CALTRAIN ELECTRIFICATION PROGRAM

San Francisco to San Jose (MP 0.0 to 52.0)

U.S. Department of Transportation

Federal Transit Administration

Environmental Assessment/ Final Environmental Impact Report

Volume I

PENINSULA CORRIDOR JOINT POWERS BOARD

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CALTRAIN ELECTRIFICATION PROGRAM

in the City and County of San Francisco, San Mateo and Santa Clara Counties

ENVIRONMENTAL ASSESSMENT/ FINAL ENVIRONMENTAL IMPACT REPORT

Pursuant to
National Environmental Policy Act (42 USC §4332) 49 USC Chapter 53, 16 USC §470, 23 CFR Part 771, 23 CFR Part 450, Executive Order 12898; and California Environmental Quality Act, PRC 21000 *et seq*.; and the State of California CEQA Guidelines, California Administrative Code, 15000 *et seq.*

by the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

and the

PENINSULA CORRIDOR JOINT POWERS BOARD

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ABSTRACT: The Peninsula Corridor Joint Powers Board proposes to convert the Peninsula Commute Service (Caltrain) from diesel-hauled to electric-hauled trains and install some *130* to *140* single-track miles of overhead contact system and approximately *10* traction power station facilities for the distribution of electrical power to the electric rolling stock consisting of electric locomotives or electric multiple units. The purposes of this project are to improve Caltrain performance, reduce noise, improve regional air quality, and modernize Caltrain. Increases in Caltrain ridership, reductions in automobile congestion on parallel routes, reductions in energy consumption, reductions in train noise, and improvements in regional air quality are expected to result. Impacts include the potential for encountering hazardous wastes *and disturbing sensitive archaeological resources*, *potential effects to special status species*, noise impacts of traction power stations, visual changes, and impacts during construction. Proposed *design features and* mitigation measures include *a Vegetation Management Plan*, *a Biological Resources Management Plan*, *a Cultural Resources Programmatic Agreement*, coordination with utility providers and advance notice to customers, a Worker Health and Safety Plan, and management practices during construction.

PREFACE

The Caltrain Electrification Program is an integral part of the Caltrain Strategic Plan, which proposes to convert a substantial portion of existing Caltrain diesel-powered passenger rail service to electric operation by 2015. Under the current scope of the Project, electrical lines would be installed along the 51 mile Peninsula Corridor Joint Powers Board (JPB) owned right-of-way, allowing electric vehicles to provide a more modern and efficient service between San Francisco and San Jose. A total of 10 traction power stations, and approximately 140 track miles of overhead contact wires would be constructed to supply power to 114 trains per day.

While the project remains essentially the same as when it was initially assessed, several project characteristics have changed since the publication of the Caltrain Electrification Program Environmental Assessment / Draft Environmental Impact Report (EA/DEIR) in 2004. The changes came about due to a refinement of operational strategy by Caltrain to focus the electrification enhancements to the more heavily traveled Peninsula portion of the service, as well as to reduce the capital cost of the project. Several project characteristics remain unchanged. For these practical and economic reasons, the project limits are now confined between San Francisco and San Jose (Tamien Station). Diesel-powered passenger service would remain in place between the San Jose Diridon station and Gilroy for the remainder of Caltrain’s total 77-mile route.

Changes to the project limits were discussed by the JPB Board of Directors in several meetings between January 2006 and May 2006. It was confirmed by the Board members in April 2006 that the level of ridership south of Tamien to Gilroy did not warrant the expense of electrification by 2015. Since that time the planning, studies, engineering and environmental clearance of the project has been focused on the San Francisco to Tamien portion of the Caltrain corridor. This EA/Final EIR (EA/FEIR) represents an update to and completion of the 2004 EA/DEIR with the refined project characteristics. The changes to the project reflected herein are summarized in the Table P-1 below.

Table P-1: 2004 EA/DEIR and 2008 EA/FEIR Project Characteristics		
	2004 EA/DEIR	**2008 EA/FEIR**
Project Location and Limits	77-mile Caltrain corridor from San Francisco to Gilroy	51-mile Caltrain corridor from San Francisco to San Jose
Electrification service year of commencement	2008	2015
Level of Service (LOS)	No Project Alternative and Electrification Program (Project) Alternative have same LOS • Year 2008 (No Project and Project Alternatives) LOS at 98 trains per day (tpd) including 8 trains per day between San Jose and Gilroy • Year 2020 (No Project and Project Alternatives) LOS increase to 132 trains per day including 20 trains per day in the SJ and Gilroy.	No Project Alternative and Electrification Program (Project) Alternative have different LOS • No Project Alternative LOS at 98 tpd including 6 trains per day between SJ and Gilroy • Year 2035 Project Alternative LOS at 114 tpd including 6 diesel only trains between SJ and Gilroy
Rolling Stock	Replacement of entire diesel fleet in year of electrification commencement (2008) Three options proposed: • Option 1: Replace Diesel Locomotives with new Electric Locomotives • Option 2: Electric Multiple Units (EMUs) • Option 3: Replace Diesel Locomotives with new Electric Locomotives and existing Passenger Cars with new Passenger Cars	Replacement of a portion of diesel fleet approaching the end of their useful life in 2015 Identifies preferred rolling-stock option as Option 2: Electric Multiple Units (EMUs)
Traction Power Facilities	13 proposed traction power facilities	10 proposed traction power facilities; several of the sites have been relocated since 2004 EA/DEIR due to development pressures along the right-of-way; 8 of 10 facility locations are within Caltrain right-of-way
Electrical System Components	• Overhead contact system • Auto-transformer power feed arrangement • Overbridge protection barriers	Same as 2004 EA/DEIR

The EA/DEIR for the Caltrain Electrification Program was circulated for public review and comment in 2004. The public review period began on April 5, 2004 and concluded on May 25, 2004 - a period of 50 days.

During the public review period, four public hearings were conducted - in San Francisco, San Carlos, Sunnyvale and Morgan Hill. The public hearings were advertised by means of direct mailings, announcements posted at Caltrain stations, newspaper display ads, and press releases. Representatives of government agencies, associations and organizations, businesses and members of the general public attended the public meetings. A total of 36 oral comments and 12 written comment cards were taken at the public hearings.

The public comment period yielded the following comment letters on the Draft EA/EIR: federal agencies (2); state agencies (5); regional agencies (2); local agencies (11); transit agencies (4); associations and organizations (7); businesses (4); individuals (65).

Also, a series of information meetings were conducted, from March 2000 until May 2004, for the purpose of explaining the project and soliciting input.

The proposed Caltrain Electrification Program is consistent with the Peninsula Corridor Joint Powers Board's (PCJPB) *Strategic Plan: 2004-2023* (adopted July, 2004). The currently proposed program is also consistent with *Project 2025* (adopted by the PCJPB in November, 2006) which is a program of capital improvement plans and actions intended to carry out the objectives of the *Strategic Plan: 2004-2023*.

This Final EA/EIR provides revised environmental impact analysis and associated mitigation measures reflecting the reduced electrification corridor length and revised project characteristics. This document also provides responses to the comments received on the 2004 Draft EA/EIR, presented in the context of the currently proposed program of improvements. Responses to comments can be found in Volume II of the document; Volume III contains the original comments.

Table of Contents

PREFACE *P-1*

SUMMARY S-1

S.1 PURPOSE OF AND NEED FOR CALTRAIN ELECTRIFICATION PROGRAM S-1

S.2 ALTERNATIVES S-3

S.2.1 The No-Electrification (No-Project*/No Action*) Alternative S-3

S.2.2 The Electrification Program Alternative (*Preferred Alternative)* S-4

S.3 SUMMARY OF ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES S-10

S.4 ESTIMATED CAPITAL COSTS S-*20*

S.5 PROJECT'S INCLUSION IN REGIONAL TRANSPORTATION PLAN S-*20*

S.6 PROPOSED FUNDING BY SOURCE S-*21*

S.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE S-21

S.8 ISSUES TO BE RESOLVED S-*22*

CHAPTER 1: PURPOSE OF AND NEED FOR PROJECT 1-1

1.1 PURPOSE OF PROJECT 1-1

1.2 NEED FOR PROJECT 1-2

1.2.1 Current and Future Transportation Demand in the Caltrain Service Area 1-3

1.2.2 Current and Future Roadway Congestion in the Caltrain Corridor 1-9

1.2.3 Corridor Air Quality 1-10

1.2.4 Current Caltrain Service and Facility Deficiencies 1-*13*

1.2.5 Accommodating Future High-Speed Rail 1-*13*

1.3 OTHER RELATED PROJECTS 1-*14*

1.3.1 New Transbay Terminal/Caltrain Downtown Extension/Terminal Area Development 1-*14*

1.3.2 Dumbarton Rail Corridor 1-*15*

1.3.3 *C*alifornia High-Speed Rail System 1-*16*

1.3.*4* Vasona Light Rail 1-*16*

1.3.*5* B*ART t*o San Jose *and* Santa Clara 1-*17*

1.3.*6* *San Fransisco Municipal Railway Mission Bay Trolley Coach Re-Routings* 1-*17*

1.3.7 *Planned and Programmed Highway Improvements in the Caltrain Corridor* *1-18*

1.4 USES OF THIS DOCUMENT 1-*18*

1.5 PERMITS AND APPROVALS NEEDED 1-*19*

CHAPTER 2: PROJECT DESCRIPTION 2-1

2.1 LOCATION AND LIMITS 2-1

2.2 BACKGROUND 2-3

2.3 ALTERNATIVES 2-5

2.3.1 The No-Electrification (No-Project*/No-Action*) Alternative 2-*5*

2.3.2 The Electrification Program Alternative (*Preferred Alternative*) 2-*7*

2.3.3 Costs, Funding, and Feasibility 2-*42*

2.4 ALTERNATIVES CONSIDERED AND WITHDRAWN 2-*50*
2.4.1 Propulsion Using Clean Diesel or Liquefied Natural Gas Fuels 2-*50*
2.4.2 Fuel Cell Vehicles and Locomotives 2-5*0*
2.4.3 Direct Center Feed Power System Arrangement 2-5*1*
2.4.4 Third Rail or Underground Electrification 2-5*1*
2.4.5 BART Service in Caltrain Corridor 2-5*2*
2.4.6 *LRT Service in Caltrain Corridor* *2-54*
2.4.7 *San Jose to Gilroy Rail* Corridor 2-*54*

CHAPTER 3: ENVIRONMENTAL SETTING AND CONSEQUENCES 3-1

3.1 AESTHETICS 3-1
3.1.1 Setting 3-1
3.1.2 Impacts 3-3
3.1.3 Mitigation 3-1*8*

3.2 AGRICULTURAL RESOURCES 3-*22*
3.2.1 Setting 3-*22*
3.2.2 Impacts 3-*22*
3.2.3 *Mitigation* *3-23*

3.3 AIR QUALITY 3-*23*
3.3.1 Setting 3-*23*
3.3.2 Impacts 3-*28*
3.3.3 Conformity 3-*37*
3.3.4 *Mitigation* *2-39*

3.4 BIOLOGICAL RESOURCES 3-*39*
3.4.1 Setting 3-*39*
3.4.2 Impacts 3-*44*
3.4.3 Mitigation 3-*46*

3.5 CULTURAL RESOURCES 3-*46*
3.5.1 Regulatory Setting 3-*46*
3.5.2 Areas of Potential Effects 3-*47*
3.5.3 Archaeological Resources 3-*47*
3.5.4 Historic Architectural Resources 3-*51*
3.5.5 Other Historic Landmarks 3-*64*

3.6 GEOLOGY, SOILS, AND SEISMICITY 3-*65*
3.6.1 Setting 3-*65*
3.6.2 Impacts 3-*67*
3.6.3 Mitigation 3-*67*

3.7 HAZARDOUS *WASTE AND* MATERIALS 3-*67*
3.7.1 Methodology and Data Sources 3-*68*
3.7.2 Setting 3-*68*
3.7.3 Impacts 3-*68*
3.7.4 Mitigation 3-*96*

3.8 HYDROLOGY, FLOODPLAIN AND WATER QUALITY 3-*97*
3.8.1 Setting 3-*97*
3.8.2 Impacts 3-*100*

3.8.3 Mitigation 3-*103*

3.9 LAND USE AND PLANNING 3-*103*

3.9.1 Setting 3-*103*
3.9.2 Impacts 3-*109*
3.9.3 Community Cohesion *3-109*
3.9.3 *Mitigation* 3-*110*

3.10 MINERAL AND ENERGY RESOURCES 3-*110*

3.10.1 Setting 3-*110*
3.10.2 Impacts 3-*115*
3.10.3 Mitigation *3-120*

3.11 NOISE AND VIBRATION 3-*120*

3.11.1 Noise 3-*120*
3.11.2 Vibration 3-*128*
3.11.3 Mitigation 3-*132*

3.12 POPULATION AND HOUSING 3-*133*

3.12.1 Demographic Characteristics 3-*133*
3.12.2 Displacements 3-*137*
3.12.3 Environmental Justice 3-*139*
3.12.4 Growth Inducement 3-*141*

3.13 PUBLIC SERVICES AND FACILITIES 3-*141*

3.13.1 Setting 3-*141*
3.13.2 Impacts 3-*143*
3.13.3 Mitigation *3-144*

3.14 RECREATION 3-*144*

3.14.1 Setting 3-*144*
3.14.2 Impacts 3-*145*
3.14.3 Mitigation *3-146*

3.15 TRANSPORTATION/TRAFFIC 3-*146*

3.15.1 Existing Rail and Bus Transit 3-*147*
3.15.2 Existing Highways and Traffic 3-*151*
3.15.3 Existing Caltrain Parking Facilities 3-*154*
3.15.4 Existing Non-Motorized Transportation 3-*156*
3.15.5 Future Rail and Bus Transit and Projected Impacts 3-*158*
3.15.6 Future Highway Improvements, Traffic Demand, and Projected Impacts 3-*163*
3.15.7 Future Caltrain Parking Facilities and Projected Impacts 3-*165*
3.15.8 Future Non*m*otorized Transportation and Projected Impacts 3-*165*
3.15.9 Mitigation Measures *3-165*

3.16 UTILITIES AND SERVICE SYSTEMS 3-*167*

3.16.1 Setting 3-*167*
3.16.2 Impacts 3-*172*
3.16.3 Mitigation 3-*173*

3.17 ELECTROMAGNETIC FIELDS (EMF) AND ELECTROMAGNETIC INTERFERENCE (EMI) 3-*173*

3.17.1 *Setting* 3-*173*
3.17.2 Impacts 3-*179*
3.17.*3* *Mitigation* 3-*183*
3.17.4 Electromagnetic Interference *3-183*

3.18 CUMULATIVE IMPACTS 3-*184*
3.18.1 Regional Context 3-*184*
3.18.2 Local Context 3-*185*
3.19 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES 3-*187*
3.20 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 3-*188*
CHAPTER 4: TEMPORARY EFFECTS DURING CONSTRUCTION 4-1
4.1 CONSTRUCTION STAGING AND METHODS 4-1
4.1.1 Construction Operations 4-1
4.1.2 Construction Schedule 4-*4*
4.2 CONSTRUCTION-PHASE IMPACTS 4-*4*
4.2.1 Aesthetics 4-*6*
4.2.2 Air Quality 4-*6*
4.2.3 Biological Resources 4-*7*
4.2.4 Cultural and Historical Resources 4-*9*
4.2.5 Hazardous Wastes 4-*10*
4.2.6 Water Quality 4-*12*
4.2.7 Neighborhoods and Businesses 4-*13*
4.2.8 Construction Employment 4-*14*
4.2.9 Construction Noise and Vibration 4-*16*
4.2.10 Public Services and Facilities 4-*24*
4.2.11 Transportation Effects *d*uring Construction 4-*25*
4.2.12 Utilities 4-*26*
CHAPTER 5: CEQA FINDINGS OF SIGNIFICANCE 5-1
5.1 SIGNIFICANCE CRITERIA 5-1
5.2 UNAVOIDABLE SIGNIFICANT ADVERSE EFFECTS UNDER CEQA 5-7
5.3 CUMULATIVE EFFECTS 5-7
5.4 GROWTH INDUCEMENT 5-*7*
CHAPTER 6: CONSULTATION AND COORDINATION 6-1
6.1 PUBLIC INVOLVEMENT AND INFORMATION PROGRAM 6-1
6.1.1 Public Involvement Activities 6-1
6.1.2 Public Informational Meetings 6-*3*
6.1.3 Other Public Information Mechanisms 6-4
6.2 CONSULTATIONS 6-*4*
6.2.1 Consultation Meetings with Covenant Holder for Historic Railroad Stations 6-*4*
6.2.2 Other Consultations 6-5
6.3 *CEQA* NOTIC*ING* 6-7
6.3.1 Notice of Preparation 6-7
6.3.2 Notices of Completion and Determination 6-7
6.4 PERMITS AND APPROVALS 6-7
6.6 CHRONOLOGY OF COORDINATION 6-*7*

Appendices

Appendix A: Environmental Checklist Form
Appendix B: Definitions, Abbreviations, and Acronyms
Appendix C: Agency Correspondence
Appendix D: *Draft EA/EIR* Distribution List
Appendix E: Bibliography
Appendix F: List of Preparers
Appendix G: Air Quality Calculations
Appendix H: Section 4(f) Evaluation

List of Figures

Figure S-1: Project Location S-2
Figure 1.2-1: Caltrain System *w*ith Stations 1-4
Figure 1.2-2: *ABAG Superdistricts* 1-*6*
Figure 1.2-3: Origin County of Workers in San Mateo and Santa Clara Counties (2000 Census) ... 1-8
Figure 2-1: Project Location 2-2
Figure 2.3-1: Overhead Contact System Two-Track Arrangement with *Side* Pole Construction 2-1*1*
Figure 2.3-2: Overhead Contact System *Typical Portal Arrangement* 2-1*2*
Figure 2.3-3: Overhead Contact System *Two Track Arrangement with Center Pole Construction* 2-1*3*
Figure 2.3-4: Overhead Contact System *Multi Track Arrangement with Headspan* 2-1*4*
Figure 2.3-5: Overhead Contact System Typical Two Track Cantilever 2-15
Figure 2.3-*6*: Proposed Traction Power Facilities Paralleling Station PS1 .... 2-*17*
Figure 2.3-*7*: Proposed Traction Power Facilities Paralleling Station PS2 .... 2-*18*
Figure 2.3-*8*: Proposed Traction Power Facilities Substation *TPS1 Preferred, Alternate A and B* 2-*19*
Figure 2.3-*9*: Proposed Traction Power Facilities Paralleling Station PS3 .... 2-*20*
Figure 2.3-*10*: Proposed Traction Power Facilities Paralleling Station PS4 .... 2-*21*
Figure 2.3-*11*: Proposed Traction Power Facilities Switching Station SWS1 .... 2-*22*
Figure 2.3-*12*: Proposed Traction Power Facilities Paralleling Station PS5 .... 2-*23*
Figure 2.3-*13*: Proposed Traction Power Facilities Paralleling Station PS6 .... 2-*24*
Figure 2.3-*14*: Proposed Traction Power Facilities Substation *TPS2 Preferred and Alternate 1* 2-*25*
Figure 2.3-*15*: Proposed Traction Power Facilities Substation *TPS2 Alternate 2* 2-*26*
Figure 2.3-*16*: Proposed Traction Power Facilities Paralleling Station PS7 .... 2-*27*
Figure 2.3-*17*: Typical Substation Compound 2-*29*
Figure 2.3-*18*: 115-*50*kV Primary Transformer (30MVA) 2-*30*
Figure 2.3-*19*: Typical Auto-Transformer (10MVA) *a*t Paralleling or Switching Station 2-*31*
Figure 2.3-*20*: Typical Switching Station 2-*32*
Figure 2.3-*21*: Typical Overbridge Protection Barrier 2-*36*
Figure 2.3-*22*: Typical Pantograph 2-*38*
Figure 2.3-*23*: Typical Electric Locomotives 2-*39*
Figure 2.3-*24*: Typical EMU Vehicles 2-*40*
Figure 3.1-1: *Tree Trimming Simulation in Atherton Area 3-5*
Figure 3.1-2: Tree Trimming Simulation in Burlingame Area 3-6
Figure 3.1-3: View from Neighborhood to Paralleling Station 3 (PS3) 3-8
Figure 3.1-4: View from Neighborhood to Paralleling Station 5 (PS5) 3-9
Figure 3.1-5: View to San Carlos Station Platform with OCS System, Headspan and Portal Arrangment 3-11
Figure 3.1-6: View to Diridon (San Jose) Station Platform with OCS System and Headspan 3-12
Figure 3.1-7: View *of* Paralleling Station (PS2) 3-*13*
Figure 3.1-*8*: View to Redwood “Wye” Junction from Residential Area with OCS System and Headspan 3-*15*
Figure 3.1-*9*: View from Atherton Station to Fair Oaks Grade Crossing with OCS System 3-*16*
Figure 3.1-*10*: View from Multi-Story Apartment Building to San Antonio Station with OCS System and Side Pole Construction 3-1*7*
Figure 3.1-*11*: *View from South San Jose Residential Area to Elevated Railroad Corridor with OCS System and Side Pole Construction 3-19*

Figure 3.1-12: View from San Antonio Station Platform to Overbridge Protection Barrier 3-*20*
Figure 3.1-*13*: View from Roadway to Overbridge Protection Barrier 3-*21*
Figure 3.5-1: Overhead Contact System Typical Two-Track System Tunnel Cantilever............... 3-*56*
Figure 3.5-2: Santa Clara Historic Station *w*ith Overhead Contact System.................................... 3-*57*
Figure 3.5-3: Diridon Historic Station *w*ith Overhead Contact System.. 3-*58*
Figure 3.10-1: Sources of PG&E's Utility-Generated Electric Energy... 3-*111*
Figure 3.10-2: Estimated Sources of PG&E's Purchased Electric Energy...................................... 3-*112*
Figure 3.11-1: Typical Sound Levels *f*rom Indoor and Outdoor Noise Sources............................. 3-*120*
Figure 3.11-2: Noise Impact Criteria for Transit Projects... 3-*122*
Figure 3.11-3: Increase in Cumulative Noise Levels Allowed by Criteria 3-*123*
Figure 3.17-1: Broadband Magnetic Field Measurements at 1.5-*S*econd Intervals *a*long Caltrain Corridor, San Francisco to San Jose.. 3-*175*
Figure 4.1-1: Estimated Construction Phasing for Caltrain Electrification Program Alternative..... 4-*5*

List of Tables

Table P-1: *2004 EA/DEIR and 2008 EA/FEIR Project Characteristics* *P-2*
Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures S-11
Table S-2: Summary of Construction Impacts and Proposed Mitigation Measures S-*18*
Table S-3: Electrification System Costs Millions of 2003 *and Year of Expenditure (YOE)* *2012* Dollars Rolling Stock and Non-Rolling Stock by Year S-*22*
Table S-4: Funding Sources for Caltrain Electrification Program with Preferred EMU Option (Millions of Dollars) S-*23*
Table 1.2-1: Anticipated Changes in San Francisco Employment *(2000-2035)* 1-5
Table 1.2-2: Summary of NAAQS and CAAQS Exceedences in the Caltrain Corridor, 2002-*2006* 1-12
Table 1.5-1: Permits and Approvals Anticipated *to b*e Required 1-*19*
Table 2.3-1: Fleet Requirements of the No-Electrification (No-Project*/No-Action*) Alternative 2-6
Table 2.3-2: *Fleet Requirements of the Electrification Program Alternative* *2-8*
Table 2.3-*3*: Overhead Bridge Protection Barriers 2-*33*
Table 2.3-*4*: Electrification System Costs Millions of 200*8 and Year of Expenditure (YOE)* Dollars Rolling Stock by Year 2-*43*
Table 2.3-*5*: Electrification System Costs Millions of 200*8* and Year of Expenditure (YOE) Dollars Non-Rolling Stock Program Costs 2-*44*
Table 2.3-*6*: Electrification System Costs Millions of 200*8 and Year of Expenditure (YOE)* Dollars Rolling Stock and Non-Rolling Stock by Year 2-*45*
Table 2.3-*7*: Funding Sources for Caltrain Electrification Program with Preferred EMU Option (Millions of Dollars) 2-*46*
Table 2.3-*8*: Caltrain Operating Parameters 2-*47*
Table 2.3-*9*: Incremental Operating and Maintenance Costs for Electrification *(Millions 2008 $)* 2-*48*
Table 2.3-1*0*: Caltrain Operating and Maintenance Costs with Electrification (Millions of 200*8* Dollars) 2-*49*
Table 3.*3*-1: Ambient Air Quality Standards and Attainment Status for Criteria Pollutants 3-2*5*
Table 3.3-*2*: Thresholds of Significance for Project Operations 3-2*8*
Table 3.3-*3*: Emissions *Comparison Summary* (*4.5*-Car Trains) 3-*30*
Table 3.3-*4*: Emissions Comparison Summary *(Five-Car Trains)* 3-*31*
Table 3.4-1: Summary of Jurisdictional Features in the Electrification Program Alternative Vicinity 3-*41*
Table 3.5-1: Prehistoric and Historic-*Era* Archaeological Sites In or Potentially In the Area of Potential Effect 3-*49*
Table 3.5-2: Properties Listed in*, Determined Eligible for, or that Appear Eligible for Listing in the National Register and California Register* 3-*53*
Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE 3-*59*
Table 3.7-1: Known Hazardous *Materials/*Waste Sites with Potential to Affect Proposed Traction Power Substation Sites 3-*69*
Table 3.9-1: *Proposed Access to Traction Power Substations* 3-*107*
Table 3.10-1: Annual Traction Power Energy Use for the No-*Electrification* and *Electrification Program* Alternatives 3-*119*
Table 3.11-1: Land Use Categories and Metrics for Transit Noise Impact Criteria 3-*122*
Table 3.11-2: Local Noise Ordinance Criteria for Stationary Sources 3-*124*
Table 3.11-3: Representative Sensitive Receptors and Existing Noise Measurements 3-*126*
Table 3.11-4: Summary of Noise Impacts from Train Operations 3-*127*

Table 3.11-5: Noise Levels for Electrical Equipment 3-*129*
Table 3.11-6: Ground-Borne Vibration Impact Criteria for Human Annoyance 3-*130*
Table 3.11-7: Existing Vibration Measurements 3-*132*
Table 3.11-8: Vibration Impacts from Train Operations at Representative Sensitive Receptors.... 3-*133*
Table 3.12-1: 2000-20*35* Population, Housing and Employment Growth in the 110 Census Tracts Bordering on the Caltrain Corridor 3-*136*
Table 3.12-2: Ethnic Populations in the Study Area 3-*136*
Table 3.12-3: Project Area Household Income and Poverty Status in 1999 .... 3-*137*
Table 3.12-4: Project Area Transit-Dependent Populations in 1999 .... 3-*137*
Table 3.12-5: Summary of Right-of-Way Acquisition (Including Easements) for the Electrification Program Alternative 3-*139*
Table 3.13-1: Public and Private Services and Facilities Identified Adjacent to the Caltrain Corridor 3-*143*
Table 3.14-1: Parks and Recreation Facilities Located along the Caltrain Corridor 3-*145*
Table 3.15-1: Connecting Bus Service *and Other Transit* at Caltrain Stations 3-*149*
Table 3.15-2: Caltrain Weekday Boardings and Alightings by Station 3-*151*
Table 3.15-3: Highway Traffic Volumes, 2006 .... 3-*154*
Table 3.15-4: Caltrain Parking 3-*157*
Table 3.15-5: Caltrain *Current and Projected* Daily Boardings and Alightings *(Weekdays)* 3-*159*
Table 3.15-6: Estimated Transit Travel Times for Selected Trips on Caltrain 3-*161*
Table 3.15-7: Current and Projected Boardings by Operator 3-*163*
Table 3.15-8: 20*35* Caltrain Parking Demand and Supply Projections 3-*166*
Table 3.16-1: Summary of Existing Utilities *w*ithin the Peninsula Corridor Right-of-Way 3-*167*
Table 3.16-2: Utilities *n*ear Proposed Traction Power Locations 3-*170*
Table 3.17-1: *Magnetic Field Strengths* *3-175*
Table 3.17-2: Broadband (40 *to* 800 Hz) and Harmonic (100 *to* 800 Hz) Magnetic Fiel*d* Measurements along Caltrain Corridor (2001) 3-*176*
Table 3.17-*3*: EMF Field Strength of Caltrain and Related Electrified Rail Transportation System 3-*180*
Table 3.17-4: Measured Magnetic and Electric Field Values - Amtrak Northeast Corridor *3-182*
Table 4.2-1: Impacts from Construction Investment in the Caltrain Electrification Program (Millions of 2003 dollars) 4-*15*
Table 4.2-2: Typical Construction Equipment Noise Emission Levels 4-*16*
Table 4.2-3: Summary of Local Ordinances Governing Construction Noise 4-*18*
Table 4.2-4: Allowable Construction Noise Levels 4-*19*
Table 4.2-5: Distance to Noise Impact *d*uring Construction Stages 4-*20*
Table 4.2-6: Vibration Source Levels for Construction Equipment 4-*21*
Table 4.2-7: Ground-Borne Vibration Impact Criteria for Human Annoyance 4-*21*
Table 4.2-8: Construction Equipment Vibration Impact Distances 4-*22*
Table 5.1-1: CEQA Significance Threshold for Selected Environmental Impact Categories 5-2

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Summary

SUMMARY

S.1 PURPOSE OF AND NEED FOR CALTRAIN ELECTRIFICATION PROGRAM

The primary purposes of the Caltrain Electrification Program are to:

- Improve train performance,
- Reduce noise,
- Improve regional air quality, and
- Modernize Caltrain.

Figure S-1 shows the location of the proposed project. *The project limits for electrification are proposed between San Francisco and San Jose.*

The population of the Bay Area is increasing and, with it, traffic congestion. Commute traffic between major employment centers in San Francisco and along the San Francisco Peninsula is growing, and there has been a substantial increase in "reverse commute" trips from San Francisco to Peninsula locations over the past decade. Off-peak travel between San Francisco and Peninsula locations is also on the rise. Caltrain has experienced increases in ridership as people seek alternate ways to meet these travel needs. Caltrain anticipates continued increases in demand for its rail services *over time***.** To meet that increasing demand, Caltrain *adopted the Rapid Rail Program and has already implemented increases in trackage; Caltrain introduced the Baby Bullet Service in 2004 and has recently purchased 8 new vehicles*.

Electrification *makes it possible to increase service levels and it* offers several advantages in comparison with diesel power, and these benefits serve the primary objectives of the Caltrain Electrification Program, as follows:

- Electric trains can accelerate and decelerate at *faster* rates than diesel-powered trains, even with longer train consists[1]. *With electrified trains, Caltrain can run longer consists without degrading speeds, thus increasing peak-period capacity. Electrification also makes it possible to increase service from the current 5 trains to 6 trains per peak hour per direction with existing trackage and signalization.*

  A substantial portion of a Caltrain trip is spent accelerating and decelerating between stations, given Caltrain's close-set station stops. Electric trains can provide travel time reductions, especially for longer trips that make numerous stops. Local service travel time savings, in addition to the reduced trip times of the express trains, are expected to stimulate additional Caltrain ridership, reducing vehicle miles of travel (VMT) and

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[1] *The term "consist" refers to the number of vehicles assembled together into a train.*

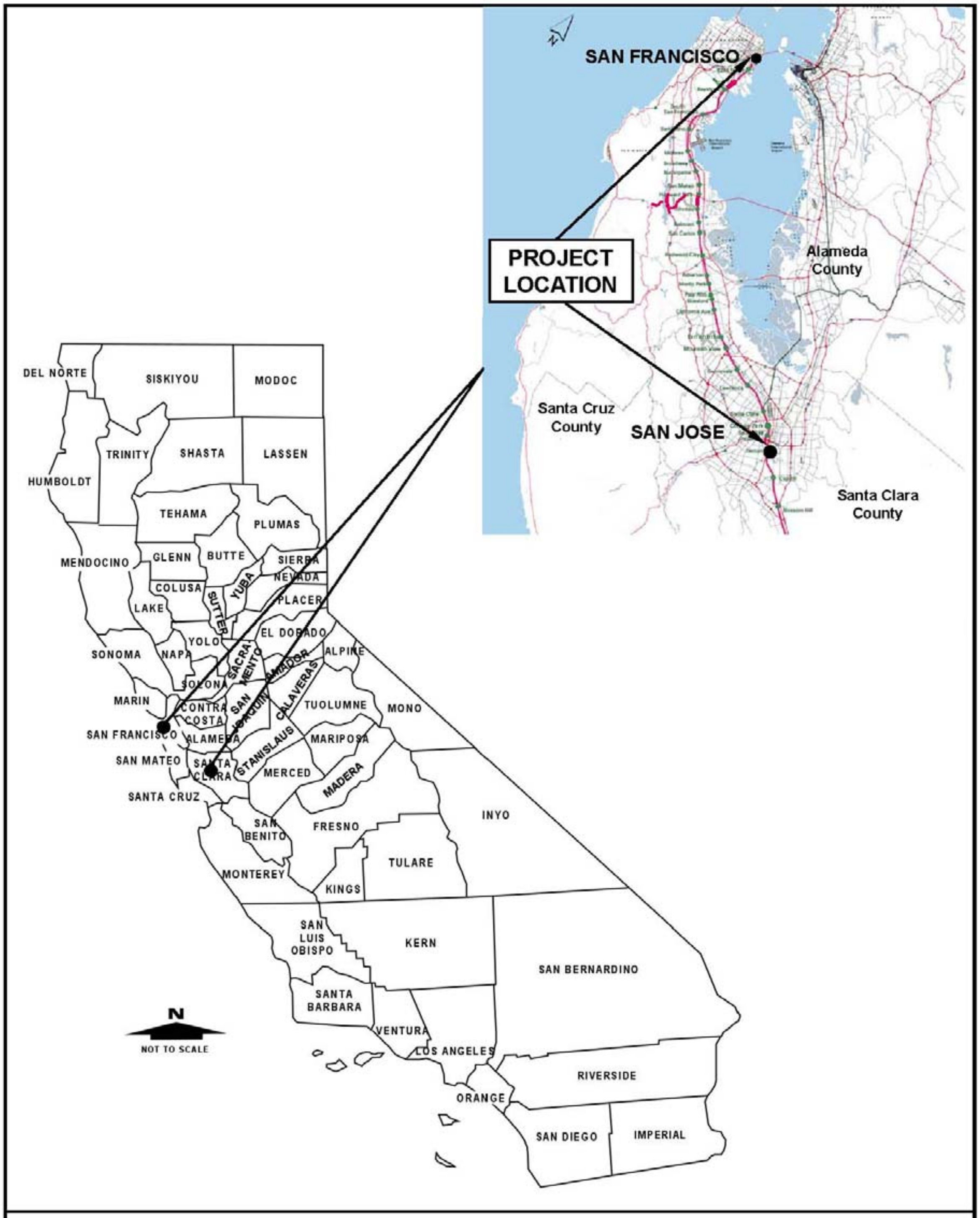

Figure S-1
PROJECT LOCATION
CALTRAIN ELECTRIFICATION PROGRAM

congestion on Peninsula roadways. Reducing auto use will also improve regional air quality and reduce parking demand in downtown San Francisco and Peninsula cities.[2]

- Noise emanating from the passage of electrified train sets is measurably less when compared with diesel operations. With the very substantial increases in peak and off-peak Caltrain service that are either underway or planned for implementation during the next *6* to *27* years, electrification becomes an important consideration for reducing noise of train passbys and maintaining Peninsula quality of life. Train whistles will continue to be sounded at grade crossings, consistent with *California* Public Utilities Commission *(CPUC)* safety regulations*, whether or not Caltrain electrification is pursued.*
- In addition to the air quality benefits of reducing automobile use for commuting by increasing rail ridership, *electric operations* are expected to produce *substantial* reductions in corridor air pollution emissions when compared with diesel locomotives, *even when the emissions of electrical power generation are included in the analysis. Electrically powered trains are also more energy efficient than diesel-electric trains. Reduced energy use also translates into reduced air emissions. Reductions in air pollutant emissions represent long-term health benefits for Caltrain riders, and residents and employees along the Caltrain corridor.*
- An electrified Caltrain system would better address Peninsula commuters' vision of an environmentally friendly, fast, reliable service. This also may stimulate ridership. Additionally, an electrified Caltrain system would set the stage for an expanded modern regional electric express service and, potentially, for a statewide high-speed rail *(HSR)* service as well. It is anticipated that any *future HSR* service would be fully electrified. The Electrification Program facilities would be designed to accommodate *HSR* service as well as Caltrain service.

S.2 ALTERNATIVES

Two alternatives are evaluated in this Environmental Assessment/Environmental Impact Report *(EA/EIR)*: the No-Electrification (No-Project*/No-Action*) Alternative and the Electrification Program Alternative. The Electrification Program Alternative *evaluated three* alternative rolling stock options.

S.2.1 THE NO-ELECTRIFICATION (NO-PROJECT*/NO-ACTION*) ALTERNATIVE

The No-Electrification Alternative constitutes the No-Project*/No-Action* Alternative for the purposes of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA)*, respectively*.

[2] The Electrification Program *requires* the existing signal system equipment to be modified/replaced as required*, in order to be compatible with the electrification equipment*. In addition, the "Constant Warning" *devices* at the grade crossings will have to be replaced with an electrification-compatible system as part of the program. This is anticipated to avoid any increase in "gate-down time" that may be associated with electric rail systems' incompatibility with signal system equipment. See Section 2.3.2.7, Modification or Replacement of Signal System.

The No-Electrification (or No-Project) Alternative incorporates a series of rehabilitation improvements *as identified in Caltrain's State of Good Repair (SOGR) Program and does not include electrification. Under the No-Project Alternative, Caltrain will not increase the level of service beyond the current 98 trains per day level of service.* The *SOGR projects* will generally be carried out within the existing *Peninsula Corridor Joint Powers Board (*JPB*)*- or *Union Pacific Railroad (*UPRR*)*-owned railroad rights-of-way and *will be evaluated* separately in accordance with applicable environmental requirements.

The No-Electrification Alternative assumes the following existing *and ongoing* Caltrain facilities *and projects*:

- Rehabilitation of the Existing System – long-term repairs, reconstruction, and modernization of the existing tracks, signals, bridges, stations, rolling stock, and other systems.
- *The modernization of stations such as removing the hold out rule.*
- *Grade crossing improvements and a systemwide fencing program to improve safety*.
- *The already completed enhanced signal and communication systems* (centralized train control [CTC] that can accommodate an upgrade to automatic train control [ATC], and fiber optics).
- *The C*entralized *E*quipment *M*aintenance and *O*perations *F*acility (CEMOF) comprising maintenance shop, buildings, and support facilities at the Lenzen *yard* in San Jose, *completed in 2007*.
- *Baby Bullet* service*, which currently* consist*s* of *11* express trains per day *in each direction* with 57-minute travel times between San Francisco and San Jose*, and commenced revenue service in June* 2004.
- *South San Francisco Station Improvement Project, which would improve access to station platforms.*

Caltrain's *existing* service level *of* 98 daily trains *(5 trips per peak hour [tpph])* in the San Francisco to San Jose segment (including *6* daily trains in the San Jose to Gilroy segment *and 22 express trains between San Francisco and San Jose*) *will remain the same for* the years *2015* and *2035 under the No Electrification Alternative.*

S.2.2 THE ELECTRIFICATION PROGRAM ALTERNATIVE (*PREFERRED ALTERNATIVE)*

The Electrification Program Alternative assumes all improvements described in the No-Electrification Alternative, plus electrification of the Caltrain system, as described below.

The Electrification Program Alternative consists of converting Caltrain from diesel-hauled to electric*ally powered* trains *for service between the Fourth and King Street Station in San Francisco and the Tamien Station in San Jose*. *Diesel-powered locomotive service would continue to be used to provide service between the San Jose Diridon Station and Gilroy. It* would require the installation of *130* to *140* single-track miles of overhead contact system (OCS) for the distribution of electrical power to the *new* electric rolling stock. The OCS would be powered from a 25 kilovolt (kV), 60 Hertz (Hz), single-phase, alternating current

(*AC*) supply system consisting of traction power supply substations, switching stations, and paralleling stations.

Rolling stock considerations include both electric locomotives and electric multiple unit (EMU) cars, as discussed in Section 2.3.2.5, Rolling Stock. Diesel-operated trains could continue to be operated on the Caltrain alignment under electrification. JPB has identified the Electrification Program Alternative with EMU rolling stock as the preferred alternative for the following reasons:

- *Since revenue service would begin in 2015, when much of Caltrain's existing fleet will need replacement or major rehabilitation, Caltrain has a good opportunity to replace the existing fleet with improved vehicles rather than simply replacing and rehabilitating the old fleet. Purchasing a new fleet of EMU equipment will allow Caltrain to improve passenger comfort, operating efficiency, operating flexibility, and performance.*
- *The new EMU vehicles have two doors per vehicle, which would provide Caltrain with improved boarding efficiency. This would permit Caltrain to reduce dwell time per station, speeding up trips for passengers and reducing operating costs.*
- *Life cycle costs would be lower with the option of replacing existing diesel locomotives and gallery cars with new electric locomotives and new passenger cars.*
- *Train performance would be optimized with EMUs compared with the No-Electrification or electric locomotive hauled options.*
- *EMUs offer increased reliability due to the multiple power sources per vehicle.*
- *EMUs offer greater operational flexibility than electric locomotives hauling passenger cars, as they can be coupled and uncoupled rapidly to enable variable consists, thereby reducing costs in off-peak periods.*

In short, while EMUs cost more initially than keeping the current trailer car fleet, they have lower life cycle costs and give more flexibility for optimizing future performance.

The description of the Electrification Program Alternative in the following sections has been revised to reflect the implementation of revenue service in 2015.

S.2.2.1 Overhead Contact System

The OCS would provide power to the electric *rolling stock*. For heavy-haul commuter rail systems, such as that operated by Caltrain, the voltage of choice today throughout the world is 25 kV at commercial frequencies (50 *to* 60 Hz), and this is the voltage proposed for the Electrification Program Alternative.

The *proposed* power supply, *power* distribution system, and voltage are compatible with the requirements of *HSR* and will, therefore, accommodate future development of *HSR* in the Caltrain corridor without any significant overhaul of the electrification system. *Furthermore, the OCS conductors and traction power equipment were sized and located based on a* *computerized analysis of traction power load flow requirements using the probable maximum capacity of the Peninsula Corridor alignment (including a mixture of Caltrain and HSR).*

A mainline OCS typically *is* comprise*d of* two conductors above each track in what is known as a catenary configuration: a messenger wire that sags between support points (much like a utility transmission line), below which a contact wire is suspended. Both main wires are energized and are part of the same circuit. The pantograph, mounted on top of the electric vehicles, slides under the contact wire and collects the traction current from it.

The messenger wire is supported by means of cantilevered, hinged bracket arms that extend horizontally over the track from vertical steel poles mounted clear of the dynamic envelope of the vehicles. These poles must be placed within 10 to12 feet of the centerline of the tracks they serve. In complex areas, where there is limited clearance between tracks, multi-track support structures, such as multi-wire headspans attached to taller steel poles, are employed. The poles themselves are supported by cast-in-place concrete foundations or driven pile footings. Depending upon the clearance requirements of particular sections of the route, the contact wire height would vary from *approximately* 17.*0* feet to 23.*0* feet *above the rail*. *Pole heights range from 30 to 50 feet.*

*T*he OCS will be designed to allow for existing railroad freight clearances and operations*. Normal design clearances will be provided in all open areas. Special designs may be employed in close clearance tunnels or under bridges in order to provide sufficient clearances to freight and diesel passenger trains without affecting their operations.*

The particular type of OCS support on a given segment is dependent upon the track segment's exact configuration (e.g., number of tracks) and other site-specific requirements and constraints. Figure 2.3-1 shows typical side cantilever bracket arms and poles for two-track sections. Figure 2.3-2 shows a portal arrangement, where the central wires are supported over multiple tracks by means of a solid steel beam and cantilever brackets. Figure 2.3-3 shows typical center cantilever bracket arms and poles for two track sections. Figure 2.3-4 shows typical multi-track cantilever bracket arms and poles. Figure 2.3-5 shows a typical two track cantilever and bracket arms.

S.2.2.2 Auto-Transformer Power Feed Arrangement

The auto-transformer power feed system arrangement would require the installation of only *two* traction power supply substations, also referred to as primary substations, spaced *approximately 36* miles apart. In addition, there would be *one* switching station and *seven* paralleling stations, *approximately 5* miles apart. The paralleling stations provide additional power support to the power distribution system and permit increased spacing of the primary substations. Figures 2.3-*6* to 2.3-*16* show the proposed locations for these traction power facilities. Alternate sites are under consideration for *two primary substation facilities*, and *they* are evaluated in the present document. *The preferred site in each case is identified. Sites have also been evaluated for the intermediate paralleling and switching station facilities, but the design incorporates some flexibility with regard to their positioning. These facilities do* *not require connection to the utility high-voltage system, or large parcels of land, so final site selection will be coordinated with local authorities during final design of the electrification systems.*

In addition to reducing the number of large primary substations, another advantage of the auto-transformer feed arrangement for implementation along the Caltrain corridor is its potential to reduce electromagnetic fields (EMF) and electromagnetic interference (EMI). *These fields are reduced* because it includes two parallel aerial feeders, one on each side of the alignment *in which* currents in the parallel feeders flow in the opposite direction to that in the main catenary conductors. *T*his tends to cancel EMF/EMI effects created by current flow in the main OCS.

S.2.2.3 Substations, Switching Stations, and Paralleling Stations

The primary substation *units* would *typically* be *approximately 150* feet by *200* feet in size, as evidenced by the size of the facilities recently installed between New Haven, Connecticut, and Boston, Massachusetts, for the 25-kV *AC* extension of the electrified services on the Amtrak Northeast Corridor. Lineside equipment would be designed to provide alternate feeding arrangements in the event of a substation equipment outage. Figure 2.3-*17* shows a typical substation installation.

At approximately the midpoint between *the two primary* substations, *a* switching station would be installed, and in between the substations and switching station, paralleling stations would be installed to permit increased spacing of the primary substations. Switching station *compound dimensions are typically 80 feet wide by 160 feet long;* paralleling station compound dimensions are typically *40* feet *wide* by *80* feet *long*. Figure 2.3-*20* shows a typical switching station compound.

Substation facilities would be placed to take advantage of connections to existing power sources and away from residential and habitat areas. The smaller paralleling and switching station facilities would be located to minimize their impact on residential and habitat areas. *The smaller paralleling and switching station facilities would be located on or adjacent to JPB property to minimize their impact on adjacent areas. The JPB has attempted to locate all traction power facilities within existing right-of-way; in areas where existing ROW was not practicable, locations were chosen to be consistent with local planning and zoning regulation, and to avoid or minimize impacts to surrounding land uses.*

S.2.2.4 Overbridge Protection Structures

In addition to the electrical facilities themselves, electrification of the Caltrain line would require the construction or enhancement of overbridge protection barriers on *approximately 47* roadway bridges *a*cross the Caltrain alignment. As shown in Table 2.3-*3* in Section 2.3.2.4, *15* of the existing bridges already have such barriers *on both the north and south face, 6 bridges have a barrier on only one bridge face, and 26 have no overbridge protection barriers*. These overbridge protection barriers prohibit access to the rail corridor and prevent objects from being thrown off the bridges in a manner that would damage or interfere with the electrical facilities. New overbridge protection barriers would be 6.5 feet high *above* *sidewalk or pavement level* and *placed along the parapet of the bridge at least 10 feet from the closest energized conductors crossing underneath*. The existing barriers would be enhanced to meet these requirements. *For two-track segments, the length of the overbridge protection barrier would be approximately 35 to 40 feet long. For three- and four-track segments, the overbridge protection barrier would be from 65 to 80 feet long.*

Overbridge protection barriers can be constructed from a variety of materials, including timber, sheet metal, small mesh wire fabric, and concrete *or other materials*. Figure 2.3-*21* shows a typical overbridge protection barrier treatment *as installed in the Northeast Corridor. For the Caltrain Electrification Program, however*, *i*t is proposed to use a fine mesh wire fabric; this provides safety protection and maintainability, but affords *a* transparency for *pedestrians and motorists*.

S.2.2.5 Rolling Stock

The Electrification Program Alternative *considered the following* three rolling stock options:

- *Option 1: Replace Diesel Locomotives with new Electric Locomotives – This option would replace Caltrain's* existing diesel locomotive fleet *approaching the end of their useful life in 2015,* on a one-for-one basis and would result in electric locomotives hauling the existing fleet of gallery cars.
- *Option 2: Electric Multiple Units (EMUs) – This* option would replace the diesel locomotives and gallery cars *approaching the end of their useful life* with EMUs *in 2015. The remaining diesel locomotives and gallery cars would be used for bullet train service. Under this option,* each motorcar has its own pantograph *(to collect power from the OCS)* mounted on the roof, and separate electric motor drives to each axle of the trucks, using four motors (one per axle) or two motors (one per truck). EMUs can be operated in a variety of train consists dependent upon the requirements of the rail system operator. *The JPB has identified EMUs as the preferred rolling stock for the preferred Electrification Program Alternative.*
- *Option 3: Replace Diesel Locomotives with new Electric Locomotives and existing Passenger Cars with new Passenger Cars – This* option would replace the diesel locomotives and gallery cars *approaching the end of their useful life in 2015,* with electric locomotives hauling a completely new fleet of *passenger* cars.

Each of the options evaluated would continue diesel-powered service between San Jose and Gilroy and would also allow continued diesel operations by freight trains, other commuter, or passenger rail services (e.g., Dumbarton service).

Under all three rolling stock options, power for the electric vehicles *would* be drawn from the OCS through a roof-mounted pantograph. The pantograph is a hinged, mechanical device that can extend vertically to follow variations in the OCS contact wire height, with a typical extension from as low as 14 feet up to 24 or 25 feet. A typical pantograph is depicted in Figure 2.3-*22*.

<u>Electric Locomotives</u>. Electric locomotives currently in passenger service on Amtrak's Northeast Corridor and used by New Jersey Transit (NJT), Southeastern Pennsylvania Transportation Authority *(SEPTA)* and Maryland Rail Commuter Service *(MARC*) include the ASEA ALP-44, the Bombardier high horsepower (HHP) locomotive; and the ADtranz ALP-46 locomotive. These locomotives are shown in Figure 2.3-*23*. The design locomotive for evaluation of the impacts of electrification in the present document is the ADtranz ALP-46.

<u>Electric Multiple Units</u>. EMUs currently in use include the 1,500-volt *direct current (DC)* gallery cars now being operated by Metra in Chicago. These cars closely resemble the Caltrain double-level gallery cars. *Northern Indiana Central Transit District also operates the new 1,500-volt DC multi-level Kawasaki cars in northern Indiana and Illinois. Twenty-five*-kV *AC* single-level EMUs are in service on the Deux Montagnes Commuter Railroad in Montreal. Typical modern European EMU vehicles are shown in Figure 2.3-*24*. *In addition, Metro-North Railroad, NJT, and SEPTA operate single-level EMUs powered from an 11.5- to 12.5-kV and 25-kV AC OCS.* There is *currently* no *United States-based* prototype for the bidirectional EMU proposed for the Electrification Program Alternative. The EMU vehicle that would be proposed for the Electrification Program would be a multi-level car of comparable dimensions to the existing Caltrain gallery car. *Caltrain is working with the Federal Railroad Administration (FRA) to develop a system of operating to allow modern European EMU equipment to operate on the Caltrain Electrification System.*

S.2.2.6 Caltrain Operating Scenario(s) *u*nder Electrification

The level of Caltrain operations and therefore fleet requirements under the Electrification Program Alternative would be *114* trains per day, including *6 diesel-powered* trains in the San Jose to Gilroy segment, by *2015. The Electrification Program Alternative assumes no service increase from 2015 to 2035. As previously stated, Caltrain can only achieve an increase in the level of service using vehicles powered by electricity; also electrified trains accelerate and decelerate somewhat faster than diesel trains, making for shorter trip times.*

S.2.2.7 Modification or Replacement of Signal System

The Electrification Program has identified the requirement for the existing signal circuitry to be modified or replaced, as needed, to achieve electrification compatibility. This applies particularly to grade crossing protection systems, where the *existing* "Constant Warning Time" equipment would have to be replaced with an electrification-compatible system. *There are several possible systems which can be installed. Engineering analysis and the need* to avoid increased crossing gate down times, particularly in locations where multiple grade crossings are in close proximity*, will determine the applicable system*. Caltrain is *also pursuing a new advanced technology that* incorporates the use of wayside radio equipment that will communicate with equipment on board the locomotives and cab cars. This technology would be compatible with both diesel and electrified operations and would therefore also permit reductions in gate down times for the existing diesel service.

S.2.2.8 Other Improvements Included in the Electrification Program Alternative

OCS infrastructure would be placed to *wire the existing tracks,*third and fourth track improvements*, and infrastructure modifications designed and scoped under the ongoing Caltrain Capital Program.*

Construction for the new CEMOF at the Lenzen Yard *was* complet*ed* in 200*7*. The CEMOF has independent utility and purpose from the Electrification Program, as it would serve current and future system operations whether they are diesel or electric. The CEMOF was the subject of a separate environmental document; a Finding of No Significant Impact *(FONSI)* was given by *the Federal Transit Administration (*FTA*)* in March 1999. The Electrification Program Alternative would provide *for an extension of the shop building and* the required OCS wiring of the shop and tracks within the CEMOF.

S.2.2.9 Staging of Electrification Improvements

The intent of the Electrification Program *would be to wire the* trackwork from San Francisco to *San Jose*. *Construction would likely take place in multiple locations concurrently in order to minimize the overall duration of the Project. Construction activities would be scheduled as one continuous phase from Fourth and King to Tamien. The staging of electrification from Tamien to Gilroy is not contemplated at the present time.*

S.2.2.10 Alternatives Considered and Withdrawn

A range of different propulsion options was considered to meet the project purpose and need. *Seven* alternatives were ultimately withdrawn from further consideration based on *poor* cost-effectiveness, environmental effects, *lack of compatibility with other improvements suggested in Caltrain's Strategic Plan,* or other factors. These alternatives and the reasons they were withdrawn are presented in Section 2.4, Alternatives Considered and Withdrawn.

S.3 SUMMARY OF ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

Long-term environmental impacts and proposed mitigation measures *for the No-Electrification and Electrification Program Alternatives* are summarized in Table S-1. Short-term, temporary construction-phase impacts and proposed mitigation measures *for the project alternatives* are summarized in Table S-2. *Brief descriptions are provided for each resource where impacts are expected; f*ull descriptions of these impacts are provided in Chapters 3 and 4, respectively.

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures

Impact Category/ Section in EA/EIR	No-Electrification (No-Project) Alternative	Electrification Program Alternative
Aesthetics Section 3.1	No impact.	Addition of OCS poles and wires and trimming of trees in *the* existing commuter and freight rail corridor would result in changes that would increase visual clutter in some locations and be perceived as negative by some residents and business occupants, depending upon their distance from the Caltrain right-of-way and the amount of visual screening present. These changes would not introduce visual elements that are substantially out of character with existing land uses or obscure a scenic view or vista. *The JPB would not trim mature vegetation any more than is necessary for safe electrified operations. Measures to mitigate visual impacts will be incorporated into the project design insofar as feasible.* Mitigation measures include use of headspans to lighten overhead elements in sensitive areas, coordinating with local jurisdictions and neighborhoods to incorporate aesthetic treatments for OCS poles *and consider the feasibility of additional planting*, and directing light associated with proposed traction power facilities onto the premises and away from surrounding land uses.
Agricultural Resources Section 3.2	No impact.	*No impact.*
Air Quality Section 3.3	Bay Area Air Quality Management District (BAAQMD) criteria for reactive organic gases (ROG), nitrogen oxides (NO_x) and particulates (PM_{10}) would be exceeded under diesel train operations in forecast years *2015* and *2035*.	Electric power generation emissions in *2015* and 20*35* would exceed only the NO_x significance threshold. For both future years, the estimated air pollutant emissions, including NO_x, would be *substantially* lower than those estimated for *continued* diesel train operations. Although there would be increases in motor vehicle use to and from stations from the increase in train ridership under the Electrification Program Alternative, this *impact* would be more than offset by the overall reduction in total *VMT* in the region.

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures

Impact Category/ Section in EA/EIR	No-Electrification (No-Project) Alternative	Electrification Program Alternative
Biological Resources Section 3.4	No impact.	No impacts to wetlands/waters of the U.S. or to habitat for special-status species. *Tree trimming on property outside of Caltrain right-of-way may be necessary for safe electrified operation. A Vegetation Management Plan will be developed in consultation with a certified arborist to minimize impacts to trees and other mature vegetation.*
Cultural Resources Section 3.5	No impact.	**Historical:** *Project design and construction treatments would result in no adverse effect on historic resources. Hence, mitigation measures are not required.* **Archaeological:** *No adverse impact. Surveys of the proposed traction power facility locations and connector routes were limited in some locations by poor ground visibility, and although no cultural resources were identified in those areas, there remains the possibility for archaeological remains. A Cultural Resources Programmatic Agreement (PA) will be developed among the Federal Transit Administration (FTA), Joint Powers Board (JPB), State Historic Preservation Office (SHPO) and if required, the Advisory Council on Historic Preservation.*
Geology, Soils, and Seismicity Section 3.6	No impact.	No impact. All project facilities w*ill* be designed in accordance with current seismic design criteria.

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures		
Impact Category/ Section in EA/EIR	**No-Electrification (No-Project) Alternative**	**Electrification Program Alternative**
Hazardous *Waste and* Materials Section 3.7	No impact.	A total of *189* known or potential hazardous waste sites were identified within *0.25*-mile of the proposed traction power facility locations. A mitigation plan*, including a worker health and safety plan (HSP), will* be developed to establish guidelines for the disposal of contaminated soil and discharge of contaminated dewatering effluent, and to generate data to address potential human health and safety issues. *A focused Phase II site investigation (and Risk Assessment, if necessary) will be performed at specific TPS station sites. Purchase agreements for acquired property will address the characterization, remediation, and liability for existing hazardous environmental conditions. The following site-specific mitigation measures will be taken, if necessary for selection of Alternative TPS sites, to reduce effects related to hazardous materials/wastes at the following locations:* •*TPS1 Alt B: Conduct subsurface investigations (including heavy metals, PCBs, and polynuclear aromatic hydrocarbons [PAHs], and total petroleum hydrocarbons) on the soil and groundwater at 166 Harbor Way.* •*TPS2 (Preferred): Conduct soil sampling on debris piles located on property to determine contents and evaluate appropriate disposal options.* •*TPS2 Alternative 1: Conduct asbestos and lead-based paint sampling on structures to determine whether asbestos-containing materials or lead-based paint exists for proper disposal*
Hydrology, Floodplain, and Water Quality Section 3.8	No hydrology or floodplain impacts. Water Quality impacts greater than Electrification Program Alternative due to associated exhaust from diesel-powered locomotives.	While constructing OCS pole foundations, groundwater *will* be encountered in areas where the groundwater table is less than 15 feet below the surface. This *will* include areas in the vicinity of San Francisco Bay in San Francisco, San Mateo, and Santa Clara counties. *Design features and general m*itigation measures to avoid *surface and* groundwater *pollution include preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP); avoiding to the extent feasible catenary pole installation in the floodplain; and modification of construction techniques for installation of poles in areas where the groundwater table is high*.

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures

Impact Category/ Section in EA/EIR	No-Electrification (No-Project) Alternative	Electrification Program Alternative
Land Use and Planning Section 3.9	No impact.	No adverse impact. This alternative is consistent with local planning. No impact on community cohesion. *Proposed t*raction power facilities are *not expected to produce changes to land use designations or zoning, and would be compatible with existing land uses*.
Mineral and Energy Resources Section 3.10	The No-Electrification Alternative would consume approximately three times the energy consumed by the Electrification Program Alternative *for the year 2035*.	The Electrification Program Alternative (all three rolling stock options) would consume *approximately* one-third of the energy consumed by *the* No-Electrification Alternative. The difference in energy consumption can be attributed to the relative efficiency of electric-powered vehicles and the relative inefficiency of diesel-powered vehicles. *EMUs have been identified by the JPB as the preferred rolling stock. These vehicles consume approximately 95 percent of the energy required to power the other electrified rolling stock types.*
Noise and Vibration Section 3.11	**Train Noise.** Based on FTA noise criteria, *875* single-family residences and *301* multi-family residences would experience noise at FTA "*Moderate* Impact" level, and *371* single-family residences and *50* multi-family residences would experience noise at FTA "Severe Impact" level.	**Train Noise.** *Based on FTA noise criteria, 805 single-family residences and 277 multi-family residences would experience noise at FTA "Moderate Impact" level, and 308 single-family and 35 multi-family residences would experience noise at FTA "Severe Impact" level. Thus, t*here would be reductions in the numbers of residences experiencing noise impacts compared to the No-Electrification Alternative. *The Electrification Program Alternative would therefore improve noise conditions when compared with the No-Electrification Alternative.*

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures		
Impact Category/ Section in EA/EIR	**No-Electrification (No-Project) Alternative**	**Electrification Program Alternative**
Noise and Vibration (cont'd) Section 3.11	**Substation Noise.** No impact. **Vibration.** Based on FTA vibration criteria, impacts would occur at *486* representative sensitive receptors.	**Substation Noise.** *Paralleling station PS5 would be located within 150 feet of a few residences on Alma Street at Green Meadow on the north side of the facility and on Adobe Creek on the south side. TPS noise levels shall comply with IEEE national standards and guidelines for electrical power facilities. Station layouts and specific noise control measures will be developed during the design phase to minimize noise impacts from the TPSs.* **Vibration.** Impacts would *be beneficial* (an 81 percent reduction, compared with No-Electrification).
Population and Housing and Environmental Justice Section 3.12	No impact	A total of *up to 3.61* acres would be acquired to site and construct traction power *facilities.* No residential properties would be affected, and there would be *one potential* displacement of *an* active business *plus* employees. Just compensation *will* be provided as required by law. *In a small number of isolated cases, small pieces of right-of-way may need to be acquired as necessary to accommodate the placement of OCS poles; care will be taken during detailed design to avoid unnecessary impacts to private property.*
Public Services and Facilities Section 3.13	No impact.	No *substantial* adverse impact. Public transportation usage to community events and facilities may be enhanced, decreasing parking demand at these locations.

