are not finalized. As part of the New Starts process, an updated financial plan will be prepared in advance of the project into Final Design.

The FTA may issue a single Final Supplemental Environmental Impact Statement/Record of Decision document pursuant to Public Law 114-94 and 23 U.S.C. 139 (n)(2), unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document. In that case, FTA would issue a Final Supplemental Environmental Impact Statement followed by an amendment to the Record of Decision, as needed.

Notice of the Draft SEIS/SEIR will be published in the *Federal Register*. The public comment period will end February 20, 2017. Written comments should be submitted to Mr. Tom Fitzwater at the address below. Comments may also be submitted by email at BARTphase2EIS-EIR@vta.org or at the public hearings noted below. Information can also be obtained from the project web site (www.vta.org/bart) or from Mr. Fitzwater at (408) 321-5705.

The dates, times, and locations of the public hearings are:

East San Jose Public Hearing
Wednesday, January 25, 2017 (6:00 p.m. to 8:00 p.m.)
Mexican Heritage Plaza, Gallery Room
1700 Alum Rock Avenue, San Jose, CA

Santa Clara Public Hearing
Thursday, January 26, 2017 (6:00 p.m. to 8:00 p.m.)
Santa Clara Senior Center, Room 222
1303 Fremont Street, Santa Clara, CA

Downtown San Jose Public Hearing
Monday, January 30, 2017 (6:00 p.m. to 8:00 p.m.)
City of San Jose- City Hall, Rooms 118-120
200 East Santa Clara Street, San Jose, CA

FOR ADDITIONAL INFORMATION CONCERNING THIS DOCUMENT, CONTACT:

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San Jose, CA 95134-1927
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Special-Status Species Lists

Cultural Resources

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Preliminary Finding of Effects

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Section 4(f)/6(f) Technical Report

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[1] Available upon request to qualified professionals.

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Chapter ES
Executive Summary

ES.1 Introduction

The Federal Transit Administration (FTA) and the Santa Clara Valley Transportation Authority (VTA) have prepared this combined Supplemental Environmental Impact Statement (SEIS), Subsequent Environmental Impact Report (SEIR), and Draft 4(f) Evaluation in accordance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). There are two alternatives evaluated in this document in accordance with NEPA: the No Build Alternative and the BART Extension Alternative. FTA is the lead agency for the NEPA analysis in this document and VTA is the implementing agency. BART is a cooperating agency for the NEPA analysis in this document. There are three alternatives evaluated in this document in accordance with CEQA: the No Build Alternative, the BART Extension Alternative, and the BART Extension with Transit-Oriented Joint Development (TOJD) Alternative. VTA is the lead agency for the CEQA analysis in this document. BART is a responsible agency for the CEQA analysis in this document.

In November 2001, the VTA and BART District governing boards approved a Comprehensive Agreement regarding the institutional, project implementation, and financial issues related to the BART Extension. BART will operate and maintain the system consistent with the Comprehensive Agreement. VTA has full responsibility for the funding of all capital improvements, operating costs, and maintenance costs of the BART Extension.

ES.2 Overview

As described above, there are two alternatives evaluated in this document in accordance with NEPA: the No Build Alternative and the BART Extension Alternative.

1. The NEPA No Build Alternative consists of planned transit improvements, but does not include the 6-mile BART Extension to Santa Clara.
2. The NEPA BART Extension Alternative consists of a 6-mile extension of the BART system from the Berryessa BART Station, currently under construction, through downtown San Jose to the Santa Clara Caltrain Station.

There are three alternatives evaluated in this document in accordance with CEQA: the No Build Alternative, the BART Extension Alternative, and the BART Extension with TOJD Alternative.

1. The CEQA No Build Alternative is the same as the NEPA No Build Alternative.

2. The CEQA BART Extension Alternative is the same as the NEPA BART Extension Alternative described above.
3. The CEQA BART Extension with TOJD Alternative consists of the 6-mile BART Extension as described above (see NEPA BART Extension Alternative) as well as TOJD at the BART Extension's four stations and at two ventilation structure sites.

The proposed TOJD is not included in the NEPA Build Alternative because the TOJD is a potential future independent action by VTA, and the TOJD project serves a separate purpose and need than the BART Extension Alternative and is included to support local and regional land use planning. A specific TOJD development plan or private developer has not been identified at this time and any proposed TOJD project would be separately funded, and would not include federal funding. The TOJD may be constructed at the same time as the BART Extension Alternative or later in time, dependent on the availability of funding and subject to market forces. However, the design of the stations and structures would not preclude TOJD. Because no federal action is involved, VTA's TOJD, which is consistent with city general plans and approved area plans, would be considered in the cumulative background conditions for NEPA purposes.

VTA will coordinate TOJD project entitlements from local planning agencies as a separate action from this project. In October, 2016, VTA was awarded a $1.52 million Fiscal Year 2016 Pilot Program for Transit-Oriented Development (TOD) Planning grant for the Phase II Project. The Pilot Program supports comprehensive planning efforts of local communities. Under the Pilot Program requirements, agencies and local communities who receive funds through this planning program must examine ways to improve economic development and ridership, foster multimodal connectivity and accessibility, improve transit access, identify infrastructure needs, and enable mixed-use development near transit stations. The Pilot Program funds will be used to support a study on concepts and future opportunities for TOD along the alignment. After the VTA Board of Directors defines the scope of work and approves the selection of a consultant, the study will take approximately a year to complete.

The 6-mile BART Extension under the NEPA BART Extension Alternative, CEQA BART Extension Alternative, and CEQA BART Extension with TOJD Alternative would begin at the terminus of the Phase I Project east of U.S. Highway 101 (U.S. 101) and south of Mabury Road in the City of San Jose and extend to the City of Santa Clara. Figure ES-1 shows the regional location of the BART Extension.

The BART Extension would include an approximately 5-mile tunnel, or subway, through downtown San Jose. Four stations are under consideration: Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara. Two options are under consideration for both the Downtown San Jose and Diridon Stations. Figure ES-2 shows a map of the BART Extension. The BART Extension would take approximately 8 years for design, construction, testing, and start-up activities. Depending upon funding availability, initial revenue service on the BART Extension is targeted to begin in late 2025/2026. The CEQA BART Extension with TOJD Alternative consists of the 6-mile BART Extension as described above in addition to TOJD at the four BART stations and at the two ventilation structure sites. The locations of the TOJD are shown on Figure ES-3. The alternatives listed above are described in detail in Chapter 2, *Alternatives*.

ES.3 Why Supplemental EIS and Subsequent EIR Document?

The extension of BART into Santa Clara County is the outcome of various prior studies that have evaluated transportation needs in the BART Silicon Valley corridor and major capital improvements intended to expand transit service.

In 2001, a Major Investment Study (MIS) was conducted, and the VTA Board of Directors approved a locally preferred alternative that would extend BART service from Fremont through Milpitas, San Jose, and into Santa Clara. The alternative came to be designated the Silicon Valley Rapid Transit Corridor Project (SVRTCP). To study the environmental impacts of this alternative, a combined Draft Environmental Impact Statement/ Environmental Impact Report (Draft EIS/EIR) and Draft 4(f) Evaluation was prepared in accordance with the requirements of NEPA and CEQA and released for public review in March 2004. Following the start of the public review period for the Draft EIS/EIR, on April 6, 2004, the NEPA Notice of Intent to prepare an EIS was published for the BART Warm Springs Extension, a 5.4-mile project extending from the downtown Fremont BART Station to south Fremont, terminating at the proposed Warm Springs Station. The Warm Springs Extension is a required precursor project to the SVRTCP.

The project was determined not ripe for NEPA review because it was in the early stages of planning as evidenced by the on-going planning for the Warm Springs Extension Project, which is a predecessor to the SVRTCP. Funding for the operations and construction of the SVRTCP was still being explored at that time. VTA continued with the environmental process under CEQA in order to advance planning. As a result of this action, VTA also withdrew the SVRTCP from FTA's New Starts project qualification and funding program. This included formal withdrawal from the FTA preliminary engineering phase of project development.

VTA did, however, continue the environmental review process under CEQA. A Final EIR was prepared and certified by the VTA Board of Directors in December 2004. A Final Supplemental EIR (updating the 2004 EIR to address project design refinements) was certified by the VTA Board of Directors in June 2007.

In mid-2007, VTA requested FTA approval to begin the NEPA process again, and FTA concurred. On September 21, 2007, FTA published in the *Federal Register* a Notice of Intent to Prepare an EIS on the project. VTA and FTA held public scoping meetings in October 2007 to solicit comments on the scope of project improvements and issues for evaluation as part of the environmental studies.

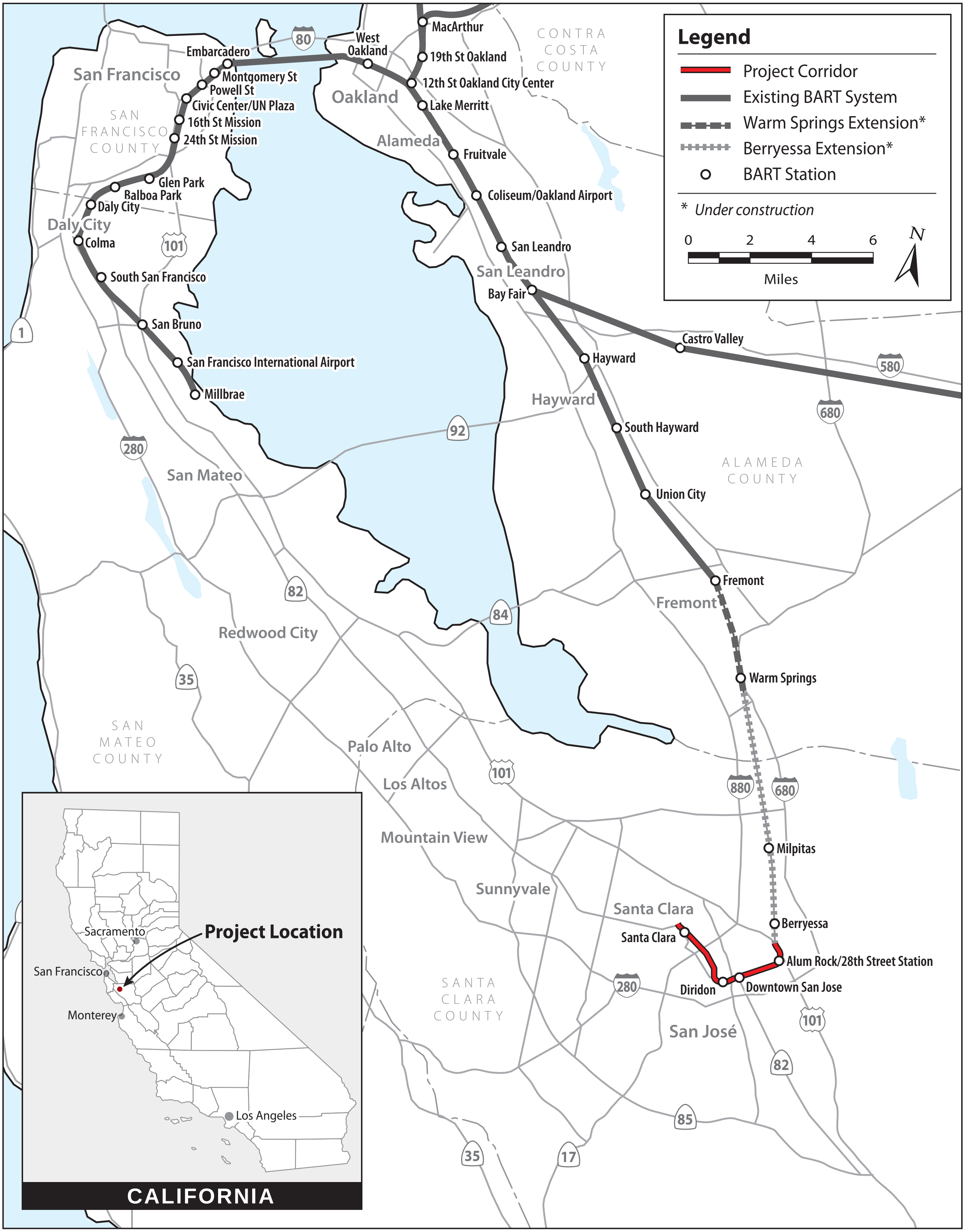

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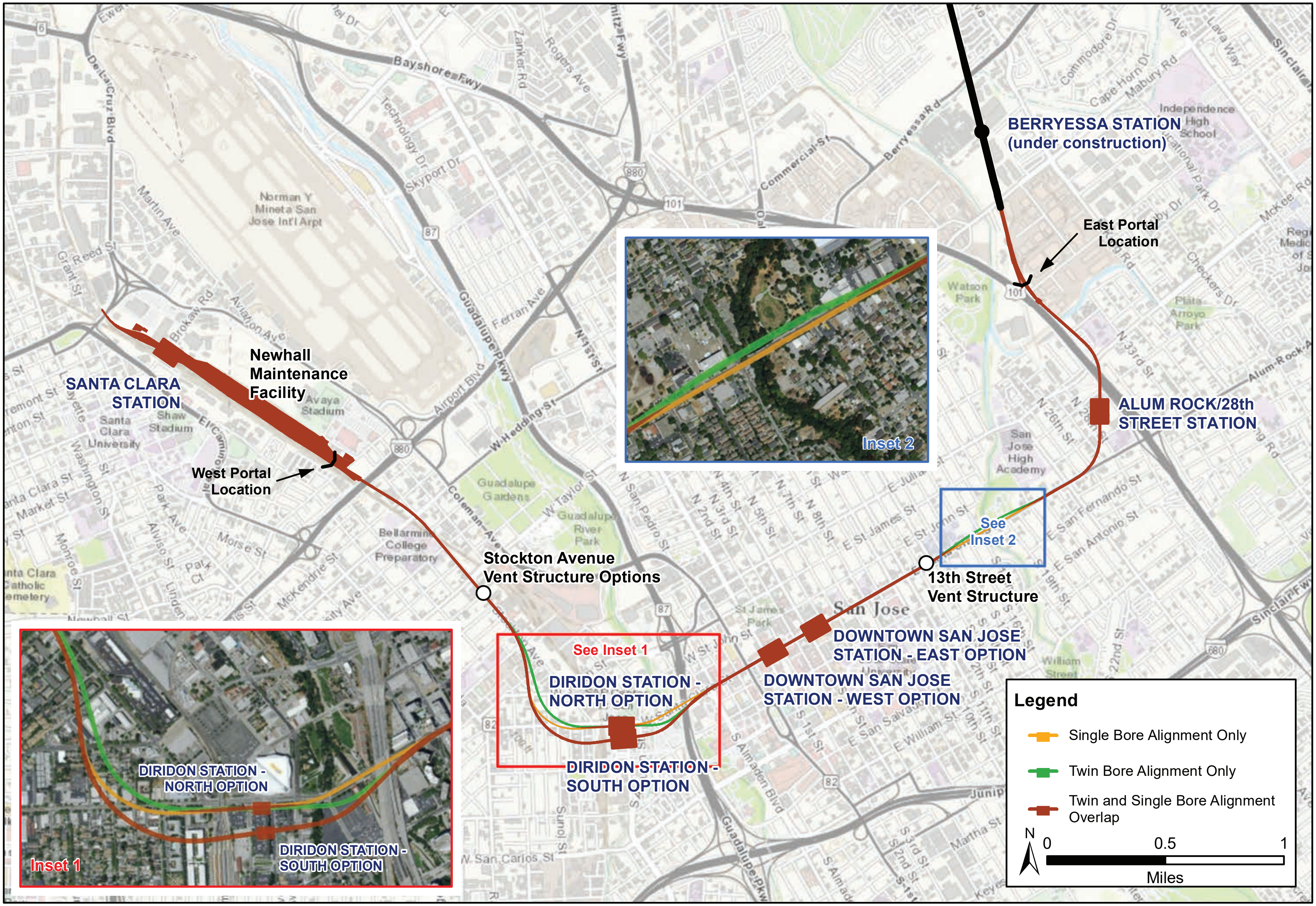
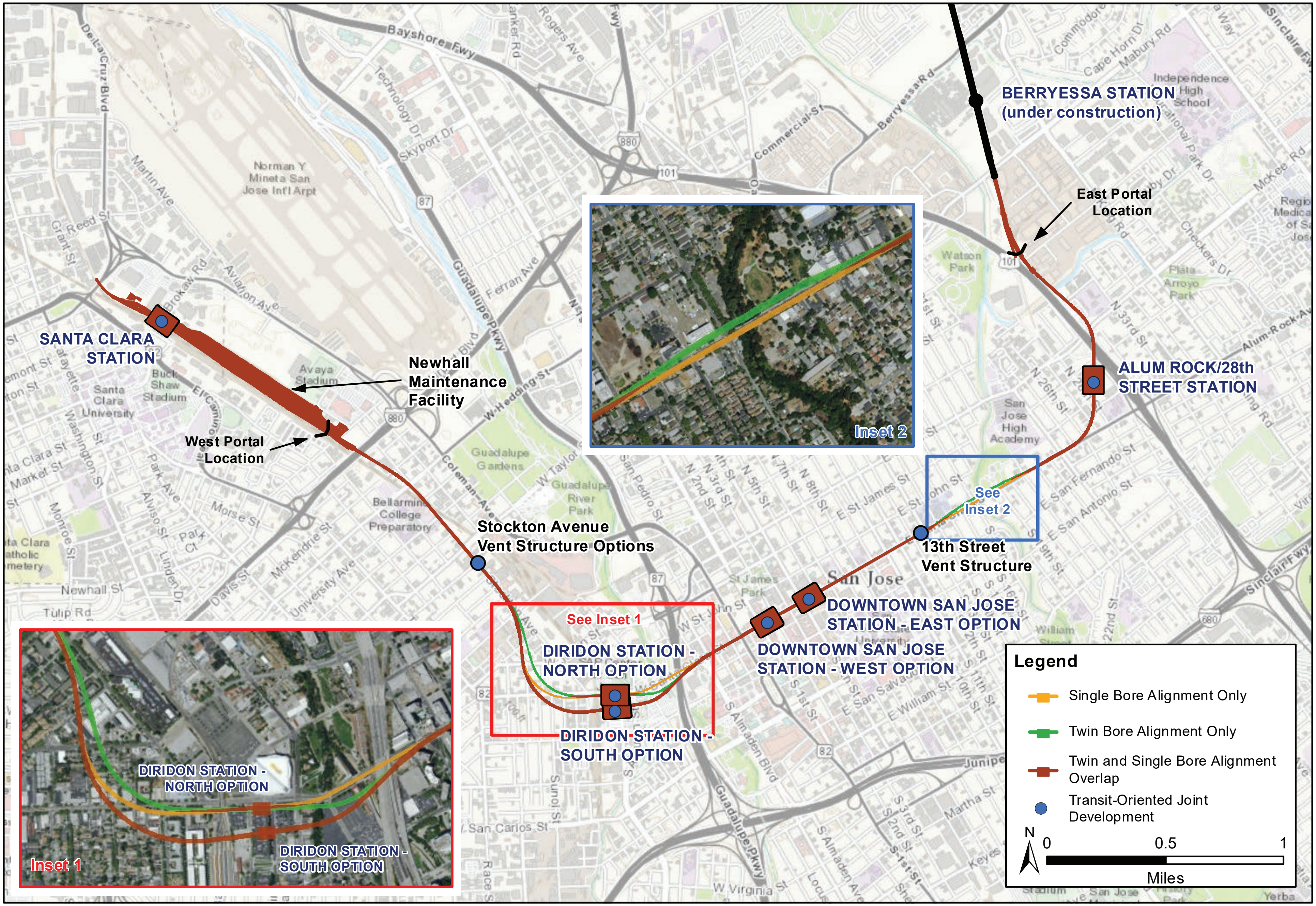
Figure ES-1
Regional Location
VTA's BART Silicon Valley–Phase II Extension Project



Source: Station and Track, VTA 2014; Basemap, ESRI 2015

Figure ES-2
BART Extension Alternative
VTA's BART Silicon Valley – Phase II Extension Project



Source: Station and Track, VTA 2014; Basemap, ESRI 2015

Figure ES-3
BART Extension (with Station options) and Transit-Oriented Joint Development Alternative
VTA's BART Silicon Valley–Phase II Extension Project

A Draft EIS was released for public comment in March 2009, and a Final EIS was published in March 2010. On June 24, 2010, the FTA issued a Record of Decision (ROD) on the first phase of the project, an approximately 10-mile segment from Warm Springs to Berryessa—designated the Berryessa Extension Project. This formally approved Phase I to move forward into detailed design and construction. The decision reflected the fact that VTA had funding committed or in the pipeline for an initial 10-mile segment of a full 16-mile SVRTCP. Funding for the full 16-mile project was, at the time, not committed or in the immediate pipeline.

VTA proceeded to complete design and initiated construction on this initial segment, which is referred to in this document as the Phase I Project. The remaining approximately 6 miles of the originally contemplated project is referred to in this document as the BART Extension. Because a considerable period of time has elapsed since preparation and publication of the Final EIS on the SVRTCP and because the project is now focused on the remaining approximately 6 miles for completion, a Supplemental Environmental Impact Statement to the 2010 document is being prepared.

To ensure that the previously issued 2007 SEIR was fully consistent with the 2010 Final EIS, a Draft 2nd Supplemental EIR was prepared and issued for public review in November 2010. A Final 2nd Supplemental EIR was published in March 2011. The 2nd SEIR focused on the Phase I Extension as the planned project.

The CEQA EIR and NEPA EIS processes now need to be brought up to date because several years have passed since the prior documents were approved, background conditions have changed, some regulatory settings have changed, and there are new options to be evaluated. In addition, for CEQA purposes, there is a new alternative with TOJD. Therefore, VTA, with FTA concurrence, has elected to prepare a combined Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR) on the remaining approximately 6-mile BART Extension. A Subsequent EIR has been prepared instead of a Supplemental EIR because substantial changes have been made to the project (primarily the introduction of transit-oriented joint development) which requires major revisions of the previous EIR due to the involvement of new significant environmental impacts and increases in the severity of previously identified significant impacts. In 2015, as preparation of the updated documents was underway, VTA decided to add a land use development component to the CEQA BART Extension with TOJD Alternative in order to maximize transit-oriented development potential; to encourage ridership; to fulfill the local and regional goals to integrate transit-oriented development at transit stations; and to integrate the planning, design, and construction of both the BART Extension and land use development.

In late 2015, VTA submitted application materials to FTA, requesting entry into New Starts Project Development, the first phase of the New Starts Capital Investment Grant Program. In March 2016, VTA received approval to enter New Starts Project Development for the NEPA Build Alternative. Completion of project development activities allows VTA to request approval to advance the project into New Starts Engineering.

ES.4 Public and Agency Involvement

Refer to Chapter 10, *Agency and Community Participation*, for more information on public and agency involvement. A summary of consultation of public agencies conducted for the BART Extension is provided in Section 10.2, *Summary of Public Agency Coordination*. Section 10.6, *Chronology of Coordination*, outlines the timeline of all public outreach, public meetings, and coordination activities.

ES.4.1 Scoping

On January 30, 2015, VTA issued the Notice of Preparation for the SEIS/SEIR. VTA conducted three formal environmental scoping meetings to gather input and comments prior to the development of the SEIS/SEIR. Meetings were held on February 12, 17, and 19, 2015, in downtown San Jose, east San Jose, and Santa Clara. Each public scoping meeting included a sign-in/open house portion of the meeting, where the public could view informational display boards of the BART Extension alignment and concept exhibits for the proposed stations, and a presentation portion of the meeting during which VTA staff provided an overview of the BART Extension and environmental process.

ES.4.2 Areas of Controversy

Written and oral comments received during the scoping process are available in the technical report titled *Environmental Scoping Report*. The report is available on VTA's website at www.vta.org/bart and on file at VTA's offices (3331 N. First Street, Building. B, San José, CA 95134).

Comments regarding environmental impacts focused on the following areas.

- Disruption to businesses in downtown San Jose and at Diridon during construction.
- Socioeconomic impacts from business displacements.
- Access to stations for automobiles, pedestrians, and bicycles.
- Construction traffic impacts on surrounding roadways, bicycle and pedestrian facilities, the state highway system, and at the SAP Center.
- Noise and air quality impacts of construction and operations on the surrounding land uses.
- Construction and operations vibration and noise impacts on the Church of Five Wounds.

ES.5 Public Circulation of Draft SEIS/SEIR

Notice of the Draft SEIS/SEIR will be published in the *Federal Register* on January 6, 2017. The public comment period will end February 20, 2017. Public hearings will be held January 25, 26, and 30, 2017, at the locations noted below to take comments from interested parties and the public regarding the alternatives, impacts, and proposed mitigation measures. The times and locations of the public hearings will be announced in direct mailings, on VTA's website, in display advertisements in local newspapers of general circulation in the area, and in the *Federal Register*. Responses will be provided in the Final SEIS/SEIR for all substantive comments received in writing prior to the close of the public comment period or entered into the public record at the public hearings. VTA and FTA will consider all of the public comments in concert with the information presented in this document prior to selection of a preferred alternative.

The dates, times, and locations of the public hearings are:

- East San Jose Public Hearing
  Wednesday, January 25, 2017 (6:00 p.m. to 8:00 p.m.)
  Mexican Heritage Plaza, Gallery Room
  1700 Alum Rock Avenue, San Jose, CA
- Santa Clara Public Hearing
  Thursday, January 26, 2017 (6:00 p.m. to 8:00 p.m.)
  Santa Clara Senior Center, Room 222
  1303 Fremont Street, Santa Clara, CA
- Downtown San Jose Public Hearing
  Monday, January 30, 2017 (6:00 p.m. to 8:00 p.m.)
  City of San Jose – City Hall, Rooms 118–120
  200 East Santa Clara Street, San Jose, CA

ES.6 Issues to be Resolved

The issues to be resolved include the following:

- Two station options: Downtown San Jose Station East or West Option
- Two station options: Diridon Station South or North Option
- Four location options for the Stockton Avenue Ventilation Structure on the east side of Stockton Avenue between Schiele Avenue and West Taylor Street.
- Selection of underground station entrances for Alum Rock/28th Street, Downtown San Jose, and Diridon Stations
- Two tunnel construction methodology options: the Twin-Bore or Single-Bore Option (see Table ES-3 for a comparison of impacts for these tunnel construction methodology options).

ES.7 Impacts and Mitigation Measures

ES.7.1 NEPA

Short-term adverse effects that would occur during the construction of the NEPA BART Extension Alternative (BART Extension) are summarized in Table ES-1, along with proposed mitigation, and the level of impact after mitigation. Table ES-2 summarizes the adverse, long-term effects from operation of the BART Extension under NEPA, proposed mitigation, and the level of impact after mitigation.

Where project features have not changed, construction and operation impacts for the NEPA BART Extension Alternative are generally similar as those identified in the 2010 FEIS. For new facilities, station and tunnel options, or new locations, impacts are generally similar or less than those previously described in the 2010 FEIS except for Transportation (construction), Air Quality (construction), and Noise (construction).

Impacts in Tables ES-1 and ES-2 are described as they relate to all features, or as they relate to specified portions of the alignment. *Tables ES-1 and ES-2 show the adverse effects only.* Any environmental effects that would not be adverse are not discussed in the tables. Refer to Chapter 4, *NEPA Alternatives Analysis of Operations*, and Chapter 5, *NEPA Alternatives Analysis of Construction*, for the criteria for determining adverse effects and detailed description of all potential effects from the NEPA No Build Alternative and the NEPA BART Extension Alternative and proposed mitigation measures.

The level of impacts after mitigation under the NEPA BART Extension Alternative analyzed in this document must be compared to the level of impacts after mitigation in the 2010 FEIS to satisfy the Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report requirements.

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
5.5.2 Transportation				
Vehicular Traffic, Bicyclists, and Pedestrians: Lane and roadway closures would require vehicular traffic, bicyclists, and pedestrians traveling within and through the construction areas to use alternate routes, increasing their travel distance and time.	Alum Rock/28th Street Station; Downtown San Jose Station (East and West Options); Diridon Station (South and North Options), Santa Clara Station, Newhall Maintenance Facility, and West Tunnel Portal *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Adverse (Twin-Bore and Single-Bore Options)
Vehicular Traffic, Bicyclists, and Pedestrians: Lane and roadway closures would require vehicular traffic, bicyclists, and pedestrians traveling within and through the construction areas to use alternate routes, increasing their travel distance and time.	13th Street and Stockton Street Ventilation Structures *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Not Adverse (Twin-Bore and Single-Bore Options)
Transit-Bus: Long-term closure of transit stops and route detours required during construction would decrease performance and affect local bus service.	Downtown San Jose Station (East and West Options), Diridon Station (South and North Options) *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
Transit-Light Rail: Construction activities may require closure and interruption of VTA's light rail service through downtown San Jose, affecting performance.	Downtown San Jose Station West Option *Tunnel Option: Twin-Bore only*	Adverse (Twin-Bore Option)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Adverse (Twin-Bore Option)
Transit-Heavy Rail: Construction activities would temporarily affect existing easternmost Caltrain track at Diridon Station and thereby affect Caltrain and other operations.	Diridon Station (North Option) *Tunnel Option: Twin-Bore only*	Adverse (Twin- Bore Option)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan	Adverse (Twin- Bore Option)
Parking: On-street and off-street parking spaces would be removed during construction.	Downtown San Jose Station (East and West Options), Diridon Station (South and North Options) *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-C: Develop and Implement a Parking Management Plan	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
5.5.3 Air Quality				
Exhaust Emissions: Construction equipment and truck exhaust emissions would exceed the Bay Area Air Quality Management District (BAAQMD) significance threshold for nitrogen oxides (NO_X).	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure AQ-CNST-A: Implement Dust Control Measures Mitigation Measure AQ-CNST-B: Use U.S. Environmental Protection Agency (EPA) Tier 4 or cleaner engines Mitigation Measure AQ-CNST-C: Maintain Construction Equipment Mitigation Measure AQ-CNST-D: Minimize Idling Times Mitigation Measure AQ-CNST-E: Use Equipment Meeting ARB Certification Standards Mitigation Measure AQ-CNST-F: Ensure Heavy-Duty Diesel Trucks Will Comply with EPA Emissions Standards Mitigation Measure AQ-CNST-G: Use Low-Sulfur Fuel Mitigation Measure AQ-CNST-H: Locate Construction Areas Away from Sensitive Receptors Mitigation Measure AQ-CNST-I: Use Low-Volatile Organic Compound (VOC) Coatings	Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
5.5.4 Biological Resources and Wetlands				
Tree Removal: Construction activities would require removal of trees, which may result in an adverse effect on nesting birds.	Entire alignment including all stations *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-CNST-A: Replace Trees	Not Adverse (Twin-Bore and Single-Bore Options)
Nesting Birds: Construction activities along the entire alignment may result in adverse effects on nesting birds.	Entire alignment including all stations *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-A: Avoid Nesting Bird Season Mitigation Measure BIO-CNST-B: Conduct Preconstruction/Predisturbance Surveys for Nesting Birds	Not Adverse (Twin-Bore and Single-Bore Options)
Roosting Bats: Construction staging areas along the alignment may result in adverse effects on roosting bats.	Entire alignment including all stations *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Measure BIO-CNST-C: Conduct Preconstruction Surveys for Roosting Bat and Implement Protective Measures	Not Adverse (Twin-Bore and Single-Bore Options)
Riparian Habitat: Construction near riparian areas may result in temporary and permanent adverse effects on riparian habitat.	SR 87 CSA near Guadalupe River and Diridon Station South and North Options near Los Gatos Creek *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-D: Protect Riparian Habitat	Not Adverse (Twin-Bore and Single-Bore Options)
Tricolored Blackbirds: Construction staging may result in an adverse effect on tricolored blackbirds.	SR 87 CSA along Guadalupe River and at Diridon Station near Los Gatos Creek *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-E: Conduct Preconstruction Tricolored Blackbird Nesting Surveys and Determine Appropriate Action	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
Burrowing Owls: The Santa Clara Valley Habitat Plan has designated the area surrounding the Newhall Maintenance Facility as a western burrowing owl survey area, and construction activities may have an adverse effect on burrowing owls.	Newhall Maintenance Facility *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-F: Conduct Preconstruction/Predisturbance Western Burrowing Owl Surveys and Determine Appropriate Action	Not Adverse (Twin-Bore and Single-Bore Options)
5.5.5 Community Facilities and Public Services				
Emergency Vehicles: Construction-period lane and street closures may require emergency vehicles to take detours, which would delay response times.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan Mitigation Measure TRA-CNST-C: Develop and Implement a Parking Management Plan Mitigation Measure TRA-CNST-D: Coordinate with Fire and Police Services during Construction	Not Adverse (Twin-Bore and Single-Bore Options)
5.5.6 Cultural Resources				
Archaeological Resources: Construction may adversely affect unknown archaeological resources and human remains.	Area of potential effect of all project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure CUL-CNST-A: Implement Programmatic Agreement and Archaeological Resources Treatment Plan	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
Vibration: Historic buildings in the vicinity of cut-and-cover station excavation activities may be exposed to excessive vibration.	Alum Rock/28th Street Station, Downtown San Jose (East and West Options) and Diridon (South and North Options) *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity	Not Adverse (Twin-Bore and Single-Bore Options)
Noise: Construction noise has the potential to affect an historic property.	Alum Rock/28th Street Station *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-C: Construct Temporary Noise Barriers	Not Adverse (Twin-Bore and Single-Bore Options)
Surface Settlement: Surface settlement during tunnel boring activities may adversely affect historic buildings.	Tunnel alignment *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-B: Implement Preconstruction Condition Surveys along the Tunnel Alignment Mitigation Measure GEO-CNST-C: Monitor Ground Surface during Tunneling Activities Mitigation Measure GEO-CNST-D: Monitor Settlement Effects around Cut-and-Cover Excavations	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
5.5.9 Geology, Soils, and Seismicity				
Liquefaction: Liquefaction potential is moderate to high and may damage project facilities along the alignment and in station areas.	All features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-A: Incorporate Design Specifications to Minimize Effects from Liquefaction Hazards	Not Adverse (Twin-Bore and Single-Bore Options)
Surface Settlement: Surface settlement has the potential to damage structures and utilities along the alignment.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-B: Implement Preconstruction Condition Surveys along the Tunnel Alignment Mitigation Measure GEO-CNST-C: Monitor Ground Surface during Tunneling Activities Mitigation Measure GEO-CNST-D: Monitor Settlement Effects around Cut-and-Cover Excavations Mitigation Measure GEO- NST-E: Implement Preconstruction Condition Surveys for Utilities Mitigation Measure GEO-CNST-F: Minimize Excavation Bottom Failure Impacts	Not Adverse (Twin-Bore and Single-Bore Options)
Stability: Excavation bottom stability or disturbance may result from bottom heave, piping, or blow-out.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-F: Minimize Excavation Bottom Failure Impacts Mitigation Measure GEO-CNST-G: Minimize Disturbance of Sensitive Deposits at the Excavation Subgrade	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
Expansive Soils: Expansive soils are a concern for the proposed system facilities, parking, and vehicular and pedestrian access at the stations and other sites.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-H: Incorporate Design Specifications to Minimize Effects from Expansive Soils	Not Adverse (Twin-Bore and Single-Bore Options)
Paleontological Resources: Potential for discovery and destruction of previously unknown paleontological resources or unique geologic features during construction.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-I: Stop Construction if Paleontological Resources are Discovered and Determine Appropriate Action	Not Adverse (Twin-Bore and Single-Bore Options)
5.5.11 Hazards and Hazardous Materials				
Contamination: Disturbance of contaminated materials during construction of all features may pose a potential threat to human health and the environment.	All features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Not Adverse (Twin-Bore and Single-Bore Options)
5.5.12 Noise and Vibration				
Noise. Construction noise would exceed noise criteria for sensitive receptors.	Alum Rock/28th Street Station, 13th Street Ventilation Structure, Downtown San Jose (East and West Options); Diridon Station (South and North Options), Stockton Street Ventilation Structure, and Newhall Maintenance Facility *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-A: Incorporate FTA Criteria Compliant Construction Noise and Vibration Specifications Mitigation Measure NV-CNST-B: Locate Equipment as Far as Feasible from Sensitive Sites Mitigation Measure NV-CNST-C: Construct Temporary Noise Barriers Mitigation Measure NV-CNST-D: Operate Equipment to Minimize Annoying Noises Mitigation Measure NV-CNST-E:	Adverse for Downtown San Jose (East and West Options) and Diridon Station (South and North Options) (Twin-Bore and Single-Bore Options) Not Adverse for Alum Rock/28th Street Station, 13th Street Ventilation Structure, Stockton Street

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
			Route Construction Trucks along Truck Routes Least Disturbing to Residents Mitigation Measure NV-CNST-F: Secure Steel and Concrete Plates over Excavated Holes and Trenches Mitigation Measure NV-CNST-G: Use Best Available Practices to Reduce Excess Noise and Vibration Mitigation Measure NV-CNST-H: Adhere to Local Jurisdiction Construction Time Periods, to the Extent Feasible Mitigation Measure NV-CNST-I: Perform Preconstruction Ambient Noise Measurements at East and West Portal CSAs Mitigation Measure NV-CNST-J: Submit a Noise Control Plan and a Noise Monitoring Plan Mitigation Measure NV-CNST-K: Require Minimum Qualifications for the Acoustical Engineer Mitigation Measure NV-CNST-L: Prohibit Operation of Noise-Generating Equipment Prior to Acceptance of Noise Monitoring Plan and Noise Control Plan Mitigation Measure NV-CNST-M: Install permanent Noise Monitors at the Downtown San Jose and Diridon	Ventilation Structure, and Newhall Maintenance Facility (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
			Station during all Construction Phases Mitigation Measure NV-CNST-N: Ensure Equipment is Pre-certified to Meet Noise Limits Mitigation Measure NV-CNST-O: Implement a Complaint Resolution Procedure	
Groundborne Noise: Soils excavated by the tunnel boring machines would be removed by a muck train or conveyor system that may cause groundborne noise impacts.	Tunnel construction *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity Mitigation Measure NV-CNST-S: Implement Measures to Reduce Vibration from Muck Extraction and Supply Trains	Not Adverse (Twin-Bore and Single-Bore Options)
Vibration: Historic buildings in the vicinity of cut-and-cover station excavation activities may be exposed to excessive vibration.	Alum Rock/28th Street Station, Downtown San Jose (East and West Options) and Diridon (South and North Options) *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
5.5.15 Socioeconomics				
Business Access: Construction activities would restrict vehicles, bicyclists, and pedestrians access to nearby businesses.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-C: Develop and Implement a Parking Management Plan Mitigation Measures AQ-CNST-A through AQ-CNST-I Mitigation Measures NV-CNST-A through NV-CNST-S	Adverse for Downtown San Jose (East and West Options) (Twin-Bore and Single-Bore Options) Not Adverse for all other features (Twin-Bore and Single-Bore Options)
5.5.17 Visual Quality and Aesthetics				
Tree Removal: Construction activities would require removal of trees.	Entire alignment *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-CNST-A: Replace Trees	Not Adverse (Twin-Bore and Single-Bore Options)
5.5.18 Water Resources, Water Quality, and Floodplains				
Surface Water: Construction activities may result in surface water impacts.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-D: Protect Riparian Habitat	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-1: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Construction

NEPA Effect	BART Facility and Tunnel Option	Significance before Mitigation	Mitigation	Significance after Mitigation
5.5.19 Environmental Justice				
Minority and Low-Income Populations: Construction would have direct and indirect adverse effects on low-income and minority populations in the vicinity of the alignment.	All project features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measures AQ-CNST-A through AQ-CNST-I Mitigation Measure HAZ-CNST-A Mitigation Measures NV-CNST-A through NV-CNST-O Mitigation Measures TRA-CNST-A through TRA-CNST-D Mitigation Measure AES-CNST-A	Not Adverse/Not disproportionately high and adverse (Twin-Bore and Single-Bore Options)

Table ES-2: Summary of Adverse Effects and Proposed Mitigation Measures of the NEPA BART Extension Alternative – Operation

NEPA Effect	BART Facility	Significance before Mitigation	Mitigation	Significance after Mitigation
4.12 Noise and Vibration				
Ancillary Facilities: Noise from ancillary facilities may exceed the City of San Jose's residential noise limit.	Ventilation Structures, Traction Power Substations, Emergency Backup Generators *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-A: Implement Noise Reduction Treatments at Ancillary Facilities	Not Adverse (Twin-Bore and Single-Bore Options)
Train Operations: Groundborne noise from train operations may exceed FTA noise criteria.	All features *Tunnel Option: Both options*	Adverse (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-B: Reduce Groundborne Noise Levels	Not Adverse (Twin-Bore and Single-Bore Options)

Table ES-3 compares the adverse effects after mitigation between the Twin-Bore and Single-Bore Options. Only resource areas that are adverse after mitigation are listed here. Please see Chapters 4 and 5 for a detailed discussion of the impacts of the Twin-Bore and Single-Bore Options.

Table ES-3: Comparison of Adverse Effects After Mitigation for Tunnel Construction Methodology Options (Twin-Bore and Single-Bore) for NEPA BART Extension Alternative

Resource Issue	Twin-Bore Option	Single-Bore Option
Construction Transportation – Vehicular Traffic, Bicyclists, and Pedestrians (Alum Rock/28th Street, Downtown San Jose, and Diridon Stations)	***Adverse Effect After Mitigation:*** Construction of the Twin-Bore Option would require more extensive cut-and-cover activities over a greater area within public roadways at the Alum Rock/28th Street Station, Downtown San Jose Station (East and West Options), downtown crossover, and Diridon Station (South and North Options) resulting in *greater* disruption to vehicular traffic, bicyclists, and pedestrians compared to the Single-Bore Option. The effect would remain adverse after mitigation.	***Adverse Effect After Mitigation:*** Construction of the Single-Bore Option would require less extensive cut-and-cover activities over a smaller area within public roadways at the Alum Rock/28th Street Station, Downtown San Jose Station (East and West Options), downtown crossover, and Diridon Station (South and North Options) resulting in less disruption to vehicular traffic, bicyclists, and pedestrians compared to the Twin-Bore Option. However, the effect would still remain adverse after mitigation.
Construction Transportation – Vehicular Traffic, Bicyclists, and Pedestrians (Newhall Maintenance Facility, West Tunnel Portal, and Santa Clara Station)	***Adverse Effect After Mitigation:*** Construction of the Twin-Bore Option would increase traffic from construction vehicles resulting in disruptions to vehicular traffic, bicyclists, and pedestrians at the Newhall Maintenance Facility, West Tunnel Portal, and Santa Clara Station. This effect would be similar for construction under both options. The effect would remain adverse after mitigation.	***Adverse Effect After Mitigation:*** Construction of the Single-Bore Option would increase traffic from construction vehicle, resulting in disruptions to vehicular traffic, bicyclists, and pedestrians at the Newhall Maintenance Facility, West Tunnel Portal, and Santa Clara Station. This effect would be similar under both options. The effect would remain adverse after mitigation.
Construction Transit – Local Bus (Downtown San Jose Station)	***Adverse Effect After Mitigation***: Construction of the Downtown San Jose Station (East and West Options) and downtown crossover under the Twin-Bore Option would cause extensive disturbance to major roadways in the downtown area, including road closures, which would adversely affect local bus service in the Downtown San Jose Station area. This effect would be greater for construction of the Twin-Bore Option as compared to the Single-Bore Option. The effect would remain adverse after mitigation.	***Adverse Effect After Mitigation:*** Construction of the Downtown San Jose Station (East and West Options) and downtown crossover under the Single-Bore Option would cause traffic disruption. Although, the disruption to roadways and to local bus service would be less than under the Twin-Bore Option, the effect would remain adverse after mitigation.

Table ES-3: Comparison of Adverse Effects After Mitigation for Tunnel Construction Methodology Options (Twin-Bore and Single-Bore) for NEPA BART Extension Alternative

Resource Issue	**Twin-Bore Option**	**Single-Bore Option**
Construction Transit – Local Bus (Diridon Station)	***Adverse Effect After Mitigation***: Construction of the Diridon Station (South and North Options) would cause relocation of the existing transit center and extensive disturbance to major roadways in the downtown area, which would adversely affect local bus service in the Diridon Station area. This effect would remain adverse after mitigation.	***Adverse Effect After Mitigation***: Construction of the Diridon Station (South and North Options) would cause relocation of the existing transit center and extensive disturbance to major roadways in the downtown area, which would adversely affect local bus service in the Diridon Station area. This effect would remain adverse after mitigation.
Construction Transit – Light Rail (Downtown San Jose Station West)	***Adverse Effect After Mitigation***: Construction of the Downtown San Jose Station West Option and downtown crossover under the Twin-Bore Option would cause extensive disturbance to VTA's light rail service under the Twin-Bore Option. The effect would remain adverse after mitigation.	***No Effect:*** Construction of the Downtown San Jose Station West Option and crossover for the Single-Bore Option would have no effect on VTA's light rail service.
Construction Transit – Heavy Rail (Diridon Station North)	***Adverse Effect After Mitigation***: For construction of the Diridon Station North Option, an existing Caltrain track (easternmost track) would be temporarily affected during construction. This would result in a temporary shift of Caltrain service onto other tracks and disruption to Caltrain and other service. The effect would remain adverse after mitigation.	***No Effect:*** Construction of the Diridon Station North Option under the Single-Bore Option would have no effect on the easternmost Caltrain track and, therefore, would not cause a change in or disruption to Caltrain or other service.
Construction – Air Quality and GHG	***Adverse Effect After Mitigation:*** Cut-and-cover excavation activities for the three underground stations under the Twin-Bore Option would be greater than under the Single-Bore Option. NO_X is anticipated to exceed acceptable thresholds during construction of the Twin-Bore Option, and NO_X exceedances are greater for the Twin-Bore Option than for the Single-Bore Option. The effect would remain adverse after mitigation.	***Adverse Effect After Mitigation:*** Although cut-and-cover excavation activities for the three underground stations under the Single-Bore Option would be less than under the Twin-Bore Option, NO_X would still exceed acceptable thresholds and would be considered adverse. However, the exceedances would not be as severe under the Single-Bore Option. The effect would remain adverse after mitigation.

Table ES-3: Comparison of Adverse Effects After Mitigation for Tunnel Construction Methodology Options (Twin-Bore and Single-Bore) for NEPA BART Extension Alternative

Resource Issue	Twin-Bore Option	Single-Bore Option
Construction Noise (Downtown and Diridon Stations)	***Adverse Effect After Mitigation:*** Construction noise would exceed acceptable noise criteria for sensitive receptors after mitigation at the Downtown San Jose Station (East and West Options) and Diridon Station (South and North Options) for the Twin-Bore Option. The effect would remain adverse after mitigation.	***Adverse Effect After Mitigation***: Construction noise would exceed acceptable noise criteria for sensitive receptors after mitigation at the Downtown San Jose Station (East and West Options) and Diridon Station (South and North Options) for the Single-Bore Option. The effect would remain adverse after mitigation.
Construction Socioeconomics (Downtown San Jose Station)	***Adverse Effect After Mitigation***: Construction would cause disruption to vehicular traffic and pedestrians around the Downtown San Jose Station (East and West Options), which would cause adverse effects on businesses. The severity of the impacts would be greater under the Twin-Bore Option due to the more extensive cut-and-cover station and crossover construction, which would require extensive street and lane closures. The effect would remain adverse after mitigation.	***Adverse Effect After Mitigation***: Construction would cause disruption to vehicular traffic and pedestrians around the Downtown San Jose Station (East and West Options), which would cause adverse effects on businesses. The impacts would be less severe for the Single-Bore Option due to the less-extensive cut-and-cover station and crossover construction required for the Single-Bore Option as compared to the Twin-Bore Option. The effect would remain adverse after mitigation.

ES.7.2 CEQA

Tables ES-4 through ES-7 summarize the significant construction and operational impacts and proposed mitigation of the CEQA BART Extension Alternative and the CEQA BART Extension with TOJD Alternative and level of impact of these alternatives after mitigation. *Tables ES-4 and ES-7 show the significant impacts only.* The criteria for determining significant impacts are provided in each topical section. Refer to Chapter 6, *CEQA Alternatives Analysis of Construction and Operation*, for a detailed description of all potential impacts from the CEQA BART Extension Alternative and the CEQA BART Extension with TOJD Alternative and proposed mitigation measures. The comparison of level of significance after mitigation for all significant impacts between the CEQA BART Extension Alternative and the 2004 FEIR and Supplemental EIRs is included in the last column of Tables ES-4 through ES-7.

CEQA BART Extension Alternative compared to the 2004 FEIR and Supplemental EIRs (after mitigation)

Where project features have not changed, impacts are generally at a similar level of impact after mitigation when compared to those previously described in the 2004 FEIR and Supplemental EIRs.

For new facilities, station and tunnel options, or new locations, impacts are generally at a similar or lesser level of impact after mitigation when compared to those previously described in the 2004 FEIR and Supplemental EIRs except for Transportation (construction), Air Quality (construction), and Noise (construction). Operational impacts would be similar to those previously described in the 2004 FEIR and 2007 Supplemental EIR.

CEQA BART Extension with TOJD Alternative compared to the 2004 FEIR and Supplemental EIRs (after mitigation)

With the addition of the TOJD, there would be greater impacts compared to those previously described in the 2004 FEIR and 2007 Supplemental EIR. Construction impacts of the BART Extension with TOJD Alternative would be similar to the BART Extension Alternative but greater (significant and unavoidable) for reactive organic gas (ROG). Operational impacts of the BART Extension with TOJD Alternative would be similar to the BART Extension Alternative but greater for ROG (significant and unavoidable), Traffic (significant and unavoidable), and Greenhouse Gases (significant and unavoidable).

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.2 Transportation -			
***Vehicular Traffic, Bicyclists, and Pedestrians:* Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** Construction has the potential to affect vehicular traffic, bicyclists, and pedestrians due to lane and street closures, and detours at Alum Rock/28th Street, 13th Street Ventilation Structure, Downtown San Jose (East and West Options), Diridon Stations (South and North Options), Stockton Street Ventilation Structure, West Tunnel Portal, Newhall Maintenance Facility, and Santa Clara Station.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan Mitigation Measure TRA-CNST-C: Develop and Implement a Parking Management Plan	Significant and Unavoidable for Alum Rock/28th Street, Downtown San Jose (East and West Options), Diridon Stations (South and North Options), West Tunnel Portal, Newhall Maintenance Facility, and Santa Clara Station (Twin-Bore and Single-Bore Options) Less than Significant for 13th Street Ventilation Structure and Stockton Street Ventilation Structure (Twin-Bore and Single-Bore Options)
***Transit-Bus:* Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** For Downtown San Jose Station (East and West Options) and Diridon Station (North and South Options) long-term closure of transit stops and route detours required during construction would decrease performance and affect local bus service.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Significant and Unavoidable (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
***Transit-Light Rail*: Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** Construction activities for the Downtown San Jose Station West Option require closure and interruption of VTA's light rail service through downtown San Jose, affecting performance.	Significant (Twin-Bore Option only)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Significant and Unavoidable (Twin-Bore Option only)
***Transit-Heavy Rail:* Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** Construction activities for the Diridon Station North Option would temporarily affect existing Caltrain easternmost track at Diridon Station and thereby affect Caltrain and other operations.	Significant (Twin- Bore Option only)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan	Significant and Unavoidable (Twin-Bore Option only)
Result in inadequate emergency access. Construction activities throughout the alignment may have a temporary impact on emergency vehicle access when construction causes temporary access or egress limitations.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-D: Coordinate with Fire and Police Services during Construction	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.3. Air Quality			
Violate an air quality standard or contribute to an air quality violation. During construction, NO_X emissions would exceed BAAQMD thresholds and may contribute to air quality degradation and impede the region's ability to attain air quality standards for all features.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AQ-CNST-A: Implement Dust Control Measures Mitigation Measure AQ-CNST-B: Use EPA Tier 4 or Cleaner Engines Mitigation Measure AQ-CNST-C: Maintain Construction Equipment Mitigation Measure AQ-CNST-D: Minimize Idling Times Mitigation Measure AQ-CNST-E: Use Equipment Meeting ARB Certification Standards Mitigation Measure AQ-CNST-F: Ensure Heavy-Duty Diesel Trucks Will Comply with EPA Emissions Standards Mitigation Measure AQ-CNST-G: Use Low-Sulfur Fuel Mitigation Measure AQ-CNST-H: Locate Construction Areas Away from Sensitive Receptors	Significant and Unavoidable for NO_X emissions (Twin-Bore and Single-Bore Options)
Cause a cumulatively considerable net increase in a criteria pollutant. Cumulative NO_X emissions would exceed BAAQMD thresholds and may contribute to air quality degradation and impede the region's ability to attain air quality standards for all project features	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures AQ-CNST-A through AQ-CNST-H (described above)	Significant and Unavoidable for NO_X emissions (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.4 Biological Resources and Wetlands			
***Nesting Birds*: Adversely affect a special-status species or habitat.** Construction activities along the entire alignment and at all stations may result in a significant impact on nesting birds.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-A: Avoid Nesting Bird Season Mitigation Measure BIO-CNST-B: Conduct Preconstruction/Predisturbance Surveys for Nesting Birds	Less than Significant (Twin-Bore and Single-Bore Options)
***Roosting Bats:* Adversely affect a special-status species or habitat.** Construction staging areas along the entire alignment and at all stations may result in a significant impact on roosting bats.	Significant (Twin-Bore and Single-Bore Options)	Measure BIO-CNST-C: Conduct Preconstruction Surveys for Roosting Bat and Implement Protective Measures	Less than Significant (Twin-Bore and Single-Bore Options)
***Tri-colored Blackbirds:* Adversely affect a special-status species or habitat.** Construction activities at the SR 87 CSA near the Guadalupe River and at Diridon Station near the Los Gatos Creek may result in a significant impact on tricolored blackbirds.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-E: Conduct Preconstruction Tricolored Blackbird Nesting Surveys	Less than Significant (Twin-Bore and Single-Bore Options)
***Burrowing Owls:* Adversely affect a special-status species or habitat.** Construction activities for Newhall Maintenance Facility may result in a significant impact on burrowing owls.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-F: Conduct Preconstruction Burrowing Owl Surveys and Determine Appropriate Action	Less than Significant (Twin-Bore and Single-Bore Options)
Adversely affect a sensitive natural community. Construction activities at the CSA near Lower Silver Creek, the SR 87 CSA near the Guadalupe River, and construction of the systems facilities at Diridon Station near Los Gatos Creek may result in a significant impact on riparian habitat adjacent to the facilities.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-D: Protect Riparian Habitat	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Interfere with wildlife movement or impede use of wildlife nursery sites. Construction noise and disturbance along the alignment and at all stations may interfere with nesting birds.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-A: Avoid Nesting Bird Season Mitigation Measure BIO-CNST-B: Conduct Preconstruction/Predisturbance Surveys for Nesting Birds	Less than Significant (Twin-Bore and Single-Bore Options)
Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Landscaping trees would be removed during construction along the alignment including all stations.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-CNST-A: Replace Trees Removed during Construction	Less than Significant (Twin-Bore and Single-Bore Options)
Conflict with an adopted habitat conservation plan, or local policies or ordinances protecting biological resources. Construction activities in the vicinity of Guadalupe Creek (construction staging areas neat SR 87) and Los Gatos Creek (system facilities at Diridon Station South Option) may result in a significant impact on tricolored blackbirds. Construction activities for Newhall Maintenance Facility may result in a significant impact on burrowing owls.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-E: Conduct Preconstruction Tricolored Blackbird Nesting Surveys Mitigation Measure BIO-CNST-F: Conduct Preconstruction Burrowing Owl Surveys and Determine Appropriate Action	Less than Significant (Twin-Bore and Single-Bore Options)
6.6 Cultural Resources			
***Noise:* Cause an adverse change in the significance of a historic resource as defined in § 15064.5.** Construction noise has the potential to affect the historic property near Alum Rock/28th Street Station.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-C: Construct Temporary Noise Barriers	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Vibration: **Cause an adverse change in the significance of a historic resource as defined in § 15064.5.** Historic buildings in the vicinity of cut-and-cover station excavation activities may be exposed to excessive vibration near Alum Rock/28th Street Station, Downtown San Jose (East and West Options) and Diridon (South and North Options).	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity	Less than Significant (Twin-Bore and Single-Bore Options)
Surface Settlement: **Cause an adverse change in the significance of a historic resource as defined in § 15064.5.** Historic buildings could be affected due to surface settlement during tunneling and cut-and-cover activities in the vicinity.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-B: Implement Preconstruction Condition Surveys along the Tunnel Alignment Mitigation Measure GEO-CNST-C: Monitor Ground Surface during Tunneling Activities Mitigation Measure GEO-CNST-D: Monitor Settlement Effects around Cut-and-Cover Excavations.	Less than Significant (Twin-Bore and Single-Bore Options)
Archaeological Resources. **Cause an adverse change in the significance of an archaeological resource as defined in § 21803.2. Disturb human remains, including those interred outside of formal cemeteries.** Construction has the potential to cause significant impact on unknown archaeological resources and human remains.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure CUL-CNST-A: Implement Programmatic Agreement and Archaeological Resources Treatment Plan	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.8 Geology, Soils, and Seismicity			
***Liquefaction:* Expose people or structures to potential seismic hazards.** Liquefaction potential is moderate to high and may damage project facilities along the alignment and in station areas.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-A: Incorporate Design Specifications to Minimize Effects from Liquefaction Hazards	Less than Significant (Twin-Bore and Single-Bore Options)
***Surface Settlement:* Be located on a geologic unit that is unstable or that would become unstable.** Surface settlement has the potential to damage structures and utilities along the alignment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-B: Implement Preconstruction Condition Surveys along the Tunnel Alignment Mitigation Measure GEO-CNST-C: Monitor Ground Surface during Tunneling Activities Mitigation Measure GEO-CNST-D: Monitor Settlement Effects around Cut-and-Cover Excavations Mitigation Measure GEO-CNST-E: Implement Preconstruction Condition Surveys for Utilities Mitigation Measure GEO-CNST-F: Minimize Excavation Bottom Failure Impacts	Less than Significant (Twin-Bore and Single-Bore Options)
***Stability:* Be located on a geologic unit that is unstable or that would become unstable.** Excavation bottom stability or disturbance may result from bottom heave, piping, or blow-out.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-F: Minimize Excavation Bottom Failure Impacts Mitigation Measure GEO-CNST-G: Minimize Disturbance of Sensitive Deposits at the Excavation Subgrade	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
***Expansive Soils:* Be located on expansive soil, creating risks to life or property.** System facilities, parking, and vehicular and pedestrian access at the stations and other sites are in areas of potential expansive soils.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-H: Incorporate Design Specifications to Minimize Effects from Expansive Soils	Less than Significant (Twin-Bore and Single-Bore Options)
***Paleontological Resources:* Destroy a unique paleontological resource or unique geologic feature.** Excavation depths involved during construction throughout the alignment may result in the discovery and destruction of previously unknown paleontological resources.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-I: Stop Construction if Paleontological Resources Are Discovered and Determine Appropriate Action	Less than Significant (Twin-Bore and Single-Bore Options)
6.10 Hazards and Hazardous Materials			
Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Disturbance of contaminated materials during construction of all features may pose a potential threat to human health and the environment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment. Disturbance of hazardous materials that may be present in the soil and ballast beneath the alignment during construction activities, such as excavation and dewatering, may pose a potential threat to human health and the environment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)
6.11 Land Use			
Conflict with any applicable habitat conservation plan or natural community conservation plan. Construction near the Newhall Maintenance Facility would conflict with the western burrowing owl survey area covered by the SCVHP.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures BIO-CNST-E and BIO-CNST-F (described under 6.4, Biological Resources and Wetlands)	Less than Significant (Twin-Bore and Single-Bore Options)
6.12 Noise and Vibration			
Expose persons to or generate noise in excess of local or agency standards; and temporarily or periodically increase ambient noise levels. Construction at the Alum Rock/28th Street and Downtown San Jose Station Options may exceed nighttime noise criterion for residences. Construction activities for 13th Street and Stockton Avenue Ventilation Facilities would	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures NV-CNST-A through NV-CNST-O	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
exceed daytime noise criterion for residences.			
Expose persons to or generate noise in excess of local or agency standards. Construction at Downtown San Jose Station (East and West Options) and Diridon Station (South and North Options) would exceed noise criterion for residences.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-A through NV-CNST-O	Significant and Unavoidable (Twin-Bore and Single-Bore Options)
Expose persons to or generate excessive groundborne vibration or groundborne noise. Residences may be exposed to temporary vibration impacts from TBM. Soils excavated by the TBM would be removed by a muck train or conveyor system and may cause groundborne noise impacts.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity Mitigation Measure NV-CNST-S: Implement Measures to Reduce Vibration from Muck Extraction and Supply Trains Procedure	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-4: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.14 Visual Quality and Aesthetics			
Tree Removal: **Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway.** Construction activities would require removal of trees along the entire alignment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-CNST-A: Replace Trees	Less than Significant (Twin-Bore and Single-Bore Options)
6.15 Water Resources, Water Quality, and Floodplains			
Degrade water quality or violate water quality standards. Construction activities may result in temporary increases in sediment loads and potential stormwater contamination, accidental spills of hazardous materials, and surface and groundwater impacts.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-D: Protect Riparian Habitat	Less than Significant (Twin-Bore and Single-Bore Options)
Deplete groundwater supplies or interfere with groundwater recharge. Construction for underground stations and tunnels would require temporary dewatering, which may reduce the volume of water in the local aquifer table.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-5: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.8 Geology, Soils, and Seismicity			
***Liquefaction:* Expose people or structures to potential seismic hazards.** Liquefaction potential is moderate to high and may damage project facilities along the alignment and in station areas.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-A: Incorporate Design Specifications to Minimize Effects from Liquefaction Hazards	Less than Significant (Twin-Bore and Single-Bore Options)
6.10 Hazards and Hazardous Materials			
Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment. Disturbance of contaminated soil and/or ballast during maintenance activities, direct contact, or inhalation of dust and potential vapor intrusion of groundwater contaminants may impact maintenance works, passengers, and offsite residents.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)
6.12 Noise and Vibration			
***Ancillary Facilities:* Expose persons to or generate noise in excess of local or agency standards.** Noise from ancillary facilities including ventilation structures, traction power substations, and emergency backup generators may exceed the noise criterion.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-A: Implement Noise Reduction Treatments at Ancillary Facilities	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-5: Summary of Significant Impacts and Proposed Mitigation Measures of the CEQA BART Extension Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
***Train Operations*: Expose persons to or generate excessive groundborne vibration or groundborne noise.** Operation of the train within the tunnel may exceed FTA groundborne noise criteria throughout the alignment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-B: Reduce groundborne noise levels	Less than Significant (Twin-Bore and Single-Bore Options)
6.13 Utilities and Service Systems			
Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which may cause significant environmental effects. Wastewater generated at the stations and Newhall Maintenance Facility may contribute to capacity deficiencies within offsite sewer systems.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure UTIL-A: Prepare a San Jose Water Supply Infrastructure Capacity Assessment. Mitigation Measure UTIL-B: Prepare a Santa Clara Water Supply Infrastructure Capacity Assessment Mitigation Measure UTIL-C: Prepare a San Jose Sewer Capacity Assessment Mitigation Measure UTIL-D: Prepare a Santa Clara Sewer Capacity Assessment	Less than Significant (Twin-Bore and Single-Bore Options)
6.15 Water Resources, Water Quality, and Floodplains			
Degrade water quality or violate water quality standards. Operation of new facilities may increase existing pollutants in storm drains and introduce new pollutants.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure WQ-A: Design and Implement Stormwater Control Measures	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.2 Transportation -			
***Vehicular Traffic, Bicyclists, and Pedestrians:* Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** Construction has the potential to affect vehicular traffic, bicyclists, and pedestrians due to lane and street closures, and detours at Alum Rock/28th Street Station, 13th Street Ventilation Structure, Downtown San Jose Station (East and West Options), Diridon Station (South and North Options), Stockton Street Ventilation Structure, West Tunnel Portal, Newhall Maintenance Facility and Santa Clara Station.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan Mitigation Measure TRA-CNST-C: Develop and Implement a Parking Management Plan	Significant and Unavoidable for Alum Rock/28th Street, Downtown San Jose (East and West Options), Diridon Stations (South and North Options), West Tunnel Portal, Newhall Maintenance Facility, and Santa Clara Station. (Twin-Bore and Single-Bore Options) Less than Significant for 13th Street Ventilation Structure and Stockton Street Ventilation Structure, (Twin-Bore and Single-Bore Options)
***Transit-Bus*: Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** For Downtown San Jose Station (East and West Options) and Diridon Station (North and South Options) long-term closure of transit stops and	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Significant and Unavoidable (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
route detours required during construction would decrease performance and affect local bus service.			
***Transit-Light Rail:* Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** Construction activities for the Downtown San Jose Station West Option would require closure and interruption of VTA's light rail service through downtown San Jose, affecting performance.	Significant (Twin-Bore Option only)	Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan Mitigation Measure TRA-CNST-B: Develop and Implement a Construction Transportation Management Plan	Significant and Unavoidable (Twin-Bore Option only)
***Transit- Heavy Rail:* Conflict with a transportation plan, ordinance, or policy; Conflict with the Congestion Management Program; and Conflict with transit, bicycle, or pedestrian policies, plans, or programs.** Construction at the Diridon Station North Option would temporarily impact existing easternmost Caltrain track at Diridon Station and thereby affect Caltrain and other operations.	Significant (Twin- Bore Option only)	Mitigation Measure TRA-CNST-A. Develop and Implement a Construction Education and Outreach Plan	Significant and Unavoidable (Twin-Bore Option only)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Result in inadequate emergency access. Construction activities may have a temporary impact on emergency vehicle access when construction requires temporary access or egress limitations.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-CNST-D. Coordinate with Fire and Police Services during Construction	Less than Significant (Twin-Bore and Single-Bore Options)
6.3 Air Quality			
Violate an air quality standard or contribute to an air quality violation. During construction, NO_X and reactive organic gas (ROG) emissions would exceed BAAQMD thresholds for all project features.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures AQ-CNST-A through AQ-CNST-H (described above) Mitigation Measure AQ-I: Use Low-VOC coatings	Significant and Unavoidable (Twin-Bore and Single-Bore Options)
Cause a cumulatively considerable net increase in a criteria pollutant. Cumulative construction NO_X and ROG emissions would exceed BAAQMD thresholds for all project features.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures AQ-CNST-A through AQ-CNST-I (described above)	Significant and Unavoidable (Twin-Bore and Single-Bore Options)
Expose sensitive receptors to substantial pollutant concentrations. Annual increase in PM2.5 concentrations and cancer risk would exceed the BAAQMD significance thresholds during construction of the Alum Rock/28th Street Station and TOJD.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AQ-CNST-B (described above)	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.4 Biological Resources and Wetlands			
***Nesting Birds:* Adversely affect a special-status species or habitat. -** Construction activities along the entire alignment and at all stations may result in a significant impact on nesting birds.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-A: Avoid Nesting Bird Season Mitigation Measure BIO-CNST-B: Conduct Preconstruction/Predisturbance Surveys for Nesting Birds	Less than Significant (Twin-Bore and Single-Bore Options)
***Roosting Bats:* Adversely affect a special-status species or habitat.** Construction staging areas along the entire alignment and at all stations may result in a significant impact on roosting bats.	Significant (Twin-Bore and Single-Bore Options)	Measure BIO-CNST-C: Conduct Preconstruction Surveys for Roosting Bat and Implement Protective Measures	Less than Significant (Twin-Bore and Single-Bore Options)
***Tri-colored Blackbirds:* Adversely affect a special-status species or habitat.** Construction activities at the SR 87 CSA near the Guadalupe River and at Diridon Station near the Los Gatos Creek may result in a significant impact on tricolored blackbirds.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-E: Conduct Preconstruction Tricolored Blackbird Nesting Surveys	Less than Significant (Twin-Bore and Single-Bore Options)
***Burrowing Owls.* Adversely affect a special-status species or habitat.** Construction activities for Newhall Maintenance Facility may result in a significant impact on burrowing owls.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-F: Conduct Preconstruction Burrowing Owl Surveys and Determine Appropriate Action	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Adversely affect a sensitive natural community. Construction activities at the CSA near Lower Silver Creek, the SR 87 CSA near the Guadalupe River, and construction of the systems facilities at Diridon Station near Los Gatos Creek may result in a significant impact on riparian habitat adjacent to the facilities.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-D: Protect Riparian Habitat	Less than Significant (Twin-Bore and Single-Bore Options)
Interfere with wildlife movement or impede use of wildlife nursery sites. Construction noise and disturbance along the alignment and at all stations may interfere with nesting birds.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-A: Avoid Nesting Bird Season Mitigation Measure BIO-CNST-B: Conduct Preconstruction/Predisturbance Surveys for Nesting Birds	Less than Significant (Twin-Bore and Single-Bore Options)
Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Landscaping trees would be removed during construction along the alignment including all stations.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-CNST-A: Replace Trees Removed during Construction	Less than Significant (Twin-Bore and Single-Bore Options)
Conflict with an adopted habitat conservation plan, or local policies or ordinances protecting biological resources. Construction activities in the vicinity of Guadalupe Creek (construction staging areas neat SR 87) and Los Gatos Creek (system facilities at Diridon Station South Option) may result in a significant	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-E: Conduct Preconstruction Tricolored Blackbird Nesting Surveys Mitigation Measure BIO-CNST-F: Conduct Preconstruction Burrowing Owl Surveys and Determine Appropriate Action	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
impact on tricolored blackbirds. Construction activities for Newhall Maintenance Facility may result in a significant impact on burrowing owls.			
6.6 Cultural Resources			
***Noise.* Cause an adverse change in the significance of a historic resource as defined in § 15064.5.** Construction noise has the potential to affect the historic property near Alum Rock/28th Street Station.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-C: Construct Temporary Noise Barriers	Less than Significant (Twin-Bore and Single-Bore Options)
***Vibration.* Cause an adverse change in the significance of a historic resource as defined in § 15064.5.** Historic buildings in the vicinity of cut-and-cover station excavation activities may be exposed to excessive vibration near Alum Rock/28th Street Station, Downtown San Jose (East and West Options) and Diridon (South and North Options).	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity	Less than Significant (Twin-Bore and Single-Bore Options)
***Surface Settlement.* Cause an adverse change in the significance of a historic resource as defined in § 15064.5.** Historic buildings could be affected due to surface settlement during tunneling and cut-and-cover activities in the vicinity.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures GEO-CNST-B through GEO-CNST-D.	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
***Archaeological Resources.* Cause an adverse change in the significance of an archaeological resource as defined in § 21803.2. Disturb human remains, including those interred outside of formal cemeteries.** Construction has the potential to cause significant impact on unknown archaeological resources and human remains.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure CUL-CNST-A: Implement Programmatic Agreement and Archaeological Resources Treatment Plan	Less than Significant (Twin-Bore and Single-Bore Options)
6.8 Geology, Soils, and Seismicity			
***Liquefaction.* Expose people or structures to potential seismic hazards.** Liquefaction potential is moderate to high and may damage project facilities along the alignment and in station areas.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-A: Incorporate Design Specifications to Minimize Effects from Liquefaction Hazards	Less than Significant (Twin-Bore and Single-Bore Options)
***Surface Settlement.* Be located on a geologic unit that is unstable or that would become unstable.** Surface settlement has the potential to damage structures and utilities along the alignment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-B: Implement Preconstruction Condition Surveys along the Tunnel Alignment Mitigation Measure GEO-CNST-C: Monitor Ground Surface during Tunneling Activities Mitigation Measure GEO-CNST-D: Monitor Settlement Effects around Cut-and-Cover Excavations Mitigation Measure GEO-CNST-E: Implement Preconstruction Condition Surveys for Utilities Mitigation Measure GEO-CNST-F: Minimize Excavation Bottom Failure Impacts	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Stability. **Be located on a geologic unit that is unstable or that would become unstable.** Excavation bottom stability or disturbance may result from bottom heave, piping, or blow-out.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-F: Minimize Excavation Bottom Failure Impacts Mitigation Measure GEO-CNST-G: Minimize Disturbance of Sensitive Deposits at the Excavation Subgrade	Less than Significant (Twin-Bore and Single-Bore Options)
Expansive Soils. **Be located on expansive soil, creating risks to life or property.** System facilities, parking, and vehicular and pedestrian access at the stations and other sites are in areas of potential expansive soils.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-H: Incorporate Design Specifications to Minimize Effects from Expansive Soils	Less than Significant (Twin-Bore and Single-Bore Options)
Paleontological Resources. **Destroy a unique paleontological resource or unique geologic feature.** Excavation depths involved during construction throughout the alignment may result in the discovery of previously unknown paleontological resources.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-I: Stop Construction if Paleontological Resources Are Discovered and Determine Appropriate Action	Less than Significant (Twin-Bore and Single-Bore Options)
6.10 Hazards and Hazardous Materials			
Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Disturbance of contaminated materials during construction may pose a potential threat to human health and the environment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment. The disturbance of hazardous materials that may be present in the soil and ballast beneath the alignment during construction activities, such as excavation and dewatering, may pose a potential threat to human health and the environment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)
6.11 Land Use			
Conflict with any applicable habitat conservation plan or natural community conservation plan. Construction at the Newhall Maintenance Facility would conflict with the western burrowing owl survey area, and the Diridon Station and SR 87 CSA is within the tricolored blackbird survey area near Guadalupe River and Los Gatos Creek, both covered by the SCVHP.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-CNST-E and BIO-CNST-F (described under 6.4, Biological Resources)	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.12 Noise and Vibration			
Expose persons to or generate noise in excess of local or agency standards; and Temporarily or periodically increase ambient noise levels. Construction at the Alum Rock/28th Street and Downtown San Jose Station Options may exceed nighttime noise criterion for residences. Construction activities for 13th Street and Stockton Avenue Ventilation Facilities would exceed daytime noise criterion for residences.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures NV-CNST-A through NV-CNST-O	Less than Significant (Twin-Bore and Single-Bore Options)
Expose persons to or generate noise in excess of local or agency standards. Construction at Downtown San Jose Station (East and West Options) and Diridon Station (South and North Options) would exceed noise criterion for residences.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measures NV-CNST-A through NV-CNST-O	Significant and Unavoidable (Twin-Bore and Single-Bore Options)

Table ES-6: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Construction

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Expose persons to or generate excessive groundborne vibration or groundborne noise. Residences may be exposed to temporary vibration impacts from TBM operations. Soils excavated by the TBM would be removed by a muck train or conveyor system and may cause groundborne noise impacts.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-CNST-P: Conduct Construction Vibration Monitoring Mitigation Measure NV-CNST-Q: Perform Vertical Direction Vibration Monitoring Mitigation Measure NV-CNST-R: Require Monitoring of Vibration for Peak Particle Velocity Mitigation Measure NV-CNST-S: Implement Measures to Reduce Vibration from Muck Extraction and Supply Trains Procedure	Less than Significant (Twin-Bore and Single-Bore Options)
6.14 Visual Quality and Aesthetics			
***Tree Removal*: Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway.** Construction activities would require removal of trees along the entire alignment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-CNST-A: Replace Trees	Less than Significant (Twin-Bore and Single-Bore Options)
6.15 Water Resources, Water Quality, and Floodplains			
Degrade water quality or violate water quality standards. Construction activities may result in temporary increases in sediment loads and potential stormwater contamination, accidental spills of hazardous materials, and surface and groundwater impacts.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure BIO-D: Protect Riparian Habitat	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-7: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.2 Transportation			
Conflict with a transportation plan, ordinance, or policy; and Conflict with a congestion management program. Traffic impacts at four intersections near the Santa Clara Station in 2035: De La Cruz Boulevard and Central Expressway (City of Santa Clara and CMP intersection), Coleman Avenue and Brokaw Road (City of Santa Clara intersection), Lafayette Street and Lewis Street (City of Santa Clara intersection), Coleman Avenue and I-880 Southbound Ramps (City of San Jose and CMP intersection intersection).	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure TRA-A: Implement Intersection Improvements at De La Cruz Boulevard and Central Expressway Mitigation Measure TRA-B: Implement Intersection Improvements at Coleman Avenue and Brokaw Road Mitigation Measure TRA-C: Implement Intersection Improvements at Lafayette Street and Lewis Street Mitigation Measure TRA-D: Implement Intersection Improvements to Coleman Avenue and I-880 Southbound Ramps	Significant and Unavoidable only for De La Cruz Boulevard and Central Expressway in 2035. Less than significant for other intersections. (Twin-Bore and Single-Bore Options)
6.3 Air Quality			
Violate an air quality standard or contribute to an air quality violation; and cause a cumulatively considerable net increase in a criteria pollutant. ROG emissions from the use of consumer products would exceed the BAAQMD significance thresholds. Significant emissions of ROG would be related to residential consumer product use (e.g., aerosol sprays) at the TOJDs.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AQ-CNST-I: Use Low-VOC Coatings	Significant and Unavoidable (Twin-Bore and Single-Bore Options)

Table ES-7: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.8 Geology, Soils, and Seismicity			
***Liquefaction.* Expose people or structures to potential seismic hazards.** Liquefaction potential is moderate to high and may damage project facilities along the alignment and in station areas.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GEO-CNST-A: Incorporate Design Specifications to Minimize Effects from Liquefaction Hazards	Less than Significant (Twin-Bore and Single-Bore Options)
6.9 Greenhouse Gas Emissions			
Generate GHG emissions, either directly or indirectly. TOJD at four stations would result in a net increase in long-term (2035) GHG emissions.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GHG-A: Implement Energy Efficiency Measures Mitigation Measure GHG-B: Participate in Food Waste Programs Mitigation Measure GHG-C: Utilize Electrical Landscaping Equipment Mitigation Measure GHG-D: Provide Preferential Parking for Electric Vehicles Mitigation Measure AQ-CNST-I: Use Low-VOC Coatings	Significant and Unavoidable (Twin-Bore and Single-Bore Options)
Conflict with a plan, policy or regulation intended to reduce greenhouse gas emissions. TOJD at four stations emissions would be inconsistent with the goals in EO S-3-05 and EO B-30-15.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure GHG-A: Implement Energy Efficiency Measures Mitigation Measure GHG-B: Participate in Food Waste Programs Mitigation Measure GHG-C: Utilize Electrical Landscaping Equipment Mitigation Measure GHG-D: Provide Preferential Parking for Electric Vehicles Mitigation Measure AQ-CNST-I: Use Low-VOC Coatings	Significant and Unavoidable (Twin-Bore and Single-Bore Options)

Table ES-7: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.10 Hazards and Hazardous Materials			
Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment. Disturbance of contaminated soil and/or ballast during maintenance activities, direct contact, or inhalation of dust and potential vapor intrusion of groundwater contaminants may impact maintenance works, passengers, and offsite residents	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure HAZ-CNST-A: Prepare and Implement Remedial Action Plans	Less than Significant (Twin-Bore and Single-Bore Options)
6.12 Noise and Vibration			
***Ancillary Facilities.* Expose persons to or generate noise in excess of local or agency standards.** Noise from ancillary facilities including ventilation structures, traction power substations, and emergency backup generators may exceed the noise criterion.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-A: Implement Noise Reduction Treatments at Ancillary Facilities	Less than Significant (Twin-Bore and Single-Bore Options)
***Train Operations.* Expose persons to or generate excessive groundborne vibration or groundborne noise.** Operation of the train within the tunnel may exceed FTA groundborne noise criteria throughout the alignment.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-B: Reduce groundborne noise levels	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-7: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
Expose people in the area to excessive airport noise. Residential uses proposed as part of TOJD may be exposed to noise from San Jose Mineta International Airport in excess of 65 CNEL.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure NV-C: Implement Acoustical Design of Residential Uses	Less than Significant (Twin-Bore and Single-Bore Options)
6.13 Utilities and Service Systems			
Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which may cause significant environmental effects. Wastewater generated may contribute to capacity deficiencies within offsite sewer systems.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure UTIL-A: Prepare a San Jose Water Supply Infrastructure Capacity Assessment. Mitigation Measure UTIL-B: Prepare a Santa Clara Water Supply Infrastructure Capacity Assessment Mitigation Measure UTIL-C: Prepare a San Jose Sewer Capacity Assessment Mitigation Measure UTIL-D: Prepare a Santa Clara Sewer Capacity Assessment	Less than Significant (Twin-Bore and Single-Bore Options)
6.14 Visual Quality and Aesthetics			
Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area. Several of the TOJD buildings would be taller than the surrounding built environment, particularly at the Alum Rock/28th Street, Diridon, and Santa Clara Station areas where TOJD would range between 4 and 11 stories high and include reflective surfaces, such as windows, that may create glare.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure AES-A: Minimize Light and Glare	Less than Significant (Twin-Bore and Single-Bore Options)

Table ES-7: Summary of Significant Impacts and Proposed Mitigation Measures of CEQA BART Extension with TOJD Alternative – Operation

CEQA Impact	Significance before Mitigation	Mitigation	Significance after Mitigation
6.15 Water Resources, Water Quality, and Floodplains			
Degrade water quality or violate water quality standards. Operation of new facilities may increase existing pollutants in storm drains and introduce new pollutants.	Significant (Twin-Bore and Single-Bore Options)	Mitigation Measure WQ-A: Design and Implement Stormwater Control Measures	Less than Significant (Twin-Bore and Single-Bore Options)

Chapter 1
Purpose and Need

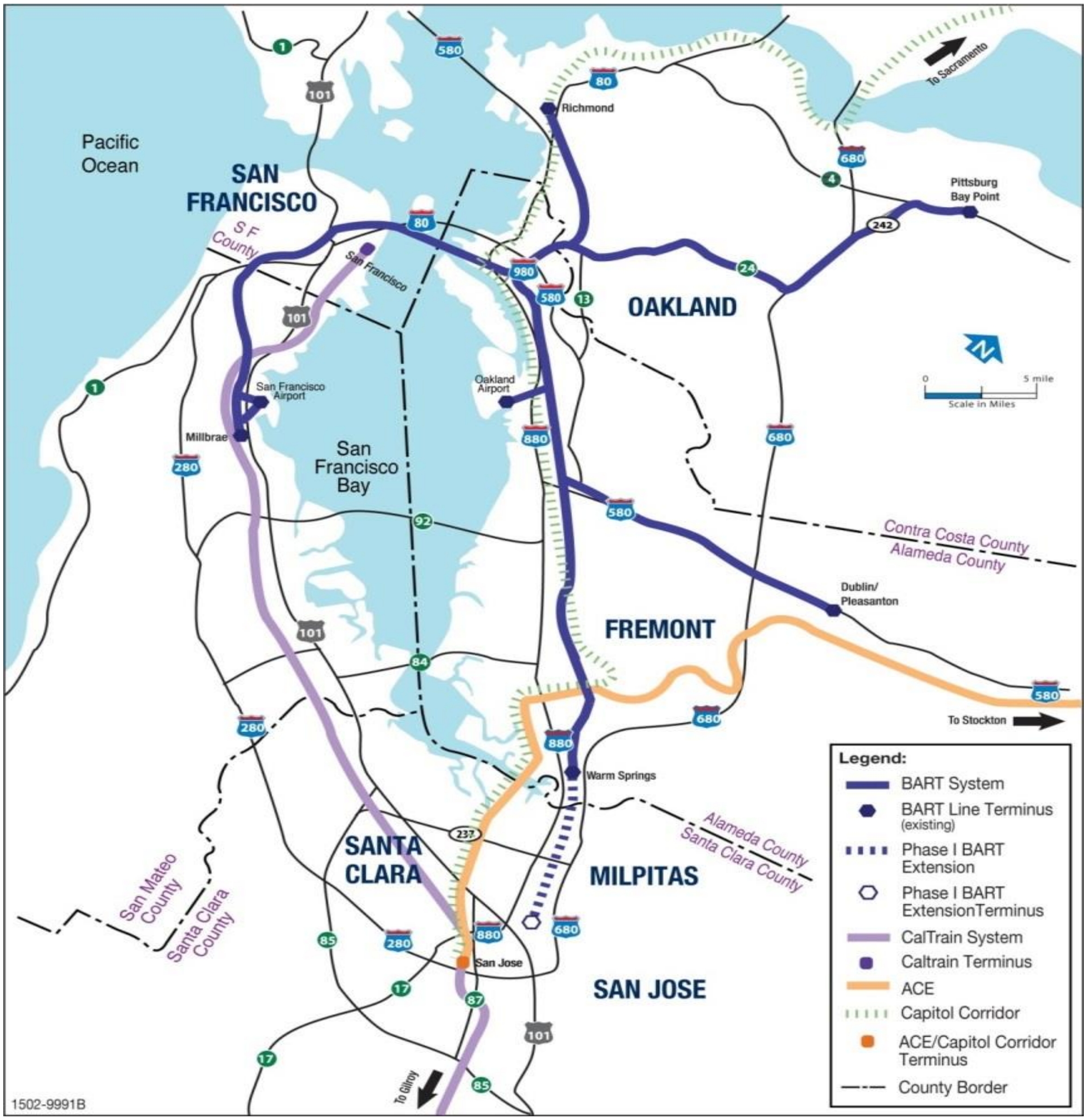
1.1 Introduction

The Federal Transit Administration (FTA) and the Santa Clara Valley Transportation Authority (VTA) have prepared this combined Supplemental Environmental Impact Statement (SEIS) and Subsequent Environmental Impact Report (SEIR) for the BART Silicon Valley Phase II Extension (Phase II) Project in accordance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). There are two alternatives evaluated in this document in accordance with NEPA: the No Build Alternative and the BART Extension Alternative. The BART Extension Alternative consists of a 6-mile Bay Area Rapid Transit (BART) extension from the Berryessa BART Station through downtown San Jose to the Santa Clara Caltrain Station. There are three alternatives evaluated in this document in accordance with CEQA: the No Build Alternative, the BART Extension Alternative, and the BART Extension with TOJD Alternative. The CEQA No Build Alternative is the same as the NEPA No Build Alternative. The CEQA BART Extension Alternative is also the same as the NEPA BART Extension Alternative described above. The additional CEQA BART Extension with TOJD Alternative consists of the 6-mile BART Extension as described above in addition to transit-oriented joint development (TOJD) at the four BART stations and two ventilation structure sites. The BART Extension with TOJD Alternative is not connected and has independent utility from the BART Extension Alternative. The alternatives listed above are described in detail in Chapter 2, *Alternatives*.

1.1.1 Regional Transportation Network

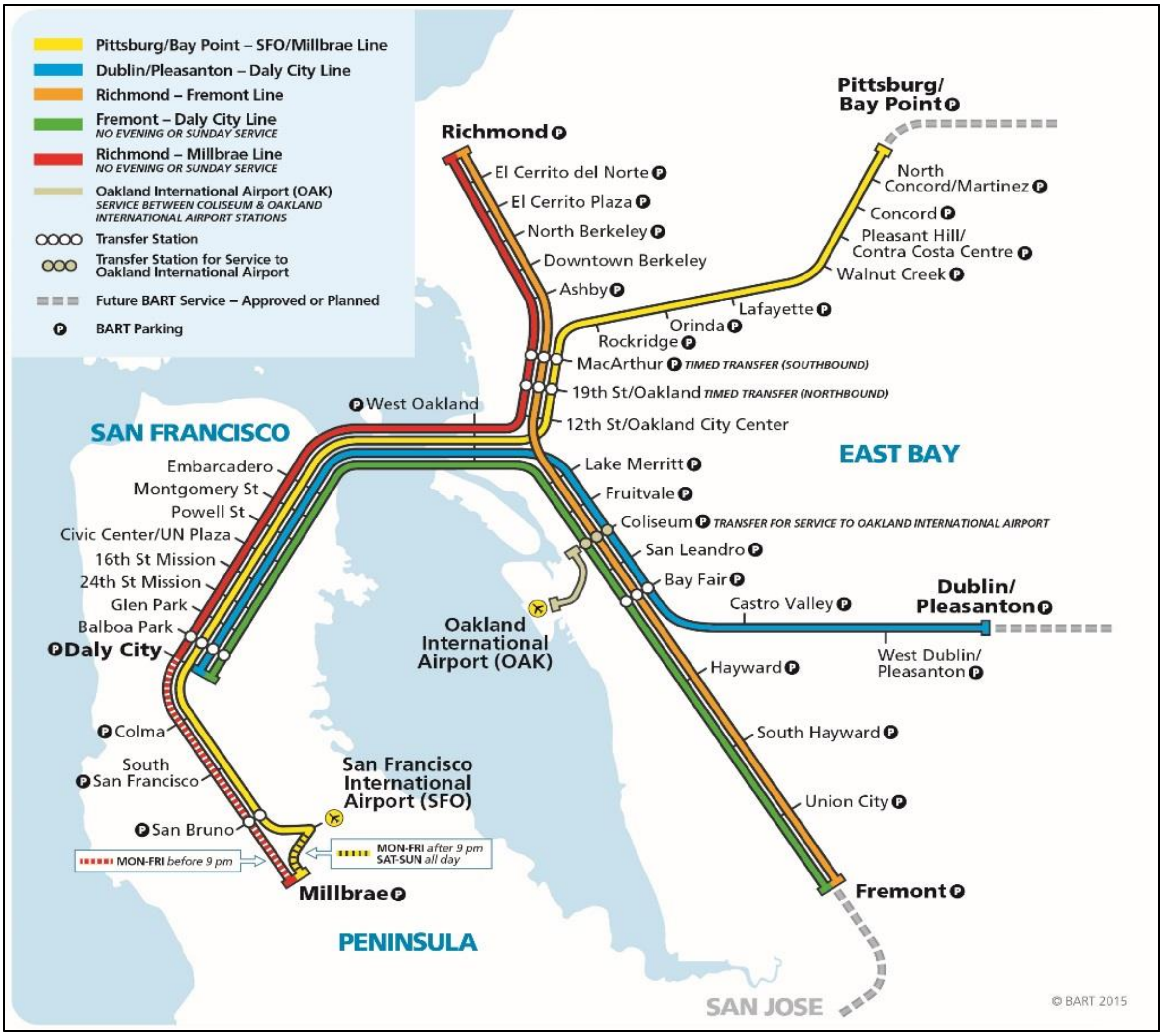
The regional transportation network is shown in Figure 1-1. VTA is the primary transit operator in Santa Clara County, but various other rail and bus operators provide transit services to major activity and employment centers in the county and from the county to centers throughout the greater San Francisco Bay Area. Caltrain provides frequent service between downtown San Jose and downtown San Francisco; Altamont Corridor Express (ACE) commuter trains connect downtown San Jose and Santa Clara with Fremont and the Livermore-Amador Valley in Alameda County and also with Central Valley communities; Capitol Corridor intercity service connects downtown San Jose with communities in the East Bay of the San Francisco Bay Area and ultimately Sacramento and Auburn; and Amtrak intercity service serves downtown San Jose.

Figure 1-1: Regional Transportation Network



The BART network serves the San Francisco Bay Area counties of Alameda, Contra Costa, San Francisco, and San Mateo. It currently consists of a 104-mile, 44-station regional rail system that extends south to central Fremont in Alameda County (see Figure 1-2). A 5.4-mile, single-station extension of the BART system is currently under construction to provide service to Warm Springs in southern Fremont, just north of the Santa Clara County limit. BART service to Warm Springs is projected to begin in 2016. An initial extension of BART service into Santa Clara County, referred to as VTA's BART Silicon Valley—Berryessa Extension Project, or Phase I Project, is also currently under construction and projected to open in late 2017. The Phase I Project consists of an approximately 10-mile extension of the BART system from Warm Springs into eastern Santa Clara County. The Phase I Project will connect to the track south of the Warm Springs Station in Fremont and proceed in the former Union Pacific Railroad (UPRR) corridor through Milpitas to the Berryessa neighborhood of San Jose near U.S. Highway 101. It includes two stations: one in Milpitas near Montague Expressway (Milpitas Station) and one in the Berryessa neighborhood of San Jose (Berryessa Station).

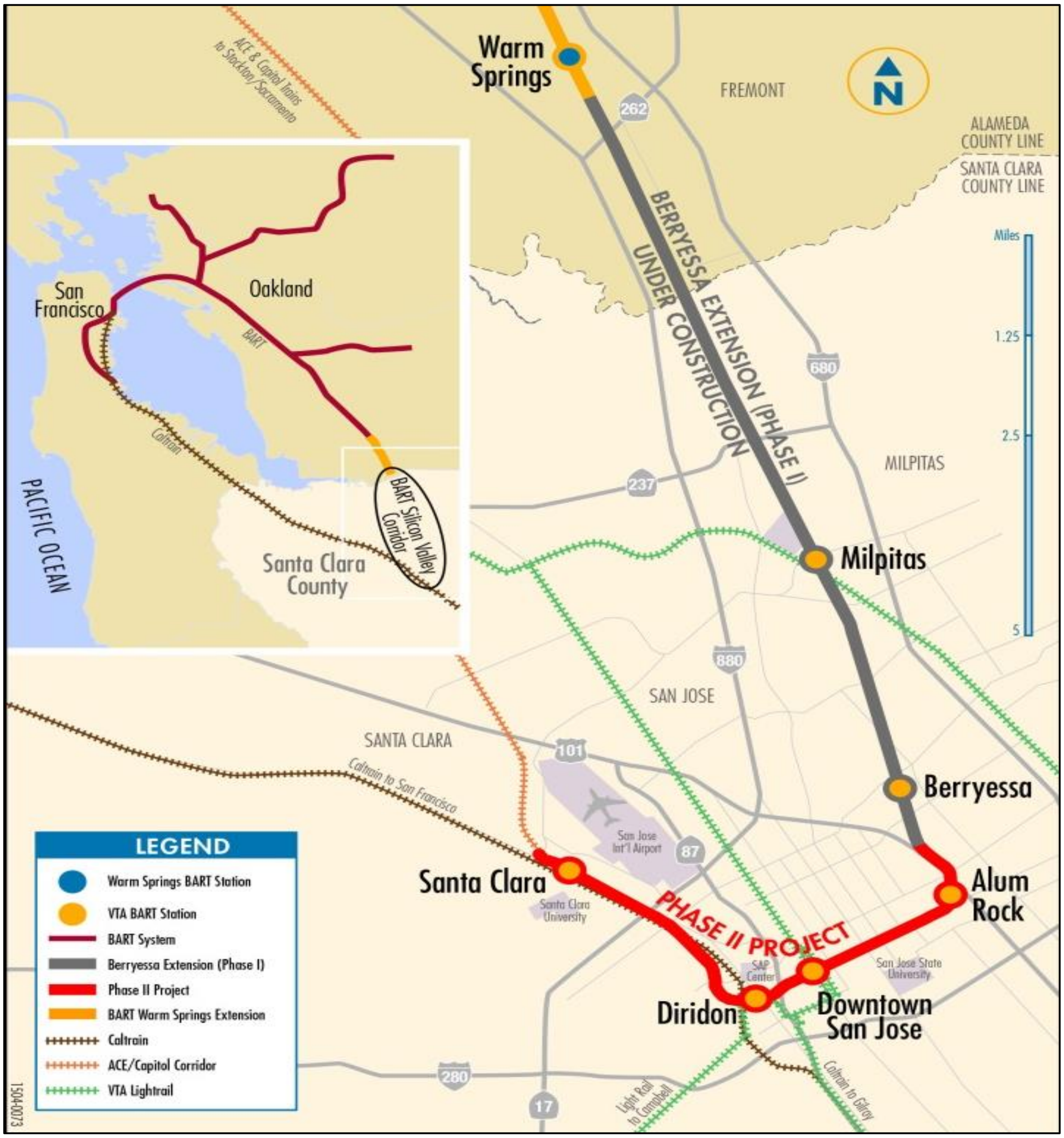
Figure 1-2: BART System Map



1.1.2 Overview of the BART Extension

The NEPA and CEQA BART Extension Alternative and the CEQA BART Extension with TOJD Alternative include a 6-mile extension of the BART system in Santa Clara County as shown in Figure 1-3. The BART Extension would extend the BART system from the Phase I terminus in the Berryessa neighborhood of San Jose for approximately 6 miles through central San Jose and terminate in the City of Santa Clara. The alignment would include an approximately 5-mile tunnel, or subway, through downtown San Jose. Four stations are under consideration: Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara. Two options for the location of the Downtown San Jose Station and for the Diridon Station are currently under consideration. Depending upon funding availability, initial revenue service on the BART Extension Alternative is targeted to begin in late 2025/2026.

Figure 1-3: BART Extension



1.2 Purpose and Need for Transportation Improvements

The overall project goal of this major transit improvement project is to improve transit services and increase intermodal connectivity, thereby improving mobility and accessibility. Meeting this overall project purpose would address a variety of related transportation needs in the corridor and benefit communities of the greater Bay Area.

1.2.1 Purpose

The purpose of the BART Extension Alternative is as follows:

- Improve public transit service in this corridor by providing increased transit capacity and faster, convenient access to and from major Santa Clara County employment and activity centers for corridor residents and populations throughout the Bay Area and from communities that can access the BART regional rail network. Santa Clara County residents will be provided improved access to employment and activity centers in Alameda, Contra Costa, and San Francisco counties, including the Bay Area's major employment concentration in downtown San Francisco.
- Enhance regional connectivity by expanding and interconnecting BART rapid transit service with VTA light rail, Amtrak, ACE, Caltrain, and VTA bus services in Santa Clara County; improve intermodal transit hubs where rail, bus, auto, bicycle, and pedestrian links meet.
- Support transportation solutions that will maintain the economic vitality and continuing development of Silicon Valley by expanding multimodal options and reducing reliance on single auto commute trips. Increasing the use of transit is critical to moving workers through highly congested travel corridors that serve major employment centers.
- Improve mobility options to employment, education, medical, and retail centers for corridor residents, in particular low-income, youth, elderly, disabled, and ethnic minority populations.
- Support local and regional land use plans and facilitate efforts of the Cities of San Jose and Santa Clara to direct business and residential investments in the Alum Rock neighborhood of east-central San Jose, downtown San Jose, Diridon Station, in the vicinity of the existing Santa Clara Caltrain Station, and elsewhere in the BART Extension alignment.

Improved transit in the corridor is consistent with the goals established in prior studies (see Section 1.4, *BART Extension Project History*) and supports the long-range *Valley Transportation Plan 2040* (VTP 2040). The primary goal of VTP 2040 is to provide transportation facilities and services that support and enhance Santa Clara County's high quality of life and vibrant economy. Another goal is to improve regional air quality by reducing auto emissions and to help alleviate human-made contributions to climate change by reducing greenhouse gas emissions.

Corridor transportation improvements would support goals identified in MTC's *Plan Bay Area,* which include improving access and thereby preserving economic vitality by concentrating future development around transit nodes and along transit corridors. Several areas along the BART Extension alignment, including all of the station areas, are designated priority development areas in *Plan Bay Area* and are targeted for higher-density development in corridor cities' general plans. Priority development areas are defined as locally designated areas within existing communities that provide infill development opportunities, and are easily accessible to transit, jobs, shopping and services.

1.2.2 Need

Sustaining Silicon Valley's economic vitality is key to maintaining the leadership of the United States in many key global industries. Besides being the nation's center of computer-related technology services, the region includes major concentrations of biotechnology, bioengineering, and renewable energy firms. It is the venture capital center of the world for private investing in these and other promising industries. The Valley, however, faces several challenges that could constrain its continued expansion. One is the efficient movement of goods and people to, from, and within the Valley as a result of historical low density land use developments with the automobile as the primary mode of travel.

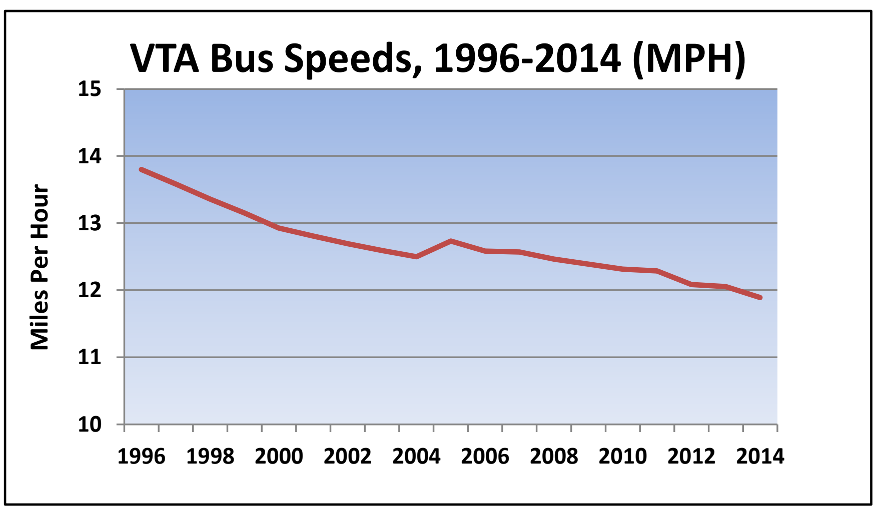
Various existing deficiencies in the regional transportation network are contributing to the worsening mobility. These include severely congested roadways that slow travel speeds to barely tolerable levels and gaps in public transit systems that discourage individuals from shifting out of their autos to higher-capacity trains and buses. As shown in Figure 1-4, already in 2012 at the start of the recent economic boom, many freeways and expressways were experiencing very poor operations during commute periods. Levels of service (LOS), where LOS F represents conditions of high delay and stop and go travel, have progressively deteriorated in the past 4 years. Roadway congestion has degraded traffic operations on urban arterials as well as the major thruways, leading to not just slower auto travel speeds but deteriorating bus transit speeds as well. This further discourages mode shifting to transit because buses fail to achieve travel time benefits relative to automobiles. Figure 1-5 tracks the steady decline in VTA average bus speed over the last 20 years.

The growing transportation needs of businesses and residents have prompted VTA to pursue various transportation improvements, with a strong focus on transit infrastructure given the reality that no new expressway or freeway corridors are included in the regional transportation plan due to environmental and public policy concerns. The current construction of the Phase I Project to East San Jose is a major accomplishment but is only a first step in implementing a broader vision to link high-capacity transit modes within Santa

Figure 1-4: Freeway Congestion, A.M. Peak Period (3 Hours), 2012

Source: 2013 Congestion Management Plan, Santa Clara VTA, October 2013

Figure 1-5: Deteriorating Bus Transit Travel Times



Source: VTA annual reports and National Transit Database

Clara County and expand mobility options for Santa Clara County and Bay Area residents. By continuing BART to downtown San Jose and Santa Clara, the BART Extension Alternative would close the gap in the region's rail systems remaining after the Phase I Project is completed in late 2017.

1.2.2.1 Continuing Rapid Growth in Travel Demand

Growth in travel demand is occurring due to the rapid increases in population and employment in Santa Clara County and the Bay Area in general. The major economic downturn of 2008 and 2009 dampened economic and housing development in the county. However, the resurgence of high-tech and other industries from 2010 onward has generated increased travel and the return of severe congestion on major roadways.

In the second half of 2013, jobs in Santa Clara County again reached pre-recession levels and have been growing ever since. Population trends are similar, with most growth now from in-migration. Employment and population growth is projected to continue into the foreseeable future and will generate additional travel demand and further worsen congestion.

Table 1-1 summarizes existing and projected population levels for Santa Clara County and the corridor cities of San Jose and Santa Clara through which the BART Extension Alternative alignment would pass. Population growth is projected to increase by 29 to 32 percent in Santa Clara County and the cities of San Jose and Santa Clara. However, a more dramatic increase in population of 100 percent is projected for the San Jose Business District. This absolute and relative growth is expected to be greater than either San Francisco (28,400 increase or 33 percent) or Oakland (14,400 increase or 70 percent) business districts.

Table 1-1: Population Growth, 2015 to 2035

Jurisdiction	2015	2035	Population Increase	% Change
Santa Clara County	1,889,488	2,444,745	555,257	29%
City of San Jose	*998,270*	*1,317,634*	*319,364*	*32%*
San Jose Business District	*29,938*	*59,902*	*29,964*	*100%*
City of Santa Clara	*121,644*	*158,212*	*36,568*	*30%*
Source: Association of Bay Area Governments, Projections 2013.				

Substantial job growth is also projected as shown in Table 1-2 with almost 200,000 new jobs in Santa Clara County. The San Jose Business District has the most concentrated as well as the highest number of employment opportunities of the communities along the alignment of the BART Extension Alternative: 44,579 jobs currently and projected to reach 70,310 jobs by 2035. The San Jose Business District has a projected 58 percent increase in jobs from 2015 to 2035. And, over 50 percent of these jobs would be within ½ mile of the BART Extension stations.

Table 1-2: Jobs Growth, 2015 to 2035

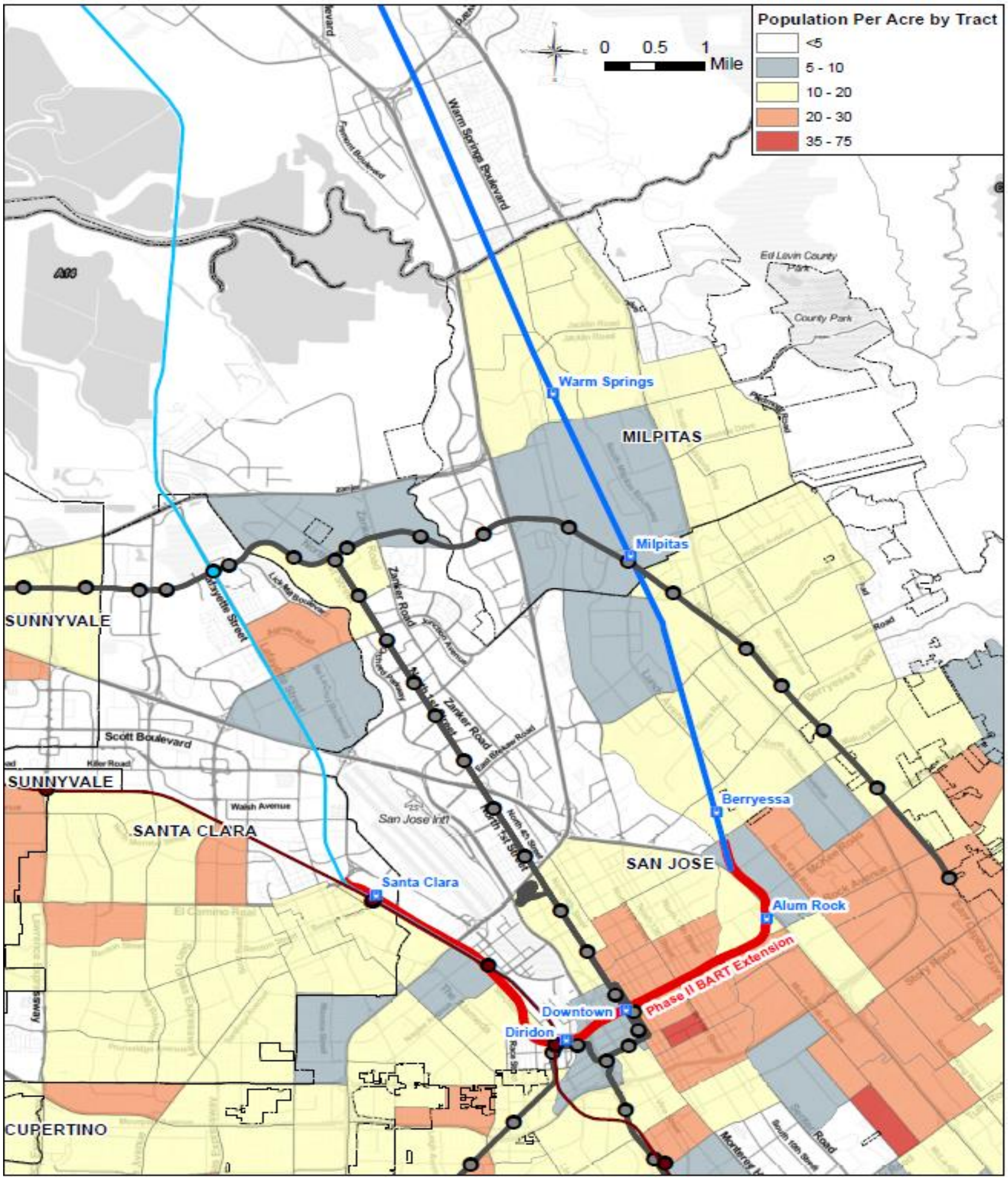
Jurisdiction	2015	2035	Job Increase	% Change
Santa Clara County	1,006,567	1,198,073	191,506	19%
City of San Jose	*419,253*	*513,209*	*93,956*	*22%*
San Jose Business District	*44,579*	*70,310*	*25,731*	*58%*
City of Santa Clara	*114,028*	*132,354*	*18,326*	*16%*
Source: Association of Bay Area Governments, Projections 2013. These numbers were used for modeling purposes, including ridership projections, and will be updated with future FTA submittals.				

Growth by itself does not equate to increased transit use. Concentrating development in central areas will make transit use more convenient and tend to reduce reliance on automobiles. Roadway congestion and limits on parking are other preconditions for transit use. Overall, higher densities of population, employment, and other activities equate to higher transit use.

The areas of northern Santa Clara County that include the Phase I and Phase II Projects lack high population and employment densities. This has been an impediment to higher VTA bus and light rail ridership. As shown in Figures 1-6 and 1-7, population per acre and jobs per acre are low except in certain districts and corridors, including downtown San Jose, the North First Street corridor in north San Jose (currently served by VTA light rail), and the U.S. 101 corridor through northwest Santa Clara County (currently served by Caltrain commuter rail). This condition is changing, however. With land use plans and transportation infrastructure investments that propose to focus development in priority development areas, consistent with the objectives of the regional transportation plan and county and city plans, both population and employment densities are expected to increase sharply in these districts and corridors.

The BART Extension would directly serve priority development areas described above in Section 1.2.1, or connect conveniently to other transit modes that serve them directly. The BART Extension is a critical transit infrastructure investment if efforts to reshape future development and accommodate future population and employment growth are to be successful.

Figure 1-6: 2010 Population Density

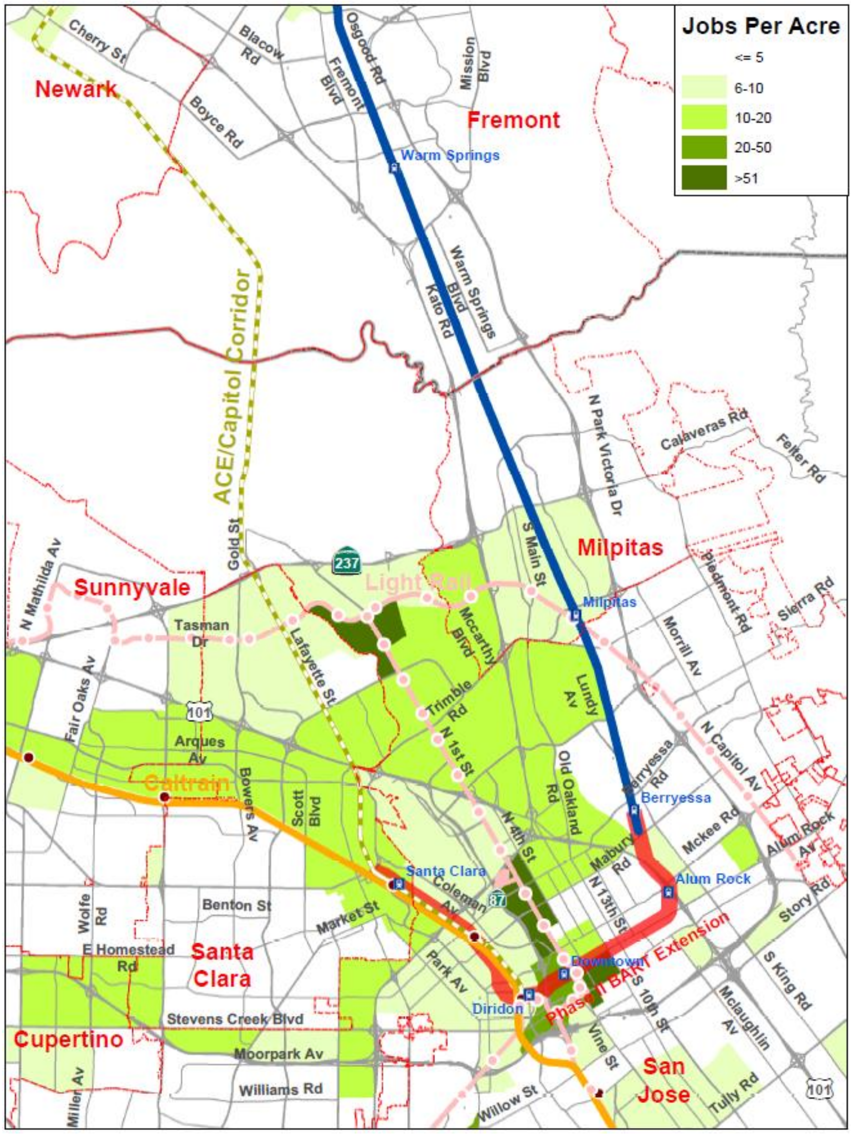


Source: VTA based on U.S. Census 2010, American Community Survey

1.2.2.2 Incomplete Regional Transit Connectivity

Despite the extensive existing transit network—a combination of light rail, commuter rail, and express and local bus—that serves Santa Clara County, critical gaps exist that limit travel. These gaps can discourage transit use. The most evident need is for improved connectivity between high-capacity, high-speed transit systems that move substantial numbers of commuters. A particular problem is access from light rail and commuter rail networks to the BART regional rail system, which offers an existing rapid, regional spine line along the eastern side of San Francisco Bay. That system connects to central and eastern Alameda and Contra Cost Counties where substantial numbers of Silicon Valley workers live due to the lower cost of housing compared to Santa Clara County. The Phase I Project from south Fremont to east San Jose will connect with light rail in Milpitas, thereby closing a portion of the gap in the regional rail network. The BART Extension is needed to fully close the gap by connecting to Caltrain in downtown San Jose and Santa Clara and to the main north-south light rail spine along North First Street in central San Jose.

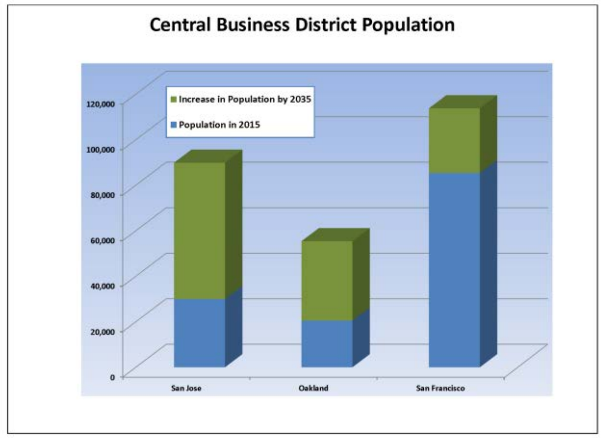
Figure 1-7: 2010 Employment Density



Source: VTA based on U.S. Census 2010, American Community Survey

The BART Extension would connect directly, without transfers, the three main central business districts in the Bay Area, including San Francisco, which has the highest number of jobs and population (Figures 1-8 and 1-9). When the Phase II Project is complete, the 126-mile BART system would be accessible from central and east San Jose. These are areas with concentrated low income, low mobility populations, and more affordable housing (see Figure 1-10). Central San Jose, including downtown, has the highest proportion of legally binding affordable housing, relative to total housing stock, in the county.

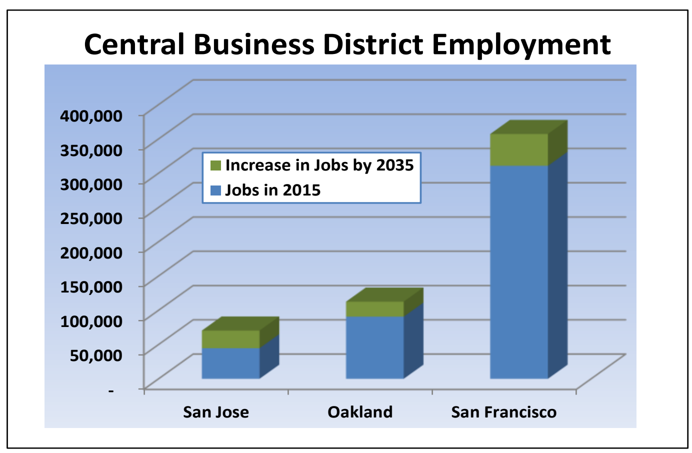
Figure 1-8: Growing Downtown Populations



Source: VTA based on Association of Bay Area Governments, Projections 2013

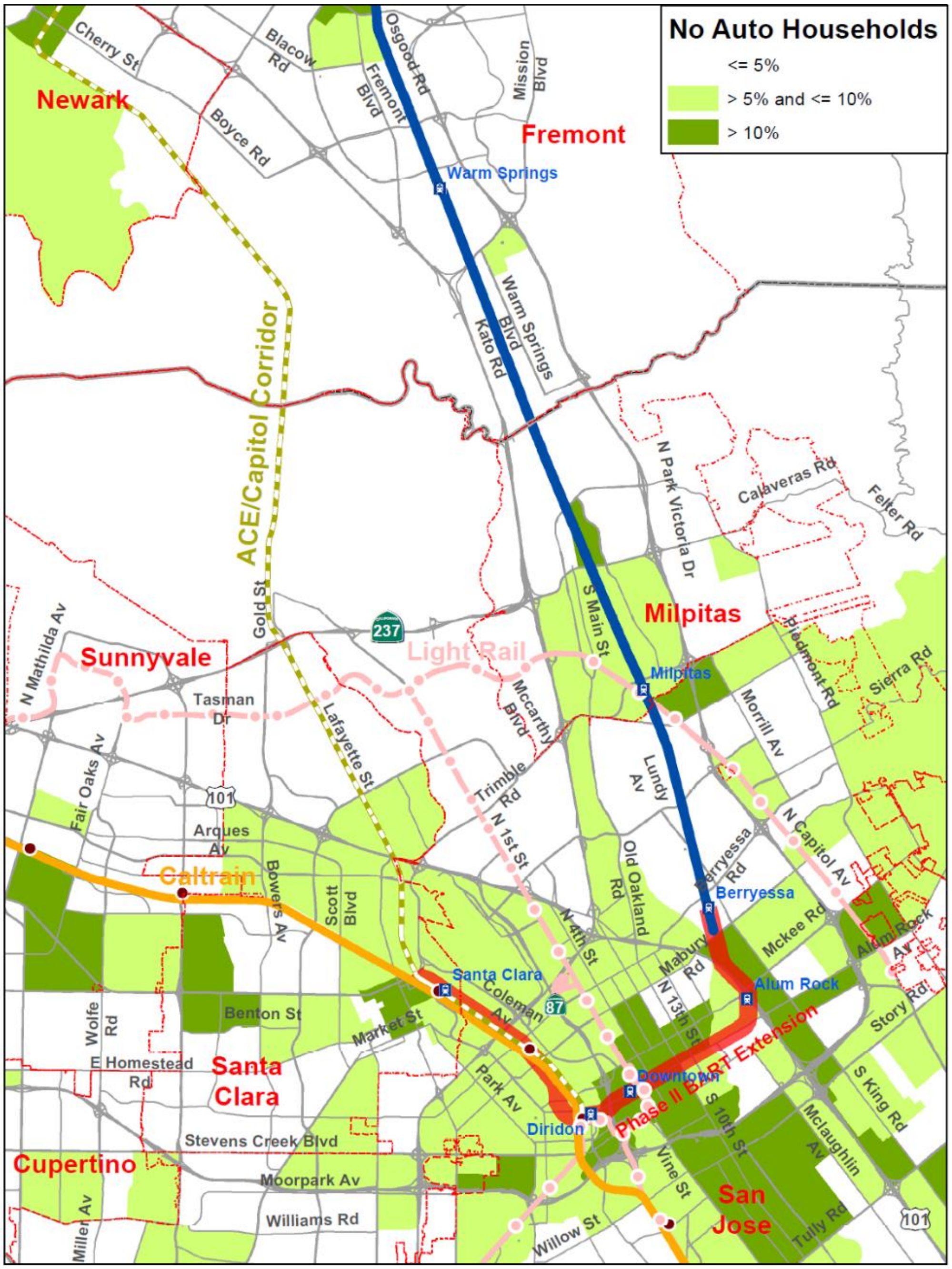
The downtown San Jose connection to light rail would allow BART riders to access light rail along North First Street, and vice versa. North First Street is the city's focus for higher density development, both residential and employment, apart from the downtown central business district. The downtown connection to Caltrain at the Diridon and Santa Clara Stations would allow BART riders convenient access to the San Francisco Peninsula, including the City of San Francisco. High speed rail access is proposed to serve the intermodal Diridon Station within 15 years.

Figure 1-9: Growing Downtown Jobs



Source: VTA based on Association of Bay Area Governments, Projections 2013

Figure 1-10: Households with Limited Mobility, 2010



Source: VTA based on U.S. Census, American Community Survey 2009-2013.

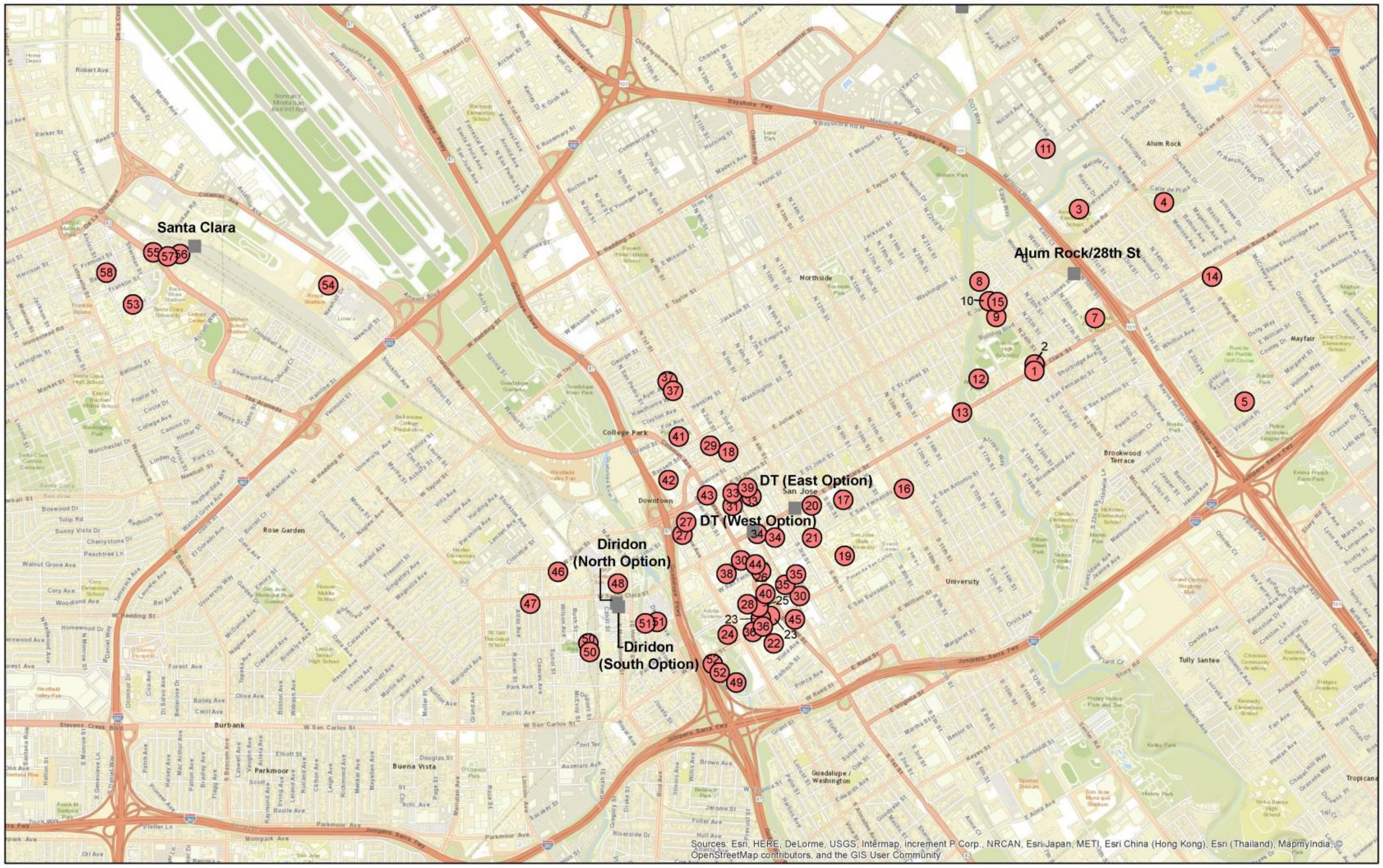
While Diridon Station is the most prominent activity center that would be served by an extension of BART regional rail from the Berryessa Station, a number of other centers would be directly accessible (i.e., within walking distance) from stations along the extension. These are listed in Table 1-3 and depicted in Figure 1-11.

Table 1-3: Activity Centers within the Vicinity of the BART Extension Alternative Stations

Alum Rock/28th Street Station
1. East San Jose Carnegie Branch Library
2. Portuguese Community Center
3. East Valley Social Services Agency
4. Plato Arroyo Park
5. Rocketship Discovery Prep
6. Cristo Rey Jesuit High School
7. Five Wounds Middle School
8. San Jose Community High School and Middle School
9. San Jose High Academy Plus High School
10. Sunrise Middle School
11. San Jose Fire Station 34
12. Roosevelt Park
13. San Jose Fire Station 8
14. Mexican Heritage Plaza
15. San Jose High Neighborhood Clinic
Downtown San Jose Station
16. Grace Community Center
17. San Jose State University Police
18. St James Health Center
19. San Jose State University (32,713 total enrollment in 2014)
20. San Jose City Hall
21. Martin Luther King. Jr. Library
22. San Jose Convention Center
23. San Jose Civic and Montgomery Theatres
24. San Jose Center for the Performing Arts
25. The Tech Museum of Innovation
26. San Jose Museum of Art
27. Santa Clara Superior Court (Notre Dame Avenue and Terraine Street facilities)
28. Santa Clara Family Court
29. Santa Clara County Law Library
30. U.S. Social Security Administration and Internal Revenue Service offices
31. U.S. Postal Service (San Jose main office)
32. San Jose Central Business District (office and retail)
33. St. James Light Rail Stations
34. Santa Clara Light Rail Stations
35. San Antonio Light Rail Stations
36. Convention Center Light Rail Stations
37. Japantown/Ayer Light Rail Stations
38. Greyhound Bus Terminal
39. St James Park
40. Plaza de Cesar Chavez Park

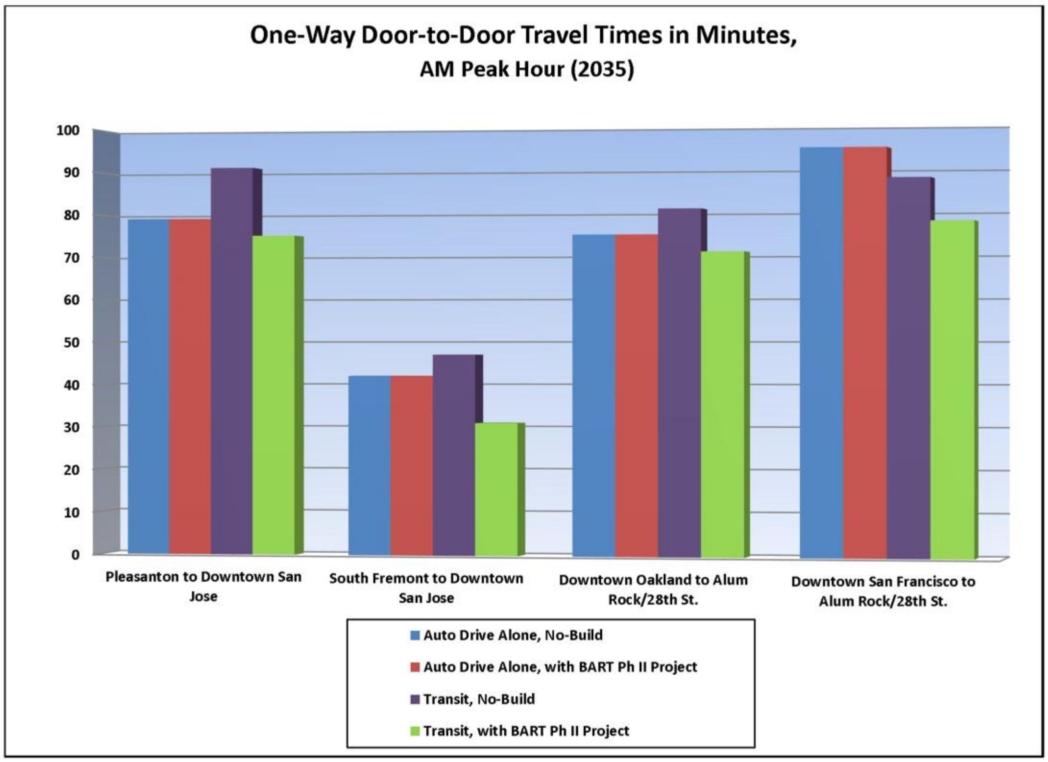
41. Ryland Park
42. San Jose Police Department Impound
43. San Jose Fire Station 1
44. Saint Joseph Cathedral Basilica
45. California Theatre
Diridon Station
46. On Lok Senior Health Services Center
47. Billy Defrank Community Center
48. SAP Center at San Jose (sports and events arena; 17,500 seated capacity)
49. Children's Discovery Museum
50. Diridon Transit Center (VTA bus and light rail, Caltrain, Altamont Commuter Express rail,
51. San Fernando Light Rail Stations
52. Children's Discovery Museum Rail Light Rail Station
Santa Clara Station
53. Santa Clara University (9,015 total enrollment in 2014)
54. Avaya Stadium (open air soccer and other sports venue; 18,000 seated capacity)
55. Santa Clara Police Department
56. South Bay Railroad Museum
57. Santa Clara Caltrain Station
58. Santa Clara Fire Station 1

Figure 1-11: Activity Centers within the Vicinity of the BART Extension Alternative Stations



Closing a major gap in the regional rail network would have the added benefit of improving local access through an important corridor. Ultimately, the improved connectivity, speed, and reliability of transit (offered by constructing a transit improvement project in dedicated right-of-way) would generate travel time savings for users. It is these savings that will encourage a mode shift to transit from auto. As shown in Figure 1-12, direct regional rail access to central San Jose would reduce 2035 transit travel times so they are 5 to 10 minutes, or more, faster than for autos during the AM peak hour for key travel markets, with similar benefits in the PM peak hour. Without transit improvements, transit travel time would take several minutes longer than auto travel and not be an attractive alternative.

Figure 1-12: Travel Time With and Without the BART Extension Alternative



Source: VTA Travel Model

1.2.2.3 Support for Transit Investments

Santa Clara County residents have continually expressed their support for transportation improvements by passing local funding measures, such as the Measure A Transit Improvement Program, which was approved by 70.3 percent of voters in 2000. That measure implemented a ½-cent local transit sales tax that extends to 2036 and provides funding for various transit projects, including the majority of local resources for the Phase I Project.

Measure A will likely be one of the major local funding sources for the BART Extension should policymakers determine to move forward with the extension. In 2008, county voters approved by 66.8 percent a 1/8-cent sales tax referred to as Measure B to fund the operating costs of BART extensions in Santa Clara County. Other transportation measures have been passed to support strictly roadway improvements.[1] Local funding measures have been supplemented by regional, state, and federal funding. Among the sources of federal support is FTA New Starts capital grant funding.

In June 2016, the VTA Board of Directors unanimously adopted the framework and funding amounts to place an additional ½-cent 30-year sales tax measure, designated as Measure B, on the November 8, 2016, ballot to help fund transportation priorities. An extensive 18-month public outreach process gathered input and suggestions on transportation needs. Through this process, a list of categories and transportation projects that best improve mobility in Santa Clara County was approved, including a plan to use $1.5 billion for the BART Phase II Extension. Measure B, which required a two-thirds majority vote, to pass was approved by voters in November 2016 and becomes effective in April 2017.

VTA's mission is to provide sustainable, accessible, community-focused transportation options that are innovative and environmentally responsible, and that promote the vitality of the region. As a result, VTA strives to provide a multimodal and balanced transportation system, serving businesses, local residents, Bay Area commuters, and visitors to Silicon Valley. Construction of the BART Extension would require various sources of local, state, and federal resources.

1.3 CEQA Objectives

VTA is the CEQA lead agency proposing TOJD as part of the BART Extension with TOJD Alternative. The Cities of San Jose and Santa Clara and BART would be responsible agencies for this alternative. The proposed TOJD is not included in the NEPA Build Alternative because the TOJD is a potential future independent action by VTA and is included to proactively facilitate and promote local and regional land use planning as described below. No specific TOJD development plan or private developer has been identified and any proposed TOJD project would be separately funded, and would not include federal funding. The TOJD may be constructed at the same time as the BART Extension Alternative or later in time, dependent on the availability of funding and subject to market forces. However, the design of the stations and structures would not preclude TOJD.

[1] Measure A provides funding for transit projects. The 2008 Measure B will fund the operations of BART in Santa Clara County. In 2010 voters approved a second Measure B that increased the motor vehicle license fee by $10 annually. The fee revenues can only be used for "programs and projects that have a relationship or benefit to the owners of motor vehicles paying the fee and the programs and projects must be consistent with the regional transportation plan."

Refer to Chapter 2, *Alternatives*, for a detailed description of the TOJD under the CEQA BART Extension with TOJD Alternative.

Under the CEQA BART Extension with TOJD Alternative, TOJD is proposed at the four BART Extension stations (Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara) and retail at the two mid-tunnel ventilation facility locations along the alignment to increase transit ridership and support the expected population and jobs growth described above. VTA's primary objective for the proposed TOJD is to encourage transit ridership and support land use development patterns that make the most efficient and feasible use of existing infrastructure and public services while promoting a sense of community as envisioned by the San Jose and Santa Clara General Plans and relevant adopted specific plans. These plans include the *Five Wounds Urban Village Plan* (City of San Jose 2013), the City of San Jose *Diridon Station Area Plan* (City of San Jose 2014), and the *Santa Clara Area Station Plan* prepared by VTA and the Cities of Santa Clara and San Jose (2010). Additionally, the Metropolitan Transportation Commission's *Resolution 3434 Transit-Oriented Development Policy* includes provisions for housing and ridership for land within a 1/2-mile radius of each station along the BART Extension to San Jose and Santa Clara. The TOJD would be consistent with the regional plans of the Metropolitan Transportation Commission (MTC), the Association of Bay Area Governments (ABAG), VTA, and BART as well as the local plans of San Jose and Santa Clara. The TOJD would encourage higher-density, mixed-use development adjacent to proposed transit stations and thus offers the benefit of increasing ridership throughout the BART system.

The BART Extension with TOJD Alternative would also support efficient growth and sustainable development patterns necessary to reduce the impacts of population growth and to achieve the Sustainable Communities Strategy included in the San Francisco Bay Area's regional transportation plan, *Plan Bay Area, Strategy for a Sustainable Region* (July 18, 2013).

Overall, the benefits of TOJD include: providing mobility choices, increasing public safety, increasing transit ridership, reducing rates of vehicle miles traveled (VMT), increasing households' disposable income, reducing air pollution and energy consumption rates, conserving resource lands and open space, playing a role in economic development, contributing to more affordable housing, and decreasing local infrastructure costs.

1.4 BART Extension Project History

The extension of BART into Santa Clara County is the outcome of various prior studies that have evaluated transportation needs in the BART Silicon Valley corridor and major capital improvements intended to expand transit service.

Prior studies hereby incorporated by reference include:

- *Fremont-South Bay Corridor Final Report* (VTA 1994)

- *Commuter Rail Study, Fremont-South Bay Corridor, Final Report* (VTA 1999)
- *Major Investment Study (MIS)* (VTA 2001)
- *Silicon Valley Rapid Transit Corridor – BART Extension to Milpitas, San Jose and Santa Clara, Draft Environmental Impact Statement/Environmental Impact Report and Draft 4(f) Evaluation (including supporting appendices and technical reports)* (VTA 2004)
- *Silicon Valley Rapid Transit Corridor – BART Extension to Milpitas, San Jose and Santa Clara, Final Environmental Impact Report (including supporting appendices and technical reports)* (VTA 2004)
- *Silicon Valley Rapid Transit Corridor – BART Extension to Milpitas, San Jose and Santa Clara, Draft Supplemental Environmental Impact Report (including supporting appendices and technical reports)* (VTA 2007)
- *Silicon Valley Rapid Transit Corridor – BART Extension to Milpitas, San Jose and Santa Clara, Final Supplemental Environmental Impact Report (including supporting appendices and technical reports)* (VTA 2007)
- *Silicon Valley Rapid Transit Corridor – Draft Environmental Impact Statement and Draft Section 4(f) Evaluation (including supporting appendices and technical reports)* (VTA 2009)
- *Silicon Valley Rapid Transit Corridor –Final Environmental Impact Statement and Final Section 4(f) Evaluation (including supporting appendices and technical reports)* (VTA 2010)
- *Wrigley Creek Improvement Project – Final Initial Study / Mitigated Negative Declaration (including supporting appendices and technical reports)* (VTA 2010)
- *BART Silicon Valley, Phase I – Berryessa Extension, Draft 2nd Supplemental Environmental Impact Reports (including supporting appendices and technical reports)* (VTA 2010)
- *BART Silicon Valley, Phase I – Berryessa Extension, Final 2nd Supplemental Environmental Impact Report (including supporting appendices and technical reports)* (VTA 2011)
- *Upper Penitencia Creek Improvement Project – Initial Study / Mitigated Negative Declaration (including supporting appendices and technical reports)* (VTA 2011)

These studies constitute a comprehensive, systematic study of transportation conditions in the BART Silicon Valley corridor, including existing and future needs. They also established transportation goals and objectives that guide the development of transportation solutions that address identified needs.

The studies satisfied federal requirements for system and corridor-level transportation needs assessment that existed at the time the proposed improvements were first contemplated. The 2001 MIS served as a federal alternatives analysis of the various transportation investment options for the BART Silicon Valley Rapid Transit Corridor. Although the federal project development process no longer requires agencies to formally proceed through alternatives analysis, it was expected that proposed sponsors of a major transit investment will conduct system level planning studies that establish the purpose and need for the investment and identify a locally preferred project alternative. The 2001 MIS served as the foundational study for the VTA's BART Silicon Valley Program and continues to be important for that reason.

Eleven alternatives were identified that potentially addressed these goals and corridor needs. They were analyzed for consistency in meeting goals and needs, capital and operating costs, possible environmental effects, and eight performance measures. Results of the MIS were reviewed by the VTA Board of Directors, which on November 9, 2001, approved a locally preferred alternative that would extend BART service from Fremont through Milpitas, San Jose, and into Santa Clara. The alternative came to be designated the Silicon Valley Rapid Transit Corridor Project (SVRTCP).

A combined Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR) and Draft 4(f) Evaluation for the 16-mile SVRTCP was prepared in accordance with the requirements of NEPA and CEQA and released for public comment in March 2004. Subsequent to the start of the public review period for the Draft EIS/EIR, the NEPA Notice of Intent to prepare an EIS was published for the BART Warm Springs Extension, a 5.4-mile project extending from the downtown Fremont BART Station to south Fremont, terminating at the proposed Warm Springs Station. The Warm Springs Extension is a required precursor project to the SVRTCP.

The project was determined not ripe for NEPA review because it was in the early stages of planning as evidenced by the on-going planning for the Warm Springs Extension Project, which is a predecessor to the SVRTCP. Funding for the operations and construction of the SVRTCP was still being explored at that time. VTA continued with the environmental process under CEQA in order to advance planning. As a result of this action, VTA also withdrew the SVRTCP from FTA's New Starts project qualification and funding program. This included formal withdrawal from the FTA preliminary engineering phase of project development.

A Final EIR was prepared and certified by the VTA Board of Directors in December 2004. A Final Supplemental EIR (updating the 2004 EIR to address project design refinements) was certified by the VTA Board of Directors in June 2007.

In mid-2007, VTA decided to request FTA approval to begin the NEPA process again, and FTA concurred. On September 21, 2007, FTA published in the Federal Register a Notice of Intent to Prepare an EIS on the project. VTA and FTA held public scoping meetings in October 2007 to solicit comment on the scope of project improvements and issues for evaluation as part of the environmental studies.

A Draft EIS was released for public comment in March 2009, and a Final EIS was published in March 2010. On June 24, 2010, the FTA issued a Record of Decision (ROD) on the first phase of the project, an approximately 10-mile segment from Warm Springs to Berryessa—designated the Phase I Project. This formally approved the Phase I Project to move forward into detailed design and construction. The decision reflected the fact that VTA had funding committed or in the pipeline for an initial 10-mile segment of the full 16-mile SVRTCP. Funding for the full 16-mile project was, at the time, not committed or in the immediate pipeline.

VTA proceeded to complete design and initiated construction on this initial segment (Phase I Project). The remaining approximately 6 miles is referred to in this document as the Phase II Project. This document analyzes alternatives as described in Chapter 2. Because it has been over 6 years since preparation and publication of the 2010 Final EIS on the SVRTCP, and because the project is now focused on the remaining approximately 6 miles for completion, a Supplemental Environmental Impact Statement to the 2010 document is being prepared.

To ensure that the previously issued 2007 Supplemental EIR was fully consistent with the 2010 Final EIS, a Draft 2nd Supplemental EIR was prepared and issued for public review in November 2010. A Final 2nd Supplemental EIR was published in March 2011. The 2nd Supplemental EIR focused on the Phase I Project as the planned project.

The CEQA EIR and NEPA EIS processes now need to be brought up to date since the Phase II Project was last addressed in the 2007 Supplemental EIR and 2010 SEIS. Since the prior documents were adopted, background conditions have changed, regulatory settings have changed, and there are new alternatives to be evaluated. Therefore, VTA, with FTA concurrence, has elected to prepare a combined Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR) on the remaining approximately 6-mile BART Extension. A Subsequent EIR has been prepared instead of a Supplemental EIR because substantial changes have been made, such as the addition of the CEQA BART Extension with TOJD Alternative, which require major revisions to the previous EIR due to the involvement of new significant environmental effects and substantial increases in the severity of previously identified significant effects. In 2015, as preparation of the updated documents was underway, VTA decided to add a land use development component, the CEQA BART Extension with TOJD Alternative, in order to maximize transit-oriented development potential, to increase ridership, to fulfill the local and regional goals to integrate transit-oriented development at transit stations, and to integrate the planning, design, and construction of both the land use development and the BART Extension.

In late 2015, VTA submitted application materials to FTA, requesting entry into New Starts Project Development, the first phase of the New Starts Capital Investment Grant Program. In March 2016, VTA received approval to enter New Starts Project Development for the NEPA Build Alternative. Completion of Project Development activities allows VTA to request approval to advance the project into New Starts Engineering.

The New Starts Engineering phase involves formal oversight and eventual project evaluation and rating. Successful completion of the New Starts process would result in a Full Funding Grant Agreement with FTA and ultimately construction. The Final SEIS/SEIR and an amended ROD on a preferred project would need to be completed before FTA would make a determination on advancing a project into engineering. These FTA actions and approvals would establish the basis for federal funding for the NEPA BART Extension Alternative. FTA is the lead agency for the NEPA analysis in this document and will evaluate the BART Extension Alternative for entry into the New Starts Process. The land use development under the CEQA BART Extension with TOJD Alternative evaluated in this document is independent from FTA's New Starts Funding Program.

In October 2016, VTA was awarded a $1.52 million Fiscal Year 2016 Pilot Program for Transit-Oriented Development (TOD) Planning grant for the Phase II Project. The Pilot Program supports comprehensive planning efforts of local communities. Under the Pilot Program requirements, agencies and local communities who receive funds through this planning program must examine ways to improve economic development and ridership, foster multimodal connectivity and accessibility, improve transit access, identify infrastructure needs, and enable mixed-use development near transit stations. The Pilot Program for TOD Planning funds will be used to support a study on concepts and future opportunities for transit-oriented development along the alignment. After the VTA Board of Directors defines the scope of work and approves the selection of a consultant, the study will take approximately a year to complete.