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures		
Impact Category/ Section in EA/EIR	**No-Electrification (No-Project) Alternative**	**Electrification Program Alternative**
Recreation Section 3.14	No impact.	No adverse impact. Public transportation usage to public parks and recreation facilities may be enhanced, *having the benefit of* decreas*ed* parking demand at these locations.
Transportation/Traffic Section 3.15	New transit ridership *is projected to be 9 percent* lower than under the Electrification Program Alternative. Projected daily riders: *64,678 (for year 2035).*	**Increased Transit Use.** *The* Electrification Program Alternative would result in increased public transit use compared with the No-Electrification Alternative. Projected riders per weekday *(San Francisco to Tamien)*: *71,001* (an increase of *approximately 6,323* riders per day over projected 20*35* No-Electrification ridership). ***Increased Mobility.*** *The Electrification Program will increase peak period travel capacity between corridor origins and San Francisco. Also, by providing drivers with an alternative mode of travel that competes favorably with the automobile in terms of travel times, many drivers will switch to Caltrain. This will free up space on area roadways, thereby reducing congestion on all roadways in the corridor.* **Travel Time Savings**. *A small savings in* travel time on board Caltrain *is anticipated for most trips,* depending on length *and type* of trip. ***Parking.*** *Parking demand at individual stations will be periodically reviewed and appropriate actions developed with Caltrains' partner agencies.*

Table S-1: Summary of Long-Term Impacts and Proposed Mitigation Measures

Impact Category/ Section in EA/EIR	No-Electrification (No-Project) Alternative	Electrification Program Alternative
Utilities and Service Systems Section 3.16	No impact	*The* JPB will coordinate with utility providers *and local jurisdictions during preliminary engineering and final design*. Underground utilities *will be relocated if required to accommodate the installation of OCS and TPS equipment and facilities; coordination with utility owner will minimize disruption to the utility and its customers*. Underground utilities *and longitudinally running utilities will be avoided to the extent possible by design modifications.* Overhead utilit*y conflicts* will be avoided by raising the existing utility wires over OCS wires *or relocating them under the tracks per federal, state and local code requirements*. Some overhead utility crossings will have to be relocated underground. *If relocation underground is required, the overhead wires will be removed once the underground service is established. Careful and continuous coordination with all utility providers and local jurisdictions would be initiated during preliminary engineering and would continue through final design and construction to ensure that all potentially conflicting utility locations are identified.*
Electromagnetic Fields *and Electromagnetic Interference* Section 3.17	No impact.	The Electrification Program Alternative would introduce a new source of EMF*s*, increasing EMF levels on-board Caltrain vehicles, along the perimeter of the *right-of-way*, and at various locations that passengers and workers frequent. Projected field strengths are within the “low-frequency” ranges for which *the most recent* scientific studies have determined there is no discernible link to human health effects. Minimal or no associated health risks would result. No mitigation *required*.
Cumulative Impacts Section 3.18	No impact.	The Electrification Program Alternative, together with other reasonably foreseeable future projects, would introduce new transportation-related visual elements into the environment. Because of the historic location of transportation corridor and floodplain areas, some encroachment into the 100-year floodplain would be unavoidable. These combined effects would not constitute a substantial adverse impact. *No other cumulative impacts are anticipated.*

Table S-2: Summary of Construction Impacts and Proposed Mitigation Measures

Impact Category and Section of the EA/EIR	No-Electrification (No-Project) Alternative	Electrification Program Alternative
Aesthetics Section 4.2.1	No impact.	Visual disruptions from construction activities would be noticeable but temporary in any given location. Some construction would be accomplished at night. The contractor *will* be required to minimize “spill over” light or glare effects on adjacent areas.
Air Quality Section 4.2.2	No impact.	Nitrogen dioxide *(NO_2)*, carbon monoxide *(CO)*, hydrocarbons, oxides of sulfur, and particulate matter would be emitted from construction equipment and workers’ vehicles. Grading and vehicular travel on unpaved areas would disperse particulate matter. Best management practices *(BMPs)*, including dust control measures (e.g., watering and covering materials hauled in trucks) will be used to minimize fugitive dust. Construction equipment will be in good working condition to minimize emissions.
Biological Resources Section 4.2.3	No impact.	Temporary impacts, such as air pollution from dust and construction equipment, increased runoff and soil erosion, and construction noise, *will* be minimized through the use of *BMPs*. Construction activities may disturb *habitat* of California red-legged frog, San Francisco garter snake, *California tiger salamander (Site PS7 only),* and Monarch butterfly, and nesting behavior of several swallow species. *A Biological Resources Management Plan will be developed in coordination with a qualified biologist during final design to address these potential impacts to special-status species.* All sensitive habitat and wetland areas *will* be identified *in the Biological Resources Management Plan* for avoidance during construction. Preconstruction surveys and avoidance measures *will* ensure no incidental take of the species. *A Vegetation Management Plan will be developed to minimize impacts to trees and other mature vegetation.*

Table S-2: Summary of Construction Impacts and Proposed Mitigation Measures		
Impact Category and Section of the EA/EIR	**No-Electrification (No-Project) Alternative**	**Electrification Program Alternative**
Cultural and Historical Resources Section 4.2.4	No impact.	**Historical:** No impact. Construction workers *will* be informed in advance of the significance of historic resources within or along the Caltrain corridor. *Prior to any activity potentially affecting the historic tunnels, structural investigations will be conducted to evaluate the probable effects on the structural integrity of the tunnels. Design approach and construction methods will be developed to minimize any potential impact to the brick lining of Tunnels 1-4.* ***Archaeological:*** *Construction activities are not expected to disturb buried cultural materials. All construction within site boundaries and in or adjacent to archaeologically sensitive zones will be conducted using methods selected to minimize the size of the excavation and the amount of soil removed, thereby lessening potential impacts on buried cultural resources. If buried cultural resources are inadvertently discovered during any ground-disturbing activities, all work would stop within 100 feet of the area until a qualified archaeologist can assess their significance. The JPB will comply with any local archaeological mitigation measures and guidelines for its activities within local jurisdictions.*
Hazardous Wastes Section 4.2.5	No impact.	Handling and storage of fuels and other flammable materials during construction *will* follow California *Occupational Safety and Health Administration (*OSHA*)* and local standards. A worker HSP *will* be developed and monitored for implementation. *A focused Phase II site investigation and Risk Assessment will be conducted.*
Water Quality Section 4.2.6	No impact.	An increase in the sediment load in stormwater would occur during rainfall events. The project *will* require a SWPPP. Groundwater may be encountered during electric pole excavations. A SWPPP will be prepared and will identify *BMPs*. Groundwater impacts will be minimized by *careful pole foundation siting and/or construction techniques (including* vibration *ultrasonic steel casing method) as* described in Section 4.1. If groundwater is encountered, *then* dewatering *will* be conducted and contaminated effluent disposed of per applicable regulations.
Neighborhoods and Businesses Section 4.2.7	No impact.	Construction-phase detours and street closures would not affect the ability of businesses to operate or disrupt neighborhood and community cohesion. *JPB will coordinate with the traffic departments of the local jurisdictions and with homeowner associations as practicable in developing traffic management measures affecting local streets.* *Construction documents will include a provision that requires the contractor to notify neighborhood residents, schools, and business owners in the work vicinity in advance of construction to discuss the schedule and any impending street closures or re-routings and their duration.*

Table S-2: Summary of Construction Impacts and Proposed Mitigation Measures		
Impact Category and Section of the EA/EIR	**No-Electrification (No-Project) Alternative**	**Electrification Program Alternative**
Construction Employment Section 4.2.8	No impact.	No impact. Construction expenditures would generate approximately *2,200* onsite full-time construction positions (person year equivalents or PYE) and *4,800* total positions (PYE), including direct, indirect, and induced.
***Construction* Noise and Vibration** Section 4.2.9	No impact.	**Noise*:*** Impacts requiring mitigation would occur when construction activities come within 60 to 125 feet of residences and remain within that distance for at least an 8-hour period. Proposed mitigation measures are listed in Section 4.2.9.3. **Vibration:** Impacts sufficient to cause annoyance are anticipated at residential locations that are within 40 to 130 feet from the construction activity. No damage to buildings is anticipated. Mitigation *will* include noise and vibration monitoring to demonstrate compliance with local noise limits, and avoiding unnecessary construction activities during evening, nighttime, and holiday periods.
Public Services and Facilities Section 4.2.10	No impact.	*Detours and street closures would be minimal and would not be expected to have adverse effects on public or emergency service delivery or the ability of people to access public facilities.* *To maintain acceptable response times and performance objectives for emergency response services, a Traffic Management Plan (TMP) will be developed for implementation during the construction period. The TMP will address traffic management procedures (e.g., roadway closures, detour routes, manual traffic operations) during construction.* *The* JPB *will* coordinate with local traffic departments and corridor emergency service providers in developing detour routes and traffic handling plans. Advance notice of street closures and detours *will* be provided to local jurisdictions, emergency service providers, and motorists.

Table S-2: Summary of Construction Impacts and Proposed Mitigation Measures		
Impact Category and Section of the EA/EIR	**No-Electrification (No-Project) Alternative**	**Electrification Program Alternative**
Transportation Effects *d*uring Construction Section 4.2.11	No impact.	Traffic in the vicinity of the proposed traction power stations or along the route of power conduits to the rail right-of-way could be disrupted. Use of rail vehicles and the rail right-of-way for construction could disrupt normal rail operations. *With the exception of PS4, c*onstruction activities for the Electrification Program Alternative are not expected to have any substantial impact on the availability of parking. No impacts to nonmotorized traffic other than those affecting general traffic are anticipated. Mitigation *will* include the following measures: - Construction staging plans will be developed to minimize impacts to roadways. - Coordination with rail dispatch will be required to minimize rail service disruption. - Track closure for construction will be limited to off-peak hours and weekends. - A *TMP* will be developed. - The public will be provided advance notice of traffic detours and their duration. - Construction crews will follow established safety practices. - Parking areas will be designated for construction workers.
Utilities Section 4.2.12	No impact.	Interference with existing utility service will be avoided insofar as possible during installations of connections to high-voltage power transmission facilities. Some overhead utilities that cross the Caltrain alignment may need to be relocated underground, or unexpected underground utilities may be encountered. Relocations of affected utilities *would* be undertaken by the utility owner and *would* require short-term, limited interruptions of service. If unexpected utilities are discovered, OCS pole foundations could be adjusted to avoid them. Any service interruptions *will* be scheduled in advance and notification provided to users.

S.4 ESTIMATED CAPITAL COSTS

The estimated capital costs for the Electrification Program Alternative from Fourth and King Streets to *Tamien* are summarized in Table S-3 *in year-of-expenditure (YOE) dollars.*

Table S-3: Electrification System Costs
Millions of YOE Dollars
Rolling Stock and Non-Rolling Stock by Year

	YOE $		
Electrification Option/Year	***Rolling Stock***	***Non-Rolling Stock***	***Electrification Total [1]***
Year 2015 *(114 trains/weekday)*			
Option 2 Preferred Alternative (EMUs)	*$440*	*$785*	*$1,225*

[1] Estimated cost of new rolling stock and non-rolling stock committed in 2011 and non-rolling stock committed in 2012 for 2015 in-service date.

Source: PCJPB, 2009.

Table S-3 includes the costs for rolling and non-rolling stock elements. The rolling stock procurement assumes nine existing Caltrain diesel locomotives and 45 coaches would be retained for Baby Bullet express train service and service between San Jose Diridon and Gilroy and emergency operations, in the event that electric power is unavailable for train propulsion. Excess diesel locomotives and coaches would be retired, as they reach the end of their 30-year useful life. No credit is taken for their value in calculation of costs or funding, due to its limited value at retirement.

In addition to rolling stock costs, *the non-rolling stock/fixed facility costs of electrification* include traction power supply and OCS delivery systems; signal systems; grade crossing, tunnel and overcrossing improvements; utility modification and relocations; landscape improvements; *property acquisition*; *retooling of the Lenzen Yard and training of maintenance personnel*; *high-level pantograph inspection platforms;* and insurance, administration, and other project development costs. *Non-rolling stock program costs would not vary with level of service, but they would be fully implemented for the first year of electrified Caltrain service. Non-rolling stock improvements are estimated to cost $608 million in 2008 dollars and $785 million YOE dollars.*

S.5 PROJECT'S INCLUSION IN REGIONAL TRANSPORTATION PLAN

The Caltrain Electrification Program is *one of a number of rail, bus and ferry projects* included in the Metropolitan Transportation Commission's (MTC) *Regional Transit Expansion Policy: Program of Projects (RTEP) Resolution No. 3434, as revised September 24, 2008*. The RTEP is the transit expansion element of the Regional Transportation Plan (RTP*) known as Transportation – 2035 Plan. The Plan* was adopted by the MTC in *April 2009*. The Caltrain Electrification Program is included in the *Transportation – 2035 Plan*.

S.6 PROPOSED FUNDING BY SOURCE

Capital costs of the Caltrain Electrification Program are proposed to be funded from *the following sources:* county sales tax *measures*; *State Transportation Improvement Program (STIP); Federal Surface Transportation Program (STP),* Congestion Management-Air Quality (CMAQ), *and FTA Section 5307/09* funds; *and State Proposition 1B and HSR bonds. While there is a funding gap of $516 million for the program, a number of potential sources are currently being considered to close the gap, including Federal American Recovery and Reinvestment Act High Speed Rail Program Funds, State Proposition 1A funds, and/or project financing. Anticipated funding amounts in YOE dollars from these sources are shown in Table S-4.*

Table S-4: Funding Sources for Caltrain Electrification Program with Preferred EMU Project (Millions of YOE Dollars)

Source	***Amount***
Local Funds, including County Sales Tax	*$191*
STIP/STP/CMAQ/Section 5307/9	*$16*
Proposition 1B and HSR Connectivity Funds	*$62*
Rolling Stock Replacement Project	*$440*[1]
Project funding shortfall, potentially to be made up for with funds from: Project Financing, Federal American Recovery and Reinvestment Act High Speed Rail Program Funds, and/or State Proposition 1A funds.	*$516*
TOTAL	***$1,225***

[1] *$440M includes $352M in FTA Section 5307/9 funds for rolling-stock replacement and $88M in matching funds from JPB Partners.*

Source: MTC, Regional Transit Expansion Policy: Program of Projects, September 2008; California High Speed Rail: San Francisco/Silicon Valley Corridor Investment Strategy, June 2009; JPB, 2009.

S.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The Electrification Program Alternative is the environmentally superior alternative because it would achieve the following benefits in comparison with the No-Electrification (No-Project) Alternative:

- Fully meets the project purpose and need;
- Increases Caltrain ridership and reduces corridor *VMT*;
- Improves corridor and regional air quality by eliminating diesel emissions and reducing *VMT*;
- *Reduces energy consumption;*
- Reduces noise of Caltrain operations;

- Accommodates future statewide *HSR;* and
- Addresses Caltrain riders' vision for a modern, upgraded train service.

S.8 ISSUES TO BE RESOLVED

Although many local jurisdictions in the Caltrain corridor, a number of organizations, and many individuals have voiced their support for electrification of the Caltrain system, some local entities and individuals have expressed concern regarding the effects of electrification, or are reserving judgment until they can fully assess the relative benefits and impacts of the project.

Chapter 1: Purpose Of and Need For Project

CHAPTER 1: PURPOSE OF AND NEED FOR PROJECT

1.1 PURPOSE OF PROJECT

The primary purposes of the Caltrain Electrification Program are to:

- Improve train performance,
- Reduce noise,
- Improve regional air quality, and
- Modernize Caltrain.

The population of the Bay Area is increasing and, with it, traffic congestion. Commute traffic between major employment centers in San Francisco and along the San Francisco Peninsula is growing, and there has been a substantial increase in "reverse commute" trips from San Francisco to Peninsula locations over the past decade. Off-peak travel between San Francisco and Peninsula locations is also on the rise. Caltrain has experienced increases in ridership, as people seek alternate ways to meet these travel needs. Caltrain anticipates continued increases in demand for its rail services *over time*. To meet that increasing demand, Caltrain adopted the Rapid Rail Program and *has* already implement*ed* increases in trackage; Caltrain *introduced the Baby Bullet Service in 2004 and has recently purchased 8 new vehicles*.

Electrification *makes it possible to increase service levels and it* offers several advantages in comparison with diesel power, and these benefits serve the primary objectives of the Caltrain Electrification project, as follows:

- Electric trains can accelerate and decelerate at *faster* rates than diesel-powered trains, even with longer train consists. *With electrified trains, Caltrain can run longer consists*[1] *without degrading speeds, thus increasing peak-period capacity. Electrification also makes it possible to increase service from the current 5 trains to 6 trains per peak hour per direction with existing trackage and signalization.*

  A substantial portion of a Caltrain trip is spent accelerating and decelerating between stations, given Caltrain's close-set station stops. Electric trains can provide real travel time reductions, *especially for longer trips that make numerous stops*. *Local service* travel time savings, *in addition to the reduced trip times of the express trains*, are expected to stimulate additional *Caltrain* ridership, reducing vehicle miles of travel and

[1] *The term "consist" refers to the number of vehicles assembled together into a train.*

congestion on Peninsula roadways. Reducing auto use will also improve regional air quality and reduce parking demand in downtown San Francisco and Peninsula cities.[2]

- Noise emanating from the passage of electrified train sets is measurably less when compared with diesel operations. With the very substantial increases in peak and off-peak Caltrain service that are either under way or planned for implementation during the next *six* to *27* years, electrification becomes an important consideration for reducing noise of train pass-bys and maintaining Peninsula quality of life. Train whistles will continue to be sounded at grade crossings, consistent with *California* Public Utilities Commission *(CPUC)* safety regulations, *whether or not Caltrain electrification is pursued.*

- In addition to the air quality benefits of reducing automobile use for commuting by increasing rail ridership, electrified *operations* locomotives are expected to produce *substantial* reductions in corridor air pollution emissions when compared with diesel locomotives, *even when the emissions of electrical power generation are included in the analysis*. *Electrically powered trains are also more energy efficient than diesel-electric trains. Reduced energy use also translates into reduced air emissions. Reductions in air pollutant emissions represent long-term health benefits for Caltrain riders, and residents and employees along the Caltrain corridor.*

- An electrified Caltrain system will better address Peninsula commuters' vision of an environmentally friendly, fast, reliable service. This also may stimulate ridership. Additionally, an electrified Caltrain system would set the stage for an expanded modern regional electric express service and for a statewide high-speed rail *(HSR)* service as well. It is anticipated that any *future HSR* service would be fully electrified. The Electrification Program facilities will be designed to accommodate *HSR* service, as well as Caltrain service.

1.2 NEED FOR PROJECT

Caltrain is the oldest commuter rail operation in the San Francisco Bay Area and the only commuter rail service *provided on* the San Francisco Peninsula. It is operated by the Peninsula Corridor Joint Powers Board (JPB), a joint powers agency *with representation from* San Francisco, San Mateo, and Santa Clara counties. Passenger trains have operated along the *51*-mile-long corridor segment between San Jose and San Francisco since 1863. Regularly scheduled service is provided between the South Bay and Peninsula communities of San Jose, Santa Clara, Sunnyvale, Mountain View, Palo Alto, Menlo Park, Atherton, Redwood City, San Carlos, Belmont, Hillsdale, San Mateo *(San Mateo and Hillsdale*

[2] The Electrification Program *requires* the existing signal system equipment to be modified/replaced as required, *in order to be compatible.* In addition, the "Constant Warning" *devices* at the grade crossings will have to be replaced with an electrification-compatible system as part of the program. This is anticipated to avoid any increase in "gate-down time" that may be associated with electric rail systems' incompatibility with signal system equipment. See Section 2.3.2.7, Modification or Replacement of Signal System.

stations), Burlingame, Millbrae, San Bruno, South San Francisco, *and Brisbane (Bayshore Station)* in Santa Clara and San Mateo counties, *and 22nd Street*, and *4th* and King Street stations in the *c*ity and *c*ounty of San Francisco. In July 1992, peak-period service was extended approximately *25* miles south of downtown San Jose, creating a 77-mile-long Caltrain corridor, with new stops in South San Jose, Morgan Hill, San Martin, and Gilroy. Figure 1.2-1 provides a map of the Caltrain system.

Weekday Caltrain ridership in October 1992 was *approximately* 21,100 passengers, *more than* half of whom boarded or alighted at the Caltrain San Francisco terminus. By August 2001, weekday Caltrain ridership had increased to *approximately* 34,400 passengers, with 38 percent boarding or alighting at the San Francisco terminus. Ridership dropped to 26,858 *daily passengers in August 2003 as a result of declining economic conditions in the Bay Area, but it rebounded to approximately 30,000 by September 2004 following introduction of the Baby Bullet service. In 2007, average daily ridership was just under 34,000 passengers, in 2008 average daily ridership reached 37,000.*

The following sections detail current and future transportation needs in the Caltrain corridor that would be addressed by the proposed Electrification Program.

1.2.1 CURRENT AND FUTURE TRANSPORTATION DEMAND IN THE CALTRAIN SERVICE AREA

1.2.1.1 Current and Future Employment in the Caltrain Corridor

Current *San Francisco* Downtown Area Employment.[3] During the decade from 1980 to 1990, San Francisco experienced a 5.4 percent increase in employment, while between 1990 and 2000, the increase was 9.5 percent. Data for the Year *2000* show the San Francisco *downtown area* containing *387,000 employees*, 60 percent of *the* total San Francisco employment. The San Francisco downtown area extends from the San Francisco Bay west to South Van Ness Avenue and south to Townsend Street.

[3] *The information in this section is based on the latest information available from the City of San Francisco as this document was being prepared.*

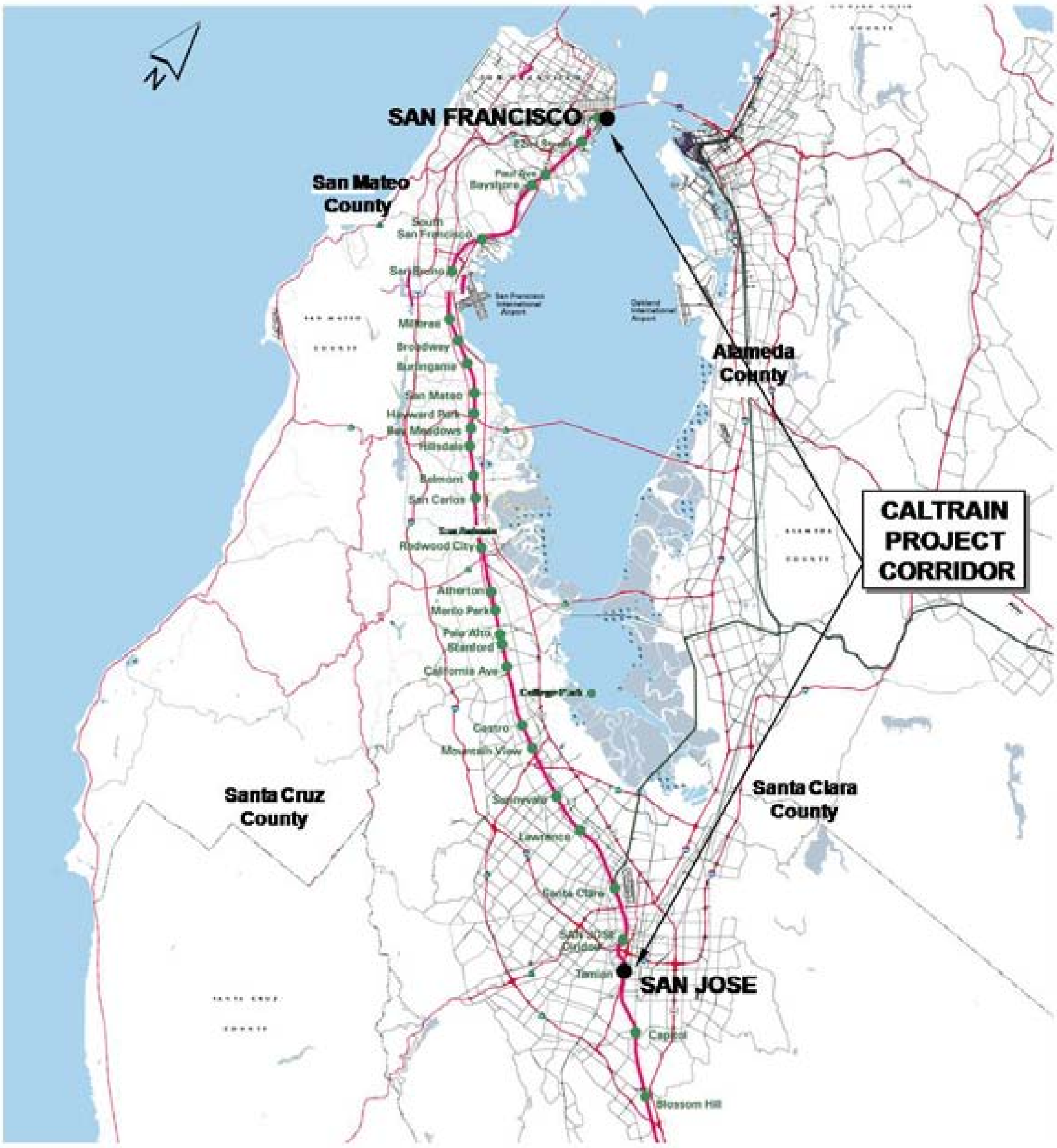

Figure 1.2-1
CALTRAIN SYSTEM WITH STATIONS
CALTRAIN ELECTRIFICATION PROGRAM

Anticipated Future San Francisco Employment. Based on *Association of Bay Area Governments (ABAG) Projections 2005* data, employment is expected to continue to grow by *more than 37* percent *between 2000 and 2035*, but anticipated growth is concentrated in a few areas. The area east of Twin Peaks and south of Townsend Street to the County line is projected to experience an increase in employment of *approximately 64* percent. These changes will shift the balance of downtown San Francisco employment concentration somewhat southward, although the *downtown area* will retain its lead in all City employment. As of 2000, the *downtown area* contained *approximately 60* percent of all employment citywide. *ABAG* anticipates that by *2035*, this area will contain *approximately 56* percent of citywide employment. Table 1.2-1 summarizes anticipated changes in San Francisco employment by workplace location. *Figure 1.2-2 shows the superdistrict ABAG zones for San Francisco and the Peninsula corresponding to the breakdown in Table 1.2-1.*

Table 1.2-1: Anticipated Changes in San Francisco Employment
2000-2035

District Workplace	2000 Employment	% of Total	*2035* Employment	% of Total	% Change 2000-*2035*
Superdistrict 1 (Downtown Area)	*387,311*	*60.4*	*495,645*	*56.3*	*28.0*
Superdistrict 3 (South of Townsend)	*134,694*	*21.0*	*220,560*	*25.1*	*63.7*
Remainder of City	*119,045*	*18.6*	*163,589*	*18.6*	*37.4*
San Francisco Total	*641,050*	*100.0%*	*879,794*	*100.0%*	*37.2*

Source: *ABAG Projections 2007.*

Current Peninsula Employment. In both 1990 and 2000, Santa Clara County, with its fast-growing, high-technology companies, had the greatest number of jobs of all Bay Area counties. During each decade from 1980 to 2000, San Mateo and Santa Clara counties each experienced employment increases of almost 23 percent. This regional growth emphasizes the fast-growing, two-directional nature of corridor travel demand and the potential for Caltrain to serve both of these travel markets. These trends have become more pronounced *since* 2000. For example, in February *2006*, morning peak-period Caltrain ridership (*i.e.*, before 9:00 a.m.) was 60 percent northbound and 40 percent southbound. The reverse commute is the fastest-growing half of Caltrain's commute ridership, growing by *21* percent in the year between *2005* and *2006* alone.

Future Peninsula Employment. ***ABAG*** *Projections 2007* forecasts *lower employment* growth rates for the decades after 2000 than before for San Mateo and Santa Clara counties. Between 2000 and *2035*, San Mateo County employment is expected to grow by *41* percent,

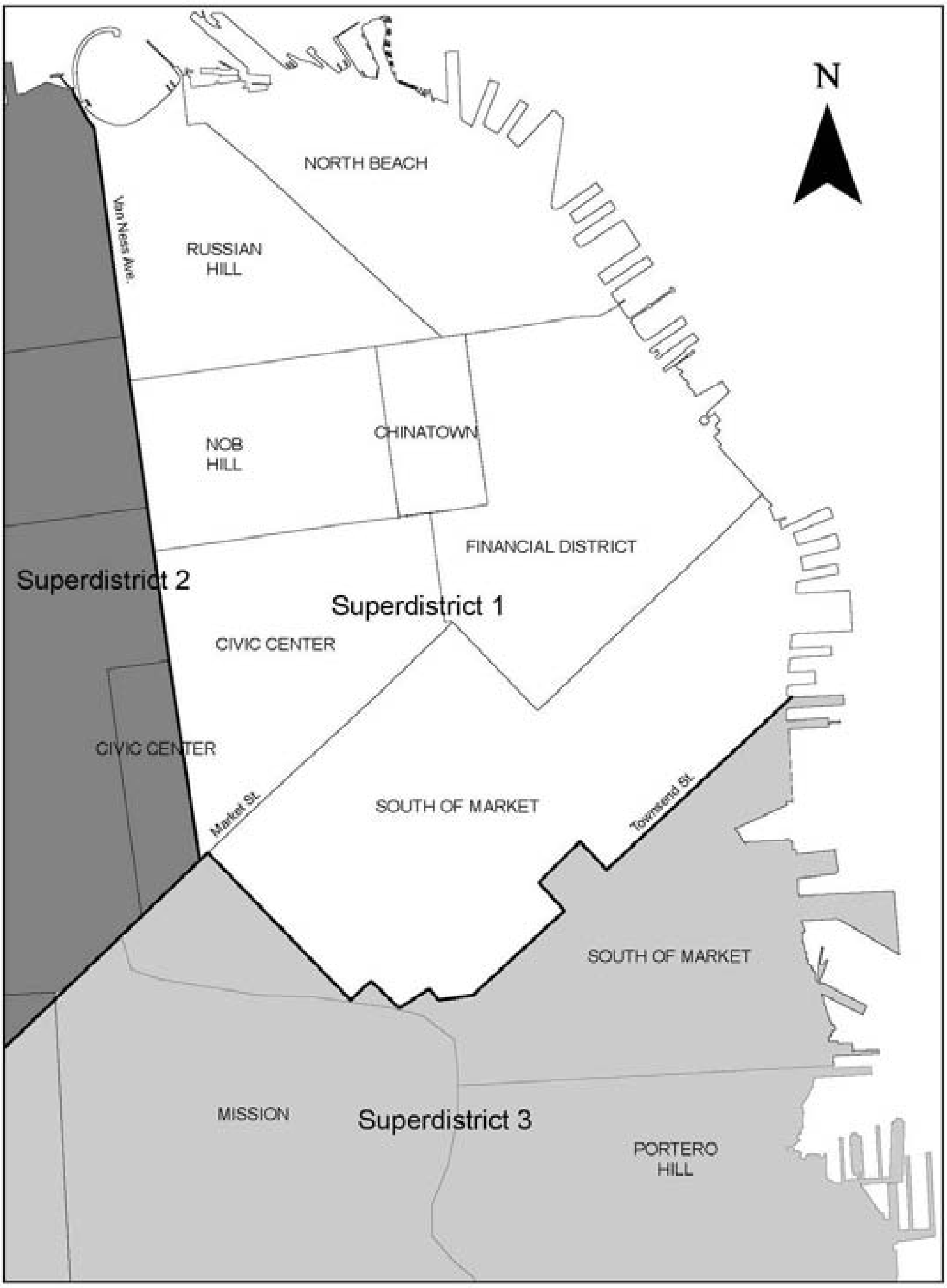

Figure 1.2-2
ABAG Superdistricts
CALTRAIN ELECTRIFICATION PROGRAM

while Santa Clara County employment growth is forecast at *37* percent. In *2035*, Santa Clara County employment is expected to total *1.4* million jobs, *50* percent of the total Bay Area employment. San Mateo County is expected to have *500,000* jobs in *2035*. The three counties of the Peninsula Corridor are projected to have *2.9* million jobs in *2035*, *more than* half of the employment in the Bay Area. Because of the constraining geography of the Peninsula, *many* of these jobs will be within a short distance of the Caltrain tracks.

1.2.1.2 Characteristics of Work Trips in the Peninsula Corridor

Journeys to Downtown San Francisco Employment. *Year* 2000 U.S. Census journey-to-work data indicate that 14 percent of work trips to San Francisco come from San Mateo and Santa Clara counties, while *more than* half come from San Francisco. The overall 1990 mode split for journeys to work in downtown San Francisco was 54 percent transit, 30 percent drive alone, and 16 percent ride share.[4] San Francisco-originating work trips had the highest transit mode share (61 percent transit) of all Bay Area residence regions. Commuters from the East Bay were next with a 55 percent transit mode share. San Francisco-destined commuters from the South Bay had the highest drive-alone mode share (44 percent) and the lowest transit mode share (37 percent) compared with commuters from the other primary regions.

This modal split information reflects the superiority of high-quality, high-capacity, direct transit access to downtown San Francisco for San Francisco and East Bay residents relative to that afforded South Bay residents. Figure 1.2-*2* shows the major destinations by *ABAG Superdistrict* of northbound Caltrain commuters.

The Electrification Program would help modernize the Caltrain service, as well as reduce transit travel times, thereby improving the service. The high transit mode share among San Francisco residents highlights the potential for the improved Caltrain to capture San Francisco riders “reverse commuting” to South Bay jobs, as well as increasing its share of San Francisco-bound workers.

Journeys to Other Peninsula Employment. According to the 2000 Census, relatively high proportions of San Mateo and Santa Clara county jobs are filled by county residents. Fifty-eight *(58)* percent of San Mateo County employment comes from within the county, with San Francisco and Santa Clara counties each providing 12 percent, as illustrated in Figure 1.2-*3*. Seventy-seven *(77)* percent of Santa Clara County jobs are filled by county residents, with 6 percent coming from San Mateo County and 2 percent from San Francisco.

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[4] “Commute Patterns to Downtown San Francisco,” a memorandum to the Transbay Study Technical Advisory Committee from the San Francisco Planning Department (Badiner, 6/30/95). *The San Francisco Planning Department has not made updates to this data based on the 2000 Census.*

Figure 1.2-3: Origin County of Workers in San Mateo and Santa Clara Counties (2000 Census)

Use of transit for work trips by Peninsula residents is much lower than for San Francisco residents. According to the *2000* Census, travel to work by *Santa Clara County* residents included only *3.5* percent on public transit, compared with *31.1* percent of work trips on public transit by residents of San Francisco. *In San Mateo County, 7.4 percent of residents utilize public transit, slightly more than those in Santa Clara County, but well below those of San Francisco County.* The high-tech employment boom in the Caltrain Corridor from San Jose to South San Francisco has, however, increased the absolute demand for transit, if not the mode share.

Caltrain boardings in Santa Clara and San Mateo counties *dropped by 8* percent between *2001* and *2006; however, boardings grew by 10 percent in the same counties between 2005 and 2006 as the high-tech industry continues to recover from the "bust" in the early part of the decade. Currently, 50* percent of Caltrain riders travel solely within or between Santa Clara or San Mateo counties. Another *25* percent of the Caltrain riders currently commute from San Francisco to the South Bay as part of the reverse commute. The total morning and evening peak-period ridership in the reverse commute direction makes up *32* percent of the Caltrain ridership and grew by *22* percent between February *2005* and February *2006*. By supporting improved Caltrain service – in concert with other Rapid Rail improvements – the Electrification Program will better serve this Peninsula-based and reverse commuter ridership.

1.2.1.3 Other Peninsula Travel That May be Served by Caltrain

Off-peak trips comprise *approximately* half of the person trips made in the region daily. Caltrain provides an important service to off-peak travel, especially since it increased the frequency of the daytime off-peak trains from 1-hour to 0.5-hour in 2000. Off-peak trips are the fastest-growing segment of the Caltrain ridership. The Electrification Program will serve this growing ridership segment by modernizing the service and reducing travel time. *Weekend travel using Caltrain is also significant. In 2007, an estimated 11,200 passengers* *used Caltrain on Saturdays for trips within the corridor; Sunday trips averaged 6,800 passengers.*

Contributing to increased use of public transportation has been the recent rapid rise of automobile fuel prices. Recent anecdotal information suggests that automobile trips have decreased by approximately 5 percent. Regional Commuter Transportation Systems, including Caltrain, would be the logical beneficiaries of a shift from private autos to public transportation, because these systems accommodate the home-work trip. Home-work trips constitute the largest share of person trips and they are the easiest trips to shift modes, assuming convenient origin-destination pairs. Should gasoline prices remain at high levels over the long-term, increased Caltrain ridership from this source would be reasonable to expect.

1.2.2 CURRENT AND FUTURE ROADWAY CONGESTION IN THE CALTRAIN CORRIDOR

Economic growth and the corresponding demand for transportation services in the San Francisco Bay Area have exceeded the region's ability to *provide the needed* roadway capacity. Existing demand for north-south travel along the Peninsula via *U.S. Highway 101* (US 101) and *Interstate 280* (I-280) regularly exceeds existing highway capacities and results in congestion that is increasing in both frequency and duration. US 101 is the most severely congested freeway through the corridor (*Transactions*, MTC, August 2001). Between San Francisco and San Jose, *many* roadway segments are at or over capacity during the peak commute hour. Caltrans travel time and speed studies indicate that major delays occur on both US 101 and I-280. The peak congestion generally occurs going into Silicon Valley in the morning and going out in the afternoon.

In San Mateo County, US 101 experienced peak-hour delays in 1999 of almost 8 minutes between *State Route* (SR) 85 and Willow Road (Menlo Park).[5] This means that the total travel time for this 6-mile segment increased from 5.6 minutes to *more than* 13 minutes as a result of congestion, an increase in travel time of 135 percent. All delays are computed with respect to travel time at 65 *miles per hour* (mph). Also in 1999, peak-hour delays reached *more than* 5 minutes between Willow Road and SR 92 (70 percent increase in travel time), SR 92 and Broadway in Burlingame (120 percent increase), and Broadway and *Interstate 380* (I-380) (140 percent increase). Delays on I-280 were of comparable magnitude north of I-380, doubling the travel time between I-380 and US 101 from *approximately* 10 minutes to *more than* 20 minutes.

[5] *The data on travel times and delay given are from 1999. While congestion has improved since then due to worsening economic conditions, traffic congestion is likely to deteriorate to 1999 conditions or worse in the long run as the economy improves. See Section 3.15.2, Existing Highways and Traffic, for more detail.*

Likewise in Santa Clara County, almost all segments of US 101 were very congested from SR 152 in Gilroy to the SR 85 interchange in Mountain View. Peak-hour travel times in 1999 on almost all of this 43-mile length of US 101 were double, or in some cases, triple, travel times experienced at 65 mph. The parallel I-280 also experienced a doubling or near doubling of peak-hour travel time in the 14 miles between SR 87 in San Jose to El Monte Avenue in Los Altos Hills.[6]

Without future roadway improvements, congestion on corridor freeways is bound to worsen to the point *at which* travel *would partially divert to surface routes* and the peak periods *would* spread *both* into the midday and to later in the evening. Bottlenecks will *continue to* constrain movement through the corridor. *ABAG Projections 2005* indicates that job growth in the corridor is expected to continue at around 1 percent per year. The resultant new transportation demand will lead to high levels of congestion that will take a toll on economic development by constraining goods and people movements.

Opportunities to improve highway capacity are constrained by a number of factors, including *funding availability,* the need for extensive and costly right-of-way acquisitions and potentially *adverse* environmental impacts, such as displacements of residences *and* businesses, and *impacts on* natural resources. For these reasons, substantial capacity improvements to US 101 and I-280 cannot be *relied upon* to address long-term travel demands in the corridor. *In this environment,* Caltrain provides a vital *and viable* transportation alternative to costly highway capacity expansion. By reducing trip times and increasing transit ridership, the Caltrain Electrification Program would *help to* ease congestion on Peninsula freeways.

1.2.3 CORRIDOR AIR QUALITY

High rates of auto ownership and *increasing* vehicle miles of travel *(VMT)* have contributed to air quality problems throughout California. *P*ollutants of concern include ozone *(O_3)*; nitrogen oxides and sulfur dioxides *(SO_2)* (precursors of smog); carbon monoxide *(CO)*; and particulate matter. *In addition, the production of very small particulates (e.g., $PM_{2.5}$) contributes to carcinogenic exposure and most recently, greenhouse gases are being focused on in the context of global climate change.*[7] *Motor vehicles contribute to the production of all of these compounds.*

The San Francisco Bay Area's air quality has improved in recent years, largely in response to technological improvements in motor vehicles and fuels that are less polluting. The project study area is within the Bay Area Air Basin (BAAB), for which air quality conditions are

[6] California Department of Transportation, District 4, Office of Highway Operations, Travel Times and Speed Profiles, 1999.

[7] Particulate matter less than 10 microns in diameter and small enough to be inhaled into the deepest parts of the lungs.

monitored by the Bay Area Air Quality Management District (BAAQMD). According to the BAAQMD, the BAAB is in attainment with national standards for CO, nitrogen oxides (NO_x), SO_2, and annual particulate matter (PM_{10}). It is designated non-attainment for O_3 and unclassified for $PM_{2.5}$[8] and 24-hour $PM_{10.}$ With respect to California standards, the BAAB has attainment status for CO, NO_x, and SO_2. It is designated non-attainment for O_3, *$PM_{2.5}$*, and $PM_{10.}$

A number of ambient air quality monitoring stations, maintained by BAAQMD, are located in the Bay Area to monitor progress toward air quality standards attainment. Six BAAQMD monitoring stations are on or near the Caltrain route. Table 1.2-2 shows a *5*-year summary (2002-2006) of data collected at these stations for monitored air pollutants and the total number of days that state and federal ambient air quality standards were exceeded. In the *5*-year period, the state *1*-hour *O_3* standard was violated on *12 days, the federal 1-hour O_3 standard was violated on 1 day, and the federal 8-hour O_3 standard was violated on 6 days. In the same 5-year period, the federal 24-hour PM_{10} standard was not violated, and the state 24-hour PM_{10} standard was violated on 26 days. In addition, the federal 24-hour $PM_{2.5}$ standard was violated 14 times.*

Because transportation is the major contributor to O_3, increasing auto travel threatens the area's improvement in air quality. Growing congestion will add to the potential problems because of increased emissions of vehicles operating in stop-and-go traffic. Shifting commuters and other travelers to higher occupancy modes is highly desirable *as a means to partially offset the effects on air quality produced by* the growth in auto travel. An improved Caltrain will serve this goal. Improved Caltrain service offers the greatest potential for increased high-occupancy travel along the San Francisco Peninsula, particularly in southern San Mateo *County* and Santa Clara *C*ount*y*, the areas with the most severe air quality problems in the corridor. Based upon projections of potential Caltrain use in 20*35*, *approximately 112,000* VMT would be removed from corridor roadways daily as a result of electrifying the Caltrain service (see Section 3.15.*6, Future Highway Improvements, Traffic Demand, and Projected Impacts*).

Equally important, the Electrification Program would also eliminate diesel train emissions from *more than 8,100* miles of daily train travel in the Caltrain Corridor. This would be an annual saving of the emissions generated by *2.3* million train miles in 2035*, a 62 percent increase over 2007* levels. Elimination of the diesel emissions would reduce *emissions of all criteria pollutants, including* O_3 and PM_{10}/$PM_{2.5.}$

[8] Particulate matter less than 2.5 microns in diameter, included in $PM_{10.}$

Table 1.2-*2*: Summary of NAAQS and CAAQS Exceedences in the Caltrain Corridor, *2002-2006*

	Ozone					*Carbon Monoxide*			Nitrogen Dioxide			PM_{10}				$PM_{2.5}$		
BAAQMD MONITORING STATION	**Max 1-Hr (pphm)**	**Nat'l Days[1]**	**Cal Days[1]**	**Max 8-Hr**	**Nat'l Days**	**Max 1-Hr**	**Max 8-Hr**	**Nat'l /Cal Days[1]**	**Max 1-Hr**	**Ann Avg**	***Nat'l* /Cal Day[1]**	**Ann Avg**	**Max 24-Hr**	**Nat'l Days**	**Cal Days[2]**	**Max 24-hr**	**Nat'l Days**	**Ann Avg**
Year *2002*																		
San Francisco	5	0	0	5	0	3.5	2.6	0	8	1.9	0	24.7	74	0	2	70	4	13.1
Redwood City	9	0	0	6	0	5.8	2.8	0	7	1.7	0	22	53	0	1	43	0	11.5
San Jose, 4th *Street*	-	-	-	-	-	5.3	4.5	0	8	-	0	-	70	0	2	58	0	-
Year *2003*																		
San Francisco	9	0	0	6	0	3.6	2.8	0	7	1.8	0	22.7	52	0	1	42	0	10.1
Redwood City	11	0	1	8	0	5.4	2.6	0	8	1.5	0	19.8	38	0	0	0.4	0	9
San Jose, 4th *Street*	12	0	4	8	0	5.5	4	0	9	2.1	0	23.6	60	0	3	56	0	11.7
Year *2004*																		
San Francisco	9	0	0	6	0	2.9	2.2	0	6	1.7	0	22.5	52	0	1	46	0	9.9
Redwood City	10	0	1	7	0	4.8	2.1	0	6	1.5	0	20.5	65	0	1	36	0	9.3
San Jose, 4th *Street*	9	0	0	7	0	4.4	3	0	7	1.9	0	23.1	58	0	4	52	0	11.6
Year *2005*																		
San Francisco	58	0	0	54	0	2.5	2.1	0	66	16	0	20.1	46	0	0	43.6	0	9.5
Redwood City	84	0	0	61	0	4.5	2.3	0	62	15	0	20.9	81	0	2	30.9	0	8.8
San Jose, 4th *Street*	113	0	1	80	1	4.3	3.1	0	74	19	0	22.3	54	0	2	54.6	0	11.8
Year *2006*																		
San Francisco	53	0	0	54	0	2.5	2.1	0	107	16	0	22.9	61	0	3	54.3	3	9.7
Redwood City	85	0	0	63	0	5.5	2.4	0	69	14	0	19.8	70	0	2	75.3	1	9.6
San Jose, 4th *Street*	118	1	5	87	5	4.1	2.9	0	74	18	0	21	73	0	2	64.4	6	10.8

CAAQS = California Ambient Air Quality Standards

mg/m^3 = milligrams per cubic meter

NAAQS = National Ambient Air Quality Standards

pphm = parts per hundred million

[1] Days over standard.
[2] PM_{10} is sampled every sixth day. Actual days over standard can be estimated as six times the number shown.
Source: BAAQMD 2008.

1.2.4 CURRENT CALTRAIN SERVICE AND FACILITY DEFICIENCIES

A major deficiency of the Caltrain service has been its *historic* image of an outmoded service that dates back to many years of little or no improvement *while being operated* under the more freight rail-oriented Southern Pacific Transportation Company. Improving the appearance and *attractiveness* of Caltrain to potential consumers has long been suggested as a means of increasing ridership.[9] *Caltrain implemented new diesel locomotives and bi-level passenger cars into service as part of the "Baby Bullet" express service program in 2005. Rider response to this service has demonstrated the benefits of modernizing image, improving passenger comfort, and reducing travel times between major origins and destinations.* Electrifying the Caltrain service would *further* enhance its consumer appeal and would likely increase ridership beyond estimates based upon improved travel time alone (see Section 3.15.5, *Future Rail and Bus Transit and Projected Impacts*).

Electrification would also help reduce travel times on Caltrain *local service trips making numerous stops* by speeding up acceleration and deceleration operations. The Electrification Program would *help* meet Caltrain riders' vision of an updated, clean, high-tech type Caltrain.

1.2.5 ACCOMMODATING FUTURE HIGH-SPEED RAIL

In June 2000, the California High-Speed Rail Authority (CHSRA) issued its *Final Business Plan for Building a High-Speed Train System for California*. This document recommend*ed* that the Governor and state legislature *prepare* a state-level program *Environmental Impact Report* (EIR) and federal-level *Environmental Impact Statement* (EIS) for a statewide high-speed train network. *The Final Programmatic EIS/EIR was completed in August 2005.* The Caltrain corridor is presented *in the CHSRA Business Plan* as an alignment for Bay Area access. In addition, the California High-Speed Rail Commission identified San Francisco as the preferred destination for a bullet train from Los Angeles to the Bay Area. *In July 2007, the Authority issued a draft program-level environmental analysis of the Bay Area to Central Valley alignments and is currently preparing a final version of this document. This final EIS/EIR has identified the Pacheco Pass and the Caltrain alignment as its preferred alternative.*

An electrified Caltrain system would set the stage for an expanded modern regional electric express train service and a statewide *HSR* service as well. It is anticipated that any *HSR* service would be fully electrified. The Electrification Program facilities evaluated herein will be designed to accommodate *HSR* service, as well as Caltrain service. *The term "accommodate" is being used in this case to mean that the Caltrain Electrification Program would install the same type of power supply and distribution system proposed for the HSR system. Any other*

[9] Lovelock, Christopher H., *Consumer Oriented Approaches to Marketing Urban Transit,* Ph.D. Thesis, Stanford University, 1972.

improvements needed to enable high-speed trains to use the Caltrain line would be evaluated in a separate environmental process.

The CHSRA's *Business Plan* states that terminating the high-speed trains at the Transbay Terminal in San Francisco should be included in environmental studies. Extension of Caltrain from its present *4th* and King Streets terminus to the site of the Transbay Terminal *was* evaluated in a separate environmental document, the *Transbay Terminal/Caltrain Downtown Extension/Redevelopment Project EIS/EIR*, by the Federal Transit Administration (FTA), the City and County of San Francisco, the San Francisco Redevelopment Agency, and the *JPB*. This document was circulated during October 2002; the final EIS/EIR *was issued* in early 2004; *the EIR was certified in June 2004, and a legal challenge to the EIR was settled out of court. The Record of Decision on the EIS was issued in February 2005. The Transbay Terminal project includes electrification of the Caltrain line from 4th and King Streets to the Transbay Terminal and could, for additional cost, use dual-mode locomotives for electrified service into San Francisco to avoid dependency on the Electrification Program.*

1.3 OTHER RELATED PROJECTS

The following paragraphs highlight a few related projects for their coordination or cumulative impact issues and their potential to support or be served by the Caltrain Electrification Program. Section 3.15.5, Future Rail and Bus *Transit* and Projected Impacts, describes projects planned by individual transit operators.

1.3.1 NEW TRANSBAY TERMINAL/CALTRAIN DOWNTOWN EXTENSION/TERMINAL AREA DEVELOPMENT

The FTA, the JPB, the City and County of San Francisco, and the San Francisco Redevelopment Agency *have completed* a combined Final EIS/EIR for the San Francisco Transbay Terminal/ Caltrain Downtown Extension/Redevelopment Project. *Construction is expected to start in 2008 with completion of Phase I in 2014 and completion of Phase II in 2019. The project consists of:*

(1) a new, multi-modal transportation facility at the site of the current Transbay Terminal at First and Mission Streets,

(2) an extension of Caltrain commuter rail service from its current San Francisco terminus at *4th* and King Streets to the new Transbay Terminal, and

(3) development of a mix of new and transit-oriented uses on publicly owned property in the vicinity of the new terminal to help defray project costs.

Other project features include an off-site bus storage facility, new bus ramps connecting to the Bay Bridge, construction and operation of a temporary bus facility for the construction period, and a reconfigured Caltrain layover yard. *The new terminal has also been designed to serve California's proposed HSR system. As part of the Transbay Terminal project's Caltrain* *downtown extension, track between Caltrain's existing 4th and King Streets terminal and the new downtown terminal would be electrified. However, to avoid dependency on the Caltrain Electrification Program, this segment could be operated using dual-mode locomotives[10], if necessary.*

1.3.2 DUMBARTON RAIL CORRIDOR

The Dumbarton Rail Corridor project will extend rail service between Redwood City and Union City by reconstructing a 20.5-mile existing rail corridor next to the Dumbarton Bridge (State Route 84). The corridor is owned by the San Mateo County Transit District and the Union Pacific Railroad. The purpose of the project is to link the East Bay and the West Bay by extending rail service across southern San Francisco Bay. The extension will connect existing public transportation services such as BART, Altamont Commuter Express, Capital Corridor and Caltrain, and regional bus service. This connection is needed to help reduce highway congestion, meet future transportation needs and improve air quality.

The reconstruction of the rail corridor will include track improvements, new moveable rail bridges, new train stations in Menlo Park/East Palo Alto, Newark and Union City, upgrading the Centerville station in Fremont, a centralized train signal control system, and a layober yard in the East Bay. Six round-trip trains will travel from Union City during peak commute hours. Three of these trains will travel to San Francisco and three to San Jose.

Funding for the project is included in Regional Measure 2, which was passed by Bay Area voters in 2004. Other sponsors include the San Mateo County Transportation Authority, Santa Clara Valley Transportation Authority, Alameda County Transportation Improvement Authority, Capital Corridor Joint Powers Authority, and Alameda County Congestion Management Agency.

An alternatives analysis for Phase I of the Environmental Process was completed in March 2006. The Peninsula Corridor Joint Powers Board and the Federal Transit Administration, in cooperation with local agencies, are currently preparing an Environmental Impact Statement / Environmental Impact Report (EIS/EIR) for the Dumbarton Rail Corridor Project.

[10] *Dual locomotives are able to operate using both diesel fuel and electric power.*

1.3.3 CALIFORNIA HIGH-SPEED RAIL SYSTEM

The CHSRA has prepared a final program-level environmental analysis of a statewide HSR system (August 2005). The program-level analysis includes an evaluation of various alignments for high-speed service. In July 2007, the CHSRA issued a draft program-level environmental analysis of the Bay Area to Central Valley alignments and is currently preparing a final version of this document. This final EIS/EIR has identified the Pacheco Pass and the Caltrain alignment as its preferred alternative.

The California HSR system is expected to use the Caltrain corridor for its Bay Area segment, at a minimum between San Jose and San Francisco (and possibly to Gilroy). The HSR system would be electrified using the same system proposed for Caltrain alone; thus, the two projects would be compatible. The HSR system is also expected to require that the Caltrain corridor be expanded to four mainline tracks with full grade separation. Given the close relationship between Caltrain electrification and the HSR project, Caltrain's Strategic Plan recommends coordinating engineering design and investment timing decisions between the two projects. This coordination is already being carried out for the grade separation projects currently under design in South San Francisco, San Bruno, and San Mateo; however, it must be emphasized that the facilities proposed as part of the Electrification Program are those required for Caltrain electrification. While they would be designed to be compatible with the HSR system, they are a stand-alone project with independent utility.

1.3.*4* VASONA LIGHT RAIL

The Vasona Light Rail Project is a 6.8-mile extension to the existing *Santa Clara Valley Transportation Authority* (VTA) light rail system. *T*he project *is being* built in two phases adding 11 new stations between Woz Way in downtown San Jose and Los Gatos. Vasona Light Rail operates primarily on the existing Union Pacific Railroad *(UPRR)* right-of-way between the San Jose Diridon Station and Vasona Junction, with the segment between the San Fernando and Diridon stations operating in a tunnel alignment.

VTA opened Phase One of the Vasona Light Rail Line between downtown San Jose to the Winchester Station, south of downtown Campbell on October 1, 2005. The 5.3-mile, eight-station Vasona extension is part of the Mountain View – Winchester Light Rail Line. The Vasona extension creates a major transfer point between the VTA light rail system and the Mountain View and San Jose Diridon Caltrain Stations. The 5.3-mile *Phase One* includes *stations at* San Fernando, San Jose Diridon, Race, Fruitdale, Bascom, Hamilton, Downtown Campbell, and Winchester. A future station is proposed for West San Carlos Street in the Midtown area of San Jose, *pending available funding. Parking is provided at* Bascom Station *(102 spaces)* and at Winchester Station *(55 spaces).*

Phase Two will be a 1.5-mile segment from Winchester in Campbell to Vasona Junction in Los Gatos. Stations will be at Hacienda and Vasona Junction, including 163 to 220 parking spaces at the Vasona Junction Station. *The schedule for Phase Two, from Winchester Station in Campbell to Vasona Junction in Los Gatos, is dependent on available funding.* Travel time from the Winchester Station to Downtown San Jose *is* approximately 16 minutes. Expected daily ridership is 8,000 to 9,000 riders.

1.3.5 BART TO SAN JOSE AND SANTA CLARA

The VTA and Bay Area Rapid Transit (BART) District are planning a 16.1-mile extension of the BART system to serve Santa Clara County. The extension would begin just south of the planned BART Warm Springs Station in Fremont, extend along the UPRR line to Milpitas, and then continue to 28th and Santa Clara Streets in San Jose. From there, the alignment would leave the railroad right-of-way and enter into a tunnel under downtown San Jose to the Diridon Station. The BART Extension would then turn north under the Caltrain line and terminate at the Caltrain Santa Clara Station. BART trains are expected to run every 6 minutes with the extension of the San Francisco and Richmond lines. A BART maintenance and storage yard also is proposed at the end of the extension in San Jose/Santa Clara.

The VTA Board of Directors certified the Final EIR under *the California Environmental Quality Act* (CEQA) on December 9, 2004, *and a Final Supplemental EIR in June 2007.* VTA will request that FTA issue a Record of Decision indicating that the environmental document has satisfied the requirements of the National Environmental Policy Act (NEPA). *VTA is initiating the federal environmental process by preparing a Draft EIS for the project. The Draft EIS will include an analysis of three alternatives: (1) Future No-Build, (2) Berryessa Extension Project (extending the BART alignment from Warm Springs to Berryessa), and (3) Silicon Valley Rapid Transit Extension (extending the BART alignment from Warm Springs to Milpitas, San Jose and Santa Clara). The Draft EIS will also address short- and long-term environmental impacts of all three project alternatives. The Draft EIS is expected to be released in summer 2008. Concurrent with the environmental studies, VTA is in the final design phase of the project. The final design is anticipated to continue through 2010. This phase will move the project into the 100 percent engineering design level. Design refinements, engineering issues, landscaping, and building material selection are included in the final design phase.*

1.3.6 *SAN FRANCISCO MUNICIPAL RAILWAY MISSION BAY TROLLEY COACH RE-ROUTINGS*

The concept of the San Francisco Municipal Railway (Muni) 22-Filmore trolley coach line routing across the Caltrain tracks at 16th Street surfaced in 2004. Further development of the concept had not moved forward or been coordinated with Caltrain during the 2005-2008 preliminary engineering phase of the electrification project. Recently, the concept of the coach line crossing the electrified Caltrain right of way was included in Muni's 2008 Transit Effectiveness Project in its plans to extend the 22-Fillmore. However, concept alternatives need to be developed and analyzed and further coordination is needed between the engineering and operations groups of Caltrain Electrification and SFMTA project staff if funding becomes available for the MUNI project and additional details of the proposed crossing are developed.

1.3.7 Planned and Programmed Highway Improvements in the Caltrain Corridor

In the face of rapid growth in Silicon Valley, a variety of highway improvements are planned, *under construction, or just completed*. Major programmed (committed) highway improvements in the corridor are listed below.

- Add *high-occupancy vehicle* (HOV) lanes on Route 87 *(North)* from *I-280 to* Julian Street to and *(South)* from I-280 to Route 85 *(projected to be completed in 2007)*;
- Complete Route 85 and US 101 interchange and connector ramps in South San Jose and widen US101 to eight lanes from Bernal Road to Metcalf Road *(completed in 2004)*;
- Construct Route 85/US 101 interchange improvements in Mountain View *(completed in 2006);*
- Add US 101 auxiliary lanes from the Santa Clara County line to Marsh Road, from Marsh Road to Route 92, from *3rd* Avenue to Millbrae, from San Bruno Avenue to Grand Avenue, and from Sierra Point to the San Francisco County line. *(Segments between Marsh Road and Route 92 were opened in fall 2004.)*
- *Add US 101 auxiliary lanes from the Millbrae Avenue Interchange and ending at the 3rd Avenue Interchange (projected to be completed in 2011).*

These projects are not enough to solve the transportation problems in the corridor. The final *2001 RTP EIR* indicates that even with these projects in place, increasing congestion is expected on US 101 and I-280 in the Caltrain corridor. Thus, there is a need for additional transit in the corridor to reduce future congestion and improve travel opportunities. Improved Caltrain service would help meet this need.

1.4 USES OF THIS DOCUMENT

This document is a*n* Environmental Assessment/*Final* Environmental Impact Report (EA/*F*EIR), prepared pursuant to the requirements of NEPA, the Council on Environmental Quality regulations implementing NEPA, CEQA, and the CEQA Guidelines, 200*7*.

This document will be used by federal, state, regional, and local agencies to assess the environmental impacts of the project on resources under their jurisdiction or to make discretionary decisions regarding the project. The *FTA* will use *the EA as the basis for* the Finding of No Significant Impact *(FONSI)* in deciding whether and how to fund the project. *Likewise, the State of California and the MTC will determine whether to fund based in part on the FEIR and associated CEQA Findings.*

1.5 PERMITS AND APPROVALS NEEDED

Pursuant to SamTrans' enabling legislation (Public Utilities Code § 103200 *et seq.*) and the 1991 Interstate Commerce Commission's approval of the JPB acquisition of the Caltrain line, JPB activities within the Caltrain right-of-way are exempt from local building and zoning codes and other land use ordinances. Nonetheless, the JPB will cooperate with local government agencies in performing improvements within its right-of-way and will comply with local regulations affecting any of its activities *within other jurisdictions*.

*Table 1.5-1 lists a*nticipated permits and approvals that would be required for this project*; JPB will continue to coordinate with all local, regional and state agencies to ensure that all permits and approvals are received prior to the start of project construction*.

Table 1.5-1: Permits and Approvals Anticipated *to b*e Required

Agency	Approval or Permit
U.S. Army Corps of Engineers	Approval of nationwide permit for effects to wetlands and other waters of the U.S. under Section 404 of the Clean Water Act *(CWA)*.
State Water Resources Control Board	General Construction Activity Stormwater Permit or Section 402 National Pollutant Discharge Elimination System (NPDES) permit.
California Public Utilities Commission *(CPUC)*	Permits required for public safety considerations of Caltrain Electrification facilities.
California Department of Fish and Game *(CDFG)*	Review and approval of *1602* Streambed Alteration Agreement for placement of power pole foundations affecting waterways.
California Department of Transportation (Caltrans)	Encroachment Permit *and Traffic Control Plan* for overbridge barriers on State roadways.
Regional Water Quality Control Board *(RWQCB)*	Water quality certification and waste discharge requirements for placement of power pole foundations affecting waterways.
California Department of Toxic Substances Control (DTSC)	*Review of Worker Health and Safety Plan.* *Review and approval of revised JPB Soil Management Plan.*
San Francisco Bay Conservation and Development Commission (BCDC)	Permit for construction of facilities within 100-foot shoreline band (at Brisbane Lagoon).
Peninsula Corridor Joint Powers Board *(JPB)*	Certification of CEQA environmental document.
San Francisco Bureau of Environmental Health	Permit for drilling or other subsurface exploration.
San Francisco Department of Public Works	Approval required for construction in public rights-of-way. Batch Industrial Wastewater Discharge Permit for de-watering effluent discharge to the combined sewer system providing the

Table 1.5-1: Permits and Approvals Anticipated *to be* Required	
Agency	**Approval or Permit**
	quality of the effluent meets the NPDES General Permit discharge standards. Article 20 of San Francisco Municipal Code requires preparation of a Site Mitigation Plan if soil sampling and analysis indicate presence of hazardous waste in soil subject to construction disturbance.
San Francisco Planning Department/ Commission	Certificate of Appropriateness for modification of historic resources.
City of Brisbane	Encroachment Permit, *Haul Permit for transport of spoils in excess of 6 cubic yards (c.y). and Traffic Control Permit for detours or traffic control measures.*
City of South San Francisco	Encroachment Permit.
City of San Bruno	Department of Public Works may issue a permit in order to monitor impacts to city sewer lines and storm drains.
City of Millbrae	Encroachment Permit for overbridge barrier. *A Haul Permit i*f spoils are hauled off-site in Millbrae.
City of Burlingame	Encroachment Permit.
City of San Mateo	Encroachment Permit.
City of Belmont	Encroachment Permit. *A Haul Permit i*f more than 50 c.y. of spoils are removed via Belmont streets.
City of Redwood City	Encroachment Permit for substation and overbridge protection barrier.
Town of Atherton	*Tree Permit and Tree Protection Plan if more than 25 percent of the canopy of a heritage tree is removed in a single season.*
City of Menlo Park	Encroachment Permit for construction in the city right-of-way.
Santa Clara County	*Encroachment permit for construction affecting Lawrence Expressway*.
Santa Clara VTA	*Access permit for work adjacent to VTA light rail operations in Mountain View*.
Santa Clara Valley Water District *(SCVWD)*	NPDES general permit for construction-related activities. Includes developing and implementing a Storm Water *Pollution* Prevention Plan (SWPPP*).* SCVWD encroachment permit if need to access any District lands or if any construction comes within 50 feet of the top of bank of any Santa Clara County stream.
City of Palo Alto	Encroachment Permit for construction in the city right-of-way.
City of Mountain View	Encroachment Permit for construction in the city right-of-way.
City of Sunnyvale	General Encroachment Permit for construction in the city right-of-way.
City of Santa Clara	Street Opening Permit for construction in the city right-of-way.

Table 1.5-1: Permits and Approvals Anticipated *to b*e Required

Agency	Approval or Permit
City of San Jose	Encroachment Permit for construction in city right-of-way.
Union Pacific Railroad (UPRR)	*Encroachment Permit for work conducted with UPRR right-of-way; design and installation permits for electrification equipment and facilities.*
Pacific Gas & Electric Company (PG&E)	*Power supply and equipment installation for traction power; Fee or Easement Title for use of PG&E Property for traction power equipment and facilities.*
Note: Activities within the Caltrain right-of-way are not subject to the jurisdiction of local governments.	

Chapter 2: Project Description

CHAPTER 2: PROJECT DESCRIPTION

The proposed project is the electrification of the Caltrain line from *its* current northern terminus at *4th* and King *S*treets in the City of San Francisco to *3 miles south of* the *Tamien S*tation in *San Jose*, a *total* distance of *approximately 51* miles. The project location is shown in Figure 2-1; a project vicinity map showing each of the stations on the line is provided in Figure 1.2-1.

2.1 LOCATION AND LIMITS

The JPB owns and operates approximately *51* miles of primarily two-track mainline railroad right-of-way between the *4th* and King *Street* Station in San Francisco and *south of* the Tamien Station *in* San Jose, Santa Clara County. *The* JPB purchased this right-of-way from the Southern Pacific Transportation Company in 1992. Between Tamien Station and Gilroy, the mainly single-track right-of-way is owned by the UPRR. Caltrain has trackage rights with the UPRR to provide commuter service in this approximately *25*-mile segment.

Caltrain trains consist of diesel *locomotive*-hauled, bi-level *passenger* cars. *As of March 2008, Caltrain operates 49 northbound and 49 southbound (for a total of 98) trains per day* between San Jose and San Francisco. *Three of these trains start in Gilroy during the morning commute period, and three terminate in Gilroy during the evening commute period. Eleven trains in each direction are "Baby Bullet" express service trains that make the trip between San Francisco and San Jose in less than 1-hour. Service is frequent during the peak periods and is provided every half hour in both directions during the midday. Caltrain provides hourly service in both directions on Saturdays and Sundays (32 trains on Saturdays and 28 trains on Sundays) between San Jose and San Francisco only*.

In addition *to Caltrain commuter rail service, the UPRR operates approximately six daily freight trains* between Santa Clara and San Francisco, *as part of* a "Trackage Rights Agreement" with Caltrain. From Santa Clara to San Jose, on a joint use corridor, UPRR operates approximately 12 to 20 daily freight trains. *Three p*assenger train *services* also operate *on the Santa Clara to San Jose segment:* the Capitol Corridor (1*5* daily trains), the *ACE (8* daily trains), and the Amtrak *Coast Starlight* (*2* daily trains).

Caltrain is planning for demand-driven increases in service over the next 20 years. "Caltrain's Strategic Plan: 2004-2023" (adopted by the JPB Board of Directors on July 1, 2004) outlines future service levels under four scenarios: status quo, moderate growth, enhanced, and build-out. Service levels range from 86 to 138 trains per day by 2023. On November 30, 2006, the JPB Board of Directors adopted the concept for the "Project 2025" program, later renamed Caltrain 2025, which provides direction for implementing the future build-out scenario in the Strategic Plan. Caltrain 2025 was undertaken to identify system improvements and electrified vehicle technology that would enable Caltrain to effectively meet ever-increasing ridership demand. Two vehicle technologies were explored - electric locomotive hauling coach cars or Electric Multiple Units (EMUs). The Caltrain Electrification Program evaluated in this document is consistent with both the 2004 Strategic Plan's full build-out scenario and Caltrain 2025, which

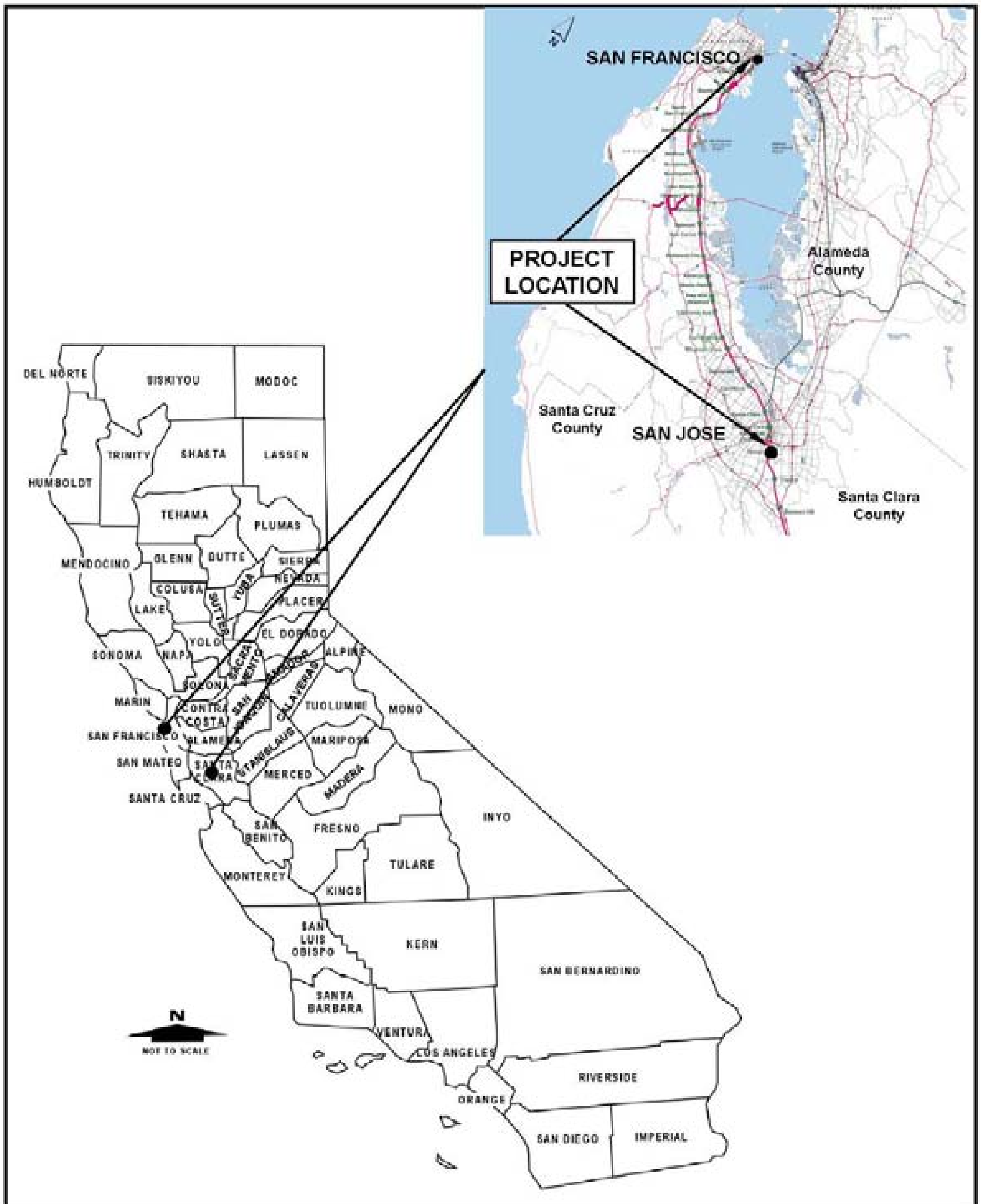

Figure 2-1
PROJECT LOCATION
CALTRAIN ELECTRIFICATION PROGRAM

would involve increased service up to 172 trains per day by 2035. Future proposed actions to expand service beyond 114 trains may require additional environmental review.

Additional track, signal, station, and terminal capacity improvements will be necessary to provide the *ultimate desired* increased levels of service *beyond 114 trains per day*. These facilities are not included in the scope of the environmental review *described* within the present document. They are being *or will be* addressed in separate environmental documents in accordance with the requirements of applicable environmental regulations and, as such, are included within the No-Project Alternative in this environmental document. *All facilities required for the Electrification Program would be closely coordinated with the design of these planned capacity improvements and enhancements to minimize repeat work or later modifications*.

2.2 BACKGROUND

The JPB has embarked upon an ambitious improvement program over the past 15 years to provide the basis for upgrading rail service in the corridor. A key part of the JPB's efforts has been preparation of a series of long-range planning studies to identify needed improvements and define future priorities. This section outlines these studies and their relationship to the Caltrain Electrification Program.

*Electrification has been under serious consideration since the JPB published its <u>Electrifying the Caltrain/PCS Railroad Feasibility Study</u> in October 1992. In 1999, the JPB adopted the Caltrain Rapid Rail Plan, which recommended implementation of a comprehensive rehabilitation and enhancement program. M*any of the rehabilitation and capacity improvement projects recommended in the Rapid Rail Plan are already in place or underway, and they are included in the No-Project Alternative in this environmental analysis.

In July 2004, the JPB published the "Caltrain Strategic Plan: 2004 – 2023." This innovative plan presents a vision and guiding principles to shape JPB policy decisions, as well as formulate specific strategies for service and capital investments. It recognizes the uncertainty in the timing of near-term capital funding and provides a structure within which the JPB can maximize the efficiency and effectiveness of capital investments.

Caltrain's Strategic Plan sets out four scenarios based on future revenue projections: status quo, moderate growth, enhanced, and build-out. Under the status quo scenario, the Strategic Plan recommends that electrification should be factored into the design of all improvement projects completed along the right-of-way and that planning (especially financial planning) continue. The moderate growth scenario includes completion of the San Francisco Caltrain Downtown Extension but not the California High-Speed Rail (HSR) project (see Section 1.3, Other Related Projects), which may share the Caltrain corridor for the Bay Area portion of its alignment; it is assumed that financial resources would be available to complete the Electrification Program by 2018. Under the Strategic Plan enhanced scenario, electrification completion as early as 2008 was targeted, but this scenario assumes enhanced levels of nearer-term funding that have not been available. The Plan identifies funding to complete electrification under this scenario by

2014. Finally, under the build-out scenario, electrification would be completed by 2014 (or earlier).

The Caltrain 2025 Program was undertaken to identify system improvements and electrified vehicle technology that would increase capacity and enable Caltrain, once electrified, to provide a greater frequency and level of service to its customers. Caltrain continues to experience tremendous ridership increases that outpace normal population and employment growth. This demand is projected to continue upward, due to worsening traffic congestion and the popularity of Caltrain's express service, which has provided a very competitive transportation alternative in the corridor since the introduction of Baby Bullet service in 2004. Given the limitations of the current infrastructure, signal system and diesel-powered vehicle technology, Caltrain recognizes that it must address these system constraints, but also invest in the most cost effective improvements to capture its increasing share of the regional transportation model.

Caltrain 2025 has identified non-traditional EMUs that meet European Norms safety standards as the vehicle technology that meets Caltrain's operating, performance, and safety needs. Advantages of the non-traditional EMU are their compatibility with future HSR service, superior operating flexibility and performance characteristics, and life-cycle cost effectiveness. Once the Caltrain mainline is electrified, Caltrain is proposing to operate a mix of conventional and non-traditional rail equipment and is working with the Federal Railroad Administration (FRA) to obtain the necessary approvals to do so. Caltrain may also need to coordinate with FTA, National Transportation Safety Board (NTSB), and the California Public utilities Commission (CPUC) in the future.

While the Caltrain Strategic Plan provides a context and options for making capital planning decisions for the system as a whole, Caltrain 2025 address the system improvements and vehicle technology decision that, with electrification completed, will increase capacity and enable Caltrain to provide more service to its customers. The present environmental document offers project-specific information on the Electrification Program alone. It is one of a series of more detailed analyses of particular projects that will be used in this process.

In summary, Caltrain electrification has been evaluated in a series of studies, each one of which has analyzed the project in more detail. The present study evaluates the environmental impacts of electrification and provides a preliminary engineering design. This information will be used by the JPB to make capital investment decisions on the basis of the structure described in Caltrain's Strategic Plan and Caltrain 2025. The purpose of this environmental document is to fully describe the Caltrain Electrification Program and its impacts, and to propose mitigation measures for identified impacts. The decision on which capital improvement projects should be pursued and when to make such commitments is a policy decision that must be made by the JPB using information from environmental studies such as this one, engineering plans, financial projections, and policy input.

2.3 ALTERNATIVES

A range of different propulsion options was considered to meet the project purpose and need. *Seven* alternatives were ultimately withdrawn from further consideration based on *poor* cost effectiveness, environmental effects, *lack of compatibility with other improvements suggested in the Caltrain Strategic Plan,* or other factors. These alternatives and the reasons they were withdrawn are presented in Section 2.4, Alternatives Considered and Withdrawn. *Two a*lternatives *were* evaluated in *detail as part of* this *Environmental Assessment/Final Environmental Impact Report (*EA/*F*EIR*)*: a No-Electrification (or No-Project) Alternative and the Electrification Program Alternative. *The Electrification Program Alternative has been identified as the Preferred Alternative. Both alternatives are described in detail below*.

2.3.1 THE NO-ELECTRIFICATION (NO-PROJECT/*NO-ACTION*) ALTERNATIVE

The No-Electrification Alternative constitutes the No-Project Alternative *under* CEQA and the *No-Action Alternative for the purposes of* NEPA.

The *No-Project/No-Action (*No-Electrification*)* Alternative *consists of* a series of rehabilitation improvements *as identified in Caltrain's State of Good Repair (SOGR) Program and does not include* electrification*. Under the No-Project Alternative, Caltrain would not increase the level of service beyond the current 98 trains per day level of service. The SOGR projects* will generally be carried out within the existing JPB or UPRR-owned railroad rights-of-way*,* and *they will be evaluated* separately in accordance with applicable environmental requirements.

The No-Electrification Alternative assumes the following:

- Rehabilitation of the Existing System – *L*ong-term repairs, reconstruction*,* and modernization of the existing tracks, signals, bridges, stations, rolling stock, and other systems.
- *The modernization of stations such as removing the hold-out rule*.
- *Grade crossing improvements and a systemwide fencing program to improve safety*.
- *South San Francisco Station Improvement Project, which would remove the holdout rule and improve access to station platforms.*

Caltrain's *existing* service level *of 98* daily trains *(5 trips per peak hour [tpph])* in the San Francisco to San Jose segment (including *six* daily trains in the San Jose to Gilroy segment *and 22 daily express trains between San Francisco and San Jose*) *for* the year*s 2008 and 2035 apply to the* No-Electrification Alternative. *Fleet requirements under the No-Electrification Alternative are presented in Table 2.3-1.*

Table 2.3-1: Fleet Requirements of the No-Electrification (No-Project./*No Action*) Alternative

Year	Diesel Locomotives	Trailer Cars	*Total Passenger Vehicles*
Year 2008 *(98 trains/weekday)*	*29*	*118*	*118*
Year 2015[1] *(98 trains/weekday)*	29	*118*	*118*
Year 2035[2] *(98 trains/weekday)*	*29*	*118*	*118*

[1] The majority of vehicles will be replaced as they reach their nominal 30-year design life. Additional vehicles would be replaced in the 2030 timeframe.

Source: PCJPB, 2008.

2.3.1.1 Trackwork Rehabilitation and Improvements

Trackwork rehabilitation improvements in the No-Electrification Alternative consist of the following:

- Replacing jointed rail track with continuous welded rail track,
- Providing concrete ties, new ballast, and improved alignment to accommodate higher speeds,
- Providing new CTC-controlled interlockings with universal crossovers at strategic locations to increase operational flexibility and reliability, and accommodate express trains and higher speeds,
- Grade crossing *improvements,*
- Drainage improvements*, and*
- *Continued State of Good Repair Maintenance*.

The No-Electrification Alternative also includes the following recently completed projects:

- *Centralized Equipment Maintenance and Operations Facility (CEMOF) comprising shop, buildings and support facilities at the Lenzen yard in San Jose, competed in 2007.*
- *Baby Bullet service currently consists of 11 express trains in each direction per day with 57-minute travel times between San Francisco and San Jose, which commenced revenue service in June 2004.*
- *Enhanced signal and communications systems have been completed, including the new centralized traffic control (CTC) system (that can accommodate an upgrade to automatic train control [ATC] and fiber optics), omni-directional signals in tracks that enable trains to travel in both directions under CTC control, additional train crossovers, and state-of-the-art active warning devices. The CTC is operated from the new CEMOF at the Lenzen Maintenance Facility site.*
- *Replaced jointed rail track with continuous welded rail track.*

- Trackwork modifications *have been made to* provide a new at-grade crossing at *Mission Bay Boulevard* in San Francisco to accommodate the San Francisco Mission Bay development.
- At Bayshore, trackwork improvements and station modifications *were constructed* to create a four-track arrangement south to Brisbane.
- Caltrain track and associated passenger platform improvements at the new Millbrae Intermodal Facility *have also been completed*. The *relatively new* BART-to-San Francisco International Airport *(SFO) E*xtension interfaces with Caltrain at the Millbrae Intermodal *S*tation.
- At Redwood Junction, a third and fourth track *have been* added to provide sidings for train meets and passes. Additionally, the double-track main line from Fair Oaks Avenue to Bowers Avenue *was* reconfigured to provide four main tracks. Between Tamien and Lick, a second main track *was* added by *the Santa Clara Valley Transportation Authority (*VTA*)* to the existing single-track line.

2.3.1.2 Bridge, Tunnel, and Station Improvements

Rehabilitation improvements included in the No-Electrification Alternative consist of tunnel rehabilitation, retrofit of existing structures to current seismic safety standards, new bridge decks, and new foundations where needed.

Rehabilitation improvements at stations include the following:

- Provision of 600-foot-long (or longer) side platforms,
- Wide center platforms at selected locations,
- Improved lighting, shelters, and communications facilities at station waiting areas,
- Facilities to meet Americans with Disability Act (ADA) requirements,
- Grade-separated underpasses for pedestrians,
- Inter-track fencing to keep passengers from attempting to cross the tracks*, and*
- *Bridge replacement and rehabilitation.*

2.3.2 THE ELECTRIFICATION PROGRAM ALTERNATIVE (*PREFERRED ALTERNATIVE*)

The Electrification Program Alternative assumes all improvements described in the No-Build Alternative, plus electrification of the Caltrain system, as described below.

The Electrification Program Alternative *consists of converting Caltrain* from diesel-hauled to *electrically powered* trains *for service between the 4th and King Street Station in San Francisco and the Tamien Station in San Jose. Diesel-powered locomotive service would continue to be used to provide service between the San Jose Diridon Station and Gilroy. It* would require the installation of some *130* to *140* single-track miles of overhead contact system (OCS) for the distribution of electrical power to the electric rolling stock. The OCS would be powered from a 25 kilovolt (kV), 60 Hertz (Hz), single-phase, alternating current (*ac*) *autotransformer* supply system consisting of traction power supply substations, switching stations, and paralleling stations.

Fleet requirements under the Electrification Program Alternative are presented in Table 2.3-2.

Table 2.3-2: Fleet Requirements of the Electrification Program Alternative

Year	Diesel Locomotives	EMUs	Trailer Cars	Total Passenger Vehicles
Year 2008 (98 trains/weekday)	29	N/A	118	118
Year 2015[1] (114 trains/weekday)	9	112	45	157
Year 2035 (114 trains/weekday)	4	160	18	178

[1] The majority of vehicles will be replaced in 2015 as they reach their nominal 30-year design life. Additional vehicles would be replaced in the 2030 timeframe.

Source: PCJPB, 2007.

2.3.2.1 Identification of the Electrification Program Alternative as the Preferred Alternative

In August 2004, following the close of the comment period on the Caltrain Electrification Program EA/DEIR and in consideration of all of the information presented therein and all of the comments received, the JPB identified the Electrification Program Alternative with the EMU rolling stock option as the Preferred Alternative. The beginning of electrified revenue service is planned for 2015 (consistent with funding availability as outlined in the Caltrain Strategic Plan).

The EMU option was identified as the preferred option for the following reasons:

- *Since revenue service would begin in 2015, when much of Caltrain's existing fleet will need replacement or major rehabilitation, Caltrain has a good opportunity to replace the existing fleet with improved vehicles rather than simply replacing and rehabilitating the old fleet. Purchasing a new fleet of EMU equipment will allow Caltrain to improve passenger comfort, operating efficiency, and performance.*
- *The new EMU vehicles have two doors, which would provide Caltrain with improved boarding efficiency. This would permit Caltrain to reduce dwell time per station, speeding up trips for passengers and reducing operating costs.*
- *Life cycle costs would be lower with the option of replacing existing diesel locomotives and gallery cars with new electric locomotives and new passenger cars.*
- *Train performance would be optimized with EMUs compared with the No-Electrification or electric locomotive-hauled options.*

- *EMUs offer increased reliability due to the multiple power sources per vehicle.*
- *EMUs offer greater operational flexibility than electric locomotives hauling passenger cars, as they can be coupled and uncoupled rapidly to enable variable consists, thereby reducing costs in off-peak periods.*

In short, while EMUs cost more initially than keeping the current trailer car fleet, they have lower life cycle costs and give more flexibility for optimizing future performance.

The description of the Electrification Program Alternative in the following sections has been revised to reflect the implementation of revenue service in 2015.

2.3.2.*2* Overhead Contact System

For the Electrification Program Alternative, an ac overhead catenary system (OCS) would be employed. To permit electric vehicles to run along a railroad track, two types of electrical power distribution system are in general use. The first type is a low-voltage direct current (*dc*) third rail system, as employed in the 1,000-volt *dc* BART system. The second type is an overhead contact wire system, used for both light and heavy rail transit. Light rail applications typically use low-voltage *dc* OCS systems, such as the Muni at 600 volts, or VTA at 750 volts. For high-speed, intercity passenger or commuter rail lines, the OCS is usually a high-voltage *ac* system, as used by Amtrak, Maryland Regional Commute *trains* (MARC), South*eastern* Pennsylva*n*ia Transportation Authority (SEPTA), New Jersey Transit (NJT), and Metro-North Railroad (MNRR) at 11.5 *to* 12.5 kV and 25 kV on the Northeast Corridor *and portions of the NJT*. For heavy-haul commuter rail systems, such as that operated by Caltrain, the voltage of choice today throughout Europe and the rest of the world is 25 kV at commercial frequencies (50 *to* 60 Hz), and this is the voltage proposed for the Caltrain Electrification Program.

This power supply and distribution system and voltage are compatible with the requirements of *HSR* and will accommodate future development of *HSR* in the Caltrain corridor. *Furthermore, the OCS conductors and traction power equipment were sized and located based on a computerized analysis of traction power load flow requirements using the probable maximum capacity of the Peninsula Corridor alignment including Caltrain and HSR.*

A mainline OCS typically *is comprised of* two conductors above each track in what is known as a catenary configuration: a messenger wire that sags between support points (much like a utility transmission line), below which a near-level contact wire is suspended. Both main wires are energized and are part of the same circuit. The pantograph, mounted on top of the electric vehicles, slides *along the underside of* the contact wire and collects the traction current from it.

The messenger wire is *typically* supported by means of cantilevered, hinged bracket arms that extend horizontally over the track from vertical steel poles mounted clear of the dynamic envelope of the vehicles. *The OCS for an autotransformer system also includes negative feeder and static wires. These are also supported on the OCS poles.* These poles *are placed approximately* 10 to 12 feet of the centerline of the tracks they serve. In areas where there is limited clearance between tracks, multi-track support structures, such as multi-wire headspans attached to taller steel poles, are employed. The poles themselves are supported by cast-in-place concrete foundations or driven pile footings, which are typically set back *approximately* 10 to 12 feet from the track centerline. Depending upon the clearance requirements of particular sections of the route, the contact wire height would vary from *approximately 17.0* feet to *23.0* feet. Pole heights range from 30 to 50 feet. Also, depending on along-track span length and other requirements, the messenger wire would *typically be* positioned between *2* feet and *5* feet directly above the contact wire.

Clearances for maintenance and operation of the OCS will be designed to allow for existing freight railroad clearances and operations. *Normal design clearances would be provided in all open areas. Special designs may be employed in close clearance tunnels or under bridges in order to provide sufficient clearances to freights and diesel passenger trains without affecting their operations.*

On tangent, or straight, sections of track, the OCS supports can be spaced up to 230 feet apart, though they would typically be about 180 to 200 feet apart. On curved track sections, the span lengths between supports must be reduced. The Caltrain right-of-way has two small radius curves, one just south of the San Francisco terminus and one north of San Jose Diridon Station, where the support spacing would be reduced to *approximately* 75 feet. For the larger radius, or shallower, curves along the route, pole spacing would range from 120 to 150 feet.

The particular type of OCS support on a given segment is dependent upon the track segment's exact configuration (e.g., number of tracks) and other site-specific requirements and constraints. Figure 2.3-1 shows typical side cantilever bracket arms and poles for two-track sections. *Figure 2.3-2 shows* a portal arrangement, where the central wires are supported over multiple tracks by means of a solid steel beam and cantilever brackets. Although the portal arrangement has advantages for multi-track train operations, since the portal structure provides independent wire supports, it is not preferred for use in the Caltrain Electrification Program because of its visual effects. It will therefore be used only where required in particular locations. *Figure 2.3-3 shows typical center cantilever bracket arms and poles for two track sections. Figure 2.3-4 shows typical multi-track cantilever bracket arms and poles. Figure 2.3-5 shows a typical two track cantilever and bracket arms.* Visual impacts of the proposed OCS facilities and treatments in different corridor locations are evaluated in Section 3.1, Aesthetics.

Power would be supplied to the OCS at each of the traction power facilities, either by means of non-insulated aerial connections or by insulated underground connections. Power would be delivered to the OCS usually through a pole-mounted disconnect switch, which permits energization or de-energization of a particular section of the OCS conductors. The overhead electrical system would include an integrated bonding and grounding system to protect the public during all system operations.

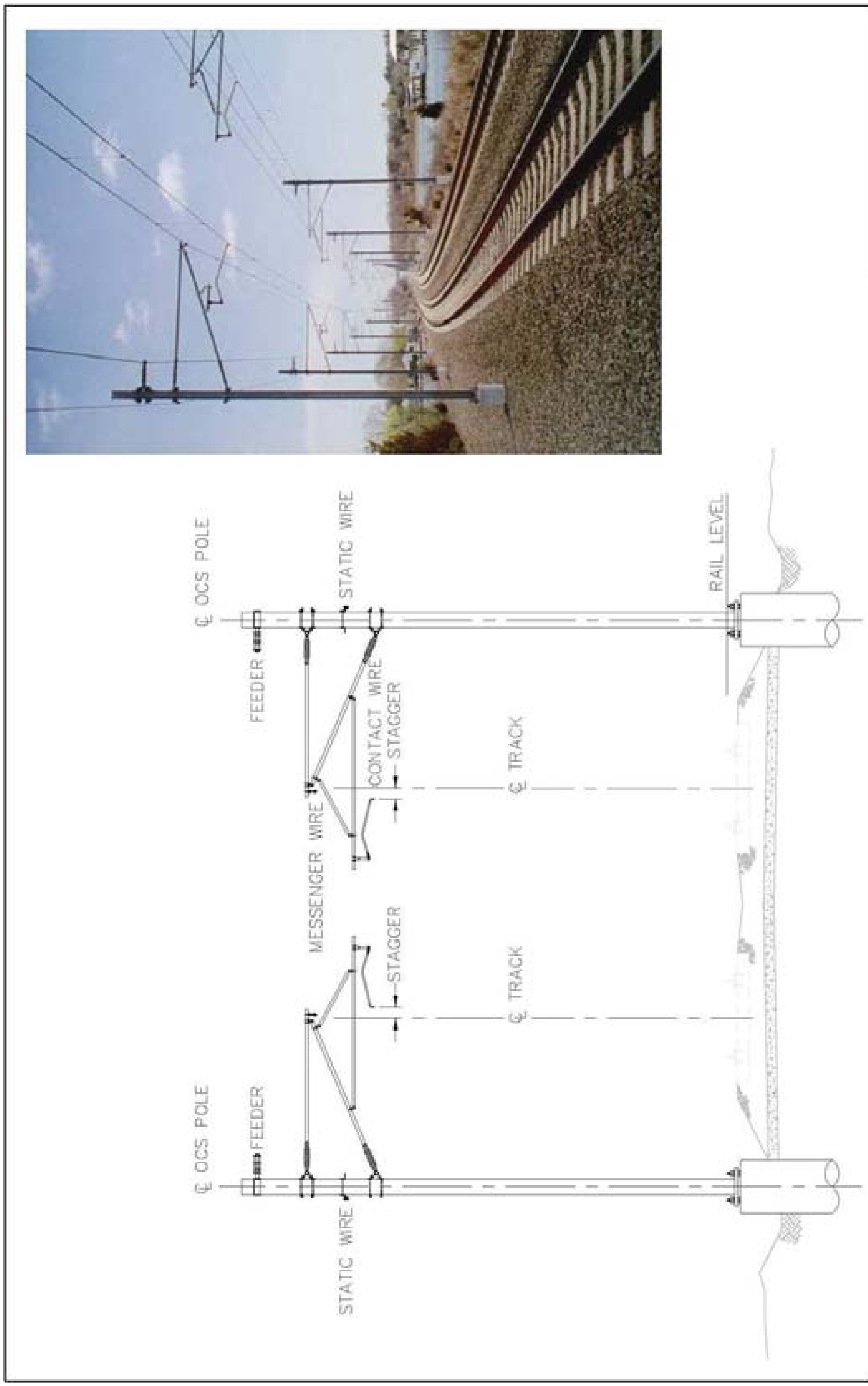

Figure 2.3-1
OVERHEAD CONTACT SYSTEM
TWO-TRACK ARRANGEMENT WITH SIDE POLE CONSTRUCTION
CALTRAIN ELECTRIFICATION PROGRAM

Figure 2.3-2
OVERHEAD CONTACT SYSTEM
TYPICAL PORTAL ARRANGEMENT
CALTRAIN ELECTRIFICATION PROGRAM

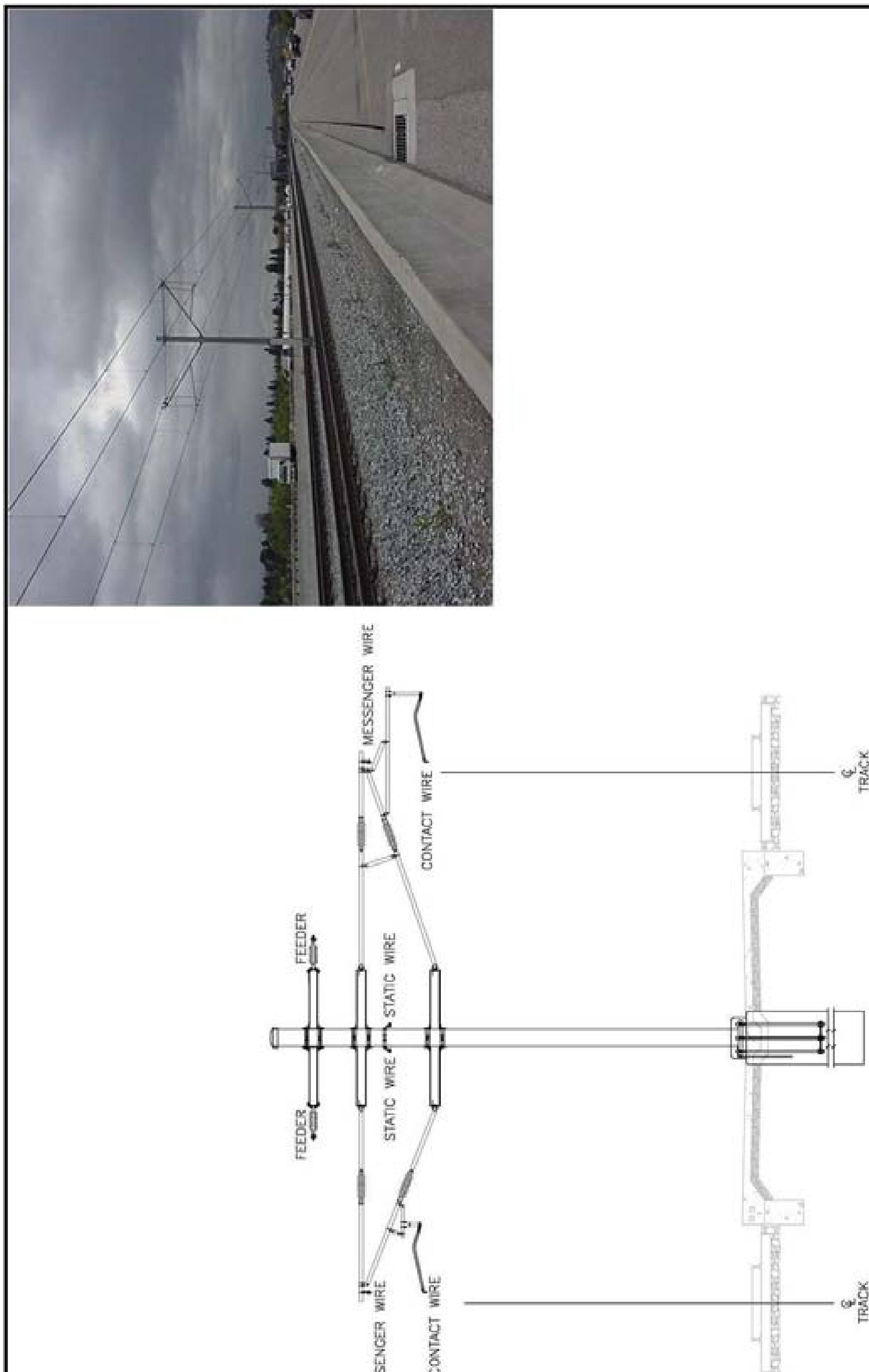

Figure 2.3-3
OVERHEAD CONTACT SYSTEM
TWO-TRACK ARRANGEMENT WITH CENTER POLE CONSTRUCTION
CALTRAIN ELECTRIFICATION PROGRAM

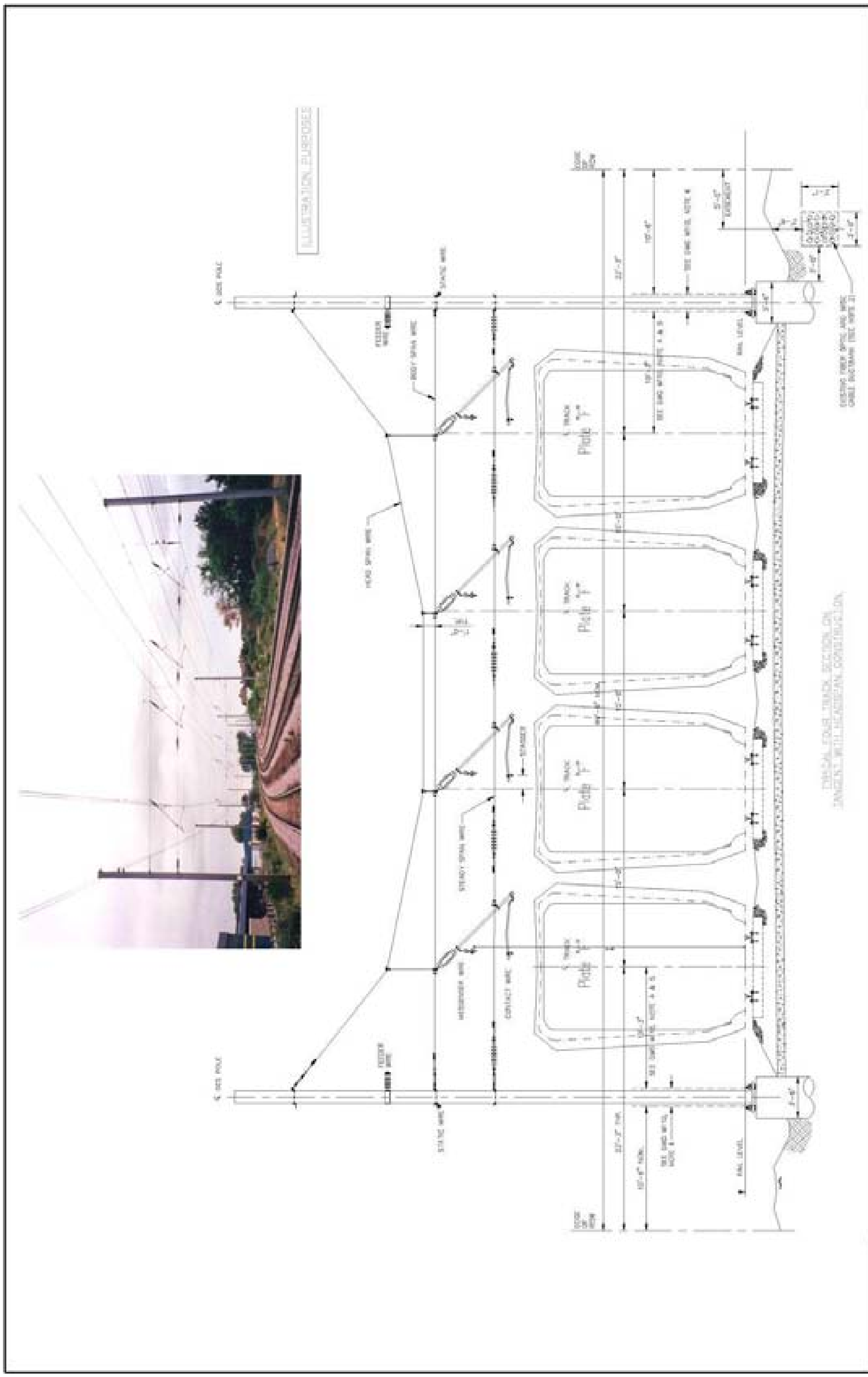

Figure 2.3-4
OVERHEAD CONTACT SYSTEM
MULTI-TRACK ARRANGEMENT WITH HEADSPAN CONSTRUCTION
CALTRAIN ELECTRIFICATION PROGRAM

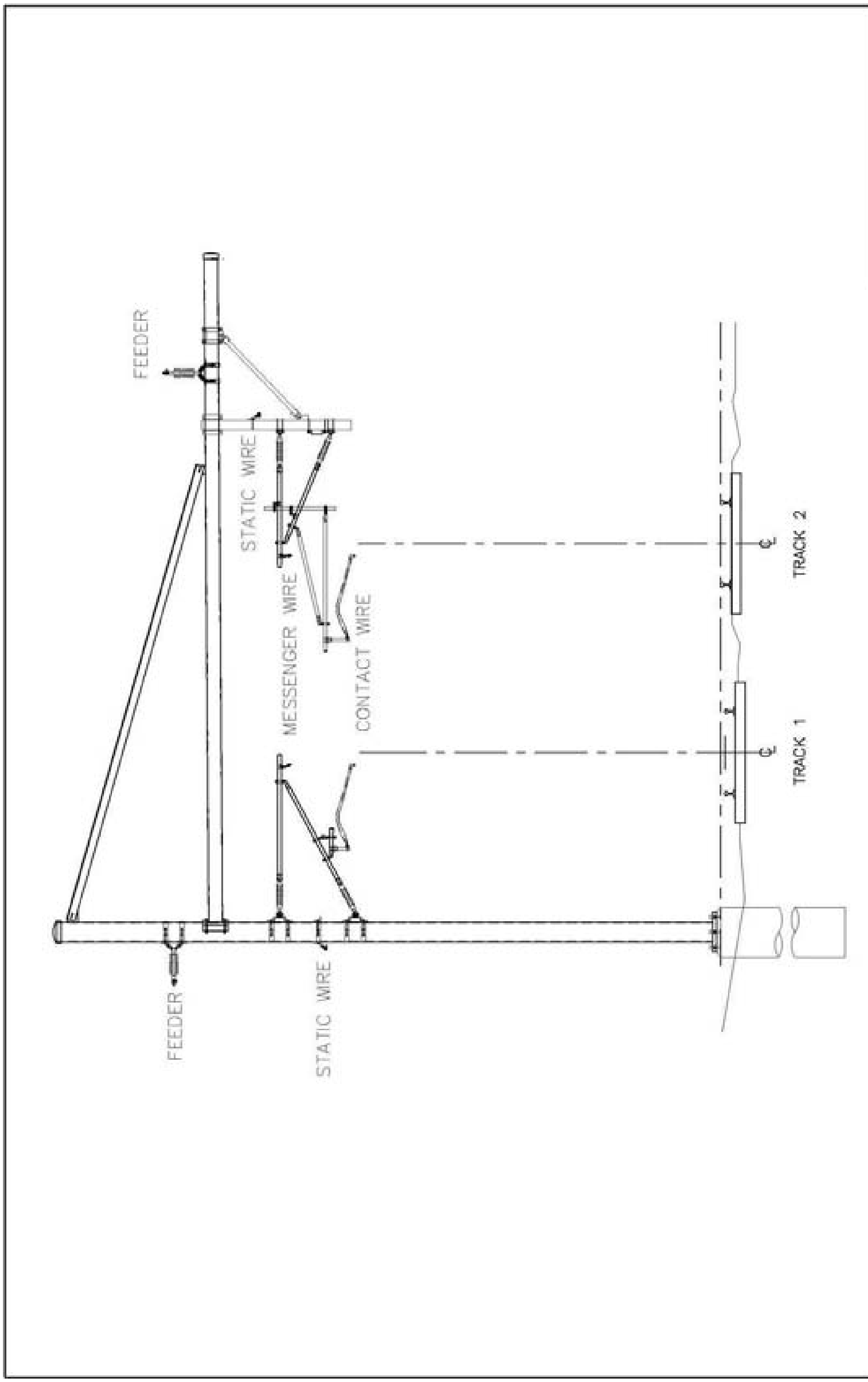

Figure 2.3-5
OVERHEAD CONTACT SYSTEM
TYPICAL TWO TRACK CANTILEVER
CALTRAIN ELECTRIFICATION PROGRAM

2.3.2.*3* Auto-Transformer Power Feed Arrangement

The auto-transformer power feed system arrangement would require the installation of only *two* supply substations spaced *36* miles apart. In addition, there would be *one* switching station and *seven* paralleling stations at a spacing of *approximately 5* miles. The paralleling stations provide additional power support to the power distribution system and permit increased spacing of the primary substations. Figures 2.3-*6* to 2.3-*16* show the proposed locations for these traction power facilities.

Since the traction power facilities require new right-of-way (in some locations) and connections to the utility high-voltage transmission network, alternate sites *were considered* for *the two substation facilities*, and *these* are evaluated in the present document. *The preferred site in each case is identified. Sites have also been evaluated for the intermediate paralleling and switching station facilities, but the design incorporates some flexibility with regard to their positioning. These facilities do not require connection to the utility high-voltage system, or such large tracts, so final site selection will be coordinated with local authorities during final design of the electrification systems.*

In addition to reducing the number of substations – and thereby minimizing *the introduction of new, large equipment installations into the corridor* – another advantage of the auto-transformer feed arrangement for implementation along the Caltrain corridor is its potential to reduce electromagnetic fields (EMF) and electromagnetic interference (EMI) because it includes two parallel aerial feeders, one on each side of the alignment. The currents in the parallel feeders flow in the opposite direction to that in the main catenary conductors, and this *reduces the* EMF/EMI effects created by current flow in the OCS. See Section 3.17.4, Electromagnetic Interference for the evaluation of the EMF/EMI effects of this power feed arrangement.

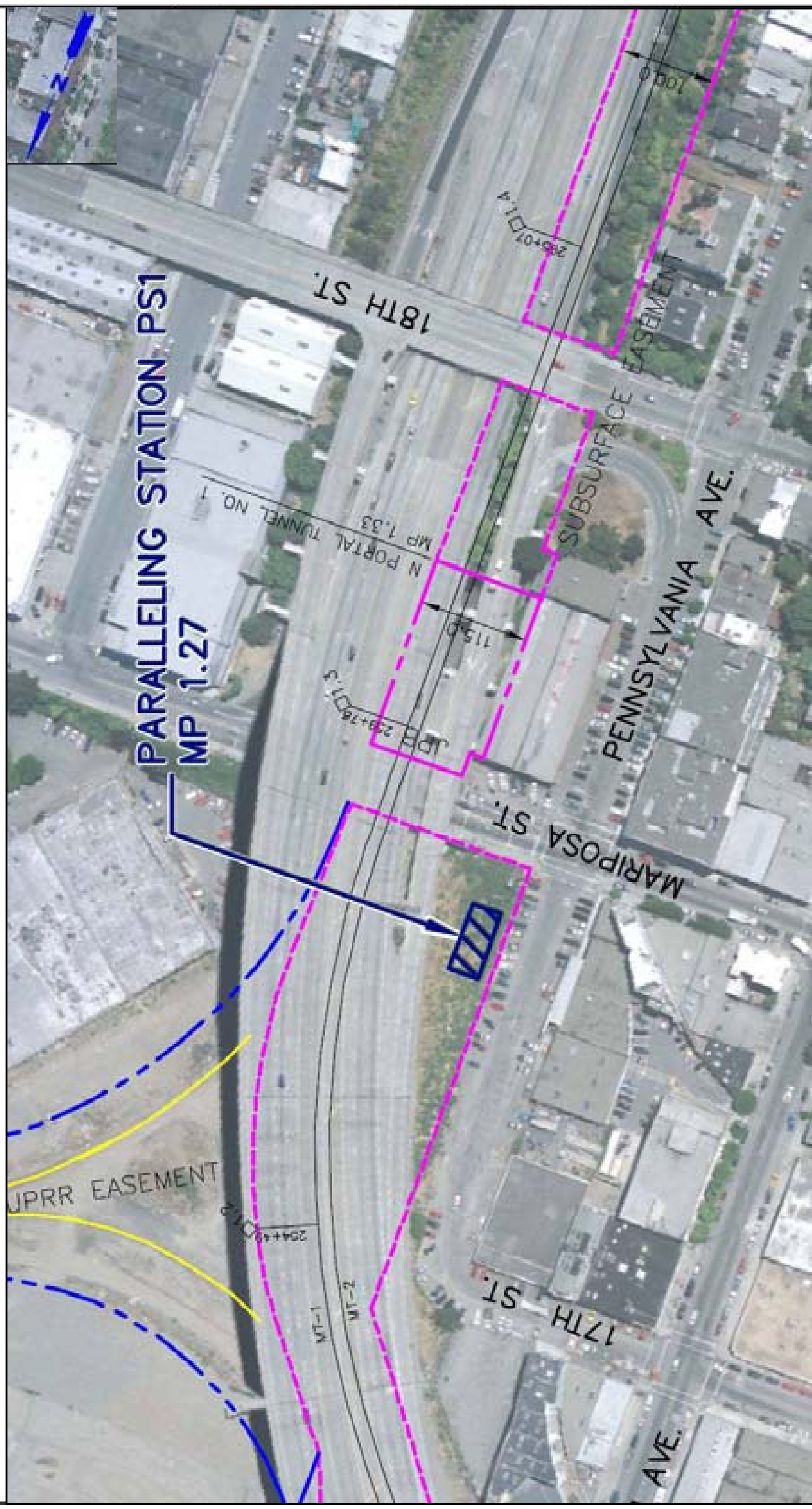

Figure 2.3-6
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS1
CALTRAIN ELECTRIFICATION PROGRAM

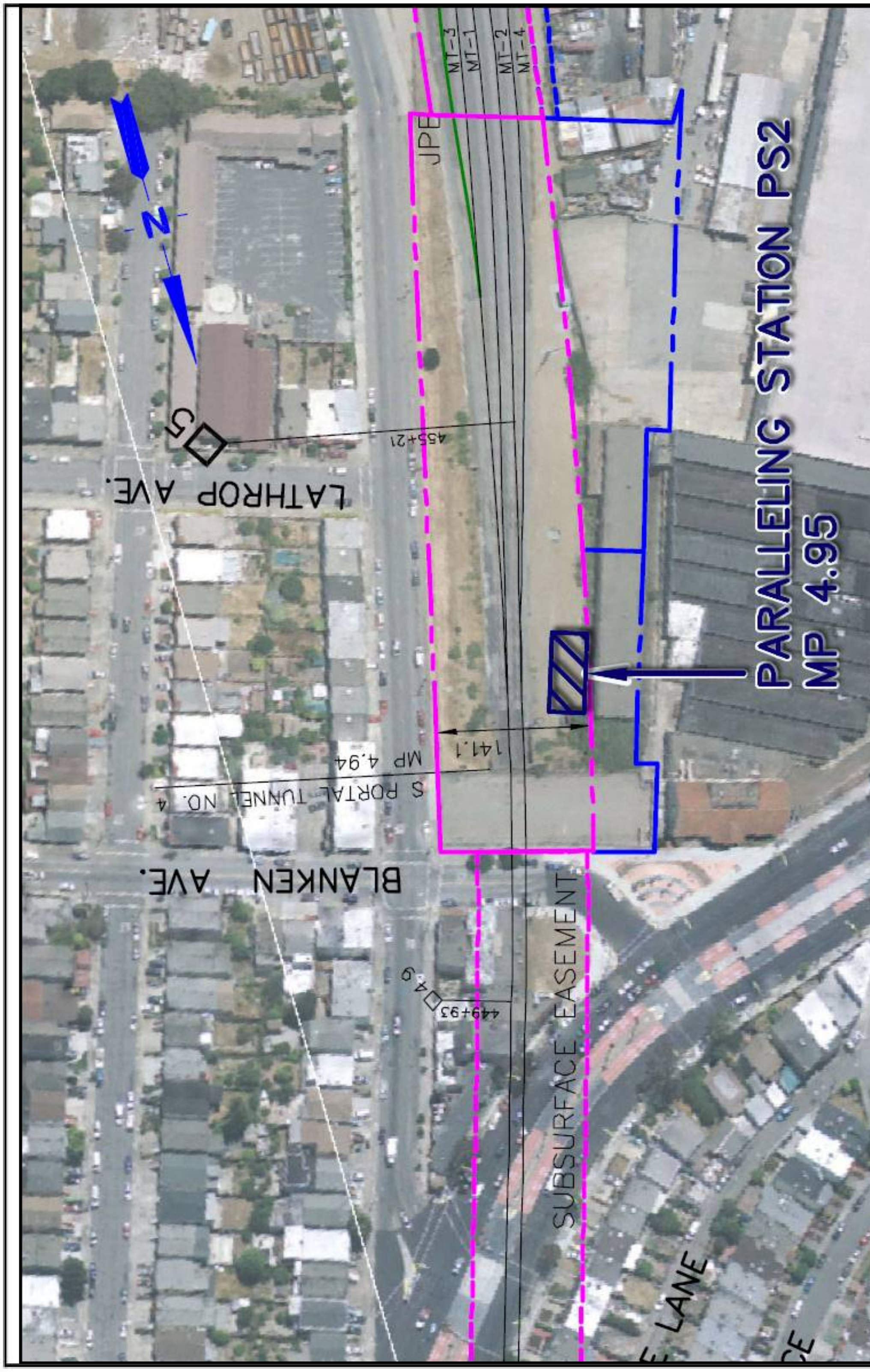

Figure 2.3-7
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS2
CALTRAIN ELECTRIFICATION PROGRAM

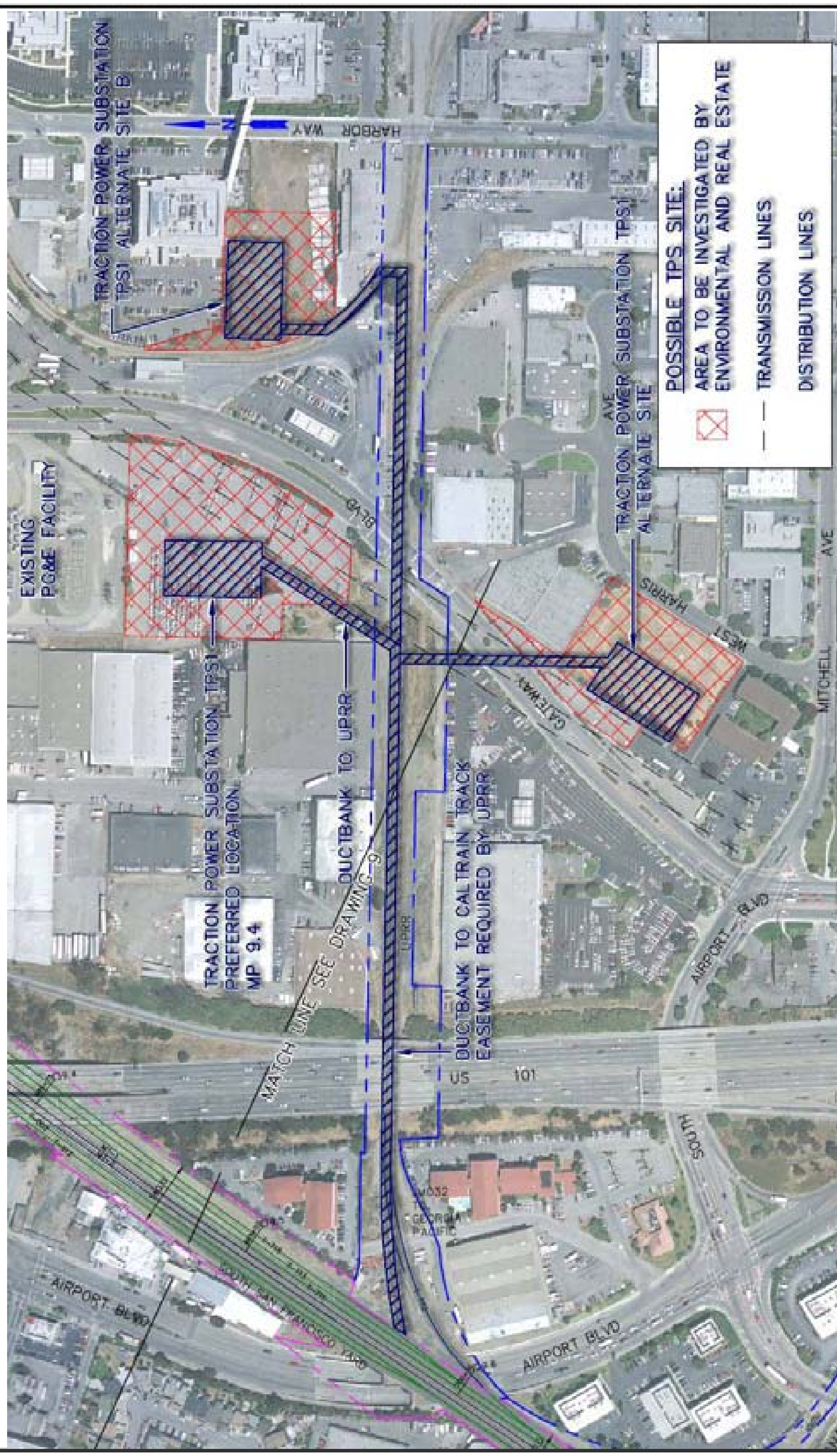

Figure 2.3-8
PROPOSED TRACTION POWER FACILITIES
SUBSTATION TPS1 ALTERNATIVES
CALTRAIN ELECTRIFICATION PROGRAM

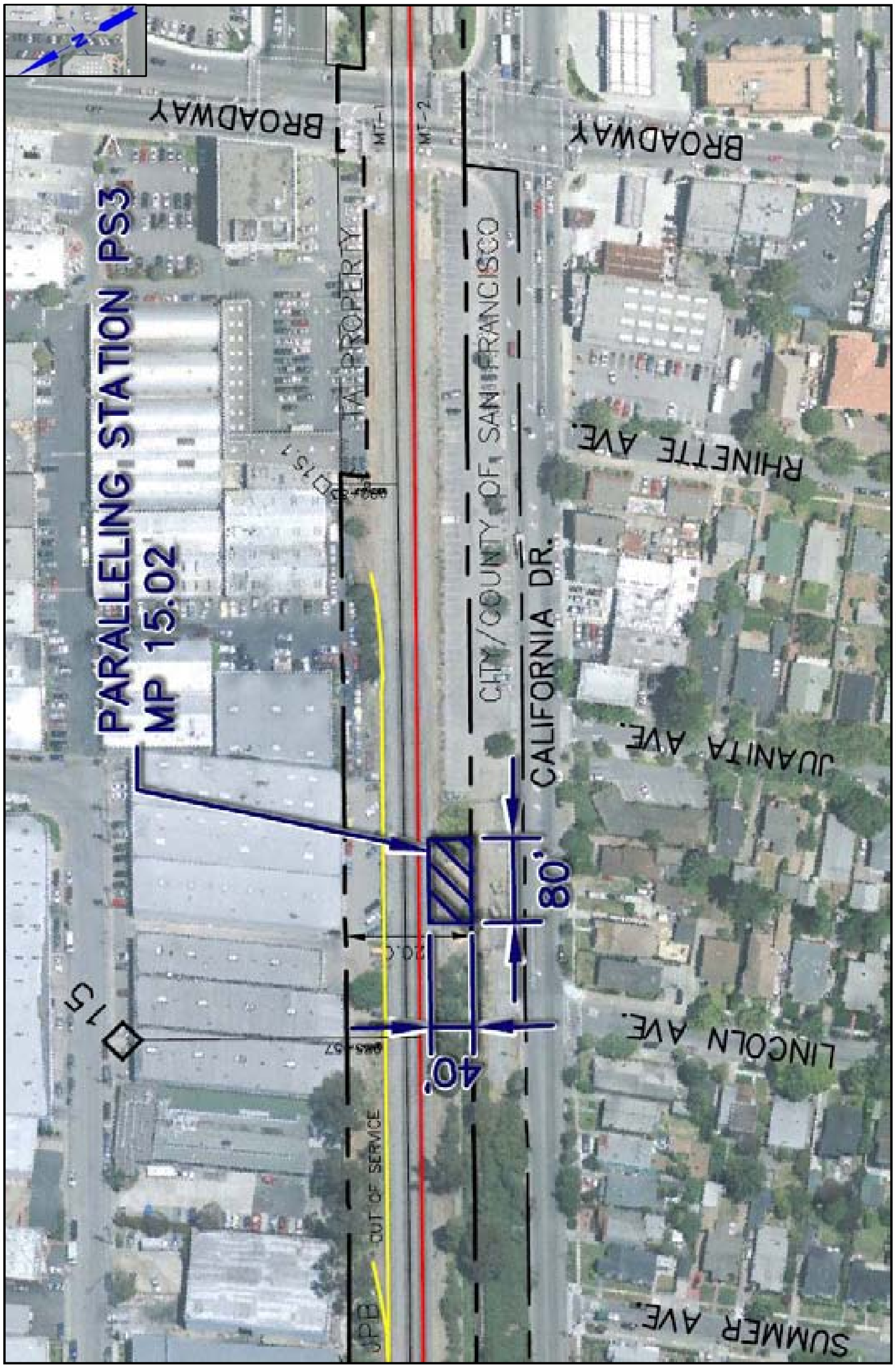

Figure 2.3-9
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS3
CALTRAIN ELECTRIFICATION PROGRAM

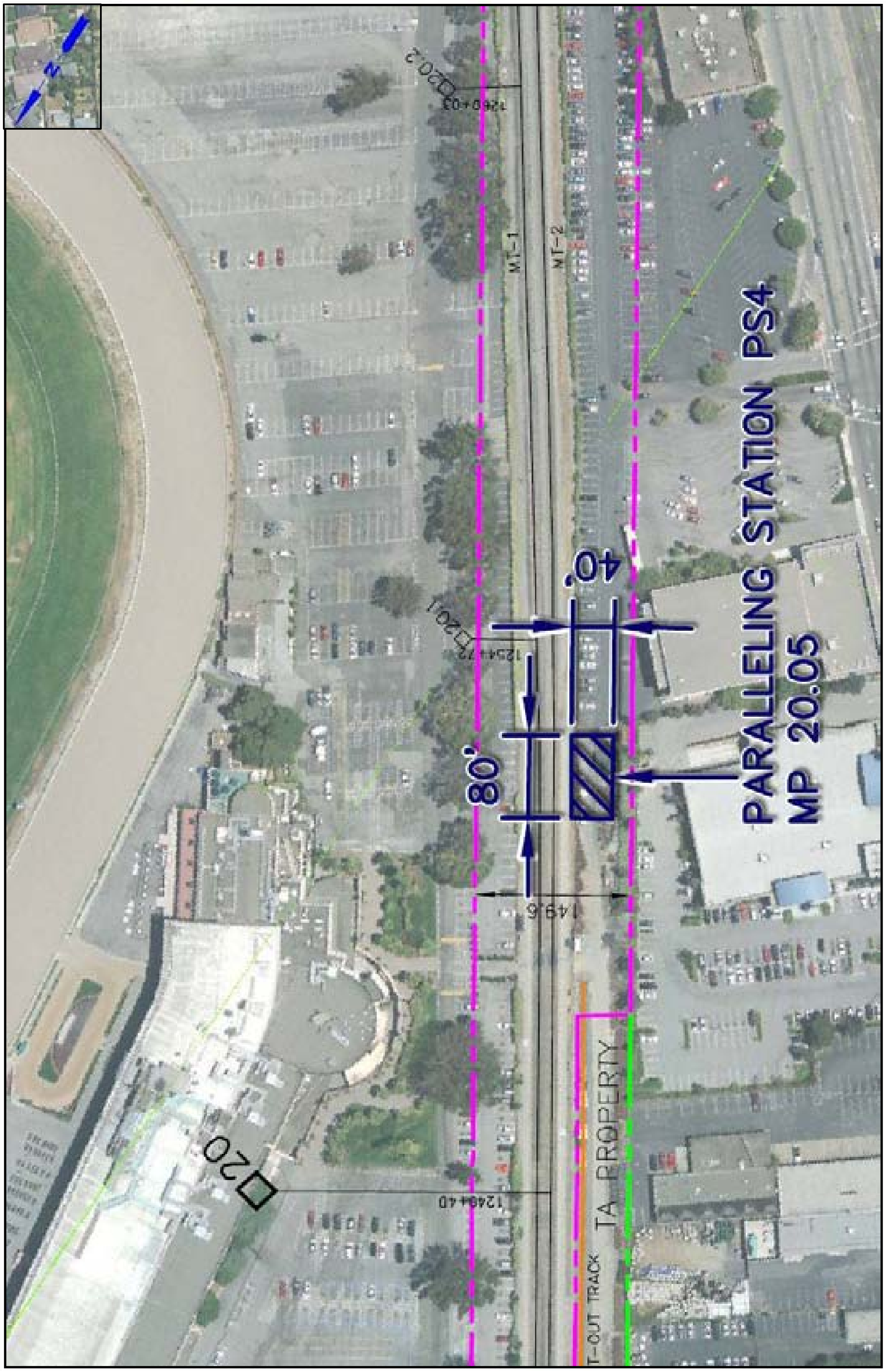

Figure 2.3-10
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS4
CALTRAIN ELECTRIFICATION PROGRAM