1.5 Organization of this Document

The contents of this document include the following chapters:

Executive Summary. This chapter provides an overview of the alternatives and the impacts and mitigation of each alternative.

Chapter 1: Purpose and Need. This chapter describes the purpose and need for the BART Extension Alternative and project objectives for the CEQA BART Extension with TOJD Alternative.

Chapter 2: Alternatives. This chapter describes all NEPA and CEQA alternatives, including the NEPA and CEQA No Build Alternative and BART Extension Alternative and the CEQA BART Extension with TOJD Alternative (consisting of the BART Extension and TOJD).

Chapter 3: NEPA and CEQA Transportation Operation Analysis. This chapter describes existing conditions and identifies transportation impacts and mitigation measures for all of the alternatives. The NEPA and CEQA construction transportation impacts are addressed in Chapter 5.

Chapter 4: NEPA Alternatives Analysis of Operations. This chapter describes the existing conditions associated with the environmental issue areas other than transportation, specifically, air quality; biological resources and wetlands; community facilities; cultural and historic resources; electromagnetic fields; energy; geology, soils, and seismicity; hazardous materials; land use; noise and vibration; safety and security; socioeconomics; utilities; visual quality and aesthetics; water resources; and environmental justice. This chapter addresses the environmental impacts that would result from operation of the NEPA No Build and BART Extension Alternatives and discusses mitigation measures under NEPA to reduce or eliminate such impacts.

Chapter 5: NEPA Alternatives Analysis of Construction. This chapter describes the construction activities that would occur during implementation of the NEPA No Build and BART Extension Alternatives. This chapter addresses the environmental impacts that would result from construction activities and discusses mitigation measures under NEPA to reduce or eliminate such impacts. This chapter should also be referred to for the CEQA construction transportation impacts and mitigation measures as they are similar to the NEPA construction transportation impacts and mitigation measures.

Chapter 6: CEQA Alternatives Analysis of Construction and Operation. This chapter describes construction and operational impacts of the CEQA Alternatives for the environmental issue areas other than transportation, specifically, air quality; biological resources and wetlands; community facilities; cultural and historic resources; energy; geology, soils, and seismicity; hazardous materials; land use; noise and vibration; safety and security; utilities; visual quality and aesthetics; and water resources. Mitigation measures are also identified where required.

Chapter 7: Other NEPA and CEQA Considerations. This chapter addresses irreversible and irretrievable commitment of resources, cumulative impacts, and growth-inducing impacts. The environmentally superior alternative is also identified.

Chapter 8: Section 4(f) Evaluation. This chapter complies with Section 4(f) of the Department of Transportation Act to ensure that special efforts are made to protect public parks and recreations lands, wildlife and waterfowl refuges, and historic sites.

Chapter 9: NEPA Financial Considerations. This chapter presents cost information and an evaluation of the costs as well as a proposed financial plan of the NEPA alternatives.

Chapter 10: Agency and Community Participation. This chapter identifies the process for consultation and coordination with federal, state, regional, and local agencies, as well as with elected officials, community leaders, organizations, and other individuals within the vicinity. This chapter also includes a summary of the agency and community participation conducted since the Major Investment Study/Alternatives Analysis process in 2001.

Chapter 11: Distribution of the SEIS/SEIR. This chapter identifies the process for making the Draft SEIS/SEIR available for public circulation, including a list of the various agencies, organizations, and individuals who were notified of its release.

Chapter 12: Definitions, Abbreviations, and Acronyms. This chapter provides a list and description of the various definitions, abbreviations, and acronyms that are used throughout the Draft SEIS/SEIR.

Chapter 13: References. This chapter provides a list of the working papers, technical reports, and other documents used in preparing the Draft SEIS/SEIR.

Chapter 14: List of Preparers. This chapter identifies the contributors to the document, including the FTA, VTA, and consultant team staff involved in the preparation of the Draft SEIS/SEIR.

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Chapter 2
Alternatives

2.1 Introduction

VTA's BART Silicon Valley Program consists of the extension of the Bay Area Rapid Transit (BART) system from its planned terminus at Warm Springs Station in southern Fremont in Alameda County, which is currently under construction and scheduled to open in 2017, into Santa Clara County through the Cities of Milpitas, San Jose, and Santa Clara. The BART Silicon Valley Program is being implemented in two phases: the Phase I Berryessa Extension Project (Phase I) and the Phase II Extension Project (Phase II) as shown on Figures 2-1 and 2-2. The Phase I Project is currently under construction and scheduled to be operational in late 2017. The remaining approximately 6 miles of the BART Silicon Valley Program are the subject of this combined Supplemental Environmental Impact Statement and Subsequent Environmental Impact Report (SEIS/SEIR), which includes both a National Environmental Policy Act (NEPA) and a California Environmental Quality Act (CEQA) analysis. The alternatives analyzed in accordance with NEPA and CEQA are described below. For environmental analysis purposes, the study years include 2015 Existing, 2025 Opening Year, and 2035 Forecast Year.

There are two alternatives evaluated in this document in accordance with NEPA: the No Build Alternative and the BART Extension Alternative.

1. The NEPA No Build Alternative consists of planned and programmed transit and roadway improvements, but does not include the 6-mile BART Extension to Santa Clara.
2. The NEPA BART Extension Alternative consists of a 6-mile extension of the BART system from the Berryessa BART Station, currently under construction, through downtown San Jose to the Santa Clara Caltrain Station.

There are three alternatives evaluated in this document in accordance with CEQA: the No Build Alternative, the BART Extension Alternative, and the BART Extension with TOJD Alternative.

1. The CEQA No Build Alternative is the same as the NEPA No Build Alternative.
2. The CEQA BART Extension Alternative is the same as the NEPA BART Extension Alternative described above.
3. The CEQA BART Extension with TOJD Alternative consists of the 6-mile BART Extension as described above (see NEPA BART Extension Alternative) along with transit-oriented joint development (TOJD) at the four proposed BART stations and at the two mid-tunnel ventilation structure sites. The proposed TOJD is not included in the NEPA Build Alternative because the TOJD is a potential future independent action by VTA and the TOJD project serves a separate purpose and need than the BART Extension

Alternative as described below. The proposed TOJD has independent utility and is included to support local and regional land use planning. The TOJD may be constructed at the same time as the BART Extension Alternative or later in time, dependent on the availability of funding and subject to market forces. However, the design of the stations and structures would not preclude TOJD. No specific TOJD development plan or private developer has been identified, and any proposed TOJD project would be separately funded and would not include federal funding.

The 6-mile BART Extension under the NEPA and CEQA BART Extension Alternatives and the CEQA BART Extension with TOJD Alternative would begin at the terminus of the Phase I Project east of U.S. Highway 101 (U.S. 101) and south of Mabury Road in the City of San Jose.

The BART Extension would descend into an approximately 5-mile-long subway tunnel, continue through downtown San Jose, and terminate at grade in the City of Santa Clara near the Caltrain Station. Four stations are proposed: Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara. The BART Extension, as described below, begins from the connection to the Phase I Project in the east, then westward through downtown San Jose, to the new BART terminus in Santa Clara. Passenger service for the BART Extension would start in 2026, assuming funding is available.

The TOJD under the CEQA BART Extension with TOJD Alternative would consist of retail, office, and residential uses. The Alum Rock/28th Street and Santa Clara Stations would include retail, office, and residential uses. The Downtown San Jose and Diridon Stations would incorporate retail and office uses. The two ventilation structures would have retail uses on the street frontage. The proposed TOJD is consistent with the Public Utilities Code 100130.5 (b) (1) definition of TOJD, which includes commercial, residential or mixed-use development. TOJD is further described in Section 2.3.3.

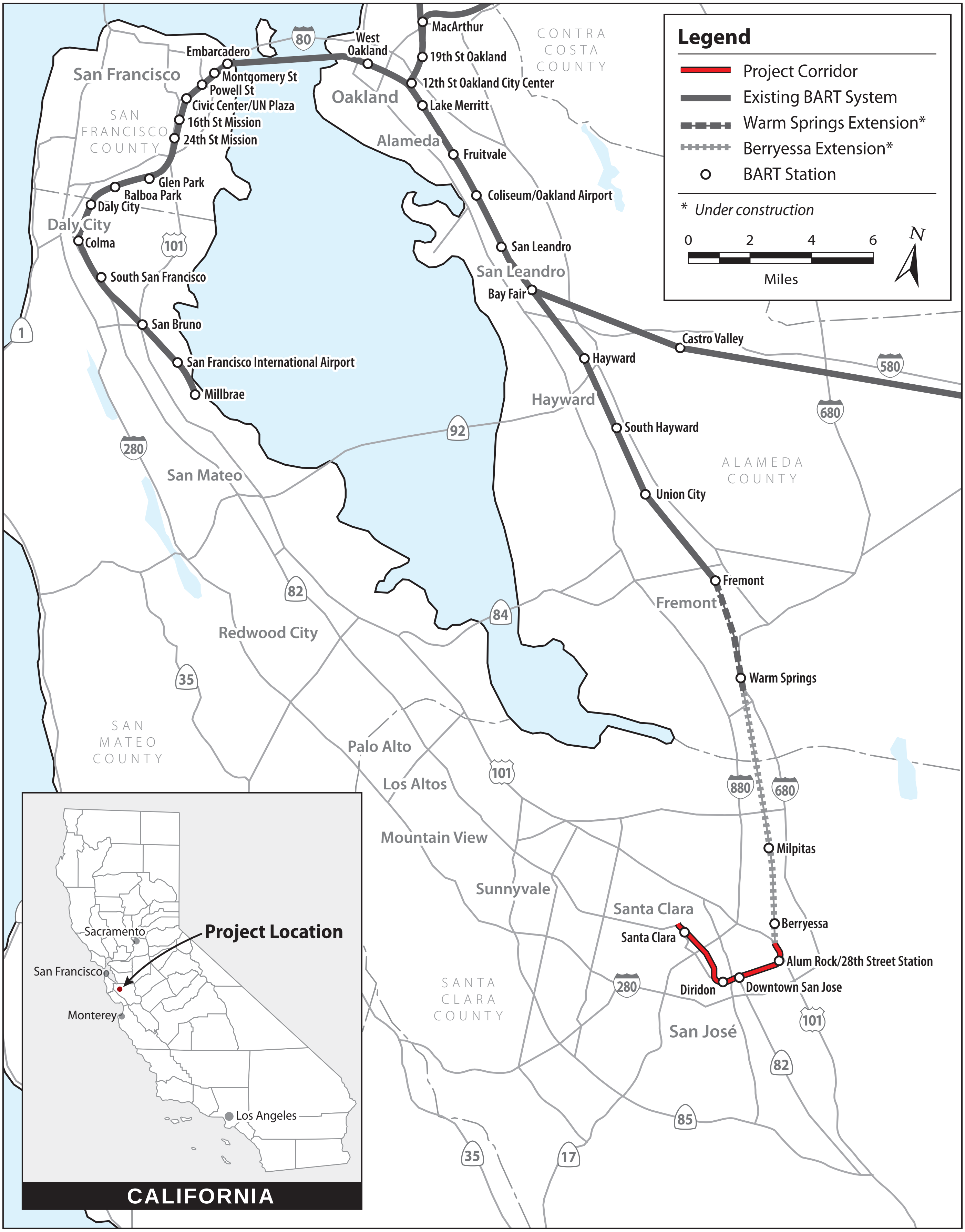
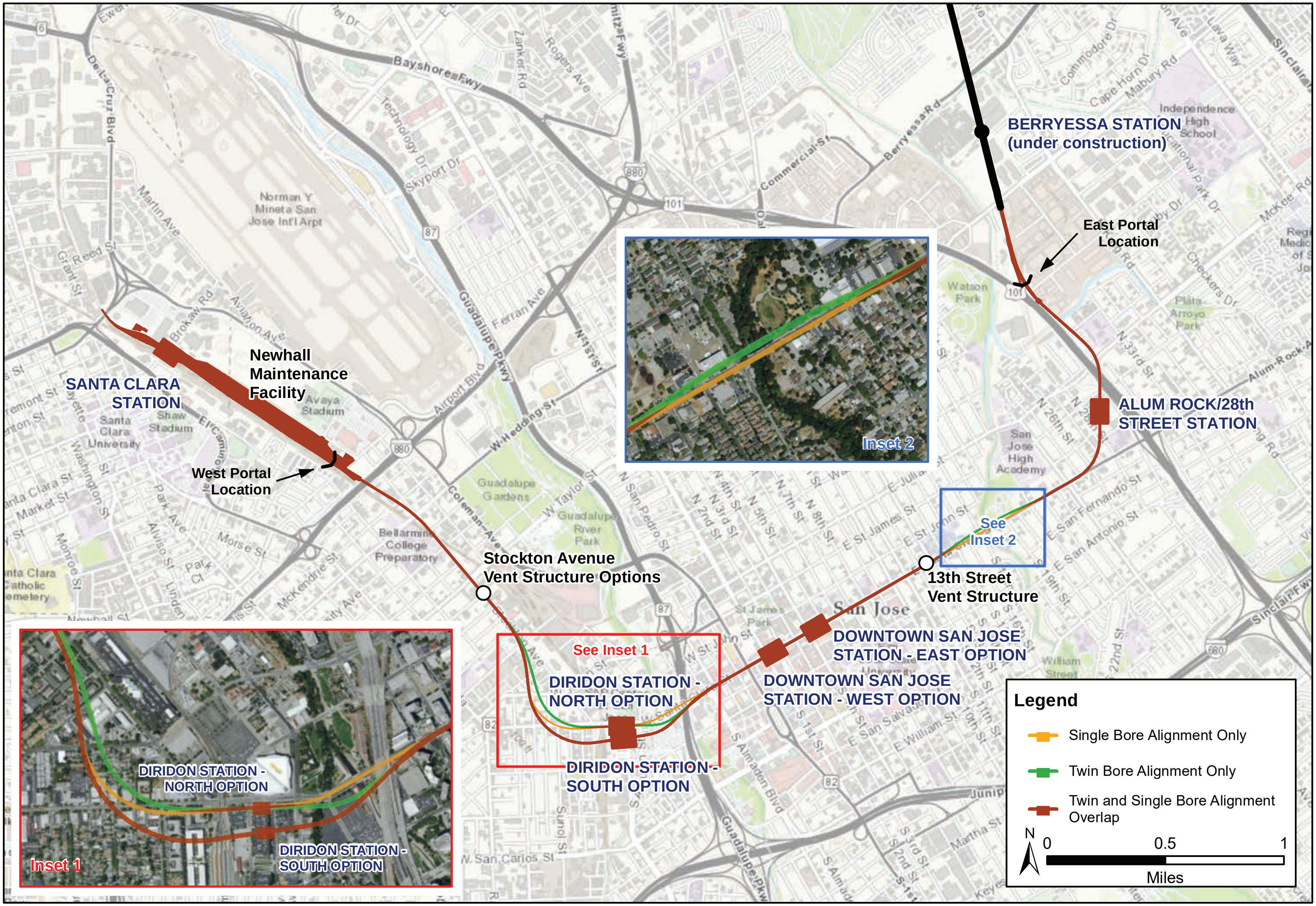


Figure 2-1
Regional Location
VTA's BART Silicon Valley–Phase II Extension Project



Source: Station and Track, VTA 2014; Basemap, ESRI 2015

Figure 2-2
BART Extension Alternative
VTA's BART Silicon Valley – Phase II Extension Project

2.2 NEPA Alternatives

2.2.1 NEPA No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the corridor that are identified in the Bay Area's Regional Transportation Plan (RTP), *Transportation 2035 Plan for the San Francisco Bay Area* (Transportation 2035 Plan), adopted by the Metropolitan Transportation Commission (MTC) in April 2009; the *Valley Transportation Plan 2040* (VTP 2040), adopted by VTA in October 2014; and the *Expressway Plan 2040 Study* (County of Santa Clara Roads and Airports Department 2015). Future land uses would be consistent with the General Plans and area plans for the Cities of San Jose and Santa Clara.

2.2.1.1 Transit System

Existing Transit System

Existing transit services consist of bus services, light rail transit (LRT), shuttle services, paratransit service, and inter-county services, and are briefly described below with the ridership provided in Chapter 3, Section 3.4, *2035 Forecast Year Transit Ridership*. A complete description of existing services is included in VTA's *Short Range Transit Plan FY 2014–2023* (Santa Clara Valley Transportation Authority 2014b).

VTA currently operates 70 bus routes, which consist of 17 core routes, 1 rapid route, 18 local routes, 18 community bus routes, 12 express routes, and 4 limited stop routes.

VTA also operates three LRT routes: Ohlone/Chynoweth to/from Almaden, Alum Rock to/from Santa Teresa, and Mountain View to/from Winchester. Total fleet size to operate the LRT service is 99 low-floor light rail vehicles. VTA provides shuttle service to LRT stations and major Silicon Valley employment destinations, activity centers, and transit facilities and offers accessible paratransit services for seniors and the disabled community.

VTA is a member of the Peninsula Corridor Joint Powers Board, which operates Caltrain service in Santa Clara, San Mateo, and San Francisco Counties. VTA is also a member of the Capitol Corridor Joint Powers Board, which operates train service from Placer County to Santa Clara County.

BART currently operates five routes: the Pittsburg/Bay Point to/from San Francisco International Airport, Fremont to/from Richmond, Fremont to/from Daly City, Richmond to/from Millbrae and to Daly City during evenings and weekends, and Dublin/Pleasanton to/from Daly City. Figure 1-2 in Chapter 1, *Purpose and Need*, shows these existing and planned BART systems. The total existing fleet size to operate BART service is 669 cars.

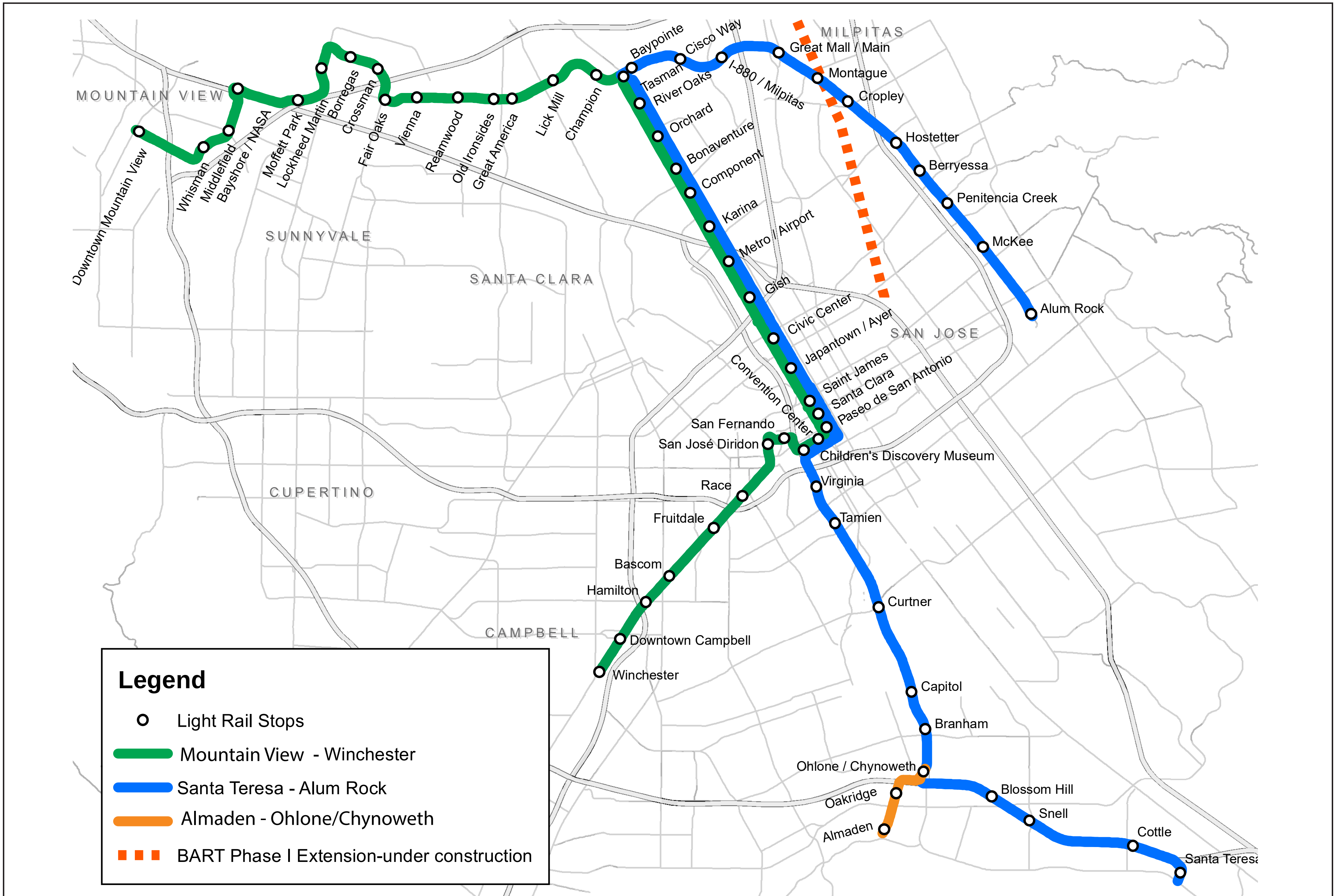
Planned and Programmed Improvements through 2035

New transit services and capital projects planned and programmed for the corridor through 2035 are identified in Table 2-1. These consist of bus rapid transit projects, an LRT extension, rail service upgrades, and the Airport People Mover to Mineta San Jose International Airport.

Table 2-1: 2035 No Build Alternative Transit Improvements in BART Silicon Valley Area

Transit Projects	Notes
1. VTA's BART Silicon Valley—Berryessa Extension Project (Phase I)	Project connects the existing BART system from the Warm Springs Station in Southern Fremont through Milpitas to the Berryessa District of San Jose.
2. Bus Rapid Transit (BRT) Line 523 – Stevens Creek Boulevard (previously Line 23)	Berryessa BART Station through Downtown San Jose to Cupertino, offering 10-minute service each direction.
3. El Camino BRT Line 522 (previously Lines 22/Line 300)	Limited stop service at 10-minute intervals; target is minimum 15% travel time reduction on El Camino Real from Downtown San Jose to Palo Alto (Line 22).
4. Santa Clara/Alum Rock BRT	Project provides enhancements in Santa Clara County's highest ridership corridor, including 2 miles of dedicated lanes. Limited stop service at 10-minute intervals.
5. Capitol Corridor Commuter and Intercity Rail	Expanded service to 11 round trips/day between Sacramento and San Jose; new Union City intermodal station in service.
6. LRT – Guadalupe Express Service	A Guadalupe Express service between Ohlone/Chynoweth and San Jose Convention Center.
7. LRT – Additional Line, Alum Rock to Mountain View	An additional line that would travel from Downtown Mountain View to Alum Rock all day.
8. Caltrain Modernization/Electrification Projects	Electrify the existing rail line from San Francisco to 2 miles south of Tamein Station. Improve train performance and increase service, shorten headways and increase travel speeds, and reduce noise and air pollution.
9. Caltrain/HSR Station Improvements: Diridon Station	Provide station improvements needed to accommodate and support proposed high-speed rail service.
10. Mineta San Jose International Airport Automated People Mover (APM) Connector	Project would provide transit link to San Jose International Airport from VTA's Guadalupe LRT line, and from Caltrain and future BART stations in Santa Clara using APM technology.
Sources: Metropolitan Transportation Commission 2009; Santa Clara Valley Transportation Authority 2014a.	

VTA's LRT service map for service through 2035 is shown in Figure 2-3. VTA's Phase I Project is included in the Transportation 2035 Plan and is currently under construction. Figure 1-2 in Chapter 1 shows the BART system map for service through 2035 and includes the Phase I Project.



Source: VTA, 2015.

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Figure 2-3
LRT Service Map
VTA's BART Silicon Valley–Phase II Extension Project

2035 Forecast Year Fleet Requirements

A total VTA bus fleet of 451 vehicles is estimated to meet 2035 service levels, which represents a slight increase over the 2015 fleet to account for additional bus service shuttling passengers between the Berryessa Station and downtown stations. Although the light rail network will expand by 2035, it will be served with no increases to the existing light rail fleet of 100 vehicles.

The current BART fleet is 669 cars. BART has ordered a new fleet of 775 cars to replace the existing fleet and accommodate the Warm Springs and VTA's Phase I Project. BART plans to purchase an additional 306 cars as part of their Core Capacity Project. Table 2-2 summarizes VTA and BART fleet sizes.

Table 2-2: 2035 No Build Alternative Fleet Size

Service	2015 Existing Service	2035 No Build Alternative
VTA Buses	440	451
VTA Light Rail Transit Vehicles	99	99
BART Cars (entire BART system)[a]	669	1,081

[a] The No Build Alternative includes the Phase I Project, which is currently under construction.
Source: Connetics Transportation Group and VTA 2015.

2035 Forecast Year Facility Requirements

The buses operated by VTA and identified under the No Build Alternative would be stored and maintained at the following existing bus operating and maintenance facilities: the Cerone Bus Operating Division and Overhaul and Repair Facility in North San Jose, the Don Pedro Chaboya Bus Operating Division in South San Jose, and the North Bus Operating Division in Mountain View. These facilities have sufficient land to enable any potential future need for expansion as necessary to accommodate additional buses above the 2035 fleet levels. Because the LRT fleet size is not anticipated to change by 2035, LRT vehicles would be stored and maintained at the existing Guadalupe Light Rail Maintenance facility near downtown San Jose.

2.2.1.2 Roadway System

Existing Roadway System

The corridor contains two major north-south regional freeways, Interstate I-880 and I-680, which parallel one another from southern Alameda County into northern Santa Clara County. The freeways are part of a more extensive regional roadway system that converges in Santa Clara County around the San Jose Central Business District. Other freeways and expressways that traverse the corridor are U.S. 101, State Route (SR) 87, and San Tomas Expressway.

Major arterials, such as Mabury Road/Taylor Street, McKee Road/Julian Street, San Antonio Street, Autumn Street, San Fernando Street, San Carlos Street, Brokaw Road, Lafayette Street, Benton Street, and Alum Rock Avenue/Santa Clara Street/The Alameda/El Camino Real (SR 82), traverse the corridor from east to west. Major north-south streets within the corridor include North 28th Street, Bird Avenue/Montgomery Street, Stockton Avenue, Coleman Avenue, and De La Cruz Boulevard.

Planned and Programmed Roadway Improvements Through 2035

Roadway improvements planned and programmed for the corridor through 2025 or 2035 include projects in Santa Clara County. These roadway improvements consist of widenings and new interchanges on existing routes. No new freeways or other major roadways are planned.

The following list identifies road and highway improvements that are assumed to be completed by 2025[1] in the corridor under the No Build Alternative.

- Convert all existing freeway high-occupancy vehicle (HOV) lanes to express lanes.
- I-880: Add HOV lanes and convert to express lanes between SR 237 and U.S. 101.
- Coleman Avenue: Widen from four lanes to six lanes between I-880 and Taylor Street.
- 10th and 11th Streets, Almaden Avenue and Vine Street, and 2nd and 3rd Streets: Convert one-way couplets to two-way streets.
- Central Expressway: Widen from four lanes to six lanes between Lawrence and San Tomas Expressways.
- Central Expressway: Convert HOV lanes to mixed-flow lanes between De La Cruz Boulevard and San Tomas Expressway.
- San Tomas Expressway: Widen to eight lanes between Williams Road and El Camino Real.
- San Carlos Street: Replace and widen bridge at Caltrain/Vasona LRT.
- U.S. 101 and Mabury Road/Taylor Street: Construct interchange.
- Julian Street: Realign between SR 87 and North 1st Street to extend the downtown urban grid system.
- St. James Street: Convert from a one-way to two-way street from Notre Dame/SR 87 to Market Street (part of the Julian Realignment project).
- Autumn Street: Complete the realignment and extension between St. John Street and Coleman Avenue.

[1] This list was generated from VTA staff, Cities of San Jose and Santa Clara staff, the County's 2040 Expressway Plan, and VTP 2040.

- Autumn Street: Convert from a one-way (northbound) street to a two-way street between Santa Clara Street and Park Avenue. Autumn Street will become a four-lane street.
- Montgomery Street: Convert from a one-way (southbound) street to a two-way street between Santa Clara Street and San Fernando Street. Montgomery Street will remain a two-lane street.
- Montgomery Street: Create cul-de-sac at southerly end, just north of Park Avenue.
- King Road and McKee Road: Add a second eastbound left-turn lane.
- Eastbound SR 87 and Julian Street: Convert the existing northbound shared right-through lane to separate through and right-turn lanes; convert the existing westbound shared right-through lane to a dedicated right-turn lane.
- Montgomery Street and Santa Clara Street: Add a left-turn and a right-turn lane on the northbound approach; eliminate one of the existing westbound left-turn lanes.
- Autumn Street and Santa Clara Street: Add a southbound through lane and convert the existing southbound right-turn lane to shared right-through lane; add an eastbound right-turn lane; and add two westbound left-turn lanes and a separate westbound right-turn lane.
- Montgomery Street and San Fernando Street: Add an all-movement lane on the northbound approach and convert all intersection approaches to single all-movement lanes.
- Autumn Street and San Fernando Street: Convert the existing northbound shared left-through lane to a dedicated left-turn lane; add one left-turn, one through, and one shared right-through lane on the southbound approach; and convert the existing westbound through lane to a shared left-through lane.
- Montgomery Street and Park Avenue: This intersection will become Autumn Street and Park Avenue. Reconfigure intersection with one left, one through, and one shared right-through lane on the northbound approach; one left, one through, and one shared right-through lane on the southbound approach; one left and one shared right-through lane on the eastbound approach; and two left-turn and one shared right-through lane on the westbound approach.
- Bird Avenue and San Carlos Street: Add a second left-turn lane and convert the shared right-through lane to exclusive right-turn lane (reducing the number of through lanes by one) on the northbound approach; and eliminate one southbound through lane.
- Autumn Street and Julian Street: Reconfigure the northbound and southbound approaches to include one left-turn, one through, and one shared right-through lane.
- Lafayette Street and El Camino Real: Add second left-turn lanes on both the southbound and eastbound approaches.

- Coleman Avenue and Brokaw Road: Widen Coleman Avenue to accommodate a third southbound through lane.
- San Tomas Expressway and El Camino Real: Add second left-turn lanes on both the eastbound and westbound approaches.

The following list identifies road highway improvements that are assumed to be completed by 2035[2] in the corridor under the No Build Alternative.

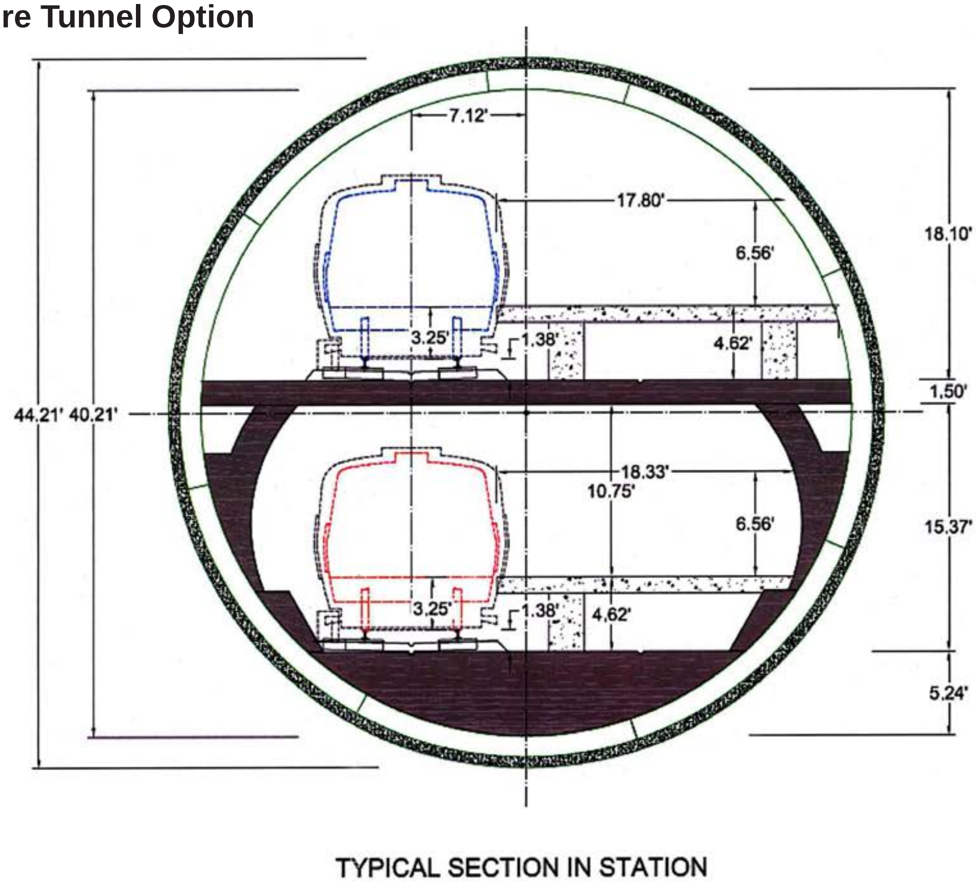
- I-280: Convert one mixed-flow lane to express lanes between U.S. 101 and Leland Avenue.
- I-680: Convert one mixed-flow lane to express lanes between Montague Expressway and U.S. 101.
- I-280: Downtown San Jose access improvements between 3rd and 7th Streets; reconstruct existing ramps at 7th and 4th Streets; eliminate existing off-ramp connection at 5th Street.
- I-280/Senter Road interchange: Extend Senter Road and construct new on-/off-ramps, and modify existing on-/off-ramps into a collector/distributor ramp system.
- U.S. 101 Southbound/Trimble Road/De La Cruz Boulevard/Central Expressway interchange: Modify existing loop cloverleaf ramp from Southbound U.S. 101 to Trimble Road into a partial cloverleaf ramp. Modify the Southbound U.S. 101 on-ramp from De La Cruz Boulevard/Central Expressway to one mixed-flow and one HOV lane with ramp meter. Widen the De La Cruz Boulevard bridge from four to six lanes.

2.2.2 NEPA BART Extension Alternative

The BART Extension Alternative consists of the approximately 6-mile extension of the BART system from the Berryessa BART Station in San Jose through downtown San Jose, terminating in Santa Clara near the Santa Clara Caltrain Station. There are two tunneling methodologies proposed to construct the BART Extension, the Twin-Bore and Single-Bore Options. Both options have a length of approximately 4.5 miles with the differences shown on Figure 2-2. The Twin-Bore Option tunnel diameter is approximately 20 feet, and the Single-Bore Option tunnel diameter is approximately 44 feet as depicted in Figure 2-4. The larger Single-Bore Option tunnel diameter requires the tunnel to be at a greater depth to reduce vertical settlement displacement. Therefore, stations are deeper and escalators, elevators, and stairways cover greater distances. The tunnel(s) would be lined with precast concrete segmental linings, which are installed behind the tunnel boring machine as it moves forward. These linings serve as permanent waterproof support for the tunnel(s). Chapter 5, Section 5.3.1 *Tunnel, Trackwork, and Ventilation Structures* provides additional descriptions of the tunnel boring options.

[2] This list was generated from VTA staff, Cities of San Jose and Santa Clara staff, the 2008 Santa Clara County Expressway Plan, and VTP 2040.

Single-Bore Tunnel Option



Twin-Bore Tunnel Option

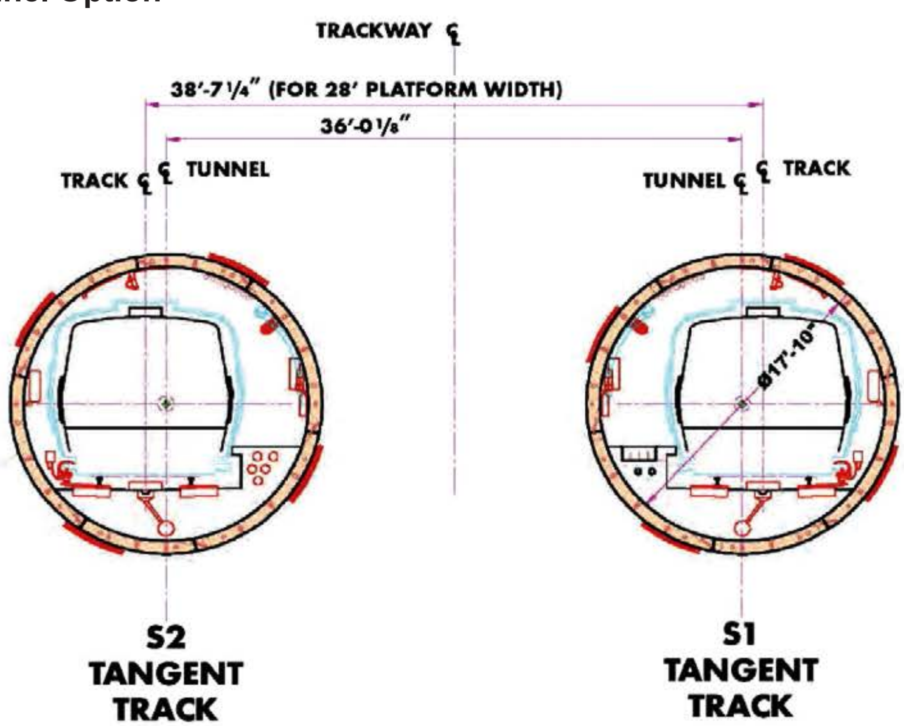


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Figure 2-4
Tunnel Options
VTA's BART Silicon Valley–Phase II Extension Project

The differences between the Twin-Bore and Single-Bore Options are described below. Where no differences are described, the project description applies to both tunnel boring options.

In order to provide maximum flexibility, both aboveground and belowground options will be evaluated in the environmental analysis. In order to optimize future joint development and ridership around the stations, the traction power substations in the three underground stations are located underground. VTA will work with BART and key joint development stakeholders to determine the final location. Where the facilities are placed underground they will be within the Single-Bore Option tunnel or within the Twin-Bore Option station box. Two BART lines are planned to serve the BART Extension Alternative: Santa Clara–Richmond, and Santa Clara–Daly City. The service level description that follows represents the combined service of these two lines in one direction. BART would operate every weekday from 4 a.m. to 1 a.m., with 6- to 12-minute average headways from 4 a.m. to 6 a.m., 6-minute peak to 7.5-minute average headways from 6 a.m. to 7 p.m., and 15- to 20-minute average headways after 7 p.m. Saturday BART service would be from 6 a.m. to 1 a.m., with 7.5- to 10-minute average headways from about 9 a.m. to 6:30 p.m., and 15- to 20-minute average headways before 9 a.m. and after 6:30 p.m. Sunday BART service would be from 8 a.m. to 1 a.m., with 15- to 20-minute headways all day. However, BART service levels are subject to refinement based on BART's updates to their systemwide operating plan. Approximately 48 new BART vehicles would be needed to accommodate these service levels and the 2035 Forecast Year ridership demand.

2.2.2.1 Alignment and Station Features by City

City of San Jose

Connection to Phase I Berryessa Extension

The BART Extension would begin where the Phase I tail tracks end. The at-grade Phase I tail tracks would be partially removed to allow for construction of the bored tunnels, East Tunnel Portal, and supporting facilities. The new tracks would be connected to the Phase I tracks to allow for future BART operation along the entire BART Silicon Valley corridor from southern Fremont to Santa Clara.

The alignment would transition from a retained-fill configuration east of U.S. 101 and south of Mabury Road near the end of the Phase I alignment into a retained-cut configuration and enter the East Tunnel Portal just north of Las Plumas Avenue (approximately STA 570+00).

South of the portal, the alignment would pass beneath North Marburg Way, then approximately 25 feet below the creek bed of Lower Silver Creek (STA 581+00) for the Twin-Bore Option, or approximately 30 feet for the Single-Bore Option, just to the east of U.S. 101 (STA 581+00), then curve under U.S. 101 south of the McKee Road overpass, and enter Alum Rock/28th Street Station.

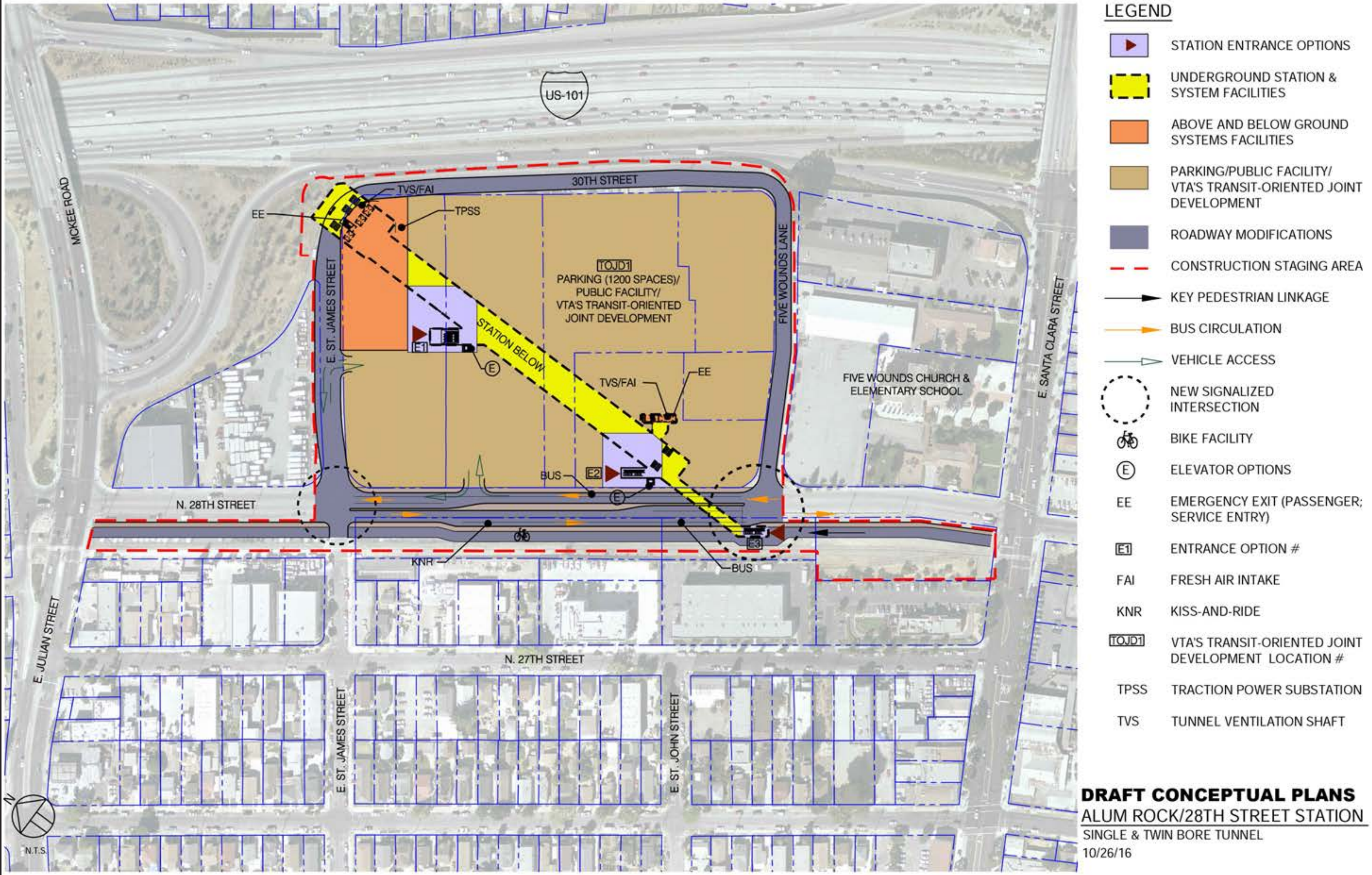
Alum Rock/28th Street Station

Alum Rock/28th Street Station would be located between U.S. 101 and North 28th Street (starting at approximately STA 600+00) and between McKee Road and Santa Clara Street. The approximately 11-acre station campus would include an underground station and aboveground facilities, such as a parking structure, systems facilities, and roadway improvements to North 28th Street as shown on Figure 2-5. The station would be underground with street-level entrance portals with elevators, escalators, and stairs covered by canopy structures. The station would have a minimum of two entrances. The number, location, and configuration of the station entrances would be finalized during final design based on BART Facilities Standards and ridership projections. Signage for all stations would comply with Metropolitan Transportation Commission's Regional Transit Wayfinding Guidelines and Standards.

A parking structure of up to seven levels would accommodate BART park-and-ride demand with 1,200 parking spaces. Areas for automobiles, shuttles, and buses to drop off passengers would be provided on North 28th Street and/or within the station campus.

Access to Alum Rock/28th Street Station would be primarily from McKee Road and North 28th Street at the north end of the station site, and from Santa Clara and North 28th Streets at the south end of the site. New or modified traffic signals would be provided at the intersections of North 28th Street and McKee Road, and North 28th and Santa Clara Streets. New traffic signals would also be provided in the station area on North 28th Street at St. James Street and at Five Wounds Lane for access to the parking structure and passenger loading areas. A pedestrian connection along the south side of the station campus at North 28th Street from Santa Clara Street would be designed as a pedestrian/bicycle/transit gateway into the station campus with amenities such as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting. This gateway would link the station with buses and Bus Rapid Transit (BRT) operating on Santa Clara Street and Alum Rock Avenue. Accommodations for the Five Wounds Trail would be provided along North 28th Street as part of station access improvements.

The station would include systems facilities such as electrical, ventilation, and communication equipment as shown on Figure 2-5 and described in Section 2.2.2.2. Systems facilities include a Traction Power Substation (TPSS), Train Control Communications Room (TCCR), an auxiliary power substation, and an emergency generator. Systems facility sites within public view would be surrounded by an approximately 9-foot-high concrete block (CMU) wall, and sites outside of public view would be surrounded by a 9-foot-high fence. Under the Twin-Bore and Single-Bore Options, most of these system facilities would be located underground; however, these systems facilities may also be located aboveground. If aboveground, access to the aboveground systems facilities and parking areas for service vehicles would be restricted by access gates.



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Source: VTA, 2016.

Figure 2-5
Alum Rock/28th Street Station Plan (Twin-Bore and Single-Bore)
VTA's BART Silicon Valley–Phase II Extension Project

The station would include emergency exhaust ventilation facilities and at least three ventilation shafts as shown on Figure 2-5. Fresh air intake/exhaust hatches at grade would be near the emergency ventilation facilities.

From Alum Rock/28th Street Station, the alignment would curve under North 28th Street, North 27th Street, and North 26th Street before aligning under Santa Clara Street (STA 620+00). The alignment would continue under the Santa Clara Street right-of-way (ROW) until the alignment approaches Coyote Creek (STA 644+00).

Tunnel Alignment near Coyote Creek

For the Twin-Bore Option, the alignment would transition north of Santa Clara Street beginning just west of 22nd Street and pass approximately 20 feet beneath the creekbed of Coyote Creek to the north of Santa Clara Street and avoid the Coyote Creek/Santa Clara Street bridge foundations. The alignment would transition back into the Santa Clara Street ROW near 13th Street, west of Coyote Creek. However, for the Single-Bore Option, the alignment would continue directly under Santa Clara Street and pass approximately 55 feet beneath the creekbed of Coyote Creek and approximately 20 feet below the existing bridge foundations.

13th Street Ventilation Structure

A systems facility site would be located at the northwest corner of Santa Clara and 13th Streets. This site would include a tunnel ventilation structure, which would be an aboveground structure with an associated ventilation shaft and is described in Section 2.2.2.2.

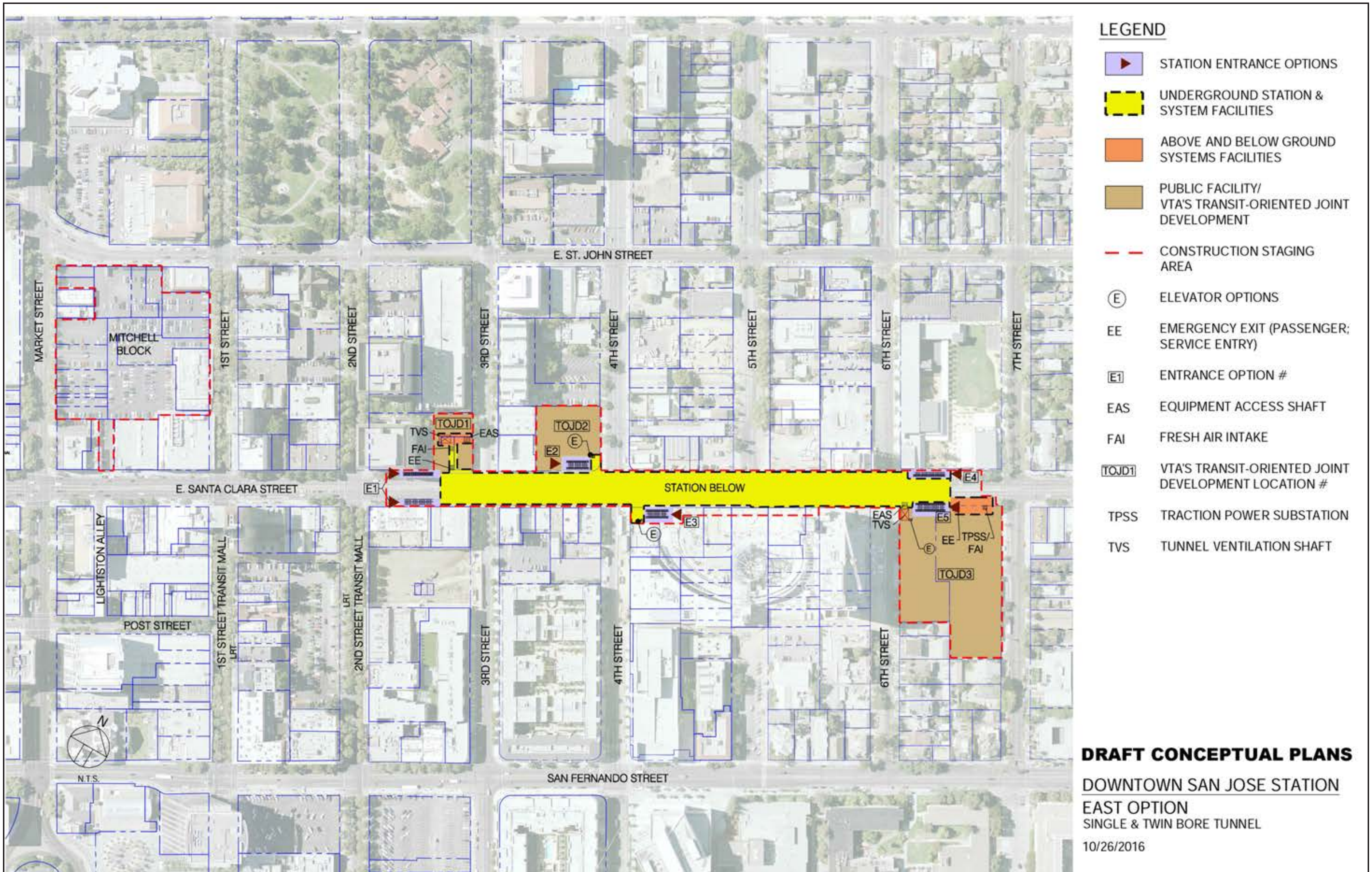
Downtown San Jose Station

There are two station location options for the Downtown San Jose Station: the Downtown San Jose Station East Option and the Downtown San Jose Station West Option, as described in detail below. The alignment for this area would be the same irrespective of the station option.

Downtown San Jose Station East Option

The alignment would continue beneath Santa Clara Street to the Downtown San Jose Station East Option. Under the Twin-Bore Option, crossover tracks would be located east of the Downtown San Jose Station between 7th and 5th Streets (within the cut-and-cover box). Under the Single-Bore Option, the crossover tracks would be located east of the station between 9th and 5th Streets. The station would not have dedicated park-and-ride facilities.

The Downtown San Jose Station East Option would be located between 5th and 2nd Streets as shown on Figure 2-6. The station would consist of boarding platform levels and some systems facilities within the tunnel beneath Santa Clara Street, as well as entrances at street level.



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Source: VTA, 2016.

Figure 2-6
Downtown San Jose Station East Option Station (Twin-Bore and Single-Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Elevators, escalators, and stairs that provide pedestrian access to the mezzanine would be at station portal entrances as shown on Figure 2-6. Escalators and stairs would be covered by canopy structures. Several station portal entrance location options in sidewalks along Santa Clara Street between 2nd and 7th Streets are being evaluated. The station would have a minimum of two entrances. Stairs and up/down escalators would be provided at each of the entrances. Elevators would be provided at each station near each end. The number, location, and configuration of station entrances would be finalized during final design and based on BART Facilities Standards and ridership projections.

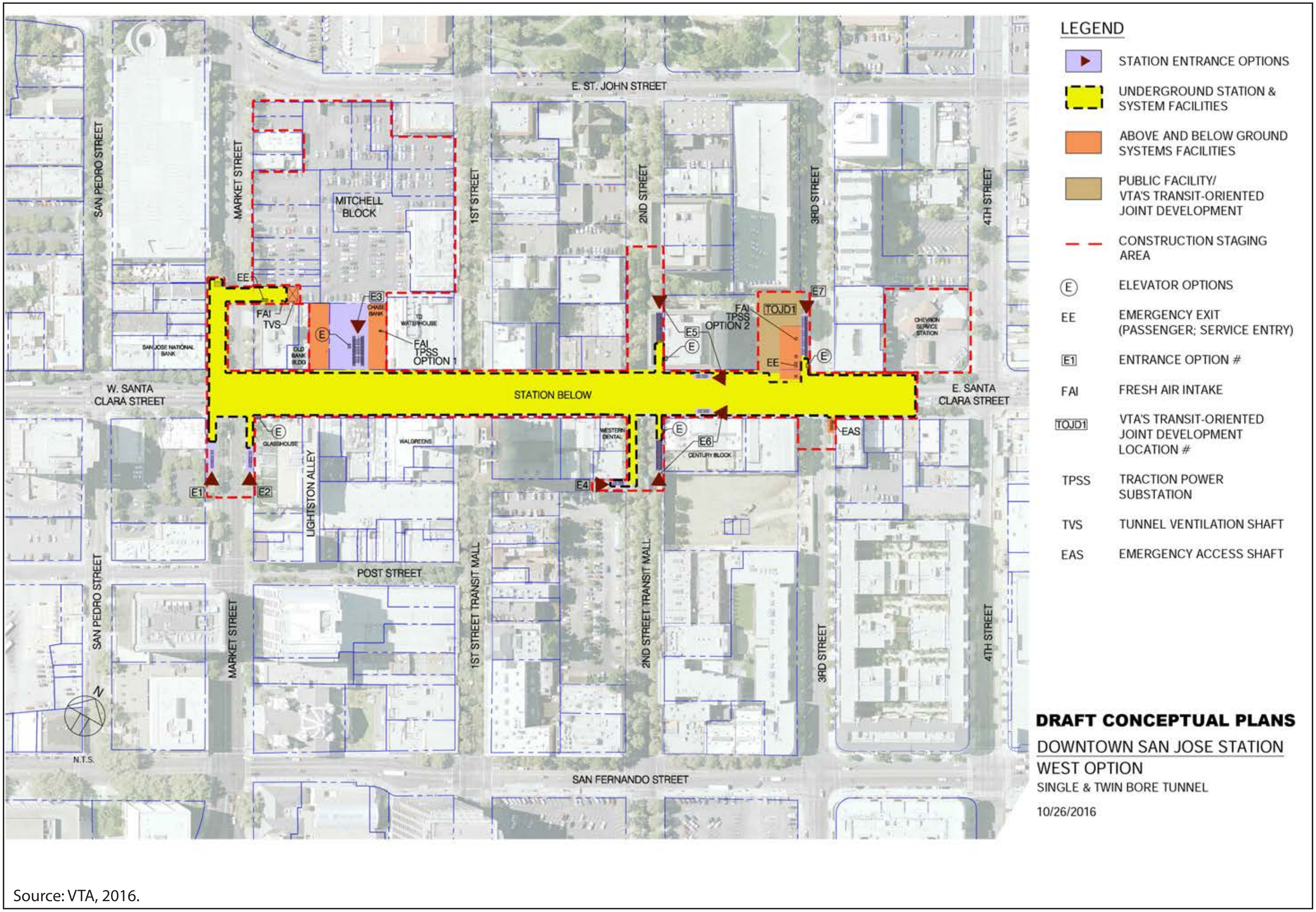
Systems facilities would be located aboveground and underground as shown on Figure 2-6 and would include a TPSS, an auxiliary power substation, ventilation facilities, and a TCCR. Under the Twin-Bore and Single-Bore Options, most of these system facilities would be located underground; however, these systems facilities may also be located aboveground. The station would also include emergency exhaust ventilation facilities with ventilation shafts and fresh air intake/exhaust hatches as shown on Figure 2-6.

Streetscape improvements would be provided along Santa Clara Street between 7th and 1st Streets to create a pedestrian corridor connecting San Jose City Hall and San Jose State University with the Downtown Commercial District. Streetscape improvements would be guided by San Jose's Master Streetscape Plan.

Downtown San Jose Station West Option

The alignment would continue beneath Santa Clara Street to the Downtown San Jose Station West Option. Crossover tracks for the Twin-Bore Option would be located east of the Downtown San Jose Station between 2nd and 4th Streets (within the cut-and-cover box. Under the Single-Bore Option, the crossover tracks would be located east of the station between 7th and 2nd Streets. The station would not have dedicated park-and-ride facilities.

The Downtown San Jose Station West Option would be located between 2nd and Market Streets as shown on Figure 2-7. The station would consist of boarding platform levels and some systems facilities within the tunnel beneath Santa Clara Street, and entrances at street level as shown on Figure 2-7. Elevators, escalators, and stairs that provide pedestrian access to the mezzanine level would be at station portal entrances. Escalators and stairs would have canopy structures. Several station entrance location options within sidewalks along Santa Clara Street and cross streets between Market and 3rd Streets are being evaluated. The station would have a minimum of two entrances. Stairs and up/down escalators would be provided at each of the entrances. Elevators would be provided near each end of the station. The number, location, and configuration of station entrances would be finalized during final design and based on BART Facilities Standards and ridership projections.



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Source: VTA, 2016.

Figure 2-7
Downtown San Jose Station West Option Plan (Twin-Bore and Single-Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Systems facilities would be located aboveground and underground as shown on Figure 2-7 and would include a TPSS, an auxiliary power substation, ventilation facilities, and a TCCR. Under the Twin-Bore and Single-Bore Options, most of these system facilities would be located underground; however, these systems facilities may also be located aboveground. The station would also include emergency exhaust ventilation facilities with ventilation shafts and fresh air intake/exhaust hatches as shown on Figure 2-7.

Tunnel Alignment into Diridon Station

There are two station location options at Diridon Station: the Diridon Station South Option and the Diridon Station North Option, as described in detail below. The alignment into Diridon Station varies between the Diridon Station North and South Options and between the Twin-Bore and Single-Bore Options for the tunnel as described below and as shown in Appendices B and C.

Tunnel Alignment into Diridon Station South Option

The alignment would continue from the Downtown San Jose Station beneath Santa Clara Street and shift south beginning just west of South Alamaden Boulevard to pass between the SR 87 bridge foundations. For the Twin-Bore Option, the alignment would pass 40 feet below the riverbed of the Guadalupe River and a retaining wall west of the river, and over 20 feet below the creekbed of Los Gatos Creek. For the Single-Bore Option, the alignment would pass 50 feet below the riverbed of the Guadalupe River, the retaining wall, and the creekbed of Los Gatos Creek. After passing under Los Gatos Creek, the alignment for both options would enter the Diridon Station between Los Gatos Creek and Autumn Street.

Tunnel Alignment into Diridon Station North Option

Under the Twin-Bore Option, the alignment would continue beneath Santa Clara Street and shift south beginning just west of South Almaden Boulevard to pass between the SR 87 bridge foundations. The alignment would then pass 45 feet below the riverbed of the Guadalupe River and a retaining wall, then veer back north to a location just south of and adjacent to Santa Clara Street. The alignment passes 25 feet below the creekbed of Los Gatos Creek. After passing under Los Gatos Creek, the alignment would enter Diridon Station under Autumn Street and directly south of Santa Clara Street. The Diridon Station North Option is closer to Santa Clara Street in comparison to the South Option.

Under the Single-Bore Option, the alignment would continue beneath Santa Clara Street, continue 50 feet below the riverbed of the Guadalupe River and 50 feet below the creekbed of Los Gatos Creek. After passing under Los Gatos Creek, the alignment would shift north and enter Diridon Station between Autumn and Montgomery Streets, directly south of Santa Clara Street. The Diridon Station North Option is closer to Santa Clara Street in comparison to the South Option.

Diridon Station

There are two station location options for the Diridon Station: the Diridon Station South Option and the Diridon Station North Option, as described in detail below. The alignment varies by station location.

Diridon Station South Option

The Diridon Station South Option would be located between Los Gatos Creek to the east, the San Jose Diridon Caltrain Station to the west, Santa Clara Street to the north, and West San Fernando Street to the south as shown on Figure 2-8. The station would consist of a boarding platform level, a mezzanine level, and entrances at street-level portals. Entrances would have elevators, escalators, and stairs covered by canopy structures.

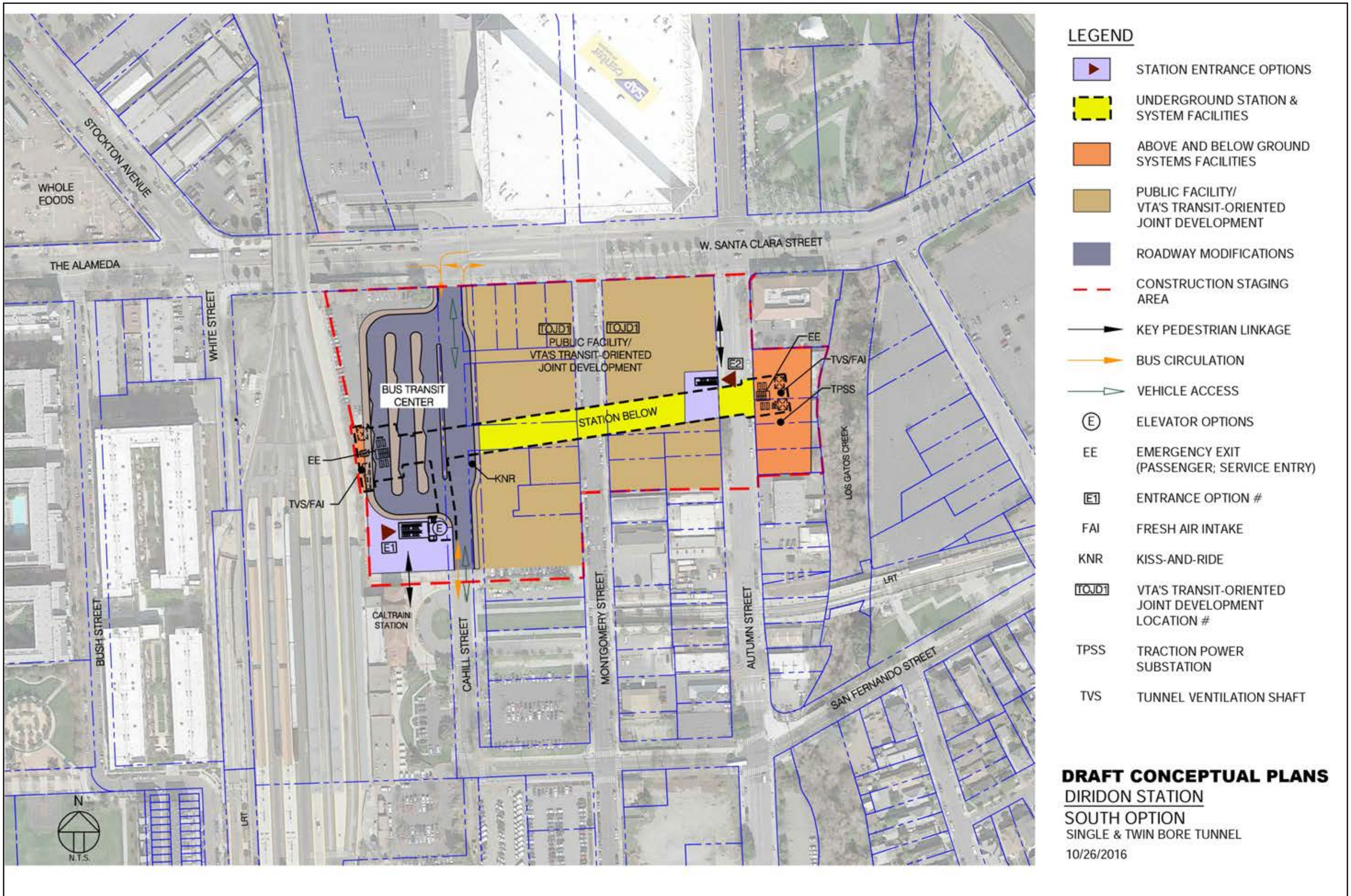
The station would have a minimum of two entrances. Stairs and up/down escalators would be provided at each of the entrances. Two elevators would be provided at each station, generally one near each end. The number, location, and configuration of station entrances would be finalized during final design and based on BART Facilities Standards and ridership projections.

An existing VTA bus transit center would be reconfigured for better access and circulation to accommodate projected bus and shuttle transfers to and from the BART station. Kiss-and-ride facilities would be located along Cahill Street. No park-and-ride parking would be provided.

Access to the station would be from Santa Clara Street from the north and from West San Fernando Street from the south. Street-level station entrance portals would provide pedestrian linkages to the Diridon Caltrain Station and SAP Center.

Systems facilities would be located aboveground and underground as shown on Figure 2-8 and would include a TPSS, an auxiliary power substation, ventilation facilities, associated ventilation shafts, and a TCCR. Under the Twin-Bore and Single-Bore Options, most of these system facilities would be located underground; however, these systems facilities may also be located aboveground. The station would also include emergency exhaust ventilation facilities with ventilation shafts and fresh air intake/exhaust hatches as shown on Figure 2-8. System facility sites within public view would be surrounded by an approximately 9-foot-high CMU wall, and sites outside of public view would be surrounded by a 9-foot-high fence. Access to the aboveground systems facilities and parking areas for service vehicles would be restricted by access gates.

West of the station, the alignment for both the Twin-Bore and Single-Bore Options would continue beneath the Diridon Caltrain Station train tracks and White Street. The alignment would then turn towards the north, crossing under The Alameda at Cleaves Avenue and under West Julian Street at Morrison Avenue before aligning under Stockton Avenue (STA 780+00).



Source: VTA, 2016.

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Figure 2-8
Diridon Station South Option Plan (Twin-Bore and Single-Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Diridon Station North Option

Under the Twin-Bore Option, the Diridon Station North Option would be located between Autumn Street to the east, the Caltrain tracks to the west, Santa Clara Street to the north, and West San Fernando Street to the south as shown on Figure 2-9.

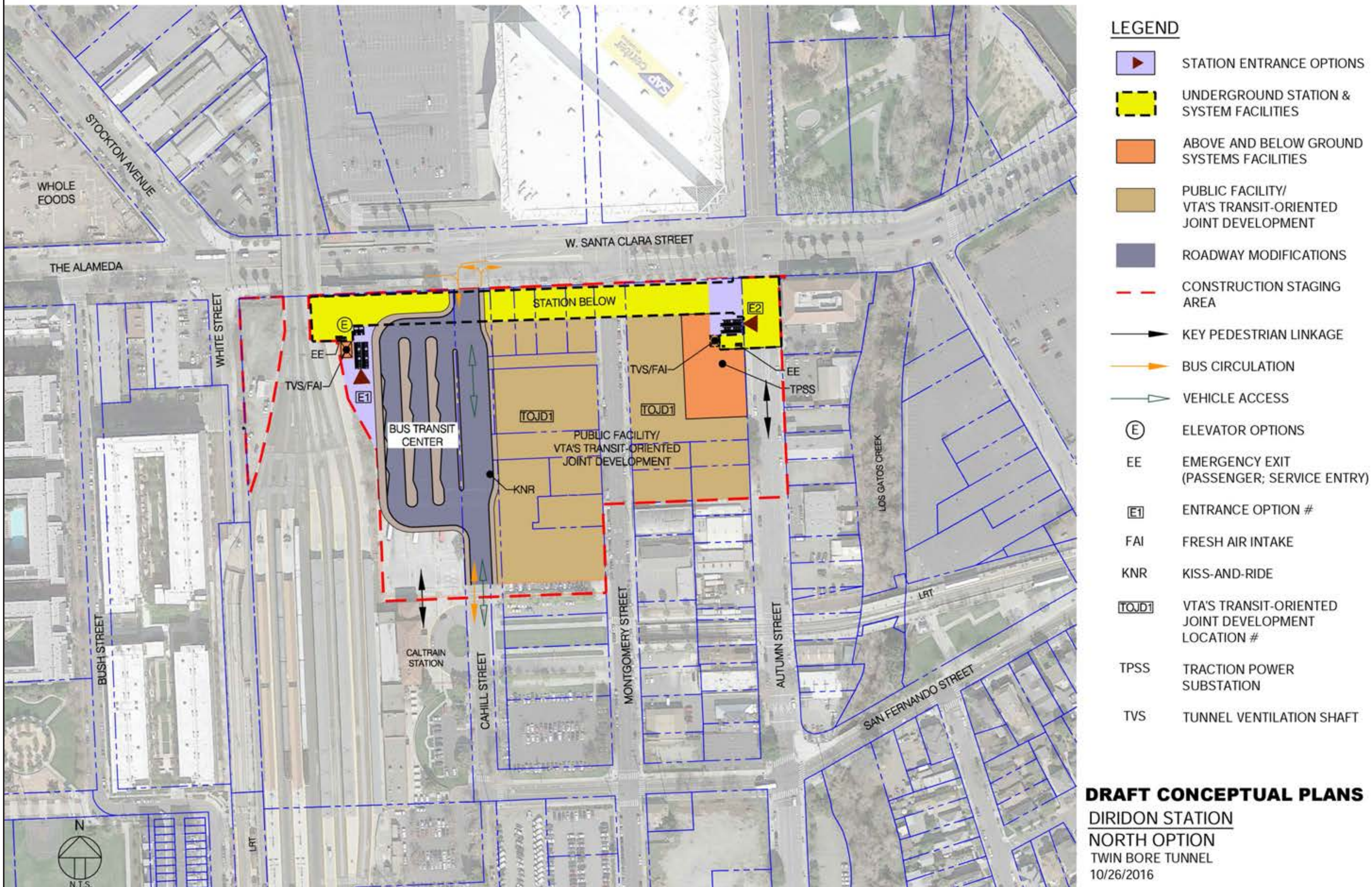
Under the Single-Bore Option, the Diridon Station North Option would be located between Autumn Street to the east, White Street to the west, Santa Clara Street to the north, and West San Fernando Street to the south as shown on Figure 2-10.

The station would be located underground and adjacent to, and just south of, Santa Clara Street. The station would consist of a boarding platform level, a mezzanine level, and entrances at street-level portals. Access to the station would be from Santa Clara Street. Street-level station entrance portals would provide pedestrian linkages to the Diridon Caltrain Station and SAP Center. Entrances would have elevators, escalators, and stairs covered by canopy structures. The station would have a minimum of two entrances. Stairs and up/down escalators would be provided at each of the entrances. Elevators would be provided at each station near each end as shown on Figure 2-9. The number, location, and configuration of station entrances would be finalized during final design based on BART Facilities Standards and ridership projections.

An existing VTA bus transit center would be reconfigured for better access and circulation to accommodate projected bus and shuttle transfers to and from the BART station. Kiss-and-ride facilities would be located along Cahill Street. No park-and-ride parking would be provided.

Systems facilities would be located aboveground and underground as shown on Figure 2-9 for the Twin-Bore Option and Figure 2-10 for the Single-Bore Option and would include a TPSS, an auxiliary power substation, ventilation facilities, associated ventilation shafts, and a TCCR. Under the Twin-Bore and Single-Bore Options, most of these system facilities would be located underground; however, these systems facilities may also be located aboveground. The station would also include emergency exhaust ventilation facilities with ventilation shafts and fresh air intake/exhaust hatches as shown on Figure 2-9. System facility sites within public view would be surrounded by an approximately 9-foot-high CMU wall, and sites outside of public view would be surrounded by a 9-foot-high fence. Access to the aboveground systems facilities, and parking areas for service vehicles would be restricted by access gates.

Under the Twin-Bore Option, west of the station, the alignment would continue beneath the Diridon Caltrain Station train tracks and White Street. The alignment would then turn towards the north, crossing under The Alameda at Wilson Avenue and under West Julian Street at Cleaves Street before aligning under Stockton Avenue (STA 775+00).



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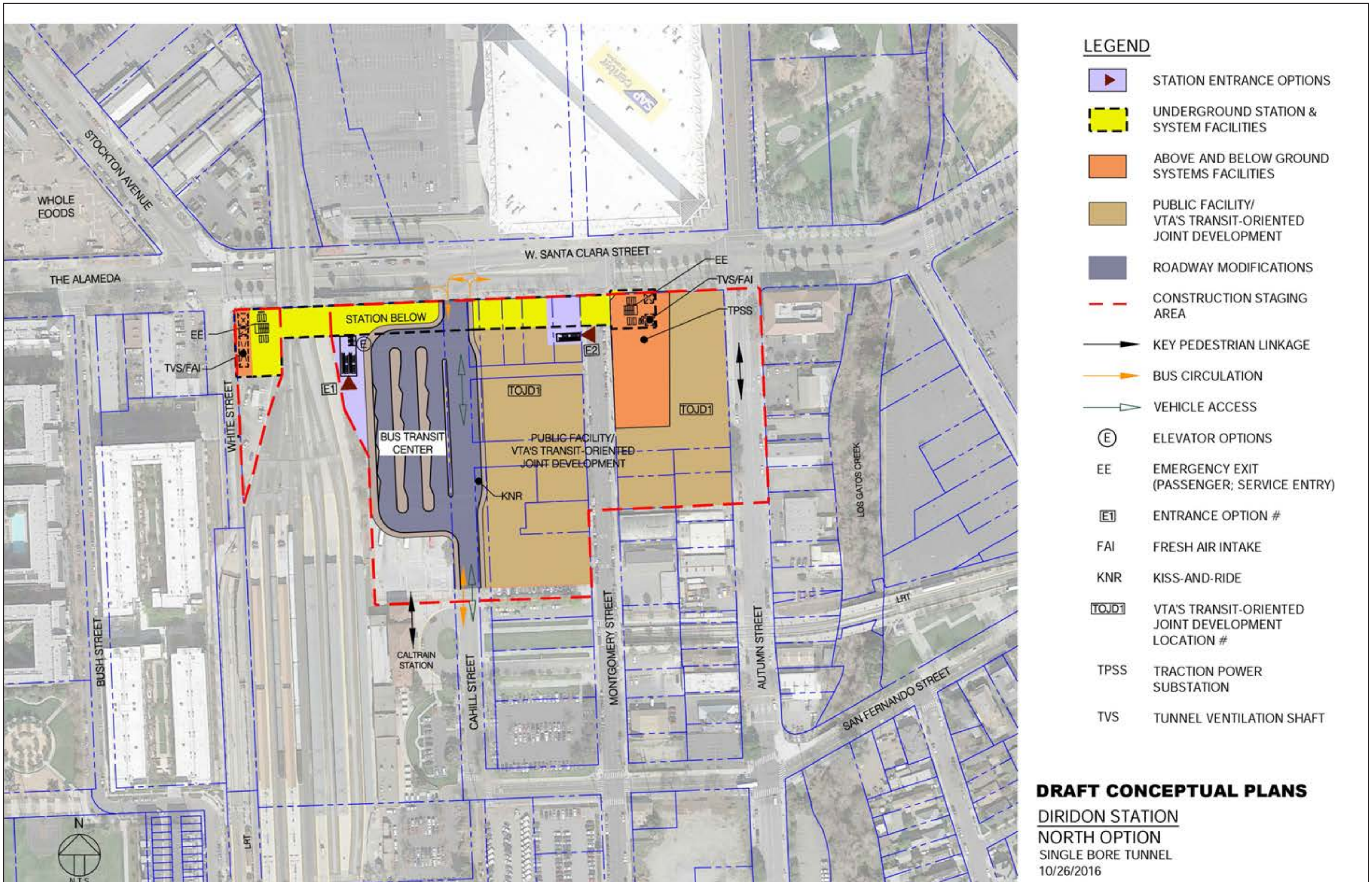
Source: VTA, 2016.

Figure 2-9
Diridon Station North Option Plan (Twin-Bore)
VTA's BART Silicon Valley–Phase II Extension Project



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Source: VTA, 2016.

Figure 2-10
Diridon Station North Option Plan (Single-Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Under the Single-Bore Option, west of the station, the alignment would continue under White and Bush Streets south of The Alameda. The alignment would then turn towards the north, crossing under The Alameda at Sunol Street and under West Julian Street at Morrison Avenue before aligning under Stockton Avenue (STA 780+00).

Tunnel Alignment along Stockton Avenue

Around Pershing Avenue, all of the options—the Twin-Bore and Single-Bore Options and the Diridon Station South and North Options—converge back onto the same alignment under Stockton Avenue, The alignment is the same for all four options mentioned above after Pershing Avenue; however, the station numbering is different between the Diridon Station South and North Options because the alignment for the Diridon Station North Option is slightly “shorter” than the South Option as shown on Appendices B and C. On the east side of Stockton Avenue between Schiele Avenue and West Taylor Street, there are three alternate locations for a systems facility site that would house a tunnel ventilation structure, auxiliary power substation, and a gap breaker station (Twin Bore: STA 780+00 to STA 793+00, Single Bore: 785+00 to 798+00) as described in Section 2.2.2.2. Sites within public view would be surrounded by an approximately 9-foot-high CMU wall, and sites outside of public view would be surrounded by a 9-foot-high fence. Access to the aboveground systems facilities and parking areas for service vehicles would be restricted by access gates.

The alignment would continue north and cross under the Caltrain tracks (STA 807+00) and Hedding Street (STA 813+00). The alignment would continue on the east side of the Caltrain tracks and cross under Interstate (I-) 880 before ascending and exiting the West Tunnel Portal near Newhall Street (Single Bore: STA 835+00, Twin Bore: 833+00).

A high-voltage substation, TPSS, and TCCR would be located at a systems facility site above the West Tunnel Portal and near Pacific Gas & Electric Company’s (PG&E’s) FMC Substation as described in Section 2.2.2.2. A 115-kiloVolt (kV) line from PG&E’s existing FMC substation would serve the high-voltage substation. There are two alternate routes for this 115-kV line connection. The first alternate route would begin at the high-voltage substation, run north to Newhall Street, then run east on upgraded poles along Newhall Street, then south on an existing line along Stockton Avenue. A second alternate route would also run north to Newhall Street and then run east on upgraded poles along Newhall Street, but a new line would be constructed to traverse the PG&E substation site. The 115-kV line would require approximately 80- to 115-foot-high galvanized tapered tubular steel towers or wood poles spaced approximately every 150 to 300 feet.

Crossover tracks would be located in the retained-cut trench just outside the West Tunnel Portal (Single Bore: STA 833+00, Twin Bore: STA 831+00 (Diridon North Option) and STA 836+00 (Diridon South Option). The alignment would transition to be at grade (Twin Bore: STA 844+00 and Single Bore: STA 848+00) as it enters the Newhall Maintenance Facility and the Santa Clara Station to the north.

City of Santa Clara

The BART Extension Alternative in Santa Clara would consist of the Newhall Maintenance Facility and the Santa Clara Station. The San Jose/Santa Clara boundary is located approximately midway through the Newhall Maintenance Facility.

Newhall Maintenance Facility

The Newhall Maintenance Facility would begin north of the West Tunnel Portal at Newhall Street in San Jose and extend to De La Cruz Boulevard near the Santa Clara Station in Santa Clara as shown in Figure 2-11. A single tail track would extend north from the Santa Clara Station and cross under the De La Cruz Boulevard overpass and terminate on the north side of the overpass. A systems facility is located north of Brokaw Road that includes a radio tower, traction power substation, and auxiliary power substation.

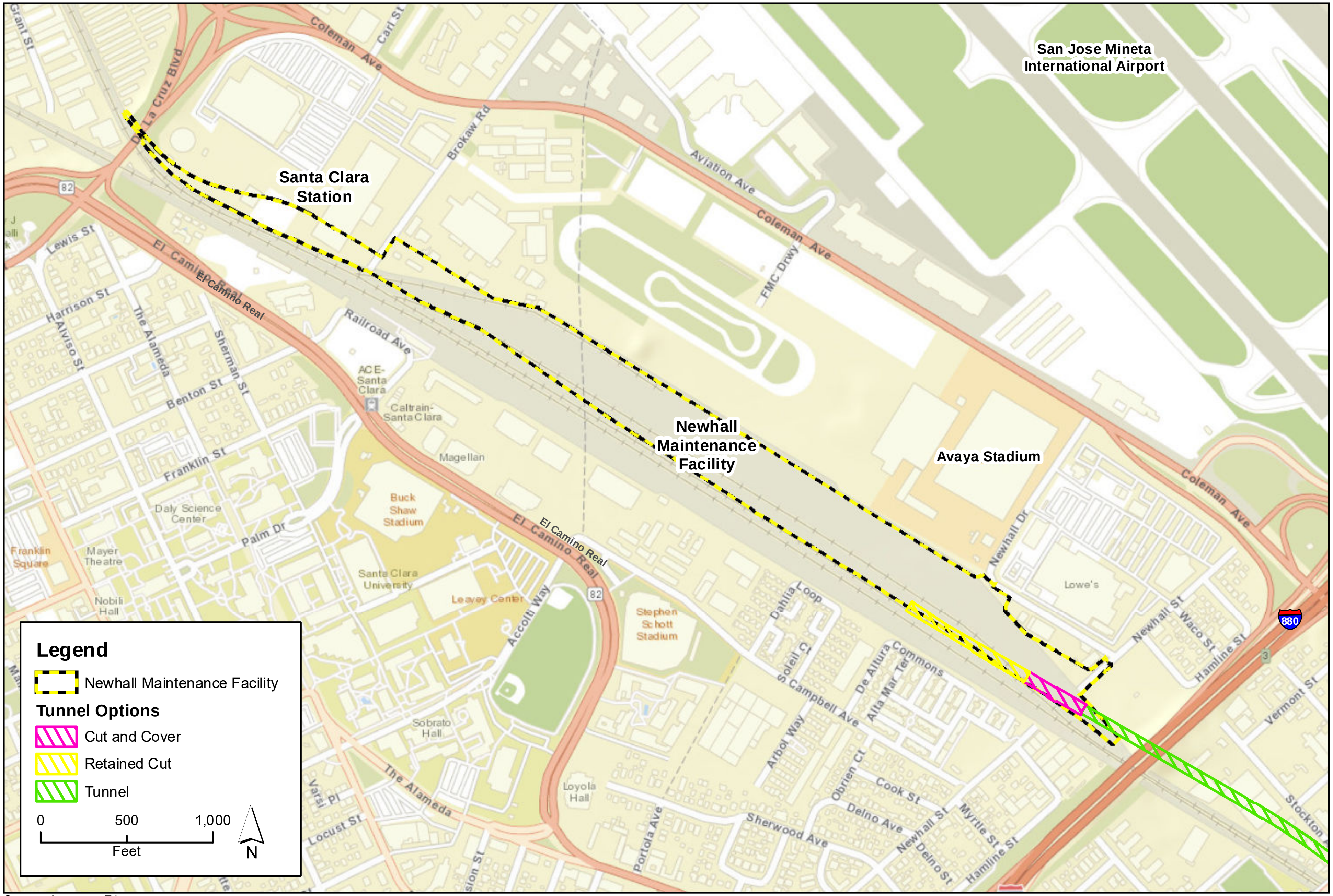
The maintenance facility would be constructed on the former Union Pacific Railroad (UPRR) Newhall Yard that was purchased by VTA in 2004 and has been cleared of all structures. The main entrance to the facility would be from Newhall Drive. Other secured entrances would be provided at various locations for employees and emergency personnel. The site would include service roads to all buildings and approximately 225 onsite parking spaces for employees, authorized visitors, and delivery and service vehicles. The layout of the facility is provided in Appendix B.

The maintenance facility would serve two purposes: (1) general maintenance, running repairs, and storage of up to 200 BART revenue vehicles and (2) general maintenance of non-revenue vehicles. The facility would also include maintenance and engineering offices and a yard control tower. To provide for these functions, several buildings and numerous transfer and storage tracks would be constructed.

The following systems facilities would be located in the maintenance facility: a TPSS (11,000 square feet and 12 feet high), an auxiliary power substation (3,000 square feet and 12 feet high), two gap breaker stations (one 3,800 square feet and 12 feet high, and the other 3,200 square feet and 12 feet high), and a TCCR (3,300 square feet and 35 feet high).

System facility sites within public view would be surrounded by an approximately 9-foot-high CMU wall, and sites outside of public view would be surrounded by a 9-foot-high fence. The systems site would require two access points with gates and internal parking areas for service vehicles. An approximately 150-foot-high radio tower and an associated equipment shelter would be located within the systems site north of Brokaw Road.

Provisions would be made in the maintenance facility area for storage of maintenance equipment and supplies. Two detention basins, one in each city, would be constructed to retain and provide controlled release of stormwater into the respective city’s storm drain systems.



Source: Imagery, ESRI 2016

Figure 2-11
Newhall Maintenance Facility
VTA's BART Silicon Valley – Phase II Extension Project

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Specific features of the Newhall Maintenance Facility are described below.

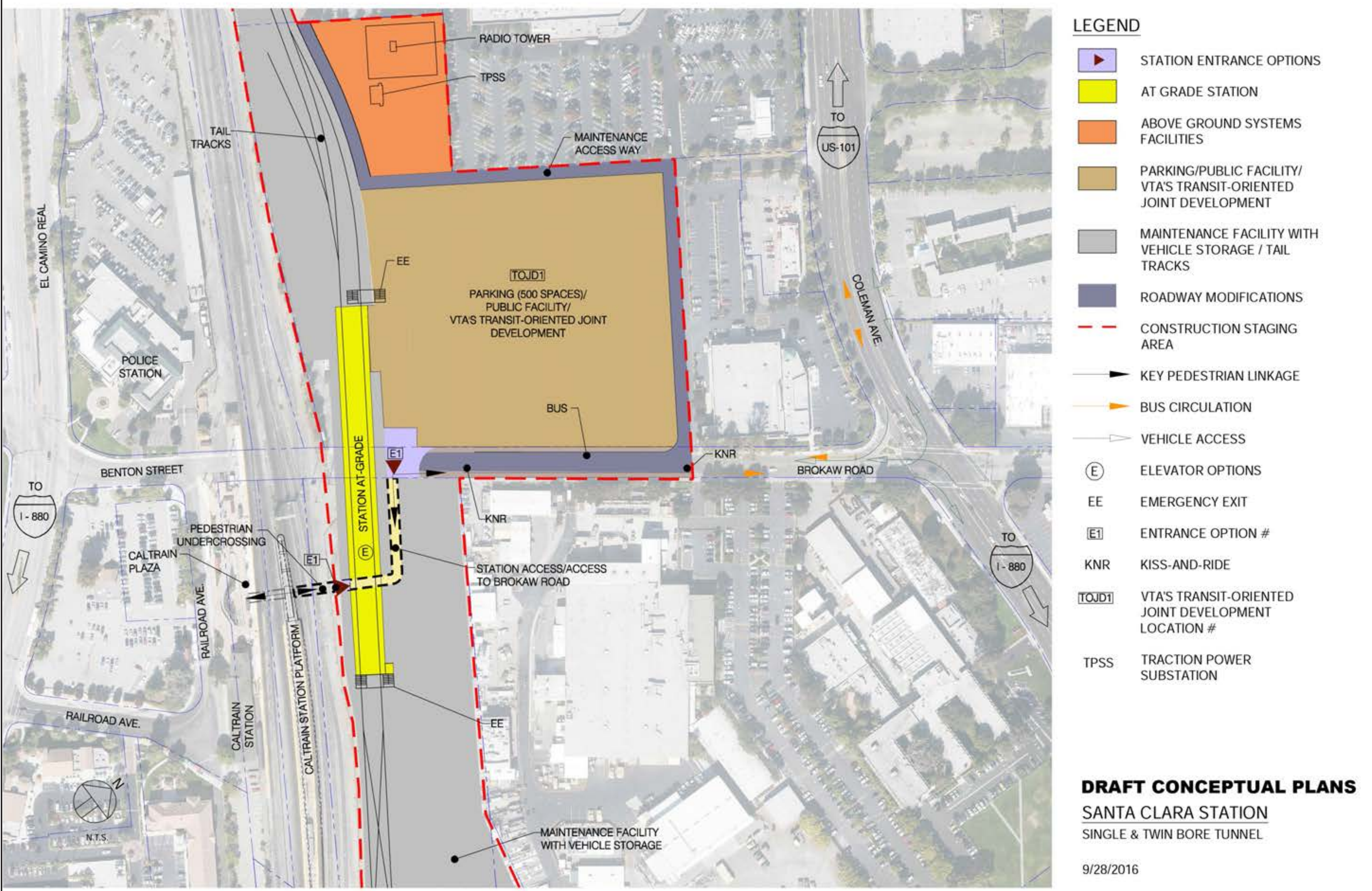
- **Train Car Washer.** The train car washer would be an open-ended building with an automated vehicle washing machine. As each train returns to the yard for storage, it would be driven through the car washer, where the exterior would be cleaned.
- **Yard Control Tower.** The yard control tower would be approximately three stories in height. The tower would be situated to have a view of train operations in the maintenance yard area. Employees staffing the tower would control the majority of train movements within the yard area, while shop area movements would be made under local control.
- **Inspection Pit.** The inspection pit would be enclosed in a shed and open at each end to allow trains to travel over a depressed pit so that the underside of trains could be inspected.
- **Blowdown Facility.** The blowdown facility would be used primarily for cleaning the underside of trains in a combined wet and dry process in preparation for scheduled inspections. The cleaning operation would be performed within a service pit.
- **Wheel Truing Facility.** The wheel truing facility would be located next to the revenue vehicle maintenance shop. The primary function of this facility would be to enclose the wheel truing pit and equipment to facilitate the maintenance and repair of BART vehicle wheel sets.
- **Revenue Vehicle Maintenance Shop.** The revenue vehicle maintenance shop would be approximately 70,000 square feet. Tracks would lead to and through the building. Vehicle car lifts, bridge cranes, and jib cranes would be located within the first floor of the shop. The second floor would be primarily for administration offices. The major functions carried out in the shop would include car inspections and repairs, parts storage, heavy component repairs, electro-mechanical repairs, and electronic repairs.
- **Vehicle Turntable.** The approximately 85-foot-diameter vehicle turntable would be located on a spur track close to the storage tracks. The vehicle turntable would be used for turning cars that must be oriented in the correct direction before they are added to a consist (a group of rail vehicles that make up a train).
- **Non-revenue Vehicle Maintenance Shop and Maintenance and Engineering Offices.** The non-revenue vehicle maintenance facility would be for maintenance of non-revenue service vehicles, such as rubber-tired vehicles, and cars for the maintenance of track and equipment. The facility would contain maintenance bays for rubber-tired vehicles, a service bay with a depressed pit for train maintenance, and a storage area for replacement parts. It would also contain an overhead crane, vehicle hoists, and diagnostic repair equipment.
- **Material Storage Area.** The material storage area would be utilized to store maintenance equipment and stockpile supplies.

- **Train Control House.** The train control house would be a one-story building located within the maintenance facility.
- **Gap Breaker Station.** The maintenance facility gap breaker station would be located adjacent to the train control house.
- **Radio Tower.** An approximately 150-foot-high radio tower and associated equipment shelter would be located near the traction power substation.
- **High-Voltage Substation.** A High-Voltage Substation and Switching Station would be located in the north east corner of the maintenance facility.

Santa Clara Station

The closest streets to the Santa Clara Station would be De La Cruz Boulevard to the northwest, Coleman Avenue to the northeast and Brokaw Road to the east. The station would be at grade, centered at the west end of Brokaw Road, and would contain an at-grade boarding platform with a concourse one level below (Figure 2-12). Access to the boarding platform would be provided via elevators, escalators, and stairs covered by canopy structures. A pedestrian underpass would connect from the concourse level of the BART station to the Santa Clara Caltrain plaza. In addition, a pedestrian underpass would connect from the station concourse level to a new BART plaza near Brokaw Road. Kiss-and-ride, bus, and shuttle loading areas would be provided on Brokaw Road. Brokaw Road would be widened, and the intersection of Coleman Avenue and Brokaw Road would be reconfigured.

A parking structure of up to five levels would be located north of Brokaw Road and east of the Caltrain tracks within the approximately 10-acre station area and would accommodate 500 BART park-and-ride parking spaces in addition to public facilities on the site. Vehicular access to the parking structure would be provided from Brokaw Road. Pedestrian access from the parking structure to the Santa Clara BART Station would be provided by a pedestrian tunnel from Brokaw Road to the below-grade BART concourse level.



Graphics ... 00332.13 (10-31-2016)

Source: VTA, 2016.

Figure 2-12
Santa Clara Station (Twin-Bore and Single-Bore)
VTA's BART Silicon Valley–Phase II Extension Project

2.2.2.2 Description of NEPA BART Extension Alternative Auxiliary Features

This section describes various features of the NEPA BART Extension Alternative to assist the reader's understanding of the electrical, communication, cross passages, ventilation, and pump facilities required to operate the transit system. Definitions for the terms used in this chapter and throughout this SEIS/SEIR are included in Chapter 12, *Definitions, Abbreviations, and Acronyms*.

Electrical Facilities

Several types of electrical facilities are required to provide power to BART trains, stations, and associated facilities. High-voltage substations transform 115-kV AC power distributed from PG&E to 34.5kV AC power that is then distributed to the dual 34.5kV sub-transmission cable system (two sets of cables on the guideway that deliver this intermediate voltage to various locations throughout the system such as the traction power substations). Traction power substations convert the 34.5kV power to 1,000-volt (V) DC power that is then distributed to the BART third rail (also called the contact rail). Switching and sectionalizing stations control power on the 34.5-kV sub-transmission system. The switching stations are co-located with the high-voltage substations, and the sectionalizing stations are between these locations and co-located with traction power substations.

High-Voltage Substations and Switching Stations

High-voltage substations transform 115-kV AC power distributed from PG&E to 34.5-kV AC power that is then distributed to the dual 34.5-kV sub-transmission cable system. High-voltage substations include outdoor type equipment consisting of power utility interface equipment, such as a disconnect switch; metering potential and current transformers; a revenue metering facility; a 115-kV, outdoor-type power circuit breaker; a power transformer; a 34.5-kV indoor-type power circuit breaker; and electrical auxiliary equipment, protection relays, meters, telemetering devices, and supervisory control and data acquisition system (SCADA).

Switching stations consist of 34.5-kV metal-clad, walk-in-type switchgear circuit breakers, protection relays and meters, and SCADA, all of which are used for switching, distribution, and protection of the dual 34.5kV sub-transmission cable system.

High-voltage substations would require installation of high-voltage (115-kV) power feed lines connecting to nearby existing PG&E towers and lines or to PG&E substations. Permanent overhead or underground easements would be required for the 115-kV lines. Site dimensional requirements would vary based on site-specific requirements and where sites would be combined with other facilities such as traction power substations and train control buildings. However, approximate dimensional requirements are 75 by 190 feet and 20 feet in height for high-voltage substations and 30 by 60 feet and 20 feet in height for switching stations. Some sites would require construction of an access road.

Traction Power Substations and Sectionalizing Stations

Traction power substations provide the power required to run BART trains on the mainlines, storage tracks, and maintenance facility tracks. These substations transform 34.5-kV AC to 1,000-V DC for distribution through BART's electrified third rail (also called the contact rail). Traction power substations include both outdoor and indoor equipment. The equipment consists of 34.5-kV AC metal clad walk-in type switchgear, transformer-rectifier assemblies, 1,000-V DC switchgear circuit breakers, control equipment, electrical auxiliary equipment, protection relays, meters and telemetering devices, SCADA, and connecting AC and DC power and control cables.

Sectionalizing stations consist of metal-clad, walk-in-type 34.5-kV switchgear circuit breakers, protection relays and meters, and SCADA, all of which are used to tie-in existing BART 34.5-kV cable distribution circuits or new 34.5-kV cable distribution circuits to obtain a flexible and reliable power supply system during contingency operations.

Site dimensional requirements would vary based on site-specific requirements and where sites would be combined with other facilities, such as train control buildings. Some sites would require an access easement or construction of an access road. Minimum approximate dimensional requirements for traction power substations are 60 by 200 feet and 15 feet in height. Approximate dimensional requirements of sectionalizing stations are 30 by 20 feet, and the equipment would be combined with the traction power substation's 34.5-kV AC switchgear assembly.

Auxiliary Power Substations

Auxiliary power substations provide the power required to run the stations and Newhall Maintenance Facility. Electric power to the substations would be supplied by nearby overhead and underground medium voltage 480-V, 12.47-kV, and 21-kV distribution lines. Short (typically less than 1,000 feet) sections of overhead and underground power lines would be constructed from existing distribution facilities to the new facilities. Transformers and switching equipment would be located within ancillary areas at stations. In addition, each station and the Newhall Maintenance Facility would have a standby diesel-electric generator located aboveground. Additional standby diesel-electric generators would be located at pump stations and possibly at train control buildings.

Gap Breaker Stations

Gap breaker stations isolate appropriate electrified third rail sections for maintenance and repair purposes or de-energize third rail sections during an emergency. Gap breaker stations include indoor equipment in pre-fabricated enclosures or custom-built buildings. The equipment consists of 1,000-V DC switchgear circuit breakers and associated ancillary equipment such as relays and meters. DC power cables run in ductbanks from the gap breaker circuit breakers to BART's electrified third rail. Approximate dimensional requirements for gap breaker stations are 30 by 40 feet and 15 feet high.

Train Control and Communication Equipment

Train control equipment would be installed to provide automatic train control functions (e.g., accelerating, maintaining speed, braking, switching tracks, maintaining separation between different trains on the same track) and to integrate operations with the existing BART system. Some of the equipment required to monitor and control trains would be mounted along the trackways and on the trains. This equipment would include radios and antennae. Much of the wayside equipment would be contained in stand-alone train control buildings along the alignment or in train control rooms within the station areas. Train control buildings would be custom-built structures that range from 50 by 60 feet to 35 by 90 feet and 15 feet high.

Communications equipment for transmission of voice, video, and data would be installed as a means to: (1) provide information to passengers; (2) facilitate communication between passengers, BART staff, and BART Central; (3) provide transmission of closed circuit television camera data to a BART security center; and (4) enable subsystems to be monitored and remotely controlled where necessary.

Cross Passages

Under the Twin-Bore Option, cross passages are underground connections located between the two tunnel bores and fitted with fire-rated doors. Cross passages would be spaced approximately 450 to 750 feet apart and are not required within the underground station boxes. Cross passages permit crossing from one tunnel bore to the other tunnel bore for purposes of emergency evacuation. For example, in the event of a fire, cross passages would provide the means to evacuate passengers from the tunnel with the fire incident to the other tunnel. Passengers could access rescue trains within the tunnel not affected by the emergency via the cross passages.

Under the Single-Bore Option, both train tracks would be located within one large diameter tunnel, not within two separate tunnels as in the Twin-Bore Option. Cross passages are required between two side-by-side tunnels, but the larger tunnel diameter of the Single-Bore Option includes emergency evacuation areas between each set of tracks within the single tunnel. For more information, see Chapter 5, Section 5.3.1, *Tunnel, Trackwork, and Ventilation Structures*.

Tunnel and Underground Station Ventilation Facilities

Tunnel and underground station ventilation facilities consist of emergency ventilation, fresh air intake, and exhaust facilities.

Emergency Ventilation Facilities

Emergency ventilation facilities would be located along the tunnel alignment between the underground stations (called mid-tunnel ventilation structures) and within the underground stations. The facilities include fans, dampers, ventilation shafts, and associated facilities and operate primarily to remove smoke in cases of emergency in either the tunnels or the stations. In addition, the facilities limit air velocities as trains pass through the tunnel and push the air forward and ventilate the tunnel when diesel propelled vehicles are being used during tunnel maintenance. Periodic testing of the facilities is required to ensure their proper operation.

There would be two mid-tunnel ventilation structures: one located at the northwest corner of Santa Clara and 13th Streets and another located east of Stockton Avenue south of Taylor Street. There are four optional locations for the Stockton Avenue ventilation structures. The final decision of a location would be based on the environmental impacts, property negotiations, and acquisition costs. The mid-tunnel ventilation structures would include an aboveground structure, or building, that houses the equipment required to ventilate the tunnel. The area required to accommodate each facility would be approximately 110 by 200 feet (including a small paved area used for maintenance activities or parking for maintenance personnel and an area for electrical transformers) with most of the equipment housed in a structure approximately 90 by 140 feet and 25 feet in height. A ventilation shaft would connect the structure to the tunnel below. The shaft opening would be located on the roof of the structure, with the smoke and air exhaust discharging vertically out of, or fresh air being drawn into, a protective grate.

There would be several underground ventilation facilities at the Alum Rock/28th Street, Downtown San Jose, and Diridon Stations, with all of the equipment located in the ancillary areas at both ends of the station boxes. The surface feature would be one or more ventilation shafts at each end of the station. Each shaft would be approximately 15 by 20 feet and 10 to 15 feet in height above ground level. An opening would be located at the top of each ventilation shaft with the smoke and air exhaust discharging vertically out of a protective grate.

Fresh Air Intake and Exhaust Facilities

Fresh air intake and exhaust facilities would be located within the underground stations. Dedicated fresh air intake and exhaust facilities supply fresh air exchange to the non-public ancillary areas. Similar to the tunnel and underground emergency ventilation facilities, these facilities would include shafts leading to the surface. Each shaft would be approximately 10 by 10 feet and approximately 18 feet in height above ground level. As trains pass through the tunnel and push air forward, fresh air exchanges into the station public area through the station entrances.

Pump Stations

All the equipment for pump stations along the tunnel alignment or in underground stations would be located underground. Access to these facilities for maintenance purposes would be from the nearest underground station or another facility. Access to pump stations located elsewhere along the alignment would be from within the retained cuts or from an at-grade location.

Pump stations would be located in the East and West Tunnel Portals, in the tunnel south of Lower Silver Creek, in the tunnel at Santa Clara and 13th Streets, in the tunnel west of SR 87, and in the tunnel between Schiele and Villa Avenues (location would vary depending on location of the ventilation structure near Stockton Avenue).

2.2.2.3 Sustainability Strategies

To the maximum extent practicable and in consultation with BART as required, the design and operation of the BART Extension Alternative would incorporate VTA's Sustainability Program green strategies through features that reduce energy, water, and solid resource consumption and improve indoor environmental quality. Some features that VTA will consider are listed below.

- **Daylighting and lighting controls.** Daylight combined with controls for artificial lighting can reduce electric power consumption. Photosensor-driven lighting control and dimming control is a well-established technology that could be applied to station platforms and interiors, and also on train cars. Controls should also offer low-power settings for after-hours periods at stations.
- **Escalators.** Because many passengers arrive at BART stations during peak hours, running escalators at full speed during non-peak hours uses energy needlessly. To reduce energy consumption, variable speed escalators that can stop and re-start or that operate at a low-speed mode (which may result in fewer maintenance problems than the start/stop escalators) could be installed.
- **Renewable power.** Photovoltaic solar panels are typically used to generate on-site power for transportation facilities. The top of roofs provide an opportunity for installing solar panels.
- **Water.** There are numerous well-established ways to save water, reduce stormwater flooding, and improve water quality in landscape design that are directly applicable to station areas and potentially to BART trackways. These methods include planting native, drought-resistant plants; using low-flow fixtures; increasing pervious surface with porous paving and unit pavers; capturing surface flow with bioswales and raingardens; and using soil-water separators and other filters. At the Newhall Maintenance Facility, the train car washing process could use recycled grey water and save up to 90 percent of the water used. If access to the San Jose and Santa Clara recycled water networks is available, then recycled water could be used for station landscaping.
- **Plant-based lubricants and coolants.** Soy-based oil is being considered in the design for use with large transformers and potentially other system machinery.
- **Materials and resources.** Green strategies in this category include the management of construction and demolition waste through recycling and reuse to keep waste out of landfills to the maximum extent practicable; the use of recycled and regionally or locally available materials; and the reuse of soils onsite or elsewhere in the vicinity. Excavated soils could also be made available for use at other sites.

- **Indoor environmental quality.** Given that there would be indoor space involved, measures are being considered to address indoor environmental quality. These include the use of paints, coatings, carpet, and other materials containing reduced volatile organic compounds and green cleaning products.

2.3 CEQA Alternatives

2.3.1 CEQA No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the corridor that are described in Section 2.2.1, *NEPA No Build Alternative*. Future land uses would be consistent with the General Plans and area plans for the Cities of San Jose and Santa Clara.

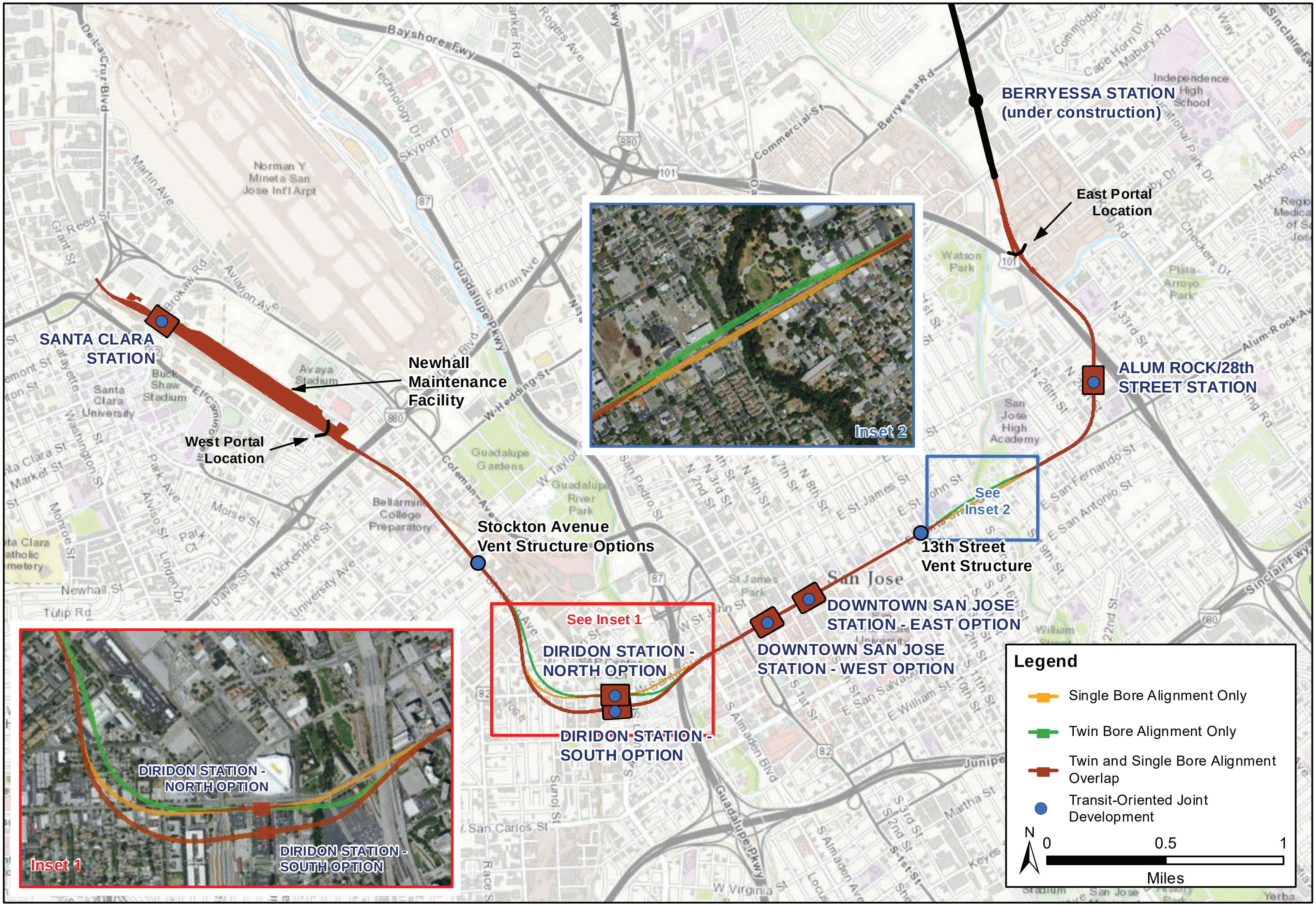
2.3.2 CEQA BART Extension Alternative

The CEQA BART Extension Alternative consists of the approximately 6-mile extension of the BART system from the Berryessa BART Station in San Jose through downtown San Jose terminating in Santa Clara near the Santa Clara Caltrain Station as described in Section 2.2.2, *NEPA BART Extension Alternative*.

2.3.3 CEQA BART Extension with TOJD Alternative

The CEQA BART Extension with TOJD Alternative consists of the approximately 6-mile extension of the BART system from the Berryessa BART Station in San Jose through downtown San Jose terminating in Santa Clara near the Santa Clara Caltrain Station, as described in Section 2.2.2, *NEPA BART Extension Alternative.* In addition, this alternative has TOJD at each of the four BART stations and TOJD at the two ventilation structures as described below. The alignments, stations, and TOJD locations are depicted on Figure 2-13.

The TOJD would involve VTA working with a private developer to develop mixed-use developments consistent with California Public Utilities Code Section 100130-100133. The code defines TOJD as a commercial, residential, or mixed-use development that is undertaken in connection with existing, planned, or proposed transit facilities and is located ¼ mile or less from the external boundaries of that facility. The TOJD may be constructed at the same time as the BART Extension Alternative or later in time, dependent on the availability of funding and subject to market forces. However, the design of the stations and structures would not preclude TOJD. A private developer has not been identified at this time.



Source: Station and Track, VTA 2014; Basemap, ESRI 2015

Figure 2-13
BART Extension (with Station options) and Transit-Oriented Joint Development Alternative
VTA's BART Silicon Valley–Phase II Extension Project

In October, 2016, VTA was awarded a $1.52 million Fiscal Year 2016 Pilot Program for Transit-Oriented Development (TOD) Planning grant for the Phase II Project. The Pilot Program supports comprehensive planning efforts of local communities. Under the Pilot Program requirements, agencies and local communities who receive funds through this planning program must examine ways to improve economic development and ridership, foster multimodal connectivity and accessibility, improve transit access, identify infrastructure needs, and enable mixed-use development near transit stations. The Pilot Program for TOD Planning funds will be used to support a study on concepts and future opportunities for transit-oriented development along the alignment. After the VTA Board of Directors defines the scope of work and approves the selection of a consultant, the study will take approximately a year to complete.

No federal dollars would be used to design or construct the TOJD. Because the TOJD is a separate action by VTA from the NEPA BART Extension Alternative, VTA's TOJD, which is consistent with city general plans and approved area plans, would be considered in the cumulative background conditions for NEPA purposes. However, the potential impacts of TOJD are fully analyzed under the CEQA BART Extension with TOJD Alternative.

2.3.3.1 Proposed Development

VTA is proposing to construct TOJD (office, retail, and residential land uses) at the four BART stations (Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara), which offers the benefit of encouraging transit ridership. VTA is also proposing to construct TOJD at two mid-tunnel ventilation structure locations (the northwest corner of Santa Clara and 13th Streets and east of Stockton Avenue south of Taylor Street). VTA's primary objective for the proposed TOJD is to encourage transit ridership and support land use development patterns that make the most efficient and feasible use of existing infrastructure and public services while promoting a sense of community as envisioned by the San Jose and Santa Clara General Plans and relevant adopted specific plans. Estimates for VTA's TOJD at the station sites and at the mid-tunnel ventilation structure locations are provided below and are based on current San Jose and Santa Clara general plans, approved area plans, the existing groundwater table constraints, and market conditions.

Table 2-3 summarizes the land uses at each proposed TOJD location, which are explained in further detail below. The number of parking spaces is based on meeting the Cities of San Jose and Santa Clara parking requirements for residential and commercial land uses. Parking for BART riders is not included in the table nor is shared parking with BART riders.

Table 2-3: Summary of Proposed TOJD

Location	Residential (dwelling units)	Retail (square feet)	Office (square feet)	Parking (spaces)
Alum Rock/28th Street Station	275	20,000	500,000	2,150
Santa Clara and 13th Streets Ventilation Structure	N/A	13,000	N/A	N/A
Downtown San Jose Station – East Option (at 3 sites)	N/A	160,000	303,000	1,398
Downtown San Jose Station – West Option	N/A	10,000	35,000	128
Diridon Station South Option	N/A	72,000	640,000	400
Diridon Station North Option	N/A	72,000	640,000	400
Stockton Avenue Ventilation Structure	N/A	15,000	N/A	N/A
Santa Clara Station	220	30,000	500,000	2,200

City of San Jose

Alum Rock/28th Street Station

TOJD would be located within the station campus and would consist of a maximum of 500,000 square feet of office space with approximately 1,650 parking spaces, 20,000 square feet of retail with 100 parking spaces, and up to 275 dwelling units with approximately 400 parking spaces. The TOJD would range from 4 to 9 stories within the station area identified on the *Alum Rock/28th Street Station Conceptual Site Plan* in Appendix C.

Santa Clara and 13th Streets Ventilation Structure

TOJD would be co-located with the ventilation structure at the northwest corner of Santa Clara and 13th Streets. The development would consist of a maximum of 13,000 square feet of ground-level retail along the street frontage facing Santa Clara Street.

Downtown San Jose Station East Option

Three TOJD sites would be located near the station as shown in *the Downtown San Jose Station East Option Conceptual Site Plan* in Appendix C. The first site is 2.79 acres located south of Santa Clara Street between 6th and 7th Streets. A station entrance, elevator, and system facilities, including a TPSS, tunnel ventilation shaft, fresh air intake, and exhaust would also be located at this site. Because of the high groundwater table, underground parking would be limited to three levels. The TOJD would consist of one level of retail (approximately 120,000 square feet) and two levels of office (approximately 220,000 square feet). Three levels of underground parking would accommodate approximately 1,030 spaces (480 spaces for retail uses and 550 spaces for office uses).

The second site is 0.7 acres and located north of Santa Clara Street, west of 4th Street. A station entrance and elevator would also be located at this site. Because of the high groundwater table, underground parking would be limited to three levels. The TOJD would consist of one level of retail (approximately 30,000 square feet) and one and one-half levels of office (approximately 48,000 square feet). Three levels of underground parking would accommodate approximately 240 spaces (120 spaces for retail uses and 120 spaces for office uses).

The third site is 0.35 acres located north of Santa Clara Street, west of 3rd Street. System facilities, including a TPSS, tunnel ventilation shaft, fresh air intake, exhaust, emergency exit, and an equipment access shaft would also be located at this site. Because of the high groundwater table, underground parking would be limited to three levels. The TOJD would consist of one level of retail (approximately 10,000 square feet) and two and one-half levels of office (approximately 35,000 square feet). Three levels of underground parking would accommodate approximately 128 spaces (40 spaces for retail uses and 88 spaces for office uses).

Downtown San Jose Station West Option

The TOJD site for the West Option is 0.35 acre and located north of Santa Clara Street, west of 3rd Street, as shown in on the *Downtown San Jose Station West Option Conceptual Site Plan* in Appendix C. System facilities, including a TPSS, elevator, tunnel ventilation shaft, fresh air intake, exhaust, emergency exit, and an equipment access shaft would also be located at this site. Because of the high groundwater table, underground parking would be limited to three levels. The TOJD would consist of one level of retail (approximately 10,000 square feet) and two and one-half levels of office (approximately 35,000 square feet). Three levels of underground parking would accommodate approximately 128 spaces (40 spaces for retail uses and 88 spaces for office uses).

Diridon Station

Under both station location options, TOJD would be located adjacent to Diridon Station and would consist of a maximum of 640,000 square feet of office space with approximately 400 parking spaces, and 72,000 square feet of retail. The location of the TOJD is shown in the *Diridon Station Conceptual Site Plan* in Appendix C. The TOJD would be approximately 8 levels high and would have 3 levels of underground parking.

Stockton Avenue Ventilation Structure

TOJD would be located on the east side of Stockton Avenue, south of Taylor Street, with the ventilation structure at the rear of the site. The development would consist of a maximum of 15,000 square feet of ground level retail along the street frontage facing Stockton Avenue.

City of Santa Clara

Santa Clara Station

TOJD would be located within the station campus as shown on the *Santa Clara Station Conceptual Site Plan* in Appendix C. The TOJD would consist of a maximum of 500,000 square feet of office space with approximately 1,650 parking spaces, 30,000 square feet of retail with approximately 150 parking spaces, and up to 220 dwelling units with approximately 400 parking spaces. The TOJD would range from 4 to 11 stories and have one level of underground parking.

2.3.3.2 Sustainability Strategies

The sustainability strategies described for the BART Extension Alternative would be similarly applied to the BART Extension with TOJD Alternative.

2.4 Alternatives Considered and Withdrawn

In 2001, VTA initiated a Major Investment Study/Alternative Analysis that evaluated 11 alternative alignments, including busway, commuter rail, light rail, and BART. Upon evaluating the performance of the alternatives and considering public comment, which favored the BART mode over light rail or other new modal options, the VTA Board of Directors on November 9, 2001, unanimously selected Alternative 11: BART on the former UPRR Alignment as the locally preferred alternative/preferred investment strategy. Alternative 11 was the environmentally superior alternative and best achieved the goals and objectives for the corridor. When compared with the other alternatives, BART on the former UPRR Alignment offered the fastest travel times to passenger destinations, the greatest congestion relief, improved air quality, best regional connectivity, lowest traffic and safety impacts due the fully grade-separated guideway, and consistency with local land use plans and policies. The VTA Board of Directors also approved a Comprehensive Agreement with the Bay Area Rapid Transit District that identified the terms and conditions for implementing and operating the locally preferred alternative/preferred investment strategy. On November 12, 2001, the BART Board of Directors adopted the terms and conditions of the Comprehensive Agreement.

Since then, the following additional variations to the selected alternative have been considered but withdrawn.

- **Santa Clara Station South Option.** The Santa Clara Station and 500-space parking garage would be located south of Brokaw Road requiring reconfiguration of the Newhall Maintenance Facility. Access to the station platform and concourse from intermodal connections would require 300- to 500-foot passenger tunnel/undercrossings and result in an inefficient maintenance facility layout.
- **San Fernando Street Alignment.** An alignment would run between Berryessa and Santa Clara BART Stations via UPRR ROW, then under San Fernando Street (subway alignment) to Diridon Station.
- **BART in a Bridge Over U.S. 101 Alignment.** An alignment would go from Berryessa Station to Santa Clara Street via the existing railroad bridge over U.S. 101, with Alum Rock Station west of 28th Street in a trench within VTA ROW. The alignment would pass perpendicularly under and south of Santa Clara Street (subway alignment) before realigning with Santa Clara Street west of 19th Street.

- **Coyote Creek – South of Santa Clara Street Alignment.** An alignment would travel under Santa Clara Street (subway alignment) from 25th Street to 21st Street, then swing to the south of Santa Clara Street at 21st Street as it passes under Coyote Creek to avoid intersecting the bridge abutments. It would then realign under Santa Clara Street at 13th Street.
- **Coyote Creek – Under Santa Clara Street Alignment.** An alignment would run directly under Santa Clara Street (subway alignment) starting at 25th Street, continuing directly under Santa Clara Street as it passes under Coyote Creek with the alignment below the Santa Clara Street bridge abutments.
- **Alum Rock Station at 23rd Street.** An alignment would run from Berryessa Station over U.S. 101 on a bridge within VTA ROW, under Julian Street (subway alignment) parallel to 28th Street, and swing west starting north of East St. John Street to align parallel to and north of Santa Clara Street at 24th Street. Alum Rock Station would be north of Santa Clara Street between 24th and 20th Streets. Past the station, the alignment would realign directly under Santa Clara Street west of 13th Street.
- **Connection to Mineta San Jose International Airport.** A connection would be constructed to Mineta San Jose International Airport (SJIA) via a spur from the alignment just south of I-880. The alignment would be in a tunnel under I-880, then swing east and travel under the SJIA runways and terminate under the terminals.
- **St. James Street Alignment.** An alignment would travel from Berryessa Station over U.S. 101 on a bridge, along VTA ROW west of 28th Street, before swinging west near McKee Road and aligning under St. James Street (subway alignment). The alignment would then swing diagonally south through St. James Park and under Santa Clara Street, then west under SR 87 south of Santa Clara Street and into Diridon Station.

All of these variations to the selected alternative were considered and withdrawn because of substantial construction costs, operational costs, inefficient passenger access and intermodal connectivity, design and engineering concerns, inefficient maintenance yard operations, financial risk, lower ridership, or environmental impacts.

Also refer to Section 1.4, *BART Extension Project History*, which summarizes the previous environmental studies that have been completed.

2.5 Required Permits and Approvals

This Draft SEIS/SEIR for the BART Silicon Valley Phase II Extension Project has been prepared in accordance with NEPA, the Council on Environmental Quality regulations implementing NEPA, and CEQA. There are two alternatives evaluated in this document in accordance with NEPA: the No Build Alternative and the BART Extension Alternative. The BART Extension Alternative consists of a 6-mile BART Extension from the Berryessa BART Station through downtown San Jose to the Santa Clara Caltrain Station. There are three alternatives evaluated in this document in accordance with CEQA: the No Build Alternative, the BART Extension Alternative, and the BART Extension with TOJD Alternative. The CEQA No Build Alternative is the same as the NEPA No Build Alternative. The CEQA BART Extension Alternative is the same as the NEPA BART Extension Alternative. The CEQA BART Extension with TOJD Alternative consists of the 6-mile BART Extension as described above in addition to TOJD at the four BART stations and retail at the two ventilation structure sites. This document discloses the environmental impacts of all the alternatives listed above and provides mitigation, where feasible, to minimize significant impacts.

VTA is the local project sponsor and CEQA lead agency intending to partially fund and implement the CEQA BART Extension with TOJD Alternative. In November 2001, the VTA and BART District governing boards approved a Comprehensive Agreement regarding the institutional, project implementation, and financial issues related to the SVRTCP. FTA is the federal lead agency for preparation of the EIS, and VTA is the implementing agency. BART is a designated Cooperating Agency on the SEIS and a Responsible Agency on the SEIR. BART will operate and maintain the system consistent with the Comprehensive Agreement. VTA has full responsibility for all capital improvements, operating, and maintenance funding of the BART Extension. While not a component of the NEPA BART Extension Alternative, the TOJD component of the CEQA BART Extension with TOJD Alternative is reviewed as part of the NEPA cumulative impact analysis in Section 7.1, *Cumulative Impacts under NEPA and CEQA*. The TOJD review under CEQA is contained in Chapter 3, *NEPA and CEQA Transportation Operation Analysis*, Chapter 6, *CEQA Alternatives Analysis of Construction and Operation*, and Section 7.1*, Cumulative Impacts under NEPA and CEQA*.

Information provided in this document will enable the public to review, evaluate, and comment on all of the alternatives. This document will also be used by federal, state, regional, and local agencies to assess the environmental impacts of all alternatives on resources under their jurisdiction and to make discretionary decisions. FTA, the State of California, and the San Francisco Bay Area's metropolitan planning organization, MTC, will use this document in deciding whether and how to fund the BART Extension. These and other agencies will use the SEIS/SEIR as the basis for their decisions to issue permits and other approvals necessary to construct the selected alternative.

FTA will use the final version of this document when amending the 2010 Record of Decision (ROD) to formalize the final selection of the preferred NEPA alternative. The ROD is a written public record explaining why an agency has taken a particular course of action. The 2010 ROD determined that the requirements of NEPA were satisfied for Phase I. Pursuant to Public Law 112-141, 126 Stat. 405, Section 13 l 9(b), the FTA can issue a single Final Supplemental Environmental Impact Statement/Record of Decision document unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319. For this project, if practicality considerations preclude the issuance of a combined Final SEIS/ROD, FTA would issue a Final Supplemental Environmental Impact Statement followed by an amendment to the Record of

Decision, as needed. When the amended ROD is issued, VTA would be able to proceed with final design, right-of-way acquisition, and construction of the federally funded BART Extension Phase II, subject to federal funding requirements.

A list of permits and approvals required for the BART Extension and TOJD is provided in Table 2-4. This includes working within the ROW of various jurisdictions.

Table 2-4: Required Permits and Approvals

Agency	Permits and Approvals
BART Extension Alternative	
Federal Railroad Administration	Coordination regarding common corridor and crossing under Caltrain/UPRR ROW.
Federal Highway Administration	Approval of plans for crossings under U.S. 101 and I-880.
California Department of Transportation	Approval of plans for crossings under U.S. 101, SR 82, SR 87, and I-880. Encroachment permit for any work or traffic control within the state right-of-way.
State Office of Historic Preservation	Approval and execution of Programmatic Agreement and Treatment Plan describing procedures for protection and mitigation of impacts on historic and cultural resources pursuant to Section 106 of the National Historic Preservation Act and Code of Federal Regulations, Title 36, Part 800.
California Public Utilities Commission	Coordination regarding common corridor and responsibility for all safety and security certification of the system.
San Francisco Bay Area Rapid Transit District	Approval of project pursuant to VTA/BART Comprehensive Agreement.
Peninsula Corridor Joint Powers Board (Caltrain)	Temporary Encroachment permit for closing easternmost track for construction (Diridon Station Twin-Bore Option only). Encroachment permit for crossing under railroad tracks at Diridon.
State Water Resources Control Board and San Francisco Bay Regional Water Quality Control Board	Approval of Section 402 General Construction Activity National Pollutant Discharge Elimination System Permit for construction phase impacts and project-specific construction compliance measures. Incorporation of Section 402 Phase II Small Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System General Permit project-specific control measures to reduce the discharge of stormwater pollutants to the Maximum Extent Practicable. Waste discharge requirements for discharges of stormwater associated with industrial activities, excluding construction activities (Industrial General Permit) for Newhall Maintenance Facilities.
Bay Area Air Quality Management District	Various permits for operating the Newhall Maintenance Facility.
Santa Clara Valley Water District	Issuance of encroachment permit if construction comes within specified limits of any Santa Clara County stream. Well permits for geotechnical and chemical investigations or groundwater monitoring. Permits for monitoring and dewatering well installations and destructions per District Ordinance 90-1.
City of San Jose	Encroachment permit for construction in the City ROW.
City of Santa Clara	Encroachment permit for construction in the City ROW.
Additional Permits and Approvals for BART Extension with TOJD Alternative	
City of San Jose	Responsible Agency in accordance with CEQA. Approval of rezoning. Site and Architectural Review Issuance of site development, grading, and building permits.

Agency	Permits and Approvals
City of Santa Clara	Responsible Agency in accordance with CEQA. Approval of rezoning. Site and Architectural Review. Issuance of grading, building, and occupancy permits.
State Water Resources Control Board and San Francisco Regional Water Quality Control Board	Approval of Section 402 General Construction Activity National Pollutant Discharge Elimination System Permit for construction phase impacts and project-specific construction compliance measures. Incorporation of Section 402 Phase II Small Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System General Permit project-specific control measures to reduce the discharge of stormwater pollutants to the Maximum Extent Practicable.

All of the TOJD that would be constructed under the BART Extension with TOJD Alternative at the four BART stations and two ventilation structures is consistent with the land uses identified in the approved General Plans of the Cities of San Jose and Santa Clara. The TOJD is also consistent with a number of other adopted land use plans including the Diridon Station Area Plan, the San Jose Downtown Strategy 2000 Plan, the Five Wounds/Roosevelt Park Urban Villages Plan, and the Santa Clara Station Area Plan. CEQA review for all of these plans previously occurred at a program level with the Cities of San Jose and Santa Clara as CEQA Lead Agencies, as applicable.

In that context, the intent of this document is to provide project-level CEQA clearance for all components of the BART Extension with TOJD Alternative. VTA recognizes that the TOJD is subject to the approvals of the Cities of San Jose and Santa Clara as they have jurisdiction over land use decisions within their respective boundaries. Because VTA has assumed the role of CEQA Lead Agency, the Cities of San Jose and Santa Clara would function as CEQA Responsible Agencies in conjunction with their necessary approvals and actions for the TOJD (e.g., rezonings, site development permits, demolition permits, grading permits, building permits, etc.). This document will be used by San Jose and Santa Clara during this process.

2.6 Construction Schedule

With all of the permits and approvals secured in a timely manner, construction of the BART Extension is still projected to take at least 8 years. With preconstruction activities beginning in 2018, revenue service would begin in late 2025 or 2026. Chapter 5, *NEPA Alternatives Analysis of Construction*, provides a discussion of construction activities and durations for the various activities. Figure 5-1, Construction Schedule, provides an overview of the construction timelines.

Chapter 3
NEPA and CEQA Transportation Operation Analysis

3.1 Introduction

This chapter includes a transportation analysis of the operational impacts of the following:

- The National Environmental Policy Act (NEPA) Alternatives based on *VTA's BART Silicon Valley—Phase II Extension Project Transportation Impact Analysis of the BART Extension Only* ("BART Extension TIA") (Hexagon 2016a).
- The California Environmental Quality Act (CEQA) Alternatives based on *VTA*'s *BART Silicon Valley – Phase II Extension Project Transportation Impact Analysis of the BART Extension and VTA's Transit-Oriented Joint Development* ("BART Extension with TOJD TIA") (Hexagon 2016b).

Accordingly, this chapter analyzes the transportation-related impacts of three alternatives: the No Build Alternative (for NEPA and CEQA purposes), the BART Extension Alternative (for NEPA and CEQA purposes), and the BART Extension with Transit-Oriented Joint Development (TOJD) Alternative (for CEQA purposes only). Refer to Chapter 2*, Alternatives,* for a full description of the NEPA and CEQA Alternatives. Each of these alternatives is evaluated under 2015 Existing and 2035 Forecast Year conditions.

This chapter presents the regulatory setting for transportation and the 2015 Existing conditions for transit, bicycle, and pedestrian facilities; the study intersections near the BART stations; freeway segments; and freeway ramps. Existing and projected future transit services, forecasts of transit patronage, and effects on travel patterns and the transportation environment are also described, and the projected adverse transportation impacts under NEPA or CEQA, as appropriate, are quantified. Circulation, parking, and non-motorized conditions near the BART stations/TOJD sites are also addressed. Traffic operations during the peak hours are evaluated, with emphasis on intersection and freeway levels of service (LOS), and measures are identified for mitigating substantial adverse effects on the roadway network for the 2015 Existing and 2035 Forecast Year.

The BART Extension TIA also analyzed the 2025 No Build and 2025 BART Extension conditions. Similarly, the BART Extension with TOJD TIA analyzed the 2025 No Build and 2025 BART Extension with TOJD conditions. Those analyses were prepared for comparative purposes and can be reviewed in the TIAs. Because traffic volumes are projected to be greater in 2035 than in 2025, mitigation requirements have been based on a worst case condition.

Construction-phase transportation effects are discussed in Chapter 5, *NEPA Alternatives Analysis of Construction*. The CEQA analysis of cumulative and growth-inducing transportation impacts is provided in Chapter 7, *Other NEPA and CEQA Considerations*.

3.2 Regulatory Setting

There are no relevant state regulations for identifying environmental effects on transportation. The following regional and local regulations and planning policies and guidelines are relevant to the alternatives analysis. Discussion of the documents relevant to implementation is included in Chapter 6, Section 6.11, *Land Use*.

- Santa Clara Valley Transportation Authority
  - *Valley Transportation Plan 2040*
  - Community Design and Transportation Program
- Metropolitan Transportation Commission (MTC)
  - *Transportation 2035 Plan for the San Francisco Bay Area*
  - *Plan Bay Area*
  - Resolution 3434
  - *2008 Strategic Plan*
  - Transportation for Livable Communities Program
- San Francisco Bay Area Rapid Transit District
  - *BART Strategic Plan*
  - BART System Expansion Policy

The *Santa Clara Countywide Bicycle Plan* (Bicycle Plan), adopted by VTA in August 2008, identifies various existing and/or planned cross-county bicycle corridors in the vicinity of the BART stations. The purpose of the cross-county bicycle corridors, as described in the Bicycle Plan, is to provide continuous connections between Santa Clara County jurisdictions and to adjacent counties, and to serve the major regional trip-attractors in the County. The *San Jose Bike Plan 2020* was adopted on November 17, 2009, and includes a vision statement of becoming “a city where bicycling is safe, convenient, and commonplace.” The *San Jose Bike Plan 2020* includes specific goals and performance measures for achieving that vision throughout the City.

In addition, VTA’s *Transportation Impact Analysis Guidelines*, most recently adopted in October 2014, are used by local agencies when analyzing the transportation impacts of projects on the transportation system. The City of San Jose has prepared the *2009 Traffic Impact Analysis Handbook* for use in conducting traffic studies for proposed projects in the

City of San Jose. The Handbook includes all of the City's transportation-related policies, including the City's LOS standards and criteria for significant impacts.

3.2.1 Methods of Analysis

This section presents a summary of the methods used to determine the traffic conditions for each alternative. It includes descriptions of the data requirements, the analysis methodologies, and the applicable LOS standards. A description of the stations where intersection analysis was conducted under each alternative and the number of study intersections to which the LOS standards are applied under each alternative is also provided. A more detailed description of assumptions and analysis approaches is provided in the BART Extension TIA and the BART Extension with TOJD TIA.

3.2.1.1 Data Collection

The data required for the analysis were obtained from new traffic counts, previous traffic studies, the Cities of San Jose and Santa Clara, the Congestion Management Program (CMP) Annual Monitoring Report, and field observations. The following data were collected from these sources.

- Existing traffic volumes.
- Existing and planned lane configurations.
- Signal timing and phasing (for signalized intersections only).
- Traffic volumes, average speed, and density (for freeway segments under 2015 Existing conditions).
- Traffic from approved but not yet completed developments.

3.2.1.2 VTA Travel Demand Forecasting Model

The model chosen for use in the analysis is VTA's 2012 PD Phase II, December 2014 Travel Demand Forecasting Model, hereafter referred to as the VTA Model. The VTA Model was developed as an extension and refinement of the Metropolitan Transportation Commission's (MTC's) Regional Model (MTC Model). The VTA Model relies extensively upon MTC Model structure, coding conventions, and calculation procedures. This was done to ensure consistency between the two modeling systems. The VTA Model expands on the MTC Model structure in order to provide significantly more detail and forecasting precision within and surrounding Santa Clara County.

3.2.1.3 Intersection Turning Movement Adjustments

Adjustments were made to the forecasted model volumes to account for the coarse turn-movements produced by the VTA Model. Although the VTA Model used for this analysis was updated to include all of the study intersections, the general regional roadway network used by the VTA Model does not represent all minor streets. The lack of coding of these minor streets causes the VTA Model to over-assign traffic volumes to those facilities that are represented in the network. This results in inaccurate forecasted turn-movement volumes that require adjustments to calibrate them with actual travel patterns and use of proper facilities. The adjustment process begins by comparing and adjusting base model forecasts (2015 Existing forecasts representing existing conditions) with existing traffic counts. By adjusting the base model forecasts with existing volumes, model projections are calibrated with actual travel patterns and use of proper facilities. Once the base model forecasts are calibrated, future model forecasts are developed for the 2035 Forecast Year. These are all considered raw model volume forecasts, which on their own do not represent future volume conditions, but are simply used to forecast growth and travel pattern changes expected in the future.

To obtain the final traffic volume forecasts, raw model volume forecasts in conjunction with existing count data are used. Future traffic volume forecasts are developed by adding to the existing traffic count data the projected growth between the base (2015 Existing) and the future (2035 Forecast Year) model volume forecasts. The final traffic volume forecasts are then used as input to the analysis of intersections, freeway segments, and freeway ramps.

3.2.1.4 Stations Analyzed

The Phase II BART Extension includes four stations: Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara. However, different stations and different numbers of study intersections were analyzed for the No Build Alternative, the BART Extension Alternative, and the BART Extension with TOJD Alternative. The reasons for the differences are highlighted here to assist the reader in later sections of this chapter.

The BART Extension Alternative includes intersection analyses at three of the four Phase II BART Extension stations: Alum Rock/28th Street, Diridon, and Santa Clara. The Downtown San Jose Station (East and West Options) was not included in the intersection LOS or parking analysis because it would not include any kiss-and-ride (KNR) or park-and-ride (PNR) facilities and therefore would not generate a significant amount of vehicular traffic on the surrounding roadway network or parking demand. This station would be analogous to BART stations in downtown San Francisco and Oakland, as all station facilities would be below grade, and patrons would access BART by walking, biking, and taking transit.

The BART Extension with TOJD Alternative analyzes intersections in the vicinity of two stations: Alum Rock/28th Street and Santa Clara. The Downtown San Jose Station (East and West Options) and the Diridon Station (South and North Options) were not included in the BART Extension with TOJD TIA intersection or parking demand analysis because they are in the Downtown Core Area as defined by the City of San Jose's *Downtown Strategy 2000 Environmental Impact Report*, and the office and retail uses proposed for the TOJD at these stations are fully consistent with that environmental impact report (EIR). More information on the *Downtown Strategy 2000* is included in the Section 3.5.3, *BART Extension with TOJD Alternative*.

In order to provide a means of comparison for the stations covered under both of the above alternatives, the No Build Alternative includes intersection analysis for three stations: Alum Rock/28th Street, Diridon, and Santa Clara.

3.2.1.5 Study Intersections

For the two stations (Alum Rock/28th Street and Santa Clara) that are analyzed under both the BART Extension Alternative and the BART Extension with TOJD Alternative, the study areas around the stations are the same, but the TOJD has the potential to affect additional intersections due to the estimated number of trips generated by the TOJD. Thus, there are more intersections discussed near the Alum Rock/28th Street Station and Santa Clara Station under the BART Extension with TOJD Alternative than under the BART Extension Alternative because the additional traffic generated by the TOJD would result in more intersections where there may be more than 10 additional vehicles per lane per hour.

The BART Extension Alternative analyzes the LOS at 63 intersections in the vicinity of three stations, as follows (CMP intersections are those that are designated for inclusion in VTA's CMP [more information on the CMP is included in Section 3.2.1.6]).

- Alum Rock/28th Street Station: 17 intersections (including 3 CMP intersections).
- Diridon Station (South and North Options): 29 intersections (including 10 CMP intersections).
- Santa Clara Station: 17 intersections (including 6 CMP intersections).

The BART Extension with TOJD Alternative analyzes the LOS at 62 intersections in the vicinity of two stations.

- Alum Rock/28th Street Station: 27 intersections (including 7 CMP intersections).
- Santa Clara Station: 35 intersections (including 15 CMP intersections).

For the 2015 Existing and 2035 Forecast Year No Build Alternative, a total of 91 intersections are analyzed in order to provide a means of comparison for all intersections in both of the other alternatives.

- Alum Rock/28th Street Station: 27 intersections (including 7 CMP intersections).
- Diridon Station: 29 intersections (including 10 CMP intersections).
- Santa Clara Station: 35 intersections (including 15 CMP intersections).

Of the 35 study intersections in the vicinity of the Santa Clara Station, 13 are in the City of San Jose and 22 are in the City of Santa Clara. All of the study intersections near the Alum Rock/28th Street Station and the Diridon Station are within the City of San Jose.

The freeway analysis evaluates the same segments under the No Build, BART Extension, and BART Extension with TOJD Alternatives. These freeway segments are on Interstate (I-)

280, I-680, I-880, U.S. 101, and State Route (SR) 87. The specific segments are identified in the two technical reports referenced at the beginning of this chapter.

3.2.1.6 Intersection Analysis Methodologies and Level of Service Standards

This section presents the analysis methodologies used for signalized and unsignalized intersections. The Cities of San Jose and Santa Clara and VTA in its role as the Congestion Management Agency for the Santa Clara County CMP each have adopted LOS standards for intersections. These standards are used in conjunction with each jurisdiction's definition of significant impact to determine if a project would have a significant impact on an intersection.

As noted above, a total of 91 intersections are analyzed in this chapter, of which 32 have been designated by VTA as intersections included in the Santa Clara County CMP. California state law (State Government Code 65089) mandates the creation of a CMP in all urban counties and requires them to designate roadways and intersections of regional importance to be monitored. The purpose of the CMP, which was instituted in 1991, is to monitor land use changes within its jurisdiction, develop procedures to alleviate and control congestion, and promote countywide solutions to traffic congestion. CMP intersections are located on the CMP roadway network, which includes freeways and their interchanges, county expressways, and principal arterials. Principal arterials are defined by VTA as roadways that meet one of the following criteria: (a) state highway, (b) six-lane facility, or (c) non-residential arterial with average daily traffic (ADT) of 30,000 vehicles per day or greater. Certain major intersections on this roadway network have been designated as CMP intersections and are included in VTA's biannual CMP Monitoring Report.

Level of Service at Signalized Intersections

All of the signalized study intersections are within the Cities of San Jose and Santa Clara and are therefore subject to their corresponding City's LOS standards. Both Cities' LOS methodologies are based on the *Highway Capacity Manual 2000* (HCM 2000) method for signalized intersections. Signalized intersection operations are evaluated using the HCM 2000 Operations Method and TRAFFIX software. The method evaluates intersection LOS on the basis of average control delay time for all vehicles at the intersection. Because TRAFFIX is also the CMP-designated intersection LOS software, the City of San Jose and City of Santa Clara methodologies employ the CMP default values for the analysis parameters.

The correlation between average delay and LOS is shown in Table 3-1. Many of the terms used in the LOS definitions are included in Chapter 12, *Definitions, Abbreviations, and Acronyms*.

Table 3-1: Signalized Intersection Level of Service Definitions Based on Delay

Level of Service	Description	Average Control Delay per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	Up to 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	Greater than 80.0
Source: Transportation Research Board, 2000		

Level of Service Standards

The City of San Jose LOS standard for all signalized intersections is LOS D or better. The City of Santa Clara LOS standard is LOS D or better at all City-controlled intersections and LOS E or better at all expressway and CMP intersections. The CMP LOS standard for signalized intersections is LOS E or better. Of the 91 total intersections near all three of the stations for which a level of service analysis has been conducted, 32 have been designated as CMP intersections

This chapter evaluates CMP intersections within San Jose under both the City's standard of LOS D and the CMP standard of LOS E. As seen in Table 3-2, for CMP intersections within Santa Clara, there is no difference between the City's standard and the CMP standard. The level of service standards for signalized intersections for this chapter are summarized in Table 3-2.

Table 3-2: Signalized Intersection Level of Service Standards

Jurisdiction or Agency	LOS Standard
City of San Jose	D
City of Santa Clara	
City-Controlled Intersections	D
Expressway or CMP Intersections	E
VTA as Congestion Management Agency (CMP intersections only)	E

City of San Jose Protected Intersection Policy

One of the analyzed intersections, 24th Street and Santa Clara Street near the Alum Rock/28th Street Station, is identified as a Protected Intersection in the City of San Jose's Transportation Level of Service Policy, Council Policy 5-3. Protected Intersections consist of locations (there are a total of 25 in the City of San Jose) that have been built to their planned maximum capacity and where expansion of the intersection would have an adverse effect on other transportation facilities (e.g., pedestrian, bicycle, transit systems). Protected Intersections are, therefore, not required to maintain an LOS D, which is the City of San Jose standard. The deficiencies at all 25 Protected Intersections have been disclosed and overridden in previous EIRs.

Unsignalized Intersection

One unsignalized intersection is being analyzed—Lafayette Street and Harrison Street, which is in the City of Santa Clara and has two-way stop control. The City of Santa Clara does not have an LOS standard for unsignalized intersections. Therefore, the analysis of the unsignalized study intersection is presented for informational purposes only.