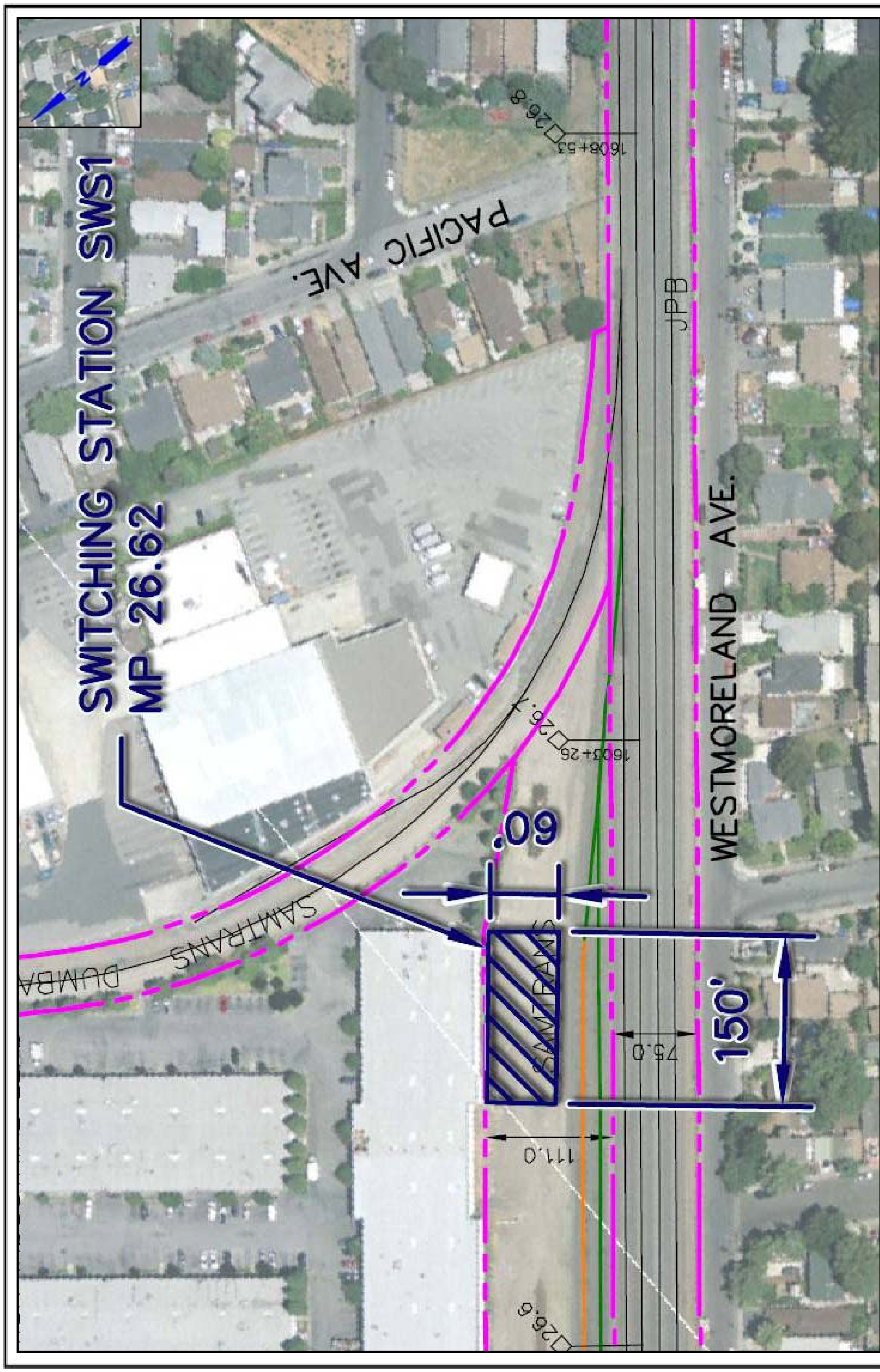

Figure 2.3-11
PROPOSED TRACTION POWER FACILITIES
SWITCHING STATION SWS1
CALTRAIN ELECTRIFICATION PROGRAM

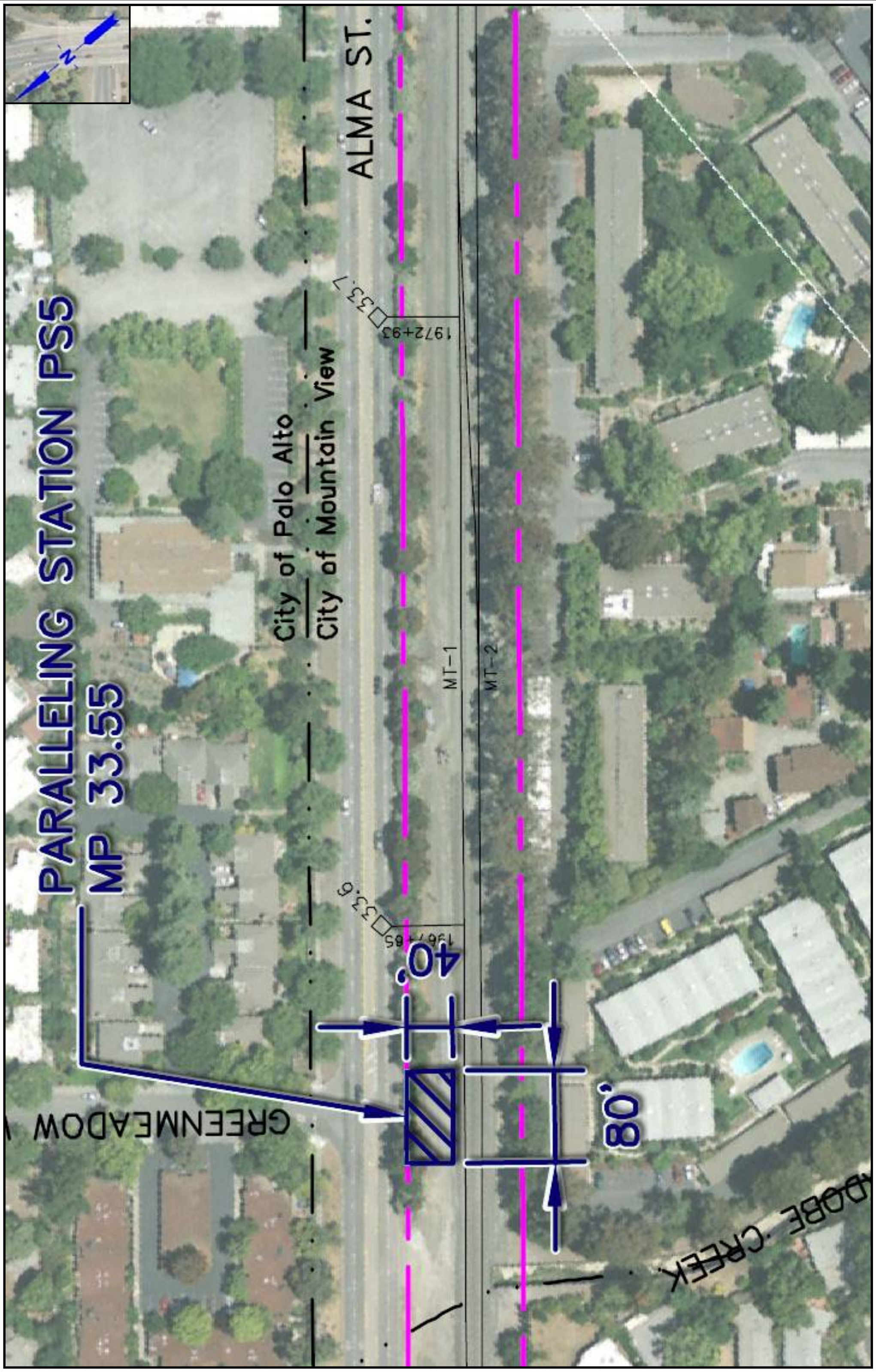

Figure 2.3-12
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS5
CALTRAIN ELECTRIFICATION PROGRAM

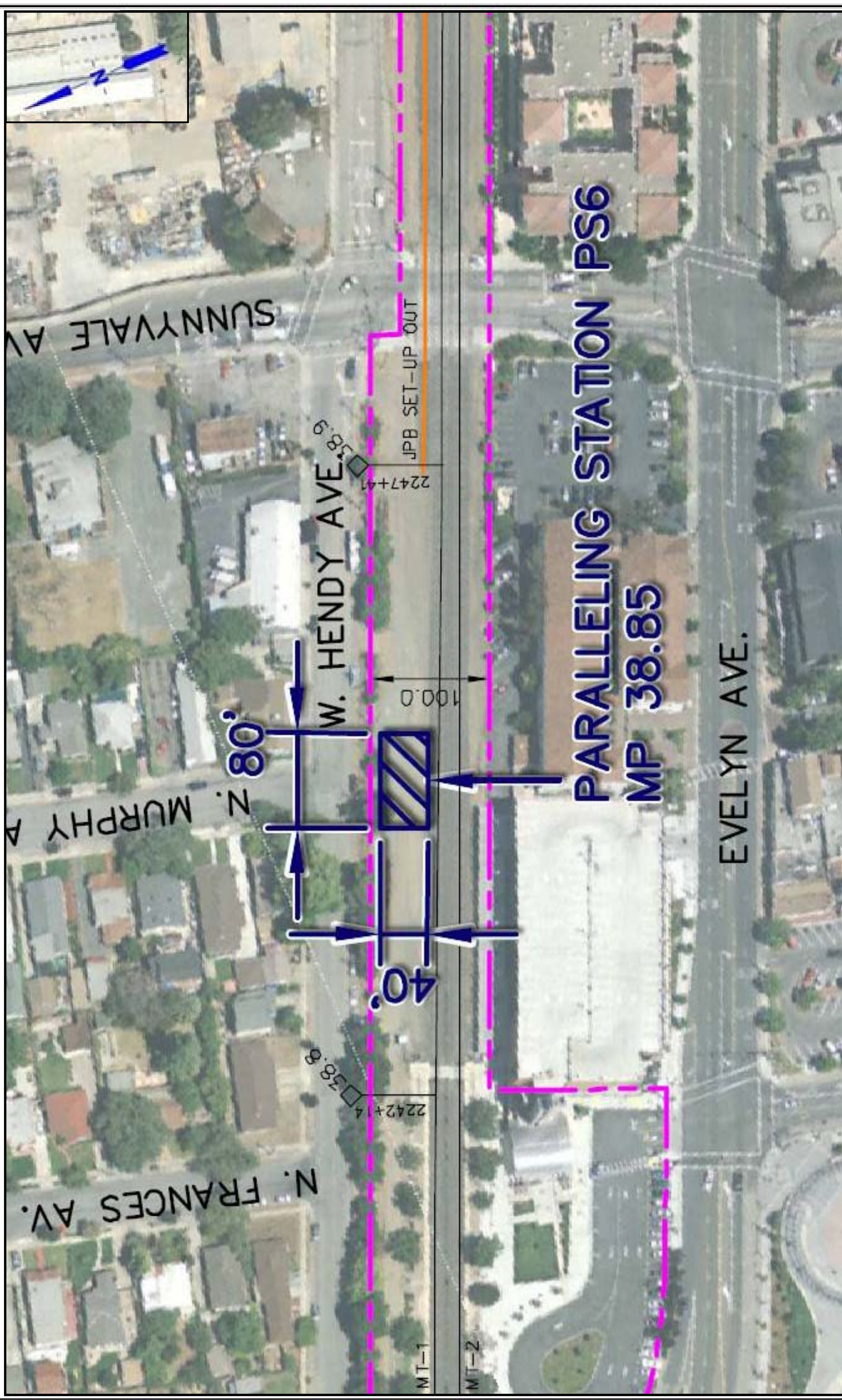

Figure 2.3-13
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS6
CALTRAIN ELECTRIFICATION PROGRAM

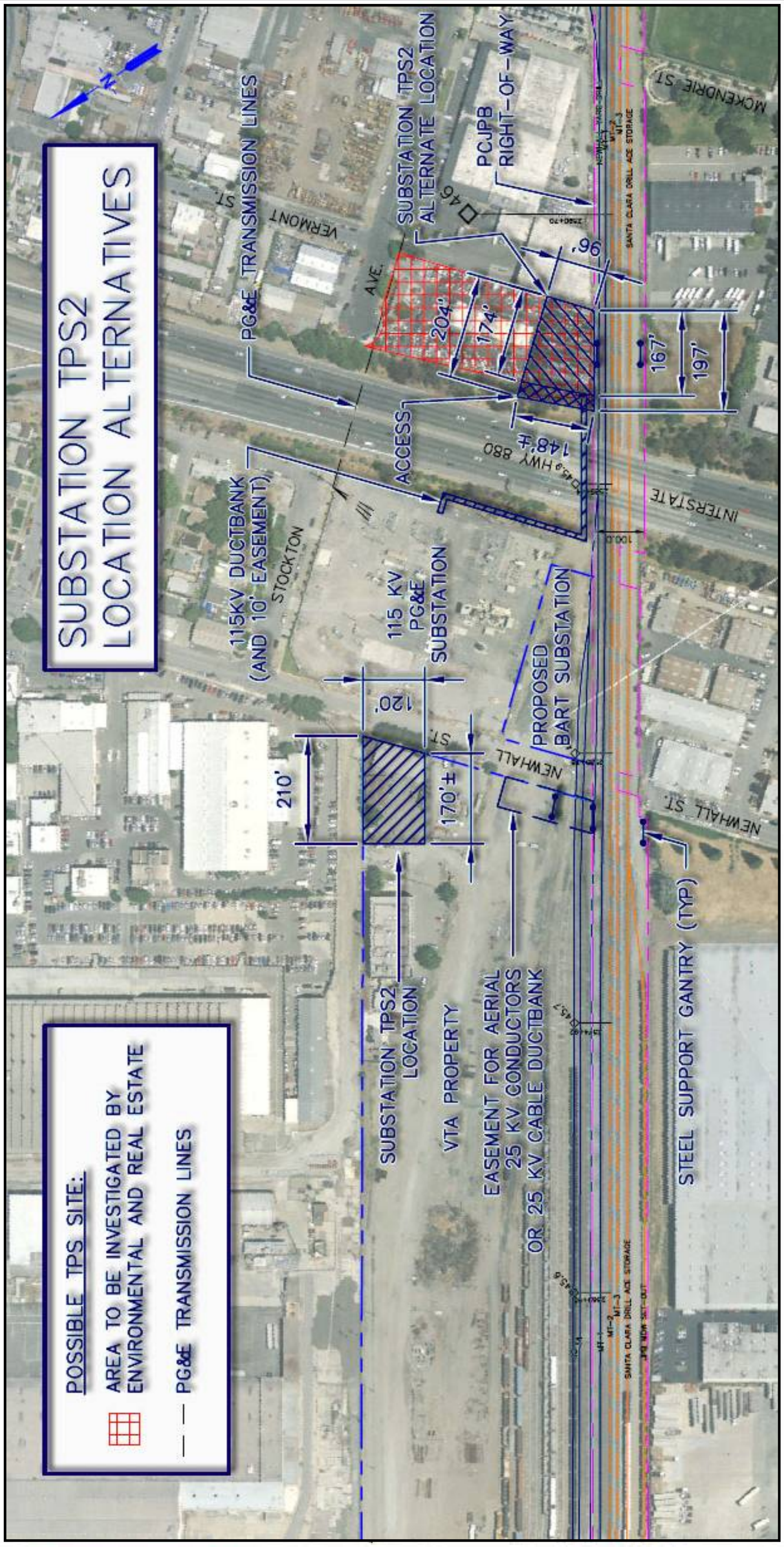

Figure 2.3-14
PROPOSED TRACTION POWER FACILITIES
SUBSTATION TPS2 PREFERRED AND ALT1
CALTRAIN ELECTRIFICATION PROGRAM

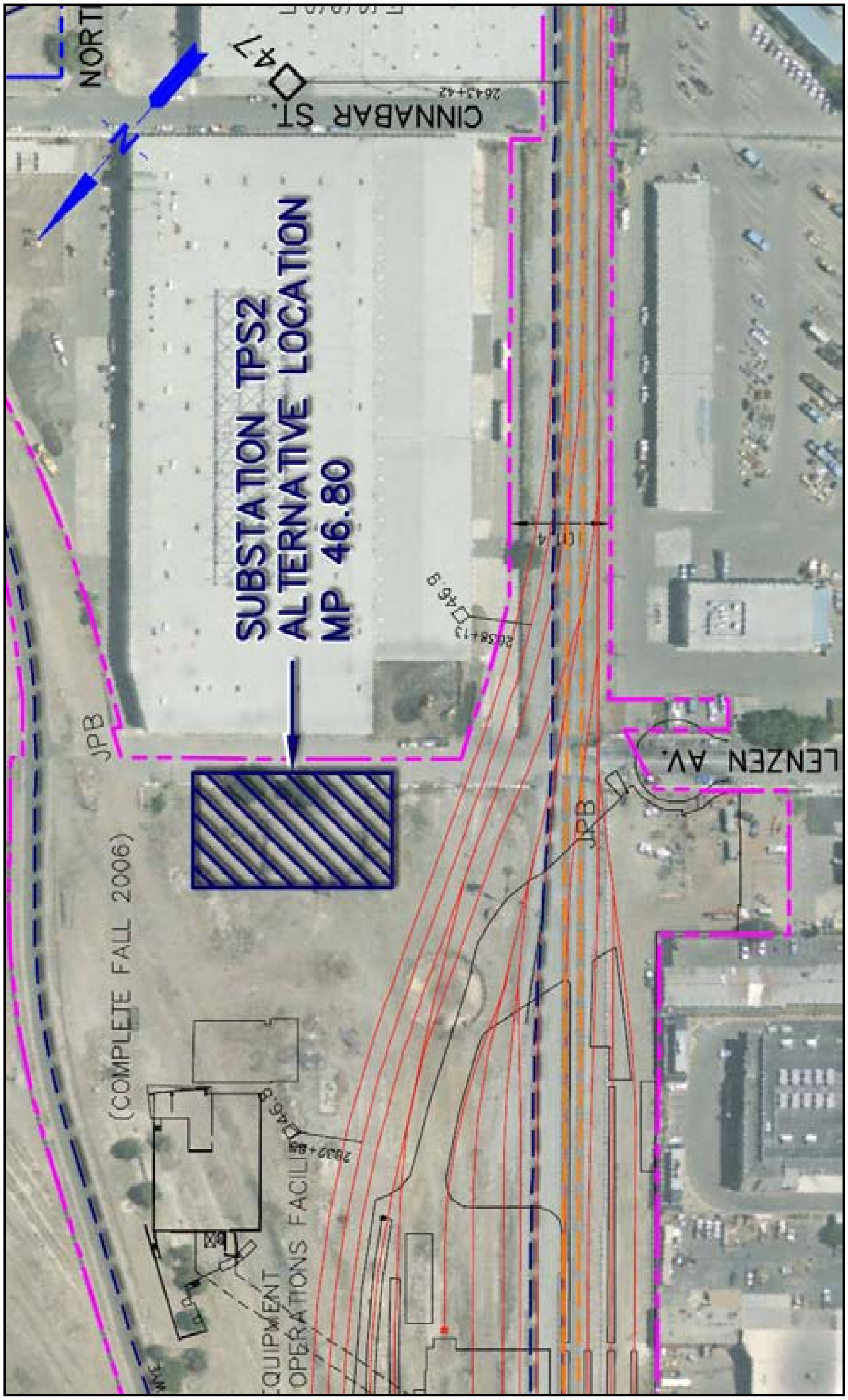

Figure 2.3-15
PROPOSED TRACTION POWER FACILITIES
SUBSTATION TPS2 ALT 2
CALTRAIN ELECTRIFICATION PROGRAM

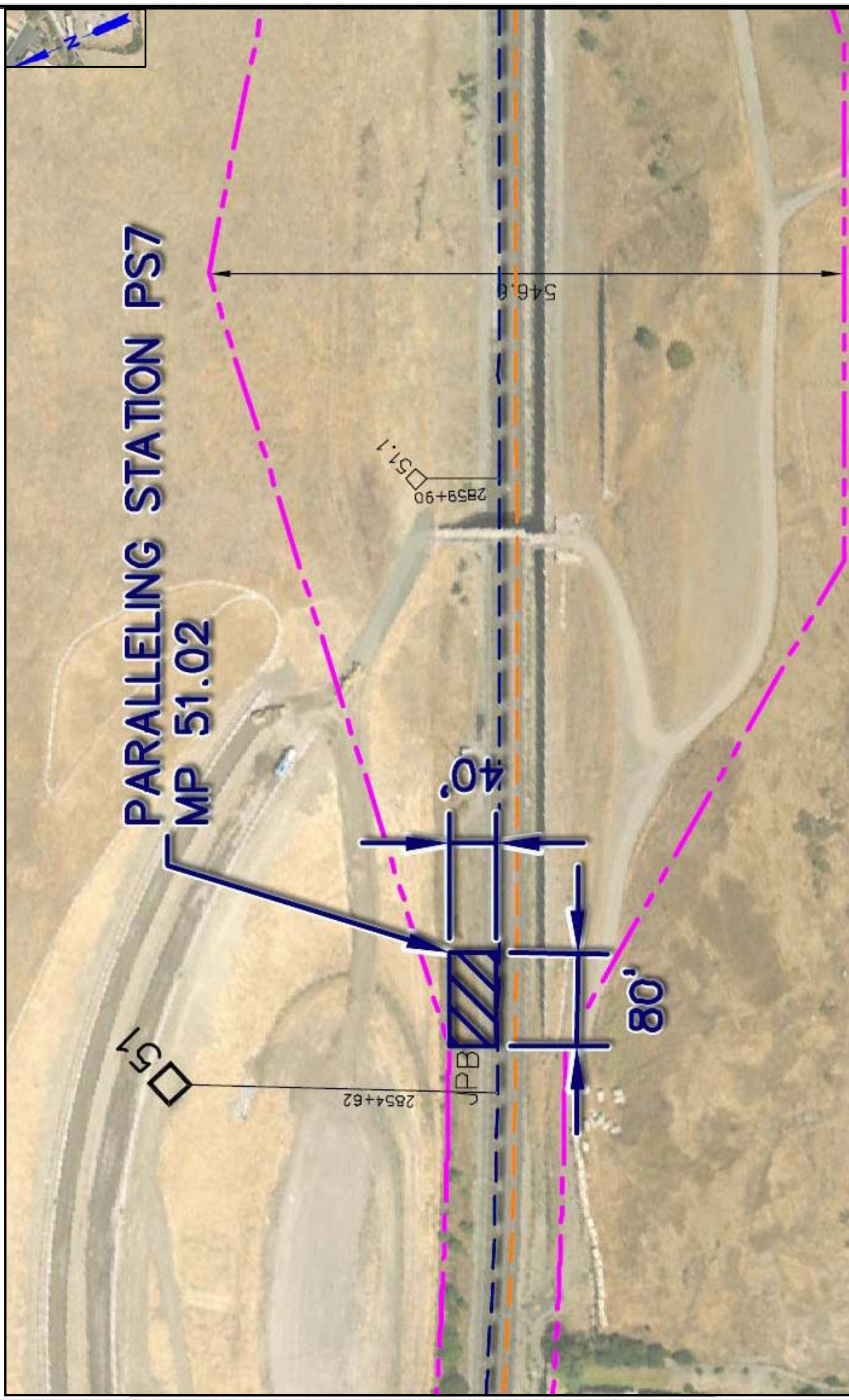

Figure 2.3-16
PROPOSED TRACTION POWER FACILITIES
PARALLELING STATION PS7
CALTRAIN ELECTRIFICATION PROGRAM

2.3.2.*4* Substations, Switching Stations, and Paralleling Stations

The substations would have two 60MVA (million Volt-amperes) oil-filled transformers that will step down the power utility supplied voltage of 115kV to the 2 x 25 kV distribution voltage for the OCS. The source power utility would be requested to provide two incoming feeds, which would tap two phases of each three-phase transmission line. The substation compound would include circuit breakers and switching equipment that would feed power from the high-voltage lines to each line section of track. The lineside equipment would be designed to provide alternate *switching* arrangements in the event of a substation equipment outage. A substation compound would *typically* be *approximately 150* feet by *200* feet in size, as evidenced by the size of the facilities recently installed between New Haven, Connecticut, and Boston, Massachusetts, for the 25-kV *ac* extension of the electrified services on the Amtrak Northeast Corridor.

Figure 2.3-*17* shows a typical substation installation. Figure 2.3-*18* shows a typical 115- to *50*-kV primary transformer, and Figure 2.3-*19 shows* a typical 10-MVA auto-transformer.

At approximately the midpoint between substations, a switching station would be installed. At the switching station a phase break would be required to ensure the power supplies from each substation is isolated from each other in order to avoid a fault condition. In addition, switching would be installed to provide operating flexibility during equipment outages. In between the substations and switching stations, paralleling stations would *be installed to maintain the autotransformer system and system operating voltages*. The switching stations would be equipped with two 10-MVA oil-filled auto-transformer units and the paralleling stations with either one or two 10-MVA oil-filled auto-transformer units. These facilities would contain a variety of circuit breakers and switching equipment but would be *typically as shown in the proposed location drawings above*. Switching station *compound dimensions are typically 80 feet wide by 160 feet long;* paralleling station compound dimensions are typically *40* feet *wide* by *80* feet *long*. Figure 2.3-*20* shows a typical switching station compound.

The substations are required to be located adjacent to suitable 115kV utility power sources and away from residential and habitat areas. The smaller paralleling and switching station facilities would be located to minimize their impact on *adjacent* areas. *The JPB has attempted to locate all traction power facilities to be consistent with local planning and zoning regulations, and to avoid or minimize impacts to surrounding land uses.*

Figure 2.3-17
TYPICAL SUBSTATION COMPOUND
CALTRAIN ELECTRIFICATION PROGRAM

Figure 2.3-18
115-50kV (2x25kV) PRIMARY TRANSFORMER (40 MVA)
CALTRAIN ELECTRIFICATION PROGRAM

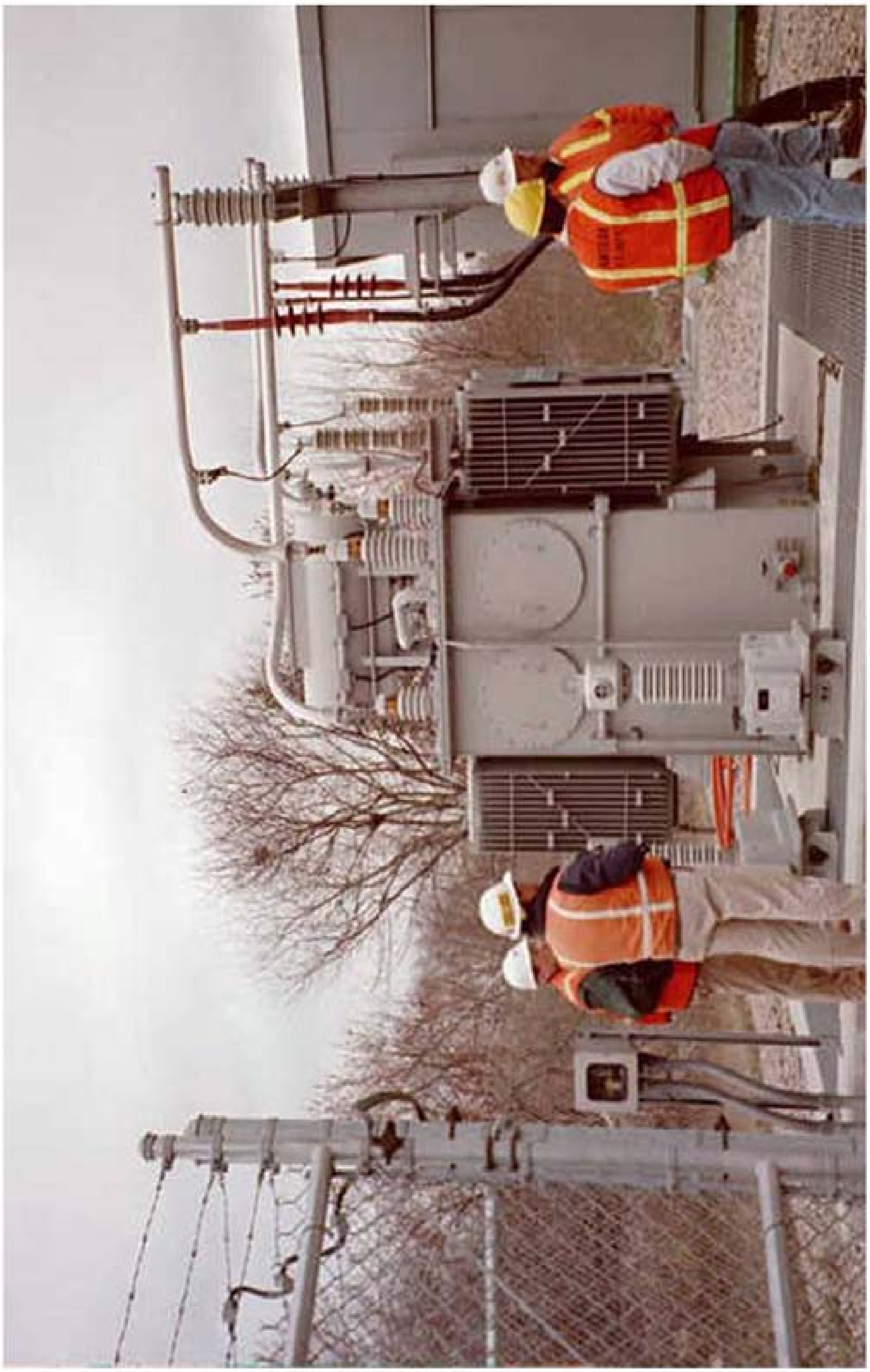

Figure 2.3-19
TYPICAL AUTO-TRANSFORMER (10MVA) AT PARALLELING OR SWITCHING STATION
CALTRAIN ELECTRIFICATION PROGRAM

AUTO-TRANSFORMERS WITH FIRE WALLS

CONTROL BUILDING AND AUTO-TRANSFORMER

Figure 2.3-20
TYPICAL SWITCHING STATION
CALTRAIN ELECTRIFICATION PROGRAM

2.3.2.*5* Overbridge Protection Structures

In addition to the electrical facilities themselves, electrification of the Caltrain line would require the construction or enhancement of overbridge protection barriers on *47* roadway bridges *a*cross the Caltrain alignment. These barriers prohibit access to the rail corridor and prevent objects from being thrown off the bridges in a manner that would damage or interfere with the electrical facilities. As indicated in Table 2.3-*3*, *15* of the existing bridges already have such barriers on both the north and south bridge face, six bridges have a barrier on only one bridge face, and *26* have no overbridge protection barriers. Overbridge protection barriers would be 6.5 feet high *above sidewalk or pavement level*, and placed along the parapet of the bridge at least 10 feet from the closest energized conductors crossing underneath. The existing barriers will be enhanced to meet these requirements.

Table 2.3-3: Overhead Bridge Protection Barriers

Number	Mile Post	Bridge Location	Is There an Existing Barrier?	
			North Face	South Face
Bridges *w*ith Barriers on Both Sides – Barriers *m*ay *b*e Enhanced				
1	1.90	23rd Street, San Francisco	yes	yes
2	3.14	Oakdale Avenue, San Francisco		
3	8.67	Oyster Point Boulevard, South San Francisco		
4	9.22	Grand Avenue West*b*ound, South San Francisco		
5	9.23	Grand Avenue East*b*ound, South San Francisco		
6	13.63	Pedestrian Crossing (Millbrae Sta), Millbrae		
7	13.70	Millbrae Avenue, Millbrae		
8	35.60	Shoreline Boulevard, Mountain View		
9	36.49	Stevens Creek Pedestrian Crossing, Mtn. View		
10	39.32	Pedestrian Crossing, Sunnyvale		
11	39.71	Wolfe Road, Sunnyvale		
12	40.70	Pedestrian Crossing, Sunnyvale		
13	40.75	Lawrence Expressway, Sunnyvale		
14	43.65	Lafayette Pedestrian Crossing, Santa Clara		
15	45.60	Hedding Avenue, San Jose		
Bridges *w*ith One Barrier – Construct One New Barrier; Existing Barrier *m*ay *b*e Enhanced				
1	1.72	22nd Street, San Francisco	yes	none
2	19.16	Highway 92 East*b*ound, San Mateo	none	yes
3	26.15	Woodside Road / Highway 84, Redwood City	yes	none
4	36.80	Whisman Road, Mountain View	yes	none
5	38.60	Mathilda Avenue, Sunnyvale	none	yes
6	42.90	Scott Boulevard, Santa Clara	none	yes

Table 2.3-3: Overhead Bridge Protection Barriers

Number	Mile Post	Bridge Location	Is There an Existing Barrier?	
			North Face	South Face
Bridges with No Barriers – Construct Two New Barriers				
1	0.48	6th Street Off-Ramp, San Francisco	none	none
2	0.85	I-280, San Francisco		
3	1.27	Mariposa Street, San Francisco		
4	2.10	I-280 South*b*ound, San Francisco		
5	2.16	I-280 North*b*ound, San Francisco		
6	2.70	Cesar Chavez Street Off-Ramp, San Francisco		
7	3.66	Williams Avenue, San Francisco		
8	4.15	Paul Avenue, San Francisco		
9	6.64	Tunnel Avenue, Brisbane		
10	7.69	Highway 101, Brisbane		
11	7.80	Sierra Point Parkway, Brisbane		
12	9.40	Highway 101 North*b*ound, South San Francisco		
13	9.41	Highway 101 South*b*ound, South San Francisco		
14	10.82	Highway 380, San Bruno		
15	19.12	Highway 92 West*b*ound, San Mateo		
16	34.00	San Antonio Avenue, Palo Alto		
17	36.50	Highway 85, Mountain View		
18	37.10	Highway 237 West*b*ound, Mountain View		
19	37.11	Highway 237 East*b*ound, Mountain View		
20	39.31	Fair Oaks Avenue, Sunnyvale		
21	42.50	San Tomas Expressway, Santa Clara		
22	43.99	De La Cruz Boulevard, Santa Clara		
23	45.30	Highway 880, San Jose		
24	47.29	San Carlos Street, San Jose		
25	50.10	Alamaden Expressway, San Jose		
26	50.49	Curtner Avenue, San Jose		
TOTALS				
Total Bridges with Two Existing Barriers: Barriers May Be Enhanced				***15***
Total Bridges with One Existing Barrier: Construct One/May Enhance One				**6**
Total Bridges with No Existing Barriers: Construct Two New Barriers				***26***
TOTAL NUMBER OF BRIDGES				***47***
Source: Parsons, 200*8*.				

For two-track segments, the length of the overbridge protection barrier would be about 35 to 40 feet *long*. For three- and four-track segments, the overbridge protection barrier would be from 65 to 80 feet long.

Overbridge protection barriers can be constructed from a variety of materials, including timber, sheet metal, small mesh wire fabric, and concrete *or other solid material*. Figure 2.3-*21* shows a typical overbridge protection barrier treatment *as installed on the Northeast Corridor. For the Caltrain Electrification Program, however, i*t is proposed to use a fine mesh wire fabric; this provides safety protection and maintainability, but affords a measure of transparency for *both pedestrians and* motorists. See Section 3.1, Aesthetics, for *a* visual simulation of the overbridge protection barrier type that would be used for the Caltrain Electrification Program and evaluation of its visual impacts.

2.3.2.*6* Rolling Stock

The Electrification Program Alternative *considered the following* three rolling stock options:

> ***Option 1: New Electric Locomotives Hauling Existing Gallery Cars*** **–** The first option would replace the *portion of the* existing diesel locomotive fleet *that will reach the end of its useful life by 2015. Caltrain would operate electric service between San Francisco and San Jose. The* one-for-one basis *replacement* would result in electric locomotives hauling the existing fleet of *passenger* cars. Under this option, the train consists would remain essentially the same as today, with the exception that a single electric locomotive would be able to haul more passenger cars than a single diesel-electric locomotive. One of the major advantages of the electric locomotive option is that it does not require complete replacement of the entire fleet at commencement. Diesel locomotives would continue to haul freight trains over the route, and the ACE, Capitol Corridor, and Amtrak passenger trains would also utilize diesels in the southern section, so compatibility of operations would have to be maintained after electrification. Under this option, Caltrain could operate a mixed fleet and replace existing diesels on an incremental basis, particularly if funding issues limit the initial acquisition. *All of Caltrain's existing fleet of passenger cars are fully compatible with electric locomotives.*

> ***Option 2: New EMUs*** **–**The second option*, which is the preferred rolling stock option for the Electrification Program Alternative,* would *replace the portion of Caltrain's existing* diesel locomotives and *passenger* cars *that will reach the end of its useful life by 2015. Caltrain would operate electric service between San Francisco and San Jose* with EMUs. With EMUs, each car*, or set of carts (unit),* has its own pantograph mounted on the roof, and separate electric motor drives to each axle of the trucks, using four motors (one per axle) or two motors (one per truck). EMUs can be operated in a variety of train consists, dependent upon the requirements of the rail system operator. Options include single motor cars (where each car is fitted with a driving cab at both ends) or paired cars (where there is a driving cab at only one end of each car). A pair can comprise two motor-cab cars, or a motor-cab plus a non-motored trailer-cab car. Another option would be a triplet formation, in which a single non-powered trailer car would be introduced between two motorized cab cars. *Also, quad units are an option.*

> **Option 3: New Electric Locomotives Hauling New Passenger Cars –** The third option would replace *the portion of* Caltrain's existing diesel locomotives *and passenger cars that will reach the end of its useful life by 2015. Caltrain would operate electric service*

PEDESTRIAN WALKWAY WITH OVERBRIDGE PROTECTION BARRIER

BARRIER MATERIAL

Figure 2.3-21
TYPICAL OVERBRIDGE PROTECTION BARRIER
CALTRAIN ELECTRIFICATION PROGRAM

between San Francisco and San Jose with electric locomotives, and all *of* Caltrain's existing gallery cars with new passenger cars.

Each of the options *evaluated* would *continue diesel-powered service between San Jose and Gilroy and would also allow continued diesel operations by freight trains, or other commuter or passenger rail services (e.g., Dumbarton service).*

All three options *were* evaluated *in response* to Caltrain's short- and long-term needs for rolling stock. *Since electrified revenue service would begin in 2015, when much of Caltrain's existing fleet will need replacement or rehabilitation, This would be a good time to replace the portion of the existing fleet that will have reached the end of its useful life with improved vehicles rather than simply replacing and rehabilitating the old fleet.* A railroad operations analysis was undertaken separately from the Electrification Program to determine Caltrain requirements and to estimate the increases in service that would be supported by electrification of the system, as well as to determine fleet requirements. *As described in Section 2.3.2.1 above, the JPB has identified Option 2, New EMU, as the rolling stock component of the Preferred Alternative. Purchasing of EMU equipment would allow Caltrain to improve passenger comfort, operating efficiency, operating flexibility, and performance.*

With any of the *build* options, power for the electric vehicles *would* be drawn from the OCS through a roof-mounted pantograph *on the power car(s) or locomotive*. The pantograph is a hinged, mechanical device that can extend vertically to follow variations in the OCS contact wire height, with a typical extension from as low as 14 *feet* up to 24 or 25 feet. A typical pantograph is depicted in Figure 2.3-*22*.

<u>Electric Locomotives</u>. Electric locomotives are currently in passenger service on Amtrak's Northeast Corridor and by *NJT*, *SEPTA*, and *MARC*. These locomotives include the ASEA ALP-44, the Bombardier high horsepower (HHP) locomotive; and the ADtranz ALP-46 locomotive. These locomotives are shown in Figure 2.3-*23*. The design locomotive for evaluation of the impacts of electrification in the present document is the ADtranz ALP-46.

<u>Electric Multiple Units</u>. EMUs currently in use include the 1,500-volt *DC* gallery cars now being operated by Metra in Chicago. These cars closely resemble the Caltrain double-level gallery cars. *Northern Indiana Commuter Transportation District also operates the new 1,500-volt dc multi-level Nippon Sharyo cars in northern Indiana and Illinois.* Twenty-five kV *ac* single-level EMUs are in service on the Deux Montagnes Commuter Railroad in Montreal. Typical modern European EMU vehicles are shown in Figure 2.3-*24*. In addition, Metro-North Railroad, NJT, and SEPTA operate single-level EMUs powered from an 11.5 *to* 12.5 *k*V and 25 *k*V *ac* OCS. There is currently no *United States-based* prototype for the EMU proposed for the Caltrain Electrification Program. The EMU vehicle that would be proposed for the Caltrain Electrification Program would be a multi-level car of comparable dimensions to the existing Caltrain gallery car. *Caltrain is working with the Federal Railroad Administration (FRA) to develop a system of operating to allow modern European EMU equipment to operate on the Caltrain Electrification System.*

Figure 2.3-22
TYPICAL PANTOGRAPH
CALTRAIN ELECTRIFICATION PROGRAM

BOMBARDIER

ALP-46

Figure 2.3-23
TYPICAL ELECTRIC LOCOMOTIVES
CALTRAIN ELECTRIFICATION PROGRAM

Figure 2.3-24
TYPICAL EMU VEHICLES
CALTRAIN ELECTRIFICATION PROGRAM

2.3.2.7 Caltrain Operating Scenario(s) Under Electrification

The level of Caltrain operations and therefore fleet requirements under the Electrification Program Alternative would be *114* trains per day, including *six diesel-powered* trains in the San Jose to Gilroy segment, by *2015*. *The Electrification Program Alernative assumes no service increase between 2015 and 2035.* As previously stated, Caltrain can *only* achieve this *increase in its* level of service using vehicles powered by electricity*; also,* electrified trains accelerate and decelerate somewhat faster than diesel trains, making for shorter trip times.

2.3.2.8 Modification or Replacement of Signal System

The Electrification Program has identified the requirement for the existing signal system equipment to be modified or replaced, as needed, to achieve electrification compatibility. This applies particularly to the grade crossing protection systems, where the "Constant Warning Time" equipment will have to be replaced with an *electrification*-compatible system as part of the project.

Between San Francisco and San Jose, Caltrain has approximately *43* vehicular grade crossings *and 16* pedestrian grade crossings with active warning devices and “Constant Warning Time” predictors.

The current Constant Warning Time systems *would not be electronically compatible with the Electrification Program Alternative*. Continued use of the existing system with the current level of service would result in increased gate down time on the highway grade crossings, particularly at the locations where multiple grade crossings are in close proximity. Gate down time would become even greater with the projected future levels of rail service.

Although other electrified services have electrification-compatible crossing systems, none is directly transferable to the Caltrain Electrification Program. The recently electrified Amtrak line between New Haven and Boston has six at-grade crossings where the existing technology had to be modified for electrification compatibility, but these crossings do not have the same volume of either highway or rail traffic that is seen on the Caltrain route. SEPTA has one grade crossing on one of its Philadelphia commuter lines, and *NJT* has several grade crossings on the *M&E* commuter line, all of which have electrification-compatible crossing protection, using similar equipment. Again, though, none of these crossings experiences the *high* volume of highway or rail traffic that is seen by Caltrain.

Recognizing the potential problems that extended gate down time could create, *and the requirement for the existing signal circuitry to be modified or replaced to achieve electrification compatibility,* Caltrain is *pursuing a new advanced technology that* incorporates the use of wayside radio equipment that will communicate with equipment on board the locomotives and cab cars. This new equipment would be compatible with both diesel and electric operations *and would therefore also permit reductions in gate down times for the existing diesel service*.

Further, there are several possible systems which can be installed. Engineering analysis and the need to avoid increased crossing gate down times, particularly in locations where multiple grade crossings are in close proximity, will determine the applicable system.

2.3.2.9 Other Improvements Included in the Electrification Program Alternative

OCS infrastructure *would* be placed to *wire the existing tracks*,third and fourth track improvements*, and infrastructure modifications designed and scoped under the ongoing Caltrain Capital Program.*

Construction *of* the CEMOF at the Lenzen Yard *was* complet*ed* in *2007*. The CEMOF has independent utility and purpose from the Electrification Program, as it would serve current and future system operations regardless of whether they are diesel or electrified. The CEMOF was the subject of a separate environmental document; a Finding of No Significant Impact *(FONSI)* was given by FTA in March 1999. The Electrification Program Alternative would provide *installation of an inspection platform and* the required OCS wiring of *existing* tracks within the CEMOF.

Some trimming or removal of trees will be required along the tracks and electrical facilities where they would otherwise pose a maintenance or safety concern. These impacts are addressed within the present document; refer to Section 3.1, Aesthetics, and Section 3.4, Biological Resources.

One maintenance item that is unique to electric vehicles is the need to inspect the pantograph carbon collector strips for wear and damage. Carbon is a relatively soft material, even when mixed with copper particles to create "metalized" strips, *but it* is designed to be the sacrificial element in the sliding current collection interface *rather than the contact wire*.

The electrification system envisioned for the corridor would be configured in such a way that it would support the future operation of California *HSR*. Twenty-five kV, 60-Hz single-phase *ac* electrification is likely to be the power supply system of choice for a steel-wheel-on-steel-rail high-speed train option. The OCS configuration and *auto-transformer* power supply arrangement envisioned for the Caltrain commuter rail system could support rail operations at speeds greater than 90 mph, if this were to be required for *HSR* operations in this corridor.

2.3.2.*10* Staging of Electrification Improvements

The intent of the Electrification Program would be to wire the existing trackwork, *including that built* under the North CTX and South CTX projects, from San Francisco to *San Jose*. *C*onstruction *would likely consist of one continuous* phase *between the 4th and King and* Tamien *stations*. *Construction staging would be conducted at several currently-unidentified sites along the project corridor between San Francisco and San Jose. Staging would occur at each traction power facility site and on railroad property to the extent feasible. JPB will coordinate with the Construction Contractor to identify appropriate locations that would result in minimal environmental impact.*

2.3.3 COSTS, FUNDING, AND FEASIBILITY

2.3.3.1 Capital Costs

The capital costs associated with the Caltrain Electrification Program including rolling stock and the fixed facilities are shown below. The cost of the fixed facilities (e.g., OCS, substations, *and signal system) is estimated at approximately $608 million in 2008 dollars, or $785 million in year-of-expenditure (YOE) dollars. The cost of rolling stock for the Electrification Program Alternative, in 2008 dollars is estimated to be $397 million. Thus, the total cost of the Electrification Program Alternative, is estimated to be $397 million in 2008 dollars, or $440 million in YOE dollars.*

Thus, the total cost of the Electrification Program is approximately $1,005 million in 2008 dollars, or $1,225 million in YOE dollars. All of these estimates are based on starting electrified operations in 2015 with 114 trains per day.

***Rolling Stock** – Table 2.3-4 summarizes the rolling stock procurement costs (in YOE dollars) for the service level currently contemplated by the JPB (114 trains per weekday), which corresponds with the year 2015. Under the Electrification Program Alternative, it is assumed that the level of service would remain the same until 2035.*

Table 2.3-*4*: Electrification System Costs
(in* Millions of *YOE* Dollars*)
Rolling Stock by Year

Year	***YOE$ Total***
***Year 2015** (114 trains/weekday)*	
Preferred Alternative (EMUs)	$*440*
Source: PCJPB, 2009.	

***Fixed Facilities* –** In addition to rolling stock costs, there are the costs for electrification of the trackway itself plus related improvements. *These n*on-rolling stock program costs are shown in Table 2.3-*5* and include traction power supply and OCS delivery systems; signal systems; grade crossing, tunnel, and overcrossing improvements; utility modification and relocations; *purchase of property*; landscape improvements; retooling of the Lenzen Yard and training of maintenance personnel; high-level *pantograph inspection* platforms; and insurance, administration, and other project development costs. *Non-rolling stock program costs would not vary with level of service, but they would be fully implemented for the first year* of electrified Caltrain service. *N*on-rolling stock improvements are estimated to cost $*608* million *in 2008 dollars and $785 million in YOE dollars.*

The Electrification Program will be closely coordinated with other Caltrain capital improvements, such as grade separations, to reduce the potential for redoing electrification facilities when additional projects are implemented.

Table 2.3-5: Electrification System Costs ***(in*** **Millions of *YOE* Dollars*)*** **Non-Rolling Stock Program Costs**	
	YOE $
Cost Category	***San Francisco to San Jose***
Traction Power Supply System	$*171*
Overhead Contact System (OCS)	$*358*
Signal System & Grade Crossings	$*93*
Communications	*$40*
Tunnel and Overcrossing Clearance	$*39*
Utilities, Landscape Improvements	$*27*
OCS Equipment & Materials Storage	$*22*
Retooling of Lenzen Yard and Training	$*11*
High-Level Catenary Platforms	$*2*
Liability Insurance, Financing, Other	$*9*
Real Estate Acquisition	***$13***
***Subtotal*:**	***$785***

Both the rolling stock and other system improvement costs include design, development, and construction oversight costs.

Total Costs **–** Table 2.3-*6* combines the costs for rolling and non-rolling stock elements into total program costs. Costs represent the procurement costs of new rolling stock and trackway improvements. *The rolling stock procurement assumes nine* existing Caltrain diesel locomotives *and 45 coaches* would be retained for *Baby Bullet express trains, service between San Jose Diridon and Gilroy stations and* emergency operations, in the event that electric power is unavailable for train propulsion. Excess diesel locomotives *and coaches would be retired, as they will have reached the end of its 30-year useful life. No credit is taken for its value in calculation of costs or funding, due to its limited value at retirement*.

It should be noted that program costs for *2015 (given in YOE$)* represent total system costs but include rolling stock to support a service level of *114* trains per weekday.

Table 2.3-*6*: Electrification System Costs *(in* Millions of *YOE* Dollars*)* Rolling Stock and Non-Rolling Stock by Year			
	YOE **$**		
Electrification Option/Year	**Rolling Stock**	**Non-Rolling Stock**	**Electrification Total [1]**
Year *2015* (*114* trains/weekday)			
Option 2 *Preferred Alternative* (EMUs)	$*440*	$*785*	$*1,225*

[1] Estimated cost of new rolling stock *and non-rolling stock committed in 2011 and non-rolling stock committed in 2012 for 2015 in-service date*.

Source: *PCJPB, 2009.*

2.3.3.2 Funding Sources and Programming

Capital costs of the Caltrain Electrification Program are proposed to be funded from *the following sources:* county sales tax *measures*; *State Transportation Improvement Program (STIP) funds; Federal Surface Transportation Program (STP)*, Congestion Management-Air Quality (CMAQ)*, and FTA Section 5307/09* funds; *and State Proposition 1B and HSR bonds. These sources total $709 million in YOE revenues for both rolling stock and non-rolling stock costs. Anticipated funding amounts from these sources are shown in Table 2.3-7.*

While there is a funding gap of $516 million for the program, a number of potential sources are currently being considered to close the gap, including Federal American Recovery and Reinvestment Act High Speed Rail Program Funds, State Proposition 1A funds and/or project financing:

- *Federal American Recovery and Reinvestment Act High Speed Rail Program: President Obama signed into law the Federal American Recovery and Reinvestment Act (ARRA) on February 17, 2009. The ARRA Program provides $8 billion dollars to develop high speed rail lines in America. A Strategic Plan for the $8 billion dollars, recently released by the Administration, formalizes the identification of ten high-speed rail corridors as potential recipients of this federal funding. California is formally included in the designation. The PCJPB is coordinating with a number of partners, including but not limited to the California High Speed Rail Authority, Transbay Joint Powers Authority, and the MTC in preparing a package of projects to compete for the $8 billion in ARRA funds. On June 24, 2009, MTC adopted California High Speed Rail: San Francisco/Silicon Valley Corridor Investment Strategy for using federal economic stimulus funds to expedite the arrival of high-speed rail service to the San Francisco Bay Area while at the same time upgrading commuter rail service along the Peninsula Corridor that runs from San Francisco through Silicon Valley to San Jose. The package included $785 million to electrify the corridor so Caltrain can convert its commuter* *service from diesel power to electric technology, which is cleaner and quieter, and to pave the way for high-speed rail.*

- *State Proposition 1A Program: California voters approved Proposition 1A on November 4, 2008 that provided $10 billion for high-speed rail projects to link San Diego, Los Angeles, the Central Valley and the Bay Area. As with the ARRA Program, the PCJPB is coordinating with partners to pursue funds from the state bond measure for projects that will support high speed rail development in the Bay Area. As with the ARRA Program, Electrification is one such project included in the proposed state program.*
- *Project Financing: A commercial paper program is considered during the construction period of the project in order to provide sufficient cash flow for the program, to be followed by a traditional public financing program underwritten by farebox revenue once the project is in revenue service. It is anticipated, based on the modeling information, that the Project will provide additional fare revenues to support the public financing.*

In addition, the Caltrain Electrification Program is *one of a number of rail, bus and ferry projects* included in the MTC*'s Regional Transit Expansion Program (RTEP) Resolution No. 3434, as revised September 24, 2008*. The RTEP is the transit expansion element of the RTP. The 2005 RTP, *known as Transportation – 2035 Plan. The Plan* was adopted by the MTC in *April 2009*. *T*he Caltrain Electrification Program is included in the *Transportation – 2035 Plan*.

Table 2.3-7: Funding Sources for Caltrain Electrification Program with Preferred EMU *Project* (Millions of *YOE* Dollars)

Source	**Amount**
Local Funds, including County Sales Tax	*$191*
STIP/STP/CMAQ/Section 5307/9	*$16*
Proposition 1B and HSR Connectivity Funds	*$62*
Rolling Stock Replacement Project	*$440*[1]
Project funding shortfall, potentially to be made up for with funds from Project Financing, Federal American Recovery and Reinvestment Act High Speed Rail Program Funds, and/or State Proposition 1A funds.	*$516*
TOTAL	**$*1,225***

[1] *$440M includes $352M in FTA Section 5307/9 funds for rolling-stock replacement and $88M in matching funds from JPB Partners.*

Source: MTC, *Regional Transit Expansion Policy: Program of Projects, September 2008; and California High Speed Rail: San Francisco/Silicon Valley Corridor Investment Strategy, June 2009; JPB, 2009.*

2.3.3.3 Operating and Maintenance Costs

A railroad operations analysis was performed for this study to estimate the service increases (increased train frequencies and/or train lengths) that would be supported by electrification of the system, and to determine fleet and other requirements. The JPB subsequently prepared a Caltrain Operating Plan, *Fiscal Year (*FY*)* 2004-2026, in support of project documentation for the RTEP, which projected annual service levels and associated operating costs to 2026. The plan did not specifically assign a cost for electrified operations.

The *operating and maintenance costs for the Electrification Program* were initially identified in a technical report prepared as part of the preliminary engineering of electrification improvements (see *Caltrain 25 kV, 60 Hz, AC Electrification Program, Overview of Preliminary Engineering Operating and Maintenance Costs,* July 30, 2001). *These costs* were later updated to reflect refinements in fleet requirements, proposed train schedules, *current energy costs*, *current labor rates, and projected operating and maintenance costs developed for the FY 2005 budget*.

Table 2.3-*8* lists the Caltrain operating parameters assumed in the operating and maintenance cost estimates *for 2008, 2015 and 2035.* Existing service parameters are shown for comparison with electrified operations. All rolling stock options would have the same operating requirements. During the peak *periods in 2015, two Baby Bullet* train*s* would be provided each hour in both the southbound and northbound directions. Baseline service would also operate, with *four* limited-stop trains per hour southbound and northbound during the peak period in *2015*. *Service levels for 2035 remain the same as for 2015.*

Table 2.3-*8*: Caltrain Operating Parameters

	Existing Diesel Service	***Electrified Service (All Options)***	
	2008	***2015***	***2035***
Number of Trains per Weekday	*98*	*114*	*114*
Weekday Train Trips *(San Francisco – San Jose Diridon)*			
A.M. Peak Period (6-9 a.m)	*27*	*38*	*38*
A.M. Peak Period Hour, one-way	5	6	6
Weekday Train Trips (San Jose Diridon – Gilroy)			
A.M. Peak Period (6-9 a.m.)	*3*	*3*	*3*
A.M. Peak Period Hour, one-way	*1*	*1*	*1*
Cars/Train (Avg.)	*4 to 5*	6	6
Train Capacity (*Seats*)	*580 to 725*	*600*	*600*

Source: *Caltrain Timetable, March 2008.*

The operating parameters presented in Table 2.3-8 were used to estimate operating and maintenance (O&M) costs for operating electrified Caltrain service in the years 2015 and 2035. Table 2.3-9 summarizes the incremental O&M costs under the Electrification Program.

As shown in Table 2.3-9 incremental costs include cost savings on train operations, traction power, and rolling stock maintenance; as well as increased costs for track electrification (the personnel required to maintain and operate the electric power system), maintenance-of-way (reflecting, for example, the increased cost of track maintenance for working under the OCS lines), and changes to maintenance facility operations.

Caltrain O&M costs would be higher (compared to diesel operation) with electrification based on 2008 schedule assumptions, but they would be lower under service with EMUs based on 2015 schedule assumptions.

Table 2.3-9: Incremental Operating and Maintenance Costs for Electrification
(Millions YOE $)

	Increase (Decrease) in Annual O&M Relative to No-Project	
	Preferred Alternative: Electric Multiple Units (EMUs)	
Item	**2015 (114 Trains/day)**	**2035[2] (114 Trains/day)**
Train Operations (crew and admin.)	*($0.94)*	*($1.87)*
Traction Power (Fuel or Electricity)	*($5.11)*	*($18.81)*
Rolling Stock Maintenance[1]	*$4.55*	*$12.38*
Traction Electrification/MOW	*$7.0*	*$13.92*
Maintenance Facilities	*$0.19*	*$0.38*
Total Change in Annual Costs	***$5.69***	***$6.00***

[1]The No-Project Alternative retains Caltrain's equipment and maintenance methods. The Electrification Program Alternative utilizes newer electric equipment and a new life cycle maintenance philosophy that increases annual cost, but improves service reliability and overall condition of the vehicle over its life. Thus, a direct comparison between maintenance costs between the No Project and the Project Alternative may be misleading.

[2] Cost assumes majority of vehicles would be replaced as they reach their nominal 30-year design life. 2035 O&M cost assumes additional diesel locomotive and coach replacement with EMUs in the 2030 timeframe, increasing electricity demand and decreasing diesel fuel consumption.

Source: PCJPB, 2009.

The main cost of electrification is $5.69 million per year for labor and materials to maintain the traction power delivery system (a cost not associated with diesel service). This cost is offset by lower power and vehicle maintenance costs associated with electric operations. Generally speaking, electrification becomes more cost effective as the number of trains increases (since electrified trains are more energy efficient than diesel trains).

Table 2.3-9 presents the estimated total O&M costs under the Electrification Program Alternative. Caltrain electrification with EMUs is projected to increase Caltrain's O&M costs by approximately $5.69 million in 2015 and about $6.00 million in 2035.

Table 2.3-10 shows the potential revenue because the calculation is based on unconstrained ridership demand.

Finally, it should be noted that the traction power costs used in this analysis were computed with 2008 electricity rates typical for other electrified transit systems ($0.09 per kWh). A diesel fuel price reflects the actual average price that Caltrain paid in 2008. Projecting future electricity and diesel prices is very uncertain, but current trends would project diesel fuel increases outpacing electricity price increases. Electricity costs for 2015 were based on the 2008 rate of $0.09 per kWh.

Table 2.3-1*0*: Caltrain Operating and Maintenance Costs with Electrification (Millions of *YOE* Dollars)

Expense Category	**Operating Year[1]**		
	2008	***2015***	***2035[3]***
Number of Trains per Day	*98*	*114*	*114*
Total O&M Expense	*$86.96*	*$117.72*	*$228.93*
Estimated Potential Operating Revenues (Fare and Other)	*$47.48*	*$73.45*	*$206.18*
Net O&M Expense/Subsidy [2]	*$39.48*	*$44.27*	*$22.75*

[1] Figures are for fiscal year, July 1- June 30, and provide a reasonable approximation of calendar year performance.

[2] *The net O&M expense/subsidy is split between San Francisco, San Mateo, and Santa Clara counties in an approximate 18-42-40 ratio, respectively. In addition to net direct O&M costs, there are debt service, and capital contingency expenses that are paid for by the subsidy. These costs are estimated to total $1.9 million in 2008 and $2.1 million in 2015 and $3.0 million in 2035.*

[3] *Cost assumes majority of vehicles will be replaced as they reach their nominal 30-year design life. 2035 O&M cost assumes additional vehicle replacement in the 2030 timeframe.*

Source: PCJPB, 2009.

2.4 ALTERNATIVES CONSIDERED AND WITHDRAWN

In addition to electrification, *seven* other propulsion alternatives were considered to meet the project purpose and need, and were ultimately withdrawn from further consideration based on their *poor* cost effectiveness, potential environmental impacts, *incompatibility with other planned improvements*, operational constraints, or other criteria. Some of the alternatives originally considered for the 1997 Caltrain Downtown Extension Draft EIS/EIR a*re* reconsidered *below*, *including* the reasons they were withdrawn from further consideration.

2.4.1 PROPULSION USING CLEAN DIESEL OR LIQUEFIED NATURAL GAS FUELS

"Clean" diesel and liquefied natural gas (LNG) fuels were the least expensive of the alternative train propulsion options considered. Similar to electrification, the conversion of locomotives to LNG fuel could substantially reduce pollutant emissions compared with continued diesel operations. These alternative fuel options did not address the basic project purpose to electrify the Caltrain line*; to enhance train performance by enabling longer train consists without degrading speeds—thereby serving more peak-period passengers without increasing staff and operating costs;* or to realize Peninsula commuters' vision of a modernized commuter railroad. Nor would they have accommodated future California *HSR* implementation in the Caltrain corridor *as presented in the Strategic Plan*. For these reasons, propulsion using clean diesel or LNG was withdrawn from further consideration as an alternative to electrification.

2.4.2 FUEL CELL VEHICLES AND LOCOMOTIVES

Fuel cell technology has been evolving over the last *10* years but still has many limitations for commuter rail operations. One of the primary limitations is the weight of the fuel cell, which would add from 20 to 33 percent to the weight of the original vehicle. An electric locomotive of 6,000 to 8,000 horsepower (HP) and weighing approximately 200,000 pounds is required to pull six to eight 120- to 146-passenger coaches weighing approximately 125,000 pounds apiece. For a comparable fuel cell locomotive, the additional weight attributable to the fuel cell alone could increase the weight of the locomotive to *more than* 300,000 pounds. Operating such heavy vehicles would require thorough review and potentially modification of Caltrain track construction and maintenance standards.

Also, fuel cell technology would require extensive testing. *VTA and* SamTrans purchase*d* three fuel cell buses in 200*4*, *with* commence*ment of transit service in February 2005. This Zero-Emission Bus Demonstration Program purpose is to explore the feasibility of using fuel-cell technology buses in everyday mass transit service.* The fuel cell required to power a heavy locomotive pulling a six- to eight-passenger-car consist would be considerably larger and would require even more extensive testing prior to revenue service. This would delay the initiation of non-diesel Caltrain service for many years. *Furthermore, the fuel cell locomotive option would not accommodate future California HSR implementation in the Caltrain corridor*. Given the untested status of the fuel cells for use on Caltrain, the potential delays to the initiation of revenue service required for testing, the added research and development costs, and the unclear and unproven benefits of fuel cell operation in comparison with electricity, this propulsion option was withdrawn from further consideration.

2.4.3 DIRECT CENTER FEED POWER SYSTEM ARRANGEMENT

A Direct Center Feed (DCF) power system was evaluated in comparison with an Auto-Transformer Feed (ATF) system to identify the advantages and disadvantages for Caltrain operations. Key considerations in the evaluation included the number and costs, including capital, *O&M* costs of system facilities, and the electromagnetic field emissions and electromagnetic interference implications of the alternative arrangements.

A DCF power system would require the installation of *three* substations, spaced between 13 and 19 miles apart, compared to *two* for the ATF system. In addition, *two* switching station*s under a DCF system* would have to be located approximately halfway between the substations to provide separation between utility phases*. This compares to only one* switching station *for an ATF arrangement*. Moreover, pole-mounted 25-kV parallel feeders might be required at selected locations to keep system voltages from degrading below minimum operating levels. The DCF system would also require equipment for mitigation of EMF and EMI exposure and to alleviate increased rail-to-ground voltages.