The unsignalized study intersection was analyzed using TRAFFIX software, which is based on the HCM 2000 method. This method is applicable for both two-way and all-way stop-controlled intersections. For the analysis of stop-controlled intersections, the HCM 2000 methodology evaluates intersection operations on the basis of average control delay time for all vehicles on the stop-controlled approaches. For the purpose of reporting LOS for one- and two-way stop-controlled intersections, the delay and corresponding LOS for the stop-controlled minor street approach with the highest delay is reported. The correlation between average control delay and LOS for unsignalized intersections is shown in Table 3-3.

Table 3-3: Unsignalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay per Vehicle (Seconds)
A	Operations with very low delays occurring with favorable progression.	Up to 10.0
B	Operations with low delays occurring with good progression.	10.1 to 15.0
C	Operations with average delays resulting from fair progression.	15.1 to 25.0
D	Operation with longer delays due to a combination of unfavorable progression of high V/C ratios.	25.1 to 35.0
E	Operation with high delay values indicating poor progression and high V/C ratios. This is considered to be the limited of acceptable delay.	35.1 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation and poor progression.	>50.0
Source: Transportation Research Board 2000		

Signal Warrant

The LOS analysis at the unsignalized intersection is supplemented with an assessment of the need for signalization of the intersection. The need for signalization of unsignalized intersections is typically assessed based on the Peak Hour Volume Warrant (Warrant 3) described in the *California Manual on Uniform Traffic Control Devices for Streets and Highways*, Part 4, Highway Traffic Signals, 2014. This method makes no evaluation of intersection LOS, but simply provides an indication of whether vehicular peak hour traffic volumes are, or would be, sufficient to justify installation of a traffic signal.

3.2.1.7 Freeway Segment Analysis Methodologies and Level of Service Standards

As prescribed in the CMP technical guidelines, the LOS for freeway segments is estimated based on vehicle density. Density is calculated by the following formula.

$D = V / (N*S)$

where:

D= density, in vehicles per mile per lane

V= peak hour volume, in vehicles per hour (vph)

N= number of travel lanes

S= average travel speed, in miles per hour (mph)

The vehicle density on a segment is correlated to LOS as indicated in Table 3-4. The CMP requires that mixed-flow lanes and auxiliary lanes be analyzed separately from high-occupancy vehicle (HOV; carpool) lanes. The CMP specifies that a capacity of 2,300 vehicles per hour per lane (vphpl) be used for segments six lanes or wider in both directions and a capacity of 2,200 vphpl be used for segments four lanes wide in both directions. The CMP defines an acceptable LOS for freeway segments as LOS E or better.

Table 3-4: Freeway Segment Level of Service Definition Based on Density

Level of Service	Description	Density (vehicles/mile/lane)
A	Average operating speeds at the free-flow speed generally prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	0–11
B	Speeds at the free-flow speed are generally maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high.	>11–18
C	Speeds at or near the free-flow speed of the freeway prevail. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more vigilance on the part of the driver.	>18–26
D	Speeds begin to decline slightly with increased flows at this level. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels.	>26–46
E	At this level, the freeway operates at or near capacity. Operations in this level are volatile, because there are virtually no usable gaps in the traffic stream, leaving little room to maneuver within the traffic stream.	>46–58
F	Vehicular flow breakdowns occur. Large queues form behind breakdown points.	>58
Source: Transportation Research Board 2000		

3.2.1.8 Interchange Ramp Analysis

An assessment of queue lengths and operations on freeway ramps serving the station areas was performed where traffic volumes are projected to increase as a result of the BART Extension Alternative or the BART Extension with TOJD Alternative. Only those ramps where one of the alternatives is projected to add 10 or more trips per lane to the freeway ramps were included in this analysis.

3.2.2 Thresholds of Significance

In accordance with Appendix G of the State CEQA Guidelines, a project would have a significant impact if it would result in any of the conditions listed below. The same criteria have been used to determine NEPA adverse effects.

- Conflict with a plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

- Conflict with a congestion management program, including level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risk.
- Substantially increase hazards due to a design feature (e.g., sharp curve or dangerous intersection) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

In addition to the above criteria, the BART Extension and BART Extension with TOJD Alternatives are evaluated in terms of potential impacts on two large event centers located near stations and potential impacts on parking.

Significance criteria are used to establish what constitutes an impact at a signalized intersection or on a freeway segment. For the Congestion Management Agency, the City of San Jose, and the City of Santa Clara,[1] the methodology for determining if there would be a significant impact under CEQA at an intersection requires first determining if the LOS at the intersection would be acceptable or unacceptable under the condition being analyzed, based on the LOS standards described above. Generally, if an intersection falls below the acceptable LOS standard to an unacceptable LOS, then there would be a significant impact. If the intersection was already operating at an unacceptable LOS, then there would be a significant impact only if the average critical delay increases by more than 4 seconds and the critical volume-to-capacity (V/C) ratio increases by more than 0.01.[2] NEPA considers the context and intensity of an impact to determine if there would be an adverse effect, and these CEQA thresholds provide an appropriate measure of context and intensity. The following sections provide the specific significance thresholds used by VTA and the Cities of San Jose and Santa Clara. Many of the terms used in these definitions of significant impact are included in Chapter 12, *Definitions, Abbreviations, and Acronyms*.

[1] The CMP criteria for significant impacts at intersections and on freeways are from VTA's *Transportation Impact Analysis Guidelines* (2014). The City of San Jose's significant impact criteria are from the City's *2009 Traffic Impact Analysis Handbook.* There is no official document available with the City of Santa Clara's impact criteria, but the criteria used here are consistent with other recent traffic studies done in Santa Clara and are based on communications with City of Santa Clara staff.

[2] The thresholds of 4 seconds of average critical delay and 0.01 increase in V/C are from the VTA Congestion Management Program's *Transportation Impact Analysis Guidelines* (2014) and the City of San Jose's (2009) *Traffic Impact Analysis Handbook.*

3.2.2.1 Congestion Management Agency

Definition of Significant Intersection Impacts under 2015 Existing and 2035 Forecast Year Conditions

For CMP intersections, a significant traffic impact at an intersection is identified by comparing either the BART Extension against No Build conditions (for NEPA and CEQA purposes) or the BART Extension with TOJD against No Build conditions (for CEQA purposes only). The CMP definition of significant intersection impacts below applies to both the 2015 Existing and 2035 Forecast Year. Very similar criteria are used by the City of San Jose for 2015 Existing conditions and by the City of Santa Clara for both 2015 Existing and 2035 Forecast Year conditions.

A project alternative is said to create a significant impact on traffic conditions under 2015 Existing or 2035 Forecast Year conditions at a CMP intersection if for either peak hour:

1. The LOS at a CMP-designated intersection degrades from an acceptable LOS E or better under No Build conditions to an unacceptable LOS F under the BART Extension or BART Extension with TOJD Alternative.

   Or

2. The LOS at a CMP-designated intersection is an unacceptable LOS F under No Build conditions and the addition of BART Extension traffic or BART Extension with TOJD traffic causes both the average critical-movement delay at the intersection to increase by four or more seconds *and* the critical volume-to-capacity ratio (V/C) to increase by .01 or more under the BART Extension or BART Extension with TOJD Alternative.

An exception to Rule 2 above applies when the addition of BART Extension traffic or BART Extension with TOJD-generated traffic reduces the amount of average control delay for critical movements (i.e., the change in average control delay for critical movements is negative). In this case, the threshold of significance is an increase in the critical V/C value by 1 percent (0.01) or more.

Definition of Significant Freeway Segment Impacts under 2015 Existing and 2035 Forecast Year Conditions

The CMP defines an acceptable LOS for freeway segments as LOS E or better. The same definition of significant freeway impacts is applied to both 2015 Existing and 2035 Forecast Year. A project alternative is said to create a significant impact on traffic conditions on a freeway segment if, for either peak hour:

1. The LOS on a freeway segment degrades from an acceptable LOS E or better under No Build conditions to an unacceptable LOS F under the BART Extension or BART Extension with TOJD Alternative.

   Or

2. The LOS on a freeway segment is operating at an unacceptable LOS F under No Build conditions and the amount of BART Extension traffic or BART Extension with TOJD traffic added to that segment constitutes at least 1 percent of capacity on that segment under either the BART Extension or BART Extension with TOJD Alternative.

3.2.2.2 City of San Jose Definition of Significant Intersection Impacts

The City of San Jose uses different definitions of significant intersection impacts for 2015 Existing and 2035 Forecast Year conditions.

Definition of Significant Intersection Impacts under 2015 Existing Conditions

The City of San Jose's definition of significant intersection impacts under existing conditions is identical to the CMP definition above, except that the acceptable LOS changes from E to D and different criteria are specified for Protected Intersections. A project is said to create a significant impact on 2015 Existing traffic conditions at a signalized intersection in the City of San Jose if, for either peak hour:

1. The LOS at the intersection degrades from an acceptable LOS D or better under 2015 Existing No Build conditions to an unacceptable LOS E or F under 2015 Existing BART Extension or 2015 Existing BART Extension with TOJD conditions.

   Or

2. The LOS at the intersection is an unacceptable LOS E or F under 2015 Existing No Build conditions and the addition of BART Extension or BART Extension with TOJD trips causes both the average critical-movement delay at the intersection to increase by 4 or more seconds and the critical V/C ratio to increase by 1 percent (0.01) or more under 2015 Existing BART Extension or 2015 Existing BART Extension with TOJD conditions.

   Or

3. The LOS at a designated City of San Jose Protected Intersection is an unacceptable LOS E or F under 2015 Existing No Build conditions and the addition of BART Extension or BART Extension with TOJD trips causes the V/C ratio to increase by 0.5 percent (0.005) or more under 2015 Existing BART Extension conditions or 2015 Existing BART Extension with TOJD conditions.

An exception to Rule 2 above applies when the addition of BART Extension traffic or BART Extension with TOJD-generated traffic reduces the amount of average control delay for critical movements (i.e., the change in average control delay for critical movements is negative). In this case, the threshold of significance is an increase in the critical V/C ratio value by 1 percent (0.01) or more.

Definition of Significant Intersection Impacts under 2035 Forecast Year Conditions

In the City of San Jose, the evaluation of whether a project would cause a significant impact under cumulative conditions is different from the evaluation process used for Existing and Background conditions. The City of San Jose's "Cumulative Plus Project" (which would be the 2035 Forecast Year BART Extension Alternative or the 2035 Forecast Year BART Extension with TOJD Alternative) evaluation methodology requires comparing the 2035 Plus Project scenario to the 2025 No Build scenario, and then determining if the BART Extension or BART Extension with TOJD Alternatives would contribute more than 25 percent of the total increase in traffic between the 2025 No Build scenario and the 2035 Plus Project scenario. Note that the term *cumulative project trips* in San Jose's definition of significant impacts below refers to all of the trips generated by all of the projects or land uses that are included in the 2035 (Cumulative) Plus Project scenario (including the relevant project alternative) that were not included in the 2025 No Build scenario.

In the City of San Jose, a significant cumulative traffic impact at an intersection is identified by comparing 2035 (Cumulative) Plus Project conditions against 2025 (Background) No Build conditions. The future projects included in the 2035 Cumulative Plus Project scenario *collectively* would create a significant impact on traffic conditions at a signalized intersection in the City of San Jose if, during either the AM or PM peak hour:

1. The LOS at the intersection degrades from an acceptable LOS D or better under 2025 No Build conditions to an unacceptable LOS E or F under 2035 Forecast Year BART Extension or 2035 Forecast Year BART Extension with TOJD conditions.

   Or

2. The LOS at the intersection is an unacceptable LOS E or F under 2025 No Build conditions and the addition of cumulative project trips causes both the average critical-movement delay at the intersection to increase by 4 or more seconds and the V/C ratio to increase by 0.01 or more under 2035 Forecast Year BART Extension or 2035 Forecast Year BART Extension with TOJD conditions.

   Or

3. The LOS at a designated Protected Intersection is an unacceptable LOS E or F under 2025 No Build conditions and the addition of cumulative project trips causes the V/C ratio to increase by 0.5 percent (0.005) or more under 2035 Forecast Year BART Extension or 2035 Forecast Year BART Extension with TOJD conditions.

An exception to Rule 2 above applies when the addition of BART Extension traffic or BART Extension with TOJD traffic reduces the amount of average delay for critical movements (i.e., change in average delay for critical movements is negative). In this case, the threshold of significance is an increase in the critical V/C ratio value by 0.01 or more.

A *single project's* contribution to a 2035 Cumulative Plus Project intersection impact is deemed considerable in the City of San Jose if the proportion of project traffic (i.e., BART Extension traffic for NEPA and CEQA purposes or BART Extension with TOJD traffic for CEQA purposes only) represents 25 percent or more of the increase in total volume from 2025 No Build conditions to 2035 Cumulative Plus Project conditions.

3.2.2.3 City of Santa Clara Definition of Significant Intersection Impacts

Like the Congestion Management Agency, the City of Santa Clara uses the same definition of significant intersection impacts for 2015 Existing and 2035 Forecast Year conditions. Also, Santa Clara's definition is identical to the CMP definition, except that for City-controlled intersections an unacceptable LOS is E or F, and for expressway and CMP intersections an unacceptable LOS is F.

In the City of Santa Clara, a significant traffic impact at an intersection is identified by comparing No Build conditions against BART Extension or BART Extension with TOJD conditions. The BART Extension and BART Extension with TOJD are said to create a significant impact on traffic conditions at a signalized intersection in the City of Santa Clara if for either peak hour:

1. The LOS at the intersection degrades from an acceptable level (LOS D or better at all City-controlled intersections and LOS E or better at all expressway and CMP intersections) under No Build conditions to an unacceptable level (LOS E or F at City-controlled intersections and LOS F at expressway and CMP intersections) under BART Extension conditions or BART Extension with TOJD conditions,

   Or

2. The LOS at the intersection is an unacceptable level (LOS E or F at City-controlled intersections and LOS F at expressway and CMP intersections) under No Build conditions and the addition of BART Extension traffic or BART Extension with TOJD traffic causes both the average critical delay at the intersection to increase by four or more seconds *and* the V/C to increase by 1 percent (0.01) or more under BART Extension conditions or BART Extension with TOJD conditions.

An exception to Rule 2 above applies when the addition of BART Extension traffic or BART Extension with TOJD-generated traffic reduces the amount of average control delay for critical movements (i.e., the change in average control delay for critical movements is negative). In this case, the threshold of significance is an increase in the critical V/C value by 1 percent (0.01) or more.

3.3 2015 Existing Conditions

3.3.1 Transit Service

Existing transit services consist of bus services, light rail transit (LRT), shuttle services, paratransit service, and inter-county services, and are briefly described below. A complete description of existing services is included in VTA's *Short Range Transit Plan FY 2014–2023* (Santa Clara Valley Transportation Authority 2014b).

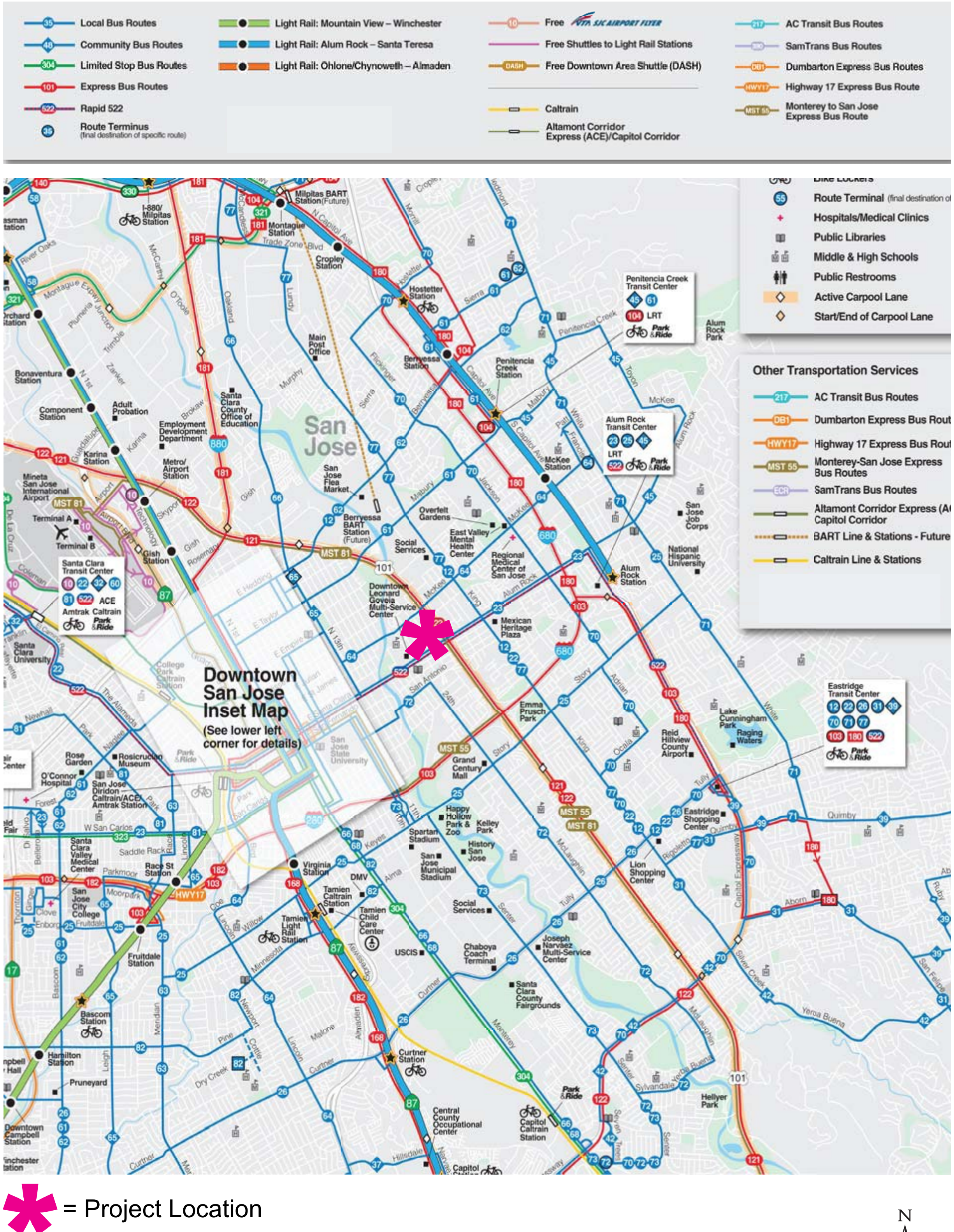
VTA currently operates 69 bus routes, which consist of 17 core routes, 1 rapid route, 17 local routes, 18 community bus routes, 12 express routes, and 4 limited stop routes.

VTA also operates three LRT routes: Ohlone/Chynoweth to/from Almaden, Alum Rock to/from Santa Teresa, and Mountain View to/from Winchester. Total fleet size to operate the LRT service is 99 low-floor light rail vehicles. VTA provides shuttle service to LRT stations and major Silicon Valley employment destinations, activity centers, and transit facilities and offers accessible paratransit services for seniors and the disabled community.

VTA is a member of the Peninsula Corridor Joint Powers Board, which operates Caltrain service in Santa Clara, San Mateo, and San Francisco Counties. VTA is also a member of the Capitol Corridor Joint Powers Board, which operates train service from Placer County to Santa Clara County.

BART currently operates five routes: Pittsburg/Bay Point to/from San Francisco International Airport, Fremont to/from Richmond, Fremont to/from Daly City, Richmond to/from Millbrae and to Daly City during evenings and weekends, and Dublin/Pleasanton to/from Daly City. Figure 1-2 in Chapter 1, *Purpose and Need*, shows these existing and planned BART systems. Total fleet size to operate BART service is 669 cars.

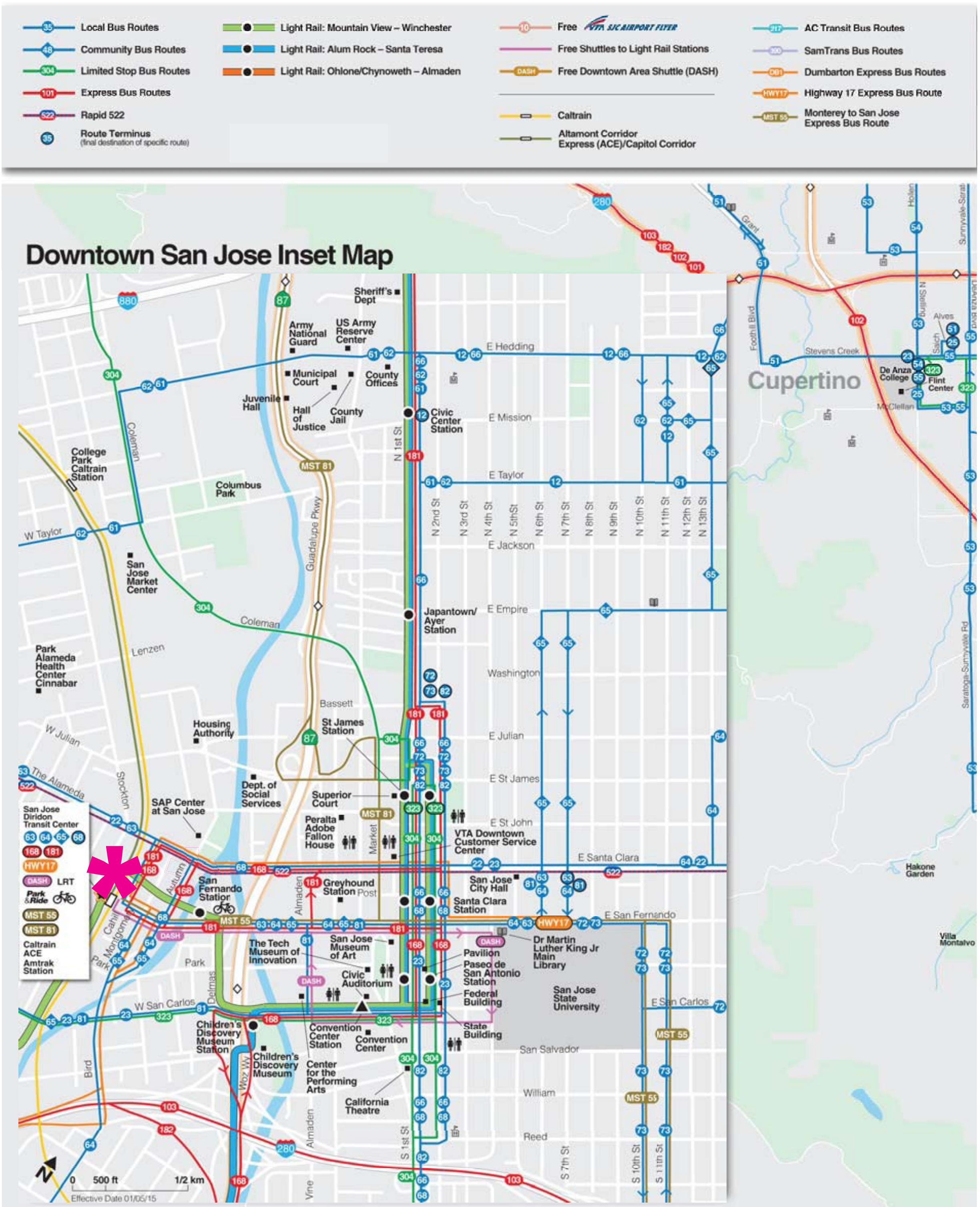
Existing transit service to the areas around the four future stations (Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara) is provided by VTA, Altamont Corridor Express (ACE), Amtrak, and Caltrain. The transit services are described below and shown on Figures 3-1, 3-2, and 3-3.



Source: VTA's Bus & Rail Map, January 2015.

Graphics ... 00332.13 (11-13-2015)

Figure 3-1
Existing Transit Services – Alum Rock Station Area
VTA's BART Silicon Valley–Phase II Extension Project



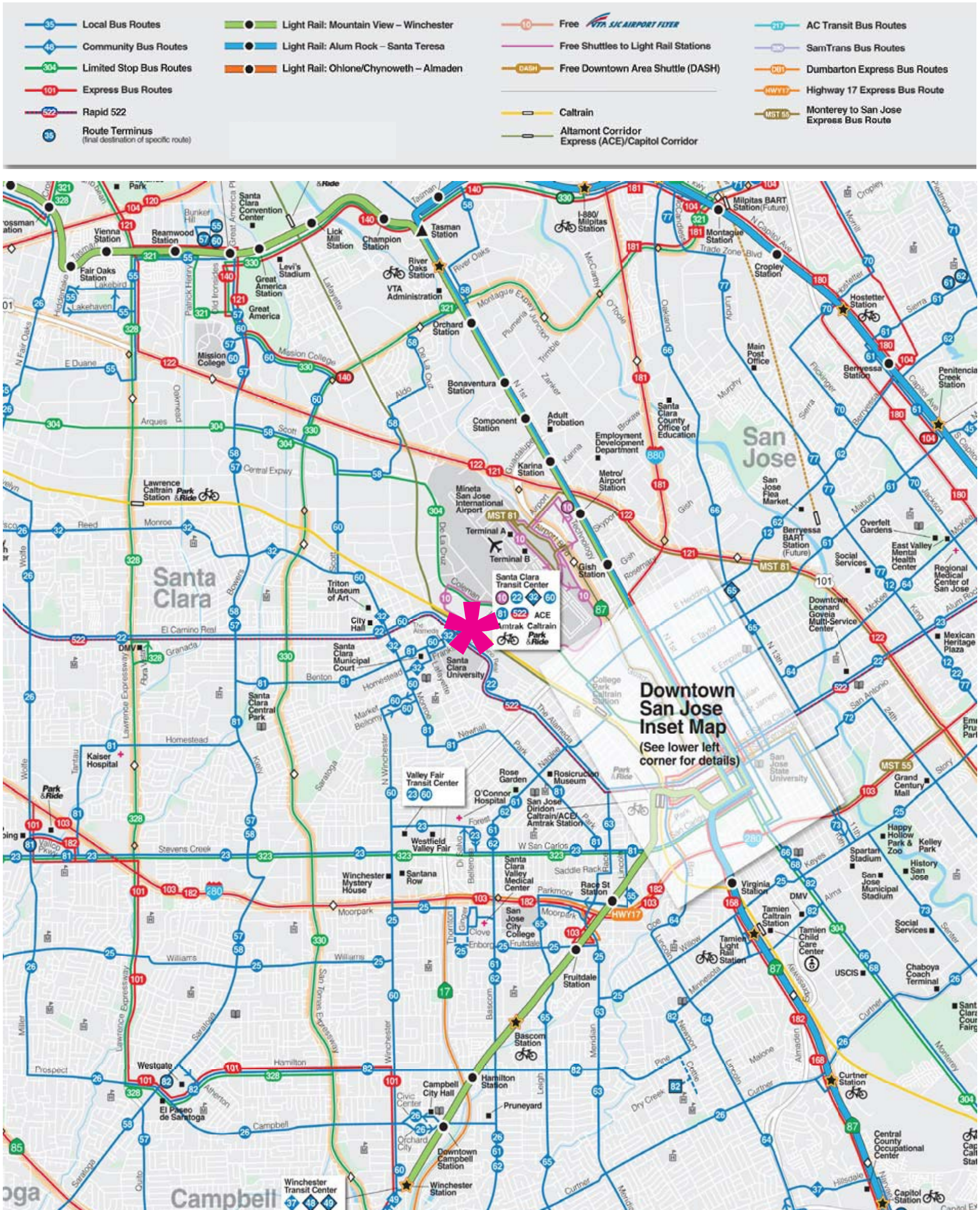
* = Project Location

Source: VTA's Bus & Rail Map, January 2015.

N
NOT TO SCALE

Graphics … 00332.13 (11-13-2015)

Figure 3-2
Existing Transit Services – Diridon Station Area
VTA's BART Silicon Valley–Phase II Extension Project



= Project Location

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NOT TO SCALE

Source: VTA's Bus & Rail Map, January 2015.

Graphics … 00332.13 (11-13-2015)

Figure 3-3
Existing Transit Services – Santa Clara Station Area
VTA's BART Silicon Valley–Phase II Extension Project

3.3.1.1 VTA Transit Service

The future Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara Stations are served directly by several local bus routes, express bus routes, inter-county bus routes, free shuttles, and LRT lines.

Local Bus Routes

The area around the future Alum Rock/28th Street Station is served by the following VTA local bus routes.

- 22 (Eastridge Transit Center to Palo Alto Transit Center) with 12-minute headways during the commute hours.
- 23 (De Anza College to Alum Rock Transit Center) with 12-minute headways during the commute hours.
- 64 (Almaden LRT Station to McKee & White) with 15-minute headways during the commute hours.

The area around the future Downtown San Jose Station is served by the following VTA local bus routes.

- 22 (Eastridge Transit Center to Palo Alto Transit Center) with 12-minute headways during the commute hours.
- 23 (De Anza College to Alum Rock Transit Center) with 12-minute headways during the commute hours.
- 66 (Kaiser San Jose to Milpitas/Dixon Road via Downtown San Jose) with 15-minute headways during the commute hours.
- 68 (Gilroy Transit Center to San Jose Diridon Transit Center) with 15- to 20-minute headways during the commute hours.
- 72 (Santa Teresa to Downtown San Jose) with 15- to 20-minute headways during the commute hours.
- 73 (Snell/Capitol to Downtown San Jose) with 15-minute headways during the commute hours.
- 82 (Westgate Mall to Downtown San Jose) with 30 minutes headways during the peak commute hours.

The area around the future Diridon Station is served by the following VTA local bus routes.

- 22 (Eastridge Transit Center to Palo Alto Transit Center) with 12-minute headways during the commute hours.
- 63 (Almaden Expressway & Camden to San Jose State University) with 30-minute headways during the commute hours.

- 64 (Almaden LRT Station to McKee & White) with 15-minute headways during the commute hours.
- 65 (Kooser & Blossom Hill to Hedding & 13th) with 45-minute headways during the commute hours.
- 68 (Gilroy Transit Center to San Jose Diridon Transit Center) with 15- to 20-minute headways during the commute hours.

The area around the future Santa Clara Station is served by the following VTA local bus routes.

- 22 (Eastridge Transit Center to Palo Alto Transit Center) with 12-minute headways during the commute hours.
- 32 (San Antonio Shopping Center to Santa Clara Transit Center) with 30-minute headways during the commute hours.
- 60 (Winchester Transit Center to Great America) with 15-minute headways during the commute hours.
- 81 (San Jose State University to Moffett Field) with 30-minute headways during the commute hours.

Express Bus Routes

The Alum Rock/28th Street Station, Downtown San Jose Station, Diridon Station, and Santa Clara Station are served by VTA Rapid Bus Route 522 (Eastridge Transit Center to Palo Alto Transit Center) with 15-minute headways during the commute hours. The Diridon Station is served by the following VTA Express Bus Routes: 168 (Gilroy Transit Center to Diridon Transit Center) with 20- to 30-minute headways during the commute hours and 181 (Fremont BART Station to San Jose Diridon Transit Center) with 15-minute headways during the commute hours. Express Route 304 provides service between South San Jose and Sunnyvale via downtown San Jose with 30-minute headways during commute hours.

VTA Shuttle Service

VTA also provides shuttle services. The Downtown Area Shuttle (DASH) provides shuttle service from the Diridon Caltrain Station to San Jose State University, the San Jose McEnery Convention Center LRT Station, and the Downtown San Jose area via San Fernando Street, West San Carlos Street, Almaden Boulevard, and Fourth Street with approximately 10-minute headways during the commute hours. The Free Airport Flyer (Route 10) provides shuttle service from the Santa Clara Transit Center to the Metro Airport LRT Station via the Mineta San Jose International Airport with approximately 15-minute headways during the commute hours.

Light Rail Transit Service (Downtown San Jose Only)

LRT service is provided in the Downtown San Jose area by VTA. The Alum Rock-Santa Teresa and Mountain View-Winchester LRT lines provide service to the Downtown San Jose area. The Alum Rock-Santa Teresa LRT line provides service between the Alum Rock/28th Street Station in East San Jose to the Santa Teresa Station in South San Jose, and the Mountain View-Winchester LRT line provides service between the Mountain View Transit Center in Mountain View and the Winchester Transit Center in Campbell. Both LRT lines run directly through Downtown San Jose alongside First and Second Streets. At San Carlos Street and SR 87, the Alum Rock-Santa Teresa LRT line continues to South San Jose along SR 87 while the Mountain View-Winchester LRT line continues to the Winchester Station after stopping at the Diridon Transit Center. Both lines provide service on 15-minute headways during most hours of the day. The LRT stations within the Downtown area provide connections to virtually every bus line described above.

3.3.1.2 Transit Service by Other Operators

Inter-County Bus Service (Diridon and Downtown Stations)

Inter-county bus service is provided by Santa Cruz Metro and Monterey-Salinas Transit (MST). The Highway 17 Express Bus is an Amtrak Thruway route and provides service from Santa Cruz/Scotts Valley to Downtown San Jose (Diridon Caltrain Station) on 15- to 45-minute headways during the commute hours. The MST 55 Express line provides service between Monterey and the San Jose Diridon Station with two daily round trips. The MST 86 Express line provides service between King City and Monterey to the Mineta San Jose International Airport and Diridon Caltrain Station with one daily round trip.

Altamont Commuter Express (Diridon and Santa Clara Stations)

ACE provides commuter rail service between the Central Valley and Silicon Valley. Four trains are in operation during weekday commuting hours with westbound trains heading to San Jose in the morning and eastbound trains heading to Stockton in the evening. ACE Stations are located at the Santa Clara Transit Center and the Diridon Transit Center. Shuttle service from the stations to employment centers is provided by various public transit agencies.

Amtrak Capitol Corridor Inter-City Rail (Diridon and Santa Clara Stations)

Amtrak provides intercity passenger rail service between Auburn in Placer County and San Jose. There are seven round trips between Sacramento and San Jose on weekdays and weekends. An additional eight round trips operate only between Sacramento and Oakland. There is one round trip per day that serves Auburn. The trains share the Diridon Caltrain Station and the Santa Clara Caltrain Station facilities. In addition, Amtrak provides a daily Coast Starlight line from Los Angeles to Seattle.

Caltrain (Diridon and Santa Clara Stations)

Caltrain operates a commuter rail service 7 days a week between San Jose and San Francisco. During weekday commuting hours, Caltrain also serves south Santa Clara County, including Gilroy, San Martin, and Morgan Hill. Caltrain provides shuttle service to businesses in the Silicon Valley and on the Peninsula.

The existing Diridon Caltrain Station (west of Cahill Street) is south of the Diridon BART Station site. The existing Santa Clara Caltrain/ACE Station (at Railroad Avenue and El Camino Real) is on the opposite side of the rail tracks from the Santa Clara BART Station. Transit service between the Diridon Caltrain Station and the Downtown San Jose area is provided via connections with bus lines 63, 64, 65, and 68 described above, express bus routes 168, 181, and Highway 17, DASH, LRT, MST 55, MST 86, and ACE/Amtrak connections. The Santa Clara Caltrain Station provides service to the Santa Clara area via connections with bus lines 22, 32, 60, and 81 described above, rapid bus route 522, bus route 10, and ACE/Amtrak connections. Caltrain provides service with 15- to 30-minute headways during commute hours.

3.3.1.3 Existing Transit Ridership

The average weekday transit boardings of BART, Caltrain, Amtrak-Capitol Corridor, ACE, and VTA, which total over 607,000 per day, are summarized in Table 3-5.

Table 3-5: 2015 Existing Average Weekday Boardings by Transit Operator

Operator	Submode	2015 Existing
BART[a]	Heavy Rail	403,900
Caltrain[b]	Commuter Rail	52,600
Amtrak-Capitol Corridor[c]	Intercity Passenger Rail	2,300
ACE[d]	Commuter Rail	5,040
VTA[e]	Light Rail	35,500
	Express Bus	5,090
	Local/Limited Bus	102,850
Total		**607,280**

Note: BART boardings **exclude** BART to BART transfers
Sources:
[a] BART Monthly Ridership Report, April 2014
[b] Caltrain 2015 Annual Passenger Count Report
[c] BART comments on Administrative Draft SVSX EIR
[d] Amtrak-Capitol Corridor boardings exclude stations north of Fairfield/Suisun station
[e] VTA 2015 Systemwide Ridership By Route

3.3.2 Bicycle Facilities

There are several bicycle facilities near each of the station campuses. As defined by the California Department of Transportation (Caltrans), bicycle facilities include Class I bikeways (defined as bike paths off street, which are shared with pedestrians and exclude general motor vehicle traffic), Class II bike lanes (defined as striped bike lanes on street), Class III bike routes (defined as roads with bike route signage where bicyclists share the road with motor vehicles), and Class IV cycle tracks (bike lanes physically separated from vehicle traffic by a vertical element). With the exception of limited-access highways, bicyclists are allowed to ride on any roadway, even if there is no bicycle facility present.

In Santa Clara County, bicycle facilities are typically constructed and maintained by local jurisdictions. Bikeways that serve the stations fall within City of San Jose, the City of Santa Clara, and Santa Clara County jurisdictions, and are maintained by the agencies. San Jose and Santa Clara have bike plans from 2009.

Additionally, the *Santa Clara Countywide Bicycle Plan* (Bicycle Plan), adopted by VTA in August 2008, identifies various existing and/or planned cross-county bicycle corridors in the vicinity of the BART stations. The purpose of the cross-county bicycle corridors, as described in the Bicycle Plan, is to provide continuous connections between Santa Clara County jurisdictions and to adjacent counties, and to serve the major regional trip-attractors in the County. The cross-county bicycle corridors serving the alignment are discussed below. Bicycle facilities in the area of each of the stations are presented on Figures 3-4, 3-5, and 3-6 and described below. The bike paths shown on the figures are recreational facilities primarily used for recreational purposes. The bike lanes and routes are transportation facilities and are primarily used for commuting and running errands.

3.3.2.1 Alum Rock/28th Street Station

The Alum Rock/28th Street Station site is moderately accessible by bicycle. The station site is surrounded by bicycle facilities, but none provide a direct connection to the site. Class II bike lanes are provided on Mabury Road, 21st Street, portions of San Antonio Street, and Jackson Avenue. There are no Class I bikeways that serve the station area. The streets near the station site, Santa Clara Street/Alum Rock Avenue and McKee Road, are identified as “high caution” roads in VTA’s Bikeways Map (May 2016).

Access to the station site from the east is constrained by U.S. Highway 101 (U.S. 101); the closest freeway crossings to the site are at McKee Road and Alum Rock interchanges. Neither are designed well for bicyclists. Access from the west is constrained by Coyote Creek; bicyclists may cross Coyote Creek on Julian Street (identified as “Alert” in VTA’s Bikeways Map), Santa Clara Street (“High Caution”), or San Antonio Street. None of these roads have bike lanes, and only San Antonio Street is designated as a Class III bike route. No nearby bicycle facilities connect from the north. From the south, there are bicycle lanes on 24th Street; however, these stop half a mile before the station, and bicyclists traveling on 24th Street must bike through an interchange with I-280.

VTA’s 2008 Santa Clara Countywide Bicycle Plan identifies San Antonio Street as a Cross County Bicycle Corridor (CCBC). This is the closest CCBC to the Alum Rock/28th Street Station Site.

The Countywide Bicycle Plan identifies the interchange of Julian Street/McKee Road and U.S. 101, and Santa Clara Street over U.S. 101 as "Across Barrier Connections" needing bicycle improvements.

There are no nearby Bay Area Bikeshare stations.

The City of San Jose's planned Coyote Creek Trail will complete a Class I bikeway along Coyote Creek between Milpitas (Dixon Landing Road) and Coyote Lake in the South County. Currently, bicycle facilities along this corridor are missing between Montague Expressway and Tully Road and Anderson Lake County Park and Coyote Lake County Park. Coyote Creek runs west of the Alum Rock/28th Street Station.

3.3.2.2 Downtown San Jose Station

The Downtown San Jose Station site is generally accessible by bicycle, and very close to the City's trail network. The station site is served by Class II bicycle lanes on San Fernando Street, 3rd Street, 4th Street, and Almaden Boulevard and Class III bicycle routes on Saint John Street, 1st Street, and 2nd Street. The Guadalupe River Trail (Class I bikeway) is one-third of a mile to the west of the station site, and provides high-quality bicycle access south to Virginia Street and north to Alviso, with connections to the Highway 237 Bicycle Path and the Bay Trail. Bicyclists can access the trail at Saint John Street, Santa Clara Street, and San Fernando Street. Of these three, only San Fernando Street provides an uninterrupted high quality access to the trail. Santa Clara Street does not have bike lanes for the entire way and is rated "High Caution" on the VTA Bicycle Map. Bicyclists traveling on Saint John Street must ride against traffic on a wide sidewalk. While trailheads are well-marked, there is little wayfinding signage directing bicyclists to the Guadalupe River Trail from downtown. From the south, I-280 limits bicycle access to the station site. The Guadalupe River Trail, South 2nd Street, and South 3rd Street provide continuous bikeways across this barrier. From the west, SR 87 and the Guadalupe River limit bicycle access to the station site. While many cross streets include Class II bicycle lanes, the bike lanes generally do not extend farther west than just under SR 87. Park Avenue is the only street close to the station area that continues a significant distance west of SR 87. Within the vicinity of the station site, VTA's 2008 Santa Clara Countywide Bicycle Plan identifies the following streets or trails as Cross County Bicycle Corridors: Saint John Street, San Fernando Street, Market/South 1st Street, and Guadalupe River Trail.

The Countywide Bicycle Plan identifies the interchange of Julian Street and SR 87, and Almaden Boulevard under SR 87 as "Across Barrier Connections" needing bicycle improvements. The nearest Bay Area Bikeshare station is at the intersection of San Pedro Street and St. John Street.

3.3.2.3 Diridon Station

Diridon Station is generally accessible by bicycle, and very close to two major bicycle paths. Diridon Station is served by Class II bicycle lanes on Stockton Avenue, Santa Clara Street, San Fernando Street, and Park Avenue. There are few low-stress bicycle connections from Diridon Station directly south. Montgomery Avenue, which provides the most direct connection south, is rated as "High Alert" on the VTA Bikeways Map.

The Guadalupe River Trail is one-third of a mile to the east, and provides high quality bicycle access south to Virginia Street and north to Alviso, with connections to the Highway 237 Bicycle Path and the Bay Trail. Bicyclists can access the trail at San Fernando Street, Park Avenue, and Santa Clara Street. There is no wayfinding signage directing bicyclists from the station to the trailheads.

The Los Gatos Creek Trail (Class I bikeway) is one-third of a mile south of Diridon Station, and provides low-stress bicycle access south to the Willow Glen neighborhood. Bicyclists can access the trail at West San Carlos Street. There is no wayfinding signage directing bicyclists from the station to the trailhead. After a gap between Lonus Street and Meridian Avenue, the Los Gatos Creek Trail continues south to Main Street in Los Gatos, connecting Willow Glen, Downtown Campbell, and Downtown Los Gatos.

The Countywide Bicycle Plan identifies the following locations as "Across Barrier Connections" needing bicycle improvements: the San Carlos Street undercrossing of SR 87 and the interchange of Park Avenue and SR 87.

Within the vicinity of the station site, VTA's 2008 Santa Clara Countywide Bicycle Plan identifies the following streets or trails as Cross County Bicycle Corridors: Montgomery Street, Park Avenue, San Carlos Street, The Alameda, San Fernando Street, Los Gatos Creek Trail, and Guadalupe River Trail.

Bike lockers and a Bay Area Bikeshare station are provided at the existing San Jose Diridon Transit Center.

3.3.2.4 Santa Clara Station

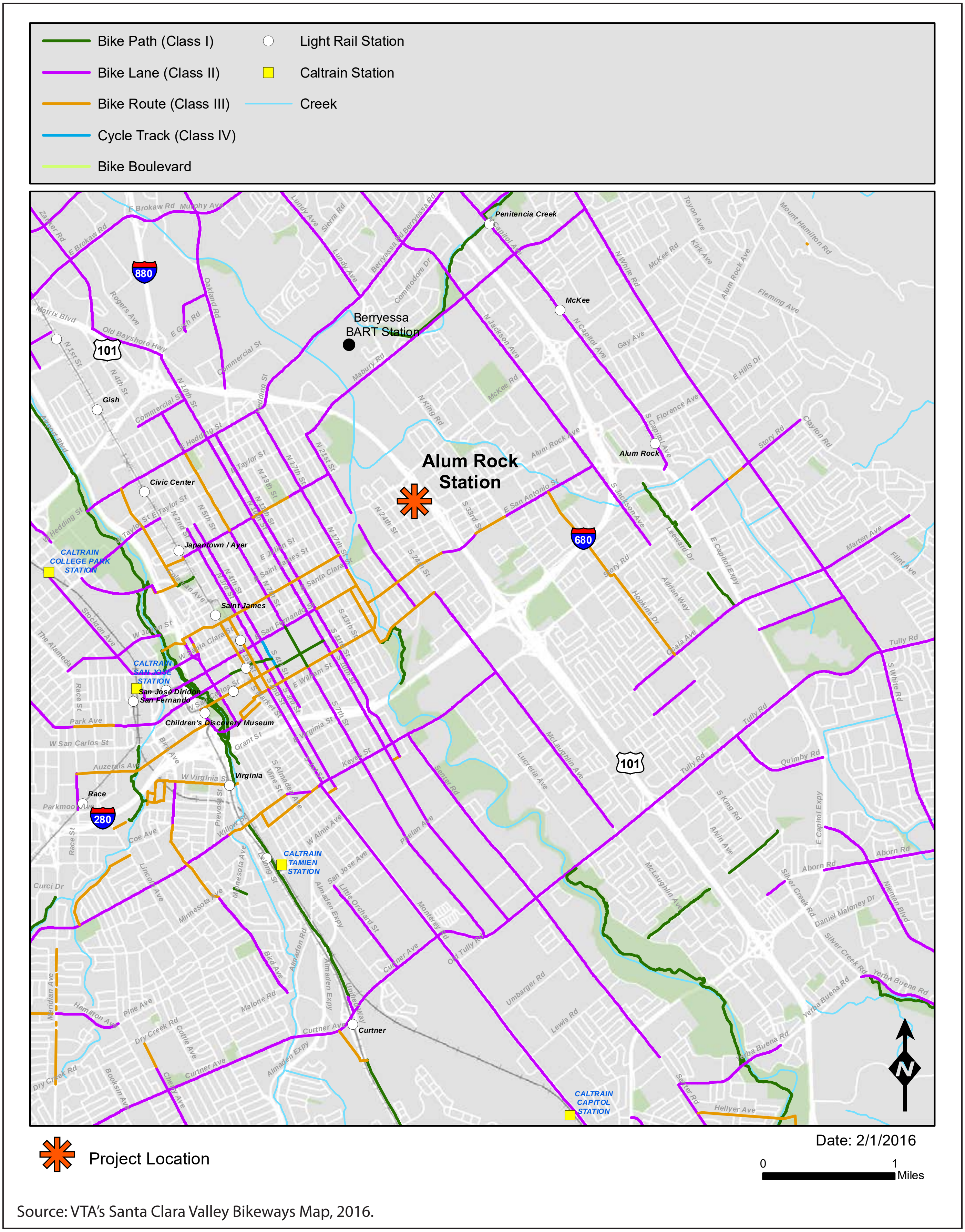
Santa Clara Station is difficult to access by bicycle, particularly from the north, east, and south. A Class III bicycle route on Benton Street provides direct access to the station from the west. No other bicycle facilities directly serve the station. Within two-thirds of a mile of the station, Class II bicycle lanes are provided on Monroe Street, Homestead Road, and portions of Coleman Avenue, the Alameda, Poplar Street, Market Street, and Bellomy Street and a Class III bike route is provided on Park Avenue. Santa Clara University, located adjacent to the station, includes some disconnected Class I bikeways.

De La Cruz Avenue and Coleman Avenue are identified on VTA's Countywide Bicycle Map as "High Caution" streets. The adjacent section of El Camino Real is identified as an "Alert" street.

Bicycle access from the north, east, and south is constrained by the rail lines, Highway 880, U.S. 101, the San Jose International Airport, SR 87, and the Guadalupe River. Bicyclists wishing to access the station from these directions must travel through high-stress freeway interchanges and major roadway intersections. Although the Guadalupe River Trail is a mile to the east, there are no low-stress connections to the trail from Santa Clara Station. There is no wayfinding signage directing bicyclists to the Guadalupe River Trail from the Santa Clara Station.

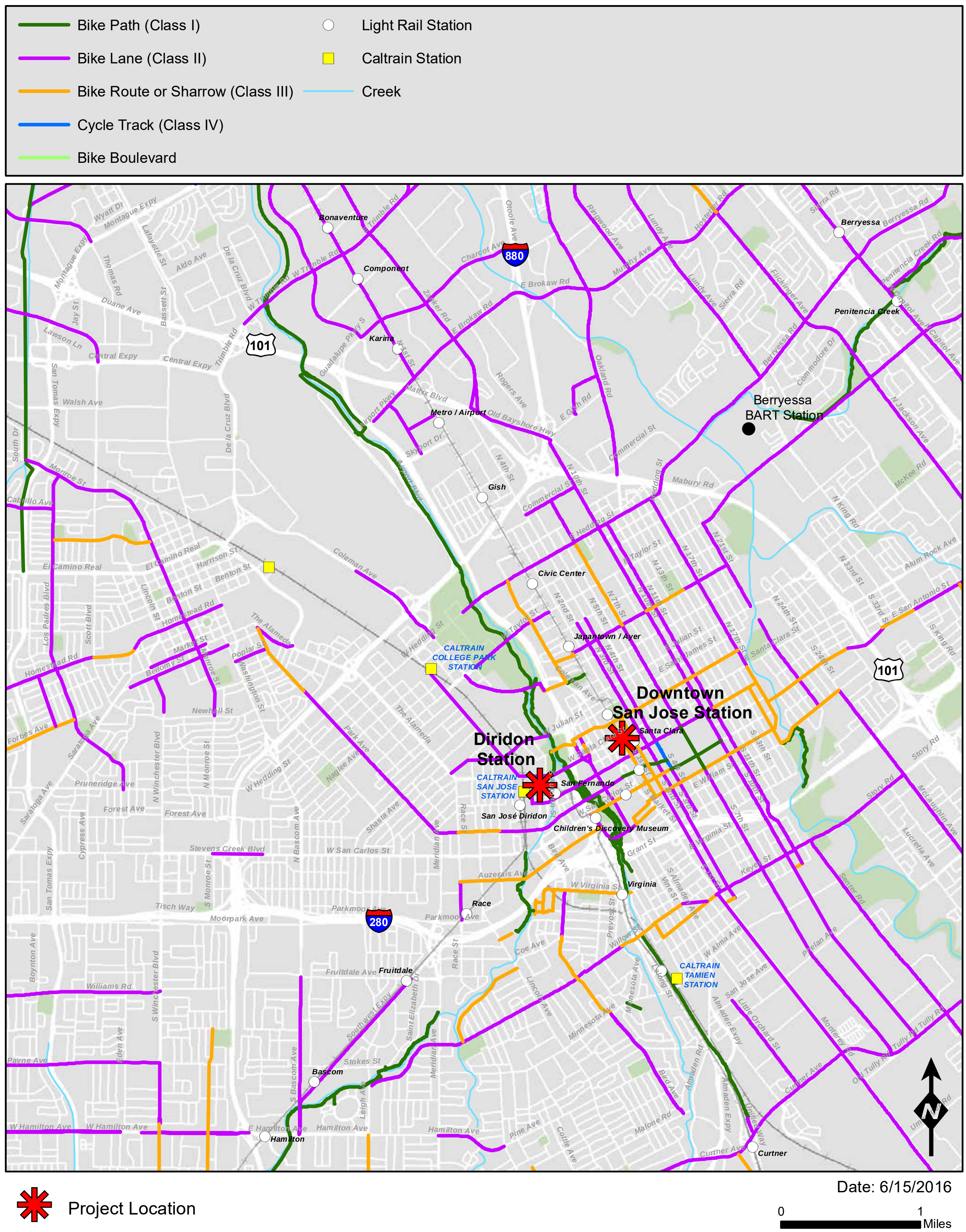
Within the vicinity of the station site, VTA's 2008 Santa Clara Countywide Bicycle Plan identifies the following streets or trails as "Cross County Bicycle Corridors": Coleman Avenue, Brokaw Road, El Camino Real/The Alameda, Benton Street, Monroe Street, Park Avenue, Hedding Street, Airport Boulevard, and the Guadalupe River Trail. The Countywide Bicycle Plan identifies the following locations as places where bicycle crossing improvements need to be made: The Alameda/880 Interchange, and the railroad crossing of De La Cruz/El Camino Real/Lewis Street. The Countywide Bicycle Plan identifies the need for a new bicycle/pedestrian bridge or undercrossing of the Caltrain Union Pacific Railroad tracks between De La Cruz Boulevard and Hedding Street. VTA is currently working on the design and construction of a bicycle/pedestrian undercrossing of the tracks at the Santa Clara Caltrain Station.

Bike lockers are provided at the existing Santa Clara Transit Center. There are no Bay Area Bikeshare Stations in the vicinity.



Source: VTA's Santa Clara Valley Bikeways Map, 2016.

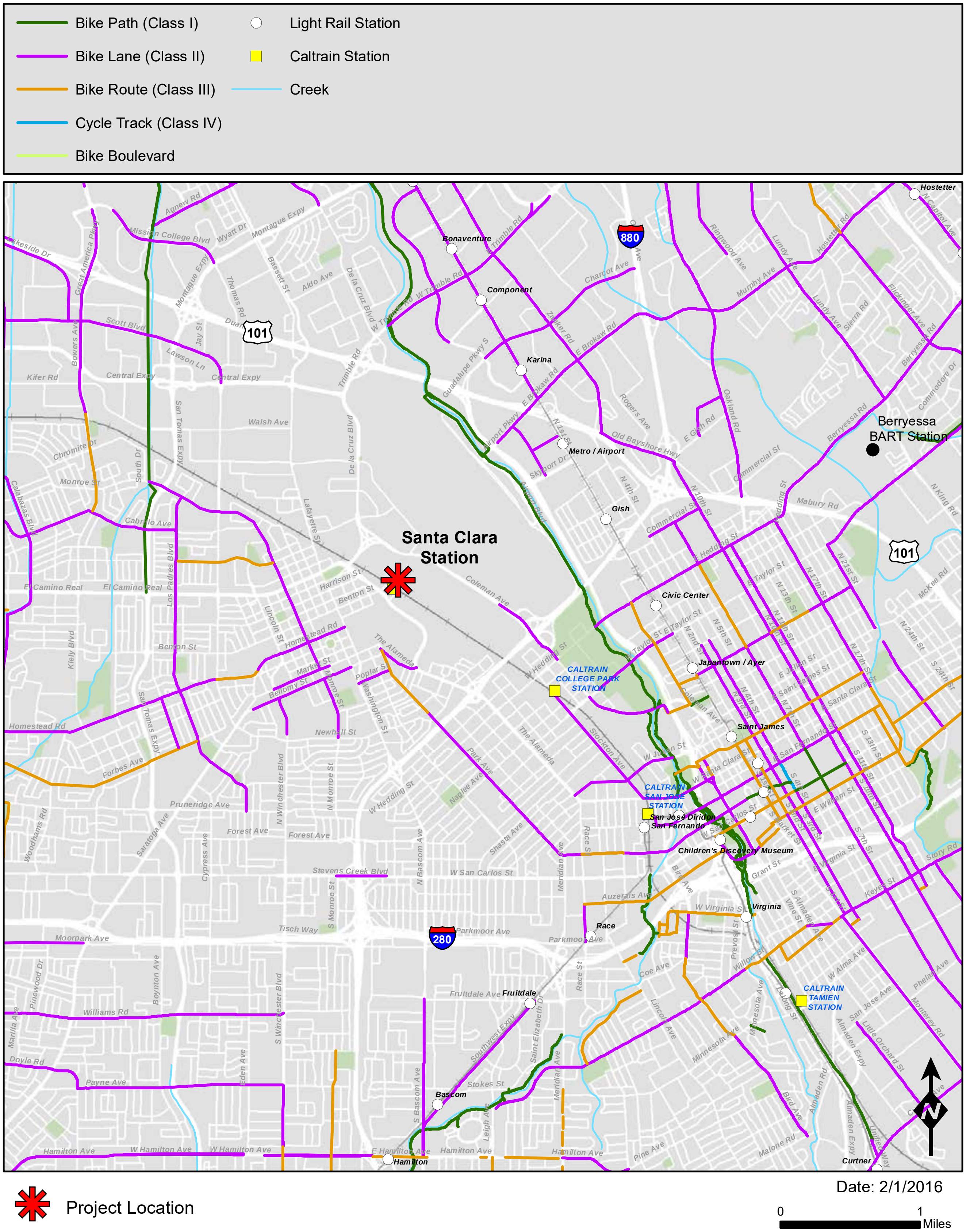
Figure 3-4
Existing Bicycle Facilities – Alum Rock Station Area
VTA's BART Silicon Valley–Phase II Extension Project



Source: VTA's Santa Clara Valley Bikeways Map, 2016.

Graphics ... 00332.13 (6-20-2016)

Figure 3-5
Existing Bicycle Facilities – Diridon Station Area
VTA's BART Silicon Valley–Phase II Extension Project



Source: VTA's Santa Clara Valley Bikeways Map, 2016.

Graphics ... 00332.13 (6-20-2016)

Figure 3-6

Existing Bicycle Facilities – Santa Clara Station Area

VTA's BART Silicon Valley–Phase II Extension Project

3.3.3 Pedestrian Facilities

Pedestrian facilities in the study areas consist primarily of sidewalks, crosswalks, pedestrian push buttons, and signal heads at intersections. With a few exceptions, sidewalks are found along virtually all of the local roadways in the study areas and along the local residential streets and collectors near the station sites.

VTA is developing a Pedestrian Access to Transit Plan (anticipated adoption December 2016) to identify high-priority areas (Focus Areas) for pedestrian improvements. Several of the proposed BART stations fall within the Plan's Focus Areas. The Plan identifies specific infrastructure that could improve pedestrian comfort, safety, and convenience in these areas. Findings from field work conducted in the area are presented below.

3.3.3.1 Alum Rock/28th Street Station

Overall, the existing network of sidewalks has good connectivity and provides pedestrians with adequate routes to the surrounding land uses and transit services near the Alum Rock/28th Street Station campus. With the exception of the west side and most of the east side of North 28th Street between McKee Road and Santa Clara Street, and along some of the industrial areas north of the station site, sidewalks are found along previously described local roadways in the Alum Rock/28th Street Station study area and along the local residential streets and collectors near the station site. Additionally, all signalized intersections in the vicinity of the Alum Rock/28th Street Station have marked crosswalks on all or most of the legs of the intersection, combined with pedestrian push buttons and pedestrian signal heads.

For pedestrians who may walk between the residential neighborhood east of U.S. 101 and the Alum Rock/28th Street Station site or between the TOJD site and VTA bus routes along King Street, there are continuous sidewalks and crosswalks along Alum Rock Avenue, including pedestrian push buttons and signal heads for the crosswalks on the U.S. 101 on- and off-ramps, at 33rd Street, and at King Road. There are also continuous sidewalks and crosswalks along McKee Road between 28th Street and King Road, including pedestrian push buttons and signal heads for the crosswalks on the U.S. 101 on- and off-ramps, at 33rd Street, and at King Road.

However, although the pedestrian facilities in the vicinity of the Alum Rock/28th Street Station are minimally adequate as described above, the area is not an especially pedestrian-friendly environment at present. There are locations, such as the crosswalks near the U.S. 101 on- and off-ramps, where walking is not as comfortable as it could be. The City of San Jose plans to improve the pedestrian environment in this area through its ongoing efforts to promote greater usage of alternative modes of travel.

3.3.3.2 Downtown San Jose Station

The existing network of sidewalks on Santa Clara Street between Market and 7th Street has good connectivity and provides pedestrians with safe routes to the surrounding land uses and transit services near the Downtown San Jose Station. Additionally, all signalized intersections in the vicinity of the Downtown San Jose Station have marked crosswalks on all or most of the legs of the intersection in addition to pedestrian push buttons and pedestrian signal heads. There is a continuous sidewalk along San Jose City Hall between 4th and 6th Streets, including pedestrian push buttons and signal heads to cross over Santa Clara Street.

VTA's Pedestrian Access to Transit Plan Draft Improvements Document (February 2016) identified the following challenges to walking within the downtown area:

- High speed vehicle turns/wide curb radii and long crossing distances along San Carlos Street and Market Street.
- Poorly marked pedestrian crossings at SR 87 ramps (Santa Clara Street, Julian Street).
- Long distances between pedestrian crossings along Santa Clara Street near San Jose Diridon.
- VTA Light Rail creates barrier for pedestrians using San Fernando Street to access transit.
- Limited passenger waiting space, no shelters on north side of Santa Clara Street near First Street.
- Wide turn radii at Santa Clara Street and 3rd/4th Streets
- Unclear pedestrian connections between VTA Light Rail stations on 1st and 2nd Streets. Suggest wayfinding.

3.3.3.3 Diridon Station

Near the Diridon Station, sidewalks are found along virtually all local roadways. Signalized intersections along Santa Clara Street have marked crosswalks on all or most of the legs of the intersection, combined with pedestrian push buttons and pedestrian signal heads. Midblock crosswalks at Stover Street and Crandall are marked across Cahill Street, South Montgomery Street, and South Autumn Street, but are not signalized.

The Pedestrian Access to Transit Plan identified the following challenges to walking within the area of Diridon Station:

- Pathway and uncontrolled crossing between Diridon Station and San Fernando Light Rail unclear, blocked by parked vehicles.
- Missing curb ramps and worn crosswalk markings at sidewalks that provide access to Diridon Station entrance.
- At San Fernando VTA Light Rail Station, it is unclear that main route to San Fernando Street is through San Fernando VTA Station. Suggest wayfinding.
- Drivers observed not yielding to pedestrians at Delmas/Santa Clara uncontrolled crossing.

- Opportunity to provide pedestrian scramble at Montgomery/ Santa Clara intersection.
- At Santa Clara/Cahill intersection, pedestrians are prohibited from crossing the west leg, and curb radii are wide, yet there are high pedestrian volumes.
- Sidewalks missing at Laurel Grove Lane/ Park Avenue.

3.3.3.4 Santa Clara Station

Near the Santa Clara Station site, sidewalks are found along virtually all of the local roadways in the study area and along the local residential streets and collectors, with the exception of the east side of Lafayette Street. Additionally, signalized intersections in the vicinity of the Santa Clara Station have marked crosswalks on all or most of the legs of the intersection, combined with pedestrian push buttons and pedestrian signal heads. However, there is less connectivity in the pedestrian facilities near the Santa Clara Station campus, due to the Caltrain tracks, the nearby Mineta San Jose International Airport, and the fact that some of the nearby streets serving industrial land uses do not include sidewalks.

There is a continuous sidewalk along the east side of De La Cruz Boulevard that connects with the sidewalk along Coleman Avenue, leading to the intersection at Brokaw Road where the Santa Clara Station would be located. However, the De La Cruz Boulevard overpass over El Camino Real and the Caltrain tracks and most portions of the interchange of De La Cruz Boulevard and Coleman Avenue do not include sidewalks. West of De La Cruz Boulevard, there is a bike and pedestrian bridge over the Caltrain tracks next to the Lafayette Street undercrossing. There is currently no convenient pedestrian access across the Caltrain tracks from the vicinity of the Santa Clara Caltrain Station to the site where the Santa Clara BART Station and TOJD would be located. However, a pedestrian undercrossing from the Caltrain center platform to Brokaw Road is under construction and planned to be completed in mid-2017.

3.3.4 Vehicular Traffic

Existing peak-hour traffic volumes at most study intersections were obtained from manual turning-movement counts conducted in the fall of 2014. In addition, 2013 and 2015 counts were utilized at four locations where construction was underway at the time of the 2014 counts. The existing conditions LOS tables (described in the following section) include count dates/count year for each of the study intersections.

3.3.4.1 Roadway Network

Regional access to the station sites is provided via U.S. 101, I-280, SR 87, and I-880. These facilities are described below.

U.S. 101 is a north-south freeway that extends northward through San Francisco and southward through Gilroy. Within the study area, U.S. 101 is an eight-lane facility that includes two HOV lanes. During the peak commute hours, the mixed-flow lanes operate under stop-and-go conditions in the peak direction of travel—northbound in the AM and southbound in the PM. Within the HOV lane, traffic flows improve, although volumes at certain locations are approaching capacity during the peak periods. U.S. 101 would provide access to the Alum Rock/28th Street Station site via its full interchanges at Santa Clara Street and McKee Road.

I-280 is generally an eight-lane freeway in the vicinity of Downtown San Jose with auxiliary lanes between some interchanges. It extends from U.S. 101 in San Jose to I-80 in San Francisco. The section of I-280 just north of the Bascom Avenue overcrossing has six mixed-flow lanes and two HOV lanes. Connections from I-280 to Downtown San Jose are provided via a full interchange at Bird Avenue, and partial interchanges at Seventh Street (no north on-ramp), at Almaden Boulevard/Vine Street (ramps to/from north), First Street (ramp to south), and Fourth Street (ramp to north). I-280 provides access to the Diridon Station via its interchange at Bird Avenue. Connections are also available indirectly via an interchange with SR 87 (to the Diridon Station) and an interchange with U.S. 101 (to the Alum Rock/28th Street Station).

SR 87 connects from SR 85 in south San Jose to U.S. 101 near the Mineta San Jose International Airport. It is generally a six-lane freeway (two mixed-flow lanes plus one HOV lane in each direction) with auxiliary lanes near the I-280 interchange. Connections from SR 87 to Downtown San Jose and the Diridon Station are provided via a full interchange at West Julian Street and partial interchanges at Park Avenue (ramps to/from north only), at Auzerais Avenue (ramps to/from south only), and at West Santa Clara Street (northbound off-ramp only).

I-880 extends in a north-south direction from its junction with I-280 near Downtown San Jose to I-80 in Oakland. Within the study area, I-880 has six mixed-flow lanes. Near the Santa Clara Station site, the peak direction of travel is northbound during the morning commute and southbound during the afternoon commute. I-880 provides access to the Santa Clara Station site via interchanges with The Alameda and Coleman Avenue.

Roadways providing local access to each of the station sites and their configurations in the area of the stations are described below.

Alum Rock/28th Street Station

North 28th Street is a two-lane, north-south roadway that extends from East Julian Street southward to San Antonio Street. North 28th Street provides direct access to the Alum Rock/28th Street Station site via both East Julian Street and Santa Clara Street.

McKee Road is an east-west roadway with full freeway interchanges at I-680 and U.S. 101. McKee Road extends from the foothills in East San Jose to North 28th Street (west of U.S. 101). At North 28th Street, McKee Road becomes East Julian Street, which travels westward through Downtown San Jose. McKee Road has four travel lanes between U.S. 101 and King

Road. East of King Road, McKee Road widens to six lanes. East of Jackson Avenue, it narrows back to two lanes in each direction.

Alum Rock Avenue is an east-west roadway with a partial cloverleaf interchange at I-680 and a diamond interchange at U.S. 101. Alum Rock Avenue extends from Alum Rock Park near the foothills in East San Jose to U.S. 101. At U.S. 101, Alum Rock Avenue becomes Santa Clara Street, which travels westward through Downtown San Jose. Alum Rock Avenue consists of four travel lanes within the study area.

San Antonio Street is a two-lane, east-west roadway that runs between San Jose State University and Capitol Expressway. At I-680, San Antonio Street merges into Capitol Expressway and travels southward.

Downtown San Jose and Diridon Stations

West Santa Clara Street is a four-lane, east-west roadway that transverses the San Jose Downtown core area. West of the Caltrain bridge (just east of Stockton Avenue) it becomes The Alameda. Santa Clara Street would provide direct access to the Diridon Station via Cahill Street.

San Fernando Street is a two-lane roadway that is oriented in an east-west direction and runs from 17th Street to Race Street. Within the San Jose Downtown area, specifically between South 10th Street and South 1st Street, San Fernando Street consists of a two-lane plus a two-way left-turn lane roadway. In the vicinity of the Diridon Caltrain Station, San Fernando Street terminates at Cahill Street, east of the Caltrain railroad tracks, and continues to Race Street west of the Caltrain railroad tracks.

The Alameda (SR 82) is generally a four-lane arterial that is oriented in a north-south direction and runs from Santa Clara University to the Downtown San Jose area, where it becomes Santa Clara Street east of Stockton Avenue.

Stockton Avenue is a two- to three-lane roadway (one lane in each direction plus a two-way left-turn lane) that extends in a northwest direction from south of The Alameda to Emory Street, just south of the Caltrain railroad tracks. North of the Caltrain railroad tracks, Stockton Avenue extends north of (without connection to) I-880, where it terminates.

Julian Street is primarily a one-way, westbound two-lane roadway within the San Jose Downtown core area. West and east of the Downtown core area at SR 87 and 17th Street, respectively, Julian Street is generally a two-way, two-lane facility. The City of San Jose plans to remove the S-shape segment of West Julian Street between Market Street and the SR 87 Northbound Ramps and replace it with a straight, two-way extension from North Market Street to Terraine Street. Additionally, the segment of West St. James Street, between the SR 87 northbound ramps and North Market Street, would become a two-way roadway, forming a grid system roadway network. West Julian Street provides regional access to the Diridon Station via its full interchange with SR 87.

San Carlos Street is a four-lane, east-west arterial that runs from 4th Street to Bascom Avenue, just east of I-880, at which point it becomes Stevens Creek Boulevard.

Autumn Street is currently a two- to three-lane roadway that is oriented in a north-south direction and extends from Park Avenue to Cinnabar Street, north of West Julian Street. The segment of South Autumn Street between Park Avenue and Santa Clara Street is a three-lane, one-way (northbound) roadway and works as a couplet with South Montgomery Street (southbound). The City of San Jose plans to extend North Autumn Street to connect to Coleman Avenue (at New Autumn Street) and change the existing one-way segment to a four-lane, two-way roadway. The reconfigured two-way Autumn Street segment will become the north-south connection between Santa Clara Street and Park Avenue.

Montgomery Street is currently a two-lane roadway that runs between West San Carlos Street and Santa Clara Street. North of the SAP Center, North Montgomery Street extends between West St. John Street and Cinnabar Street as a two-lane, two-way roadway. South of West San Carlos Street, Montgomery Street transitions into Bird Avenue. The segment of South Montgomery Street, between Park Avenue and Santa Clara Street, is a two-lane, one-way (southbound) roadway and works as a couplet with South Autumn Street (northbound). The City of San Jose plans to change the existing one-way segment of South Montgomery Street to a two-lane, two-way roadway terminating in a cul-de-sac just north of its current intersection with Park Avenue. The reconfigured two-way Montgomery Street segment will become a local street providing direct access to the existing surrounding land uses, including the Diridon Caltrain Station.

Bird Avenue is a four-lane arterial that is oriented in a north-south direction and provides access to I-280 and the downtown area. Bird Avenue runs from the Willow Glen Area of San Jose to West San Carlos Street, where it transitions into South Montgomery Street.

Santa Clara Station

El Camino Real (SR 82) is a six-lane major arterial that is oriented in an east-west direction extending westward from The Alameda toward the City of Mountain View. Access to the PNR facility for the Santa Clara Station would be provided via Coleman Avenue.

Coleman Avenue is four- to six-lane roadway that is oriented in a north-south direction. Coleman Avenue begins at De La Cruz Boulevard in Santa Clara and extends southward into Downtown San Jose, where it becomes North Market Street at its intersection with West Julian Street. Coleman Avenue would provide access to the Santa Clara Station site via its intersection with Brokaw Road.

Brokaw Road is a two-lane, east-west roadway that runs from Martin Avenue westward to its termination point at the railroad tracks. Direct access to the Santa Clara Station site would be provided via Brokaw Road.

San Tomas Expressway is a six- to eight-lane major arterial that is oriented in a north-south direction. There is one HOV lane along San Tomas Expressway (restricted hours only) in each direction of travel. Access to the Santa Clara Station site would be provided via El Camino Real.

Lafayette Street is a four-lane roadway that is oriented in a north-south direction. Lafayette Street extends from SR 237 southward through the City of Santa Clara to Market Street, where it changes designation to Washington Street.

Benton Street is a two- to four-lane roadway that is oriented in an east-west direction. Benton Street extends between the Santa Clara Caltrain Station, near El Camino Real, and Lawrence Expressway. West of Lawrence Expressway, Benton Street becomes a two-lane residential street.

De La Cruz Boulevard is a six-lane arterial that extends from U.S. 101 to Coleman Avenue. North of U.S. 101, De La Cruz Boulevard becomes Trimble Road. De La Cruz Boulevard transitions to Coleman Avenue at its interchange with El Camino Real.

3.3.4.2 2015 Existing Intersection Operations

This section describes the existing traffic operations at the study intersections in the vicinity of the future BART stations. The Downtown San Jose Station is not included in the analysis because this station does not provide any parking or kiss-and-ride facilities and therefore would generate minimal vehicle trips.

Intersection LOS under 2015 Existing conditions was evaluated against City of San Jose, City of Santa Clara, and VTA’s CMP standards. These LOS results are used as a basis of comparison with the 2015 Existing Plus BART Extension Alternative in Section 3.5.2 and with the 2015 Existing Plus BART Extension with TOJD Alternative in Section 3.5.3.

The near-term traffic information is presented to identify possible constraints to transportation improvements near the station sites. As shown in Table 3-6, a total of 27 intersections were evaluated in the vicinity of Alum Rock/28th Street Station, 29 intersections in the vicinity of the Diridon Station, and 35 intersections in the vicinity of the Santa Clara Station. These intersections are shown on Figures 3-7, 3-8, and 3-9.

Table 3-6: 2015 Existing Intersection Levels of Service Results Summary

Station	Number of Study Intersections	Number of CMP Intersections	Unacceptable LOS Intersections[a]
Alum Rock/28th Street	27	7	0 (0)
Diridon	29	10	0 (0)
Santa Clara	35	15	2 (1)
Total	**91**	**32**	**2 (1)**

[a] The first number is based on the LOS standards of the appropriate City. The second number (in parentheses) is the number of CMP intersections that would operate at an unacceptable LOS based on the CMP LOS standard.

Graphics ... 00332.13 (6-10-2016)

Figure 3-7
Alum Rock Station Location and Study Intersections
VTA's BART Silicon Valley–Phase II Extension Project

Figure 3-8
Diridon Station Location and Study Intersections
VTA's BART Silicon Valley–Phase II Extension Project

LEGEND

- = Site Location
- = Study Intersection only under BART Extension with TOJD Alternative
- = Study Intersection under BART Extension Alternative and BART Extension with TOJD Alternative

N

NOT TO SCALE

Graphics ... 00332.13 (6-10-2016)

Source: Hexagon, 2016.

Figure 3-9
Santa Clara Station Location and Study Intersections
VTA's BART Silicon Valley–Phase II Extension Project

Alum Rock/28th Street Station

All the study intersections in the vicinity of the Alum Rock/28th Street Station are in the City of San Jose. Measured against the City of San Jose LOS policy, all of the study intersections in the vicinity of the Alum Rock/28th Street Station currently operate at an acceptable LOS (LOS D or better) during both the AM and PM peak hours of traffic. Measured against the CMP LOS standards, all of the CMP study intersections in the vicinity of the Alum Rock/28th Street Station currently operate at an acceptable LOS (LOS E or better) during both the AM and PM peak hours of traffic.

Diridon Station

All the study intersections in the vicinity of the Diridon Station are in the City of San Jose. Measured against the City of San Jose LOS policy, all of the study intersections in the vicinity of the Diridon Station currently operate at an acceptable LOS (LOS D or better) during both the AM and PM peak hours of traffic. Measured against the CMP LOS standards, all of the CMP study intersections in the vicinity of the Diridon Station currently operate at an acceptable LOS (LOS E or better) during both the AM and PM peak hours of traffic.

Santa Clara Station

Of the 35 study intersections in the vicinity of the Santa Clara Station, 22 are in the City of Santa Clara and 13 are in the City of San Jose. Fifteen of the 35 study intersections are designated as CMP intersections.

Measured against the City of San Jose LOS policy, all of the study intersections in the vicinity of the Santa Clara Station that are within San Jose currently operate at an acceptable LOS (LOS D or better) during both the AM and PM peak hours of traffic.

Measured against the City of Santa Clara LOS standards, all except two of the study intersections in the vicinity of the Santa Clara Station that are within Santa Clara currently operate at an acceptable LOS (LOS D or better at local intersections and LOS E or better at expressway and CMP intersections) during both the AM and PM peak hours of traffic. The following two intersections operate at unacceptable LOS (LOS E or worse for local intersections and LOS F for expressways and CMP intersections) during at least one peak hour. CMP intersections are denoted by an asterisk (*).

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- Coleman Avenue and Brokaw Road (LOS F: PM peak hour).

Measured against the CMP LOS standards, of the 15 CMP intersections in the vicinity of the Santa Clara Station, all except the following currently operate at an acceptable LOS E or better during both the AM and PM peak hours:

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).

The unsignalized intersection of Lafayette Street and Harrison Street has two-way stop control. The delay and the LOS for the stop-controlled approach with the highest delay was LOS E in the AM and LOS F in the PM peak hours. Because the City of Santa Clara does not have an LOS standard for unsignalized intersections, this intersection cannot be said to operate at an unacceptable LOS.

3.3.4.3 Existing LOS Results for Freeway Segments

Traffic volumes for the study freeway segments were obtained from the 2014 CMP Annual Monitoring Report, which contains the most recent data collected for freeway segments in Santa Clara County. Freeway segments can include both mixed-flow lanes, which are open to all vehicles, and HOV lanes, also known as diamond lanes and carpool lanes. HOV lanes are restricted during peak travel periods to vehicles with a driver and one or more passengers (e.g., carpools, vanpools, and public transit buses) and to vehicles that have decals identifying them as Clean Air Vehicles (Inherently Low-Emission Vehicles). This analysis includes portions of I-280, I-680, I-880, U.S. 101 and SR 87; of these, U.S. 101, SR 87, and one segment of I-280 include an HOV lane.

The results of the freeway analysis under existing conditions are summarized in Table 3-7, based on the CMP's LOS standards for freeway segments.

Table 3-7: Existing Freeway Levels of Service Results Summary by Station

Station	Number of Freeway Segments	Unacceptable LOS Mixed-Flow Segments	Unacceptable LOS HOV Segments
Alum Rock/28th Street	20	13	4
Diridon	18	16	5
Santa Clara	26	24	9
Total	**64**	**53**	**18**

Currently, most of the freeway segments operate at congested conditions. Of the 64 segments that were analyzed, 53 directional mixed flow freeway segments and 18 directional HOV freeway segments operate at an unacceptable level of service based on the CMP's level of service standards. Refer to the BART Extension with TOJD TIA (Table 8) for further information on the freeway segments analyzed.[3]

3.3.4.4 Interchange Ramps

An assessment of queue lengths and operations on freeway ramps serving the BART Extension stations was performed where traffic volumes are projected to increase as a result of the BART Extension Alternative or the BART Extension with TOJD Alternative. Only

[3] Tables providing the level of service on freeway segments under the BART Extension Alternative are included in the BART Extension TIA. Tables providing the level of service on freeway segments under the BART Extension with TOJD Alternative are in the BART Extension with TOJD TIA.

those ramps where at least one of the alternatives would add 10 or more trips per lane to the freeway ramps were included in this analysis.

The analysis was based on queue length projections at the following freeway ramps:

- U.S. 101/McKee Road Southbound On-Ramp
- U.S. 101/McKee Road Southbound Loop Off-Ramp
- U.S. 101/Santa Clara Street Southbound On-Ramp
- U.S. 101/Alum Rock Avenue Northbound Off-Ramp

None of the other freeway ramps serving the study areas near the stations are projected to experience increases in traffic of 10 or more peak hour trips per lane with implementation of the BART Extension Alternative or the BART Extension with TOJD Alternative.

- **U.S. 101 at McKee Road Interchange** would provide access to and from Alum Rock/28th Street Station. The following freeway ramps are projected to experience increases in traffic greater than 10 trips per lane during at least one of the peak hours analyzed.
  - **U.S. 101/McKee Road Southbound On-Ramp** consists of two receiving lanes at its intersection with McKee Road and narrows to a single lane prior to reaching the ramp meter. The total queue storage capacity on the on-ramp is approximately 800 feet. Although a ramp meter is located on this ramp, it is not currently active.
  - **U.S. 101/McKee Road Southbound Loop Off-Ramp:** at its diverging point from the freeway, this southbound off-ramp consists of a single lane that widens to two lanes as it loops around then widens to three lanes just prior to its intersection with McKee Road. The total queue storage capacity within this ramp is approximately 2,300 feet. This ramp is currently controlled by a traffic signal at its intersection with McKee Road.
- **U.S. 101 at Santa Clara Street/Alum Rock Avenue Interchange** would provide access to and from the Alum Rock/28th Street Station. The following freeway ramps are projected to experience increases in traffic greater than 10 trips per lane during at least one of the peak hours analyzed.
  - **U.S. 101/Santa Clara Street Southbound On-Ramp** consists of two lanes from its intersection with Santa Clara Street to the ramp meter. The total queue storage capacity within this ramp is approximately 850 feet. Although a ramp meter is currently found at the freeway merging point on this ramp, it is not currently active.
  - **U.S. 101/Alum Rock Avenue Northbound Off-Ramp:** at its diverging point from the freeway, this northbound off-ramp consists of a single lane and flares into three lanes at the northbound approach to its intersection with Alum Rock Avenue. The total queue storage capacity on this ramp is approximately 1,675 feet. This ramp is currently controlled by a traffic signal at its intersection with Alum Rock Avenue.

Estimated queue lengths at the freeway off-ramp intersections were obtained from TRAFFIX calculations. Ramp meters on each of the freeway on-ramps are not currently active. Therefore, the freeway on-ramps evaluated do not currently experience measurable queues.

3.4 2035 Forecast Year Transit System and Performance

This section provides a summary of planned transit improvements that would be operational by the 2035 Forecast Year, projections of 2035 Forecast Year transit ridership under the No Build Alternative, and projections of 2035 Forecast Year transit ridership under the BART Extension Alternative.

3.4.1 Transit Improvements

Future No Build conditions consist of the existing transit networks and planned and programmed transit improvements in the study area that would be operational by the 2035 Forecast Year. These improvements are identified in MTC's Bay Area Regional Transportation Plan, *Plan Bay Area 2040*, adopted by MTC on July 18, 2013, and the *Valley Transportation Plan 2040* (VTP 2040), adopted by VTA in October 2013. The improvements consist of transit, highway, bicycle, and pedestrian facilities, and roadway projects. Existing transit services include bus services, LRT, shuttle services, paratransit service, and inter-county services. A complete description of existing VTA services is included in VTA's *Short Range Transit Plan FY 2014–2023* (VTA 2014b).

New transit services and capital projects planned and programmed through the 2035 Forecast Year are provided in Table 2-2 in Chapter 2, *Alternatives*, and include bus rapid transit (BRT) projects, an LRT extension, and rail service upgrades. Also included under 2035 Forecast Year No Build conditions is the approved extension of BART to the Warm Springs Station in Fremont (opening in the fall of 2016) and to the Berryessa Station in San Jose (opening in late 2017).

VTA's LRT service map for service through the 2035 Forecast Year is shown in Figure 2-3 in Chapter 2. Figure 1-2 in Chapter 1 shows the BART operating plan for service through 2035, including Phase I of the BART Extension.

3.4.2 No Build Alternative Transit Trips

Travel demand forecasts, based on the 2035 Forecast Year transit network assumptions described above, were developed for the 2035 Forecast Year No Build conditions. Forecasts include estimates of transit ridership in the study area and the broader area covered by the travel demand model. Table 3-8 summarizes modeled area transit projections for the

2035 Forecast Year No Build conditions. Transit trips[4] for all transit operators in the travel forecast area are projected to grow by approximately 43 percent between 2015 and 2035, increasing from 1.309 million in 2015 to 1.873 million in 2035. Transit trips from Alameda County to Santa Clara County are expected to increase by 174 percent over the same period, from about 5,600 to 15,300 trips per day.

Table 3-8: 2015 Existing and 2035 Forecast Year No Build Conditions Total Weekday Transit Trips

Performance Measure	2015	2035	% Growth
Weekday Transit Trips: All Transit Operators in Area[a]	1,309,283	1,873,183	43%
Transit Trips Between Alameda and Santa Clara Counties[b]	5,589[c]	15,314	174%

Source: Hexagon Transportation Consultants, Inc. 2016a

[a] Includes total daily transit trips for all transit operators within the modeled area (the entire Bay Area), including transit users coming over the Altamont Pass on either trains or express buses.

[b] Estimated from model forecast by Hexagon.

[c] Estimated from model calibration data by Hexagon.

As shown in Table 3-9, the number of daily transit boardings for all transit operators from the MTC region that serve Santa Clara County are projected to grow by approximately 392,000 daily boardings, or 65 percent, over the next 20 years. Systemwide BART boardings would increase by 44 percent, from approximately 404,000 riders in 2015 to 581,700 riders in 2035. With the 2035 forecast of boardings increasing for some operators and decreasing for others, transit operators would need to re-evaluate their service and financial situation over time as alternative transportation opportunities arise.

[4] Note that "trips" and "boardings" are not the same in this and subsequent sections. "Trips" include all linked trips on all transit operators. "Boardings" include all unlinked trips, except on BART and other rail operators. For example, if a patron transfers between two VTA bus routes or between a VTA bus route and a VTA light rail route, it is counted as two boardings (unlinked trips) and one trip (linked trip). If a patron transfers between one BART line and another BART line, however, that is counted as both one boarding and one trip, because BART does not report internal transfers between BART lines. If a patron transfers between a bus route and a BART line (an external transfer), it is counted as two boardings and one trip.

Table 3-9: 2015 Existing and 2035 Forecast Year No Build Alternative Average Weekday Boardings by Transit Operator

Operator	Submode	2015 Existing	2035 Forecast Year	Absolute Difference	Percentage Difference
BART	Heavy Rail	403,900	581,700	177,800	44%
Caltrain	Commuter Rail	52,600	86,700	34,100	65%
Amtrak-Capitol Corridor [a]	Intercity Passenger Rail	2,300	1,875	-426	-18.5%
ACE	Commuter Rail	5,040	17,800	12,760	253%
VTA	Light Rail	35,500	87,700	52,200	147%
	Express Bus	5,090	12,050	6,960	137%
	Local/Limited Bus	102,850	211,850	109,000	106%
	Total	**607,288**	**999,675**	**392,336**	**64.6%**

[a] Both 2015 Existing observed ridership and 2035 Forecast Year modeled ridership on the Amtrak-Capitol Corridor only include boardings at stations within the modeled area between Fairfield/Suisun and San Jose. Boardings between Fairfield/Suisun and Sacramento and Auburn are not included in the modeling ridership totals.

It should be noted that transit ridership estimated by the VTA model reported in Table 3-9 for the Amtrak-Capitol Corridor service only includes trips made entirely between stations within the 13 County model area (the MTC region plus Santa Cruz, Monterey, San Benito and San Joaquin Counties). The 2015 existing ridership reported is actually higher than the true existing ridership made entirely within the model area, as it considers both ends of the trip as being made in the model region when either the start or end of the trip would be north of Suisun/Fairfield. However, this was the most recent data obtainable from the Capitol Corridor Joint Powers Board. Transit demand from those areas outside of the model region, while important to Capitol Corridor ridership, is not likely to be a significant market for the BART Extension. The VTA model is still an appropriate analysis tool that can be used to estimate the change to Amtrak-Capitol Corridor ridership (and other services in the project corridor) resulting from transit level of service changes in the corridor, as it considers the differences in service frequencies, transfer opportunities, and fares.

3.4.2.1 Fleet Requirements

A VTA bus fleet of 451 vehicles is estimated to meet 2035 service levels, which represents a slight increase over the 2015 fleet to account for additional bus service shuttling passengers between the Berryessa Station and Downtown stations. Although the light rail network will expand by 2035, it will be served with no increases to the existing light rail fleet of 99 vehicles.

With implementation of the Phase I Project, plus increased BART service overall, the total BART fleet is expected to expand with the addition of 313 to 365 cars, with the total number of cars estimated at 982 to 1,034. Table 3-10 summarizes this information.

Table 3-10: 2035 Forecast Year No Build Alternative Fleet Size

Service	Existing 2015 Service	2035 Forecast Year No Build Alternative
VTA Buses	440	451
Light Rail Transit	99	99
BART Cars (entire BART system)[a]	669	1,081

Sources: Connetics Transportation Group and VTA 2015.
[a] The No Build Alternative includes the Berryessa Extension Project, which is currently under construction.

3.4.2.2 Facility Requirements

The buses operated by VTA and identified under the No Build Alternative would be stored and maintained at existing bus operating and maintenance facilities, which consist of the Cerone Bus Operating Division and Overhaul and Repair Facility in North San Jose, the Don Pedro Chaboya Bus Operating Division in South San Jose, and the North Bus Operating Division in Mountain View. These facilities have sufficient land to enable any potential future need for expansion as necessary to accommodate additional buses above the 2035 Forecast Year fleet levels. Because the LRT fleet size is not anticipated to change by 2035, LRT vehicles would be stored and maintained at the existing Guadalupe Light Rail Maintenance facility near Downtown San Jose.

3.4.3 BART Extension Transit Trips

Travel demand forecasts were also developed for the 2035 Forecast Year BART Extension. Forecasts include estimates of transit ridership in the study area and the broader area covered by the travel demand model. BART system boardings would increase under the 2035 Forecast Year BART Extension Alternative. However, some new BART riders would be diverted from other transit modes due to BART's greater convenience and better access to major Santa Clara County activity centers, such as Downtown San Jose. Table 3-11 summarizes modeled area transit projections for the 2035 Forecast Year No Build and BART Extension Alternatives.

Table 3-11: 2035 Forecast Year No Build and BART Extension Alternatives Average Weekday Boardings by Transit Operator

Operator	Submode	2035 Forecast Year No Build	2035 Forecast Year BART Extension	Absolute Difference	Percentage Difference
BART[a]	Heavy Rail	581,700	617,000	35,300	6.1%
Caltrain	Commuter Rail	86,700	84,900	-1,800	-2.1%
Amtrak-Capitol Corridor	Intercity Passenger Rail	1,875	1,515	-360	-19.2%
ACE	Commuter Rail	17,800	17,100	-700	-3.9%
VTA	Light Rail	87,700	88,400	700	0.8%
	Express Bus	12,050	2,125	-9,925	-82.4%
	Local/Limited Bus	211,850	209,300	-2,550	-1.2%
Total		**999,675**	**1,020,330**	**20,655**	**2.1%**

[a] Boardings by operator are systemwide and are not necessarily made in the corridor. Because BART and other rail services typically exclude internal transfers in boarding counts, they thereby reflect linked trips. Bus services include all vehicle boardings, including transfers, and thereby reflect unlinked trips.

Table 3-11 shows the riders on BART plus other major transit services by 2035. For comparison, 2035 Forecast Year No Build conditions weekday boardings by operator are listed. Compared to the 2035 Forecast Year No Build Conditions, the 2035 Forecast Year BART Extension ridership would increase by 6.1 percent, or about 35,300 average daily riders. The total number of boardings on all transit systems would increase by about 20,655. The reduction in express bus boardings is due to the elimination of Express Route 303, which provides high-frequency bus service between the Berryessa BART Station and Downtown San Jose under 2035 Forecast Year No Build conditions; this travel market would be served by the BART Extension Alternative. The 2035 Forecast Year BART Extension Alternative is estimated to attract 2,860 trips that would otherwise (i.e., under the 2035 Forecast Year No Build conditions) be made on rail services operated by other agencies in the region (i.e., Caltrain, Amtrak-Capitol Corridor, and ACE).

As shown in Table 3-12, the BART Extension Alternative is projected to serve over 52,000 average daily riders in the 2035 Forecast Year. About 15,200 (29 percent) weekday trips would be made completely between the four BART Extension Alternative stations (internal boarding and internal alighting) while approximately 36,800 trips would be made between the BART Extension Alternative stations and all other BART stations in the region.

Table 3-12: 2035 Forecast Year Average Weekday Ridership with the BART Extension Alternative

Location	Number of Riders	Percentage
Between the Four BART Extension Alternative Stations	15,201	29%
Between the Four BART Extension Alternative Stations and all other BART Stations	36,810	71%
Total	**52,011**	**100%**
Source: Hexagon Transportation Consultants, Inc. 2016a		

Note that some of the 52,000 trips shown in Table 3-12 include BART riders that would shift from the Berryessa Station to one of the four BART Extension stations. For example, under the 2035 Forecast Year No Build Alternative, a BART rider traveling from Fremont to Downtown San Jose would get off at the Berryessa Station, transfer to a bus, and exit the bus at the rider's destination in Downtown San Jose. Under the 2035 Forecast Year BART Extension Alternative, this rider would stay on BART and get off at the Downtown San Jose Station. While this would not increase the total number of boardings on the BART system, this trip is counted as a "project trip" in the 2035 Forecast Year BART Extension Alternative because it uses one of the four BART Extension stations.

Table 3-13 presents the average weekday ridership by station. As shown, the Downtown San Jose Station would attract the highest number of riders because this station would be near large existing and planned office buildings and residential towers located in, or planned for, the greater Downtown San Jose area.

Table 3-13: 2035 Forecast Year Average Weekday Ridership by Station with the BART Extension Alternative

Station Name	Number of Riders
Alum Rock/28th Street	10,300
Downtown San Jose	24,287
Diridon	9,553
Santa Clara	7,871
Total Average Weekday Ridership	**52,011**
Source: Hexagon Transportation Consultants, Inc. 2016a	

3.4.3.1 New Linked Transit Trips ("New Riders")

New linked transit trips indicate how many new riders would actually divert from other non-transit modes to transit with the BART Extension. These could be riders on any transit modes but, in reality, would be almost entirely new riders on BART. Table 3-14 compares the 2035 Forecast Year No Build transit ridership forecasts with the 2035 Forecast Year BART Extension Alternative in terms of new linked transit trips only. Linked transit trips exclude transfer boardings so that a person who uses more than one transit line or mode is counted only once. As a result, new linked transit trips are trips that are diverted from the automobile or non-motorized modes.

The 2035 Forecast Year BART Extension Alternative would generate approximately 14,600 more transit trips in comparison to the 2035 Forecast Year No Build Alternative. The average weekday linked trips represent daily linked transit ridership for all the transit operators within the modeled area, including transit users coming over the Altamont Pass from the Central Valley on ACE trains.

Table 3-14: 2035 Forecast Year Weekday Transit Trips and New Linked Transit Trips

Performance Measure	No Build	BART Extension
Weekday Transit Trips: All Operators in Area[a]	1,873,183	1,887,802
New Linked Transit Trips[b]	n/a	14,619

Source: Hexagon Transportation Consultants, Inc. 2016a

[a] Includes total daily transit trips for the all transit operators within the modeled area (the entire Bay Area).

[b] Linked transit trips exclude transfer boardings. New linked trips are diverted almost entirely from auto trips and represent new riders on transit.

3.4.3.2 Boardings and Alightings by Station

Each unlinked transit trip on BART includes one boarding and one alighting. Table 3-15 shows the number of projected average weekday boardings and alightings at stations, including home-based work and non-work trips. The Downtown San Jose Station would have almost as many daily boardings and alightings as the three other stations combined. Note that total boardings and alightings are not double the weekday ridership estimate because many riders have one trip beginning or ending at BART stations outside the study area.

Table 3-15: 2035 Forecast Year Average Weekday Boardings and Alightings by BART Extension Station

Stations	Home-Based Work	Non-Work	Total
Alum Rock/28th Street	7,928	3,248	11,176
Downtown San Jose	18,199	12,879	31,079
Diridon	7,802	5,969	13,771
Santa Clara	6,441	4,746	11,187

Source: Hexagon Transportation Consultants, Inc. 2016a

3.4.3.3 Mode of Access at Stations

Table 3-16 presents the projected average weekday trips at the stations by mode of access. Transit modes (i.e., bus, commuter rail, and LRT) would account for 48 percent of the access trips, while 34 percent of access trips would be by pedestrians or bicycles. The high use of non-automobile modes is due to the convenience of transit connections and the proximity of jobs and housing to the stations in Downtown San Jose and at Diridon Station. Note that 42 percent of BART riders at Alum Rock/28th Street Station would arrive by car.

Table 3-16: 2035 Forecast Year Mode of Access by BART Extension Station

Station	Walk/ Bike	Bus	Rail[a]	LRT	Auto KNR[b]	Auto PNR[c]	Auto Subtotal	Total
Alum Rock/28th Street	25%	33%	n/a	n/a	5%	36%	42%	100%
Downtown San Jose	52%	29%	n/a	19%	n/a	n/a	n/a	100%
Diridon	34%	5%	26%	26%	9%	n/a	9%	100%
Santa Clara	20%	49%	12%	n/a	4%	16%	20%	100%
Total	34%	30%	7%	11%	4%	15%	19%	100%

Source: Hexagon Transportation Consultants, Inc. 2016a
[a] Rail = Caltrain, ACE, and Amtrak-Capitol Corridor
[b] KNR = kiss-and-ride
[c] PNR = park-and-ride
n/a: not applicable
Numbers do not add up to 100% due to rounding.

3.4.3.4 Inter-county Movements: Santa Clara County-Alameda County Volumes

Table 3-17 shows the projected change in transit ridership for transit services offering connections between Santa Clara County and Alameda County (in both directions). The transit services used for this comparison include local buses, ACE, Capitol Corridor, and BART. With the BART Extension, about 7,400 additional riders would cross the County line on inter-county transit services on a typical weekday in the 2035 Forecast Year in order to travel to or from work, home, or other locations in Santa Clara County compared to the No Build Alternative. Note that some of these riders crossing the County line may have an origin or destination in another county; for example, a rider travelling between Contra Costa County and Santa Clara County on BART would cross the Santa Clara County-Alameda County line.

Table 3-17: 2035 Forecast Year Weekday Transit Trips Crossing Santa Clara County-Alameda County Line

Performance Measure	No Build	BART Extension
Weekday Transit Trips Across County Line	30,665	38,086
Change from 2035 Forecast Year No Build Conditions	n/a	7,421

Source: Hexagon Transportation Consultants, Inc. 2016a

3.4.3.5 Travel Time Between Selected Origin-Destination Pairs

One of VTA's key objectives is to reduce transit travel times within the corridor. Because travel time is a key factor in mode choice decisions (e.g., using an automobile versus public transit), traffic congestion and air pollution would be reduced if more people chose to use transit rather than their private automobiles. More trips on transit also lead to faster highway travel because of reduced congestion.

Table 3-18 presents a comparison of total door-to-door auto, shared-ride, and transit travel times between selected origins and destinations in the corridor.

Table 3-18: 2035 Forecast Year AM Peak Period Door-to-Door Travel Time (Minutes) for Selected Origin-Destination Pairs: No Build versus BART Extension

From	To	Drive Alone No Build	Drive Alone BART Extension	Shared Ride No Build	Shared Ride BART Extension	Transit No Build	Transit BART Extension
North Milpitas Boulevard	Downtown San Jose	28	28	28	28	61	38
Hostetter/ Berryessa	Downtown San Jose	21	21	21	21	55	34
East San Jose	Downtown San Jose	27	27	26	26	57	57
Pleasanton	Downtown San Jose	79	79	78	78	91	75
South Fremont	Downtown San Jose	42	42	41	41	47	31
Newark	Downtown San Jose	48	48	46	46	85	69
Union City	Downtown San Jose	56	56	54	54	58	42
Santa Clara (near Caltrain)	Downtown San Francisco	87	87	80	80	84	78
Santa Clara (near Caltrain)	South Fremont	30	30	30	30	58	35
Santa Clara (near Caltrain)	Downtown Oakland	74	74	73	73	92	71
Alum Rock	Downtown San Francisco	95	95	87	87	88	78
Alum Rock	Downtown Oakland	75	75	74	74	81	71
Source: Hexagon Transportation Consultants, Inc. 2016a							

The BART Extension would provide a high-quality and seamless transit linkage between San Francisco, Oakland, Fremont, and Downtown San Jose and offer measurable travel time savings. Notable transit travel time improvements are projected for transit trips to Downtown San Jose from various points in Alameda County, including North Milpitas Boulevard (23 minutes faster), Union City, Pleasanton, Newark, and South Fremont (all of which would be 16 minutes faster). Travel times from the areas near the Alum Rock/28th Street and Santa Clara Stations to destinations in downtown Oakland and downtown San Francisco are also projected to improve by 6 to 20 minutes.

Auto travel times before and after service begins show no measurable improvement for many origin-destination pairs. The average auto travel time saving for both drive-alone and shared-ride modes for all origin-destination pairs remained unchanged due in part to the increase in freeway traffic congestion projected for the 2035 Forecast Year.

3.4.4 Conclusion

3.4.4.1 Impact on Non-BART Transit Ridership

Overall transit ridership in the corridor would increase by about 20,700 with the BART Extension. Some of this growth would be diverted ridership from other transit modes, reducing their growth in the 2035 Forecast Year. Specifically, the BART Extension is estimated to attract approximately 2,800 trips that would otherwise (i.e., under the 2035 Forecast Year No Build conditions) be made on rail services operated by other agencies in the study areas (i.e., ACE, Caltrain, and Amtrak-Capitol Corridor).

The BART Extension would result in a redistribution of VTA transit ridership. VTA local bus trips would be about 1 percent lower once BART Extension service begins. VTA express bus services would decrease by about 9,900 riders (or about 83 percent) because BART service would replace Route 303, which provides high-frequency express transit service between Berryessa Station and Downtown San Jose prior to when service begins on the BART Extension. VTA LRT ridership would not substantially change. Overall, VTA local and express bus and LRT transit ridership would decrease by almost 4 percent once the BART Extension service begins.

3.4.4.2 Impact on BART System Boardings

In the 2035 Forecast Year, the BART Extension is expected to serve over 52,000 average daily riders in the corridor, including new trips on BART as a result of its extended service to and within Santa Clara County as well as trips diverted to BART from other transit service providers.

3.4.4.3 Impact on New Transit Riders

In the 2035 Forecast Year, the BART Extension would generate 14,600 new linked transit trips, or new transit riders. New linked trips are diverted from non-transit modes (primarily auto) and represent new riders on BART.

3.5 Freeway, Roadway, and Transportation System Performance

3.5.1 2035 Forecast Year No Build Alternative

This section describes traffic conditions for the 2035 Forecast Year under No Build conditions. This scenario assumes that the Milpitas and Berryessa BART Stations would be completed. The analysis includes a summary of transportation improvements and LOS analyses for intersections, freeway segments, and ramp interchanges.

3.5.1.1 Roadway Improvements

Several transportation improvements in the study areas are planned and would be operational by the 2035 Forecast Year. These improvements are identified in the MTC Regional Transportation Plan, *Plan Bay Area 2040*, and VTP 2040. The improvements consist of freeway widenings and interchange improvements as well as improvements to regional and local facilities. There are no new freeways planned.

Information on local intersection improvements also was obtained from the Cities of San Jose and Santa Clara. These include funded improvements at intersections that will be in place by the 2035 Forecast Year. The planned roadway improvements in the vicinity of the BART stations are described in in Section 2.2.1.2, *Roadway System,* in Chapter 2, *Alternatives*, and include converting all existing freeway HOV lanes to express lanes, widening streets, converting some one-way streets to two-way operation, and reconfiguring intersections.

In addition to the improvements to freeways and streets, VTA's Santa Clara-Alum Rock BRT Project would provide BRT service along Santa Clara Street and Alum Rock Avenue, extending from Cahill Street (western Santa Clara Street end) to Capitol Avenue. This project will result in roadway and traffic signal modifications along Santa Clara Street/Alum Rock Avenue, including at some of the study intersections. However, the lane configurations at the study intersections along Santa Clara Street/Alum Rock Avenue will remain unchanged. Traffic signal modifications will occur at the following intersection:

At 17th Street and Santa Clara Street (Alum Rock/28th Street Station), with the Santa Clara-Alum Rock BRT Project, the traffic signal phasing for the eastbound/westbound direction will change from permitted left-turn to split phase.

3.5.1.2 Bicycle and Pedestrian Improvements

VTP 2040 includes a Bicycle Expenditure Program, which identifies various bicycle projects, some of which are within the study areas of the BART stations. Projects were assumed to be in place by the year 2040, and are listed in Table 3-19.

Table 3-19: 2040 Bicycle/Pedestrian Facility Improvements

VTP ID	Project Title	Description
Proximate to Diridon Station and Downtown San Jose Station		
40-B13	Auzerais Avenue Bicycle and Pedestrian Improvements: Los Gatos Creek Trail to Race St.	Construct Class II bikeways, sidewalk improvements, crossing improvements, and bicycle parking.
40-B14	Bird Avenue Bicycle and Pedestrian Corridor: Montgomery St. at Santa Clara to Bird Ave. at West Virginia	Construct Class II, III, and IV bikeways, enhanced crossing/detection, and sidewalk improvements.
40-B27	Los Gatos Creek Trail Reach 5d: Park Ave./Montgomery Ave. to Santa Clara Ave. (Diridon Station Segment)	Completion of the last reach of the Los Gatos Creek Trail, including design, land acquisition, and environmental review.
40-B28	Los Gatos Creek Trail Reach 5b and 5c: Auzerais Ave. South of W. San Carlos Ave. to Park Ave./Montgomery Ave. (Trail and Undercrossing)	Extend the last reach of the Los Gatos Creek Trail including design, land acquisition and environmental review, and construction.
40-B33	Three Creeks Trail: West from Los Gatos Creek Trail/Lonus St. to Guadalupe River	Property acquisition, master plan, environmental review, design, and construction of landscaped trail system, with paved alignment along a former railway right-of-way. Signage, striping, mileage markers, seating, fitness stations.
Proximate to Santa Clara Caltrain Station		
40-B41	San Tomas Aquino Creek Spur Trail Phase 2: El Camino Real to Homestead Rd.	Construct an extension of the San Tomas Aquino Spur Trail on the west side of San Tomas Expwy. from El Camino Real to Homestead Rd.
40-B37	Lafayette Street Bike Lanes: Agnew Rd. to Reed St.	Install Class II bicycle lanes with bicycle detection at signalized intersections.
40-B69	Santa Clara Caltrain Station Undercrossing Extension	Construct an extension of the recently opened pedestrian/bike tunnel under the Caltrain tracks at the Santa Clara Caltrain/ACE station on the east side of the Union Pacific Railroad tracks. Construct ramp and pathway to connect tunnel to Brokaw Road.
40-B12	Airport Boulevard.: Guadalupe River Trail Bike and Pedestrian Connection	Construct a multi-use path along the north side of Airport Blvd. (at south end of Mineta San Jose International Airport) from the Guadalupe River Trail to Coleman Ave. connecting with existing Coleman Ave. bike lanes and future Santa Clara BART Station (via Brokaw Rd.).
40-B18	Brokaw-Coleman Bikeway: Brokaw Road to Airport Blvd and Coleman Ave.	Construct Class II bikeways, bicycle crossing improvements, and Class I multi-use path.
40-B30	Newhall Street Bike/Pedestrian Overcrossing over Caltrain Tracks	Bike/Pedestrian Bridge from Newhall Street west of Caltrain (near Elm Street) to Newhall Street east of Caltrain (near Newhall Drive).
40-B107	De La Cruz Boulevard Bike Lanes: Central Expressway to Brokaw Road	Install Class II bicycle lanes with bicycle detection at signalized intersections.
40-B106	Benton Street Bike Lanes: Monroe Street to Railroad Avenue	Install Class II bicycle lanes with bicycle detection at signalized intersections. Existing four lanes will be reduced to road diet configuration to make room for bicycle lanes.

VTP ID	Project Title	Description
Proximate to Alum Rock/28th Street Station		
40-B32	Park Avenue/San Fernando Street/San Antonio Bikeway	Enhanced on-street crosstown bikeway between San Jose/Santa Clara City limits with Diridon Transit Center, Downtown San Jose, San Jose Creek Trails (Los Gatos, Guadalupe, Coyote), San Jose State University, and east San Jose. *Note: Park Avenue and a portion of San Fernando Street have been completed.*
40-B101	Coyote Creek Trail (Oakland Road to Watson Park)	Prepare master plan, environmental documents (CEQA and NEPA), and design and construct trail.
40-B102	Coyote Creek Trail (Watson Park to Williams Street Park)	Prepare master plan, environmental documents (CEQA and NEPA), and design and construct trail.
40-B103	Coyote Creek Trail (Williams Street Park to Kelley Park)	Prepare master plan, environmental documents (CEQA and NEPA), and design and construct trail.
Source: VTP 2040 Project List.		

3.5.1.3 Intersection Level of Service Analysis

Intersection LOS was used to evaluate traffic operations at the study intersections under 2035 Forecast Year No Build conditions. Adjusted 2035 model volume forecasts were used to calculate intersection LOS. The results of the LOS analysis for the study intersections in the vicinity of each future BART Station under 2035 Forecast Year No Build conditions are summarized in Table 3-20.

Table 3-20: 2035 Forecast Year No Build Alternative Intersection Levels of Service

Station	Number of Study Intersections	Number of CMP Intersections	Unacceptable LOS Intersections[a]
Alum Rock/28th Street	27	7	5 (1)
Diridon	29	10	4 (0)
Santa Clara	35	15	12 (8)
Total	**91**	**32**	**21 (9)**
[a] The first number is based on the LOS standards of the appropriate City. The second number (in parentheses) is the number of CMP intersections that would operate at an unacceptable LOS based on the CMP LOS standard.			

The intersection LOS results for the 2035 Forecast Year No Build Alternative are described below.

Alum Rock/28th Street Station

The following five study intersections are projected to operate at an unacceptable LOS (LOS E or F) during at least one peak hour, according to City of San Jose LOS standards. CMP intersections are denoted by an asterisk (*).

- King Road and McKee Road (LOS F: AM peak hour; LOS E: PM peak hour).
- Jackson Avenue and Alum Rock Avenue* (LOS F: AM peak hour; LOS E: PM peak hour).

- Jackson Avenue and East San Antonio/Capitol Expressway (LOS E: AM peak hour).
- McLaughlin Avenue and Story Road (LOS E: AM peak hour).
- King Road and Mabury Road (LOS E: AM and PM peak hours).

All other study intersections in the vicinity of the Alum Rock/28th Street Station are projected to operate at an acceptable LOS under the 2035 Forecast Year No Build Alternative, based on the City of San Jose LOS standard, which is more stringent than the CMP standard.

Measured against the CMP standard, of the seven CMP intersections in the Alum Rock/28th Street Station study area, only the intersection of Jackson Avenue and Alum Rock Avenue would operate at an unacceptable LOS F in the AM peak hour.

Diridon Station

The following four study intersections are projected to operate at an unacceptable LOS (LOS E or F) during at least one peak hour, according to City of San Jose LOS standards. CMP intersections are denoted by an asterisk (*).

- The Alameda and Taylor Street/Naglee Avenue* (LOS E: AM and PM peak hours).
- South Autumn/Montgomery Street and Park Avenue (LOS E: PM peak hour).
- Meridian Avenue and Fruitdale Avenue (LOS E: AM and PM peak hours).
- Bird Avenue and San Carlos Street* (LOS E: PM peak hour).

All other study intersections in the vicinity of the Diridon Station are projected to operate at an acceptable LOS under the 2035 Forecast Year No Build Alternative, based on the City of San Jose standard.

Measured against the CMP standard of LOS E, none of the ten CMP intersections in the Diridon Station study area would operate at an unacceptable LOS F in either peak hour.

Santa Clara Station

There are 12 study intersections in the vicinity of the Santa Clara Station that are projected to operate at unacceptable LOS during at least one peak hour under 2035 Forecast Year No Build conditions, of which six are in the City of San Jose and six are in the City of Santa Clara.

The following six study intersections, located in the City of San Jose, are projected to operate at an unacceptable LOS (LOS E or F) during at least one peak hour, according to City of San Jose LOS standards. CMP intersections are denoted by an asterisk (*).

- Coleman Avenue and I-880 Southbound Ramps* (LOS F: AM peak hour).
- Coleman Avenue and I-880 Northbound Ramps* (LOS F: AM peak hour).
- Coleman Avenue and West Hedding Street (LOS E: AM and PM peak hours).

- Coleman Avenue and West Taylor Street (LOS E: AM peak hour; LOS F: PM peak hour).
- The Alameda and West Hedding Street* (LOS E: AM peak hour; LOS F: PM peak hour).
- The Alameda and West Taylor Street/Naglee Avenue* (LOS F: AM peak hour; LOS E: PM peak hour).

The following six study intersections, located in the City of Santa Clara, are projected to operate at an unacceptable LOS (LOS E or F for local City of Santa Clara intersections and LOS F for expressway and CMP intersections) during at least one peak hour, according to City of Santa Clara standards. CMP intersections are denoted by an asterisk (*).

- Scott Boulevard and Central Expressway* (LOS F: PM peak hour).
- Lafayette Street and Central Expressway* (LOS F: AM and PM peak hours).
- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- Coleman Avenue and Brokaw Road (LOS E: PM peak hour).
- San Tomas Expressway and El Camino Real* (LOS F: AM and PM peak hours).
- Lafayette Street and Lewis Street (LOS E: PM peak hour).

Measured against the CMP standard, of the 15 CMP intersections in the Santa Clara Station study area, the following eight CMP intersections would operate at an unacceptable LOS F during at least one peak hour under the 2035 Forecast Year No Build Alternative:

- Coleman Avenue and I-880 Southbound Ramps* (LOS F: AM peak hour).
- Coleman Avenue and I-880 Northbound Ramps* (LOS F: AM peak hour).
- The Alameda and West Hedding Street* (LOS F: PM peak hour).
- The Alameda and West Taylor Street/Naglee Avenue* (LOS F: AM peak hour).
- Scott Boulevard and Central Expressway* (LOS F: PM peak hour).
- Lafayette Street and Central Expressway* (LOS F: AM and PM peak hours).
- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- San Tomas Expressway and El Camino Real* (LOS F: AM and PM peak hours).

Although the City of Santa Clara does not have an LOS standard for unsignalized intersections, an evaluation of the unsignalized study intersection was performed for informational purposes. The LOS analysis shows that the worst Harrison Street approach at the intersection of Lafayette Street and Harrison Street is projected to operate at LOS F during both the AM and PM peak hours under 2035 Forecast Year No Build conditions. LOS F at two-way stop-controlled intersections can occur when gaps of traffic on the major street are limited, resulting in long delays for the minor-street traffic as it attempts to enter or cross the major street. At the intersection of Lafayette Street and Harrison Street, the relatively high traffic volumes along Lafayette Street (major street) cause the delay on the low-volume Harrison Street (minor street) to be worse than the LOS F threshold. However, the peak-hour traffic signal warrant checks indicate that the intersection would not have traffic volumes under the 2035 Forecast Year No Build Alternative that meet thresholds that warrant signalization.

All other study intersections in the vicinity of the Santa Clara Station would operate at an acceptable LOS under the 2035 Forecast Year No Build Alternative.

3.5.1.4 Freeway Segment Level of Service

The 2035 Forecast Year No Build Alternative traffic volumes for the study area freeway segments were obtained from the VTA Model. No adjustments were made to the volumes produced by the VTA Model because the freeway network contained in the VTA Model is represented more accurately than local roadways.

The results of the analysis under 2035 Forecast Year No Build conditions are summarized in Table 3-21. Supporting documentation for this and subsequent freeway analysis for the No Build, BART Extension, and BART Extension with TOJD Alternatives is found in the BART Extension TIA (Tables 9, 10, 11, 41, 42, 43, 47, 51, and 54) and in the BART Extension with TOJD TIA (Tables 8, 16, and 26).

Table 3-21: 2035 Forecast Year No Build Conditions Freeway Levels of Service

Station	Number of Freeway Segments	Unacceptable LOS Mixed-Flow Segments	Unacceptable LOS HOV Segments
Alum Rock/28th Street	20	12	4
Diridon	18	17	3
Santa Clara	26	24	8
Total	**64**	**53**	**15**

Table 3-21 shows that:

- 12 (plus 4 HOV segments) of the 20 directional freeway segments analyzed for the Alum Rock/28th Street Station are projected to operate at an unacceptable LOS F during at least one peak hour.
- 17 (plus 3 HOV segments) of the 18 directional freeway segments analyzed for the Diridon Station are projected to operate at an unacceptable LOS F during at least one peak hour.
- 24 (plus 8 HOV segments) of the 26 directional freeway segments analyzed for the Santa Clara Station are projected to operate at an unacceptable LOS F during at least one peak hour.

3.5.1.5 Freeway Interchange Ramp Analysis

The results of the freeway ramp analysis under 2035 Forecast Year No Build conditions are described below and summarized in Table 3-22. Based on the projected queue lengths obtained from TRAFFIX, it was determined that the available queue storage space for the freeway off-ramps studied would be sufficient to serve the projected demand under 2035 Forecast Year No Build conditions.

Table 3-22: 2035 Forecast Year No Build Alternative Freeway Ramp Queuing Analysis

Freeway Ramp	Total Storage (Vehicle)[a]	Volume and Queue Projections (Vehicles)	
		2015 Existing	2035 Forecast Year No Build
U.S. 101 at McKee Road Interchange			
U.S. 101 SB On-Ramp at McKee Road	32		
PM Volume[b]		1,131	1,476
Projected Queue Length[c]		--[e]	*576*
U.S. 101 SB Loop Off-Ramp at McKee Road	92		
AM Volume[b]		426	470
Projected Queue Length[d]		*27*	*30*
U.S. 101 at Santa Clara Street/Alum Rock Avenue Interchange			
U.S. 101 SB On-Ramp at Santa Clara Street	34		
PM Volume[b]		949	1,397
Projected Queue Length[c]		--[e]	*497*
U.S. 101 NB Off-Ramp at Alum Rock Avenue	67		
AM Volume[b]		244	407
Projected Queue Length[d]		*10*	*14*
PM Volume[b]		695	984
Projected Queue Length[d]		*24*	*43*

[a] Total number of vehicles that can store within the ramp.
[b] Peak-hour ramp volume projections.
[c] Total number of vehicles in the queue, as calculated based on the ramp meter rate and projected traffic volumes.
[d] Total number of vehicles in the queue, as obtained from TRAFFIX.
[e] Currently, the ramp meter at these on-ramps is not operational during the PM peak hour; therefore, no measurable queues are currently experienced at these locations.
SB = southbound; NB = northbound

Based on the projected queue lengths, the available queue storage space for the two freeway off-ramps studied would be sufficient to serve the projected demand under 2035 Forecast Year No Build conditions. However, the queue length projections for the two freeway on-ramps show that the on-ramps studied would experience excessive queue lengths that would spill out of the ramps onto the adjacent street under 2035 Forecast Year No Build conditions. This is the result of the of the projected on-ramp demand exceeding the assumed ramp capacity. These projections assume a very conservative meter rate of 900 vph for the entire peak hour analyzed.

3.5.1.6 Potential Impacts of the 2035 Forecast Year No Build Alternative

The No Build Alternative would lack the transportation benefits of the BART Extension and the BART Extension with TOJD Alternatives, such as improved transit access and reliability, enhanced connectivity with the regional transportation network, and better interface with pedestrian and bicycle travel. As discussed in Section 3.4.4 above, the BART Extension would result in increased transit ridership due to the projected mode shift, and as discussed in Section 3.5.2.4 below, the BART Extension would result in a decrease in traffic volumes on the freeway network, as commuters use BART as an alternative to regional freeway travel. The No Build Alternative would result in greater traffic congestion, especially on the freeway network, resulting in longer travel times.

3.5.2 BART Extension Alternative

3.5.2.1 Consistency with Other Plans

The BART Extension is included as one of the transit improvement projects in *Plan Bay Area*, MTC's current regional transportation plan that outlines the course for transportation investment and land-use priorities for the next 25 years. The BART Extension is also included in VTP 2040, VTA's countywide long-range transportation plan for Santa Clara County. Therefore, the BART Extension is consistent with regional transportation plans and policies.

3.5.2.2 BART Extension Vehicle Trips

Implementation of the BART Extension Alternative would result in a shift in travel patterns as the result of some commuters modifying their travel routes to access the station areas, and in the removal of auto trips from the roadway network as some commuters shift from auto to transit modes of travel. Therefore, station-generated traffic consists of two components: (1) new vehicular trips accessing the BART stations, referred to as *station drive access trips*, and (2) all the trips that would no longer be on the roadway as a result of the BART Extension Alternative, represented by negative trips on the roadway network. The total net BART Extension trips generated are therefore calculated by adding the new station drive access trips (positive trips) and the trips removed from the roadway network as a result of the BART Extension (negative trips).

The trip assignment process shows that at some locations, particularly for those movements leading directly to the station area, the number of vehicles accessing the station would be larger than the number of vehicles shifted from the roadway network to transit modes; therefore, the BART Extension would result in a net increase in traffic volumes. At many locations, particularly for those movements either not leading to the station area or leading to freeways, the number of vehicles shifted from the roadway network to transit modes would be greater than the number of vehicles using that movement to access the station, and the BART Extension would result in a net decrease in traffic volumes.

3.5.2.3 2015 Existing Traffic Impact Analysis

The BART Extension is not expected to open until 2025. Therefore, it is not possible for the 2015 Existing BART Extension conditions to occur, but they are included for comparative purposes.

It is assumed in this analysis that the transportation network under the 2015 Existing BART Extension would be the same as the existing transportation network, as described in Section 3.3.4, *Vehicular Traffic*. The information in Section 3.3.4 represents the 2015 Existing No Build Alternative to which the 2015 Existing BART Extension Alternative is compared. The BART Extension Alternative trips were added to existing traffic volumes to obtain 2015 Existing Plus BART Extension Alternative traffic volumes.

Station Trip Generation

The 2015 Existing trip generation for the BART Extension stations was estimated based on daily transit ridership projections by mode of access, which includes PNR and KNR person trips, forecasted by the VTA's Travel Forecasting Model. The PNR and KNR daily person trips were converted to auto access trips to BART by applying average vehicle occupancy rates for PNR and KNR trips. Peak-hour factors were then applied to the daily trips to obtain drive access trips for the AM and PM peak-hours. The PNR auto trips were then assigned to the BART station parking lots, and the KNR trips were assigned to the BART drop-off areas at the BART stations.

Table 3-23 presents the daily and peak hour trip generation estimates for each of the drive access modes to the Alum Rock/28th Street, Diridon, and Santa Clara Stations.

Table 3-23: 2015 Existing Trip Generation and Parking Demand with BART Extension Alternative

Mode of Access by Station	Daily Trips	Parking Demand (# of Spaces)	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Alum Rock/28th Street								
Kiss-and-Ride Trips	218		21	21	42	25	24	50
Park-and-Ride Trips	1,430	650	192	7	199	18	150	168
Total	**1,648**		**213**	**28**	**241**	**43**	**174**	**218**
Diridon								
Kiss-and-Ride Trips	235		23	23	46	27	27	54
Park-and-Ride Trips	0	0	0	0	0	0	0	0
Total	**235**		**23**	**23**	**46**	**27**	**27**	**54**

Mode of Access by Station	Daily Trips	Parking Demand (# of Spaces)	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Santa Clara								
Kiss-and-Ride Trips	70		7	7	14	8	8	16
Park-and-Ride Trips	275	125	37	1	38	3	29	32
Total	**345**		**44**	**8**	**52**	**11**	**37**	**48**
Source: VTA Model, December 2014.								

Under 2015 Existing BART Extension conditions, approximately 900 AM and 760 PM peak-hour trips would be removed from the roadway transportation system because commuters would shift from driving a car to riding BART.

Intersection Analysis

Intersection LOS under the 2015 Existing BART Extension Alternative were evaluated against CMP and Cities of San Jose and Santa Clara LOS standards and significant impact criteria. The results are summarized below. For those intersections that would operate at an unacceptable LOS, a comparison was made between the 2015 Existing No Build Alternative and the 2015 Existing BART Extension Alternative.[5]

A total of 63 intersections at three stations were analyzed. The analysis results for the study intersections near each BART Extension Alternative station under 2015 Existing conditions are summarized in Table 3-24 and discussed in detail below.

Table 3-24: 2015 Existing BART Extension Alternative Intersection Analysis Summary

Station	Number of Study Intersections	Number of CMP Intersections	Unacceptable LOS Intersections[a]	Intersections with Impacts[b]
Alum Rock/28th Street	17	3	0 (0)	0 (0)
Diridon	29	10	0 (0)	0 (0)
Santa Clara	17	6	2 (1)	0 (0)
Total	**63**	**19**	**2 (1)**	**0 (0)**
[a] The first number is based on the LOS standards of the appropriate City. The second number (in parentheses) is the number of CMP intersections that would operate at an unacceptable LOS based on the CMP LOS standard.				
[b] The first number presents how many study intersections would be impacted based on the appropriate City's impact criteria. The second number (in parentheses) is how many of the CMP intersections would be impacted based on the CMP criteria.				

Alum Rock/28th Street Station

Measured against the City of San Jose LOS standards, all 17 of the study intersections in the vicinity of the Alum Rock/28th Street Station would operate at an acceptable LOS D or better

[5] For further information on the application of the City of San Jose, City of Santa Clara, and CMP significant impact criteria to each intersection and the supporting data for these findings (e.g., change in average critical delay and change in critical V/C), refer to the BART Extension TIA.

during both the AM and PM peak hours of traffic. Based on the City of San Jose significant impact criteria, the BART Extension would not have a significant impact on any intersections in the Alum Rock/28th Street Station study area under 2015 Existing BART Extension conditions.

Measured against the CMP LOS standards, all seven CMP intersections in the Alum Rock/28th Street Station study area would operate at an acceptable LOS E or better during both the AM and PM peak hours of traffic. Based on the CMP LOS impact criteria, the BART Extension would not have a significant impact on any CMP intersections in the Alum Rock/28th Street Station study area under 2015 Existing BART Extension conditions. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Diridon Station

Measured against the City of San Jose LOS standards, all 29 of the study intersections in the vicinity of the Diridon Station would operate at an acceptable LOS D or better during both the AM and PM peak hours of traffic. Based on the City of San Jose significant impact criteria, the BART Extension would not have a significant impact on any intersections in the Diridon Station study area under 2015 Existing BART Extension conditions.

Measured against the CMP standards, all ten CMP intersections in the Diridon Station study area would operate at an acceptable LOS E or better during both the AM and PM peak hours of traffic. Based on the CMP LOS impact criteria, the BART Extension would not have a significant impact on any CMP intersections in the Diridon Station study area under 2015 Existing BART Extension conditions. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Santa Clara Station

Of the 17 study intersections in the vicinity of the Santa Clara Station, two are located in the City of San Jose and 15 are in the City of Santa Clara. Six of the 17 study intersections are designated CMP intersections.

Measured against the City of San Jose LOS standards, both of the San Jose intersections in the vicinity of the Santa Clara Station would operate at an acceptable LOS D or better during both the AM and PM peak hours of traffic. Based on the City of San Jose significant impact criteria, the BART Extension would not have a significant impact on either San Jose intersection in the Santa Clara Station study area under 2015 Existing BART Extension conditions.

Measured against the City of Santa Clara LOS standards, 13 of the 15 Santa Clara Station study intersections within Santa Clara would operate at an acceptable LOS (LOS D or better at local intersections and LOS E or better at expressway and CMP intersections) during both the AM and PM peak hours of traffic. The following two intersections would operate at unacceptable LOS (LOS E or worse for local intersections and LOS F for expressways and CMP intersections) during at least one peak hour.

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- Coleman Avenue and Brokaw Road (LOS F: PM peak hour).

However, when measured against the City of Santa Clara significant impact criteria, the BART Extension Alternative would not cause a significant impact at either of these intersections under 2015 Existing BART Extension conditions.

Measured against the CMP LOS standards, the results of the LOS analysis under 2015 Existing BART Extension Alternative conditions show that, five of the six CMP study intersections in the vicinity of the Santa Clara Station would operate at an acceptable LOS (LOS E or better) during both the AM and PM peak hours of traffic. The following CMP intersection would operate at unacceptable LOS (LOS F) during at least one peak hour.

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours)

However, based on the CMP significant impact criteria, the BART Extension Alternative would not result in any significant impacts on any of the CMP intersections in the vicinity of the Santa Clara Station.

The unsignalized intersection of Lafayette Street and Harrison Street has two-way stop control. The LOS for this intersection, LOS F in the AM and PM peak hours, reflects the delay and the LOS for the stop-controlled approach with the highest delay, not the average of the entire intersection. Because the City of Santa Clara does not have an LOS standard for unsignalized intersections, this intersection cannot be said to operate at an unacceptable LOS. The LOS is presented for informational purposes only.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Freeway Segments Analysis

Traffic volumes on freeway segments for 2015 Existing BART Extension conditions were established by adding to the existing freeway volumes the projected net station trips on each freeway segment. Note that the BART Extension Alternative would generally result in a decrease in traffic volumes on the freeway network as commuters use the BART Extension as an alternative to freeway travel.

The results of the freeway analysis under 2015 Existing BART Extension Alternative conditions are summarized in Table 3-25.

Table 3-25: 2015 Existing BART Extension Alternative Freeway Levels of Service

Station	Number of Freeway Segments	Unacceptable LOS Mixed-Flow Segments	Unacceptable LOS HOV Segments
Alum Rock/28th Street	20	13	4
Diridon	18	16	5
Santa Clara	26	24	9
Total	**64**	**53**	**15**

Table 3-25 shows that:

- 13 (plus 4 HOV segments) of the 20 directional freeway segments analyzed for the Alum Rock/28th Street Station are projected to operate at an unacceptable LOS F during at least one peak hour.
- 16 (plus 5 HOV segments) of the 18 directional freeway segments analyzed for the Diridon Station are projected to operate at an unacceptable LOS F during at least one peak hour.
- 24 (plus 9 HOV segments) of the 26 directional freeway segments analyzed for the Santa Clara Station are projected to operate at an unacceptable LOS F during at least one peak hour.

However, because the 2015 Existing BART Extension Alternative would not add traffic representing 1 percent or more of the segment's capacity to any of the freeway segments projected to operate at LOS F (including HOV segments), the BART Extension Alternative would not result in a significant impact on freeways under 2015 Existing traffic conditions, based on the CMP significance criteria for freeways.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Interchange Ramp Analysis

The results of the freeway ramp analysis under 2015 Existing BART Extension conditions are described below and summarized in Table 3-26. Based on the projected queue lengths obtained from TRAFFIX, the available queue storage space for the freeway off-ramps studied would be sufficient to serve the projected demand under 2015 Existing BART Extension conditions. The 2015 Existing BART Extension Alternative is projected to increase queue lengths at the study off-ramps by no more than two vehicles during the peak hours.

The freeway on-ramps are currently uncontrolled (ramp meters have been installed but are not yet operational). Thus, the freeway on-ramps evaluated are not projected to experience measurable queues at the freeway merging point under 2015 Existing BART Extension conditions.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Table 3-26: 2015 Existing BART Extension Alternative Freeway Ramp Queuing Analysis

Freeway Ramp	Total Storage (Vehicle)[a]	No Build Condition	BART Extension Condition	Change
U.S. 101 at McKee Road Interchange				
U.S. 101 SB On-Ramp at McKee Road	32			
PM Volume [b]		1131	1187	56
Projected Queue Length [c]		-	-	
U.S. 101 SB Loop Off-Ramp at McKee Road	92			
AM Volume [b]		426	418	-8
Projected Queue Length [d]		*27*	*27*	*0*
U.S. 101 at Santa Clara Street/Alum Rock Avenue Interchange				
U.S. 101 SB On-Ramp at Santa Clara Street	34			
PM Volume [b]		949	1021	72
Projected Queue Length [c]		-	-	
U.S. 101 NB Off-Ramp at Alum Rock Avenue	67			
AM Volume [b]		244	316	72
Projected Queue Length [d]		*10*	*12*	*2*
PM Volume [b]		695	716	21
Projected Queue Length [d]		*24*	*26*	*2*

[a] Total number of vehicles that can store within the ramp.
[b] Peak-hour ramp volume projections.
[c] Currently, the ramp meter at these on-ramps is not operational during the PM peak hour. Therefore, no measurable queues are currently experienced at these locations.
[d] Total number of vehicles in the queue, as obtained from TRAFFIX.

3.5.2.4 2035 Forecast Year Traffic Impact Analysis

This section describes the traffic conditions in the 2035 Forecast Year with the BART Extension. It is assumed in this analysis that the transportation network under the 2035 Forecast Year BART Extension Alternative would be the same as the 2035 Forecast Year No Build transportation network. The BART Extension vehicle trips were added to 2035 Forecast Year No Build Alternative traffic volumes to obtain the 2035 Forecast Year BART Extension Alternative traffic volumes.

Station Trip Generation

2035 Forecast Year trip generation for the BART Extension stations was developed using the VTA Model and based on the method previously described. Table 3-27 presents the 2035 Forecast Year daily and peak hour trip generation estimates for each of the drive access modes to the Alum Rock/28th Street, Diridon, and Santa Clara Stations.

Table 3-27: 2035 Forecast Year Trip Generation and Parking Demand with the BART Extension Alternative

Mode of Access by Station	Daily Trips	Parking Demand (# of Spaces)	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Alum Rock/28th Street								
Kiss-and-Ride Trips	506		49	49	98	58	58	116
Park-and-Ride Trips	3,421	1,555	460	16	476	42	359	401
Total	**3,927**		**509**	**65**	**574**	**100**	**417**	**517**
Diridon								
Kiss-and-Ride Trips	440		43	43	86	50	50	100
Park-and-Ride Trips	0	0	0	0	0	0	0	0
Total	**440**		**43**	**43**	**86**	**50**	**50**	**100**
Santa Clara								
Kiss-and-Ride Trips	200		19	19	38	23	23	46
Park-and-Ride Trips	864	393	116	4	120	11	91	102
Total	**1,064**		**135**	**23**	**158**	**34**	**114**	**148**
Source: VTA Model, December 2014.								

Under 2035 Forecast Year BART Extension conditions, approximately 1,400 AM and 1,150 PM peak-hour trips would be removed from the roadway transportation system because commuters would shift from driving a car to riding BART.

Intersection Analysis

Traffic volumes for the 2035 Forecast Year BART Extension Alternative conditions were obtained by adding the traffic projected to be generated by the BART stations (net trips, as described earlier) to the 2035 Forecast Year No Build traffic volumes. Intersection LOS under 2035 Forecast Year BART Extension conditions were evaluated against CMP and Cities of San Jose and Santa Clara LOS standards. The results of the LOS analysis for the BART stations under the 2035 Forecast Year BART Extension Alternative are summarized in Table 3-28.

This section also evaluates whether the BART Extension Alternative would result in a significant impact on the study intersections under 2035 Forecast Year traffic conditions, based on the significant impact criteria of the City of San Jose, the City of Santa Clara, and CMP. To determine whether there would be any significant impacts under 2035 Forecast Year BART Extension Alternative conditions, intersections that would operate at an unacceptable LOS under 2035 Forecast Year BART Extension conditions were further analyzed. For City of Santa Clara and CMP intersections, a comparison was made between 2035 Forecast Year No Build conditions and 2035 Forecast Year BART Extension conditions and the appropriate significant impact criteria were applied.[6] For City of San Jose intersections, a comparison was made between 2025 No Build conditions and 2035 Forecast Year BART Extension conditions, and the City of San Jose's significant impact criteria were applied.

Table 3-28: 2035 Forecast Year BART Extension Alternative Intersection Analysis Summary

Station	Number of Study Intersections	Number of CMP Intersections	Unacceptable LOS Intersections[a]	Intersections with Impacts[b]
Alum Rock/28th Street	17	3	1 (0)	0 (0)
Diridon	29	10	3 (0)	0 (0)
Santa Clara	17	6	3 (1)	0 (0)
Total	**63**	**19**	**7 (1)**	**0 (0)**

[a] The first number is based on the LOS standards of the appropriate City. The second number (in parentheses) is the number of CMP intersections that would operate at an unacceptable LOS based on the CMP LOS standard.

[b] The first number presents how many study intersections would be impacted based on the appropriate City's impact criteria. The second number (in parentheses) is how many of the CMP intersections would be impacted based on the CMP criteria

Alum Rock/28th Street Station

Measured against the City of San Jose LOS standards, the following intersection would operate at an unacceptable level of service during both peak hours.

- King Road and McKee Road (LOS F: AM peak hour; LOS E: PM peak hour)

This intersection was also projected to operate at an unacceptable level of service under 2035 Forecast Year No Build conditions. Based on the City of San Jose significant impact criteria, the BART Extension would not have a significant impact on this intersection under 2035 Forecast Year BART Extension conditions.

Measured against the CMP LOS standards, all three CMP intersections in the Alum Rock/28th Street Station study area would operate at an acceptable LOS E or better during both the AM and PM peak hours. Based on the CMP LOS impact criteria, the BART Extension would not exceed the significance thresholds at any of the CMP study intersections in the vicinity of the Alum Rock/28th Street Station. All other CMP and local San Jose study intersections are projected to operate at an acceptable LOS.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

[6] For further information on the application of the City of San Jose, City of Santa Clara, and CMP significant impact criteria to each intersection and the supporting data for these findings (e.g., change in average critical delay and change in critical V/C; percentage of increased traffic volume contributed by the alternative), refer to the BART Extension TIA.

Diridon Station

The following study intersections, which were identified to operate at an unacceptable LOS under 2035 Forecast Year No Build conditions, are projected to continue to operate at unacceptable LOS during at least one peak hour with the BART Extension. The CMP intersection is denoted by an asterisk (*).

- The Alameda and Taylor Street/Naglee Avenue* (LOS E: AM & PM peak hours).
- South Autumn Street and Park Avenue (LOS E: PM peak hour).
- Meridian Avenue and Fruitdale Avenue (LOS E: AM & PM peak hours).

However, when measured against the City of San Jose significant impact criteria, the BART Extension would not have a significant impact on these three intersections under 2035 Forecast Year BART Extension conditions.

Measured against the CMP LOS standards, all ten CMP intersections in the Diridon Station study area would operate at an acceptable LOS E or better during both the AM and PM peak hours of traffic. Based on the CMP LOS impact criteria, the BART Extension would not result in an impact that would exceed the significance thresholds at any of the CMP study intersections in the vicinity of the Diridon Station. All other CMP and local San Jose study intersections are projected to operate at an acceptable LOS.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Santa Clara Station

The same study intersections identified to operate at unacceptable LOS under 2035 Forecast Year No Build conditions are projected to continue to operate at unacceptable LOS during at least one peak hour under the 2035 Forecast Year BART Extension Alternative. One of the intersections is in the City of San Jose and two are in the City of Santa Clara. The CMP intersection is denoted by an asterisk (*).

- Coleman Avenue and Newhall Drive (LOS E: PM peak hour)—San Jose.
- Lafayette Street and Lewis Street (LOS E: PM peak hour)—Santa Clara.
- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours)—Santa Clara.

When measured against the City of San Jose significant impact criteria for 2035 Forecast Year conditions, the intersection of Coleman Avenue and Newhall Drive would not be adversely affected by the BART Extension Alternative.

Based on City of Santa Clara and the CMP LOS impact criteria, the 2035 Forecast Year BART Extension Alternative would not cause an adverse effect that would exceed the significance thresholds at any of the Santa Clara or CMP intersections in the vicinity of the

Santa Clara Station. All other CMP and local Santa Clara and San Jose study intersections are projected to operate at an acceptable LOS.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Freeway Segments Analysis

Traffic volumes for the 2035 Forecast Year BART Extension for the study freeway segments were obtained from the VTA Model. These volumes represent traffic projections with the addition of planned improvements and the BART Extension. Note that the BART Extension would result in a decrease in traffic volumes on the freeway network, as commuters use BART as an alternative to regional freeway travel. While a portion of traffic accessing the station areas would use the freeway network to do so, generally those trips are already on the freeway network and do not represent an increase in traffic from 2035 Forecast Year No Build conditions. However, a number of others accessing the stations would do so via transit or local streets; therefore, there would be a net reduction in freeway volumes.

The results of the freeway analysis under the 2035 Forecast Year BART Extension Alternative are summarized in Table 3-29.

Table 3-29: 2035 Forecast Year with BART Extension Alternative Freeway Levels of Service

Station	Number of Freeway Segments	Unacceptable LOS Mixed-Flow Segments	Unacceptable LOS HOV Segments
Alum Rock/28th Street	20	12	4
Diridon	18	17	3
Santa Clara	26	24	8
Total	**64**	**53**	**15**

Alum Rock/28th Street Station

As shown in Table 3-29, 12 of the 20 directional freeway segments (and 4 HOV segments) analyzed for the Alum Rock/28th Street Station would operate at an unacceptable LOS F during at least one of the peak hours. However, because the BART Extension Alternative would not add traffic representing 1 percent or more of the segment's capacity to any of the study freeway segments projected to operate at LOS F (including HOV segments), the BART Extension Alternative would not result in an impact that would exceed the significance thresholds on any of the freeway segments.

There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Diridon Station

As shown in Table 3-29, 17 of the 18 directional freeway segments (and 3 HOV segments) analyzed for the Diridon Station would operate at an unacceptable LOS F during at least one of the peak hours. However, because the BART Extension would not add traffic representing 1 percent or more of the segment's capacity to any of the study freeway segments projected to operate at LOS F (including HOV segments), the BART Extension would not result in an impact that would exceed the significance thresholds on any of the freeway segments. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Santa Clara Station

As shown in Table 3-29, 24 of the 26 directional freeway segments (and 8 HOV segments) analyzed for the Santa Clara Station would operate at an unacceptable LOS F during at least one of the peak hours. However, because the BART Extension Alternative would not add traffic representing 1 percent or more of the segment's capacity to any of the study freeway segments projected to operate at LOS F (including HOV segments), the BART Extension Alternative would not result in an impact that would exceed the significance thresholds on any of the freeway segments. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Freeway Ramp Analysis

The results of the freeway ramp analysis under 2035 Forecast Year BART Extension conditions are described below and summarized in Table 3-30. Based on the projected queue lengths obtained from TRAFFIX, the available queue storage space for the freeway off-ramps studied would be sufficient to serve the projected demand under the 2035 Forecast Year BART Extension Alternative. The BART Extension is projected to increase queue lengths at the study off-ramps by no more than four vehicles during the peak hours.

The queue length projections for the freeway on-ramps show that the on-ramps studied would experience excessive queue lengths that would spill out of the ramps onto the adjacent street under 2035 Forecast Year No Build conditions and is projected to increase the queue length under 2035 Forecast Year BART Extension conditions. This is due to the projected on-ramp demand exceeding the assumed ramp capacity.

Table 3-30: 2035 Forecast Year BART Extension Alternative Freeway Ramp Queuing Analysis

Freeway Ramp	Total Storage (Vehicle)[a]	No Build Condition	BART Extension Condition	Change
U.S. 101 at McKee Road Interchange				
U.S. 101 SB On-Ramp at McKee Road	32			
PM Volume [b]		1,476	1,558	82
Projected Queue Length [c]		*576*	*658*	*82*
U.S. 101 SB Loop Off-Ramp at McKee Road	92			
AM Volume [b]		470	522	52
Projected Queue Length [d]		*30*	*34*	*4*
U.S. 101 at Santa Clara Street/Alum Rock Avenue Interchange				
U.S. 101 SB On-Ramp at Santa Clara Street	34			
PM Volume [b]		1,397	1,453	56
Projected Queue Length [c]		*497*	*553*	*56*
U.S. 101 NB Off-Ramp at Alum Rock Avenue	67			
AM Volume [b]		407	463	56
Projected Queue Length [d]		*14*	*18*	*4*
PM Volume [b]		984	1009	25
Projected Queue Length [d]		*43*	*43*	*0*

[a] Total number of vehicles that can store within the ramp.
[b] Peak-hour ramp volume projections.
[c] Total number of vehicles in the queue, as calculated based on the ramp meter rate and projected traffic volumes.
[d] Total number of vehicles in the queue, as obtained from TRAFFIX.

The queuing analysis shows that under 2035 Forecast Year BART Extension conditions, the queue length at the U.S. 101 southbound on-ramp at McKee Road is projected to increase by 82 vehicles and the queue length at the U.S. 101 southbound on-ramp at Santa Clara Street is projected to increase by 56 vehicles during the PM peak hour. Therefore, under 2035 Forecast Year BART Extension Conditions, the vehicular queue at the U.S. 101 southbound on-ramp at McKee Road is projected to extend out of the ramp by approximately 626 vehicles during the PM peak hour, while the queue at the U.S. 101 southbound on-ramp at Santa Clara Street is projected to extend out of the ramp by approximately 519 vehicles during the PM peak hour. The AM peak hour queue lengths at these ramps would not be affected by the BART Extension.

The available queue storage capacity at the freeway on-ramps would be inadequate to serve the projected queue length under 2035 Forecast Year No Build conditions, and the BART Extension Alternative would worsen the projected deficiency under 2035 Forecast Year BART Extension conditions. However, it should be noted that these projections assume a very conservative meter rate of 900 vph for the entire peak hour analyzed. If the future meter rate at these locations is greater than the assumed 900 vph, the projected demand on these ramps would be dissipated faster and the projected queues would be shorter. Alternatively, setting the ramp meter rate to allow no more than 900 vph could potentially result in peak-hour spreading (drivers accessing these ramps before or after the peak hour to avoid the long queues), use of alternative freeway ramps, and/or use of alternative modes of transportation, such as walk/bike/public transportation.

3.5.2.5 Impact BART Extension TRA-1: Conflict with a Transportation Plan, Ordinance, or Policy

The potential impacts of the BART Extension were evaluated in accordance with the standards set forth by the Cities of San Jose and Santa Clara and the CMP of Santa Clara County (see Tables 3-28 and 3-29). A total of 17 signalized intersections and 20 freeway segments in the vicinity of the Alum Rock/28th Street Station; 29 signalized intersections and 18 freeway segments in the vicinity of the Diridon Station; and 16 signalized intersections, one unsignalized intersection, and 26 freeway segments in the vicinity of the Santa Clara Station were analyzed. All study intersections are within the Cities of San Jose and Santa Clara. Based on City of San Jose, City of Santa Clara, and CMP LOS standards and impact criteria, the BART Extension would not exceed the significance thresholds at any of the study intersections or on any of the freeway segments in the vicinity of the BART stations.

The BART Extension Alternative would not conflict with any regional or local transportation plans, including MTC's *Transportation 2035 Plan for the San Francisco Bay Area*, MTC's *Plan Bay Area*, VTA's *Valley Transportation Plan 2040,* VTA's *Santa Clara Countywide Bicycle Plan,* the City of San Jose's *Bike Plan 2020*, the City of San Jose's *Strategy 2000: San Jose Downtown Strategy Plan*, the City of San Jose's *Diridon Station Area Plan*, and the General Plans of the Cities of San Jose and Santa Clara. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.6 Impact BART Extension TRA-2: Conflict with the Congestion Management Program

A total of 19 CMP intersections and 62 freeway segments were analyzed for the 2035 Forecast Year BART Extension Alternative. Based on the CMP LOS standards and impact criteria, the BART Extension Alternative would not exceed the significance thresholds at any of the CMP intersections or on any of the freeway segments in the vicinity of the BART stations. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.7 Impact BART Extension TRA-3: Cause Changes in Air Traffic Patterns

The BART Extension would not change air traffic patterns, increase air traffic levels, or cause a change in location that would result in substantial safety risks. The nearest airport is the Mineta San Jose International Airport, approximately 0.5 mile northeast of Santa Clara

Station. The Diridon Station (which is within the City's DSAP) is approximately 0.8 mile to the southeast and subject to restrictive height limits of 263 feet. The BART Extension would be within the Airport Influence Area due to height restrictions established by Federal Aviation Regulations Part 77, *Objects Affecting Navigable Airspace*. To comply with the Santa Clara County Airport Land Use Commission restrictions, no structures would exceed an elevation of 150 feet above the ground surface near the Santa Clara Station and Newhall Maintenance Facility or 212 feet above the ground surface in any other portions of the alignment. The Diridon Station and associated facilities would not exceed the 263-foot height restriction. Therefore, the BART Extension would not change air traffic patterns and the proposed structures would not intrude into the height restrictions. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.8 Impact BART Extension TRA-4: Increase Traffic Hazards

As discussed in Chapter 4, Section 4.13, *Security and System Safety*, the BART Extension would be designed by VTA to comply with the pertinent codes and standards including BART Design Criteria Facilities Standards, which describe and specify design requirements for all new projects. These standards are based on experience in operations and industry-wide best practices, and have been developed to provide a high level of security and safety in a cost-effective manner. A Safety and Security Certification Program has also been developed for the BART Extension to ensure that it is designed in compliance with pertinent BART Design Criteria Facilities Standards and applicable safety and security design codes. In addition, the BART Extension would be designed and constructed to the provisions of the pertinent BART Design Criteria Facilities Standards in accordance with the current System Safety Program Plan. These standards address a train control system, operating procedures, training of operating and maintenance personnel, and emergency responses. In addition, the BART Extension would not include incompatible uses. Therefore, in terms of substantially increasing hazards due to a design feature or incompatible uses there would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.9 Impact BART Extension TRA-5: Result in Inadequate Emergency Access

The existing roadways surrounding the BART Extension enable emergency vehicle response to all areas. Emergency vehicles often identify and use multiple routes dependent upon time of day and traffic conditions. Peak-period traffic congestion generally does not result in delay for emergency vehicles, which have the right-of-way and often utilize multi-lane major arterials for access. Emergency vehicles are permitted to use transit-only lanes or other vehicle-restricted lanes if necessary. In addition, emergency vehicles at intersections with traffic signals can pass through the intersections at reduced speeds even when receiving a red signal indication.

Emergency vehicle response times are a function of travel along the entire path from their base to the incident location. At some locations, particularly for those movements leading directly to the station area, the number of vehicles accessing the station is larger than the number of vehicles shifted from the roadway network to transit modes, and the BART Extension would result in a net increase in traffic volumes. At many locations, particularly for those movements either not leading to the station area or leading to freeways, the number of vehicles shifted from the roadway network to transit modes would be greater than the number of vehicles using that movement to access the station, and the BART Extension would result in a net decrease in traffic volumes. Overall, in terms of emergency access during operation there would be would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.10 Impact BART Extension TRA-6: Conflict with Transit, Bicycle, or Pedestrian Policies, Plans, or Programs

The BART Extension Alternative consists of the 6-mile-long extension of the BART system from the Berryessa neighborhood in San Jose through downtown San Jose and west into Santa Clara and includes four new BART stations. Therefore, the BART Extension *is* a transit project and represents a substantial improvement to the transit system in the study area. Additionally, the BART Extension is being integrated with VTA's light rail and bus systems and would not adversely affect transit facilities or services within the Cities of San Jose or Santa Clara in the vicinity of the BART Extension or BART stations.

In addition, several bike and pedestrian improvements are proposed as part of the BART Extension and would be coordinated with the local Cities and their plans. Bicycle facilities, including bike parking, will be provided at each station. Because much of the BART Extension would be underground, the alignment of the BART Extension would not significantly impact bicycle or pedestrian facilities along the alignment.

A pedestrian connection along the south side of the Alum Rock/28th Street Station at North 28th Street from Santa Clara Street is proposed. This pedestrian connection, which would include such amenities as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting, would link the BART station entrances with buses and bus rapid transit operating on Santa Clara Street/Alum Rock Avenue, enhancing connectivity of pedestrian facilities surrounding the station. Additionally, the BART Extension Alternative would add sidewalks around the perimeter of the Alum Rock/28th Street Station and the west side of 28th Street from the station entrance to Santa Clara Street. Crosswalks at the signalized intersections of North 28th Street/East St. James Street and North 28th Street/Five Wounds Lane would also be provided, including pedestrian push buttons and signal heads.

Construction of the Downtown San Jose Station (East or West Options) would provide improvements to Santa Clara Street in accordance with the City of San Jose's Streetscape Master Plan to facilitate pedestrian movement to and from the station and Downtown San

Jose. These enhancements would improve the streetscape within the Downtown area once construction is complete.

At the Diridon Station (South or North Options), street-level station entrance portals would provide pedestrian linkages to the Diridon Caltrain Station and SAP Center. Additionally, sidewalks are found along all local roadways in the Diridon Station study area and along the local residential streets and collectors near the station site.

At the Santa Clara Station, an approximately 240-foot-long pedestrian tunnel would connect to the Santa Clara Caltrain Station plaza, and an approximately 175-foot-long pedestrian tunnel would connect from the BART station to a new BART plaza on Brokaw Road. This pedestrian connection would link the station with other pedestrian and transit facilities in the vicinity, enhancing connectivity of pedestrian facilities surrounding the station and transit services. Additionally, with the exception of the east side of Lafayette Street, sidewalks are found along most local roadways in the area and along the local residential streets and collectors near the Santa Clara Station site. All signalized intersections in the vicinity of the Santa Clara Station have marked crosswalks on all or most of the legs of the intersection combined with pedestrian push buttons and pedestrian signal heads. In combination with planned pedestrian/bicycle improvements in the area, the BART Extension Alternative would enhance pedestrian/bicycle facilities along Brokaw Road.

Therefore, the BART Extension Alternative would result in no adverse effects on bicycle and pedestrian circulation at any of the stations areas and would improve connectivity. Overall, the BART Extension would not conflict with transit, bicycle, or pedestrian policies, plans, or programs. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.11 Impact BART Extension TRA-7: Interfere with Activities at Event Centers

There are two major event facilities along the alignment: the SAP Center and Avaya Stadium. Activities at these facilities are discussed below. Because potential interference with activities at event centers is not included in Appendix G of the State CEQA Guidelines, as listed in Section 3.2.2, *Thresholds of Significance*, this discussion is provided for informational purposes for CEQA and impact analysis purposes for NEPA.

SAP Center

The SAP Center is across Santa Clara Street from the Diridon Station. The SAP Center holds a substantial number of events throughout the year, primarily on weekends. The Diridon Station would not provide parking for BART riders. Ridership projections have been based on access from heavy and light rail, buses, KNR, bicycling, and walking. The Diridon Station design would be similar to other BART system Downtown stations where parking is not provided. If BART riders require parking, they could access either the BART Alum Rock/28th Street or Santa Clara Stations or one of several downtown parking garages.

Because the Diridon Station would not provide parking for BART riders, traffic associated with the Diridon Station would be from KNR drop-offs and pick-ups and from those choosing to park in nearby parking lots in the area. The convenience of having a BART station across the street would also encourage a transit access alternative for those attending SAP Center events and reduce the number of vehicles traveling to SAP Center events. Therefore, the number of vehicles on the adjacent roadways associated with the BART Extension operations would not be substantial. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

Avaya Stadium

The Avaya Stadium, which is the home of the San Jose Earthquakes soccer team, is at Coleman Avenue and Newhall Drive near the San Jose/Santa Clara City limit line. It is also close to the Newhall Maintenance Facility and Santa Clara Station.

During the 2015 season, almost all soccer games were played on weekend days. Four games were played on Friday evenings and started at 8:00 p.m., which is 2 hours after the typical commute hour ends. Only one soccer game was played on a (midweek) Wednesday, and it started at 7:30 p.m. Intersection counts at two main parking lots along Coleman Avenue were conducted on Friday, October 16, 2015, starting 3 hours before game time. Based on these traffic counts, it was estimated that about 18 percent of the soccer traffic arrived between the 5:00 and 6:00 p.m. commute hour, which is 2 to 3 hours before the game started. About 23 percent of the soccer traffic arrived between 1.5 and 2.5 hours before game time (between 5:30 and 6:30 p.m.). The majority of soccer traffic arrived within the hour before game time. Assuming that the Earthquakes soccer schedule in future years is similar to the 2015 schedule, soccer traffic would coincide with evening commute traffic only 5 days a year. The starting time of soccer games occurs after the peak (5:00 to 6:00 p.m.) commute hour, and the majority of soccer traffic arrives after the evening commute traffic has peaked. Therefore, because there are only a handful of soccer games per year that are played on weekday evenings and because most of the soccer traffic arrives after the peak commute hour has ended, weekday afternoon commute traffic conditions on game days, with or without the BART Extension, would be affected only infrequently. There would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.2.12 Impact BART Extension TRA-8: Increase Demand for Parking

Revisions to the significance thresholds for CEQA that became effective on January 1, 2010, eliminated effects on parking. The revisions to the CEQA thresholds were based on the decision in *San Franciscans Upholding the Downtown Plan v. City & County of SF, 102 Cal.App.4th 65 (Sept. 30, 2002)*, in which the court ruled that parking deficits are an inconvenience to drivers but not a significant physical impact on the environment. As a result of this change to the State CEQA Guidelines, VTA adopted new significance thresholds that did not include the effects of parking on November 4, 2010. In addition, Section 7.1.3.2, Area Plans/Studies, BART Core Modification Study (19) provides a discussion of how core parking is being addressed. This discussion describes BART's adopted System Expansion Policy, which discusses the potential to add BART parking as station improvements are implemented, but also consider alternatives to driving to stations, such as improvements to station access encouraging carpool, transit, bicycle and pedestrian access.

Parking conditions evolve over time as people alter their modes and patterns of travel in response to changing land uses and transportation options. The availability of parking spaces is not part of the permanent physical environment subject to environmental review. Therefore, the loss of parking spaces by itself or the generation of parking demand by itself are not considered a direct significant impact on the physical environment in this document. However, parking losses caused by a project or parking demand generated by a project in excess of the parking provided could result in a significant indirect impact on the environment if drivers circling for parking cause significant secondary effects on traffic operations or air quality. The other criteria in this Draft SEIS/SEIR for evaluation of traffic operation and air quality are used as the thresholds for evaluating these secondary effects. The following discussion of parking is for information purposes for CEQA and impact analysis purposes for NEPA and as background to the evaluation of any secondary effects on traffic operations and air quality.

Parking considerations fall within two areas: (1) BART parking demand and supply associated with the BART Extension Alternative stations, and (2) parking demand and supply at existing and future No Build Alternative stations in the BART system. Existing and future BART stations that are not part of the BART Extension Alternative are also referred to as the Core Stations.

At the Alum Rock/28th Street Station, other than on-street curbside parking, there are no public or private surface parking lots or garages available for public parking within reasonable walking distance. In Downtown San Jose, there are several public parking facilities and several large, privately owned parking facilities with public access. Caltrain provides parking for its patrons on three surface lots immediately east of the existing Diridon Caltrain Station. VTA owns one of the lots—1.3 acres south of Santa Clara Street and between Montgomery Street and Cahill Street. This site is currently leased to others and provides approximately 185 parking spaces. In addition, a large parking lot is immediately west of the SAP Center for patrons of this facility.

Near the Santa Clara Station, there are three surface parking lots west of the railroad tracks serving the Santa Clara Caltrain Depot. The west lot is jointly owned by the City of Santa Clara and VTA and is designated for Caltrain patrons.

Table 3-31 summarizes the parking space requirements for the BART Extension stations. As shown in the table, PNR demand for the BART Extension would be approximately 1,960 spaces in the 2035 Forecast Year for the two stations with PNR facilities. The parking table does not include KNR demand at stations. Space for that activity is provided, along with spaces for bus passenger boarding and alighting, as part of overall station access design. VTA express and local bus services would not generate substantial PNR requirements. The 2035 Forecast Year parking demand reflects ridership of 52,000 for the BART Extension. Note that the BART Extension Alternative would not provide dedicated parking spaces for BART riders at the Downtown San Jose and Diridon Stations, although BART riders would be able to park in public and private parking facilities near these stations.

Table 3-31: 2035 Forecast Year BART Extension Alternative Park-and-Ride Demand

Station Name	2035 Parking Demand (spaces)
Alum Rock/28th Street	1,560
Santa Clara	400
Total	**1,960**
Source: Hexagon Transportation Consultants, Inc. 2016a	

Alum Rock/28th Street Station

As shown in Table 3-31, in 2035, the Alum Rock/28th Street Station is projected to require approximately 1,560 parking spaces. The station plans accommodate 1,200 parking spaces in an up to seven-story parking structure next to the station. Parking demand would be monitored and, if parking demand exceeds supply, VTA would evaluate measures to promote non-vehicular access to the station.

Diridon Station

Two planning exercises are underway with Diridon area stakeholders to study parking demand and develop parking management strategies in preparation for the construction of several planned transit and development projects in and around the Diridon Station area. First, the City of San Jose is currently leading an effort in partnership with VTA, Peninsula Corridor Joint Powers Board, and area stakeholders to develop an interim parking plan through 2025 that will address parking needs in the Diridon Station area. In addition, VTA, the City of San Jose, Peninsula Corridor Joint Powers Board, and California High-Speed Rail Authority are participating in the Diridon Intermodal Study, which will analyze long-term multimodal access in and around Diridon Station in 2025 and beyond once proposed transit investments and development projects are in place. During the development of both the interim parking plan and the Diridon Intermodal Study, VTA will work with existing and future transit providers in the Diridon Station area to evaluate parking demand based on updated transit patron mode of access data and/or VTA policies established for transit park-and-ride lots and/or joint development parking requirements. The interim parking plan and the Diridon Intermodal Study will address the provision, location, and management of parking in the area; identify an overall strategy for meeting parking needs with stakeholders; allow for shared parking among area transit providers, the SAP Center, and future development; and evaluate strategies that would encourage transit-supportive access to the area and non-auto travel.

Santa Clara Station

As shown in Table 3-31, the Santa Clara Station projected demand is approximately 400 spaces. This demand would be accommodated by providing 500 parking spaces in an up to five-story parking structure.

Conclusion

The Alum Rock/28th Street and Santa Clara Stations would provide up to 1,700 parking spaces. Parking would not be provided at the Downtown San Jose or Diridon Stations. At these two stations, access would be almost entirely by transit, walk/bicycle, and auto/taxi drop-off and pick-up. Only limited short-term on-street metered parking would be available as another option. There are no residential neighborhoods in the immediate area that would be adversely affected by spillover parking. As stated previously, a Transportation and Parking Management Plan would be developed for the Diridon Station area. This plan would address the provision, location, and management of parking in the area, including parking demand for BART and High-Speed Rail. VTA, in partnership with the City of San Jose, Caltrain, and area stakeholders, would work to develop a plan to meet future parking demands.

Nevertheless, VTA would closely monitor parking activity at all stations and institute control measures where necessary. Possible measures include parking charges, parking time, and location restrictions to prevent long-term parking in neighborhoods, and/or other actions. VTA would also continue to work with the Cities of San Jose and Santa Clara and other transit agencies to implement appropriate parking policies to manage non-BART-related parking demand adjacent to these stations. Therefore, there is not projected to be a significant indirect impact on the environment caused by drivers circling for parking, resulting in significant secondary effects on traffic operations or air quality. Thus, there would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA. No mitigation is required.

3.5.3 BART Extension with TOJD Alternative

The TOJD included in this alternative would include a combination of office space, retail space, and residential units at the Alum Rock/28th Street and Santa Clara Stations, and a mix of office and retail space at the Downtown San Jose and Diridon Stations. The TOJD also includes small supporting retail developments at two locations along the alignment in San Jose where ventilation structures for the BART tunnel would be located.

As explained in detail in Chapter 2, *Alternatives,* the BART Extension with TOJD Alternative is evaluated under CEQA only.

3.5.3.1 Relevant Plans and Policies

The City of San Jose has adopted two plans to guide land use development projects in the Downtown San Jose area: the *Strategy Plan* (adopted in 2000) and the *Diridon Station Area Plan* (adopted in 2014).

Both the Downtown San Jose and Diridon Stations would be within the Downtown Core Area as defined by *Strategy 2000: San Jose Greater Downtown Strategy Plan for Development Program Environmental Impact Report* (San Jose Downtown Strategy 2000 EIR), and the office and retail TOJD at these stations would be fully consistent with that EIR.

The *Downtown Strategy Plan 2000* is a long-range conceptual program for revitalizing downtown San Jose by allowing high density infill development and replacement of underutilized uses (City of San Jose 2001). That EIR included analysis of 164 intersections in the Downtown Core Area, the surrounding neighborhoods, and corridors leading to the Core Area. A total of 46 directional freeway segments, parking facilities, and transit, bicycle, and pedestrian facilities were also analyzed. Therefore, the potential for traffic impacts associated with the BART Extension with TOJD Alternative has already been analyzed, and appropriate mitigation strategies for any impacts have been identified as part of that EIR.

Because of the location of the TOJDs near the Downtown San Jose and Diridon Stations within the Downtown Core Area, City of San Jose staff concluded that these developments are exempt from the City of San Jose Transportation Level of Service Policy (Council Policy 5-3) and will not require preparation of a comprehensive Transportation Impact Analysis (TIA). Based on guidance from City of San Jose staff (Wong pers. comm.), analysis of the TOJD at these two stations was environmentally cleared at a project level in the San Jose Downtown Strategy 2000 EIR, and therefore is not included in this analysis. Accordingly, the TIA for the BART Extension with TOJD does not include intersection analysis for the Downtown San Jose or Diridon Stations.

The San Jose Public Works Department has requested that a detailed traffic operations study be prepared at a future date prior to construction of the BART Extension with TOJD Alternative, if approved, in order to identify potential operational issues that could occur as a result of the TOJD at the Downtown San Jose and Diridon Stations. Site planning and design for the TOJD at these stations are still in a very preliminary stage. Therefore, a detailed traffic operations analysis of intersection queuing, site access, and onsite circulation at these locations would be prepared and submitted to the City of San Jose Public Works Department for their review at a future date when detailed site plans are available.

The Diridon Station is also within the area covered by the DSAP, a 35-year land use plan developed by the City of San Jose that focuses on the intensification of land uses in the Diridon Station area and expansion of the Diridon Station to serve as a transit hub for existing and planned transit systems, including the BART Extension. The office and retail uses proposed by for the Diridon Station TOJD exemplify the intensification of land uses envisioned by the DSAP.

The DSAP includes a shift in approved development growth from the traditional Downtown Core as identified by the approved Strategy 2000 to the Diridon Station Area, west of SR 87. Although the DSAP consists of the reallocation of land uses, the total planned development growth within the Downtown area remains as identified with the San Jose Downtown Strategy 2000 EIR. However, a small amount of retail space and over half of the residential units proposed by the DSAP are outside of the Downtown area. An EIR was prepared for the DSAP (City of San Jose 2014) in order to identify any intersection or freeway impacts under DSAP Buildout plus Strategy 2000 project conditions and to develop appropriate mitigation measures for any impacts. Because the office and retail TOJD for Diridon Station would be consistent with the DSAP, it is also covered by that EIR.

3.5.3.2 2015 Traffic Impact Analysis

Station and TOJD Trip Generation

The trip generation for the BART Extension with TOJD Alternative includes three separate components.

1. The additional trips generated by BART patrons who access the BART stations by vehicle and use the KNR or the PNR facilities. These trips are referred to as the *station drive access trips*.
2. The reduction in trips on the roadway network as motorists switch from passenger vehicles to BART. The BART Extension would result in a shift in travel patterns, and this mode shift would result in the removal of some auto trips from the roadways.
3. The additional trips generated by the TOJD at each station, which are discussed in detail below.

The trip generation estimates for the first two components of the BART Extension with TOJD Alternative (station drive access trips and mode shift trips) were quantified in Section, 3.5.2, *BART Extension Alternative*, and are incorporated into this analysis.

Table 3-32 presents the trip generation estimates for TOJD, the third component of total trip generation, for 2015 Existing conditions. In order to calculate the trip generation estimates for the TOJD, standard trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual* were used for each land use. In accordance with VTA's *TIA Guidelines,* trip reductions were taken for proximity to transit, internalization of trips for mixed-use projects, and pass-by trips for the retail uses.

After applying the standard ITE trip generation rates and appropriate trip reductions, the TOJD portion of the Alum Rock/28th Street Station site would generate 7,105 new daily vehicle trips, with 768 new trips occurring during the AM peak hour and 771 new trips occurring during the PM peak hour. The TOJD portion of the Santa Clara Station site would generate 7,229 new daily vehicle trips, with 755 new trips occurring during the AM peak hour and 763 new trips occurring during the PM peak hour.

Table 3-32: Trip Generation Estimates for Mixed-Use Developments at the Alum Rock/28th Street and Santa Clara Station TOJD Sites (2015 Conditions)

					AM Peak Hour						PM Peak Hour					
					Peak-Hour	Splits		Trips			Peak-Hour	Splits		Trips		
Land Use	**ITE Code**	**Size**	**Daily Trip Rates**	**Daily Trips**	**Rate**	**In**	**Out**	**In**	**Out**	**Total**	**Rate**	**In**	**Out**	**In**	**Out**	**Total**
Alum Rock BART Station Transit-Oriented Joint Development Site																
Office Building[a]	710	500,000 sf	8.92	4,461	1.39	88%	12%	610	83	693	1.28	17%	83%	109	529	638
6% Transit Trip Reduction for Office[b]								(37)	(5)	(42)				(7)	(31)	(38)
3% Reduction for Employment and Employee-serving Retail[c]								(18)	(3)	(21)				(3)	(16)	(19)
Apartments[d]	220	275 units	6.51	1,790	0.50	20%	80%	28	110	138	0.61	65%	35%	110	59	169
9% Transit Trip Reduction for Residential[e]								(3)	(10)	(13)				(10)	(5)	(15)
15% Housing and Retail Internal Reduction[f]								(1)	(2)	(3)				(6)	(5)	(11)
Retail Space[g]	820	20,000 sf	42.70	854	0.96	62%	38%	12	7	19	3.71	48%	52%	36	38	74
15% Housing and Retail Internal Reduction[f]								(2)	(1)	(3)				(5)	(6)	(11)
25% Retail PM Pass-By Reduction[h]														(8)	(8)	(16)
Net Alum Rock/28th Street Station TOJD Site Trips:				7,105				589	179	768				216	555	771
Santa Clara BART Station Transit-Oriented Joint Development Site																
Office Building[a]	710	500,000 sf	8.92	4,461	1.39	88%	12%	610	83	693	1.28	17%	83%	109	529	638
6% Transit Trip Reduction for Office[b]								(37)	(5)	(42)				(6)	(32)	(38)
3% Reduction for Employment and Employee-Serving Retail[c]								(18)	(3)	(21)				(3)	(16)	(19)
Apartments[d]	220	225 units	6.61	1,487	0.51	20%	80%	23	91	114	0.63	65%	35%	92	49	141
9% Transit Trip Reduction for Residential[e]								(2)	(8)	(10)				(8)	(5)	(13)
15% Housing and Retail Internal Reduction[f]								(2)	(2)	(4)				(9)	(8)	(17)
Retail Space[g]	820	30,000 sf	42.70	1,281	0.96	62%	38%	18	11	29	3.71	48%	52%	53	58	111
15% Housing and Retail Internal Reduction[f]								(2)	(2)	(4)				(8)	(9)	(17)
25% Retail PM Pass-By Reduction[h]														(11)	(12)	(23)
Net Santa Clara Station TOJD Site Trips:				7,229				590	165	755				209	554	763
Total Transit-Oriented Joint Development Project Trips:				**14,334**				**1,179**	**344**	**1,523**				**425**	**1,109**	**1,534**

Source for all trip generation rates: ITE *Trip Generation Manual, 9th Edition,* 2012.

[a] Rate based on ITE Land Use Code 710 (General Office), fitted curve equation used.

[b] Transit trip reduction of 6% for office trips, based on VTA's October 2014 *TIA Guidelines*.

[c] Mixed-Use reduction of 3% for mix of employment and employment-serving retail, based on VTA's October 2014 *TIA Guidelines*.

[d] Rates based on ITE Land Use Code 220 (Apartment), fitted curve equation used.

[e] Transit trip reduction of 9% for residential trips, based on VTA's October 2014 *TIA Guidelines.*

[f] Internal capture reduction of 15% for mix of residential and retail uses (15% of smaller trip generator = retail use), based on VTA's October 2014 *TIA Guidelines.*

[g] Rates based on ITE Land Use Code 820 (Shopping Center), average rates used.

[h] A typical 25% pass-by trip reduction was applied to the retail component of the project during the PM peak hour.

Table 3-33 shows the project trip generation estimates for both the Alum Rock/28th Street and Santa Clara Station TOJD sites, when station drive access trips and the TOJD-generated trips are combined.

Table 3-33: 2015 Existing Station Drive Access Trips and TOJD Trips

Station	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Alum Rock/28th Street							
Kiss-and-Ride Trips	218	21	21	42	25	25	50
Park-and-Ride Trips	1,430	192	7	199	18	150	168
TOJD Trips	7,105	589	179	768	216	555	771
Total	**8,753**	**802**	**207**	**1,009**	**259**	**730**	**989**
Santa Clara							
Kiss-and-Ride Trips	70	7	7	14	8	8	16
Park-and-Ride Trips	275	37	1	38	3	29	32
TOJD Trips	7,229	590	165	755	209	554	763
Total	**7,574**	**634**	**173**	**807**	**220**	**591**	**811**

Source: Hexagon Transportation Consultants, Inc. 2016b

In order to determine the total number of trips that would be generated by the Alum Rock/28th Street and Santa Clara Station sites, the trips projected to be generated by the TOJD were added to the station drive access trips (people driving to or from the stations to park or to drop off or pick up someone). This sum includes all the trips that would be generated by the Alum Rock/28th Street and Santa Clara Stations (i.e., by their KNR and PNR facilities and by their TOJD uses), as shown in Table 3-33.

For the analysis of intersections, freeways, and freeway ramps, the reduction in trips on the roadway network as motorists switch from passenger vehicles to BART (a negative number of trips) is also included. Thus, the traffic volumes for the 2015 Existing BART Extension with TOJD Alternative adds to existing traffic volumes all TOJD trips, station drive access trips (KNR and PNR), and the removal of some auto trips from the roadways due to a mode shift to greater transit usage.

VTA and the Cities would work to maximize multimodal access to the BART stations and the TOJD land uses. Through various efforts such as Access Plans for the station areas, Transportation Demand Management Plans for the TOJD, improving the bike and pedestrian facilities in the vicinity of the stations, and offering “unbundled” parking for the residential uses, the number of vehicle trips generated by the BART Extension with TOJD Alternative would be reduced. Therefore, the estimates of vehicle trips for the BART Extension with TOJD Alternative should be regarded as conservative.

Intersection Analysis

For the BART Extension with TOJD traffic analysis, 28 additional intersections (10 near the Alum Rock/28th Street Station and 18 near the Santa Clara Station) were analyzed, compared to the traffic study that was conducted for the BART Extension Alternative. These intersections were added at the request of the Cities of San Jose and Santa Clara because the traffic generated by the TOJD land uses could affect additional intersections. These additional intersections are shown on Figures 3-7 and 3-9.

Intersection LOS under 2015 Existing BART Extension with TOJD Alternative conditions were evaluated against CMP and Cities of San Jose and Santa Clara LOS standards. The results of the intersection LOS analysis are summarized below and in Table 3-34.

This section also evaluates whether the BART Extension with TOJD Alternative would result in a significant impact on the study intersections under 2015 Existing traffic conditions, based on the significant impact criteria of the City of San Jose, City of Santa Clara, and CMP. To determine whether there would be an impact under 2015 Existing BART Extension with TOJD Alternative conditions, intersections that would operate at an unacceptable LOS were analyzed. A comparison was made between 2015 Existing No Build conditions and 2015 Existing BART Extension with TOJD conditions and the appropriate significant impact criteria were applied.[7]

Table 3-34: 2015 Existing BART Extension with TOJD Alternative Intersection Analysis Summary

Station	Number of Study Intersections	Number of CMP Intersections	Unacceptable LOS Intersections[a]	Intersections with Impacts[b]
Alum Rock/28th Street	27	7	0 (0)	0 (0)
Santa Clara	35	15	2 (1)	1 (0)
Total	**62**	**22**	**2 (1)**	**1 (0)**

[a] The first number is based on the LOS standards of the appropriate City. The second number (in parentheses) is the number of CMP intersections that would operate at an unacceptable LOS based on the CMP LOS standard.
[b] The first number presents how many study intersections would be impacted based on the appropriate City's impact criteria. The second number (in parentheses) is how many of the CMP intersections would be impacted based on the CMP criteria.

Alum Rock/28th Street Station

City of San Jose Analysis

Measured against the City of San Jose LOS standards, all 27 of the study intersections in the vicinity of the Alum Rock/28th Street Station would operate at an acceptable LOS D or better during both the AM and PM peak hours of traffic. Based on the City of San Jose significant

[7] For further information on the application of the City of San Jose, City of Santa Clara, and CMP significant impact criteria to each intersection and the supporting data for these findings (e.g., change in average critical delay and change in critical V/C), refer to the BART Extension with TOJD TIA.

impact criteria, impacts with the BART Extension with TOJD Alternative would be *less than significant* on any intersections in the Alum Rock/28th Street Station study area under 2015 Existing traffic conditions.

CMP Analysis

Measured against the CMP LOS standards, all seven CMP intersections in the Alum Rock/28th Street Station study area would operate at an acceptable LOS E or better during both the AM and PM peak hours of traffic. Based on the CMP LOS impact criteria, impacts with the BART Extension with TOJD Alternative would be *less than significant* on any CMP intersections in the Alum Rock/28th Street Station study area under 2015 Existing traffic conditions.

Santa Clara Station

Of the 35 study intersections in the vicinity of the Santa Clara Station, 13 are located in the City of San Jose and 22 are in the City of Santa Clara. Fifteen of the 35 study intersections are designated CMP intersections.

City of San Jose Analysis

Measured against the City of San Jose LOS standards, all 13 of the San Jose intersections in the vicinity of the Santa Clara Station would operate at an acceptable LOS D or better during both the AM and PM peak hours of traffic. Based on the City of San Jose significant impact criteria, impacts with the BART Extension with TOJD would be *less than significant* on any of the San Jose intersections in the Santa Clara Station study area under 2015 Existing traffic conditions.

City of Santa Clara Analysis

Measured against the City of Santa Clara LOS standards, 20 of the 22 Santa Clara Station study intersections within Santa Clara would operate at an acceptable LOS (LOS D or better at local intersections and LOS E or better at expressway and CMP intersections) during both the AM and PM peak hours of traffic. The following two intersections would operate at unacceptable LOS (LOS E or worse for local intersections and LOS F for expressways and CMP intersections) during at least one peak hour. CMP intersections are denoted by an asterisk (*).

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- Coleman Avenue and Brokaw Road (LOS F: PM peak hour).

When measured against City of Santa Clara significant impact criteria, the BART Extension with TOJD Alternative is not projected to cause a significant impact at the intersection of De La Cruz Boulevard and Central Expressway.

When measured against the City of Santa Clara significant impact criteria, the 2015 Existing BART Extension with TOJD Alternative would potentially cause a significant impact at the following intersection:

- Coleman Avenue and Brokaw Road (LOS F: PM peak hour)

A mitigation measure for this intersection has been proposed and is presented below under Impact BART Extension + TOJD TRA-1.

The unsignalized intersection of Lafayette Street and Harrison Street has two-way stop control. The LOS for this intersection, LOS F in the AM and PM peak hours, reflects the delay and the LOS for the stop-controlled approach with the highest delay, not the average of the entire intersection. Because the City of Santa Clara does not have an LOS standard for unsignalized intersections, this intersection cannot be said to operate at an unacceptable LOS.

CMP Analysis

Measured against the CMP LOS standards, the results of the LOS analysis with the 2015 Existing BART Extension with TOJD Alternative show that 14 of the 15 CMP study intersections in the vicinity of the Santa Clara Station would operate at an acceptable LOS (LOS E or better) during both the AM and PM peak hours of traffic. The following CMP intersection would operate at an unacceptable LOS (LOS F) during at least one peak hour.

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).

Based on the CMP LOS impact criteria, impacts for the 2015 Existing BART Extension with TOJD Alternative would be *less than significant* on any CMP intersections in the Santa Clara Station study area.

Freeway Segments Analysis

Traffic volumes on freeway segments for 2015 Existing BART Extension with TOJD conditions were projected by adding the projected net station and TOJD trips on each freeway segment to the existing freeway volumes. Note that even though Diridon Station was not included in the BART Extension with TOJD Alternative analysis, the same 64 freeway segments were analyzed because they would also serve trips going to and from the Alum Rock/28th Street and Santa Clara Stations.

The results of the freeway analysis under 2015 Existing BART Extension with TOJD Alternative conditions are summarized in Table 3-35. For this alternative, the summary table identifies segments by freeway, rather than by their nearest station.

Table 3-35: 2015 Existing BART Extension with TOJD Freeway Levels of Service

Freeway	Number of Freeway Segments	Unacceptable LOS Mixed-Flow Segments	Unacceptable LOS HOV Segments
U.S. 101	20	16	13
I-280/I-680	20	17	2
I-880	14	12	0
SR 87	10	8	3
Total	**64**	**53**	**18**

Table 3-35 shows that:

- 16 (plus 13 HOV segments) of the 20 directional freeway segments analyzed on U.S. 101 are projected to operate at an unacceptable LOS F during at least one peak hour.
- 17 (plus 2 HOV segments) of the 20 directional freeway segments analyzed on I-280 and I-680 are projected to operate at an unacceptable LOS F during at least one peak hour.
- 12 of the 14 directional freeway segments analyzed on I-880 are projected to operate at an unacceptable LOS F during at least one peak hour.
- 8 (plus 3 HOV segments) of the 10 directional freeway segments analyzed on SR 87 are projected to operate at an unacceptable LOS F during at least one peak hour.

There are projected to be four freeway segments that were operating at LOS F under 2015 Existing No Build conditions that would continue to operate at LOS F under 2015 Existing BART Extension with TOJD conditions and would cause significant increases in traffic volumes (1 percent or more of freeway capacity). Based on the CMP definition of significant freeway impacts, the BART Extension with TOJD Alternative would therefore result in a significant impact on the following four segments under 2015 Existing traffic conditions:

- U.S. 101, Northbound, Tully Road to Story Road: AM peak hour for mixed-flow lanes.
- U.S. 101, Northbound, Story Road to I-280: AM peak hour for mixed-flow and HOV lanes.
- U.S. 101, Northbound, I-280 to Santa Clara Street: AM peak hour for mixed-flow and HOV lanes.
- U.S. 101, Northbound, Santa Clara Street to McKee Road: AM peak hour for mixed-flow lanes.

These freeway segments are in the vicinity of the Alum Rock/28th Street Station. Caltrans has no plans to widen these freeway segments beyond what is already assumed in the analysis (three mixed-flow lanes and one HOV lane). The BART Extension with TOJD Alternative would result in a significant impact on these segments under 2015 Existing BART Extension with TOJD conditions that would be *significant and unavoidable* under CEQA. However, under 2035 Forecast Year conditions, these segments would not be significantly impacted because by that time a sufficient mode shift from passenger cars to BART is projected to more than offset the station access trips and TOJD trips. Because the impact only occurs under 2015 Existing conditions and the BART Extension with TOJD Alternative would not be built until 2025, no mitigation is proposed.

Freeway Ramp Analysis

The results of the freeway ramp analysis under 2015 Existing BART Extension with TOJD conditions are described below and summarized in Table 3-36. Those freeway on-ramps where the BART Extension with TOJD Alternative would add a substantial amount of traffic (more than 10 net peak hour trips per lane) were evaluated; each of these ramps is currently metered or is expected to be metered in the future. The freeway on-ramps that were evaluated under 2015 Existing BART Extension with TOJD conditions are listed below:

- U.S. 101 southbound on-ramp from McKee Road – PM peak hour.
- U.S. 101 southbound loop on-ramp from WB Santa Clara Street/Alum Rock Avenue – PM peak hour.
- I-880 southbound diagonal on-ramp from southbound Coleman Avenue – PM peak hour.

The I-880 southbound diagonal on-ramp from southbound Coleman Avenue is currently metered. The existing maximum vehicle queue that occurs at this metered on-ramp during the PM peak hour was measured in the field. The metering lights at both U.S. 101 freeway on-ramps listed above—the U.S. 101 southbound on-ramp from McKee Road and the U.S. 101 southbound loop on-ramp from westbound Santa Clara Street/Alum Rock Avenue—are not currently operating. Therefore, no measurable queues are currently experienced at these ramp locations, and no changes in queue length are shown for 2015 Existing BART Extension with TOJD conditions.

Table 3-36: 2015 Existing with BART Extension with TOJD Freeway Ramp Queuing Analysis

Freeway Ramp	Total Storage (Vehicle)[a]	No Build Condition	BART Extension with TOJD Condition	Change
U.S. 101 at McKee Road Interchange				
U.S. 101 SB On-Ramp at McKee Road	32			
PM Volume [b]		1,131	1,296	165
Projected Queue Length [c]		-	-	
U.S. 101 at Santa Clara Street/Alum Rock Avenue Interchange				
U.S. 101 SB On-Ramp at Santa Clara Street	34			
PM Volume [b]		949	1,113	164
Projected Queue Length [c]				
I-880 at Coleman Avenue Interchange				
I-880 SB On-Ramp from SB Coleman	72			
PM Volume [b]		709	738	29
Observed/Projected Queue Length (in feet) [c]		200	208	

[a] Total number of vehicles that can store within the ramp.
[b] Peak-hour ramp volume projections.
[c] Currently, the ramp meter at these on-ramps is not operational during the PM peak hour. Therefore, no measurable queues are currently experienced at these locations.
[d] Total number of vehicles in the queue, as obtained from TRAFFIX.

The I-880 southbound on-ramp from southbound Coleman Avenue currently has adequate storage space for the number of vehicles observed on that ramp during the PM peak hour. It is projected to have adequate storage space for the number of vehicles projected to use that ramp under the 2015 Existing BART Extension with TOJD Alternative. Impacts would be *less than significant*, and no mitigation is required.

3.5.3.3 2035 Forecast Year Traffic Impact Analysis

2035 Forecast Year Traffic Volumes

Peak hour traffic volumes for the 2035 Forecast Year were produced with the VTA Model with the BART Extension with TOJD Alternative included in its land use and transportation network assumptions. For the 2035 Forecast Year BART Extension with TOJD conditions, in addition to using the model to forecast future (2035 Forecast Year) traffic volumes in the study area, the model was applied to estimate the percentage of TOJD trips that would use transit. Based on 2035 Forecast Year land use data, the level of congestion on the roadway system, and the high quality and frequent transit rail and bus service serving the workers and residents of the region, the model estimated a transit share for residential and office use at the Alum Rock/28th Street Station of 18 percent and 16 percent, respectively. BART Extension with TOJD Alternative trips at the Santa Clara Station would have even higher transit mode shares, because this station would be served by BART, ACE, Caltrain, and numerous bus routes. The transit shares for residential and office use at the Santa Clara Station would be 19 percent and 24 percent, respectively.

These trip reductions were then applied to the ITE trip generation rates presented in Table 3-32 (discussed above under Section 3.5.3.2, *2015 Traffic Impact Analysis*) instead of the reductions of 9 percent and 6 percent for residential and office uses, respectively, for proximity to transit. These reductions, based on model projections of transit mode share, result in 81 fewer vehicle trips during the AM peak hour and 79 fewer vehicle trips during the PM peak hour at the Alum Rock/28th Street Station. An additional reduction of 137 AM peak hour vehicle trips and 129 PM peak hour vehicle trips were taken from the trips in Table 3-32 for the Santa Clara Station to account for the larger share of transit use in 2035.

Intersection Analysis

Traffic volumes for the 2035 Forecast Year BART Extension with TOJD Alternative conditions were obtained by adding the traffic projected to be generated by the BART stations (net trips, as described earlier) and trips generated by the TOJD to the 2035 Forecast Year No Build traffic volumes. Intersection LOS under 2035 Forecast Year BART Extension with TOJD conditions were evaluated against CMP and Cities of San Jose and Santa Clara LOS standards. The results of the LOS analysis are summarized in Table 3-37.

This section also evaluates whether the BART Extension with TOJD Alternative would result in a significant impact on the study intersections under 2035 Forecast Year traffic conditions, based on the significant impact criteria of the City of San Jose, the City of Santa Clara, and CMP. To determine whether there would be any significant impacts under 2035 Forecast Year BART Extension with TOJD Alternative conditions, intersections that would operate at an unacceptable LOS under 2035 Forecast Year BART Extension with TOJD conditions were further analyzed. For City of Santa Clara and CMP intersections, a comparison was made between 2035 Forecast Year No Build and 2035 Forecast Year BART Extension with TOJD conditions, and the appropriate significant impact criteria were applied.[8] For City of San Jose intersections, a comparison was made between 2025 No Build and 2035 Forecast Year BART Extension with TOJD conditions, and the City of San Jose's significant impact criteria were applied. These comparisons have been made and significant impacts identified for the BART Extension Alternative under 2035 Forecast Year traffic conditions.

[8] For further information on the application of the City of San Jose, City of Santa Clara, and CMP significant impact criteria to each intersection and the supporting data for these findings (e.g., change in average critical delay and change in critical V/C; percentage of increased traffic volume contributed by the alternative), refer to the BART Extension with TOJD TIA.

Table 3-37: 2035 Forecast Year BART Extension with TOJD Alternative Intersection Analysis Summary

Station	Number of Study Intersections	Number of CMP Intersections	Unacceptable LOS Intersections [a]	Intersections with Impacts [b]
Alum Rock/28th Street	27	7	5 (1)	0 (0)
Santa Clara	35	15	12 (8)	3 (2)
Total	**62**	**22**	**17 (9)**	**3 (2)**

[a] The first number is based on the LOS standards of the appropriate City. The second number (in parentheses) is the number of CMP intersections that would operate at an unacceptable LOS based on the CMP LOS standard

[b] The first number presents how many study intersections would be impacted based on the appropriate City's impact criteria. The second number (in parentheses) is how many of the CMP intersections would be impacted based on the CMP criteria.

Alum Rock/28th Street Station

City of San Jose Analysis

The results of the LOS analysis for the 2035 Forecast Year BART Extension with TOJD Alternative show that, measured against the City of San Jose LOS standards, 22 of the 27 study intersections in the vicinity of the Alum Rock/28th Street Station would operate at an acceptable level of service (LOS D or better) during both the AM and PM peak hours of traffic. The following five intersections would operate at unacceptable levels of service (LOS E or F) under 2035 Forecast Year BART Extension with TOJD conditions during at least one peak hour. The CMP intersection is denoted by an asterisk (*).

- King Road and McKee Road (LOS F – AM peak hour and LOS E – PM peak hour).
- Jackson Avenue and Alum Rock Avenue* (LOS F – AM peak hour and LOS E PM peak hour).
- Jackson Avenue and San Antonio Street/Capitol Expressway (LOS E – AM peak hour).
- McLaughlin Avenue and Story Road (LOS E – AM peak hour).
- King Road and Mabury Road (LOS E – PM peak hour).

When measured against the City of San Jose significant impact criteria for cumulative conditions, none of the study intersections near the Alum Rock/28th Street Station would be significantly impacted by the BART Extension with TOJD Alternative under 2035 Forecast Year traffic conditions. Impacts would be *less than significant*, and no mitigation is required.

CMP Analysis

The results of the LOS analysis for the 2035 Forecast Year BART Extension with TOJD Alternative show that, measured against the CMP standards, all except one of the CMP study intersections in the vicinity of Alum Rock/28th Street Station would operate at an acceptable level of service (LOS E or better) during both the AM and PM peak hours of traffic. The following CMP intersection would operate at an unacceptable level of service (LOS F) during at least one peak hour:

- Jackson Avenue and Alum Rock Avenue* (LOS F – AM peak hour).

However, based on the CMP LOS impact criteria, impacts with the BART Extension with TOJD Alternative would be *less than significant* on any CMP intersections in the Alum Rock/28th Street Station study area under 2035 traffic conditions.

Santa Clara Station

Of the 35 study intersections in the vicinity of the Santa Clara Station, 13 are located in the City of San Jose and 22 are in the City of Santa Clara. Fifteen of the 35 study intersections are designated CMP intersections.

City of San Jose Analysis

The results of the LOS analysis with the 2035 Forecast Year BART Extension with TOJD Alternative show that, measured against the City of San Jose LOS standards, all but six of the Santa Clara Station intersections located within San Jose would operate at an acceptable LOS D or better during both the AM and PM peak hours of traffic. The following six intersections would operate at unacceptable levels of service (LOS E or F) under 2035 Forecast Year BART Extension with TOJD conditions during at least one peak hour. The CMP intersections are denoted by an asterisk (*).

- Coleman Avenue and I-880 Southbound Ramps* (LOS F – AM peak hour and LOS E – PM peak).
- Coleman Avenue and I-880 Northbound Ramps* (LOS F – AM peak hour).
- Coleman Avenue and West Hedding Street (LOS E – AM and PM peak hours).
- Coleman Avenue and West Taylor Street (LOS E – AM peak hour and LOS F - PM peak hour)
- The Alameda and West Hedding Street* (LOS E – AM peak hour and LOS F – PM peak hour)
- The Alameda and West Taylor Street/Naglee Avenue* (LOS F – AM peak hour and LOS E PM peak hour)

Based on the City of San Jose significant impact criteria, impacts with the BART Extension with TOJD Alternative would be *less than significant* on any of the San Jose intersections in the Santa Clara Station study area under 2035 Forecast Year traffic conditions.

City of Santa Clara Analysis

The results of the LOS analysis with the 2035 Forecast Year BART Extension with TOJD Alternative show that, measured against the City of Santa Clara LOS standards, all but six of the Santa Clara Station intersections located within Santa Clara would operate at an acceptable level of service (LOS D or better at local intersections and LOS E or better at expressway and CMP intersections) during both the AM and PM peak hours of traffic. The following six intersections would operate at unacceptable levels of service (LOS E or worse for local intersections and LOS F for expressways and CMP intersections) under 2035 Forecast Year BART Extension with TOJD conditions during at least one peak hour. The CMP intersections are denoted by an asterisk (*).

- Scott Boulevard and Central Expressway* (LOS F: PM peak hour).
- Lafayette Street and Central Expressway* (LOS F: AM and PM peak hours).
- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- Coleman Avenue and Brokaw Road (LOS F: PM peak hour).
- San Tomas Expressway and El Camino Real* (LOS F: AM and PM peak hours).
- Lafayette Street and Lewis Street (LOS E: PM peak hour).

When measured against the City of Santa Clara significant impact criteria, the following three Santa Clara intersections would be significantly impacted under 2035 Forecast Year BART Extension with TOJD conditions:

- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- Coleman Avenue and Brokaw Road (LOS F: PM peak hour).
- Lafayette Street and Lewis Street (LOS E: PM peak hour).

Mitigation measures for these three intersections have been proposed and are described below under Impact BART Extension + TOJD TRA-1.

Although the City of Santa Clara does not have an LOS standard for unsignalized intersections, an evaluation of the unsignalized study intersection was performed for informational purposes. The LOS analysis shows that the intersection of Lafayette Street and Harrison Street is projected to operate at LOS F during both the AM and PM peak hours under 2035 Forecast Year BART Extension with TOJD conditions.

LOS F at two-way stop-controlled intersections can occur when gaps of traffic on the major street are limited, resulting in long delays for the minor-street traffic as it attempts to enter or cross the major street. At the study intersection of Lafayette Street and Harrison Street, the relatively high traffic volumes along Lafayette Street (major street) cause the delay on the low-volume Harrison Street (minor street) to be worse than the LOS F threshold. However, the peak-hour traffic signal warrant checks indicate that the intersection would not have traffic volumes under 2035 Forecast Year BART Extension with TOJD conditions that meet thresholds that warrant signalization.

CMP Analysis

Measured against the CMP LOS standards, the results of the LOS analysis with the 2035 Forecast Year BART Extension with TOJD Alternative show that 7 of the 15 CMP study intersections in the vicinity of the Santa Clara Station would operate at an acceptable LOS (LOS E or better) during both the AM and PM peak hours of traffic. The following eight CMP intersections would operate at unacceptable LOS (LOS F) during at least one peak hour.

- Coleman Avenue and I-880 Southbound Ramps* (LOS F – AM peak hour)
- Coleman Avenue and I-880 Northbound Ramps* (LOS F – AM peak hour)
- The Alameda and West Hedding Street* (LOS F – PM peak hour).
- The Alameda and West Taylor Street/Naglee Avenue* (LOS F – AM peak hour).
- Scott Boulevard and Central Expressway* (LOS F: PM peak hour).
- Lafayette Street and Central Expressway* (LOS F: AM and PM peak hours).
- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).
- San Tomas Expressway and El Camino Real* (LOS F: AM and PM peak hours).

Based on the CMP LOS impact criteria, the following two CMP intersections would be significantly impacted by the BART Extension with TOJD Alternative under 2035 Forecast Year traffic conditions:

- Coleman Avenue and I-880 Southbound Ramps* (LOS F – AM peak hour).
- De La Cruz Boulevard and Central Expressway* (LOS F: AM and PM peak hours).

Mitigation measures for these two intersections have been proposed and are described below under Impact BART Extension + TOJD TRA-1.

Freeway Segments Analysis

Traffic volumes on freeway segments for 2035 Forecast Year BART Extension with TOJD conditions were established by adding those net trips to the 2035 freeway volumes obtained from the VTA Travel Demand Forecasting Model. Note that even though Diridon Station was not included in the BART Extension with TOJD Alternative analysis, the same 64 freeway segments were analyzed because they may also serve trips going to and from the Alum Rock/28th Street and Santa Clara stations and TOJD sites.

The results of the freeway analysis under 2035 Forecast Year BART Extension with TOJD Alternative conditions are summarized in Table 3-38. The table identifies segments by freeway, rather than by their nearest station.

Table 3-38: 2035 Forecast Year BART Extension with TOJD Alternative Freeway Levels of Service

Freeway	Number of Freeway Segments	Unacceptable LOS Mixed-Flow Segments	Unacceptable LOS HOV Segments
U.S. 101	20	16	12
I-280/I-680	20	16	2
I-880	14	12	0
SR 87	10	9	1
Total	**64**	**53**	**15**

Table 3-38 shows that:

- 16 (plus 12 HOV segments) of the 20 directional freeway segments analyzed on U.S. 101 are projected to operate at an unacceptable LOS F during at least one peak hour.
- 16 (plus 2 HOV segments) of the 20 directional freeway segments analyzed on I-280 and I-680 are projected to operate at an unacceptable LOS F during at least one peak hour.
- 12 of the 14 directional freeway segments analyzed on I-880 are projected to operate at an unacceptable LOS F during at least one peak hour.
- 9 (plus 1 HOV segment) of the 10 directional freeway segments analyzed on SR 87 are projected to operate at an unacceptable LOS F during at least one peak hour.

The BART Extension with TOJD Alternative would not cause significant increases in traffic (1 percent or more of freeway capacity) on any of the study freeway segments currently operating at LOS F, and none of the study freeway segments currently operating at LOS E or better would worsen to LOS F. In fact, many freeway segments would experience a decrease in volume, because the reduced number of trips on the freeway (due to the mode shift from passenger vehicles to BART) more than offsets the trips that would be generated by station access trips and TOJD trips. Therefore, based on CMP freeway impact criteria, impacts on all of the study freeway segments would *less than significant* under the 2035 Forecast Year BART Extension with TOJD Alternative.

Vehicle Miles Traveled

Recent trends in the transportation planning field have expanded the range of metrics to be evaluated beyond LOS in order to better capture the potential impacts of a project on other modes of transportation and on the greenhouse gases associated with vehicular travel.

Pursuant to Senate Bill 743, the Governor's Office of Planning and Research released a *Draft of Updates to the CEQA Guidelines* in August 2014, which proposes vehicle miles traveled (VMT) as the replacement metric for LOS in the context of CEQA. While the Office of Planning and Research emphasizes that a lead agency has the discretionary authority to establish thresholds of significance, the *Draft of Updates to the CEQA Guidelines* suggests criteria that indicate when a project may have a significant, or less-than-significant, transportation impact on the environment. For instance, a project that results in VMT greater than the regional average for the land use type (e.g., residential, employment, commercial) may indicate a significant impact. Alternatively, a project may have a less-than-significant impact if it is within 0.5 mile of an existing major transit stop, or results in a net decrease in VMT compared to existing conditions.

The revised State CEQA Guidelines are still in draft form and it is anticipated that they will undergo further changes as a result of significant public input. Because the Office of Planning and Research has not yet adopted new State CEQA Guidelines for the alternative criteria to LOS, the adopted significance criteria for study intersections in the City of San Jose, the City of Santa Clara, and VTA's CMP still remain applicable to the scenarios analyzed in the BART Extension and TOJD TIA. However, examination of VMT and VMT per capita is consistent with the anticipated changes to the State CEQA Guidelines.

For purposes of looking at the effect of the BART Extension with TOJD Alternative on travel associated with land use activities in Santa Clara County, average daily VMT and VMT per capita were analyzed under No Build and BART Extension with TOJD Conditions in the 2015 Existing and 2035 Forecast Year.

VMT refers to the number of Santa Clara County-based vehicle trips multiplied by their trip distances. Santa Clara County trips are defined as trips with one or both "trip ends" in the County. The average daily weekday VMT were calculated for 2015 Existing conditions and 2035 Forecast Year conditions, with and without the BART Extension with TOJD Alternative. VMT per capita is a common metric to analyze and compare travel characteristics between alternatives. The average daily VMT and VMT per capita are presented in Table 3-39.

Table 3-39: Average Daily VMT and VMT Per Capita for Santa Clara County-Based Trips

	2015 Existing		2035 Cumulative	
	No Build	BART Extension with TOJD	No Build	BART Extension with TOJD
Daily VMT	51,893,183	51,795,427	59,777,409	59,703,751
Households	640,435	640,935	781,011	781,511
Total Population	1,852,676	1,854,247	2,267,232	2,268,803
Total Jobs	1,010,252	1,013,652	1,231,164	1,234,564
VMT per Capita	18.13	18.06	17.09	17.04

Source: Hexagon Transportation Consultants, Inc. 2016b.
VMT Per Capita = Daily Trips x Distance / (Population + Jobs)

As shown in Table 3-39, Average Daily VMT and VMT Per Capita are projected to decrease under BART Extension with TOJD conditions in both the 2015 Existing and 2035 Forecast Year. This result is logical because many travelers who would be making trips in automobiles under No Build conditions would shift to BART under BART Extension with TOJD conditions. Impacts would be *less than significant*, and no mitigation is required.

3.5.3.4 Impact BART Extension + TOJD TRA-1: Conflict with a Transportation Plan, Ordinance, or Policy

The BART Extension with TOJD Alternative would not conflict with any regional or local transportation plans, including MTC's *Transportation 2035 Plan for the San Francisco Bay Area*, MTC's *Plan Bay Area*, VTA's *Valley Transportation Plan 2040,* VTA's *Santa Clara Countywide Bicycle Plan,* the City of San Jose's *Bike Plan 2020*, the City of San Jose's *Strategy 2000: San Jose Downtown Strategy Plan*, the City of San Jose's *Diridon Station Area Plan*, and the General Plans of the Cities of San Jose and Santa Clara.

The potential impacts of the BART Extension with TOJD Alternative were evaluated in accordance with the standards set forth by the Cities of San Jose and Santa Clara and the CMP of Santa Clara County. A total of 62 intersections in the vicinity of the Alum Rock/28^{th} Street and Santa Clara Stations and TOJD sites were analyzed. Because freeway segments are evaluated only by CMP standards, they are discussed under Impact BART Extension + TOJD TRA-2.

Intersections

Measured against City of San Jose, City of Santa Clara, and CMP impact criteria, there are four intersections that would exceed the appropriate City's impact criteria or the CMP impact criteria under 2035 Forecast Year BART Extension with TOJD conditions. The criteria under which each intersection was evaluated and found to have a *significant impact* are included in parentheses. The CMP intersections are denoted by an asterisk (*).

- De La Cruz Boulevard and Central Expressway* (Santa Clara and CMP).
- Coleman Avenue and Brokaw Road (Santa Clara).
- Lafayette Street and Lewis Street (Santa Clara).
- Coleman Avenue and I-880 Southbound Ramps* (less-than-significant impact under San Jose criteria, but significant impact under CMP criteria).

All of these intersections are in the vicinity of the Santa Clara Station and TOJD site in the City of Santa Clara.

For all other study intersections near stations, there would be no exceedance of the criteria for 2015 Existing BART Extension with TOJD condition and 2035 Forecast Year BART Extension with TOJD conditions.

Mitigation Measures TRA-A through TRA-D would be implemented for the Santa Clara intersections identified above.

Mitigation Measure TRA-A: Implement Intersection Improvements at De La Cruz Boulevard and Central Expressway

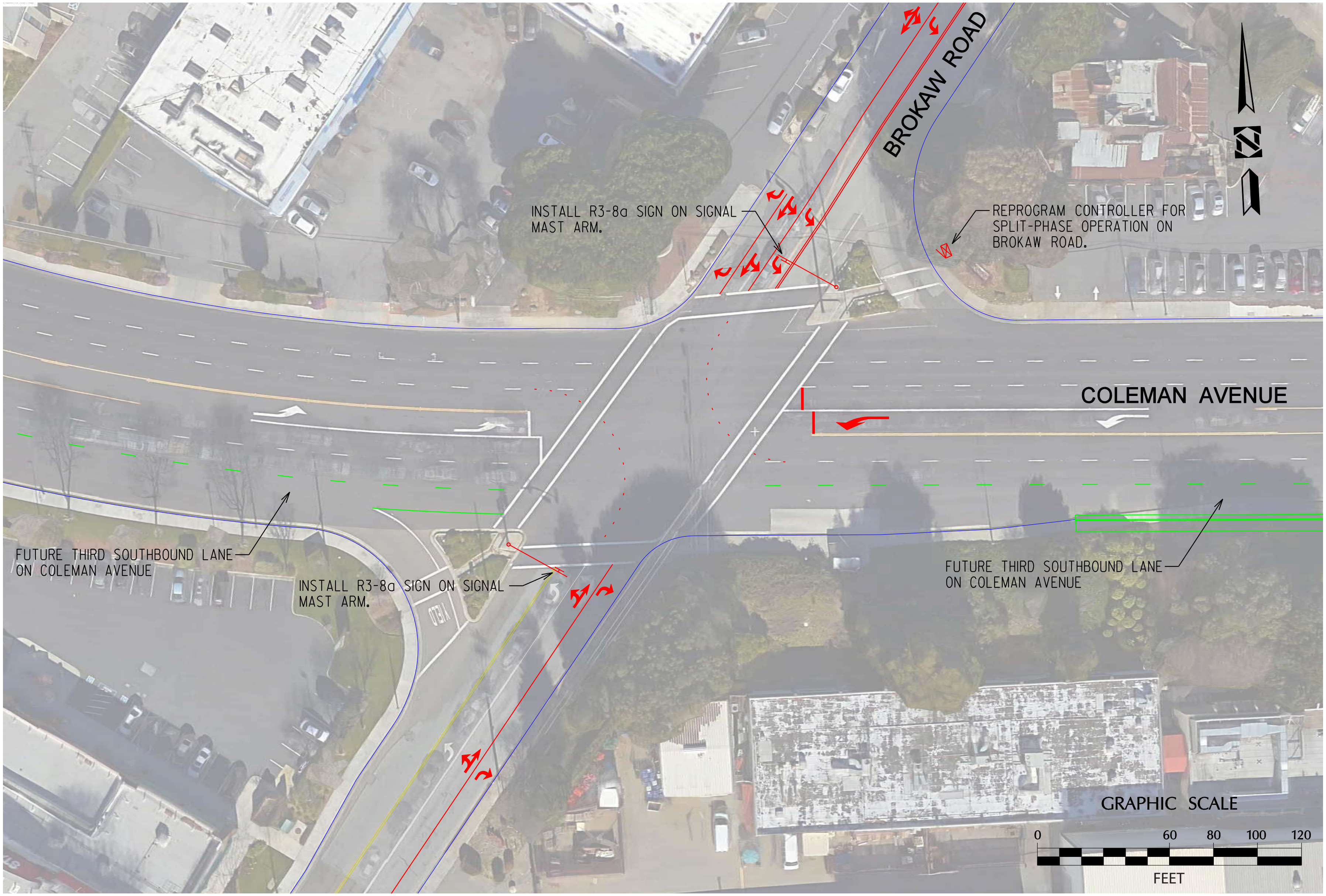
The Santa Clara County Department of Roads and Airports plans to convert the existing eastbound HOV lane to a mixed-use lane at this intersection, as shown in Chapter 2, Section 2.2.1.2, *Roadway System*, which lists planned roadway improvements. This modification was included as a change to the roadway network under 2035 Forecast Year BART Extension with TOJD conditions, and cannot be proposed as a mitigation measure.

Other than the change to the eastbound HOV lane already included in the planned roadway improvements, no feasible mitigation measures have been identified for the De La Cruz Boulevard and Central Expressway intersection. Therefore, the impact at this intersection would be *significant and unavoidable* under CEQA under Santa Clara and CMP criteria. State Congestion Management law requires a local jurisdiction to prepare a deficiency plan (now referred to as *Multimodal Improvement Plan* in the Santa Clara County CMP maintained by VTA) when roadway LOS standards are not maintained on the designated CMP system (California Government Code Section 65098.4). VTA maintains guidelines for the development of Multimodal Improvement Plans, which were developed in consultation with Member Agencies (i.e., the 15 cites of Santa Clara County and Santa Clara County) and last adopted by the VTA Board of Directors in September 2010. According to these guidelines, Multimodal Improvement Plans are prepared by Member Agencies in response to the transportation impacts of land use plans and development projects. The impact on this intersection would be a result of the TOJD component and not due to the BART Extension; however, VTA's guidelines do not address a situation where a land use project that is led by VTA contributes to an impact on a CMP facility. With this in mind, VTA commits to work with the City of Santa Clara and Santa Clara County in the preparation of a Multimodal Improvement Plan for the identified impact on a CMP intersection.

Mitigation Measure TRA-B: Implement Intersection Improvements at Coleman Avenue and Brokaw Road

Change the signal control for Brokaw Road (the east and west legs of this intersection) from Protected Left-Turn phasing to Split Phase. Add a shared through/left-turn lane to the east and west approaches within the existing right-of-way. Change the existing shared through/right-turn lanes to right-turn only lanes on the east and west approaches, and change the eastbound right-turn coding from Include to Overlap, indicating that many eastbound right turns would be able to turn right on red.

Mitigation Measure TRA-B is illustrated in Figure 3-10. With implementation of this mitigation measure, or a comparable mitigation measure as determined upon coordination with the City of Santa Clara, the intersection would operate at LOS D under 2035 Forecast Year BART Extension with TOJD mitigated conditions, and the impact at Coleman Avenue and Brokaw Road would be reduced to a *less-than-significant* level.



Source: Hexagon, 2016.

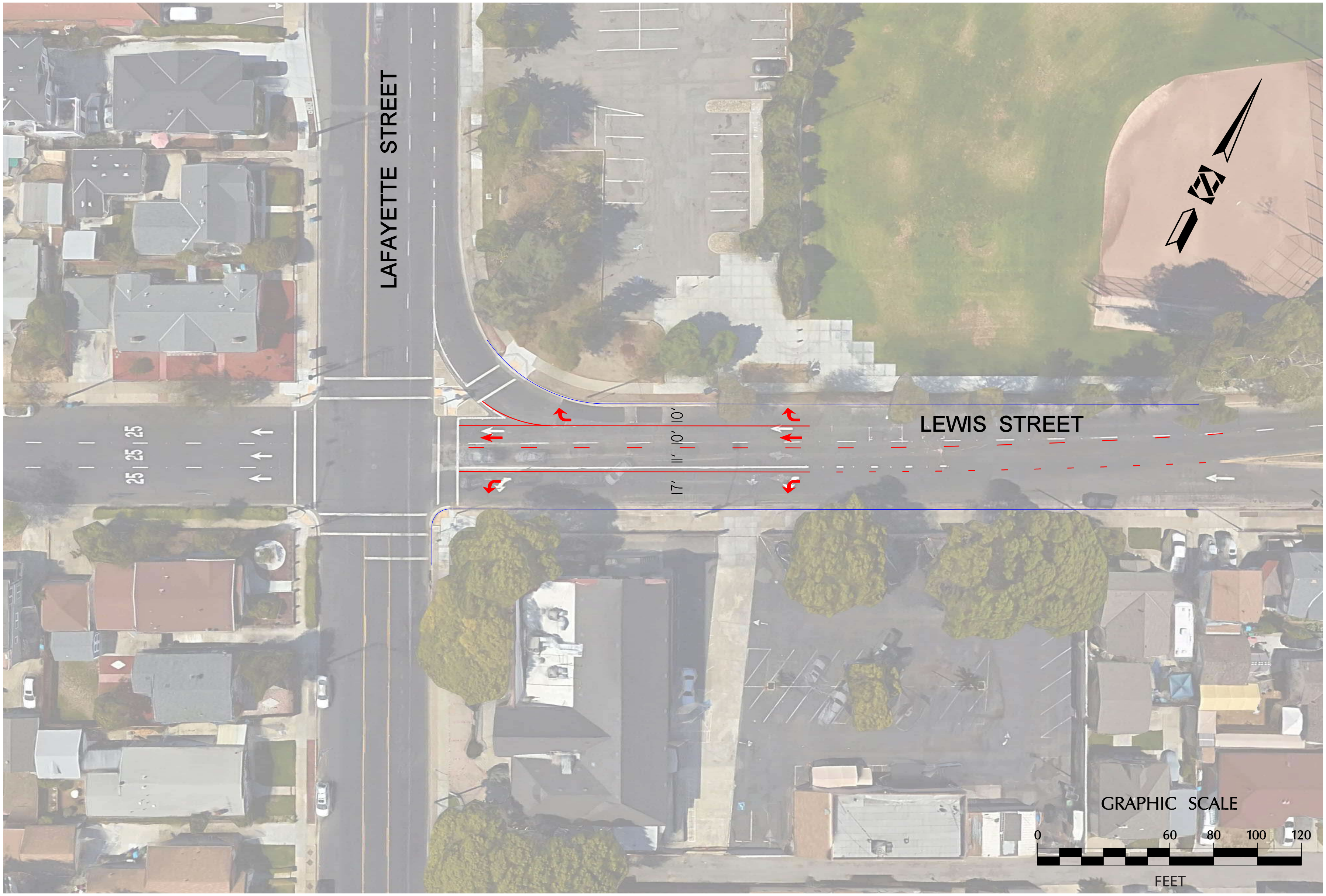
Graphics ... 00332.13 (6-22-2016)

Figure 3-10
Proposed Mitigation for Coleman Avenue and Brokaw Road
VTA's BART Silicon Valley–Phase II Extension Project

Mitigation Measure TRA-C: Implement Intersection Improvements at Lafayette Street and Lewis Street

Shift the westbound approach lanes on Lewis Street to the south to allow for the current through/right-turn lane to operate as a separate right-turn lane and a separate through lane. A shift of approximately 2 feet would increase the current through/right-turn lane width to 20 feet, which would allow adequate room for right-turning vehicles to proceed past vehicles traveling straight through the intersection and make the right turn onto northbound Lafayette Street. The westbound approach and receiving lanes would be slightly offset as a result, which can be addressed with dashed pavement markings across the intersection.

With implementation of Mitigation Measure TRA-C, even though the intersection would continue to operate at LOS E in the PM peak hour under 2035 Forecast Year BART Extension with TOJD mitigated conditions, the control delay would be reduced from 66.3 seconds under 2035 Forecast Year No Build conditions to 56.8 seconds under 2035 Forecast Year BART Extension with TOJD mitigated conditions. With implementation of this mitigation measure, or a comparable mitigation measure as determined upon coordination with the City of Santa Clara, delay would be less than the No Build Alternative. Therefore, there would be a *less-than-significant impact* at this intersection. This mitigation measure is illustrated in Figure 3-11.



Source: Hexagon, 2016.

Figure 3-11
Conceptual Striping Plan—Lafayette Street and Lewis Street
VTA's BART Silicon Valley–Phase II Extension Project

The BART Extension with TOJD Alternative would have a significant impact on the intersection of Coleman Avenue and I-880 Southbound ramps according to the CMP criteria (but not according to City of San Jose criteria). Mitigation Measure TRA-D will be implemented for this significantly affected intersection.

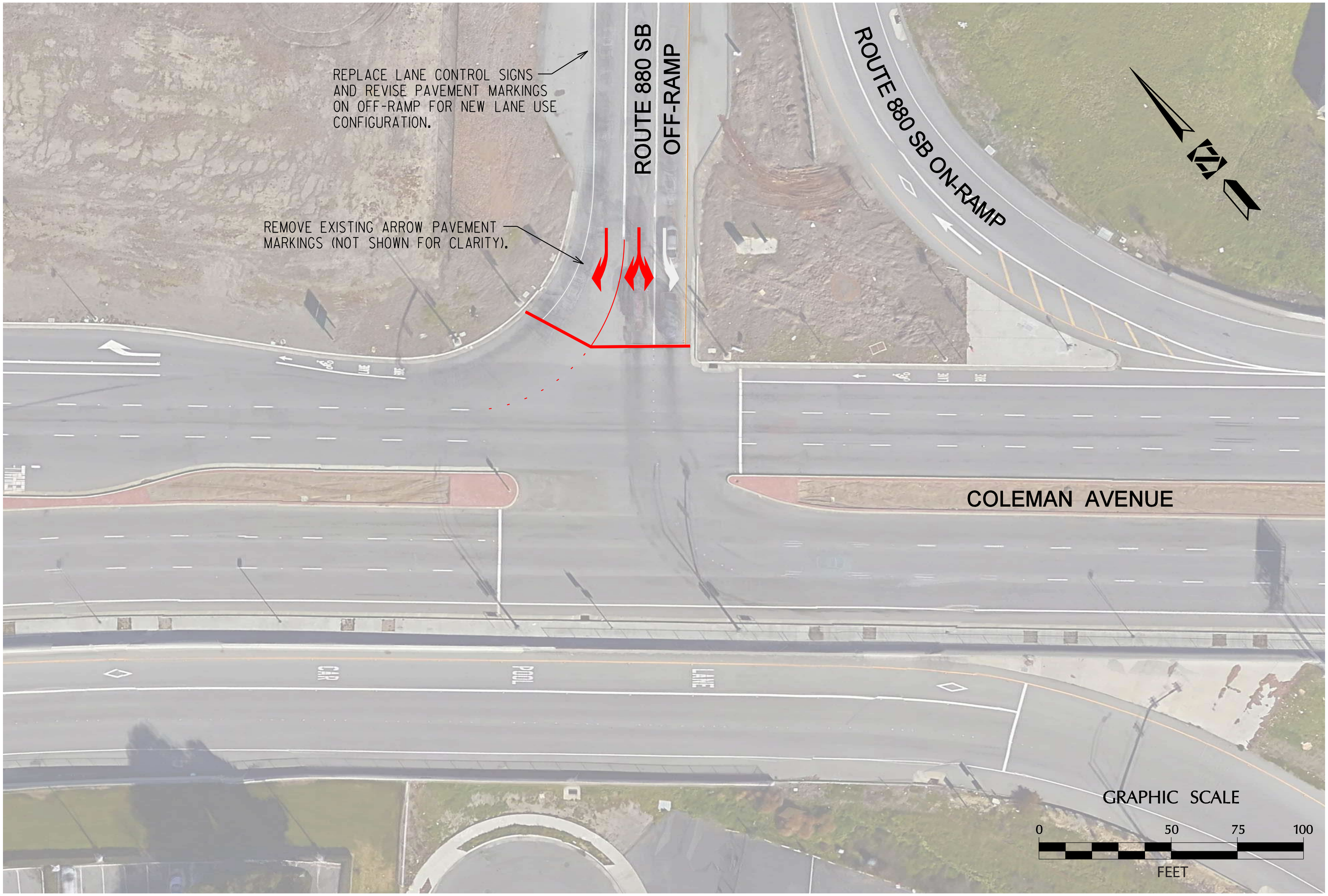
Mitigation Measure TRA-D: Implement Intersection Improvements at the Intersection of Coleman Avenue and I-880 Southbound Ramps

Convert the second (center) left-turn lane on the I-880 off-ramp (the intersection's westbound approach) to a shared left/right-turn lane. Replace the lane control signs and the pavement markings on the off-ramp to reflect the new lane usage.

This mitigation measure is illustrated in Figure 3-12. With implementation of this mitigation measure, the intersection would operate at LOS E under 2035 Forecast Year BART Extension with TOJD mitigated conditions, and the average control delay in the AM peak hour would be reduced from 114.7 seconds under 2035 Forecast Year No Build conditions to 58.6 seconds under 2035 Forecast Year BART Extension with TOJD mitigated conditions. Thus, the impact would be reduced to a *less-than-significant* level under CMP criteria.

Although the BART Extension with TOJD Alternative would not have a significant impact on the intersection of Coleman Avenue and the I-880 Northbound Ramps under 2035 Forecast Year BART Extension with TOJD conditions, the BART Extension with TOJD TIA noted that it would be significantly impacted under 2025 conditions.[9] This SEIS/SEIR does not include 2025 conditions.

[9] The intersection would operate at LOS F under both 2035 Forecast Year No Build and 2035 Forecast Year BART Extension with TOJD conditions. The increase in average critical delay under 2035 conditions is projected to be 3.9 seconds, just under the significance threshold of 4 seconds. The increase critical V/C under 2035 conditions is projected to be 0.009, just under the significance threshold of 0.01. Under 2025 conditions both of these values were slightly higher and went over the thresholds.



Source: Hexagon, 2016.

Graphics ... 00332.13 (6-22-2016)

Figure 3-12
Proposed Mitigation for Coleman Avenue and I-880 Southbound Off-ramp
VTA's BART Silicon Valley–Phase II Extension Project

3.5.3.5 Impact BART Extension + TOJD TRA-2: Conflict with the Congestion Management Program

Intersections

As discussed above, there are three CMP intersections that would result in significant impacts under the BART Extension with TOJD Alternative:

- De La Cruz Boulevard and Central Expressway* (2035 Forecast Year conditions).
- Coleman Avenue and I-880 Southbound Ramps * (2035 Forecast Year conditions).
- Coleman Avenue and I-880 Northbound Ramps * (2025 conditions).

Mitigation measures for the De La Cruz Boulevard and Central Expressway intersection and the Coleman Avenue and I-880 Southbound Ramps intersection are presented above under Impact BART Extension + TOJD TRA-1. This SEIS/SEIR does not include 2025 conditions.

Freeway Segments

The BART Extension with TOJD Alternative would not cause significant increases in traffic volumes (1 percent or more of freeway capacity) on any of the study freeway segments currently operating at LOS F, and none of the study freeway segments currently operating at LOS E or better would worsen to LOS F as a result of the BART Extension with TOJD Alternative. In fact, many freeway segments would experience a decrease in volume, because the reduced number of trips on the freeway (due to the mode shift from passenger vehicles to BART) would more than offset the trips that would be generated by the TOJD portion of the BART Extension with TOJD Alternative. Therefore, based on CMP freeway impact criteria, none of the study freeway segments would be significantly affected by the 2035 Forecast Year BART Extension with TOJD Alternative. Impacts would be *less than significant*, and no mitigation is required.

3.5.3.6 Impact BART Extension + TOJD TRA-3: Cause Changes in Air Traffic Patterns

The BART Extension with TOJD Alternative would not change air traffic patterns, increase air traffic levels, or cause a change in location that result in substantial safety risks. The nearest airport is the Mineta San Jose International Airport, approximately 0.5 mile northeast of Santa Clara Station. The Diridon Station (which is within the City's DSAP) is approximately 0.8 mile to the southeast (City of San Jose 2014). The BART Extension with TOJD Alternative would be within the Airport Influence Area due to height restrictions established by Federal Aviation Regulations Part 77, *Objects Affecting Navigable Airspace*. The TOJD at the Diridon Station is within the approach zone of the Mineta San Jose International Airport and within the City's DSAP, and is therefore subject to restrictive height limits of 263 feet. The TOJD in the area would consist of a maximum height of eight stories (or 120 feet) and would be well below height restrictions found in the Comprehensive Land Use Plan (of 263 feet) for this area. Similarly, to comply with Santa Clara County

Airport Land Use Commission restrictions, no structures would exceed an elevation of 150 feet above the ground surface near the Santa Clara Station and Newhall Maintenance Facility. Therefore, impacts on air traffic patterns would be *less than significant* because the BART Extension with TOJD Alternative would not change air traffic patterns and the proposed structures would not interfere with air traffic. No mitigation is required.

3.5.3.7 Impact BART Extension + TOJD TRA-4: Increase Traffic Hazards

Impacts under the BART Extension with TOJD Alternative would be similar to those discussed under Impact BART Extension TRA-4. Impacts related to substantially increasing hazards due to a design feature or incompatible uses would be *less than significant*, and no mitigation is required.

3.5.3.8 Impact BART Extension + TOJD TRA-5: Result in Inadequate Emergency Access

Operations-related impacts under the BART Extension with TOJD Alternative would be similar to those discussed under Impact BART Extension TRA-5. Overall, impacts related to emergency access during operation would be *less than significant*, and no mitigation is required.

3.5.3.9 Impact BART Extension + TOJD TRA-6: Conflict with Transit, Bicycle, or Pedestrian Policies, Plans, or Programs

Transit Services

The BART Extension with TOJD Alternative consists of the 6-mile-long extension of the BART system from the Berryessa neighborhood in San Jose through downtown San Jose and west into Santa Clara and includes four new BART stations. Therefore, the BART Extension with TOJD Alternative is foremost a transit project and represents a substantial improvement to the transit system in the study areas. Additionally, the BART Extension is being integrated with VTA's light rail and bus systems and would not adversely affect transit facilities or services within the Cities of San Jose or Santa Clara in the vicinity of the BART Extension, BART stations, and TOJDs.

Alum Rock/28th Street Station

The City of San Jose's General Plan identifies the transit commute mode split target as "at least 20 percent" for the year 2040. The BART Extension with TOJD Alternative includes providing BART service to the neighborhood surrounding the Alum Rock/28th Street Station and constructing TOJD on top of or next to the Alum Rock/28th Street Station. Therefore, the BART Extension with TOJD Alternative would be expected to contribute to the attainment of that mode split target. Impacts would be *less than significant*, and no mitigation is required.

Santa Clara Station

The City of Santa Clara’s General Plan identifies a Santa Clara Station Focus Area, which is based on the Santa Clara Station Area Plan. The Santa Clara Station Area Plan has been cooperatively developed by the City Of Santa Clara, City of San Jose, and VTA and covers 432 acres of land surrounding the Santa Clara Transit Center and the Phase II BART station. The Santa Clara Station would be situated at the center of the Santa Clara Station Focus Area. Within the Santa Clara Station Focus Area, pedestrian and bicycle circulation have priority. High-density development, including a mix of office and residential uses, close to transit services is a goal for this planning area. Another goal of the Santa Clara Station Focus Area is to provide a link between the Santa Clara Caltrain Station and other transit options throughout the City of Santa Clara and beyond.

The City of Santa Clara General Plan aims to support a coordinated regional transit system that includes BART, Amtrak, ACE, Caltrain, VTA LRT and bus services, and High-Speed Rail facilities.

Based on the analysis above, the BART Extension with TOJD Alternative would be consistent with the goals and policies of the San Jose and Santa Clara General Plans. Impacts would be *less than significant*, and no mitigation is required.

Bicycle and Pedestrian Facilities

Pedestrian facilities consist mostly of sidewalks along the streets in the vicinity of the rail alignment and Alum Rock/28th Street and Santa Clara Station areas. Crosswalks with pedestrian signal heads are located at all of the signalized intersections in the study areas. The overall network of sidewalks and crosswalks within the vicinity of the alignment would provide good connectivity and provide pedestrians with safe routes between the Alum Rock/28th Street and Santa Clara Stations’ TOJD sites and the surrounding land uses and transit services in the station areas.

Alum Rock/28th Street Station

The City of San Jose’s General Plan identifies the bicycle commute mode split target as 15 percent or more for the year 2040. This level of bicycle mode share is a reasonable goal for the BART Extension with TOJD Alternative, particularly if BART and LRT services are utilized in combination with bicycle commuting. As part of the reconstruction of North 28th Street, the BART Extension with TOJD Alternative would accommodate the Five Wounds Trail between Santa Clara and Julian Streets.

The pedestrian facilities in the vicinity of the Alum Rock/28th Street Station are not an especially pedestrian-friendly environment at present. There are locations, such as the crosswalks near the U.S. 101 on- and off-ramps, where walking is not as comfortable as it could be. The City of San Jose plans to improve the pedestrian environment in this area through its ongoing efforts to promote greater usage of alternative modes of travel.

With the BART Extension with TOJD Alternative, a pedestrian connection along the south side of the Alum Rock/28th Street Station area at North 28th Street from Santa Clara Street would be provided. This pedestrian connection, which would include amenities such as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting, would link the BART station entrances with buses operating on Santa Clara Street/Alum Rock Avenue, enhancing connectivity of pedestrian facilities surrounding the station. Additionally, the BART Extension with TOJD Alternative would add sidewalks around the perimeter of the Alum Rock/28th Street Station and the west side of 28th Street from the station entrance to Santa Clara Street. Crosswalks at the signalized intersections of North 28th Street/East St. James Street and North 28th Street/Five Wounds Lane would also be provided, including pedestrian push buttons and signal heads.

In combination with planned pedestrian/bicycle improvements in the study area, the BART Extension with TOJD Alternative pedestrian/bicycle improvements would help enhance pedestrian/bicycle facilities in the area. Therefore, the BART Extension with TOJD Alternative would not have a negative effect on bicycle or pedestrian facilities in the vicinity of Alum Rock/28th Street Station, and no additional improvements are necessary.

There are four schools within an approximately 0.5-mile walk of Alum Rock/28th Street Station: (1) Cristo Rey San Jose Jesuit High School, on the south side of Five Wounds Lane adjacent to Five Wounds Portuguese National Church; (2) San Jose High School, to the west on Julian Street and accessible via St. James Street; (3) Rocketship Discovery Prep (Grades K–5) on Wooster Avenue north of Julian Street; and (4) Anne Darling Elementary School, just east of U.S. 101 on the corner of McKee Avenue and 33rd Street.

VTA would work closely with these schools to implement a Safe Routes to Schools Program. Safe Routes to Schools is designed to decrease traffic and pollution and increase the health of children and the community as a whole. The program promotes walking and biking to school through education and incentives. The program also addresses the safety concerns of parents by encouraging greater enforcement of traffic laws, educating the public, and exploring ways to create safer streets. A comprehensive Safe Routes to Schools program would identify a focused area surrounding the schools, provide a map with the routes that children can take to school, and recommend improvements to routes if necessary.

Santa Clara Station

As discussed previously, there is less connectivity in the pedestrian facilities near the Santa Clara Station, due to the Caltrain tracks, the nearby Mineta San Jose International Airport, and the fact that some of the nearby streets serving industrial land uses do not include sidewalks.

A pedestrian tunnel would connect from the mezzanine level of the proposed Santa Clara Station to the existing Santa Clara Caltrain Station center platform. This pedestrian connection would link the station with other pedestrian and transit facilities to the west of the railroad tracks, enhancing connectivity of pedestrian facilities surrounding the station and transit services. Additionally, with the exception of the east side of Lafayette Street, sidewalks are found along most local roadways in the area and along the local residential streets and collectors near the Santa Clara Station site. All signalized intersections in the vicinity of the Santa Clara Station have marked crosswalks on all or most of the legs of the intersection combined with pedestrian push buttons and pedestrian signal heads. In combination with planned pedestrian/bicycle improvements in the area, the BART-sponsored pedestrian/bicycle improvements would help enhance pedestrian/bicycle facilities in the area. Therefore, the BART Extension with TOJD Alternatives would result in *less-than-significant* impacts on bicycle and pedestrian circulation, and no mitigation measures are required.

In combination with planned pedestrian/bicycle improvements in this study area, the BART Extension with TOJD Alternative would enhance pedestrian/bicycle facilities along Brokaw Road. Therefore, the BART Extension with TOJD Alternative would improve bicycle or pedestrian facilities in the vicinity of the Santa Clara Station.

Overall, the BART Extension with TOJD Alternative would not conflict with transit, bicycle, or pedestrian policies, plans, or programs, and impacts would be *less than significant*. No mitigation is required.

3.5.3.10 Impact BART Extension + TOJD TRA-7: Interfere with Activities at Event Centers

Operations-related impacts under the BART Extension with TOJD Alternative would be similar to those discussed under Impact BART Extension TRA-7. Overall, there would be *no adverse effects* related to event centers during operations under NEPA, and impacts related to event centers would be *less than significant* under CEQA, and no mitigation is required.

3.5.3.11 Impact BART Extension + TOJD TRA-8: Increase Demand for Parking

Revisions to the significance thresholds for CEQA that became effective on January 1, 2010, eliminated effects on parking. The revisions to the CEQA thresholds were based on the decision in *San Franciscans Upholding the Downtown Plan v. City & County of SF, 102 Cal.App.4th 65 (Sept. 30, 2002)*, in which the court ruled that parking deficits are an inconvenience to drivers but not a significant physical impact on the environment. As a result of this change to the State CEQA Guidelines, VTA adopted new significance thresholds that did not include the effects of parking on November 4, 2010.

Parking conditions evolve over time as people alter their modes and patterns of travel in response to changing land uses and transportation options. The availability of parking spaces is not part of the permanent physical environment subject to environmental review. Therefore, the loss of parking spaces by itself or the generation of parking demand by itself are not considered a direct significant impact on the physical environment in this document. However, parking losses caused by a project or parking demand generated by a project in excess of the parking provided could result in a significant indirect impact on the environment if drivers circling for parking cause significant secondary effects on traffic operations or air quality. The other criteria in this Draft SEIS/SEIR for evaluation of traffic operations and air quality are used as the thresholds for evaluating these secondary effects. The following discussion of parking is for information purposes for CEQA and impact analysis purposes for NEPA and as background to the evaluation of any secondary effects on traffic operations and air quality.

The amount of BART parking demand and supply associated with the BART Extension was addressed in Section 3.5.2.12, *Impact BART Extension TRA-8*, and would be similar to the BART Extension with TOJD Alternative. The amount of parking demand and supply associated with the TOJD land uses at the Alum Rock/28th Street Station and the Santa Clara Station are addressed below and shown in Table 3-40.

Alum Rock/28th Street Station

As noted in Chapter 2, *Alternatives*, a total of 2,150 parking spaces would be provided at the Alum Rock/28th Street Station: 1,650 spaces for the office use, 100 spaces for the retail use, and 400 spaces for the residential use. TOJD at the Alum Rock/28th Street Station would be subject to the parking requirements of the City of San Jose, as follows.

- Office: 4 spaces per 1,000 square feet.
- Retail: 5 spaces per 1,000 square feet.
- Apartments: 1.25 spaces per studio or 1-bedroom unit and 1.7 spaces per 2-bedroom unit.

Because the number of studio, 1-bedroom, and 2-bedroom apartments among the maximum of 275 units proposed for this station is still a preliminary estimate, the actual number of spaces required may change if the mix of different types of units is different from the estimate used in Table 3-40. This analysis assumes that half of the units will be studio or 1-bedroom units and half will be 2-bedroom units.

For mixed-use projects in the City of San Jose, the Planning Director may reduce the required parking spaces by up to 50 percent, including any other allowed exceptions or reductions, so long as: (1) the reduction in parking will not adversely affect surrounding projects, (2) the reduction in parking will not rely upon or reduce the public parking supply, and (3) the project provides a detailed Transportation Demand Management (TDM) program and demonstrates that the TDM program can be maintained indefinitely. The TOJD at the Alum Rock/28th Street Station would meet all three of these requirements, and so would be eligible to request a reduction from the standard parking requirements.

It is common for mixed-use projects to request a reduction in parking requirements based on an analysis of how many parking spaces could be shared among the different land uses. The shared parking analysis for the TOJD is based on the Urban Land Institute's publication *Shared Parking*, 2nd Edition (Smith 2005), which provides parking occupancy rates for many land uses according to the time of day. These parking occupancy rates can be applied to the parking demand for each proposed land use. Comparing the parking requirement for each land use separately with the cumulative parking demand for all land uses combined shows whether parking demand can be reduced with a shared parking plan. For example, because office space has peak parking demand during the day and residential uses have peak parking demand at night, office and residential uses have complementary parking needs and are frequently good candidates for shared parking. The analysis for the Alum Rock/28th Street Station indicates that a reduction of 51 spaces would be justified due to shared parking among uses.

Table 3-40: TOJD Parking

TOJD Site	Size	Required Parking Rate[a]	Required Parking Spaces	Parking Spaces Proposed
Alum Rock 28th Street Station[b]				
Office	500,000 s.f.	4.0	2,000	1,650
Retail	20,000 s.f.	5.0	100	100
Residential	138 Studio/1-BR	1.25	173	
	137 2-BR	1.7	233	
Total Residential	275		406	400
Total TOJD			**2,506**	
Reduction due to Shared Parking[c]			-51	
Reduction due to 16% transit mode share for office[d]			-320	
Total after Reductions			**2,135**	**2,150**
Santa Clara Station				
Office	500,000 s.f.	3.33	1,665	1,650
Retail	30,000 s.f.	5.0	150	150
Residential	10 Studio	1	10	
	100 1-BR	1.5	150	
	110 2-BR	2	220	
Total Residential	220		380	400
Total TOJD			**2,195**	**2,200**

s.f. = square feet; BR =bedroom

[a] Parking rates for Alum Rock/28th Street Station are based on City of San Jose Zoning Code, Chapter 20.90, Parking and Loading. Parking Rates for Santa Clara Station are based on City of Santa Clara Zoning Code, Chapters 28.22 and 18.74. Parking rates are given per 1,000 s.f. for office and retail uses, and per unit for apartments.

[b] For mixed-use projects in the City of San Jose, the Planning Director may reduce the required parking spaces by up to 50%, including any other allowed exceptions or reductions, so long as: (1) the reduction in parking will not adversely affect surrounding projects; (2) the reduction in parking will not rely upon or reduce the public parking supply; and (3) the project provides a detailed TDM program and demonstrates that the TDM program can be maintained indefinitely.

[c] Reduction for shared parking in a mixed-use project based on Urban Land Institute's *Shared Parking* (Smith 2005).

[d] A 16% transit mode share was projected for the office use at Alum Rock/28th Street Station by the model. Applying a 16% reduction to San Jose's parking rate would result in a rate of 3.36 spaces per 1,000 s.f. instead of 4 spaces per 1,000 s.f.

The travel demand forecasting model used for the traffic analysis of the 2035 Forecast Year BART Extension with TOJD Alternative projected a 16 percent transit mode share for the office use at the Alum Rock/28th Street Station. A 16 percent transit mode share indicates that at least 16 percent of the workers in the TOJD offices would not need to park their car there. Because the BART Extension with TOJD Alternative would include a TDM program that encourages bicycling, walking, and ridesharing in addition to transit use, the number of employees who do not need a parking space is likely to be much higher than 16 percent. Given that the TOJD would literally be on top of a BART station and would likely need fewer parking spaces than office developments in other parts of San Jose, a 16 percent reduction in San Jose's parking requirement for office uses would be a very conservative reduction for this location. Reducing San Jose's parking requirement by 16 percent results in a rate of 3.36 spaces per 1,000 square feet and a reduction of 320 parking spaces.

The TOJD would prepare a TDM program for all land uses and would implement unbundled parking for the apartments, which would likely reduce parking demand even further. However, based only on the reductions for shared parking and for the transit mode share for the office use, a total of 2,135 spaces would be required. The 2,150 parking spaces proposed would meet the requirements of the City of San Jose and would meet the parking demand generated by the TOJD. Therefore, there is not projected to be a significant indirect impact on the environment caused by drivers circling for parking, resulting in significant secondary effects on traffic operations or air quality. Thus, there would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA, and no mitigation is required.

Santa Clara Station

A total of 2,200 parking spaces would be provided for the TOJD at the Santa Clara Station: 1,650 spaces for the office use, 150 spaces for the retail use, and 400 spaces for the residential use. TOJD at the Santa Clara Station would be subject to the parking requirements of the City of Santa Clara, as follows.

- Office: 3.33 spaces per 1,000 square feet.
- Retail: 5 spaces per 1,000 square feet.
- Apartments: 1 space per studio unit, 1.5 spaces per 1-bedroom unit, and 2 spaces per 2-bedroom unit.

Based on these rates, the BART Extension with TOJD Alternative would be required to provide a total of 2,195 parking spaces for all the TOJD land uses. Because the number of studio, 1-bedroom, and 2-bedroom apartments among the maximum of 220 units proposed for this station is still a preliminary estimate, the actual number of spaces required may change if the mix of different types of units is different from the estimate used in Table 3-40. In order to make this analysis of parking requirements conservative, this estimate assumes that there will be 10 studio units, 100 1-bedroom units, and 110 2-bedroom units.

The TOJD at the Santa Clara station would also implement a TDM program for all land uses and would implement unbundled parking for the apartments. Also, the Santa Clara Station TOJD could utilize a shared parking approach, as at the Alum Rock/28th Street Station, and the transit share for the TOJD office use projected by the model for the Santa Clara Station is 24 percent, even higher than at the Alum Rock/28th Street Station.

However, even without any reductions, the 2,200 spaces provided would meet the Santa Clara parking requirement and would meet the parking demand generated by the TOJD. Therefore, there is not projected to be a significant indirect impact on the environment caused by drivers circling for parking, resulting in significant secondary effects on traffic operations or air quality. Thus, there would be *no adverse effects* under NEPA, and impacts would be *less than significant* under CEQA, and no mitigation is required.

Chapter 4
NEPA Alternatives Analysis of Operations

4.1 Introduction

Pursuant to NEPA regulations (Code of Federal Regulations, Title 40, Section 1508.27), the evaluation of effects in this chapter is based on context and intensity. *Context* means the affected environment in which a proposed project would be located. *Intensity* refers to the severity of the effect, which is examined in terms of the type, quality, and sensitivity of the resource involved; location and extent of the effect; duration of the effect (short- or long-term); and other considerations. Beneficial effects are also identified and described.

There are two alternatives evaluated in this chapter in accordance with NEPA: the No Build Alternative and the BART Extension Alternative.

Chapter 4 discusses the operational impacts of the NEPA Alternatives, except for the operational transportation analysis, which is included in Chapter 3, *NEPA and CEQA Transportation Operation Analysis*. For construction impacts (and mitigation measures) of the NEPA Alternatives, see Chapter 5, *NEPA Alternatives Analysis of Construction*. For an analysis of impacts and mitigation measures of the CEQA Alternatives, see Chapter 6, *CEQA Alternatives Analysis of Construction and Operation*. Cumulative and growth-inducing impacts related to the BART Extension Alternative are discussed in Chapter 7, *Other NEPA and CEQA Considerations*.

VTA's transit-oriented joint development (TOJD) is not part of the NEPA BART Extension Alternative. No federal dollars would be used to design or construct the TOJD, and no federal approvals are required. VTA's TOJD impacts and mitigation measures are addressed in each of the Chapter 6 sections under the *BART Extension with TOJD Alternative* subsection.

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4.2 Air Quality

4.2.1 Introduction

This section describes the affected environment and environmental consequences related to air quality from operations of the NEPA Alternatives. Information in this section is based on *VTA's BART Silicon Valley – Phase II Extension Project Air Quality Study* (Terry A. Hayes Inc. 2016), which is included with this SEIS/SEIR as a technical report and provides calculation details and air quality data.

4.2.2 Environmental and Regulatory Setting

4.2.2.1 Environmental Setting

Existing Air Quality Conditions

Climate and Meteorology

Regional Context

The BART Extension Alternative alignment passes through the Cities of San Jose and Santa Clara. The west portal is less than 1 mile west of Mineta San Jose International Airport. The corridor is in an air basin that includes nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. Air quality in the region is affected by natural factors, such as proximity to the bay and ocean, topography, meteorology, and existing air pollution sources. At the northern end of the peninsula, in San Francisco, pollutant emissions are high, especially with motor vehicle congestion. Localized pollutants, such as carbon monoxide (CO), can build up in "urban canyons." However, the winds are generally strong enough to carry the pollutants away before they can accumulate.

The Bay Area is characterized by a Mediterranean-type climate, with warm, dry summers and cool, wet winters. The terrain of the area influences both the climate and air pollution potential. The Cities of San Jose and Santa Clara lie in the Santa Clara Valley climatological subregion of the air basin. The northwest/southeast-oriented Santa Clara Valley is bounded by the Santa Cruz Mountains to the west, the Diablo Range to the east, the San Francisco Bay to the north, and the convergence of the Gabilan Range and the Diablo Range to the south. Winter temperatures are mild, except for very cool but generally frostless mornings. At the northern end of the Santa Clara Valley, Mineta San Jose International Airport reports mean maximum temperatures ranging from the high 70s to the low 80s during the summer and the high 50s to the low 60s during the winter; mean minimum temperatures range from the high 50s during the summer to the low 40s during the winter. Farther inland, where the moderating effect of the bay is not as strong, temperature extremes are greater.

Local Climate

The annual average temperature along the BART Extension alignment is approximately 60°F (Western Regional Climate Center 2015). The corridor area experiences an average winter temperature of approximately 50°F and an average summer temperature of approximately 68°F. Total precipitation in the corridor averages approximately 14.6 inches annually. Precipitation occurs mostly during the winter and relatively infrequently during the summer.

The wind patterns in the Santa Clara Valley are influenced greatly by the terrain, resulting in a prevailing flow roughly parallel to the valley's northwest-southeast axis, with a north-northwesterly ocean breeze that flows up the valley in the afternoon and early evening and a light south-southeasterly flow during the late evening and early morning. In the summer, a convergence zone is sometimes observed in the southern end of the valley between Gilroy and Morgan Hill when air flowing from the Monterey Bay through the Pajaro Gap is channeled northward into the south end of the Santa Clara Valley and meets with the prevailing north-northwesterly winds. Speeds are greatest in the spring and summer; nighttime and early morning hours have light winds and are frequently calm in all seasons. Summer afternoons and evenings can be windy.

Air Quality Monitoring

The Bay Area Air Quality Management District (BAAQMD) monitors air quality conditions at more than 30 locations throughout the Bay Area. The nearest air monitoring station to the BART Extension is in San Jose at 158 East Jackson Street, approximately 0.9 mile northwest of Santa Clara Street and 0.5 mile east of State Route (SR) 87. The East Jackson Street monitoring station is representative of air quality conditions throughout the alignment. Historical data from this station were used to characterize existing conditions in the vicinity of the BART Extension and establish a baseline for estimating future conditions with and without the extension. Pollutants monitored at the 158 East Jackson Street Monitoring Station include ozone, CO, and particulate matter (PM), which consists of PM that is 10 microns in diameter or less (PM10) and PM that is 2.5 microns in diameter or less (PM2.5).

Monitored data is compared to National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) to determine if existing conditions exceed health standards. Table 4.2-1 summarizes the NAAQS, and the CAAQS are provided for reference. Table 4.2-2 summarizes ambient air quality conditions from 2010 to 2014 and number of exceedances as compared to NAAQS and CAAQS.

Sensitive Receptors

Some land uses are considered more sensitive to changes in air quality than others, depending on the population groups and the activities involved. The California Air Resources Board (ARB) has identified the following groups who are most likely to be affected by air pollution: children under 14, the elderly (over 65 years of age), athletes, and people with cardiovascular and chronic respiratory diseases. Typically, sensitive receptors include residences, schools, playgrounds, child-care centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The 6-mile extension passes through San Jose and ends in Santa Clara. The alignment is surrounded by a mix of residential, industrial, commercial, institutional, and recreational land uses. Refer to Section 4.4, *Community Services and Public Facilities*, for locations of schools, parks, and recreational facilities, and religious or civic institutions that may be sensitive to air quality pollutants. Refer to Section 4.11, *Land Use*, for locations of residential uses along the alignment.

Table 4.2-1: Federal and State Air Quality Standards and Attainment Status, San Francisco Bay Area

Pollutant	Averaging Period	Federal (NAAQS)		California (CAAQS)	
		Standards	Attainment Status	Standards	Attainment Status
Ozone	1 hour	No federal standard	No federal standard	0.09 ppm (180 µg/m³)	Nonattainment
	8 hours	0.070 ppm (137 µg/m³)	Nonattainment	0.070 ppm (137 µg/m³)	Nonattainment
Respirable Particulate Matter (PM10)	24 hours	150 µg/m³	Unclassified	50 µg/m³	Nonattainment
	Annual arithmetic mean	No federal standard	No federal standard	20 µg/m³	Nonattainment
Fine Particulate Matter (PM2.5)	24 hours	35 µg/m³	Nonattainment	No state standard	No state standard
	Annual arithmetic mean	12.0 µg/m³	Unclassified	12 µg/m³	Nonattainment
Carbon Monoxide	8 hours	9 ppm (10 mg/m³)	Attainment/Maintenance	9.0 ppm (10 mg/m³)	Attainment
	1 hour	35 ppm (40 mg/m³)	Attainment/Maintenance	20 ppm (23 mg/m³)	Attainment
Nitrogen Dioxide	Annual arithmetic mean	53 ppb (100 µg/m³)	Attainment	0.030 ppm (57 µg/m³)	Attainment
	1 hour	100 ppb (188 µg/m³) /a/	Unclassified	0.18 ppm (339 µg/m³)	Attainment
Sulfur Dioxide	24 hours	0.14 ppm (365 µg/m³)	Attainment	0.04 ppm (105 µg/m³)	Attainment
	1 hour	75 ppb (196 µg/m³)	Attainment	0.25 ppm (655 µg/m³)	Attainment
Lead	30-day average	--	Attainment	1.5 µg/m³	Attainment
	Calendar quarter	1.5 µg/m³	Attainment	No state standard	No state standard
	Rolling 3-month average	0.15 µg/m³	--	No state standard	No state standard
Visibility-Reducing Particles	8 hours	No federal standard		Extinction coefficient of 0.23 per kilometer	Unclassified
Sulfates	24 hours	No federal standard		25 µg/m³	Attainment
Hydrogen Sulfide	1 hour	No federal standard		0.03 ppm (42 µg/m³)	Unclassified

Note: ppb = parts per billion; ppm = parts of million
Source: California Air Resources Board 2015b.

Table 4.2-2: 2010–2014 Ambient Air Quality Data in BART Extension Vicinity[a]

		Number of Days Above State Standard				
Pollutant	**Pollutant Concentration and Standards**	**2010**	**2011**	**2012**	**2013**	**2014**
Ozone	Maximum 1-hour Concentration (ppb)	126	98	101	93	89
	Days > 90 ppb (state 1-hour standard)	5	1	1	1	0
	Maximum 8-hour Concentration (ppm)	86	67	62	79	66
	Days > 70 ppb (state 8-hour standard)	3	0	0	1	0
	Days > 75 ppb (federal 8-hour standard)	3	0	0	1	0
Carbon Monoxide	Maximum 1-hour concentration (ppm)	2.8	2.5	2.6	3.1	2.4
	Days > 20 ppm (state1-hour standard)	0	0	0	0	0
	Days > 35 ppm (federal 1-hour standard)	0	0	0	0	0
	Maximum 8-hour concentration (ppm)	2.2	2.2	1.9	n/a	n/a
	Days > 9.0 ppm (state 8-hour standard)	0	0	0		
	Days > 9.0 ppm (federal 8-hour standard)	0	0	0		
Respirable Particulate Matter (PM10)	Maximum 24-hr Concentration (µg/m^3)	44.2	41.3	56.5	55.8	56.4
	Estimated Days > 50 µg/m^3 (state 24-hour standard)	0	0	1	5	1
	Estimated Days > 150 µg/m^3 (federal 24-hour standard)	0	0	0	0	0
Fine Particulate Matter (PM2.5)	Maximum 24-hr Concentration (µg/m^3)	41.5	50.5	38.4	57.7	60.4
	Estimated Days > 35 µg/m^3 (federal standard)	3	3	2	4	2

Note: ppb = parts per billion; ppm = parts of million; µg/m^3 = microgram per cubic meter

[a.] PM2.5 and PM10 background data were obtained from the East Jackson Street monitoring station.

Source: California Air Resources Board 2015a.

4.2.2.2 Regulatory Setting

Background on Air Pollutants

The federal government has established NAAQS for six criteria pollutants: ozone, CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM10, and PM2.5. Effective October 1, 1993, ARB required a new sulfur limit of 0.05 percent (500 ppm) termed “low sulfur” diesel fuel, which is applicable to both highway and off-road vehicles. The new low sulfur diesel fuel led to negligible SO_2 emissions as compared to emissions of other criteria pollutants such as nitrogen oxides (NO_X) and CO. The proposed project is not considered a significance source of SO_2 emissions. In addition, the local air district does not consider SO_2 to be a pollutant of concern in the air basin. The primary pollutants of concern for the BART Extension Alternative are ozone, CO, PM, and NO_2. which is assessed as NO_X. The principal characteristics surrounding these pollutants are discussed below. Toxic air contaminants

(TACs)/mobile-source air toxics (MSATs) are also discussed, although there are no federal standards for these pollutants.

Ozone

Ground-level ozone is not emitted directly into the air but is created by chemical reactions between NO_X and volatile organic compounds (VOCs)/reactive organic compounds (ROGs) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NO_X and VOCs. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Ground-level ozone can also have harmful effects on sensitive vegetation and ecosystems.

Carbon Monoxide

CO, a colorless, odorless gas, is emitted from combustion processes. In urban areas, the majority of CO emissions to ambient air come from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to the body's organs (e.g., the heart and brain) and tissues.

Particulate Matter

PM is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of the particles is directly linked to their potential for causing health problems. The U.S. Environmental Protection Agency (EPA) is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. EPA groups particle pollution into two categories: inhalable coarse particles, which include PM10, and fine particles, which include PM2.5. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air.

Numerous scientific studies have linked particle pollution exposure to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased incidences of respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing. People with heart or lung diseases, children, and older adults are most likely to be affected by particle pollution. However, even healthy individuals may experience temporary symptoms from exposure to elevated levels of particle pollution.

Toxic Air Contaminants/Mobile Source Air Toxics

Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, the ARB) has consistently found that there are no levels or thresholds below which exposure is risk free. Individual TACs vary greatly with regard to the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment (OEHHA). TACs are a category of air pollutants that have been shown to have an impact on human health but are not classified as criteria pollutants.

Air toxics are generated by a number of sources, including stationary sources (e.g., dry cleaners, gas stations, auto body shops, combustion sources), mobile sources (e.g., diesel trucks, ships, trains), and area sources (e.g., farms, landfills, construction sites). Ten TACs have been identified, with use of ambient air quality data, as posing the greatest health risks in California. Adverse health effects of TACs can be carcinogenic (cancer causing), short-term (acute) noncarcinogenic, and long-term (chronic) noncarcinogenic. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders.

EPA has identified a group of 93 compounds that are emitted from mobile sources and listed them in its Integrated Risk Information System. From this list of 93 compounds, EPA has identified seven as priority MSATs: acrolein, benzene, 1,3-butadiene, diesel particulate matter/diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter.

Federal

The federal regulations discussed below are applicable to the study area. Chapter 6, Section 6.3, *Air Quality*, provides further details regarding state and local regulations related to air quality.

Clean Air Act

The Clean Air Act (CAA) governs air quality in the United States. EPA is responsible for enforcing the CAA and establishing the NAAQS, which are required under the 1977 CAA and subsequent amendments. EPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain types of locomotives. In addition, EPA has jurisdiction over emission sources that are outside state waters (e.g., beyond the outer continental shelf). It also establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet stricter emission standards, which are established by ARB.

The CAA requires EPA to designate areas as *attainment*, *nonattainment*, or *maintenance* (previously nonattainment and currently attainment) areas with regard to each criteria pollutant, based on whether the NAAQS have been achieved. Table 4.2-2 summarizes the NAAQS; CAAQS are provided for reference. The attainment status of the BART Extension area with respect to the NAAQS and CAAQS is also presented.

Transportation Conformity

CAA Section 176(c)(1) (U.S. Code, Title 42, Section 7506) states that "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan after it has been approved or promulgated…" A transportation conformity analysis is required to ensure that federally supported highway and transit project activities are consistent with the purpose of the State Implementation Plan (SIP). Conformity with the CAA takes place on two levels—first, at the regional level and second, at the project level. The proposed project must conform at both levels to be approved.

Mobile-Source Air Toxics

The CAA made controlling air toxic emissions a national priority; therefore, Congress mandated that EPA regulate 188 air toxics. These substances are also known as hazardous air pollutants (HAPs). In its latest rule on the control of HAPs from mobile sources (72 *Federal Register* 8430), EPA identified a group of 93 compounds that are emitted from mobile sources and listed them in its Integrated Risk Information System. From this list of 93 compounds, EPA identified seven as priority MSATs: acrolein, benzene, 1,3-butadiene, diesel particulate matter/diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. The high regulation priority of these seven MSATs was based on EPA's 1999 National Air Toxics Assessment.

In March 2001, EPA issued regulations that required the producers of urban air toxics to decrease emissions of these pollutants by target dates in 2007 and 2020. As a result, on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde will be reduced by 67 to 76 percent between 1990 and 2020. On-highway diesel particulate matter emissions will be reduced by 90 percent. These reductions are expected as a result of the national mobile-source control programs listed below.

- Reformulated gasoline program
- New threshold for the toxic content of gasoline
- National low-emission vehicle standards
- Tier 2 motor vehicle emissions standards and gasoline sulfur-control requirements
- Heavy-duty engine and vehicle standards and on-highway diesel-fuel sulfur-control requirements

The predicated improvements are net emission reductions that will be experienced even after the number of vehicle miles traveled (VMT) is taken into account.

4.2.3 Methodology

4.2.3.1 Overview

Based on EPA's transportation conformity rule (40 Code of Federal Regulations [CFR] Parts 51 and 93) and federal air quality regulations, the BART Extension would have an adverse effect on air quality if it were to result in the conditions listed below.

- Design and scope of the BART Extension would be inconsistent with the Metropolitan Transportation Commission's (MTC's) *Transportation 2035 Plan* (Regional Transportation Plan [RTP]) or 2015 *Transportation Improvement Program* (Federal Transportation Improvement Program [FTIP}).
- BART Extension Alternative would worsen existing or contribute to new localized CO or PM hot spots.
- BART Extension Alternative would generate substantial levels of MSAT emissions.

A project's air quality impacts are considered significant under the CAA if project emissions cause or contribute to ambient air concentrations that exceed a NAAQS.

Regional Conformity

Regional conformity for a given project is analyzed by determining if the project was included in a conforming RTP or FTIP with substantially the same design concept and scope that was used for the regional conformity analysis. Accordingly, the regional conformity analysis was conducted by comparing the BART Extension Alternative's design, concept, and scope to its description in *Plan Bay Area* and associated air quality analyses.

Project-Level Conformity (localized CO or PM hot-spots)

Project-level conformity is analyzed by determining if the project would cause localized exceedances of CO, PM2.5, and/or PM10 standards or interfere with "timely implementation" of the transportation control measures called out in the SIP. The sections that follow summarize the methodology used to evaluate project-level conformity requirements for CO, PM10, and PM2.5.

Carbon Monoxide

The BART Extension would be located in a maintenance area with regard to the federal CO standard (see Table 4.2-2). Consequently, an evaluation of transportation conformity related to CO would be required. The CO transportation conformity analysis would be based on the CO screening criteria established by the BAAQMD (BAAQMD 2010). The criteria provide a conservative indication of whether a project will generate new air quality violations, worsen existing violations, or delay attainment of the NAAQS and CAAQS with regard to CO. If the screening criteria are met, a quantitative analysis of project-related CO emissions would not be necessary because the transportation conformity requirements would be satisfied.

The BART Extension was evaluated against the BAAQMD CO screening criteria listed below.

- Consistency with an applicable congestion management program established by the county congestion management agency for designated roads or highways, a regional transportation plan, and local congestion management agency plans.
- Increased traffic volumes at affected intersections with more than 44,000 vehicles per hour.

Particulate Matter

The BART Extension would be located in a nonattainment area with regard to the federal PM2.5 standard. Consequently, a project-level conformity determination for PM2.5 would be required (see Table 4.2-2).

In December 2010, EPA finalized conformity guidance for determining which transportation projects must be analyzed for local air quality impacts in PM2.5 and PM10 nonattainment and maintenance areas. The guidance requires a quantitative hot-spot analysis to be performed for a project of air quality concern (POAQC) or any other project identified by the PM10 or PM2.5 SIP as a localized air quality concern. POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in the PM2.5 or PM10 SIP as a localized air quality concern.

For projects that have not been identified as a POAQC, PM2.5 and PM10 hot-spot analyses are not required. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that CAA and 40 CFR 93.116 requirements have been met without a hot-spot analysis because the projects have not been found to be an air quality concern under 40 CFR 93.123(b)(1).

Mobile-Source Air Toxics

The Federal Highway Administration's (FHWA's) *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* was used to evaluate potential MSAT emissions associated with the BART Extension Alternative (Federal Highway Administration 2012). The guidance uses a tiered approach to address MSAT impacts from roadway projects. The analysis levels outlined in FHWA's interim guidance, and listed below, were used to evaluate the BART Extension Alternative's MSAT impacts.

Level 1 – Exempt projects with no potential for meaningful MSAT effects. These projects require no analysis. The types of projects included in this category are:

- Projects that qualify for a categorical exclusion under 23 CFR 771.117(c).
- Projects that are exempt under the CAA conformity rule under 40 CFR 93.126.
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

Level 2 – Projects with low potential for MSAT effects. These projects require a qualitative analysis. The types of projects included in this category are those that improve highway, transit, or freight operations without adding substantial new capacity or creating a facility that is likely to meaningfully increase MSAT emissions. Examples of these types of projects are minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where design-year traffic is not projected to meet the 140,000 to 150,000 average daily traffic (ADT) criterion.

Level 3 – Projects with higher potential MSAT. These projects require quantitative analysis to differentiate alternatives. To fall into this category, a project must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes where the ADT is projected to be in the range of 140,000 to 150,000 or more by the design year; and
- Be located in proximity to populated areas.

The FHWA guidance for the assessment of MSATs in NEPA documents does not specifically address the analysis of construction-related emissions because of their relatively short duration. FHWA is considering whether more guidance is needed regarding construction activities in future versions of its guidance.

4.2.3.2 Local Air District Thresholds

Although the BART Extension Alternative would be subject to transportation conformity, the BAAQMD CEQA thresholds are used to evaluate the intensity of operational emissions. BAAQMD's applicable mass emission threshold are summarized below.

- ROG and NOx: 54 pounds per day, 10 tons per year
- PM10: 82 pounds per day, 15 tons per year
- PM2.5: 54 pounds per day, 10 tons per year

4.2.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether such impacts would be adverse under NEPA, using the criteria identified in Section 4.2.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.2.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the study area (see Chapter 2, Section 2.2.1, *NEPA No*

Build Alternative, for a list of these projects). Given the mix of projects, some of the projects may reduce air quality and greenhouse gas emissions by providing transit, bicycle and pedestrian improvements and also reducing congestion. Other projects may result in short-term exceedances in air quality standards during construction. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse air quality and greenhouse gas effects. Several of these projects have already been programmed in the Regional Transportation Plans. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.2.4.2 BART Extension Alternative

Regional Conformity

The BART Extension is included in MTC's 2015 FTIP, which was adopted by MTC on September 24, 2014. FTA and FHWA approved the 2015 FTIP on December 15, 2014. The 2015 FTIP Identification Number is BRT030001 (Metropolitan Transportation Commission 2015b). The BART Extension is described as "BART: Extend BART from Berryessa Station to San Jose and Santa Clara." The BART Extension is also included in the RTP under Identification Number 240375 and described as "Extend BART from Berryessa to San Jose/Santa Clara (Phase 2)." The regional planning documents assume construction beginning in 2018, with completion in 2024. Passenger service is anticipated to begin in late 2025/2026. It is anticipated that the assumed open-to-traffic-year change will occur through the FTIP and RTP amendment process before completion of the NEPA process. The FTIP and RTP amendments will ensure that, prior to preparation of the final environmental document for the BART Extension, the design, concept, and scope will be consistent with the project description in the FTIP and RTP amendment. Therefore, the BART Extension's regional conformity determination requirement is satisfied.

BART Extension Alternative Conformity

Conformity requires demonstration that a project will not result in new local CO or PM2.5 exceedances or worsen existing violations.

Carbon Monoxide Hot-Spot Analysis

CO hot-spot analysis is required under the EPA Transportation Conformity regulations for non-exempt projects in nonattainment or maintenance areas for CO. BAAQMD air quality monitors have not recorded an exceedance of the federal CO standards since at least 1994. CO concentrations throughout California have steadily declined over time as vehicle engines have become more efficient and less polluting. BAAQMD has recognized this trend and published a screening methodology for determining the possibility for a CO hot spot (BAAQMD 2010).

VTA's BART Silicon Valley – Phase II Extension Project Draft Traffic Impact Analysis of the BART Extension Only (Hexagon 2016) assessed 17 signalized intersections in the vicinity of the Alum Rock/ 28th Street Station, 29 signalized intersections in the vicinity of the Diridon Station (South and North Options), and 16 signalized intersections in the vicinity of the Santa Clara Station. The identified intersections support fewer than 5,000 vehicles during the weekday AM and PM peak hours. The BART Extension Alternative would not increase traffic volumes at any intersection in the traffic study area to more than 24,000 vehicles per hour. No potential exists for a new localized CO hot spot or worsening of an existing CO hot spot.

PM2.5 Hot-Spot Analysis

The alignment is within a nonattainment area for the federal PM2.5 standard. Therefore, pursuant to 40 CFR Part 93, a project-level PM2.5 analysis is required for conformity purposes.

A quantitative hot-spot analysis is required only for a project that has been identified as a POAQC, as defined in 40 CFR 93.123(b)(1). As described below, the BART Extension Alternative does not meet the criteria that would classify it as a POAQC under EPA's final rule. Accordingly, the BART Extension Alternative is not considered to be a POAQC, and the project-level PM conformity determination requirements are satisfied. Confirmation of this finding was obtained following interagency consultation with MTC's Air Quality Conformity Task Force. Under the BART Extension Alternative, there would be *no adverse effect* related to worsening existing or contributing to new localized PM hot spots.

Projects involving new or expanded highway facilities and a significant number of, or a significant increase in the number of, diesel vehicles (*significant number* is defined as more than 125,000 AADT, with 8 percent or more of such AADT being diesel truck traffic or, in practice, truck AADT of 10,000 or more regardless of total AADT; *significant increase* is defined in practice as a 10 percent increase in the volume of heavy-duty truck traffic).

A list of projects that are considered to be POAQCs is provided below, along with an analysis of why the BART Extension Alternative is not considered to be a POAQC.

1. Projects affecting intersections that are at level of service (LOS) D, E, or F, with a significant number of diesel vehicles, or will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to BART Extension Alternative.

2. New bus and rail terminals and transfer points with a significant number of diesel vehicles congregating at a single location.

3. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

4. Projects in or affecting locations, areas, or categories of sites identified in the PM2.5 or PM10 Implementation Plan or Implementation Plan submission, as appropriate, as sites of possible violation.

The BART Extension Alternative is a heavy-rail transit project that would not directly increase diesel truck traffic on the roadway network. The level of service related to increased traffic volumes from a significant number of diesel vehicles related to the BART Extension Alternative is not relevant. In addition, although the BART Extensions Alternative would involve new bus and rail transfer points, the new bus and rail transfer points would be located at the Alum Rock/28th Street Station and Santa Clara Station, and in central San Jose. At the Alum Rock/28th Street Station, the new bus transfer location would be provided along North 28th Street. At the Santa Clara Station, a new bus transfer location would be provided along Brokaw Road. The bus transfer locations would operate similar to existing bus stops on a local roadway; they are not considered significant terminals or transfer points with a significant number of diesel vehicles (VTA will have phased out diesel buses by 2025).

The No Build Alternative bus fleet includes services to shuttle passengers between the Berryessa Station and downtown destinations. This shuttle service would be eliminated in the BART Extension Alternative resulting in a decrease in bus activity in response to the light rail transit (LRT). Based on a bus demand study completed by VTA, the Santa Clara Station would experience a decrease of 96 buses in late 2025/2026 and 160 buses in 2035. The Alum Rock/28th Street Station would experience no change in daily late 2025/2026 or 2035 bus volumes. Central San Jose would experience no change in 2026 bus volumes and a decrease of 32 buses in 2035.

VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus idling would increase localized emissions; however, idling time is typically limited to less than 1 minute per vehicle. Although sensitive receptors would be located within 1,000 feet of the transfer points, these land uses would not be exposed to adverse diesel particulate matter emissions given the bus type (hybrids) and limited idling time.

The Diridon Station Options include an existing bus transit facility. The existing facility will be reconstructed for better bus circulation in the same location for both Diridon Station Options. Similar to the Santa Clara Station Option, the Diridon Station Options would experience a decrease of 96 buses in late 2025/2026 and 192 buses in 2035. In addition, VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses.

In addition, the BART Extension Alternative sites have not been identified as possible violation sites in the PM2.5 or PM10 Implementation Plan or Implementation Plan submission. Due to the above reasons, the MTC's Air Quality Conformity Task Force determined on June 23, 2016, that the BART Extension Alternative is not considered to be a POAQC.

Mobile-Source Air Toxics

This SEIS/SEIR includes a basic qualitative analysis of the likely MSAT emission impacts of the BART Extension Alternative. However, available technical tools do not make it possible to predict the specific health impacts of the emission changes associated with the BART Extension Alternative.

The BART Extension Alternative would be electrically powered and would not generate MSAT emissions. FHWA has published guidance related to roadway emissions. Thus, the MSAT analysis focuses on how the BART Extension Alternative would affect exposure to roadway MSAT.

New bus transfer points would be located at the Alum Rock/28th Street Station and Santa Clara Station. At the Alum Rock/28th Street Station, a bus transfer location would be provided along North 28th Street. At the Santa Clara Station, a bus transfer location would be provided along Brokaw Road. In addition, the Diridon Station (both Options) include an existing bus transit facility. The existing facility would be reconstructed for better bus circulation. It is not anticipated that this facility would accommodate any increased bus frequency. VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus idling would increase localized emissions; however, idling time is typically limited to less than 1 minute per vehicle. Given the above qualitative analysis, diesel-hybrid bus activity would not represent a significant source of new exposure.

The Newhall Maintenance Facility, including vehicle storage at the facility, would not include significant sources of combustion-related TACs, such as heavy-duty diesel trucks or active power generators. The maintenance facility would require the use of chemicals related to repair and cleaning activities, resulting in evaporative emissions. However, the chemicals would be stored in accordance with BAAQMD permitting requirements and state safety guidelines; the majority of related activities would occur within maintenance facilities. This would reduce the potential for exposure to substantial MSAT concentrations. Given the above qualitative analysis, the maintenance facility would not represent a significant source of new exposure and, therefore, would result in *no adverse effect* related to operational MSAT emissions.

Operational Emissions

The operational analysis for the BART Extension Alternative considers emissions benefits associated with vehicle mode shift. It is anticipated that the BART Extension Alternative would increase ridership, thereby decreasing regional passenger VMT through mode shift from private automobiles to transit. Accounting for emissions reductions associated with mode shift is consistent with recommendations from APTA (2009). Table 4.2-3 shows regional VMT associated with the No Build and BART Extension Alternatives. The VMT and associated emissions analysis are presented for 2025 Opening Year and 2035 Forecast Year.

Table 4.2-3: Regional Vehicle Miles Traveled – BART Extension Alternative

Analysis Year	Vehicle Miles Traveled (miles per day)		% VMT Change from No Build Alternative	% VMT Change from Existing
	No Build Alternative	BART Extension Alternative		
2025 Opening Year	54,981,379	54,693,572	(0.52%)	5%
2035 Forecast Year	59,777,409	59,492,258	(0.48%)	15%
Source: *VTA's BART Silicon Valley – Phase II Extension Project Draft Traffic Impact Analysis of the BART Extension Only* (Hexagon 2016).				

Estimated criteria pollutant emissions from all vehicles in the region are shown in Table 4.2-4. The differences in emissions between the alternatives represent criteria pollutant emissions generated as a result of implementation of the BART Extension Alternative. Considering the small decrease in regional VMT, differences in operational emissions generated by the BART Extension Alternative are expected to be minor and related primarily to changes in VMT and vehicle speeds as a result of use of public transportation.

Table 4.2-4: Estimated Maximum Daily Operational Emissions – Bart Extension Alternative

Criteria Pollutant or Ozone Precursor	Pounds per Day				
	ROGs	NO_X	CO	PM10	PM2.5
2025 Opening Year					
No Build Alternative	1,453	7,207	75,108	5,962	2,499
BART Extension Alternative	1,446	7,181	74,715	5,932	2,486
Net Change from No Build	**(-7)**	**(-26)**	**(-393)**	**(-30)**	**(-13)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	**No**	**No**	**--**	**No**	**No**
2035 Forecast Year					
No Build Alternative	927	4,852	52,408	6,360	2,607
BART Extension Alternative	924	4,839	52,158	6,331	2,595
Net Change from No Build	**(-3)**	**(-13)**	**(-250)**	**(-29)**	**(-12)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	**No**	**No**	**--**	**No**	**No**
Sources: ARB, EMFAC2014, CalEEMod version 2013.					

The analysis shows that the BART Extension Alternative would reduce regional criteria pollutant emissions and associated concentrations. Therefore, implementation of the BART Extension Alternative would result in a regional air quality benefit by encouraging a modal shift from single-occupancy vehicles toward transit, and would not generate emissions that exceed the NAAQS. Consequently, operation of the BART Extension Alternative would result in *no adverse effect*.

4.2.5 NEPA Conclusion

The design, concept, and opening year of the BART Extension Alternative are consistent with MTC's RTP and FTIP. The BART Extension Alternative would not result in a CO or PM2.5 hot spot. Accordingly, the BART Extension Alternative's regional and project-level conformity requirements are satisfied. Neither the VTA buses nor the new maintenance facility would represent a significant source of new MSATs. Long-term operation of the BART Extension Alternative would reduce criteria pollutant emissions, relative to the No Build Alternative, and therefore result in a beneficial air quality effect. For these reasons, operation of the BART Extension Alternative would result in *no adverse effect*.

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4.3 Biological Resources and Wetlands

4.3.1 Introduction

This section describes the affected environment and environmental consequences related to biological resources and wetlands from operations of the NEPA Alternatives.

Additional information on biological resources is provided in *VTA's BART Silicon Valley—Phase II Extension Project Special-Status Species Lists* technical report.

Biologists compiled a variety of natural resource information for the corridor by consulting the California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2016), the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants* (California Native Plant Society 2015), and the U.S. Fish and Wildlife Service (USFWS) list of threatened and endangered species (U.S. Fish and Wildlife Service 2015). A reconnaissance survey was conducted on November 4, 2015, to confirm existing biological resources and wetlands in the area. In addition, the *Silicon Valley Rapid Transit Corridor Environmental Impact Statement and 4(f) Evaluation* (Santa Clara Valley Transportation Authority and Federal Transit Administration 2010) and associated biological technical studies prepared for the FEIS were used as background information for the vicinity. The CNDDB, CNPS, and USFWS lists are included in *VTA's BART Silicon Valley—Phase II Extension Project Special-Status Species Lists*.

4.3.2 Environmental and Regulatory Setting

4.3.2.1 Environmental Setting

This section discusses the existing biological resources and wetlands in the area. For purposes of this analysis, a 2-mile buffer of the area of disturbance, including construction staging areas, was assessed for the potential presence of special-status species that could be affected by the BART Extension Alternative. See Figures 4.3-1 and 4.3-2 for special-status plant and animal species with CNDDB-documented occurrences within 2 miles of the BART Extension.

Land Cover Types

The BART Extension would be located within the central California Coast Range. Vegetation and non-developed land cover types identified in the area consist of ruderal/disturbed, willow scrub/riparian woodland, and riverine (Guadalupe River and creeks). Four creeks run through the BART Extension area: Coyote Creek, Lower Silver Creek, Los Gatos Creek, and the Guadalupe River. Land cover types in the area are highly fragmented, which diminishes their ecological value in most cases. Isolated habitat islands may provide refuge for wildlife, but the habitat value in these areas is degraded and most likely will continue to degrade regardless of the BART Extension because of the isolation from urban development. Willow scrub/riparian woodland is the only sensitive natural communities (i.e., communities that are of limited distribution statewide or within a county or region and considered "special-status" by the California Department of Fish and Wildlife [CDFW]) in the area. See Figure 4.3-3 for the mapped land cover types within the area, which are based on those identified and mapped in the *Santa Clara Valley Habitat Plan* (SCVHP) (Santa Clara County 2012).

A brief description of the vegetation and wildlife resources within each land cover type is provided below. Plant taxonomy and nomenclature follow the *Jepson Manual: Vascular Plants of California* (Baldwin and Wilken 2012).

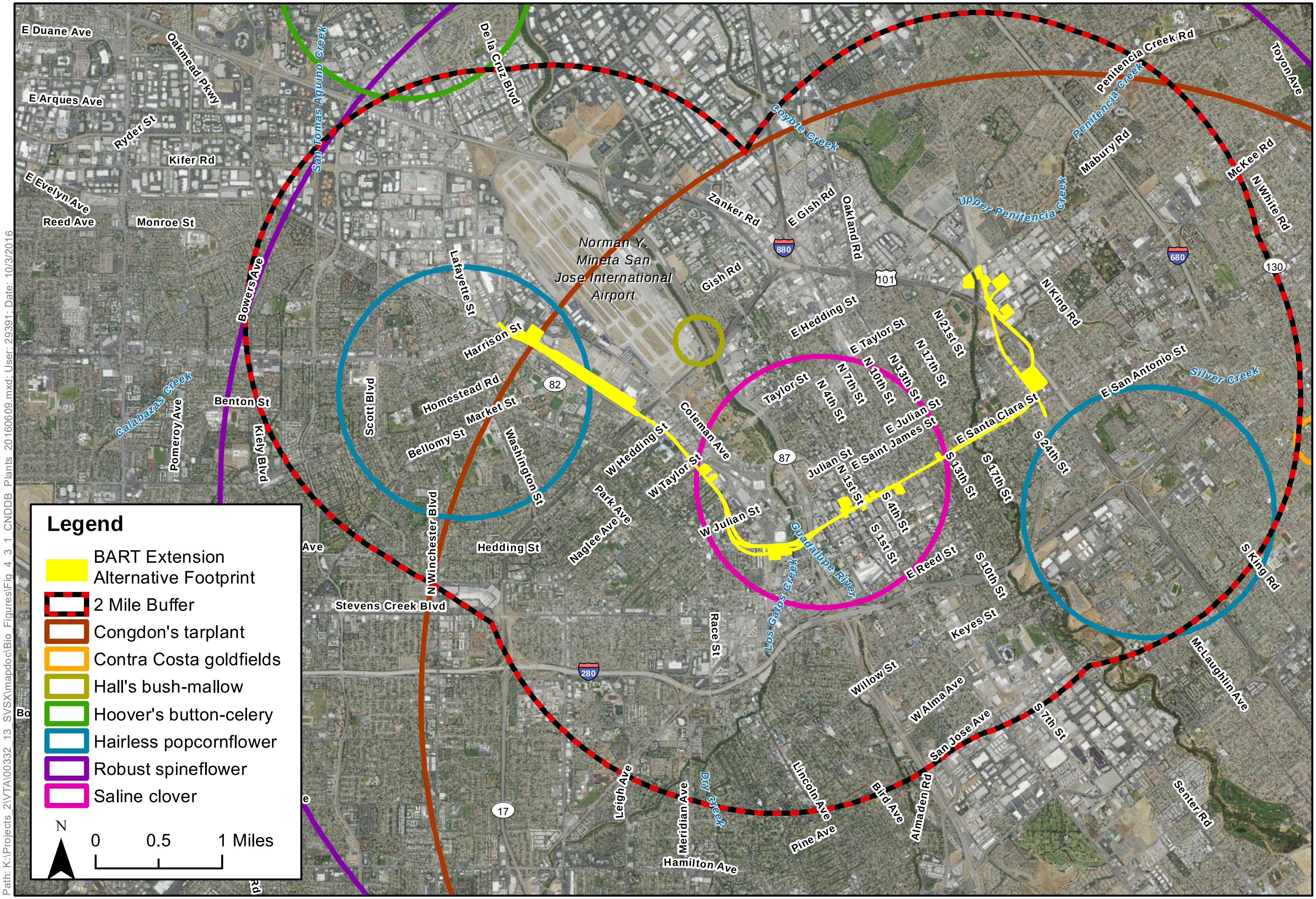
Ruderal/Disturbed

This land cover type includes species groupings found in urban ornamental landscape and agriculture settings. A distinguishing characteristic of ruderal/disturbed communities within urban areas is the mixture of native and exotic plant species. Exotic plant species may provide valuable habitat elements, such as cover for nesting and foraging, as well as food sources, such as nuts, berries, or insects. Ruderal/disturbed habitat is typically dominated by nonnative grass species, including Italian ryegrass, orchardgrass (*Dactylus glomerata*), and wild oat, as well as bull thistle (*Cirsium vulgare*). Examples of animal species tolerant of human activities that often utilize ruderal/disturbed habitats include killdeer (*Charadrius vociferous*), mourning doves (*Zenaida macroura*), and California ground squirrel (*Otospermophilus beecheyi)*.

The majority of the corridor lies within ruderal/disturbed vegetation, and most of the area that would be disturbed by the BART Extension consists of ruderal/disturbed urban landscape. Some remnant agricultural areas, consisting solely of disked pasture, persist adjacent to the BART Extension.

Willow Scrub/Riparian Woodland

Willow scrub occurs along Lower Silver Creek, which was disturbed during flood protection improvements in August 2009 and subsequently revegetated for the Santa Clara Valley Water District's Lower Silver Creek Project. Willow (*Salix* spp.) shrubs dominate this land cover type and are supported by the water of Lower Silver Creek. Understory species are primarily nonnative grasses but are eventually expected to change as willow scrub matures and a defined overstory develops.



Source: Plants, CNDDB June 2106; Imagery, NAIP 2014

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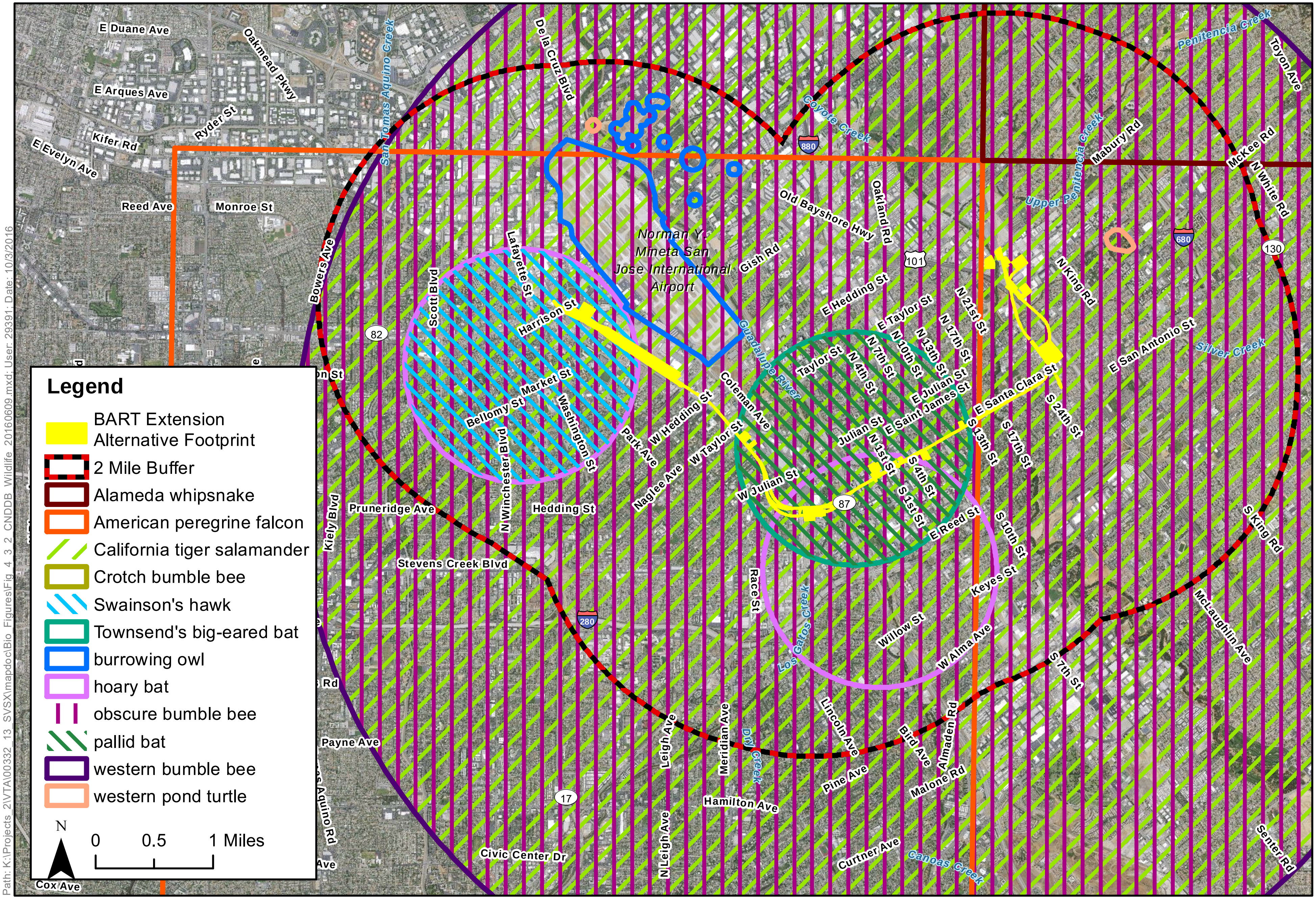
Figure 4.3-1
CNDDB Plants within 2 Miles
VTA's BART Silicon Valley–Phase II Extension Project



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Source: Plants, CNDDB June 2016; Imagery, NAIP 2014

ICF INTERNATIONAL

Figure 4.3-2
CNDDB Wildlife within 2 Miles
VTA's BART Silicon Valley–Phase II Extension Project

Riparian woodland occurs along portions of Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek and is recognized as a sensitive natural community by CDFW (2010). Dominant plant species in the overstory of riparian woodland along the creeks include willows, Fremont cottonwood (*Populus fremontii*), and box elder (*Acer negundo*), as well as a few scattered walnuts (*Juglans* sp.). Common species in the understory of riparian woodland include California blackberry (*Rubus ursinus*), mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis*), western goldentop (*Euthamia occidentalis*), and several nonnative herbaceous species such as bristly oxtongue (*Helminthotheca echioides*), perennial pepperweed (*Lepidium latifolium*), and poison hemlock (*Conium maculatum*). The understory of this land cover type typically includes nonnative grasses, including barley (*Hordeum vulgare*), Italian ryegrass (*Lolium multiflorum*), and ripgut brome (*Bromus diandrus*).

Because the vegetation is structurally diverse and portions are well developed, riparian woodland communities provide habitat for many wildlife species. The multilayered riparian woodland land cover type provides escape cover, forage, and nesting opportunities for wildlife. Common wildlife species observed in riparian woodland habitats are acorn woodpecker (*Melanerpes formicivorus*), downy woodpecker (*Picoides pubescens*), black phoebe (*Sayornis nigricans*), northern mockingbird (*Turdus migratorius*), red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*) and American kestrel (*Falco sparverius*), among others. Riparian woodland habitat is frequently used by terrestrial mammals as movement corridors if they connect larger patches of habitat.