These requirements *were compared with* the equipment needs for an ATF arrangement, which as noted in Section 2.3.2.*3,* Autotransformer Power Feed Arrangement, incorporates *'negative' feeder wires that act to* neutralize EMF and EMI emissions. *The costs for the DCF equipment is less than for the ATF system.* Finally, the DCF system has not been used in any recent commuter rail or *HSR* electrification program*s* in the United States or elsewhere around the world. In summary*, the DCF arrangement has been withdrawn from further consideration because of* potential impacts and costs for additional facilities and mitigation measures, *which* made *such a* system less *practical* than the ATF arrangement*. Further, the ATF arrangement was more practical due to the availability of 115kV adjacent to the Caltrain right-of-way.*

2.4.4 THIRD RAIL OR UNDERGROUND ELECTRIFICATION

Another type of electrical power distribution system considered for the Caltrain Electrification Program is a low-voltage *dc*, third-rail system, as used in the 1,000-volt *dc* BART system. This type of electrification *uses an electrified third rail at grade level along the entire railroad corridor instead of* overhead power distribution and contact system. There were two primary reasons why this type of power distribution system could not be used for the Caltrain Electrification Program. First, to ensure the safety of people, access to the rail corridor would have to be strictly controlled to prevent accidental contact with the electrified third rail. This would necessitate major reconfiguration of Caltrain facilities throughout the corridor and require that every crossing with local streets and other roadways be grade-separated to prevent contact of vehicles and pedestrians with the electrified third rail. This would add substantially to the costs of the Caltrain Electrification Program and potentially delay *electrification* for many years. An electrified third-rail system in the Caltrain corridor could cost on the order of several billion *dollars*. The likelihood of obtaining federal funding in the foreseeable future to complete such a project is remote.

The second reason was that a third-rail power distribution system would not be compatible with California *HSR* implementation in the Caltrain corridor*, since power collection using third-rail* *shoes is limited to 75- to 90-mph maximum speeds*. Another reason why the low-voltage *dc*, third-rail system is less desirable is that it would require a connection to *the utility power distribution network* every 1.5 to 2.0 miles *to supply power to* the *dc* traction power substations. This would increase costs, as well as impacts, to the surrounding communities.

Another option for implementation of underground electrification would be to lower the entire rail corridor, as was recently accomplished for the Alameda Corridor in *s*outhern California. This would require even more new construction, relocation of existing utilities, and grade separation of all of the cross streets tha*n* would be needed for an at-grade "third-rail" system. Such construction would have potentially severe business and residential right-of-way impacts at the new grade separations and take many years to construct.

Grade separating the Caltrain corridor is a JPB objective that would have substantial benefits in terms of reduced accidents and noise, since train operators would not need to sound their horns at the many grade crossings. But this is a costly, large-scale, long-term project that must be implemented incrementally. Constructing the Electrification Program as soon as funding permits will provide many years of electrified service while planning proceeds for future grade separations. Design of all electrification infrastructures will be closely coordinated with any planned grade separations to minimize "throw-away" work and reduce the amount of facility modifications that would be required to accommodate grade separations once the electrification infrastructure is in place.

In summary, the overhead electrification and contact system proposed for the Caltrain Electrification Program in the present study was deemed to be much more cost effective and can be implemented much more rapidly with fewer impacts. For these reasons, an electrified third-rail or underground electric power arrangement was withdrawn from further consideration.

2.4.5 BART Service in Caltrain Corridor

This alternative consists of extending BART service along the Caltrain corridor. BART currently provides service to Millbrae and has discussed plans to extend service south from Fremont through San Jose and into Santa Clara. The Millbrae BART station is located on the Caltrain alignment, and a planned Santa Clara station will be located on the Caltrain alignment. Hence, the natural question is why not simply extend BART between Millbrae and Santa Clara rather than improve Caltrain?

The idea of extending BART south along the Peninsula to San Jose has been studied several times in the past. Reasons for rejecting this alternative as discussed below in detail are due to: (1) its extremely high cost compared to incrementally upgrading Caltrain; (2) the fact that the Caltrain tracks would need to remain in place to provide rail freight service to Peninsula businesses even without passenger service; and (3) operating disadvantages of the BART system for long distance trips (e.g., the inability to operate express trains). Furthermore, current plans for building a statewide California High Speed Rail (HSR) system assume that high-speed trains would operate on the Caltrain corridor into San Francisco.

High Cost. Caltrain's current capital improvement plan, of which the Electrification Program is a major part, can be implemented gradually over the next 20 years in conjunction with the HSR

System. Conversely, implementing BART in the Caltrain corridor would require a huge one-time capital investment (BART is estimated to cost four to five times the cost per route mile for the Caltrain Electrification Program, including rolling stock acquisition). Furthermore, the project could probably not begin construction for decades given the environmental planning, engineering, and other major transit projects planned for the region.

Some people suggest that Caltrain electrification might preclude any investment to extend BART on the Peninsula. As described below, it is unlikely that standard railroad service (Caltrain, HSR, and freight) could be completely removed from the Caltrain corridor, and therefore most of the investment in Caltrain electrification would still be needed. Any improvements made as part of Caltrain's capital improvement program will be useful for many years in the future.

Right-of-Way Issues. The primary right-of-way issue for a BART Alternative involves the amount of land required to operate both BART and Caltrain express tracks. Caltrain currently operates on a mixed exclusive/non-exclusive right-of-way, while BART must operate on an exclusive right-of-way (since BART uses third rail power distribution). Given the need to maintain rail freight service on the Peninsula, even if a decision was made to eliminate Caltrain express service, at least one standard railroad track with passing sidings would need to be maintained in the corridor. Hence, a BART Alternative would require land for two commuter rail express tracks and two BART tracks between Santa Clara and Millbrae. The width of the Caltrain right-of-way varies along this segment. In some locations, there would be enough space available for both Caltrain and BART while in other areas additional right-of-way would need to be acquired. Since existing urban development generally lines the Caltrain corridor on both sides, acquiring right-of-way would be expensive and would greatly increase project impacts

Operating Issues. The first problem with the "BART Alternative" is to define it. In all cases the alternative would include constructing BART between Millbrae (MP 13.7) and Santa Clara (MP 44.7). Assuming that BART has already been constructed between Santa Clara and San Jose (MP 47.5), there would still be an on-going need to continue to offer diesel locomotive Caltrain service from San Jose Diridon Station south to Gilroy. It is also fair to assume that Caltrain would be required to continue operating commuter trains between Millbrae and San Francisco, since removing an important existing public transit service on this segment would likely be unacceptable for many reasons, including environmental justice (as the route serves some of San Francisco's most economically-depressed neighborhoods). Given this scenario, Caltrain would be called upon to operate commuter service on two segments of line separated by nearly 34 miles. This would create numerous operational problems and inefficiencies, as well as deteriorating service to customers by requiring them to transfer more often and eliminating express service. This operating scenario could also presumably require the electrification of Caltrain between Millbrae and San Francisco.

High Speed Rail. The California High Speed Rail Authority is developing plans for operating high speed trains from Los Angeles to San Francisco. A BART extension option would not accommodate future California HSR implementation in the Caltrain corridor as presented in the Strategic Plan. In November 2008, the state will vote on whether to provide funding for this project from general obligation bonds. The project is planned to include two express tracks and two commuter rail tracks (for existing Caltrain service) in the Peninsula alignment. Under the

BART Alternative, high speed rail trains could probably use the Caltrain commuter rail tracks, since both systems plan to use the same type of electrification, although passing tracks would be necessary in some locations to provide effective commuter and high speed express service. This would further increase right-of-way requirements, project costs, and impacts.

In summary, Caltrain electrification is part of an incremental series of rehabilitation and enhancement projects designed to build a world-class railroad. The purpose and need for electrification as defined in this document fit directly into this objective, helping to improve train performance, reduce noise, improve regional air quality, and modernize Caltrain. Electrification, as one element of Caltrain's Strategic Plan, meets this purpose and need in an efficient and effective manner. For all of these reasons, replacing Caltrain with BART service was rejected from further consideration.

2.4.6 LRT Service in Caltrain Corridor

This alternative consists of replacing Caltrain service with light-rail transit (LRT) service. LRT service is a popular type of public transportation best suited to relatively short distance travel. Replacing Caltrain service with LRT would have some of the same problems as replacing Caltrain with BART. Specifically, it would be extremely expensive, it would require major changes to Caltrain operations, it would interfere with HSR service, and it would not be ideally suited to longer distance trips because of its slower speed and lower capacity. LRT would be expensive because it would require replacing the entire Caltrain fleet with light-rail vehicles. It would require major changes to operations since light-rail vehicles cannot be operated on the same tracks simultaneously with standard railroad cars. This would interfere with freight operations and plans to operate other long-distance passenger trains (including service to Monterey or even Gilroy) on the line. The LRT service option also would not accommodate future California HSR implementation in the Caltrain corridor as presented in the Strategic Plan. Finally, it would not provide any meaningful advantage over electrified commuter rail service. Therefore, this alternative was rejected from further consideration.

2.4.7 San Jose to Gilroy Rail Corridor

The Caltrain Electrification Program originally included plans to electrify the segment between San Jose and Gilroy. Since this segment is owned by the UPRR and used for regular freight service (in addition to limited Caltrain and intercity service), an understanding between the UPRR and Caltrain must be reached in order to electrify the segment and increase Caltrain service. The VTA is currently discussing options for increasing service with the UPRR. These options include making capital improvements, trackage rights agreements, and right-of-way purchase. Negotiations between JPB, VTA, and UPRR are ongoing. Implementation of this potential future extension of electrification service is not expected within the time horizon (2035) of the primary electrification program, and it is not included within the plans for electrification documented in this EA/EIR. Once a conceptual plan for providing this service is developed to a point at which an estimated implementation schedule is available, it will be addressed in a separate environmental document.

Chapter 3: Environmental Setting and Consequences

CHAPTER 3: ENVIRONMENTAL SETTING AND CONSEQUENCES

This chapter presents information on the environmental setting in the project area, as well as the environmental consequences of the No-Electrification and Electrification Program Alternatives. Environmental issue categories are organized in alphabetical order, consistent with the CEQA checklist presented in Appendix A. The project study area encompasses the geographic area potentially most affected by the project. For most issues involving physical effects, this is the project "footprint," or the area that would be disturbed or replaced by the new project facilities. This area focuses on the Caltrain corridor from the San Francisco *4th* and King Station in the City and County of San Francisco to approximately *3* miles south of the Tamien Station in downtown San Jose in Santa Clara County, and *it* also includes the various locations proposed for traction power facilities and power connections. Air quality effects may be felt over a wider area.

3.1 AESTHETICS

3.1.1 SETTING

The visual or aesthetic environment in the Caltrain corridor is described to establish the baseline against which to compare changes resulting from construction of project facilities and the demolition or alteration of existing structures. This discussion focuses on representative locations along the railroad corridor, including existing stations (both modern and historic), tunnel portals, railroad overpasses, locations of the proposed traction power facilities and other areas where the Electrification Program would physically change above-ground features, affecting the visual appearance of the area and views *experienced* by area residents and users.

For purposes of this analysis, sensitive visual receptors are defined as corridor residents and business occupants, recreational users of parks and preserved natural areas, and students of schools in the vicinity of the proposed project. *Members of each of these groups could have views of the visual setting containing the proposed project over extended periods of time.* Scenic views are defined as long-range views towards preserved natural areas or recognized visual and/or historic landmarks. A visual change would be considered adverse if it introduced obtrusive elements substantially out of character with existing land uses or substantially obscured a scenic view or vista available to sensitive receptors in the vicinity of the proposed project features.

3.1.1.1 Visual Character of Caltrain Corridor

Existing transportation facilities, including railroad tracks, ancillary structures, area freeways and roadways, are the dominant visual elements along the existing Caltrain corridor. Towards the northern end of the Caltrain route, adjacent uses are primarily industrial in character, there is little natural landscaping, and there are no views or vistas of interest. Moving southward down the Peninsula, there is a greater variety of adjacent land uses, including residential and natural landscaping; however, rail facilities continue to dominate the visual environment of the corridor. Several schools and parks abut the railroad at various locations along the project corridor.

3.1.1.2 Representative Corridor Locations Possessing Sensitive Visual Receptors or Offering Scenic Views

The locations described below were selected because they are representative of the numerous Caltrain corridor locations that are proximate to sensitive visual receptors. Visual simulations of *these* locations *showing* the proposed electrification facilities of the Electrification Program Alternative are discussed in Section 3.1.2.2.

Bayshore Station. The existing visual quality of the Bayshore Station area is primarily characterized by the railroad corridor and the industrial land uses surrounding it. The former Schlage Lock Factory (now vacant) is located on the western side of the railroad tracks across from the station platform. Residents on the hill above and northwest of the station currently have views of the railroad right-of-way. *The area surrounding the station is part of a large scale redevelopment plan known as Visitacion Valley Redevelopment Project.*

Downtown San Bruno. Businesses in Downtown San Bruno have northerly views toward the railroad corridor and San Bruno Avenue grade crossing. Visual elements in the immediate vicinity of the grade crossing include the railroad and ancillary structures, an elevated parking structure and street lighting electroliers. Distant views of the hills from downtown are currently available. *Plans are underway to provide a grade separation with an elevated structure over San Bruno and San Mateo Avenues; these plans are not part of this project. This may interrupt distant views of the hills.*

San Carlos Station. The San Carlos Station has historically been visually important due to the quality of its architecture. In 1999, the existing at-grade railroad tracks were raised approximately 15 feet, resulting in the rail alignment no longer being at-grade with the station. The elevated rail alignment with its embankment, fencing, lighting, and passenger shelters, now dominates the view of the station from proximate San Carlos streets and businesses. The primary view of the station for passengers leaving the train at San Carlos is of the historic station roof.

Redwood Junction. The Redwood "Wye" Junction is located north of the City of Atherton in the railroad corridor. An adjacent residential area is currently separated from the railroad right-of-way by a cyclone fence. Views of the railroad corridor are primarily from the street and sidewalk areas of the neighborhood. Existing utility wires and poles are located along the street next to the railroad.

Atherton. The aesthetic setting of the railroad corridor in Atherton is characterized by the spacious homes and mature landscaping in the neighborhood that surrounds it. The historic Atherton depot reflects the high visual quality of the surrounding residential area. Existing residences abut the railroad right-of-way, although backyard fences and mature vegetation currently obscure most views of the corridor.

San Antonio. Residents in multi-story apartments located across the street from the San Antonio Station currently have views of the at-grade station platform. The station, as viewed from these residences, is characterized by railroad and ancillary structures, street utilities, and minimal landscaping. Beyond the station platform, mature trees and landscaping are visible. Passengers on the San Antonio Station platform have views of the railroad corridor and roadway overcrossing at this location.

South San Jose. Segments of the railroad right-of-way in southern San Jose are constructed on an elevated embankment. Existing views from residential areas in the vicinity of the corridor in these locations are dominated by the elevated railroad right-of-way.

3.1.2 IMPACTS

Physical changes attributable to the Caltrain Electrification Program that would cause changes to views currently experienced by residents and other users of the area are described in this section. Mitigation measures to minimize visual effects are described in Section 3.1.3.

3.1.2.1 No-Electrification Alternative

Under the No-Electrification Alternative, the Caltrain system would be rehabilitated *through the State of Good Repair (SOGR) Program over time* within the existing JPB or UPRR-owned right-of-way. *Diesel-powered train consists would continue to operate along the entire corridor.* No major adverse changes to existing visual quality are anticipated because the modifications would consist of *rehabilitation to the existing system such as long-term repairs, reconstruction, and modernization of the existing tracks, signals, bridges, stations, diesel rolling stock and other systems*. These types of modifications would be consistent with the current aesthetic quality of the existing railroad corridor, although there would be temporary disruptions causing visual impacts during *the rehabilitation work. Unlike the Electrification Program Alternative, t*here would be no OCS poles and wires or other electrification facilities off the right-of-way.

3.1.2.2 Electrification Program Alternative

Under the Electrification Program Alternative, physical changes would occur where electrification facilities, including the OCS poles and wires, and traction power facilities are proposed. Trees and mature vegetation *that lean or hang over or into the Caltrain right-of-way and create a potential hazard to safe electrified train operations* would be trimmed back to enable placement, operation, and maintenance of the poles and wires. These physical changes would alter views from residential or business areas in various locations along the corridor.

Overhead Contact System. OCS poles and wires would be introduced throughout the existing rail corridor from San Francisco to *San Jose*. In general, the introduction of OCS poles and wires within an existing railroad corridor would not constitute a substantial adverse visual change; these types of facilities are consistent with the existing visual quality of the active commuter and freight rail corridor. *In addition, poles and wires have been an integral component of the visual landscape for railway transportation uses in existence for more than*

*100 years; one example in the region is the San Francisco Cable Cars still in use today. Some r*esidents or business occupants *accustomed to the existing Caltrain corridor,* however, may consider these visual effects adverse. The new OCS infrastructure would be more or less visible from corridor residences and businesses, depending on the visual screening between the rail corridor and adjacent land uses, and on the profile of the rail corridor relative to these uses.

Trees and other mature vegetation *that hang or lean over or into the railroad right-of-way, creating a potential hazard for safe electrified train operations* would be *trimmed* to enable placement *and operation* of electrification poles and wires along the edge of the Caltrain right-of-way. *To comply with CPUC requirements, necessary* vertical and horizontal clearances would need to be maintained from surrounding vegetation to ensure safe operation and regular maintenance of the electrical wires. *This would result in trees and vegetation being trimmed approximately 10 feet behind the OCS poles. T*ree trimming would occur on the railroad right-of-way side of the corridor, which would lessen visual effects for residences and businesses adjacent to the Caltrain right-of-way. In residential areas along the corridor where the existing foliage is dense, tree trimming would be less noticeable *from private property viewpoints. Figure 3.1-1 depicts a before and after simulation of tree trimming in the Atherton area of the corridor where there is existing dense vegetation. As shown, tree trimming of dense foliage would be less noticeable from outside the rail right-of-way*. In areas of sparse vegetation where the existing right-of-way is already visible, the addition of poles and wires would be more evident. *Figure 3.1-2 depicts tree trimming before and after simulations in the Burlingame area of the corridor, an area with existing sparse vegetation. As shown, the OCS poles and wires would typically be more noticeable in these types of areas. JPB would trim trees only insofar as necessary to provide the required safety envelope. No removal of trees on private property is contemplated. See Section 3.4.2, Biological Resources Impacts, for details regarding tree trimming.*

Traction Power Facilities

The auto-transformer power feed system proposed for the Electrification Program Alternative would require ten traction power facilities along the Caltrain corridor (see Figures 2.3-6 to 2.3-18 for locations of these facilities). Two traction power substations (TPS) approximately 150 by 200 feet in dimension would be required (see Figure 2.3-17 for the typical configuration of this type of facility). Seven paralleling stations (PS) approximately 40 by 80 feet in dimension (see Figure 2.3-19 for the typical configuration of this type of facility), and one switching station (SWS) approximately 80 by 160 feet in dimension are also required (see Figure 2.3-20 for the typical configuration of this type of facility).

To the extent possible, the proposed facility locations are within existing rail right-of-way and away from residential and natural areas. No proposed facilities are located within or near identified scenic views or recognized visual or historic landmarks. Four of the proposed traction power facilities are located in areas where the Caltrain corridor is surrounded by industrial and/or commercial uses. The proposed facilities are consistent with the existing

Figure 3.1-1
TREE TRIMMING SIMULATION IN ATHERTON AREA
CALTRAIN ELECTRIFICATION PROGRAM

Figure 3.1-2
TREE TRIMMING SIMULATION IN BURLINGAME AREA
CALTRAIN ELECTRIFICATION PROGRAM

visual quality of the active commuter and freight rail corridor, are not expected to introduce an obtrusive element to the surrounding viewshed, and are not expected to alter the character of surrounding land uses; therefore, no adverse visual effects are expected at these proposed facility locations.

Six of the proposed traction power facility sites are located in areas with residential uses; corridor residents in the areas are considered especially sensitive to changes in their visual environment. Four of the six proposed traction power facility sites (PS2, PS3, SWS1, and PS6) are located within rail right-of way and in areas with mixed land uses, including residential, commercial, and/or industrial; views of the proposed sites include adjacent commercial or industrial uses and existing railway facilities. Figure 3.1-3 depicts a before and after, and after with proposed mitigation simulation of PS3 from the Burlingame neighborhood located west of the corridor; the simulation is representative of views of the four proposed facility sites located in mixed land use areas. The presence of existing railway facilities and commercial and industrial uses already establish the rail/industrial visual character; therefore, the introduction of the proposed facility would not substantially alter views from the neighborhood, and would reduce its visual effects and not be considered adverse. However, screening elements such as trees and bushes are proposed to further reduce its visual effect on views from the neighborhood (screening elements are depicted in Figure 3.1-3). The remaining two facilities (PS5 and PS7), also located within rail right-of-way, are expected to be visible from nearby residences. PS5 is located in close proximity to the residential neighborhood located across Alma Street; Figure 3.1-4 is a before and after, and after with proposed mitigation simulation of neighborhood views of PS5. The current views do not include associated rail facilities and will require tree removal; this effect on views in the area is expected to be adverse, and replacement landscaping (as simulated in Figure 3.1-4) should be considered to reduce this effect to an acceptable level. PS7 is located below a residential neighborhood located on Communication Hill; existing views include associated rail facilities. The topography of the surrounding land and the distance of views to the proposed facility and existing railway facilities are expected to reduce the obtrusion of PS7 on views from the adjacent residential neighborhood to less than significant.

Stations

There are 27 railway stations along the approximately 51-mile corridor of the Electrification Program Alternative. These stations stretch south from the 4th and King Station in San Francisco to the Tamien Station in downtown San Jose (see Figure 1.2-1 for station locations). The stations and their platforms are train boarding and disembarking areas for Caltrain users. Caltrain riders passing through stations and station users are considered to be very familiar with a station's existing visual environment and therefore sensitive to any adverse changes to the visual environment.

The Electrification Program Alternative proposes to introduce OCS poles and wires within the rail right-of-way along the entire corridor, including through all 27 station areas (see Figures 2.3-1 through 2.3-5 for typical OCS arrangements). This action would result in visual changes at each of the stations. Placement of OCS poles and wires would avoid the

Figure 3.1-3
VIEW FROM NEIGHBORHOOD TO PARALLELING STATION 3 (PS-3)
CALTRAIN ELECTRIFICATION PROGRAM

Figure 3.1-4
VIEW FROM NEIGHBORHOOD TO PARALLELING STATION 5 (PS-5)
CALTRAIN ELECTRIFICATION PROGRAM

station structures and be placed as far away as possible from the stations. OCS poles may be spaced up to 230 feet apart on straight sections of the track, which will reduce the cluttered appearance of numerous poles within station areas. The particular type of OCS support (see Figures 2.3-1 to 2.3-5) would be chosen to further minimize the visual effects at station areas. Seven Caltrain station properties have heightened sensitivity to visual changes due to their historic status (including some stations listed in the National Register of Historic Places [NRHP]): Millbrae, Burlingame, San Carlos, Menlo Park, Palo Alto, Santa Clara, and Diridon (San Jose). An adverse effect to an historic property 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" (36 Code of Federal Regulations [CFR] 800.5(a)). The introduction of OCS poles and wires will not directly affect an historic resource; therefore, the consideration of effects primarily focuses on integrity considerations of setting and feeling; visual effects fall into these categories. Visual simulations at the San Carlos and Diridon stations are depicted in Figures 3.1-5 and 3.1-6, respectively. Qualified architectural historians have determined that the placement of OCS poles near existing historic stations will have no adverse effect to properties that are listed in or qualify for listing in the NRHP. See 3.5 Cultural Resources, for a detailed discussion of effects at each historic station. With the above-mentioned measures on placement and OCS support-type integrated into project design, the introduction of OCS poles and wires in station areas are not expected to significantly alter the visual experience of station users, and therefore would not have an adverse visual effect to historic and non-historic stations.

No traction power facilities are planned directly adjacent to station areas where the facility would obtrude or interrupt existing views from station platforms; therefore, no visual effects on stations by traction power facilities are expected.

Visual simulations were *also* prepared of the proposed OCS and traction power facilities in the representative locations previously described to provide more context-specific evaluation of the aesthetic impacts of the new facilities, as presented in the following paragraphs.

Bayshore Station. Figure 3.1-*7* is representative of a location along the railroad corridor where the Electrification Program Alternative facilities would be visible from both the station area platform and surrounding residential areas. Existing views from the Bayshore Station platform of the former Schlage Lock Factory (now vacant) would be modified due to construction of the proposed paralleling station (PS2). *The area surrounding the station is part of a large scale redevelopment area known as Visitacion Valley Redvelopment Project.* Residential areas located on the hill beyond the station to the northwest would also experience visual changes as a result of construction of the paralleling station, as well as of the OCS poles and wires.

The close-range visual changes would be consistent with the visual quality of the existing railroad corridor and surrounding industrial land uses. The views from residential areas are at

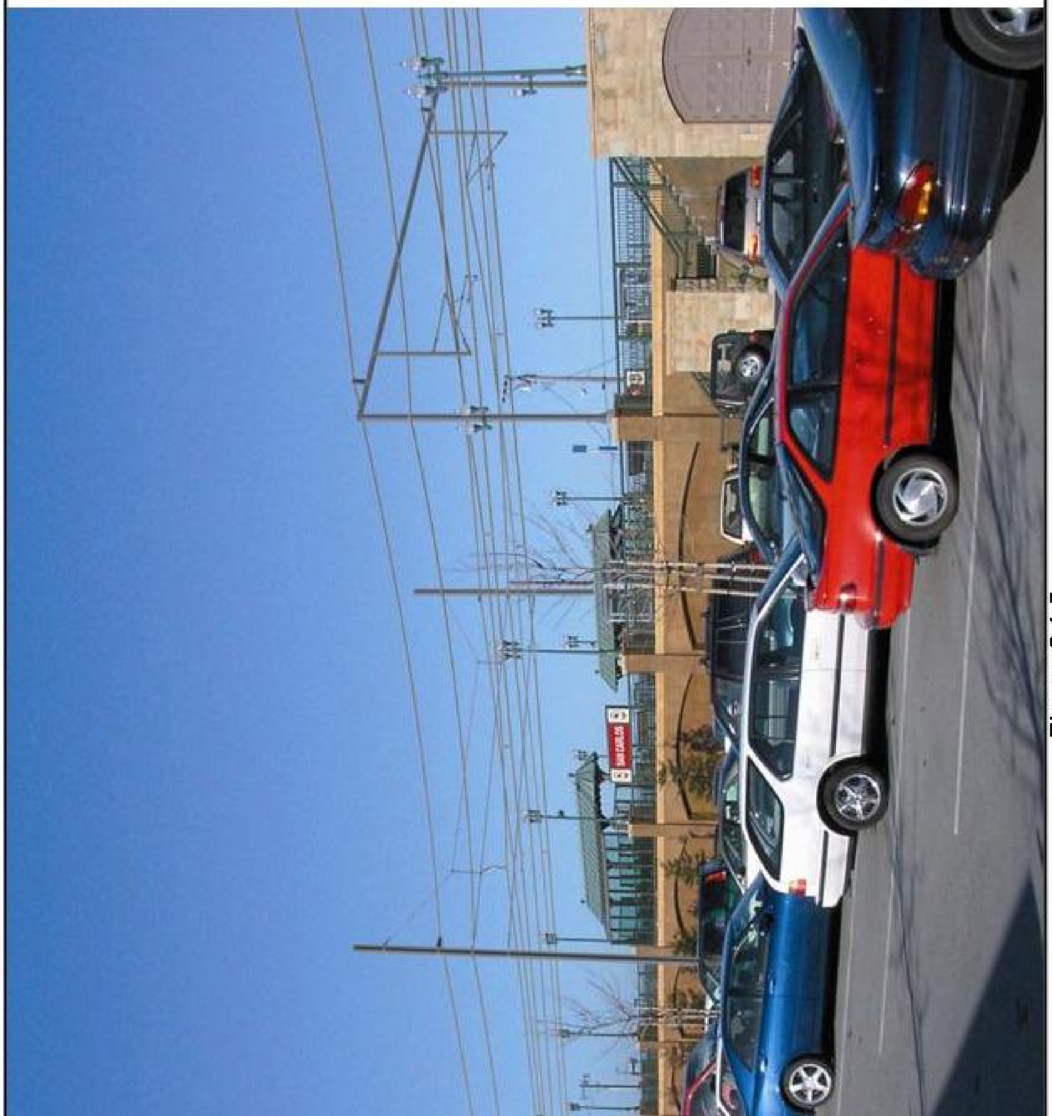

Figure 3.1-5
VIEW TO SAN CARLOS STATION PLATFORM
WITH OCS SYSTEM, HEADSPAN AND PORTAL ARRANGEMENT
CALTRAIN ELECTRIFICATION PROGRAM

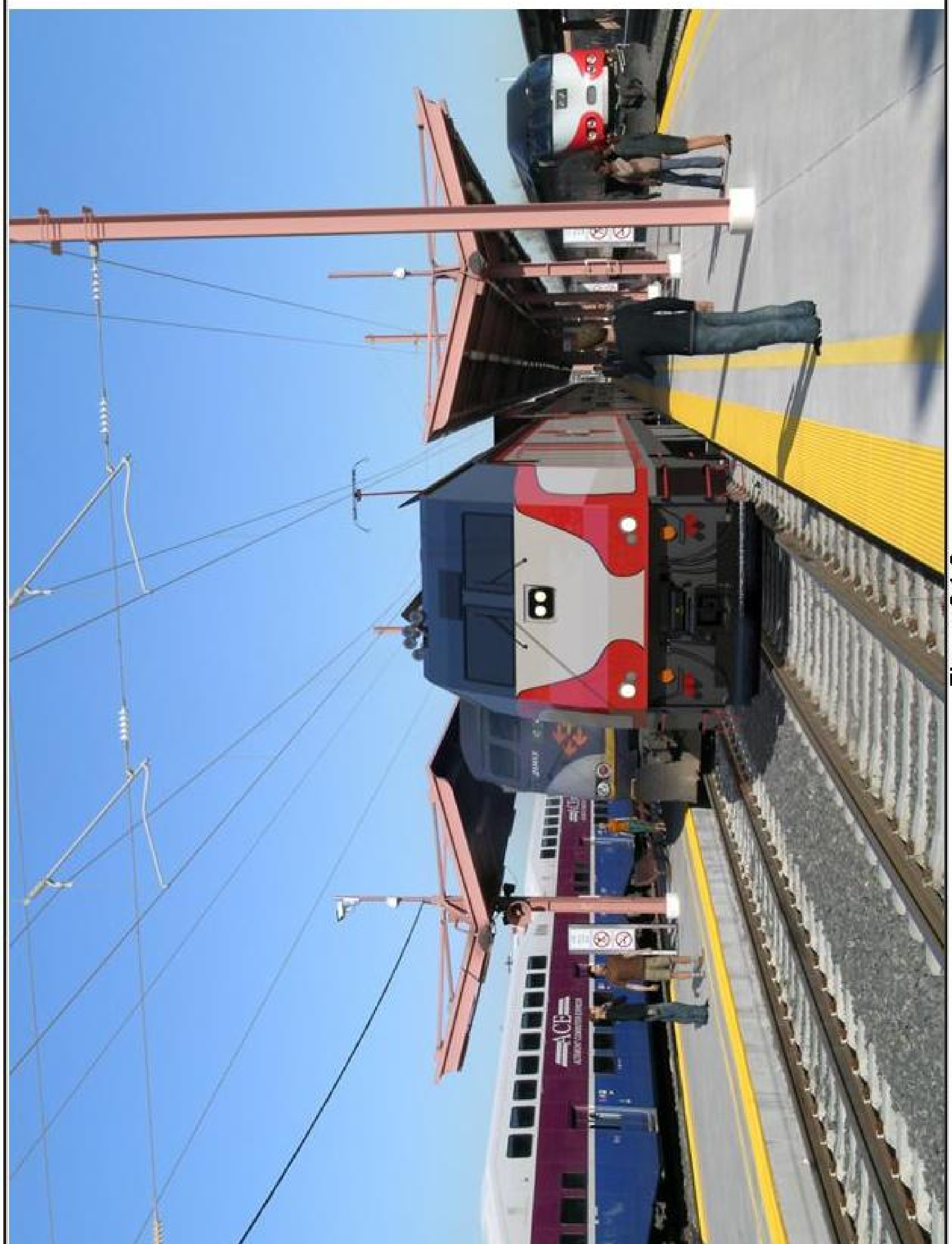

Figure 3.1-6
VIEW TO DIRIDON (SAN JOSE) STATION PLATFORM
WITH OCS SYSTEM AND HEADSPAN
CALTRAIN ELECTRIFICATION PROGRAM

Figure 3.1-7
VIEW OF PARALLELING STATION 2 (PS-2)
CALTRAIN ELECTRIFICATION PROGRAM

a greater distance and from above, so that the power facilities would be subordinate to other elements in the viewscape. The aesthetic impact would therefore not be substantially adverse.

Downtown San Bruno. Existing views toward the railroad corridor in downtown San Bruno would be changed due to *construction of the proposed San Bruno grade separation project (not a part of the Electrification Program Alternative), and the OCS. The OCS* poles and overhead wires would be *highly* visible in comparison with street-*level* lighting electroliers, and *they would be at or above the level of the* elevated parking structure at this location.*Figure 3.1-5, which shows the elevated San Carlos Station with added OCS infrastructure, gives an approximation of the visual effect.* These changes would constitute a noticeable visual impact, but it would not be substantially adverse in *the* context of existing conditions. A headspan OCS configuration, using taller poles and spanning the railroad tracks with only wires is proposed for this vicinity to reduce visual effects. *OCS designs would be carefully coordinated with the design plans for the grade separation project.*

San Carlos Station. Catenary facilities proposed at the San Carlos Station include both a headspan and a portal arrangement, as shown in Figure 3.1-*5*. Poles would be constructed above the historic station on the modern elevated embankment. None would be placed directly in front of the historic station building. The OCS poles and wires would add new vertical structures similar to the existing light electroliers. These facilities would cause a physical change affecting views of the station, but the effect is minor in comparison with the other numerous railroad facilities already in the view and the dominance of the elevated railroad embankment. The electrification facilities would therefore not result in a substantial adverse visual impact.

Redwood Junction. Figure 3.1-*8* simulates the proposed electrification facilities at the Redwood "Wye" Junction as viewed from the adjacent residential area. Existing views are dominated by the railroad corridor, which is on an embankment and can be seen clearly through the cyclone fencing. Utility poles and wires are also clearly evident from the surrounding neighborhood. The electrification poles and wires would add to the visual clutter, but these types of facilities are not inconsistent with the existing aesthetic quality of the view at this location. *The SWS1 facility located across the tracks is similar to the existing surrounding facilities; its distance from the residential area and the presence of existing railway facilities reduces the visual impact to less than significant.* Thus, the visual impact *of the project in this area of the corridor* would not constitute a substantial adverse change. A headspan OCS configuration is proposed also at this location to minimize visual effects.

Atherton. Proposed catenary wires at the Fair Oaks grade crossing as viewed from the Atherton Station are shown in Figure 3.1-*9*. As illustrated, the OCS poles and wires would be largely obscured by the *dense* landscaping *and vegetation*, thereby minimizing visual effects. The trees would be trimmed to provide for construction, operation, and maintenance of the *OCS*; *see Section 3.4.2, Biological Resources Impacts, for details regarding trimming of trees*. Because the existing vegetation is so dense and the trimming would be from the railroad right-of-way side, considerable screening would still remain between the residences

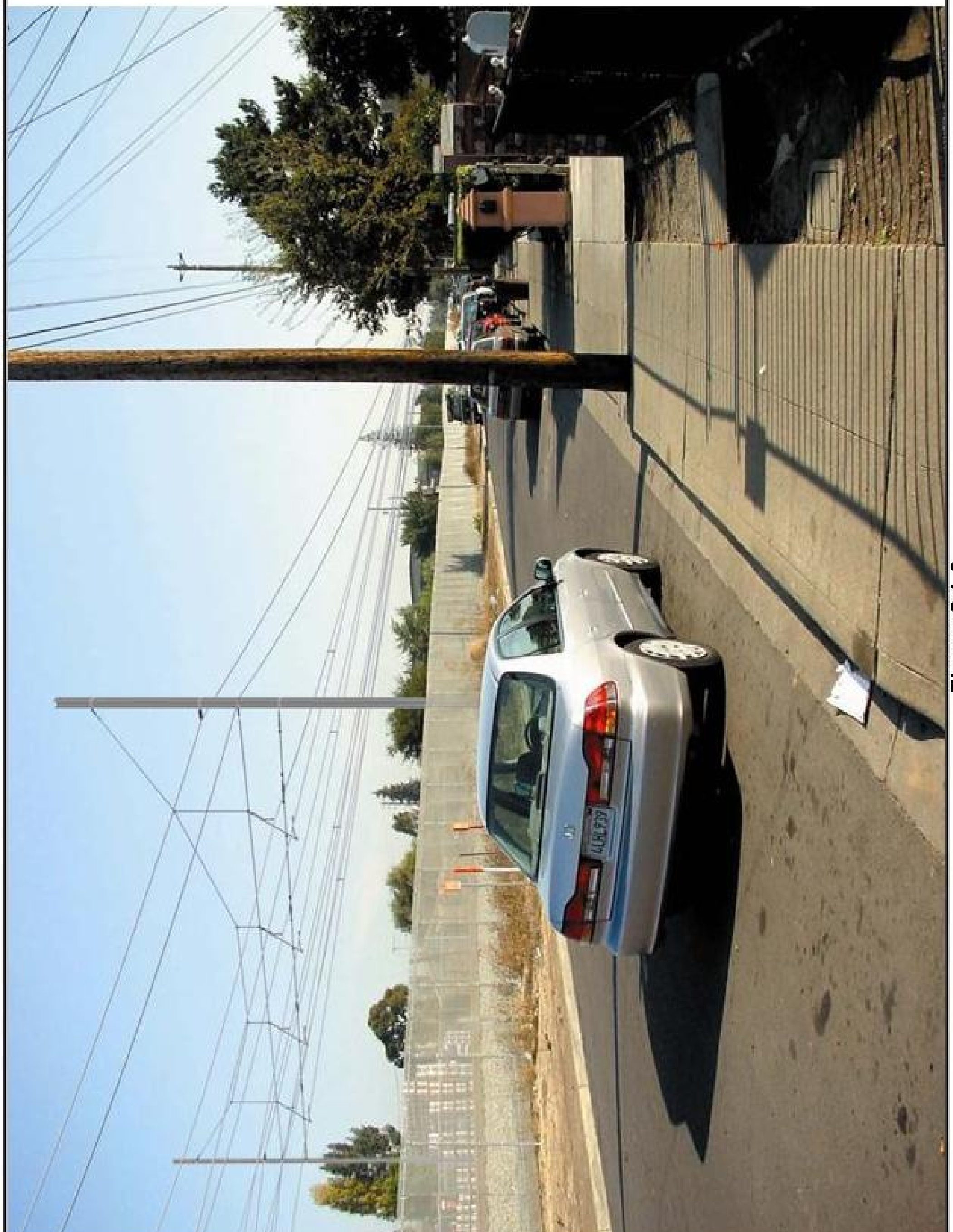

Figure 3.1-8
VIEW TO REDWOOD "WYE" JUNCTION FROM RESIDENTIAL AREA
WITH OCS SYSTEM AND HEADSPAN
CALTRAIN ELECTRIFICATION PROGRAM

Figure 3.1-9
VIEW FROM ATHERTON STATION TO FAIR OAKS GRADE CROSSING
WITH OCS SYSTEM
CALTRAIN ELECTRIFICATION PROGRAM

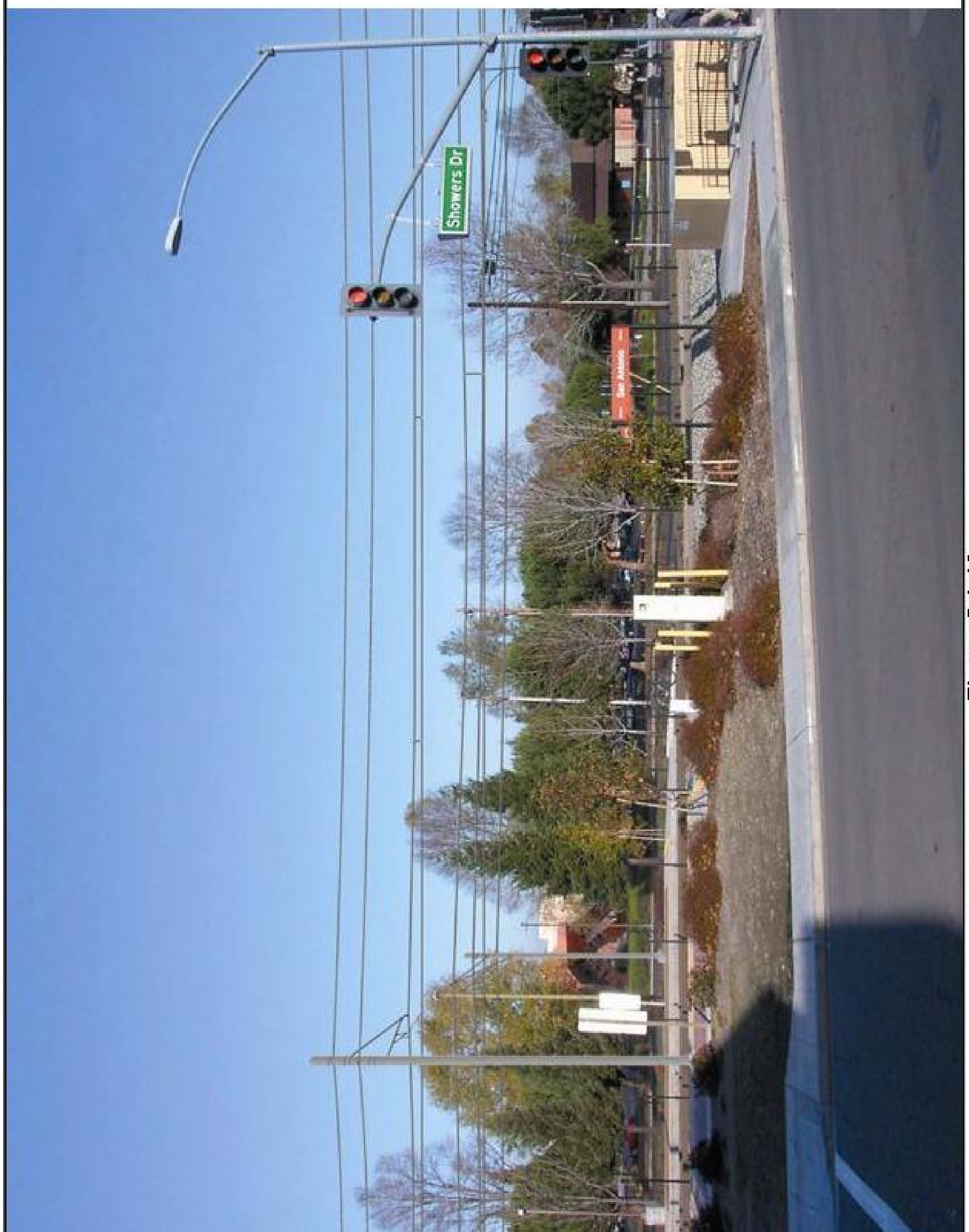

Figure 3.1-10
VIEW FROM MULTI-STORY APARTMENT BUILDING TO SAN ANTONIO STATION WITH OCS SYSTEM AND SIDE POLE CONSTRUCTION
CALTRAIN ELECTRIFICATION PROGRAM

and the rail corridor. This would make the OCS infrastructure less noticeable from the station or adjacent neighborhood. There would be a visual effect, *but it would not be substantially adverse.*

San Antonio. Figure 3.1-*10* shows a proposed side-pole cantilever OCS pole configuration at *the* San Antonio Station as viewed from a nearby multi-story apartment building. These OCS facilities would be clearly visible, given that the existing large trees at the site are all on the opposite side of the railroad corridor. These visual changes may be perceived as increasing clutter by residents in close proximity of the station, but they are not inconsistent with the existing railroad corridor, ancillary structures, and street lighting electroliers, nor would they obscure an existing scenic view. The landscaping within and beyond the station area would remain visible to residents. All-in-all, this visual change, although somewhat adverse, would not be substantial.

South San Jose. *An elevated segment of the railroad corridor with the proposed side-pole cantilever OCS configuration, as viewed from a south San Jose residential area, is simulated on Figure 3.1-11. The poles would both be placed within the embankment of the railroad overhead and attached to the railroad structure crossing Prevost Street. Large trees help to screen the view of the railroad corridor from residences at this location, which presents a variety of ancillary facilities, including both a concrete and a landscaped crib retaining wall alongside the railroad embankment, a drainage pipe emerging from the embankment, chain-link fencing along the railroad right-of-way, telephone poles, and street signs. Placement of the OCS poles and wires would result in visual changes at this location, but it would not substantially alter the existing character of the view of the railroad corridor as viewed from adjacent residences.*

Overbridge Protection Barriers. Overbridge protection barriers are proposed on various roadway bridges that cross over the Caltrain alignment. These barriers are designed to prevent objects from being dropped or thrown onto the electrification wires. As described in Section 2.3.2.4, the overbridge protection barriers would be 6.5 feet high and placed along the outside edge of the bridge parapet. The overbridge protection barriers would range from 35 to 80 feet in length, depending on the number of tracks in that segment of the alignment. Figure 3.1-*12* simulates a typical overbridge protection barrier constructed from a semi-transparent wire mesh, as viewed from the San Antonio station platform. The tight wire mesh fabric is proposed for use rather than solid materials to achieve the best balance between safety and aesthetic considerations. The transparency lightens up the barrier when viewed at a distance and provides a sense of openness to the passing motorist. The same barrier, as viewed from the roadway above the station platform, is shown on Figure 3.1-*13*. These barriers would be added to existing highway infrastructure that dominates the surrounding views and would therefore not constitute a substantially adverse effect on views of the roadway facilities. The wire mesh fabric is designed to preserve views beyond the barrier for passing motorists and thus would also not constitute a substantially adverse effect on views from the roadway.

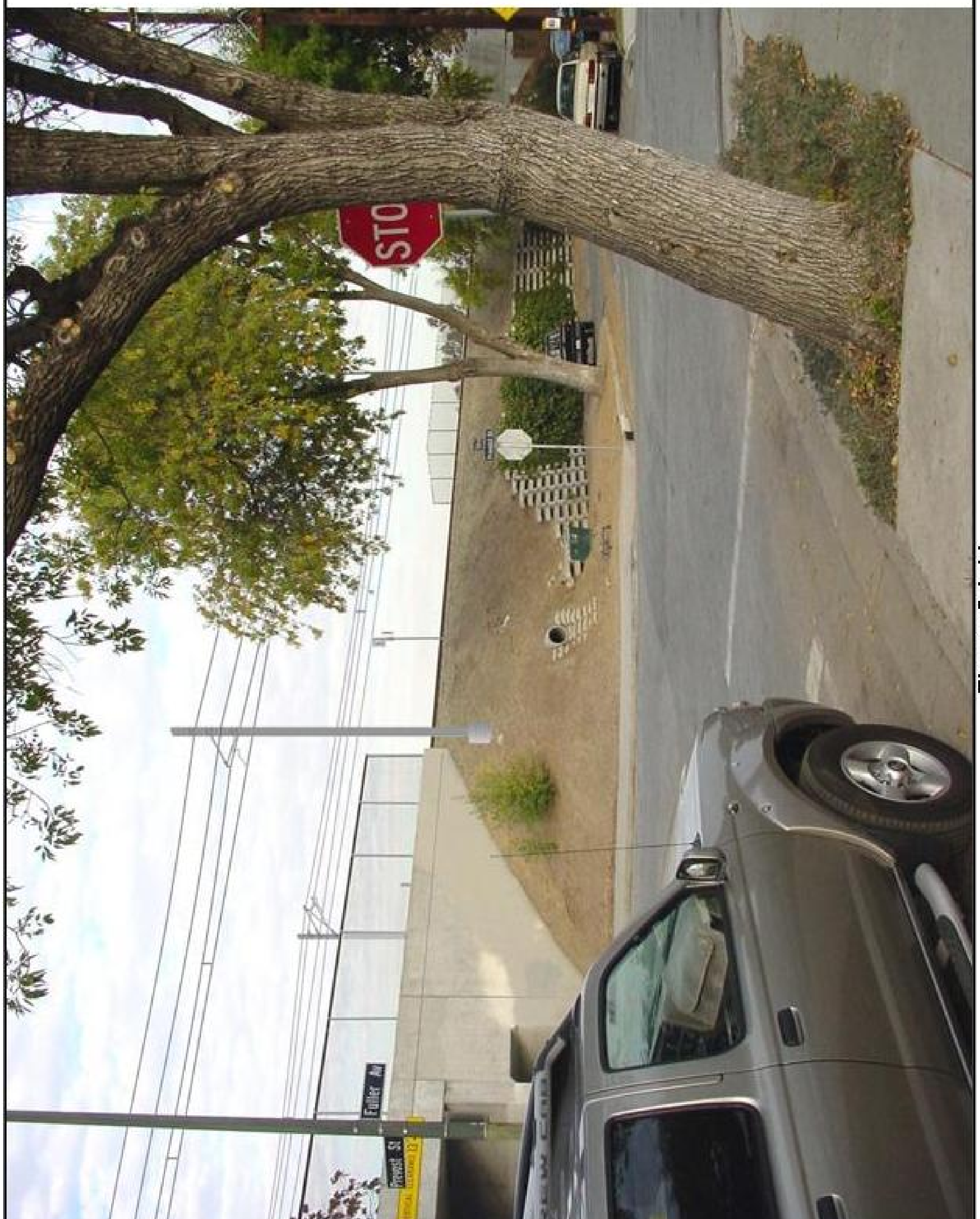

Figure 3.1-11
VIEW FROM SOUTH SAN JOSE RESIDENTIAL AREA
TO ELEVATED RAILROAD CORRIDOR WITH OCS SYSTEM AND SIDE POLE CONSTRUCTION
CALTRAIN ELECTRIFICATION PROGRAM

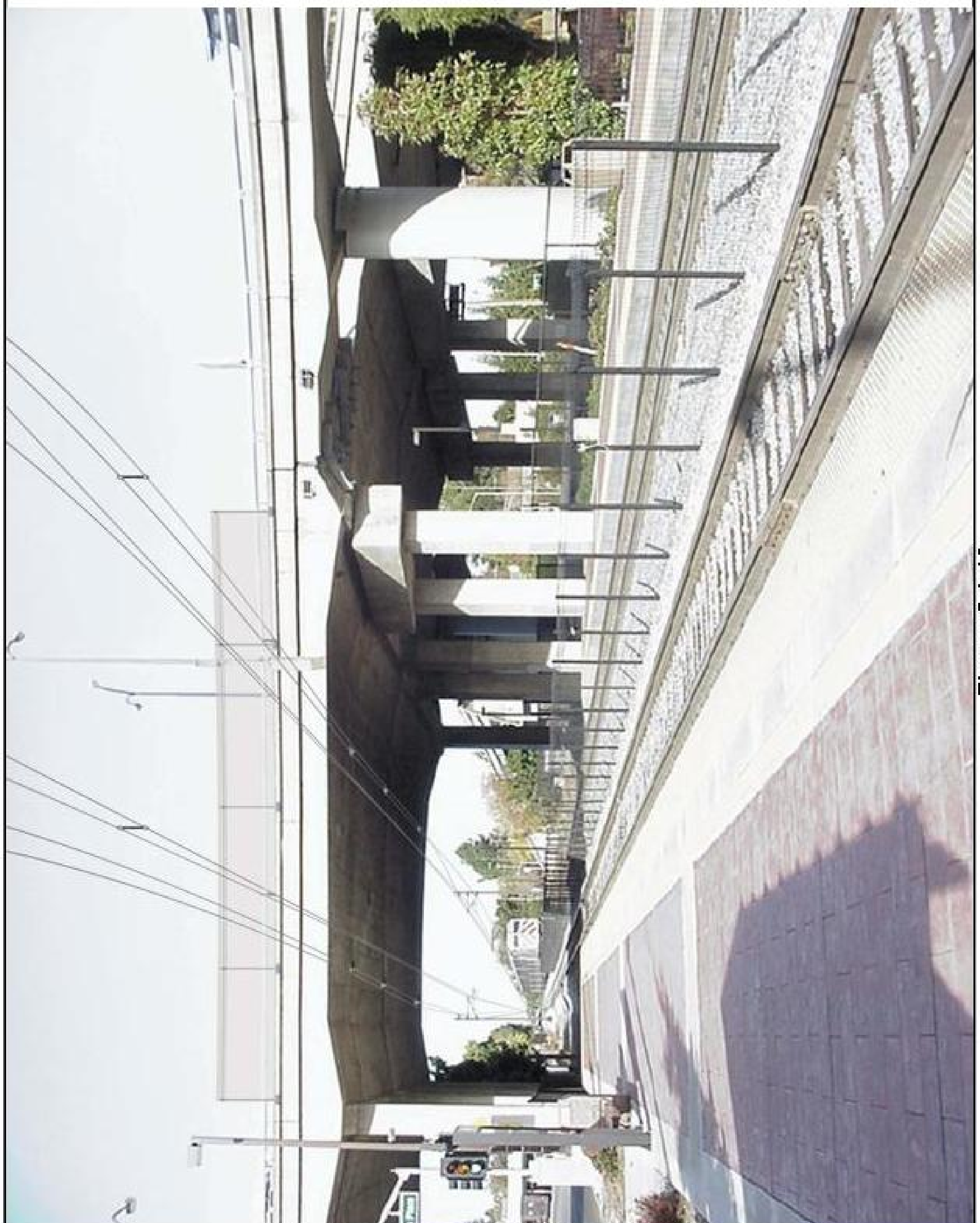

Figure 3.1-12
VIEW FROM SAN ANTONIO STATION PLATFORM
TO OVERBRIDGE PROTECTION BARRIER
CALTRAIN ELECTRIFICATION PROGRAM

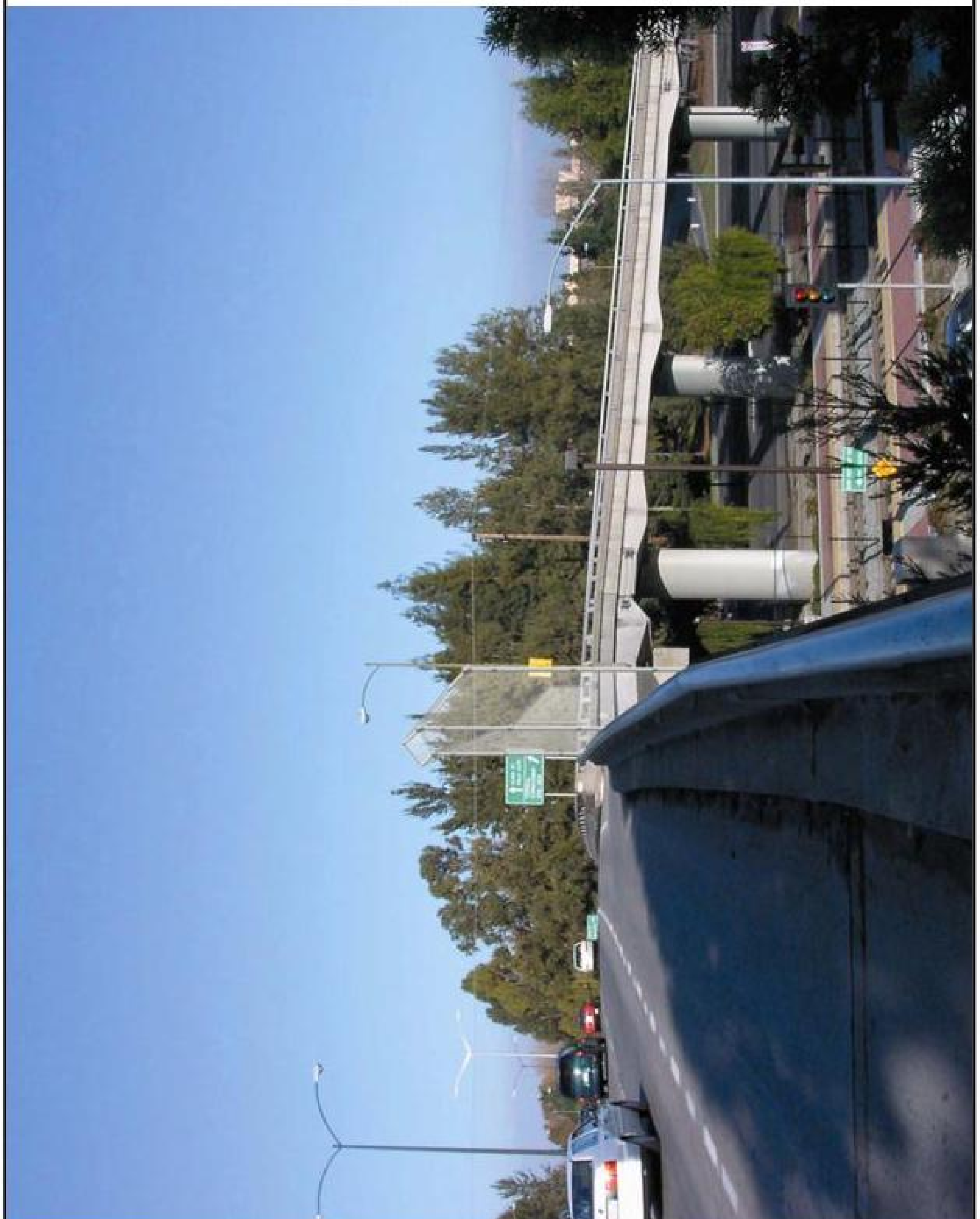

Figure 3.1-13
VIEW FROM ROADWAY TO OVERBRIDGE PROTECTION BARRIER
CALTRAIN ELECTRIFICATION PROGRAM

3.1.3 MITIGATION

Measures to mitigate visual impacts will be incorporated into *the* project design insofar as feasible. *Minimally-sized* side-poles *and* cantilever OCS construction will be implemented where practical. Headspan OCS configurations, rather than *portal beams*, will be used to lighten the overhead elements in areas sensitive to increasing visual clutter. This applies to all historic station areas. *In historic station areas pole placement and wire arrangement will be designed to minimize impacts to the extent possible, and coordinated with the BART Santa Clara Project. The* JPB will *ensure the project's final design* minimizes visual effects *to the extent possible*. These may include aesthetic measures such as landscaping *to screen views of facilities and* tapering *of catenary* poles to blend into the surrounding environment.

Because clearance requirements for safe electrified railroad operations limit the potential for replacement landscaping along the Caltrain right-of-way, *the* JPB will attempt to maintain existing visual screening such as windrow trees and other mature vegetation, insofar as possible, consistent with safe electrified train *O&M*. The feasibility of landscaping mitigation will be considered in the context of required safety clearances from the poles, wires *and electrical facilities*. If trees not on Caltrain right-of-way are damaged or must be removed as a result of trimming undertaken by *the* JPB for placement of OCS *or TPS equipment and* facilities, replacement will be considered *on an individual basis. Such replacement will be planned* in coordination with local property owners *and the appropriate city and county urban foresters for activities within their jurisdictions*. *Consistent with Executive Order 13112 on invasive species, the JPB will consider replacement with native plant and tree species insofar as it is practicable.* No adverse impacts to heritage or significant trees are anticipated. Mitigation measures to be implemented must comply with *CPUC* safety clearance requirements. *These measures will be included in the Vegetation Management Plan, which is discussed in Section 3.4.3 Biological Resources Mitigation.*

The JPB will control potential light and glare by directing lighting associated with proposed traction power facilities onto the premises of each facility.

3.2 AGRICULTURAL RESOURCES

3.2.1 *SETTING*

Existing land uses along the currently proposed Caltrain electrification corridor are primarily urban, as described in Section 3.9, Land Use and Planning; agricultural resources do not exist within the Caltrain project corridor area of potential effect (APE).

3.2.2 *IMPACTS*

The No-Electrification and Electrification Program Alternatives would not have any direct or indirect impacts on agricultural resources. Hence, there would be no effect on agricultural resources due to the proposed action.

3.2.3 *MITIGATION*

Adverse agricultural resource impacts would not occur due to the proposed action; therefore, no mitigation is required.

3.3 AIR QUALITY

This section addresses the impacts of the proposed Caltrain Electrification Program on Caltrain corridor and Bay region air quality. Air pollutants of concern include ozone *(O_3)*, carbon monoxide *(CO), inhalable* particulate matter *($PM_{2.5}$ and PM_{10})*, and oxides of nitrogen *(NO_X)*. This section reports the type and quantity of emissions that would be generated by the operation of the proposed Electrification Program Alternative and compares those emissions to those of the No-Electrification Alternative, which involves the continued use of diesel electric locomotives.

3.3.1 SETTING

Air quality is affected by both the rate and location of pollutant emissions and by meteorological conditions that influence movement and dispersal of pollutants. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, along with local topography, provide the link between air pollutant emissions and air quality. The following subsections discuss the air pollution potential of the two climatological subregions within which Caltrain operates, applicable air quality regulations, and existing air quality.

3.3.1.1 Climatological Subregions

Peninsula Subregion. The Peninsula Subregion extends from northwest of San Jose to the Golden Gate. The Santa Cruz Mountains run up the center of the Peninsula, with elevations exceeding 2,000 feet at the southern end and decreasing to 500 feet in South San Francisco. Coastal towns experience a high incidence of cool, foggy weather in the summer. Cities in the southeastern Peninsula experience warmer temperatures and fewer foggy days because the marine layer is blocked by the ridgeline to the west. San Francisco lies at the northern end of the Peninsula. Because most of San Francisco's topography is below 200 feet, marine air is able to flow easily across most of the city, making its climate cool and windy.

The blocking effect of the Santa Cruz Mountains results in variations in summertime maximum temperatures in different parts of the Peninsula. For example, in coastal areas and San Francisco the mean maximum summer temperatures are in the mid-60s, while in Redwood City the mean maximum summer temperatures are in the low-80s. Mean minimum temperatures during the winter months are in the high-30s to low-40s in the eastern side of the Peninsula.

Air pollution potential is highest along the southeastern portion of the Peninsula. This is the area most protected from the high winds and fog of the marine layer. Pollutant transport from upwind sites is common. Also, air pollutant emissions are relatively high due to motor vehicle traffic as well as stationary sources. Pollutant emissions are also high, especially from motor vehicle congestion, at the northern end of the Peninsula in San Francisco, but there is more air movement to disperse pollution.

Santa Clara Valley Subregion. The Santa Clara Valley Subregion is bounded by the San Francisco Bay to the north and by mountains to the east, south, and west. Temperatures are warm on summer days and cool on summer nights, and winter temperatures are fairly mild. At the northern end of the valley, mean maximum temperatures are in the low-80s in the summer and the high-50s during the winter, and mean minimum temperatures range from the high-50s in the summer to the low-40s in the winter. Further inland, where the moderating effect of the bay is not as strong, temperature extremes are greater.

The air pollution potential of the Santa Clara Valley is high. High summer temperatures, stable air, and mountains surrounding the valley combine to promote O_3 formation. In addition to the many local sources of pollution, O_3 precursors from San Francisco, San Mateo, and Alameda counties are carried by prevailing winds to the Santa Clara Valley. The valley tends to channel pollutants to the southeast. In addition, on summer days with low-level inversions, O_3 can be recirculated by southerly drainage flows in the late spring evening and early morning and by the prevailing northwesterlies in the afternoon. A similar recirculation pattern occurs in the winter, affecting levels of *CO* and particulate matter. This movement of the air up and down the valley increases the impact of pollutants.

Pollution sources are plentiful and complex in this subregion. The Santa Clara Valley has a high concentration of industry in the Silicon Valley at the northern end. Some of these industries are sources of air toxics as well as criteria air pollutants. In addition, Santa Clara Valley's large population and many worksite destinations generate the highest mobile source emissions of any subregion in the Bay Area.

3.3.1.2 Air Quality Regulations, Plans, and Policies

The federal Clean Air Act (CAA) was passed in 1963 by the U.S. Congress and has been amended several times. The 1970 Clean Air Act Amendments strengthened previous legislation and laid the foundation for the regulatory scheme of the 1970s and 1980s. In 1977, Congress again added several provisions, including non-attainment requirements for areas not meeting National Ambient Air Quality Standards (NAAQS) and the Prevention of Significant Deterioration (PSD) program. The 1990 Amendments represent the latest in a series of federal efforts to regulate the protection of air quality in the U.S.