Riverine

Riverine land cover consists of perennial, intermittent, and ephemeral watercourses characterized by a defined bed and bank. Four watercourses occur within the study area: Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek (refer to Section 4.17.2.1, *Environmental Setting*, and Figure 4.17-1 for locations and descriptions of these watercourses). All of these watercourses are mainly perennial, but may be dry in certain areas during the summer months. These features are associated with adjacent willow scrub/riparian woodland land cover type. Common fish species known to occur in the Guadalupe River and Coyote Creek include California roach (*Lavinia symmetricus*), hitch (*L. exilicauda*), Sacramento sucker (*Catostomus occidentalis*), and threespine stickleback (*Gasterosteus aculeatus*). In addition to fish, western pond turtle (*Actinemys marmorata*) and Pacific tree frogs (*Pseudacris regilla*) may occur in or near the watercourses.

Waters of the United States

Waters of the United States include the three creeks and one river that cross the BART Extension—Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek (refer to Section 4.17, *Water Resources, Water Quality, and Floodplains*). The streams and their respective floodplains are jurisdictional features regulated by the U.S. Army Corps of Engineers (USACE). Lower Silver Creek, Coyote Creek, the Guadalupe River, and

Los Gatos Creek are inventoried by the USFWS as palustrine forested, temporarily flooded wetlands; the vegetated portions of the streams are described in the *Willow Scrub/Riparian Woodland* section above and the open water portions of the streams are described in the *Riverine* section. These streams were not studied intensively for the BART Extension because facilities would be constructed in underground tunnels 20 to 40 feet below the creek and river bottoms and all construction staging areas and access would be outside of waterways; therefore, VTA would avoid potential adverse effects on waters of the United States.

Special-Status Species

Special-status species are plants and animals that are legally protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. For the purposes of this document, special-status species consist of the following.

- Species listed or proposed for listing as threatened or endangered under the ESA (Title 50, Code of Federal Regulations [CFR], Section 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the Federal Register [FR] for species proposed for listing).
- Species that are candidates for possible future listing as threatened or endangered under the ESA.
- Species that are listed or proposed for listing by the State of California as threatened or endangered under CESA (14 California Code of Regulations Section 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Plants listed as rare under the California Native Plant Protection Act (CNPPA) (California Fish and Game Code Sections 1900 et seq.).
- Plants with a California Rare Plant Rank of 1A, 1B, 2A, and 2B (California Department of Fish and Wildlife 2016).
- Animals listed as California Species of Special Concern on CDFW’s Special Animals List (California Department of Fish and Wildlife 2016).
- Animals that are fully protected in California (California Fish and Game Code Section 3511 [birds], Section 4700 [mammals], Section 5050 [amphibians and reptiles], and Section 5515 [fish]).
- Bats identified as medium or high priority on the Western Bat Working Group regional priority species matrix (Western Bat Working Group).

An official species list of rare, threatened, endangered, and candidate species with potential to occur in the area, which includes the San Jose West and San Jose East U.S. Geological

Survey (USGS) quadrangles, was generated from USFWS online data on September 24, 2015. A CDFW species list for the BART Extension was generated from a search of the CNDDB (California Department of Fish and Wildlife 2016). See *VTA's BART Silicon Valley—Phase II Extension Project Special-Status Species Lists* for species lists and determining potential for special-status species to occur in the BART Extension area.

Following the database searches, an extensive review of literature and environmental documentation prepared for other projects in the vicinity was conducted. This section reports findings only for those species for which suitable habitat was determined to occur in the immediate vicinity of the BART Extension. Special-status species known to occur or with potential to occur based on the presence of suitable habitat in the area include several fish, amphibian, bird, and mammal species, as described below. No special-status plant species have been observed in the area, and none is expected to occur due to historic and ongoing disturbance and consequent lack of suitable habitat.

Fish

Central California Coast Steelhead

Central California coast steelhead (*Oncorhynchus mykiss*) is a federally listed threatened fish species. The Central California Coast steelhead distinct population segment has been listed as threatened under the ESA (62 FR 159, August 18, 1997). Critical habitat for steelhead is designated and includes the Guadalupe River and Coyote Creek (50 FR 226, September 2, 2005).

Despite degraded habitat conditions, Coyote Creek supports a small, viable steelhead fishery (Busby et al. 1996; Leidy et al. 2005), and the Guadalupe River has the potential to support steelhead as well. The extent to which steelhead spawn and rear in Coyote Creek is not known. One adult steelhead was observed in Alamitos Creek, a tributary to the Guadalupe River upstream of the BART Extension area, in early 2003 (California Department of Fish and Wildlife 2016). This means that adults are moving through the Guadalupe River system at some level and could spawn, though the extent of spawning is unknown. Flows and habitat conditions (e.g., water temperature) are believed to be insufficient in all other streams in the BART Extension area to support self-sustaining steelhead populations. Steelhead may stray into Lower Silver Creek and Los Gatos Creek because of their connections to Coyote Creek and the Guadalupe River, respectively, although steelhead are mainly seen in Coyote Creek (Smith 2013).

Fall-Run Chinook Salmon

The National Marine Fisheries Service (NMFS) considers the Chinook salmon (*Oncorhynchus tshawytscha*) in the South Bay Area to be part of the Central Valley fall- run Chinook salmon evolutionarily significant unit (ESU). NMFS has determined that the Central Valley fall-run - Chinook salmon ESU does not warrant listing, but it is considered a candidate species (64 FR 50394, September 16, 1999). In addition, streams in the vicinity are considered essential fish habitat for Chinook salmon, a commercial species. The

Magnuson-Stevens Fishery Conservation and Management Act defines *essential fish habitat* as waters and substrate necessary for fish to spawn, breed, feed, and grow to maturity.

As is the case for steelhead, Chinook salmon may stray into Lower Silver Creek and are known to spawn and rear in portions of Coyote Creek. Fall-run Chinook salmon have occurred in small numbers in the Guadalupe River in the last decade (Smith 2013). The current Chinook salmon population may be mostly strays from hatchery populations from the Sacramento-San Joaquin River system (Garza and Pearse 2008). Currently, Chinook salmon migrate up the Guadalupe River to spawn. The majority of Chinook salmon in Guadalupe River spawn throughout the downstream reaches of the river (Smith 2013). Chinook salmon may stray into Los Gatos Creek because of its connection to the Guadalupe River.

Wildlife

California Red-Legged Frog

The California red-legged frog (*Rana draytonii*) is listed as threatened under the ESA and is a state Species of Special Concern. The area is not located within an area designated as critical habitat for California red-legged frog. There are no known occurrences of the species in the BART Extension area (California Department of Fish and Wildlife 2016). However, the riparian and aquatic habitat in Guadalupe River, Coyote Creek, and Lower Silver Creek may provide suitable habitat, and some of the smaller streams may function as dispersal corridors for this species when they contain water. H.T. Harvey and Associates (1997) concluded that although the California red-legged frog is not believed to inhabit urbanized areas of San Jose, known occurrences in Alum Rock Park indicate that frogs may potentially be transported downstream during high flows and reach the BART Extension area. Four individuals were observed in July 2000 in Upper Penitencia Creek in Alum Rock Park, approximately 4.5 miles east of the BART Extension (California Department of Fish and Wildlife 2016). Also, four adult California red-legged frogs were captured and relocated in Upper Penitencia Creek in Alum Rock Park during construction of VTA’s Fish Passage Project from August 2012 to October 2012 (Ann Calnan pers. comm.). The area between these known occurrences and the BART Extension area is highly urbanized. Frogs would not be able to move overland into the BART Extension area. Any movement of frogs would have to occur in stream system, most of which are urban streams with little to no vegetation. Therefore, California red-legged frogs are not expected to occur within the BART Extension area.

Western Pond Turtle

The western pond turtle (*Actinemys marmorata*) is a candidate for future listing under the ESA and is a state Species of Special Concern. Habitat for the western pond turtle is present in the Guadalupe River, Coyote Creek, Los Gatos Creek, and Lower Silver Creek, and some of the smaller streams may function as dispersal corridors for this species when the streams contain water. Western pond turtles have been observed in Coyote Creek and the Guadalupe River (California Department of Fish and Wildlife 2016).

Bay Checkerspot Butterfly

Although there is no habitat for Bay checkerspot butterfly in the immediate vicinity, there is a potential for indirect effects on the butterfly from nitrogen deposition in locations situated away from the study area. The Bay checkerspot butterfly (*Euphydryas editha bayensis*) is listed as threatened under the ESA. The Bay checkerspot butterfly associates with specific host plants that typically grow within serpentine soils, including native grassland species such as dwarf plantain (*Plantago erecta*) as larvae and California goldfields (*Lasthenia californica*) as adults. The species currently occurs only in Santa Clara and San Mateo Counties on serpentine rock outcrops. The life cycle of the Bay checkerspot butterfly corresponds directly to its host plant, where the butterfly emerges from pupae between late February and early May as the nectar plants begin to bloom (U.S. Environmental Protection Agency 2010).

There is one known Bay checkerspot butterfly occurrence at the Silver Creek Hills, between Silver Creek and U.S. Highway 101 (U.S. 101) in 1999, but the site was partially developed in 2000. The occurrence is approximately 6.5 miles southeast of the BART Extension (California Department of Fish and Wildlife 2016).

Tricolored Blackbird

The tricolored blackbird (*Agelaius tricolor*) is a California Species of Special Concern. Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open, accessible water; a protected nesting substrate, including flooded, thorny, or spiny vegetation; and suitable foraging space providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999). Almost 93 percent of the 252 breeding colonies reported by Neff (1937) were in freshwater marshes dominated by cattails and bulrushes (*Schoenoplectus* spp.). The remaining colonies in Neff's study were in willows, blackberries (*Rubus* spp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* spp.). In contrast, only 53 percent of the colonies reported during the 1970s were in cattails and bulrushes (DeHaven et al. 1975).

There are no known occurrences of tricolored blackbirds in the area (California Department of Fish and Game 2015; Figure 4.3-2), but preconstruction surveys for nesting tricolored blackbirds are required by the SCVHP (2012) due to the presence of riparian habitat. See Figure 4.3-3 for the areas where preconstruction surveys would be required.

Burrowing Owl

The burrowing owl is a California Species of Special Concern. It is not a federally listed species, and therefore no federal consultation is required. Historically, resident and wintering burrowing owls were common throughout most of California except in mountainous areas and coastal counties north of Marin (Gervais et al. 2008). Urbanization and agricultural conversion have eliminated large tracts of burrowing owl habitat and fragmented the remainder (Haug et al. 1993; Schulz 1997; Dechant 2002); however, burrowing owls exhibit a high level of tolerance to human disturbance and will nest or roost in urban and metropolitan areas (Haug et al. 1993).

At one point it was estimated that 167 nesting pairs (about 1.8 percent of the total California population) occurred in the San Francisco Bay Area, a decline of 50 percent from population estimates in the mid-1980s (DeSante et al. 1997). In 2014, surveys documented 115 breeding adults and 87 fledged young in Santa Clara Valley, occurring in the North San José/Baylands, Morgan Hill, and Gilroy (Santa Clara Valley Habitat Agency 2016). Potential breeding and foraging habitats in the area are located in the ruderal and non-native grasslands. The documented occurrences within 2 miles of the Newhall Maintenance Facility are all at the Mineta San Jose International Airport. The portion of the Newhall Maintenance Facility within the City of San Jose would be located within the burrowing owl fee zone of the SCVHP. The fee zone was established to protect burrowing owl habitat and fund conservation actions (Santa Clara County 2012). See Figure 4.3-3 for the areas where the fee zone and preconstruction surveys will occur.

Special-Status Bats

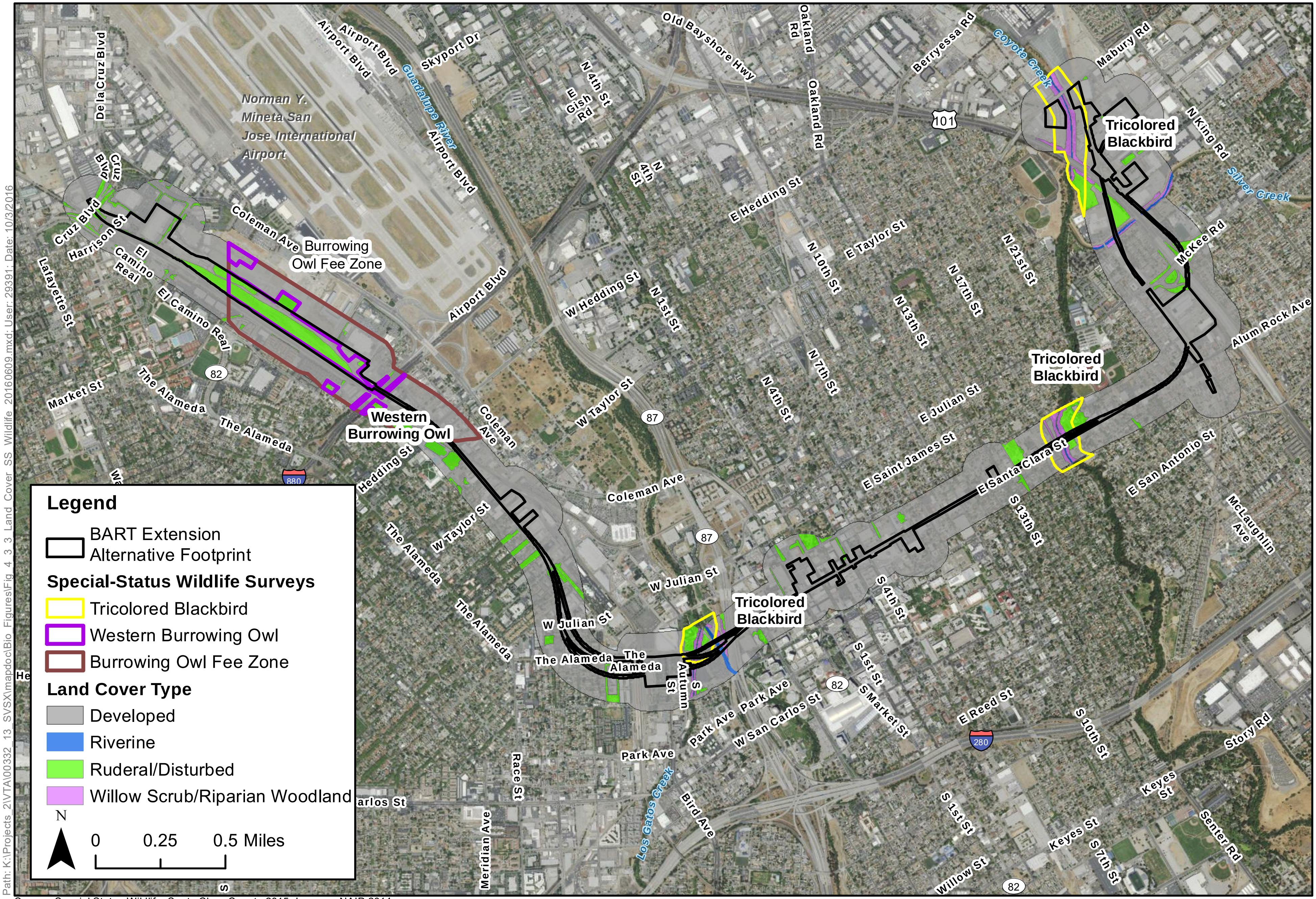
Special-status bat species, such as Townsend's big-eared bat (*Corynorhinus townsendii*), may occur in the area. The underside of bridges and buildings located throughout the area, and riparian areas of the Guadalupe River and Coyote Creek, offer potential roosting and nursery habitat and foraging habitat for bats. Many bat species that can occur in the area may be state species of special concern.

Other Protected or Managed Biological Resources

Nesting Birds

Several species of birds, including many raptors, are not currently listed under the ESA or CESA, and are typically not considered to be special-status species by CDFW or USFWS. However, the occupied nests and eggs of these birds are protected by federal and state laws, including the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Sections 3503 (active bird nests) and 3503.5 (active raptor nests). Birds have the potential to nest and forage in all natural and some semi-natural habitats in the area. The highest concentration of nesting habitat for birds is in the riparian woodland of the Guadalupe River, Los Gatos Creek, and Coyote Creek.

Cliff swallows (*Petrochelidon pyrrhonota*), tree swallows (*Tachycineta bicolor*), and barn swallows (*Hirundo rustica*) may nest in the area. Cliff swallows and barn swallows are colonial nesters and build mud nests on the undersides of artificial structures such as bridges. Tree swallows nest in tree and snag cavities in riparian and other woodland habitats. Swallows nest from February to August, and begin migrating southward in September and October. Potential nesting habitat for swallows occurs on the undersides of bridges in the area and in riparian habitat along the Guadalupe River, Los Gatos Creek, and Coyote Creek.



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Source: Special Status Wildlife, Santa Clara County 2015; Imagery, NAIP 2014

Figure 4.3-3
Land Cover Types and Special-Status Wildlife Surveys
VTA's BART Silicon Valley–Phase II Extension Project

Other migratory bird species with a high potential to occur in an urbanized setting like the BART Extension area include mourning dove, killdeer, and black phoebe.

Roosting Bats

Bats, including Yuma myotis (*Myotis yumanensis*), long-legged myotis (*Myotis volans*), Pacific long-eared myotis (*Myotis evotis*), and special-status bats, could roost in the area under existing bridges, in abandoned buildings, or in trees within riparian woodland. Bat roosts are considered sensitive resources by CDFW. In addition, "take" of nongame mammals (i.e., all mammals occurring naturally in California which are not game mammals, fully protected mammals, or fur-bearing mammals), including bats, is prohibited by California Fish and Game Code Section 4150.

4.3.2.2 Regulatory Setting

The following federal regulations are relevant to the BART Extension. State and local regulations are discussed in Chapter 6, Section 6.4, *Biological Resources and Wetlands*.

Federal

Federal Endangered Species Act

The ESA of 1973 protects fish and wildlife species that have been identified by USFWS or NMFS as threatened or endangered, and their habitats. Endangered refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range; threatened refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future. USFWS and NMFS administer the ESA. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes while other listed species are under USFWS jurisdiction. The following sections summarize provisions of the ESA (Sections 9 and 7) that are relevant to the BART Extension.

ESA Prohibitions (Section 9)

ESA Section 9 prohibits the take of any fish or wildlife species listed under the ESA as endangered. Take of a threatened species is also prohibited under Section 9 unless otherwise authorized by federal regulations. *Take*, as defined by the ESA, means “to harass, harm, pursue, hunt, shoot, wound, trap, kill, capture, or collect, or to attempt to engage in any such conduct.” Harm is defined as “any act that kills or injures the species, including significant habitat modification.” In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction.

ESA Authorization Process for Federal Actions (Section 7)

ESA Section 7 provides a means for authorizing take of threatened and endangered species by federal agencies. It applies to actions that are conducted, permitted, or funded by a federal agency. Under Section 7, the federal agency conducting, funding, or permitting an action (the lead agency) must consult with USFWS or NMFS, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project “may affect” a listed species or designated critical habitat, the lead agency is required to prepare a Biological Assessment (BA) evaluating the nature and severity of the expected effect. If the BA concludes that the project "may affect, but is not likely to adversely affect" the species or designated critical habitat, then USFWS or NMFS must determine whether to concur with that conclusion. If so, the agency may issue a Letter of Concurrence and specify conditions underlying their concurrence, thereby concluding informal consultation. If, however, USFWS or NMFS do not concur and determine instead that the project “is likely to adversely affect” the species under review, then formal consultation is necessary and USFWS or NMFS issues a Biological Opinion (BO), with a determination that the proposed action would result in one of two conditions.

- The action may jeopardize the continued existence of one or more listed species (jeopardy finding) or result in the destruction or adverse modification of critical habitat (adverse modification finding).
- The action will not jeopardize the continued existence of any listed species (no jeopardy finding) or result in adverse modification of critical habitat (no adverse modification finding).

The BO issued by USFWS or NMFS may stipulate discretionary “reasonable and prudent” conservation measures. If the project would not jeopardize a listed species, USFWS or NMFS issues an incidental take statement to authorize the proposed activity. Incidental take permits are required when non-federal activities could result in take of a threatened or endangered species.

Migratory Bird Treaty Act

The MBTA (U.S. Code, Title 16, Section 703, 50 CFR 21, 50 CFR 10) enacts the provisions of treaties between the U.S., Canada, Mexico, Japan, and the former Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. Most actions that result in taking or in permanent or temporary possession of a protected species constitute violation of the MBTA. Examples of permitted actions that do not violate the MBTA include the possession of a hunting license to pursue specific game birds, legitimate research activities, display in zoological gardens, bird-banding, and other similar activities (Faanes et al. 1992). USFWS is responsible for overseeing compliance with the MBTA, and the U.S. Department of Agriculture’s Wildlife Services Officer makes recommendations on related animal protection issues.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires all federal agencies to consult with NMFS on all actions or proposed actions (permitted, funded, or undertaken by the federal agency) that may adversely affect fish habitats. Under the provisions of the act, Congress mandated the identification of habitats essential to managed species (e.g., commercial species) and measures to conserve and enhance these habitats. The act requires cooperation among NMFS, Regional Fishery Management Councils, fishing participants, and federal and state agencies to protect, conserve, and enhance *essential fish habitat*, defined as those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity.

Federal Clean Water Act

The federal Clean Water Act (CWA) is the primary law protecting the quality of the nation's surface waters, including lakes, rivers, and wetlands. As such, it empowers the U.S. Environmental Protection Agency to set national water quality standards and effluent limitations and establishes permit review mechanisms to enforce them, operating on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit.

Sections 303(d) (Identification of Areas with Insufficient Controls, Maximum Daily Load, Certain Effluent Limitation Revision), 401 (Certification), and 402 (National Pollutant Discharge Elimination System) of the CWA apply to the BART Extension. Sections 303(d), 401 and 402 are discussed in Section 4.17.2.2, *Water Quality*.

4.3.3 Methodology

An impact finding of *adverse effect* would involve influential regional effects and high-intensity loss of sensitive natural communities, wetlands and waters of the United States, special-status species and habitat, or wildlife movement habitat.

4.3.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.1, *Introduction*, and Section 4.3.3, *Methodology*. This section also identifies measures to avoid, minimize, or mitigate impacts.

4.3.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects would likely result in biological effects typically associated with transit, highway, bicycle and pedestrian facilities, and roadway projects. Mitigation for potential adverse effects could include avoidance or replacement of a land cover type in accordance with a mitigation and monitoring plan approved by the regulatory agencies. Projects planned under the No Build Alternative would undergo separate environmental review to determine biological resources and wetlands effects, which would include an analysis of impacts and mitigation measures to mitigate potential project impacts.

4.3.4.2 BART Extension Alternative

Sensitive Natural Communities

Connection to Phase I Berryessa Extension

The connection to the Phase I Berryessa Extension would be at grade near Las Plumas Avenue, north of Lower Silver Creek, and then enter the East Tunnel Portal. South of the portal, the tunnel would pass beneath Lower Silver Creek near the U.S. 101 crossing. Riparian woodland occurs at Lower Silver Creek; however, the Twin-Bore and Single-Bore Options would pass approximately 25 feet and 30 feet beneath the creekbed, respectively. Tunneling is discussed in Chapter 5, Section 5.3.1.1, *Tunnel Boring*; Section 5.3.2.1, *Tunnel Construction*; and Section 5.5.9.2, *Surface Settlement*. The tunnels would be lined with precast concrete segmental linings as the pressurized closed-faced tunnel boring machine moves forward. The closed-face tunnel boring machine keeps out groundwater, stabilizes the tunnel face, and minimizes settlement. Maximum settlement is projected to be 1 inch. Therefore, Lower Silver Creek and other creeks and rivers along the alignment would not be adversely affected. For the Twin-Bore Option, cross passages are required every 460 to 750 feet between the tunnels and may require surface ground treatment. Excavation of cross passages is not required for the Single-Bore Option. Surface ground treatment for cross passages would be a minimum of 200 feet from any river or creek. Because the BART Extension Alternative for both tunnel options would be located beneath the creek and surface activities would be at least 200 feet from any river or creek, there would be *no adverse effect* on sensitive natural communities at this location. No mitigation is required.

Alum Rock/28th Street Station

No sensitive natural communities occur at the Alum Rock/28th Street Station location; therefore, there would be *no effect* on these resources. No mitigation would be required.

Tunnel Alignment near Coyote Creek

Riparian woodland occurs in Coyote Creek; however, the Twin-Bore and Single-Bore Options would pass approximately 20 feet and 55 feet beneath the creekbed, respectively. The Twin-Bore Option would veer slightly to the north of the Single-Bore Option alignment near Coyote Creek. There would be no aboveground operations activities at this location for either tunnel option. Therefore, BART Extension Alternative operations would have *no adverse effect* on sensitive natural communities at this location. No mitigation would be required.

Downtown San Jose Station

No sensitive natural communities occur at the locations of the Downtown San Jose Station East Option or the Downtown San Jose Station West Option; therefore, there would be *no effect* on these resources. No mitigation would be required.

Diridon Station

Riparian woodland occurs along the alignment in Guadalupe River and Los Gatos Creek near the Diridon Station South and North Options. For the Diridon Station South Option, the Twin-Bore and Single-Bore Options would pass approximately 40 feet and 50 feet beneath the Guadalupe River bed, respectively, and 20 feet and 50 feet beneath the Los Gatos Creek bed, respectively. For the Diridon Station North Option, Twin-Bore and Single-Bore Options would pass approximately 45 feet and 50 feet beneath the Guadalupe River bed, respectively, and 25 feet and 50 feet beneath the Los Gatos Creek bed, respectively. There would be no aboveground operational activities at these locations. All operational activities would occur in previously developed areas and would avoid riparian habitat. Therefore, BART Extension Alternative operations would have *no adverse effect* on sensitive natural communities at this location**.** No mitigation would be required.

Continuation of Tunnel Alignment

No sensitive natural communities occur along the continuation of the tunnel alignment from the Diridon Station to just north of Interstate 880 (I-880).Therefore, although the aboveground Stockton Avenue ventilation facility would be located in this portion of the alignment, there would be *no effect* on biological resources. No mitigation would be required.

Newhall Maintenance Facility

No sensitive natural communities occur at the site of the proposed Newhall Maintenance Facility; therefore, there would be *no effect* on these resources. No mitigation would be required.

Santa Clara Station

No sensitive natural communities occur at the site of the proposed Santa Clara Station; therefore, there would be *no effect* on these resources. No mitigation would be required.

Wetlands and Waters of the United States

Connection to Phase I Berryessa Extension

The connection to the Phase I Berryessa extension would be at grade near Las Plumas Avenue, north of Lower Silver Creek, and then enter the East Tunnel Portal. South of the portal, the Twin-Bore and Single-Bore Options would pass approximately 25 feet and 30 feet beneath Lower Silver Creek bed, respectively, near the U.S. 101 crossing. No operations would occur aboveground at Lower Silver Creek. Therefore, BART Extension Alternative operations would have *no adverse effect* on federally protected wetlands or waters of the United States at Lower Silver Creek. No mitigation would be required.

Alum Rock/28th Street Station

No federally protected wetlands or waters of the United States are present at the Alum Rock/28th Street Station. Therefore, there would be *no effect* on wetlands or waters of the United States at this location. No mitigation would be required.

Tunnel Alignment near Coyote Creek

The Twin-Bore and Single-Bore Options alignment would pass approximately 20 feet and 55 feet beneath the Coyote Creek bed, respectively, and there would be no aboveground operations activities near the creek. Therefore, there would be *no effect* on wetlands or waters of the United States at this location. No mitigation would be required.

Downtown San Jose Station

No federally protected wetlands or waters of the United States are present at the locations of the Downtown San Jose Station East and West Options. All aboveground BART Extension Alternative operations would be in previously developed areas. Therefore, there would be *no effect* on wetlands or waters of the United States under either option. No mitigation would be required.

Diridon Station

For the Diridon Station South Option, tunnels for the Twin-Bore and Single-Bore Options would pass approximately 40 feet and 50 feet beneath the Guadalupe River bed, respectively. For the Diridon Station North Option, tunnels for the Twin-Bore and Single-Bore Options would pass approximately 45 feet and 50 feet beneath the Guadalupe River bed, respectively. There would be no aboveground operational activities near the river.

As the alignment approaches the Diridon Station South Option, it would continue approximately 20 feet (Twin-Bore Option) and 50 feet (Single-Bore Option) under Los Gatos Creek bed. Systems facilities for the Diridon Station South Option would be on the north side of the creek in a previously developed area. As the alignment approaches the Diridon Station North Option, it would continue approximately 25 feet (Twin-Bore Option) and 50 feet (Single-Bore Option) under the Los Gatos Creek bed. Systems facilities for the Diridon Station North Option would be on the north side of Autumn Street in a previously developed area. Therefore, there would be *no effect* on wetlands and waters of the United States at this location. No mitigation would be required.

Continuation of Tunnel Alignment

No federally protected wetlands or waters of the United States occur along the tunnel alignment from Diridon Station to just north of I-880. Therefore, although the aboveground Stockton Avenue ventilation facility would be located in this portion of the alignment, there would be *no effect* on wetlands and waters of the United States along this alignment. No mitigation would be required.

Newhall Maintenance Facility

No federally protected wetlands or waters of the United States occur at the site of the proposed Newhall Maintenance Facility. Therefore, there would be *no effect* on wetlands and waters of the United States at this location. No mitigation would be required.

Santa Clara Station

No federally protected wetlands or waters of the United States occur at the Santa Clara Station. Therefore, there would be *no effect* on wetlands and waters of the United States. No mitigation would be required.

Special-Status Species

Connection to Phase I Berryessa Extension

The connection to the Phase I Berryessa extension would be at grade near Las Plumas Avenue, north of Lower Silver Creek, and then enter the East Tunnel Portal. South of the portal, the Twin-Bore and Single-Bore Options would pass approximately 25 feet and 30 feet beneath Lower Silver Creek bed, respectively, near the U.S. 101 crossing. The surrounding area is highly urbanized. No special-status species are expected to occur on the BART Extension Alternative because of a lack of habitat. Therefore, BART Extension Alternative operations in this location would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Alum Rock/28th Street Station

Alum Rock/28th Street Station would be located in an area that is already urbanized. No special-status species are expected to occur on the BART Extension Alternative because of a lack of habitat. Therefore, BART Extension Alternative operations at the Alum Rock/ 28th Street Station would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Tunnel Alignment near Coyote Creek

The Twin-Bore and Single-Bore Options alignment would pass approximately 20 feet and 55 feet beneath Coyote Creek bed, respectively, near Santa Clara Street. In addition, there would be a ventilation facility on an existing site consisting of a parking lot and building west of Coyote Creek. Although Coyote Creek and associated riparian woodland are known to or could potentially support special-status fish, bat, and aquatic reptile (i.e., western pond turtle) species, BART Extension Alternative operations would not disturb any aquatic or woodland habitat potentially supporting special-status species because operations would be 20 feet below the ground surface or away from the creek. Therefore, BART Extension

Alternative operations in this location would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Downtown San Jose Station

Both of the locations of the Downtown San Jose Station Options (East and West) are in a downtown commercial area that is urbanized. No special-status species are expected to be present in this area. Therefore, BART Extension Alternative operations at the Downtown San Jose Station would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Diridon Station (South and North Options)

For the Diridon Station South Option, tunnels for the Twin-Bore and Single-Bore Options would pass approximately 40 feet and 50 feet beneath the Guadalupe River bed, respectively, and 20 feet and 50 feet beneath the Los Gatos Creek bed, respectively, east of the Diridon Station, For the Diridon Station South Option, the tunnels for the Twin-Bore and Single-Bore Options alignments would pass approximately 45 feet and 50 feet beneath the Guadalupe River bed, respectively, and 25 feet and 50 feet beneath the Los Gatos Creek bed, respectively, east of the Diridon Station North Option, then continue along the south side of Santa Clara Street underground for both the Twin-Bore and Single-Bore Options. Special-status species with the potential to occur in and around Guadalupe River and Los Gatos Creek consist of special-status bats, western pond turtles, and Central California coast steelhead and Chinook salmon. Underground operations would not disturb habitat for these species. The rest of the Diridon Station South and North Options would be in an area that is currently used as parking for the existing Caltrain station. The Diridon Station North Option would also utilize a previously disturbed, triangular parcel for construction staging and/or underground station system facilities (Single-Bore Option) adjacent to the western section of the Caltrain tracks. Therefore, BART Extension Alternative operations at the Diridon Station with both the South and North Options would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Continuation of Tunnel Alignment

The continuation of the tunnel alignment from Diridon Station to just north of I-880 would be located in an urbanized area with extensive human disturbance. No special-status species are expected to be present in this area; therefore, BART Extension Alternative operations along the continuation of the tunnel alignment, including operation of the ventilation facility along Stockton Avenue, would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Newhall Maintenance Facility

The Newhall Maintenance Facility would be located in an urbanized area with extensive human disturbance. Burrowing owl habitat is identified in the SCVHP as possibly being present in the portion of the Newhall Maintenance Facility within the City of San Jose. This area is a burrowing owl fee zone. Mitigation requiring surveys for owls would be implemented during construction, as described in Mitigation Measure BIO-CNST-F (see Chapter 5, Section 5.5.4, *Biological Resources and Wetlands* for construction mitigation). After construction, no special-status species are expected to be present in this area. Impacts for the Twin-Bore and Single-Bore Options would be the same. Therefore, BART Extension Alternative operations would have *no adverse effect* on special-status species or habitat, and no mitigation would be required.

Santa Clara Station

The Santa Clara Station would be located in an urbanized area with extensive human disturbance, including passenger and freight train movements. No special-status species are expected to be present in this area because of a lack of habitat; therefore, BART Extension Alternative operations at the Santa Clara Station would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Santa Clara Valley Habitat Plan

The BART Extension Alternative falls within the SCVHP permit area. Within the permit area, the alignment falls within wildlife survey areas for burrowing owl at the Newhall Maintenance Facility and tricolored blackbird along Guadalupe River and Los Gatos Creek, and is also located in the burrowing owl fee zone (SCHVA 2015). Construction activities could result in a significant impact on these species if found in the area (see Chapter 5, Section 5.4.4, *Biological Resources and Wetlands*). VTA would perform preconstruction surveys, and if necessary implement avoidance measures for tricolored blackbird (Mitigation Measure BIO-CNST-E) and burrowing owls (Mitigation Measure BIO-CNST-F). With the implementation of these mitigation measures and compliance with the SCVHP burrowing owl fee zone, this impact would have *no adverse effect*.

The SCVHP addresses nitrogen deposition in the region of the BART Extension Alternative. Operations of the BART Extension Alternative could affect nitrogen output, which could indirectly reduce habitat quality for Bay checkerspot butterflies, a species listed as threatened under the ESA and covered under the SCVHP, by impacting success of their host plants. Serpentine soils have low productivity and naturally low nitrogen levels. This allows the bay checkerspot butterfly native host plants to thrive in serpentine soils. As a result of increased air pollution, nitrogen has been depositing into the serpentine soils, allowing for other nonnative invasive species to persist and compete with the bay checkerspot butterfly host plants. Serpentine soils are also important to a variety of native grasses. Nitrogen deposition poses threats to many resources in the region (Santa Clara County 2012). As discussed in Chapter 6, Sections 6.3, *Air Quality*, and 6.7, *Energy*, the BART Extension Alternative will actually decrease nitrogen output because fewer vehicle miles traveled as a result of fewer vehicles on the road. Therefore, there would be *no adverse effect*. No mitigation is required.

Wildlife Movement and Nesting Birds

Operation of the BART Extension Alternative is not expected to interfere with wildlife movement or impede use of wildlife nursery sites, including active bird nests protected under the MBTA and California Fish and Game Code. Although opportunities for wildlife movement in the study area are severely limited by the existing urban development, some wildlife movement could be expected along the Guadalupe River and Lower Silver, Coyote, and Los Gatos Creeks. However, the Twin-Bore and Single-Bore Options at these locations would be, at a minimum, approximately 20 feet below the creek beds and, thus, would not prevent wildlife movement.

Terrestrial wildlife species, including birds, may be temporarily disturbed during maintenance activities at the Newhall Maintenance Facility; however, because all the facilities would be in highly urbanized areas that lack vegetation suitable for nesting, birds would not likely use these areas for nesting or would have already adapted to the high levels of disturbance characteristic of urbanized areas. Therefore, there would be *no adverse effect*.

NEPA Conclusion

There would be *no adverse effect* on any biological resources from operation of the BART Extension Alternative (for both Single-Bore and Twin-Bore Options).

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4.4 Community Facilities and Public Services

4.4.1 Introduction

This section describes the affected environment and environmental consequences related to community facilities and public services from operations of the NEPA Alternatives. The following sources of information were used to prepare the analysis in this section.

- *Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *Envision San Jose 2040 General Plan EIR* (City of San Jose 2011b).
- *City of Santa Clara 2010-2035 General Plan* (City of Santa Clara 2010).
- *City of Santa Clara 2010-2035 General Plan EIR* (City of Santa Clara 2010a).
- *Fire Department Organizational Review – City of San Jose, CA* (Citygate Associates, Inc. 2016).
- *Triennial On-Site Security Review of VTA* (California Public Utilities Commission 2014).
- Personal communications with San Jose Police Department, San Jose Fire Department, San Jose Unified School District, San Jose Parks, Recreation and Neighborhood Services, Santa Clara Police Department, Santa Clara Fire Department, Santa Clara Unified School District, Santa Clara Department of Parks and Recreation, and BART Police Department.

4.4.2 Environmental and Regulatory Setting

4.4.2.1 Environmental Setting

This section discusses the existing conditions related to public services and community facilities in the vicinity of the BART Extension Alternative. For the purposes of this analysis, *public services* include fire protection, emergency services, and law enforcement, whereas *community facilities* include schools, parks, libraries, civic and cultural centers, religious institutions, entertainment hubs, and museums. Figures 4.4-1 through 4.4-3 show the locations of these public services and community facilities within San Jose and Santa Clara along the alignment.

Police, Fire, and Emergency Services

Police Services

Police protection for the BART Extension Alternative is provided by the BART Police Department for the station platforms and trackway and VTA in coordination with the Santa Clara County Sheriff's Office for other facilities, as discussed in Section 4.13, *Security and System Safety*. Police protection and traffic enforcement for areas outside the BART Extension Alternative facilities would be provided by the San Jose Police Department (SJPD) and Santa Clara Police Department (SCPD). In addition, local police departments have mutual-aid agreements with other agencies such as the San Mateo County Sheriff's Office and California Highway Patrol.

Police protection services for each city in the study area are discussed below. Police facilities servicing the BART Extension Alternative are mapped in Figure 4.4-1.

City of San Jose

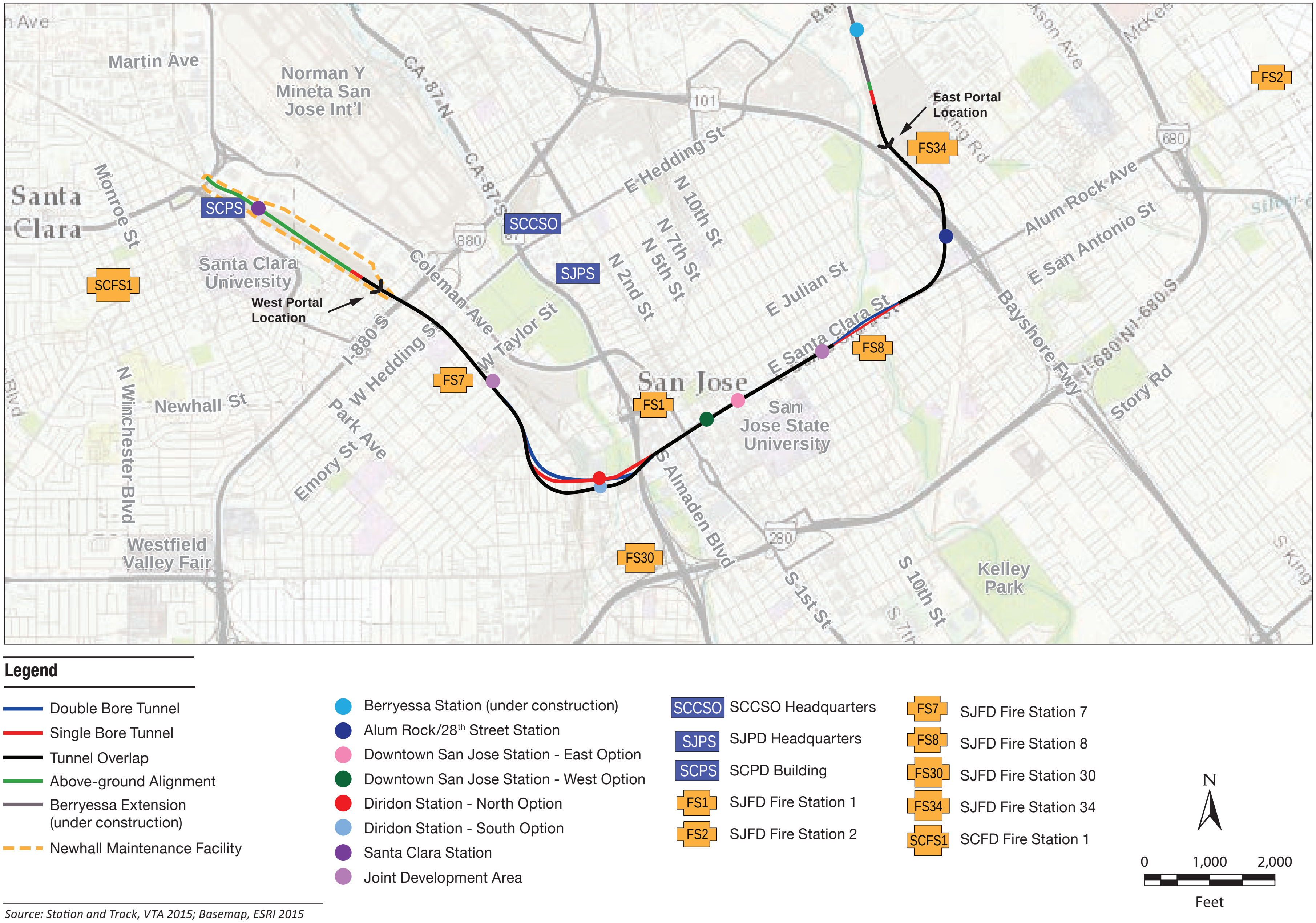
SJPD provides police services to the City of San Jose, and currently employs 932 sworn officers and 423.67 civilian staff members. SJPD's response target, defined as the period from when a call is received until an officer is on the scene, is under 6 minutes for Priority 1 calls and under 11 minutes for Priority 2 calls. (Priority 1 calls indicate an event of immediate potential for imminent danger to life or property; Priority 2 calls indicate that an event has occurred but the suspect is no longer at the scene and/or no imminent threat exists to life or property). For the first quarter of the 2015 fiscal year, SJPD maintained an average 7.58-minute response time for Priority 1 calls and 20.89-minute response time for Priority 2 calls. SJPD responded to 53 percent of Priority 1 calls in under 6 minutes, and 45 percent of Priority 2 calls in under 11 minutes.

SJPD operates out of the 201 West Mission Street headquarters, located outside of the BART Extension Alternative study area. This location serves the entire City of San Jose. As of fall 2015, there were no new proposed police stations. SJPD does not consider current equipment, staffing, facilities, and response times as adequate to provide police service in its jurisdiction (Morales pers. comm.).

City of Santa Clara

SCPD provides police services to the City of Santa Clara. SCPD currently employs 205 full-time and 68 volunteer employees. The Santa Clara BART station would be served by the SCPD Police Building at 601 El Camino Real. The *City of Santa Clara 2010-2035 General Plan* establishes a 3 minutes-or-less response time for high priority calls. In fiscal year 2014, SCPD had an average response time of 3:59 minutes to high-priority calls (McDowell pers. comm.).

SCPD currently needs additional police officers and support staff to maintain its level of service, and is conducting a detailed assessment to better evaluate existing resources and plan for future staffing needs.



Source: Station and Track, VTA 2015; Basemap, ESRI 2015

Graphics ... 00332.13 (10-17-2016)

Figure 4.4-1
Police and Fire Services
VTA's BART Silicon Valley–Phase II Extension Project

Santa Clara County Sherriff's Office

The Santa Clara County Sheriff's Office (SCCSO) provides law enforcement for Cupertino, Los Altos Hills, Saratoga, and unincorporated Santa Clara County, and maintains contracts with VTA and Santa Clara County Parks Department for police services. SCCSO currently employs 1,299 sworn officers and 426 civilian staff members, operating from a headquarters in San Jose and multiple substations across Santa Clara County.

Currently, under the direction of VTA's Director of System Safety and Security, VTA's law enforcement and investigative services are provided under contract with the SCCSO Transit Patrol Division. Transit Patrol deputies are on duty 24 hours per day and respond to calls for service through VTA's Operations Control Center and passengers using the 9-1-1 system. In addition, three special enforcement units are employed to ensure a safe environment for VTA operators and passengers (California Public Utilities Commission 2014).

San Mateo County Sherriff's Office

The San Mateo County Sheriff's Office (SMCSO) Transit Police Bureau provides law enforcement and investigative services to the municipal bus system in San Mateo County and the entire Caltrain commuter railroad line operating from San Francisco to Gilroy. The Transit Police Bureau currently employs 15 officers responsible for patrolling transit stations, railroad rights-of-way, district parking lots, and related properties throughout San Francisco, San Mateo, and Santa Clara counties; as well as the investigation of crimes, collisions, accidents, and deaths involving Caltrain passenger trains. The Transit Police operate from a headquarters in San Carlos, but maintain substations at the 4th and King Caltrain Station in San Francisco and the Diridon Caltrain Station in San Jose. SMCSO provides primary enforcement for the parking areas related to the Diridon Caltrain Station.

Fire Protection and Emergency Services

Fire protection services and emergency medical rescue in the study area are provided by the Cities of San Jose and Santa Clara. These cities maintain mutual-aid agreements with the municipal and county fire departments through the Santa Clara County Local Mutual Aid Plan, as well as with the California Department of Forestry and Fire Protection.

Fire protection services for San Jose and Santa Clara are discussed below. Fire facilities servicing the BART Extension Alternative are mapped in Figure 4.4-1.

City of San Jose

The San Jose Fire Department (SJFD) provides fire protection and emergency services throughout San Jose. As of October 2015, SJFD had 660 sworn personnel and 33 active fire stations (Pereira pers. comm.). Each station is capable of providing fire protection, fire rescue, and emergency medical services.

Six SJFD stations serve the study area:

- Fire Station 1, located at 225 North Market Street, is staffed 24 hours a day. This station has a four-person fire engine, a four-person fire truck, and a battalion chief.
- Fire Station 2, located at 2949 Alum Rock Avenue, is staffed 24 hours a day. This station has a four-person fire engine, a four-person fire truck, and a battalion chief.
- Fire Station 7, located at 800 Emory Street, is staffed 24 hours a day. This station has a four-person fire engine.
- Fire Station 8, located at 802 Santa Clara Street, is staffed 24 hours a day. This station has a four-person fire engine.
- Fire Station 30, located at 454 Auzerais Avenue, is staffed 24 hours a day. This station has a four-person fire truck, a two-person squad, and a paramedic supervisor.
- Fire Station 34, located at 1634 Las Plumas Avenue, is staffed 24 hours a day. This station has a four-person engine and a four-person urban search and rescue team.

SJFD's current performance goal is to arrive within 8 minutes for 80 percent of 9-1-1 calls for serious (Priority 1) incidents. For medical emergencies and emerging fires, national best practices recommend that the first fire unit arrive within 7 minutes of a 9-1-1 call 90 percent of the time. Neither of these standards are met department-wide, though five individual station areas meet the 8-minute goal (Citygate 2016).

In addition, the *Envision San Jose 2040 General Plan* identifies a 4-minute response time for first engine response, and 6 minutes for the second engine and first truck/urban search and rescue responses. No SJFD station meets this response time goal (Citygate 2016). The SJFD's primary obstacles to meeting response goals include too few stations, traffic congestion, high workload rates, and movements of station companies for mandatory multi-unit training.

City of Santa Clara

The Santa Clara Fire Department (SCFD) provides fire protection and emergency services to Santa Clara. SCFD currently employs 134 full-time personnel and 44 volunteer reserve staff members. SCFD aims for a city-wide response time of less than 5:30 minutes for 90 percent of all high-level emergency calls. In 2014, SCFD achieved this response standard 85 percent of the time (Madden pers. comm.).

Fire Station 1, located at 777 Benton Street, would service the Santa Clara Station with supplemental assistance from Fire Station 4, located at 2323 Pruneridge Avenue, and Fire Station 2, located at 1900 Walsh Avenue, depending on the nature of the emergency. Fire Station 1 is staffed 24 hours a day and provides fire protection, advanced life support, fire and life safety inspection, and emergency medical services to District 1, which ranges from Newhall Street to the south, Los Padres Boulevard to the west, De La Cruz Avenue to the east, and Reed Street to the north. Fire Station 1 is equipped with a three-person advanced life support fire engine company, a two-person fire department ambulance, and a battalion chief.

SCFD is currently conducting a staffing analysis and comprehensive standards of cover report.

Community Facilities

Community facilities are defined as schools, parks, libraries, civic and cultural centers, religious institutions, entertainment hubs, and museums. For the purposes of this analysis, facilities within approximately 0.25 mile (walking distance) of a BART station are evaluated, because community facilities within this proximity are most likely to be affected by the BART Extension Alternative. There are no hospitals within this study area.

Schools

San Jose

San Jose has 22 public school districts that operate 222 public schools serving the city. The San Jose Unified School District (SJUSD) operates schools that serve the San Jose portions of the BART Extension Alternative. Many private and charter schools also operate within the city.

Empire Gardens Elementary School, Burnett Middle School, and San Jose High School would be the designated schools for students generated by the BART Extension Alternative within San Jose. According to SJUSD, Empire Gardens Elementary School is at 74 percent capacity with 399 students, Burnett Middle School is at 87 percent capacity with 813 students, and San Jose High School is at 76 percent capacity with 1,065 students (Case pers. comm.). SJUSD is currently considering an expansion of the Burnett Middle School campus to accommodate an Alternative Cooperative Education Charter School. Based on a recent demographic study, SJUSD is experiencing an enrollment decline in the study area over the next 5 years (Case pers. comm.). According to the *Envision San Jose 2040 General Plan EIR*, San Jose is expecting an additional 11,079 students by 2040.

Two high schools, three elementary schools, and one community middle/high school are within 0.25 mile of the BART station locations in San Jose. These institutions are listed in Table 4.4-1 and shown on Figure 4.4-2. Anne Darling Elementary School, San Jose Community Middle and High Schools, and San Jose High School (all operated by SJUSD) would be within walking distance of the Alum Rock/28th Street Station. Cristo Rey San Jose Jesuit High School is a private high school within walking distance of this station.

Table 4.4-1. Schools within the Study Area

Schools	Location	Nearby Station (within 0.25 mile)	Figure 4.4-2 Map Icon
Anne Darling Elementary School	333 North 33rd Street, San Jose	Alum Rock/28th Street	S1
San Jose Community Middle and High Schools	1155 E. Julian, San Jose	Alum Rock/28th Street	S2
San Jose High School	275 North 24th Street, San Jose	Alum Rock/28th Street	S3
Cristo Rey San Jose Jesuit High School	1390 Five Wounds Lane, San Jose	Alum Rock/28th Street	S4
Saint Patrick Elementary School	51 North 9th Street, San Jose	Downtown San Jose (East Option)	S5
San Jose State University	One Washington Square, San Jose	Downtown San Jose (East Option)	S6
Horace Mann Elementary School	55 North 7th Street, San Jose	Downtown San Jose (East Option)	S7
Bellarmine College Preparatory	850 Elm Street, San Jose	N/A	S8
Santa Clara University	500 El Camino Real, Santa Clara	Santa Clara	S9
Source: Google Maps 2015; San Jose State University 2014; Santa Clara University 2016; Case pers. comm.			

Horace Mann Elementary School, operated by SJUSD, would be within walking distance of the San Jose Downtown Station East Option. In addition, Saint Patrick Elementary School, a private elementary school, and San Jose State University, a public university with almost 32,000 students, also would be within 0.25 mile of this station (San Jose State University 2014).

Bellarmine College Preparatory is not within 0.25 mile of a BART station, but a corner of the Bellarmine College Preparatory school grounds is directly above the tunnel alignment for both the Twin-Bore and Single-Bore Options.

Santa Clara

The Santa Clara Unified School District (SCUSD) provides public education services to students in Santa Clara, Sunnyvale, and San Jose, and is responsible for 16 elementary schools, three middle schools, two high schools, one kindergarten through 8th grade (K–8), two continuation high schools, and one adult education school.

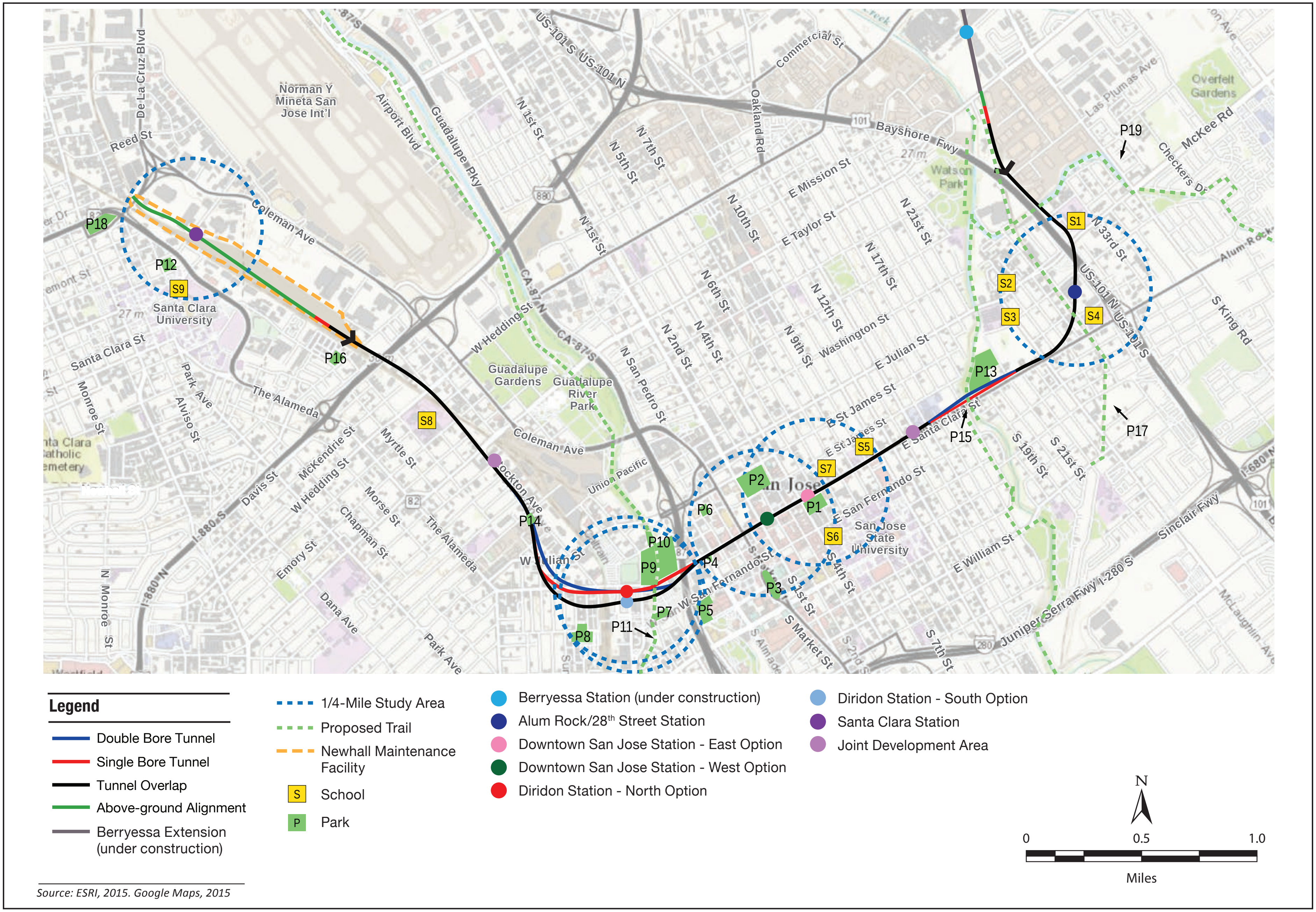


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Figure 4.4-2
Schools and Park Facilities
VTA's BART Silicon Valley–Phase II Extension Project

Scott Lane Elementary School, Buscher Middle School, and Santa Clara High School would be the designated schools for students generated by the BART Extension Alternative within Santa Clara. Scott Lane Elementary is at 104 percent capacity with 466 students, Buscher Middle School is at 103 percent capacity with 1,047 students, and Santa Clara High School is at 124 percent capacity with 2,017 students (Healy pers. comm.).

Approximately 2,000 additional students will need to be accommodated by SCUSD by 2035 (City of Santa Clara 2010). SCUSD currently has four closed school sites in Santa Clara that could be used by students generated by new development. New school facilities are also anticipated in north San Jose that would add more capacity, and Campbell school districts could accommodate a relatively modest gain in students from Santa Clara. Alternatively, school catchment areas[1] could be modified or modular classrooms could be used to accommodate new students.

The only school within walking distance of the BART Station in Santa Clara is Santa Clara University, a private university with over 9,000 students (Santa Clara University 2016). A number of Santa Clara University academic buildings, recreational facilities, and student housing would also be within 0.25 mile of the Newhall Maintenance Facility.

Parks and Recreational Facilities

There are a variety of existing and proposed parks and recreational facilities within the vicinity of the BART Extension Alternative. As noted in Table 4.4-2 and shown on Figure 4.4-2, 19 parks, trails, and proposed trails are within 0.25 mile of the San Jose and Santa Clara BART stations. Table 4.4-2 and Figure 4.4-2 also identify recreational facilities located directly over the proposed alignment or within 0.25 mile of the Newhall Maintenance Facility.

City of Jose

The City of San Jose Department of Parks, Recreation and Neighborhood Services (SJPRNS) operates 3,484 acres of regional and neighborhood/community serving parkland in San Jose (LéVeque pers. comm.). SJPRNS manages 197 neighborhood services parks, 9 regional parks, and 57 miles of trails. As stated in the *Envision San Jose 2040 General Plan*, San Jose has a neighborhood parkland level of service (LOS) goal of 3.5 acres per 1,000 residents. Citywide, the LOS is estimated at 1.68 acres per 1,000 residents, less than half of the LOS goal.

[1] School catchment areas are the predefined geographic zones associated with a school. Students living within a catchment area are eligible to attend the corresponding school.

Table 4.4-2. Parks and Recreational Facilities within the Study Area

Parks and Recreational Facility	Location	Nearby Station (within 0.25 mile)[a]	Figure 4.4-2 Map Icon
City Hall Plaza	San Jose	Downtown San Jose	P1
St. James Park	San Jose	Downtown San Jose	P2
Plaza de Cesar Chavez	San Jose	Downtown San Jose (West Option)	P3
Almaden Entrance Triangle Park	San Jose	Downtown San Jose (West Option)	P4
McEnery Park	San Jose	Diridon (South and North Options)	P5
Peralta Adobe – Fallon House Historic Site	San Jose	Downtown San Jose (West Option)	P6
San Fernando Station Plaza	San Jose	Diridon (South and North Options)	P7
Cahill Park	San Jose	Diridon (South and North Options)	P8
Arena Green	San Jose	Diridon (South and North Options)	P9
Guadalupe River Park & Trail	San Jose	Diridon (South and North Options)	P10
Los Gatos Creek Trail (Proposed)[b]	San Jose	Diridon (South and North Options)	P11
The Forge Garden	Santa Clara	Santa Clara	P12
Roosevelt Park[c]	San Jose	N/A	P13
Theodore Lenzen Park[c]	San Jose	N/A	P14
Coyote Creek Trail (Proposed)[d]	San Jose	N/A	P15
Newhall Park	San Jose	N/A	P16
Five Wounds Trail (Proposed)[e]	San Jose	Alum Rock/28th Street	P17
Larry J. Marsalli Park	Santa Clara	N/A	P18
Lower Silver Creek Trail	San Jose	N/A	P19

Sources: City of San Jose 2015; Google Maps 2015.

[a] Unless specifically mentioned, parks and recreational facilities within 0.25 mile of the Downtown San Jose Station are within 0.25 mile of both the Downtown San Jose Station East Option and the Downtown San Jose Station West Option locations.

[b] The proposed Reach 5 of the Los Gatos Creek Trail would extend north from the existing Los Gatos Creek Trail to intersect with the Guadalupe Creek Trail at Santa Clara Street. A planning document for this segment – *Los Gatos Creek Trail Reach 5 Master Plan* – was released in 2008. Final design of this segment is currently ongoing, and no construction commencement date has been identified.

[c] Roosevelt Park and Theodore Lenzen Park are not with 0.25 mile of a BART Station. However, both parks are directly above the tunnel alignment.

[d] Coyote Creek Trail (Proposed) would extend north and south along Coyote Creek through the City of San Jose. Only a segment of this proposed trail is depicted in Figure 4.4-2. A planning document for this segment – *Coyote Creek Trail, Story Road to Lower Silver Creek Master Plan* – was released in 2008. Final design of this segment is currently ongoing, and no construction commencement date has been identified.

[e] Five Wounds Trail (Proposed) would follow a former railway alignment through eastern downtown San Jose. In 2010, the community developed a conceptual plan for this trail. No further studies have been completed.

City of Santa Clara

The City of Santa Clara owns and maintains 38 parks, playgrounds, and open space areas, for a total of approximately 299 acres. This acreage includes parks that primarily serve Santa Clara residents and businesses, but excludes regional service facilities such as the Municipal Santa Clara Golf & Tennis Club and the Pruneridge Golf Course. All of these facilities are managed by the City of Santa Clara Department of Parks and Recreation. Santa Clara currently has 2.53 acres of local-serving parkland per 1,000 multi-family apartment residents, and 3 acres of parkland per 1,000 single-family subdivision residents (Teixeira pers. comm.). Opportunities for additional open space within Santa Clara are limited by existing urban development (City of Santa Clara 2010a).

There are no Santa Clara-owned parks or recreational facilities in the vicinity of the BART Extension Alternative. Forge Garden is a Santa Clara University facility located within 0.25 mile of the Santa Clara Station. This garden is used for academic courses and is open during weekdays for public engagement. Santa Clara University also operates a number of sports complexes within 0.25 mile of the Newhall Maintenance Facility.

Civic, Religious, Entertainment, and Cultural Facilities

As shown in Table 4.4-3 and on Figure 4.4-3, there are 30 civic, cultural, and religious facilities within 0.25 mile of the BART station locations. Of these, 25 facilities are in San Jose and 5 are in Santa Clara.

Table 4.4-3. Civic, Cultural, and Religious Facilities within the Study Area

Facility	Location	Nearby Station (within 0.25 mile)[a]	Figure 4.4-3 Map Icon
Civic Facilities			
San Jose City Hall	200 Santa Clara Street, San Jose	Downtown San Jose	C3
Dr. Martin Luther King Jr. Library	150 East San Fernando Street, San Jose	Downtown San Jose	C4
United States Post Office	105 North 1st Street, San Jose	Downtown San Jose	C5
Notre Dame Courthouse	99 Notre Dame Avenue, San Jose	Downtown San Jose (East Option)	C9
6th District Court of Appeal	333 Santa Clara Street #1060, San Jose	Downtown San Jose (East Option)	C10
Santa Clara University Library	500 El Camino Real, Santa Clara	Santa Clara	C16
Cultural Facilities			
Sociedade Filarmonica Uniao	1220 Santa Clara Street, San Jose	Alum Rock/28th St	C1
Portuguese Band of San Jose	100 North 27th Street, San Jose	Alum Rock/28th St	C2
Hammer Theater	101 Paseo De San Antonio Walk, San Jose	Downtown San Jose	C6
San Jose Museum of Art	110 South Market Street, San Jose	Downtown San Jose (West Option)	C7
Tech Museum of Innovation	201 South Market Street, San Jose	Downtown San Jose (West Option)	C8
SAP Center at San Jose	525 Santa Clara Street, San Jose	Diridon (South and North Options)	C11
Santa Clara Women's Club Adobe	3260 The Alameda, Santa Clara	Santa Clara	C12
de Saisset Museum	500 El Camino Real, Santa Clara	Santa Clara	C13
Lois B. Mayer Theater	500 El Camino Real, Santa Clara	Santa Clara	C14
Mission Santa Clara de Asis	500 El Camino Real, Santa Clara	Santa Clara	C15
Religious Facilities			
Pilgrim Church of the Living God	1452 Whitton Ave, San Jose	Alum Rock/28th Street	R1
Seventh-Day Adventist Church	281 North 33rd Street, San Jose	Alum Rock/28th Street	R2
Five Wounds National Portuguese Church	1375 Santa Clara Street, San Jose	Alum Rock/28th Street	R3
Church of Jesus Christ	66 South 7th Street, San Jose	Downtown San Jose (East Option)	R4
First Christian Church	80 South 5th Street, San Jose	Downtown San Jose	R5
Apostolic Assembly of Faith	77 North 5th Street, San Jose	Downtown San Jose	R6
First United Methodist Church	24 North 5th Street, San Jose	Downtown San Jose	R7
Central Apostolic Church of San Jose	77 North 5th Street, San Jose	Downtown San Jose	R8
First Presbyterian Church	49 North 4th Street, San Jose	Downtown San Jose	R9
First Unitarian Church	160 North 3rd Street, San Jose	Downtown San Jose	R10
Nuestra Senora De Guadalupe	81 North 2nd Street, San Jose	Downtown San Jose	R11
Trinity Episcopal Cathedral	81 North 2nd Street, San Jose	Downtown San Jose	R12
St. Josephs Cathedral Basilica	80 South Market Street, San Jose	Downtown San Jose	R13
Templo la Hermosa - Assemblies of God	56 South Montgomery Street, San Jose	Diridon (South and North Options)	R14

Source: Google Maps 2015

[a] Unless specifically mentioned, civic, cultural, and religious facilities with 0.25 mile of the Downtown San Jose Station are within 0.25 mile of both the Downtown San Jose Station East Option and the Downtown San Jose Station West Option locations.

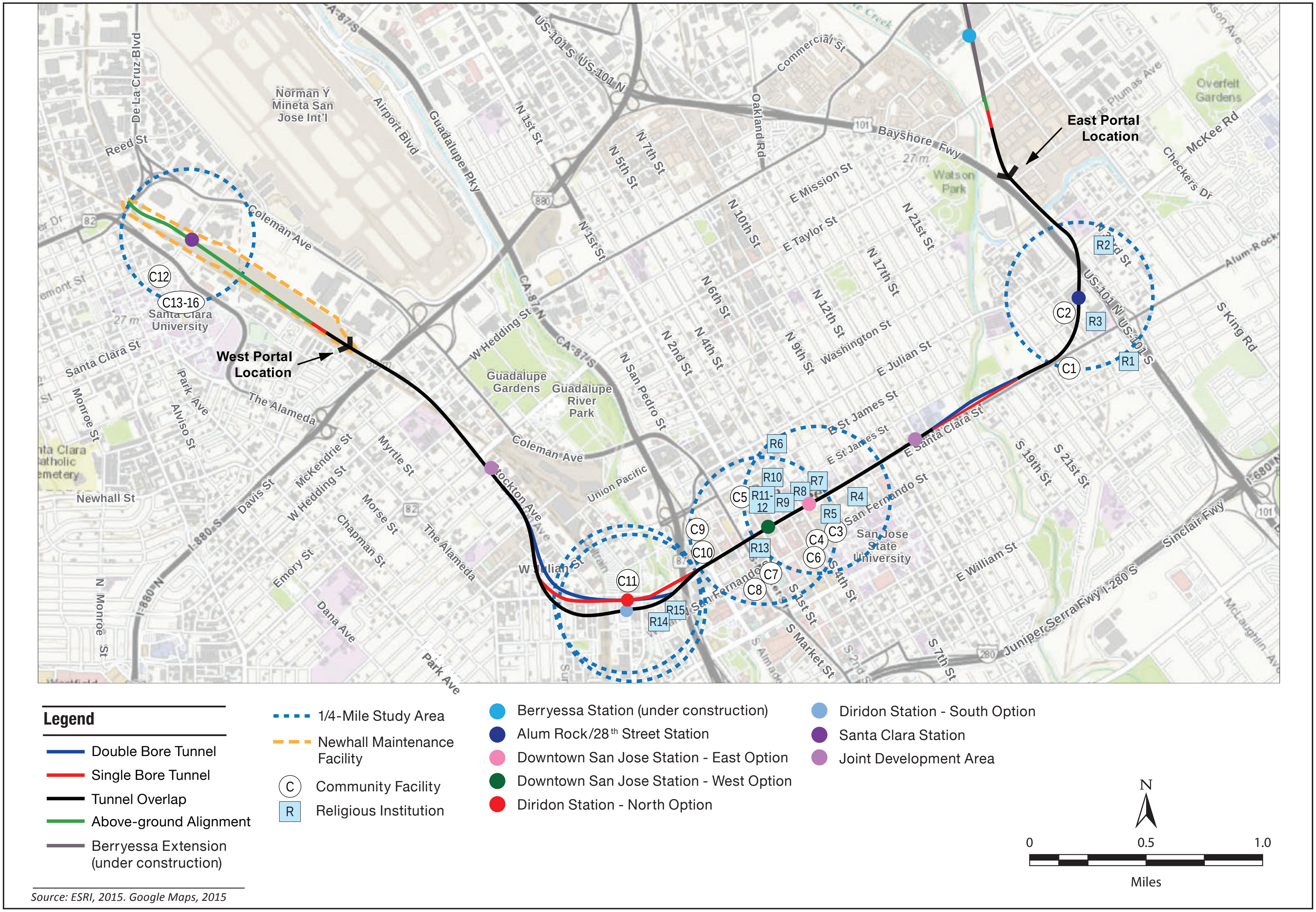

Figure 4.4-3
Civic, Religious, Entertainment, and Cultural Facilities
VTA's BART Silicon Valley–Phase II Extension Project

4.4.2.2 Regulatory Setting

There are no federal regulations that specifically pertain to public services and community facilities. Design guidelines and mutual-aid agreements with the cities of San Jose and Santa Clara provide guidance for the alternatives and for addressing potential adverse effects on public services and community facilities. There are several state and local land use regulations applicable to public services and community facilities, which are summarized in Chapter 6, Section 6.5, *Public Services and Recreation*.

4.4.3 Methodology

An *adverse effect* on public services and community facilities would occur if the BART Extension that would contribute to a violation of regulatory standards or exceed the capacity of existing facilities.

4.4.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA using the criteria (i.e., context and intensity) identified in Section 4.1, *Introduction*.

As noted in Section 4.4.2.1, *Environmental Setting*, several public services serve the BART Extension Alternative, and many community facilities are within walking distance (0.25 mile) of a BART station location. These services and facilities can expect to see increased pedestrian traffic and activity as a result of improved transit access.

Changes in existing service ratios for public services are analyzed in this section for each alternative, along with a discussion of the potential need for new public service facilities. Affects from changes in access, changes in use, and alteration to community facilities are also evaluated in this section. Displacement of community facilities is discussed in Section 4.14, *Socioeconomics*.

4.4.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects).

The No Build Alternative projects would likely result in changes to community facility access typically associated with transit, highway, bicycle, and pedestrian facilities, and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would result in effects on access to community facilities. When necessary, mitigation for adverse effects could include measures to ensure continued access to these facilities.

The No Build Alternative projects would likely result in effects on community facilities and police and fire service ratios. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would result in alteration or displacement of community facilities and changes in police and fire service ratios. Environmental review would include an analysis of mitigation measures to mitigate potential impacts.

4.4.4.2 BART Extension Alternative

Police Service

As discussed in Section 4.13, *Security and System Safety*, BART police facilities would be expanded to provide police services at the proposed BART stations and along the corridor. A new BART police station at the Berryessa Station is under construction as part of the Phase I Project. BART police would operate from this station to provide security enforcement for both the Phase I and Phase II segments. VTA anticipates that the BART Police Department would have primary responsibility within the Operating Corridor, which consists of onboard trains, tunnels, and rights-of-way, and areas within the station platforms. The exact boundaries of this Operating Corridor are subject to final agreement between BART and VTA.

VTA would expand its current agreement with SCCSO to provide law enforcement for the BART Extension Alternative facilities not patrolled by the BART Police Department. This includes aboveground facilities outside of the Operating Corridor such as the bus transit centers, kiss-and-ride facilities, parking lots, and pedestrian areas. SCCSO currently provides law enforcement services to VTA stations, including the bus stops at Diridon Transit Station and Santa Clara Caltrain Station. SCCSO would need to increase staffing to provide adequate enforcement to the BART Extension Alternative. Additional facilities could be provided through reconfiguring one of VTA’s existing facilities.

VTA and BART would expand existing mutual-aid agreements with the SMCSO and local police service providers in the cities of San Jose and Santa Clara and ensure appropriate coordination. SJPD and SCPD would provide supporting police enforcement to the BART Extension Alternative through these expanded mutual-aid agreements. SMCSO would also provide supporting police enforcement where the BART Extension Alternative Operating Corridor is within the Caltrain right-of-way. Though SMSCO, SJPD, and SCPD may receive service calls related to the BART Extension Alternative, this increased call volume would not degrade the existing level of police services.

The BART Extension Alternative constitutes a transportation project that would not directly introduce new population or lower the current ratio of officers to residents in the area. In addition, the BART Extension Alternative does not propose new at-grade crossings, and would not interfere with emergency responders traveling along existing roadways. Given the above, operation of the BART Extension Alternative would have *no adverse effect* on police services, and no mitigation would be required.

Fire Service

VTA and BART would expand existing mutual-aid agreements with SJFD and SCFD to provide fire and emergency services to the BART Extension Alternative. In the event of a large incident, additional aid could come from Mountain View Fire Department, Sunnyvale Public Safety, Santa Clara County Fire Department, Rural Metro Ambulance Services, Santa Clara County Emergency Medical Services, or other jurisdictions in Santa Clara County.

SJFD and SCFD would be the primary responders to incidents within the BART system. However, as discussed in Section 4.13, *Security and System Safety*, BART's System Safety Department is responsible for monitoring and implementing operational safety procedures throughout the BART system. The System Safety Department also implements BART's Emergency Plan, which establishes public safety mobilization procedures. Furthermore, the BART Extension Alternative would be designed to comply with pertinent BART Facilities Standards Design Criteria, which ensure that new BART projects provide a high level of security and safety. These management practices and design criteria would significantly reduce the need for emergency services along the BART Extension Alternative.

Although the BART Extension Alternative would incrementally increase demand on SJFD and SCFD, it would not substantially degrade the level of service provided by SJFD and SCFD. In addition, the BART Extension Alternative does not propose new at-grade crossings, and would not interfere with emergency responders traveling along existing roadways. Operation of the BART Extension Alternative would have *no adverse effect* on fire services, and no mitigation would be required.

School Facilities

School demand is based on population factors. The BART Extension Alternative constitutes a transportation project that would not directly introduce new population to the area. As a result, implementation of the BART Extension Alternative would not increase the demand for schools beyond what is currently provided in the study area.

The Downtown San Jose and Santa Clara BART Stations would improve regional access to San Jose State University and Santa Clara University, which may lead to increased demand of these educational institutions. However, capacity at these universities is dictated by the admissions process, and increased accessibility does not correlate to higher acceptance rates or a larger body of matriculated students. Operation of the BART Extension is unlikely to directly require new or expanded university facilities.

Both Anne Darling Elementary and Bellarmine High Schools are adjacent to the tunnel alignment. Because the tunnel would be at least 35 feet below the surface and not directly beneath school facilities, BART extension operations would not cause disruption to school activities. Therefore, the BART Extension Alternative would have *no adverse effect* on school facilities, and no mitigation would be required.

Park Facilities

Park demand is based on population factors. The BART Extension Alternative constitutes a transportation project that would not directly introduce new population to the area. As a result, implementation of the BART Extension Alternative would not increase the demand for parks beyond what is currently provided in the area.

Several park facilities would be located above the tunnel alignment, including Roosevelt Park, Theodore Lenzen Park, Guadalupe River Park & Trail, Los Gatos Creek Trail (Proposed), Five Wounds Trail (Proposed) and Coyote Creek Trail (Proposed). The BART Extension Alternative would not entail surface improvements that would interfere with these park facilities. Passing trains would not adversely affect park facilities above the alignment.

Operation of the BART Extension Alternative may lead to increased usage of the Guadalupe River Trail near the Diridon Station South and North Options. This trail network may be used by BART riders to access employers, homes, and other regional destinations. However, the BART Extension Alternative is considered in VTA's *Valley Transportation Plan 2030* and San Jose's *Diridon Station Area Plan Environmental Impact Report*. Together, these planning documents propose multimodal circulation improvements to accommodate transit users near the Diridon Station South and North Options.

Given the above, operation of the BART Extension Alternative would have *no adverse effect* on park and trail facilities, and no mitigation would be required.

Civic, Cultural, and Religious Facilities

As listed in Table 4.4-3, there are 33 civic, cultural, and religious facilities within 0.25 mile of a BART station. Many of these facilities, such as religious and civic institutions, serve local residents. Because the BART Extension Alternative would not directly increase population in the area, these facilities are not expected to experience increased usage. Other facilities, such as museums and theaters, can be expected to draw larger audiences as a result of improved accessibility and transit connectivity.

Civic, cultural, and religious facilities would experience improved access as a result of the BART Extension Alternative. Alteration to civic, cultural, and religious facilities resulting from displacement and relocation is discussed in Section 4.14, *Socioeconomics*. Operation of the BART Extension Alternative would have *no adverse effect* on civic, cultural, and religious facilities, and no mitigation would be required.

4.4.5 NEPA Conclusion

BART Police would provide primary law enforcement within the BART Extension Alternative Operating Corridor, including onboard trains, tunnels and right-of-ways, and within the station platform areas. Police protection for BART facilities outside of the Operating Corridor would be coordinated by VTA and the SCCSO. VTA would also expand existing mutual aid agreements with regional police providers, including SJPD, SCPD, and

SMCSO. These agencies would provide supplemental law enforcement along the BART Extension Alternative; however, the BART Extension would not significantly degrade their existing level of service. The BART Extension Alternative would have *no adverse effect* on police services under NEPA, and no mitigation would be required.

SJFD and SCFD would be the primary responders to incidents along the BART Extension Alternative. However, operational safety procedures implemented by BART's System Safety Department would significantly reduce the need for emergency services within the BART system. Though SJFD and SCFD would respond to incidents along the BART Extension Alternative, the BART Extension Alternative would not significantly degrade their existing level of service. The BART Extension Alternative would have *no adverse effect* on fire services under NEPA, and no mitigation would be required.

The BART Extension Alternative would not directly increase population in the study area. Therefore, there would be no direct demand for school or park facilities. Existing trails near the proposed Diridon Station South and North Options may experience increased usage as a result of the BART Extension Alternative; however, planned transportation improvements would reduce the potential for degradation of trail facilities. Operation of the BART Extension Alternative would have *no adverse effect* on parks and *no effect* on schools under NEPA, and no mitigation would be required.

Civic, cultural, and religious facilities that serve local residents would not see a direct increase in demand as a result of the BART Extension Alternative, although facilities that serve regional audiences would benefit from increased transit connectivity. There would be *no adverse effect* on civic, cultural, or religions facilities with the BART Extension Alternative, and no mitigation would be required. There would be *no adverse effect* on schools and park and recreational facilities under NEPA, and no mitigation would be required.

4.5 Cultural Resources

4.5.1 Introduction

This section describes the environmental consequences related to cultural resources from operations of the NEPA Alternatives. The analysis in this section is based on the following key sources of information.

- Background records/literature review conducted at the Northwest Information Center, Sonoma State University, Rohnert Park; the repository of cultural data for Santa Clara County.
- Consultation with the California State Historic Preservation Officer (SHPO), Native American Heritage Commission (NAHC), local Native American groups, and individuals.
- *VTA's Silicon Valley Rapid Transit Corridor EIS/SEIR Technical Memorandum, Archaeological Survey and Sensitivity Report for SVRTC EIS/SEIR* (Far Western Anthropological Research Group 2010).
- *VTA's BART Silicon Valley—Phase II Extension Project, Archaeological Resources Technical Report* (Far Western Anthropological Research Group 2016).
- *VTA's BART Silicon Valley—Phase II Extension Project: Supplemental Built Environment Survey Report* (JRP Historical Consulting 2016).
- *VTA's BART Silicon Valley—Phase II Extension Project: Finding of Effects* (JRP Historical Consulting, ICF, Far Western Anthropological Research Group 2016).

4.5.2 Environmental and Regulatory Setting

4.5.2.1 Environmental Setting

Two Areas of Potential Effects (APEs), one for archaeological resources and one for architectural resources, have been identified and are included in this SEIS/SEIR as Appendices D.1 and D.2. The APEs for archaeological and historic architectural resources were defined by the Federal Transit Administration (FTA) and VTA, in consultation with the SHPO. On April 6, 2016, the SHPO concurred with the delineation of the APE. Since then, options for the Twin-Bore and Single-Bore tunnel as well as station design options, construction staging areas, parking lots, ventilation structures, and other design features had been incorporated into the project design, which resulted in changes to the APE. The SHPO concurred on the delineation of the revised APEs on October 28, 2016 (Polanco 2016). Additional details on the APEs are provided below.

Archaeology

Area of Potential Effect

The archaeological APE was identified in accordance with National Historic Preservation Act (NHPA) Section 106 (36 Code of Federal Regulations [CFR] part 800.4(a)(1)) and encompasses all areas where BART Extension construction and staging would occur. It encompasses both a horizontal and vertical extent, measuring approximately 6 miles in length, a maximum of 1,897 feet in width (including the combined width of the Twin-Bore and Single-Bore Options), and reaches depths up to 120 feet below surface.

Besides the 5-mile-long underground tunnel corridor route, the eastern extent of the APE includes surface construction staging areas (CSAs) and the East Tunnel Portal east of U.S. 101 and south of Mabury Road in the City of San Jose; CSAs in part of the existing Union Pacific Railroad right-of-way, including the bridge over U.S. 101; and the Alum Rock/28th Street Station, just west of U.S. 101 and north of Alum Rock Avenue. The tunnel then passes under Coyote Creek, includes the 13th Street Mid-Tunnel Ventilation Structure, and passes through downtown San Jose where the San Jose Station East and West Options and associated CSAs are proposed. Another CSA is under the elevated roadway of State Route (SR) 87, followed by the Diridon Station South and North Options, and the Stockton Avenue Mid-Tunnel Ventilation Structure. The West Tunnel Portal, Newhall Maintenance Facility, Santa Clara Station, and additional CSAs extend along the west end of the APE. The APE map can be found in Appendix D.2 of this document, and a detailed text description is presented in the *Archaeological Resources Technical Report* (ARTR).

The majority of the alignment (about 5 of the 6 miles) would consist of subway tunnels excavated by a tunnel boring machine, and in those areas, no surface deposits would be disturbed. Tunnel depths vary across the corridor, ranging between 30 and 80 feet for the Twin-Bore Option, and between 40 and 120 for the Single-Bore Option. This depth places most of the tunnel length well below where cultural deposits would be anticipated. The station boxes, crossovers, station entrances, and supporting infrastructure would be excavated from the surface and would variably extend to approximately 70 to 150 feet deep. Excavations at the campus areas of the four stations would range from approximately 12 to 15 feet for elevator shafts, utilities, and site preparation. Pile driving for tall structures within the station campuses typically ranges from 30 to 90 feet deep depending on site conditions. Excavations at the two mid-tunnel ventilation facilities would extend from the surface to approximately 75 to 90 feet deep. Excavations at the end-of-the-line maintenance facility would range from 5 to 10 feet deep for utility relocation and site preparation. Excavation for building pads within the maintenance facility would range from approximately 15 to 20 feet deep, with pile driving for tall structures at depths of 30 to 90 feet deep. Cut-and-cover excavation at the East and West Tunnel Portals would range from approximately 75 to 90 feet deep.

In the staging areas outside of permanent footprints, minimal ground disturbance and compaction is anticipated (1–2 feet) to account for stockpiling of soils or building materials, machinery, and other construction equipment. However, some portions of staging areas may be subject to greater disturbance, such as possible excavation to 3–5 feet, for detention areas to dry out materials such as concrete washout pits.

Background Records Search and Archival Research

Bibliographic references, previous survey reports, historic maps, and archaeological site records pertinent to the archaeological APE were compiled through a records search of the California Historical Resources Information System in order to identify prior archaeological studies and known cultural resources within a 0.5-mile area surrounding, or adjacent to, the archaeological APE. The area within this 0.5-mile search radius is referred to as the *study area* or *records search area* in this section.

Records searches were conducted in 2001, 2002, 2008, 2013, and 2015 at the Northwest Information Center of the California Historical Resources Information System (Ruby et al. 2010; Far Western 2016).

The records search involved a review of the following.

- Site records for previously recorded sites.
- All previous studies conducted within 0.5 mile of the archaeological APE.
- The National Register of Historic Places (NRHP).
- The California Historic Resources Inventory (HRI).
- The Office of Historic Preservation (OHP) Historic Properties Directory (HPD).

Archival and geoarchaeological research, pedestrian inventory, bore hole monitoring, and records searches identified one formally recorded archaeological site within the APE (site CA-SCL-363H/P-43-000369), the potential for archaeological deposits associated with 84 historic-era sites, and areas of high sensitivity for buried cultural deposits.

Summary of Native American Consultation

VTA, on behalf of the FTA, contacted the NAHC on March 4, 2015, to request a search of the Sacred Lands File (SLF) and to provide a list of interested Native American representatives. The NAHC responded on March 26, 2015, stating that a search of the SLF did not contain any records of Native American sacred sites in or adjacent to the archaeological APE.

The NAHC also provided a list of 11 Native American contacts who might have information pertinent to the BART Extension or have concerns regarding the proposed actions. Because the BART Extension was initiated before July 2015, California State Assembly Bill 52 (Chapter 532, Statutes of 2014) does not apply for CEQA. For Section 106, the following is a list of the Native American Identified Contacts whom FTA contacted in regards to the BART Extension.

- Jakki Kehl, Ohlone/Costanoan
- Katherine Erolinda Perez, Ohlone/Costanoan, Northern Valley Yokuts, Bay Miwok
- Linda Yamane, Ohlone/Costanoan
- Valentin Lopez, Chairperson, Amah Mutsun Tribal Band
- Edward Ketchum, Amah Mutsun Tribal Band
- Irene Zwierlein, Chairperson, Amah Mutsun Tribal Band
- Michelle Zimmer, Amah Mutsun Tribal Band of Mission San Juan Bautista
- Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan
- Rosemary Cambra, Chairperson, Muwekma Ohlone Indian Tribe of the SF Bay Area
- Andrew Galvan, The Ohlone Indian Tribe
- Ramona Garibay, Representative, Trina Marine Ruano Family

The ARTR contains the Native American correspondence sent and received as well as phone call transcripts between VTA and Native American contacts for the BART Extension to date. Comments received during the consultation process included the following: requests to be kept informed as the process progresses, requests for copies of the cultural studies when they are available, and requests that cultural resource training be required for construction crews because the project is located in culturally sensitive areas. Valentin Lopez, Chairperson of the Amah Mutsun Tribal Band, deferred review and comment on this project to the Muwekma Ohlone Indian Tribe and representative Rosemary Cambra. No resources, including traditional cultural properties, were identified during the consultation process described above. Native American consultation for the Phase II Project is ongoing and will be updated as responses are received.

Resources

Known Resource CA-SCL-363H (CA-SCL-363H/P-43-000369)

This site contains archaeological features associated with the Spanish Period Amesquita Adobe as well as Late American commercial and residential features, some of which are possibly associated with one of the City's post-1877 Chinatowns. It encompasses a part of the city's original Pueblo San Jose de Guadalupe, which was established in 1777. Most of the site is considered eligible for listing to the NRHP under Criteria A and D, although the portion underlying SR 87 is not.

The Amesquita Adobe was built in the 1790s and is named for Manuel Amesquita, one of the original founders of the Pueblo San Jose de Guadalupe. The building remained in the Amesquita family until 1848 and was dismantled in 1925. The building may have been the oldest fired-brick, two-story residence in California and was used as the region's first jail (Gilreath 2003). The dismantled adobe building was apparently reconstructed in Cupertino sometime around 1925 within an unspecified historic park. The adobe's foundations were exposed during archaeological excavations conducted in 1979 by Archaeological Resource Management (Cartier 1979) and remains protected by two feet of sand on its sides and top (City of San Jose 2013). The adobe foundations lie outside the APE just south of the tunnel alignment.

Extensive additional excavations at the site conducted for various redevelopment projects since 1979 have revealed historic trash and privy deposits and foundations associated with a Chinese laundry, the Orange Mill/Distillery Complex, a flour mill, an undertaker, a wine depot, residences, and delivery stables (e.g., Basin Research Associates 2003; Caltrans 2003; Cartier et al. 1984). All these deposits and features were encountered at maximum depth of 6 feet.

The site extends across the city block now bounded by Santa Clara Street on the north, Almaden Boulevard on the east, West San Fernando Street on the south, and Guadalupe River on the west. SR 87 courses north-south across its western portion, and that portion of the site underlying its right-of-way was greatly disturbed during the highway construction and during prior river channelization conducted by the U.S. Army Corps of Engineers (Basin Research Associates 2003). Consequently, the Federal Highway Administration determined that this disturbed portion of the site did not contribute to the site's eligibility. This correspondence is provided in the *Finding of Effects*. The SHPO concurred with this finding but noted that historic archaeological deposits might still exist to the west of the right-of-way (Mellon 2003a,2003b,2003c). This contradicts the most recent boundary revision proposed for this site (Gilreath 2003), which confines the site to the east of SR 87. For the BART Extension, therefore, the site boundaries are considered to extend west of SR 87 to the Guadalupe River as per SHPO.

Unknown Resources

The 2016 ARTR identified numerous locations within the APE where archaeological resources or human burials may be expected. According to the buried site sensitivity assessment in the ARTR, there are several locations within the APE where buried prehistoric archaeological deposits may present (i.e., areas of buried site sensitivity). Buried site sensitivity was also identified in the vicinity of the proposed stations, vents, and station portals. Additionally, Holocene-age sediments that may contain cultural materials may occur in the area between Coyote Creek and the Guadalupe River.

In addition to CA-SCL-363H, there are 84 locations within or immediately adjacent to the APE where historic-period archaeological materials may be discovered based on archival research. Of those, 77 are within the APE, and 7 are adjacent to the APE (within 30 feet) and could potentially extend into the APE. Of these 84 locations, 55 are in areas of proposed surface disturbance by the BART Extension, and 29 are above the proposed underground tunnel alignment.

Whether those resources qualify as significant under Section 106 of the National Historic Preservation Act cannot be determined without further research and testing. Preconstruction archaeological testing is recommended to test the sensitive areas within the APE that may be disturbed by construction. However, many of the sensitive areas are located under existing buildings or infrastructure that would have to be removed prior to testing, are located on private property, or both. Therefore, it is not feasible to test all areas of potential buried site sensitivity at this time.

Therefore, a Draft Programmatic Agreement (PA) has been prepared for the identification and evaluation of archaeological resources in phases prior to construction of the project and treatment of archaeological resources and burials in the event that such resources are discovered during construction activities. The Draft PA includes an outline for an Archaeological Resources Treatment Plan (ARTP) that will be prepared. The ARTP will describe archaeological procedures, notification and consultation requirements, professional qualifications requirements, and procedures for the disposition of artifacts if any are discovered. The preparation and implementation of the Draft PA and ARTP are identified in Chapter 5, Section 5.5.6, *Cultural Resources*, as Mitigation Measure CUL-CNST-A. The Draft PA is included in Appendix D.3.

On October 28, 2016, the SHPO concurred that FTA and VTA's historic resources identification efforts to date were appropriate for the Undertaking, and the development of a Programmatic Agreement and Treatment Plan to address the phased archaeological identification efforts was appropriate (Polanco 2016).

Historic Architecture

Area of Potential Effects

A separate APE, referred to as the architectural APE, was delineated for historic architectural resources or built environment resources to allow for the identification and analysis of potential effects on this type of historic property. The architectural APE, as shown in Appendix D.1, reflects the BART Extension Alternative as described in Chapter 2, *Alternatives*. In accordance with NHPA Section 106, CFR Part 800.4(a)(1), the architectural APE includes the Area of Direct Impact (ADI), plus a buffer area immediately adjacent to surface construction and the legal parcels immediately above the work for tunneled portions of the BART Extension Alternative. Where the BART Extension Alternative bisects a legal parcel, the architectural APE extends to encompass the entire legal parcel.

Background Records Search

Historic architectural resources generally include buildings, structures, objects, and districts that are more than 50 years of age. However, to account for the long lead time between preparation of the environmental documentation and actual construction, the age limit was extended to 40 years to include buildings, structures, and features constructed in or prior to 1975. The BART Extension is scheduled to be operational in 2025; therefore, resources constructed in 1975 or before would potentially be historic resources in 2025 and require evaluation. Those resources constructed in or before 1975 have been included in the survey population in addition to the resources added due to the expanded APE since 2003.

The initial survey efforts were completed in 2003 for the full 16-mile BART Silicon Valley Program (JRP Historical Consulting 2003). As previously discussed, design refinements such as station design options, construction staging areas, parking lots, ventilation structures, and other design features, resulted in a revised APE. Additional surveys and record searches were conducted for the revised APE. For reference purposes, the survey population resources have been assigned Map Reference numbers; these include properties identified as listed in or determined eligible for the NRHP as part of the initial survey efforts (JRP Historical Consulting 2003). The Map Reference numbers are identified in Tables 4.5-1 through 4.5-3, below, and are shown on aerial base maps with a reference number that consists of the sheet letter and resource reference number (these maps are included as Figure 3 in Appendix A of the *Supplemental Built Environment Survey Report* (JRP Historical Consulting 2016). For example, resources located on Figure 3-A have been assigned Map Reference numbers "A-01, A-02," etc., and resources located on Figure 3-D are "D-01, D-02," etc.

In addition to the background records search discussed above, which included built environment resources, additional research was conducted to determine which resources within the architectural APE were built in or before 1975 and would be studied further as part of the survey and evaluation process. This included property records research through First American Real Estate Solutions (FARES) and CoreLogic commercial databases; and the review of current and historic topographic and property maps, Santa Clara County property records, building permits for the City of San Jose, historic aerial photographs, Sanborn Fire Insurance Company maps, and other documents, including previous surveys of historic architectural resources. The following data sources were also examined for known historic architectural resources.

- National Register of Historic Places (both listed and determined-eligible properties).
- California Register of Historical Resources.
- California Inventory of Historic Resources (OHP 1976).
- California Points of Historical Interest (OHP 1992).
- California Historical Landmarks (OHP 1995).
- Directory of Properties in the Historic Property Data Files for Santa Clara County (updated April 2014).

Of the more than 500 historic-era built environment resources identified within the 0.5-mile buffer around the BART alignment and stations from the 2013 and 2015 record searches conducted at the NWIC, 7 were located within the architectural APE. These resources were found to be not eligible for the NRHP and are not historic properties under Section 106, nor are they historical resources for the purposes of CEQA. However, 27 known historic properties located within the current architectural APE were identified within previous survey reports, including the inventory and evaluation report completed in 2003 for VTA's 16-mile BART Silicon Valley Program (JRP Historical Consulting 2003). All 27 properties are listed in or determined eligible for the NRHP and CRHR (see Table 4.5-1). Also, during the field surveys in 2015 and 2016, an additional 2 resources were discovered to be eligible for the NRHP and are described in Table 4.5-2. Two other properties identified in the 2003 survey efforts were found not eligible for the NRHP but were eligible for the CRHR (Table 4.5-3). The remaining resources identified through the NWIC record searches are not historic properties because they were previously found not eligible for the NRHP or CRHR, are no longer extant, or were not within the architectural APE.

The survey population was inspected in the field, photographed, and described in detail on Department of Parks and Recreation (DPR) 523 forms, as necessary. Research collected during the 2003 survey was utilized to the extent possible for the survey population and was augmented with additional research at the California State Library, Sacramento; Shields Library, University of California, Davis; Santa Clara County Assessor's Office; California Room, San Jose Public Library; the archives of "History San Jose" at Kelly Park; the San Jose City Planning Department, Building Division; and various online sources.

Consultation with Historic Preservation Groups

As part of earlier survey effort conducted for the first phase of the BART Silicon Valley Program (JRP Historical Consulting 2003) and pursuant to Section 106 of the National Historic Preservation Act, interested parties were contacted through a notification letter circulated in November 2002, with follow-up correspondence in January 2003. Letters were also sent to 25 local historical agencies and organizations requesting information regarding known or potential historic resources in the vicinity. These agencies and organizations included the following:

- Santa Clara County Planning Office
- Alameda County Planning Department
- City of San Jose Planning Department
- City of San Jose Historic Preservation Officer
- City of Milpitas Planning Department
- Alameda County Historical Society
- Santa Clara County Historical Heritage Commission
- San Jose Historic Landmarks Commission
- San Jose Redevelopment Agency
- East Santa Clara Street Revitalization Committee
- Los Fundadores–Santa Clara
- Victorian Preservation Association
- City of Santa Clara Planning Department
- City of Santa Clara Historical and Landmarks Commission

- Heritage Council of Santa Clara County
- Milpitas Cultural Resources Preservation Board
- Milpitas Historical Society
- Historical Preservation Society of Santa Clara
- History San Jose and Historical Association
- Preservation Action Council of San Jose
- Santa Clara County Historical and Genealogical Society
- South Bay Historical Railroad Society
- California Trolley and Railroad Corporation
- National Railroad Historical Society Central Coast Chapter
- Caltrain/Peninsula Corridor Joint Powers Board (JPB)

Responses were received from Los Fundadores–Santa Clara and the City of Milpitas. Follow-up meetings were held with the City of San Jose Historic Preservation Officer, Preservation Action Council of San Jose, San Jose Historic Landmarks Commission, City of Santa Clara Historical and Landmarks Commission, South Bay Historical Railroad Society, and JPB. Comment letters related to the 2004 EIR and 2007 Supplemental EIR were received from the City of San Jose Planning Department, City of San Jose Historic Preservation Officer, Preservation Action Council of San Jose, San Jose Historic Landmarks Commission, City of Santa Clara Historical and Landmarks Commission, and South Bay Historical Railroad Society. Coordination with the historical agencies and organizations remains ongoing.

FTA and VTA coordinated with SHPO regarding the inventory of cultural resources within the APE, the eligibility of these resources for listing on the NRHP, and the impacts of the alternatives to such eligible resources. Meetings with the SHPO were held on October 30, 2003, January 26, 2009, December 17, 2009, in 2013, and on January 17, 2014, February 29, 2016, May 5, 2016, and June 8, 2016.

In addition, VTA, FTA, and JRP Historical Consulting have worked closely with the historic preservation covenant holder for the two listed train stations within the APE: Ms. Lorie Garcia of the South Bay Historic Railroad Society (SBHRS), whose headquarters are located within the Santa Clara Station. VTA, principals of JRP, representatives of local communities, and Ms. Garcia also participated in a meeting and site visit on July 25, 2002, of both the NRHP-listed railroad stations within the APE: Diridon (Cahill) Station and Santa Clara Station. The SBHRS is the covenant holder for both these stations, which are currently part of the Caltrain system.

On January 30, 2015, VTA distributed a Notice of Preparation (NOP) to advise interested agencies and the public that VTA intends to prepare an SEIS/SEIR for the Phase II Project.

VTA distributed the NOP to approximately 225 agencies, elected officials, and interested parties and organizations in the study area. VTA also notified potentially interested individuals and organizations regarding the scoping process and public scoping meetings for the Phase II Project. VTA used multiple methods to announce the scoping process and public meetings, including display advertisements in local newspapers, mailings to addresses located in the vicinity of the Phase II Project, emails sent to recipients on the VTA emailing list, news releases posted on the VTA website, and social media postings on VTA's Facebook page and Twitter account.

VTA conducted three formal environmental scoping meetings to gather input and comments prior to the development of the SEIS/SEIR. Meetings were held on February 12, 17, and 19, 2015, in Santa Clara, downtown San Jose, and east San Jose. Each public scoping meeting included a sign-in/open house portion of the meeting, where the public could view Phase II Project informational display boards of the alignment and concept exhibits for the stations, and a presentation portion of the meeting during which VTA staff provided an overview of the Phase II Project and environmental process in PowerPoint format. Following the presentation, formal public comments on the presented materials were documented. Oral comments provided at the meetings were transcribed by a court reporter. Written comments were accepted at the meetings and via mail or email to VTA until the comment deadline.

Starting in 2015, VTA re-initiated three Community Working Groups (CWGs), one for the Alum Rock/28th Street Station area, one for the Downtown San Jose Station (East and West Options)/Diridon Station (South and North Options) area, and one for the Santa Clara Station area to communicate project information to key members of the community and provide feedback on strategies related to successfully delivering and completing the BART Extension. CWGs receive briefings on technical areas and project updates and act as a conduit for the community at large. Group members include the leaders of neighborhood and business associations, community organizations, advocacy groups, major property owners, and planning commissioners. VTA invited Mr. Jack Morash, who has been a Santa Clara CWG member since June 11, 2015, as a representative of the South Bay Historical Railroad Society. Mr. Morash provides project updates to Lorie Garcia and contributes to the CWGs by notifying VTA staff of the SBHRS concerns about the project.

Consultation with historic preservation groups for the Phase II Project is ongoing and will be updated as responses are received.

Historic Architectural Resources Present in the APE

The architectural APE includes 129 historic built-environment resources constructed in or before 1975. The SHPO concurred with the eligibility findings of the 2003 inventory and evaluation report (*Historic Resources Evaluation Report*) for the BART Silicon Valley Program (JRP Historical Consulting 2003) within letters dated June 9, 2003 and July 9, 2003 (Mellon 2003d, 2003e). In a letter dated October 28, 2016 (Polanco 2016) the SHPO also agreed with the eligibility determinations in the 2016 *Supplemental Built Environment Survey Report* (JRP Historical Consulting 2016). The following summarizes the properties that were determined eligible or not eligible for the NRHP. SHPO concurred with the eligibility of the properties on October 28, 2016 (Polanco 2016).

- 27 are currently listed in or have previously been determined eligible for the NRHP and CRHR.
- 2 have been determined eligible for the NRHP and CRHR as part of the current study.
- 2 have been determined not eligible for the NRHP but are eligible for the CRHR.
- 1 has been determined not eligible for the NRHP and CRHR but is a locally listed landmark and is therefore a historical resource for the purposes of CEQA (but is not a historic property under Section 106).
- 2 have been determined not eligible for the NRHP or CRHR, but are listed in local government registers or inventories and are therefore historical resources for the purposes of CEQA (but are not historic properties under Section 106).
- 95 have been determined not eligible for listing in the NRHP or CRHR.

The 29 historic architectural resources that are listed in or determined eligible for the NRHP and CRHR are historic properties under Section 106 and historical resources under CEQA. Ten of these historic properties are contributing elements to a NRHP-listed historic district (the San Jose Downtown Commercial District; see tables below), but are not individually eligible. The four properties that are eligible for the CRHR only or are listed in a local register or inventory are historical resources for the purposes of CEQA only. Tables 4.5-1 and 4.5-2 list the 29 historic properties (Section 106), which are also historical resources (CEQA). Table 4.5-3 lists the four properties that are only historical resources under CEQA. The remaining 95 resources are not historic properties (Section 106) or historical resources (CEQA).

Table 4.5-1: Properties Listed in or Previously Determined Eligible for the National Register of Historic Places and California Register of Historical Resources

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]	Date of Determination or listing
C-25	467-08-007 467-08-009 467-08-014	1375–1401 Santa Clara Street	1916–1960	2S2	6/9/2003
C-26	467-10-043	1191 Santa Clara Street	1949	2S2	6/9/2003
C-27	467-10-046	1169 (1167) Santa Clara Street	1888	2S2	6/9/2003
D-03	467-57-082	227–247 Santa Clara Street	1928	2S2 2S3	2/6/2006
E-08[b]	467-23-035	142–150 Santa Clara Street	1913	1D	1/1/1983
E-09[b]	467-23-036	138 Santa Clara Street	1905	1D	1/1/1983
E-10[b]	467-23-038	124–126 Santa Clara Street	1900	1D	1/1/1983
E-11[b]	467-23-039	114–118 Santa Clara Street	1920	1D	1/1/1983
E-12[b]	467-23-089	100 Santa Clara Street	1912	1D	1/1/1983
E-13[b]	467-22-149	96 Santa Clara Street	ca. 1883	1D	1/1/1983
E-14[b]	467-22-148	52 Santa Clara Street	1900	1D	1/1/1983
E-15	467-21-028	19 East 2nd Street	1925	2S2	1/1/1981
E-18[b]	467-22-041 467-22-042	42–48 Santa Clara Street	1930s	1D	1/1/1983
E-19[b]	467-22-158	36–40 Santa Clara Street	1869	1D	1/1/1983
E-20	467-54-001 through 467-54-034	22 North 1st Street	1926	2S2	8/3/1981
E-21[b]	467-62-001 467-62-007 through 467-62-020	8–14 South 1st Street	1926	1D	1/1/1983
E-22	259-40-038	34 Santa Clara Street	ca. 1880 1910s 1920s	2S2	6/9/2003
E-23	259-34-018	81 Santa Clara Street	1926	2S2	6/9/2003
E-24	259-34-046	101 Santa Clara Street	1942	2S2	6/9/2003
E-25	259-38-128	374 Santa Clara Street	1934	2D2	5/29/1990
E-35	259-35-05	151–155 Santa Clara Street	ca. 1884 1930 ca. 1970	2S2	2/6/2006
E-36	259-35-035	161–167 Santa Clara Street	1883	2S	6/4/1996
F-13	261-34-020	Cahill Station and Santa Clara / Alameda Underpass	1935	1D	4/1/1993
F-14	261-33-020	848 The Alameda	ca. 1884	2S	6/9/2003
F-15	261-01-074	176 North Morrison Avenue	ca. 1898	2S2	6/9/2003

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]	Date of Determination or listing
I-01	230-06-031 230-06-032 230-06-050 230-06-051	1 Railroad Avenue (Santa Clara Station)	1863– 1864 1877	1S	2/28/1985
I-02	230-06-040	Benton Street and Railroad Avenue (Santa Clara Tower, Speeder Shed, and Tool House)	1904 1927	2S2 2D	6/9/2003

[a] Applicable NRHP Status Codes are:

1D – Contributor to a district or multiple resource property listed in NRHP by the keeper. Listed in the CRHR.
2D – Contributor to a district determined eligible for the NRHP.
1S – Individual property listed in NR by the Keeper. Listing in the CRHR.
2D2 – Contributor to a district determined eligible for NRHP by consensus through Section 106 process. Listed in the CRHR.
2S – Individual property determined eligible for NRHP by the Keeper. Listed in the CRHR.
2S2 – Individual property determined eligible for NRHP by a consensus through Section 106 process. Listed in the CRHR.

[b] Contributor to the San Jose Downtown Commercial District, which was listed in the National Register of Historic Places in 1983.

Table 4.5-2: Properties Determined Eligible for Listing in the National Register of Historic Places and California Register of Historical Resources as Part of the Phase II Extension Project

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]
E-27	467-20-078	30 N. 3rd Street	ca. 1903	2S2
E-22	261-01-063	179-181 Rhodes Court	1948	2S2

[a] Applicable NRHP Status Codes are:

3S – Appears eligible for NRHP as an individual property through survey evaluation.

Table 4.5-3: Survey Population Properties that Are Historic Resources for CEQA but Are Determined Not Eligible for Listing in the National Register of Historic Places and/or California Register of Historical Resources as Part of the Phase II Extension Project

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]
D-04	467-24-036	48-52 South 6th Street	ca. 1905–1907	5S2, 6Z, 6Y
D-05	467-24-035	58 South 6th Street	1921	6L, 6Z, 6Y
E-16	467-21-027	43–49 Santa Clara Street	1887, 1927	5S3, 6Z, 6Y
E-17	467-21-026	35–39 Santa Clara Street	1876, 1936	5S3, 6Z, 6Y
F-19	261-33-023	808 and 824–826 The Alameda	ca. 1920s-1930, 1954	5S1, 6Z, 6Y

[a] Applicable NRHP Status Codes are:
5S2 – Individual property that is eligible for local listing or designation.
5S3 – Appears to be individually eligible for local listing or designation through survey evaluation.
6L – Determined ineligible for local listing or designation through local government review process; may warrant special consideration in local planning.
6Y – Determined ineligible for NRHP by consensus through Section 106 process. Not evaluated for CRHR or local listing.
6Z – Found ineligible for NRHP, CRHR, or Local designation through survey evaluation.

4.5.2.2 Regulatory Setting

Federal

National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) (United States Code [USC], Title 43, Section 4321 et seq.) requires the consideration of potential environmental effects, including potential effects on cultural resources, in the evaluation of any proposed federal agency action. This includes consideration of unique characteristics of the geographic area such as proximity to cultural resources and the degree to which the action may adversely affect districts, sites, highways, objects, or landscapes listed in or eligible for listing in the National Register of Historic Places (NRHP).

The NEPA regulations also require that, to the fullest extent possible, agencies integrate NEPA review concurrently with other environmental regulations, including surveys and studies required by the NHPA (described below), which, under Section 106, requires federal agencies to consider the effects of their actions on historic properties.

Section 106 of the National Historic Preservation Act

The NHPA (16 USC 470 et seq.) establishes the federal government policy on historic preservation and the programs—including the NRHP—through which this policy is implemented. Under NHPA, significant cultural resources, called historic properties, include any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the NRHP. A property is considered significant if it meets the NRHP criteria.

Section 106 requires that impacts on historic properties be taken into consideration in any federal Undertaking. The process for implementing the NHPA contains five steps: (1) initiating the Section 106 process, (2) identifying historic properties, (3) assessing adverse effects, (4) resolving adverse effects, and (5) implementing the project and any stipulations in an agreement document.

Section 106 affords the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Officer (SHPO) a reasonable opportunity to comment on any Undertaking that would adversely affect historic properties eligible for listing in the NRHP. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be determined eligible for inclusions in the NRHP.

Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act (16 USC 469–469(c)-2) provides for preservation of significant historic or archaeological data, including relics and specimens that may otherwise be irreparably lost or destroyed by construction of a project by a federal agency or under a federally licensed activity or program.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act (16 USC 470(a)-11) provides for the protection of archaeological resources and sites on public lands and Indian lands; establishes a procedure for the issuance of permits for conducting cultural resources research; and prescribes penalties for unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act (42 USC 1996) protects and preserves the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and Native Hawaiians. The act requires policies of all governmental agencies to respect the free exercise of Native religion and to accommodate access to and use of religious sites to the extent that the use is practicable and is not inconsistent with an agency's essential functions.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (25 USC 3001–3013) sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items on federal and tribal lands during implementation of a project. The act clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American tribes or tribes likely to be lineal descendants or culturally affiliated with the discovered remains or objects.

American Antiquities Act

The American Antiquities Act (16 USC 431–433) prohibits appropriation, excavation, injury, or destruction of “any historic or prehistoric ruin or monument, or any object of antiquity” located on lands owned or controlled by the federal government. The act also establishes penalties for such actions and sets forth a permit requirement for collection of antiquities on federally owned lands.

4.5.3 Methodology

4.5.3.1 Determination of Effect on Historic Architectural Resources

The analysis of potential effects on historic architectural resources is based on the Criteria of Adverse Effects contained within 36 CFR 800: “Effect means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register.” An *adverse effect* occurs “when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association….Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.”

Adverse effects include, but are not limited to, the following.

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary’s standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines.
- Removal of property from its historic location.
- Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance.
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property’s significant historic features.
- Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance.

An *adverse effect* would occur if the BART Extension Alternative would cause perceptible changes to the significant characteristics of a resource and would inhibit the resource's interpretive potential.

4.5.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.5.3, *Methodology*. This section also identifies measures to avoid, minimize, or mitigate impacts.

4.5.4.1 No Build Alternative

The No Build Alternative consists of existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects may result in varying degrees of effects to cultural resources typically associated with transportation projects in a culturally rich and diverse area. Where architectural and archaeological resources have adverse effects from the No Build Alternative projects, mitigation measures could include, but not be limited to, avoidance, protection, data recovery, and public education. Inadvertent or unexpected discoveries of cultural resources would be addressed in accordance with federal and state laws related to the protection of cultural resources. These projects would undergo separate environmental review to define potential substantial effects on historic resources, both archaeological and architectural, and to determine appropriate mitigation measures.

4.5.4.2 BART Extension Alternative

Archaeological Resources

The only operational activity that would have the potential to affect the one known archaeological historic property during BART operations would result from potential vibration impacts of the trains operating along the tracks within the tunnel.

A *Noise and Vibration Technical Report* was prepared for the BART Extension (Wilson, Ihrig & Associates 2016), in which data were based on criteria defined in the FTA *Transit Noise and Vibration Impact Assessment*, also referred to as the FTA Guidance Manual. The FTA Guidance Manual provides criteria to evaluate operational impacts for the BART Extension. This study found that operational (ground-borne) vibration primarily causes human annoyance or interference with use of equipment sensitive to vibration. Damage to historic buildings from vibration resulting from train operation is "unlikely, except when the track will be very close to the structure." In these cases, FTA provides direction to use the construction vibration threshold of 0.12 inches per second Peak Particle Velocity (PPV)—or alternatively 90 vibration velocity decibels (VdB) from the PPV limits—for those structures. Operational vibration levels at this historic property would be below 90 VdB; therefore, vibration from operation of the BART Extension would not adversely affect CA-SCL-363H or the elements of CA-SCL-363H that contribute to its eligibility to the NRHP. Therefore, operation of the BART Extension Alternative would result in *no adverse effect* on the one known archaeological historic property within the APE. Refer to Chapter 5, Section 5.5.6, *Cultural Resources*, for a detailed discussion about the BART Extension's effects on archaeological resources caused by construction.

Historic Architecture

Elements of the BART Extension located near historic properties include the connection to the Phase I Berryessa Extension, tunnel portals, ventilation or electrical facilities, Twin-Bore and Single-Bore Options, stations (Alum Rock/28th Street, Downtown San Jose East and West Options, Diridon South and North Options, and Santa Clara), and the Newhall Maintenance Facility. Operation of the BART Extension would cause *no adverse effects* on any of the 29 identified historic properties as described below.

Direct Adverse Effects

The elements of the BART Extension would result in *no direct adverse effects* on the identified historic properties because they would not result in the partial removal of, physical destruction of, or damage to any historic property. None of the aboveground components of the BART Extension alignment, including the elements described in the paragraph above, would result in the partial removal of, physical destruction of, or damage to any historic property.

Alum Rock/28th Street Station

The historic property near Alum Rock/28th Street Station, the Church of Five Wounds (Map Reference C-25), is located across the street from the station; therefore, the station is located outside of the historic property boundary and would not result in the partial removal of, physical destruction of, or damage to this historic property.

Downtown San Jose Station (East and West Options)

While some elements of the Downtown San Jose Station East and West Options, such as station entrance portals and elevators, would be located within the boundary of the San Jose Downtown Commercial District (see Map References E-08 through E-14, E-18, E-19, and E-21) and may alter the landscaping, infrastructure, and hardscape (i.e., sidewalks, curbs, light standards, and street furniture) within the public right-of-way at those locations, these features have been altered and/or replaced over time are not considered contributing elements of the district. Given the size of the historic district (28 contributing structures in total located within a more than two-square-block area over 11 acres), and that there are only three locations under the West Option and one location under the East Option where station entrance portals or elevators would be located within or immediately adjacent to the historic district, any potential alteration of the streetscape features within the public right-of-way would not present an adverse effect on the overall historic district.

Set in a dense urban setting, the San Jose Downtown Commercial District, which consists of late nineteenth and early twentieth century buildings predominantly one to five stories in height, has already been altered by the construction of modern (i.e., not dating to the historic district's period of significance) buildings, structures, and infrastructure, including the addition and/or replacement of light standards, mailboxes, signage, traffic and pedestrian lights, bus shelters, parking meters, and sidewalk improvements. The Undertaking's proposed one-story entrance portals and elevators are small in scale relative to the surrounding buildings, and their massing would be consistent with the character of the commercial district and existing transportation corridors. The historic integrity of the historic district and its contributors, including those that are adjacent to entrance portals and elevators (Map References E-13, E-14, and E-18), would remain unchanged.

Under the Downtown San Jose Station West Option, a station entrance portal is proposed within a vacant lot, currently used as a parking lot, adjacent to 81 Santa Clara Street (Map Reference E-23), which is individually eligible for the NRHP. The station entrance would include an elevator, stairs, and escalators set back from Santa Clara Street behind a glass façade. However, the glass façade of the entrance would be free standing and set back slightly from the façade of the historic property; therefore, it would result in *no direct adverse effect* on the historic building.

Refer to the *Indirect Adverse Effects* section below for additional analysis of potential effects on historic properties from the Downtown San Jose Station East and West Options.

Diridon Station South Option

Components of the Diridon Station South Option (Twin-Bore and Single-Bore Options), including a reconstructed bus transit center, station entrance portal, and tunnel ventilation, emergency exhaust ventilation, and fresh air shafts, would also be located within the boundary of the Cahill Station (Map Reference F-13). For the same reasons described above for the Diridon Station North Option, these features would be in an area already altered by the extant transit center and would be a considerable distance away (approximately 50 or more feet) from the key contributors (depot, wrought-iron fencing, tracks, and passenger sheds). These Undertakings would not cause the partial removal of, physical destruction of, or damage to any contributing elements of the historic property. The historic use and integrity of the historic property would be unchanged.

Diridon Station North Option

Portions of the Diridon Station North Option (Twin-Bore and Single-Bore Options) would be located within the boundary of the Cahill Station (Map Reference F-13). The aboveground features, including a reconstructed bus transit center, station entrance portal, and tunnel ventilation, emergency exhaust ventilation, and fresh air shafts, would be in an area already altered by the extant transit center and would be approximately 20 or more feet away from the depot, wrought-iron fencing, tracks, passenger sheds, and undercrossing, all of which contribute to the significance of this historic property. These features would not cause the partial removal of, physical destruction of, or damage to any contributing elements of the historic property. The historic use and integrity of the historic property would be unchanged.

Newhall Maintenance Facility

Two historic properties (Map References I-01 and I-02) are located adjacent to the Newhall Maintenance Facility; however, operation of the maintenance facility would not result in the partial removal of, physical destruction of, or damage to these two historic properties.

Santa Clara Station

Santa Clara Station would be located more than 150 feet from the historic properties (Map References I-01 and I-02) and across several active passenger and freight heavy rail lines; therefore, the station would not result in the partial removal of, physical destruction of, or damage to these two historic properties.

Indirect Adverse Effects

The BART Extension Alternative would also result in *no indirect adverse effects* on the identified historic properties from the operation of tunnels, stations (Alum Rock/28th Street, Downtown San Jose East and West Options, Diridon South and North Options, and Santa Clara), or the Newhall Maintenance Facility. Indirect effects on historic properties may be caused by the introduction of new visual, auditory, and vibration elements from the Build Alterative. However, all below-grade features of the Twin-Bore and Single-Bore Options and stations would not be visible from the surface near any historic property, and therefore would not result in any indirect adverse visual effects on the 29 historic properties. Each station would include the operation of aboveground station entrances; ventilation, fresh air, exhaust, and access shafts. In addition, the Downtown San Jose Station would include the construction of a new building to house the emergency exhaust shaft and streetscape improvements. None of these aboveground components would cause any indirect adverse visual effect on historic properties. Refer to the series of figures included in the *Finding of Effects* (JRP, ICF, and Far Western 2016) that show existing conditions and simulated views depicting BART Extension elements such as station entrances and other aboveground elements in relation to eligible historic properties (see also, Chapter 5, Section 5.5, *Impacts from Construction of the BART Extension*). These figures are provided in Section 4.16, *Visual Quality and Aesthetics*.

Station entrance portals at all four stations would consist of canopy structures that would measure approximately between 8 and 24 feet wide, 10 and 40 feet long, and up to approximately 15 feet high. The length and width of the canopies vary depending on the number of escalators and/or stairs at each entrance portal location. These entrances would be in proximity to various historic properties, some of which are contributors to the San Jose Downtown Commercial District but not individually eligible, and some of which are outside the historic district but individually eligible. The small scale of these structures, which would be one-story in height, and the use of transparent materials, which would have the effect of reducing the appearance of the massing, would minimize visual impacts on nearby historic properties and the historic district. The structures would be compatible with the existing urban setting and the character of the late nineteenth and early twentieth century historic district, which has already been modified by modern infill construction and infrastructure. These canopies would not noticeably block views when looking to or from historic properties, nor would they alter the character-defining features for which the historic properties or the historic district were found to be historically significant.

In addition, the Downtown San Jose West Option would include an entrance portal set back behind a free-standing glass façade adjacent to one historic property (Map Reference E-23), which is located outside of the boundaries of the historic district. The free-standing façade would be constructed of transparent glass and metal panels and would measure approximately 160 feet in length. Similarly, the entrance canopies at this location, which would be behind the free-standing façade, would be constructed using transparent glass walls and roof with only a thin entrance archway of non-transparent material. The one-story façade and the even smaller entrance canopies would be subordinate in terms of size and massing to the adjacent two-story buildings, and the use of transparent materials would minimize visual impacts on the nearby historic property. The façade would not visually detract from the architectural character of the historic property because it would be lower in height and use materials that are architecturally differentiated but compatible with the historic building. These canopies and façade would not noticeably block views when looking to or from the historic property, nor would they alter the character-defining features for which the historic property was found to be historically significant.

Ventilation, fresh air, exhaust, and access shafts associated with stations would extend approximately 12 feet above grade and measure approximately 15 by 20 feet. These station components would be visible from some historic properties; however, their viewshed and setting would not be adversely altered, and the historic integrity of the historic properties near these shafts would be unchanged. The small scale and massing of these elements would be consistent with the existing dense urban setting of these historic properties.

The operation of the Newhall Maintenance Facility and the Santa Clara Station would not cause any indirect adverse visual effects on the two nearby historic properties (Map References I-01 and I-02). All components of the station (except an underground pedestrian tunnel connection that would not be visible from either historic property), including a portal entrance, a one-story boarding platform, a parking structure that would be up to five stories in height, and two system facilities that would be 12 and 20 feet high, would be more than 200 feet from both historic properties, and all aboveground elements of the maintenance facility would be more than 150 feet from either historic property. Although both the station and maintenance facility would be visible from both historic properties, neither would adversely diminish the viewshed of the industrial and rail transportation setting of these historic properties. These historic buildings were originally constructed along a nineteenth century, at-grade railroad, and the introduction of a similar rail line and its associated station and maintenance facilities nearby would not diminish the qualities of these historic properties that qualify them for the listing in the NRHP.

Further, there are no indirect adverse effects on any historic property from predicted vibration or noise impacts from operation of the BART Extension Alternative at the location of any historic property. Operational noise has the potential to cause indirect adverse effects only on historic properties that have an inherent quiet quality that is part of a property's historic character and significance (i.e. churches, parks, and National Historic Landmarks with significant outdoor use). Of the 29 historic properties addressed in this report, only one, the Church of Five Wounds (Map Reference C-25), is considered to have an inherent quiet quality. The predicted operational noise level at the location of this historic church would reach up to 25 A-weighted decibels (dBA), a level less than the FTA threshold of 40 dBA for institutional buildings and historic buildings with an indoor use that involves meditation and study (i.e., a church or school). Thus, the BART Extension Alternative would result in no indirect adverse effects on the historic church from operational noise.

All other historic properties, which consist of commercial, transportation, industrial, and residential resources, do not have an inherent quiet quality that is part of their historic character or significance; therefore, the BART Extension Alternative would not result in any indirect adverse effect on those 28 historic properties from operational noise.

According to the FTA *Transit Noise and Vibration Impact Assessment* (2006), operational (ground-borne) vibration primarily causes human annoyance or interference with use of equipment sensitive to vibration. Damage to historic buildings from vibration resulting from train operation is "unlikely, except when the track will be very close to the structure." In these cases, FTA provides direction to use the construction vibration threshold of 0.12 in/sec PPV—or alternatively 90 vibration velocity decibels (VdB) from the PPV limits—for those structures. Operational vibration levels at all 29 historic properties would be below 90 VdB; thus, no adverse effects are anticipated on any historic properties from operational vibration.

In conclusion, under Section 106, the BART Extension Alternative would have *no adverse effect* on any of the 29 identified historic properties, and therefore, no further mitigation is necessary.

4.5.5 NEPA Conclusion

Operation of the BART Extension Alternative would result in *no adverse effect* under NEPA on archaeological resources, historic properties, or historic districts listed or eligible for the NRHP, and no mitigation is required.

The extension consists of a corridor and large land areas, and areas where access to properties is restricted. In addition, portions of the corridor include areas of sensitivity for encountering buried archaeological deposits and features, and the effect on historic properties cannot be fully determined prior to the approval of the Undertaking. As described in Chapter 5, Section 5.5.6, *Cultural Resources*, construction of the BART Extension may adversely affect as-yet unidentified archaeological sites eligible for the NRHP. FTA and VTA have therefore chosen to conduct the identification and evaluation of potential historic properties, and the resolution of any adverse effects on historic properties within the APE, in phases pursuant to 36 CFR 800.4(b)(2) and 36 CFR 800.5(a)(3), subsequent to the approval of the Undertaking. Therefore, a Draft PA has been prepared, which includes an outline for an ARTP. The preparation and implementation of the Draft PA and ARTP are identified in Chapter 5, Section 5.5.6, *Cultural Resources*, as Mitigation Measure CUL-CNST-A. The Draft PA is included in Appendix D.3.

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4.6 Electromagnetic Fields and Electromagnetic Interference

4.6.1 Introduction

This section describes the affected environment and environmental consequences related to electromagnetic fields (EMF) and electromagnetic interference (EMI) from operations of the BART Extension. EMF is associated with electromagnetic radiation, which is energy in the form of photons. Radiation energy spreads as it travels and has many natural and human-made sources. The electromagnetic spectrum, the scientific name given to radiation energy, includes light, radio waves, and X-rays, among other energy forms. For purposes of describing the EMF setting and effects for the BART Extension, human-made sources of radiation energy and associated EMF are relevant.

4.6.2 Environmental and Regulatory Setting

4.6.2.1 Environmental Setting

This section discusses the existing conditions related to EMF and EMI in the BART Extension area, including staging areas.

Because EMF levels are typically site-specific, the existing EMF environment along the corridor varies depending upon location. For example, commercial and industrial centers using major electrical systems and areas near high-voltage lines or other power transmission networks would likely have higher EMF levels than residential and undeveloped areas. Land uses within urbanized areas vary from industrial to commercial to residential. Table 4.6-1 shows measurements to establish EMF levels. Although these measurements were taken in 2003, these are considered valid in 2015 because background EMF levels typically change little over time in urban areas such as the area along the alignment. New development since 2003 has typically been urban infill that has not resulted in substantial new sources of EMF. It is anticipated that the range of EMF levels presented below represents the existing range of EMF levels along the alignment.

Table 4.6-1: EMF Levels along BART Extension

Location	Vertical Field Peak (in Gauss / µT)
Southwest corner of 28th and Santa Clara Streets	1.7 G / 170 µT
At Berryessa Road crossing of right-of-way	1.1 G / 110 µT
Center island of Montague Expressway (east side) at North Capitol Avenue (Tasman East light rail line right-of-way)	1.4 G / 140 µT
Along north side of Santa Clara Street between Market Street and North 1st Street	.9 – 1.4 G 90 – 140 µT
Along north side of Santa Clara Street between Terraine Street and Notre Dame Street	1.0 – 1.4 G 100 µT – 140 µT
At Caltrain Depot on Railroad Avenue at Palm Drive, Santa Clara (near airport)	.9 – 1.1 G 90 µT – 110 µT
Source: Earth Tech, Inc. 2003. µT = microTesla	

Medical facilities with magnetic resonance imaging are particularly susceptible to EMF because high EMF levels can interfere with the equipment.

The closest medical facilities (with imaging facilities) to the BART Extension Alternative where EMF interference would be of concern are listed below.

- Regional Medical Center of San Jose (225 N Jackson Avenue, San Jose, CA 95116), approximately 1 mile to the east of the BART Extension Alternative.
- Santa Clara Valley Medical Center and Valley Specialty Center (751 S Bascom Avenue, San Jose, CA 95128), approximately 2 miles to the southwest of the BART Extension Alternative.
- Santa Clara Imaging Center (1825 Civic Center Drive, Santa Clara, CA 95050), approximately 1.1 miles to the west of the BART Extension Alternative.

  The San Jose Medical Center was analyzed as a medical facility with magnetic resonance imaging as part of the 2004 FEIR. However, the Medical Center has since moved and is located more than 8 miles to the south of the BART Extension Alternative.

4.6.2.2 Regulatory Setting

The commonly known human-made sources of EMF are electrical systems such as electronics, telecommunications, electric motors, and other electrically powered devices. The radiation from these sources is invisible, non-ionizing, and low frequency. Generally, in most living environments, the level of such radiation plus background natural sources of EMF are low and not considered hazardous. Under extreme conditions, however, EMF can become intense, and hazards include shock and burn. Such conditions are nevertheless rare. The more pertinent concern over EMF exposure is the potential biological and health effects to individuals as the number of EMF-generating activities increases. As more sources of EMF are introduced, the extent and level of human exposure increases. The potential biological and health effects are under much study and intense debate.

Another concern over EMF generation is the potential interference to other electromagnetic systems that can result when new or more intense sources of radiation are introduced into the environment. These effects are better understood than health effects and are well documented. Electromagnetic interference (EMI) may include interruption, obstruction, or other degradation in the effective performance of electronics and electrical equipment. Depending upon the critical nature of this equipment, the effects can have serious consequences for the health and safety of individuals. Perhaps of less concern, but nonetheless important, is that the efficiency of affected systems may be reduced.

With the increasing number of personal computer systems in use in homes and businesses, a common problem is magnetic interference to computer monitors when used near alternating current (AC) or varying direct current (DC) magnetic fields. Computer monitors, particularly large screen monitors, are susceptible to interference created from nearby electrical sources, such as electrical panels, transformers, currents within internal systems wiring, and transmission and distribution lines.

Data corruption can also occur on magnetic or film media from very high magnetic fields. It is commonplace for data files to be transported using pocket-size magnetic or film media, particularly floppy or zip diskettes. The potential for computer monitor interference and data corruption on magnetic media from the operation of BART Extension Alternative is extremely small. It is worth noting that magnetic media materials (e.g., fare cards, credit cards, laptop computers with hard drives) are routinely carried by passengers on DC-powered transit systems throughout the world, with no reported negative effects.

As the name implies, EMF has electrical and magnetic field components. With respect to electrical systems, electric fields result from the strength of the electric charge (voltage), with DC generating stronger EMFs than AC at a given voltage, while magnetic fields result from the motion of the charge (current). Electric field strength is measured in units of volts per meter (V/m) and is greater the higher the voltage. Field strength deteriorates rapidly with distance from the source. Magnetic field strength has several units of measure; the most commonly used are milligauss (mG) and microTesla (µT). Ten milligauss equal one microTesla. Magnetic fields also deteriorate with distance but readily pass through most objects. Magnetic fields are typically the radiation of concern when evaluating EMFs.

Although modern society increasingly relies on electromagnetic systems, strong EMF fields are not associated with the normal living and working environment. Examples of EMF intensities from human activities include the following.

- Overhead power transmission line: 32 to 57 mG (range of exposure to utility workers).
- Household appliances: 8 to 165 mG (at a distance of 27 cm, or 12 inches).
- Computer video display: 2 to 4 mG (at 35 cm, or 16 inches).

- Rail vehicle (electrically powered): 400 mG (at 110 cm, or 43 inches from the vehicle floor) to 1,500 mG (at floor level).[1]

For comparison, in the natural environment apart from human activity, the earth's static magnetic field varies from 300 mG (30 μT) at the equator to more than 600 mG (60 μT) at the magnetic poles. In San Jose and Santa Clara, the earth has a natural static magnetic field of about 510 mG (approximately 50 μT).

Although short-term human health effects from exposure to elevated levels of EMFs are well established, such as effects on the central nervous system and heating of the body, the long-term effects from exposure to lower levels of EMFs continue to be studied. Several reports have proposed a link between EMF exposures and such health problems as cancer, including childhood leukemia. The preponderance of authoritative scientific studies, however, has found no firm evidence of long-term health risks from low-intensity EMF exposures. Despite the lack of scientific evidence of harm, the public continues to express concern, and health and regulatory agencies continue to study the matter.

Neither the federal government nor the state has set standards for EMF exposures. The Federal Drug Administration, Federal Communications Commission, U.S. Department of Defense, and the U.S. Environmental Protection Agency at various times have considered guidelines. The California Department of Education has established a policy of "prudent avoidance" for the location of schools in the vicinity of high-voltage power lines. Several states and other countries have standards for electrical field exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) publishes annual threshold limit values (TLVs) for chemical substances and physical agents, as well as biological exposure indices (BEIs). In the 2013 TLVs and BEIs published by the ACGIH, threshold limit values are recommended for static (DC) magnetic flux densities to which it is believed that nearly all persons may be repeatedly exposed day after day without adverse health effects. According to ACGIH, these values may be used as guides in the control of exposure to static magnetic fields but should not be regarded as fine lines between safe and dangerous levels.

The ACGIH guidelines suggest that routine occupational exposures should not exceed 60,000 μT to the whole body, or 600,000 μT to the body's limbs on a daily, time-weighted average basis (ACGIH 2013). Recommended ceiling values are 2 Tesla (2,000,000 μT) for whole body, and 5 T for the limbs. Safety hazards may exist from the mechanical forces exerted by the magnetic field upon ferromagnetic tools and medical implants. Cardiac pacemakers and similar medical electronic device wearers should not be exposed to field levels exceeding 0.5 T (500,000 μT). These values are listed in Table 4.6-2.

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[1] *Safety of High Speed Guided Ground Transportation Systems, EMF Exposure Environments Summary Reports*, Federal Railroad Administration, August 1993.

Table 4.6-2: ACGIH Guidelines for EMF Exposure

	Whole Body	Limbs
Daily Average	60,000 µT	600,000 µT
Ceiling Values	2T	5T
Medical Device Wearers	0.5T	N/A
Sources: ACGIH 2013. T = Tesla µT = microTesla		

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has published reference levels for general public exposure to time-varying magnetic fields (unperturbed root mean square values) of 40,000 µT for frequencies below 1 hertz (International Commission on Non-Ionizing Radiation Protection 1998). This reference level is given for the condition of maximum coupling of the field to the exposed individual, thereby providing maximum protection. The value is obtained from the basic restrictions by mathematical modeling and by extrapolation from the results of laboratory investigation. The ICNIRP guidelines on limits of exposure to static magnetic fields suggest that continuous exposure of the general public should not exceed a magnetic flux density of 40,000 µT (International Commission on Non-Ionizing Radiation Protection 1994).

The guidelines published by ICNIRP and ACGIH both recommend exposure limits well above those typically found within the passenger or pedestrian exposure fields from BART. Because the BART Extension would employ the same vehicles and propulsion system as those currently in use on BART, EMF influence on operators or passengers within the vehicles would not change from current operation levels.

4.6.3 Methodology

For the present analysis, a computer model was designed to calculate the worst-case static magnetic field strength that could result from BART Extension operations. An at-grade rail profile was developed in the model with the third rail located inside, or between, the running rails for each track. In each case modeled, a maximum third rail current of 12,000 amperes was used for simulation of a 10-car train under maximum load operation. This condition does not exist for extended operating periods, but typically only for short durations during maximum acceleration. Other moderating features that BART typically employs were omitted, such as multiple traction power substations and propulsion cross-bonding, which equalizes and distributes rail currents. This model is designed to illustrate the maximum potential field possible under normal operation. The earth's magnetic field of 50 µT, as it exists in San Jose and Santa Clara, was used as a reference.

4.6.4 Environmental Consequences and Mitigation Measures

4.6.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the BART Extension vicinity that are identified in the Bay Area's Regional Transportation Plan (RTP), *Transportation 2035 Plan for the San Francisco Bay Area*, adopted by the Metropolitan Transportation Commission in 2009; the *Valley Transportation Plan 2040*, adopted by VTA in 2014; and the *Expressway Plan 2040 Study* (County of Santa Clara Roads and Airports Department 2015). The No Build Alternative would not introduce major new EMF generators into the BART Extension vicinity. Transit improvements would be primarily related to expanded bus service. Although bus systems may have electrical systems that would generate EMF, the potential exposure to riders would differ little from the exposure an individual would experience when riding in a non-electric private automobile. Therefore, the No Build Alternative would have *no adverse effect* related to EMF.

4.6.4.2 BART Extension Alternative

The BART Extension would result in new sources of EMF generation, and exposure of passengers and individuals working on the systems or passing in the vicinity of such systems. The main sources of EMF generation would include train power distribution systems; traction power substations with connecting lines to the major utility lines; passenger facilities, with their various electrical systems for lighting, communications, utilities, fare machines, and other systems, and their proximity to power distribution networks; and electrically powered rail passenger vehicles. Because the BART Extension would use DC traction power, contributions to the magnetic field levels of the ambient power frequency (60 hertz AC) would be negligible.

Tables 4.6-3 and 4.6-4 show the measured EMF values found above and below BART rails. The values in these tables are well below the guidelines presented in Table 4.6-2.

Table 4.6-3: Vertical Field Peak Measurements above Existing, Operating BART Tracks at Hopyard Overpass, Pleasanton for Reference

Location	Vertical Field Peak (in Gauss / µT)
Over eastbound Interstate 580 lanes – approximately 14 meters (46 feet) above rails, approximately 35° from rail center	2.1 G / 210 µT
Over eastbound I-580 lanes – approximately 14 meters (46 feet) above rails, directly over rail center	2.1 G / 210 µT
Source: Earth Tech, Inc. 2003.	

Table 4.6-4: Vertical Field Peak Measurements below Existing, Operating BART Pleasanton Line at Rodeo Park Underpass at BART/Interstate 580 for Reference

Location	Vertical Field Peak (in Gauss / µT)
Approximately 6 meters (20 feet) directly below eastbound rails – no train present	1.7 G / 170 µT
Approximately 6 meters (20 feet) directly below eastbound rails – six-car train moving overhead	1.8 G / 180 µT
Approximately 10 meters (33 feet) directly below and between eastbound and westbound rails.	2.0 G / 200 µT[a]
Source: EarthTech, Inc. 2003. [a] Fairly constant field, with or without train movement overhead. µT = microTesla	

EMF intensities associated with trains vary considerably. The greatest potential fields would be within the electric rail vehicle. Therefore, the greatest potential for exposure would be for passengers, train operators, and attendants onboard the train. Passengers and workers would also be exposed to EMF fields in stations, and further exposure would occur to workers at traction power substations. Strong fields that carry a greater possibility of health risks would not be associated with these environments, however. The field strengths of electrified rail systems would be below maximum recommended exposure levels. Representative field measurements taken outside of existing BART stations are shown in Table 4.6-5.

Table 4.6-5: Vertical Field Peak and Range Measurements for Reference

Location	Range	Vertical Field Peak (in Gauss / µT)
Church of Christ, Pleasanton parking lot	Approximately 50 meters (164 feet) south of BART rails (with and without trains)	2.0 G / 200 µT
Church of Christ, Pleasanton parking lot	Approximately 100 meters (329 feet) south of BART rails (with and without trains)	1.9 G / 190 µT
Background field measurement between Dublin and Livermore	15 miles east of the end of BART tracks	1.3 – 1.7 G 130 µT – 170 µT
Background field measurement between Dublin and Livermore	15 miles east of the end of BART on farm	.8 – 1.4 G 80 µT – 140 µT
Source: EarthTech, Inc. 2003. µT = microTesla		

Measurements of DC magnetic fields were taken along the south wall of a substation at the Pleasanton Station where public exposure might occur. Additional measurements were taken at all three levels at the Lake Merritt Station. The values found at these BART stations are shown in Table 4.6-6. Field strengths onboard BART trains, which contain major propulsion equipment below floor level, show measurements ranging from 1,600 to 2,000 mG total (USDOT et al. 2002). These values are equal to 160 to 200 µT, which is well within the ACGIH and ICNIRP guideline thresholds.

Table 4.6-6: Vertical Field Peak Measurements at Representative BART Stations

Location	Vertical Field Peak (in Gauss / µT)
Between Pleasanton Station and BART rails, parking lot center – max. along south wall of substation	2.2 G / 220 µT
Lake Merritt Station – platform level between rail centers	1.3 G / 130 µT
Lake Merritt Station – Level 1, approximately 7 meters (23 feet) directly above southbound rails	1.7 G / 170 µT
Lake Merritt Station – Level 2, street level, approximately 15 meters (49 feet) directly above southbound rails	1.9 G / 190 µT
Source: Earth Tech, Inc. 2003. µT = microTesla	

The results of the modeling show that static magnetic field levels above 50 µT do not extend beyond 10.0 meters (32.8 feet) from the center of the tracks. This finding is based on two trains running in opposite directions on two parallel tracks. Electric currents are assumed to be evenly distributed between the power rails (i.e., the third rails) and the running rails (i.e., the iron rails on which BART trains run), which return very low voltage current to electric power substations. Under conditions when electric currents are not evenly distributed (e.g., if only one of the third rails is supplying power to a train or return currents are not balanced among the running rails), static magnetic field levels above 50 µT can extend to approximately 15.0 meters (49.2 feet) from the center to the BART tracks. At approximately 15.0 meters (49.2 feet), static magnetic field strength returns to the normal background level when there are no other sources of static electric currents present.

BART trains would run underground in tunnels for much of the alignment, which would significantly reduce exposure. The Twin-Bore is typically 40 feet below ground level and the Single-Bore is typically 70 feet below ground level. The distance between the underground tunnel, power lines, and any EMF sensitive device aboveground in the medical centers are adequate to reduce possible EMF interference from BART Extension operations, as demonstrated by the model discussed above. This analysis assumes the sensitive devices/equipment are at ground level. The Regional Medical Center of San Jose is approximately 1 mile to the east of the BART Extension Alternative, and the elevation difference between the nearest part of the tunnel and the facility elevation would be at least 20 feet depending on the boring option. The Santa Clara Valley Medical Center and Valley Specialty Center is approximately 2 miles to the southwest of the BART Extension Alternative, and the elevation difference between the nearest part of the tunnel and the facility elevation would be at least 20 feet. The Santa Clara Imaging Center is approximately 1.1 miles to the west of the BART Extension Alternative, and the alignment would be at-grade at this location. Because of the distances and depths, there would be no adverse effects to these medical facilities related to EMF.

The measurements and models presented in this section demonstrate that exposure levels for BART Extension passengers and operators, passengers and BART employees in a station, and other BART Extension workers would be well below the guidelines for preventing health effects. Therefore, the potential for non-users, businesses, and residences at ground level to experience EMF exposures from BART Extension would be minimal, and present evidence suggests that there would be no demonstrable health risks from exposure to EMF. Therefore, the Build Conditions would have *no adverse effect* related to EMF.

An EMF Control and Test Plan will be included in the general contractor specifications to maintain awareness of the possible effects of BART Extension construction and operation, as well as provide field measurement for, and confirmation of, the final design. The plan will include EMF limits (based on ICNIRP and ACGIH guidelines) in the design and construction specifications and require testing and measurement of the final installed system.

Because EMF intensities and exposures from BART Extension operations would be below thresholds indicating potential health risks, no mitigation measures are necessary.

4.6.5 NEPA Conclusion

The BART Extension Alternative would have *no adverse effect* under NEPA. No mitigation measures are necessary.

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4.7 Energy

4.7.1 Introduction

This section describes the affected environment and environmental consequences related to energy from operations of the NEPA Alternatives. Information regarding energy resources was obtained from the following sources.

- *California State Profile and Energy Estimate* (U.S. Energy Information Administration 2015)
- *California Energy Demand 2012-2022 Final Forecast* (California Energy Commission. 2012)
- *California Energy Demand Updated Forecast 2015-2025* (California Energy Commission. 2015a)
- California-modified Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (CA-GREET) model (California Air Resources Board 2015)
- Air quality technical modeling outputs (*VTA's BART Silicon Valley—Phase II Extension Project Air Quality Study* included with this SEIS/SEIR)

4.7.2 Environmental and Regulatory Setting

4.7.2.1 Environmental Setting

This section discusses the existing conditions related to energy. Various forms of energy are used in vehicle propulsion and the operation of transportation facilities. Automobiles, buses, and trucks within the study area for the BART Extension Alternative use a variety of energy forms, including gasoline, diesel, and natural gas, whereas the BART fleet is powered by electricity. These energy forms would be delivered by regional and statewide distribution networks. Accordingly, the study area for energy resources consists of the physical boundaries of the construction area, as well as the larger statewide energy distribution network.

Existing State Energy Generation and Demand

California has a diverse portfolio of energy resources. Excluding offshore areas, the state ranked third in the nation in crude oil production in 2014, producing more than 15,720 barrels (equivalent to 1,154 trillion British thermal units [BTU]). The state also ranked fourth in the nation in conventional hydroelectric generation and second in the nation for net electricity generation from renewable resources. Other energy sources in the state include natural gas, nuclear, and biofuels (U.S. Energy Information Administration 2015).

According to the California Energy Commission (CEC), total statewide electricity demand is projected to grow from 277,140 gigawatt-hours (GWh) in 2013 to 320,862 GWh in 2025 (1.23 percent annually; mid-energy demand scenario) (California Energy Commission 2015a). Natural gas demand is predicted to grow at a slightly slower rate, 0.81 percent annually between 2010 and 2022, and is forecasted to reach 14,075 million therms by 2022 (California Energy Commission 2012). While alternatively fueled vehicles will continue to penetrate the transportation market, demand for gasoline and diesel is also forecasted to increase steadily over the next 10 years.

Local Energy Providers and Distribution

Pacific Gas & Electric Company (PG&E) is the largest publicly owned utility in California and is the electricity and natural gas provider for residential, industrial, and agency consumers in the area. PG&E buys electricity from a diverse mix of generating sources, including fossil-fueled plants, hydroelectric powerhouses, wind farms, solar facilities, and nuclear power plants. Under the authority granted to BART in California Public Utility Code Section 701.8 (b), BART purchases its own power. In addition to a small amount of power purchased directly from the Western Area Power Administration, the bulk of BART's power is provide via power contracts entered into by the Northern California Power Agency (NCPA) specifically to serve BART loads, and by market power purchases via NCPA. These purchases are made from resources located in the Pacific Northwest, and are delivered into California and scheduled into the California Independent System Operator's (CAISO) market along with a day-ahead load forecast to provide a load/resource balanced schedule to the CAISO. As BART's current power contracts expire December 31, 2016, BART will be actively pursuing zero carbon resources, with a stretch goal up to 100 percent carbon free supply.

Electricity is supplied to the area through a network of distribution and transmission lines. Although transmission lines are continuously being upgraded, and new routes are being constructed, increasing electrical demand throughout the state has strained system reliability and power quality. The transmission capabilities of some portions of the state's electrical grid are occasionally inadequate to transmit electricity at a rate that satisfies the quantities of electricity demanded. This phenomenon is known as a transmission bottleneck and can result in power blackouts. The CAISO operates the transmission system to minimize such bottlenecks using a congestion charge mechanism that prices congestion into the transmission cost. The CAISO is also responsible for taking remedial actions to avoid blackouts or other operational problems, as well as to identify any grid upgrades that need to be made for reliability purposes.

Diesel and gasoline are distributed by a number of methods, including pipelines, railroads, and trucks. Natural gas is supplied through a combination of interstate and intrastate pipelines. The majority of PG&E's natural gas supply comes from Canada.

Local Energy Consumption

Santa Clara County consumes a small amount of energy relative to the state. As shown in Table 4.7-1, electricity and natural gas usage in Santa Clara County are approximately 6 percent and 4 percent of the statewide total, respectively. Gasoline usage for Santa Clara County is about 5 percent of statewide usage, and diesel fuel usage is about 3 percent of the statewide total. For reference, Santa Clara County is home to about 4.8 percent of California residents.

Table 4.7-1: Santa Clara County Energy Usage in 2010

Fuel	Santa Clara County Energy Use	Percent of State Consumption
Electricity (million kWh)	16,251	6%
Natural Gas (million therms)	446	4%
Gasoline (million gallons)	727	5%
Diesel (million gallons)	88	3%
Sources: California Department of Transportation 2009; California Energy Commission 2015b. kWh = kilowatt-hours		

4.7.2.2 Regulatory Setting

Federal

In accordance with NEPA regulations, the Council on Environmental Quality requires that the energy requirements for each alternative be analyzed and the energy conservation and mitigation measures be identified (Code of Federal Regulations, Title 40, Section 1502.16(e)). Refer to Chapter 6, Section 6.7, *Energy*, for a summary of state and local energy policies relevant to the BART Extension.

4.7.3 Methodology

4.7.3.1 Overview

Guidance for evaluating energy impacts of transportation projects subject to NEPA is outlined in Federal Highway Administration (FHWA) Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. The FHWA Advisory applies to projects for which an EIS is prepared. Among these projects, the majority will not require a detailed energy study, but rather a “general” discussion of project energy requirements during construction and operation. Large-scale projects with “potentially substantial energy impacts” should prepare a more robust energy analysis that includes computations of construction and operational energy requirements. Consistency with state and regional energy plans should be discussed, as well as an analysis of direct and indirect energy impacts, which are defined by the FHWA Advisory as follows.

- **Direct energy**: Energy consumed by vehicles using the facility.
- **Indirect energy**: Construction energy and such items as the effects of any changes in automobile usage.

The Federal Transit Administration has not issued guidance on energy impact analysis. Thus, FHWA guidance is used in this analysis. Consistent with FHWA's guidance, this section analyzes operational energy requirements, as well as consistency with state and regional energy plans and the conservation potential of the BART Extension. Effects on energy production and natural resource consumption are also assessed pursuant to U.S. DOT Order 5601.1D.

This analysis characterizes effects related to energy as *no effect, no adverse effect*, or *adverse effect.*

- *No effect* on energy resources would occur if the Build Alternative results in no new increase in energy consumption.
- *No adverse effect* on energy resources would result if the Build Alternative implements energy conservation policies consistent with applicable state and local energy plans and policies, and if the Build Alternative would not place a substantial strain on statewide energy resources.
- The BART Extension would result in an *adverse effect* if it would involve energy consumption that is wasteful, inefficient, and unnecessary, or is otherwise inconsistent with applicable state and regional energy plans and polices.

4.7.3.2 Calculation Approach

Operation of the BART Extension would increase electricity consumed for vehicle propulsion. The stations and related facilities built as part of BART Extension would also use electric power. This "other" energy requirement was calculated on a percentage basis. About 22 percent of BART's existing power requirements are for station and facilities operations, with the other 78 percent for vehicle propulsion. It was assumed this relationship would apply to the BART Extension as well. Based on data obtained from the air quality analysts, annual electricity consumption for vehicle propulsion along the BART Extension would be 1.4 million kilowatt-hours (kWh) (Hosseini pers. comm.). Additional electricity consumed by other facilities was therefore estimated to be about 392,000 kWh per year (1.4 million kWh x 28 percent).

Although the BART Extension would increase electricity consumption, it would improve existing transit opportunities, which would facilitate the removal of single occupancy vehicles from the transportation network. Regional vehicle miles traveled (VMT) with and without the extension under 2015 Existing, 2025 Opening Year, and 2035 Forecast Year conditions were obtained from the air quality analysts and are summarized in Table 4.7-2. The VMT estimates were converted to gallons of diesel and gasoline based on light duty vehicle fuel economy data for Santa Clara County obtained from the California Air Resources Board's EMFAC2014 model.[1]

Table 4.7-2: Annual Regional Vehicle Miles Traveled (million) for the BART Extension Alternative

Mode[a]	2015 Existing		2025 Opening Year		2035 Forecast Year)	
	No Build	BART Extension	No Build	BART Extension	No Build	BART Extension
Automobile	18,057	17,944	19,075	18,970	20,663	20,557
Change from No Build		*-113 (-0.6%)*		*-105 (-0.5%)*		*-106 (-0.5%)*

Source: Hosseini pers. comm.

[a] Implementation of the BART Extension would not have a measurable effect on regional bus or truck activity (Van den Hout pers. comm.). Accordingly, VMT from regional buses and trucks are not include in the VMT analysis for the BART Extension.

Because transit and auto modes consume different types of energy, to provide for a common measure of comparison, kWh of electricity and gallons of gasoline and diesel consumed (or saved) were converted to their BTU equivalents. Energy use is expressed at two levels: in terms of the direct energy content of electricity and fuels consumed (or saved), as well as the total energy content of each energy unit. The former is the specific energy available at the point of use while the latter also includes the energy required to generate or refine and transmit or transport the energy unit to the final point of use. For instance, a kWh has a final or direct energy content of 3,414 BTUs, but an additional 4,586 BTUs of energy is required to generate and transmit the kWh to its point of use. The total energy content of a kWh is therefore estimated to be 8,000 BTUs (see Table 4.7-3). The BTU conversion factors used in the analysis are summarized in Table 4.7-3.

Table 4.7-3: Direct and Total BTU Conversion Factors by Fuel Type

Fuel Type	Direct Energy BTU per Unit	Total Energy BTU per Unit
Gasoline (gallon)	116,090	138,766
Diesel (gallon)	127,464	156,765
Electricity (kWh)	3,414	8,000

Sources: California Air Resources Board 2014; United States Department of Energy 2014.

BTU = British thermal units

kWh = kilowatt-hours

[1] Weighted fuel economy factors for light-duty vehicles (EMFAC vehicle categories of LDA, LDT1, and LDT2) under 2015 Existing, 2025 Opening Year, and 2035 Horizon Year conditions are 24.3, 35.1, and 45.4 miles per gallon, respectively.

4.7.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.7.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.7.4.1 No Build Alternative

The No Build Alternative consists of the existing transportation network and all programmed improvements outlined in regional transportation planning documents. The transportation projects completed under the No Build Alternative would be consistent with local policies that encourage alternative transportation and energy conservation, but would not be as supportive of regional plans to promote BART and transit-oriented joint development. Because BART is a more energy efficient form of transportation than personal automobiles are, the No Build Alternative would have greater energy use than the BART Extension Alternative. All individual projects planned under the No Build Alternative would undergo separate environmental review to define effects on energy and to determine appropriate mitigation measures, as needed.

4.7.4.2 BART Extension Alternative

Energy consumption under the BART Extension Alternative for 2015 Existing, 2025 Opening Year, and 2035 Forecast Year conditions is summarized in Table 4.7-4. The BART Extension Alternative would increase electricity usage as a result of BART vehicle propulsion and station operations, but would reduce vehicular fuel use through the removal of passenger vehicle trips from the transportation network. As shown in Table 4.7-4, this reduction in vehicular fuel use would offset increases in BART electricity consumption, resulting in a net energy reduction, relative to the No Build Alternative.

Table 4.7-4: Annual Direct and Total Energy Use for the BART Extension Alternative (Million BTU)

Condition and Source	Direct Energy[a]	Total Energy[b]
2015 Existing		
BART Electricity	6,388	14,969
Change in Vehicular Fuel from Increased Ridership	-538,819	-644,067
Overall Net Change in Energy Consumption (Existing Plus BART Extension vs. No Build)	*-532,431*	*-629,098*
2025 Opening Year		
BART Electricity	6,388	14,969
Change in Vehicular Fuel from Increased Ridership	-347,882	-415,834
Overall Net Change in Energy Consumption (Opening Plus BART Extension vs. No Build)	*-341,494*	*-400,865*
2035 Forecast Year		
BART Electricity	6,388	14,969
Change in Vehicular Fuel from Increased Ridership	-270,620	-323,480
Overall Net Change in Energy Consumption (Forecast Plus BART Extension vs. No Build)	*-264,232*	*-308,511*

[a] Direct energy includes energy required at the point of use.

[b] Total energy includes the energy required to generate or refine and transmit or transport the energy unit to the final point of use.

BART's Policy Framework for Sustainability includes a goal to "Apply sustainable techniques and procedures into BART's maintenance projects and operations in a cost-effective manner." Energy conservation is an important aspect of this goal. For example, variable speed escalators that stop and re-start or that operate at a low-speed mode will be evaluated for implementation to reduce off-peak energy consumption as they are being done on VTA's Phase I Project.

Although the BART Extension would increase electricity consumption, relative to the No Build, the adjacent transit centers, parking garages and other supporting facilities would incorporate VTA's Sustainability Program green strategies, which would help conserve energy. For example, LED lighting, photosensor-driven lighting and dimming controls could be applied to minimize artificial lighting during daylight hours and reduce power during off-peak periods. Photovoltaic solar panels may also be incorporated, which would minimize purchased power and demand on PG&E loads. These strategies are consistent with state and local energy plans and policies to reduce energy consumption, including the State of California Energy Action Plan. The BART Extension Alternative would also facilitate implementation of the Metropolitan Planning Commission's *Plan Bay Area* by promoting regional transit and reductions in single occupancy vehicle use. Plan Bay Area is a long-range integrated transportation and land-use strategy through 2040 for the San Francisco Bay Area.

With regard to effects on local and regional energy supplies, BART would procure and PG&E would distribute electricity to the BART Extension through 115-kilovolt alternating current lines. Power feed lines connecting high-voltage substations to existing PG&E towers and lines would be required. Electricity consumption would be highest during peak-periods (3 to 7 p.m.) and would be on the order of 11 megawatts, which is approximately 0.018 percent of historic (2011) peak demand (California Energy Commission 2015c). The degree to which VTA is able to conserve energy and generate renewable power through implementation of the strategies described above would dictate the BART Extension Alternative's dependency on PG&E.

Natural gas consumption, which would be supplied by PG&E, would be highest during peak-periods (3 to 7 p.m.), with demand greatest during the winter months. The degree to which VTA is able to utilize natural gas conservation would dictate its dependency on PG&E and have a direct effect on supply from PG&E.

PG&E uses local and regional development plans to forecast and plan for the energy needs of its service territory. This dynamic process is subject to regulatory oversight by the Public Utilities Commission (PUC), where every 2 years in Long Term Procurement Plan proceedings, the PUC assesses the system and local resource needs of the state's three investor-owned utilities over a 10-year horizon. The PUC establishes upfront standards for utility procurement activities and cost recovery by reviewing and approving proposed procurement plans prior to their implementation. Integral to this process is the utility demand forecast, which is subject to review by the CEC. As part of this process, BART's 20-year load forecast, which includes extension loads, is submitted to PG&E for long-term planning. To ensure consistency with approved plans, the PUC conducts annual Energy Resource Recovery Account proceedings in which energy forecasts are refined based on existing procurement. This continual planning process ensures local utilities will accommodate the current and planned local energy requirements for a region. Consequently, it is anticipated the BART Extension Alternative would have *no adverse effect* on local and regional energy supplies, nor on any requirements for additional capacity. No mitigation would be required.

4.7.5 NEPA Conclusion

The BART Extension Alternative would result in a net energy reduction, relative to the No Build Alternative. Implementation of VTA's Sustainability Program green strategies would ensure the BART Extension Alternative is consistent with state and local energy plans and policies to reduce energy consumption. Peak electrical demand would not impede PG&E's ability to meet regional loads, and ongoing utility and system planning processes would be employed to accommodate increases in future electricity consumption. Accordingly, the impact would have negligible intensity under NEPA and there would be *no adverse effect*. No mitigation is required.

4.8 Geology, Soils, and Seismicity

4.8.1 Introduction

This section describes the affected environment and environmental consequences related to geology, soils, and seismicity from operations of the NEPA Alternatives. The analysis in this section is based on *VTA's BART Silicon Valley Phase II Extension Project Geotechnical Memorandum* prepared by PARIKH Consultants, Inc. in February 2014.

4.8.2 Environmental and Regulatory Setting

4.8.2.1 Environmental Setting

This section discusses the existing conditions related to geology, soils, and seismicity within the BART Extension, including staging areas.

Geologic Setting

Topography

Santa Clara County is primarily in a flat alluvial plain that lies between the Santa Cruz Mountains and the Diablo Range. Most of the area consists of level terrain, which gives way to rolling foothills toward the east and west. These foothill areas become steeper and graduate into mountain ranges. The Salinas Valley lies to the south, and San Francisco Bay is located to the north. The elevations in the county range from approximately 0 feet to 4,370 feet above mean sea level, and the slope of the land is toward the bay. The mountains and foothills in the western and southern portions of the county are the sources of the watercourses that flow through the northern county (Santa Clara County 1994).

The alignment is located on relatively flat terrain within Santa Clara County.

Geology

The BART Extension would be located in the Santa Clara Valley, which extends southeastward from San Francisco Bay and is a northwest/southeast trending valley within the Coast Ranges Geomorphic Province of Northern California. The Santa Clara Valley is an alluvium-filled basin located between the Santa Cruz Mountains to the southwest and the Diablo Range to the northeast. The valley is covered by alluvial fan, levee, and active stream channel deposits with marine estuary deposits located along the bay margins. These unconsolidated deposits cover Tertiary through Cretaceous age bedrock. The BART Extension would be located in an area of the valley where the ground surface has no steep slopes.

The BART Extension is underlain by a variety of alluvial deposits. The alluvium has been identified as Holocene age alluvial fan deposits (Qf & Qhf), fine-grained Holocene alluvial fan deposits (Qhff), Holocene alluvial fan levee deposits (Qhl), Holocene stream channel deposits (Qhc), and historic artificial channel deposits (ac). Fine-grained Holocene alluvial fan deposits (Qhff) occur on the flatter distal portions of fans and consist primarily of silt and clay-rich sediments with interbedded layers of coarser sand and occasional gravel. The Holocene alluvial fan levee deposits (Qhl) consist of silt, sand, and clay. Artificial fill may be present over any of the Holocene age deposits along the BART Extension.

Bedrock buried at great depth beneath the BART Extension is presumed to be the Franciscan Complex of the upper Jurassic to Cretaceous age. The Franciscan Complex bedrock is overlain by a thick (over 1,000 feet) deposit of Tertiary marine/non-marine sediments and by Pleistocene to Recent deposits.

Geologic Hazards

Fault Rupture

The BART Extension lies between the San Andreas Fault to the west and the Hayward and Calaveras Faults to the east. Both the Hayward Fault and Calaveras Fault are known active faults. The Hayward fault is located approximately 12 miles north of the Alum Rock/28th Street Station and extends from San Jose about 74 miles northward along the base of the East Bay Hills to San Pablo Bay. The Silver Creek Fault crosses the alignment perpendicularly between the Downtown San Jose and Alum Rock/28th Street Station locations. Based on geomorphic and preliminary paleoseismic evidence, Silver Creek fault is considered to be potentially active. The Silver Creek Fault is also characterized as potentially active in the *Envision San Jose 2040 General Plan*. The following provides additional detail on the aforementioned faults:

- **Hayward Fault** – Last major earthquake occurred in October 1868 and had a Richter magnitude of 7. Capable of generating a maximum credible earthquake[1] of moment magnitude (Mw) 7.1.
- **San Andreas Fault** –Largest active California fault, responsible for the largest earthquake in California: the 1906 Mw 7.9 San Francisco earthquake.
- **Silver Creek Fault** – Maximum magnitude distribution for this fault ranges from 6.3 to 6.9.

Other faults in the region that are capable of producing large magnitude earthquakes are the San Gregorio, Rodgers Creek, Hayward Southeast Extension, Sargent, Concord-Green Valley, Ortigalita, and Greenville Faults, along with the faults of the Foothills thrust belt. All of these faults are located within 40 miles of the BART Extension.

[1] Maximum credible earthquake is the largest earthquake that can be expected to occur on a fault over a particular period of time.

Liquefaction

Liquefaction occurs when saturated, low-density, loose materials (e.g., sand or silty sand) are weakened and transformed from a solid to a near-liquid state as a result of increased pore water pressure. The increase in pressure is caused by strong ground motion from an earthquake. Liquefaction most often occurs in areas underlain by silts and fine sands and where shallow groundwater exists. Liquefaction can cause structures built on or above liquefiable soils to experience bearing capacity failure and collapse. Flow failure, lateral spreading, differential settlement, loss of bearing capacity, ground fissures, and sand boils are evidence of generation of excess pore pressure and liquefaction. In areas susceptible to liquefaction, one of the primary liquefaction hazards is seismically-induced settlement and temporary increase in lateral earth pressures on below-grade structures. Although a soil layer may or may not fully liquefy during an earthquake, it can still experience settlement.

All of the stations and the Newhall Maintenance Facility would be located on Holocene alluvial fan deposits, which are identified as having a moderate liquefaction potential. Post-liquefaction settlements of less than 1 inch to 2 inches are anticipated near Alum Rock/28th Street, Diridon (South and North Options), and Santa Clara Stations (PARIKH Consultants 2014). A portion of the alignment near the Alum Rock/28th Street Station location crosses a narrow historic artificial channel that is also rated with a moderate liquefaction potential.

Approximately 100 and 700 feet northeast of Diridon Station (South and North Options) the alignment crosses the two (approximately 100-foot-wide) stream channels (Los Gatos Creek and Guadalupe River, respectively), where the liquefaction potential is characterized as being very high. The approximately 500-foot-long segment of the alignment near the Diridon Station (South and North Options) location between the two stream channels is rated as having moderate liquefaction potential.

Landslides

The BART Extension is located on nearly flat terrain and is not identified as being susceptible to earthquake-induced landslides.

4.8.2.2 Regulatory Setting

There are no specific federal regulations related to geologic conditions. The BART Extension must be in compliance with state laws. The state regulations relevant to the BART Extension are provided in Chapter 6, Section 6.8, *Geology, Soils, and Seismicity*.

4.8.3 Methodology

The following section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.1, *Introduction*. An *adverse effect* would pose an increased risk of personal injury, loss of life, and damage to property on a regional scale. The section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.8.4 Environmental Consequences and Mitigation Measures

4.8.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the study area(see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). The No Build Alternative projects would likely result in geologic and seismic effects typically associated with transit, highway, bicycle, and pedestrian, facilities, and roadway projects. Structures associated with the projects would be designed in accordance with applicable seismic design standards in the California Building Code. Additionally, it could be anticipated that engineering studies would be performed to identify the appropriate design measures needed for the geologic and seismic conditions of any project sites. Projects planned under the No Build Alternative would undergo separate environmental review to determine geologic effects. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.8.4.2 BART Extension Alternative

Potential seismic hazard sources in the study area are surface fault rupture, ground shaking, and liquefaction. Potential expansive soils and erosion impacts are also discussed because they have the potential to negatively affect the BART Extension.

Surface Fault Rupture

The BART Extension is not located within an Earthquake Fault Zone as defined and mapped under the Alquist-Priolo Act. The Silver Creek Fault, which is a potentially active fault, runs northwest to southeast and crosses the alignment between the Downtown San Jose and Alum Rock/28th Street Stations. Although there may be potential for fault rupture impacts along the Silver Creek Fault near Alum Rock/28th Street Station, the BART Extension would comply with requirements set forth in the California Building Code and the pertinent BART Facilities Standards to withstand forces associated with the maximum credible earthquake. The California Building Code and the pertinent BART Facilities Standards provide standards intended to permit structures to withstand seismic hazards. The code sets standards for excavation, grading, construction earthwork, fill embankments, expansive soils, foundation investigations, liquefaction potential, and soil strength loss. Adherence to the requirements in the California Building Code and the pertinent BART Facilities Standards would reduce the potential of fault rupture impacts to *no adverse effect*, and no mitigation is required.

Ground Shaking

The San Andreas, Hayward, and Calaveras Faults are capable of generating large magnitude earthquakes that can result in strong ground shaking. Additionally, the Silver Creek Fault is considered a potentially significant seismic source. Seismically induced ground shaking within the BART Extension would depend on the magnitude of the earthquake, distance from the BART Extension to the fault source, directivity (focusing of earthquake energy along the fault in the direction of the rupture), and subsurface conditions. Therefore, the potential for strong ground shaking to occur within the BART Extension is considered moderate to high. The proximity of these faults and other nearby active faults means that strong ground shaking would eventually subject the alignment and structures to strong seismic shaking. Structures could be damaged or destroyed and people could be harmed during a major seismic event originating on any of the nearby faults.

The BART Extension would be designed and constructed to meet or exceed the current seismic design standards set forth by the California Building Code, as well as the pertinent BART Facilities Standards, Release 1.2. These codes and standards are designed to reduce major structural damage and avoid major injury and loss of life in the event of an earthquake. The seismic performance goals generally expect that some property damage would result from a moderate to large earthquake, but that damage would generally be reparable and not life threatening. With adherence to the standards mentioned above, potential exposure of people to harm from geologic or seismic hazards would result in *no adverse effect*, and no mitigation is required.

Liquefaction

As described in Section 4.8.2.2, *Environmental Setting*, the majority of the BART Extension is located in an area with moderate liquefaction potential, and a portion of the alignment is located in an area with very high liquefaction potential. Settlement after liquefaction could range from 1 to 2 inches at the Alum Rock/28th Street, Diridon (South and North Options), and Santa Clara Stations. BART Facilities Standards Design Criteria limit the total settlements for structure foundations to 1 inch or less; therefore, there would be a need to reduce liquefaction-related settlement hazards along some portions of the alignment. The exact methodologies to reduce these hazards to be used will be determined during final engineering, but examples are included in Mitigation Measure GEO-CNST-A (see Chapter 5, Section 5.5.9, *Geology, Soils, and Seismicity*). These design requirements would reduce the potential exposure of people to hazard from seismic risk associated with liquefaction.

Liquefaction could also affect underground structures if the structures are buoyant. The liquefied soil could uplift the underground structures resulting in the deformation of ground surface, buildings, and utilities located above an uplifted structure. This would be a potentially adverse effect.

The BART Extension would be designed and constructed to meet or exceed standards set forth by the California Building Code and the pertinent BART Facilities Standards. Because the BART Extension would be constructed with adherence to the aforementioned standards, requirements, and mitigation measure, potential operational impacts would result in *no adverse effect*, and no mitigation is required.

Because the ground surface is relatively flat along the alignment, the impacts from lateral spreading would be *no adverse effect*, and no mitigation is required.

Landslides

The BART Extension is located on nearly flat terrain and is not identified on any California Geological Survey Seismic Hazard Zone maps as being susceptible to earthquake-induced landslides. Therefore, impacts from landslides would result in *no adverse effect*, and no mitigation is required.

Expansive Soils

Expansive soils are fine-grained soils (generally high-plasticity clays) that can undergo a significant increase in volume with an increase in water content as well as a significant decrease in volume with a decrease in water content. Changes in the water content of highly expansive soils can result in severe distress for structures constructed on or against the soils.

Expansive soils are a concern for the structures for system facilities, parking garages, and vehicular and pedestrian access at the stations. Some of the soils at station locations and the Newhall Maintenance Facility have high Plasticity Indices of between 21 and 40 meaning that they have moderate to high expansion potential.

The BART Extension would be designed and constructed to meet or exceed standards set forth by the California Building Code and the pertinent BART Facilities Standards.

Because the BART Extension would be constructed with adherence to the aforementioned standards, requirements and mitigation measures, operational impacts result in *no adverse effect*, and no mitigation would be required.

4.8.5 NEPA Conclusion

For the BART Extension Alternative, adherence to California Building Code requirements and pertinent BART Facilities Standards would ensure that impacts related to liquefaction would result in *no adverse effect* under NEPA. Impacts related to fault rupture, ground shaking, liquefaction, landslides, erosion, and expansive soils would result in *no adverse effect* for the BART Extension Alternative, and no mitigation would be required.

4.9 Greenhouse Gas Emissions

4.9.1 Introduction

This section describes the affected environment and environmental consequences related to greenhouse gas emissions (GHG) from operation of the NEPA Alternatives. Information in this section is based on Terry A. Hayes Associates Inc. (2016) *VTA's BART Silicon Valley – Phase II Extension Project Air Quality Study* (included as a technical report with this SEIS/SEIR).

4.9.2 Environmental and Regulatory Setting

4.9.2.1 Environmental Setting

GHG emissions refer to a group of emissions that are generally believed to affect global climate conditions. The greenhouse effect compares Earth and the atmosphere surrounding it to a greenhouse with glass panes. The glass panes in a greenhouse let heat from sunlight in and reduce the amount of heat that escapes. GHGs, as defined in accordance with Section 19(i) of Executive Order (EO) 13514 (Focused on Federal Leadership in Environmental, Energy, and Economic Performance), include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These GHGs, in addition to water vapor, keep the average surface temperature of Earth close to 60 degrees Fahrenheit (°F).

CO_2 is the most abundant pollutant that contributes to climate change through fossil fuel combustion. The other GHGs are less abundant but have higher global warming potential than CO_2. To account for this higher potential, emissions of other GHGs are frequently expressed in the equivalent mass of CO_2, denoted as CO_2e.

The Bay Area Air Quality Management District (BAAQMD) has published an emissions inventory that includes direct GHG emissions due to human activities within the boundaries of the BAAQMD (BAAQMD 2015). The emissions are estimated for industrial, commercial, transportation, residential, forestry, and agriculture activities. For generation of electricity, both direct GHG emissions from locally generated electricity in the Bay Area and indirect emissions from electricity generated elsewhere for consumption in the region are reported.

In 2011, 86.6 million metric tons of CO_2e ($MMTCO_2e$) GHG were emitted by the Bay Area (83.9 $MMTCO_2e$ were emitted within the Bay Area Air District and 2.7 MMT CO_2e were indirect emissions from imported electricity).

CO2 accounts for 90.3 percent of total Bay Area GHG emissions in 2011. CO_2 emissions are mainly associated with carbon-bearing fossil fuel combustion. Other activities that produce CO_2 emissions include mineral production, waste combustion, and land use and forestry changes.

CH_4 emissions also contribute to climate change and represent 3.0 percent of the Bay Area's total CO_2e emissions. Major sources of CH_4 emissions in the Bay Area are municipal solid waste landfills, raising of livestock and other agricultural activities, stationary and mobile fuel combustion, gas and oil production fields, and natural gas distribution systems.

N_2O emissions account for 1.7 percent of the total 2011 GHG emissions inventory. Municipal wastewater treatment facilities, fuel combustion, and agricultural soil and manure management are the major contributors of N_2O emissions in the Bay Area.

Emissions from high-global warming potential (GWP) gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) make up about 4.9 percent of the total CO_2e. High-GWP gases are substitutes for stratospheric ozone depleting substances (e. g., chlorofluorocarbons). These gases are used in applications such as refrigeration and air-conditioning, semi-conductor/electronic industry manufacturing processes, and electric power distribution systems.

4.9.2.2 Regulatory Setting

Relevant to GHG emissions and climate change, NEPA recognizes "the profound impact of man's activity on the interrelations of all components of the natural environment." (U.S. Code, Title 42, Section 4331). It was enacted to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." (U.S. Code, Title 42, Section 4321). In December 2009, the U.S. Environmental Protection Agency (EPA) Administrator signed two distinct findings regarding GHGs under Section 202(a) of the Clean Air Act (CAA). The Endangerment Finding found that the current and projected concentrations of the six key GHGs (i.e., CO_2, CH_4, nitrous oxides, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride) in the atmosphere threaten the health and welfare of current and future generations. The Cause or Contribute Finding found that the combined emissions of these GHGs from new motor vehicles and motor vehicle engines contribute to GHG pollution, which threatens public health and welfare. These findings were necessary prerequisites for implementing GHG emissions standards for vehicles. In collaboration with the National Highway Traffic Safety Administration, EPA finalized emissions standards for light-duty vehicles (2012–2016 model years) in May 2010 and heavy-duty vehicles (2014–2018 model years) in August 2011.

On August 1, 2016, the Council on Environmental Quality (CEQ) released revised final guidance that describes how federal departments and agencies should consider the effects of GHG emissions and climate change in their National Environmental Policy Act (NEPA) reviews.[1] The final guidance is designed to allow decision makers and the public to fully understand the potential climate impacts of federal actions, and in turn, assist agencies in comparing alternatives and considering measures to mitigate the impacts of climate change. In

[1] Council on Environmental Quality. 2016. *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*. August 1.

addition to providing agencies with a reasoned approach as to how to describe climate change impacts, the guidance:

- Advises agencies to quantify projected GHG emissions of proposed federal actions whenever the necessary tools, methodologies, and data inputs are available.
- Encourages agencies to draw on their experience and expertise to determine the appropriate level (broad, programmatic or project- or site-specific) and the extent of quantitative or qualitative analysis required to comply with NEPA.
- Counsels agencies to consider alternatives that would make the action and affected communities more resilient to the effects of a changing climate.
- Reminds agencies to use existing information and science when assessing proposed actions.

The federal guidance provides a common approach for assessing actions, while recognizing each agency's unique circumstance and authority. Agencies have discretion in how they tailor their individual NEPA reviews to accommodate the final guidance. The final guidance does not create new or additional regulatory requirements or NEPA implementing procedures. Importantly, the final guidance does not include a quantitative emissions limit that could be used to identify potential adverse effects.

Published on June 10, 2015, EO 13693, Planning for Federal Sustainability in the Next Decade, revokes multiple prior EOs and memorandum, including EO 13514. The goal of EO 13693 is to maintain federal leadership in sustainability and GHG emission reductions. The new EO outlines forward-looking goals for federal agencies in the area of energy, climate change, water use, vehicle fleets, construction, and acquisition. Federal agencies must, where life-cycle cost-effective, beginning in 2016 do the following.

- Reduce agency building energy intensity (as measured in British thermal units per square foot) by 2.5 percent annually through 2025.
- Improve data center energy efficiency at agency buildings.
- Ensure a minimum percentage of total building electric and thermal energy is from clean energy sources.
- Improve agency water use efficiency and management (including stormwater management).
- Improve agency fleet and vehicle efficiency and management by achieving minimum percentage GHG emission reductions.

4.9.3 Methodology

4.9.3.1 Overview

There are no adopted quantitative thresholds that are relevant to the NEPA analysis. Potential adverse effects of quantified GHG emissions are assessed by comparing the magnitude of emissions associated with the BART Extension Alternative to the No Build Alternative. Consistent with the CEQ's final GHG guidance, implications of climate change on the proposed action are qualitatively assessed.

4.9.3.2 Methods

Operational emissions associated with the BART Extension Alternative have been estimated related to changes to regional vehicle miles traveled (VMT) and electricity production to support facilities. Because BART provides an alternative to vehicle trips, it would contribute to a decrease in regional emissions from reductions in personal vehicle use (also known as mode shift). The America Public Transportation Association (APTA) (2009) recommends GHG analyses for transit projects account for this emissions "credit" associated with avoided car trips through mode shift. Consistent with APTA recommendations, FTA has used this methodology for other transit projects (i.e., Phase I Project) throughout the region.

Emissions from changes in regional VMT were estimated using the California Air Resources Board's (ARB's) emissions model (EMFAC2014) and daily VMT data obtained from *VTA's BART Silicon Valley – Phase II Extension Project Draft Traffic Impact Analysis* by Hexagon Transportation Consultants, Inc. The VMT data were provided in 5-mile-per-hour (mph) speed bins (or ranges) for the 2015 Existing, 2025 Opening Year, and 2035 Forecast Year under the with- and without-BART Extension Alternative scenarios.

GHG emissions to support BART electricity consumption associated with traction, station lighting, and station auxiliary power have been quantified using a power consumption rate of 0.00267 megawatt-hour per BART VMT per day. To calculate total daily power consumption, the above power consumption rate was multiplied by the total length of the BART Extension Alternative and the total number of train departures/arrivals in a day. It is assumed that there would be 6-minute headways between 6:00 a.m. and 7:30 p.m., 20-minute headways between 4:00 a.m. and 6:00 a.m., and between 7:30 p.m. and 1:30 a.m., resulting in 13.5 hourly train trips. The stations and related facilities built as part of BART Extension Alternative would also use electric power. This "other" energy requirement was calculated on a percentage basis. About 25 percent of BART's existing power requirements are for station and facilities operations, with the other 75 percent for vehicle propulsion. It was assumed this relationship would apply to the BART Extension as well. Based on data obtained from the air quality analysts, annual electricity consumption for vehicle propulsion along the BART Extension would be 1.4 million kilowatt-hours (kWh). Additional electricity consumed by other facilities was therefore estimated to be about 468,000 kWh per year. The electricity intensity factors were obtained from the CalEEMod and used to calculate CO_2

emissions associated with the production of electricity consumed by operation of the BART Extension (California Air Pollution Control Officers Association 2013).

4.9.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.9.3, *Methodology*. This section also identifies measures to avoid, minimize, or mitigate impacts.

4.9.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). Given the mix of projects, some of the projects may reduce GHG emissions by providing transit, bicycle and pedestrian improvements and also reducing congestion. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse GHG effects. Several of these projects have already been programmed in the Regional Transportation Plans. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts. Without the transit improvements, the No Build Alternative would not result in the GHG reduction benefits of the BART Extension Alternative.

As discussed above, other projects would undergo separate environmental review to determine whether they would result in adverse GHG effects. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.9.4.2 BART Extension Alternative

Greenhouse Gas Emissions

The operational analysis for the BART Extension Alternative considers electricity-related emissions from operation of BART, as well as GHG benefits associated with vehicle mode shift. As discussed above, it is anticipated that the BART Extension Alternative would increase ridership, thereby decreasing regional passenger VMT through mode shift from private automobiles to transit. Accounting for GHG emissions reductions associated with mode shift is consistent with recommendations from APTA (2009).

As shown in Table 4.9-1, operation of the BART Extension Alternative would decrease GHG emissions because of reductions in VMT-related emissions. This is a beneficial effect of the BART Extension Alternative, and there would be no potential for an adverse effect associated with increased GHG emissions.

Table 4.9-1: Estimated Carbon Dioxide Emissions – BART Extension Alternative

Alternative	Carbon Dioxide Metric Tons per Year
2015 Existing	
No Build	7,907,605
BART Extension Alternative – VMT Related Emissions	7,864,744
BART Extension Alternative – Emissions Related to Electricity Production for Operations	615
Net Emissions (No Build minus BART Extension Alternative)	(-42,246)
2025 Opening Year	
No Build Change in Vehicular Emissions from Increased Ridership	6,154,061
BART Extension Alternative Change in Vehicular Emissions from Increased Ridership	6,124,275
BART Extension Alternative Electricity-Related Emissions	615
Net Emissions (No Build minus BART Extension Alternative)	(-29,171)
2035 Forecast Year	
No Build Change in Vehicular Emissions from Increased Ridership	5,314,428
BART Extension Alternative Change in Vehicular Emissions from Increased Ridership	5,291,677
BART Extension Alternative Electricity-Related Emissions	615
Net Emissions (No Build minus BART Extension Alternative)	(-22,136)
Source: ARB EMFAC2014, CalEEMod version 2013.2.2.	

Climate Change Effects on the BART Extension Alternative

Several impacts on the environment are expected throughout California as a result of global climate change. The extent of these effects is being defined as climate modeling tools become more refined. Regardless of the uncertainty in precise predictions, it is widely understood that substantial climate change is expected to occur in the future. Potential climate change impacts include, but are not limited to, extreme heat events, increased water and energy consumption, and changes in species distribution and range. Certain low-lying parts of cities of San Jose and Santa Clara may be susceptible to flooding that has been influenced by climate-change events. Section 4.17, *Water Resources, Water Quality, and Floodplains*, includes a detailed discussion of potential flooding. Currently, all of the BART Extension Alternative within the floodplain is developed, partially developed, or zoned for development. Some of the projected base floodplain development would occur regardless of the BART Extension Alternative. In general, the BART Extension Alternative would be consistent with development plans for the area and would not significantly change the land use in the area because it is currently developed or zoned for development. The change in water surface elevation would be minimal because there would be minimal fill in the base floodplains with proper minimization measures (WRECO 2015). The BART Extension Alternative would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation. Natural and beneficial floodplain values would not be affected by the BART Extension Alternative.

Regarding adapting to climate change, the Bay Area Joint Policy Committee (JPC) is tasked with producing a Bay Area Climate and Energy Resilience Strategy to provide guidance on how to include protecting the Bay Area's economy, public health, infrastructure, and ecosystems from sea-level rise, water shortages, high energy prices, and other impacts in long-term regional and local planning, including *Plan Bay Area*. This work focuses on the institutional structures and resources that will be needed to create a multi-stakeholder adaptive management process on regional resilience. In September 2012, the JPC adopted a work plan to develop a Regional Sea Level Rise Adaptation Strategy. The objective of the project is to ensure the ongoing health and ecological viability of regional natural resources, such as San Francisco Bay; coordinate adaptation mechanisms that transcend local jurisdictional boundaries; and share the costs of adaptation responses at a regional level, especially when regional resources are involved. The sea-level rise adaption strategy work plan focuses on providing enough background information and support to develop a "bottom-up" regional strategy where the regional agencies work with local entities to assess vulnerabilities and risks, identify critical assets, explore adaptation options, and use a balanced approach to identify costs, benefits, and adaptation strategies for the natural resources/ecosystem services provided by the Bay and its watersheds.

In addition, *Plan Bay Area* provides a long-range framework to minimize transportation impacts on the environment, improve regional air quality, protect natural resources, and reduce GHG emissions by encouraging new development to locate near transit rather than areas poorly served or not served by transit. Mitigation Measure 2.5(c) in *Plan Bay Area* states that, "[m]itigation measures that shall be considered by implementing agencies and/or project sponsors where feasible based on project-and site-specific considerations include, but are not limited to the following. The project sponsors and implementing agencies shall coordinate with BCDC, Caltrans, local jurisdictions (cities and counties), and other transportation agencies to develop Transportation Asset Management Plans (TAMPs) that consider the potential impacts of sea level rise over the asset's life cycle." As stated above, the BART Extension Alternative would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation.

A range of other potential climate change impacts may affect the BART Extension Alternative, including increased temperatures, heat stress days, and water supplies. The BART Extension Alternative would not exacerbate these issues.

4.9.5 NEPA Conclusion

For operation of the BART Extension Alternative, there would be a beneficial reduction in GHG emissions and *no adverse effect* related to climate change emissions under NEPA.

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4.10 Hazards and Hazardous Materials

4.10.1 Introduction

This section describes the affected environment and environmental consequences related to hazards and hazardous materials from operations of the NEPA Alternatives. The hazardous materials information contained herein is based on the *VTA's BART Silicon Valley Phase II Extension Project—Phase II Extension Initial Site Assessment* (ISA) prepared by BASELINE Environmental Consulting (2016).

4.10.2 Existing Conditions and Regulatory Setting

4.10.2.1 Environmental Setting

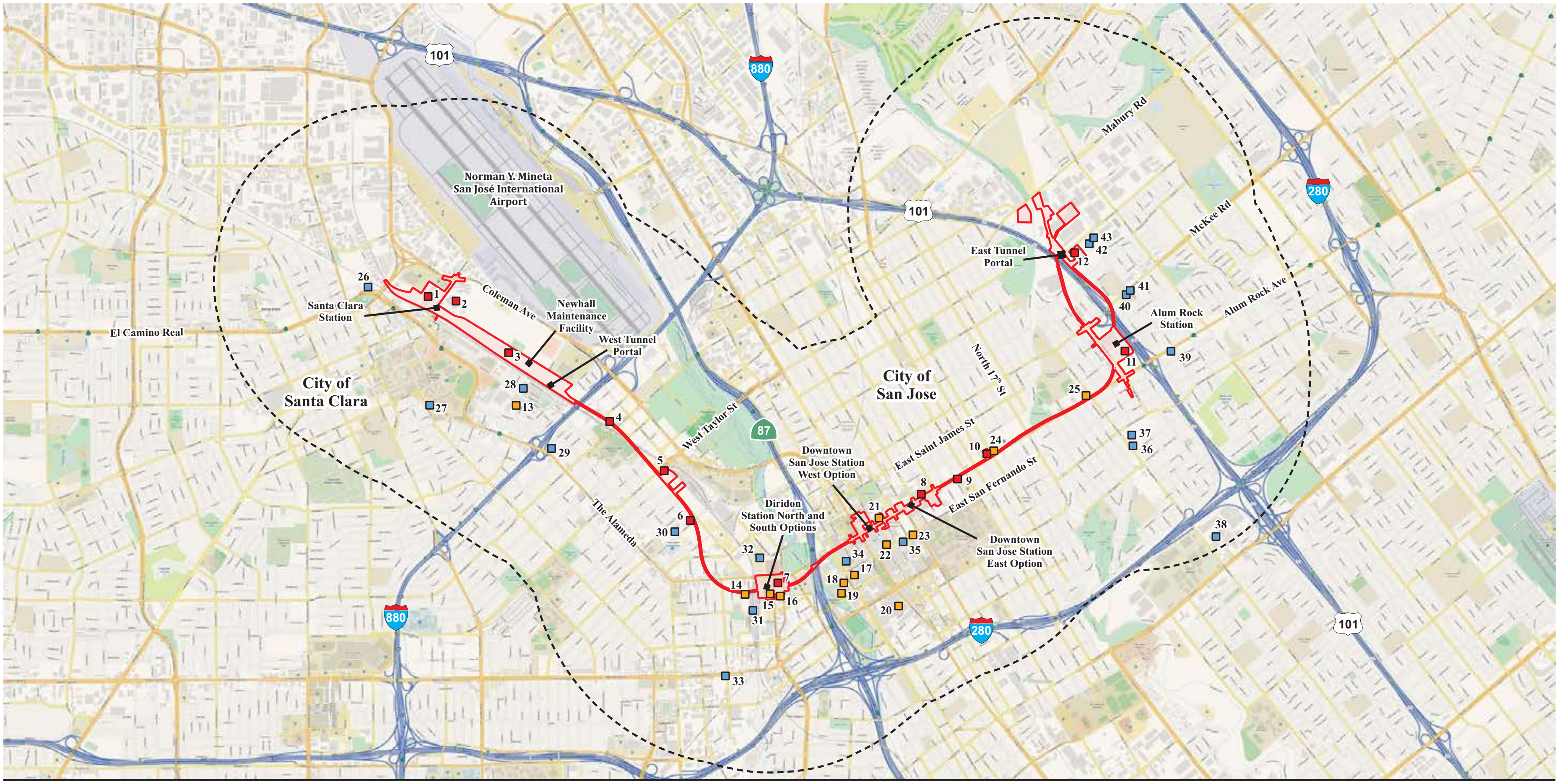
This section discusses the existing conditions related to hazards and hazardous materials for the BART Extension and in the surrounding area, including staging areas.

Hazardous Materials

The ISA identified numerous sources of hazardous materials in soil, railroad ballast, groundwater, and buildings for the BART Extension that could possibly be encountered during construction and operations. They are described in detail below.

Hazardous Materials Release Sites

The ISA identified 437 records of sites with known releases of hazardous materials within a 1-mile radius of the BART Extension (BASELINE Environmental Consulting 2016). Based on the findings of the ISA, only 43 of the 437 hazardous materials release sites are under active regulatory oversight and/or have land use restrictions and are located on, adjacent to, or hydraulically upgradient of the BART Extension (Figure 4.10-1). Petroleum hydrocarbons, chlorinated solvents, and metals are the primary contaminants of concern in soil and groundwater associated with the 43 hazardous materials release sites. Two release sites located at the Santa Clara Station, one release site located at the Diridon Station (South and North Options), and one release site located above the tunnel alignments between the Santa Clara Station and the Diridon Station (South and North Options) have land-use restrictions that prohibit subsurface work or groundwater extraction without prior approval from the San Francisco Bay Regional Water Quality Control Board (Regional Water Board), Santa Clara County Department of Environmental Health, and/or City of San Jose Planning Department. The ISA evaluates the 43 sites to identify whether the releases have resulted in either known, potential, or no subsurface contamination on the BART Extension.



Legend

- Project Area of Potential Effect
- 1-Mile Buffer
- Release Site of Concern with Known Subsurface Contamination on the Project
- Release Site of Concern with Potential Subsurface Contamination on the Project
- Release Site of Concern with No Subsurface Contamination on the Project

Notes: "Release Sites of Concern" are under active regulatory oversight and/or have land use restrictions, and are located on, adjacent to, or upgradient within one mile of the Project. Site information is summarized in Table 3 and Section 5.3.
Base: MapQuest OpenStreetMap.
Sources: Release Sites of Concern (SWRCB, 2015 and DTSC, 2015).

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Figure 4.10-1
Hazardous Materials Locations
VTA's BART Silicon Valley–Phase II Extension Project

Potential Hazardous Materials Release Sites

As early as the 1950s, numerous commercial and industrial properties have been located in the vicinity of the BART Extension. The ISA identified five permitted underground storage tank (UST) facilities and 69 Resource Conservation and Recovery Act (RCRA) generator sites on or adjacent to the BART Extension (within 500 feet) that are generally associated with commercial and industrial properties (e.g., dry cleaners and gas stations) (BASELINE Environmental Consulting 2016). The large quantity and apparent long history of commercial and industrial properties that have managed hazardous materials in the vicinity could have resulted in undocumented releases of hazardous materials that could have impacted soil and/or groundwater.

The ISA identified 107 hazardous materials release sites on or adjacent to the BART Extension that have obtained regulatory closure for cleanup activities (BASELINE Environmental Consulting 2016). Due to the large number of sites, residual soil and groundwater contamination, if any, from closed release sites, impacted soil and/or groundwater beneath the BART Extension could pose an unacceptable health risk under future land use and development scenarios (e.g., grading, excavation, and/or dewatering). As a result, future developers of many of these sites are required to notify the Santa Clara County Department of Environmental Health and the appropriate planning/building department prior to redevelopment to state that residual contamination exists on the property and to list all measures necessary to protect human health and the environment.

Railroad Corridors

Between 2001 and 2008, several investigations were conducted to evaluate the environmental issues related to the soil and ballast along the existing railroad corridor for the Phase I Project that will connect to the eastern terminus of the BART Extension. The results from the investigations indicated there were no significant impacts on soil or ballast from polychlorinated biphenyls (PCBs), volatile organic compounds, semi-volatile organic compounds, or petroleum hydrocarbons. However, significant arsenic and lead contamination in the shallow soil and ballast materials was present along much of the Phase I Project. The primary source of arsenic appears to be from slag used as ballast for track maintenance from about 1960 to 1983, and potential secondary sources may have included use of inorganic pesticides. The occurrence of elevated lead concentrations appears to be attributed to aerially distributed automobile exhaust emissions and lead-acid batteries used to power signals near railroad crossings. Overall, arsenic appears to be the primary metal impacting shallow soil and ballast along the railroad corridor.

Existing and former railroad corridors are located along the following portions of the BART Extension.

- From Mabury Road to Las Plumas Avenue in the city of San Jose.
- Parallel to 28th Street in San Jose along construction staging areas for the Alum Rock/28th Street Station.

- Immediately west of the Diridon Station (South and North Options).
- Near the intersection of Emory Street in San Jose.
- Immediately south of and parallel to the Santa Clara Station and Newhall Maintenance Facility.

Based on the previous investigations for the Phase I Project, similar arsenic and lead impacts on shallow railroad soils and ballasts would be expected on the BART Extension (AECOM Technical Services, Inc. 2014).

Hazardous Building Materials

Construction may require demolition of existing buildings that could possibly contain hazardous building materials. Building materials such as thermal system insulation, surfacing materials, and asphalt and vinyl flooring materials installed in buildings prior to 1981 may be asbestos-containing materials (ACMs). Also, lead-based paints (LBP) may have been applied to the interior and exterior surfaces of commercial and industrial buildings, regardless of construction date. Lead and asbestos are state-recognized carcinogens. Other hazardous building materials of concern include PCB-containing light ballasts; mercury vapor lamps; and/or wood, concrete, or sheetrock contaminated from chemical use, storage, and/or handling (AECOM Technical Services, Inc. 2014).

Naturally Occurring Asbestos

Geologic mapping from the United States Geological Survey does not show any areas of rock likely to contain naturally occurring asbestos (ultramafic rock) along the BART Extension. Therefore, naturally occurring asbestos in bedrock along the BART Extension would not be expected to be a potential hazard.

4.10.2.2 Regulatory Setting

The following federal regulations are relevant to the BART Extension.

Federal

Resource Conservation and Recovery Act/Federal Toxic Substances Control Act/Hazardous and Solid Waste Act

The United States Environmental Protection Agency (EPA) is the lead agency responsible for enforcing federal laws and regulations governing hazardous materials that affect public health or the environment. The major federal laws and regulations enforced by EPA that could relate to the management of hazardous materials in the alignment are the RCRA; the Toxic Substances Control Act (TSCA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and the Hazardous Material Transportation Act (HMTA).

The Federal Toxic Substances Control Act (1976) and the RCRA established an EPA-administered program to regulate the generation, transport, treatment, storage, and disposal of hazardous waste. The RCRA was amended in 1984 by the Hazardous and Solid

Waste Act, which affirmed and extended the "cradle to grave" system of regulating hazardous.

In 1976, TSCA was enacted to provide EPA authority to regulate the production, importation, use, and disposal of chemicals that pose a risk of adversely impacting public health and the environment, such as PCBs, ACMs, and LBP. TSCA also gives EPA authority to regulate the cleanup of sites contaminated with specific chemicals, such as PCBs.

In 1972, an amendment to FIFRA provided EPA authority to regulate the manufacture, distribution, and import of pesticides. EPA approves registered uses of a pesticide based on an evaluation of its potential adverse effects to human health and the environment. EPA has granted the California Department of Pesticide Regulation (DPR) authority to enforce federal laws pertaining to the proper and safe use of pesticides. DPR can also designate pesticides as "restricted material" based on potential adverse effects on public health, applicators, farm workers, domestic animals, honeybees, the environment, wildlife, or crops other than those being treated.

In 1990 and 1994, the HMTA was amended to improve the protection of life, property, and the environment from the inherent risks of transporting hazardous material in all major modes of commerce. The United States Department of Transportation (USDOT) developed hazardous materials regulations, which govern the classification, packaging, communication, transportation, and handling of hazardous materials, as well as employee training and incident reporting. The transportation of hazardous materials is subject to both RCRA and USDOT regulations.

Cortese List

U.S. Code 65962.5 (commonly referred to as the Cortese List) includes Department of Toxic Substances Control (DTSC)-listed hazardous waste facilities and sites, Department of Health Services lists of contaminated drinking water wells, sites listed by the State Water Resources Control Board as having underground storage tank leaks or a discharge of hazardous wastes or materials into the water or groundwater, and lists from local regulatory agencies of sites with a known migration of hazardous waste/material.

Department of Transportation Hazardous Materials Regulations (Code of Federal Regulations, Title 49, Sections 100–185)

USDOT Hazardous Materials Regulations cover all aspects of hazardous materials packaging, handling, and transportation. Parts 107 (Hazard Materials Program), 130 (Oil Spill Prevention and Response), 172 (Emergency Response), and 177 (Highway Transportation) would apply to the BART Extension.

OSHA Lead Standard for the Construction Industry – Title 29 Code of Federal Regulations 1926.62

This standard covers lead in a variety of forms, including metallic lead, all inorganic lead compounds, and organic lead soaps. The standard establishes maximum limits of exposure to lead for all workers covered, including a permissible exposure limit (PEL) and action level (AL).

4.10.3 Methodology

The BART Extension would result in *an adverse effect* if it would represent a measurable localized increased risk that does not pose an immediate threat to health or safety and entail increased risks on a regional scale.

4.10.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.10.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.10.4.1 No Build Alternative

The No Build Alternative consists of existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects would likely require consideration of hazardous materials exposure during construction and operation. Typically a worker health and safety plan would be prepared and adopted to prevent exposure of maintenance workers, control emissions of hazardous dusts, and safeguard offsite transport of hazardous materials. Additionally, a Phase 2 site assessment, Contaminant Management Plan (CMP), and associated permits could be required. Projects planned under the No Build Alternative would undergo separate environmental review to determine the potential for exposure to hazardous materials. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.10.4.2 BART Extension Alternative

Operation

Handling and Storage of Hazardous Materials

Hazardous materials, such as motor fuels, oils, solvents, and lubricants, would be routinely managed during operations, particularly at the Newhall Maintenance Facility. Diesel would also be used for standby generators located at each station, yard, shop, and pump station, and possibly at the train control buildings. BART Extension workers, the public, and/or the environment could be exposed to hazardous materials during routine operations if the materials are not properly managed, thus posing a potentially significant adverse effect. Workers handling hazardous materials are required to adhere to federal Occupational Safety and Health Administration health and safety requirements. Handling of these materials would also be compliant with applicable regulations such as the RCRA, USDOT Hazardous Materials Regulations, and local Certified United Program Agencies (CUPA) regulations via implementation of Hazardous Materials Business Plans (HMBP). HMBPs are designed to protect both human and environmental health from adverse effects as a result of the storage or possible release of hazardous materials. This is accomplished by documenting significant amounts of hazardous materials (thresholds are 55 gallons of a liquid, 200 cubic feet of a gas, and 500 pounds of a solid) so that emergency responders can effectively protect the public in case of an emergency. Furthermore, the HMBP would be modified, if necessary, to include a description of any new hazardous materials that might be used during future operations and would be subject to approval and oversight by the San Clara Fire Department (SCFD) and Hazardous Material Compliance Division (HMCD), including routine inspections. With the adherence to these regulations, potential significant adverse effects on human health or the environment related to hazardous materials handling and storage would be reduced to *no adverse effect*, and no mitigation would be required.

Disturbance of Contaminated Materials

Sources of known and/or anticipated subsurface contamination on the BART Extension sites include 43 known release sites, 5 permitted UST facilities, 69 RCRA generators sites, and existing railroad corridors. Contaminated materials encountered during construction and operations activities could pose a potential threat to human health and the environment. The disturbance of contaminated soil and/or ballast during construction and maintenance activities could pose a direct exposure hazard to workers. Vapor intrusion of groundwater contaminants (e.g., chlorinated solvents) into future BART Extension buildings, such as the stations, system facilities, and maintenance facilities, could pose an inhalation hazard to indoor workers and residents. BART passengers at the above-grade Santa Clara Station could be exposed to hazardous materials in soil and/or ballast (if any) by direct contact and/or inhalation of dust. Offsite residents near the Santa Clara Station and above-grade corridors of tracks could also be exposed to hazardous materials in soil and/or ballast (if any) by inhalation of dust disturbed by passing trains.

The level of potential health risks posed by the disturbance of subsurface contamination would primarily depend on the sensitivity of the receptors, contaminant concentrations, and duration of exposure. Health risks posed by existing subsurface contamination would not be expected to pose an immediate threat to human health. Operations could potentially expose maintenance workers, indoor workers, indoor residents, passengers, and offsite residents to subsurface hazardous materials and pose an adverse effect on human health.

The approach for assessing and managing hazardous materials in soil and ballast materials that would be encountered during earthwork activities is described in the CMP. For example, the CMP has developed screening values for the reuse of soil and ballast that are protective of potential human and ecological receptors. The CMP will be implemented through site-specific Remedial Action Plans (RAPs) prepared for the BART Extension and approved by the Regional Water Board. Under the oversight of the Regional Water Board, compliance with the CMP and BART Extension RAPs is mandatory. In accordance with the CMP, the RAPs will identify site-specific hazards to human and ecological receptors and propose preferred site-specific remedial strategies. With compliance with the CMP and RAPs, there would be *no adverse effect*.

4.10.5 NEPA Conclusion

Potential impacts related to handling and storage of hazardous materials for the BART Extension Alternative would result in *no adverse effect* with adherence to the hazardous materials regulations.

4.11 Land Use

4.11.1 Introduction

This section describes the affected environment and environmental consequences related to land use from operations of the NEPA Alternatives. Information regarding land use and planning in the Cities of San Jose and Santa Clara was obtained from the following sources.

- *Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *Envision San Jose 2040 General Plan Environmental Impact Report* (City of San Jose 2011b).
- *City of Santa Clara 2010–2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010–2035 General Plan Environmental Impact Report* (City of Santa Clara 2010b).

4.11.2 Environmental and Regulatory Setting

4.11.2.1 Environmental Setting

This section discusses the existing conditions related to land use within the BART Extension vicinity, including the construction staging areas.

A broad range of land uses exists along the alignment, including residential, commercial, retail, and industrial uses. There are no agricultural properties located along the alignment, at station locations or parking areas, or at the sites of systems facilities. The BART Extension would begin at the terminus of the Phase I Project, east of U.S. 101 and south of Mabury Road in San Jose, and would terminate at grade in Santa Clara near the Caltrain Station.

Figures 4.11-1 to 4.11-7 show existing land uses at the station sites. Current land uses along the corridor are also shown on the plan and profile drawings in Appendix B of this SEIS/SEIR. Existing land uses are described using the following standard categories.

- Low-density residential: single-family and one- to two-story housing units.
- Medium-density residential: apartments, condominiums, and duplex buildings.
- High-density residential: residential buildings over three stories in height.
- Light industrial: industrial parks, research and development, and automotive repairs.
- Heavy industrial: manufacturing warehouses, industrial plants, and freight facilities.
- General commercial/office: offices, business parks, small businesses, restaurants, clothing stores, and other vendors of general consumer goods.
- Public/civic/community center: public venues and government-related buildings.
- School/educational: colleges, universities, and other schools.

- Open space/parks: public parks, waterway corridors, and other undeveloped areas.
- Airport/highway service/transit: transit-related buildings and areas.

City of San Jose

Connection to Phase I Berryessa Extension

Both the Twin-Bore and Single-Bore Options would follow the same tunnel alignment in this location. Land uses along the east side of the alignment are predominantly industrial between Mabury Road and Coyote Creek. South of Coyote Creek is Anne Darling Elementary School, and south of McKee Road land uses are predominately single-family residences. U.S. 101 is located immediately adjacent and to the west of the alignment north of McKee Road. The alignment crosses under U.S. 101 south of McKee Road.

Alum Rock/28th Street Station

The Alum Rock/28th Street Station would be excavated to approximately 40 feet below ground level with the Twin-Bore Option. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. Both stations would be below an existing industrial area and within an urban village boundary. Industrial uses are located along the former railroad right-of-way (ROW) and along the west side of U.S. 101. Industrial uses are located within the station area. Other industrial buildings, warehouses, and storage yards are located immediately adjacent to the station site. Low- and medium-density residential uses are located across U.S. 101 to the north and east of the station site, as well as to the west of 28th Street and the former railroad ROW. The Portuguese Band and Social Center is located to the west of the station site, and the Five Wounds National Portuguese Church and associated elementary school are located to the southeast. Commercial uses border the southwestern corner of the station site along Santa Clara Street.

Tunnel Alignment near Coyote Creek

The Twin-Bore Option would curve slightly north of Santa Clara Street as it passes under Coyote Creek. The Single-Bore Option would remain in line with Santa Clara Street, going under the bridge abutments. Uses along Santa Clara Street from 28th to 18th Streets are generally commercial, with residential areas to the north and south of the commercial corridor. The East San Jose Carnegie Branch Library is directly south of the alignment at South 23rd Street. From 18th Street heading west into downtown San Jose, land uses are primarily commercial and retail. Older single-family residential neighborhoods are located beyond the commercial strip to the north and south of the alignment. Horace Mann Elementary School is located along the north side of the alignment, and San Jose State University and San Jose City Hall are to the south.

Legend

- Public Facility/Station Area
- Parking Lot
- System Facilities
- Underground Station

General Plan Land Use Designations

- Urban Village
- Residential Neighborhood
- Neighborhood / Community Commercial
- Public / Quasi-Public
- Mixed Use Neighborhood
- Open Space, Parklands and Habitat
- Light Industrial

N

NOT TO SCALE

Source: Circlepoint; Google Earth, 2015.

Graphics ... 00332.13 (6-9-2016) tm

Figure 4.11-1

San Jose General Plan Land Use Designations – Alum Rock/28th Street Station

VTA's BART Silicon Valley–Phase II Extension Project

Legend

- Public Facility
- Underground Station
- System Facilities

General Plan Land Use Designations

- Urban Village
- Urban Residential
- Residential Neighborhood
- Neighborhood / Community Commercial
- Public / Quasi-Public
- Mixed Use Commercial
- Transit Residential
- Open Space, Parklands and Habitat
- Downtown

Graphics … 00332.13 (6-9-2016) tm

Source: Circlepoint; Google Earth, 2015.

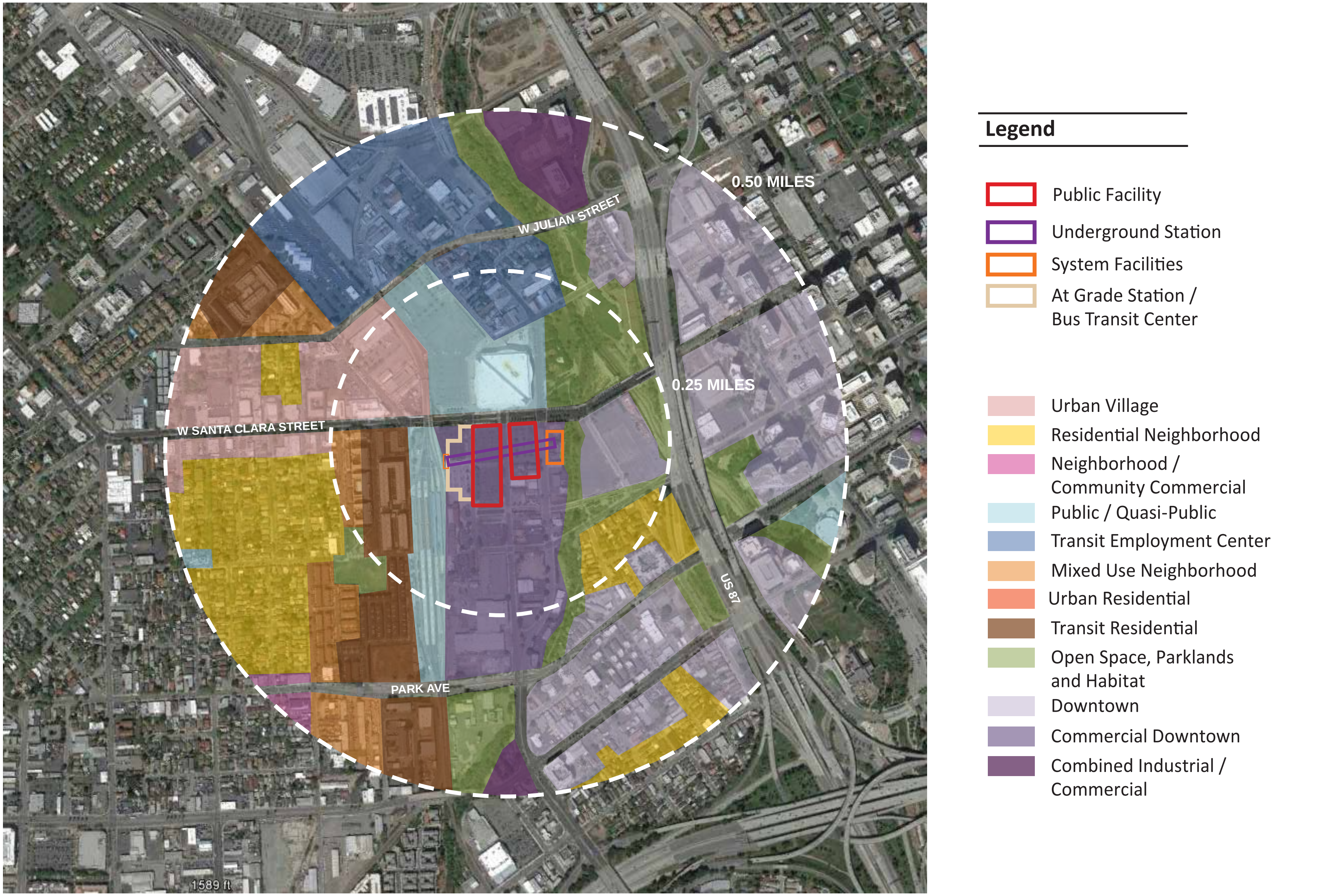
N
NOT TO SCALE

Figure 4.11-2
San Jose General Plan Land Use Designations – Downtown San Jose Station East Option
VTA's BART Silicon Valley–Phase II Extension Project

Source: Circlepoint; Google Earth, 2015.

Graphics ... 00332.13 (6-9-2016) tm

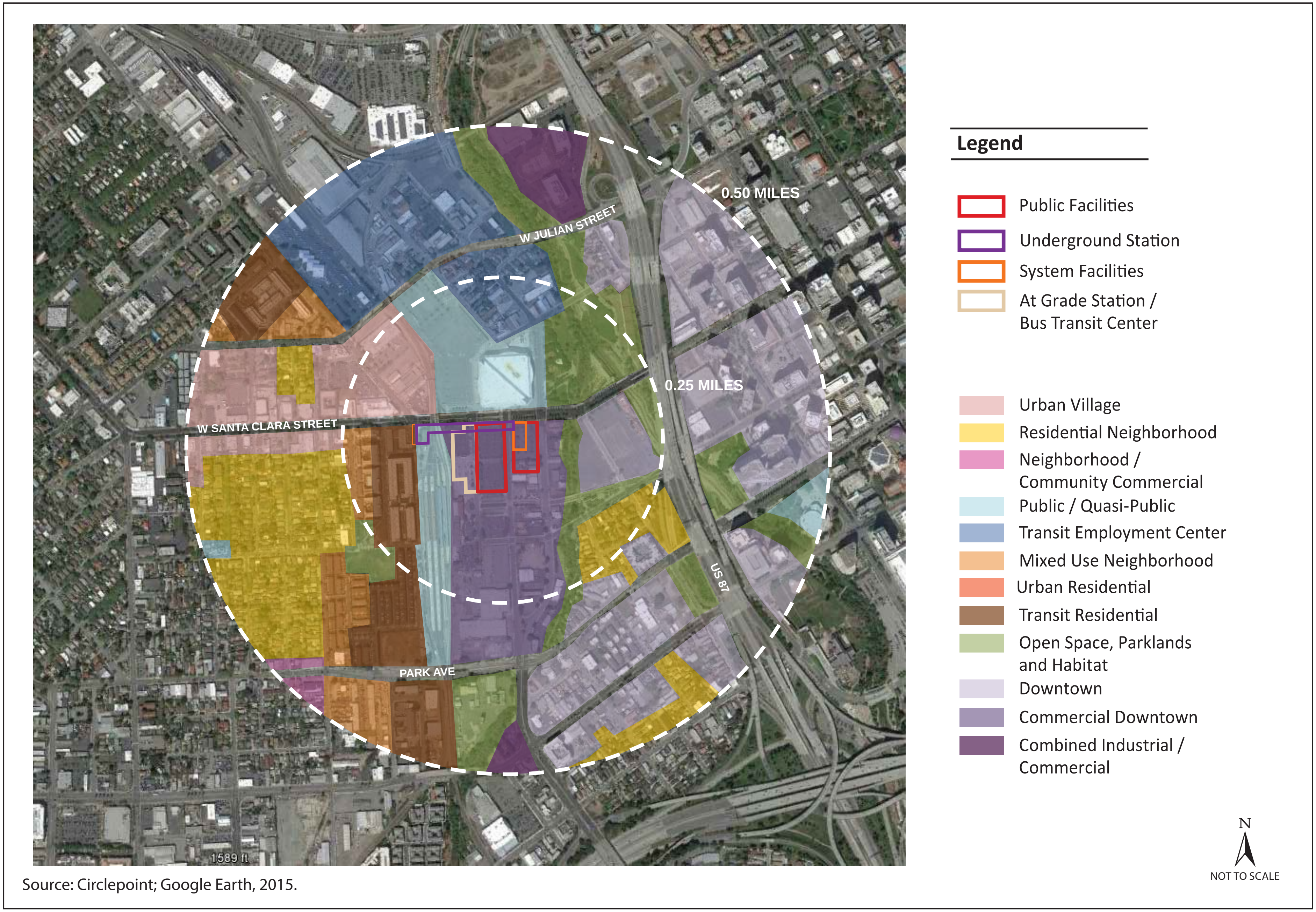
Figure 4.11-3
San Jose General Plan Land Use Designations – Downtown San Jose Station West Option
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

Graphics … 00332.13 (6-9-2016) tm

Figure 4.11-4
San Jose General Plan Land Use Designations – Diridon Station South Option
VTA's BART Silicon Valley–Phase II Extension Project



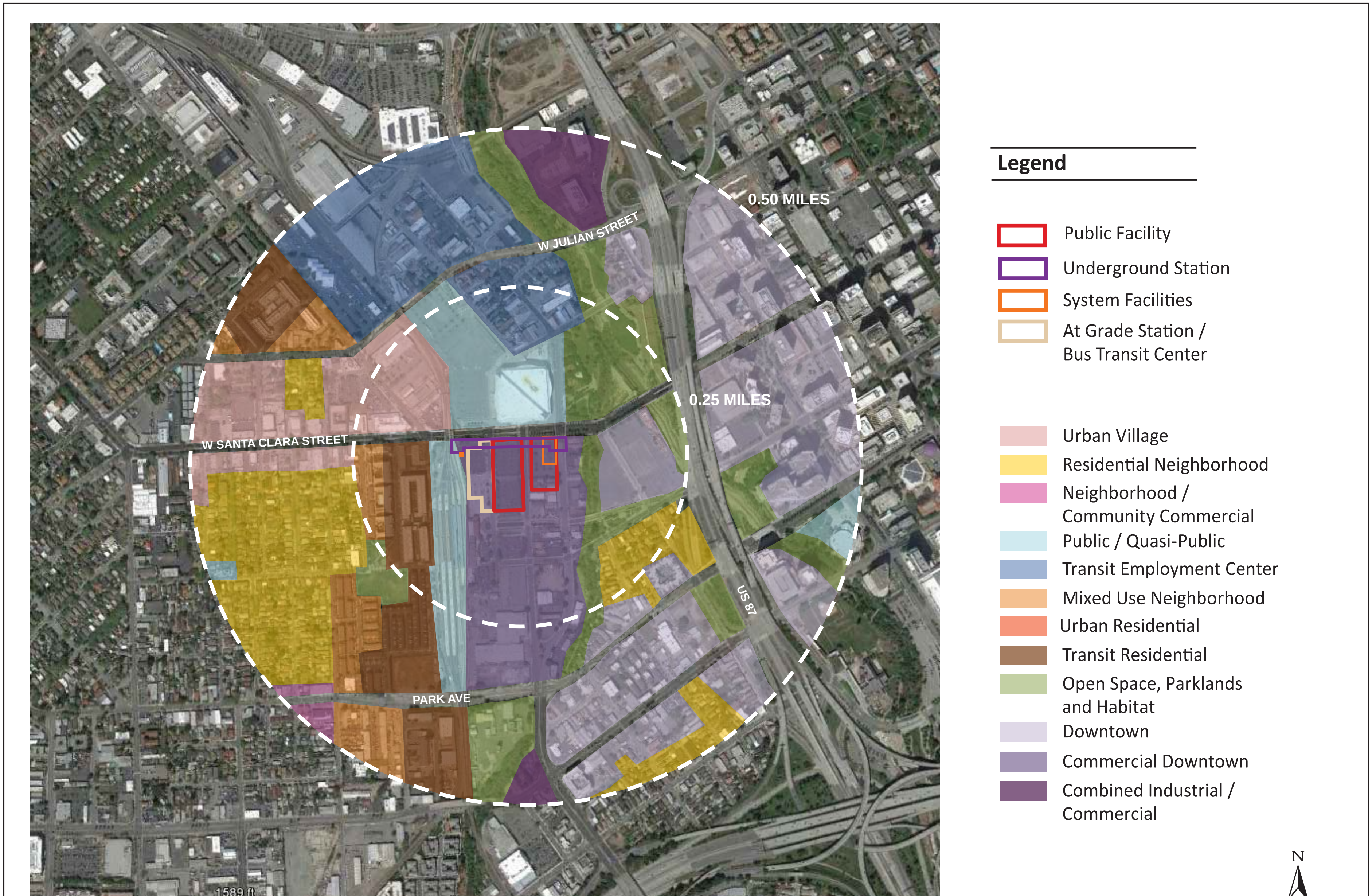
Source: Circlepoint; Google Earth, 2015.

Graphics ... 00332.13 (6-9-2016) tm

Figure 4.11-5

San Jose General Plan Land Use Designations – Diridon Station North, Single-Bore Option

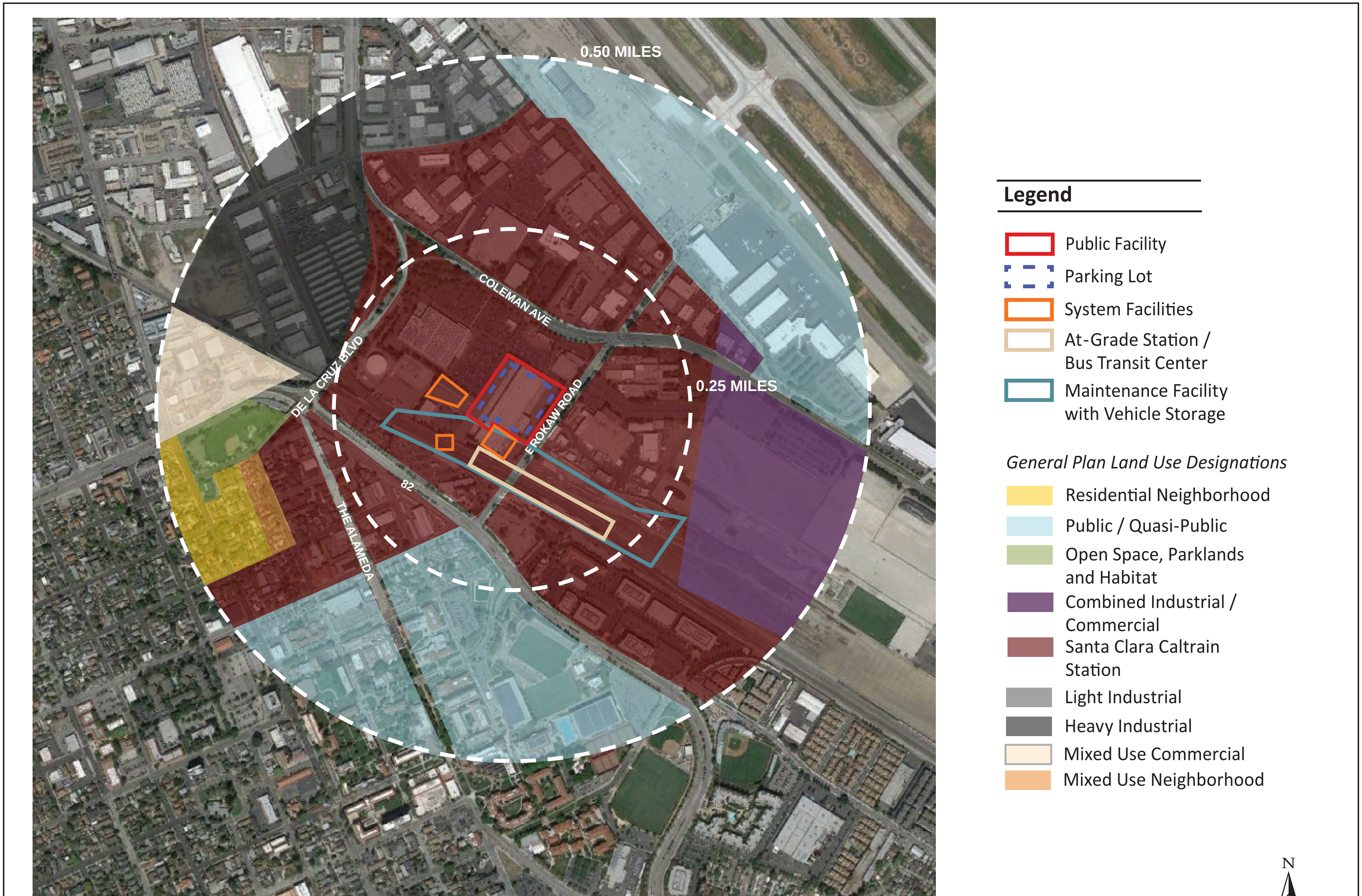
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

Graphics … 00332.13 (6-9-2016) tm

Figure 4.11-6
San Jose General Plan Land Use Designations – Diridon Station North, Twin-Bore Option
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

Graphics ... 00332.13 (6-9-2016) tm

Figure 4.11-7

Santa Clara General Plan Land Use Designations – Santa Clara Station

VTA's BART Silicon Valley–Phase II Extension Project

Downtown San Jose Station

Downtown San Jose contains high-rise office buildings lining Santa Clara Street. These buildings have first floor retail uses that mainly serve downtown employees, residents, and visitors. Downtown is characterized by a strip of retail uses along the street frontage, with older residential uses just beyond the retail corridor. The San Jose State University campus is located one block south of Santa Clara Street between 4th and 10th Streets. The San Jose Civic Plaza, including San Jose City Hall, is located south of Santa Clara Street, between 4th and 6th Streets. The Museum of Art, Plaza de Cesar Chavez, St. Joseph's Cathedral, San Pedro Square, and several theaters and major hotels are near the new station locations. Santa Clara Street is a busy retail, commercial, and business thoroughfare leading into downtown San Jose. Commercial businesses include many restaurants, bars, retailers, a grocery store, and a gas station. Low- and medium-density residential uses are located to the north of Santa Clara Street, just outside of downtown San Jose.

Downtown San Jose Station East Option

The Downtown San Jose Station East Option would be excavated to approximately 40 feet below ground level under Santa Clara Street between 5th and 2nd Streets with the Twin-Bore Option. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. The station would consist of a boarding platform level, a mezzanine one level above, and entrances at street level. Several station portal entrance location options are being evaluated such as in sidewalks along Santa Clara Street near 6th, 4th, and 3rd Streets, alongside commercial and entertainment venues.

Downtown San Jose Station West Option

The Downtown San Jose Station West Option would be excavated to approximately 40 feet below ground level under Santa Clara Street between 2nd and Market Streets. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. Businesses along this portion of Santa Clara Street include several restaurants, retailers, a bank, and hair salons. The station would consist of a boarding platform level, a mezzanine one level above, and entrances at street level. Several station portal entrance location options from sidewalks on 3rd Street north of Santa Clara Street, along Santa Clara Street between 2nd and 3rd Streets, on 2nd Street both north and south of Santa Clara Street, north of Santa Clara Street and east of Market Street, and along Market Street south of Santa Clara Street are being evaluated.

Diridon Station

Land uses near the Diridon Station South and North Options include Guadalupe River Park and Gardens to the north, and low- to medium-density residential, commercial, and industrial uses to the south. Between the station and Stockton Avenue, the land uses are predominately low- to medium-density residential with some park/open space, as well as commercial uses along The Alameda. Industrial land uses are located east of the alignment near the Caltrain corridor. Cahill Park is located one block south of the station on West San Fernando Street.

Diridon Station South Option

The Diridon Station South Option would be located between Autumn Street to the east, the existing Caltrain tracks to the west, Santa Clara Street to the north, and the existing Diridon Caltrain Station to the south. The Diridon Station South Option would be located approximately 40 feet below ground level and would be located slightly south relative to the North Option with the Twin-Bore Option. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. The alignments for the Twin-Bore and Single-Bore Options would be the same as they enter and exit the Diridon Station South Option.

Primary land uses within the Diridon Station South Option area are industrial and office/commercial, with office/commercial and institutional/education to the west. To the south are industrial uses and residential uses are to the southwest of the station area. Commercial and industrial uses, as well as the Los Gatos Creek are located to the east. The SAP Center is directly north of the station and is anticipated to draw substantial numbers of riders during entertainment and sporting events. Transportation-related infrastructure dominates the landscape within the footprint of the Diridon Station South Option.

Diridon Station North Option

Under the Twin-Bore Option, the Diridon Station North Option would be located slightly to the east, between the exiting Caltrain tracks to the west and Autumn Street to the east. Excavation for this option would extend approximately 40 feet below ground level. Under the Single-Bore Option, the top of the Diridon Station North Option would be located a maximum of approximately 70 feet below ground level between Montgomery Street to the east, White Street to the west, Santa Clara Street to the north, and the existing Diridon Caltrain Station to the south. The track alignments for the Twin-Bore and Single-Bore Option would also vary slightly as they enter and exit the Diridon Station North Option.

Primary land uses within and in the vicinity of the Diridon Station North Option area are the same as described above for the Diridon Station South Option.

Continuation of Tunnel Alignment

Around Pershing Avenue, all of the options—the Twin-Bore and Single-Bore Options and the Diridon Station South and North Options—converge back onto the same alignment under Stockton Avenue. The top of the Twin-Bore Option would be approximately 40 feet below ground level and the top of the Single-Bore Option would be approximately 70 feet below ground level. Exiting the stations, the alignment would continue west and cross under the Caltrain tracks. Residential and commercial uses are along the alignment before reaching Stockton Avenue. Residential land uses dominate the southwest side of the alignment, and commercial and industrial uses occupy areas to the northeast approaching Schiele Avenue. Some commercial and institutional uses are also located along the alignment in this area.

The alignment would continue on the east side of the Caltrain tracks and cross under Interstate 880 (I-880) before ascending and exiting the West Tunnel Portal near Newhall Street. City of Santa Clara

Newhall Maintenance Facility

Within Santa Clara, the alignment begins north of I-880 and extends to the Santa Clara Station. North of I-880, the uses are primarily industrial, while single-family and multi-story residences are located to the west. The Santa Clara University campus also lies to the west.

The Newhall Maintenance Facility would begin north of the West Tunnel Portal at Newhall Street in San Jose and extend to Brokaw Road near the Santa Clara Station in Santa Clara. The facility would be constructed on the former Union Pacific Railroad (UPRR) Newhall Yard that was purchased by VTA in 2004. Land uses on the southwest side of the maintenance facility and storage area and across the existing railroad tracks are primarily single-family and multi-family residences. On the northeast side of the storage area there are primarily commercial and industrial uses, such as a home improvement business and an athletic club, as well as Avaya Stadium.

Santa Clara Station

The Santa Clara Station would be bounded by railroad tracks to the southwest, De La Cruz Boulevard to the northwest, and Coleman Avenue to the northeast near the intersection of Brokaw Road in an area currently occupied by industrial and commercial uses. The station would be at grade, centered at the west end of Brokaw Road, and would contain an at-grade boarding platform with a mezzanine level one level below.

The Santa Clara Caltrain Station is located west of the station site. Land uses along the southern and western boundaries of the station site include the Santa Clara Police Station and office and commercial land uses. Santa Clara University occupies a substantial portion of land to the southwest of the station area. There are also medium- and low-density residential developments to the south of the Santa Clara Station site.

The station site was formerly a FedEx shipping and receiving facility but is now leased to another tenant. Retail uses are located immediately adjacent to the northwest. Industrial buildings and Mineta San Jose International Airport are located to the north and northeast. The existing Caltrain tracks and station are located southwest of the station.

4.11.2.2 Regulatory Setting

There are no federal land use regulations that would be applicable to the BART Extension. However, there are several state and local land use regulations applicable to the BART Extension. Please refer to Chapter 6, Section 6.11, *Land Use,* for a summary of state and local land use policies applicable to the BART Extension.

4.11.3 Methodology

The land use analysis of the BART Extension focuses on four primary components: the alignment, the station areas, the support facilities required for operation, and parking areas. The BART Extension is evaluated against the existing and planned developments adjacent to and surrounding the BART Extension in order to evaluate the compatibility of the facilities with neighboring land uses. The land use study area incorporates areas along either side of the alignment and a 0.5-mile radius around the BART stations.

An *adverse effect* on land use would involve physically dividing an established community, conflicting with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the BART Extension Alternative, or conflicting with any applicable habitat conservation plan or natural community conservation plan.

4.11.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.11.3, *Methodology*. This section also identifies design commitments to avoid, minimize, or mitigate impacts.

4.11.4.1 No Build Alternative

The No Build Alternative consists of existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects could result in effects on land uses typically associated with transit, highway, bicycle, pedestrian facilities, and roadway projects. These projects are anticipated to cause a similar range of the type and intensity of impacts as caused by the BART Extension Alternative. This would include typically include transportation, noise and vibration, air quality, and land use impacts and associated mitigation measures. However, projects planned under the No Build Alternative would undergo separate environmental review to determine whether these projects would result in adverse effects to surrounding land uses. The No Build Alternative would not be as supportive of regional plans and policies to promote BART use, infill development, and densification around BART stations as would the BART Extension Alternative.

4.11.4.2 BART Extension Alternative

The final property acquisitions required to construct the BART Extension Alternative may change (i.e., increase or decrease in size, change type, and/or change from permanent to temporary, etc.) during final design. Also, during final design, additional easements may be identified such as temporary construction easements, temporary access easements, and long-term maintenance and access easements. It is the intent of this and previous environmental documents to disclose the potential environmental impacts of acquisitions known at the time the environmental document is prepared while recognizing that some adjustments may be necessary based on final design, working with individual property owners during the acquisition process, and/or during construction. Should additional modifications beyond the scope of this environmental document trigger the need for additional environmental review, the necessary additional environmental analyses will be prepared.

Physically Divide an Established Community

Community cohesion addresses the degree to which residents feel a sense of belonging to their neighborhood or experience attachment to community groups and institutions as a result of continued association over time. Possible adverse effects of a project on community cohesion include effects on interactions among persons and groups; isolation of certain people from others; and the perceived effect on community quality of life due the creation of a new barrier or physical division within an established community.

VTA has taken measures to ensure the public is aware and has been engaged during the design period of the BART Extension. The community offered suggestions and concerns at several public forums, including scoping meetings. During the scoping process for the BART Extension, VTA invited the community to provide input on the BART Extension. VTA conducted three public scoping meetings (on February 12, 17, and 19, 2015) which provided BART Extension-related information to the community and initiated public involvement in the environmental review process. The community offered suggestions and voiced concerns related to several BART Extension components. Such community input has helped to guide the development of BART Extension plans, particularly for aboveground station areas, to minimize adverse community effects of the BART Extension.

Alignment

The BART Extension is approximately 6 miles long and would pass through the Cities of San Jose and Santa Clara. Of those 6 miles, approximately 5 would be underground. The BART Extension would descend from the connection to Phase I Berryessa Extension into the East Tunnel Portal just north of Las Plumas Avenue. From here, the alignment would travel underground through San Jose before ascending at the West Tunnel Portal north of I-880 near Newhall Street. The alignment would continue to the Santa Clara Station (approximately 0.75 mile) near the existing Santa Clara Caltrain Station. The only tunnel locations where the Twin-Bore and Single-Bore Options would differ would be near Coyote Creek and entering/exiting the Diridon Station North Option. However, both of these portions of the alignment would be underground and vary only slightly; thus the discussion of surrounding land uses is the same for both the Twin-Bore and Single-Bore Options.

No new physical barriers would be created within the community surrounding the 5-mile-long underground alignment, and there would be no division of an existing community. The underground alignment would transition from an at-grade alignment into a trench and into a tunnel portal at both the east and west ends of the BART Extension.

Approximately 1 mile of the alignment would be located aboveground either at grade or in a trench. The aboveground portion of the alignment north of the East Tunnel Portal would be located near U.S. 101 and within an existing industrial area. The portion in Santa Clara would travel within an existing heavily-utilized rail corridor, including passenger service by Altamont Corridor Express, Caltrain, and Capitol Corridor and infrequent Union Pacific Railroad operations. Therefore, neither aboveground segment would create a new division in an existing community. There would be *no adverse effect*, and mitigation would not be required.

Station Locations

Alum Rock/28th Street Station

The Alum Rock/28th Street Station is located within the Five Wounds Urban Village Area and the *Five Wounds/Brookwood Terrace BART Station Area Community Concept Plan*. This Plan was conceptualized through a collaboration between the City, community, and University of San Jose. This plan envisions the Alum Rock/28th Street Station as a center for a conceptualized "Town Square," and associated pedestrian promenades and mixed use developments. The ultimate goal of the community in designing the *Five Wounds/Brookwood Terrace BART Station Area Community Concept Plan* was to enhance the area and create a community gathering place with mixed land uses.

The Alum Rock/28th Street Station would be underground and include aboveground facilities, such as street level station entrances, a parking structure, system facilities, and roadway improvements to North 28th street. The Alum Rock/28th Street Station would be contained within an approximately 11-acre station campus that is currently in industrial uses. As previously described, the station campus area is surrounded by a mix of industrial, commercial, institutional/civic and residential land uses that all operate independently from each other. The current uses on the site do not provide primary access to adjacent users. The Alum Rock/28th Street BART Station would replace the existing industrial buildings contained within the station campus; however, it would not take any streets out of the existing roadway network, create new barriers, or divide an existing neighborhood. Buildout of the Alum Rock/28th Street Station would be consistent with the *Five Wounds/Brookwood Terrace BART Station Area Community Concept Plan.* Thus, operation of the Alum Rock Station would not substantially disturb the cohesiveness in the area or substantially interfere with community interaction. Furthermore, implementation of this station would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect,* and no mitigation would be required.

Downtown San Jose Station Options

Downtown San Jose Station would be located underground and consist of a boarding platform level, a mezzanine one level above, and entrances at street level. Land uses surrounding both station options are primarily institutional/civic, commercial, and residential uses and are located near VTA's Santa Clara Light Rail Station. The current uses around the station options do not provide primary access to adjacent users. Both station options have relatively little aboveground infrastructure; aboveground features would not create a new barrier or substantially interrupt the community interaction in the area. The aboveground features would be designed to blend with the existing urban fabric of the downtown area. The station would not take any streets out of the existing roadway network, remove any residential neighborhoods, or put up barriers between any neighborhoods. Furthermore, implementation of either of the downtown station options would not divide any existing established community in the area. Implementation of a new BART station in downtown San Jose would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect,* and no mitigation would be required.

Diridon Station Options

The Diridon Station South and North Options would be located underground and would consist of a boarding platform level, a mezzanine one level above, and entrances at both the east and west ends of the station at street-level portals. Diridon Station is included in the *Diridon/Arena Station Area Plan*. This plan was the result of a collaboration between the City and the community, and conceptualizes the station as a landmark facility with opportunities for a variety of mixed land uses. The ultimate goal of the *Diridon/Arena Station Area Plan* is to create a community-designed transit-oriented development (TOD) that enhances San Jose as an attractive urban center in which to work and live.

Existing land uses within the Diridon Station areas consist mostly of transportation infrastructure as well as industrial, residential, entertainment, and office/commercial land uses. Transportation infrastructure is located all around the Diridon BART Stations including the Caltrain Station and tracks which lie to the west, VTA's Vasona Light Rail Line which passes under the station area traveling east to west, and VTA's Bus Transit Center which is located to the north. Most of the existing land uses within the Diridon Station footprints are surface parking lots. SAP Center is located to the north of Santa Clara Street. Industrial uses are located to the south and east, and residential uses are located to the southwest of the station area. Office and commercial land uses are located to the northwest, south, and northeast of the station area. The current uses on the site are parking lots, which primarily support the surrounding transportation infrastructure, SAP Center, and nearby office/commercial uses.

Aboveground infrastructure onsite includes station entrance portals, systems facilities, and the reconfigured Diridon Station Bus Transit Center. Construction of either the Diridon Station South or North Option would cause the displacement of one single-family residence on South Autumn Street (APN 259-38-009). However, the property owner would be compensated in compliance with all the requirements of the federal law Uniform Relocation Act, 42 U.S.C. chapter 61, Government Code Sec. 7260 (Relocation Assistance) through Sec. 7267; and State Regulations—Relocation Assistance and Real Property Acquisition Guidelines (Title 25, California Administrative Code Ch. 6, Art 1, Section 6000 et seq.)

(refer to Section 4.14, *Socioeconomics*, for more information). The residence is surrounded by industrial and commercial uses; only one other residence is located on Autumn Street between Santa Clara and San Fernando Streets. The removal of this residence would not cause or contribute to the physical division of a community.

Aboveground station features would be consistent with the existing transportation land uses in the area associated with the Diridon Caltrain Station. The Diridon Station South and North Options would be consistent with the *Diridon/Arena Station Area Plan,* which calls for new opportunities for expanded, more efficient transit between community hubs, residential areas, and downtown. The station would not permanently take any streets out of the existing roadway network or put up barriers between any neighborhoods, and the one single-family home displacement would occur in accordance with state and federal laws, the owner would be compensated appropriately, and the removal of one residence within a non-residential and predominantly industrial neighborhood would not cause or contribute to the physical division of a community. Therefore, implementation of the Diridon Station South and North Options would not physically divide an existing established community. Furthermore, implementation of the Diridon Station South and North Options would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect*, and no mitigation would be required.

Santa Clara Station

The station would be at grade, centered at the west end of Brokaw Road, and would contain an at-grade boarding platform with a mezzanine one level below. A parking structure of up to five levels would be located north of Brokaw Road and east of the existing railroad tracks. Existing land uses in the vicinity of the station consist of industrial, commercial/retail, and entertainment uses as well as transportation infrastructure. Industrial uses are located directly to the east, including Mineta San Jose International Airport and supporting aviation-related businesses to the north and northeast. The station area was formerly a FedEx shipping and receiving facility but is now vacant, and commercial/retail uses are located immediately adjacent to the north and northwest. Avaya Stadium is located to the southeast. Transportation infrastructure includes railroad tracks to the south running northwest to southeast that support Altamont Commuter Express, Capitol Corridor, and Caltrain passenger service and infrequent Union Pacific Railroad operations. The Santa Clara Caltrain Station is located to the south across the existing railroad corridor. The closest residences are located across El Camino Real southwest of the station site. The existing uses within the station footprint do not provide access to the adjacent users. Santa Clara Station would be constructed on the vacant site and, because the adjacent land uses consist mostly of industrial, infrastructure, and commercial uses, is not located in an area that would cause adverse impacts on an existing community. The station and parking structure would not take any streets out of the existing roadway network, remove any residential neighborhoods, or put up barriers between any neighborhoods. The BART Extension would also construct the final segment of the Santa Clara Pedestrian Undercrossing, which would allow for pedestrians and cyclists to travel between El Camino Real and the Santa Clara Caltrain Station in the west directly to Brokaw Road and Coleman Avenue in the east. Furthermore, implementation of this station would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect*, and no mitigation would be required.

Newhall Maintenance Facility

The Newhall Maintenance Facility would begin north of the West Tunnel Portal at Newhall Street in San Jose and extend to Brokaw Road near the Santa Clara Station in Santa Clara. The Newhall Maintenance Facility would provide primarily industrial uses, including a BART vehicle storage area, general maintenance facilities, engineering offices, and a yard control tower. The facility would be located on the former UPRR Newhall Yard that was purchased by VTA in 2004. For more information on the Newhall Maintenance Facility, refer to Chapter 2, Section 2.2.2.1, *Alignment and Station Features by City*.

The Newhall Maintenance Facility site is adjacent to an existing actively used railroad corridor including Altamont Commuter Express, Caltrain, and Capitol Corridor, and UPRR service. Existing land uses to the south and west include a police station, the Santa Clara Caltrain Station and parking lot, other commercial, retail, and office uses, and single-family and multi-family residences. The residences are separated from the existing rail corridor and future BART corridor by existing 10- to 12-foot-high soundwalls. Farther to the west across El Camino Real is Santa Clara University. North and east of the yard, existing land uses include retail, commercial, and industrial uses, including Avaya Stadium and, farther to the north, Mineta San Jose International Airport. Southeast of the yard is I-880. The existing site does not provide access to the adjacent users. Given that the maintenance facility would be located within the existing railroad corridor, would be located farther from the residences than the active rail corridor, and would be separated from the residential uses by existing 10- to 12-foot-high soundwalls, the Newhall Maintenance Facility would not adversely affect or divide an existing community, create new physical barriers, or substantially interrupt existing community interaction in the area. Therefore, there would be *no adverse effect*, and no mitigation would be required.

System Facilities

The BART Extension’s supporting system facilities include electrical facilities—including traction power substations and a sectionalizing station, high-voltage substations and switching stations, auxiliary power substations, and gap breaker stations—as well as train control and communication equipment, emergency ventilation facilities, and fresh air intake and exhaust facilities for the tunnels, underground stations, and underground pump stations. Supporting system facilities would be, limited in size and located along the alignment, within station areas, and often underground. Two mid-tunnel ventilation facilities, one located at the northwest corner of Santa Clara and 13th Streets and another located east of Stockton Avenue south of Taylor Street, would be aboveground structures housing the equipment required to ventilate the tunnel and would be the same under the Twin-Bore and Single-Bore Options. All publicly visible system facilities would be visually screened by a concrete block wall or fence. Refer to Chapter 2, Section 2.2.2.2, *Description of NEPA BART Extension Alternative Auxiliary Features,* for more detail regarding the sizes, locations, etc. of the system facilities.

Land uses surrounding the site of the 13th Street ventilation facility include commercial and residential uses. Commercial, residential, and industrial land uses surround the Stockton Avenue ventilation facility site options. The final decision regarding the four optional locations for the Stockton Avenue ventilation facility would be based on environmental impacts and property negotiations including availability and costs. Although residential uses are nearby, neither of the system facility sites would replace any community facilities, take any roads out of the existing roadway system, or physically divide an established community. In addition, both system facility sites would be designed to be aesthetically compatible to the surrounding existing uses. Therefore, there would be *no adverse effect*, and no mitigation would be required.

Conflict with any Applicable Land Use Plan, Policy, or Regulation

Consistency of the BART Extension with specific goals and policies is summarized below. An in depth analysis of applicable land use plans, policies, and regulations is located in Section 6.11, *Land Use*.

The BART Extension would be consistent with the regional plans of MTC, ABAG, VTA, and BART to extend BART service, enhance transit service to the South Bay, support the creation of a unified transit system that encircles the bay, and encourage higher-density, mixed-use development adjacent to new transit stations.

The BART Extension would contribute to a coordinated transit system that circles the South Bay and the Peninsula, as the Diridon Station (South and North Options) and the Santa Clara Station would provide intermodal connections from BART to existing rail lines and stations. Thus, the alignment and stations would be consistent with regional land use policies, and there would be *no adverse effect*. No mitigation would be required.

Providing a high-capacity regional rail station in the vicinity of land uses approved for TOD is consistent with the local land use goals of the Cities of San Jose and Santa Clara. The consistency with local plans is described below.

Alignment

As previously described, the tunnel alignments for the Twin-Bore and Single-Bore Options would be similar, and, in the areas in which they differ, the alignment would be underground. Because both alignments would primarily travel underground, and the only aboveground portions of the alignments, which are near the West and East Tunnel Portals, would be within an active rail corridor already established in the area surrounded by primarily industrial uses, additional rail transit use would not be incompatible with the land use plans, policies, or regulations. Thus, there would be *no adverse effect*, and mitigation would not be required.

Station Locations

The station campuses and associated parking structures would be located within areas of an adopted urban village plan (Five Wounds; City of San Jose 2013), adopted station area plans (Diridon; City of San Jose 2014 and Santa Clara Station Area Plan), the Strong Neighborhoods Initiative (SNI), and strategic development plans. Locating BART stations and associated parking structures in these areas would achieve compatibility with adjacent land uses and approved plans because TOD is a key component of many of these plans. Locating BART and supporting transit facilities near planned, mixed land uses would help facilitate a pedestrian-friendly environment that is consistent with the adopted land use plans and future proposed land uses. Furthermore, as previously discussed, VTA has taken measures to ensure communities are engaged during the design period of the BART Extension. During the scoping process for the BART Extension, VTA invited the community to provide input on the BART Extension. VTA plans to include the community throughout the entire planning process and into final design of the BART Extension.

The existing land uses surrounding the station areas are described in detail in the section above. For a full description of existing land uses surrounding the stations, refer to the beginning of Section 4.11.4.2, *BART Extension Alternative*. As previously described, the station campuses would be located within areas that are regulated by adopted development plans.

The Alum Rock/28th Street Station is located within the Five Wounds Urban Village Plan. This Urban Village Plan recognizes the location of the Alum Rock/28th Street BART Station and describes it as an opportunity to achieve the job goals of the General Plan for the Five Wounds Urban Village. This Urban Village Plan envisions the station area to be a part of a mixed-use town square. Locating a new BART station within this area would be compatible with the existing industrial and residential land uses and would be compatible with the proposed land uses within the Five Wounds Urban Village Plan.

The Downtown San Jose Station East and West Options are generally located within the San Jose SNIs for 13th Street and University Neighborhood. Each SNI supports the General Plan designation of Santa Clara Street as a transit-oriented development corridor, allowing for new development that would be compatible with public transit investments such as the extension of BART through downtown San Jose. Therefore, both Downtown San Jose Station Options would be consistent with adjacent land uses and with the adopted SNIs.

The Diridon Station Area Plan provides an overview of the future development of the Diridon Station area, which integrates open space, transportation, and land uses to create an expansion of downtown San Jose. One of the primary objectives of the plan is to establish a land use plan and policy framework that will guide future development and redevelopment toward land uses that support transit ridership and economic development. New transportation infrastructure such as the Diridon Station South and North Options would be compatible with the existing land uses, as well as with future land uses proposed in the Diridon Station Area Plan.

The Santa Clara Station Area Plan has been incorporated into the SCGP as the Santa Clara Station Focus Area and guides the future development of the Santa Clara Transit Center and surrounding area. With a planning horizon to 2030, the plan articulates a vision and policies for the future development of the Santa Clara Station Area, providing guidance for changes as appropriate to the general plans and the Santa Clara zoning ordinance. The Santa Clara Station would achieve compatibility with existing and future surrounding land uses (as described in the Santa Clara Station Area Plan) for the same reasons described previously for San Jose station sites; however, given that it would be located adjacent to an existing Caltrain station, the Santa Clara Station would achieve even greater compatibility with surrounding land uses.

Therefore, the BART station areas would be compatible with existing and future land uses. There would be *no adverse effect*, and mitigation would not be required.

Additionally, VTA will design the BART Extension to be aesthetically compatible to adjacent land uses. Considerations would include urban design, pedestrian/transit integration, cost/value capture, safety and security, engineering requirements, operating requirements, maintenance, and BART design criteria and standards. These criteria would be developed in coordination with BART, the cities, and the community and would help to achieve even greater compatibility with surrounding land uses.

Newhall Maintenance Facility

The Newhall Maintenance Facility would be located within an existing heavily-used rail corridor with Altamont Commuter Express, Caltrain, Capitol Corridor passenger service and infrequent Union Pacific freight movements. Locating maintenance facilities in this area would be consistent with the adjacent land uses and thus there would be *no adverse effect*, and mitigation would not be required.

System Facilities

As previously described, supporting facilities would be contained within system facility sites, limited in size, and located along the alignment. All of the systems facilities are 12 feet or less in height.

Facility sites at the Alum Rock/28th Street, Diridon, and Santa Clara Stations within public view would be surrounded by an approximately 9-foot-high concrete block wall, and sites outside of public view would be surrounded by a 9-foot-high fence. The locations of system facilities associated with the Diridon Station would differ slightly between the Diridon Station South and North Options. However, they would all be blocked from public view and would not conflict with any applicable land use plan, policy, or regulation.

Other system facilities, including the two mid-tunnel ventilation structures, would be located within buildings and designed to be compatible with the surrounding land uses. The two mid-tunnel ventilation structures would be the same for both the Twin-Bore and Single-Bore

Options. VTA will also design the system facilities to be compatible with adjacent land uses, and thus there would be *no adverse effect*. Therefore, mitigation would not be required.

Conflict with any Applicable Habitat Conservation Plan or Natural Community Conservation Plan

The *Santa Clara Valley Habitat Plan* (SCVHP), which is both a habitat conservation plan and natural community conservation plan, aims to enhance the viability of threatened and endangered species throughout the Santa Clara Valley. The majority of the Bart Extension area is within the boundaries of the SCVHP. However, except for the Newhall Maintenance Facility, all of the BART Extension area has already been disturbed by urban development. A portion of the Newhall Maintenance Facility is within the western burrowing owl (*Athene cunicularia hypogea*) survey area covered by the SCVHP, and construction activities could result in a significant impact on the species. Furthermore, the SCVHP regulates nitrogen deposition in the vicinity of the BART Extension. However, once operational, the BART Extension reduce vehicle miles traveled and thus reduce nitrogen deposition which would benefit the Bay checkerspot butterfly (*Euphydryas editha bayensis*), a species listed as threatened under the Endangered Species Act. VTA would implement Mitigation Measure BIO-CNST-G, which require VTA to perform preconstruction surveys, and, if necessary, implement avoidance or relocation measures for burrowing owls if present to comply with the SCVHP. With the implementation of these mitigation measures, this impact would be less than significant. Refer to Chapter 5, Section 5.5.4, *Biological Resources and Wetlands*, for mitigation measure details and more information regarding the BART Extension's consistency with the SCVHP.

4.11.5 NEPA Conclusion

The BART Extension Alternative is consistent with regional plans, the Midtown Specific Plan, Strong Neighborhoods Initiative, Urban Village Plans, SJGP, and SCGP that encourage development of land uses and densities that maximize transit ridership. As previously discussed, one single-family residence would be displaced by both Diridon Station South and North Options. However, the displacement would occur in accordance with state and federal laws, the owner would be compensated appropriately, and the removal of one residence within a non-residential and predominantly industrial neighborhood would not cause or contribute to the physical division of a community (refer to Section 4.14, *Socioeconomics*). With the implementation of Mitigation Measure BIO-CNST-G, the BART Extension Alternative would be consistent with the HCP. Therefore, there would be *no adverse effect* on land use, and no additional mitigation would be required.

4.12 Noise and Vibration

4.12.1 Introduction

This section describes the affected environment and environmental consequences related to noise and vibration from operations of the NEPA Alternatives. The information provided in this discussion is based on *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* prepared in 2016 by Wilson, Ihrig & Associates. The analysis also draws upon a study prepared by ATS Consulting LLC prepared in January 2005, the *Station Noise Mitigation and Acoustical Treatment Study*, which outlined the noise and acoustical mitigation measures that need to be considered during the design of the BART stations. The descriptions of existing noise conditions along the BART Extension alignment are based on information and data provided by Wilson Ihrig & Associates.

4.12.2 Existing Conditions and Regulatory Setting

4.12.2.1 Noise and Vibration Terminology

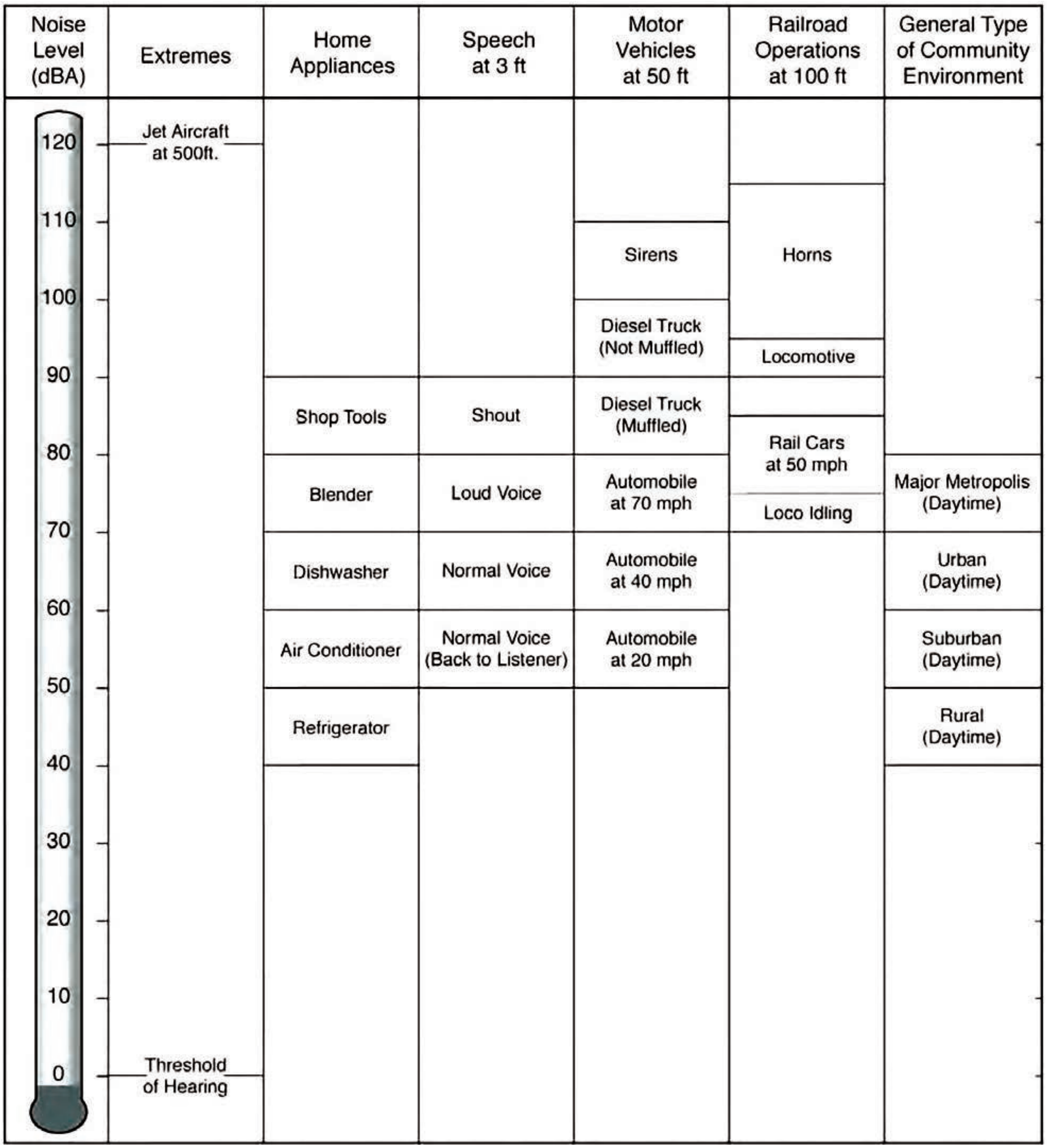
Noise Descriptors

Noise is typically defined as unwanted or undesirable sound, where sound is characterized by small air pressure fluctuations above and below the atmospheric pressure. The basic parameters of environmental noise that affect human subjective response are (1) intensity or level, (2) frequency content, and (3) variation with time. The first parameter is determined by how greatly the sound pressure fluctuates above and below the atmospheric pressure and is expressed on a compressed scale in units of decibels (dB). By using this scale, the range of normally encountered sound can be expressed by values between 0 and 120 dB. On a relative basis, a 3 dB change in sound level generally represents a barely noticeable change outside the laboratory, whereas a 10 dB change in sound level would typically be perceived as a doubling (or halving) in the loudness of a sound.

The frequency content of noise is related to the tone or pitch of the sound and is expressed based on the rate of the air pressure fluctuation in terms of cycles per second (called Hertz [Hz]). The human ear can detect a wide range of frequencies from about 20 to 17,000 Hz. Because the sensitivity of human hearing varies with frequency, the A-weighting system is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response. Sound levels measured using this weighting system are called *A-weighted sound levels* and are expressed in decibel notation as dBA. The A-weighted sound level is widely accepted for describing environmental noise. Figure 4.12-1 provides a comparison of representative dBA levels for common noise sources and environments. Although the extremes range from 0 dBA (approximate threshold of hearing) to 120 dBA (jet aircraft at 500 feet), most commonly encountered noise levels fall within the range of 40 to 90 dBA.

Because environmental noise fluctuates from moment to moment, it is common practice to condense all of this information into a single number called the *equivalent sound level* (L_{eq}). L_{eq} is a measure of sound energy over a period of time, typically 1 hour or 24 hours. It is referred to as the equivalent sound level because it is equivalent to the level of a steady sound that, over a referenced duration and location, has the same sound energy as the actual fluctuating sound. Often L_{eq} values over a 24-hour period are used to calculate cumulative noise exposure in terms of the *day-night equivalent sound level* (L_{dn}). L_{dn} is the A-weighted L_{eq} for a 24-hour period with an added 10-dB penalty imposed on noise that occurs during the nighttime hours (between 10 p.m. and 7 a.m.). Many surveys have shown that L_{dn} is well correlated with human annoyance, and therefore this descriptor is widely used for environmental noise impact assessment. Figure 4.12-2 provides examples of typical noise environment and criteria in terms of L_{dn}. Although the extremes of L_{dn} range from 35 dBA in a wilderness environment to 85 dBA in noisy urban environments, L_{dn} generally ranges between 55 and 75 dBA in most communities. As shown in Figure 4.12-2, this spans the range between an ideal residential environment and the threshold for an unacceptable residential environment according to the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency.

Environmental noise can also be described statistically using percentile sound levels, L_n, which refer to the sound level exceeded “n” percent of the time. For example, the sound level exceeded 90 percent of the time, denoted as L_{90}, represents the “background” noise in a community. Similarly, the sound level exceeded 33 percent of the time (L_{33}) is often used to approximate the L_{eq} in the absence of loud, intermittent sources such as aircraft and trains.



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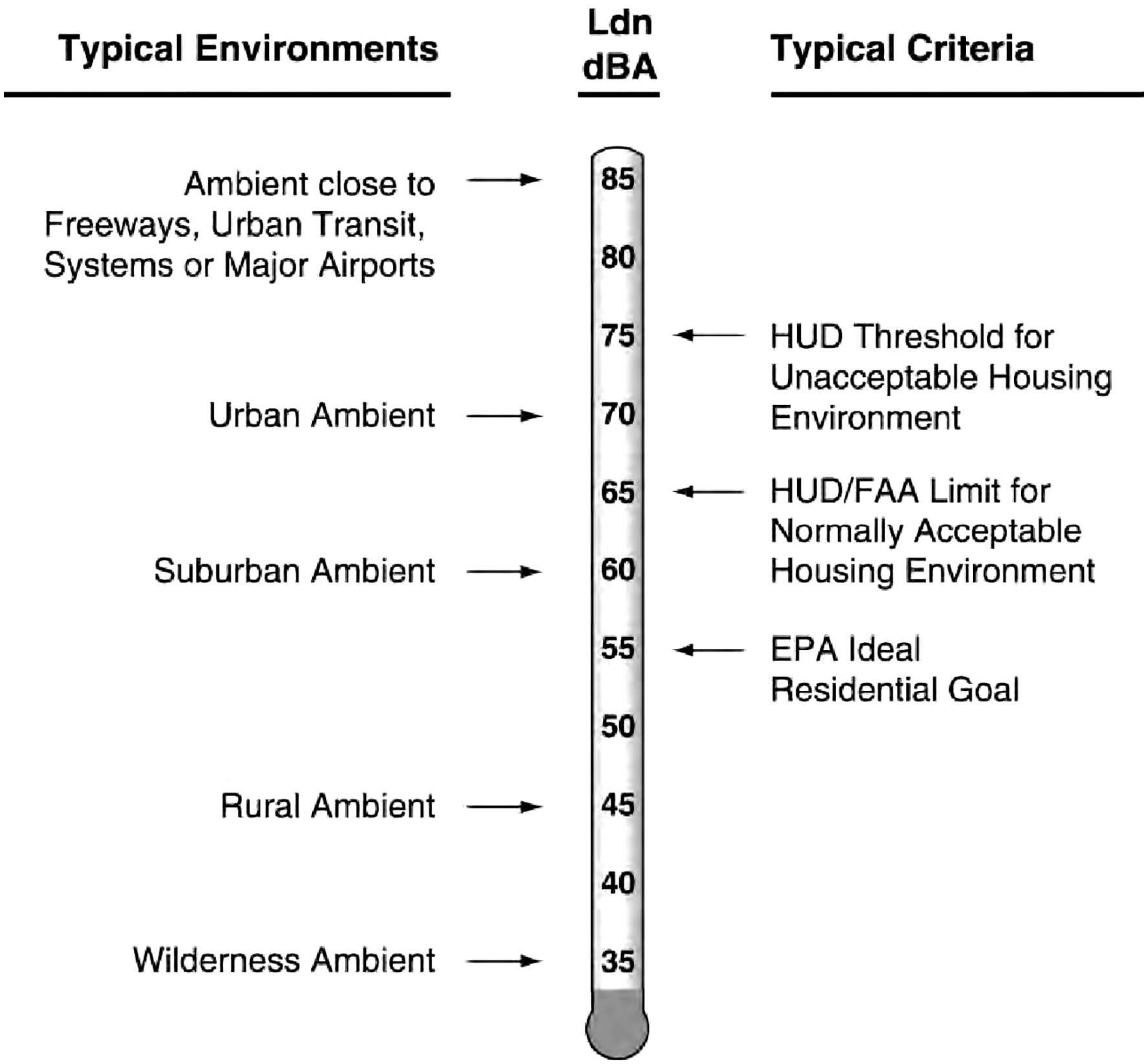
Source: VTA, 2008.

Figure 4.12-1
Comparison of Various Noise Levels
VTA's BART Silicon Valley–Phase II Extension Project



Source: VTA, 2008.

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Figure 4.12-2
Examples of Typical Outdoor Noise Exposure
VTA's BART Silicon Valley–Phase II Extension Project

Groundborne Noise and Vibration Descriptors

Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operating heavy earth-moving equipment. The effects of groundborne vibration include the movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. The rumbling sound caused by the vibration of room surfaces is called groundborne noise.

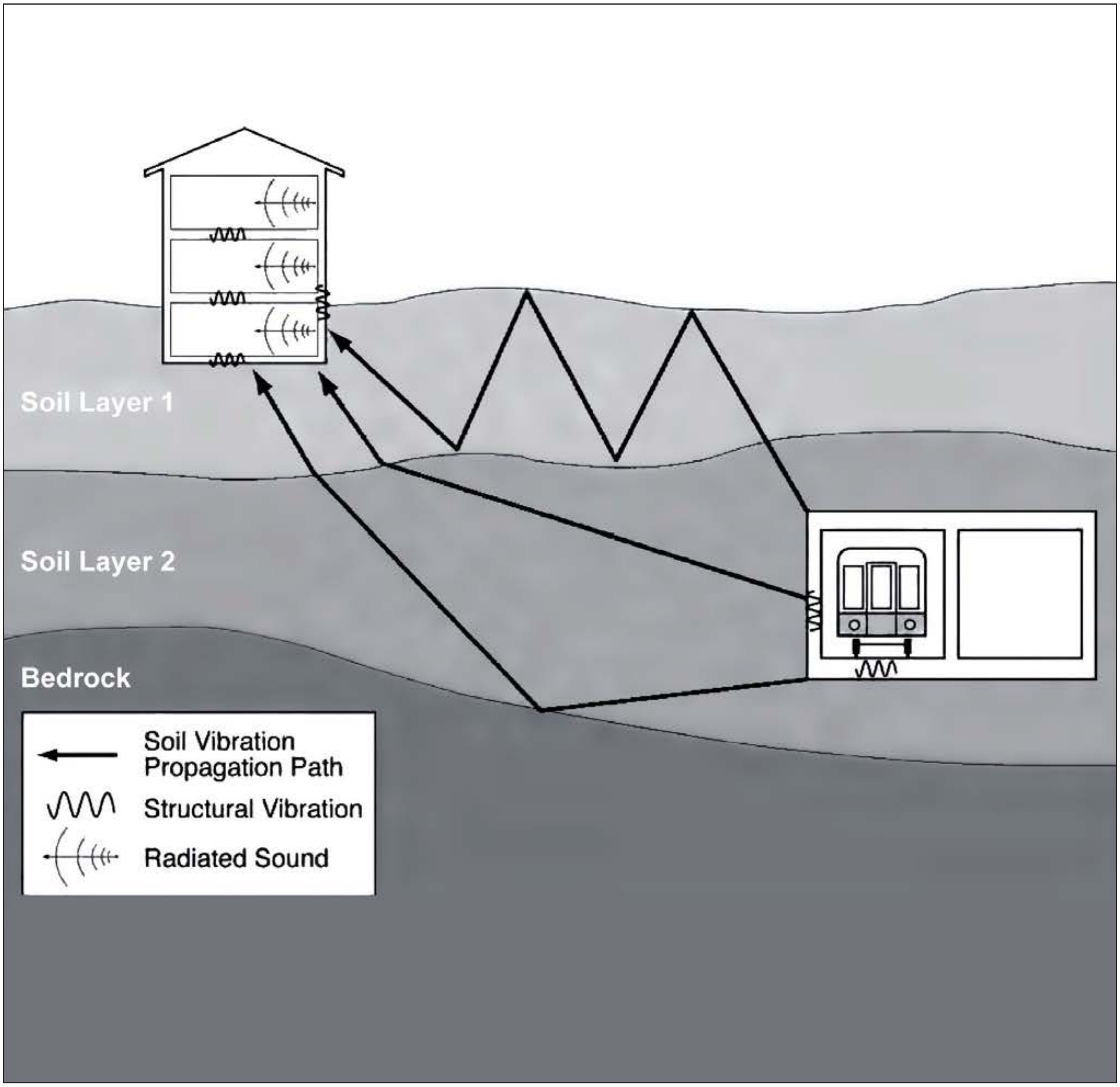
The basic concepts of groundborne vibration and noise are illustrated for a rail system in Figure 4.12-3. The train wheels rolling on the rails create vibration energy that is transmitted through the track support system into the transit structure. The amount of energy that is transmitted into the transit structure is strongly dependent on factors such as how smooth the wheels and rails are and the resonance frequencies of the vehicle suspension system and the track support system. These systems, like all mechanical systems, have resonances that result in increased vibration response at certain frequencies, called *natural frequencies*.

The vibration of the transit structure creates vibration waves that propagate through the various soil and rock strata to the foundations of nearby buildings. The vibration propagates from the foundation throughout the building structure. The maximum vibration amplitudes of the floors and walls of a building often will be at the resonance frequencies of various components of the building.

Groundborne vibration is the oscillatory motion of the ground about an equilibrium position. It can be described in terms of displacement, velocity, or acceleration. *Displacement* refers to the distance an object moves away from its equilibrium position, *velocity* refers to the rate of change in displacement or the speed of this motion, and *acceleration* refers to the time rate of change in the velocity of the object.

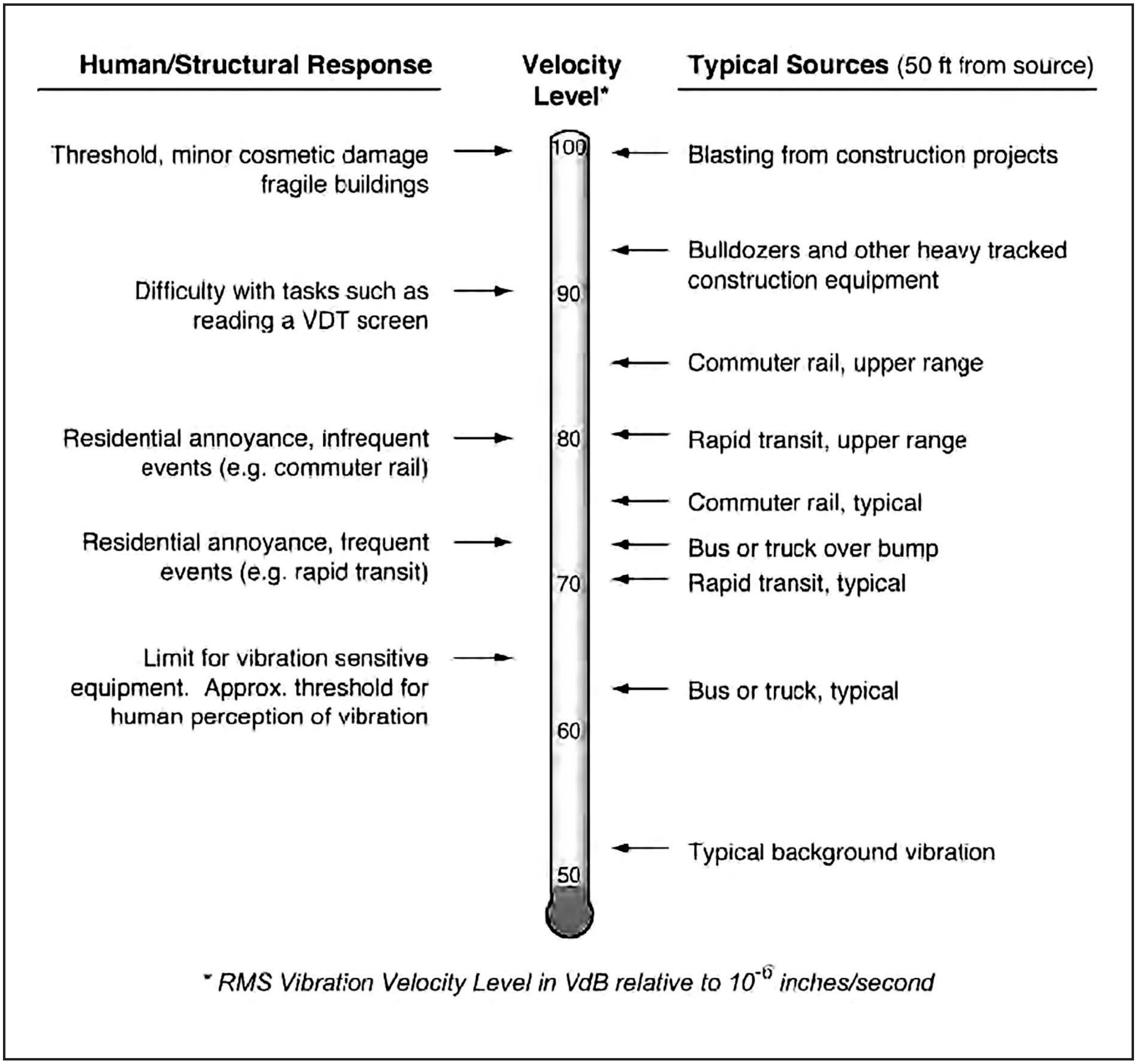
Although displacement is easier to understand than velocity or acceleration, it is rarely used for describing groundborne vibration. One reason for this is that most sensors used for measuring groundborne vibration are designed to provide output signals proportional to either velocity or acceleration. Even more important, the response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration. Sensitivity to vibration typically corresponds to the amplitude of vibration velocity within the low frequency range of most concern for environmental vibration (roughly 5 to 100 Hz). Therefore, vibration velocity is used in this analysis as the primary measure to evaluate the effects of vibration.

Vibration velocity level can be expressed in terms of decibels (VdB) relative to one micro-inch (μin) per second (1 x 10^{-6} inch per second). Figure 4.12-4 illustrates typical groundborne vibration levels for common sources, as well as criteria for human and structural response to groundborne vibration.



Source: Wilson Ihrig Associates, 2008.

Figure 4.12-3
Propogation of Groundborne Vibration into Buildings
VTA's BART Silicon Valley–Phase II Extension Project



Source: VTA, 2008.

Figure 4.12-4
Typical Groundborne Vibration Levels and Criteria
VTA's BART Silicon Valley–Phase II Extension Project

As shown, the range is from approximately 50 to 100 VdB, from imperceptible background vibration to the threshold of damage. Although the threshold of human perception to vibration is approximately 65 VdB, annoyance is not usually substantial unless the vibration exceeds 70 VdB.

4.12.2.2 Environmental Setting

Existing Land Uses

Existing land uses along the BART Extension alignment include residential uses, commercial uses such as offices and warehouses, and industrial uses. Figures 4.11-1 to 4.11-7 in Section 4.11, *Land Use*, show existing land uses at the station sites. No buildings along the alignment have been identified as being highly sensitive to noise and vibration such as vibration-sensitive manufacturing, research, or special medical facilities. The majority of receivers along the alignment are residential land uses and those places where people sleep at night (e.g., hotels and hospitals). There are also institutional land uses that primarily have daytime uses (e.g., schools and churches), along with parks and other outdoor uses. No facilities such as performing arts facilities and recording studios have been identified that could be affected by groundborne noise or vibration.

No buildings along the alignment have been identified that can be classified as Land Use Category 1. Such receivers would include vibration-sensitive manufacturing, research, or special medical facilities. The majority of receivers within the alignment corridor are Land Use Category 2. Category 2 receivers include residential land uses and those where people sleep at night (e.g., hotels and hospitals). As described in Section 4.11, *Land Use*, there are several sensitive receptors that could be affected by groundborne noise or vibration.

Connection to Phase I Berryessa Extension

At the connection to Phase I Berryessa Extension, sensitive receptors include Anne Darling Elementary School south of Coyote Creek, and single-family residences south of McKee Road.

Alum Rock/28th Street Station

Low- and medium-density residential uses are located across U.S. 101 to the north and east of the Alum Rock/28th Street Station, as well as to the west of 28th Street and the former railroad right-of-way. The Portuguese Band and Social Center is located to the west of the station site, and the Five Wounds National Portuguese Church and associated elementary school are located to the southeast.

Tunnel Alignment near Coyote Creek

There are residential areas to the north and south of Santa Clara Street from 28th to 18th Streets. The East San Jose Carnegie Branch Library is directly south of the alignment at South 23rd Street. Older single-family residential neighborhoods are to the north and south of the alignment. Horace Mann Elementary School is along the north side of the alignment, and San Jose State University and San Jose City Hall are to the south.

Downtown San Jose Station East and West Options

Older residential uses are just beyond the retail corridor along Santa Clara Street. The San Jose State University campus is one block south of Santa Clara Street between 4th and 10th Streets. The San Jose Civic Plaza, including San Jose City Hall, is south of Santa Clara Street, between 4th and 6th Streets. The Museum of Art, Plaza de Cesar Chavez, St. Joseph's Cathedral, San Pedro Square, and several theaters and major hotels are near the new station locations. Low- and medium-density residential uses are to the north of Santa Clara Street, just outside of downtown San Jose.

Diridon Station South and North Options

Sensitive land uses near the Diridon Station South and North Options include Guadalupe River Park and Gardens to the north, and low- to medium-density residential uses to the south. There are low- to medium-density residential uses with some park/open space between Diridon Station and Stockton Avenue. Cahill Park is located one block south of the station on West Fernando Street.

Continuation of Tunnel Alignment

Residential uses are along the alignment before reaching Stockton Avenue, and to the southwest side of the alignment.

Newhall Maintenance Facility

Across the existing railroad tracks, there are single-family and multi-story residences to the southwest and west of the alignment leading to the Newhall Maintenance Facility, along with Santa Clara University. Avaya Stadium, home of the Earthquakes soccer team, is on the northeast side of the facility.

Santa Clara Station

The Santa Clara Police Station is along the western boundary of the station site, and Santa Clara University occupies a substantial portion of the land to the southwest of the station area. There are also medium- and low-density residential developments to the south of the Santa Clara Station site. Mineta San Jose International Airport is to the northeast.

Noise

The existing ambient noise conditions along the alignment are primarily affected by local vehicle traffic on nearby roadways, freeways, aircraft overflights, train activities on the existing Caltrain alignment, train activities north of Interstate (I-) 880 and local activities common to a suburban community. Ambient noise conditions were determined from long-term measurements at 13 sites that would be exposed to wayside noise or ancillary facilities from the BART Extension (Wilson, Ihrig & Associates 2016). The 13 measurement sites were selected to be representative of the different areas adjacent to the alignment where airborne noise impacts might occur.

For each location, the noise survey was conducted by means of a calibrated sound level meter (data logger) programmed to measure and store hourly average noise levels and statistical levels of environmental noise using a slow meter response and A-weighting. They were left unattended for a period of 2 to 4 full days. These noise-measuring instruments meet ANSI S1.4-193 specifications for Type I Sound Level Meters. Table 4.12-1 summarizes existing ambient noise levels. Figures 4.12-5 through 4.12-7 show the measurement locations.

Table 4.12-1: Existing Ambient Noise Levels

Measurement Location Label	Site Description	Primary Noise Sources	Most Recent Survey Dates	Ambient Used In Analysis (L_{dn})
A	N 13th St north of LT-B	Santa Clara St	03/29/08 to 04/01/08	62
B	N 13th St north of Santa Clara St	Santa Clara St	09/22/14 to 09/24/15	71
C	N 12th St north of Santa Clara St	Santa Clara St	04/03/08 to 04/06/08	63
E	S 13th St south of Santa Clara St	Santa Clara St	09/22/14 to 09/24/15	66
H	S 15th St south of Santa Clara St	Santa Clara St	03/27/08 to 03/30/08	60
I	S 16th St south of Santa Clara St	Santa Clara St	03/27/08 to 03/30/08	63
L	NW Corner of Villa Ave and Stockton Ave	Stockton Ave	01/29/14 to 02/03/14	69
N	Stockton Ave, 94 feet north of Schiele Ave	Stockton Ave	01/13/14 to 01/16/14	70
O	Schiele Ave, 197 feet west of Stockton Ave	Stockton Ave	04/05/08 to 04/08/08	62
P	SW Corner of Harding Ave and Stockton Ave	Stockton Ave	01/29/14 to 02/03/14	69
T	1070 Stockton Ave	Stockton Ave, Newhall St, I-880, Caltrain	01/13/14 to 01/16/14	67
U	Newhall St and Elm St	Newhall St, Elm St, I-880, Caltrain	01/29/14 to 02/03/14	62

Source: Wilson, Ihrig & Associates 2016.

Figure 4.12-5
Long-term Noise Measurement Locations for Wayside Train Noise
VTA's BART Silicon Valley–Phase II Extension Project

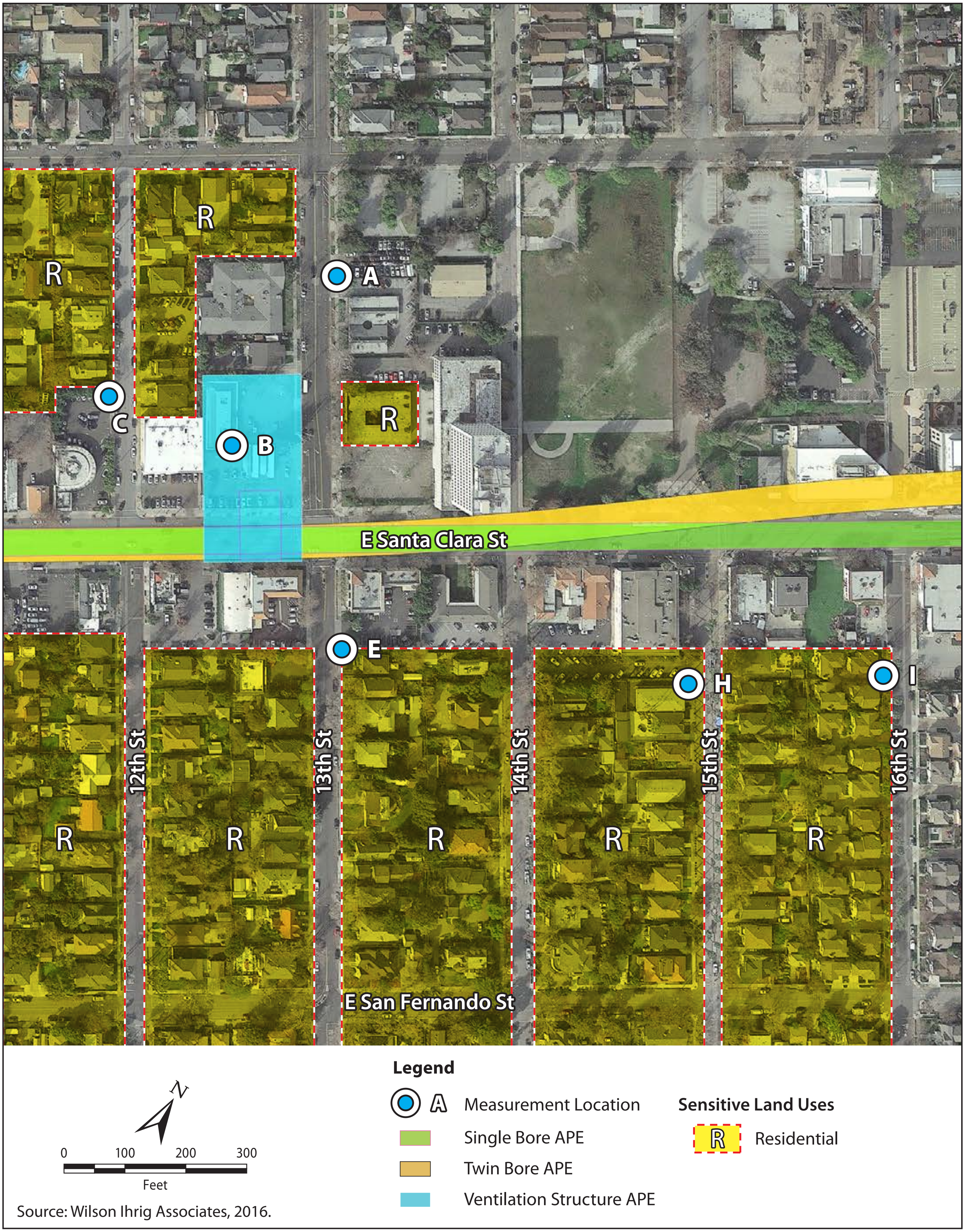


Figure 4.12-6
Long-term Noise Measurement Locations at 13th Street Ventilation Structure
VTA's BART Silicon Valley–Phase II Extension Project

Figure 4.12-7
Long-term Noise Measurement Locations at Stockton Avenue Ventilation Structure
VTA's BART Silicon Valley–Phase II Extension Project

Vibration

Existing ambient vibration conditions along the alignment are consistent with a typical urban environment with vibration typically being imperceptible. Train activities on the existing Caltrain alignment are a source of intermittent perceptible vibration at locations in proximity to the track. Vibration-sensitive land uses within the screening zones for the alignment and stations are the same as for noise-sensitive land uses, which are described under *Existing Land Uses* above.

4.12.2.3 Regulatory Setting

Federal

The environmental noise and vibration impact evaluation for the BART Extension is based on criteria defined in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* (2006) also referred to as the FTA Guidance Manual. The FTA Guidance Manual provides criteria to evaluate construction and operational impacts for projects. The noise and vibration criteria are based on studies that examined community reactions to noise and vibration from construction activity and transit operations. Local noise and vibration regulations do not apply to regional transit operations and are therefore not used in the impact assessment.

Airborne Noise Criteria

For transit operations aboveground, the FTA Guidance Manual provides noise criteria that evaluates impacts based on potential changes to the existing ambient noise environment. For higher levels of existing ambient noise, less of a change is needed to cause impacts due to transit operations, which are long-term. Operational noise impacts are classified as No Impact, Moderate Impact, or Severe Impact depending on the amount of change in noise level relative to the existing ambient noise level. These terms only apply to operational train noise and cannot be directly applied to noise from other sources such as vehicle traffic and ancillary facilities.

For both a General Assessment and Detailed Analysis, the FTA provides guidelines to assess project noise levels from mass transit system operations, as well as noise criteria to assess impacts. Table 4.12-2 provides the FTA noise-sensitive land-use categories: Category 1, Category 2, and Category 3. The FTA guidelines specify a particular noise metric to be used depending on the specific land use (e.g., residential). Table 4.12-2 describes the FTA land-use categories, and specifies the noise metric to be used and the criterion for each Category.