In 1988, the State Legislature passed the California Clean Air Act *(CCAA)*, which established California's air quality goals, planning mechanisms, regulatory strategies, and standards of progress for the first time. The *CCAA* requires attainment of state ambient air quality standards by the earliest practicable date. Attainment plans are required for air basins in violation of the state O_3, *CO*, sulfur dioxide (SO_2), or nitrogen dioxide (NO_2) standards. Preparation of and adherence to attainment plans are the responsibility of the local air pollution control or air quality management districts.

State and federal agencies have set ambient air quality standards for certain air pollutants. NAAQS have been established for the following criteria pollutants: CO, O_3, SO_2, NO_2, PM_{10}, $PM_{2.5}$, and lead (Pb). The state standards for these criteria pollutants are more stringent than the corresponding federal standards. California has also established standards for sulfates, hydrogen sulfide, chloroethene (vinyl chloride), and visibility-reducing particles. Table 3.3-1 lists these standards.

Table 3.3-1: Ambient Air Quality Standards and Attainment Status for Criteria Pollutants

Pollutant	Averaging Time	California Standards[1]		National Standards[2]	
		Concentration	Attainment Status	Concentration[3]	Attainment Status
Ozone	8 Hour	*0.07 ppm (180 µg/m^3)*	*N*[9]	0.08 ppm	*N*[4]
	1 Hour	0.09 ppm (180 µg/m^3)	N	*No Standard*[5]	
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m^3)	A	9 ppm (10 mg/m^3)	*A*[6]
	1 Hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	A
Nitrogen Dioxide	Annual Average	*0.03 ppm (56 µg/m^3)*	**A**	0.053 ppm (100 µg/m^3)	A
	1 Hour	0.25 ppm (470 µg/m^3)	A	*No Standard*	
Sulfur Dioxide	Annual Average	*No Standard*		80 µg/m^3 (0.03 ppm)	A
	24 Hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	A
	1 Hour	0.25 ppm (655 µg/m^3)	A	*No Standard*	
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	*N*[7]	*No Standard*	
	24 Hour	50 µg/m^3	N	150 µg/m^3	U
Particulate Matter - Fine ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	*N*[7]	15 µg/m^3	*A*
	24 Hour	*No Standard*		*35 µg/m^3 (See note [10])*	U
Sulfates	24 Hour	25 µg/m^3	A	*No Standard*	

Table 3.3-1: Ambient Air Quality Standards and Attainment Status for Criteria Pollutants

Pollutant	Averaging Time	California Standards[1]		National Standards[2]	
		Concentration	Attainment Status	Concentration[3]	Attainment Status
Lead	Calendar Quarter	*No Standard*		1.5 µg/m^3	A
	30 Day Average	1.5 µg/m^3	A	*No Standard*	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	U	*No Standard*	
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 µg/m^3)	No information available	*No Standard*	
Visibility-Reducing Particles	8 Hour (1000 to 1800 PST)	(See note [8])	U	*No Standard*	

A = Attainment, N = Nonattainment, U = Unclassified
ppm = parts per million
mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter

Notes:

1 California standards for *O_3*, *CO* (except Lake Tahoe), *SO_2* (1-hour and 24-hour), *NO_2*, suspended particulate matter - PM_{10}, and visibility-reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe *CO*, *Pb*, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for *Pb* and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that *the California Air Resources Board (*CARB*)* determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.

2 National standards other than for *O_3*, particulates, and those based on annual averages are not to be exceeded more than once a year. The 1-hour *O_3* standard is attained if, during the most recent *3*-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour standard is attained when the *3*-year average of the fourth highest daily concentrations are 0.08 ppm or less. The 24-hour PM_{10} standard is attained when the *3*-year average of the 99th percentile of monitored concentrations is less than 150 µg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the *3*-year average of 98th percentiles is less than 65µg/m^3. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM_{10} is met if the *3*-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the *3*-year average of annual averages spatially averaged across officially designed clusters of sites falls below the standard.

3 National air quality standards are set at levels determined to be protective of public health with an adequate margin of safety.

4 *In June 2004, the Bay Area was designated as a marginal non-attainment area of the national 8-hour O_3 standard.*

5 *The national 1-hour O_3 standard was revoked by the United States Environmental Protection Agency (EPA) on June 15, 2005.*

6 In April 1998, the Bay Area was redesignated to attainment for the national 8-hour *CO* standard.

7 In June 2002, CARB established new annual standards for $PM_{2.5}$ and PM_{10}.

8 Statewide VRP Standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction

Table 3.3-1: Ambient Air Quality Standards and Attainment Status for Criteria Pollutants

Pollutant	Averaging Time	California Standards[1]		National Standards[2]	
		Concentration	Attainment Status	Concentration[3]	Attainment Status

coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

[9] *The 8-hour state O_3 standard was approved by CARB on April 28, 2005, and became effective on May 17, 2006.*

[10] *EPA lowered the 24-hour $PM_{2.5}$ standard from 65 µg/m^3 to 35 µg/m^3 in 2006. EPA is required to designate the attainment status of the Bay Area Air Quality Management District (BAAQMD) for the new standard by December 2009.*

Source: BAAQMD, Ambient Air Quality Standards and Bay Area Attainment Status, 2007.

3.3.1.3 Existing Air Quality

Areas are classified under the Federal *CAA* as either “attainment” or “non-attainment” areas for each criteria pollutant based on whether the NAAQS have been achieved or not. The Bay Area has attainment status for both state and federal ambient air quality standards for all but the following criteria pollutants (see Table 3.3-1):

- O_3 status is non-attainment for both the state and federal *eight*-hour average*, as well as* for the *state one*-hour average.
- PM_{10} status is non-attainment for the state 24-hour average and the state annual geometric mean and unclassified for the federal 24-hour average.
- $PM_{2.5}$ status is non-attainment for the state annual arithmetic mean and unclassified for the federal 24-hour average.
- Hydrogen sulfide status is unclassified for the state standard.

A number of ambient air quality monitoring stations are located in the Bay Area to monitor progress toward air quality standards attainment. The Bay Area Air Quality Management District (BAAQMD) maintains these stations. Six BAAQMD monitoring stations are on or near the Caltrain route. Table 1.2-2 shows a *5*-year summary (*2002-2006*) of data collected at these stations for monitored air pollutants and the total number of days that state and federal ambient air quality standards were exceeded.[10] In the *5*-year period, the state *1*-hour *O_3* standard was violated on *54* days, the federal *8*-hour *O_3* standard was violated on *21* days, *and the state 8-hour O_3 standard was violated on 28 days*. In the same *5*-year period, the federal 24-hour PM_{10} standard was not violated, and the state 24-hour PM_{10} standard was violated on *26* days.

[10] *The BAAQMD had not published 2007 data at the time this analysis was completed.*

3.3.2 IMPACTS

3.3.2.1 Methodology

Caltrain Electrification Program operational phase air contaminant emissions were calculated using the procedures outlined in the BAAQMD's *CEQA Guidelines*, South Coast Air Quality Management District's *CEQA Air Quality Handbook*, and emission factors provided by the *United States* Environmental Protection Agency (EPA). The calculated Electrification Program Alternative emissions were compared to thresholds of significance for individual projects using the BAAQMD CEQA guidelines.

The emissions calculations for diesel and electric trains assume that all of the emissions occur within the Bay Area Air Basin *(BAAB)*. Emissions resulting from the generation of electricity to drive electric trains are actually created on a regional or greater basis. Typically, electric energy is generated by a mix of fossil-fueled power plants, hydroelectric facilities, cogeneration plants, wind power and other low-emissions generators, and imported power, all of which are fed to the grid. The exact mix of sources for power to the grid changes frequently depending upon the availability of resources and distribution facilities. Thus, the emissions calculations for the Caltrain Electrification Program Alternative power generation were based on an average mix of generators, which are located both within and outside the *BAAB*, but are assumed to be within the *BAAB* for the purpose of calculating impacts. This provides the most conservative, or “worst-case” approach *since, according to the BAAQMD, the BAAB is a net power importer*.

3.3.2.2 Thresholds of Significance

Electrification Program Alternative-related air emissions would have a significant effect if they resulted in concentrations that either created a violation of an ambient air quality standard (as identified in Table 3.3-1) or contributed to an existing air quality violation. *The BAAQMD has established threshold criteria for projects likely to increase r*eactive *o*rganic *g*ases *(ROG), NO_X, and PM_{10} emissions in non-attainment areas*. Table 3.3-2 presents the threshold *emission* rates *below* which *the* operational emissions from a project would be considered to have *an insignificant* effect on air quality throughout the *BAAB*. *T*his standard is applied as if all the emissions would be created within the *BAAB*.

Table 3.3-2: Thresholds of Significance for Project Operations

Air Pollutant	Pounds/day	Tons/year	Kilograms/day
Reactive Organic Gases (ROG)	80	15	36
Nitrogen Oxides (NO_x)	80	15	36
Particulates (PM_{10})	80	15	36

Source: *BAAQMD CEQA Handbook, December 1999*.

In addition to the thresholds for total emissions, the BAAQMD recommends that localized *CO* be estimated for projects in which: *(*a) vehicle emissions of CO would exceed 550 *pounds per* day; *(*b) project traffic would impact intersections or roadway links operating at Level of Service (LOS) D, E, or F or would cause LOS to decline to D, E, or F; or *(*c) project traffic would increase traffic volumes on nearby roadways by 10 percent or more. A project contributing to CO concentrations exceeding the State Ambient Air Quality Standard of *9 parts per million (*ppm*)* averaged over *8* hours and 20 ppm for *1*-hour would be considered to have a significant impact.

3.3.2.3 Impacts of the No-Electrification and Electrification Program Alternatives

Corridor-wide Air Pollutant Emissions. Under the No-Electrification Alternative, Caltrain would continue diesel train operations at *the current level of service – 98 trains per day* (see Section 2.3.1, No-Electrification *[No-Project/No-Action]* Alternative). To provide a basis for comparing current (*2007 data*) emissions with forecast emissions for both diesel trains (the No-Electrification Alternative) and the Electrification Program Alternative in the horizon year (*2035*), an emissions baseline was established.

Table*s* 3.3-3 *and 3.3-4* compare *4.5- and 5-car* emissions *for existing conditions, the No-Electrification Alternative, and the Electrification Program Alternative.* Note that electric locomotives are classified as zero emissions vehicles. The emissions of electrified Caltrain operations result from the generation of electricity to power the electrified trains rather than from the operation of the trains themselves. The power requirements of the Adtranz ALP-46 electric locomotive, the prototypical locomotive for the Electrification Program Alternative, were used in the analysis.

The data indicate that threshold criteria for air pollutant emissions would be exceeded under continued diesel train operations for both train lengths (or consists). By contrast, electric power generation emissions under the Electrification Program Alternative (again, there are no emissions from electric train operation) in *2035* for both train consists exceed only the NO_x *pounds per day and tons per year* significance threshold*s*. This is with the conservative assumption that all electric generation emissions would be created within the *BAAB*. In either case, for both future years the estimated air pollutant emissions, including NO_x, are *substantially* lower for the Electrification Program Alternative than *those* estimated for *the No-Electrification Alternative*.

It is clear that electrification of the Caltrain line would create a substantial air quality benefit over continued use of diesel-powered locomotives. This benefit would be experienced corridor-wide, *including* more pollution-prone, urbanized areas along the railroad route.

Table 3.3-3: Emissions Comparison Summary (4.5-Car Trains)					
Pollutant	***2007 Diesel Trains (pounds /day)[1]***	***2035 Diesel Trains (pounds /day)[2]***	***2035 Electric and Diesel Trains (pounds /day)[3]***	***Electrification vs. Existing Difference (pounds /day)***	***Electrification vs. No-Electrification Difference (pounds /day)***
CO	*1,045*	*1,065*	*87*	*(958)*	*(978)*
ROG	*373*	*268*	*12*	*(361)*	*(256)*
NO_X	*6,745*	*4,752*	*448*	*(6,297)*	*(4,304)*
PM_{10}	*236*	*163*	*16*	*(220)*	*(147)*
$PM_{2.5}$	*217*	*150*	*15*	*(202)*	*(135)*
Pollutant	***2007 Diesel Trains (tons/yr)[1]***	***2035 Diesel Trains (tons/yr)[2]***	***2035 Electric and Diesel Trains (tons/yr)[3]***	***Electrification vs. Existing Difference (tons/yr)***	***Electrification vs. No-Electrification Difference (tons/yr)***
CO	*154*	*156*	*12*	*(142)*	*(144)*
ROG	*55*	*39*	*2*	*(53)*	*(37)*
NO_X	*989*	*698*	*62*	*(927)*	*(636)*
PM_{10}	*35*	*24*	*2*	*(33)*	*(22)*
$PM_{2.5}$	*32*	*22*	*2*	*(30)*	*(20)*

Note: Ozone is produced by the chemical reaction of nitrogen oxides (NO_X) with reactive organic gases (ROG) that occurs in sunlight.

[1] Includes emissions from 96 diesel trips per day.

[2] Includes emissions from 98 diesel trips per day.

[3] Includes emissions from 114 electric and 6 diesel trips per day.

Source: Terry A. Hayes Associates, 2008.

Table 3.3-*4*: Emissions *Comparison Summary* (Five-Car Trains)

Pollutant	2007 Diesel Trains (pounds /day)[1]	2035 Diesel Trains (pounds /day)[2]	2035 Electric and Diesel Trains (pounds /day)[3]	Electrification vs. Existing Difference (pounds /day)	Electrification vs. No-Electrification Difference (pounds /day)
CO	*1,161*	*1,183*	*96*	*(1,065)*	*(1,087)*
ROG	*415*	*298*	*14*	*(401)*	*(285)*
NO_X	*7,494*	*5,280*	*498*	*(6,996)*	*(4,782)*
PM_{10}	*262*	*181*	*17*	*(245)*	*(164)*
$PM_{2.5}$	*242*	*167*	*17*	*(225)*	*(150)*
Pollutant	***2007* Diesel Trains (tons/yr)[1]**	***2035 Diesel* Trains (tons/yr)[2]**	***2035* Electric *and Diesel* Trains (tons/yr)[3]**	**Electrification vs. Existing Difference (tons/yr)**	***Electrification vs. No-Electrification* Difference (tons/yr)**
CO	*170*	*174*	*13*	(157)	*(161)*
ROG	*61*	*44*	*2*	(59)	*(42)*
NO_X	*1,099*	*776*	*69*	(1,030)	*(707)*
PM_{10}	*39*	*27*	*2*	(37)	*(25)*
$PM_{2.5}$	*35*	*25*	*2*	(33)	*(23)*

Note: Ozone is produced by the chemical reaction of nitrogen oxides (NO_X) with reactive organic gases (ROG) that occurs in sunlight.

[1] *Includes emissions from 96 diesel trips per day.*

[2] *Includes emissions from 98 diesel trips per day.*

[3] *Includes emissions from 114 electric and 6 diesel trips per day.*

Source: *Terry A. Hayes Associates, 2008.*

Localized Carbon Monoxide Concentrations. Another air quality impact evaluated for the study was the potential for increases in localized CO concentrations resulting from increases in motor vehicle traffic at train stations, or from increased vehicle idling at train crossings. Micro-scale CO modeling at such "hot spots" would *typically* be performed to analyze these impacts. *H*owever, hot spots analysis was not performed because there would be no substantial increase in local CO concentrations associated with the Electrification Program Alternative for the following reasons:

- Vehicle idling times at train crossings can be expected to decrease marginally because electric trains will accelerate and decelerate slightly faster than diesel trains.
- Vehicle traffic at train stations is not expected to reach congested levels that would increase pollutant emissions because the change in the number of vehicles arriving at Caltrain stations would be slight. There would be an increase in train ridership under the Electrification Program Alternative (see Section 3.15.5, Future Rail and Bus Transit and

Projected Impacts), and *it is anticipated that* the increases in motor vehicle use to and from stations would be more than offset by the overall reduction in total vehicle miles of travel in the region.

Consistency with the Air Quality Management Plan. The proposed Electrification Program is consistent with both the BAAQMD *2000 Clean Air Plan* (CAP) and the *Bay Area 2005 Ozone Strategy*. Consistency is demonstrated in the following manner:

- The *2000 CAP* states that a mobile source control measure first promulgated in the *1997 CAP* was partially implemented. This measure is implementation of the "Carl Moyer Program" for replacing old diesel locomotive engines with new, low-emission engines. Replacement of diesel locomotives with electric locomotives would be consistent with this program and control measure.
- Federal law preempts California from setting locomotive emission standards. EPA has established standards for reducing emissions from diesel locomotives by 70 percent by 2010. Those standards were used in estimating future diesel locomotive emissions in this report.

Mobile Source Air Toxics (MSAT). *The Federal Highway Administration (FHWA) published project-level MSAT assessment guidance in February 2006.*[11] *The MSAT guidance was designed as an air quality analysis tool for transportation projects. The MSAT guidance is relevant to the Caltrain Electrification Program because the proposed project would affect highway traffic volumes. The following qualitative analysis discusses MSAT emissions based on FHWA guidance.*

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

MSATs are a subset of the 188 air toxics defined by the CAA. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

EPA is the lead federal agency for administering the CAA and has certain responsibilities regarding the health effects of MSATs. EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources. 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program; national low-emission vehicle standards; Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements; proposed heavy-duty engine and vehicle standards; and on-highway diesel fuel sulfur control requirements.

[11] FHWA, *Interim Guidance on Air Toxic Analysis in NEPA Documents*, February 3, 2006.

Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 to 65 percent, and they will reduce on-highway diesel particulate matter emissions by 87 percent. As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary 6 MSATs.

The following analysis is based on language contained in FHWA guidance.[12]

1. ***Unavailable Information for Project Specific MSAT Impact Analysis***

   Evaluating the environmental and health impacts from MSATs on a transportation project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project. Due to these limitations, the following discussion is included in accordance with Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

   - ***Emissions:*** *EPA air quality models to estimate MSAT emissions from motor vehicles are meant to be used for regional projects and are not sensitive to key variables determining emissions of MSATs in the context of specific highway projects (e.g., the modeler cannot change the vehicle speeds to reflect a specific emission factor). While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model – emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of particulate matter under the conformity rule, EPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis.*

[12] Ibid.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

- ***Dispersion.*** *The tools to predict how MSATs disperse are also limited. EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of CO to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific project locations across an urban area to assess potential health risk. The National Cooperative Highway Research Program is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, there is also a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.*
- ***Exposure Levels and Health Effects.*** *Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Consequently, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Therefore, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.*

2. ***Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs***

Research into the health impacts of MSATs is ongoing. For different emission types, epidemiological studies show that MSATs are statistically associated with adverse health outcomes (frequently based on emissions levels found in occupational settings). Epidemiological studies also show that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database illustrate county levels of various toxics when compared to national or state levels.

EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from EPA 's IRIS database and represents EPA's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- ***Benzene** is characterized as a known human carcinogen.*
- *The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.*
- ***Formaldehyde** is a probable human carcinogen based on limited evidence in humans, and sufficient evidence in animals.*
- ***1,3-butadiene** is characterized as carcinogenic to humans by inhalation.*
- ***Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.*
- ***Diesel exhaust** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust, as reviewed in this document, is the combination of diesel particulate matter and diesel exhaust organic gases.*
- ***Diesel exhaust** also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.*

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, *FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.*

Some recent studies have reported that proximity to roadways is related to adverse health outcomes – particularly respiratory problems.[13] Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. These studies do not provide information that would be useful to alleviate the uncertainties listed above and enable a more comprehensive evaluation of the health impacts specific to this project.

3. Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow reasonable predictions of relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In the absence of FTA guidelines on this subject, FHWA guidance is used to provide a qualitative analysis of MSAT emissions relative to the alternatives. It is acknowledged that the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project; however, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and

[13] *South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 studies on the relationship between health and air quality; NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.*

measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by FHWA entitled "A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives," found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The Electrification Program Alternative would ultimately remove 112,000 daily vehicle miles of travel from corridor roadways. The reduction in VMT would reduce regional MSAT emissions from on-road vehicles. Electrification of diesel locomotives would substantially reduce rail-related diesel particulate matter emissions. As such, the proposed project would cause region-wide MSAT levels to be significantly lower than today.

3.3.3 CONFORMITY

The FTA cannot approve funding for project activities beyond preliminary engineering until it has reviewed the project in accordance with the EPA transportation air quality conformity regulations (40 CFR Part 93) and has found that the project conforms. This regulation, which took effect in December 1993, establishes criteria for project conformity that cover all possible situations.

The conformity criteria that the Caltrain Electrification Program must satisfy and the status of the project in meeting these criteria are as follows:

•§93.110 The conformity determination must be based on the latest planning assumptions.

ABAG and MTC are the Metropolitan Planning Organizations (MPOs) responsible for determining area-wide population and employment forecasts, modeling regional travel demand, and formulating the RTP and the Transportation Improvement Program (TIP). Assumptions used in the transportation analysis for this project are derived from ABAG's most recently adopted population, employment, travel, and congestion estimates. Travel forecasts are based on *ABAG's 2005 Series Projections* for the Year *2030 and were factored up to year 2035 using ABAG 2007 Series Projections*.

•§93.111 The conformity determination must be based on the latest emission estimation model available.

All emissions estimates are based on the latest *emission rates available from the California Air Resources Board (CARB) and EPA sources*.

•§93.112 *The conformity determination must be made according to the consultation procedures of this rule and in the applicable implementation plan, and according to the public involvement procedures established in compliance with 23 CFR Part 450. The conformity determination must be made according to 40 CFR Part 93 (§93.105(a)(2) and (e)) and the requirements of 23 CFR Part 450.*

The proposed project would follow the consultation procedures in 23 CFR Part 450 and 40 CFR Part 93 (§93.105(a)(2) and (e)) before making its conformity determination. The environmental document for the proposed project would be available for public review and comment prior to adoption. FHWA was consulted during the preparation of the environmental document.

•§93.114 There must be a currently conforming transportation plan and currently conforming TIP at the time of project approval.

The most recent transportation plan in the project area is the Transportation 2030 Plan. The most recent TIP is the 2007 TIP. The Transportation 2030 Plan was adopted by MTC on February 23, 2005. The 2007 TIP was adopted by MTC on October 2, 2006. FHWA and FTA made a conformity determination on the Transportation 2030 Plan on March 17, 2005, and on the 2007 TIP on October 2, 2006. The proposed project is included in the Transportation 2030 Plan and the 2007 TIP.

•§93.115 The project must come from a conforming transportation plan and program.

The proposed project is included in the Transportation 2030 Plan and the 2007 TIP.

•§93.116 The *proposed* project must not cause or contribute to any new localized *CO*, $PM_{2.5}$, or PM_{10} violations or increase the frequency or severity of any existing *CO or* $PM_{2.5}$ violations in *CO*, $PM_{2.5}$, non-attainment, and maintenance areas.

According to the California Department of Transportation (Caltrans) and FHWA, a project does not need to complete a particulate matter hot spot analysis if the build VMT is less than or equal to the no-build VMT.[14] *The proposed project is projected to remove approximately 120,000 daily VMT from corridor roadways. The increases in motor vehicle use to and from stations would be more than offset by the overall reduction in total VMT in the region. As such, the Caltrain Electrification Program would not cause or contribute to a CO,* $PM_{2.5}$*, or* PM_{10} *exceedance.*

•§93.117 The *proposed* project must comply with $PM_{2.5}$ *and* PM_{10} control measures *that are contained* in the applicable implementation plan.

[14] *California Department of Transportation and Federal Highway Administration, Particulate Matter and Transportation Projects, An Analysis Protocol, February 23, 2005.*

$PM_{2.5}$ and PM_{10} control measures are not available for the San Francisco Bay Area since BAAQMD does not have an implementation plan for $PM_{2.5}$ and PM_{10}. The project can be considered beneficial in terms of $PM_{2.5}$ or PM_{10}, in that it would substantially reduce regional diesel emissions and remove approximately 120,000 daily VMT from corridor roadways. If a federal $PM_{2.5}$ and PM_{10} attainment plan were required in the future, appropriate control measures for $PM_{2.5}$ and PM_{10} emissions would be identified.

•§93.118 The transportation plan and TIP must be consistent with the motor vehicle emissions budget(s) in the applicable implementation plan (or implementation submission).

FHWA and FTA made a conformity determination on the Transportation 2030 Plan on March 17, 2005, and on the 2007 TIP on October 2, 2006. Therefore, the Plans are consistent with the motor vehicle emissions budget in the applicable implementation plan.

3.3.4 MITIGATION

No exceedences of state or federal *ambient air quality standards* are projected under the Electrification Program Alternative in the future analysis year of *2035*. Under this conclusion, no mitigation is required for long-term air quality effects resulting from project operation.

3.4 BIOLOGICAL RESOURCES

3.4.1 SETTING

A *Natural Environmental Study* (NES) (Parsons, 2002) was prepared, consisting of a comprehensive literature review and background search, multiple reconnaissance-level field surveys for biological resources, and coordination with state and federal resource agency personnel. *A subsequent biology letter report assessment was prepared in 2008 to determine if project modifications affect the "no significant impact" conclusion of the NES (Garcia and Associates, 2008a). In addition, a biology letter review was prepared in 2008 in order to determine the project affects at site PS7 (2008b), and another biology letter review was prepared in 2008 in order to determine the project affects at TPS1 Alternative sites A and B (2008c).* Vegetation communities and incidental wildlife sightings were recorded during the surveys. Wetlands and waters of the U.S. that may be subject to the jurisdiction of the U.S. Army Corps of Engineers (ACOE) under Section 404 of the *CWA* were also surveyed and delineated.

A variety of natural resources are present along the Caltrain corridor. These include tidal basins filled with rubble from the 1906 San Francisco earthquake and more than 40 wetlands and creeks, some influenced by tidal action. Storm drains (both open and closed systems) consisting of highly altered creeks in urban settings and the Hetch Hetchy Aqueduct are also present. The Caltrain corridor also transects several well-known streams with regionally significant riparian corridors, including San Francisquito, Stevens, Los Gatos, and the Guadalupe River.

Although ruderal disturbed areas dominate the Caltrain corridor, some special-status species have *the* potential to occur within the greater project vicinity, and several of the resource areas are in close proximity *to* the railroad right-of-way. The Caltrain corridor cuts through Communications Hill, *which is* composed of serpentine outcrops of rock and soil and may be inhabited by special-status wildlife and plants. Several *Eucalyptus* windrows occur within the project corridor; these *Eucalyptus* trees can serve as over-wintering habitat for the Monarch butterfly.

Executive Order 13112, Invasive Species, is intended to prevent the introduction and control the spread of invasive plant and animal species. This law prohibits the Federal government from authorizing or funding actions that may cause or promote the introduction and/or spread of invasive species unless the agency has determined that the action's benefits clearly outweigh potential harm caused by invasive species; and that all feasible and prudent measures will be taken to minimize risk of harm.

3.4.1.1 Vegetation/Wildlife

During the reconnaissance-level surveys, biotic communities were characterized based on plant composition and distribution. Seven biological communities have been identified as occurring within the project corridor, including willow scrub riparian, Central Coast cottonwood-sycamore riparian forest, ruderal/disturbed, windrow, freshwater marsh, Northern Coastal salt marsh, and coastal brackish marsh. These biological communities were evaluated for their potential to support special-status plant and animal species, as described in the NES.

3.4.1.2 Jurisdictional Waters

A routine on-site determination of jurisdictional waters, including wetlands, was conducted along the proposed project corridor in November and December 2000 and 2001, and in January 2002. The wetland delineation focused on proposed construction areas within the Caltrain right-of-way (i.e., where poles for the OCS would be installed, and where materials and equipment would be temporarily stored) that coincided with parallel wetland resources and where project design might not be able to avoid these resources. At all other locations within the right-of-way where the OCS poles would clearly span creeks or rivers, wetland resources were not delineated. Several locations within the project corridor were identified as meeting the criteria for waters of the U.S. under Section 404 of the Clean Water Act (see Table 3.4-1). Findings of the wetland determination are presented in the *Preliminary Wetlands Delineation Report* (Parsons, 2002), which will be submitted to ACOE for review and verification as part of the permit application.

Table 3.4-1: Summary of Jurisdictional Features in the Electrification Program Alternative Vicinity

Location	**Name and Type of Resource**
Paul *Avenue* Station *(closed 2005)*	Unnamed ditches
Millbrae Station	South Lomita Canal
Broadway Station	Easton Creek, Sanchez Creek, and Cherry Creek Canyon ditches
Bay Meadows Station	Seal Slough Tributary B
Lawrence Station	Calabazas Creek
Los Gatos Creek *Crossing*	Los Gatos Creek
Source: *Preliminary Wetlands Delineation Report,* Parsons, *July* 2002.	

3.4.1.3 Special-Status Species

Special-status plant and wildlife species are species that have been afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. These species are generally considered rare, threatened, or endangered due to declining or limited populations. Plant and animal species listed by the U.S. Fish and Wildlife Service (USFWS) as threatened or endangered are protected under the Federal Endangered Species Act (FESA). Section 7 of this act requires federal agencies to ensure their actions do not have adverse impacts on threatened or endangered species or habitats critical in preserving the species. The California Endangered Species Act (CESA) also mandates the California Department of Fish and Game (CDFG) to issue written findings as to whether proposed projects would jeopardize *state*-listed species.

Information on the biology, distribution, taxonomy, status, and other aspects of the special-status species that could occur in the project vicinity was obtained from standard references on biological resources. A search of the California Natural Diversity Database (CNDDB/Rarefind *3.1*) and California Native Plant Society's (CNPS) Inventory of Rare and Endangered Vascular plants of California (Electronic Version *7-07c 12-04-07*) was conducted to determine if there are any recorded occurrences of special-status species in the project area. Current lists prepared by CDFG's Habitat Conservation Division were also reviewed.

A letter was sent to the Sacramento Office of USFWS requesting a listing of threatened, endangered, and candidate species that may occur in the project vicinity. A response was received from Ms. Jan C. Knight, Chief of the Endangered Species Division, of the USFWS Sacramento Office on November 14, 2001. *Subsequent letters were exchanged between USFWS and Garcia and Associates for this reduced-scope project.* A copy of *all* USFWS correspondence is included in Appendix C.

Field surveys *and site assessments* for special-status wildlife and plant species and their habitat were conducted on *the following dates:* April 25, 2000; June 10 *and November 30,* 2001*; December 6, 2007; January 3, 22, 29, and* 30, *2008; and April 28, 2008.* Suitable habitat for special-status species is defined as areas where special-status species are known to exist or have potential to exist based on a range, habitat, and presence of important habitat elements. *For the 2000-01 surveys, d*etailed species-specific studies were not conducted, owing to the *52*-mile length of the corridor and because most construction would occur within the Caltrain right-of-way, where ground-disturbing activities would be limited to installation of OCS poles. All areas with at least a moderate potential to provide suitable habitat for a particular special-status species were evaluated in the inventory*;* however, particular attention was paid to drainages paralleling the railroad corridor and to the proposed locations for the traction power facilities. *The primary objective of the latter surveys was to assess the ten (10) newly proposed traction power facility sites for potential habitat and the presence of special-status species. The area surveyed included a 100-foot buffer around each site when not obstructed by private property.*

A limited number of special-status species have moderate potential to occur within the corridor, including the California red-legged frog *(Rana aurora draytonii),* San Francisco garter snake *(Thamnophis sirtalis tetrataenia), California tiger salamander (Ambystoma californiense), Western burrowing owl (Athene cunicularia),* Monarch butterfly *(Danaus plexippus),* and several species of swallows.

<u>California Red-legged Frog</u> is listed as Threatened by USFWS and is designated as a Species of Special Concern by CDFG. Suitable habitat for California red-legged frog occurs within the project corridor but outside of the immediate project impact area. Like most other ranid species, the California red-legged frog is known to make seasonal movements, often between winter spawning sites and spring-summer foraging habitats. Such movements may be especially likely during extended periods of rain when ground surface saturation or surface sheet flow creates seasonal wetland pathways between otherwise isolated wetland sites. When storm water runoff decreases the salinity in tidally influenced ditches, the California red-legged frog may use these ditches to migrate between isolated freshwater habitats.

<u>San Francisco Garter Snake.</u> On March 11, 1967, USFWS listed the San Francisco garter snake as Endangered. Subsequently, on June 27, 1971, CDFG listed the species as Endangered. Encroachment of development into their habitat and underwater channeling of water sources are the primary threats to the species. The San Francisco garter snake is known to occupy freshwater wetlands, drainage ditches, and creeks in the San Francisco Bay area and such areas within and near the Caltrain corridor. The species also uses tidally influenced ditches as migration corridors between disconnected patches of freshwater wetland habitat. Much like the California red-legged frog, these migrations are most likely to occur when surges of freshwater are introduced into saltwater and brackish water habitats. A reduction in salinity provides the species with a more tolerable gateway between other, more favorable habitats. The CNDDB suppresses detailed location information for this species*;* however, the

San Francisco garter snake is known to occur within the project corridor, and *it* should be assumed present where suitable habitat exists.

California tiger salamander *is listed as Threatened by USFWS and is designated as a Species of Special Concern by CDFG. California tiger salamander is recorded at three sites south of the Caltrain right-of-way from the PS7 site. These records, from 1992 and 1993, indicate observances between 350 and 2,000 feet south of the railroad tracks from PS7. This species is estimated to have disappeared from more than 50 percent of its historic range. Many populations have been extirpated due to loss of or fragmenting of suitable habitat through urbanization and agriculture. Hybridization with non-native Tiger Salamanders also threatens the continuity of this species.*

Western burrowing owl *is not listed by USFWS, but it is designated as a Species of Special Concern by CDFG. Burrowing owls are found in open, dry grasslands and inhabit the abandoned underground burrows of other animals, such as the ground squirrel. They can dig up their own burrows, but usually prefer the deserted excavations of other animals. The owls commonly perch on fence posts or on top of mounds outside their burrows. The only area in the project vicinity where burrows were noted is the south-facing hillside to the north of Communications Hill Boulevard. An individual burrowing owl was observed on this hillside approximately 300 feet north of the PS7 site during the December 2007 survey.*

Monarch Butterfly is considered a CDFG special animal, and its wintering sites are tracked by CDFG. Several *Eucalyptus* windrows occur within the Caltrain corridor; these *Eucalyptus* trees have potential to serve as over-wintering habitat for the Monarch butterfly. The CNDDB suppresses detailed location information for this species*;* however, intermittent linear groves of *Eucalyptus* trees occur along the periphery of the Caltrain right-of-way between milepost 10 and 30, and Monarch butterflies have been identified as occurring within the project corridor and should be assumed present where suitable habitat exists.

Swallows. During a hi-rail reconnaissance survey conducted on June 10, 2001, unidentified swallows and/or their nests were observed under five bridges in the Caltrain corridor: 22nd Street bridge, San Tomas Aquino Creek bridge, San Jose bridge, I-880 bridge, and an unnamed bridge located at the intersection of the UPRR/*Western Pacific Railroad (*WPRR*) tracks*. Swallow species likely to use overpasses and bridges as nest sites include the cliff, barn, and northern rough-winged swallows and the purple martin. Nesting swallows are protected under the provisions of the Migratory Bird Treaty Act, and take of these species, including disturbance to or destruction of nesting sites, is prohibited. With the exception of the purple martin, a California species of special concern, the CNDDB does not track populations of swallows. There are currently no CNDDB records for the purple martin within the study area vicinity.

3.4.1.4 Trees and Other Mature Vegetation

Trees and other mature vegetation in the Caltrain corridor consist primarily of various windrow species (e.g., *Eucalyptus* and oleander) that have been planted for ornamental or commercial purposes. *The project arborist (HortScience, Tree Survey and Assessment, 2003)* *surveyed the trees along the Caltrain corridor and determined that there were eight mile-long segments (approximately eight [8] percent of the 104 total mile-long segments bordering both sides of the 52-mile-long corridor) where dense tree canopy currently exists. One of these segments is in the Atherton portion of the corridor; another is in Menlo Park.* Some heritage trees also occur *in these segments and elsewhere* along the Caltrain corridor. Approximately 20 coast live oaks (*Quercus agrifolia*) were identified between milepost 12 and 30.

Some trees and mature vegetation stand within the Caltrain right-of-way while others are on adjacent public or private property. This vegetation, which provides visual screening between the railroad right-of-way and adjacent land uses, may encroach into vertical and horizontal clearances for installation and safe operations and maintenance of the electric wires. Potential project impacts on such vegetation were therefore considered.

A landmark redwood tree, also known as "El Palo Alto," is identified by the City of Palo Alto as Heritage Tree #1. The tree is located adjacent to the proposed project right-of-way and is estimated to be *more than* 110 feet high and more than 1,000 years old (City of Palo Alto, *2002*). El Palo Alto is discussed in more detail in Section 3.5.5.

3.4.2 IMPACTS

3.4.2.1 No-Electrification Alternative

Under the No-Electrification Alternative, Caltrain would continue diesel train operations, and there would be no need for ground-disturbing activities potentially affecting adjacent biological resources. The *state of good repair (rehabilitation)* improvements would be carried out within the existing railroad corridor built environment.

3.4.2.2 Electrification Program Alternative

Field surveys of the proposed *traction power facility* sites confirm that there would be no impacts to biological resources due to the existing ruderal and highly disturbed environment at these locations. Effects on biological resources along the Caltrain corridor and proposed mitigation measures are described below.

Jurisdictional Waters. Although potentially jurisdictional waters occur within the project area, no wetlands or waters of the U.S. would be affected by construction of the Electrification Program Alternative. Project design flexibility in the placement of OCS poles would be implemented to avoid impacts to all potentially jurisdictional waters that cross the Caltrain corridor. These areas include all stream, creek, and ditch crossings along the entire length of the corridor. All potentially jurisdictional wetlands and waters of the U.S. that parallel the existing tracks occur sufficiently far outside of the project right-of-way that they would not be affected by project construction. Detailed field surveys and measurements were conducted and reported in the NES to confirm that the line of poles can be constructed without encroaching into wetlands/waters that lie longitudinally along the edge of the Caltrain right-of-way.

Special-Status Species. As discussed in Section 3.4.1.3 above, a limited number of special-status species have moderately suitable habitat within or adjacent to the project corridor. These include the California red-legged frog, San Francisco garter snake, *California tiger salamander, Western burrowing owl,* Monarch butterfly, and several species of swallows. *Garcia and Associates (2008b) did a follow-up visit to the proposed PS7 site in April 2008 and prepared a memorandum to confirm that this site has little to no value to protected biological resources, including the California tiger salamander and Western burrowing owl.* All sensitive habitat areas would be avoided during project design and implementation; therefore, no long-term effects on special-status species would occur. Pre-construction surveys are recommended to ensure that there *would be* no incidental take of species during construction (see Section 3.4.3, Mitigation).

Trees and Other Mature Vegetation. Numerous large trees on adjacent properties currently hang over or lean into the Caltrain right-of-way. These overhangs could, in some locations, interfere with the safe operation and maintenance of the OCS conductors. They could encroach upon the clearance envelope required by the CPUC. *It is ordinary JPB maintenance practice to comply with CPUC requirements by trimming trees and other mature vegetation from adjacent properties that lean or hang over or into the Caltrain right-of-way and pose a potential hazard to safe train operations.*

JPB engaged a certified arborist to assess the extent of tree trimming that would be required to comply with *C*PUC requirements. The entire Caltrain corridor was videotaped, and an assessment was made of the density of tree canopy on both sides of the right-of-way and the potential need for trimming of *leaning trees or o*verhanging branches. The majority of the trees and vegetation that would require pruning are Eucalyptus, Oleander, and other windrow species; some coast live oaks and other native and horticultural species are also present.

The arborist also assessed the condition and age of the trees, *and* has identified trees that are either dead, dying, or over-mature *and recommended their removal.* This information will be available to assist property owners who may want to consider such action. *The* JPB will coordinate with the property owners if the need arises.

The JPB would trim trees only insofar as necessary to provide the required safety envelope. It is not anticipated that this tree trimming would result in the removal of mature trees. A structurally weak, overmature, or particularly fast-growing tree on JPB property may be considered for removal. No removal of trees on private property is contemplated. Tree trimming would be conducted consistent with arboricultural industry standards. The JPB would evaluate potentially affected trees on an individual basis.

The City of Atherton tree ordinance requires a permit and potentially a tree protection plan to be approved if 25 percent or more of a heritage tree's canopy were to be pruned in a single season. Such drastic trimming is not anticipated.

The "El Palo Alto" redwood tree is located outside of the proposed project right-of-way and would not be affected by the Electrification Program Alternative.

3.4.3 MITIGATION

As no permanent impacts to biological or habitat resources are anticipated, no mitigation *during project operation* is proposed. Preven*ta*tive measures for temporary construction-related activities are described in Section 4.2.3.

A Vegetation Management Plan will be developed in consultation with a certified arborist to minimize impacts to trees and other mature vegetation. Trimming will be done in accordance with arboricultural industry recommended practices. If trees outside the Caltrain right-of-way are damaged or must be removed for placement of OCS or TPS equipment and facilities, feasibility of replacement will be considered on an individual basis in coordination with the property owner and the appropriate city and county urban foresters in accordance with applicable local ordinances. The JPB will not trim or remove mature vegetation any more than is necessary for safe electrified operations. Additional measures, as discussed in Section 3.1.3 Aesthetics, will be included.

Consistent with Executive Order 13112, Invasive Species, the JPB will consider restoration using native plant and tree species insofar as is practicable. Any landscape conditions applied by the JPB would include a requirement that invasive plants cannot be a part of the planting scheme.

3.5 CULTURAL RESOURCES

Historical and archaeological resources in the project area have been identified and evaluated in accordance with applicable regulations and guidelines. This section reports on the identification of such resources and evaluates the potential for the project to affect these properties. Reference is made to the archaeological and historical architecture reports and findings of effect.[15]

3.5.1 REGULATORY SETTING

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the effects of their activities and programs on historic properties. Section 110 of the Act lays out affirmative agency responsibilities with respect to historic properties and establishes the National Register of Historic Places (*National Register*) for identifying and listing historic properties of importance to the nation, the states, and local communities.

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[15] Archaeological Inventory for the Caltrain Electrification Program Alternative in San Francisco, San Mateo, and Santa Clara Counties, California, Far Western Anthropological Research Group, Inc., January 2002; Inventory and Evaluation of Historic Resources: Caltrain Electrification Program, San Francisco to Gilroy (MP 0.0 to 77.4), JRP Historical Consulting Services, December 2001; Finding of No Effect and No Adverse Effect: Caltrain Electrification Program, San Francisco, San Mateo, and Santa Clara Counties, California, JRP Historical Consulting Services, December 2001; *Cultural Resources Addendum Report for the Caltrain Electrification Program Alternative: San Francisco, San Mateo, and Santa Clara Counties, California, Far Western Anthropological Research Group, Inc, July 2008. Addendum Inventory and Evaluation of Historic Resources : Caltrain Electrification Program, San Francisco to San Jose (MP 0.0 to 52.0), JRP Historical Consulting Services, July 2008; and Addendum Finding of Effect: Caltrain Electrification Program, San Francisco to San Jose (MP 0.0 to 52.0), JRP Historical Consulting Services, August 2008.*

Guidelines for implementing Section 106 requirements are promulgated by the Advisory Council on Historic Preservation (*Advisory Council*) in "Protection of Historic Properties" (36 CFR Part 800). These guidelines *also* require agencies to comply with other federal laws related to historic preservation, including the National *Historic Preservation* Act of 1969; the Archaeological and Historic Preservation Act of 1979; and Executive Order 11593 (1971) addressing "Protection and Enhancement of the Cultural Environment." Other agency-specific legislation requires consideration of the impacts of federal *undertakings* on cultural resources. *For example, t*ransportation projects must comply with the provisions of Section 4(f) of the Department of Transportation Act of 1966 *(see Appendix I), which also affords protection to cultural resources eligible for the National Register*.

The State of California addresses cultural resources in *CEQA* (CEQA-*Public Resources Code [*PRC*]* Division 13, Sections 21000-21178); archaeological and historical resources are specifically treated under Sections 21083.2 and 21084.1, respectively. California PRC 5020.1 through 5024.6 (effective 1992) creates the California Register of Historical Resources (*California Register*) and sets forth requirements for protection of historic cultural resources. City-designated historic resources are presumed to be historically or culturally significant for purposes of CEQA, as are resources that are listed on or determined eligible for listing on the *National Register* and/or the *California Register*.

3.5.2 AREAS OF POTENTIAL EFFECT

Two APEs were delineated by the JPB in consultation with FTA and the State Historic Preservation Officer (SHPO). An APE for archaeological resources was defined as the extent of proposed construction for the Caltrain Electrification Program (i.e., the project "footprint"). This includes the railroad right-of-way that Caltrain operates, for a total length of approximately *52* miles. The APE varies in width along the Caltrain route, but typically incorporates approximately 40 feet on either side of the centerline of the two or more sets of railroad tracks. *At separate* locations, the APE is expanded to include proposed traction power facility sites *that are located outside of Caltrain right-of-way*, and three *ductbank* routes where underground electrical connectors would be laid to supply power from *service connections to* the power stations.

An APE for historical architectural resources was defined that includes the *directly affected and* first *row of* parcels surrounding each of the proposed traction power facility sites. The historical architectural APE includes all of the railroad features within and along the right-of-way, such as stations (modern and historic), signal bridges, tunnels, grade separations, culverts, bridges, viaducts, and overpasses. *The APE for archaeological resources includes all facility footprints and a 20-foot buffer on all sides.*

3.5.3 ARCHAEOLOGICAL RESOURCES

3.5.3.1 Setting

Archaeological resources in the APE were identified in accordance with the National Historic Preservation Act [36 CFR 800.4 (a) and (b)]. An archaeological resources assessment *technical report* was prepared according to the general guidelines set forth by the California SHPO for archaeological resource management reports (1989) and the cultural resources inventory general guidelines developed by the U.S. Department of the Interior, Bureau of Land Management (1989).

The archaeological resources assessment included a records search and literature review; *consultation with the Native American Heritage Commission and local Native American groups and individuals;* an assessment of previous surveys of the Caltrain Electrification Program APE; a field survey of the proposed traction power facility locations and three electrical connector routes; *a geoarchaeological sensitivity study to assess the potential for buried resources;* and development of avoidance measures for sites within or potentially within the APE.

Inventory of the APE was *conducted* in 1999 (Carrico *et al.*, 2000). Field surveys of the *previously defined* traction power facilit*y* s*ites* and electrical connector routes were conducted in November and December 2001. *Field visits in 2008 were conducted to include any of the newly defined facility sites that lay outside the earlier survey areas (Waechter et al. 2008).* Since most of these proposed facilities are located in built environments (e.g., existing buildings and paved parking lots), ground visibility during field surveys was restricted. Those locations with good ground visibility were subjected to an intensive survey.

Prehistoric and historic-*era* archaeological sites in or potentially in the APE are shown in Table 3.5-1. No sites were identified in the expanded APE (i.e., for the traction power facilities) during the record search and survey. Documentary research identified two archaeologicall*y* sensitive zones (Hamilton shell mound, *vicinity of the Third Mission Santa Clara [CA-SCL-30/H], and the Native American burial ground at Tamien Station [CA-SCL-690]).* Previous investigations indicate that one site, CA-SCL-30/H, has been determined eligible to the *National Register* and CA-SCL-690 has been *recommended* eligible; neither have been listed *as of this writing*.

Section 106 provides *federally recognized* Native American tribes the opportunity to identify their concerns about *cultural and heritage resources*, advise on the identification and evaluation of *such resources*, articulate their views on the undertaking's effects on *archaeological sites and traditional cultural properties*, and participate in the resolution of adverse effects (per 36 CFR 800.2 (c)(3)(i)). JPB contacted the Native American Heritage Commission on December 4, 2001, to advise them of the proposed project. The Commission responded on December 12, 2001, stating that their record search revealed no indication of the presence of Native American cultural resources in the immediate project area; however, they also recommended that JPB contact other Native American individuals/organizations to verify the findings of the Commission. JPB sent notification letters to these Native American tribes on December 18, 2001. The *30*-day review period expired, and no additional comments were received from the Native American tribes *or individuals*. A copy of the letter from the Native American Heritage Commission is included in Appendix C.

Table 3.5-1: Prehistoric and Historic-*Era* Archaeological Sites In or Potentially In the Area of Potential Effect

Site Trinomial or Number	Site Description	Relation to APE*
CA-SFR-15	Shell mound	Potentially In
CA-SMA-371	*Shell midden capped by historic-era debris*	*Potentially In (buried)*
P-41-498	*Shell midden*	*Potentially In (buried)*
CA-SMA-358/H	*Prehistoric/protohistoric and historic-era artifact scatter*	*In*
CA-SMA-343H	Historic trash dump	In
CA-SMA-102	Shell mound	In
CA-SMA-316	Shell midden	In
CA-SMA-317	Shell mound	In
CA-SMA-4	Large shell midden	In
CA-SMA-232	Shell midden	In
CA-SMA-318	Shell mound	Potentially In
CA-SMA-309 (C-767)	Shell mound	Potentially In
CA-SMA-233	Shell midden	Potentially In
CA-SCL-624	Shell midden	Potentially In
CA-SCL-707	Shell midden	Potentially In
CA-SCL-22	Dirt midden	In
CA-SCL-8	Large occupation site	Potentially In
CA-SCL-30/H	Habitation site w/burial	In
CA-SCL-690 Tamien Station	Large prehistoric cemetery	In
C-1	Reported burial	Potentially In
CA-SCL-448	Shell scatter	In

**Sites listed as potentially within the APE are those whose full extent has not been determined.*

JPB sent a second letter to the Commission in December of 2007, informing them of the revisions to the project APE (with maps) and asking for any information on known resources or sensitive areas (a copy of the letter is included in Appendix C). In their January 16, 2008 reply, the Commission stated that the Sacred Lands File did not indicate any cultural resources within the project area, but cautioned that the absence of specific site information does not necessarily indicate the absence of cultural resources. Subsequently, JPB sent letters to all the Native American individuals and groups on the list provided by the Commission; in addition, phone calls or emails were sent to each contact, as summarized in Appendix C.

3.5.3.2 Archaeological Resources Impacts

No-Electrification Alternative. Under the No-Electrification Alternative, Caltrain would continue diesel train operations, and there would be no need for ground-disturbing activities either within or outside the right-of-way *associated with the construction of* OCS or traction power electrification facilities*; t*herefore, there would be no impacts to subsurface archaeological resources. *Rehabilitation work under the State of Good Repair Program would be carried out within the existing railroad corridor built environment.*

<u>Electrification Program Alternative.</u> *Any archaeological sites that have not been formally evaluated for their National Register eligibility are considered eligible until shown to be otherwise. Where there are known sites in the APE, all ground-disturbing activities will be designed to avoid those sites. Where sites cannot be avoided, they will be evaluated before any project disturbance takes place in the vicinity. In addition to known resources, there* is potential for *encountering buried archaeological deposits during* excavation for OCS pole foundations. *A geoarchaeological sensitivity study done by Far Western identifies those areas most sensitive for buried resources.*

Three areas of the APE are particularly sensitive: the Hamilton shell mound, *the Native American burial ground at Tamien Station,* and *areas surrounding known M*ission-*era remains*. The Hamilton shell mound *overlaps the APE in two locations*. The extent of the basal deposit for shell mounds is unknown; therefore, there is potential to expose cultural materials (especially human burials) when conducting ground-disturbing activities in the vicinity. Eight *other known* sites *lie* within th*is sensitive zone; they will be avoided during all project activities or, where avoidance is not feasible, they will be evaluated for their National Register eligibility. At Tamien Station, there are known human burials and an archaeological deposit that could be affected during project construction. Finally, t*he *M*ission sensiti*vity* zone extends for 1.01 miles *and includes s*ite CA-SCL-30/H, *the Third Mission Santa Clara. This site* has been determined eligible to the *National Register* and would be avoided; *however, it is very likely that structures and other remains associated with the Mission lay undetected beneath the modern ground surface.* For areas within the sensitive zones, yet outside known site boundaries, testing would be performed *at* the planned location of OCS poles prior to construction *to confirm that the pole locations are outside the site boundaries*.

All construction within site boundaries and the sensitive zones would be conducted using *methods selected so as to* minimize effects of excavation. *Such* method*s will be selected to* reduce the amount of soil that would be removed, *thereby* lessening potential impacts on buried cultural resources. Nonetheless, in accordance with CFR 800.5 (2) (i), physical destruction or damage to all or <u>part</u> of a property constitutes an adverse effect. Section 800.6 (a) calls for continued consultation to develop and evaluate alternatives or modifications to the project that could avoid, minimize, or mitigate adverse effects on historic properties.

As *noted in the survey reports,* surveys of the proposed traction power facility locations and connector routes were limited in some locations by poor ground visibility, and although no cultural resources were identified *in these areas*, there remains the possibility for *archaeological remains*.

3.5.3.3 *Archaeological Resources Mitigation Measures*

<u>No-Electrification Alternative.</u> *No mitigation is required.*

<u>Electrification Program Alternative.</u> *A Cultural Resources Programmatic Agreement (PA) will be developed among the Federal Transit Administration (FTA), JPB, the SHPO, and if* *required, the Advisory Council on Historic Preservation. The PA will apply to project activities both prior to and during construction. This Agreement will address the following requirements.*

Unless avoidance is certain, in those areas identified as most sensitive for buried resources, exploration with a coring device or a backhoe (depending on the extent of planned project impacts) will be conducted to determine whether buried resources are present. Any such exploration will be done under the direction of a qualified geoarchaeologist prior to initiating construction.

Where known sites cannot be avoided, a qualified archaeologist will conduct evaluation of those portions of the site within the APE, in consultation with the Native American community and the State Office of Historic Preservation.

Any ground-disturbing project activities within the three zones of special sensitivity (Hamilton shell mound zone, Third Mission Santa Clara, Tamien Station), or other known sites specified in the PA, will require testing and/or data recovery. Any such work will be guided by a detailed research design and treatment plan. Consultation with the Native American community and the State Office of Historic Preservation will be conducted in accordance with the PA.

As required by the PA, a pre-construction Burial Agreement will be drawn up between the Joint Powers Board and the Native American Heritage Commission (in consultation with the local Native American community) to outline procedures to be followed if Native American burials are encountered during archaeological investigations or subsequent project construction. Discovery of any human remains within the APE will trigger the protocols outlined in Section 7050.5 of the California Health and Safety Code for the treatment of human remains outside a dedicated cemetery.

If cultural resources are inadvertently discovered during any ground-disturbing activities, work will stop within 100 feet of the area until the consulting archaeologist can assess the significance of the find. Furthermore, if additional ground-disturbing activities not addressed by the current project description are necessary, then the project would be subject to additional cultural resources study.

The JPB will comply with local archaeological mitigation measures and guidelines for its activities within local jurisdictions, including but not limited to the City of Santa Clara's Archaeological Monitoring and Treatment Plan.

3.5.4 HISTORIC ARCHITECTURAL RESOURCES

3.5.4.1 Setting

The inventory of built environment resources for the project consisted of a complete survey and evaluation of all resources within the APE through the update of the previous survey. Research and field investigations for architectural resources were conducted between spring 2000 and *f*all 2001, and *they* included preliminary and background research, property-specific research, and field surveys. A review of previous documentation evaluating historic resources along the Caltrain route was conducted in the California Historic Resources Information System Northwest Information Center at Sonoma State University and with the environmental compliance staff at the San Mateo County Transit District. Documents reviewed included the California Historic Resources Inventory (HRI), the Caltrans Bridge Inventory, and previously prepared historic inventory and evaluation studies for projects on all or part of the Caltrain line. The HRI was examined to ascertain National Register *e*ligibility or other status for properties within the APE. The staff at the California *Office of Historic Preservation (OHP)* were consulted to verify the National Register status of properties. Local historic resource inventories were also examined, including those in Palo Alto, San Jose, *and* Santa Clara County. To verify addresses, dates of construction, and ownership for properties in areas outside of the Caltrain right-of-way, county assessor records were reviewed.

The previous survey identified 9 properties already listed in the National Register and 15 properties determined eligible for listing. On December 9, 2002, SHPO concurred in the eligibility determination for the 15 properties; the concurrence letter is included in Appendix C.

A revisit of the previous survey area from mile-post 0.0 to mile-post 52.0 was conducted between February and April 2008 to field verify the current condition and status of all resources that had previously been found eligible for listing. In addition to the field survey, the update to the inventory of built environment resources included research incorporated information from a large number of previous inventory and evaluation studies, including the National Register nominations (primarily for historic train stations on the Caltrain line). Other important sources of information regarding historic resources within the APE were surveys undertaken by local governments and studies required by other projects that intersected or paralleled the APE.

One-hundred ninety-five (195) buildings and structures were identified within the project APE. Of these, 98 were constructed on or prior to 1963; 73 of these resources were determined to not appear eligible for listing in the National Register. Of the remaining 25 properties, 9 properties were already listed in the National Register, 10 were determined eligible for listing in the National Register, and 6 appear eligible for listing in the National Register. Table 3.5-2 shows a listing of these 25 properties. FTA requested SHPO's concurrence in the determination that the 4 properties identified as "appearing eligible" are eligible for inclusion in the National Register under applicable criteria established by 36 CFR 60.4. SHPO concurred in the eligibility determination for these properties. A copy of each letter is included in Appendix C. All 25 properties are subject to Section 106 procedures and consultation as described in the regulatory framework.

Table 3.5-2 Properties Listed in, Determined Eligible for, or that Appear Eligible for Listing in the National Register and California Register

Mile Post	*Resource Name (and OHP status code)*	*Property Type*	*City*	*County*	*Year Built*
*01.33 **	*Tunnel No. 1[1] (3D)*	*Tunnel*	*San Francisco*	*San Francisco*	*1907*
*01.72 **	*22nd Street Overpass (3D)*	*Overpass*	*San Francisco*	*San Francisco*	*1906*
*01.90 **	*23rd Street Overpass (3D)*	*Overpass*	*San Francisco*	*San Francisco*	*1906*
*01.93 **	*Tunnel No. 2[1] (3D)*	*Tunnel*	*San Francisco*	*San Francisco*	*1907 / 1936*
*03.19 **	*Tunnel No. 3 (2)*	*Tunnel*	*San Francisco*	*San Francisco*	*1904-1907, 1999*
*04.27 **	*Tunnel No. 4 (2)*	*Tunnel*	*San Francisco*	*San Francisco*	*1904-1907*
*04.95-A**	*Schlage Lock Factory (2)*	*Building*	*San Francisco*	*San Francisco*	*1926*
09.59	*Airport Boulevard Underpass (3S)*	*Underpass*	*South San Francisco*	*San Mateo*	*1927/1935*
13.70	*Millbrae Station/Building (1)*	*Station*	*Millbrae*	*San Mateo*	*1907*
16.30	*Burlingame Station (1)*	*Station*	*Burlingame*	*San Mateo*	*1894*
*17.20 **	*East Poplar Avenue Underpass (2)*	*Underpass*	*San Mateo*	*San Mateo*	*1903*
*17.34 **	*East Santa Inez Avenue Underpass (2)*	*Underpass*	*San Mateo*	*San Mateo*	*1903*
*17.45 **	*Monte Diablo Avenue Underpass (2)*	*Underpass*	*San Mateo*	*San Mateo*	*1903*
*17.53 **	*Tilton Avenue Underpass (2)*	*Underpass*	*San Mateo*	*San Mateo*	*1903*
23.20	*San Carlos Station (1)*	*Station*	*San Mateo*	*San Carlos*	*1888*
27.80	*Atherton Station[2](3S)*	*Station*	*Atherton*	*San Mateo*	*1913*
28.90	*Menlo Park Station (1)*	*Station*	*Menlo Park*	*San Mateo*	*1867, 1890s, 1917*
29.69	*San Francisquito Bridge (2)*	*Bridge*	*Palo Alto*	*Santa Clara*	*1902*
30.10	*Palo Alto Station (1)*	*Station*	*Palo Alto*	*Santa Clara*	*1940*
30.13	*University Avenue Underpass (2)*	*Underpass*	*Palo Alto*	*Santa Clara*	*1941*
30.70	*Embarcadero Underpass (2)*	*Underpass*	*Palo Alto*	*Santa Clara*	*1936*
44.60	*Santa Clara Tower at Benton and Railroad Street[3] (1)*	*Station*	*Santa Clara*	*Santa Clara*	*1927*
44.70	*Santa Clara Station (1)*	*Station*	*Santa Clara*	*Santa Clara*	*1863-64, 1877, 1885*
47.35	*Santa Clara Street / Alameda Underpass (part of San Jose / Cahill Station) (1)*	*Underpass*	*San Jose*	*Santa Clara*	*1933*
47.50	*San Jose / Cahill Station (1)*	*Station*	*San Jose*	*Santa Clara*	*1935*

Table 3.5-2 Properties Listed in, Determined Eligible for, or that Appear Eligible for Listing in the National Register and California Register					
Mile Post	*Resource Name (and OHP status code)*	*Property Type*	*City*	*County*	*Year Built*
Total: 25 properties listed, determined eligible, or appear eligible for listing					

(1) Listed in the NRHP and CRHP
(2) Properties previously evaluated, found eligible, and received SHPO concurrence
(3S) Properties appear eligible for listing
(3D) Properites appear eligible for listing in the NRHP as a contributor to a historic district

[1] JRP determined that Tunnels 1 and 2 (MP 01.33 and 01.93) appeared to have significance, but did not retain enough integrity to convey that significance under the criteria for listing in the National Register and California Register. SHPO concurred with this conclusion in a letter dated December 9, 2002, which is included in Appendix C. In 2002, the San Francisco Planning Department conducted an inventory and evaluation of resources located in the Central Waterfront area, including Tunnels 1 and 2. The Planning Department presented their evaluation of the tunnels to the San Francisco Landmarks Preservation Advisory Board on May 15, 2002, and the board agreed with planning staff that these two tunnels appeared to be eligible for the National Register, and therefore appeared to be eligible for the California Register. The Central Waterfront Historic District inventory is identified in the Historic Property Data File with OHP status code 3 (appears eligible for listing in the National Register). Because they have been found eligible as contributors to the district, Tunnels 1 and 2 appear eligible for the National Register and are considered to be historical resources for the purposes of CEQA. "Directory of Properties in the Historic Property Data File" for San Francisco County, as of December 2007; San Francisco Landmarks Preservation Advisory Board, 2002 Minutes, Minutes of Regular Meeting, May 15, 2002, http://www.sfgov.org/site/planning_page.asp?id=15882. See also Section 15064.5(a)(2)-(3) of the CEQA Guidelines and the criteria outlined in Section 5024.1 of the California PRC.
[2] The Atherton Station was previously found "potentially eligible for the National Register of Historic Places for its local significance as a contributor to a historic district if a historic district is established encompassing the neighborhood surrounding the depot."
[3] The tower is part of the Santa Clara Station National Register property.
** Field verification noted that a previously eligible property had been changed in some manner.*

3.5.4.2 Historic Architectural Resources Impacts

No-Electrification Alternative. Under the No-Electrification Alternative, Caltrain would continue diesel train operations, and there would be no need for construction activities that would affect historical architectural resources. *The State of Good Repair Program's rehabilitation work would occur within the existing right-of-way and would not have an effect on identified historic architecture resources.*

Electrification Program Alternative. The potential impact of the Electrification Program Alternative on historic resources was carefully considered, and approaches were modified to ensure that design and construction treatments would have no effect or no adverse effect on such resources.

Inside Tunnels *1, 2,* 3, and 4, as shown in Figure 3.5-1, the OCS *supports will* be installed *as far* from the tunnel portal *as practical so* they would not be within the view of the portal. Drilling into the historic fabric would have an effect on the tunnel, but it would not be adverse. Current survey data for Tunnel*s 1, 2, and* 3 indicate that the OCS can be installed and operated to accommodate the movement of the electrified vehicle pantograph without *compromising the historic* fabric of the tunnel structure.