Table 4.12-2: FTA Land Use Category and Noise Metric for Transit Impact Criteria

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor L_{eq}(h)	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor L_{eq} (h)	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

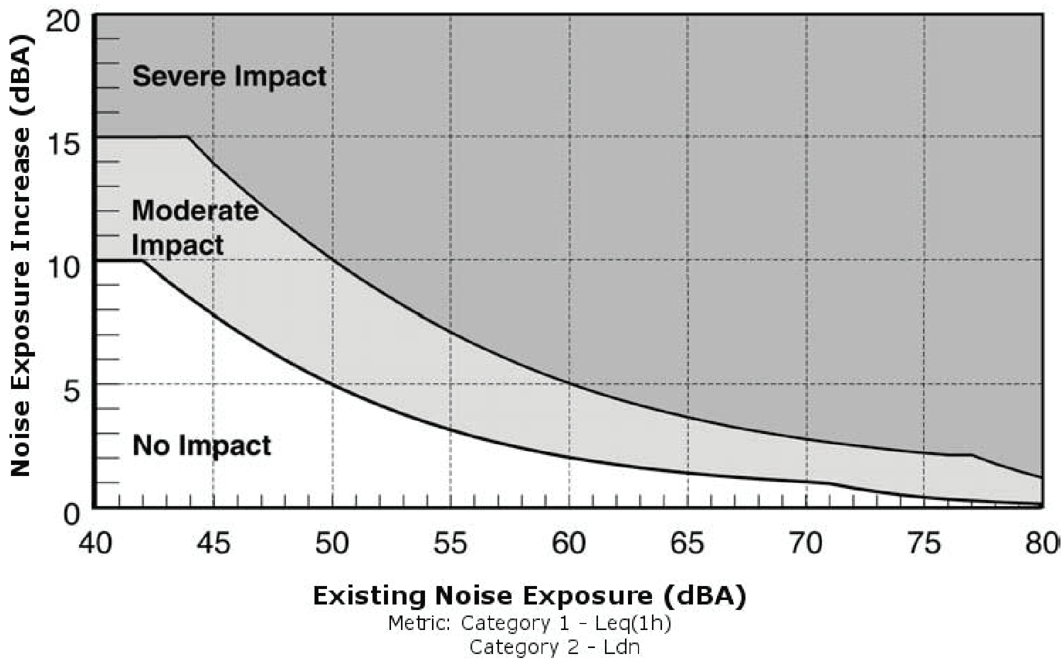
Three levels of noise impact are defined by the FTA guidelines: *No Impact*, *Moderate Impact,* and *Severe Impact*. These levels of impact are shown graphically in Figure 4.12-8 (Land Use Categories 1 and 2) and Figure 4.12-9 (Land Use Category 3).

The FTA noise impact thresholds are presented in Table 4.12-3. They are based on the existing ambient noise exposure level and the projected increase in noise level created by a project or combination of new projects. The noise thresholds in Table 4.12-3 reflect the graphic data presented in Figures 4.12-8 and Figure 4.12-9.

Table 4.12-3: Cumulative Increase Thresholds for Transit Noise Impact

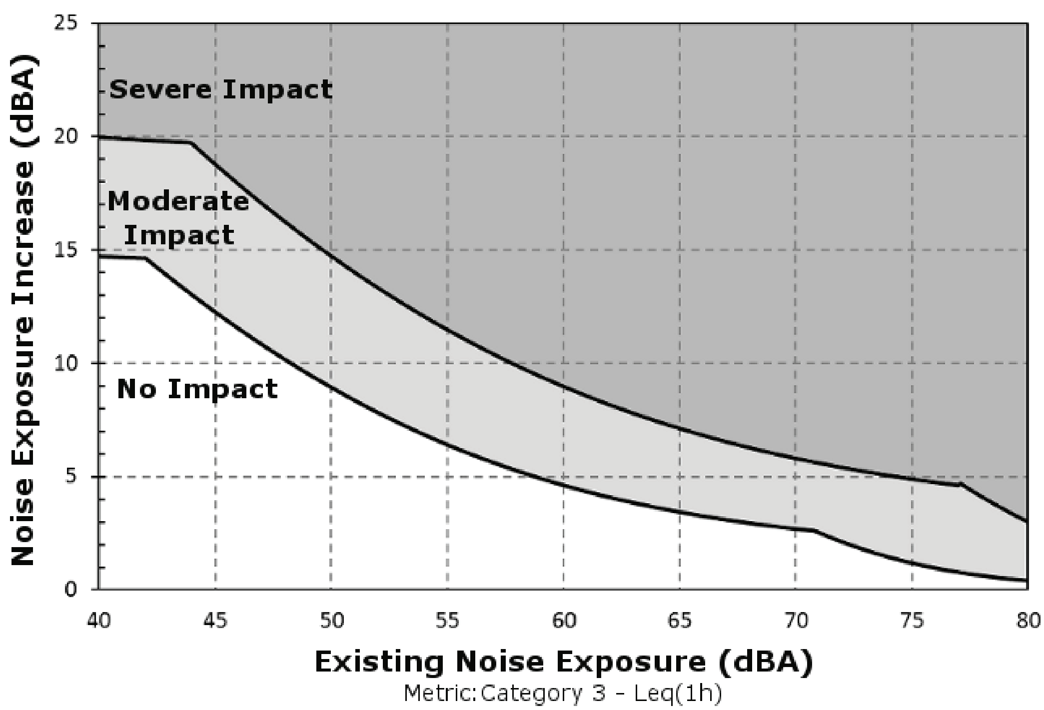
Existing Noise Exposure, L_{eq} or L_{dn}	Impact Threshold for Increase in Cumulative Noise Exposures (dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
45	8	14	12	19
46	7	13	12	18
47	7	12	11	17
48	6	11	10	16
49	5	11	10	15
50	5	10	9	15
51	5	9	8	14
52	4	9	8	13
53	4	8	7	13
54	3	8	7	12
55	3	7	6	11
56	3	7	6	11
57	3	6	6	10
58	2	6	5	10
59	2	5	5	9
60	2	5	5	9
61	1.9	5	4	9
62	1.7	4	4	8
63	1.6	4	4	8
64	1.5	4	4	7
65	1.4	4	3	7
66	1.3	3	3	7
67	1.2	3	3	7
68	1.2	3	3	6
69	1.1	3	3	6
70	1.0	3	3	6
71	1.0	3	3	6
72	0.8	3	2	5
73	0.6	2	1.8	5
74	0.5	2	1.5	5
75	0.4	2	1.2	5

Source: Federal Transit Administration Transit Noise and Vibration Impact Assessment, May 2006.
Note: Maximum 1-hour L_{eq} is used for land use involving only daytime activities; L_{dn} is used for land uses where nighttime sensitivity is a factor.



Source: Wilson Ihrig Associates, 2016.

Figure 4.12-8
Increase in Noise Levels Allowed by Criteria (Land Use Categories 1 and 2)
VTA's BART Silicon Valley–Phase II Extension Project



Source: Wilson Ihrig Associates, 2016.

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Figure 4.12-9
Increase in Noise Levels Allowed by Criteria (Land Use Category 3)
VTA's BART Silicon Valley–Phase II Extension Project

Noise generated by a project that falls in the No Impact range requires no mitigation. At the other extreme, noise projections in the Severe Impact range represent the most compelling need for mitigation. Noise generated by a project in the Moderate Impact range will also require consideration and adoption of mitigation measures where considered reasonable. The mitigation policy adopted by VTA for the BART Extension is to mitigate Moderate Impacts when the increase in noise levels is greater than 5 dBA and mitigation is feasible.

The FTA Guidance Manual does not directly address ancillary facilities that do not operate continuously. However, there is a local regulation that can be used to assess infrequently occurring noises. The tunnel ventilation fans (TVF) are the main example of this. TVF are used primarily in emergencies. They also need to be tested occasionally and will occasionally be used to ventilate tunnel sections during nighttime maintenance work. An applicable criterion for this infrequent, operational noise source is provided by a City of San Jose code (2011). Although this code is intended to apply to emergency power, the operation of and need for of TVF are similar in that they are primarily for emergencies, but also need to be operated infrequently for short periods of time. The noise limit for a commercial land use adjacent to a residential land use is 55 dBA (see Table 20-105 in City of San Jose Department of Planning, Building and Code Enforcement [2011]).

Transit Groundborne Noise and Vibration Criteria

Predicted levels of groundborne noise and vibration have been evaluated using the FTA criteria, according to the Land Use Categories defined in Table 4.12-4. The vibration criteria for the three Land Use Categories are also indicated in Table 4.12-4. If the overall vibration level does not exceed the relevant criterion, then neither do any of the 1/3-octave band levels. It is sufficient to evaluate the predicted overall vibration levels, unless the criteria are exceeded, in which case an evaluation of the 1/3-octave band levels is warranted.

The FTA noise and vibration criteria are affected by the number of events, which in this case corresponds to the number of train passbys per day. Because the plan for BART Extension operations calls for more than 70 train movements a day, the *Frequent Events* criteria would apply.

Table 4.12-4: Indoor Groundborne Noise and Vibration Impact Criteria

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch /sec)			GBN Impact Levels (dBA re 20 micro Pascals)		
	Frequent Events[a]	**Occasional Events[b]**	**Infrequent Events[c]**	**Frequent Events[a]**	**Occasional Events[b]**	**Infrequent Events[c]**
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB*	65 VdB*	65 VdB*	N/A[d,e]4,5	N/A[d,e]	N/A[d,e]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

[a] *Frequent Events* is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category
[b] *Occasional Events* is defined as 30 to 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
[c] *Infrequent Events* is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
[d] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
[e] Vibration-sensitive equipment is not sensitive to groundborne noise.

No buildings along the alignment have been identified that can be classified as Land Use Category 1. The FTA noise and vibration criteria for Category 2 receivers are 35 dBA for groundborne noise and 72 VdB (re: 10-6 in/sec) for vibration.

The criteria for Institutional land uses under Category 3 with daytime uses only (e.g., schools and churches) are 40 dBA for groundborne noise and 75 VdB for vibration. The criteria do not apply to most commercial or industrial uses because, in general, the activities within these buildings are compatible with higher noise levels. They do apply to business uses which that depend on quiet as an important part of operations, such as sound and motion picture recording studios. If the buildings or structures are used for commercial or industrial purposes and are located in busy commercial areas, they are not considered noise-sensitive and the noise impact criteria do not apply.

FTA also provides criteria for Special Buildings, which include concert halls, TV studios, recording studios, auditoriums, and theaters. There no facilities along the alignment that have been identified as potentially being affected by groundborne noise or vibration that meet the definition of a Special Building.

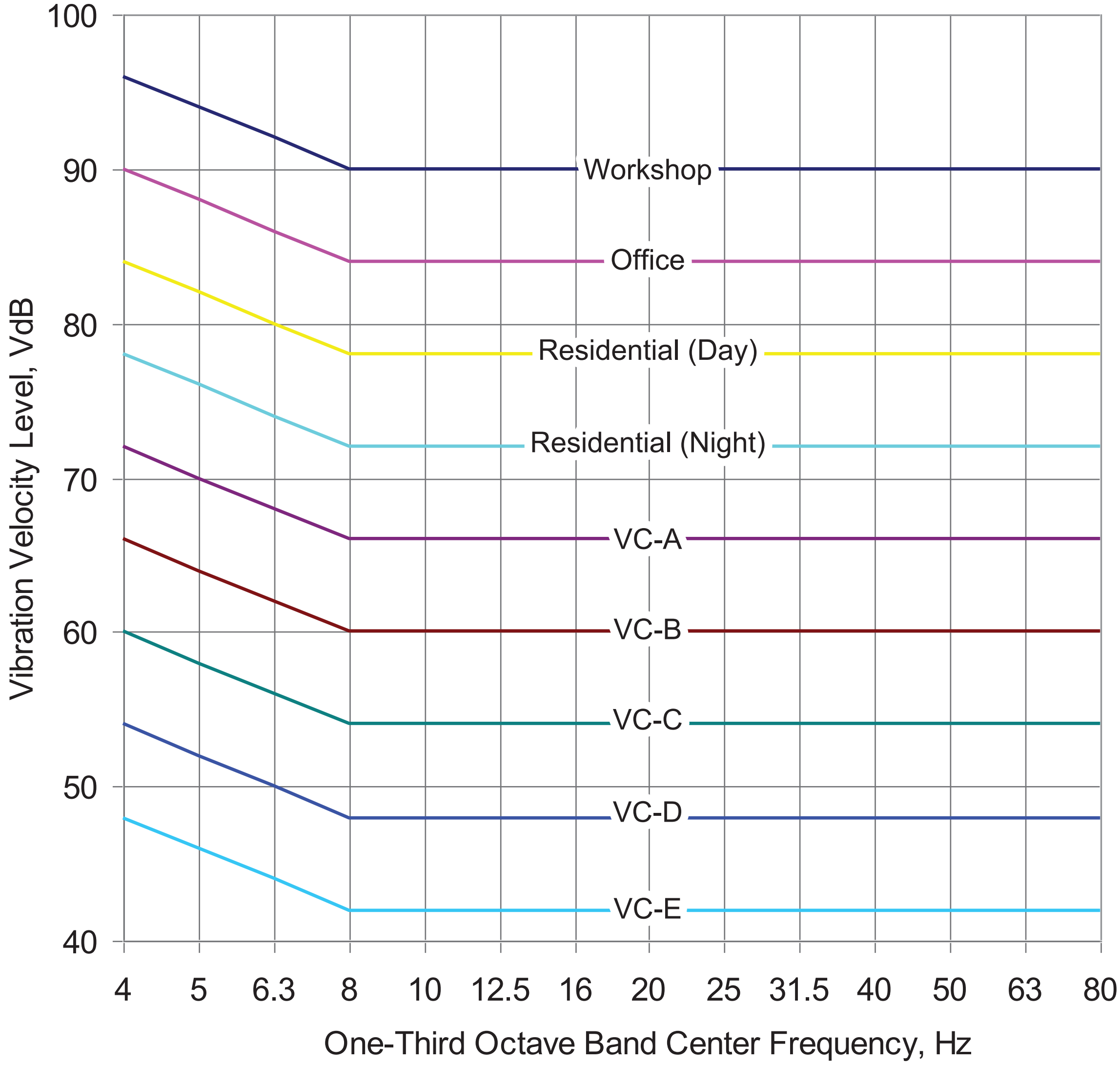
FTA vibration criteria for detailed analysis are presented in terms of 1/3-octave bands as shown in Figure 4.12-10. The projected vibration levels are compared to the spectral criteria curves, and if the applicable curve is not exceeded, then no impact is projected to occur. For example, the criterion curve for residences (night) is 72 VdB above 8 Hz. Below 8 Hz the sensitivity of humans decreases as reflected in the higher threshold, although below 8 Hz transit systems typically produce little vibration.

Interpretation of the various vibration criteria levels shown in Figure 4.12-10 are presented below in Table 4.12-5. Frequency band levels that exceed a particular criterion curve indicate the need for mitigation. The frequency range(s), over which the exceedance occurs, is important for determining the type and extent of mitigation. To be effective, the vibration mitigation must be able to reduce the vibration levels to achieve criteria over the frequency range of exceedance. In general, the lower the frequency at which exceedance occurs, the more difficult it is to mitigate vibration impacts and more substantial are the measures necessary to accomplish the reductions.

Table 4.12-5: Interpretation of Vibration Criteria for Detailed Analysis

Criterion Curve	Max L_v (VdB)[a]	Description of Use
Workshop	90	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas.
Office	84	Feelable vibration. Appropriate to offices and non-sensitive areas.
Residential Day	78	Barely feelable vibration. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night, Operating Rooms	72	Vibration not feelable, but groundborne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100X) and other equipment of low sensitivity.
VC-A	66	Adequate for medium-to high-power optical microscopes (400X), microbalances, optical balances, and similar specialized equipment.
VC-B	60	Adequate for high-power optical microscopes (1000X), inspection and lithography equipment to 3 micron line widths.
VC-C	54	Appropriate for most lithography and inspection equipment to 1 micron detail size.
VC-D	48	Suitable in most instances for the most demanding equipment, including electron microscopes operating to the limits of their capability.
VC-E	42	The most demanding criterion for extremely vibration-sensitive equipment.

[a] As measured in 1/3-octave bands of frequency over the frequency range 8 to 80 Hz.
L_v = vibration velocity level



Source: Wilson Ihrig Associates, 2016.

Graphics … 00332.13 (6-7-2016)

Figure 4.12-10
Criteria for Detailed Vibration Analysis
VTA's BART Silicon Valley–Phase II Extension Project

4.12.3 Methodology

An *adverse effect* would be a change in the cumulative noise level that would cause a substantial percentage of people to be highly annoyed by project-related noise. For train operational noise only, each the levels of effect generally correspond to the impacts levels of *No Impact, Moderate Impact,* and *Severe Impact.* For other noise sources such as surface traffic and ancillary facility, terms such as *no effect*, *no adverse effect*, and *adverse effect* are used.

4.12.3.1 Transit Operations

Transit vehicle operations produce airborne noise that is projected to the wayside when tracks are above grade and can produce groundborne noise and/or vibration inside adjacent buildings for alignment segments that are in a tunnel, if the buildings are close enough and other conditions are conducive to these phenomena. The FTA Guidance Manual provides methodologies for predicting levels of noise and vibration for both configurations. Section 3.3 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the parameters used in the noise analysis (wayside train noise) for above-grade operations. The key parameters for BART train wayside noise analysis are summarized in Table 4.12-6. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model parameters.

Table 4.12-6: Summary of Key Parameters for BART Train Wayside Noise Analysis

Parameter	2035 Forecast Year
Reference Sound Exposure Level (SEL_{ref}) at 50 feet[a]	82 dBA
Number of cars per train (N_{pk}) during peak hours	10
Average number of cars per train (N_d) during the daytime (between 7 a.m. and 10 p.m.)	10
Average number of cars per train (N_n) during the nighttime (between 10 p.m. and 7 a.m.)	10
Peak hour volume of trains (V_{pk}) – one direction	10
Off-peak hour volume of trains (V_{opk}) – one direction	3
Peak hours service	6 a.m.–7:30 p.m.
Off-peak hours of service	4 a.m.–6 a.m. and 7:30 p.m.–1 a.m.
Average hourly daytime volume of trains (V_d) (between 7 a.m. and 10 p.m.) – one direction	8.83
Average hourly nighttime volume of trains (V_n) (between 10 p.m. and 7 a.m.) – one direction	2.78
Maximum train speed (S)	70 mph
Track type (e.g., welded, jointed)	Welded

[a] The FTA Guidance Manual provides a reference Sound Exposure Level (SEL) of 82 dBA for a single transit car traveling at 50 mph on ballast-and-tie track at a distance of 50 feet from the receptor. Specific wayside noise data have been measured for the BART system over the past years and have been used for previous BART extensions and have been found to be consistent with this noise emission level.

Prediction Model for Transit Vehicle Wayside Noise

The FTA Guidance Manual provides a detailed methodology for modeling airborne train noise, which is often referred to as wayside noise. Depending on the adjoining land use, projections of wayside noise are either based on an exposure over one hour (L_{eq}) or a daily exposure (L_{dn}). When evaluating noise effects on institutional land uses, the "peak hour" L_{eq} (hour with the greatest number of trains) is used to compare to the FTA criteria. When evaluating residential land uses, the L_{dn} is used to compare to the FTA criteria. The FTA wayside noise model accounts for several factors, such as the speed and length of each train and any noise shielding topography and sound walls. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model.

The FTA Guidance Manual provides a reference Sound Exposure Level (SEL) of 82 dBA for a single transit car traveling at 50 mph at a distance of 50 feet from the receptor. Specific wayside noise data have been obtained for the BART system over the past years and have been used for previous BART extensions. The noise emission level for a BART trains is consistent with the emission level suggested in the FTA Guidance Manual.

Prediction Model for Transit Vehicle Groundborne Vibration

The methodology used for predicting interior groundborne vibration and noise levels from future transit train operations was developed during an extensive research project conducted for the United States Department of Transportation. The methodology is discussed in detail in *A Prediction Procedure for Transportation Groundborne Noise and Vibration* (Nelson and Saurenman 1987). The methodology has been used successfully in the United States for over 30 years to evaluate the environmental effects of groundborne noise and vibration for numerous transit projects. This prediction procedure is the basis for the methodology recommended by in the FTA Guidance Manual. Refer to the *Silicon Valley Rapid Transit Project, Tunnel Segment Design Report* (HMM/Bechtel and Wilson, Ihrig & Associates 2005) for BART Extension–specific data related to vibration and used in the groundborne noise and vibration model.

The prediction methodology is based on the fact that vibration is generated by a train's wheels rolling on steel rails. The resulting vibration is caused by the inherent roughness and irregularities in the rail, which forces the wheels to move up and down, thus imparting a force in the rail. The vibration generated by the resulting forces propagates through the underlying structure of the transit system that supports the track and subsequently into the surrounding soil until it encounters nearby buildings, at which point the vibration is transmitted into the building through its foundation. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model.

Prediction Model for Transit Vehicle Operational Groundborne Noise

Groundborne noise is the noise generated inside a building due to vibration of the building's interior surfaces such as floors, walls, and ceilings. This vibration causes sound to be radiated inside rooms within the buildings. In the case of the BART Extension, the source of groundborne vibration is the transit system operating in a tunnel. Because groundborne noise is generally characterized by low frequency sound, it is commonly described as a rumble such as one might hear from a subway train in a large city. The level of groundborne noise in a particular room is affected by the level of vibration of the room's surfaces and the amount of acoustic absorption in the room. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model.

4.12.4 Environmental Consequences

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.12.3, *Methodology*.

4.12.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the study area (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). There would be a general increase in traffic associated with the No Build Alternative due to increased population and development in the region. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse noise and vibration effects. Several of these projects have already been programmed in the Regional Transportation Plans. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.12.4.2 BART Extension Alternative

Wayside Noise Impacts from Train Operations

Airborne noise impacts from train operations can occur where trains are running on track aboveground, at ventilation facilities where train noise is transmitted to the surface from the tunnel below, and from storage yard tracks and maintenance facility activities.

Wayside Train Noise from At-Grade Alignment

The segment of BART track that is aboveground on at-grade track north of I-880 has the potential to affect sensitive receptors. The tunnel portal is approximately 600 feet north of I-880. Beyond the portal, airborne noise from running trains would be emitted to the wayside on both sides of the alignment. The land use in this area is a mixture of residences, offices, and warehouses. The noise-sensitive receivers in this area are residences; and they are shielded by noise walls along the existing railroad right-of-way or are located approximately 220 feet away. The screening distance for a rail rapid transit system is 700 feet. In this particular circumstance the screening distance for BART is 220 feet. The noise walls are estimated to be from 10 to 12 feet high, and provide a substantial amount of noise reduction from existing railroad operations.

Table 4.12-7 presents the projected wayside noise levels for ground-floor receivers. Wayside noise for these receivers is projected to result in *no effect* for all but one receiver (Candlewood Suites). For the others, the projected increase is 0.8 dBA or less and the threshold for Moderate Impact for these receptors is 1.2 or greater based on existing ambient noise ranges from 62 to 67 dBA.

With an existing L_{dn} of 65 dBA at Candlewood Suites, the threshold for Moderate Impact is 1.4 dBA. The increase in noise level for this receptor is projected to be 2 dBA. The mitigation policy adopted for the BART Extension is to mitigate Moderate Impacts only when the increase in noise levels is greater than 5 dBA. Therefore, no mitigation is required for this impact.

Table 4.12-8 presents the projected wayside noise levels for second-story receivers. For second story receivers, wayside noise is projected to impact two receivers (Dahlia Loop SFR complex and Candlewood Suites) with Moderate Impacts. The threshold for Moderate Impact for Dahlia Loop SFR is 1.2 dBA. The increase in noise level at the second story of this receptor is 1.7 dBA. For Candlewood Suites, the increase in noise level is projected to be 2 dBA. Because the mitigation policy adopted for the BART Extension is to mitigate Moderate Impacts only when the increase in noise levels is greater than 5 dBA, no mitigation is proposed.

Table 4.12-7: First-Story, Wayside Noise Impacts from Train Operations

Civil Station	Receiver Location	Track Direction	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Estimated Sound Wall Height (feet)	Existing Ambient L_{dn} (dBA)	Future L_{dn} (dBA)	Increase Level (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type	# of Impacted Receptors
826	697 Hamline S	S1	MFR	67	690	--	67	67.0	0.0	1.2	NI	--
829	Stockton Ave East of Alignment	S1	SFR	67	660	--	67	67.1	0.1	1.2	NI	--
835	Campbell Ave	S2	SFR	67	750	--	62	62.1	0.1	1.7	NI	--
835	Newhall and Elm St SFR	S2	SFR	67	430	--	62	62.2	0.2	1.7	NI	--
834 to 845	De Altura Commons	S2	SFR	67	235	10	64	64.8	0.8	1.5	NI	--
846 to 853	Dahlia Loop SFR	S2	SFR	67	223	12	64	64.5	0.5	1.5	NI	--
855 to 860	1270 Campbell Ave	S2	MFR	45	270	10	64	64.5	0.5	1.5	NI	--
871	Candlewood Suites Hotel	S2	HOTEL	45	290	--	65	67.0	2.0	1.4	MI	1

CL = Center Line
NB = Northbound side of alignment
SB = Southbound side of alignment
MFR = Multifamily residence
SFR = Single family residence
NI = No Impact
MI = Moderate Impact

Table 4.12-8: Second-Story, Wayside Noise Impacts from Train Operations

Civil Station	Receiver Location	Track Direction	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Estimated Sound Wall Height (feet)	Existing Ambient L_{dn} (dBA)	Future L_{dn} (dBA)	Increase Level (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type	# of Impacted Receptors
834 to 845	De Altura Commons, 2nd Floor	S2	SFR	67	235	10	67	68.3	1.3	1.2	MI	26
846 to 853	Dahlia Loop SFR, 2nd Floor	S2	SFR	67	223	12	67	68.7	1.7	1.2	MI	14
855 to 860	1270 Campbell Ave, 2nd Floor	S2	MFR	45	270	10	67	68.2	1.2	1.2	NI	--
871	Candlewood Suites Hotel, 2nd Floor	S2	HOTEL	45	290	--	65	67.0	2.0	1.4	MI	1

CL = Center Line
NB = Northbound side of alignment
SB = Southbound side of alignment
MFR = Multifamily residence
SFR = Single family residence
NI = No Impact
MI = Moderate Impact

Airborne Noise Impacts from Motor Vehicle Traffic

Traffic noise would increase over the existing ambient conditions due to an increase in the volume of traffic. The magnitude of increase in noise is proportional to the increase in traffic as presented in Chapter 7, Section 7.1.4, *Cumulative Environmental Impacts*. For the BART Extension Alternative, traffic associated with BART stations would also contribute to ambient noise in the future. However, the increase in noise both for the No Build Alternative and the BART Extension Alternative is projected to be relatively small and would result in *no adverse effect*, and no mitigation would be required. The increase in noise was quantified on a cumulative basis and is presented in Chapter 7, *Other NEPA and CEQA Considerations*.

Ancillary Facilities

BART ancillary facility noise impacts were analyzed in a memorandum prepared by Wilson, Ihrig & Associates (2006). Additional ambient noise measurements were performed in 2008 and 2014 and confirmed that the background noise level had not changed significantly. Therefore, the analysis from 2006 still was valid. Ancillary facilities include tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators. Analyses for ventilation shafts at the Santa Clara and 13th Street and Stockton Avenue were reevaluated in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report.* The results of these analyses are summarized below and assume all ancillary facilities are above ground for both tunnel options as a worst case for noise impacts. If some of the facilities are located underground, they would be within the Single-Bore tunnel or within the Twin-Bore station box.

Tunnel Ventilation Shafts

Emergency Ventilation Fan Noise

Untreated ventilation shafts and ventilation structures could produce a noise level of 67 to 77 dB at 50 feet. This could result in exceedance of the City of San Jose's noise limit of 55 dBA at residences located within 200 to 630 feet of these facilities. With implementation of Mitigation Measure NV-A the impact would be reduced and there would be *no adverse effect*.

Mitigation Measure NV-A: Implement noise reduction treatments at ancillary facilities

Noise reduction treatments will be implemented at ancillary facilities such as tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators such that noise levels comply with applicable Cities of San Jose and Santa Clara noise criteria at nearby developed land uses. Treatments that will be implemented, if necessary, include but are not limited to:

- Sound attenuators and acoustical absorptive treatments in ventilation shafts and facilities.

- Sound attenuators for the tunnel emergency ventilation fans.
- perimeter noise walls (nominally an 8 feet high wall) placed around emergency generators.

Train Noise

Noise from BART trains operating in the subway tunnels can be transmitted to the surface via the ventilation shafts.

Santa Clara and 13th Streets Ventilation Facility

Long-term ambient noise measurements were conducted near the Santa Clara and 13th Streets Ventilation Facility in 2008. Ambient noise measurements were conducted in 2015 at two of the same locations studied in 2008. Table 4.12-9 summarizes the results of the 2008 and 2015 ambient noise measurements. Measurement locations are depicted in Figure 4.12-6.

Table 4.12-9: Ambient Noise in Santa Clara and 13th Street Neighborhood

Measurement Location Label	Ambient L_{dn} (dBA)				
	2008		2015		Ambient Used in Analysis
	Range	Average	Range	Average	
A	61–62	61.5	--	--	62
B	70–71	70.5	67	67	71
C	62–64	63	62–63	62.5	63
E	64–67	65.5	--	--	66
H	59–60	59.5	--	--	60
I	61–64	62.5	--	--	63

The ambient noise at Location B was measured to be 3.5 dBA lower in 2015 than in 2008. The ambient noise at Location C did not change. Because higher existing ambient noise levels are more critical (more likely to require mitigation) and there is no consistent trend, the greater of the ambient readings from 2008 and 2015 was used in the impact analysis to characterize the ambient noise at the six locations.

There are two noise sources associated with ventilation facilities: noise from trains running in the tunnel and the testing of emergency ventilation fans. Trains run continuously during revenue hours and have potential for impacting ambient noise over the course of a day.

Table 4.12-10 presents the projected noise from train noise exiting the tunnel from the ventilation shaft. The train noise emitted from the Santa Clara/13th Street ventilation shaft is minimal. No noise impacts are projected to occur from this source of operational noise. Therefore, no mitigation is required for train noise that exits the tunnel from the ventilation shaft.

Table 4.12-10: Airborne Train Noise from Santa Clara/13th Street Ventilation Structure

Civil Station	Receiver Location Address	Land Use	Vehicle Speed (mph)	Distance to Vent Structure (feet)	Existing Ambient L_{dn}/L_{eq} (dBA)	Total L_{dn}/L_{eq} (dBA)	Increase over Existing Ambient (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type
657	30 N 13th St	MFR	67	85	67	67.1	0.1	1.2	NI
658	602 Santa Clara St - Indian Health Center of Santa Clara Valley	Institutional	67	145	69	69.0	0.0	1.1	NI
658	28 S 13th St	SFR	67	280	63	63.0	0.0	1.6	NI
660	29 S 13th St - Duong Bich-Hai Thi, DDS	Institutional	67	260	63	63.0	0.0	1.6	NI
660	26 S 12th St	SFR	67	250	63	63.0	0.0	1.6	NI
661	551 Santa Clara St - Holistic Health Care Clinic (Chiropractic)	Institutional	67	80	69	69.1	0.1	1.1	NI
661	32 N 12th St	MFR	67	100	66	66.1	0.1	1.3	NI
662	15 S 12th St	SFR	67	270	64	64.0	0.0	1.5	NI
663	12 S 11th St	MFR	67	395	64	64.0	0.0	1.5	NI
665	32 N 11th St	MFR	67	360	66	66.0	0.0	1.3	NI

MFR = Multifamily residence
SFR = Single family residence
NI = No Impact

Stockton Avenue Ventilation Facility

Long-term ambient measurements were conducted near the site of the Stockton Avenue Ventilation Facility in 2008 to characterize the existing conditions. In 2015, ambient noise measurements were repeated at three of the four locations to determine changes that might have occurred. Table 4.12-11 summarizes the results of the 2008 and 2015 ambient noise measurements. Measurement locations are depicted in Figure 4.12-7.

Table 4.12-11: Ambient Noise in Stockton Avenue Neighborhood

Measurement Location Label	Ambient Ldn (dBA)				
	2008		2015		Ambient Used in Analysis
	Range	Average	Range	Average	
L	66–68	67	68–70	69	69
N	64–66	65	69–70	69.5	70
O	60–63	61.5	--	--	62
P	67–70	68.5	68–70	69	69

The ambient noise levels at Location N increased by 4.5 dBA. Because higher existing ambient noise levels are more critical (more likely to require mitigation) and there is no consistent trend, the greater of the ambient readings from 2008 and 2015 was used in the impact analysis to characterize the ambient noise at the four locations.

Table 4.12-12 presents the projected noise from train noise exiting the tunnel from the ventilation shaft. The train noise emitted from the Stockton ventilation shaft is minimal. No noise impacts are projected to occur for this source of operational noise. Therefore, no mitigation is required for train noise that exits the tunnel from the ventilation shaft.

Table 4.12-12: Airborne Train Noise from Stockton Ventilation Shaft

Civil Station	Receiver Location Address	Land Use	Vehicle Speed (mph)	Distance to Vent Structure (feet)	Existing Ambient L_{dn} / L_{eq} (dBA)	Total L_{dn} / L_{eq} (dBA)	Increase over Existing Ambient (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type
782	701 Harding Ave	SFR	67	345	70	70.0	0.0	1.0	NI
784	551 Stockton Ave	SFR	67	195	70	70.0	0.0	1.0	NI
785	599 Stockton Ave	SFR	67	115	70	70.0	0.0	1.0	NI
787	733 Schiele Ave	SFR	67	250	63	63.0	0.0	1.6	NI
788	623 Stockton Ave	SFR	67	165	69	69.0	0.0	1.1	NI
788	635 Stockton Ave	SFR	67	180	69	69.0	0.0	1.1	NI
789	641 Stockton Ave	SFR	67	140	69	69.0	0.0	1.1	NI
794	647 Stockton Ave	SFR	67	120	69	69.0	0.0	1.1	NI
796	759 Villa St	SFR	67	330	62	62.0	0.0	1.7	NI
796	745 W Taylor St	SFR	67	340	63	63.0	0.0	1.6	NI
797	727 Stockton Ave	SFR	67	400	70	70.0	0.0	1.0	NI

SFR = Single family residence
NI = No Impact

Pressure Relief Shaft

The ventilation shafts act as pressure relief shafts as well. The ventilation shafts will have large emergency ventilation fans. Based on previous BART projects, the sound attenuators that would be required to reduce the noise from tunnel emergency ventilation fans would be more than adequate to reduce the sound of trains. Introducing two silencers in the pressure relief shaft as specified in Mitigation Measure NV-A (one to control noise within the tunnel and station, the other to control noise at the surface) can reduce the train noise by more than 15 dBA. Accordingly, there will be *no adverse effect* from train sound that travels through the shaft.

Traction Power Substations

Based on previous BART projects (e.g., BART SFO) Traction Power Substations (TPSS) that are beyond 250 feet from residences will not require noise mitigation, as they are projected to result in No Impact based on the criteria used. There are TPSS that lie within 250 feet of receptors at the Downtown San Jose West and Diridon Station South and North Options. The TPSS at the Downtown San Jose West Station is on the corner of Santa Clara Street and 3rd Street. There are multi-family residential uses within 250 feet to the north of the TPSS location. At the Diridon Station South Option, the TPSS is on the west side of the station between Autumn Street and Los Gatos Creek. The TPSS is on the southeast corner of the station at the Diridon Station North Option on Autumn Street. There is a single-family residence within 250 feet of both the Diridon Station South and North Options' TPSS. Tables 4.12-13 through 4.12-15 summarize the noise analysis at each location. The FTA Guidance Manual provides a reference L_{max} noise level of 63 dBA for substations with an analysis of the closest receptor at each location. Using a noise level criterion of 55 dBA, there is one projected impact each at the Downtown San Jose West and Diridon Station South and North Options. With implementation of Mitigation Measure NV-A the impact would have *no adverse effect*.

Older residential uses are just behind the retail uses along Santa Clara Street. The San Jose State University campus is one block south of Santa Clara Street between 4th and 10th Streets. The San Jose Civic Plaza, including San Jose City Hall, is south of Santa Clara Street, between 4th and 6th Streets. The Museum of Art, Plaza de Cesar Chavez, St. Joseph's Cathedral, San Pedro Square, and several theaters and major hotels are near the new station locations. Low- and medium-density residential uses are to the north of Santa Clara Street, just outside of downtown San Jose.

Table 4.12-13: Predicted TPSS Noise Levels Near the Downtown San Jose West Station

Receptor	Land Use	Distance to TPSS (feet)	Projected Maximum Noise Level (dBA)	Impact Threshold (dBA)	Impact Type
97 Santa Clara St	MFR	20	71.0	55	Impact
101 Santa Clara St	MFR	125	55.0	55	No Impact
60 N 3rd St	MFR	175	52.1	55	No Impact
100 Santa Clara St	MFR	166	52.6	55	No Impact
126 Santa Clara St	MFR	220	50.1	55	No Impact
20 S 2nd St	MFR	210	50.5	55	No Impact
MFR = Multifamily residence					

Table 4.12-14: Predicted TPSS Noise Levels Near the Diridon Station South Option

Receptor	Land Use	Distance to TPSS (feet)	Projected Maximum Noise Level (dBA)	Impact Threshold (dBA)	Impact Type
35 S Autumn St	Single-family residence	90	57.9	55	Impact

Table 4.12-15: Predicted TPSS Noise Levels Near the Diridon Station North Option

Receptor	Land Use	Distance to TPSS (feet)	Projected Maximum Noise Level (dBA)	Impact Threshold (dBA)	Impact Type
35 S Autumn St	Single-family residence	90	57.9	55	Impact

Emergency Backup Generators

Emergency backup generators would be located at the Alum Rock/28th Street and Downtown San Jose Stations. Generators for Phase II would be expected to be quieter than existing generators on the BART system and are typically located within enclosures that reduce noise levels.

Alum Rock/28th Street Station Generator

The Alum Rock/28th Street Station generator would be located at grade, within a concrete structure. Although specific details on the size of the generator are not available it is anticipated that noise from operation of the generator could exceed 55 dBA at nearby receptors and result in an adverse effect. With implementation of Mitigation Measure NV-A this impact would have *no adverse effect*.

Downtown San Jose Station Generator

The generator for the Downtown San Jose Station would be fully enclosed by the station structure. Although specific details on the size of the generator are not available, it is anticipated that noise from operation of the generator could exceed 55 dBA at nearby receptors and result in an adverse effect. With implementation of Mitigation Measure NV-A this impact would have *no adverse effect*.

Newhall Maintenance Facility

The Newhall Maintenance Facility were studied in 2006 as part of the preliminary engineering design process. The Newhall Maintenance Facility location and usage have not changed significantly since 2006. Therefore, the previous noise analysis (ATS Consulting 2006a, 2006b) conclusions remain valid, and there would be *no effect* on noise from train activity within the yard or from facility activity. Accordingly, no mitigation would be required.

4.12.4.3 Groundborne Noise and Vibration Impacts from Operations

The groundborne noise and vibration impacts along the tunnel alignment were evaluated using the FTA criteria. All residential land uses identified along the alignment were treated individually in the groundborne noise and vibration prediction model. Institutional land uses (e.g., schools) were also treated individually in the calculations. The Screening Distance for groundborne noise and vibration for a rail rapid transit system such as BART is 200 feet.

At-grade Segment

All sensitive receptors adjacent to the at-grade segment of the alignment, which starts approximately 600 feet north of I-880, would be over 200 feet (i.e., 223 feet and greater) from the nearest track. The Screening Distance for a rail rapid transit system such as BART is 200 feet. Consequently, no groundborne noise and vibration impacts would be expected for the at-grade segment.

Tunnel Segment

The projected levels of groundborne noise and vibration for BART train operations within the tunnel were calculated using the vibration prediction models described in Section 4.12.3.1, *Transit Operations*, and the measured data in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report.*

Groundborne vibration and groundborne noise levels are presented as a range of projected values reflecting the use of a modeling factor, which conservatively accounts for the various uncertainties in the model. The levels at each receptor location are based on distance to and depth of the track, train design speed, wheel/rail interaction forces, dynamic characteristics of rail support system, soil conditions, and the dynamic response of the receptor building. The baseline analysis (i.e., before mitigation) assumes a rail support system that is referred to as a resiliently supported tie (RST) system with a standard pad stiffness similar to the design implemented on the BART Colma Extension. Determinations of noise and vibration impacts are based on the upper value of the predicted range.

Twin-Bore Option

No vibration impacts are projected for the tunnel alignment when the predicted levels of vibration are compared to the FTA 1/3-octave band criteria. Refer to Tables 4.8 through 4.10 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* for the projected levels of groundborne vibration for the Twin-Bore Option. The analysis does indicate that groundborne noise levels are projected to exceed the FTA criteria (35 dBA for residences and 40 dBA for institutional uses) for many receptors, as shown in Tables 4.12-16 through 4.12-20. Groundborne noise mitigation has been evaluated for those receptors indicated as potentially impacted.

Where the unmitigated groundborne noise levels from the prediction model exceed the FTA criteria, the use of an Isolated Slab Track (IST) (Mitigation Measure NV-B) was evaluated. This type of mitigation can be installed at track level to reduce vibration transmitted into the tunnel invert, thereby reducing vibration that would otherwise be emitted from the tunnel structure into the surrounding soil. This method has been used extensively in Europe with various degrees of effectiveness depending on the design to reduce higher frequency vibration and would be effective at reducing groundborne noise from the BART system operations.

An IST can also be used with special trackwork (i.e., crossover). The IST system is constructed with a continuous elastomeric mat instead of discrete elastomeric pads that are typically used for an FST system. An IST can be designed to provide from 10 to 13 dBA of noise reduction.

Tables 4.12-16 through 4.12-20 indicate whether an impact is projected with standard track design (i.e., standard RST) and where an IST would be needed as mitigation. Tables 4.12-21 through 4.12-25 indicate where mitigation is required. Depending on the options selected, 20,600–22,700 linear feet of IST groundborne mitigation would be required.

Table 4.12-16: Groundborne Noise Mitigation -Twin-Bore Option Alignment

S1 Track	S2 Track
617+50 to 638+75	618+00 to 639+50
645+75 to 656+00	646+25 to 656+50
662+25 to 677+50	663+00 to 678+00
For Downtown San Jose Station East and West Options see Tables 4.12-17 and 4.12-18, respectively	
708+00 to 713+00	708+50 to 713+50
For Diridon Station South and North Options see Tables 4.12-19 and 4.12-20, respectively	
782+00 to 802+75	783+00 to 803+75
Total IST: 14,500 feet	
IST = Isolated Slab Track	

Table 4.12-17: Groundborne Noise Mitigation - Twin-Bore, Downtown San Jose Station East Option

S1 Track	S2 Track
682+25 to 695+50	682+75 to 696+00
Total IST: 2,650 feet	
IST = Isolated Slab Track	

Table 4.12-18: Groundborne Noise Mitigation - Twin-Bore, Downtown San Jose Station West Option

S1 Track	S2 Track
692+00 to 697+50	692+50 to 698+00
Total IST: 1,100 feet	
IST = Isolated Slab Track	

Table 4.12-19: Groundborne Noise Mitigation – Twin-Bore, Diridon Station South Option

S1 Track	S2 Track
744+25 to 761+75	744+75 to 763+00
767+25 to 773+25	769+00 to 774+50
777+75 to 782+00	779+00 to 783+00
Total IST: 5,550 feet	
IST = Isolated Slab Track	

Table 4.12-20: Groundborne Noise Mitigation – Twin-Bore, Diridon Station North Option

S1 Track	S2 Track
745+75 to 758+75	746+50 to 760+00
761+50 to 769+25	762+75 to 770+50
773+00 to 777+00	774+00 to 778+00
Total IST: 5,000 feet	
IST = Isolated Slab Track	

With implementation of Mitigation Measure NV-B, impacts would have *no adverse effect.*

Mitigation Measure NV-B: Reduce groundborne noise levels

The mitigation strategy for groundborne noise is an Isolated Slab Track (IST), An IST is a form of floating slab track (FST). The IST system is constructed with a continuous elastomeric mat instead of discrete elastomeric pads that are typically used for an FST system. An IST can be designed to provide from 10 to 13 dBA of noise reduction. Mitigation Measure NV-B can also be used under a crossover. The locations for implementing this mitigation are shown in Tables 4.12-21 through 4.12-25. The specific mitigation strategy will be determined in final design and could include alternative strategies that similarly achieve the FTA groundborne noise criteria.

Table 4.12-21: Projected Levels of Groundborne Noise for Twin-Bore Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
584	433 N 33rd St	MFR	48	156	54	35	20 to 24	--	--
585	1500 Marburg Way	SFR	48	0	52	35	24 to 28	--	--
590	333 N 33rd St - Anne Darling Elementary School	Institutional	48	155	49	40	20 to 24	--	--
593	290 N 31st St	SFR	48	184	50	35	25 to 29	--	--
595	269 N 31st St	SFR	48	53	50	35	29 to 33	--	--
595	263 N 31st St	SFR	48	120	50	35	27 to 31	--	--
595	261 N 31st St	SFR	48	125	50	35	27 to 31	--	--
610	5 Wounds Lane - 5 Wounds School	Institutional	48	280	49	40	21 to 25	--	--
614	24 N 26th St - SF Nova Alliance Community Center	Institutional	48	0	50	40	35 to 39	--	--
615	26 N 26th St	SFR	48	150	52	35	30 to 34	--	--
617	23 N 26th St	SFR	48	140	52	35	31 to 35	--	--
618	1245 Santa Clara St - Alum Rock Counseling Center	Institutional	48	0	52	40	33 to 37	--	--
618	9 S 26th St	SFR	48	178	52	35	29 to 33	--	--
619	30 N 25th St	SFR	48	200	53	35	28 to 32	--	--
619	20 N 25th St	SFR	48	160	53	35	21 to 25	--	--
619	1236 Santa Clara St	SFR	48	68	53	35	29 to 33	--	--
619	1241 Shortridge Ave	MFR	48	197	53	35	21 to 25	--	--
619	1211 Santa Clara St	MFR	48	21	53	35	35 to 39	4	23 to 27
619	1226 Santa Clara St	SFR	48	68	53	35	36 to 40	1	25 to 29
620	1220 Santa Clara St - Sociedad Filharmonica	Institutional	48	45	53	40	31 to 35	--	--
620	1210 Santa Clara St	SFR	48	35	53	35	39 to 43	1	28 to 32
622	45 N 25th St	SFR	48	171	55	35	29 to 33	--	--
622	16 S 24th St	SFR	48	114	55	35	32 to 36	1	22 to 26
623	1169 Santa Clara St	SFR	48	60	56	35	37 to 41	1	26 to 30

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
623	1161 Santa Clara St	SFR	48	70	56	35	29 to 33	--	--
623	16 N 24th St	SFR	48	90	56	35	34 to 38	1	23 to 27
624	11 S 24th St	SFR	48	137	56	35	22 to 26	--	--
625	13 Carnegie Sq	SFR	48	149	56	35	30 to 34	--	--
626	1102 Santa Clara St - East San Jose Carnegie Branch Library	Institutional	48	25	57	40	33 to 37	--	--
627	1115 Santa Clara St - Portuguese Community Center	Institutional	48	45	57	40	31 to 35	--	--
627	11 S 23rd St	MFR	48	132	57	35	23 to 27	--	--
627	15 S 23rd St	SFR	48	163	57	35	30 to 34	--	--
627	9 S 23rd St	MFR	48	103	57	35	24 to 28	--	--
627	1098 Santa Clara St - Casa Do Benfica	Institutional	48	18	57	40	33 to 37	--	--
628	1082 Santa Clara St	MFR	48	19	57	35	35 to 39	5	23 to 27
628	16 S 22nd St	SFR	48	119	57	35	32 to 36	1	22 to 26
628	1072 Santa Clara St	MFR	48	19	57	35	35 to 39	10	23 to 27
629	1075 Santa Clara St - Santa Clara County Multi Service Center	Institutional	48	85	58	40	28 to 32	--	--
630	15 S 22nd St	SFR	48	160	58	35	30 to 34	--	--
630	1050 Santa Clara St - Daniel B Martinez, MD	Institutional	48	37	58	40	39 to 43	1	27 to 31
631	1049 Santa Clara St	SFR	48	72	58	35	36 to 40	1	25 to 29
631	1026 Santa Clara St	SFR	48	45	58	35	38 to 42	1	27 to 31
631	1047 Santa Clara St	SFR	48	70	58	35	36 to 40	1	25 to 29
632	8 S 21st St	SFR	48	140	59	35	31 to 35	--	--
633	16 N 21st St	SFR	48	135	59	35	31 to 35	--	--
633	19 S 21st St	SFR	48	160	59	35	30 to 34	--	--
633	990 Santa Clara St - Trinh Hung Quoc, MD	Institutional	48	60	59	40	37 to 41	1	26 to 30
634	20 S 20th St	SFR	48	181	60	35	29 to 33	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
635	966 Santa Clara St	MFR	48	56	60	35	31 to 35	--	--
636	19 S 20th St	SFR	48	222	61	35	24 to 28	--	--
637	961 Santa Clara St -- Roosevelt Youth Center	Institutional	48	0	62	40	30 to 34	--	--
637	901 Santa Clara St - Roosevelt Youth Center	Institutional	48	0	62	40	30 to 34	--	--
640	896 Santa Clara St	MFR	48	150	67	35	26 to 30	--	--
640	884 Santa Clara St	MFR	48	200	67	35	24 to 28	--	--
644	802 Santa Clara - Fire Station - Battalion 1	MFR	67	110	65	35	31 to 35	--	--
645	90 N 17th St	SFR	67	240	65	35	25 to 29	--	--
647	765 Santa Clara St	Institutional	67	0	65	35	33 to 37	1	22 to 26
648	765 Santa Clara St	Institutional	67	0	63	40	43 to 47	1	30 to 34
648	10 N 16th St	Institutional	67	0	63	40	43 to 47	1	30 to 34
649	675 Santa Clara St	Hospital	67	0	62	35	35 to 39	1	23 to 27
649	748 Santa Clara St	MFR	67	95	62	35	31 to 35	--	--
649	31 S 16th St	SFR	67	236	62	35	18 to 22	--	--
651	22 S 15th St	SFR	67	218	58	35	25 to 29	--	--
651	716 Santa Clara St	MFR	67	100	58	35	31 to 35	--	--
651	675 Santa Clara St	Hospital	67	0	58	35	30 to 34	--	--
652	12 S 15th St #206 - Bay Area College of Nursing: Cagampan Bu	Institutional	67	78	58	40	27 to 31	--	--
654	25 S 15th St - Dr Viet-Hong Bui	Institutional	67	59	57	40	29 to 33	--	--
654	678 Santa Clara St - Buena Vista Eyecare Group	Institutional	67	54	57	40	36 to 40	--	--
655	652 Santa Clara St - Elite Dental	Institutional	67	48	56	40	37 to 41	1	25 to 29
656	25 N 14th St #Ste 55 - Norcal Care	Institutional	67	19	56	40	30 to 34	--	--
657	30 N 13th St	MFR	67	122	57	35	22 to 26	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
658	602 Santa Clara St - Indian Health Center of Santa Clara Vall	Institutional	67	31	57	40	33 to 37	--	--
658	28 S 13th St	SFR	67	171	57	35	26 to 30	--	--
660	55 N 13th St - Ming Li, MD	Institutional	67	119	57	40	29 to 33	--	--
660	26 S 12th St	SFR	67	169	57	35	26 to 30	--	--
660	29 S 13th St - Duong Bich-Hai Thi, DDS	Institutional	67	169	57	40	26 to 30	--	--
661	551 Santa Clara St - Holistic Health Care Clinic (Chiropractic)	Institutional	67	31	57	40	33 to 37	--	--
661	32 N 12th St	MFR	67	196	57	35	18 to 22	--	--
662	15 S 12th St	SFR	67	128	56	35	29 to 33	--	--
663	12 S 11th St	MFR	67	146	56	35	28 to 32	--	--
665	32 N 11th St	MFR	67	182	54	35	19 to 23	--	--
665	478 Santa Clara St - Santa Clara Dental	Institutional	67	29	54	40	41 to 45	1	28 to 32
667	35 N 11th St	MFR	67	180	53	35	25 to 29	--	--
667	23 S 11th St	SFR	67	167	53	35	26 to 30	--	--
668	471 Santa Clara St - Darling & Fischer Garden Chapel Mortuary	Institutional	67	50	54	40	34 to 38	--	--
668	30 N 10th St	MFR	67	167	54	35	26 to 30	--	--
668	22 S 10th St	MFR	67	167	54	35	26 to 30	--	--
669	11 S 10th St	MFR	67	30	55	35	43 to 47	6	30 to 34
669	25 S 10th St	MFR	67	120	55	35	43 to 47	8	30 to 34
670	425 Elizabeth St	SFR	67	121	55	35	30 to 34	--	--
670	425 Santa Clara St - San Jose Fire Fighters Local 230	MFR	67	33	55	35	42 to 46	1	29 to 33
670	39 N 10th St	SFR	67	168	55	35	26 to 30	--	--
670	421 Elizabeth St	SFR	67	121	55	35	30 to 34	--	--
671	417 Elizabeth St	SFR	67	121	54	35	30 to 34	--	--
672	401 Santa Clara St	MFR	67	33	53	35	42 to 46	6	29 to 33

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
672	24 N 9th St	SFR	67	156	53	35	27 to 31	--	--
672	18 S 9th St	SFR	67	135	53	35	29 to 33	--	--
672	23 S 9th St	MFR	67	166	53	35	26 to 30	--	--
673	390 Santa Clara St	MFR	67	31	53	35	43 to 47	4	29 to 33
674	26 S 8th St	MFR	67	166	53	35	26 to 30	--	--
674	389 Santa Clara St - St. Patrick's Proto-Cathedral	Institutional	67	60	53	40	32 to 36	--	--
675	365 Santa Clara St - Our Lady of La Vang Parish	Institutional	67	65	53	40	31 to 35	--	--
676	25 S 8th St	MFR	67	160	52	35	27 to 31	--	--
677	345 Santa Clara St - 420 Medical Doctor	Institutional	67	40	52	40	42 to 46	1	31 to 35
679	24 S 7th St	MFR	48	200	51	35	22 to 26	--	--
680	1295 Santa Clara St - Horace Mann Elementary	Institutional	48	33	50	40	33 to 37	--	--
For Downtown San Jose Station East and West Options, see Tables 4.12-22 and 4.12-23, respectively									
707	101 Santa Clara St - Chamber of Commerce Silicon Valley	Institutional	33	30	50	40	23 to 27	--	--
709	20 N Almaden Ave		33	29	52	35	32 to 36	10	18 to 22
710	161 Santa Clara St - Masson Apartments	MFR	33	29	53	35	32 to 36	16	19 to 23
712	22 Almaden Ave	MFR	33	144	57	35	29 to 33	--	--
715	233 Santa Clara St - Hotel De Anza	Hotel	33	29	60	35	19 to 23	--	--
716	38 N Almaden Blvd - Axis Apartments	MFR	33	112	63	35	27 to 31	--	--
For Diridon Station South and North Alignment Options, see Tables 4.12-24 and 4.12-25, respectively									
782	762 Harding Ave	SFR	67	285	68	35	32 to 36	1	23 to 27
782	750 Harding Ave	SFR	67	240	68	35	32 to 36	1	23 to 27
782	714 Harding Ave	SFR	67	95	68	35	36 to 40	1	25 to 29
782	738 Harding Ave	SFR	67	188	68	35	32 to 36	1	23 to 27
782	701 Harding Ave	SFR	67	35	68	35	39 to 43	1	28 to 32

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
782	726 Harding Ave	SFR	67	135	68	35	34 to 38	1	24 to 28
784	551 Stockton Ave	SFR	67	35	69	35	38 to 42	1	27 to 31
784	713 Harding Ave	SFR	67	85	69	35	35 to 39	1	25 to 29
784	761 Harding Ave	SFR	67	280	69	35	32 to 36	1	23 to 27
784	749 Harding Ave	SFR	67	235	69	35	32 to 36	1	23 to 27
784	737 Harding Ave	SFR	67	185	69	35	32 to 36	1	23 to 27
784	725 Harding Ave	SFR	67	135	69	35	34 to 38	1	24 to 28
785	714 Schiele Ave	SFR	67	85	70	35	36 to 40	1	26 to 30
785	750 Schiele Ave	SFR	67	245	70	35	32 to 36	1	23 to 27
785	738 Schiele Ave	SFR	67	190	70	35	32 to 36	1	23 to 27
785	726 Schiele Ave	SFR	67	145	70	35	26 to 30	--	--
785	599 Stockton Ave	SFR	67	35	70	35	38 to 42	1	27 to 31
786	762 Schiele Ave	SFR	67	275	70	35	32 to 36	1	23 to 27
787	733 Schiele Ave	SFR	67	170	70	35	32 to 36	1	22 to 26
787	745 Schiele Ave	SFR	67	217	70	35	32 to 36	1	23 to 27
787	757 Schiele Ave	SFR	67	265	70	35	32 to 36	1	23 to 27
788	623 Stockton Ave	SFR	67	50	70	35	37 to 41	1	26 to 30
788	766 Villa Ave	SFR	67	290	70	35	32 to 36	1	23 to 27
788	635 Stockton Ave	SFR	67	55	70	35	37 to 41	1	26 to 30
789	641 Stockton Ave	SFR	67	40	69	35	38 to 42	1	27 to 31
789	647 Stockton Ave	SFR	67	55	69	35	37 to 41	1	26 to 30
790	744 Villa Ave	SFR	67	195	68	35	32 to 36	1	23 to 27
790	756 Villa Ave	SFR	67	240	68	35	32 to 36	1	23 to 27
790	732 Villa Ave	SFR	67	155	68	35	33 to 37	1	24 to 28
794	759 Villa St	SFR	67	260	64	35	25 to 29	--	--
795	765 W Taylor St	SFR	67	270	65	35	32 to 36	1	23 to 27
795	755 W Taylor St	SFR	67	235	65	35	32 to 36	1	23 to 27
796	745 W Taylor St	SFR	67	185	66	35	32 to 36	1	23 to 27
796	724 Laurel St	SFR	67	290	66	35	32 to 36	1	23 to 27
797	727 Stockton Ave	SFR	67	60	66	35	30 to 34	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
797	733 Stockton Ave	SFR	67	35	66	35	39 to 43	1	28 to 32
798	732 Asbury St	SFR	67	160	63	35	33 to 37	1	23 to 27
798	742 Asbury St	SFR	67	200	63	35	32 to 36	1	23 to 27
798	702 Asbury St	SFR	67	35	63	35	39 to 43	1	28 to 32
798	764 Asbury St	SFR	67	260	63	35	24 to 28	--	--
798	722 Asbury St	SFR	67	120	63	35	34 to 38	1	24 to 28
798	712 Asbury St	SFR	67	80	63	35	37 to 41	1	26 to 30
799	755 Asbury St	SFR	67	245	62	35	32 to 36	1	23 to 27
801	779 Stockton Ave	SFR	67	55	60	35	37 to 41	1	26 to 30

Shaded cells indicate impacts.
CL = Center Line; SFR = Single--Family Residential, MFR = Multi--Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-22: Projected Levels of Groundborne Noise for the Twin-Bore Option – Downtown San Jose Station East Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
683	235 Santa Clara St - Vintage Tower (X-Over)	MFR	48	28	50	35	37 to 41	60	26 to 30
684	24 N 5th St - First United Methodist Church (X-Over)	Institutional	48	28	49	40	42 to 46	1	31 to 35
685	200 Santa Clara St - San Jose City Hall (X-Over)	Institutional	48	33	49	40	41 to 45	1	30 to 34
691	148 Santa Clara St	MFR	48	34	49	35	29 to 33	--	--
691	138 Santa Clara St	MFR	48	34	49	35	29 to 33	--	--
692	134 Santa Clara St	MFR	48	34	48	35	29 to 33	--	--
693	118 Santa Clara St	MFR	48	34	48	35	29 to 33	--	--
693	101 Santa Clara St	MFR	48	27	48	35	31 to 35	--	--
693	100 Santa Clara St	MFR	48	34	48	35	29 to 33	--	--
693	60 N 3rd St - Town Park Towers	MFR	48	203	48	35	12 to 16	--	--
694	97 Santa Clara St	MFR	48	31	49	35	36 to 40	4	23 to 27
697	20 S Second St	MFR	48	141	50	35	24 to 28	--	--
701	15 S 1st St - MFR above Commercial	MFR	48	90	51	35	29 to 33	--	--
701	1 N 1st St - Lincoln Law School	Institutional	48	30	51	40	28 to 32	--	--

Shaded cells indicate impacts.
CL = Center Death; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-23: Projected Levels of Groundborne Noise for Twin-Bore Option – Downtown San Jose Station West Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
683	235 Santa Clara St - Vintage Tower	MFR	48	28	50	35	29 to 33	--	--
684	24 N 5th St - First United Methodist Church	Institutional	48	28	49	40	34 to 38	--	--
685	200 Santa Clara St - San Jose City Hall	Institutional	48	33	49	40	33 to 37	--	--
691	148 Santa Clara St	MFR	48	30	49	35	29 to 33	--	--
691	138 Santa Clara St	MFR	48	30	49	35	29 to 33	--	--
692	134 Santa Clara St (X-Over)	MFR	48	30	48	35	31 to 35	--	--
693	118 Santa Clara St (X-Over)	MFR	48	30	48	35	33 to 37	6	22 to 26
693	101 Santa Clara St (X-Over)	MFR	48	27	48	35	40 to 44	4	28 to 32
693	100 Santa Clara St (X-Over)	MFR	48	30	48	35	38 to 42	3	27 to 31
693	60 N 3rd St - Town Park Towers	MFR	48	203	48	35	12 to 16	--	--
694	97 Santa Clara St (X-Over)	MFR	48	31	49	35	44 to 48	4	31 to 35
697	20 S Second St (X-Over)	MFR	48	141	50	35	27 to 31	--	--
701	15 S 1st St - MFR above Commercial	MFR	48	90	51	35	29 to 33	--	--
701	1 N 1st St - Lincoln Law School	Institutional	48	30	51	40	28 to 32	--	--

Shaded cells indicate impacts.
CL = Center Line; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-24: Projected Levels of Groundborne Noise for Twin-Bore Option – Diridon Station South Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
736	35 S Autumn St	SFR	33	35	48	35	30 to 34	-	-
737	56 S Montgomery St - Templo La Hermosa	Institutional	48	189	46	40	27 to 31	-	-
745	88 Bush St - Plant 51	MFR	48	0	49	35	32 to 36	265	20 to 24
748	754 The Alameda - Avalon at Cahill Park	MFR	48	0	49	35	32 to 36	218	20 to 24
750	53 Wilson Ave	SFR	48	80	54	35	26 to 30	-	-
750	51 Wilson Ave	SFR	48	35	54	35	33 to 37	1	22 to 26
750	49 Wilson Ave	SFR	48	0	54	35	36 to 40	1	24 to 28
751	40 Sunol St	MFR	48	90	54	35	25 to 29	-	-
752	34 Sunol St	SFR	48	50	54	35	30 to 34	-	-
752	30 Sunol St	SFR	48	0	55	35	36 to 40	1	24 to 28
752	24 Sunol St	SFR	48	0	56	35	36 to 40	1	24 to 28
753	830 The Alameda	MFR	48	38	56	35	28 to 32	-	-
753	20 Sunol St	SFR	48	0	56	35	36 to 40	1	24 to 28
753	33 Sunol St	SFR	48	85	56	35	26 to 30	-	-
753	27 Sunol St	SFR	48	40	56	35	32 to 36	1	21 to 25
754	24 Cleaves Ave	SFR	48	115	57	35	23 to 27	-	-
756	938 The Alameda - Billy Defrank LGBT Community Center	Institutional	48	125	58	40	17 to 21	-	-
758	925 The Alameda - Lofts on The Alameda	MFR	48	0	62	35	33 to 37	40	20 to 24
759	87 Rhodes Ct	SFR	48	115	64	35	24 to 28	-	-
758	128 Rhodes Ct	SFR	48	250	62	35	20 to 24	-	-
759	152 Rhodes Ct	SFR	48	276	64	35	20 to 24	-	-
759	109 Rhodes Ct	SFR	48	130	64	35	23 to 27	-	-
760	133 Rhodes Ct	SFR	48	107	61	35	25 to 29	-	-
760	157 Rhodes Ct	SFR	48	132	61	35	31 to 35	-	-
760	176 Rhodes Ct	SFR	48	0	61	35	30 to 34	-	-
760	179 Rhodes Ct	SFR	48	151	61	35	21 to 25	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
760	200 Rhodes Ct	SFR	48	0	61	35	30 to 34	-	-
761	176 N Morrison Ave	MFR	48	20	62	35	31 to 35	-	-
761	201 Rhodes Ct	SFR	48	169	62	35	30 to 34	-	-
761	229 Rhodes Ct	SFR	48	186	62	35	30 to 34	-	-
761	204 N Morrison Ave	SFR	48	40	62	35	31 to 35	-	-
761	224 Rhodes Ct	0	48	0	62	35	30 to 34	-	-
761	248 Rhodes Ct	0	48	0	62	35	30 to 34	-	-
762	173 N Morrison Ave	Institutional	48	45	62	40	32 to 36	-	-
762	253 Rhodes Ct	SFR	48	200	62	35	30 to 34	-	-
762	197 N Morrison Ave	SFR	48	30	62	35	31 to 35	-	-
762	225 N Morrison Ave	MFR	48	15	62	35	31 to 35	-	-
762	272 Rhodes Ct	0	48	0	62	35	30 to 34	-	-
762	275 Rhodes Ct	SFR	48	213	62	35	30 to 34	-	-
763	800 W Julian St	0	48	0	62	35	30 to 34	-	-
763	264 N Morrison Ave - Support Systems Homes Recovery Center	MFR	48	40	62	35	31 to 35	-	-
763	295 Rhodes Ct	SFR	48	263	62	35	30 to 34	-	-
763	908 W Julian St	SFR	48	224	62	35	30 to 34	-	-
763	920 W Julian St	SFR	48	182	62	35	30 to 34	-	-
763	936 W Julian St	SFR	48	141	62	35	31 to 35	-	-
764	909 W Julian St	SFR	48	246	62	35	30 to 34	-	-
763	950 W Julian St - Family and Children Services San Jose of	MFR	48	0	62	35	24 to 28	-	-
766	379 N Morrison Ave	SFR	48	70	62	35	31 to 35	-	-
766	962 Cinnabar St	SFR	48	175	62	35	30 to 34	-	-
766	956 Cinnabar St	SFR	48	140	62	35	31 to 35	-	-
766	899 Morrison Park Dr - Avalon Morrison Park	MFR	48	0	62	35	24 to 28	-	-
768	910 Cinnabar St	SFR	48	0	63	35	31 to 35	-	-
768	945 Cinnabar St	SFR	48	110	63	35	31 to 35	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
768	890 Cinnabar St	SFR	48	0	63	35	31 to 35	-	-
768	927 Cinnabar St	SFR	48	75	63	35	32 to 36	1	23 to 27
768	870 Cinnabar St	SFR	48	29	63	35	31 to 35	-	-
769	909 Cinnabar St	SFR	48	45	63	35	32 to 36	1	23 to 27
769	850 Cinnabar St	SFR	48	62	63	35	32 to 36	1	23 to 27
769	875 Cinnabar St - Cinnabar Commons Apartments	MFR	48	0	63	35	25 to 29	-	-
769	434 N Morrison Ave	SFR	48	150	63	35	30 to 34	-	-
771	417 Stockton Ave	SFR	48	41	62	35	32 to 36	1	22 to 26
772	808 Lenzen Ave	MFR	48	240	63	35	32 to 36	5	24 to 28
773	790 Lenzen Ave	MFR	48	20	63	35	25 to 29	-	-
775	777 Lenzen Ave	SFR	67	278	63	35	24 to 28	-	-
776	476 Lenzen Ct	SFR	67	280	63	35	24 to 28	-	-
778	774 Pershing Ave	SFR	67	310	64	35	32 to 36	1	23 to 27
778	762 Pershing Ave	SFR	67	250	64	35	32 to 36	1	23 to 27
778	489 Stockton Ave	SFR	67	10	64	35	39 to 43	1	28 to 32
778	750 Pershing Ave	SFR	67	210	64	35	32 to 36	1	23 to 27
778	738 Pershing Ave	SFR	67	160	64	35	33 to 37	1	23 to 27
779	726 Pershing Ave	SFR	67	115	65	35	35 to 39	1	25 to 29
779	714 Pershing Ave	SFR	67	70	65	35	37 to 41	1	27 to 31
779	495 Stockton Ave	MFR	67	10	65	35	39 to 43	2	28 to 32
780	749 Pershing Ave	SFR	67	220	65	35	32 to 36	1	23 to 27
780	761 Pershing Ave	SFR	67	270	65	35	32 to 36	1	23 to 27
780	737 Pershing Ave	SFR	67	170	65	35	33 to 37	1	23 to 27
780	711 Pershing Ave	SFR	67	70	65	35	37 to 41	1	27 to 31
780	725 Pershing Ave	SFR	67	120	65	35	34 to 38	1	24 to 28
780	501 Stockton Ave	SFR	67	26	65	35	40 to 44	1	28 to 32

Shaded cells indicate impacts.
CL = Center Line; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-25: Projected Levels of Groundborne Noise for Twin-Bore Option – Diridon Station North Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
734	35 S Autumn St	SFR	33	270	55	35	24 to 28	-	-
735	56 S Montgomery St - Templo La Hermosa	Institutional	48	450	55	40	21 to 25	-	-
745	88 Bush St - Plant 51	MFR	48	210	58	35	13 to 17	-	-
748	754 The Alameda - Avalon At Cahill Park	MFR	48	25	58	35	33 to 37	218	20 to 24
748	53 Wilson Ave	SFR	48	425	60	35	19 to 23	-	-
748	51 Wilson Ave	SFR	48	375	60	35	19 to 23	-	-
749	49 Wilson Ave	SFR	48	325	61	35	19 to 23	-	-
749	40 Sunol St	MFR	48	420	61	35	19 to 23	-	-
749	34 Sunol St	SFR	48	380	61	35	19 to 23	-	-
749	30 Sunol St	SFR	48	330	61	35	19 to 23	-	-
749	24 Sunol St	SFR	48	280	61	35	19 to 23	-	-
750	830 The Alameda	MFR	48	80	61	35	22 to 26	-	-
750	20 Sunol St	SFR	48	245	61	35	19 to 23	-	-
751	33 Sunol St	SFR	48	400	61	35	19 to 23	-	-
751	27 Sunol St	SFR	48	350	61	35	19 to 23	-	-
752	24 Cleaves Ave	SFR	48	420	62	35	19 to 23	-	-
753	938 The Alameda - Billy Defrank LGBT Community Center	Institutional	48	415	64	40	13 to 17	-	-
755	925 The Alameda - Lofts on The Alameda	MFR	48	120	65	35	17 to 21	-	-
754	87 Rhodes Ct	SFR	48	53	64	35	30 to 34	-	-
754	128 Rhodes Ct	SFR	48	40	65	35	32 to 36	1	22 to 26
754	152 Rhodes Ct	SFR	48	60	65	35	30 to 34	-	-
754	109 Rhodes Ct	SFR	48	25	64	35	37 to 41	1	25 to 29
755	133 Rhodes Ct	SFR	48	25	64	35	37 to 41	1	25 to 29
755	157 Rhodes Ct	SFR	48	25	64	35	31 to 35	-	-
755	176 Rhodes Ct	SFR	48	100	64	35	31 to 35	-	-
755	179 Rhodes Ct	SFR	48	25	64	35	24 to 28	-	-
755	200 Rhodes Ct	SFR	48	130	64	35	31 to 35	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
756	176 N Morrison Ave	MFR	48	118	64	35	30 to 34	-	-
756	201 Rhodes Ct	SFR	48	25	64	35	31 to 35	-	-
756	229 Rhodes Ct	SFR	48	25	64	35	31 to 35	-	-
757	204 N Morrison Ave	SFR	48	86	64	35	31 to 35	-	-
755	224 Rhodes Ct	SFR	48	160	64	35	30 to 34	-	-
756	248 Rhodes Ct	SFR	48	180	64	35	30 to 34	-	-
757	173 N Morrison Ave	Institutional	48	292	64	40	30 to 34	-	-
757	253 Rhodes Ct	SFR	48	35	64	35	31 to 35	-	-
757	197 N Morrison Ave	SFR	48	250	64	35	28 to 32	-	-
757	225 N Morrison Ave	MFR	48	235	64	35	28 to 32	-	-
757	272 Rhodes Ct	SFR	48	200	64	35	30 to 34	-	-
757	275 Rhodes Ct	SFR	48	35	64	35	31 to 35	-	-
758	800 W Julian St	SFR	48	240	62	35	30 to 34	-	-
758	264 N Morrison Ave - Support Systems Homes Recovery Center	MFR	48	25	62	35	31 to 35	-	-
758	295 Rhodes Ct	SFR	48	77	62	35	32 to 36	1	23 to 27
758	908 W Julian St	SFR	48	25	62	35	31 to 35	-	-
758	920 W Julian St	SFR	48	25	62	35	31 to 35	-	-
758	936 W Julian St	SFR	48	25	62	35	31 to 35	-	-
764	909 W Julian St	SFR	48	197	63	35	30 to 34	-	-
759	950 W Julian St - Family and Children Services San Jose of	MFR	48	210	63	35	20 to 24	-	-
760	379 N Morrison Ave	SFR	48	250	61	35	28 to 32	-	-
761	962 Cinnabar St	SFR	48	340	61	35	30 to 34	-	-
761	956 Cinnabar St	SFR	48	300	61	35	30 to 34	-	-
759	899 Morrison Park Dr - Avalon Morrison Park	MFR	48	25	63	35	24 to 28	-	-
762	910 Cinnabar St	SFR	48	85	61	35	32 to 36	1	23 to 27
763	945 Cinnabar St	SFR	48	245	60	35	30 to 34	-	-
762	890 Cinnabar St	SFR	48	30	61	35	31 to 35	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
763	927 Cinnabar St	SFR	48	210	60	35	30 to 34	-	-
763	870 Cinnabar St	SFR	48	30	60	35	31 to 35	-	-
763	909 Cinnabar St	SFR	48	173	60	35	30 to 34	-	-
763	850 Cinnabar St	SFR	48	25	60	35	31 to 35	-	-
764	875 Cinnabar St - Cinnabar Commons Apartments	MFR	48	25	60	35	25 to 29	-	-
764	434 N Morrison Ave	SFR	48	275	60	35	30 to 34	-	-
766	417 Stockton Ave	SFR	48	39	59	35	31 to 35	-	-
768	808 Lenzen Ave	MFR	48	335	61	35	32 to 36	5	24 to 28
767	790 Lenzen Ave	MFR	48	105	61	35	23 to 27	-	-
771	777 Lenzen Ave	SFR	67	300	61	35	24 to 28	-	-
772	476 Lenzen Ct	SFR	67	310	62	35	24 to 28	-	-
774	774 Pershing Ave	SFR	67	320	64	35	32 to 36	1	23 to 27
774	762 Pershing Ave	SFR	67	285	64	35	32 to 36	1	23 to 27
773	489 Stockton Ave	SFR	67	40	63	35	38 to 42	1	27 to 31
774	750 Pershing Ave	SFR	67	240	64	35	32 to 36	1	23 to 27
774	738 Pershing Ave	SFR	67	190	64	35	32 to 36	1	23 to 27
774	726 Pershing Ave	SFR	67	135	64	35	34 to 38	1	24 to 28
774	714 Pershing Ave	SFR	67	92	64	35	36 to 40	1	26 to 30
774	495 Stockton Ave	MFR	67	37	64	35	38 to 42	2	27 to 31
776	749 Pershing Ave	SFR	67	230	65	35	32 to 36	1	23 to 27
776	761 Pershing Ave	SFR	67	280	65	35	32 to 36	1	23 to 27
776	737 Pershing Ave	SFR	67	185	65	35	32 to 36	1	23 to 27
776	711 Pershing Ave	SFR	67	84	65	35	36 to 40	1	26 to 30
776	725 Pershing Ave	SFR	67	133	65	35	34 to 38	1	24 to 28
776	501 Stockton Ave	SFR	67	37	65	35	39 to 43	1	27 to 31

Shaded cells indicate impacts.
CL = Center Line; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Single-Bore Option

The second tunnel option is a single bore with bi-level tracks. Typically, the single-bore tunnel would be approximately 70 feet below ground compared to 40 feet with the Twin-Bore Option. On the lower level of the single-bore tunnel the tracks would be supported on the tunnel invert similar to twin-bore tunnel. On the upper level the tracks would be supported on a structural concrete slab spanning the width of the tunnel. Based on analyses for a similar bi-level tunnel, groundborne noise from the upper level is projected to be less than for the lower level.

Groundborne noise and vibration level projections were projected for the train operation on the lower track level of the Single-Bore Option for a limited number of receptors and compared to the levels for the Twin-Bore Option. The vibration projection model for the deeper tunnel was somewhat hindered due to the lack of vibration propagation test data at deeper depths since the tests did not, at the time (2004), envision a deeper tunnel.

Due to the greater depth of the single-bore tunnel, the projected groundborne noise levels would be less than those from the twin-bore tunnel. However, the difference is only in the range of 1 to 2 dBA. In the engineering phase of the Phase II Project, vibration propagation test data will be required for tunnel depths of the single-bore tunnel to define the specific mitigation required, if this is the preferred alternative. For purposes of this analysis, where groundborne noise levels in Tables 4.12-16 through 4.12-20 exceed the noise criterion by 1 dBA for the Twin-Bore Option, similar mitigation would be required for the Single-Bore Option.

Tables 4.12-26 through 4.12-28 indicate where mitigation is required. Depending on the options selected, 13,525–16,150 linear feet of IST groundborne mitigation would be required.

Table 4.12-26: Groundborne Noise Mitigation – Single-Bore Alignment

S1 Track	S2 Track
618+00 to 632+50	618+25 to 633+00
645+00 to 653+50	645+75 to 654+00
662+25 to 677+50	663+00 to 678+00
For Downtown San Jose Station East and West Options see Tables 4.12-17 and 4.12-18, respectively	
For Diridon Station South and North Options see Tables 4.12-19 and 4.12-20, respectively	
782+00 to 791+00	783+00 to 792+00
796+00 to 801+00	797+00 to 802+00
Total IST: 10,425 feet	
IST = Isolated Slab Track	

Table 4.12-27: Groundborne Noise Mitigation – Single-Bore, Diridon Station North Option

S1 Track	S2 Track
745+75 to 757+00	746+50 to 758+00
773+00 to 777+00	774+00 to 778+00
Total IST: 3,075 feet	
IST = Isolated Slab Track	

Table 4.12-28: Groundborne Noise Mitigation – Single-Bore, Diridon Station South Option

S1 Track	S2 Track
749+25 to 755+00	750+00 to 756+00
777+75 to 782+00	779+00 to 783+00
Total IST: 2,000 feet	
IST = Isolated Slab Track	

4.12.5 NEPA Conclusion

Aboveground BART Extension Alternative operations on at-grade track north of I-880 would result in a Moderate Impact at one ground-floor receiver and two second-story receivers. However, the increases are 2 dBA or less, which is not a readily perceived amount. Therefore, no mitigation is proposed.

Operation of emergency ventilation fans, piston relief shafts, traction power substations, and emergency backup generators could result in exceedances of Cities of San Jose and Santa Clara noise criteria at nearby residence, which is considered an adverse effect. Implementation of Mitigation Measure NV-A will reduce this impact to *no adverse effect*.

Train operations in the tunnel are predicted to result in exceedances of FTA groundborne noise criteria at many receptor locations. Implementation of Mitigation Measure NV-B would reduce this impact to *no adverse effect*.

All other noise and vibration effects would have *no effect* or *no adverse effect* under NEPA.

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4.13 Security and System Safety

4.13.1 Introduction

This section describes the affected environment and environmental consequences related to security and system safety from operations of the NEPA Alternatives. Information regarding BART security and system safety was obtained from the BART Police Department, *Response to VTA Information Request to BART Police Department* (2015) and Santa Clara County, *Santa Clara County Sheriff* (2015).

4.13.2 Environmental and Regulatory Setting

4.13.2.1 Environmental Setting

This section discusses the existing conditions related to security and system safety for the BART Extension, including the entire alignment, stations, maintenance yard, and system facilities, and vicinity.

Security refers to the prevention of unlawful acts resulting in harm to persons or damage to property. In a broader sense, it also implies freedom from threats or uncertainty about the likelihood of threatening acts. Crime and antisocial behavior are potential problems in any public environment.

System safety refers to the prevention of accidents to the riding public, employees, and others present at the BART Extension, which include aerial structures, stations, tracks, pedestrian walkways, parking lots, parking structures, bus transfer center, trains, and the trackway. Accidents may be caused by events such as fires, faulty equipment, faulty software, inadequate procedures or training, improper boarding and alighting of the rail and bus vehicles, and improper passenger drop-off and loading. Fire and life safety considerations involve preventive design criteria and those that provide protection for people and property during an emergency.

VTA and Other Transit Facilities

Security and safety measures are already in place to serve current transit operations and related pedestrian activities near existing transit facilities and bus stops in the area. VTA's Protective Services Division provides security for VTA bus and light rail service and facilities in coordination with the Santa Clara County Sheriff and Allied Barton Security Services LLC., a private security contractor under contract to VTA.

Security

BART Police Department

The BART Police Department has primary jurisdiction for responding to, and investigating, all criminal incidents at facilities owned or operated by the BART District. Members of the BART Police Department are authorized as peace officers with full police powers within the State of California under California Penal Code Section 830.33(a). The BART Police Department's sworn officers are supported by a professional staff consisting of community service officers, communications and 9-1-1 dispatchers, revenue protection guards, police administrative specialists, and civilian supervisors and managers. The department is currently staffed by 208 sworn and 91 civilian employees.

The BART Police Department is responsible for responding to, and emergency management of, security incidents. It maintains the BART District's System Security Plan and provides emergency management in accordance with the BART District's Emergency Plan.

In accordance with national best practices, the BART Police Department maintains an emergency response time standard of 5 minutes to in-progress crimes against persons or property. The department currently meets the emergency response time standard and the department's compliance with the standard is continuously measured and tracked on BART's district-wide Quarterly Performance Report.

Subject to final agreement between BART and VTA, VTA anticipates that BART would be responsible only for policing the BART Operating Corridor, which consists of BART trains, tunnels and operating rights-of-way, and the paid and free station areas. VTA would be responsible for providing police and security for all areas outside the Operating Corridor, although VTA may contract separately with BART to perform these services.

The BART Police Department maintains cooperative agreements with neighboring law enforcement agencies to establish jurisdictional responsibilities to protect life and property. Personnel from the BART Police Department handle various types of incidents from simple infractions to complex felonies, and surrounding police departments provide assistance to BART police personnel as needed. This assistance ranges from providing back-up to BART police officers at major incidents, to providing intelligence information on suspects in ongoing criminal investigations. The department also provides training to first responders in local agencies on specific hazards and problems associated with police operations in the BART operating environment. BART police personnel participate in regional Multi-Agency Mobile Field Force teams for the response to regional incidents requiring mutual aid.

The BART Police Department relies on criminal intelligence information provided by the local fusion center, the Northern California Regional Intelligence Center (NCRIC), and assists NCRIC by providing Suspicious Activity Report (SAR) data to the NCRIC database. The NCRIC then combines the SAR data into an intelligence picture that is shared within the region to spot criminal trends, including terrorist plots.

System Safety

BART has a separate System Safety Department, which is responsible for all operational safety related matters. The System Safety Department is primarily responsible for ensuring that operational safety procedures are developed and implemented throughout the BART District. The System Safety Department maintains the District's System Safety Program Plan, which states, "Safety is the major consideration in all [BART] operations including planning, design, construction, testing, and maintenance of the rail transit system." Implementation of the program includes the setting of safety goals and objectives, as well as hazard identification, reduction, and control throughout the system.

The BART System Safety Department is responsible for the monitoring of safety performance to identify any failures and deficiencies in the program, including accidents on BART property and within the BART operating system, and for implementing corrective measures. Where it is determined that unsafe conditions exist, the manager of the System Safety Department has the authority to interrupt or cease BART operations.

The System Safety Department also contributes to the development of BART's Emergency Plan, the authoritative procedure to be used during an emergency. 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 train fires, derailments, injuries or deaths on the right-of-way (ROW), ROW intrusions, earthquakes, high winds, flooding, gas leaks and toxic spills, bomb threats, explosions, and hostage situations. In all cases, the Emergency Plan identifies the responsibilities of the involved persons and authorities (e.g., train operators, BART Central Control, BART police, the responding fire departments) 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 procedures, and related factors.

In accordance with BART emergency procedures, local fire departments are the primary responders in the event of a fire within the BART system. Under an agreement with all fire departments for the existing system, the local fire department would assume overall command of any fire emergency scene, in cooperation with BART Central Control. Information on local fire departments within the corridor is provided in Section 4.4, *Community Services and Facilities*.

4.13.2.2 Regulatory Setting

The BART Extension would be required to comply with the following federal codes for tunnel and station ventilation, and for train and station circulation and exiting.

- National Fire Protection Association (NFPA) 130 Fixed Guideway Transit Systems.

- National Fire Protection Association (NFPA) 101 Life Safety Code.
- U.S. Department of Transportation Subway Environmental Design Handbook, Volume 1.
- 28 Code of Federal Regulation (CFR) Part 36, Americans with Disabilities Act, Standards for Accessible Design.

4.13.3 Methodology

The BART Extension would have an *adverse effect* on public safety if it would increase risk of accidents on a regional scale. Such an effect would increase the risk of criminal or terrorist acts on a regional scale.

4.13.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA using the criteria identified in Section 4.13.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.13.4.1 No Build Alternative

The No Build Alternative consists of the existing transit, highway, roadway, bicycle, and pedestrian facilities, in addition to planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). These projects would likely result in the potential for security and safety incidents typically associated with transit, highway, roadway, bicycle, and pedestrian facilities. Typically, a system safety plan and emergency response plan would be developed for each project, and appropriate security and safety systems would be installed in facilities to minimize the potential for harm to persons and damage to property. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect security and system safety, which would include an analysis of mitigation measures to mitigate potential impacts on security and system safety.

4.13.4.2 BART Extension Alternative

The BART Extension Alternative carries the potential for security and safety incidents in the trains, along the rail alignment, and near and within rail stations and entrances, parking lots and structures, and amenities located at street level. Also of concern would be passenger safety onboard trains.

Security

A BART Police Station at the Berryessa Station is being constructed by VTA as part of the Phase I Project and will serve the Phase II Project as well. BART would conduct a needs assessment for any additional staffing and equipment that may be required for the BART Extension. The level of additional need would be partially based on the future negotiations with the BART Police Department regarding their area of responsibility along the extension. Currently, VTA anticipates that the BART Police Department would have primary responsibility within the Operating Corridor, generally defined as consisting of onboard trains, tunnels and operating rights-of-way, and within the paid and free area of stations out to the “dripline” of the stations, subject to final agreement between BART and VTA.

As discussed in Section 4.4, *Community Facilities and Public Services,* VTA would coordinate with the Santa Clara County Sheriff’s Office (SCCSO) to police areas outside the Operating Corridor. VTA and BART would also expand existing mutual-aid agreements with local police providers in the cities of San Jose and Santa Clara.

Fencing would be installed along the at-grade and depressed BART alignments and at tunnel portals. Fencing would separate the BART tracks from the Union Pacific Rail Road (UPRR) tracks to prevent passengers from crossing tracks after disembarking from a train. BART stations and parking areas would be lighted and have designated walkways for pedestrians. Passengers disembarking and walking to their destinations would be clearly directed to use sidewalks and crosswalks. Station platforms, fare gates, and elevators would be monitored by CCTV. BART would ensure that there is adequate police presence, as well as surveillance cameras and emergency call boxes, at all BART stations and parking facilities.

Application of the design requirements discussed in this section would reduce safety and security risks associated with the BART Extension. Implementation of the national, state, and district codes, regulations, and guidelines listed in Section 4.13.2.2, *Regulatory Setting* are designed to provide a safe and secure environment. The BART Police Department, in coordination with local jurisdictions, would implement BART’s System Security Plan and Emergency Plan for their areas of responsibility. BART’s police force staff would be expanded to cover the extension. The existing agreement between VTA and SCCSO would also be expanded to include services for the BART Extension not covered by BART’s police force and safety department staff. In addition, VTA and BART would expand existing mutual aid agreements with the Cities of San Jose and Santa Clara.

System Safety

The BART Extension will follow applicable codes and standards including the California Building Code and BART Facilities Standards Design Criteria. The BART Facilities Standards Design Criteria specify design requirements for all new BART projects, and have been developed to provide a high level of security and safety in a cost-effective manner. A Safety and Security Certification Program (SSCP) has been developed for the BART Extension to ensure that it is designed in compliance with the BART Facilities Standards Design Criteria and applicable safety and security design codes. The SSCP requires that compliance be documented and applicable project features and design characteristics itemized. Because the Single-Bore Option tunnel and stations are deeper that the Twin-Bore

Option, more extensive measures will be required to ensure compliance with applicable codes and standards.

BART Facilities Standards Design Criteria address the train control system, operating procedures, training of operating and maintenance personnel, and emergency responses. Fire sprinklers, stand pipes, smoke detectors, and alarm systems would be placed throughout the new stations in accordance with fire department jurisdiction requirements, standards set forth by the National Fire Protection Association, California Building and Fire Codes, and BART criteria. BART would coordinate and train its emergency response personnel with fire departments in San Jose and Santa Clara to assure response readiness in the event of an emergency. The provisions of BART's existing System Safety Program Plan require active participation by the BART System Safety Department in the design of system extensions. VTA, working with a BART safety engineer and local fire department personnel, would review contract drawings and specifications for compliance with the previously mentioned codes and criteria. This process is particularly critical for the tunnel segment emergency ventilation structures and emergency egress and ingress. Established emergency station and tunnel egress criteria would be applied to the BART Extension. The System Safety Department would also monitor engineering testing and conduct safety technical audits of all new facilities and equipment to ensure that they meet applicable safety standards prior to passenger operation and that they continue to meet these standards while in operation.

As a part of the design review process, VTA and BART safety engineers would review the security fencing design along the at-grade alignment train storage areas, and transitions from subways to at-grade alignments. Similarly, VTA and BART safety engineers would review the design of station entrances, exits, platforms, and concourse areas for pedestrian safety. The design of parking lots and loading zones would also be reviewed for pedestrian and vehicular safety and for accessibility by emergency response vehicles. For security purposes, BART Facilities Standards Design Criteria would be implemented as applicable for the BART Extension, including closed-circuit television (CCTV) in stations and along the trackway (at tunnel portals), and access control devices.

In accordance with CPUC General Order 164-D and the BART System Safety Program Plan, VTA would certify the safety and security of the BART Extension to ensure that the design, construction, and installation of equipment are systematically reviewed for compliance with safety and security requirements and BART will validate safety operational readiness of the system prior to the commencement of revenue service.

Given the above, the BART Extension would have *no adverse effect* on security and system safety, and no mitigation measures are required.

4.13.5 NEPA Conclusion

The impact on public safety from the BART Extension Alternative would be *no adverse effect*, and no mitigation measures are required.

4.14 Socioeconomics

4.14.1 Introduction

This section describes the affected environment and environmental consequences related to socioeconomics from operation of the NEPA Alternatives. Sources of information used in this section are as follows:

- *American Community Survey* (U.S. Census Bureau 2009–2014).
- *American Fact Finder* (U.S. Census Bureau 2010).
- *Bay Area Plan Projections 2013* (Association of Bay Area Governments 2013).
- *Unemployment Rate and Labor Force* (California Employment Development Department 2014).
- *The Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *The Envision San Jose 2040 General Plan EIR* (City of San Jose 2011b).
- *City of Santa Clara 2010–2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010–2035 General Plan Integrated Final EIR* (City of Santa Clara 2010b).
- *Transportation 2035* (Metropolitan Transportation Commission 2009).
- *VTA's BART Silicon Valley—Phase II Extension Project Socioeconomics and Environmental Justice Technical Memorandum* (Circlepoint 2016).

4.14.2 Environmental and Regulatory Setting

4.14.2.1 Environmental Setting

This section describes the existing socioeconomic conditions within the study area. The study area is defined as the block groups within a 0.5-mile buffer of the alignment. The following analysis isolates the study area to represent a subset of the Cities of San Jose and Santa Clara population that would be closest to the BART Extension and most sensitive to localized effects. San Jose and Santa Clara statistics represent a baseline for demographics on a regional scale and a point of comparison for the study area demographic findings. This analysis compares if and how the study area demographics deviate from the regional demographics (i.e., San Jose and Santa Clara).

Population Trends

Table 4.14-1 shows the San Jose and Santa Clara populations. San Jose is the largest city within Santa Clara County with over 945,942 people in 2010. The Association of Bay Area

Governments (ABAG) projects the population to grow to approximately 1,334,100 people by 2040, a 41 percent increase. Santa Clara's population was 116,468 people in 2010. ABAG projections show that Santa Clara will grow to approximately 156,500 people over the next several decades, a 34 percent increase.

The Cities of San Jose and Santa Clara have grown over the past 40 years, largely owing to an increase in job growth associated with the high-technology sector. Accessibility to public transit is a major factor in growth trends moving forward. Caltrain service between San Francisco and San Jose, Amtrak Capital Corridor, and VTA light rail network provide access to San Jose and Santa Clara, which has contributed to development trends and population growth as well.

Table 4.14-1: Population Change 2010–2040

Geographic Area	Population		
	2010	**2040**	**Percent Change**
San Jose	945,942	1,334,100	41%
Santa Clara	116,468	156,500	34%
Source: ABAG 2013.			

Housing and Development

The U.S. Census Bureau defines a household as a group of people, related or not, living together in a dwelling unit. Table 4.14-2 shows the average household sizes of San Jose and Santa Clara. The average household size is approximately 2.9 people per household within the Cities of San Jose and Santa Clara.

Table 4.14-2: Average Household Size

Area	People Per Household
San Jose	3.1
Santa Clara	2.7
Average	*2.9*
Source: American Community Survey (ACS) data (U.S. Census 2010–2014).	

The San Jose General Plan indicates it is no longer feasible for the City to accommodate the increasing population through outward expansion. Such development would have negative economic implications for San Jose as a result of diminished municipal service levels. However, cultural values in San Jose are shifting to demonstrate a growing interest in infill and urban environments. The City expects to attract a younger age group between 20 and 34 who are seeking a more urban lifestyle and who want to live closer to their workplace.

Santa Clara expects to see new high-density housing opportunities as well. Such development encourages affordable and accessible homes for the community and assists in maintaining existing character and integrity of established neighborhoods. Much of the areas surrounding the existing Santa Clara Caltrain Station and other transit corridors are considered underutilized and are therefore target focus areas for infill redevelopment.

Infill development trends within established growth and focus areas of San Jose and Santa Clara are becoming more common as local goals and policies focus on opportunities to better utilize existing development (See Section 4.14.2.2, *Regulatory Setting*). Table 4.14-3 summarizes housing growth projections within the Cities of San Jose and Santa Clara. ABAG projects that the number of households in San Jose will increase by 43 percent by 2040. This matches the anticipated San Jose population increase of 41 percent by 2040 identified in Table 4.14-3. Santa Clara also projects housing growth to increase consistent with population, at 33 and 34 percent, respectively—a slightly lower percent change than San Jose.

Table 4.14-3: 2010–2040 Household Growth

Geographic Area	Households		
	2010	2040	Percent Change
San Jose	301,366	432,030	43%
Santa Clara	43,021	57,260	33%
Source: ABAG 2013			

Jobs and Employment

Table 4.14-4 provides a breakdown of employment industries by sector. Managerial and professional sector jobs are the largest percentage of jobs for San Jose, Santa Clara, and the study area. Such professions include financial, computer, engineering, sciences, education, community service, healthcare, and technical occupations. Approximately 37 percent of the study area works in the management and professional sector, which is lower than the Santa Clara percentage (51 percent) and the San Jose percentage (43 percent). Additionally, the study area has a higher percentage of service-related jobs (19 percent) than the respective City percentages. Service sector jobs include food preparation, law enforcement, and maintenance occupations.

As discussed in Section 4.14.2.2, *Regulatory Setting*, local goals and policies encourage development and employment opportunities in particular areas. The Cities of San Jose and Santa Clara aim to spur economic and job growth through strategic land use planning that increases the job-to-employed ratio.

Table 4.14-4: Employment by Sector

Sector	San Jose		Santa Clara		Study Area	
	Persons	Percent	Persons	Percent	Persons	Percent
Employed civilian population 16 years and over	*512,413*	*100%*	*55,528*	*100%*	*43,258*	*100%*
Management, professional	221,402	43%	28,498	51%	16,322	37%
Service	92,042	18%	5,142	9%	8535	19%
Sales and office	108,264	21%	12,862	23%	9532	22%
Natural resource, construction, maintenance	37,558	7%	3,127	6%	4415	10%
Production, transportation, and material moving	53,147	10%	5,899	11%	4454	10%
Source: ACS data (U.S. Census 2010–2014).						

Table 4.14-5 outlines projected employment growth within San Jose and Santa Clara from 2010 to 2040. San Jose is projected to have a 39 percent increase in employment; Santa Clara is projected to have a 29 percent increase in employment.

Table 4.14-5: 2010–2014 Employment Growth

Geographic Area	Employment (Jobs)		
	2010	2040	Percent Change
San Jose	377,140	524,510	39%
Santa Clara	112,890	146,180	29%

Table 4.14-6 summarizes the employment and unemployment rates for San Jose, Santa Clara, and the study area from the 2014 American Community Survey (ACS) data (U.S. Census 2010–2014). Approximately 12 percent of the study area is unemployed, which is higher than the unemployment rates in San Jose and Santa Clara (6 and 5 percent, respectively).

Table 4.14-6: Employment/Unemployment Rates

Area	Total Labor Force Population	Employed		Unemployed	
		Persons	Percent	Persons	Percent
San Jose	530,500	499,700	94%	30,800	6%
Santa Clara	65,800	62,700	95%	3,100	5%
Study Area	54,646	47,969	88%	6,677	12%
Sources: California Employment Development Department 2014; ACS data (U.S. Census 2010–2014					

Income

Table 4.14-7 summarizes the median household income for San Jose and Santa Clara from the 2014 ACS estimates (U.S. Census 2010–2014). The median household income is also defined for the study area. The study area median household income is $61,063, which is approximately $33,000 less than the Santa Clara overall average. The study area median household income is approximately $23,000 less than the San Jose overall average.

Table 4.14-7: Median Household Income

Geographic Area	Median Household Income
San Jose	$83,787
Santa Clara	$93,840
Study Area	$61,063
Source: ACS data (U.S. Census 2010–2014	

Table 4.14-8 summarizes per capita income levels from the 2014 ACS estimates. Individuals within the study area make roughly $5,500 per year less than the overall average in San Jose, and $11,800 per year less than overall average in Santa Clara.

Table 4.14-8: Per Capita Income

Area	Per Capita Income
San Jose	$34,992
Santa Clara	$41,222
Study Area	$29,439
Source: ACS data (U.S. Census 2010–2014)	

4.14.2.2 Regulatory Setting

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

The Uniform and Real Property Acquisition Policies Act provides important protections and assistance for people affected by federally funded projects. The act was passed by Congress to ensure that people whose real property is acquired, or who require relocation as a result of projects receiving federal funds, will be treated fairly and equitably and will receive assistance in moving from the property they occupy. Direct property acquisition under a project requires providing for relocation assistance services to affected homeowners, renters, and tenant businesses. In addition, residential and commercial property owners should be paid fair market value of any property acquired as a result of a project.

Title VI of the Civil Rights Act of 1964

The Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal funding. Direct property acquisition as part of the BART Extension Alternative would require implementation of this act along with the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

San Jose

The majority of San Jose’s growth is planned for specifically identified Growth Areas within the City limits. The City supports infill growth to maximize mixed-use development and create new opportunities for jobs. The City promotes growth and development trends that maintain social equity by using community-based planning mechanisms. Focused Growth Areas would strategically place high-density housing options in locations with access to public transportation and are within proximity to retail and other services in the surrounding neighborhoods. Growth Areas are planned to encourage pedestrian and bicycle activity with the hope of fostering community identity, while protecting the quality of existing neighborhood character. Portions of the corridor are located within the Urban Village Plan Area, Downtown Plan Area, and the Transit Employment Center within the Urban Growth Boundary line. Accordingly, the City selected these areas for new growth, fiscal, economic, and transportation growth.

The City supports plans to expand BART service and new stations to San Jose in the *City of San Jose 2040 General Plan* (SJGP). The SJGP indicates that new station service would support new development and employment in concentrated areas surrounding such station locations. San Jose includes goals and policies in the SJGP to support community and economic growth as shown Table 4.14-9.

Table 4.14-9: San Jose General Plan Policies

Number	Policy
IE-1.3	As part of the intensification of commercial, Village, Industrial Park and Employment Center job Growth Areas, create complete, mixed-employment areas that include business support uses, public and private amenities, child care, restaurants and retail goods and services that serve employees of these businesses and nearby businesses.
IE-1.4	Manage land uses to enhance employment lands to improve the balance between jobs and workers residing in San José. Strive to achieve a minimum ratio of 1.3 jobs/employed resident to attain fiscal sustainability for the City.
IE-1.5	Promote the intensification of employment activities on sites in close proximity to transit facilities and other existing infrastructure, in particular within the Downtown, North San José, the Berryessa International Business Park and Edenvale.
IE-1.6	Plan land uses, infrastructure development, and other initiatives to maximize utilization of the Mineta San José International Airport, existing and planned transit systems including fixed rail (e.g., High-Speed Rail, BART and Caltrain), Light-Rail and Bus Rapid Transit facilities, and the roadway network. Consistent with other General Plan policies, promote development potential proximate to these transit system investments compatible with their full utilization. Encourage public transit providers to serve employment areas.
IE-1.7	Advance the Diridon Station Area as a world-class transit hub and key transportation center for Northern California.
IE-1.8	Measure and report the number of jobs created in identified Growth Areas during the City Council's periodic review of this General Plan.
IE-1.9	Invest in strategic infrastructure improvements, as appropriate, in order to encourage private investment, reduce new construction costs, increase business efficiency, and in order to support business retention and growth, stimulate economic activity, and employ people.
IE-1.13	Achieve goals related to Quality Neighborhoods, including diverse housing options, a walkable/bikable public street and trail network and compact, mixed-use development where infrastructure exists to distinguish San José as a livable and attractive city, to promote interaction among community members, and to attract talented workers to the City.
IE-4.5	Continue implementation of improvements to Mineta San José International airport facilities pursuant to the Airport Master Plan to maintain and expand regional, trans-continental, and international Airport operations.
IE-4.7	Support Valley Transportation Authority efforts to extend BART service to Downtown San José and to Diridon Station
IE-6.3	Attract job opportunities accessible to all of San José's residents, particularly residents in low-income neighborhoods.
LU-1.1	Foster development patterns that will achieve a complete community in San José, particularly with respect to increasing jobs and economic development and increasing the City's jobs-to-employed resident ratio while recognizing the importance of housing and a resident workforce.
LU-1.3	Within Identified Growth Areas, where consolidation of parcels is necessary to achieve viable designated land uses or other objectives of the Envision General Plan, limit residential development of individual parcels that do not conform to approved Village Plans or further other plan objectives.

Number	Policy
LU-2.1	Provide significant job and housing growth capacity within strategically identified "Growth Areas" in order to maximize use of existing or planned infrastructure (including fixed transit facilities), minimize the environmental impacts of new development, provide for more efficient delivery of City services, and foster the development of more vibrant, walkable urban settings.
LU-2.2	Downtown – The City's Downtown Strategy plans for ambitious job and housing growth capacity in the Downtown area to reinforce its role as San Jose's civic, cultural and symbolic center and to support key infrastructure investments, including the planned BART and High-Speed Rail systems. Employment Lands – The Plan supports significant intensification of employment activity within each of the City's major employment districts (North San José, Monterey Corridor, Edenvale, Berryessa/International Business Park, Mabury, East Gish and Senter Road and North Coyote Valley). Within the North San José, Berryessa / International Business Park and Old Edenvale areas, a centralized sub-area with strong transit access has been designated as an Employment Center to support mid-rise or high-rise employment development. The Employment Center in the northeast corner of the Berryessa / International Business Park area is also classified as a BART station area due to its proximity to the planned Milpitas BART station and existing Capitol Avenue Light Rail stations. Urban Villages: BART/Caltrain Station Areas – To maximize utilization of the Caltrain and BART systems, support regional commuting and foster the City's growth as a regional job center, significant new job growth capacity is planned for the each of the BART / Caltrain Urban Villages. Significant job and housing growth capacity is planned for the Berrryessa BART station area in order to support intensification of the station area as a regional employment destination and to achieve a level of density consistent with that planned for other BART and Light Rail station areas.
TR-1.1	Accommodate and encourage use of non-automobile transportation modes to achieve San José's mobility goals and reduce vehicle trip generation and vehicle miles traveled (VMT).
TR-1.2	Update the City's engineering standards for public and private streets based on the new street typologies that incorporate the concept of "complete streets."
TR-3.7	Regularly collaborate with BART to coordinate planning efforts for the proposed Silicon Valley Rapid Transit Corridor Project (SVRTC Project) to San José/Santa Clara with appropriate land use designations and transportation connections.

Santa Clara

Santa Clara encourages new development to meet the needs of projected population growth and to ensure new development is accommodated and supported with the appropriate infrastructure and economic services. Such growth is focused to particular areas, as discussed in the *City of Santa Clara 2010-2035 General Plan* (SCGP). The BART Extension would be within the Santa Clara Station Focus Area. Santa Clara projects future development in this area to include extended BART service. The Santa Clara Station Area is currently served by Caltrain, Altamont Commuter Express, and VTA bus lines and is consistent with designated land uses and SCGP policies. The Santa Clara Station Focus Area would provide opportunities for new development of housing, offices, retail, hotels, restaurants, and parks within its geographic area with an assumed development of 1,490,000 square feet for commercial development, 550,000 square feet for office development, and 1,663 additional dwelling units. Santa Clara includes goals and policies in the SCGP to support community and economic growth as shown Table 4.14-10.

Table 4.14-10: Santa Clara General Plan Policies

Number	Policy
5.8-3-P1	Support a coordinated regional transit system that circles the South Bay and the Peninsula, including existing and planned Bay Area Rapid Transit, Amtrak, Altamont Commuter Express, Caltrain, Valley Transportation Authority and High Speed Rail facilities.
5.8.3-P3	Support transit priority for designated Bus Rapid Transit, or similar transit services, through traffic signal priority, bus queue jump lanes, exclusive transit lanes and other appropriate techniques.
5.8.3-P4	Encourage the continued efforts by other agencies to provide transit services that are accessible and meet the needs of all segments of the population, including youth, seniors, persons with disabilities and low-income households
5.8.3-P5	Facilitate implementation of the transit system defined in the transit network classifications and illustrated on the Transit Network Diagram in Figure 5.7-2.
5.8-3-P6	Encourage additional multimodal transit centers and stops in order to provide convenient access to commuter rail, buses, shuttle and taxi services.
5.8.3-P7	Provide transit stops at safe, efficient and convenient locations to maximize ridership, including near employment centers, higher-density residential developments and Downtown.
5.8.3-P9	Require new development to incorporate reduced onsite parking and provide enhanced amenities, such as pedestrian links, benches and lighting, in order to encourage transit use and increase access to transit services.
5.8.4-P4	Facilitate implementation of the bicycle and pedestrian classifications as illustrated on the Bicycle and Pedestrian Network Diagram in Figure 5.7-3.
5.3.1-P5	Implement a range of development densities and intensities within General Plan land use classification requirements to provide diversity, use land efficiently and meet population and employment growth.
5.4.3-G3	A link between the Santa Clara Station and a variety of transit options that offer viable transportation alternatives throughout the City and the region.

4.14.3 Methodology

An *adverse effect* would occur if the BART Extension Alternative would influence socioeconomic trends (e.g., population, housing, employment, income) to be inconsistent with existing local general plans.

4.14.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria noted in Section 4.14.3, *Methodology* (i.e., context and intensity). This section also identifies measures to avoid, minimize, or mitigate impacts.

4.14.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). These projects would likely result in effects on socioeconomics typically associated with transit, highway, bicycle, and pedestrian facilities and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect socioeconomics, which would include an analysis of mitigation measures to mitigate potential impacts on socioeconomics. With the No Build Alternative, land uses along the alignment would be built out in accordance with the Cities of San Jose and Santa Clara General Plans. This would include residential, commercial, and industrial projects.

4.14.4.2 BART Extension Alternative

Population

Implementation of the BART Extension Alternative would expand BART service to the greater San Jose and Santa Clara communities, thereby increasing connectivity in the regional San Francisco Bay Area. Accordingly, implementation of the BART Extension Alternative would accommodate growth on a regional level.

By increasing connectivity and access to BART service, the BART Extension would indirectly result in the development and intensification of land uses in cities surrounding the study area. However, indirect growth potentially resulting from the BART Extension is already planned for and forecasted in land use regulating documents (i.e., SJGP and SCGP) and is discussed in Section 4.14.2.2, *Regulatory Setting*. Such infill-type development intensification would most likely occur in areas already planned for growth by the surrounding cities. Therefore, *no adverse impacts* related to population would occur.

Employment

As further described below, above-ground BART Extension features would require displacement and relocation of some businesses, which would potentially result in some job loss; however, VTA will work with the business owners to relocate businesses to eliminate long-term impacts on employees or owners. The BART Extension Alternative would generate some direct employment associated with operation and maintenance of BART service. Once in operation, the BART Extension would also indirectly facilitate residential and employment growth planned for the regional area, particularly around station areas, consistent with the general plans. Expanded BART service would improve transit reliability and services throughout the corridor and provide new stations that would improve regional access to downtown employment opportunities. As indicated, approximately 12 percent of the study area population is unemployed. Thus, such opportunities would be a beneficial impact, particularly in the immediate areas surrounding the alignment. Additionally, enhanced access to public transit would likely increase the ability for residents to travel to other cities in the Bay Area for other available employment opportunities. Therefore, *no adverse impacts* related to employment would occur.

Displacements and Acquisitions

The BART Extension would require property acquisitions and resultant displacements from acquiring the underlying property in whole or in part. Property acquisition and resultant displacements would occur prior to the start of construction. The types of displacements associated with the BART Extension are described below. Table 4.14-11 shows the number and type of displacement that would occur from implementing the BART Extension. *VTA's BART Silicon Valley—Phase II Extension Project Socioeconomics and Environmental Justice Technical Memorandum* (Circlepoint 2016) includes acquisitions by type and assessor parcel number (APN).

Table 4.14-11: BART Extension Alternative – Summary of Displacements

Location	Residences	Businesses	RV Storage Spaces	Advertising Signs	Cell Tower
CSAs near East Tunnel Portal	0	7	250	2	0
Alum Rock/28th Street Station	0	4	0	2	0
13th Street Ventilation Structure	0	1	0	2	0
Downtown San Jose Station	-	-	-	-	-
East Option	0	10	0	0	0
West Option	0	6	0	0	0
Diridon Station	-	-	-	-	-
South Option	1	3	0	0	0
North Option	1	3	0	0	0
Stockton Ave Ventilation Structure[a]	0	1-8	0	0	0
Santa Clara Maintenance Facility	0	0	0	0	1
Santa Clara Station	0	1	0	0	0
Range of Total Displacements	**1**	**23-34**	**250**	**6**	**1**

[a] The Stockton Avenue ventilation structure includes displacements presented as a range because three properties are being considered for the four optional locations. The final decision will depend on the environmental analysis conclusions and property negotiations and will be made during Final Design.

Approximately 1 residence, 23 to 34 businesses, 250 recreational vehicle (RV) storage tenants, 6 advertising signs, and one cell tower (relocated within the same parcel to avoid conflict with the alignment) would be displaced by the BART Extension. The estimate of permanent displacements herein is based on property utilization in the winter of 2016. Estimates presented here are based on Appendix B, *Project Plans and Profiles*, and Appendix C, *BART Station Site Plans*.

Additionally, tunnel easements would be obtained from private properties, but would not require property acquisitions or other associated surface impacts because they would be entirely underground. Approximately 110 tunnel easements under private properties and

26 tunnel easements under public rights-of-way (ROW) (City streets, highways, Caltrain, City parks, and waterways) would be required to construct the tunnel alignment. These tunnel easements would not cause the displacement of any businesses or residences.

VTA will adhere to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act) and FTA guidelines in acquiring real estate and relocating occupants, in addition to applicable state laws and regulations. During final design, the ROW drawings, which will identify all permanent and temporary property acquisitions for the BART Extension, will be finalized. VTA will prepare a Real Estate Acquisition Management Plan (RAMP) and Relocation Assistance Plan (RAP), as required by the FTA, based on those parcels identified in the final ROW plans. Therefore, *no adverse socioeconomic effects* related to displacement and relocation would occur.

Connection to Phase I/East Tunnel Portal

Several construction staging areas would be required to construct the BART Extension and are considered to be temporary property acquisitions. Although use of these properties would only be temporary during construction, all existing businesses would be relocated, and all existing structures would be demolished and removed to allow for the use of these sites for storage of construction equipment and materials. Acquisition of these staging areas would displace 6 industrial businesses, 1 non-profit business, and approximately 250 RV storage tenant spaces. These RV spaces are used for parking and storage, not for residential purposes. The businesses that would be displaced in this area are mostly industrial or commercial warehouse types of establishments within an entirely industrial area. These establishments may be an employment source for the local and regional community; thus, relocation would have a temporary effect on employees during the transition. VTA will work with the business owners to relocate businesses with no anticipated long-term impacts on employees or owners. No residential properties would be acquired in this segment of the alignment.

Tunnel Easements

Tunnel easements would be obtained from approximately 40 private properties for the tunnel alignment from the East Tunnel Portal to US 101. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Alum Rock/28th Street Station

Construction of Alum Rock/28th Street Station would cause the displacement of four light industrial businesses and one billboard structure with double-facing advertising signs. The businesses that would be displaced in this area are mostly industrial warehouse types of establishments within an entirely industrial area. These establishments may be an employment source for the local and regional community; thus, relocation would have a temporary effect on employees during the transition. The BART Extension would not displace the Five Wounds National Portuguese Church and associated facilities or the Cristo Rey San Jose Jesuit High School.

Tunnel Easements

Tunnel easements would be obtained from an estimated 12 private properties for the tunnel alignment from 28th to 24th Streets. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Tunnel Alignment near Coyote Creek

Construction of the 13th Street Ventilation Structure would cause the displacement of one medical office business and one billboard structure with double-facing advertising signs. This business is not likely to be a large source of employment within the local community. No residential properties would be acquired in this segment of the alignment.

Tunnel Easements

Near Coyote Creek, tunnel easements would be obtained from an estimated 13 private properties between 22nd and 12th Streets. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Downtown San Jose Station

Downtown San Jose Station East Option

Construction of the East Option would displace nine businesses. The businesses include one discount grocery store, one hair salon, two bars, one bakery, one check cashing store, three restaurants, and one gas station. These establishments may be an employment source for the local and regional community; thus relocation would have a temporary effect on employees during the transition. Additionally, residents and employees that work in the downtown area access these businesses regularly for errands or during the work day. Community members and consumers would be able to access similar types of business establishments that offer comparable services within the nearby area. No residential properties would be acquired for the Downtown San Jose Station East Option.

Downtown San Jose Station West Option

Construction of the Downtown San Jose Station West Option would displace six businesses. These businesses include two bars, one bakery, one check-cashing store, one restaurant, and one gas station. The establishments may be an employment source for the local and regional community; thus relocation would have a temporary effect on employees during the transition. Additionally, residents and employees who work in the downtown area access these businesses regularly for errands or during the work day. Community members and consumers would be able to access similar types of business establishments that offer comparable services within the nearby area. No residential properties would be acquired for the Downtown San Jose Station West Option.

Diridon Station

Diridon Station South and North Options

The Diridon Station South and North Options would cause the same displacements: two industrial businesses and one residence. These establishments may be an employment source for the local and regional community; thus relocation would have a temporary effect on employees during the transition. VTA will work with the business owners to relocate businesses with no anticipated long-term impacts on employees or owners.

There would be one displacement of a single-family residence on South Autumn Street; however, the property owner would be compensated in compliance with all the requirements of the Uniform Act and state regulations—Relocation Assistance and Real Property Acquisition Guidelines (Title 25, California Administrative Code Ch. 6, Art 1, Section 6000 et seq.). The residence is surrounded by industrial and commercial uses; only one other residence is located on Autumn Street between Santa Clara and San Fernando Streets. The removal of this residence would not cause or contribute to the physical division of a community.

Tunnel Easements

Tunnel easements would be obtained for an estimated 9 private properties for the alignment from Almaden Boulevard to Diridon Station and from approximately 33 private properties for the alignment from Diridon Station to just north of Pershing Avenue. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Continuation of Tunnel Alignment

Of the three alternate locations for a mid-tunnel ventilation facility between Diridon Station and Santa Clara Station, the most southern alternate location would cause the displacement of one industrial business; the second alternate location would cause the displacement of eight industrial businesses; the third and most northern alternate location would cause the displacement of two industrial businesses.

The businesses that would be displaced in this area are mostly industrial warehouse establishments. As a result, local residents of the community likely do not visit these establishments on a regular daily basis. However, these establishments may be an employment source for the local and regional community; thus, relocation would have a temporary effect on employees during the transition.

Tunnel Easements

An estimated five tunnel easements would be obtained from private properties between Emory Street and the Newhall Maintenance Facility. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

End-of-the-Line Newhall Maintenance Facility

The Newhall Maintenance Facility would be constructed on the former UPRR Newhall Yard. No residential or business displacements would be required; however, one cellular tower located just south of De La Cruz Boulevard would need to be relocated within the same parcel to avoid conflict with the alignment. The property is owned by the City of Santa Clara and leased to a private company. Relocation of the cellular tower would require a building permit from the City of Santa Clara and new lease agreement.

Santa Clara Station

Construction of Santa Clara Station may cause the displacement of a business. No residences would be affected.

Relocation Programs/Requirements

All displacement and relocation activities would be conducted in accordance with the Uniform Act, which ensures the fair and equitable treatment of persons and businesses whose real property is acquired or who are displaced as a result of a federal or federally assisted project. Government-wide regulations provide procedural and other requirements (appraisals, payment of fair market value, notice to owners, etc.) in the acquisition of real property and provide for relocation payments and advisory assistance in the relocation of persons and businesses.

VTA's Relocation Program, which complies with federal relocation requirements, provides assistance to affected residence and business owners. This assistance, which varies on a case-by-case basis, can be both financial (e.g., moving costs, rent subsidies, relocation costs, personal property losses, reestablishment expenses, etc.) and technical (e.g., providing information regarding suitable replacement sites, providing referrals, assisting with lease negotiations, assisting with moving logistics, etc.). Business owners also have the option of receiving a fixed payment in lieu of the payments for actual moving and related expenses and actual reasonable reestablishment expenses.

When acquisition occurs, properties would be appraised at fair market value and offers would be based on just compensation. For relocation, the availability of alternate sites would vary; however, the economy is characterized by a comfortable vacancy rate in the BART Extension area, which could easily accommodate the need for relocation space in a similar price range.

During final design and engineering, VTA may determine that some parcels can be temporarily leased prior to being needed for construction. Also, the number of displacements, property acquisitions, and related relocations and easements required could change during final design and engineering, as could the amount of land required from individual parcels.

Federal and state laws require consistent and fair treatment of owners of property to be acquired, including just compensation for their property. These laws also require uniform and equitable treatment of displaced persons or businesses. The provisions of VTA's Relocation Program will mitigate any adverse effects of the business and residential displacements.

4.14.5 NEPA Conclusion

Most of the property acquisitions required for the BART Extension Alternative would displace industrial and commercial types of businesses. VTA will work with the business owners to relocate businesses to minimize long-term impacts on employees and owners. VTA will prepare a RAMP and RAP, as required by FTA, addressing all of the parcels identified in the final ROW plans. VTA will adhere to the Uniform Act and FTA guidelines in acquiring real estate and relocating occupants, in addition to applicable state laws and regulations.

The final property acquisitions required to construct the BART Extension Alternative may change (i.e., increase or decrease in size, change type, and/or change from permanent to temporary, etc.) during final design and construction. Also, during final design and construction, additional easements may be identified such as temporary construction easements, temporary access easements, and long-term maintenance and access easements. It is the intent of this and previous environmental documents to disclose the potential environmental impacts of acquisitions known at the time the environmental document is prepared while recognizing that some adjustments may be necessary based on final design and/or working with individual property owners during the acquisition process or during construction. Should additional modifications beyond the scope of this environmental document trigger the need for additional environmental review, the necessary additional environmental analyses will be prepared.

Implementation of the BART Extension Alternative would accommodate growth on a regional level. By increasing connectivity and access to BART service, the BART Extension Alternative would indirectly result in the development and intensification of land uses in cities surrounding the study area. However, such population is anticipated in San Jose and Santa Clara land use planning documents. Once in operation, the BART Extension Alternative would also indirectly facilitate residential and employment growth planned for the regional area, particularly around station areas, consistent with the general plans. As a result, the BART Extension Alternative would have *no adverse effect* on socioeconomics.

4.15 Utilities

4.15.1 Introduction

This section describes the affected environment and environmental consequences related to water supply, wastewater treatment, solid waste disposal, and stormwater facilities from operation of the NEPA Alternatives. Construction impacts are discussed in Chapter 5, Section 5.5.16, *Utilities*. For information regarding new electrical facilities and communication equipment for the BART Extension Alternative, refer to Chapter 2, *Alternatives*.

The following sources of information were used to prepare the analysis in this section.

- *2010 Urban Water Management Plan* (San Jose Water Company 2011).
- *2010 Urban Water Management Plan* (City of Santa Clara Water and Sewer Utility 2011).
- *City of San Jose Storm Sewer and Sanitary Sewer Annual Reports* (City of San Jose 2013)
- *City of Santa Clara 2010–2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010–2035 General Plan EIR* (City of Santa Clara 2010b).
- *Envision San Jose 2040 General Plan EIR* (City of San Jose 2011).
- *Facility/Site Summary Details: Newby Island Sanitary Landfill (43-AN-003)* (California Department of Resources Recycling and Recovery 2015).
- *Industrial Sector: Estimated Solid Waste Generation Rates* (California Department of Resources Recycling and Recovery 2013).
- Personal Communication with representatives of the Newby Island Landfill.
- *Newby Island Sanitary Landfill and The Recyclery Rezoning Project* (City of San Jose 2009).
- *Sanitary Sewer Master Plan Initial Study/Addendum to General Plan EIR* (City of San Jose 2012).
- *VTA's BART Silicon Valley Phase II Extension Water Supply Assessment* (San Jose Water Company 2015).
- *BART Santa Clara Station and Joint Development [Water Supply Assessment]* (City of Santa Clara Water and Sewer Utility 2016).

4.15.2 Environmental and Regulatory Setting

4.15.2.1 Environmental Setting

Water Supply

San Jose

Water to the San Jose portions of the BART Extension would be provided by San Jose Water Company (SJWC), which provides water to over 219,000 accounts in Santa Clara County, including most of San Jose. In 2011, SJWC's Board of Directors adopted an Urban Water Management Plan (UWMP) in accordance with California's Urban Water Management Planning Act. This document provides an overview of SJWC's water supply sources and usage, recycled water, and conservation programs.

According to the UWMP, SJWC has three sources of potable water supply.

- Groundwater comprises approximately 40 percent of SJWC's water supply. SJWC has 91 active, 5 standby, and 16 inactive wells to draw water from major aquifers within the 225 square-mile Santa Clara Valley subbasin. These aquifers are recharged naturally by rainfall and artificially by recharge ponds operated by Santa Clara Valley Water District (SCVWD).
- Imported surface water provides 50 percent of SJWC's water supply. SJWC is under contract with SCVWD to purchase water originating primarily from the State Water Project and the Central Valley Project. The water is treated at a SCVWD water treatment plant before entering the SJWC system. Some of this imported water is also supplied by local reservoirs.
- Local surface water provides 5 to 10 percent of the SJWC's supply, depending on the amount of rainfall. A series of dams and intakes collect water released from SJWC's lakes and sends it to the Montevina Water Treatment Plant for treatment prior to entering the distribution system.

The UWMP concluded that SJWC has adequate water supplies to meet demand in its service area through 2035, but may encounter system-wide shortages during prolonged periods of drought.

Santa Clara

The City of Santa Clara Water and Sewer Utility (SCWSU) serves as the water retailer for all water users in Santa Clara, and had approximately 25,600 water service connections in 2010. SCWSU's distribution system consists of 334 miles of distribution mains and 7 storage tanks, and has a maximum supply capacity of 88 million gallons per day (mgd) of potable water and 18 mgd of recycled water. Average consumption is 20.9 mgd potable water and 2.5 mgd of recycled water.

Santa Clara operates 28 wells within an extensive local underground aquifer that provides about 68 percent of the City's water supply. Approximately 21 percent of the water supply is provided by two wholesale water agencies: SCVWD and San Francisco Public Utilities Commission. The remaining 11 percent of Santa Clara's water supply is provided by recycled water from the San Jose/Santa Clara Water Pollution Control Plant's (WPCP) South Bay Recycled Water facility, and is used exclusively for irrigation.

Santa Clara's City Council in 2011 approved and adopted an UWMP, which concluded that the SCWSU has adequate water supplies to meet demand in its service area through 2021, but may encounter system-wide shortages during prolonged periods of drought.

Wastewater

San Jose/Santa Clara Water Pollution Control Plant

The WPCP treats wastewater from San Jose and Santa Clara. The WPCP is a regional wastewater treatment facility serving eight tributary sewage collection agencies and is operated by the City of San Jose's Department of Environmental Services. The WPCP provides primary, secondary, and tertiary treatment of wastewater and has capacity to treat 167 mgd of wastewater under dry weather conditions. The design peak wet-weather flow is 271 mgd (City of Santa Clara 2015). The WPCP currently operates at an average dry weather flow (ADWF) of 109 mgd, or 65 percent of its 167 mgd treatment capacity.

The WPCP is currently operating under a 120 mgd dry weather effluent flow constraint. This constraint is based upon regulatory concerns over the effects of additional freshwater discharges from the WPCP on the saltwater marsh habitat and pollutant loading in the San Francisco Bay (City of San Jose 2011).

San Jose's average dry weather flow is 69.8 mgd, or 64 percent of the City's total allocated 108.6 mgd of wastewater flow to the WPCP (City of San Jose 2011). Santa Clara's average dry weather flow is 13.3 mgd, or 59 percent of the Santa Clara's total allocated 22.585 mgd of wastewater flow to the WPCP (City of Santa Clara 2010b).

San Jose

The San Jose sanitary sewer system includes approximately 2,200 miles of sewer pipelines. In addition, 16 sewer pump stations move wastewater through the system where local topography inhibits gravity flow. Sewage from the West Valley Sanitation District, County Sanitation District 3, and portions of the Cupertino Sanitary District and SCWSU also flow through San Jose's wastewater collection system. Sewer lines are inspected and maintained by the San Jose Department of Transportation, and are rehabilitated or replaced by the San Jose Department of Public Works (SJPW).

The majority of domestic water used in San Jose becomes wastewater. Average wastewater flow rates are approximately 70 to 80 percent of domestic water use. For industries without internal recycling or reuse programs, approximately 85 to 95 percent of water used becomes wastewater.

San Jose’s Sanitary Sewer Level of Service Policy seeks to ensure adequate capacity in existing sewer mains before development occurs that could compromise the ability of the system. There are six levels of service (LOS) that are used to determine under what conditions new developments are allowed to connect to the existing sewer system. The LOS are defined based on comparison of flows to existing sewer capacity. The *Sanitary Sewer Master Plan Initial Study/Addendum to General Plan Environmental Impact Report* identified approximately 200,000 feet of sewer pipeline that operates below the level of service target. These deficiencies will be addressed through ongoing implementation of the City’s Sanitary Sewer Capital Program. New development in San Jose that would increase wastewater flow to capacity-deficient areas of the sanitary sewer system must contribute to system improvements.

Santa Clara

Santa Clara’s wastewater collection system includes approximately 270 miles of sewer pipelines ranging from 4 to 48 inches in diameter, and 6 sewage pump stations. This system is owned and operated by the SCWSU. In addition to conveying Santa Clara’s wastewater flows to the WPCP, Santa Clara’s wastewater system must provide conveyance capacity for up to 13.8 mgd from the City of Cupertino. Based on hydraulic modeling of the system, several sewer mains and collector lines are at or near capacity (City of Santa Clara 2010b). Much of the insufficient capacity exists in the northwestern portion of Santa Clara. New development in Santa Clara that would increase wastewater flow to capacity-deficient areas of the sanitary sewer system must contribute to system improvements.

Solid Waste

San Jose

San Jose generates approximately 1.7 million tons of solid waste annually (City of San Jose 2011). In 2008, approximately 60 percent of solid waste was recycled and 40 percent was landfilled. Of the amount landfilled, approximately 36 percent originated from residential sources, 36 percent originated from commercial, industrial and institutional sources, and 28 percent originated from construction and demolition sources. Solid waste and recycling collection services for San Jose businesses are provided by various franchised waste and recycling haulers.

San Jose is served by the Newby Island Landfill, located at 1601 Dixon Landing Road, Milpitas. The Newby Island Landfill has remaining capacity for approximately 21.2 million tons of solid waste and is expected to reach permitted capacity in 2041 (California Department of Resources Recycling and Recovery 2015). San Jose has an arrangement with the owners of the Newby Island Landfill to provide disposal capacity for the City through 2024.

Santa Clara

Solid waste collection in the City of Santa Clara is provided by Mission Trail Waste Systems through a contract with the City. In 2013, Santa Clara disposed of 120,563 tons of solid waste (Local Agency Formation Commission of Santa Clara County 2015). Mission Trail Waste Systems also has a contract to implement the Clean Green portion of the City's recycling plan by collecting yard waste. Recology Silicon Valley provides supplementary recycling services.

Santa Clara has an arrangement with the Newby Island Landfill to provide disposal capacity for the City through 2024 (City of Santa Clara 2010b).

Stormwater

San Jose

The San Jose stormwater system is designed to convey stormwater away from urban areas to local creeks and rivers, and ultimately to the San Francisco Bay. This system consists of approximately 1,150 miles of stormwater pipe, 29,900 storm drain inlets, 4,500 miles of curb and gutter, 1,500 outfalls, and 29 pump stations. These facilities are maintained by the San Jose Department of Transportation and upgraded by the SJPW (City of San Jose 2013).

Since the mid-1980s, San Jose has required that storm sewer systems be designed to convey stormwater from a 10-year storm event (a storm large enough to have a 10 percent chance of occurring in any year). However, over 93 percent of the existing stormwater system is designed to an older 3-year storm event standard. While new development is required to design their onsite storm system to accommodate a 10-year event, they are not required to address deficiencies of the downstream system to which they connect.

San Jose is currently preparing a Storm Drain Master Plan to meet long-term system capacity and water quality objectives. This document is anticipated in 2017.

Santa Clara

Santa Clara's storm drain system consists of curb inlets that collect and channel surface water, from rainfall and other sources, into a series of pipelines beneath city roadways. Stormwater is conveyed through these underground pipelines to the channelized creeks within Santa Clara, which then direct flow into the San Francisco Bay (City of Santa Clara 2010b).

4.15.2.2 Regulatory Setting

There are no federal regulations regarding utilities that would be applicable to the BART Extension under NEPA. However, there are several state and local land use regulations applicable to the BART Extension. Please refer to Chapter 6, Section 6.13, *Utilities*, for a summary of state and local land use policies applicable to the BART Extension**.**

4.15.3 Methodology

In the following section, the BART Extension's potential impacts on utilities are measured by intensity using the terms *no effect*, *no adverse effect*, and *adverse effect*, which are defined as follows.

- *No effect* on utilities would mean no measurable increase in use of utilities.
- *No adverse effect* on utilities is defined as an impact that would increase use of utilities but that would not result in substantial degradation in service, violate a regulatory standard, or conflict with or exceed the capacity of existing utilities.
- An *adverse effect* on utilities is defined as an impact that would contribute to a violation of regulatory standards or would exceed the capacity of existing utilities.

Adverse effects on water utilities would result if the BART Extension operations exceeded existing water entitlements or required the construction of new or expanded water infrastructure. Adverse impacts on wastewater utilities would result if the BART Extension operations exceeded existing wastewater infrastructure capacity and directly required the construction of new or expanded wastewater infrastructure. Adverse impacts on solid waste services would result if landfills serving the BART Extension lacked adequate capacity to accommodate the BART Extension solid waste disposal needs. Adverse impacts on stormwater systems would result if the BART Extension operations exceeded existing stormwater infrastructure capacity and directly required the construction of new or expanded wastewater infrastructure.

4.15.4 Environmental Consequences and Mitigation Measures

This section identifies impacts on utilities and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.15.3, *Methodology*, and in Section 4.1, *Introduction*.

4.15.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for lists of these projects). These projects would likely result in effects on utilities typically associated with transit, highway, bicycle, pedestrian facility and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect utilities, which would include an analysis of mitigation measures to mitigate potential impacts on utilities.

4.15.4.2 BART Extension Alternative

The BART Extension consists of an approximately 6-mile extension of the BART system and includes the construction and operation of four new BART stations, two ventilation facilities, and the Newhall Maintenance Facility. Other features include electrical facilities, power stations, and pump stations, and communication equipment.

Water Supply

San Jose

The Alum Rock/28th Street, Downtown San Jose, and Diridon BART Stations would require water supply for operational purposes, including restrooms and custodial needs. The portion of the Newhall Maintenance Facility located in San Jose would also require water supply, mostly related to the train car washer. According to SJWC calculations based on information provided by VTA, daily water usage for the stations and maintenance facilities in San Jose would be approximately 0.04 acre-feet (AF[1]), which would be provided by SJWC (SJWC 2015).

SJWC prepared a Water Supply Assessment (WSA) for the BART Extension, which was approved by the City of San Jose on January 27, 2016. According to this WSA, SJWC supplied customers with 336 AF of water per day in 2010 (SJWC 2015). The BART Extension Alternative's daily water demand in San Jose represents a 0.01 percent increase in SJWC's 2010 water demand.[2] SJWC concluded that there are sufficient water supplies to provide service to the BART station and facilities in San Jose. Therefore, the BART Extension Alternative would have *no adverse effect* on SJWC's water supply, and no mitigation would be required.

Santa Clara

The Santa Clara BART station would require water supply for operational purposes, including restrooms and custodial needs. The portion of the Newhall Maintenance Facility located in Santa Clara would also require water supply, mostly related to the blowdown facility. According to SCWSU's calculations based on information provided by VTA, daily water usage at the BART station and Newhall Maintenance Facility in Santa Clara would be approximately 0.02 AF, which would be provided by SCWSU (2016).

SCWSU prepared a WSA for the BART Extension, which was approved by the City of Santa Clara on April 5, 2016. According to this WSA, SCWSU supplied customers with 63.6 AF per day in 2010 (SCWSU 2016). Therefore, the BART Extension's water demands in Santa Clara would represent a 0.03 percent increase in SCWSU's 2010 water demand.[3] SCWSU concluded that there are sufficient water supplies to service to the BART station and facilities in Santa Clara. Therefore, the BART Extension Alternative would have *no adverse effect* on SCWSU's water supply, and no mitigation would be required.

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[1] 1 acre-foot is approximately 325,851 gallons.

[2] 0.04 AF (estimated daily water usage at BART Extension in San Jose) divided by 336 AF (daily water supplied by SJWC in 2010) = 0.0001.

[3] 0.02 AF (estimated daily water usage at BART Extension Alternative in Santa Clara) divided by 63.6 AF (daily water supplied by SCWSU in 2010) = 0.0003.

Water Conveyance Infrastructure

SJWC owns and operates the water conveyance system that would serve the BART Extension Alternative in San Jose. SCWSU owns and operates the water conveyance system that would serve the BART Extension Alternative in Santa Clara. SJWC and SCWSU would be responsible for providing onsite water infrastructure to connect BART stations and facilities to the existing water supply system.

Water supply at the BART stations and facilities may contribute to capacity deficiencies within offsite supply networks, which represents a potential impact to utility systems. With implementation of Mitigation Measures UTIL-A and UTIL-B, this impact would have *no adverse effect*.

Mitigation Measure UTIL-A: Prepare a San Jose Water Supply Infrastructure Capacity Assessment

Prior to the issuance of a building permit, VTA will coordinate with SJWC and prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite water supply infrastructure. The SJWC may conduct a detailed engineering study and flow analysis to determine the extent of these impacts.

Capacity-relief upgrades will occur during the utility relocation phase of construction and will be implemented in accordance with SJWC requirements. Construction activities will be subject to provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Mitigation Measure UTIL-B: Prepare a Santa Clara Water Supply Infrastructure Capacity Assessment

Prior to the issuance of a building permit, VTA will coordinate with SCWSU and prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite water supply infrastructure. The SCWSU may conduct a detailed engineering study and flow analysis to determine the extent of these impacts.

Capacity-relief upgrades will occur during the utility relocation phase of construction, and will be implemented in accordance with Chapter 17.15.210 of the Santa Clara City Code. Construction activities will be subject to provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Wastewater Treatment

Wastewater would be generated at the BART stations and Newhall Maintenance Facility. The total amount of wastewater generated by the BART Extension Alternative is not anticipated to exceed the amount of water supplied to the BART Extension. The WPCP treats wastewater from both San Jose and Santa Clara, and has the capacity to treat 167 mgd

(ADWF). The WPCP presently operates at an ADWF of 109 mgd, or 65 percent of its 167 mgd treatment capacity. In addition, BART recycles (treats and reuses) its train wash water through onsite treatment systems at all of its existing yards. The feasibility of implementing a water recycling system, which would reduce wastewater generation at the Newhall Maintenance Facility, also would be evaluated during final design.

San Jose's current ADWF is 69.8 mgd, or 64 percent of San Jose's allocated 108.6 mgd of wastewater flow to the WPCP. According to the SJWC WSA, the BART Extension Alternative within San Jose would increase the amount of wastewater flowing to the WPCP by approximately 8,000 gpd. This represents 0.02 percent of San Jose's remaining allocated capacity at the WPCP.[4] Santa Clara's current ADWF is 13.3 mgd, or 59 percent of Santa Clara's allocated 22.585 mgd of wastewater flow to the WPCP. According to SCWSU's WSA, the BART Extension Alternative within Santa Clara would increase the amount of water flowing to the WPCP by 4,841.8 gpd. This represents 0.05 percent Santa Clara's remaining allocated capacity at the WPCP.[5]

The BART Extension Alternative would incrementally increase wastewater flowing to WPCP, but is not likely to trigger the need for new or expanded wastewater treatment facilities. There would be *no adverse effect* on the WPCP, and no mitigation would be required.

Wastewater Conveyance Infrastructure

Wastewater generated by operation of the BART Extension Alternative in San Jose would be conveyed to the WPCP through the San Jose sanitary sewer system. Wastewater generated by operation of the BART Extension Alternative in Santa Clara would be conveyed to the WPCP through the Santa Clara sanitary sewer system.

The BART Extension Alternative would be responsible for providing onsite sewer infrastructure, such as laterals and extensions, connecting BART stations and facilities to the existing sewer system. New sewer infrastructure would be designed in accordance with applicable LOS guidelines and installed during BART Extension construction.

Wastewater generated at the BART stations and facilities may contribute to capacity deficiencies within offsite sewer systems. This represents a potential impact on utility systems; however, with implementation of Mitigation Measures UTIL-C and UTIL-D, this impact would have *no adverse effect*.

[4] 8,000 gallons (daily water requirements for San Jose's portions of the BART Extension Alternative) divided by 38,800,000 gallons (San Jose's remaining capacity at the WPCP) = 0.0002.

[5] 4,841.8 gallons (daily water requirements for Santa Clara's portions of the BART Extension Alternative) divided by 9,285,000 gallons (Santa Clara's remaining capacity at the WPCP) = 0.0005.

Mitigation Measure UTIL-C: Prepare a San Jose Sewer Capacity Assessment

Prior to zoning approval, VTA will coordinate with SJPW to prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite sanitary sewer capacity deficiencies. SJPW may conduct a detailed engineering study and hydraulic analysis to determine the extent of these impacts.

VTA will mitigate impacts on downstream sewer systems in San Jose through payment of the Sanitary Sewer Connection Fee, which is used to rehabilitate and enhance sewer capacity through San Jose's Sanitary Sewer Capital Improvement Program. If payment to the Sanitary Sewer Connection Fee does not adequately mitigate potential offsite sewer capacity impacts related to the BART Extension, direct upgrades to the sewer system will be required. If sewer system overcapacity is a result of projected cumulative development, San Jose and VTA shall develop a Cooperative Agreement to determine the BART Extension Alternative's participation in upgrades to the current system.

Capacity-relief upgrades will occur during the BART Extension's construction phase, and will be conducted in accordance with applicable San Jose standards regarding sewer infrastructure improvements. Generally, sewer infrastructure improvements will be located within the existing public right-of-way, with minimal potential to impact sensitive environmental resources. Construction activities will be subject to provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Mitigation Measure UTIL-D: Prepare a Santa Clara Sewer Capacity Assessment

Prior to zoning approval, VTA will coordinate with SCWSU to prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite sanitary sewer capacity deficiencies. SCWSU may conduct a detailed engineering study and hydraulic analysis to determine the extent of these impacts.

VTA will mitigate impacts on downstream sewer systems in Santa Clara through payment of the Sanitary Sewer Connection Charge, which is used to rehabilitate and enhance sewer capacity through Santa Clara's Capital Improvement Program. If payment to the Sanitary Sewer Connection Charge does not adequately mitigate potential offsite sewer capacity impacts related to the BART Extension, direct upgrades to the sewer system may be required. If sewer system overcapacity is a result of cumulative development, Santa Clara and VTA shall develop a Cooperative Agreement to determine the BART Extension Alternative's proportional participation to the upgrades to current system capacity.

Capacity-relief upgrades improvements would occur during the BART Extension's construction phase, and will be implemented in accordance with Chapter 17.15.210-280 of the Santa Clara City Code. Generally, sewer infrastructure improvements will be located within the existing public right-of-way, with minimal potential to impact sensitive environmental resources. Construction activities will be subject to provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Solid Waste

BART facilities would generate solid waste at the Newhall Maintenance Facility and the stations. The Newhall Maintenance Facility would generate approximately 0.8 tons per day (tpd) of solid waste in San Jose, and 0.7 tpd in Santa Clara. Users of the three stations in San Jose would generate approximately 3.3 tpd of solid waste, and users of the Santa Clara station would generate approximately 1.1 tpd of solid waste. In total, 5.9 tpd of solid waste would be generated by the BART Extension. Track corridors along the BART alignment would not generate solid waste. Daily maintenance of right-of-way might be required to dispose of waste items that stray onto tracks, but this amount of waste is expected to be negligible.

The Newby Island Landfill has a maximum permitted throughput of 4,000 tpd of solid waste, and currently receives an average of 2,600 tpd of solid waste (Boccaleoni pers. comm.). Annual solid waste generated by the BART facilities would represent 0.4 percent of Newby Island Landfill's remaining daily capacity.[6]

The BART Extension Alternative is scheduled for operation beginning in 2026, and therefore extends beyond currents contracts between Newby Island Landfill and San Jose and Santa Clara. These contracts were based Newby Island Landfill's original 2025 closure date. In 2014, the state granted an expansion of the Newby Island Landfill and extended the landfill's estimated closure date from 2024 to 2041. Though it is uncertain whether San Jose and Santa Clara will continue to dispose of solid waste at the Newby Island Landfill beyond 2024, this facility has sufficient capacity to accept solid waste generated by the BART Extension Alternative. Therefore, solid waste generated by the BART Extension Alternative would not exceed the collective capacity of regional landfills that may serve the project beyond 2024, and *no adverse effect* would occur.

Stormwater

New and renovated facilities would be drained by a combination of existing, new, and modified stormwater infrastructure throughout San Jose and Santa Clara. As discussed in Section 6.15, *Water Resources, Water Quality, and Floodplains*, the BART Extension would increase the total amount of impervious surfaces relative to existing conditions, thus resulting in higher stormwater volumes and velocities into the stormwater system. However, new drainage improvements would be implemented to ensure that runoff does not exceed the capacity of existing or planned stormwater infrastructure.