For Tunnel 4, the tunnel lining, but not the stone portal, *may* require notching by crown mining to achieve the clearances needed for electrified train operations. Notching would consist of cutting an approximate *6*-inch groove in the tunnel fabric in the three locations within the tunnel where clearances are insufficient. This clearance could be achieved without notching into the tunnel portal itself and thus would not be visible from outside the tunnel.

Prior to any crown mining or other action potentially affecting the historic tunnels, a structural *investigation* would be conducted to evaluate the probable effects on the structural *integrity* of the tunnels. Based on the findings of the study, design approach and construction methods *will be developed to minimize any potential impact to the* brick lining of the tunnels.

At Santa Clara Station, the OCS pole foundations nearest the historic station *will* be placed *and designed so as to be consistent with separation of modern versus historic features, as shown in* Figure 3.5-2. *Placement of OCS poles will be coordinated with the BART Santa Clara Project. Consultation will be conducted with the historic covenant holder from SHPO.*

At Diridon Station, the OCS poles *will be designed and placed to* minimize effects on the historic resource. *Placement of OCS poles will be coordinated with the BART Santa Clara Project. Consultation will be conducted with the historic covenant holder from SHPO.*

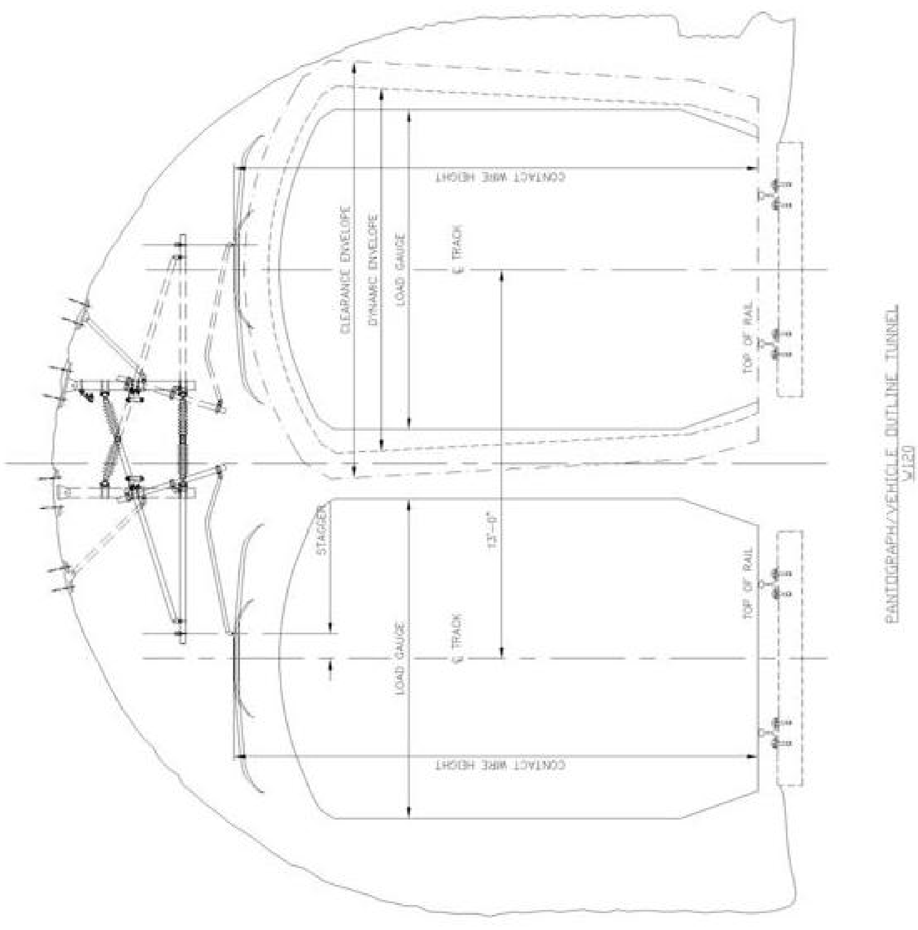

Figure 3.5-1
OVERHEAD CONTACT SYSTEM
TYPICAL TWO-TRACK SYSTEM TUNNEL CANTILEVER
CALTRAIN ELECTRIFICATION PROGRAM

Figure 3.5-2
SANTA CLARA HISTORIC STATION WITH OVERHEAD CONTACT SYSTEM
CALTRAIN ELECTRIFICATION PROGRAM

Figure 3.5-3
DIRIDON HISTORIC STATION WITH OVERHEAD CONTACT SYSTEM
CALTRAIN ELECTRIFICATION PROGRAM

A Finding of Effects (FOE) report, an amended FOE report, *and an Addendum to the FOE* were prepared for the Electrification Program Alternative in accordance with the guidelines for documentation in 36 CFR 800.11 to assess effects for each of the *25* historic resources identified as a part of this project. In Table 3.5-*3*, these findings are discussed separately by individual resource because the number and types of effects vary from one location to the next. SHPO *has* concurred with FTA's determination that the project would have no adverse effect on any of the *25* historic resources.

Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
Tunnel No. 1(3)	*01.33*	***Not adverse.*** *Power system supports would be installed within the tunnel. These are depicted on* ***Figure 3.5-1.*** *The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 1, the pole sets would be design W110, which are side poles with power systems over the individual tracks they power. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms.*
22nd Street Overpass (3)	*01.72*	***Not adverse.*** *Power system supports and/or barrier enhancements would be constructed on or near the overpass. The installation of these facilities would not require extensive physical changes to the historic properties, nor to their use, nor their character defining features. These project activities would introduce some new materials to the overpass and their setting, but the existing barriers on the bridges are modern additions and the setting has already been substantially altered since their original construction. Furthermore, the addition of these facilities would not add additional infrastructural elements to a corridor already substantially altered, and will not diminish the integrity of the properties' significant historic features such that they would no longer contribute to the historic district.*
23rd Street Overpass (3)	*01.90*	***Not adverse.*** *Power system supports and/or barrier enhancements would be constructed on or near the overpass. The installation of these facilities would not require extensive physical changes to the historic properties, nor to their use, nor their character defining features. These project activities would introduce some new materials to the overpass and their setting, but the existing barriers on the bridges are modern additions and the setting has already been substantially altered since their original construction. Furthermore, the addition of these facilities would not add additional infrastructural elements to a corridor already substantially altered, and will not diminish the integrity of the properties' significant historic features such that they would no longer contribute to the historic district.*
Tunnel No. 2(3)	*01.93*	***Not adverse.*** *Power system supports would be installed within the tunnel. These are depicted on* ***Figure 3.5-1.*** *The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 2, the pole sets would be design W110, which are side poles with power systems over the individual tracks they power. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms.*

Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
Tunnel No. 3 (3)	03.19	**Not adverse.** Power system supports would be installed within the tunnel. These are depicted on **Figure 3.5-1.** The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 3, the pole sets would be design W110, which are side poles with power systems over the individual tracks they power. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms.
Tunnel No. 4 (3)	04.27	**Not adverse.** Power system supports would be installed within the tunnel. These are depicted on **Figure 3.5-1.** The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 4, the pole sets would be *design* W114, formed by two pole sets that provide a wide headspan to support the power system over multiple tracks. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms (particularly at Tunnel No. 4's southern portal, the Bayshore Station). Although crown mining of the tunnel would be required in three separate sections, it would not be visible from outside the tunnel portals.
Schlage Lock Factory	04.95	**Not adverse.** Poles and catenaries would be installed in the railroad right-of-way running east of the Main Building. The Main Building is one of a group of buildings interconnected with a modern warehouse that will be demolished to accommodate power requirements*;* however, the project would not affect the Main Building portion of the Schlage Plant. The poles would be located along the railroad line at a substantial distance from the Main Building. The installation of poles in this location would have no adverse *effects* on the attributes that make the Main Building appear to meet the criteria for listing in the *National Register,* and the building will not be directly affected by construction.
Airport Boulevard Underpass (3)	09.59	**Not adverse.** Power cables would be suspended parallel to and above the Airport Boulevard Underpass. The power cables would use W114 pole sets. The pole sets would support a headspan that crosses the track at the same angle as the roadway beneath. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and because the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.
Millbrae Station (1)	13.70	**Not adverse.** Poles and catenaries would be installed near the location of the moved historic station. The type of pole proposed for this location is *design* W113; the pole sets provide a headspan with wires that span the multiple tracks at this location. They would be placed up- and down-track from the station; none would be placed directly in front of the structure. The installation of poles in this location would have no adverse *effect* on the attributes that made the Millbrae Station eligible for listing in the *National Register* nor those listed in the preservation covenant; the station would not be directly affected by construction. *I*t was previously moved from its original location closer to Millbrae Avenue, and its setting has already been substantially altered by modern development and construction in its immediate vicinity.

Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
Burlingame Station (1)	16.30	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W113. The poles would be set in pairs supporting a headspan of power wires over the tracks in this location. They would be placed between the station and the currently active Caltrain track, and there is a relatively wide concrete platform area in front of the historic station; none would be placed directly in front of the structure. The installation of poles in this location would have no adverse *effect* on the attributes that made the Burlingame Station eligible for listing in the *National Register*; the station would not be directly affected by construction, and its setting has already been substantially altered by modern development and construction in its immediate vicinity. None of the features listed in the preservation covenant would be affected by the proposed project.
East Poplar Ave. Underpass (3)	17.20	**Not adverse.** Power cables would be suspended parallel to and above the East Poplar Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and because the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.
East Santa Inez Ave. Underpass (3)	17.34	**Not adverse.** Power cables would be suspended parallel to and above the East Santa Inez Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath, and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridges that make it appear to meet the criteria for listing in the *National Register*.
Monte Diablo Ave. Underpass (3)	17.45	**Not adverse.** Power cables would be suspended parallel to and above the Monte Diablo Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.
Tilton Avenue Underpass (3)	17.53	**Not adverse.** Power cables would be suspended parallel to and above the Tilton Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.
San Carlos Station (1)	23.20	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W112. The poles for side pole sets that power individual sets of tracks would be placed above the historic station on the modern embankment made by the 1999 grade separation project along the currently active Caltrain track. None would be placed directly in front of the structure. The installation of poles in this location would have no adverse *effect* on the attributes that made the San Carlos Station eligible for listing in the National Register; the station would not be directly affected by construction; and, as noted above, its setting has already been substantially altered by construction of the grade separation project embankment in 1998-1999. None of the significant features listed in the preservation covenant would be affected by the proposed project.

Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
Atherton Station (3)	27.80	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W118. The poles would be set in pairs that support headspans of wires that provide power to widely spaced dual tracks. The poles would be placed between the station and the currently active Caltrain track, and there would be a relatively long span between the poles that will carry the power cables above the track in front of the historic station. None of the poles would be placed directly in front of the structure, the nearest being approximately 40 feet from the station building. The installation of poles in this location would have no adverse *effect* on the attributes that make the Atherton Station appear to meet the criteria for listing in the *National Register*, and the station itself would not be directly affected by construction.
Menlo Park Station (1)	28.90	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W118. The poles would be set in pairs that support a headspan that provides power to two widely separated tracks. They would be placed between the station and the currently active Caltrain track, and there would be at least 40 feet between the station building and the nearest pole. None would be placed directly in front of the structure. The installation of poles in this location would have no adverse *effect* on the attributes that make the Menlo Park Station eligible for listing in the *National Register*; the station would not be directly affected by construction, and modern previous improvements to the station area and in its immediate vicinity have already altered the original station setting. None of the “significant features” specified in the covenant agreement would be affected by the proposed project.
San Francisquito Bridge (3)	29.69	**Not Adverse.** Power cables would be suspended from the upper portions of the San Francisquito Creek Bridge truss. The power cables would use fasteners and brackets to support the power lines. The brackets would be attached to the existing structure, but no part of the existing structure would be removed as a part of this project. Installation of the main support brackets would require no permanent modification to the bridge structure and would be completely removable. Installation of the static wire grounding brackets would require site drilling of eight 5/8-inch-diameter clearance holes with the brackets completely removable. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing railroad line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.
Palo Alto Station (1)	30.10	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W110. This design provides a single pole set alongside the tracks it powers. The poles would be placed between the station and the two currently active Caltrain tracks, and between the tracks away from the station and other contributing structures. Only one set of poles would be placed directly in front of the structure, but *they* would be located 40 feet to the east and would be separated from the station by one of the two sets of active tracks. The next nearest set of poles to the historic station would be more than 60 feet away to the northeast. The installation of poles in these locations would have no adverse *effect* on the attributes that make the Palo Alto Station eligible for listing in the *National Register*, and none of the resources listed in the nomination would be directly affected by the installation of the poles. Only the setting of the tracks would be slightly affected, in that the poles would be installed between them, and would extend over them, at this location.
University Avenue Underpass (3)	30.13	**Not adverse.** Power cables would be suspended parallel to and above the University Avenue Underpass. The power cables would use W110 pole sets. The poles in this configuration would be set at the side of the track they power. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.

Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
Embarcadero Underpass (3)	30.70	**Not adverse.** Power cables would be suspended parallel to and above the Embarcadero Road Underpass. The power cables would use W110 pole sets. The poles in this configuration would be set at the side of the track they power. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.
Santa Clara Station (1) and the Station Tower	44.70	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W114. This design provides pole sets consisting of two poles supporting a headspan that provides power to the tracks beneath. The poles would be placed between the station and the currently active Caltrain track. The pole at the northern end of the station would be located near a modern steel and glass passenger-waiting shelter. The southernmost pole would be sited east of the old set of tracks nearest the historic station (retained as an example of the relationship of the station to the original line and no longer operative) and set in the modern poured concrete passenger platform. This is depicted on the photo-simulation included as **Figure 3.5-2**. The pole would be located among the modern electroliers on this platform. The poles would not be located near the speeder shed or the utility shed. Two sets of W114 poles would be located to each side of the tower, one between it and the stub of Benton Street, the other more than 50 feet to the north. The installation of poles in these locations would have no adverse *effect* on the attributes that made the Santa Clara Station, its tower or sheds eligible for listing in the *National Register*, nor would it affect features described in the preservation covenant. The station and contributing resources would not be directly affected by construction, and modern previous improvements to the station area and in its immediate vicinity have already affected – to a substantial degree – the original station setting. The original station was located adjacent to an active freight and passenger track in a relatively sparsely settled agricultural area east of the old Santa Clara mission; its current setting is a combination of industrial and commercial buildings, modern streets, and a large and active railroad freight yard.
Alameda Underpass (1)	47.35	**Not adverse.** Power cables would be suspended parallel to and above the Alameda Underpass. The power cables would use W113 pole sets north of the Alameda and W114 sets in the rail yard. In both instances, pole sets would support a headspan that crosses the track at the same angle as the roadway beneath. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse *effect* on the characteristics of the bridge that make it appear to meet the criteria for listing in the *National Register*.

Table 3.5-*3*: Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
Cahill/Diridon Station (1)	47.50	**Not adverse.** Poles and catenaries would be installed to extend through the butterfly passenger shelters (often called “umbrella” sheds) on the Caltrain platforms at the Cahill Station. These sheds are contributing elements to the Cahill Station National Register Historic District, a resource composed of six related resources, including the main terminal building, the passenger umbrella sheds, the tunnels connecting the terminal to the platforms, car cleaners shed, water tank, *and* the Alameda Underpass (grade separation). The butterfly passenger sheds are the only resource that would be directly affected by the project. The station complex is an active facility, serving Amtrak, Caltrain, and UPRR freight trains. Also, VTA is constructing an underground intermodal connection station to the southwest of the terminal building. The butterfly passenger sheds have a generally “Y” shaped cross section, with two shed roof surfaces running parallel to the active Caltrain lines. The installation of catenaries in this location would be accomplished by removing the original “I” beam posts that support the shed roofs, and replacing them in kind with somewhat larger “I” beam posts that would extend sufficiently high above the shelters to allow installation of the power system. The system would extend beyond the passenger platforms into the rail yard west of the station, thus providing power to trains on the yard tracks. The appearance of the butterfly passenger shed posts to those waiting for trains would be slightly different because of the increased dimension required for their greater heights, but the portion of the post extending above the shelter would not be visible from beneath the shelter. It would be visible from north or south of the platform shelters, and to a limited degree by persons waiting for trains on the adjacent platform; **Figure 3.5-3** provides a photo-simulation of the proposed installation. The locations of the poles are depicted on **Figure 3.5-3**. The types of pole proposed for this location are W118 and W114. While the installation of poles in this location would change the materials of the original butterfly passenger sheds, it would have no adverse effect on the attributes that made the sheds a contributing element of the Cahill Station National Register District. No other resource within the district would be directly affected by construction.

(1) Listed in the *National Register*
(2) Determined eligible for listing in the *National Register* by consensus determination (by OHP or *Advisory Council*)
(3) Appears to meet the criteria for listing in the *National Register*

3.5.4.3 Historic Architectural Resources Mitigation

As there would be no adverse affects to historic architectural resources, no mitigation measures are *required for either the No-Electrification or Electrification Program Alternatives*.

3.5.5 OTHER HISTORIC LANDMARKS

3.5.5.1 Setting

A large and very old redwood tree, known as “El Palo Alto,” is located adjacent to the Caltrain right-of-way in the *c*ity of Palo Alto. The tree has been recognized through at least three historic preservation programs, both locally and statewide, and is identified as California State Historic Landmark #2, a State Point of Historic Interest, and City of Palo Alto Heritage Tree #1. The state landmark status (Landmark #2) was conferred in 1954. Because the SHPO did not develop specific uniform standards for landmark designation until well after many resources had been identified, landmarks with a number lower than 770 are not considered to have been evaluated for the California Register. Nevertheless, the tree is described as follows in the SHPO's published list of state landmarks: “Portola Journey's End. In 1769 the Portola expedition of 63 men and 200 horses and mules camped near El Palo Alto, the tall tree. They had traveled from San Diego in search of Monterey but discovered instead the Bay of San Francisco” *(*SHPO, California Historical Landmarks *[*1990*]*, 219*)*. In 1974, the tree was designated as State Point of Historic Interest #SCL-026, in recognition of its local significance *(*SHPO, California Points of Historic Interest *[*1992*]*, 65*)*. A recent City of Palo Alto press release states that the tree is estimated to be more than 1,000 years old and more than 110 feet high *(*City of Palo Alto, “Press Release: Palo Alto Celebrates California Arbor Day 2002 and Tree City-USA,” February 26, 2002, www.city.palo-alto.ca.us/press/*)*.

3.5.5.2 Other Historic Landmarks Impacts

The “El Palo Alto” redwood tree is located outside of the Caltrain right-of-way and would not be affected by either the No-Electrification Alternative or the Electrification Program Alternative.

3.5.5.3 *Other Historic Landmark Mitigation*

As there would be no impact to the “El Palo Alto,” no mitigation measures are required.

3.6 GEOLOGY, SOILS AND SEISMICITY

3.6.1 SETTING

The Caltrain corridor is located along the flatlands on the west side of San Francisco Bay and the northern part of the Santa Clara Valley.

Background information regarding the geology of the project corridor was obtained from the Preliminary Environmental Survey of San Francisco/San Jose Railroad Right-of-Way (Wahler Associates, no date); BART-San Francisco Airport Extension Final Environmental Impact Report/Statement (BART, FTA, Sam*T*rans, June 1996); and Seismic Retrofit Study: Eight Railroad Bridges (Golder Associates, Inc., November 2000).

The surficial deposits that underlie most of this portion of the corridor can be characterized as follows:

- Artificial Fill – mixed sand, silt, clay, gravel, and man-made debris
- Younger Alluvial Fan Deposits – unconsolidated permeable sand and silt, with coarse sand and gravel and moderately permeable fine sand, silt, and clayey silt
- Older Alluvial Fan Deposits – weakly consolidated irregularly interbedded clay, silt, sand, and gravel
- Interfluvial Fresh Water Basin Deposits – organic clay and silty clay
- Bay Mud – unconsolidated, water-saturated; soft, organic rich clay and silty clay
- Colma Formation – weakly to moderately consolidated sand with gravel, sandy silt, and clay
- Merced Formation – unconsolidated sandy silts and fine sands

Artificial fills are found mostly in areas that appear to be reclaimed tidal flats in San Francisco, Brisbane, and South San Francisco. Bedrock is found along the route in short reaches in San Francisco and Brisbane. The Colma Formation is found along portions of the route in South San Francisco and in San Bruno. Bay Mud deposits are found along short segments of the route in Millbrae near the entrance to the *San Francisco International A*irport, in Burlingame, south of the airport, and possibly in Belmont. A major portion of the route south of the airport to San Jose is underlain by younger and older alluvial fan deposits and interfluvial basin deposits consisting of unconsolidated to weakly consolidated mixed sand, silt, clay, and gravel.

3.6.1.1 Seismicity

The project corridor is located within the seismically active San Francisco Bay region that has been subjected to numerous large earthquake events. The U.S. Geological Survey (USGS) has organized a working group, known as WG99, to study earthquakes in the Bay Area. WG99 was expanded in 1997 to include more than 100 scientists from federal and California State governments, consulting firms, industry, and universities. WG99 has estimated that there is a 70 percent chance of at least one magnitude 6.7 or greater earthquake affecting the San Francisco Bay region in the next 30 years. The major active fault that could impact the project corridor is the San Andreas Fault, which runs roughly north-south along the west coast of the San Francisco Peninsula. Based on the source documents cited above, this fault comes as near as 1.9 miles west of the corridor (BART/FTA/Sam*T*rans, 1996), and at other points approximately 10 miles (City of San Jose, 2000) from the corridor. The San Andreas Fault dominates the tectonics, geology, and physiography of the entire project corridor. Other major active faults that could cause strong shaking in the project corridor are the Hayward, Calaveras, and Seal Cove-San Gregorio faults. No known faults cross the project corridor.

When an earthquake occurs, waves of energy are transmitted through the earth, resulting in a variety of seismic effects, including surface rupture, ground shaking, and ground failure such as liquefaction. Surface rupture is most common within the vicinity of a main fault trace and along other faults associated with the main fault. Ground shaking is the phenomenon most readily associated with earthquakes and may be experienced as a violent shuddering or rocking motion, or as a gentle nudge. Soil liquefaction is a phenomenon in which saturated soils experience sudden and nearly complete loss of strength during seismic events. If not confined, the soil acquires a mobility sufficient to permit both horizontal and vertical movements. Liquefaction can result in shallow foundation failures, boiling, severe settlement, and failure of fill supported on liquefiable soils. The magnitude of liquefaction-induced settlement depends on the thickness and relative density of the liquefiable soils and on the intensity of ground shaking. Soils most susceptible to liquefaction are loose, uniformly graded, fine-grained sands. Saturated silty and clayey sands may also liquefy during strong ground shaking, although clayey sands liquefy only if the clay content is quite low.

Due to the presence of artificial fill overlying Bay Mud and a high ground water table in the vicinity of San Francisco *International* Airport, liquefaction potential in this area is moderate to high. Occasional sand layers known to exist in Bay Mud may also be susceptible to liquefaction. Elsewhere along the corridor between San Francisco and the San Francisco International Airport, the granular soils of the Colma Formation and alluvial deposits within the Colma Creek drainage basin are considered to have a low liquefaction potential. In the City of San Mateo, test borehole logs for borings 3,000 feet east of the project showed layers of coarse sand at *approximately* 25 feet below the ground surface (Golder Associates, Inc., November 2000). These sand layers may pose potential liquefaction hazards, although subsurface conditions could change abruptly over short distances.

3.6.2 IMPACTS

3.6.2.1 Geology and Soils

Corrosive subsurface soils could have a detrimental effect on concrete, reinforcing steel, and metals exposed to these soils. Substations could be subject to settlement if they are constructed on artificial fills or soft compressible soils.

Seismicity. Fault rupture along the project alignment in this area is unlikely, as no known faults cross the project corridor. Strong ground shaking would, however, be experienced during an earthquake. Substations and catenary poles could be subject to liquefaction effects, such as foundation failure or settlement, during an earthquake, if they are constructed on liquefiable soils.

3.6.3 MITIGATION

The following design features are recommended to be integrated into the proposed project:

Site-specific geotechnical studies will be performed at the substation sites to identify specific soil conditions and develop seismic design data for substations. *Geotechnical report recommendations will be implemented during project design and construction as appropriate.*

Project components, including electrical poles and pole foundations, will be designed in accordance with Caltrain criteria to withstand corrosive subsurface soils.

Project elements will be built in accordance with Caltrain criteria and the Uniform Building Code (UBC) to withstand settlement and forces associated with the maximum credible earthquake (MCE).

3.7 HAZARDOUS *WASTE AND* MATERIALS

The Electrification Program Alternative would erect OCS poles within an active commuter and freight rail corridor that has been in use since the 1860s. In addition, traction power station facilities would be constructed *both inside and* outside the right-of-way on sites that are in industrial use or are located close to existing power sources. There is potential to encounter hazardous wastes in these areas. This section summarizes data sources to identify known hazardous waste sites and *identify* mitigation measures*, as appropriate*.

3.7.1 METHODOLOGY AND DATA SOURCES

Primary sources for contaminat*ed* sites *data* with potential to affect the Caltrain right-of-way or proposed traction power facility locations include:

1. The 1991 Preliminary Environmental Survey of San Francisco/San Jose Railroad Right-of-Way: Volume I report by Wahler Associates. This comprehensive review of regulatory agency and historical databases was performed when the JPB purchased the Caltrain right-of-way from Caltrans. It included a walking tour of the entire corridor.
2. Hazardous Wastes Initial Site Assessment for Proposed Traction Power Facilities for the Caltrain Electrification Program by ERM West, 2002. This study *involved a* review *of* regulatory and historical databases and included a walking tour of the *previously* proposed traction power facility sites.
3. *Parsons conducted a review of regulatory and historical databases and a walking tour of the proposed traction power facility sites for the present environmental document (Parsons, 2007 and 2008).*

3.7.2 SETTING

The Caltrain right-of-way has been an active rail corridor for *more than* 100 years, and rail operations are a potential source of contamination along the entire *52*-mile project corridor. The database search conducted by *Parsons* recorded a total of *189* sources of contamination within *0.25*-mile of TPS sites. These are identified in Table 3.7-1.

3.7.3 IMPACTS

The entire Caltrain right-of-way is considered an area with a high probability of encountering hazardous wastes. Mitigation measures have therefore been developed, as identified in Section 3.7.4, to address anticipated contamination.

Parsons (2007, 2008) identified *known* potential sources of hazardous waste within *a 0.25*-mile area of the proposed TPS *properties*, as *listed* in Table 3.7-1. *A Caltrans District 4 Maintenance Station, located at 166 Harbor Way, is a site with known contamination. The TPS1 Alt B proposed location is located either on this contaminated site or immediately adjacent to the contaminated site. In 2005, Caltrans terminated the Voluntary Cleanup Agreement with the Department of Toxic Substances Control. A cap had been put in place to prevent potential exposure to subsurface contamination. One of the conditions of the terminated agreement is that Caltrans will evaluate any subsurface conditions prior to any development of this property.*

At the majority of these sites, the environmental risk *would be considered* “neutral,” meaning that conditions at those sites are typical of properties in urbanized areas where there is a history of industrial use. Low levels of aerially deposited contaminants, such as metals and/or poly-nuclear aromatic hydrocarbons, may affect such properties. Low levels of pesticides/herbicides may also be present due to past weed and pest control activities. The presence of low-level contamination of this nature may warrant worker health and safety and

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
PS1	A.P. Green Refractories, Inc. 580 Indiana Street 0.14-mile SE of PS1	LUST, UST	Gasoline was discharged and contaminated soil only. The case was closed in 1995.	LOW
	Consumers Distribution 1350 17th Street 0.20-mile NW of PS1	LUST	Gasoline was discharged and contaminated soil only. The case was closed in 1996.	LOW
	Copy Copia, Inc. 1400 17th Street 0.23-mile NW of PS1	LUST, RCRAGEN-SGN	Miscellaneous motor oil and vehicle fuels were discharged. The case was closed in 1993.	LOW
	Craftsman Tool 131 Missouri Street 0.17-mile NW of PS1	LUST	Gasoline was discharged and contaminated soil only. The case was closed in 1998.	LOW
	Direct Mail Service 209 Mississippi Street 0.07-mile SW of PS1	LUST	Gasoline was discharged and contaminated soil only. The case was closed in 2000.	LOW
	The Glidden Paint Company 1000 16th Street 0.22-mile NW of PS1	RCRAGEN-LGN, LUST, UST	Waste oil was discharged and contaminated soil only. The case was closed in 1999.	LOW
	L and H Paint Products/Company 150 Mississippi 0.07-mile NW of PS1	LUST, UST	Gasoline was discharged and contaminated soil only. The case was closed in 1993.	LOW
	Louie Property 200 Mississippi 0.07-mile SW of PS1	LUST	Gasoline and waste oil were discharged. A preliminary workplan has been submitted, but no action has been taken yet.	MED
	Macor, Inc. 1200 17th Street 0.14-mile NW of PS1	LUST	Gasoline was discharged and a preliminary site assessment was submitted. This case remains open. A second UST on site discharged gasoline and contaminated soil only. This case was closed in 2005.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Miraposa Street and Highway 280 880 Miraposa Street Vicinity 0.07-mile SE of PS1	LUST	Mineral Spirits were discharged and contaminated soil only. The case was closed in 1998.	LOW
	Mission Bay Parcel 24 1600 16th Street 0.23-mile NE of PS1	LUST	Motor fuels were discharged and contaminated soil only. The case was closed in 1999.	LOW
	North Half of Mississippi Street 17th and Mississippi Street 0.08-mile NW of PS1	STATE	Unknown waste found in soil and groundwater. Soluable lead found in soil. A preliminary assessment is required. Case is still open as of 2000.	MED/HIGH
	Pip Printing 2001 3rd Street 0.21-mile SE of PS1	LUST	Gasoline was discharged and contaminated soil only. The case was closed in 2003.	LOW
	Plant Design/Runnymeade Invst. 729 Tennessee Street 0.25-mile SE of PS1	LUST	Waste oil was discharged and contaminated soil only. The case was closed in 1994.	LOW
	Rainbow 120 Mississippi Street 0.08-mile NW of PS1	ERNS	12 quarts of Formaldehyde were spilled on land. The spill was cleaned up in 1994.	LOW
PS2	Bayshore Gas and Service 2260 Bayshore Boulevard 0.09-mile NE of PS2	LUST, UST	Gasoline was discharged. The site is undergoing pollution characterization as of 10/18/07.	MED
	Bayshore Service 2598 Bayshore Boulevard 0.21-mile SW of PS2	LUST, RCRAGEN-SGN, UST	Two LUST events occurred at this site. Gasoline was discharged and contaminated soil only. The leak was still being confirmed as of 10/18/07. Gasoline was discharged, and this case was closed in 1994.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Norcal Chet C Smith Truc 515 Tunnel Avenue 0.25-mile SE of PS2	UST, LUST	Diesel was discharged. The case was closed in 2005.	LOW
	Olympican Oil/Dave Saleh Serv. 2550 Bayshore Boulevard 0.18-mile SW of PS2	UST, LUST	Gasoline was discharged and contaminated soil only. The case was closed in 1995.	LOW
	San Francisco So*l*id Waste Tran and San Francisco Haz Waste Collection SWETS 501 Tunnel Avenue 0.11-mile SE of PS2	SWL, UST, LUST, RCRAGEN-SGN	There have *been* several LUSTs at this site. Unleaded gasoline was discharged. This case was closed in 2006. Gasoline was discharged. This case has remedial action ongoing as of 10/18/07. Waste oil was discharged contaminating soil only. This case has a preliminary site assessment underway. Gasoline was discharged. This case was closed in 2001. Waste oil was discharged. This case was closed in 2001. Waste oil was discharged contaminating soil only. This case was closed in 1995. Waste oil was discharged. This site is undergoing post remedial action monitoring. Diesel was discharged. This case was close in 1999.	LOW/MED
	Schlage Lock Company 2401 Bayshore Boulevard 0.06-mile NW of PS2	RCRAGEN-SGN, UST, STATE, ERNS	15 gallons of sodium dimethyl dithiocarbonate was discharged on land. The material evaporated - no cleanup was required.	LOW
	T.W. Automotive 2500 Bayshore Boulevard 0.14-mile SW of PS2	UST, LUST	This site had two LUST events. Gasoline was discharged in both events. Both events were closed in 1997.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Union Oil Service Station 4524 901 Airport 0.10-miles NW of TPS1 Alt X/Y	UST, LUST	Miscellaneous motor vehicle fuels were discharged. Post remedial action monitoring is taking place.	LOW
TPS1 Pref	Allan Baker Company 160 170 180 Sylvester Road 0.14-mile SW of TPS1 Pref	*LUST, RCRAGEN - SGN, UST*	*Gasoline was discharged and contaminated soil only. Case was closed in 2000. One UST is still active and one has been closed. No violations for the SGN.*	LOW
	Bell Electric Supply 208 E Grand Avenue 0.24-mile NE of TPS1 Pref	UST, LUST	*Miscellaneous motor vehicle fuels were discharged and contaminated soil only. The case was closed in 1995.*	LOW
	Britannia Developments 115 - 185 Harbor 0.16-mile NE of TPS1 Pref	LUST	Lead was discharged. Post remedial action monitoring is being conducted.	LOW
	Caltrans District 4 Maint. Station *Caltrans/SSF Maintenance Station* 166 Harbor Way 0.16-mile SE of TPS1 Pref	RCRAGEN-SGN, VCP, STATE	*Soil is contaminated with hydrocarbons, soluable lead, copper, mercury and zinc. Groundwater is contaminated with arsenic, barium, lead, cadmium, nickel, selenium, thallium, mercury and diesel and gasoline. In 2005, Caltrans terminated the Voluntary Cleanup Agreement. A cap was installed and will remain to prevent potential exposure to subsurface contamination.*	LOW/MED
	CTC Food International 131 W Harris Avenue 0.24-mile SW of TPS1 Pref	LUST, UST	*Gasoline was discharged. The case was closed in 2000.*	LOW
	Don's Auto Wreckers 137 Harbor Way 0.16-mile NE of TPS1 Pref	LUST	Gasoline was discharged. The case was closed in 1997.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	East Grand Olympic Cardto 190 E Grand Avenue 0.10-mile NE of TPS1 Pref	UST, LUST	Unleaded gasoline was discharged. Pollution characterization is underway.	LOW
	KB South San Francisco 175 Sylvester 0.12-mile SW of TPS1 Pref	LUST	Diesel was discharged. A preliminary site assessment is underway.	LOW/MED
	Mattison and Shidler 205 Grand Avenue 0.23-mile NE of TPS1 Pref	LUST	Miscellaneous motor vehicle fuels were discharged and contaminated only soil. The case was closed in 1995.	LOW
	Nella Oil 219 Texaco Olympian Gateway 176 Gateway Boulevard 0.24-mile SW of TPS1 Pref	RCRAGEN-VGN	*No violations reported.*	LOW
	Olympian Gateway *176 Gateway Boulevard* *0.24-miles SW of TPS1 Pref*	*LUST*	*Diesel was discharged. The case was closed in 2004.*	*LOW*
	Olympian Ryder Truck Rental 186 E Grand Avenue 0.07-mile NE of TPS1 Pref	LUST, UST, RCRAGEN-SGN	Miscellaneous motor vehicle fuels were discharged. The case was closed in 1996.	LOW
	Ryder Truck Rental *186 E Grand Avenue* *0.07-miles NE of TPS1 Pref*	*RCRAGEN-SGN*	*No violations reported.*	*LOW*
	Pony Express 108 Sylvester Road 0.11-mile SW of TPS1 Pref	LUST, UST	Gasoline was discharged and contaminated soil only. The case was closed in 2000. Gasoline was discharged in a separate event. A preliminary site assessment is underway.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	So. San Francisco Tire Service 114 Harbor Way 0.16-mile NE of TPS1 Pref	UST, LUST	Unleaded gasoline was discharged. Post-remedial action monitoring is underway. Unleaded gasoline was discharged in a separate event. This case was closed in 2003.	LOW
	Traditional Wood Works 184 Harbor Way 0.17-mile SE of TPS1 Pref	LUST, UST, RCRAGEN-SGN	Two events involving gasoline being discharged. Both cases closed in 2001.	LOW
TPS1 Alt A	*Allan Baker Company* *160 Sylvester Road* *0.11-miles NW of TPS1 Alt A*	*LUST, RCRAGEN - SGN, UST*	*Gasoline was discharged and contaminated soil only. Case was closed in 2000. One UST is still active and one has been closed. No violations for the SGN.*	*LOW*
	Avis Rent A Car System 230 Harbor Way 0.21-miles SE of TPS1 Alt A	RCRAGEN-SGN, UST, LUST	No violations for SGN. Waste oil was discharged and post remedial action monitoring is ongoing. Unleaded gasoline was discharged. The case was closed in 2003.	LOW
	Bay Bridge Hardware Supply 151 Mitchell Avenue 0.12-miles SW of TPS1 Alt A	LUST	Miscellaneous motor fuels were discharged. The case was closed in 1995.	LOW
	Budget Rent A Car 177 S Airport Boulevard 0.18-miles SW of TPS1 Alt A	LUST, UST, RCRAGEN - SGN	Miscellaneous motor fuels were discharged. Post remedial action monitoring ongoing. No violations for SGN. A UST has been closed at this site.	LOW
	Business 145 Mitchell Avenue 0.12-miles SW of TPS1 Alt A	UST	The UST is inactive. No violations reported.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Caltrans District 4 Caltrans/SSF Maintenance Station 166 Harbor Way 0.25-miles NE of TPS1 Alt A	*RCRAGEN-SGN, VCP, STATE*	*Soil is contaminated with hydrocarbons, soluable lead, copper, mercury and zinc. Groundwater is contaminated with arsenic, barium, lead, cadmium, nickel, selenium, thallium, mercury and diesel and gasoline. In 2005, Caltrans terminated the Voluntary Cleanup Agreement. A cap was installed and will remain to prevent potential exposure to subsurface contamination.*	*LOW/MED*
	Color Craft 255 S Airport Boulevard 0.24-miles SW of TPS1 Alt A	*LUST, UST*	*Miscellaneous motor fuels were discharged. The case was closed in 2001.*	*LOW*
	Costers Furniture Refinishing 164 W Harris Avenue 0.07-miles SE of TPS1 Alt A	*RCRAGEN - SGN*	*No violations cited.*	*LOW*
	CTC Food International 131 W Harris Avenue 0.06-miles SE of TPS1 Alt A	*LUST, UST*	*Gasoline was discharged. The case was closed in 2000.*	*LOW*
	Exelixis, Inc. 170 Harbor Way 0.21-miles NE of TPS1 Alt A	*RCRAGEN - LGN*	*Administrative violations were reported in 2005.*	*LOW*
	Fibropharma Inc. 201 Gateway Boulevard 0.15-miles SW of TPS1 Alt A	*RCRAGEN - SGN*	*No violations cited.*	*LOW*
	Fibropharma Inc. 255 Gateway 0.12-miles SW of TPS1 Alt A	*RCRAGEN - SGN*	*General requirement (administrative) violations were reported in 2005.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Fire Station No 2 249 Harbor Way 0.23-miles SE of TPS1 Alt A	*UST*	*No violations reported.*	*LOW*
	Giusto S Speciality Foods Inc 241 Harris 0.09-miles NE of TPS1 Alt A	*UST*	*The UST is inactive. No violations reported.*	*LOW*
	Godar and Hossenlopp Printing Co 151 Mitchell Avenue 0.12-miles SW of TPS1 Alt A	*RCRAGEN - SGN*	*No violations cited.*	*LOW*
	Hertz Equipment Rental 9734-00 266 Harbor Way 0.21-miles SE of TPS1 Alt A	*UST*	*No violations reported.*	*LOW*
	KB South San Francisco 175 Sylvester 0.11-miles NW of TPS1 Alt A	*LUST*	*Diesel was discharged. A preliminary site assessment is underway.*	*LOW/MED*
	Unknown 175 Sylvester 0.11-miles NW of TPS1 Alt A	*ERNS*	*in 1990, five gallons of oil containing PCBs was discharged on to land only. The oil was completed contained and the contaminated soil was cleaned up.*	*LOW*
	Nella Oil 219 Texaco 176 Gateway Boulevard 0.03-miles NE of TPS1 Alt A	*RCRAGEN - VGN*	*No violations cited.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Olympian Gateway 176 Gateway 0.06-miles SW of TPS1 Alt A	*LUST*	*Diesel was discharged. The case was closed in 2004.*	*LOW*
	Pony Express 108 Sylvester Boulevard 0.15-miles NW of TPS1 Alt A	*LUST, UST*	*Gasoline was discharged and contaminated soil only. Case was closed in 2000.*	*LOW*
	Proteolix 225 A Gateway Boulevard 0.12-miles NE of TPS1 Alt A	*RCRAGEN - SGN*	*No violations cited.*	*LOW*
	REQMED Research Inc 201 Gateway Boulevard 0.15-miles SW of TPS1 Alt A	*RCRAGEN - Transporter*	*No violations cited.*	*LOW*
	SAM TRANS (Vacant) 196 Produce Avenue 0.25-miles SW of TPS1 Alt A	*LUST, UST*	*Miscellaneous motor fuels were discharged. The case was closed in 2000.*	*LOW*
	Sewage Pump Station 4 249 Harbor Way 0.23-miles SE of TPS1 Alt A	*LUST, UST*	*Diesel was discharged in 1994. Latest status is that the leak is being confirmed. Unleaded gasoline was discharged. The case was closed in 2003.*	*LOW*
	Shel Oil Company 140 Produce Avenue 0.24-miles SW of TPS1 Alt A	*LUST, RCRAGEN - SGN, UST*	*Diesel was discharged. The case was closed in 2005. No violations for SGN.*	*LOW*
	Shell Service Station 248 S Airport Boulevard 0.23-miles SW of TPS1 Alt A	*RCRAGEN - SGN*	*No violations reported.*	*LOW*
	Shore Line Diesel Maint Inc. 207 Harbor Way 0.22-miles NE of TPS1 Alt A	*RCRAGEN - SGN*	*No violations reported.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
	So San Francisco Tire Service 114 Harbor Way 0.24-miles NE of TPS1 Alt A	*UST, LUST*	*Unleaded gasoline was discharged. The case was closed in 2003.*	*LOW*
	Traditional Wood Works 184 Harbor Way 0.21-miles NE of TPS1 Alt A	*UST. LUST, RCRAGEN - SGN*	*Gasoline was discharged. The case was closed in 2001. No violations for SGN. USTs are still active on the site.*	*LOW*
TPS Alt. B	*Allan Baker Company 160 Sylvester Road 0.19-miles SW of TPS1 Alt B*	*LUST, RCRAGEN - SGN, UST*	*Gasoline was discharged and contaminated soil only. Case was closed in 2000. One UST is still active and one has been closed. No violations for the SGN.*	*LOW*
	Avis Rent A Car System 230 Harbor Way 0.17-miles SE of TPS1 Alt B	*RCRAGEN-SGN, UST, LUST*	*No violations for SGN. Waste oil was discharged and post remedial action monitoring is ongoing. Unleaded gasoline was discharged. The case was closed in 2003.*	*LOW*
	Bell Electrical Supply 208 E Grand Avenue 0.19-miles NE of TPS1 Alt B	*LUST, UST*	*Miscellaneous motor vehicle fules were discharged and contaminated soil only. The case was closed in 1995.*	*LOW*
	Britannia Developments 115 - 185 Harbor Way 0.12-miles NE of TPS1 Alt B	*LUST*	*Lead was discharged. Post remedial action monitoring is being conducted.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Caltrans District 4 Caltrans/SSF Maintenance Station 166 Harbor Way 0.07-miles NE of TPS1 Alt B	*RCRAGEN-SGN, VCP, STATE*	*Soil is contaminated with hydrocarbons, soluable lead, copper, mercury and zinc. Groundwater is contaminated with arsenic, barium, lead, cadmium, nickel, selenium, thallium, mercury and diesel and gasoline. In 2005, Caltrans terminated the Voluntary Cleanup Agreement. A cap was installed and will remain to prevent potential exposure to subsurface contamination.*	*HIGH*
	Codon (Grand Roebling Inv) 213 E Grand Avenue 0.21-miles NE of TPS1 Alt B	*LUST, UST*	*Gasoline was discharge and contaminated soil only. The case was closed in 1991.*	*LOW*
	Costers Furniture Refinishing 164 W Harris Avenue 0.16-miles SW of TPS1 Alt B	*RCRAGEN - SGN*	*No violations cited.*	*LOW*
	CTC Food International 131 W Harris Avenue 0.23-miles SW of TPS1 Alt B	*LUST, UST*	*Gasoline was discharged. The case was closed in 2000.*	*LOW*
	Don's Auto Wreckers 137 Harbor Way 0.09-miles NE of TPS1 Alt B	*LUST*	*Gasoline was discharged. The case was closed in 1997.*	*LOW*
	East Grand Olympic Cardtol 190 E Grand Avenue 0.15-miles NE of TPS1 Alt B	*LUST, UST*	*Unleaded gasoline was discharged in 1987. Pollution characterization is underway.*	*LOW*
	Exelixis, Inc. 170 Harbor Way 0.10-miles SE of TPS1 Alt B	*RCRAGEN - LGN*	*Administrative violations were reported in 2005.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
	Fire Station No 2 249 Harbor Way 0.22-miles SE of TPS1 Alt B	*UST*	*No violations reported.*	*LOW*
	Genemed Synthesis, Inc. 213 E Grand Avenue Suite 3 0.16-miles NE of TPS1 Alt B	*RCRAGEN - SGN*	*No violations reported.*	*LOW*
	George M Philpott Company Inc 115 Harbor Way 0.12-miles NE of TPS1 Alt B	*UST*	*The UST is active. No violations reported.*	*LOW*
	Giusto S Speciality Foods Inc 241 Harris 0.12-miles SW of TPS1 Alt B	*UST*	*The UST is inactive. No violations reported.*	*LOW*
	KB South San Francisco 175 Sylvester 0.18-miles SW of TPS1 Alt B	*LUST*	*Diesel was discharged. A preliminary site assessment is underway.*	*LOW*
	Mattison and Shidler 205 E Grand Avenue 0.19-miles NE of TPS1 Alt B	*LUST*	*Miscellaneous motor vehicle fules were discharged and contaminated soil only. The case was closed in 1995.*	*LOW*
	Metropolitan Furniture Corp 245 E Harris Avenue 0.21-miles SE of TPS1 Alt B	*RCRAGEN - LGN*	*No violations reported.*	*LOW*
	Nella Oil 219 Texaco 176 Gateway Boulevard 0.16-miles SW of TPS1 Alt B	*RCRAGEN - VGN*	*No violations cited.*	*LOW*
	Nella Oil 411 190 E Grand Avenue 0.12-miles NW of TPS1 Alt B	*RCRAGEN - VGN*	*No violations cited.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
	Olympian Gateway *176 Gateway* *0.25-miles SW of TPS1 Alt B*	*LUST*	*Diesel was discharged. The case was closed in 2004.*	*LOW*
	Oympian *186 E Grand Avenue* *0.14-miles NW of TPS1 Alt B*	*LUST, UST*	*Miscellaneous motor vehicle fules were discharged. The case was closed in 1996.*	*LOW*
	Pony Express *108 Sylvester Boulevard* *0.19-miles NW of TPS1 Alt B*	*LUST, UST*	*Gasoline was discharged and contaminated soil only. Case was closed in 2000.*	*LOW*
	Proteolix *225 A Gateway Boulevard* *0.12-miles NE of TPS1 Alt B*	*RCRAGEN - SGN*	*No violations cited.*	*LOW*
	Ryder Truck Rental *186 E Grand Avenue* *0.14-miles NW of TPS1 Alt B*	*RCRAGEN - SGN*	*No violations reported.*	*LOW*
	Sewage Pump Station 4 *249 Harbor Way* *0.22-miles SE of TPS1 Alt B*	*LUST, UST*	*Diesel was discharged in 1994. Latest status is that the leak is being confirmed. Unleaded gasoline was discharged. The case was closed in 2003.*	*LOW*
	Shore Line Diesel Maint Inc. *207 Harbor Way* *0.11-miles SE of TPS1 Alt B*	*RCRAGEN - SGN*	*No violations reported.*	*LOW*
	So San Francisco Tire Service *114 Harbor Way* *0.06-miles SE of TPS1 Alt B*	*UST, LUST*	*Unleaded gasoline was discharged. The case was closed in 2003.*	*LOW*
	Traditional Wood Works *184 Harbor Way* *0.07-miles SE of TPS1 Alt B*	*UST. LUST, RCRAGEN - SGN*	*Gasoline was discharged. The case was closed in 2001. No violations for SGN. USTs are still active on the site.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
PS3	ARC Electric Company Cameron Ashley Building Prod 1330 Marsten Road 0.15-mile NE of PS3	LUST, UST, RCRAGEN-LGN	Miscellaneous motor vehicle fuels were discharged. The site is undergoing post-remedial action monitoring. Another event involving miscellaneous motor vehicle fuels where discharge occurred. This case was closed in 1998.	LOW
	ARCO 0508 Prestige Stations, Inc. 1000 Broadway 0.21-mile SE of PS3	*LUST, UST, RCRAGEN-SGN*	*Gasoline was discharged. Pollution characterization is being conducted.*	*LOW*
	Beacon 56-4 Chevron 1101 Broadway 0.19-mile SE of PS3	*LUST, UST, RCRAGEN-SGN*	*Miscellaneous motor vehicle fuels were discharged. The site is undergoing pollution characterization. Another event involving miscellaneous motor vehicle fuels were discharge occurred. This case was closed in 2005.*	*LOW*
	Bekins Storage 1070 Broadway 0.19-mile SE of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 1991.*	*LOW*
	Biscay Auto Repair 1215 California Drive 0.16-mile SE of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 2000.*	*LOW*
	Burlingame Fire Dept Station 3 1399 Rollins Road 0.23-mile NW of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 2000.*	*LOW*
	Caulking Waterproofing, Inc. 1333 Marsten Road 0.16-mile NE of PS3	*LUST, UST*	*Two events involved gasoline being discharged. Both cases were closed in 1993.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
	City of Burlingame 1391 Rollins 0.15-mile NW of PS3	*LUST*	*An event involved miscellaneous motor vehicle fuels being discharged. The case was closed in 2004.*	*LOW*
	D and M Towing and Auto Autohaus Schmid Inc. 1213 Rollins Road 0.20-mile NE of PS3	*UST, LUST, RCRAGEN-SGN*	*An unknown material was discharged. The case was closed in 2001.*	*LOW*
	Desert Petroleum Fred Koo Service Station Gasco Service Station 1100 Broadway Avenue 0.18-mile SE of PS3	*LUST, UST*	*Perchlorethylene was discharged. The leak is still being confirmed. Miscellaneous motor vehicle fuels were discharged. Remedial action is taking place. Miscellaneous motor vehicle fuels were discharged. The case was closed in 2002.*	*LOW*
	Encore Theater 1159 California 0.24-mile SE of PS3	*LUST, UST*	*Two events involved gasoline being discharged. Both cases were closed in 1997.*	*LOW*
	Hammet and Edison Real Estate 1400 Rollins Road 0.25-mile NW of PS3	*LUST, UST*	*Two events involved diesel being discharged and contaminating soil only. Both cases were closed in 1994.*	*LOW*
	Horn Investment and Realty Hornung Trucking Service 1344 Marsten 0.18-mile NE of PS3	*LUST, UST*	*Two events involved diesel being discharged and contaminating soil only. Both cases were closed in 1995.*	*LOW*
	John Sutti and Associates, Inc. Warehouse II 1327 Carolan 0.07-mile NE of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 1996.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Mary Ruane Property 1368 Rollins 0.12-mile NE of PS3	*LUST*	*An event involved unleaded gasoline being discharged. The case was closed in 2002.*	*LOW*
	Mike Harvey Chrysler 1049 Broadway 0.19-mile SE of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 1997.*	*LOW*
	Mosquito Abatement Office San Mateo County 1351 Rollins Road 0.16-mile NW of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 1997.*	*LOW*
	Mr. Detail 1405 N Carolan Avenue 0.11-mile NW of PS3	*LUST, UST*	*Miscellaneous motor vehicle fuels were discharged. The case was closed in 1999. Another discharge involving miscellaneous motor vehicle fuels occurred. The site is undergoing pollution characterization.*	*LOW*
	Myers Air Conditioning 1395 Marsten Road 0.16-mile NE of PS3	*LUST, UST*	*Two events involved gasoline being discharged. Both cases were closed in 1996.*	*LOW*
	National Car Rental 40 Edwards Court 0.25-mile NW of PS3	*RCRAGEN-SGN, LUST, UST*	*An event involved diesel being discharged. The case was closed in 2002.*	*LOW*
	Nerli Construction Western Exterminator, Co. 1320 Marsten Road 0.15-mile NE of PS3	*RCRAGEN-SGN, LUST, UST*	*Miscellaneous motor vehicle fuels were discharged. The case was closed in 2000. Another discharge involving miscellaneous motor vehicle fuels occurred and contaminated soil only. The case was closed in 2000.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	**Sites Within 0.25-Mile of TPS Locations**	**Reported Databases**	**Reported Contamination**	**Significance**
	Nicolet Property 1348 Rollins Road 0.16-mile NW of PS3	*LUST, UST*	*Miscellaneous motor vehicle fuels were discharged. The case was closed in 1997. Another event involved miscellaneous motor vehicle fuels being discharged. Post-remedial action monitoring is occurring.*	*LOW/MED*
	Pacific Construction 1369 Carolan 0.07-mile NW of PS3	*LUST, UST*	*Two events involved gasoline being discharged. Both cases were closed in 1997.*	*LOW*
	Warehouse I 1337 Carolan Avenue 0.07-mile NE of PS3	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 1999.*	*LOW*
	28th Avenue Car Wash C and P Service, Inc. 2777 El Camino Real 0.23-mile NW of PS4	*UST, LUST*	*An event involved unleaded gasoline being discharged. Post-remedial action monitoring is occurring. An event involved gasoline being discharged. The leak is still being confirmed.*	*LOW*
PS4	*Ah Sam 2645 El Camino Real 0.25-mile NW of PS4*	*LUST*	*An event involved unleaded gasoline being discharged. The leak is still being confirmed. Another event involved unleaded gasoline being discharged. This case was closed in 2003.*	*LOW*
	Chevron 9-4224 2950 El Camino Real 0.08-mile SW of PS4	*UST, LUST*	*Miscellaneous motor vehicle fuels were discharged. Post-remedial action monitoring is occurring. Another event involved miscellaneous motor vehicle fuels being discharged. The case was closed in 2005.*	*LOW/MED*
	Chevron 9-7781 300 Hillsdale 0.24-mile SE of PS4	*LUST*	*Miscellaneous motor vehicle fuels were discharged. A remediation plan has been submitted.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Coast Gas Mobil 04-FVK 254 Hillsdale 0.24-mile SE of PS4	*LUST*	*Waste oil was discharged. The case was closed in 2003. Another event involving waste oil being discharged. A remediation plan has been submitted.*	*LOW*
	Media Mall 2727 El Camino Real 0.18-mile NW of PS4	*LUST*	*Miscellaneous motor vehicle fuels were discharged. The case was closed in 1996. Another discharge involving miscellaneous motor vehicle fuels occurred and contaminated soil only. The case was closed in 1996.*	*LOW*
	Olympic San Mateo 2790 El Camino Real 0.14-mile NW of PS4	*UST, LUST*	*Two events involved diesel being discharged. Both cases were closed in 2001.*	*LOW*
	Parking Lot at Borders 2925 El Camino Real 0.09-mile NW of PS4	*ERNS*	*30 gallons of miscellaneous oil/motor oil was discharged in the parking lot. The materials were cleaned up.*	*LOW*
	Peter Pan Motors, Inc. 2695 El Camino Real 0.21-mile NW of PS4	*RCRAGEN-SGN, LUST, UST*	*Two events involved waste oil being discharged. Both cases were closed in 2001.*	*LOW*
	Shell 221 Hillsdale 0.24-mile SE of PS4	*LUST, UST*	*Gasoline was discharged. The case was closed in 2003. Another event involved unleaded gasoline being discharged. A preliminary site assessment and workplan have been submitted.*	*LOW*
	Shum Plaza 2745 El Camino Real 0.20-mile NW of PS4	*LUST, UST*	*An event involved miscellaneous motor vehicle fuels being discharged. The case was closed in 2001. Another event involved miscellaneous motor vehicle fuels. Post-remedial action plans have been submitted.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
	Unocal *2800 El Camino Real* *0.13-mile NW of PS4*	*LUST, UST*	*Two events involved miscellaneous motor vehicle fuels being discharged. Both cases were closed in 2000.*	*LOW*
	C and B Construction *438 Stanford* *0.24-mile NE of SWS1*	*UST, LUST*	*One event involved miscellaneous motor vehicle fuels being discharged. A preliminary site assessment workplan has been submitted. Another event also involved miscellaneous motor vehicle fuels being discharged. Pollution characterization is ongoing.*	*LOW*
SWS1	*Beach Cleaners* *Clean N Press* *2537 El Camino Real* *0.25-mile SW of SWS1*	*LUST, RCRAGEN-SGN*	*Gasoline was discharged and contaminated soil only. The leak is being confirmed.*	*LOW*
	Beals and Martin Associates *2682 Middlefield Road* *0.17-mile NE of SWS1*	*UST, LUST*	*Two events involved gasoline being discharged. Both cases were closed in 1998.*	*LOW*
	Dept of Water and Power *Tilton Properties* *2655 Middlefield Road* *0.19-mile NE of SWS1*	*UST, LUST*	*Two events involved motor fuels contaminating soil only. Both cases were closed in 1995.*	*LOW*
	Fair Oaks Community Center *2600 Middlefield Road* *0.22-mile NE of SWS1*	*LUST*	*One event involved the discharge of waste oil and one event involved the discharge of mineral spirits. In both cases, only soil was contaminated. Both cases were closed in 2000.*	*LOW*
	No sites were reported within 0.25-mile of PS5	*NA*	*NA*	*NA*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
PS5	*No sites were reported within 0.25-miles of PS5*	*NA*	*NA*	*NA*
PS6	*Bill Dean Goodyear 205 Washington Avenue East 0.20-miles SE of PS6*	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 1990 and 1992, respectively.*	*LOW*
	Hill Fred 111 Sunnyvale Avenue North 0.09-mile SW of PS6	*LUST*	*One event involved gasoline being discharged. Remedial action is taking place. Another event involved gasoline being discharged. Pollution characterization is underway.*	*LOW/MED*
	Pacific Bell 234 Carroll Street 0.25-mile SE of PS6	*RCRAGEN-SGN, UST, LUST*	*Two events involved diesel being discharged and contaminating soil only. Both cases were closed in 1995.*	*LOW*
	City of Sunnyvale Sunnyvale Fire Station 171 Mathilda Avenue 0.25-mile SW of PS6	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 1995. One event involved solvents being discharged. The case was closed in 1986.*	*LOW*
	Westinghouse Electric Corp Hendy Avenue and Fair Oaks Avenue 0.09-mile SE of PS6	*NPL*	*Soil and groundwater are contaminated with volatile organic compounds, other organics, PCBs, dichloro-, trichloro-, and tetrachloro benzene. Cleanup is still ongoing.*	*LOW/MED*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Unknown/San Jose Rail Yard 795 Newhall Street 0.05-mile SE of TPS2 Pref	*ERNS*	*A locomotive diesel fuel line broke and 30 gallons of diesel fuel was discharged. Cleanup was completed in 2000. One gallon of ethyl alcohol was discharged. The spill evaporated. 50 gallons of No. 2-D fuel oil was discharged. Cleanup was completed in 2003.*	*LOW/MED*
TPS2 Pref	*Unknown/San Jose Rail Yard 795 Newhall Street 0.05-miles SE of TPS2 Pref*	*ERNS*	*A locomotive diesel fuel line broke and 30 gallons of diesel fuel was discharged. Clean up was completed in 2000. One gallon of ethyl alcohol was discharged. The spill evaporated. 50 gallons of No. 2-D fuel oil was discharged. Clean up was completed in 2003.*	*LOW/MED*
	E.A. MacLean and Sons 951 Hamline Street 0.23-mile SW of TPS2 Pref	*LUST*	*Two events involved gasoline being discharged. One case was closed in 1995. The other case was closed in 1998.*	*LOW*
	Eagle Painting 645 Hamline Street 0.15-mile SE of TPS2 Pref	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 2001.*	*LOW*
	FMC Corp 1125 Coleman Avenue 0.20-mile NE of TPS2 Pref	*RCRA-TSD, RCRAGEN-LGN, STATE, OTHER, NFRAP, RCRACOR, LUST*	*An unknown event has No Further Remedial Action Planned as of 8/1990. Arsenic, TPH-diesel, chromium VI, manganese and TPH-motor oil were found in soil. Site screening was done in 1987. Numerous wastes that were treated and untreated were found in the city storm drains. Cleanup continues.*	*LOW/MED*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	McNab Enterprises 1098 Stockton Avenue 0.07-mile NE of TPS2 Pref	*LUST*	*Gasoline was discharged and contaminated soil only. The case was closed in 1993. Gasoline was discharged in a separate event. The case was closed in 1993 also.*	*LOW*
	San Jose Airport 1101 Airport Boulevard 0.20-mile NE of TPS2 Pref	*LUST*	*Diesel was discharged. A preliminary site assessment is underway.*	*LOW*
	San Jose Stair Company, Inc. 972 Newhall Street 0.19-mile SW of TPS2 Pref	*LUST*	*Miscellaneous motor vehicle fuels were discharged and contaminated soil only. The case was closed in 1995. Jet fuel was discharged and contaminated soil only. The case was closed in 1995.*	*LOW*
	Wattis Construction 964 Stockton Avenue 0.25-mile SE of TPS2 Pref	*UST, LUST*	*Diesel and gasoline were discharged during separate events. Both cases were closed in 2001.*	*LOW*
TPS2 Alt 1	*Aramark Uniform Services 855 McKendrie Street 0.12-miles SE of TPS2 Alt 1*	*UST*	*This facility has one 12,000 gallon UST onsite. No violations.*	*LOW*
	Bay Area/Golden Gate/Diablo Petroleum 905 Stockton Avenue 0.17-mile SE of TPS2 Alt 1	*UST, LUST*	*Gasoline was discharged from a tank. Pollution characterization is ongoing. Waste oil was discharged from a tank. Remedial action is underway to remove contaminated soil. The site has four USTs, ranging in size from 6,000 to 12,000 gallons, containing motor vehicle fuel. No violations reported.*	*LOW*
	Central Concrete 928 Stockton Avenue 0.13-mile SE of TPS2 Alt 1	*LUST*	*Diesel was discharged from two separate tanks. Both cases were closed in 1995.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	Sites Within 0.25-Mile of TPS Locations	Reported Databases	Reported Contamination	Significance
	College Park Paint Co, Inc 707 W Hedding Street 0.19-mile SE of TPS2 Alt 1	RCRAGEN-SGN	This facility is a small quantity generator of hazardous materials. No violations reported.	LOW
	Diagnostic X Ray Imaging 636 Newhall Street 0.19-mile NW of TPS2 Alt 1	RCRAGEN-SGN	This facility is a small quantity generator of hazardous materials. Several administrative violations have been reported for this site.	LOW
	E.A. Maclean and Sons 951 Hamline Street 0.19-mile SW of TPS2 Alt 1	LUST	Gasoline was discharged and only contaminated soil. Both cases were closed in 1995.	LOW
	Eagle Painting 645 Hamline Street 0.12-mile NE of TPS2 Alt 1	LUST	Gasoline was discharged from two separate tanks. Both cases were closed in 2001.	LOW
	Ferron, Inc. 645 W Hedding Street 0.22-mile SE of TPS2 Alt 1	LUST	Gasoline was discharged at this site. Both cases were closed in 1995.	LOW
	John Colendich Automotive 950 Hedding Street 0.24-mile SE of TPS2 Alt 1	LUST	Waste oil was discharged. Remedial action is underway.	LOW
	McNab Enterprises 1098 Stockton Avenue 0.17-mile NW of TPS2 Alt 1	LUST	Gasoline was discharged from two separate tanks. Only soil was contaminated. The contaminated soil was removed and both cases were closed in 1993.	LOW
	One-O-One Plating Works Inter Con Paint and Body 953 Chestnut Street 0.17-mile NE of TPS2 Alt 1	OTHER, RCRAGEN-SGN, STATE	This facility is a small quantity generator of hazardous materials. No violations reported. In 1999, a site inspection found administrative violations.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Pac West Transportation 795 Hedding Street W 0.19-mile SE of TPS2 Alt 1	*LUST, RCRAGEN-Transporter*	*Diesel was discharged and only contaminated soil. Both cases were closed in 1996. This facility is also considered a transporter of hazardous materials. No violations noted.*	*LOW*
	Red Star Laundry Aratex Services Inc. 920 Chestnut Street 0.21-mile SE of TPS2 Alt 1	*OTHER, RCRAGEN-SGN, STATE*	*This site had total petroleum hydrocarbon contamination. The case was closed in 1994.*	*LOW*
	Safe Way Chemical 909 Stockton Avenue 0.17-mile SE of TPS2 Alt 1	*NFRAP, LUST*	*Stoddard solvent was discharged from tanks. No action was required due to incident being minor. The site was put on the No Further Remedial Action Planned list in 1987.*	*LOW*
	San Jose Stair Company 972 Newhall Street 0.23-mile SW of TPS2 Alt 1	*LUSTs*	*Jet fuel and miscellaneous motor vehicle fuels were discharged. Only soil was contaminated. Both cases were closed in 1995.*	*LOW*
	Strip Nu Div Inod Inc. 575 W Hedding Street 0.25-mile SE of TPS2 Alt 1	*RCRAGEN-SGN*	*This facility is a small quantity generator. No violations reported.*	*LOW*
	Wattis Construction 964 Stockton Avenue 0.07-mile NE of TPS2 Alt 1	*UST, LUST*	*The facility has four USTs onsite - two 10,000 gallon tanks, one 6,000 gallon tank, and one 4,000 gallon tank. No violations for the USTs. Gasoline and diesel were discharged from separate tanks. Both cases were closed in 2001.*	*LOW*
TPS2 Alt 2	AC Label Co 350 Montgomery Street 0.16-mile NE of TPS2 Alt 2	NFRAP	No further remedial action planned as of 10/1991.	LOW

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Air Systems 381 Stockton Avenue 0.22-mile SW of TPS2 Alt 2	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 1997.*	*LOW*
	American Welding Company 441 Hobson Street 0.23-mile NW of TPS2 Alt 2	*LUST*	*Two events involved diesel being discharged and contaminating soil only. Both cases were closed in 1995.*	*LOW*
	Don Bocci Mobil Service 395 Stockton Avenue 0.21-mile SW of TPS2 Alt 2	*LUST*	*Gasoline was discharged. Pollution characterization is ongoing. In a separate event, gasoline was discharged. Remedial action is ongoing.*	*LOW*
	Farmer's Sheet Metal 725 Lenzen Avenue 0.17-mile SW of TPS2 Alt 2	*LUST*	*Gasoline was discharged. The case was closed in 2003. In a separate event, gasoline was discharged. Pollution characterization is ongoing.*	*LOW*
	Gruthfield Property 370 Montgomery Street 0.15-mile SE of TPS2 Alt 2	*LUST*	*Gasoline was discharged and contaminated soil only. The case was closed in 2000. Gasoline was discharged in a separate event. The case was closed in 2000*	*LOW*
	Hardcastle Autothon 590 Coleman Avenue 0.24-mile NE of TPS2 Alt 2	*RCRAGEN-SGN, LUST*	*Gasoline was discharged and contaminated soil only. The case was closed in 1995. Gasoline was discharged in a separate event. The case was closed in 1995.*	*LOW*
	Lincoln Property 469 Howard Street 0.24-mile SE of TPS2 Alt 2	*LUST*	*Diesel was discharged and contaminated soil only. The case was closed in 1993. Gasoline was discharged in a separate event. The case was closed in 1993.*	*LOW*
	Montgomery Street Property 341 Montgomery Street 0.20-mile SE of TPS2 Alt 2	*LUST, RCRAGEN-SGN*	*Two events involved gasoline being discharged. Both cases were closed in 2001.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)

TPS No.	*Sites Within 0.25-Mile of TPS Locations*	*Reported Databases*	*Reported Contamination*	*Significance*
	PG&E 650 Lenzen 0.08-mile SW of TPS2 Alt 2	*SPILLS, NFRAP*	*A tank was possibly leaking waste oil. The site was closed by 1991. A No Further Remedial Action Planned site is also located here. The NFRAP was issued in 1987.*	*LOW*
	PG&E 655 Lenzen 0.09-mile SW of TPS2 Alt 2	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 1999.*	*LOW*
	River Street Project 350 W. Julian Street 0.21-mile SE of TPS2 Alt 2	*LUST*	*Gasoline was discharged. The case was closed in 2001.*	*LOW*
	Sealex 582 Stockton Avenue 0.25-mile NW of TPS2 Alt 2	*NFRAP*	*No further remedial action planned as of 1987.*	*LOW*
	Serpa Property 435 Stockton Avenue 0.16-mile SW of TPS2 Alt 2	*LUST*	*Gasoline was discharged. The case was closed in 2002.*	*LOW*
	Southern Pacific Transport Company 595 Lenzen Avenue 0.05-mile SW of TPS2 Alt 2	*LUST, RCRAGEN-LGN*	*Two events involved gasoline being discharged and contaminating soil only. Both cases were closed in 2002.*	*LOW*
	Stockton Auto Repair 465 Stockton Avenue 0.16-mile SW of TPS2 Alt 2	*LUST*	*Waste oil was discharged and contaminated soil only. The case was closed in 1993.*	*LOW*
	Tim's Auto Trim 369 Stockton Avenue 0.23-mile SE of TPS2 Alt 2	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 2001.*	*LOW*

Table 3.7-1: Known Hazardous Materials/Wastes Sites with Potential to Affect Proposed Traction Power Substation Sites (TPS)				
TPS No.	***Sites Within 0.25-Mile of TPS Locations***	***Reported Databases***	***Reported Contamination***	***Significance***
	Unocal *500 Stockton Avenue* *0.17-mile SW of TPS2 Alt 2*	*LUST*	*Two events involved gasoline being discharged. Both cases were closed in 1998.*	*LOW*
PS7	*No sites were reported within 0.25-mile of PS7.*	*NA*	*NA*	*NA*

ERNS = Emergency Response Notification System
LUST = Leaking Underground Storage Tank
NFRAP = No Further Remedial Action Plan
NPL = National Priorities List
OTHER = National clandestine laboratory register
RCRACOR = Resource Conservation and Recovery Act - Corrective Action
RCRAGEN-LGN = Resource Conservation and Recovery Act - Large Quantity Generator
RCRAGEN-SGN = Resource Conservation and Recovery Act - Small Quantity Generator
RCRAGEN-VGN = Resource Conservation and Recovery Act - Conditionally Exempt Generator
RCRANLR = Resource Conservation and Recovery Act - No Longer Reporting
RCRA-TSD = Resource Conservation and Recovery Act - Treatment, Storage and Disposal Facilities
RCRA – Transporter = Resource Conservation and Recovery Act - Transporter of RCRA materials
SPILLS = California Regional Water Quality Control Board sites that have had spills, leaks, investigations, and cleanups.
STATE = Sites listed in the Department of Toxic Substance Control database
SWL = Solid Waste and Landfill
UST = Underground Storage Tank
VCP = Voluntary Cleanup Program

material management; however, no need for remedial action or modification to the project was identified.