[6] 5.9 tons (daily solid waste generated by BART Extension Alternative) divided by 1,400 tons (daily input capacity remaining at Newby Island Landfill) = 0.004

After designs are finalized, a Stormwater Management Report will be prepared to document the final design for stormwater management and ensure sufficient storm drain capacity. The storm drainage infrastructure would be operated in accordance with the Phase II MS4 NPDES Permits within BART fenced areas and VTA-owned right-of-way. New drainage systems within VTA managed areas would be designed in accordance with the post-construction stormwater treatment measures included in VTA's Stormwater and Landscaping Design Criteria Manual, which includes the requirements of the Phase II MS4 NPDES Permit. Other applicable NPDES requirements will be applied when facilities are built within other agencies' fee owned right-of-way (for example, City streets and/or Caltrans jurisdiction) and when constructing facilities that will be subject to the Industrial General Permit (for example, the Newhall Maintenance Facility). Therefore, operation of the BART Extension would have *no adverse effect* on stormwater infrastructure, and no mitigation is required.

4.15.5 NEPA Conclusion

With implementation of Mitigation Measures UTIL-A through UTIL-D, the BART Extension Alternative would result in *no adverse effects* on utility systems.

4.16 Visual Quality and Aesthetics

4.16.1 Introduction

This section describes the affected environment and environmental consequences related to visual quality and aesthetics from operations of the NEPA Alternatives. Information regarding visual quality and aesthetics in the City of San Jose and the City of Santa Clara was obtained from:

- *Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *Envision San Jose 2040 General Plan EIR* (City of San Jose 2011b).
- *City of Santa Clara 2010-2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010-2035 General Plan EIR* (City of Santa Clara 2010b).

4.16.2 Environmental and Regulatory Setting

4.16.2.1 Environmental Setting

The BART Extension would be generally located in an urbanized portion of central San Jose and the southeast portion of Santa Clara, approximately 45 miles southeast of San Francisco and within the Santa Clara Valley. The Santa Clara Valley is bounded on the west by the Santa Cruz Mountains and on the east by the Diablo Range and runs south–southeast from the southern end of the San Francisco Bay. Visual quality, prominent features, and scenic resources within San Jose and Santa Clara are described below.

Visual Study Area

The visual study area for the BART Extension is the area visible from the alignment and from which the BART Extension features can be seen. The visual study area includes the alignment, which is relatively flat and extends approximately 6 miles from just east of U.S. Highway 101 (U.S. 101) and south of Mabury Road in San Jose to approximately the Santa Clara Caltrain Station. The visual study area also includes the available offsite views from within the alignment. Given that the majority of the BART Extension is underground and thus would not be visible, this analysis focuses on aboveground features. Viewer groups within the visual study area consist of existing residents; workers at office or industrial sites; and pedestrians, bicyclists, and drivers using roadways in the vicinity of the aboveground features, namely station areas, parking structures, ventilation facilities, systems facility sites, and at-grade portions of the alignment.

City of San Jose

The visual study area for San Jose extends from Mabury Road to just north of Interstate (I-) 880. The surrounding land uses adjacent to the alignment from Mabury Road to Santa Clara

Street are characterized primarily by industrial uses, composed of large, boxed-shaped industrial buildings painted in neutral colors and associated surface parking lots. The alignment along Santa Clara Street from U.S. 101 to South 7th Street transitions to a mixture of low-rise industrial and commercial buildings, with intermittent single-family and multiple-unit housing on small lots. Santa Clara Street is lined with various types of mature trees with intermittent large, commercial billboards. West of South 7th Street, mid-rise commercial buildings and high-rise contemporary-style office buildings in the downtown San Jose area dominate the visual character. There are a few open-space areas along the alignment, including Roosevelt Park adjacent to Coyote Creek and the Guadalupe River Park and Gardens recreational area near the Diridon Station South and North Options.

Panoramic views of hillside areas, including the foothills of the Diablo Range, Silver Creek Hills, Santa Teresa Hills, and Santa Cruz Mountains, are key scenic features in the San Jose area. Intermittent views of the eastern foothills are available from Mabury Road and North 28th Street between Julian Street and Santa Clara Street, and there are also views of the Santa Cruz Mountains from Santa Clara Street at Cahill Street. There are no scenic byways or highways within the San Jose visual study area. Overall, the views are typical of an urban area, and no memorable views of natural features exist, with the exception of the distant hillsides.

In the vicinity of the Alum Rock/28th Street Station, the Five Wounds National Portuguese Church and School (Five Wounds Church), which is an ornate, sixteenth-century style church built in 1919, is located on Santa Clara Street west of U.S. 101 immediately adjacent to the Alum Rock/28th Street Station, and is considered a landmark and architectural resource by the San Jose general plan within the San Jose visual study area. The primary viewer groups would be workers in nearby industrial and commercial buildings; visitors of the Five Wounds Church; residents in the Roosevelt Park neighborhood west of 28th Street between Julian Street and Santa Clara Street; and motorists, pedestrians, and cyclists in the area, particularly those traveling along Santa Clara Street and 28th Street. Views primarily consist of industrial buildings and the visually prominent Five Wounds Church near 28th and Santa Clara Streets. The eastern foothills are located approximately 4 miles northeast of the study area and can be seen intermittently from 28th Street looking east.

In the vicinity of the 13th Street Ventilation Structure, there are primarily one- and two-story neutral colored commercial buildings and street trees, with distant views of large-scale buildings associated with downtown San Jose. Single-family residential homes are located north of the ventilation structure on either side of 13th Street within the Julian/St. James and Horace Mann neighborhoods.

In the vicinity of the Downtown Station options, the San Jose Downtown Historic District is located along Santa Clara Street between 4th Street and 1st Street and also contains several historic buildings listed in the City's Historic Resources Inventory (refer to Section 4.5, *Cultural Resources*, for details related to historic buildings in the area). These are located immediately adjacent to components of the BART Extension Alternative such as new station portals, and are considered visual resources within the San Jose study area for the Downtown Station options. One- to two-story commercial uses transition to large-scale institutional and office buildings with tree-lined streets traveling west along Santa Clara Street toward downtown San Jose.

The historic Diridon Station is located immediately adjacent to the existing Diridon Station on Cahill Street. Near the existing Diridon Station, views are dominated by the visually prominent SAP Center, paved parking areas, transportation amenities, and light industrial uses. Intermittent views of the distant Santa Cruz Mountains are available from Santa Clara Street at Cahill Street looking south. The Santa Cruz Mountains are located over 8 miles south of the study area.

One-story neutral colored industrial uses are located on the Stockton Avenue Ventilation Structure site. Intermittent street trees line Stockton Avenue, and several overhead power lines are visible. Across Stockton Avenue to the west is the Garden Alameda neighborhood, which consists of mostly one- and two-story single-family residences.

City of Santa Clara

The City of Santa Clara visual study area extends from north of I-880 to the existing Santa Clara Caltrain Station and north of Benton Street. The study area is characterized primarily by industrial and commercial uses along the alignment. New single-family multi-story residences are located on the west side of the study area north of I-880, and have neutral coloring with 10- to 14-foot-high walls separating the residences from the existing Caltrain tracks. The industrial areas are dominated by large, neutral-colored buildings with parking lots surrounding the buildings containing sparse landscaping. The built-up, industrial landscape continues on the east side of the alignment. Small commercial, single-story strip malls, institutional buildings such as the Santa Clara Police Department, and the historic Santa Clara Caltrain Station are located near the northern terminus of the study area on the west side of the existing Caltrain tracks that traverse Santa Clara east to west in this location. Santa Clara University is located less than 0.25 mile southwest of the Santa Clara Caltrain Station across El Camino Real. Several trees are along the perimeter of the Santa Clara Caltrain Station and line the El Camino Real corridor. Elements of the historic Santa Clara Caltrain Station/Station Depot (historic Depot) are visual resources, which is located less than 0.10 mile west of the proposed Santa Clara Station platform.

The primary viewer groups are workers in nearby industrial and commercial buildings and passengers at the Santa Clara Caltrain Station; visitors and staff of the Santa Clara Police Department; and motorists, pedestrians, and cyclists in the area. Additional viewers include residents in the surrounding neighborhoods, north of Campbell Avenue and west of Newhall Street, and southwest of El Camino Real between De La Cruz Boulevard and Franklin Street. Views primarily consist of a mix of industrial uses, multi-story homes, strip mall–style commercial complexes, and the existing Santa Clara Caltrain Station. Intermittent views of the eastern foothills are available from El Camino Real and within the existing Santa Clara

Caltrain Station; however, there are no high quality views of any scenic vistas or mountain ranges within the study area.

4.16.2.2 Regulatory Setting

There are no federal laws that specifically define or protect visual resources; however, state and local regulations provide protection for scenic views and other visual resources. Most local jurisdictions have provisions for design review of all commercial, industrial, or public buildings, facilities, or other major infrastructure. Refer to Chapter 6, Section 6.14, *Visual Quality and Aesthetics*, for a description of relevant state and local regulations.

4.16.3 Methodology

Pursuant to the National Environmental Policy Act (NEPA), impacts were assessed through evaluation of the degree to which the BART Extension would change the existing visual quality of the study area and consideration of viewer sensitivity. Analysis of visual effects under NEPA considers context for both the existing visual quality *category* of a viewed landscape (high, moderately high, moderate, moderately low, or low) and the viewer sensitivity (high, moderate, or low).

An *adverse effect* on visual quality and aesthetics would involve a negative change of two or more visual categories (e.g., from high to moderate) where viewer groups of high or moderate sensitivity would see it.

The method used to evaluate visual effects is based upon accepted visual analysis techniques, such as those employed by the Federal Highway Administration (FHWA) (1988). The FHWA approach provides both a framework and methodology for assessing the potential impacts associated with highway projects. These methods have been adapted to address the BART Extension and include systematic inventory of existing visual conditions, documentation of visual change, and evaluation of viewer response to change.

The evaluation of visual change considers several factors:

- The extent of visibility and the degree to which the various BART Extension elements would contrast with or be integrated into the existing urban landscape.
- The extent of change in the affected view's composition and character.
- The relative number and sensitivity of viewers.

Areas possessing sensitive viewer groups or offering scenic views were identified for the purpose of evaluating the visual effects of the BART Extension, and 10 important viewpoint locations were selected within the vicinity. Visual simulations were prepared using computer-generated information overlaid on the photo images of the selected viewpoints to show height and massing of the structural elements that would be seen from each viewpoint. Architectural features were included to make the features appear realistic; however, the simulations are not intended to represent the final design or architectural expression of the

BART Extension. Their purpose is to depict the general mass of key station elements as they relate to the surrounding areas. Architecture for the stations would be developed with the City partners and with community input and would be defined in subsequent design phases. Figure 4.16-1 shows the locations of 10 viewpoint locations.

4.16.4 Environmental Consequences and Mitigation Measures

This section identifies impacts within the visual study area and evaluates whether they would be adverse according to NEPA.

4.16.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements along the alignment (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these features). The No Build Alternative would likely result in visual effects typically associated with transit, highway, bicycle, and pedestrian, facilities, and roadway projects. These projects are not anticipated to adversely affect the visual character or scenic views in the area. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse visual effects. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

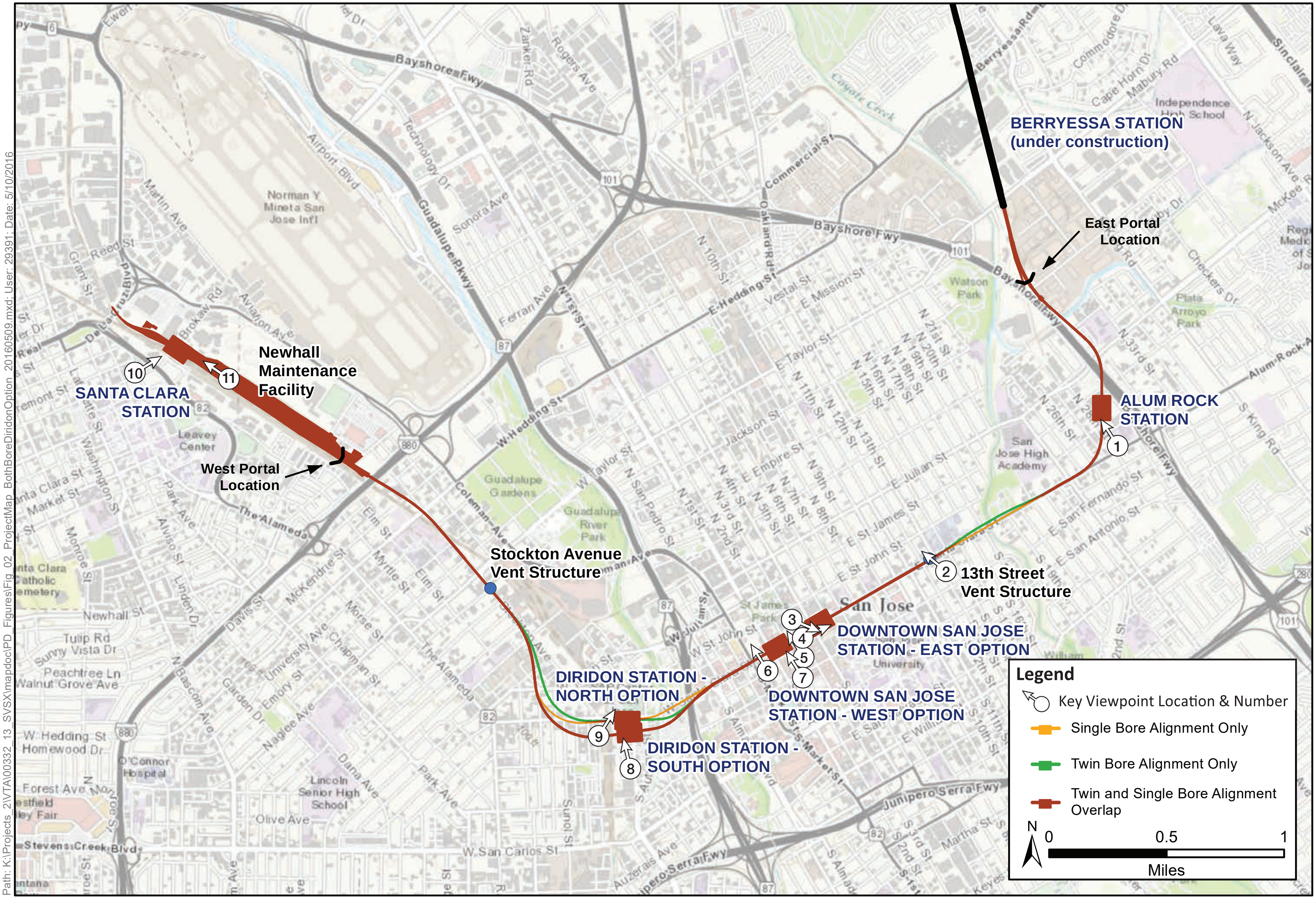
4.16.4.2 BART Extension Alternative

City of San Jose Visual Study Area

Connection to Phase I Berryessa Extension

The BART Extension would reconfigure the tail tracks south of Mabury Road in San Jose. Aboveground features in this area include a small portion of the tracks before they descend into a tunnel portal just north of Las Plumas Avenue, and an aboveground structure at the tunnel portal. Currently this area is occupied by an open, flat dirt lot and old railroad tracks. East of the site, land uses are predominantly industrial between Mabury Road and Coyote Creek. West and north of the site is mostly industrial, and the U.S. 101 corridor travels along the southwest side of the alignment.

The visual character in this area is defined by one- and two-story, neutral-toned industrial buildings, as well as vehicles traveling along U.S. 101. Single-family residential neighborhoods and street trees are located farther southeast beyond the immediate industrial landscape. Given that the majority of the surrounding visual landscape is dominated by industrial and transportation uses, the visual quality of this area is low. There are no high quality scenic views or vistas within this area.



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Source: Station and Track, VTA 2014; Basemap, ESRI 2015

Figure 4.16-1
Viewpoints Map for Visual Simulations
VTA's BART Silicon Valley–Phase II Extension Project

Existing lighting in the area is minimal as the majority of land uses are industrial. Streetlights are intermittingly dispersed along the surrounding roadways, and additional lighting is provided by the industrial facilities in the area.

Viewers in this area primarily consist of motorists traveling on U.S. 101 and employees working at the industrial sites. Motorists and employees have low viewer sensitivity because motorist views are short in duration, and employees likely spend most of their time indoors focused on their work. Residents typically have moderate to high viewer sensitivity depending on the quality of view. At this location, the quality of views for residents is low, as the nearest residences are over 0.3 mile north of the aboveground features. Given the distance of the BART Extension features from sensitive viewers, and the existing surrounding industrial and transportation uses, moderate viewer sensitivity is assumed.

Lighting at the tunnel portal would be directed downward and would not spillover to any residences. The BART Extension would be consistent with the existing industrial and transportation uses in the vicinity of the site. The portal structure would be small and consistent with surrounding structures. The BART Extension would not substantially degrade the existing visual character or quality of the site. Therefore, there would be *no adverse effects* on visual quality and aesthetics. No mitigation would be required.

Alum Rock/28th Street Station

The alignment would continue in a tunnel and transition into Alum Rock/28th Street Station just east of 28th Street and north of Santa Clara Street. Aboveground features would include up to a seven-story parking structure, which would be located in the west corner of the station area, as well as a small area of system facilities at the north corner of the parking structure. Industrial uses such as Monarch Truck Dealership, SCS Contractor Service, Mission Concrete, and Granite Counters are currently located onsite.

The surrounding visual character is characterized by industrial buildings, warehouses, and storage yards, immediately adjacent to the station site. Low- and medium-density residential uses are located across U.S. 101 to the north and east of the station site, as well as to the west of 28th Street and the existing out-of-service railroad tracks. The Portuguese Band and Social Center is located to the west of the station site, and the visually prominent Five Wounds Church and associated elementary school are to the southeast. Given the mix of industrial and residential uses, the visual quality of the area is considered moderate. Figure 4.16-1 shows the corner of Santa Clara Street and 28th Street looking north toward the historic Five Wounds Church, the Alum Rock/28th Street Station site, and associated parking structure.

Viewers in this area primarily consist of church attendees, store patrons, passing motorists, residents in the Roosevelt Park neighborhood, pedestrians, and bicyclists. Given the predominately industrial character of the landscape, viewer sensitivity of these groups would be low to moderate.

Existing lighting in the immediate area consists of overhead street lights on the surrounding roadways, as well as some lighting associated with the existing industrial uses.

As shown on Figure 4.16-2, the parking structure would be visible to pedestrians and motorists on surrounding roadways, including Santa Clara and 28th streets. The multi-level parking structure would be taller than the surrounding one- to three-story industrial warehouses. A pedestrian connection along the south side of the station area at North 28th Street from Santa Clara Street would be designed as a pedestrian/bicycle/transit gateway into the station area with amenities such as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting. Station entrances and signage for the Alum Rock/28th Street Station would be slightly visible from Santa Clara Street at 28th Street (Figure 4.16-2).

The Five Wounds Church is a key visual resource in the area; however, the rest of the surrounding area has low visual quality. The BART Extension components would be of comparable height and mass to other buildings currently on and surrounding the site, and would improve the visual quality of the area by providing a community-oriented and pedestrian friendly streetscape.

The historic Five Wounds Church, at the southeast corner of Santa Clara Street and 28th Street, is just south of the Alum Rock/28th Street Station and is considered a City Landmark and architectural resource by the general plan. Because this station would be underground, the parking structure would be the only structure of notable height and mass added to the viewshed. The parking structure would likely partially disrupt existing views of the Five Wounds Church for anyone traveling southbound along North 28th Street as relatively uninterrupted views of the top half of the Five Wounds Church are visible from the roadway. However, these viewers do not currently have high sensitivity to changes in views and they do not have full views of the church under existing conditions. For pedestrians and motorists on Santa Clara Street and 28th Street, the area in the immediate vicinity of the church would not be dominated by the parking garage. The station entrances would be closer to the church structure, but are anticipated to be no more than one-story high. Furthermore, the parking structure would be set back at least 200 feet from the church building. The Five Wounds Church fronts Santa Clara Street, and the existing view available from the back of the church is dominated by the existing industrial uses. As a result, the BART Extension would not cause substantial visual degradation to the Five Wounds Church because it would not substantially block views of or from the church for viewers with high sensitivity relative to existing conditions. See Section 4.5, *Cultural Resources*, for further discussion of the effects of the BART Extension on the Five Wounds Church.

Existing view of Five Wounds Church (view to the northwest from the intersection of East Santa Clara Street and North 28th Street)

Alum Rock/28th Street Station - BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics ... 00332.13 (1-26-2016)

Figure 4.16-2
Key Viewpoint 1: Alum Rock/28th Street Station Area – Santa Clara and North 28th Street
VTA's BART Silicon Valley–Phase II Extension Project

Nighttime lighting from the parking structure would be visible to the immediately surrounding areas, which consists of industrial uses, storage yards, parking areas, and the Five Wounds Church. Roosevelt Park is the closest residential neighborhood, approximately 500 feet west of 28th Street between Julian Street and Santa Clara Street, and is separated from the station area by a block of light industrial uses. It is unlikely that the lighting would be noticeable to residents in the surrounding neighborhoods due to the intervening industrial and commercial buildings between the residences and the new BART station and parking structure. The lighting would, however, be designed to focus on BART Extension facilities and minimize spillover of light and glare into adjacent areas. There are no sensitive viewers in the immediate vicinity that would be adversely affected by spillover lighting.

There are no identified scenic vistas in the vicinity of the station site. Additionally, the Alum Rock/28th Street Station area would incorporate design features such as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting, which would improve the visual quality of the area. With the incorporation of lighting design to minimize the spillover of light and glare into adjacent areas, no substantial effects would be expected. Therefore, the visual impact would be *no adverse effect*. No mitigation would be required.

13th Street Ventilation Structure

A ventilation structure would be located at the northwest corner of Santa Clara and 13th Streets and housed in one building approximately 12 feet high. Currently the site is occupied by a paved parking lot. One- and two-story commercial and commercial/industrial land uses are located adjacent to the site and dominate the visual character of the area. There are some street trees present, as well as overhead billboards and signage for the commercial uses. The visual quality in this area is low.

Viewers in this area would primarily consist of motorists and pedestrians traveling on Santa Clara Street and employees/visitors of the commercial establishments. The nearest residences are immediately north of the site along North 13th Street; however, views of the site are limited due to intervening trees. Given the land uses in the area and types of viewers, viewer sensitivity is low to moderate.

The ventilation structure would be consistent with the mass and scale of the surrounding one- and two-story commercial land uses, and would blend visually with the industrial/commercial character of the surrounding environment, as shown in Figure 4.16-3. Thus, the 13th Street Ventilation Structure would not substantially degrade visual quality in the area. Additionally there are no scenic vistas identified in this area, and no major sources of light or glare would be introduced. Therefore, the visual impact would be *no adverse effect*. No mitigation would be required.

Downtown San Jose Station

Downtown San Jose Station East Option

Aboveground components of the Downtown San Jose Station East Option include street-level portal station entrances, an emergency exhaust generator near the east end of the station, and one emergency ventilation structure, which would be approximately 12 feet high. The station portal entrance locations are being evaluated in sidewalks along Santa Clara Street and near 6th, 4th, and 3rd Streets (see Figures 4.16-4 through 4.16-6). The exhaust generator and ventilation structure would be in vacant areas, commercial parking lots, sidewalks, and landscaped areas along Santa Clara Street.

Heading west on Santa Clara Street from 5th Street, street trees line the sidewalks and views include large institutional and commercial buildings toward downtown San Jose. West of 4th Street, the density of buildings increases and the styles transition to an old town historic brick façade. Several street trees line both sides of Santa Clara Street, and businesses in this area include restaurants, bars, retailers, and a gas station. Given the more unified nature of the downtown district and the presence of street trees, the visual quality in this area is moderate to high. The primary viewer groups in this location are motorists, pedestrians, bicyclists, restaurant and store patrons, workers, transit riders (bus and light rail), and San Jose State University students and staff. Given the visual appeal of this portion of the station site and types of visitors, viewer sensitivity is moderate to high.

Figure 4.16-4 depicts the view looking east down Santa Clara Street near its intersection with 4th Street and shows station portal entrances in the vicinity of City Hall. Figure 4.16-5 shows station portal entrances along Santa Clara Street from 4th Street looking east. As shown, station entrances and signage would be visible aboveground elements. However, the station entrances and signage would not dominate the visual character of the area over the existing business-oriented streetscape and density of the surrounding buildings. The design of the station entrances would be utilitarian and would not distract from the surrounding architecture, or disrupt the area’s intact nature or unity. Ventilation structures would be enclosed, and the size and mass of the ventilation structures and station portals would be designed to be unified with the surrounding urban environment so they would not visibly conflict with the urban setting or substantially degrade the existing visual character of the surrounding area (see Figure 4.16-6). Furthermore, VTA will continue to encourage public input throughout the design process to further ensure the visual character is not adversely affected.

Light and glare from the station entrances would be minimal, and would be designed to reduce spillover of light, thereby minimizing any adverse effects of light and glare. Additionally, streetlights and lighting associated with the commercial and local bus and light rail facilities currently exist along the alignment; thus, lighting associated with the station entrances would be consistent with the surrounding lighting landscape, particularly with local transit facilities.

Existing View of vacant site near Coyote Creek (view to the northwest from the East Santa Clara Street and North 13th Street intersection)

13th Street Ventilation Structure - BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.

Source: Circlepoint, 2016.

Graphics … 00332.13 (1-26-2016)

Figure 4.16-3

Key Viewpoint 2: 13th Street Ventilation Structure

VTA's BART Silicon Valley–Phase II Extension Project

Existing view of City Hall (view to the east from the intersection of East Santa Clara Street and North 4th Street)

Downtown San Jose East Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics ... 00332.13 (1-26-2016)

Figure 4.16-4
Key Viewpoint 3: Downtown San Jose East Station Option – City Hall Looking East
VTA's BART Silicon Valley–Phase II Extension Project

Existing view down East Santa Clara Street (view to the northeast near the intersection of East Santa Clara Street and 4th Street)

Downtown San Jose East Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics ... 00332.13 (1-26-2016)

Figure 4.16-5
Key Viewpoint 4: Downtown San Jose East Station Option – Santa Clara and 4th Streets
VTA's BART Silicon Valley–Phase II Extension Project

Existing view down 3rd Street (view to the northwest at the intersection of East Santa Clara Street and 3rd Street)

Downtown San Jose East Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics … 00332.13 (1-26-2016)

Figure 4.16-6
Key Viewpoint 5: Downtown San Jose East Station Option – Santa Clara and 3rd Streets
VTA's BART Silicon Valley–Phase II Extension Project

The station portals and ventilation facilities would not have an adverse effect on a scenic vista as no scenic vistas exist in the vicinity nor would the BART Extension components be of a size that could substantially block views.

Streetscape improvements would be provided along Santa Clara Street between 7th Street and 1st Street to create a pedestrian corridor connecting San Jose City Hall and San Jose State University with the Downtown Commercial District. Streetscape improvements would enhance the visual quality of the area for pedestrian and motorists and would be guided by San Jose's *Downtown Master Streetscape Plan*. See Section 4.5, *Cultural Resources*, for a discussion of the effects of this design change on historic architectural resources in the San Jose Downtown Commercial Historic District. Additionally, VTA operates light rail throughout downtown San Jose, including along portions of Santa Clara Street; thus, new aboveground BART components would be consistent with the existing transportation uses in the area. As such, the visual impact would be *no adverse effect*. No mitigation would be required.

Downtown San Jose Station West Option

Aboveground features associated with the Downtown San Jose Station West Option would be similar to those for the Downtown San Jose Station East Option. Several station entrance locations are being evaluated at 2nd Street and 3rd Street, Market Street, along Fountain Alley close to 2nd Street, and between mid-block buildings on 1st Street and Market Street (see Figures 4.16-7 and 4.16-8). An emergency exhaust generator would be located above grade near the northwest corner of Santa Clara Street and 4th Street. One emergency ventilation facility would be located at each end of the station with a ventilation structure aboveground adjacent to Santa Clara Street. The BART Extension components and existing visual character and quality of the area would be visually identical to that described for the Downtown San Jose Station East Option, with the exception that the mass and scale of buildings increases substantially around 1st Street and Market Street, and building density decreases. Viewer groups and viewer sensitivity for this portion of the alignment would be similar to those described for the Downtown San Jose Station East Option.

As described under the Downtown San Jose Station East Option, station entrances, ventilation structures, and signage would be visible aboveground elements. Figure 4.14-7 shows a station entrance/system facility site along Santa Clara Street near Lightson Alley. Figure 4.16-8 illustrates the view looking north along 2nd Street near station entrances on the east side of 2nd Street. Such BART Extension elements would be designed to maintain consistency with the mass and scale of the surrounding architecture and would not block any views as they would be smaller than the surrounding buildings in the area. Lighting at the station entrances would blend with the existing street lighting in the area and would have minimal effects. Such lighting would be designed to reduce spillover of light during the night, thereby minimizing any adverse effects of light and subsequent glare to adjacent buildings.

Existing view of Lightson Alley (view to the northeast from Santa Clara Street)

Downtown San Jose West Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics ... 00332.13 (1-26-2016)

Figure 4.16-7
Key Viewpoint 6: Downtown San Jose West Station Option – Santa Clara Street/Lightson Alley
VTA's BART Silicon Valley–Phase II Extension Project

Existing view down 2nd Street near Fountain Alley (view to the northwest from 2nd Street)

Downtown San Jose West Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics … 00332.13 (1-26-2016)

Figure 4.16-8
Key Viewpoint 7: Downtown San Jose West Station Option – 2nd Street/Fountain Alley
VTA's BART Silicon Valley–Phase II Extension Project

Streetscape improvements would be provided along Santa Clara Street between 4th Street and San Pedro and would be guided by San Jose's *Downtown Master Streetscape Plan*, improving the visual quality of the area for pedestrian and motorists. See Section 4.5, *Cultural Resources*, for a discussion of the effects of this design change on historic architectural resources in the San Jose Downtown Commercial Historic District. As such, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.

Diridon Station

Diridon Station South Option

The aboveground components at Diridon Station South Option are the same as under the Diridon Station North Option below; however, the locations of systems facilities would be located south and slightly east. System facilities would be the same for both the Twin- Bore and Single-Bore Options, and the alignments would be the same under the Diridon Station South Option. The systems facility site for a traction power substation (TPSS), auxiliary power substation, emergency generator, and ventilation structures would be located at the east end of the station between Autumn Street and Los Gatos Creek. The westernmost fresh air intake and tunnel ventilation shaft would be located just north of the existing Caltrain Station.

System facilities sites would also be approximately 12 feet high and surrounded by an approximately 9-foot-high concrete block (CMU) wall. This area currently contains paved parking lots and the existing Diridon Caltrain Station.

The visual character along Santa Clara Street in this area is dominated by street trees, the SAP Center building, which is large in mass and scale in comparison with the adjacent historic, large brick Diridon Station, and associated paved parking lots. Autumn Street is defined by low-density industrial-style buildings and few street trees; power lines dominate the sky in this area. Several mature street trees line both sides of Cahill Street and, given that no tall buildings are within this viewshed, views of the open sky and distant hillsides are available. The City has also constructed a green median to serve as a pedestrian linkage for transit riders from Cahill Street to Montgomery Street, along the south side of Stover Street. Given the mix of landscaping, distant views, large buildings, and transportation infrastructure, the visual quality is moderate in this area. The primary viewers are Caltrain train passengers, motorists, SAP event goers, residents, pedestrians, and bicyclists. The nearest residential units are multi-story condominiums approximately 0.10 mile west of the station area along Bush Street on the far side of the existing Caltrain tracks. It is likely that residents dwelling in top floor units immediately adjacent to the Caltrain tracks have views of the station area. Given the mix of transient and resident viewers in this area, viewer sensitivity is moderate.

Existing lighting onsite consists of street lights, lighting in the paved parking areas, Caltrain station lighting, and the more substantial lighting associated with the SAP Center, particularly during nighttime public events.

Station entrances and signage would be visible to pedestrians and motorists along Cahill Street, Montgomery Street, and Autumn Street under both the Diridon Station South and North Options, as shown on Figure 4.16-9a.[1] Under the Diridon Station North Option (below), station above-ground facilities would also be visible from Santa Clara and White Streets (see Figure 4.16-9b). The surrounding area is urbanized, and station entrances and signage would be small and designed to be consistent with the mass and scale of the surrounding urban setting and historic Diridon Station. As such, the station entrances would not substantially disrupt views of the existing historic station or of distant hillsides.

The system facilities would be enclosed, but visible to motorists, pedestrians, and bicyclists traveling along Santa Clara Street between Los Gatos Creek and the existing Caltrain corridor. They may also be visible from the existing top-story condominiums located on Bush Street. The surrounding environment in this area is urbanized, and the system facility site would be located within an existing parking lot and shielded from public view by a 9-foot-high CMU wall if publicly visible. It would be designed in mass and scale to maintain consistency with the surrounding environment and would be visually consistent with the surrounding built environment.

There are no scenic vistas close to the station site. The visual changes caused by the aboveground station amenities and system facility sites would not substantially degrade the existing visual character or quality of the surrounding area as they would be designed for consistency and unity with surrounding visual character (mass and scale) of the area. Furthermore, transportation amenities, including the San Jose Diridon Transit Center already exist onsite; thus, the addition of new station portals would not introduce substantial sources of new light or glare to the area. Therefore, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.

[1] The Diridon Station North Option would be visually similar to the Diridon Station South Option from Cahill Street; thus, there is no separate visual simulation for the Diridon Station North Option in this location.

Existing view of the Diridon Caltrain Station (view to the northwest from Cahill Street)

Diridon Station South Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Figure 4.16-9a
Key Viewpoint 8: Diridon Station South Option – Looking Northwest
VTA's BART Silicon Valley–Phase II Extension Project

Existing view of the intersection of Santa Clara and White Street (looking northeast)

Diridon Station North Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics … 00332.13 (1-26-2016)

Figure 4.16-9b
Key Viewpoint 9: Diridon Station North Option – Looking Northeast
VTA's BART Silicon Valley–Phase II Extension Project

Diridon Station North Option

The aboveground components at the Diridon Station North Option include two station entrances, at-grade emergency exhaust ventilation hatches at each end of the station with ventilation shafts extending 12 feet above ground, and a systems facility site for a TPSS, auxiliary power substation, emergency generator, and ventilation structures at the east end of the station between Autumn Street and Montgomery Street. Under the Single-Bore Option, the westernmost fresh air intake and tunnel ventilation shaft would be located on the west side of the Caltrain tracks, adjacent to White Street. Under the Twin-Bore Option, these facilities would be located east and immediately adjacent to the existing Caltrain tracks. Refer to Figure 4.16-9b for a visual simulation of the above-ground systems facility.

System facilities sites would be approximately 12 feet high and surrounded by an approximately 9-foot-high CMU wall. This area currently contains paved parking lots and the existing Diridon Caltrain Station.

Continuation of Tunnel Alignment

On the east side of Stockton Avenue between Schiele Avenue and West Taylor Street, there are three alternate locations for a systems facility site that would house a tunnel ventilation facility, auxiliary power substation, and a gap breaker station. This system facilities site would be similar in size to that described for the 13th Street Ventilation Structure. The area is currently occupied by industrial uses and consists primarily of surface parking lots.

Heading north on Stockton Avenue from Schiele Avenue, several street trees and utility power lines are visible. Single-story industrial buildings are dispersed along the northeast side of Stockton Avenue, and mostly small, single-family residences are visible along the southwest side of Stockton Avenue. Approaching West Taylor Street, billboards and large towers associated with a concrete company are visible. Given the predominately industrial uses in this area, the visual quality is low to moderate.

Viewer groups in this area include residents, motorists, workers, and pedestrians and bicyclists. The nearest residents to the system facilities site are directly across Stockton Avenue; therefore, viewer sensitivity is moderate to high.

There are no scenic vistas in the vicinity. All three alternate ventilation structure locations would be in the existing industrial area. The surrounding area is urbanized, and the size and mass of the ventilation structure would be designed to be consistent and unified with the surrounding urban environment and would be screened from public view by a CMU wall. Thus, the ventilation structure would not substantially degrade the existing visual quality of the area. Furthermore, the visible structures would be screened from public view, and no substantial light or glare impacts would result. Therefore, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.

City of Santa Clara Visual Study Area

Newhall Maintenance Facility

The Newhall Maintenance Facility would be constructed on the former Union Pacific Railroad (UPRR) Newhall Yard. The Newhall Maintenance Facility would include maintenance and engineering offices and a yard control tower (up to three stories high). To provide for these functions, several buildings and numerous transfer and storage tracks would be constructed onsite. An onsite system facility would house a TPSS and other required facilities.

The visual character in the southwest quadrant adjacent to the Newhall Maintenance Facility site is dominated by modern style multi-story condominiums. Past Campbell Avenue in the northwest quadrant, El Camino Real is a six-lane street separated by a small, landscaped median. There are several street trees lining both sides of El Camino Real, and residential uses transition to large-scale, modern offices, and commercial uses line the north side of the street. Buildings of large mass and scale are also located along the south side of El Camino Real; however, they are set back, which provides an open visual environment. On the northeast side of the Newhall Maintenance Facility in the northeast quadrant, the visual character is defined by overhead power lines, and one- and two-story industrial and commercial buildings. The southeast quadrant is defined by the large Avaya Stadium and some light industrial uses. Viewer groups in this area include motorists, train passengers, residents, students, bicyclists, pedestrians, and workers. Viewer sensitivity along the southwest side of the Newhall Maintenance Facility site is moderate given the residential and commercial uses, and is low to the northeast given the dominance of industrial uses.

There are no scenic vistas in the vicinity of the Newhall Maintenance Facility. The Newhall Maintenance Facility would be designed to be consistent with the existing mass and scale of the surrounding areas. Additionally, the facilities would be located within the existing UPRR Newhall Yard and thus would blend with the existing visual character of the area. Therefore, the Newhall Maintenance Facility would not substantially degrade the existing visual character or quality of the surrounding area. The yard control tower would be up to three stories tall and would be the most visible facility to offsite viewers. However, given the urban/industrial landscape in the area, no substantial adverse visual effects would be expected. Additionally, the only buildings that are directly adjacent to the Newhall Maintenance Facility are the multi-story condominiums, along the southwest side of the facilities. Given that these are shielded from the system facilities site by a large retaining wall, no substantial light or glare impacts are anticipated. Therefore, the impact on visual quality and aesthetics would be *no adverse effects.* No mitigation would be required.

Santa Clara Station

The Santa Clara Station would be at grade, centered at the west end of Brokaw Road, and would contain a boarding platform with a mezzanine level one level below grade. The systems facility at the Santa Clara Station would be no more than 20 feet high. Figures 4.16-10 and 4.16-11 represent typical views of the Santa Clara Station area.

A parking structure with up to five levels would be located north of Brokaw Road and east of the Caltrain tracks and would accommodate approximately 500 BART park-and-ride parking spaces. The area was formerly occupied by a FedEx shipping and receiving facility but is currently vacant, and a large retail center is immediately adjacent to the northwest. Industrial buildings and Mineta San Jose International Airport are located to the north and northeast. The existing Caltrain tracks and station are located to the south. The parking structure would be constructed in a primarily industrial area, and the bulk and height of the structures would be similar to those of the existing industrial buildings.

Given that the uses currently onsite and immediately adjacent to the new station and parking structure are primarily commercial and industrial, visual quality in the area is low to moderate. Viewer groups in this area primarily consist of motorists, train passengers, pedestrians, bicyclists, and workers and visitors to the police station and the commercial/industrial areas. Given the transient nature of viewer groups, viewer sensitivity is low to moderate.

The BART station and new parking structure would be a dominant visual feature in this area. The surrounding area is developed with existing institutional and industrial uses, roadways, railroad right-of-way, and other transportation-related infrastructure. The addition of the station and parking structure would be visually compatible with the surrounding land uses, and would not substantially degrade the existing visual character or quality of the surrounding area. The station would strengthen the railroad/transportation aesthetic of the immediate area. The BART station and associated components would create a denser urban aesthetic environment, and the facilities would not block any scenic views as none have been identified in the vicinity.

At night, lighting from the BART station and parking structure would be designed to maintain consistency with the existing Santa Clara Caltrain Station lighting and would help to create a safe environment. There are no light-sensitive land uses (i.e., residences) in the immediate vicinity of the new facilities, and design measures would be implemented to reduce spillover of light. Furthermore, the area already has existing lighting associated with the Santa Clara Police Station and streetlights along roadways and sidewalks. Therefore, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.

Existing view of the Santa Clara Caltrain Station (view to the northeast from El Camino Real)

Santa Clara Station – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

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Figure 4.16-10
Key Viewpoint 10: Santa Clara Station – Benton Street and El Camino Real
VTA's BART Silicon Valley–Phase II Extension Project

Existing view of the Santa Clara Caltrain Station and Platform (view to the northwest from the Santa Clara Caltrain Station platform)

Santa Clara Station – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2016.

Graphics ... 00332.13 (1-26-2016)

Figure 4.16-11
Key Viewpoint 11: Santa Clara Station Platform
VTA's BART Silicon Valley–Phase II Extension Project

Tree Removal

As described in detail in Section 5.5.4, *Biological Resources and Wetlands*, construction would include removing street- and other trees to accommodate BART Extension features and clear construction staging areas. Existing tree species occur within or in the vicinity of the Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara Station areas are predominantly landscaping trees and would be removed during construction. As described in Mitigation Measure BIO-CNST-H (see Chapter 5, Section 5.5.4), tree removal would comply with the overall intent of local tree ordinances, and therefore replacement trees would be planted or in lieu fees paid to mitigate the effects. Therefore, there would be *no adverse effect*.

4.16.5 NEPA Conclusion

The BART Extension Alternative impact on aesthetics and visual quality would result in *no adverse effect*. Trees that would be removed due to construction activities would be inventoried and noted on construction plans before construction begins. Any trees that are removed will be compensated for according to local tree ordinances (refer to Mitigation Measure BIO-CNST-I); no additional mitigation would be required. VTA would continue to work with city, community, and business groups in developing a BART Extension Alternative that would be integrated into the surrounding streetscape.

4.17 Water Resources, Water Quality, and Floodplains

4.17.1 Introduction

This section describes the affected environment and environmental consequences related to water resources, water quality, and floodplains from operation of the NEPA Alternatives. The discussion of existing conditions below is based on information from *VTA's BART Silicon Valley—Phase II Extension Project Hydrology and Water Quality Technical Report* (WRECO 2016a) and *VTA's BART Silicon Valley—Phase II Extension Project Location Hydraulic Study* (WRECO 2016b).

4.17.2 Existing Conditions and Regulatory Setting

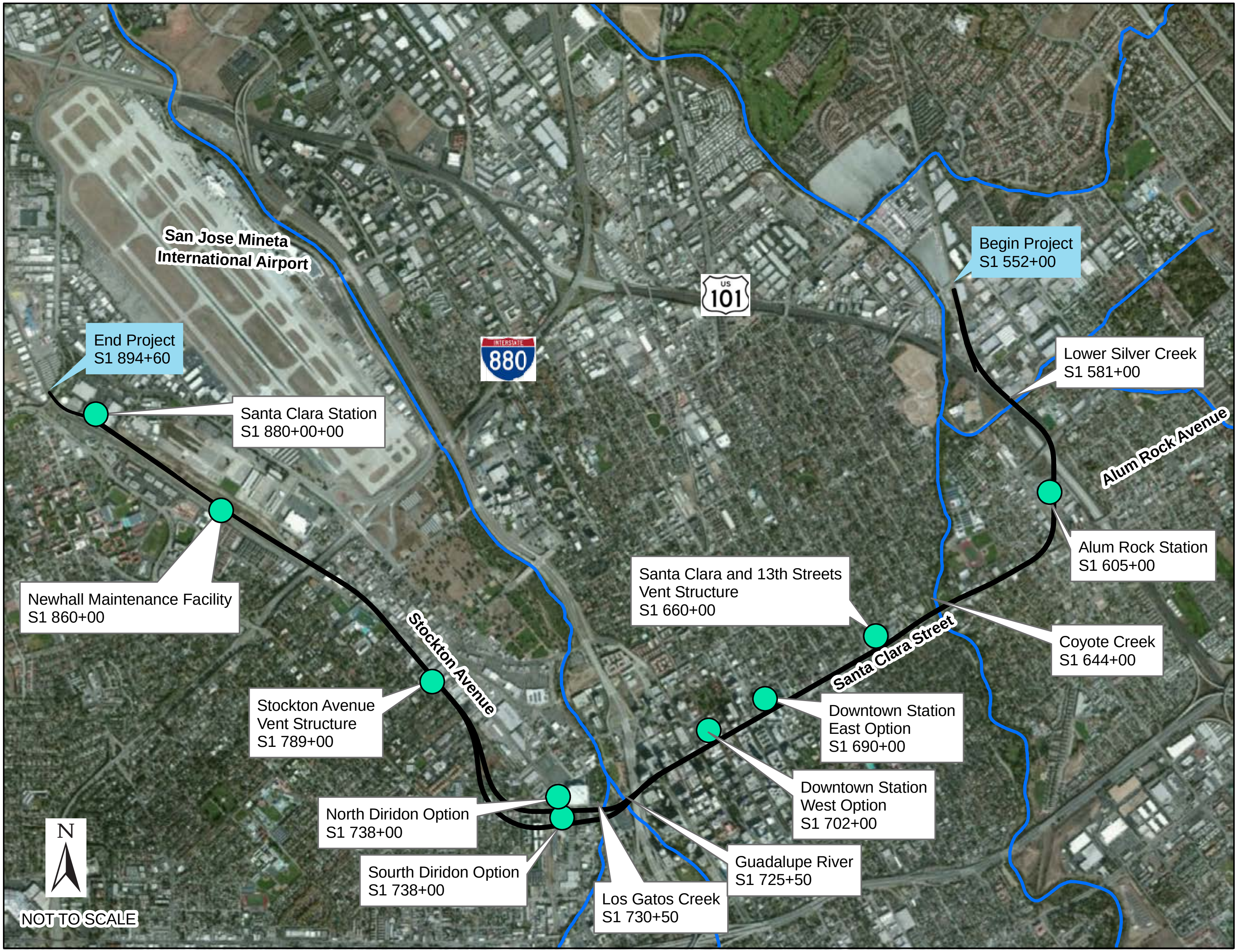
4.17.2.1 Environmental Setting

This section discusses existing conditions related to water resources, water quality, and floodplains in the study area.

Surface Water Hydrology

Creek and River Crossings

The BART Extension is within four watersheds: Lower Silver Creek, Coyote Creek, Guadalupe River, and Los Gatos Creek. All four watersheds within the study area limits ultimately discharge to South San Francisco Bay. The alignment would cross four water bodies: Lower Silver Creek, Coyote Creek, Los Gatos Creek, and the Guadalupe River (receiving water bodies for the stations) (Figure 4.17-1, Table 4.17-1) (WRECO 2016b).



Source: VTA, 2016.

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Figure 4.17-1
Waterways Crossing the Study Area
VTA's BART Silicon Valley–Phase II Extension Project

Table 4.17-1: Creek and River Crossings

Approximate Creek Crossing Station	Waterway	Drainage Area (square miles)	Drainage Area (acres)	1% Flood Discharge[a] (cubic feet per second)
S1 581+00	Lower Silver Creek	44	28,160	2,670
S1 644+00	Coyote Creek	247	158,080	12,500
S1 725+50	Guadalupe River	144	92.160	10,000
S1 732+25	Los Gatos Creek	54.8	35,072	7,980

Source: WRECO 2016b.

[a]. Federal Emergency Management Agency's Santa Clara County Flood Insurance Study.

Coyote Creek

The Coyote Creek watershed is the largest watershed in the Santa Clara Basin. It drains approximately 247 square miles (158,080 acres) from the Diablo Range on the east side of the Santa Clara Basin. Coyote Creek originates in the mountains northeast of the City of Morgan Hill, then flows northwest for 42 miles before flowing into Lower San Francisco Bay. At the base of the Diablo Range, Coyote Creek is impounded by two dams that form Coyote Reservoir and Anderson Reservoir.

Lower Silver Creek

Lower Silver Creek is one of the tributaries that drain to Coyote Creek. The Lower Silver Creek watershed drains approximately 44 square miles (28,160 acres). Lower Silver Creek originates near Silver Creek Road in San Jose and flows northerly to the Lake Cunningham area. It then flows in a northwesterly direction to its confluence with Coyote Creek in the City of San Jose.

The Santa Clara Valley Water District (SCVWD), in cooperation with the Natural Resources Conservation Service and the Guadalupe Coyote Resource Conservation District, proposed an approximately 4.4-mile-long section of Lower Silver Creek between its confluence with Coyote Creek and Lake Cunningham to provide flood protection from a 1 percent annual chance event. The construction for Reach 1 through Reach 3 of this six-reach flood control project was completed in 2006. As a result of this flood protection effort, the area northeast of the US 101/Lower Silver Creek crossing is no longer within a floodplain. However, the area south of the Lower Silver Creek remains within the base floodplain because this area is within the commingled floodplain of both Lower Silver Creek and Coyote Creek. Upon completion of all six reaches and Lake Cunningham, SCVWD and the City of San Jose will be able to demonstrate to FEMA that all homes and businesses subject to the 1 percent annual chance flood from Lower Silver Creek have been protected. Work on Reaches 4–6 are on-going and according to SCVWD will run through December 2017.

Guadalupe River

The Guadalupe River watershed drains approximately 144 square miles (92,160 acres). It originates in the eastern Santa Cruz Mountains near the summit of Loma Prieta in Los Gatos. The Guadalupe River begins on the valley floor at the confluence of Alamitos Creek and Guadalupe Creek, just downstream of Coleman Road in San Jose. It then flows north for approximately 14 miles before discharging into the Lower South San Francisco Bay from Alviso Slough.

Los Gatos Creek

Los Gatos Creek, which originates in the Santa Cruz Mountains at an elevation of 3,483 feet, follows State Route (SR) 17 as it winds through the mountains. Upstream of the SR 17 crossing, the creek flows primarily in a natural channel; however, downstream of the crossing, some portions of the channel have been straightened. Downstream of SR 85, the creek continues parallel to SR 17 until it outfalls into the Guadalupe River in downtown San Jose.

Drainage Patterns

Runoff from the study area drains to an existing conveyance system, which consists of pipes, culverts, inlets, earth ditches, and natural swales and ponds. This existing conveyance system is tied to local rivers and creeks, which ultimately drain to South San Francisco Bay.

Flooding

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were used to identify the base floodplain, or the area with a 1 percent annual chance of an exceedance event, within the limits of the BART Extension Alternative. The BART Extension Alternative area contains all FIRM Special Flood Hazard Area (SFHA) categories (i.e., zones AE, AO, A, AH, D, X [shaded], and X [unshaded]), as shown in Figures 4.17-2 through 4.17-5. Zone AE is within the 100-year floodplain zone and represents areas with a 1 percent chance of flooding. Zone AO is within the 100-year floodplain zone and represents areas with a 1 percent chance of shallow flooding (usually sheet flow on sloping terrain), with specified flood depths of 1 to 3 feet. Zone A represents areas with a 1 percent annual chance of flooding (base flood elevations have not been determined for this zone). Zone AH is within the 100-year floodplain zone and represents areas with a 1 percent annual chance of shallow flooding, with specified flood depths of 1 to 3 feet. There are also portions of the BART Extension Alternative within Zone D, Zone X (shaded), and Zone X (unshaded). Possible but undetermined flood hazards can occur within Zone D; this area is not considered a SFHA, and no analysis of flood hazards has been conducted. Zone X (unshaded) includes areas where minimal flooding can occur, with elevations higher than areas with a 0.2 percent annual chance of flood event. Zone X (shaded) is an area with a moderate flood hazard, usually the area between the limits of 100- and 500-year floods (includes areas affected by a 0.2 percent annual chance of flood) (WRECO 2016b).

FEMA's 2009 *Flood Insurance Study: Santa Clara County and Incorporated Areas* was used to obtain existing floodplain information and supplement data provided by the FIRMs. The flood insurance study (FIS) provides hydrologic information and explains the methods of analysis that were used to generate the floodplain shown on the FIRMs. The FIS also includes profiles of the floodplain elevations. Table 4.17-2 summarizes the hydrologic, hydraulic, and base floodplain information.

Table 4.17-2: Floodplain Information

Approximate Floodplain Station	Flood Source	FIRM Number	Flood Hazard Zone	FIRM Panel Date	100-year Flood Depth (feet)	100-year Water surface elevation (feet)
555+00	Coyote Creek	06085C0251J 06085C0232H	AE	February 19, 2014 May 18, 2009	--	--
555+00	Coyote Creek	06085C0251J	AE (Floodplain)	February 19, 2014	--	82–83
565+00	Lower Silver Creek	06085C0251J	AH	February 19, 2014	--	87
581+00	Lower Silver Creek	06085C0251J	A	February 19, 2014	--	--
605+00	Lower Silver Creek/Coyote Creek	06085C0251J	AH/AO	February 19, 2014	1	89
725+00	Guadalupe River	06085C0234H	A	May 18, 2009	--	--
732+50	Los Gatos Creek	06085C0234H	A	May 18, 2009	--	--
745+00	N/A	06085C0234H	AO	May 18, 2009	1	—
880+00	N/A	06085C0234H 06085C0227H	AH/A	May 18, 2009 May 18, 2009	—	63–66

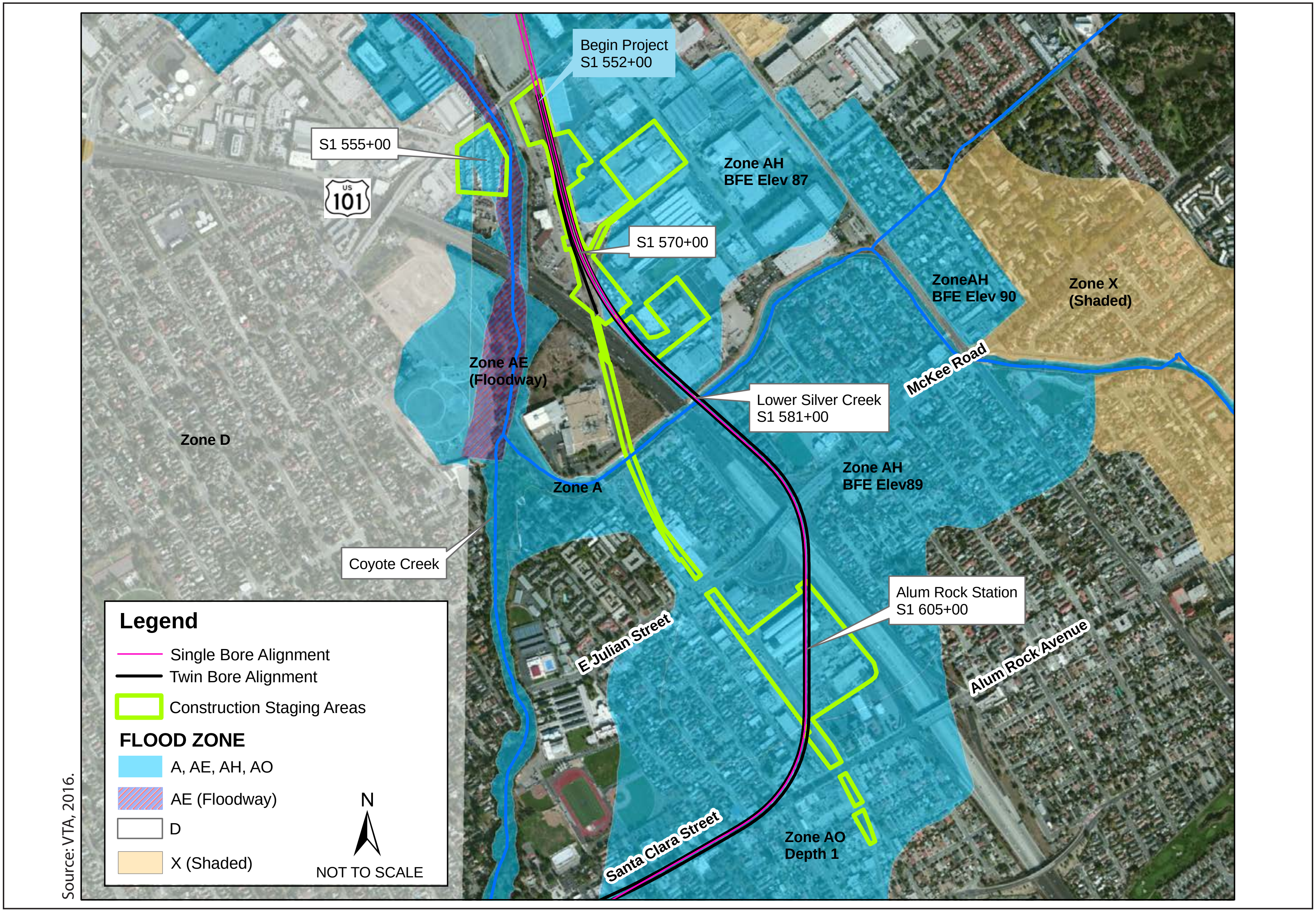

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Figure 4.17-2
Floodplains, Part 1 of 4
VTA's BART Silicon Valley–Phase II Extension Project

Source: VTA, 2016.

Graphics ... 00332.13 (10-13-2016)

Figure 4.17-3
Floodplains, Part 2 of 4
VTA's BART Silicon Valley–Phase II Extension Project

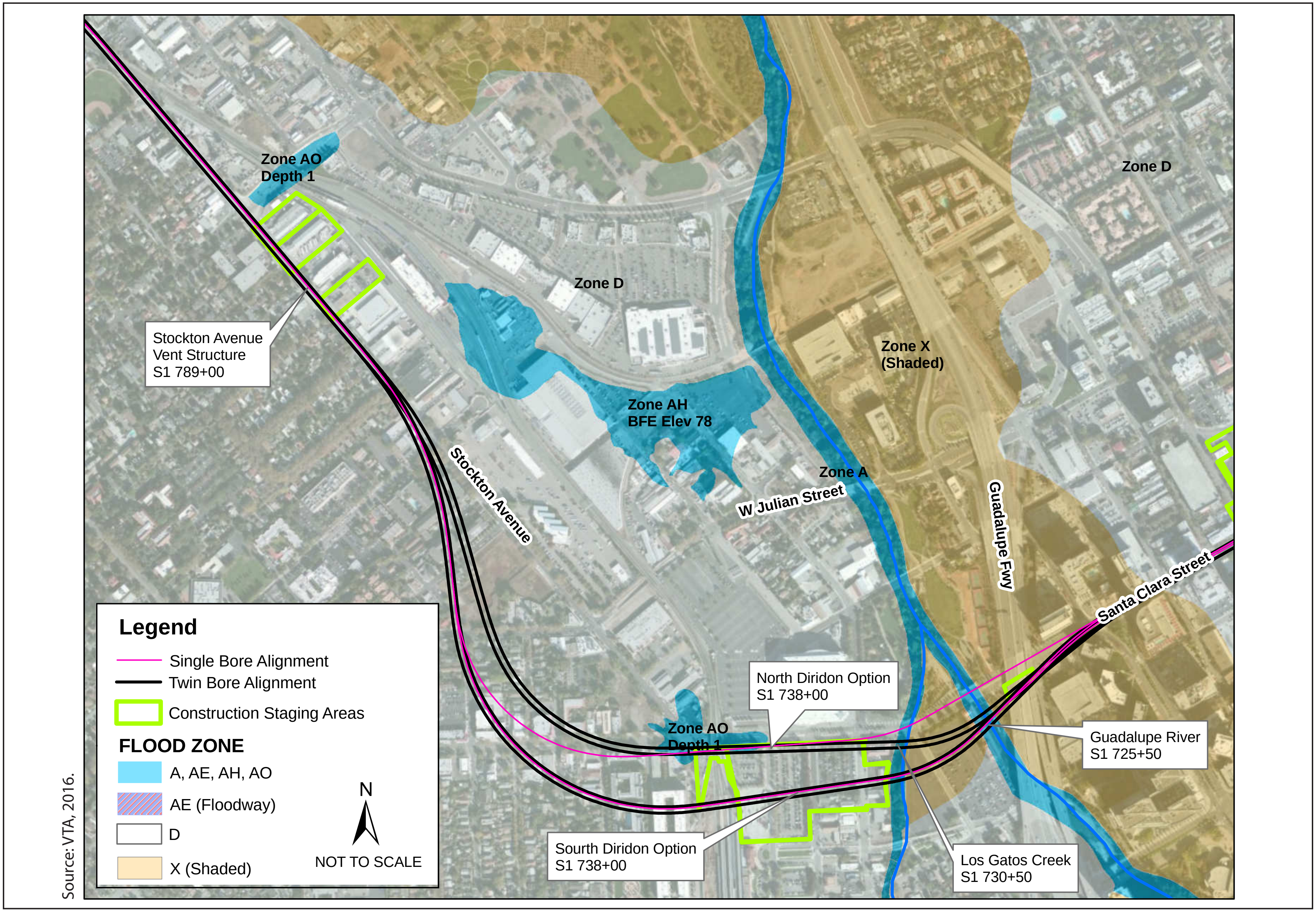

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Figure 4.17-4
Floodplains, Part 3 of 4
VTA's BART Silicon Valley–Phase II Extension Project

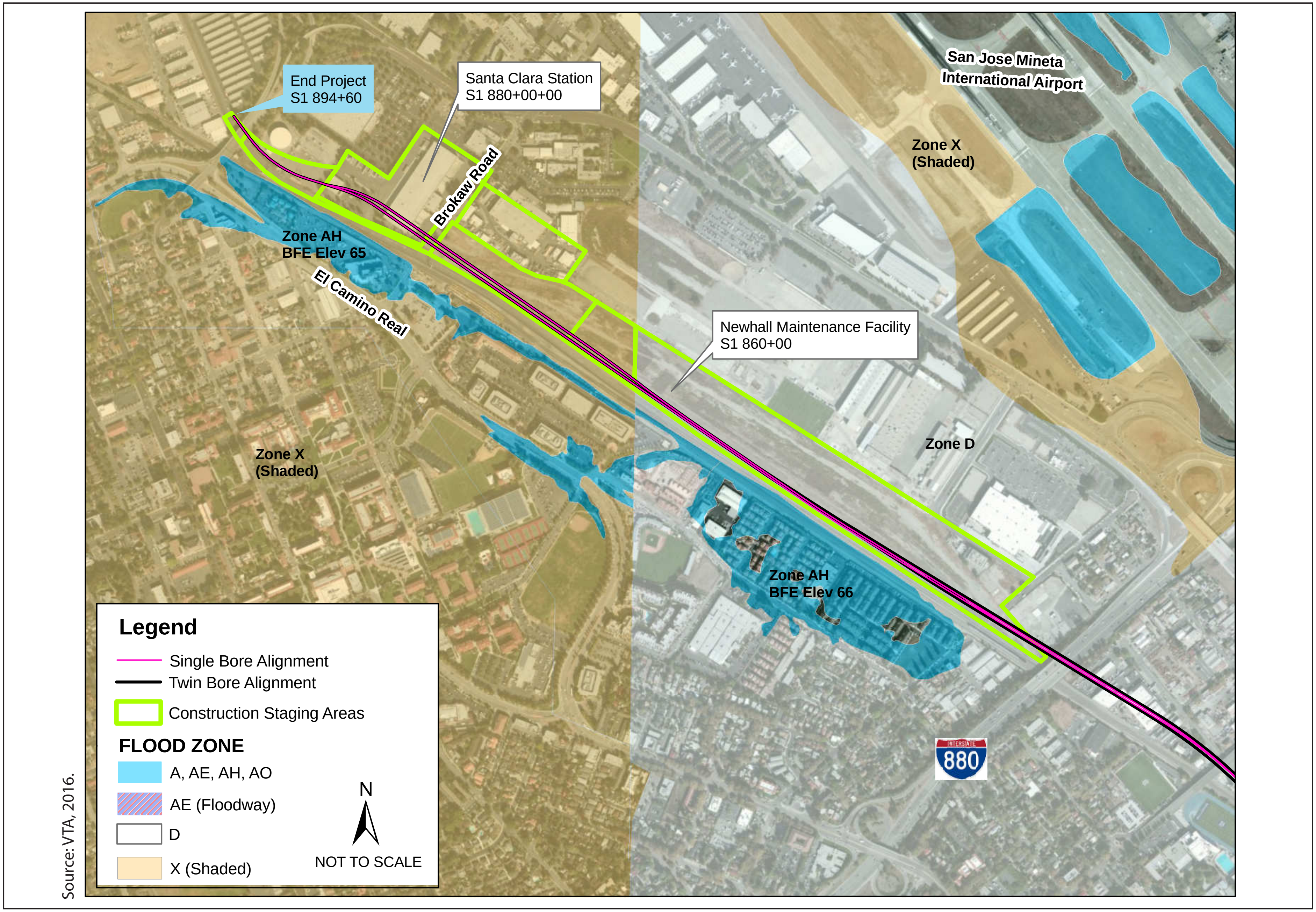

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Figure 4.17-5
Floodplains, Part 4 of 4
VTA's BART Silicon Valley–Phase II Extension Project

Groundwater Hydrology

The BART Extension Alternative is located within the Santa Clara Valley groundwater basin and the Santa Clara subbasin (the subbasin is also known as Coyote Valley). The Santa Clara subbasin occupies a structural trough parallel to the northwest-trending Coast Ranges. To the north, the inland valley is drained by tributaries to San Francisco Bay, including Coyote Creek, the Guadalupe River, and Los Gatos Creek. The Coyote Valley region of the Santa Clara subbasin is fairly shallow, extending to a maximum depth of approximately 500 feet (California Department of Water Resources 2004).

Historically, water level declines from groundwater pumping have induced subsidence in the Santa Clara subbasin and caused degradation of the aquifer adjacent to the bay from saltwater intrusion. As a result of increases in recharge and decreases in pumping, groundwater levels have generally increased since 1965. According to *VTA's BART Silicon Valley—Phase II Extension Project Geotechnical Memorandum* (PARIKH 2014), groundwater has been detected at depths averaging between 14 and 18 feet below ground surface (bgs) in the study area (WRECO 2016a).

4.17.2.2 Water Quality

Water Quality Objectives/Standard Beneficial Uses

The San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) identifies narrative and numerical water quality objectives for the region. The general objectives for the region involve bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, taste and odor, temperature, toxicity, turbidity, and unionized ammonia.

Beneficial uses are critical to water quality management in California. According to state law, the beneficial uses of California's water that may be protected against quality degradation include, but are not limited to, "domestic, municipal, agricultural and industrial supply, power generation, recreation, aesthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning.

The Basin Plan identifies beneficial uses for water bodies within its jurisdiction. Runoff from the BART Extension Alternative area would drain into storm drainage systems of Santa Clara and San Jose. Existing and potential beneficial uses for water bodies in the BART Extension Alternative limits are listed in Table 4.17-3.

Table 4.17-3: Existing and Potential Beneficial Uses

Water Body	MUN	FRSH	GWR	COMM	COLD	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2
Coyote Creek			E	E	E	E	E	E	E	E	E	E
Lower Silver Creek									E	E	E	E
Guadalupe River			E		E	E	E	E	E	E	E	E
Los Gatos Creek	E	E	E		E	P	E	P	E	E	E	P

SOURCE: San Francisco Bay Regional Water Quality Control Board 2015.

MUN = municipal and domestic supply
FRSH = freshwater replenishment
GWR = groundwater recharge
COMM = commercial and sport fishing
MIGR= fish migration
RARE = preservation of rare and endangered species
SPWN = fish spawning
WARM = warm freshwater habitat
WILD = wildlife habitat
REC-1 = water contact recreation
REC-2 = noncontact water recreation
E = existing beneficial use
P = potential beneficial use

The Basin Plan identifies general narrative and numerical water quality objectives for the region.

Existing Water Quality

The BART Extension Alternative site is located within in developed areas of the Cities of San Jose and Santa Clara. The majority of the ground surface is covered by pavement (roads and parking lots) and structures (office and commercial buildings).

Common sources of stormwater pollution in urban areas include construction sites, parking lots, large landscaped areas, and household and industrial sites. Street surfaces are the primary source of pollutants in stormwater runoff in urban areas. Grease, oil, hydrocarbons, and metals deposited by vehicles and heavy equipment can accumulate on streets and paved parking lots and be carried into storm drains by runoff.

Polychlorinated biphenyls (PCBs) are listed as 303(d) impairments in the Lower San Francisco Bay. PCBs can be found in automobile engines and other common items in urban areas. In addition, pesticides, herbicides, fungicides, and fertilizers for landscape maintenance can be washed into storm drains when irrigation exceeds the rate of soil infiltration and plant uptake or when these chemicals are applied in excess. Grading and earthmoving activities associated with new construction can accelerate soil erosion.

Table 4.17-4 shows 303(d)-listed impairments for Coyote Creek, Lower Silver Creek, and the Guadalupe River, based on the 2010 California Integrated Report (State Water Resources Control Board 2011). As shown in the table, diazinon, a pesticide; trash; and mercury are listed as 303(d) impairments in water bodies within the BART Extension Alternative area. Paints, solvents, soap products, and other toxic materials may be inadvertently or deliberately deposited in storm drains in residential and industrial areas. Trash can threaten aquatic life and recreational beneficial uses designated by the Basin Plan. Trash and litter can collect in storm drain inlets and ultimately be discharged into nearby waterways.

Table 4.17-4: 303(d)-Listed Water Bodies

Water Body	Pollutant	Expected TMDL Completion Date	EPA TMDL Approved Date	Potential Sources
Coyote Creek	Diazinon		5/16/2007	Urban runoff/storm sewers
	Trash	2021		Illegal dumping
	Trash	2021		Urban runoff/storm sewers
Lower Silver Creek	Trash	2021		Urban runoff/storm sewers
	Trash	2021		Illegal dumping
Guadalupe River	Diazinon		5/16/2007	Urban runoff/storm sewers
	Mercury	2008		Mine tailings
	Trash	2021		Urban runoff/storm sewers
	Trash	2021		Illegal dumping

EPA = U.S. Environmental Protection Agency; TMDL = total maximum daily load
SOURCE: State Water Resources Control Board 2011.

The receiving water bodies ultimately discharge into the South San Francisco Bay, which is identified on the 303(d) list for the region (see Table 4.15-5 for listed pollutants).

Table 4.17-5: 303(d)-Listed Water Body – South San Francisco Bay

Water Body	Pollutant	Expected TMDL Completion Date	EPA TMDL Approved Date	Potential Sources
San Francisco Bay, South	Chlordane	2013		Nonpoint source
	DDT	2013		Nonpoint source
	Dieldrin	2013		Nonpoint source
	Dioxin compounds (including 2,3,7,8-TCDD)	2019		Atmospheric deposition
	Furan Compounds	2019		Atmospheric deposition
	Invasive Species	2019		Ballast water
	Mercury		2/29/2008	Nonpoint source
	Mercury		2/29/2008	Municipal point sources
	Mercury		2/29/2008	Industrial point sources
	Mercury		2/29/2008	Atmospheric deposition
	Mercury		2/29/2008	Natural sources
	Mercury		2/29/2008	Resource extraction
	PCBs	2008		Unknown nonpoint source
	PCBs (dioxin-like)	2008		Unknown nonpoint source
	Selenium	2019		Domestic use of groundwater

DDT = dichlorodiphenyltrichloroethane

Groundwater

In Santa Clara County, almost half of all water used comes from groundwater. In general, groundwater quality in the Santa Clara Valley is good. Throughout most of the region, groundwater quality is suitable for most urban and agricultural uses, with the exception of a few local impairments.

Designated beneficial uses identified for the Santa Clara Valley groundwater basin include municipal and domestic water supply (MUN), industrial process water supply (PROC), and industrial service water supply (IND).

Under existing law, the San Francisco Bay Regional Water Quality Control Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater and are in continuity with surface water cannot cause violations of any applicable surface water standards. In July 2012, the Santa Clara Valley Water District (SCVWD) Board of Directors approved the 2012 Groundwater Management Plan, which describes SCVWD's groundwater basin management objectives.

Groundwater Quality

Groundwater contamination can be the result of historical industrial activities, soil contamination, or underground storage tank releases of hazardous materials. According to GeoTracker, leaking underground storage tank cleanup sites are found along the BART Extension, which has a history of soil contamination. A Department of Toxic Substances Control (DTSC) cleanup site is located within the study area (State Water Resources Control Board 2015a).

Baseline Environmental Consulting prepared initial site assessment, which characterized groundwater contamination within the BART Extension Alternative area. The assessment listed 12 known hazardous material release sites and 11 potential hazardous materials that could affect the soil and/or groundwater within the BART Extension Alternative limits. Groundwater monitoring results show that water quality ranges from good to excellent for all major zones in the Santa Clara Basin. In general, contaminants are not detected. However, in some areas, groundwater that has been contaminated by hazardous material releases has spread underneath the railroad corridor. SCVWD has been largely successful in its efforts to prevent groundwater overdraft, curb land subsidence, and protect water quality (WRECO 2016a)

4.17.2.3 Regulatory Setting

The federal regulations discussed below are applicable to the study area. Executive Order (EO) 13690, which amends EO 11988, Floodplain Management, directs all federal agencies to avoid conducting, allowing, or supporting construction in the base floodplain. EO 13690 also directs federal agencies to take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by the floodplain. The primary federal law for regulating water quality is the federal Clean Water Act (CWA). The U.S. Environmental Protection Agency (EPA) has delegated enforcement of the CWA in California to the State Water Resources Control Board (State Water Board) and its nine Regional Water Quality Control Boards (Regional Water Boards). All BART Extension-related activities need to be in compliance with, at a minimum, the CWA, the California Water Code's Porter-Cologne Water Quality Control Act (Porter-Cologne Act), and the Basin Plan (San Francisco Bay Regional Water Quality Control Board 2015). Chapter 6, Section 6.15, *Water Resources*, provides further details regarding state and local regulations related to water resources.

Federal

Clean Water Act

Several sections of the CWA pertain to regulating impacts on waters of the United States. The CWA sections discussed below pertain to the BART Extension. The term *waters of the United States* essentially refers to all surface waters, such as navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters. The EPA is the overarching authority for protecting the quality of waters of the United States. However, the State Water Board regulates waters of the United States and State under CWA Sections 303, 401 and 402, and the U.S. Army Corps of Engineers (USACE) has jurisdiction over waters of the United States under CWA Section 404.

CWA Sections 303 and 402 apply to the BART Extension because of potential effects on water quality. CWA Sections 404 and 401 apply to wetlands and other waters of the United States and are not discussed further because the BART Extension would not involve work within water features.

Section 303—Impaired Waters

The state of California adopts water quality standards to protect beneficial uses of waters of the state, as required by Section 303(d) of the CWA and the Porter-Cologne Act. Section 303(d) of the CWA established the total maximum daily load (TMDL) process to guide the application of state water quality standards (refer to the discussion of state water quality standards below). To identify candidate water bodies for TMDL analysis, a list of water quality–limited segments was generated by the State Water Board. These stream or river segments are impaired by the presence of pollutants such as sediment and are more sensitive to disturbance because of this impairment.

In addition to the impaired water body list required by CWA Section 303(d), CWA Section 305(b) requires states to develop a report for assessing statewide surface water quality. Both CWA requirements are being addressed through development of a 303(d)/305(b) Integrated Report, which will address both an update to the 303(d) list and a 305(b) assessment of statewide water quality. The State Water Board developed the statewide 2010 California

Integrated Report, which was based on the integrated reports from each of the nine Regional Water Boards. The 2010 California Integrated Report was approved by the State Water Board on August 4, 2010, and approved by EPA on November 12, 2010. The 2012 California Integrated Report with 303(d) listings was adopted by the State Water Board on April 8, 2015 (Resolution 2015-0021).

Drainage from the BART Extension Alternative area ultimately discharges into the San Francisco Bay. The 303(d)-listed impairments for the Lower San Francisco Bay are shown in Table 4.17-3.

Section 402—National Pollutant Discharge Elimination System

The 1972 amendments to the federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point-source discharges, or discharges that one can point to as a known source of pollutants. NPDES is the primary federal program that regulates point-source and nonpoint-source discharges to waters of the United States.

The 1987 amendments to the CWA created a new CWA section, which is devoted to stormwater permitting (Section 402). EPA has granted the state of California primacy in administering and enforcing the provisions of the CWA and NPDES within state boundaries.

NPDES permits are issued by one of the nine Regional Water Boards. Section 402(p) requires permits for discharges of stormwater from industrial, construction, and Municipal Separate Storm Sewer Systems (MS4s). The following NPDES permits are relevant to the BART Extension Alternative:

- San Francisco Bay Municipal Regional Permit (for City owned areas)
- Small Municipal Separate Storm Sewer System General Permit (for VTA property)
- Construction General Permit
- Industrial General Permit (for Newhall Maintenance Facility)
- Utility Vault and Dewatering Permit (for operations as needed)

San Francisco Bay Municipal Regional Permit

This permit ensures attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat and applies to City-owned areas that may be impacted by the BART Extension. This permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the State Water Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in section 402(p) of the CWA. In addition, this permit contains water quality-based effluent limitations to implement TMDLs. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this permit is deemed compliance with the requirements of this permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the State Water Board may invoke Provision C.1 and C.18 to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the permit will be pursued against individual Permittee(s) responsible for specific violations of the permit.

Small Municipal Separate Storm Sewer Systems General Permit

The State Water Board's Waste Discharge Requirements for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (General Permit) (Order No. 2013-0001-DWQ [Phase II MS4 Permit]) regulates stormwater discharges from municipalities and agencies that are not covered under an individual MS4 permit or Phase I MS4 permit. The State Water Board has identified VTA and BART as non-traditional small MS4s that are covered under the Phase II MS4 Permit. The State Water Board or the Regional Water Board issues NPDES permits for 5 years; permit requirements remain active until a new permit has been adopted.

Construction General Permit

The State Water Board's NPDES Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No, 2009-0009-DWQ, as amended by subsequent orders), or commonly known as the Construction General Permit (CGP), regulates stormwater discharges from construction sites that result in a disturbed soil area of 1 acre or greater. For all projects that are subject to the CGP, applicants are required to develop and implement an effective Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must list BMPs that the discharger will use to protect stormwater runoff and document the placement and maintenance of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants, to be implemented in case of a BMP failure; and a monitoring plan for turbidity and pH for projects that meet defined risk criteria (State Water Resources Control Board 2015b). The requirements of the SWPPP are based on the construction design specifications detailed in the final design plans for a project and the hydrology and geology expected to be encountered during construction. The local or lead agency requires proof of coverage under the CGP prior to issuance of the building permit. The SWPPP is submitted to the State Water Board, and a copy is kept at the jobsite where it is updated during different phases of construction.

The CGP separates projects into risk levels 1, 2, or 3. The determination of risk level is based on the potential for erosion and sediment transport to receiving waters. Requirements are applied according to the risk level determined. Because the area of land disturbance would be greater than 1 acre, a CGP would be required for activities.

It was determined that all four watersheds, Coyote Creek, Lower Silver Creek, Los Gatos, and the Guadalupe River, were risk level 2 and therefore subject to temporary construction site BMP implementation and visual monitoring requirements. Additionally, risk level 2 projects are subject to Numeric Action Levels for pH and turbidity associated with stormwater runoff. The BART Extension risk levels will be further evaluated and verified during the plans, specifications, and estimate phase.

Industrial General Permit

The State Water Board and Regional Water Boards regulate all specified industrial activities under the Waste Discharge Requirements for Discharges of Stormwater Associated with Industrial Activities, Excluding Construction Activities (Industrial General Permit, State Water Board Order No. 97-03-DQ, NPDES General Permit No. CAS000001). On April 1, 2014, the State Water Board adopted the new statewide Industrial General Permit (WQO No. 2014-0057-DWQ), which became effective on July 1, 2015, and supersedes the existing Industrial General Permit (97-03-DWQ). The Industrial General Permit requires the implementation of management measures that achieve the performance standard of best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT). The Industrial General Permit also requires development of a SWPPP and a monitoring plan. Through the SWPPP, sources of pollutants are identified, and the means for managing the sources and reducing stormwater pollution are described. Any Industrial General Permit noncompliance constitutes a violation of the CWA and the Porter-Cologne Act and is grounds for (a) enforcement action; (b) Industrial General Permit termination, revocation and reissuance, or modification; or (c) denial of an Industrial General Permit renewal application. The BART Extension would be a Category 8 industrial discharger because of the associated maintenance facilities (Category 8 includes transportation facilities that conduct any type of vehicle maintenance, such as fueling, cleaning, repairing, etc.) and therefore subject to conditions of the Industrial General Permit.

Utility Vault and Dewatering Permit

This permit is intended to authorize short-term intermittent discharges of pollutants to surface waters from dewatering of utility vaults and underground structures. The BART Extension would likely involve dewatering of vaults during operations. To be covered, discharges must meet the following criteria: pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an exceedance in a receiving water of any applicable criterion established by the EPA pursuant to CWA Section 303; pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an exceedance in a receiving water of any water quality objective adopted by the State Water Board or Regional Water Boards including prohibitions of discharge for the receiving water; and the discharge does not cause acute or chronic toxicity in the receiving water.

National Flood Insurance Program

In response to increasing costs of disaster relief, Congress passed the National Flood Insurance Act (NFIP) of 1968 and the Flood Disaster Protection Act of 1973. FEMA administers the NFIP to provide subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains. A FIRM is the official FEMA-prepared map of a community; it delineates both the special flood hazard areas and flood risk premium zones that are applicable to the community.

The BART Extension Alternative contains all FEMA-designated flood zones (i.e., zones AE, AO, A, AH, D, X [shaded], and X [unshaded]). More information is provided in Section 4.17.2.1, *Environmental Setting.*

4.17.3 Methodology

For the analysis of impacts on hydrology and water resources, an *adverse effect* determination means the BART Extension would contribute to a violation of regulatory standards or an exceedance of the capacity of existing facilities.

4.17.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to the National Environmental Policy Act (NEPA), using the criteria (i.e., context and intensity) identified in Section 4.17.3, *Methodology*. This section also identifies design commitments, BMPs, and other measures to avoid, minimize, or mitigate impacts.

4.17.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). Under the No Build Alternative, the effects of the current built environment on surface waters would continue, including effects from continued operation of roads, transit vehicles, highways, and transit facilities. Higher vehicle traffic is expected, which could degrade water quality because of increased pollutants in stormwater from roadways and associated vehicular use. Projects planned under the No Build Alternative would most likely include BMPs to reduce pollutants from stormwater runoff that are consistent with the Santa Clara Valley Urban Runoff Pollution Prevention Program NPDES permits, the NPDES General Industrial Stormwater Permit, MS4 permits, and/or General

Waste Discharge Requirements. Projects under the No Build Alternative would be designed in accordance with regulatory requirements and agency criteria from FEMA, SCVWD criteria and engineering guidelines, and the municipal codes of the local cities. Projects planned under the No Build Alternative would undergo separate environmental review to define effects on water resources and quality.

4.17.4.2 BART Extension Alternative

Potential impacts on water resources (i.e., surface waters, groundwater, floodplains) and water quality are discussed below. Potential erosion impacts are also discussed because they have the potential to affect the BART Extension.

Surface Waters

Surface water quality may be affected by polluted stormwater runoff from station areas, parking lot structures, kiss-and-ride facilities, access roads, the Newhall Maintenance Facility, and other sites that have impervious surfaces. Runoff from impervious surfaces could contain nonpoint-source pollution, which is typical of urban settings and commonly associated with automobiles, trash, cleaning solutions, and landscaped areas. Grease, oil, hydrocarbons, and metals deposited by vehicles and heavy equipment can accumulate on streets and paved parking lots and be carried into storm drains by runoff. Stormwater would be drained by a combination of new and existing pipes, drainage inlets, and other storm drain facilities. Runoff from the BART Extension would be conveyed to local storm drain systems and ultimately to South San Francisco Bay.

The BART Extension would be designed in accordance with the Phase II MS4 Permit, Section F.5.g, for post-construction stormwater management. BART would operate the system in accordance with the Phase II MS4 Permit for the guideway and systems and other facilities that they would be operating. VTA would apply the MS4 Permit for the station campuses and other facilities where BART is not the operator.

VTA developed a *Stormwater and Landscaping Design Criteria Manual* (effective June 30, 2015) to assist VTA engineers with incorporating the post-construction stormwater requirements of the small MS4 permit into VTA operated facilities. Following VTA’s *Stormwater and Landscaping Design Criteria Manual*, VTA would implement BMPs and post-construction stormwater treatment measures because the BART Extension would replace or create more than 5,000 square feet of impervious surfaces. The criteria and standards are similar to those of the Santa Clara Valley Urban Runoff Pollution Prevention Program guidelines. Stormwater treatment designs would preferentially utilize site design measures, source-control BMPs, and Low-Impact Development (LID) treatment features. Generally, the LID measures would include vegetative improvements, which must comply with VTA’s Sustainable Landscaping Policy.

To minimize any adverse effects on water quality due to stormwater runoff, stormwater management measures are included as part of the design. These would utilize LID techniques to reduce pollutant discharges and BMPs to reduce pollutants from stormwater runoff, consistent with VTA's *Stormwater and Landscaping Design Criteria Manual*, the Santa Clara Valley Urban Runoff Pollution Prevention Program stormwater handbook, City of San Jose and Santa Clara NPDES permits, MS4 permits, and/or General Waste Discharge Requirements as applicable. In the design phase, specifications and design details would be further developed to include site-specific source control, LID, and post-construction stormwater treatment measures.

A new drainage system may be required to capture stormwater throughout the BART Extension Alternative area. The drainage system may include detention basins, which detain water temporarily to reduce peak discharges before slowly releasing the water to the storm sewer system by gravity flow. Regardless of whether water is released to the storm sewer system through the detention basins or through direct discharge, the BART Extension would comply with applicable NPDES and/or MS4 permit requirements and include BMPs to reduce pollutants from stormwater runoff. In addition, BMPs and LID measures would be implemented to minimize erosion, siltation, and/or flooding (WRECO 2016a).

No effects on surface waters are anticipated because of the depth of the tunnels, which would be constructed below the water table, at an average depth of 40 feet below ground at the crown (i.e., top of the tunnel) for the Twin-Bore Option and an average depth of 70 feet below ground at the crown for the Single-Bore Option. The track alignment would be underground until the End-of-the-Line Maintenance Yard. The Twin-Bore Option would pass approximately 25 feet below Coyote Creek, under the retaining wall at the Guadalupe River (at the lowest point in the tunnel alignment, approximately 45 feet below the Guadalupe River), and approximately 20 feet below Los Gatos Creek (WRECO 2016a).

Under the Phase II MS4 Permit, the BART Extension Alternative would be required to use BMPs and permanent erosion control measures because it would replace or create more than 5,000 square feet of impervious surfaces. With application of the Phase II MS4 Permit, the BART Extension Alternative would not contribute any detectable concentrations of diazinon or mercury to any watercourses within the study area that have been identified as impaired by the Regional Water Board, pursuant to Section 303(d) of the federal CWA. The BART Extension Alternative would not violate water quality standards or waste discharge requirements or provide substantial additional sources of polluted runoff. *No adverse effect* related to surface waters would result. No mitigation is required.

Groundwater

The BART Extension would add approximately 44.99 net acres of impervious area (WRECO 2016a). Compared with existing conditions, the increase in impervious areas at the stations, structured parking, kiss-and-ride facilities, and other sites would be limited. These sites are already developed and therefore would have minimal adverse effect on groundwater recharge. However, to facilitate groundwater recharge, if necessary, engineered methods that either allow for infiltration or reduce impervious cover would be included in the BART Extension design.

Dewatering would be necessary inside retained cuts, underground stations, and tunnels during operations to keep the facilities dry. The quantity of water to be removed is anticipated to be minimal, and no detectable changes to the groundwater supply would occur. The retained cuts and underground stations would be designed to prevent water intrusion, and the tunnels would be sealed. Landscape design features at station areas and potentially the BART trackways that are being considered include planting native, drought-resistant plants; using low-flow fixtures; increasing pervious surfaces with use of porous paving and unit pavers; capturing surface flow with bioretention basins and rain gardens, and using soil-water separators and other filters.

A dewatering plan would be required as part of the Contractor's SWPPP for any dewatering proposed up to 10,000 gallons per day. Water quality sampling and analysis would be required prior to any discharge into the sanitary sewer, storm drainage system, or downstream receiving water bodies. For areas of known contamination and where pumping will exceed 10,000 gallons per day, the CGP may not be used for dewatering, and a separate NPDES permit for Structural Dewatering, VOC contaminated groundwater, and/or a project-specific Waste Discharge Requirements (WDR) permit would be needed to address potential contamination of groundwater and treatment needed prior to discharge.

Tunnel structures and underground stations may affect groundwater flow direction and pathways, resulting in the diversion of the normal flow of groundwater, the mounding of groundwater upgradient of the aforementioned facilities, or a localized rise in the water table. To minimize these adverse effects, highly permeable gravel channels and/or slotted PVC pipes would be placed in areas where water would be routed around a sealed tunnel to minimize effects on groundwater paths and directions. In addition, tunnels would be constructed below the water table, at a minimum depth of 20 feet below ground at the tunnel crown (WRECO 2016a). Therefore, groundwater would be able to flow above and below the tunnel structure, and the mounding of groundwater upgradient from the tunnel structure is not anticipated. If any fill material this is placed during construction fails to provide adequate permeability, additional drainage design features could be applied.

The BART Extension would comply with the SCVWD 2012 *Groundwater Management Plan*. The BART Extension would not affect groundwater supply and would have minimal effects on groundwater recharge. It would not alter groundwater flow directions or pathways. There would be *no adverse effect* on groundwater. No mitigation is required.

Floodplains

Several areas in the vicinity of the alignment crossing for the Alum Rock/28th Street Station are within the base floodplain. Ground parking, system facilities, and station entrances and roadway improvements are entirely within the floodplain of Coyote Creek/Lower Silver Creek and occupy a total of approximately 9.25 acres. However, the BART Extension Alternative would remove adjacent buildings that currently occupy approximately 2.77 acres and are also entirely within the same floodplain. The station improvements would add approximately 2.54 acres of added impervious area (AIA) to the floodplain area. The removal of structures (light industrial warehouses) helps with the reducing/offsetting floodplain risk. In addition, it is anticipated that the roadway improvements would not significantly change the existing grade. The Alum Rock/28th Street Station is located within Zone AH, with a base flood elevation of 89 feet (NAVD) and a Zone AO depth of 1 foot. Station features would have a floor elevation of 2 to 3 feet above the base flood elevation, depending on whether the feature is deemed non-critical or critical per Executive Order 13690. Critical facilities such as traction power substations, gap breaker stations, train control and communication buildings, and vent shaft openings, would be set above the 0.2 percent annual storm event. Minimization measures at this station would include balancing pre-fill and post-fill in the floodplain to minimize the amount of fill and prevent flood storage from being lost. Balancing the pre-fill and post-fill would result in *no effect* because flooding would not be exacerbated as a result of the project. The floodflow pattern would be maintained as much as possible by incorporating and providing a flow-through area in the station campus, especially in the parking areas. Storage and detention would be implemented as necessary to make up for storage lost as a result of the BART Extension (WRECO 2016b).

The area of the structures within the base floodplain is insignificant compared with the overall floodplain area for Coyote Creek/Lower Silver Creek (approximately 28,160 acres). Therefore, the BART Extension Alternative would not significantly change the base floodplain water surface elevation (WSE) at Alum Rock/28th Street Station. Although there would be fill in the floodplain as a result of the Alum Rock/28th Street Station, with the minimization measures mentioned above, such as balancing the fill and storage capacity and providing a flow-through area to ensure floodflow is maintained, mitigation measures will not be required (WRECO 2016b). Therefore, floodplain impacts as a result of the BART Extension Alternative would be minimal at Alum Rock/28th Street Station. In addition, after completion of work at all six reaches of the Lower Silver Creek Flood Protection Project, SCVWD and the City of San Jose will be able to demonstrate to FEMA that all homes and businesses that are subject to a 1 percent annual chance flood from Lower Silver Creek have been protected.

The BART Extension would be designed to withstand 10 percent annual storm events, and specific facilities would be designed to withstand 1 percent and 0.2 percent annual storm events, as required by *BART Facility Standards* (Bay Area Rapid Transit 2011). In addition, the design of critical facilities would comply with Executive Order 13690.

The Newhall Maintenance Facility is a critical facility and would be designed in accordance with the standards and requirements for critical facilities. The Newhall Maintenance Facility would add approximately 2.16 acres of structures, and the AIA would be 41.86 acres, within Zones D and Zone X (shaded). These areas are not considered a base floodplain. According to the *Hydraulic Study* (WRECO 2016b), critical facilities, including traction power, train control, and communications buildings, are to be set a minimum of 1 foot above the 0.2 percent WSE, with an overland flood release path that ensures that no more than 1 foot of ponding can develop. The Newhall Maintenance Facility would not be located within any base floodplain. Therefore, there would be *no effect* on floodplains as a result of the BART Extension Alternative at this location. Mitigation is not required.

Some of the station options (Alum Rock/28th Street Station, Downtown San Jose Station East Option and Downtown San Jose West Option, and Diridon Station South Option and Diridon Station North Option) would be underground and therefore would not extend into floodplain. The Downtown San Jose Station East Option would add 0.72 acre of structures, such as system facilities and transit plazas, and 0.10 acre of AIA. The Downtown San Jose Station West Option would add approximately 0.40 acre of structures, such as system facilities and transit plazas, and 0.03 acre of AIA. However, the BART Extension Alternative would remove adjacent buildings that currently occupy approximately 0.16 acre. There would be approximately 0.24 acre of additional building structures within Zone D. Within Zone D, flooding is undetermined but possible; this zone is not considered an SFHA or a base floodplain. The station would not be located within any base floodplain. The Diridon Station South Option would add approximately 1.08 acres of structures, such as system facilities and transit plazas (station entrances). However, the BART Extension Alternative would remove adjacent buildings that currently occupy approximately 0.21 acre. The AIA to this station is negligible (WRECO 2016b). The Diridon Station North Option would add acreage similar to the Diridon Station South Option.

The track alignment would not encroach upon any base floodplains because it would not be within any base floodplain areas or would be underground within a bored tunnel. As a result, there would be *no effect* on the base floodplain, and there would be no floodplain effects as a result of the BART Extension Alternative. Mitigation is not required.

The Santa Clara Station would be aboveground and would add approximately 4.61 acres of structures in Zone X (shaded, an area of moderate flood hazard) and approximately 0.46 acre of AIA to the floodplain. However, the BART Extension would remove the adjacent building that currently occupies approximately 3.42 acres, which is also entirely within the same floodplain. Localized and temporary flooding and ponding may result in areas with added impervious cover during storm events. The station would not be located within any base floodplain. Therefore, there would be *no adverse effect* in terms of the floodplain as a result of the BART Extension at this location. Mitigation is not required.

The BART Extension would not change the land use of the study area. Currently, all of the BART Extension Alternative area within the floodplain is developed, partially developed, or zoned for development. Some of the projected base floodplain development would occur regardless of the BART Extension. In general, the BART Extension would be consistent with development plans for the area and would not significantly change the land use in the area because it is currently developed or zoned for development. The base floodplain impacts as a result of the BART Extension are summarized in Table 4.17-6.

Table 4.17-6: Summary of Base Floodplain Impacts

BART Extension Alternative Element	Flood Hazard Zone	Impervious Area per Feature (ac)	Total Impervious Area (ac)	Added Impervious Area (ac)	Existing Building to be Removed	Impacts	Watershed	Watershed Drainage Area (ac)	Increase Area to Watershed (ac)	Notes
Mabury Road CSA	AE/AE (Floodplain)	4.29	25.25	--	0.00	Minimal	Coyote Creek	158,080	N/A	
	AH	20.96		--	3.74	Minimal				
Alum Rock CSA	A/AH/AO	0.71	9.96	--	0.00	Minimal	Lower Silver Creek[a]	28,160	0.01%	1
Alum Rock/28th Street Station	AH/AO	9.25	48.62	2.54	2.77	Minimal				
Downtown San Jose Station East Option	D	0.77		0.01	0.00	No Impact	Guadalupe River[b]	92,160	0.05%	2
Downtown San Jose Station West Option	D	0.40		0.03	0.16	No Impact				
Newhall Maintenance Facilities	D/X (Shaded)	43.86		41.86	0.00	No Impact				
Santa Clara Station	X (Shaded)	3.59		0.46	3.42	No Impact				
Diridon Station (South and North Options)	D	3.47	3.47	Negligible	0.21	No Impact	Los Gatos Creek	35,072	N/A	

[a] Improvements to Lower Silver Creek by SCVWD and the Natural Resources Conservation Service could result in changes to the FIRM.
[b] Improvements to Guadalupe River by the USACE and SCVWD could result in changes to the FIRM.
ac = acres; CSA = Construction Staging Area

The change in WSE would be minimal because there would be minimal fill in the base floodplains with proper minimization measures (WRECO 2016b). The BART Extension would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation. Natural and beneficial floodplain values would not be affected by the BART Extension. In addition, the BART Extension Alternative would not create or contribute runoff that would exceed the capacity of existing or planned drainage systems. There would be *no adverse effect*. No mitigation is necessary.

4.17.5 NEPA Conclusion

The BART Extension Alternative would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation. The BART Extension Alternative would result in *no adverse effect* on water resources. With the implementation of minimization measures and measure in compliance with regulations, the BART Extension would result in *no adverse effect*. No additional mitigation is required.

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4.18 Environmental Justice

4.18.1 Introduction

This section describes the affected environment and environmental consequences related to environmental justice from operations of the NEPA Alternatives. The following sources of information were used to prepare the analysis in this section.

- *American Community Survey* (U.S. Census Bureau 2010–2014).
- *American Fact Finder* (U.S. Census Bureau 2010).
- *Bay Area Projections 2013* (Association of Bay Area Governments 2013).
- *Unemployment Rate and Labor Force* (California Employment Development Department 2015).
- *VTA's BART Silicon Valley—Phase II Extension Project Socioeconomics and Environmental Justice Technical Memorandum* (Circlepoint 2016).

4.18.2 Environmental and Regulatory Setting

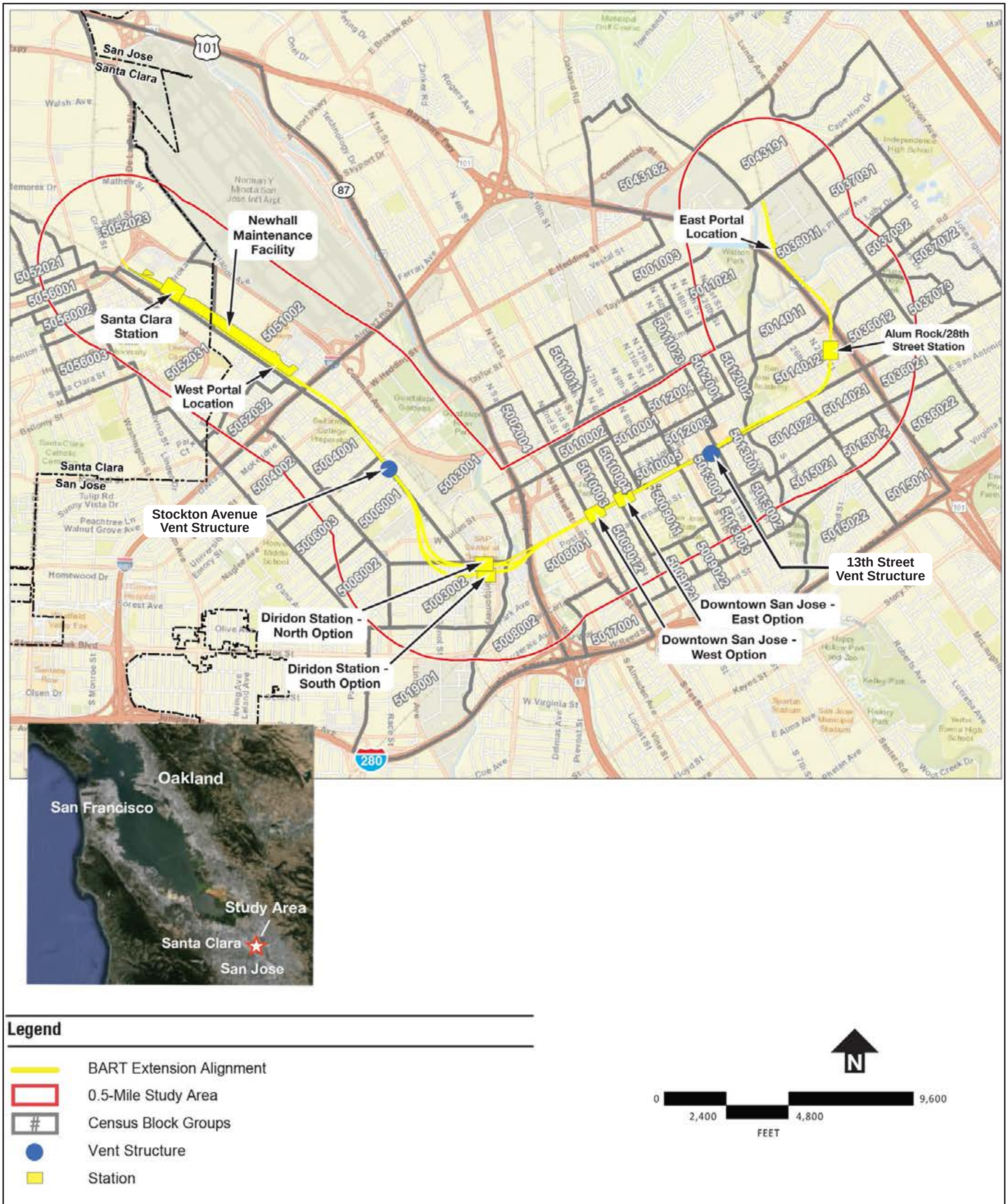
4.18.2.1 Environmental Setting

This section discusses the existing conditions related to environmental justice along the BART Extension alignment (including staging areas).

An environmental justice community is a particular geographic area that meets certain socioeconomic and demographic thresholds. Environmental justice populations can either qualify based on their minority population and/or income status.

The study area represents U.S. Census Block Groups (59 block groups) located within 0.5 mile of the alignment.[1] Figure 4.18-1 depicts the study area block groups.

[1] A census tract is a geographic region within a county. The census tract is broken into smaller block groups, which provide specific data for a more refined geography. Block groups are generally the size of several city blocks, and are therefore a useful geography boundary to represent a community.



Graphics … 00332.13 (12-1-2016)

Source: Circlepoint, 2016.

Figure 4.18-1
Study Area
VTA's BART Silicon Valley–Phase II Extension Project

Minority Populations

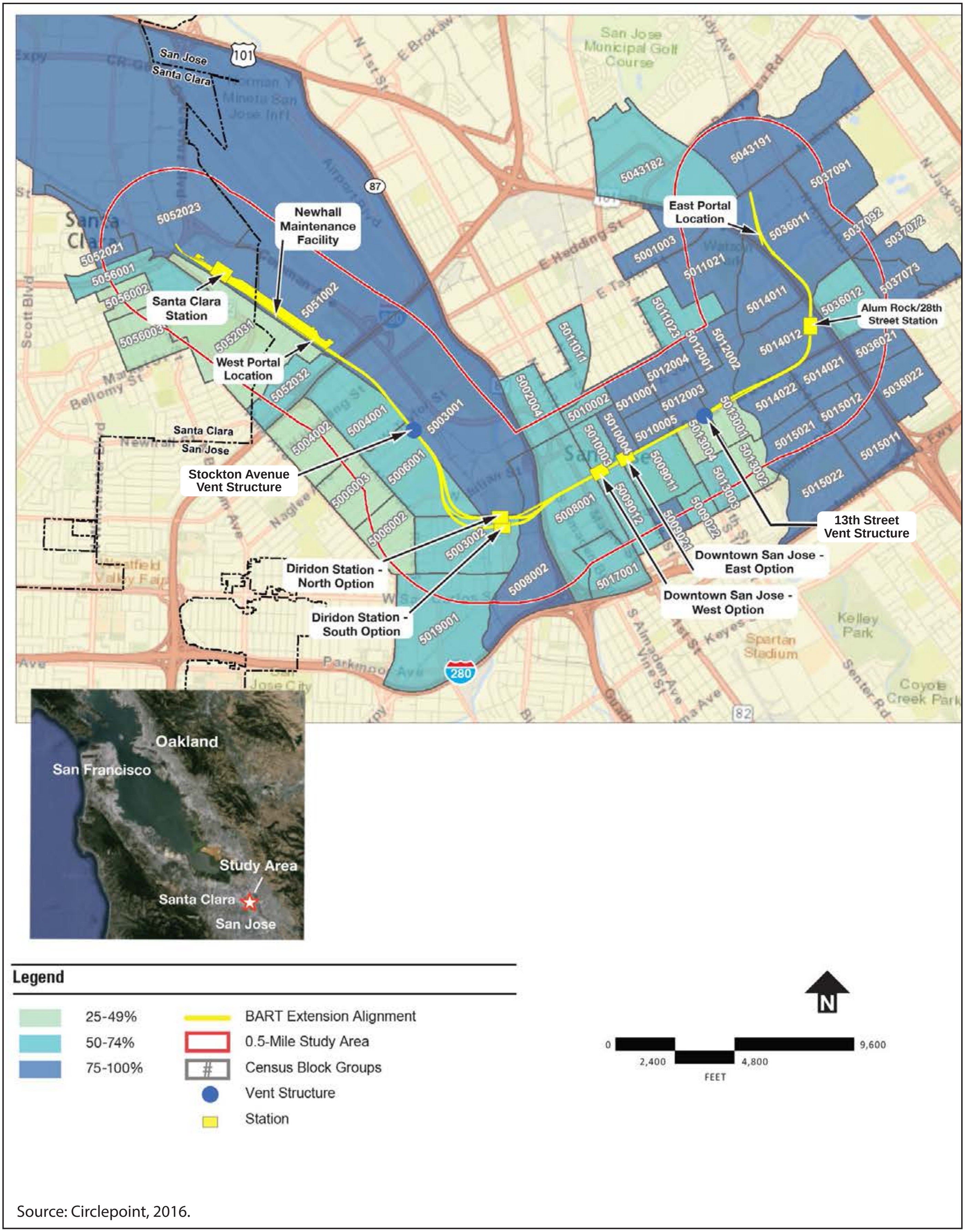
San Jose and Santa Clara are generally diverse populations, representing a variety of races and ethnicities as shown in Table 4.18-1. The study area provides a more localized assessment of the community demographics within the areas immediately surrounding the BART Extension alignment. Table 4.18-2 further summarizes these demographics by outlining the percent minority. The study area minority population is slightly higher than in San Jose and Santa Clara. Figure 4.18-2 depicts the minority percent distribution.

Table 4.18-1: Demographic Profile of the Study Area and Region

Population	San Jose	Santa Clara	Study Area
Total Population	945,942 (100%)	116,468 (100%)	89,896 (100%)
Hispanic or Latino (of any race)	*313,636 (33%)*	*22,589 (19%)*	*39,252 (44%)*
Not Hispanic or Latino	*632,306 (67%)*	*93,879 (81%)*	*50,644 (56%)*
White	271,382 (29%)	42,026 (36%)	24,357 (27%)
Black or African American	27,508 (2%)	2,929 (3%)	3,329 (4%)
American Indian and Alaska Native	2,255 (0.2%)	240 (0.2%)	245 (0.2%)
Asian	300,022 (32%)	43,531 (38%)	19,735 (22%)
Native Hawaiian and Other Pacific Islander	3,492 (0.4%)	604 (0.5%)	377 (0.4%)
Some Other Race	1,820 (0.2%)	321 (0.3%)	252 (0.3%)
Two or More Races	25,827 (3%)	4,228 (4%)	2,349 (3%)
Source: U.S. Census 2010			

Table 4.18-2: Minority Percent

Location	Percent Minority
San Jose	71%
Santa Clara	64%
Study Area	73%
Source: U.S. Census 2010	



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Source: Circlepoint, 2016.

Figure 4.18-2
Minority Percent Distribution
VTA's BART Silicon Valley–Phase II Extension Project

Table 4.18-3 summarizes the minority percent for each U.S. census block group within the study area. The minority percentage of block groups that exceed the minority percentage of the city (San Jose at 71 percent and Santa Clara at 64 percent) in which they are located are shown in **bold**. The block groups in bold represent the populations with the greatest minority populations within the study area and are considered environmental justice populations. Accordingly, these environmental justice populations are shown in Figure 4.18-5, and the aboveground BART Extension features within these block group geographic boundaries are considered in the effects analysis in Section 4.18.4.2, *BART Extension Alternative*.

Table 4.18-3: Study Area Minority Percent Distribution

Block Group	Minority Percent
San Jose Block Groups	
Block Group 3, Census Tract 5001	**87%**
Block Group 4, Census Tract 5002	51%
Block Group 1, Census Tract 5003	**77%**
Block Group 2, Census Tract 5003	53%
Block Group 1, Census Tract 5004	58%
Block Group 2, Census Tract 5004	49%
Block Group 1, Census Tract 5006	60%
Block Group 2, Census Tract 5006	30%
Block Group 3, Census Tract 5006	41%
Block Group 1, Census Tract 5008	58%
Block Group 2, Census Tract 5008	**75%**
Block Group 1, Census Tract 5009.01	**73%**
Block Group 2, Census Tract 5009.01	59%
Block Group 1, Census Tract 5009.02	**83%**
Block Group 2, Census Tract 5009.02	64%
Block Group 1, Census Tract 5010	**86%**
Block Group 2, Census Tract 5010	**72%**
Block Group 3, Census Tract 5010	**73%**
Block Group 4, Census Tract 5010	**75%**
Block Group 5, Census Tract 5010	**75%**
Block Group 1, Census Tract 5011.01	68%
Block Group 1, Census Tract 5011.02	**78%**
Block Group 3, Census Tract 5011.02	**73%**
Block Group 1, Census Tract 5012	**79%**
Block Group 2, Census Tract 5012	**82%**
Block Group 3, Census Tract 5012	**77%**
Block Group 4, Census Tract 5012	**79%**
Block Group 1, Census Tract 5013	44%
Block Group 2, Census Tract 5013	34%
Block Group 3, Census Tract 5013	60%

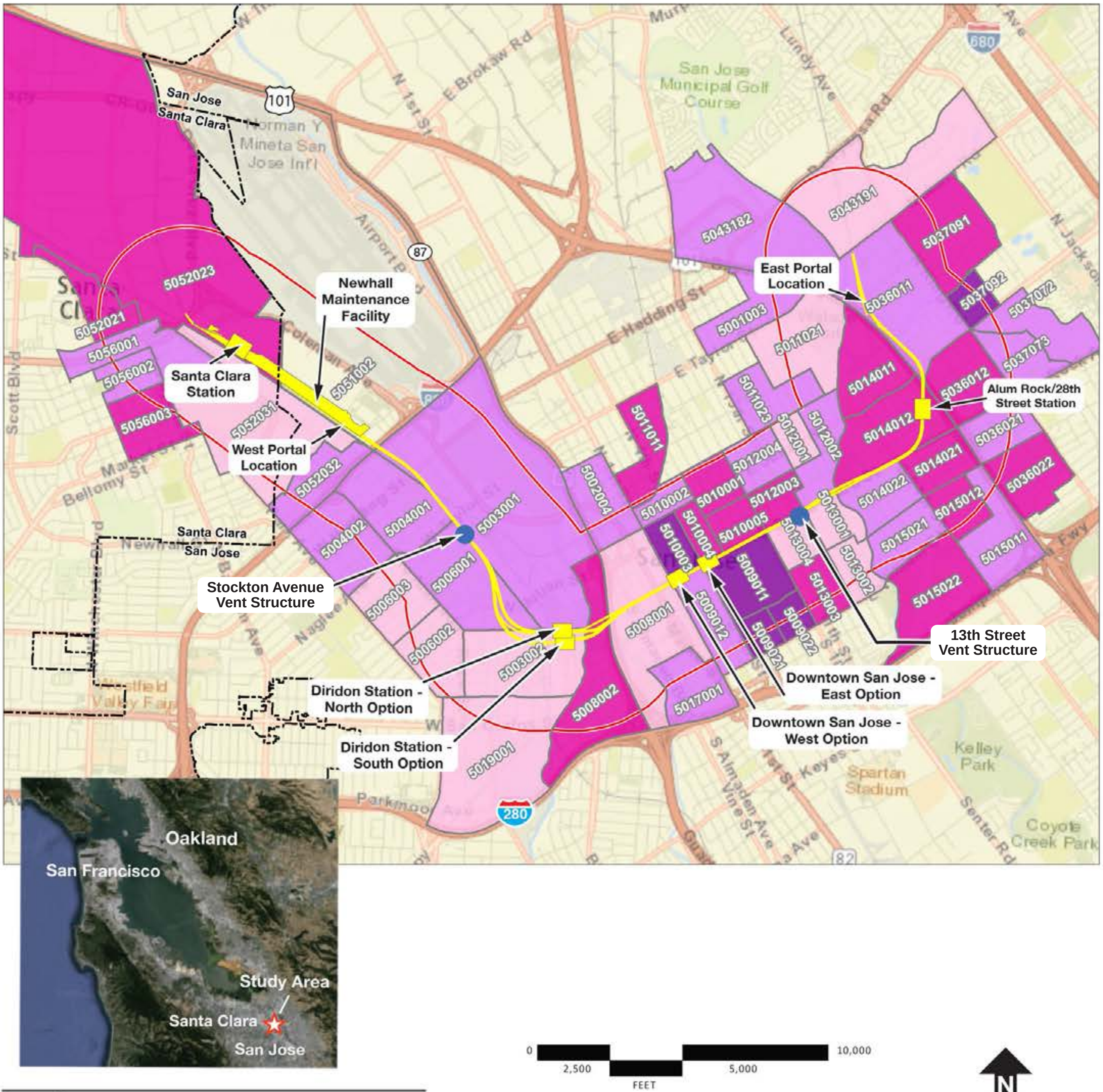
Block Group	Minority Percent
Block Group 4, Census Tract 5013	48%
Block Group 1, Census Tract 5014.01	**92%**
Block Group 2, Census Tract 5014.01	**83%**
Block Group 1, Census Tract 5014.02	**75%**
Block Group 2, Census Tract 5014.02	**87%**
Block Group 1, Census Tract 5015.01	**96%**
Block Group 2, Census Tract 5015.01	**93%**
Block Group 1, Census Tract 5015.02	**83%**
Block Group 2, Census Tract 5015.02	**92%**
Block Group 1, Census Tract 5017	70%
Block Group 1, Census Tract 5019	68%
Block Group 1, Census Tract 5036.01	**78%**
Block Group 2, Census Tract 5036.01	**72%**
Block Group 1, Census Tract 5036.02	**88%**
Block Group 2, Census Tract 5036.02	**95%**
Block Group 2, Census Tract 5037.07	**95%**
Block Group 3, Census Tract 5037.07	**90%**
Block Group 1, Census Tract 5037.09	**98%**
Block Group 2, Census Tract 5037.09	**97%**
Block Group 2, Census Tract 5043.18	56%
Block Group 1, Census Tract 5043.19	**91%**
Block Group 2, Census Tract 5051	**78%**
Block Group 2, Census Tract 5052.03	55%
Santa Clara Block Groups	
Block Group 1, Census Tract 5052.02	**75%**
Block Group 3, Census Tract 5052.02	**83%**
Block Group 1, Census Tract 5052.03	49%
Block Group 1, Census Tract 5056	51%
Block Group 2, Census Tract 5056	47%
Block Group 3, Census Tract 5056	44%

Source: U.S. Census 2010

Note: Bolded text identifies an environmental justice block group because the minority percentage exceeded the minority percentage of the city in which they are located (San Jose: 71%; Santa Clara: 64%)

Low-Income Populations

The study area contains a high percentage of low-income individuals. An environmental justice low-income population refers to the median household income compared to the Department of Health and Human Services (HHS) poverty guidelines within geographic proximity to the alignment. The average household size is 2.9 persons per household (averaged to 3), which correlates to the HHS poverty guideline threshold of $20,090. Figure 4.18-3 depicts the ranges of median household income amongst the population.



Legend

BART Extension Alignment	$ 0 - 24,999
0.5-Mile Study Area	$ 25,000 - 49,999
Census Block Groups	$ 50,000 - 74,999
Vent Structure	$ 75,000 +
Station	

Source: Circlepoint, 2016.

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Figure 4.18-3
Median Household Income
VTA's BART Silicon Valley–Phase II Extension Project

Table 4.18-4 identifies the low-income population of the entire study area as well as within San Jose and Santa Clara. Approximately 13 percent of individuals living within the study area are low-income. The study area average is slightly more than the San Jose and Santa Clara overall averages. Figure 4.18-4 depicts the low-income percent ranges within the study area. Table 4.18-5 outlines the census block groups that are considered low income. The low-income percentage of block groups that exceed the low-income percentage of the city in which they are located are shown in **bold**. The block groups in bold represent the populations with the greatest low-income populations within the study area and are considered environmental justice populations. Accordingly, these environmental justice populations are shown in Figure 4.18-5, and the aboveground BART Extension features within these block group geographic boundaries are considered in the effects analysis in Section 4.18.4.2, *BART Extension Alternative*.

Table 4.18-4: Low-Income Population

Geographic Area	Low-Income Percent
San Jose	12%
Santa Clara	9%
Study Area	13%
Source: American Community Survey (ACS), U.S. Census 2010–2014	

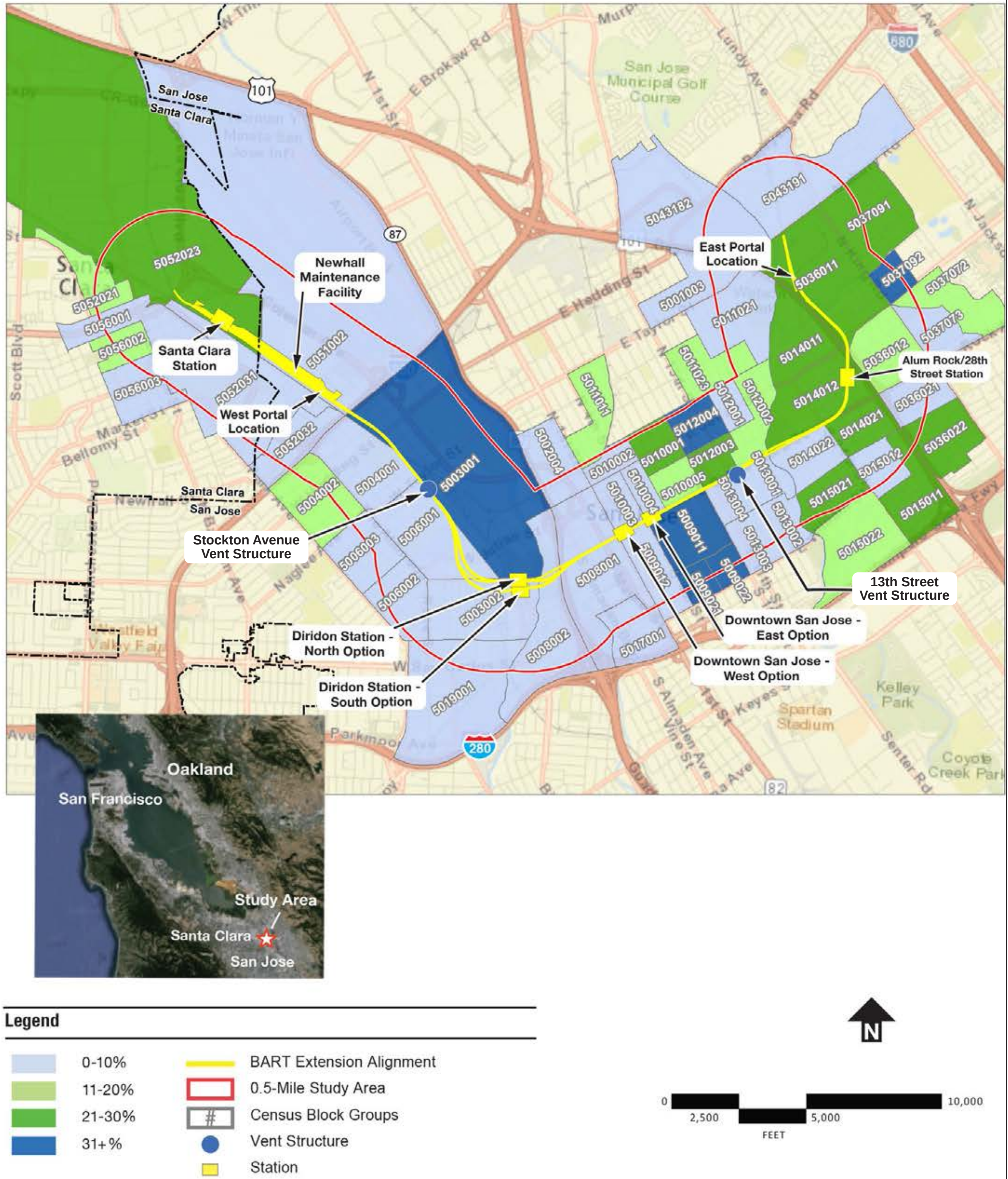
Table 4.18-5: Study Area Low-Income Percent Distribution

Block Groups	**Low-Income percent**
San Jose Block Groups	
Block Group 3, Census Tract 5001	0%
Block Group 4, Census Tract 5002	2%
Block Group 1, Census Tract 5003	**37%**
Block Group 2, Census Tract 5003	3%
Block Group 1, Census Tract 5004	0%
Block Group 2, Census Tract 5004	**21%**
Block Group 1, Census Tract 5006	4%
Block Group 2, Census Tract 5006	0%
Block Group 3, Census Tract 5006	4%
Block Group 1, Census Tract 5008	6%
Block Group 2, Census Tract 5008	4%
Block Group 1, Census Tract 5009.01	**48%**
Block Group 2, Census Tract 5009.01	9%
Block Group 1, Census Tract 5009.02	**43%**
Block Group 2, Census Tract 5009.02	**43%**
Block Group 1, Census Tract 5010	**23%**
Block Group 2, Census Tract 5010	0%
Block Group 3, Census Tract 5010	8%
Block Group 4, Census Tract 5010	0%
Block Group 5, Census Tract 5010	**18%**
Block Group 1, Census Tract 5011.01	**16%**
Block Group 1, Census Tract 5011.02	2%
Block Group 3, Census Tract 5011.02	**15%**
Block Group 1, Census Tract 5012	5%
Block Group 2, Census Tract 5012	**16%**
Block Group 3, Census Tract 5012	**22%**
Block Group 4, Census Tract 5012	**34%**
Block Group 1, Census Tract 5013	0%
Block Group 2, Census Tract 5013	0%
Block Group 3, Census Tract 5013	0%
Block Group 4, Census Tract 5013	11%
Block Group 1, Census Tract 5014.01	**21%**
Block Group 2, Census Tract 5014.01	**21%**
Block Group 1, Census Tract 5014.02	**26%**
Block Group 2, Census Tract 5014.02	10%
Block Group 1, Census Tract 5015.01	**23%**
Block Group 2, Census Tract 5015.01	9%
Block Group 1, Census Tract 5015.02	**21%**

Block Groups	Low-Income percent
Block Group 2, Census Tract 5015.02	**13%**
Block Group 1, Census Tract 5017	0%
Block Group 1, Census Tract 5019	9%
Block Group 1, Census Tract 5036.01	**23%**
Block Group 2, Census Tract 5036.01	**20%**
Block Group 1, Census Tract 5036.02	10%
Block Group 2, Census Tract 5036.02	**23%**
Block Group 2, Census Tract 5037.07	**19%**
Block Group 3, Census Tract 5037.07	8%
Block Group 1, Census Tract 5037.09	**30%**
Block Group 2, Census Tract 5037.09	**47%**
Block Group 2, Census Tract 5043.18	0%
Block Group 1, Census Tract 5043.19	4%
Block Group 2, Census Tract 5051	0%
Block Group 2, Census Tract 5052.03	0%
Santa Clara Block Groups	
Block Group 1, Census Tract 5052.02	**16%**
Block Group 3, Census Tract 5052.02	**28%**
Block Group 1, Census Tract 5052.03	6%
Block Group 1, Census Tract 5056	0%
Block Group 2, Census Tract 5056	**12%**
Block Group 3, Census Tract 5056	5%

Source: ACS, U.S. Census 2010–2014

Note: Bolded text identifies an environmental justice block group because the low-income percentage exceeded the low-income percentage of the city they are located (San Jose: 12%; Santa Clara: 9%)



Graphics ... 00332.13 (12-1-2016)

Source: Circlepoint, 2016.

Figure 4.18-4
Percent Below Poverty
VTA's BART Silicon Valley–Phase II Extension Project

The study area is 73 percent minority. For comparison, the Cities of San Jose and Santa Clara are 71 and 64 percent minority, respectively. As the majority of the study area is within the City of San Jose, the study area minority demographics do not deviate largely from the City of San Jose minority demographics.

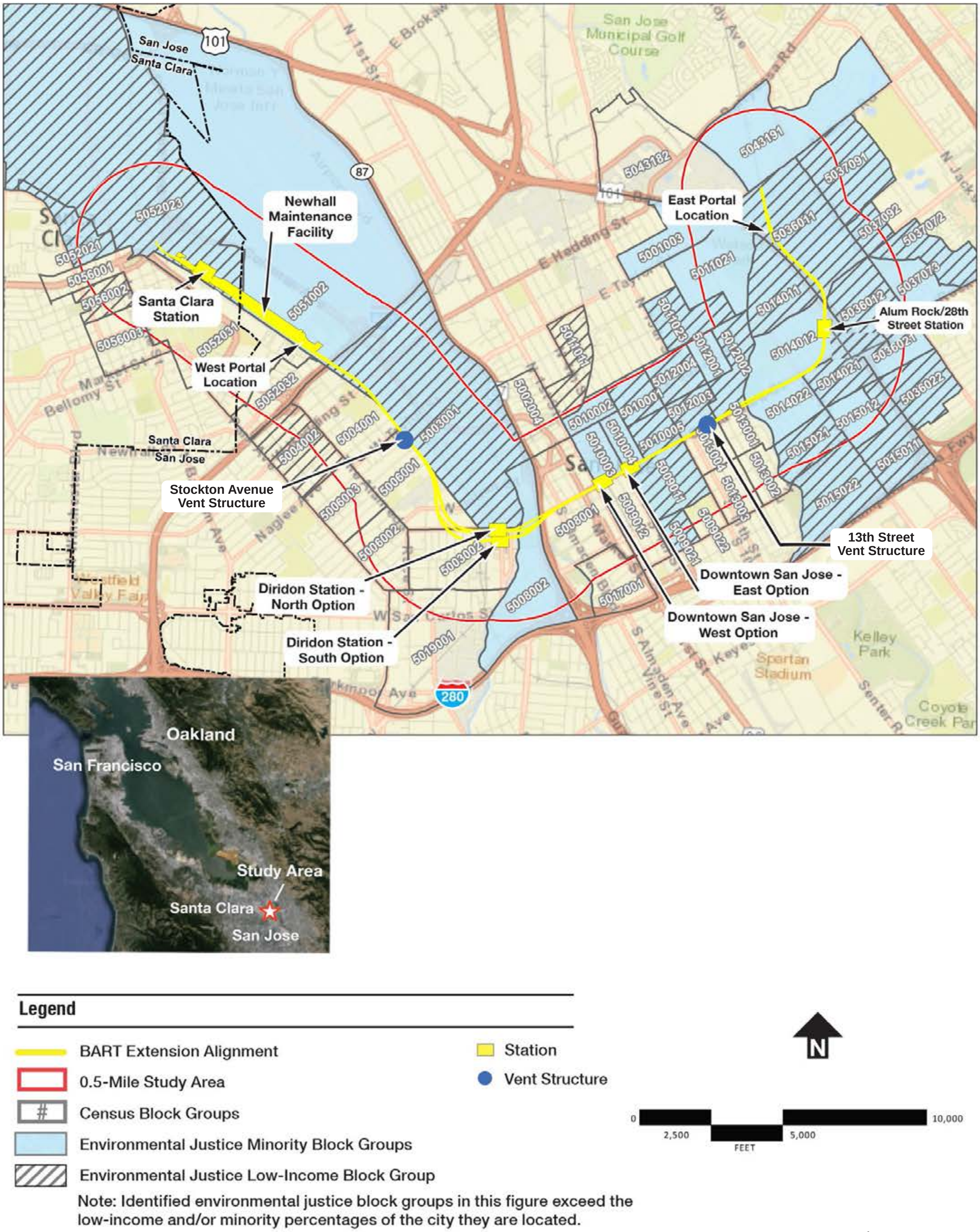
The average median household income of the overall study area is $61,063 per year, and 13 percent of the study area is considered to be low income. For comparison, the Cities of San Jose and Santa Clara median household income is $83,787 and $93,840 per year, respectively; the percent low income is 12 and 9 percent, respectively.

Environmental Justice Populations

Figure 4.18-5 summarizes the geographic locations (census block groups) of the populations with the greatest concentrations of minority and low-income percentages within the study area and are considered to be environmental justice populations. Such environmental justice determinations were based on the minority and low-income criteria outlined above in the *Minority Population* and *Low-Income* subsections. If the minority population percentage exceeded the threshold of the city in which they are located (San Jose at 71 percent and Santa Clara at 64 percent) or if the low-income population exceeded the threshold of the city (San Jose at 12 percent and Santa Clara at 9 percent), the population would be considered an environmental justice population. If the population did not exceed such thresholds, the population would not be considered an environmental justice population.

As described above, the census block groups identified in bold in Tables 4.18-3 and 4.18-5 exceed the minority and low-income population percentage thresholds of the city in which they are located and are therefore considered environmental justice populations. These environmental justice populations are shown in Figure 4.18-5. The minority environmental justice populations are shown in blue, and the low-income environmental justice populations are shown with a cross hatching. The section below describes each of the BART Extension elements and the environmental justice populations that surround each elements.

Potential adverse effects on these populations are analyzed in Section 4.18.4, *Environmental Consequences and Mitigation Measures*, along with whether such effects would be disproportionately high and adverse.



Source: Circlepoint, 2016.

Graphics ... 00332.13 (12-1-2016)

Figure 4.18-5
Environmental Justice Communities
VTA's BART Silicon Valley–Phase II Extension Project

BART Extension Alignment from East to West

At the eastern end of the BART Extension Alternative, the extension would be at grade where it would connect to the Phase I Extension before diving underground into a tunnel and crossing under U.S. 101 and into the underground station at Alum Rock/28th Street Station. Aboveground station elements at the Alum Rock/28th Street Station would include station entrances, systems facilities, and a parking garage. The area surrounding the aboveground tracks on the east side of U.S. 101 is almost entirely industrial, and the area surrounding the proposed Alum Rock/28th Street Station contains mostly residential neighborhoods between Julian Street and Santa Clara Street. As shown in Figure 4.18-5, the census block groups surrounding the alignment between Mabury Road and Santa Clara Street exceed the minority and low-income population percentage thresholds of the City of San Jose and are therefore considered to be environmental justice populations.

The alignment would remain underground starting at Alum Rock/28th Street Station and would reemerge north of Interstate (I-) 880 at the proposed Newhall Maintenance Facility and Santa Clara Station. However, other BART Extension features such as mid-tunnel ventilation structures and station facilities, including entrances, systems facilities, and parking, would be above ground. The surrounding land uses and presence of environmental justice populations are described in detail below.

The alignment would curve west from Alum Rock/28th Street Station and line up directly under Santa Clara Street as it travels west toward downtown San Jose. An aboveground ventilation structure is proposed at 13th Street on the north side of Santa Clara Street. The area surrounding the ventilation structure is mostly commercial along Santa Clara Street and residential to the north and south. As shown in Figure 4.18-5, the census block groups located immediately adjacent to this vent structure and north of Santa Clara Street exceed the minority and low-income population percentage thresholds of the City of San Jose and are, therefore, considered to be environmental justice populations. Census block groups south of Santa Clara Street and across from the 13th Street Ventilation Structure do not exceed the minority or low-income population percentage thresholds of the City of San Jose and are, therefore, not considered to be environmental justice populations.

The alignment would continue west to the Downtown San Jose Station East and West Options. The areas that surround these station options are predominantly commercial interspersed with residential uses. While both options would be below ground, station entrances and systems facilities would be aboveground.

For the East Option, as shown in Figure 4.18-5, most of the census block groups (except the southwest block group) adjoining the aboveground station have minority populations that exceed the City of San Jose's minority population percentage thresholds and are, therefore, considered to be environmental justice populations. The census block groups to the east and south of the station have low-income populations that exceed the City of San Jose's low-income population percentage thresholds; therefore, these populations are considered to be environmental justice populations. The other census block groups adjacent to the East Option do not exceed the City of San Jose's minority or low-income population percentage thresholds and are, therefore, not considered environmental justice populations.

For the West Option, only the census block group to the north exceeds the City of San Jose's minority population percentage thresholds and is, therefore, considered an environmental justice population. However, none of the census block groups surrounding the West Option exceed the City of San Jose's minority or low-income population percentage thresholds; therefore, these are not considered low-income environmental justice populations.

The alignment would continue west, pass under State Route 87, and enter the proposed Diridon Station South and North Options underground, but both options would include aboveground system facilities, station entrances, and a reconstructed bus transit center. The land uses within and around the Diridon Station South and North Options include the Caltrain Station and associated tracks to the west, the SAP Center to the North, residential and industrial uses to the south, and commercial/office establishments to the east.

For the Diridon Station South and North Options, the census block groups to the north and east exceed the City of San Jose's minority population percentage thresholds, and the census block group to the north also exceeds the City of San Jose's low-income population percentage thresholds; therefore, these census block groups are considered environmental justice populations. The other census block groups do not exceed the City of San Jose's minority or low-income population percentage thresholds and are, therefore, not considered environmental justice populations.

The alignment would continue west then swing northwest and line up under Stockton Avenue south of I-880. The Stockton Ventilation Structure would be located at Stockton Avenue south of Taylor Street. Land uses to the north, east, and southeast of the Stockton Avenue Vent Structure are mostly industrial and commercial uses. The census block group to the north and east exceeds the City of San Jose's minority and low-income population percentage thresholds; therefore, it is considered to be an environmental justice population. The census block groups to the west and southwest do not exceed the City of San Jose's minority or low-income population percentage thresholds. Therefore, they are not considered environmental justice populations.

The alignment would continue northwest, pass under I-880, and enter into the Newhall Maintenance Facility and Santa Clara Station, both of which would be aboveground and located within an industrial area with some residential uses to the southwest, south, and southeast.

The Newhall Maintenance Facility is located within the City of San Jose and City of Santa Clara. The census block groups to the north, northeast, and east of the Newhall Maintenance Facility exceed the City of San Jose and the City of Santa Clara's minority and low-income population percentage thresholds and are, therefore, considered environmental justice populations. The census block groups to the southwest and south do not exceed the City of

San Jose or the City of Santa Clara's minority or low-income population percentage thresholds; therefore, they are not considered environmental justice populations.

The Santa Clara Station is located within the City of Santa Clara. The census block groups to the southwest and south of the station do not exceed Santa Clara's minority or low-income population percentage thresholds; therefore, they are not considered environmental justice populations. However, census block groups to the north, northeast, and east exceed the City of Santa Clara's minority and low-income population percentage thresholds and are, therefore, considered environmental justice populations.

4.18.2.2 Regulatory Setting

The following federal regulations are applicable to the BART Extension Alternative.

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order (EO) 12898 directs federal agencies to "promote nondiscrimination in Federal programs substantially affecting human health and the environment, and provide minority and low-income communities' access to public information on, and an opportunity for public participation in, matters related to human health or the environment." The order directs agencies to use existing law to ensure that when they act:

- They do not discriminate on the basis of race, color, or national origin.
- They ensure public participation.
- They identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations.

Environmental Justice is defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, adoption, implementation and enforcement of environmental laws and policies." (California Senate Bill 115, Solis.)

Federal Transit Administration Circular 4703.1

The Federal Transit Administration (FTA) Circular 4703.1 (August 2012), *Environmental Justice Policy Guidance for Federal Transit Administration Recipients,* provides recipients of FTA financial assistance with guidance in order to incorporate environmental justice principles into plans, projects, and activities that receive funding from FTA. The Circular provides guidance in addressing, as appropriate, disproportionately adverse human health or environmental effects of programs, policies, and activities on minority populations and/or low-income populations. Environmental justice and non-discrimination principles are incorporated into decision-making processes.

U.S. Department of Transportation Order 5610.2(a)

The U.S. Department of Transportation (USDOT) Order 5610.2(a) (updated May 2012), *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* sets forth the USDOT policy to consider environmental justice principles in all USDOT programs, policies, and activities. It describes how the objectives of environmental justice will be integrated into planning and programming, rulemaking, and policy formulation.

4.18.3 Methodology

Potential effects on environmental justice populations are measured by intensity using the terms *adverse effect* and *disproportionately high and adverse effect*, which are defined as follows.

- An *adverse effect* on minority and low-income populations means the totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to:
    - Bodily impairment, infirmity, illness or death;
    - Air, noise, and water pollution and soil contamination;
    - Destruction or disruption of human-made or natural resources;
    - Destruction or diminution of aesthetic values;
    - Destruction or disruption of community cohesion or a community's economic vitality;
    - Destruction or disruption of the availability of public and private facilities and services;
    - Vibration;
    - Adverse employment effects;
    - Displacement of persons, businesses, farms, or nonprofit organizations;
    - Increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community; and
    - The denial of, reduction in, or significant delay in the receipt of, benefits of USDOT programs, policies, or activities.
- A *disproportionately high and adverse effect* on minority and low-income populations means an adverse effect that:
    1. Is predominately borne by a minority population and/or a low-income population, or
    2. Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

4.18.4 Environmental Consequences and Mitigation Measures

4.18.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). These projects would likely result in effects on environmental justice typically associated with transit, highway, bicycle, and pedestrian facilities and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect environmental justice, which would include an analysis of mitigation measures to mitigate potential impacts on environmental justice. With the No Build Alternative, land uses along the alignment would be built out in accordance with the Cities of San Jose and Santa Clara General Plans, which would include residential, commercial, and industrial projects, but not the BART Extension and its associated accessibility enhancements and transportation options.

4.18.4.2 BART Extension Alternative

Resource Areas with No Adverse Effects

The resource topics below would have no disproportionately high and adverse effect on environmental justice populations.

Air Quality

Once operational, the BART Extension would reduce the amount of air quality emissions generated in the region. This benefit is directly related to the BART Extension encouraging a transportation modal shift from single-occupancy vehicles toward transit. No operational adverse effects were identified for air quality; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Electromagnetic Fields

No operational adverse effects were identified for electromagnetic field generation; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Hazardous Materials

No operational adverse effects were identified for hazardous materials; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Socioeconomics

No operational adverse effects were identified for socioeconomics; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Transportation

No operational adverse effects were identified for transit, bicycle/pedestrian facilities, and vehicles; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Visual Quality

No operational adverse effects were identified for visual quality; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Water Resources, Water Quality, and Floodplains

No operational adverse effects were identified for water resources, water quality, and floodplains; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Resource Areas with Potential Adverse Effects

The resource topics below would have potential to have a disproportionately high and adverse effect on environmental justice populations; however, mitigation would reduce the potential effect so it would not be appreciably more severe or greater in magnitude than the adverse effect on non-environmental justice populations.

Noise and Vibration

The BART Extension has the potential to cause adverse effects resulting from operational airborne noise and operational groundborne noise as discussed below. No potential adverse effects are anticipated from operational vibration.

Airborne noise impacts from train operations can occur where trains are running on track aboveground, at ventilation facilities where train noise is transmitted to the surface from the tunnel below, and from storage yard tracks and maintenance facility activities. Aboveground BART operations on at-grade track north of I-880 would result in a Moderate Noise Impact at one ground-floor receiver and two second-story receivers near the Santa Clara Station. However, the increases are 2 dBA or less, which is not a readily perceived amount. Therefore, no mitigation is proposed.

Operation of emergency ventilation fans, piston relief shafts, traction power substations, and emergency backup generators could result in exceedances of Cities of San Jose and Santa Clara noise criteria at nearby residences, which would be considered an adverse effect due to airborne noise. However, with implementation of Mitigation Measure NV-A, described in Section 4.12, *Noise and Vibration*, this impact would have no adverse effect.

Train operations in the tunnel are predicted to result in exceedance of FTA groundborne noise criteria at many receptor locations, which would be considered an adverse effect. However, with implementation of Mitigation Measures NV-B and NV-C, this impact would have no adverse effect.

As described, the study area is composed of predominantly environmental justice populations interspersed among non-environmental justice populations. The BART Extension is predicted to cause potential airborne noise effects from aboveground BART Extension elements and potential groundborne noise effects from underground train operations within or immediately adjacent to environmental justice populations and non-environmental justice populations. However, mitigation would reduce potential airborne and groundborne noise effects; therefore, these impacts would have no adverse effect. The BART Extension operations do not result in any vibration impacts. Consequently, following mitigation, *no disproportionately high and adverse effects* on environmental justice populations would occur.

Community Outreach Efforts

VTA has taken measures to ensure the public is aware and has been engaged during the design period of the BART Extension. VTA displayed advertisements in the local newspapers, mailed individuals located within the vicinity of the alignment, emailed VTA's web recipients, posted on social media, and issued press releases to announce the BART Extension and held public meetings during the scoping period. The mailers were sent to 58,000 recipients within a 0.25-mile radius of the alignment and within a 1-mile radius of stations. The mailers were translated into five languages (Spanish, Vietnamese, Korean, Chinese, and Portuguese). All of these outreach efforts included a method to contact VTA with concerns or comments. These efforts are further outlined in the *Environmental Scoping Report*.

VTA conducted three scoping meetings to gather input from the community which provided information to the community and initiated public involvement in the environmental review process (see Chapter 10, *Agency and Community Participation*). The community offered suggestions and concerns at several public forums, including scoping meetings. During the scoping process, VTA invited the community to provide input on the BART Extension. The community offered suggestions and voiced concerns related to several BART Extension components. Such community input has helped to guide the development, particularly for aboveground station areas, to minimize adverse community effects of the BART Extension. The main concerns of the community were regarding parking constraints, traffic congestion, entry points of the stations, pedestrian safety, gentrification, displacement, and potential impacts on Five Wounds Church and Cristo Rey San Jose Jesuit High School. The community was also concerned about construction effects of the BART Extension regarding dust, air quality, and noise. The community also requested understanding of how all of these potential concerns would affect environmental justice populations.

VTA took this community feedback into consideration while determining the most feasible alignment. The BART Extension would expand BART service to the greater San Jose and Santa Clara community, thereby increasing connectivity in the regional San Francisco Bay Area, which would be a direct benefit of this same community. Implementation would facilitate residential and employment growth and infill development planned for the regional area.

4.18.5 NEPA Conclusion

As described above, operation of the BART Extension Alternative would not result in adverse effects regarding air quality; electromagnetic fields; hazardous materials, socioeconomics, transportation; visual quality; and water resources, water quality, and floodplains.

Operation of the BART Extension Alternative would result in potential adverse effects regarding noise and vibration. As described, VTA would implement mitigation that would reduce potential effects to a level such that *no adverse effects* would occur. The BART Extension Alternative would expand BART service to the greater San Jose and Santa Clara community, thereby increasing connectivity in the regional San Francisco Bay Area. The BART Extension would create direct and indirect jobs associated with operations that would provide new employment opportunities for all populations including environmental justice populations. Implementation of the BART Extension would facilitate residential and employment growth and infill development planned for the area. Once in operation, the BART Extension Alternative would increase regional mass transit access and reduce air pollutant emissions by shifting more users to public transit. Such effects would benefit environmental justice and non-environmental justice populations. Furthermore, VTA has taken measures to ensure the public is aware of the BART Phase II Project and engaged in the implementation process. With the community outreach efforts that have occurred to-date and with implementation of mitigation, the BART Extension Alternative would not result in adverse effects. Accordingly, *no disproportionately high and adverse effects* from operation of the BART Extension Alternative would result for environmental justice populations.

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