3.7.4 MITIGATION

The following *design features and* general mitigation measures *will* be taken to reduce effects related to hazardous wastes to a less-than-significant level:

- *The* JPB will ensure that any identified environmental site conditions that *could* represent a risk to public health and safety will be remediated in accordance with applicable federal, state, and local environmental laws and regulations. Such work *will* be performed by environmental professionals routinely engaged in the characterization and remediation of hazardous wastes.

- Following adoption of the Caltrain Electrification Program, *the* JPB *will* retain the services of a qualified professional to prepare a *focused* Phase II site investigation *at specific TPS station sites*. If this investigation determines that any hazardous wastes of concern are present, a Risk Assessment will be prepared. *The Phase II study will also include a screening program for lead arsenate herbicides, when determined necessary. See Section 4.2.5.2 Hazardous Wastes, Mitigation, for additional measures to be included in the Phase II site investigation and Risk Assessment.*

- Purchase agreements for property acquired for traction power facilities will address the characterization, remediation, and liability for existing hazardous environmental conditions.

The following site-specific mitigation measures will be taken, if necessary for selection of Alternative TPS sites, to reduce effects related to hazardous materials/wastes to a less-than-significant level at the locations indicated:

- *<u>TPS1 Alt B</u>: Conduct subsurface investigations (including heavy metals, PCBs, and polynuclear aromatic hydrocarbons [PAHs], and total petroleum hydrocarbons) on the soil and groundwater at 166 Harbor Way.*

- *<u>TPS2 (Preferred)</u>: Conduct soil sampling on debris piles located on property to determine contents and evaluate appropriate disposal options.*

- *<u>TPS2 Alternative 1</u>: Conduct asbestos and lead-based paint sampling on structures to determine whether asbestos-containing materials or lead-based paint exists for proper disposal.*

3.8 HYDROLOGY, FLOODPLAIN AND WATER QUALITY

3.8.1 SETTING

Information for the hydrological setting was obtained from the *NES* for the proposed project (Parsons, 2001), the EIS/EIR for the BART to San Francisco International Airport Project (BART/FTA/SMCTA, 1996), General Plans from communities along the project alignment, and 100-year floodplain data from the U.S. Federal Emergency Management Agency (FEMA)/ESRI Project Hazard *W*eb site.

3.8.1.1 *Applicable Regulations, Plans and Policies*

United States Environmental Protection Agency (EPA). *The primary federal law governing water quality is the Clean Water Act (CWA) of 1972. This Act provides for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. The CWA emphasizes technology-based (end-of-pipe) control strategies and requires discharge permits to allow use of public resources for waste discharge. The Act also limits the amount of pollutants that may be discharged and requires wastewater to be treated with the best treatment technology economically achievable regardless of receiving water conditions. The control of pollutant discharges is established through National Pollutant Discharge Elimination System (NPDES) permits that contain effluent limitations and standards.*

The 1987 amendments to the CWA included Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges. The amendment also provided a framework for regulating storm water runoff from construction sites. On November 16, 1990, EPA published final regulations that established requirements for storm water permits.

In 1998, Section 303(d) of the CWA was amended, requiring the state to identify and maintain a list of water bodies that do not meet water quality objectives through the control of point source discharges under NPDES permits. For these water bodies, states are required to develop appropriate Total Maximum Daily Loads (TMDLs). TMDLs are the sum of the individual pollutant load allocations for point sources, nonpoint sources, and natural background conditions, with an appropriate margin of safety for a designated water body. The TMDLs are established based upon a quantitative assessment of water quality problems, the contributing sources, and load reductions or control actions needed to restore and protect an individual water body (EPA, 2000). As opposed to the NPDES programs, which focuses on reducing or eliminating non-storm water discharges and reducing the discharge of pollutants to the maximum extent practicable, TMDLs provide an analytical basis for planning and implementing pollution controls, land management practices, and restoration projects needed to protect water quality.

State Water Resources Control Board (SWRCB). *The Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act) is the basic water quality control law for California. The Act authorizes the state to implement the provisions of the CWA. The Porter-Cologne Act establishes a regulatory program to protect the water quality of the state and the beneficial uses of state waters. Under this act, the SWRCB provides policy guidance and review for the Regional Water Quality Control Boards (RWQCBs), and the RWQCBs implement and enforce the provisions of the Act.*

Under the CWA, the state of California was originally required to develop comprehensive drainage basin plans as a prerequisite to receiving federal funding for the construction of *municipal wastewater treatment plants. The San Francisco Bay RWQCB developed the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) in April 1975, which was most recently updated in January 2007. The Basin Plan is intended to help preserve and enhance water quality and to protect the beneficial uses of state waters.*

Establishment of the NPDES regulations in 1987, under Section 402(p) of the CWA, required that EPA delegate the responsibility of the NPDES program to the State. The SWRCB was given the responsibility to enforce the regulations of the NPDES program and did so in the form of the NPDES Permit for General Construction Activities (Order No. 99-08-DWQ), adopted in 1992 and amended in August of 1999 and 2001. On December 2, 2002, the SWRCB approved the "Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) NPDES General Permit for Construction Activity (One to Five Acres)." The Permit requires that all owners of land within the State with construction activities resulting in more than 1 acre of soil disturbance (e.g., clearing, grubbing, grading, trenching, stockpile, utility relocation, temporary haul roads), comply with the General Permit. A Notice of Intent (NOI) to construct must be filed with the RWQCB at least 30 days prior to any soil-disturbing activities. The purpose of the Permit is to ensure that the land owners:

- *Eliminate or reduce non-storm water discharges to storm drains and receiving waters;*
- *Develop and implement a Storm Water Pollution Prevention Plan (SWPPP);*
- *Inspect the water pollution controls specified in the SWPPP; and*
- *Monitor storm water runoff from construction sites to ensure that the best management practices (BMPs) specified in the SWPPP are effective.*

Regional Water Quality Control Board (RWQCB). *The proposed project is located within the jurisdiction of the San Francisco Bay RWQCB (Region 2). All projects within the counties of San Francisco, San Mateo, and Santa Clara are subject to the requirements of the San Francisco Bay RWQCB.*

The Basin Plan designates beneficial uses for surface and groundwaters and sets qualitative and quantitative objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy. The Plan also describes implementation programs to protect the beneficial uses of all waters in the Region and surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan (San Francisco Bay RWQCB, 2007).

The RWQCB issues Waste Discharge Requirements (WDRs) for activities such as dredging, filling, or discharging materials into Waters of the State that are not regulated by ACOE due to a lack of connectivity with a navigable water body. The SWRCB issued Water Quality Order No. 2004-004-DWQ, which established statewide general WDRs for projects that involve dredge or fill discharges of (1) less than 0.2-acre and 400 linear feet for fill and excavation discharges, and (2) not more than 50 cubic yards (c.y.) for dredging discharges.

Projects that exceed the General WDR thresholds are authorized under a standard WDR, which requires approval by the Regional Board.

3.8.1.2 Surface Hydrology

San Francisco to South San Francisco. The hydrology in the San Francisco portion of the project alignment is substantially altered from its natural environment, and drainage is accomplished through a network of urban storm drains that flow into San Francisco Bay. There are, however, two surface water features in the vicinity of the Caltrain alignment: China Basin *(Mission Creek)* and Islais Creek Channel. In northern San Mateo County, the alignment passes through the Colma Creek drainage basin, which is a narrow alluvial valley, *2* to *3* miles wide, situated between San Bruno Mountain and the coastal hills. In South San Francisco, the project alignment runs parallel to Colma Creek and then crosses the creek north of Westborough Boulevard in South San Francisco.

South San Francisco to Central San Jose. South of the Colma Creek drainage basin, the alignment passes through heavily urbanized San Francisco Bay flatlands, bounded by San Francisco Bay to the east and mountainous terrain to the west. The alignment runs generally north*west*-south*east* and parallel to the San Francisco Bay *shoreline*. The hydrology can be characterized as a series of creeks, channels, and storm drains running generally east-west, allowing water from the mountains' eastern slopes to drain eastward to the Bay. This drainage system has been largely altered from its natural condition and is controlled by a system of storm drains and lined creekbeds.

3.8.1.3 Groundwater

Information regarding groundwater was obtained from the Preliminary Environmental Survey of San Francisco/San Jose Railroad Right-of-Way (Wahler Associates, no date).

In the vicinity of Caltrain's *4th* and *King S*tation, groundwater is between *7* and 10 feet below ground surface *(bgs)*, which corresponds to elevations of -3 to -10 feet relative to City and County of San Francisco Datum (8.6 feet above mean sea level).

San Mateo County contains parts of two groundwater basins: the southern portion of the Merced Valley Groundwater Basin (Daly City Aquifer) and the northern portion of the Santa Clara Valley Basin. The Daly City Aquifer is generally considered to be unconfined. Groundwater beneath Daly City, Colma, and South San Francisco is approximately 50 to 100 feet below mean sea level. The *direction* of groundwater *flow* near the Caltrain corridor, with the exception of the areas near San Bruno Mountain, is eastward toward San Francisco Bay. In the southern portions of South San Francisco and in San Bruno, groundwater is found throughout the year just a few feet below the ground surface; during the rainy season, its level rises above the ground surface in many local depressions, leaving standing water in drainage ditches that can remain for months.

The hydrogeology between San Bruno and Menlo Park is controlled by the distribution of aquifers and aquitards within the alluvium, most of which are continuations of those of Santa Clara Valley. The depth of groundwater along this stretch of the corridor *ranges between* 10 *and* 20 feet *bgs*, although the water table below much of Atherton and Menlo Park is greater than 20 feet *bgs*.

Two regional aquifer zones have been noted in Santa Clara Valley: an upper aquifer zone and a lower aquifer zone. These two zones are divided by a regional aquitard, the top of which is at a depth of 150 to 250 feet *bgs* and the thickness of which ranges from 20 to *more than* 100 feet *bgs*. The upper aquifer zone is divided into several unconfined and confined aquifer systems that are separated by leaky or tight aquitards. For much of the baylands in the vicinity of the corridor, there is a leaky cap of clay *approximately* 20 feet thick, and the depth to first (shallowest) groundwater is approximately 10 feet *bgs*. The direction of groundwater flow is *northerly* and toward the Bay. The primary recharge for the aquifers *occurs at* the forebay area, located in the Santa Cruz Mountains along the *western* edge of the groundwater basin, by deep infiltration of stream flows and by artificial recharge from percolation ponds.

3.8.1.4 Floodplains

Flood Insurance Rating Maps (FIRM) prepared by FEMA were reviewed to identify the locations of 100-year floodplains. *Several* miles of the 52-mile project corridor are within *or adjacent to* 100-year floodplains. The most substantial encroachments into the 100-year floodplain occur at the following locations: in Millbrae and Burlingame from Millbrae Avenue (Millbrae) to Peninsula Avenue (Burlingame), *and* in Palo Alto from El Dorado Avenue (south of the Oregon Expressway) to Creekside Drive (south of East Charleston Road).

3.8.2 IMPACTS

3.8.2.1 Water Quality Impacts

*From a water quality perspective, t*he long-term effect of the Electrification Program Alternative would be beneficial when compared with the No-Electrification Alternative. *Replacing* the existing diesel-powered *locomotives with electric vehicles would eliminate a major diesel* exhaust *source*, which *otherwise* results in dry deposition of pollutants that are later washed into *the regional* storm water *system*. Additionally, with electric trains, there would *not* be *the possibility* of contamination *while* filling *fuel* tanks *or* from *leaking* diesel locomotive *fuel tank*s. Surface waters may be affected by sediment and construction debris in stormwater runoff during construction at the locations of traction power substations and the construction staging area. Construction-period impacts are addressed in Section 4.2.6, *Water Quality*.

3.8.2.2 Groundwater Impacts

As the catenary poles have foundations that are 15 to 20 feet *bgs*, groundwater would be encountered in areas where the groundwater table is less than 15 feet *bgs*. This *would* include areas in the vicinity of San Francisco Bay in San Francisco, San Mateo, and Santa Clara counties. *Because any new access roads required for the traction power facilities (see Section 3.9, Land Use and Planning) would be formed from compacted crushed rock or gravel overlaying a compacted sub-grade, there would be a minimal increase in impervious* *surface and negligible effects on stormwater runoff. Because these roads would be used infrequently and only by railroad workers for routine maintenance and inspection of the substations, there would be no measurable increases in contaminant loads that would percolate into groundwater.* Mitigation measures to avoid pollution of groundwater *during construction of catenary pole foundations* are proposed in Section 3.8.3.

3.8.2.3 Floodplain Impacts

Regulations governing the National Flood Insurance Program (23 CFR 650, Subpart 6A Section 650) were used as guidance for the evaluation of floodway impacts, which focuses on *FEMA*-defined floodways. Section 650.111 calls for location hydraulic studies to be performed with detailed engineering design drawings, and lists five location considerations to be examined for floodplain encroachments:

1. Risks associated with implementation of the action.
2. Impacts on the natural and beneficial floodplain values.
3. Support of incompatible floodplain development.
4. Measures to minimize impacts associated with the action.
5. Measures to restore and preserve the natural and beneficial floodplain values impacted by the action.

Impacts of the project with respect to the five location considerations are considered in the following discussion. The No-Electrification Alternative would have no impact on floodplains beyond the effects discussed in the JPB's environmental documents for the Rapid Rail program*;* therefore*, this evaluation* focus*es* on the Electrification Program Alternative.

1. The risks associated with implementation of the action. The risks associated with the project are very low. The floodplain areas affected by the project are already occupied by active rail facilities. The introduction of catenary poles and wires *would* not affect flood storage capacity*;* therefore, the probability of flooding attributable to the encroachment of the poles is *considered very* low. Of the *10* locations proposed for *traction power facilities*, paralleling stations, and switching stations, *three are* located in areas of *a* 100-year floodplain. *These are TPS1 in South San Francisco,* PS3 in Burlingame (near Broadway*), and PS6 in Sunnyvale.* Because of the available right-of-way, topographic features, and electrical system requirements, project facilities must be located as indicated in this document.

2. The impacts on natural and beneficial floodplain values. Catenary poles and wires *would* be located within existing railroad right-of-way; substations *would* be either within or in the immediate vicinity of existing railroad or roadway right-of-way. No long-term impact on natural beauty, outdoor recreation, aquaculture, natural moderation of floods, or water quality is anticipated. Short-term construction impacts will be mitigated by scheduling activities in the floodplain during the dry season and by implementing erosion *and other pollution* control practices.

3. The support of probable floodplain development. The proposed project electrifies an existing rail line, which passes through *or adjacent to several* areas of 100-year

floodplain and serves existing rail stations, each of which is located in *an urban environment*. Although the project passes through floodplains, it is unlikely to induce any development in those floodplains.

4. The measures to minimize floodplain impacts associated with the action. At locations where the project corridor passes through less than approximately 230 feet of floodplain on a straight-away, encroachment would be avoided by adjusting the catenary pole spacing to site poles outside the floodplain wherever feasible. In areas where groundwater is shallow and there is potential to affect riparian habitat or encounter hazardous wastes, poles will be installed using the vibration method described in Section 3.8.3, which minimizes subsurface disruption. As described in Section 2.4.3, *Direct Center Feed Power System Arrangement*, the selection of an ATF power system arrangement enabled the JPB to minimize the number of large *TPS*s required for the project. The Electrification Program Alternative requires only *two* TPSs. *Since any new roads required for substation access would not be paved, there would be minimal increase in impervious surface from these facilities.*

5. The measures to restore and preserve the natural and beneficial floodplain values impacted by the action. Construction would occur during the dry season, to the extent that this does not interfere with the breeding season of protected species. Erosion *and other pollution* control practices will be implemented during construction, as discussed in Section 4.2.6*, Water Quality*.

3.8.3 MITIGATION

The following design features and general mitigation measures are recommended:

*A SWPPP will be prepared to address water quality impacts associated with construction activities, including non-storm water controls. This and other s*hort-term construction *measures are* discussed in Section 4.2.6.

At locations where the project corridor crosses *designated floodplain areas on a straight-away, project Engineers will determine whether it is possible to avoid encroachment by* siting catenary poles outside the floodplain *area*.

Where groundwater is encountered, *d*ewater product would be inspected for signs of contamination and disposed of in accordance with applicable state and federal requirements. In locations where groundwater is shallow and there is potential to affect riparian habitat or encounter hazardous wastes, pole foundation *siting and/or* construction techniques *(including consideration of a vibratory ultrasonic steel casing method) will* be modified to reduce the potential for impacts.

3.9 LAND USE AND PLANNING

This section characterizes existing land uses and summarizes transportation plans and policies that apply to lands in the areas surrounding the Caltrain corridor. A land use and planning study area for the purposes of this environmental document was defined to include only those areas that are directly adjacent to the Caltrain corridor from San Francisco to *San Jose*. Generalized land uses in this study area are summarized below.

The Caltrain *Electrification* corridor traverses the counties of San Francisco, San Mateo, and Santa Clara, extending from downtown San Francisco to *south of* downtown *San Jose*. This corridor includes portions of the following cities: San Francisco, South San Francisco, Brisbane, Millbrae, San Bruno, Burlingame, San Mateo, Belmont, San Carlos, Redwood City, Menlo Park, Palo Alto, Mountain View, Sunnyvale, Santa Clara, *and* San Jose. Land uses in the corridor comprise the full range of urban development, with a diverse mix of uses adjacent to the Caltrain corridor in some locations, and more homogeneous industrial/commercial uses in others. The corridor includes numerous areas of single- or multi-family residential uses that are directly adjacent to the railroad right-of-way.

3.9.1 SETTING

3.9.1.1 Existing Land Uses in the Vicinity of the Caltrain Corridor

The primary land use in the immediate vicinity of the proposed Electrification Program Alternative is the rail right-of-way, which has existed since the 1860s. Surrounding land uses include commercial, industrial, *open space*, and residential uses. Land uses in the vicinity of the proposed traction power facilities are primarily industrial*; however, at a few locations* residential properties *are within 50* to *100* feet *from the existing right-of-way*. These land uses are described by primary corridor segment in the following paragraphs.

Land uses in the downtown San Francisco area of the Caltrain corridor are primarily urban and industrial, with some retail, live/work loft, residential, and commercial uses. Existing uses in this segment include the *4th* and King *Street* Caltrain Station.

In *between* the 22nd Street and *Bayshore* station areas, land uses are primarily light industrial and warehouse with some residential uses *north of Paul Avenue*. *South of* Paul Avenue to the Bayshore Station, there is a shift to a more even distribution of light industrial and residential through Visitacion Valley, beyond which the primary use is light industrial. There is primarily open space through the Brisbane lagoon area, with primarily light industrial and warehouse uses with some residential and commercial uses through South San Francisco. San Bruno presents a mixture of park/open space and very low-density residential housing with some commercial and light industrial uses. In Millbrae, the area is *primarily commercial* and contains low-density business*es*, *with* industrial uses adjacent to the right-of-way.

Land uses in the Burlingame segment of the corridor include commercial, residential, and industrial. The tracks pass directly adjacent to Burlingame High School and Washington Park. Land use adjacent to the Caltrain corridor within the *c*ity of San Mateo are commercial, multi-family residential, neighborhood commercial, central business, office, service commercial, manufacturing, and commercial in order from north to south. South of Route 92, there is the San Mateo County Exposition Building and Bay Meadows *Race Track*. Located across *the tracks from Bay Meadows and* to the west of *El Camino Real* is the Hillsdale Shopping Mall.

The primary adjacent land uses within the *c*ity of Belmont are highway and service commercial with some high-density residential areas. The segment within the *c*ity of San Carlos includes single-family residential, regional retail, highway, service, and convenience commercial uses. Redwood City shifts to predominantly research and development uses, industrial, and some residential. The primary use in the Town of Atherton is low-density, single-family residential. The current land use in Menlo Park is general commercial and varying types of residential uses from medium-density apartment to single-family suburban. El Camino Park is located adjacent to the Caltrain right-of-way as it enters Palo Alto, beyond which is the Stanford Shopping Center. Palo Alto High School is located adjacent to the railroad corridor.

The *c*ity of Mountain View has various adjacent land uses, including general industrial, residential, public facility, limited industrial, and arterial commercial. Rengstorff Park is located adjacent to the railway right-of-way. The northern section of the corridor within the *c*ity of Sunnyvale is primarily industrial with low- to medium-density residential interspersed, then neighborhood shopping, general business, high-density residential, and industrial residential uses to the south. Through the *c*ity of Santa Clara, the adjacent uses consist of mixed use, moderate-density residential, office/research and development, and medium-density residential as defined by the city. Heavy industrial uses are located *north of* the *railroad* tracks with light industrial, research and development, and office uses located to the west and north. The San Jose International Airport is located *northeast of* the Santa Clara Station.

The College Park Station in San Jose is located near the Bellarmine College Preparatory High School. The San Jose Arena is adjacent to the Caltrain alignment just north of the San Jose Diridon Station. The primary adjacent land uses in the *c*ity of San Jose are combined industrial/commercial, public park, medium-low density to medium-density residential, light industrial, private recreation, campus industrial, and the Coyote Valley Urban Reserve. Near the Tamien Station is the Tamien Planned Community, and farther to the south between the Capitol and Blossom Hill Stations is the Communications Hill Planned Community. The main land uses in this planned community are single-family detached and attached residential, parks/play fields, heavy industrial, and combined industrial/commercial.

Caltrain operates trains south of the Tamien Station through to Gilroy; however, the Caltrain Electrification Project does not continue south of Capitol Expressway in San Jose.

3.9.1.2 Existing Land Uses in Proposed Traction Power Substation Areas

Paralleling Station PS1 is located in the Mission Bay Subarea of the Central Waterfront Planning Area (Figure 2.3-*6*); the Mission Bay Plan is guiding the transition of this subarea from its historical transportation and industrial functions to also include residential units, office space, retail, and public open space. Use of this parcel for a Caltrain Electrification traction power paralleling station has been identified in coordination with the Catellus Company, which is developing the Mission Bay project.

Paralleling Station PS2 is in the Candlestick Cove Subarea of the South Bayshore Planning Area (Figure 2.3-*7*), an area in which a principal land use objective is achieving favorable balance among diverse land uses. The paralleling station is proposed to be located directly adjacent to and within the Caltrain right-of-way, close to the old Schlage lock factory (now vacant). *The area surrounding the station is part of a large scale redevelopment area known as Visitacion Valley Redevelopment Project.*

Substation TPS-1 is proposed in South San Francisco. One preferred and two alternative sites have been investigated outside the Caltrain right-of-way, as shown in Figure 2.3-8. The preferred alternative site is located south of Grand Avenue in a parking lot adjacent to industrial uses, including a PG&E facility. Alternative A is located south of the preferred alternative on Gateway Blvd. Two parcels will be affected by this alternative; current uses of these parcels include parking and vacant land. Alternative B consists of vacant land and is located east of the preferred alternative on Harbor Road. The preferred and alternative sites proposed for TPS-1 are surrounded by industrial and commercial uses.

Paralleling Station PS3 is proposed to be located *north of Broadway near the* existing Broadway station within Caltrain right-of-way in the *c*ity of Burlingame, between *Summer* and *Lincoln A*venue *as shown in* Figure *2.3-9*. *The site is* separated from residential development by a major arterial route, California Drive, which fronts along the right-of-way. The railroad right-of-way is undesignated on the *City's* General Plan map.

Paralleling Station PS4 is proposed in San Mateo *within the Caltrain right-of-way* near the Hillsdale *Station and the San Mateo County Fairgrounds, as shown in Figure 2.3-10. The site is located adjacent to the Hillsdale Station parking lot and behind existing commercial uses.*

Switching Station SWS1 is proposed to be located in Redwood City, *within SamTrans right-of-way, as shown in* Figure 2.3-*11*, in a section of UPRR right-of-way that is being purchased by the San Mateo County Transportation Authority (SMCTA). *This site is* separated from residences on the south side by both the Caltrain right-of-way and Westmoreland Avenue, a local arterial route. This location is within a triangular area bounded by railroad tracks on all three sides and is designated Light Industrial on the *City's* Land Use Plan.

Paralleling Station PS5 is proposed to be located within the JPB right-of-way along Alma Street as shown in Figure 2.3-12, across from Greenmeadow Way in the city of Mountain View. Alma Street and the railroad, on both sides of the proposed facility, separate single- and multi-family residential developments.

Paralleling Station PS6 is proposed near the *Sunnyvale* Caltrain Station, *as shown in Figure 2.3-13, within the Caltrain right-of-way. This site is across West Hendy Avenue and less than 100 feet from existing single-family residential land uses*.

Substation TPS2 is proposed in San Jose. Three alternative sites were investigated. The preferred alternative site, shown in Figure 2.3-14, is located on VTA property on Newhall Street. A PG&E substation is located directly across Newhall Street. northwest of Interstate 880 (I-880). Surrounding uses at this location are mostly industrial, with residential uses to *the east. The first alternative is located on Stockton Avenue across I-880 from the PG&E substation, also shown in Figure 2.3-14. There is an existing commercial/industrial use, currently a tow-truck company. The second alternative facility location is on JPB property near the recently completed Centralized Equipment Maintenance and Operations Facility, as shown in Figure 2.3-15.*

Paralleling Station PS7 is proposed to be constructed *south of Oak Hill Memorial Park in South San Jose. This site is* located *on* the Caltrain right-of-way approximately *0.5-mile south* of *Curtner Avenue (as shown in Figure 2.3-16). Currently, the land use adjacent to the proposed location is vacant; new residential development is located on Communications Hill.*

3.9.1.3 *Access Roads to Traction Power Stations*

The availability of access was considered in identifying parcels for traction power facilities; however, right-of-way or easements to construct these facilities may need to be acquired. Of the above traction power facilities, only PS7 would require a new access road, which would be used for construction and for routine maintenance and inspection over the long-term. In all other locations, access to each traction power facility would be available from contiguous parcels, and no new access roads would be needed. These conditions are summarized in Table 3.9-1.

It is anticipated that the access road to PS7 would not be paved, but formed from compacted crushed rock or gravel overlaying a compacted sub-grade, similar to a gravel driveway.

Table 3.9-1: Proposed Access to Traction Power Substations	
Substation	***Access Conditions and Needs***
PS1	*Access from adjacent JPB right-of-way.*
PS2	*Access from existing paved industrial parking lot; no new access road*
TPS1 Preferred	*Located in existing paved station parking lot; no new access road*
TPS1 Alternative A	*Located adjacent to arterial roadway; no new access road*
TPS1 Alternative B	*Located adjacent to arterial roadway; no new access road*
PS3	*Located adjacent to arterial roadway; no new access road*
PS4	*Located in existing paved station parking lot; no new access road*
SWS1	*On JPB property with existing street access; no new access road*
PS5	*On SamTrans property with existing street access; no new access road*
PS6	*On JPB property with existing street access; no new access road*
TPS2 Preferred	*On VTA property with existing street access; no new access road. Curb cuts would be required.*
TPS2 Alternative 1	*Located in existing paved parking lot; no new access road*
TPS2 Alternative 2	*Located on JPB property with existing street access; no new access road*
PS7	*Approximately 60-foot-long gravel access road from existing paved road*
Source: Parsons, August, 2007.	

3.9.1.4 *Development Opportunities near Caltrain Stations*

The Caltrain Electrification Program may present opportunities for new development surrounding the Caltrain stations. MTC, through its transit expansion policy and program as well as the recently adopted 'Transportation and Land Use Platform,' clarifies that new public transit projects will be evaluated in part based on local supportive land use policies that can be proven to increase ridership and thus maximize the cost effectiveness of the project. Specifically, it states the following goals:

- *Promote development of land uses adjacent to major transit extensions, to support ridership markets that will make these investments economically feasible.*
- *Condition the award of regional discretionary funds under MTC's control for Resolution 3434 expansion projects, on the demonstration by local government that plans are in place supporting some level of increased housing/employment/mixed use density around transit stations/transfer centers.*

The proposed Caltrain Electrification Program is not a transit-expansion project; therefore, it may not need to conform with MTC's Transportation and Land Use Platform. Nonetheless, *the program would create a more conducive environment for development of land at or near Caltrain stations by reducing noise and improving air quality. Caltrain plans to work closely with adjoining communities as part of a partnership in improving coordination of land use and transportation planning, as called for in Caltrain's recently adopted Strategic Plan, to increase Caltrain ridership.*

The two stations that stand out for their relatively large amount of planned new development are the San Francisco 4th and King Station and the San Jose Diridon station. At 4th and King, much of this new growth would result from the Mission Bay Redevelopment Project. The bulk of the residential development is planned near the station, while most of the development of office and research space is planned to occur beyond a 0.5-mile radius of the station. At Diridon, both residential and office development are planned within the vicinity of the station. Some residential development has already begun to occur, but the growth in office development is likely to be slow until the Bay Area economy improves.

Of the other station areas that currently have relatively low population levels, those slated for the most future growth in residential units are Millbrae (due to planned development in both Millbrae and Burlingame), Palo Alto, Lawrence (in Sunnyvale), and Santa Clara.

Of the station areas that already have relatively moderate to high population levels, those that are slated for high growth in residential units are Redwood City, Sunnyvale, Hayward Park, Tamien (in San Jose), and Hillsdale. The City of San Mateo has gone through a lengthy planning process concerning the redevelopment of the Hillsdale and Hayward Park stations. The City is also working with the Bay Meadows Land Company to redevelop the Bay Meadows race track into a high-density, mixed-use community on the east side of the Hillsdale Station.

Although many station areas will see fairly substantial increases in population in the coming years, the picture is very different when it comes to job growth. Of the station areas that have relatively low numbers of jobs, only Hillsdale and Millbrae would have any sizable increase in office development according to current plans. While the immediate Millbrae station area would experience an increase in office space, a large amount of existing office and medical office space would be lost south of the station due to redevelopment in the northern part of Burlingame; however, due to the relative lack of a pedestrian-supportive environment between the Caltrain station and the existing offices in North Burlingame, it appears that few trips to these offices are currently made by Caltrain. The new offices would be much closer to the station and much more easily accessible by foot from the station.

Of the station areas that already support relatively moderate to high numbers of jobs, 4th and King Street, Sunnyvale, and San Jose are targeted for substantial increases in office square footage. In addition, the Hayward Park and Palo Alto station areas would have more modest increases in office square footage.

The Caltrain Electrification Program is not expected to increase development on the Peninsula, however, reducing noise and enhancing the transit experience may help to *encourage transit-oriented development around station locations. This would be consistent with MTC's Land-Use and Transportation Platform.*

3.9.2 IMPACTS

3.9.2.1 No-Electrification Alternative

Under the No-Electrification Alternative, Caltrain would continue diesel train operations in the existing, active commuter and freight rail corridor and would not extend into new or presently unserved areas. *As with the Electrification Program Alternative, t*here would be no changes in zoning or planned land use. There would be no need to acquire additional property to construct electrification facilities off the Caltrain right-of-way, and there would therefore be no displacements or relocations of residents or businesses.

3.9.2.2 Electrification Program Alternative

The Electrification Program Alternative would *involve* construct*ion of* OCS poles and wires within the Caltrain right-of-way and *10* traction power facilities along the corridor. The OCS facilities would be constructed within the existing, active commuter and freight rail corridor. *In a small number of isolated cases, small pieces of right-of-way may need to be acquired as necessary to accommodate the placement of OCS poles. Care will be taken during detailed design to avoid unnecessary impacts to private property; major property requirements are not anticipated.* Electrified service would not be extended *south of the Tamien Station or* into new or presently unserved areas. The increases in service are expected to decrease Caltrain trip times and increase Caltrain ridership in comparison to the No-Electrification Alternative (see Section 3.15.5, Future Rail and Bus Transit and Projected Impacts), but these changes, *for the most part*, are not expected to produce changes to zoning or land use *designations* and would be consistent with current land uses. *The Electrification Program Alternative would improve the environment for more intensive development around Caltrain stations by improving corridor air quality and reducing noise, but actual land use changes would depend on local and regional socioeconomic factors and planning policies.*

*With a few exceptions, t*he new traction power facilities would be placed primarily in areas zoned for industrial *or commercial/office* use, and *they* would not require displacements of residents or employees (see Section 3.12.2, Displacements) that would produce changes in population or housing along the corridor. *These facilities would be consistent with land use designations for each local jurisdiction, and they will have no substantially adverse impacts on surrounding land uses. For the three sites (PS3, PS5, and PS6) within 100 feet of residential uses, the power station facilities would be appurtenant to the existing railroad; hence, a no-impact conclusion is appropriate for land use.*

Section 3.9.3, Community Cohesion, discusses the effects of the alternatives on neighborhoods and communities. Section 3.12.3, Environmental Justice, addresses benefits and impacts on ethnic minority, low-income, and transit-dependent populations.

3.9.3 COMMUNITY COHESION

Community cohesion addresses the degree to which residents have a sense of belonging to their neighborhood or experience attachment to community groups and institutions as a result of continued association over time. Possible community cohesion impacts of a project include effects on interactions among persons and groups, whether certain people would be isolated from others, and the perceived impact on community quality of life.

3.9.3.1 No-Electrification Alternative

Under the No-Electrification Alternative, Caltrain would continue diesel train operations in the existing rail corridor and would not construct new facilities outside the right-of-way that would affect community cohesion.

3.9.3.2 Electrification Program Alternative

The proposed project would place new OCS poles and wires within the Caltrain and UPRR right-of-way and station areas. These facilities would be placed within an existing, active commuter and freight rail corridor*;* therefore, *they* would not constitute any new physical or psychological barriers that would divide, disrupt, or isolate neighborhoods, individuals, or community focal points in the corridor. In addition, the Electrification Program Alternative would place up to *10* traction power facilities, consisting of *two* substations, *a* switching stations, and *seven* paralleling stations, *a*long the corridor from San Francisco to *San Jose*. The majority of these facilities would be sited in industrially *and commercially* zoned areas, or close to existing power facilities. None would have *the* potential to divide or disrupt an existing residential neighborhood or community. Visual effects of the new electrification facilities are evaluated in Section 3.1, Aesthetics. *Potential e*lectromagnetic field radiation and electromagnetic field interference effects of the electrification facilities are presented in Section 3.17, Electromagnetic Fields and Electromagnetic Interference.

3.9.4 *MITIGATION*

Land use impacts are due to the Electrification Program Alternative would be beneficial; hence, no mitigation measures are required.

3.10 MINERAL AND ENERGY RESOURCES

The Caltrain right-of-way does not contain mineral resources of any developable value, nor would Electrification Program facilities have any potential to affect mineral resources. The remainder of this section, therefore, focuses on energy resources and impacts.

3.10.1 SETTING

The major form of energy of concern to the Caltrain Electrification Program is electricity. Through conversion of trains from diesel motor propulsion to electric motor propulsion, the proposed project would substantially increase annual electricity use by Caltrain. The proposed project would also affect the use of other forms of energy, such as diesel fuel and gasoline, but the use of these forms of energy would be expected to decrease. The energy setting discussion, therefore, focuses on the existing market for electricity in the project corridor. Brief descriptions are also provided of the sources of other forms of energy that might be affected by the proposed project.

3.10.1.1 Electricity Generation and Distribution

The markets for generation and distribution of electricity in the state of California, as in a number of other states, are changing rapidly. In the past, major regulated and investor-owned utilities both produced and distributed electricity. In northern and central California, including the majority of the Caltrain service area, PG&E was the primary electricity provider – both generator and distributor – subject to oversight by the CPUC. With the advent of deregulation of the electric power industry, distribution and production are becoming increasingly decoupled. PG&E remains the main local distributor of electricity to commercial and residential users. It owns most of the electric power transmission and distribution grid in the region but has been divesting itself of electric power generation facilities in the state, concentrating more on transmission and distribution. In fiscal year *2006*, for example, PG&E generated only *44.3* percent of the electric energy it provided its customers in California. The balance, *55.7* percent of distributed power, was purchased from various sources.

The supply of power to the PG&E grid in a deregulated environment may come from any of a number of sources, both in-state and elsewhere in the western U.S. Companies selling power to California can be based anywhere in the U.S., but, as a practical manner, their generating facilities are generally located within several hundred miles of the points of use.

Figure 3.10-1 shows the sources of PG&E's utility-generated electric energy. The major source is *natural gas fired generating plants at 40 percent, followed by nuclear power from Diablo Canyon's two generating units at 24 percent and hydroelectric power at 22 percent.*

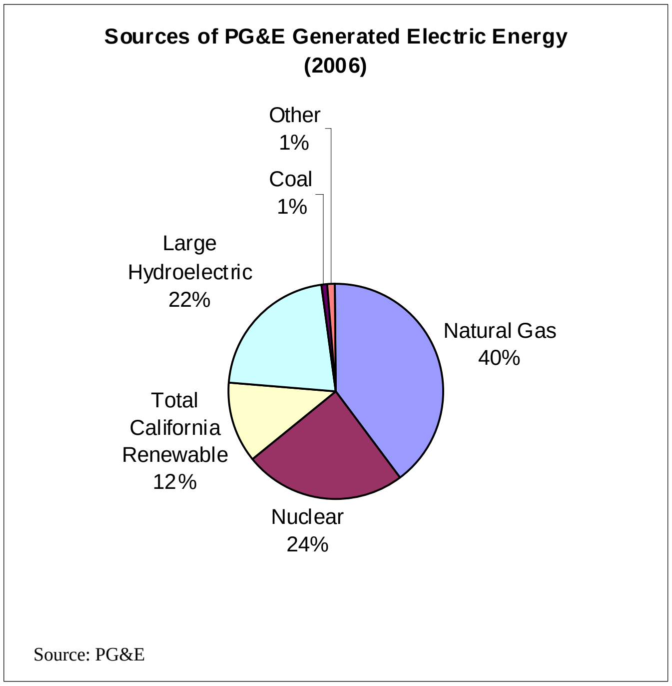

Figure 3.10-*1*: Sources of PG&E's Utility-Generated Electric Energy

Figure 3.10-2 shows the estimated sources of PG&E's purchased electric energy. The major source is natural gas fired generating plants at 35 percent, followed by large hydroelectric plants at 19 percent, and nuclear power and coal at 17 percent and 16 percent, respectively. Renewable sources of electric energy, such as geothermal, solar, small hydroelectric, wind and biomass, are estimated to account for *approximately* 12 percent of *both PG&E generated and* purchased power.

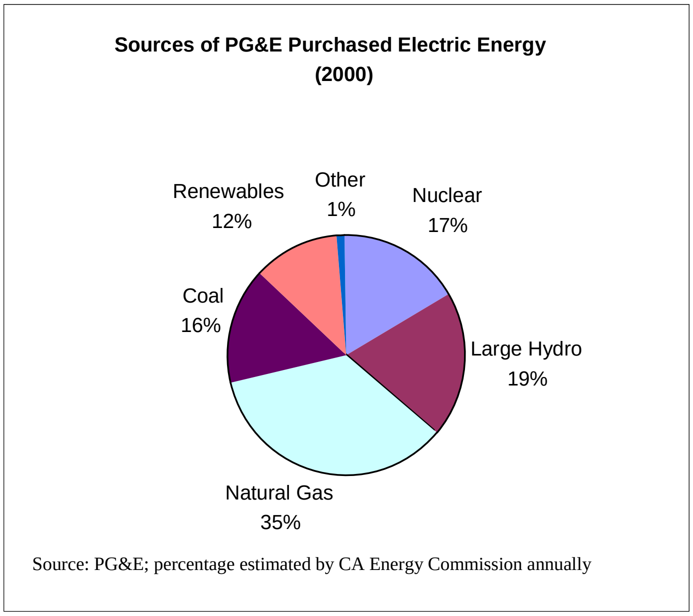

Figure 3.10-*2*: Estimated Sources of PG&E's Purchased Electric Energy

When purchasing power, PG&E does not buy directly from individual generation suppliers. Instead it purchases electric energy through any of the following three sources:

(1) the California Power Exchange, to which any number of generation companies throughout the country bid to supply electricity, and distributors like PG&E bid to buy electricity;

(2) from other qualifying facilities (including subsidiaries of PG&E Corporation); and

(3) *from* irrigation districts.

The Exchange was created in conjunction with electric power industry deregulation under the Electric Industry Restructuring Act (AB 1890, passed in September 1996 and effective March 31, 1998). PG&E's business plan under deregulation has been to entirely divest itself of generating facilities in California.[16]

Also as part of deregulation, operational control of the state's transmission system has been transferred to the Independent System Operator, a complementary entity to the Power Exchange. PG&E and other investor-owned utilities that own transmission lines are required to allow access to any generator supplying electric energy to customers in the state. PG&E remains the local distributor, where it owns the distribution lines; however, customers – first commercial and subsequently residential – have since 1998 been allowed to choose their suppliers from a variety of "retailers" besides PG&E and the traditional investor-owned

[16] PG&E Corporation, the utility's parent firm, includes, as one of the corporation's five subsidiaries, the PG&E National Energy Group, which generates electric power, transmits natural gas, and markets and trades energy wholesale.

utilities. The JPB/Caltrain has continued to purchase electric energy from PG&E but could elect to contract with any number of other energy retailers.

Future Developments. *In the future, more of PG&E's electrical energy would come from renewable resources. California law requires each investor-owned utility to increase the share of eligible renewable generating resources in its electric power portfolio to 20 percent by 2010. PG&E has made contractual commitments to have more than 20 percent of its future deliveries from renewables.*

PG&E has already entered into new contracts for renewable power. The latest contract (announced in April 2008) is with BrightSource Energy, Inc., for 900 megawatts of renewable solar power.

3.10.1.2 Municipal Power Generation and Distribution

PG&E is the main, but not the only, electric energy distributor in the study area. Two area cities have municipal utility districts that own the local power distribution systems within their jurisdictions: Santa Clara and Palo Alto. These cities serve both commercial and residential customers. Power is purchased from others, including the Western Area Power Administration *(WAPA)*, Joint Powers Agencies, and PG&E. In Santa Clara, a small portion, approximately *5* percent, of electric energy is generated by city-owned Silicon Valley Power. The JPB/Caltrain purchases electricity from these city-owned utilities to operate and provide lighting for its local facilities, such as passenger stations and commuter parking lots, but would not rely on these systems to supply the power required under the Electrification Program.

In the City and County of San Francisco, PG&E is the distributor of electric energy through its own grid*; h*owever, power is in part produced by and transmitted over the city-owned Hetch Hetchy Water and Power system, which includes a major hydroelectric facility on the Tuolomne River in Yosemite National Park. Electric energy is provided for all San Francisco municipal uses, including the San Francisco International Airport. Surplus power is sold at cost to the Modesto and Turlock Irrigation Districts and, when available, on the wholesale market to other public utilities. Hetch Hetchy could be a source of power for JPB/Caltrain facilities within San Francisco, distributed by PG&E. The JPB/Caltrain purchases electricity from these city-owned utilities to operate and provide lighting for its local facilities, such as passenger stations and, if practical, would consider these municipal utility districts for power supply for the Electrification Program.

3.10.1.3 California's Energy Crisis – *During and After*

Deregulation of the state's energy markets has been interrupted by the energy crisis that struck California in 2000. The energy crisis continued into early 2001, causing among other problems, escalating electricity prices, the occurrence of rolling blackouts, and financial hardships for a number of investor-owned and other utilities. PG&E's planned divestiture of generating facilities has been suspended for an indefinite period. The state has required that PG&E not sell additional facilities until solutions to the crisis have been implemented.

During much of the period of supply/demand imbalance that contributed to the energy crisis, PG&E had to purchase electricity through the Power Exchanges at "wholesale prices" considerably higher than the "retail prices" it – as a regulated utility – has been able to charge its customers. The result has been the accumulation of substantial operating liabilities, and on April 6, 2001, PG&E filed for reorganization under Chapter 11 of the U.S. Bankruptcy Code.

In April 2004, PG&E emerged from the Chapter 11 Bankruptcy process following a settlement agreement approved by the CPUC. As PG&E emerged from bankruptcy, consumers and the State of California were able to incur benefits, including a significant $800 million electric rate reduction, environmental benefits that protected 140,000 acres of sensitive watershed lands that surrounded PG&E's hydroelectric facilities, and the restoration of the company's investment grade credit to allow access to capital markets to finance infrastructure improvements and other procurements.

3.10.1.4 Other Forms of Energy

The two other energy resources that would likely be affected by the proposed project are petroleum-based fuels for motor vehicles and natural gas, which can also be used by motor vehicles but is commonly a fuel used in heating facilities and manufacturing or processing.

Despite short-term volatility in gasoline and diesel fuel prices, the petroleum fuels market is competitive, with a number of potential suppliers and distributors, and long-term supply is not considered a critical issue. Distribution of fuel is by a number of methods, from pipelines to railroads to trucks. The risks are primarily in the production of oil, which can be disrupted by political events. At some point, oil reserves will be depleted and alternative fuels will become necessary.

Natural gas distribution is primarily through PG&E's local network. PG&E is the main gas utility in the study area. The City of Palo Alto Municipal Utility District also owns and distributes natural gas to city residents and businesses, as it does electric power. Natural gas is purchased by distributors such as PG&E from various suppliers. The major natural gas inter- and intrastate pipelines are controlled by relatively few pipeline companies, but access to their pipelines is afforded all qualifying suppliers.

The geographic sources of natural gas purchased by PG&E in *2003* were the following, as stated in PG&E's Year *2003* Financial and Statistical Report:

- Canada – 67 percent
- California – *less than 2* percent
- Other states – *less than 35* percent

The State of California has become a less reliable source of natural gas supply as available resources are depleted*;* however, throughout North America and elsewhere, natural gas reserves are considered plentiful. According to the Department of Energy, Energy Information Administration, U.S. proved reserves of wet natural gas were *approximately*

220 billion cubic feet in *2006*, or not quite 10 times the *2006* level of production.[17] Other "technically recoverable" reserves (discovered and undiscovered) in *2006* were *1,532* trillion cubic feet, or 61 times the *2006* level of gas production. In addition to U.S. reserves, there are substantial North American gas reserves in Canada.

3.10.1.5 *Rising Fuel Prices*

Fuel prices have considerably increased over the past few years. Gasoline prices have more than doubled since 2000 when gas prices were $1.79 per gallon. Currently (as of April 2008), in California a gallon of gasoline costs more than $3.89 a gallon.[18] Diesel fuel prices in California have also risen from $1.99 per gallon in 2000 to $4.39 per gallon in April 2008. Increased demand for oil products since 2000 has not been consistently filled by suppliers and is one of the reasons that prices are expected to continue on record increases.

Even though the cost of electricity has increased over the past years, the increases are not as dramatic. The annual average rate for PG&E customers (average for all types of customers) increased from 9.7 cents per kilowatt hour (kWh) in 2000 to 14.0 per kWh in 2007, a 44 percent increase.[19]

3.10.2 IMPACTS

3.10.2.1 Overview

The Caltrain Electrification Program would require energy to construct, operate, and maintain the system. Energy for construction includes, in addition to the energy used by construction equipment and other activities at the worksite, the energy used to manufacture equipment, materials, and supplies and transport them to the work site. Energy consumed in the operation of transportation systems is primarily that used by vehicles transporting people or goods – propulsion energy – plus energy used to operate facilities such as stations and station amenities, maintenance shops, yards, and other system elements. Energy for maintenance includes that for day-to-day upkeep of equipment and systems, as well as the energy embedded in any replacement equipment, materials, and supplies.

Energy consumed in operation of transportation systems is typically referred to as direct energy. Energy consumed in construction and maintenance is referred to as indirect energy. Over the life of a transportation project, direct energy consumption is usually the largest component of total system energy use. Vehicle propulsion energy can amount to 60 percent of total system energy.[20] In the current energy environment, the ongoing energy requirements of new activities – including their long-term impacts on energy supplies – are of chief concern. From an energy conservation standpoint, therefore, direct energy impacts are of more importance than indirect energy impacts. For these reasons, the energy analysis for this

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[17] U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2006 Annual Report, USDOE, Energy Information Administration.
[18] Energy Information Administration (EIA), 2008.
[19] California Public Utilities Commission, 2008.
[20] *Energy and Transportation Systems*, Caltrans, Division of Engineering Services, July 1983.

environmental document focuses on direct rather than indirect energy requirements. It compares estimated energy use with and without electrification.

Electrification of Caltrain service would substantially increase the consumption of electric energy for train propulsion. There would also be a substantial reduction in the consumption of diesel fuel for propulsion.

3.10.2.2 Methodology

Comparing electrification energy requirements with the No-*Electrification Alternative* gives an estimate of the net effects of changing train propulsion technology.

Electrified trains can accelerate and decelerate faster than diesel-powered trains. To the extent that conversion to electrical energy improves train performance by shortening trip times, and thereby attracts more riders to Caltrain, electrification would also reduce the consumption of energy by other travel modes. These modes would be primarily autos and small trucks that consume gasoline, diesel fuel, or alternative motor vehicle fuels. These impacts*, though modest when compared to the energy impacts of a change in Caltrain rolling stock,* would be considered beneficial as persons shift from less energy-efficient modes *(i.e.,* autos and trucks*)* to a highly energy efficient mode *(i.e.,* commuter rail*)* measured in terms of energy use per passenger mile or per seat mile.

Because energy requirements for Caltrain facilities, such as stations and parking lots, administrative offices, among other facilities, are not materially affected by a change in rolling stock and the associated vehicle propulsion technology, these impacts are excluded from the analysis. The one area where a change in rolling stock would affect energy for facilities is in yard operations and, to some extent, for servicing and light maintenance. Trains would be moved around the yard and through shops before and after entering revenue service, and these facilities, too, would be electrified. The estimate of propulsion energy requirements for each rolling stock option, therefore, makes an allowance for non-revenue movements in addition to estimating energy for revenue service. Thus, the potential energy effects of electrifying yards and shops for *Electric Multiple Units (*EMUs*)* are accounted for.

The energy impacts analysis focuses, therefore, on the propulsion energy requirements of *the Electrification Program Alternative*. Electricity used for propulsion under th*is a*lternative was estimated from traction power simulations performed as part of the engineering design studies.[21] Estimated energy use for simulated train trips was converted to energy consumption per passenger car-mile operated. The analysis assumed the number of passenger cars *per train* under the No-*Electrification and Electrification Program* Alternative*s* would not vary significantly.

Diesel fuel energy use under the No-*Electrification* Alternative was not simulated but was derived from information on current fuel consumption of trains.

[21] *Traction Power System Study*, LTK Engineering Services, September 2000, and addenda.

Annual passenger car miles were *calculated for 98 diesel-powered trains per day (including 6 Gilroy trains in the San Jose to Gilroy segment) for the No-Electrification Alternative and 114* trains per day *(plus 6 diesel-powered trains in the San Jose to Gilroy segment) for the Electrification Program Alternative.* These daily train numbers were provided by *Caltrain*. Information also included proposed splits, or numbers of train trips, for express and local service. Average train trip lengths were derived from current Caltrain schedules, adjusted to reflect future operating patterns. Annual train trips were based upon *253* weekdays, *54* Saturdays/holidays, and 58 Sundays/holidays of service. Annual revenue car-miles were adjusted upwards to reflect non-scheduled or special events train trips, plus 2.5 percent to account for non-revenue movements.

3.10.2.3 Impacts

Energy Consumption. Table 3.10-1 shows the estimated annual passenger car-miles and annual power consumption of the project alternatives. Diesel propulsion is expressed in terms of gallons of diesel fuel. Electric propulsion options are expressed in terms of kWh of electricity. *Auto/truck fuel usage is expressed in terms of gallons of gasoline.*

Table 3.10-1 also shows the conversion of energy units to a standard measure of energy content, BTUs, or British thermal units. A gallon of diesel fuel is equivalent to approximately 125,000 BTUs, a gallon of gasoline is equivalent to approximately 110,400 BTUs, and a kWh of electricity has an energy content of approximately 3,416 BTUs. The second to last column in the table is an estimate of total annual BTUs consumed for propulsion of the various project alternatives. The No-Electrification Alternative using diesel locomotives push-pulling gallery cars would consume the most direct energy, 719,822 BTUs in 2035. The Electrification Program Alternative would consume substantially less, approximately 273,034 BTUs in 2035 – only approximately one-third of the energy consumption needs of the No-Electrification Alternative. This translates to a 62 percent reduction in direct energy consumption.

Table 3.10-1: Annual Traction Power Energy Use for the No-*Electrification* and *Electrification Program* Alternatives

Year	Alternative	Technology (Rolling Stock)	Power Use per Pass-Car Mile[1]		Annual Pass-Car Miles	Power Consumed (000,000s)[2]		Direct Energy Equiv. in BTUs (000,000s)[3]	Total Energy Equiv. in BTUs (000,000s)[4]
2035 (rail)	No-*Electrification*	**Diesel**	**0.8**	**gal**	***7,198,222***	**5.78**	**gal**	***719,822***	***827,796***
	Electrification *Program*	Diesel	0.8	gal	*231,059*	0.18	gal	*23,106*	*26,572*
		EMU	9.2	kWh	*7,952,599*	71.09	kWh	*249,928*	*534,097*
		Total	-	-	***8,183,657***	-	-	***273,034***	***560,668***
	Percent Change from No-*Electrification*				*14%*			*-62%*	*-32%*
2035 (autos)	No-*Electrification*	Autos/truck	0.04	gal	74,910,407,111	2,996.42	gal	289,453,813	347,344,576
	Electrificatio*n Program*		0.04	gal	74,887,542,044	2,995.50	gal	289,365,462	347,238,555
	Percent Change from No-*Electrification*				-0.03%			-0.03%	-0.03%

Notes:

1 Power use is average of simulated use for express trips (approaching 40 *percent* of daily vehicle miles) and local trips (60 *percent*) operated by Caltrain. Consumption is averaged over the number of passenger cars for diesel (No-Electrification). Locomotive miles are not included, therefore, in the car miles total. All EMUs are passenger vehicles, and no locomotive miles are generated.

2 Total power consumption for electric vehicles assumes a 10 *percent* savings in direct energy use due to regenerative braking that returns electricity to the system from decelerating vehicles. This energy, although consumed by other vehicles, does not need to be purchased from outside sources.

3 A gallon of diesel fuel has a direct energy content of *125,000* BTUs; a gallon of gasoline has a direct energy content of 110,400 BTUs; *One kWh of electricity has a direct energy content of 3,416 BTUs.*

4 Total energy includes the energy required to generate or refine a k*W*h or gallon of fuel and to transport it to the point of use. Total energy contents are as follows:
Gallon of diesel fuel = *143,750* BTUs*;* Gallon of gasoline = 132,480 BTUs*;* kWh of electricity = 7,300 BTUs
Electrification Option replaces diesel locomotives and gallery cars with electric multiple units (EMUs). An EMU is required for each gallery car replaced.

Source: Traction Power System Study (LTK Engineering Services, June 2001); Table 1; PCJPB operating statistics; PG&E; Parsons 2008.

The last column provides a final comparison of energy consumption by alternative and rolling stock option, accounting for the total energy content of the diesel fuel or electric energy consumed in train propulsion. Total energy includes not just the direct energy content of a gallon of fuel or kWh of electricity but also the energy required to refine/generate and transport/transmit fuel or electricity to the final point of consumption. As such, it is a more comprehensive indicator of the energy requirements of an alternative. For example, the energy required to refine and transport a gallon of diesel fuel to Caltrain facilities adds roughly 19,000 BTUs to the 125,000 BTUs of direct energy content in that fuel source. The energy required to generate, transmit, and distribute electricity to Caltrain electric-powered vehicles is estimated to add roughly 4,000 BTUs to the direct energy content of 1-kWh.[22] Thus, 1-kWh consumed in the propulsion of electric trains represents *approximately* 7,300 BTUs of total energy. *One gallon of gasoline is equivalent to 132,480 BTUs of total energy.*

Even with an adjustment in propulsion energy consumption from direct BTUs to total BTUs, the *E*lectrification *Program* option *is a considerably* lower energy user than the No-*Electrification* Alternative retaining diesel train service. Total energy consumption of electrified service measured in the form of total BTUs is *approximately two-thirds* that of diesel-electric service. *This translates to a 32 percent reduction in total energy consumption under the Electrification Program Alternative.*

Another beneficial effect of the Electrification Program Alternative would be the shift of people from less energy-efficient modes (i.e., autos and trucks) to a highly energy-efficient mode (i.e., electrified commuter rail); however, the energy impacts from changes in travel on auto/truck travel modes are rather modest when compared to the energy impacts of a change in Caltrain rolling stock. VMT by autos/trucks under the Electrification Program Alternative would reduce by 22.9 million miles or 0.03 percent when compared to the No-Electrification Alternative. Direct energy and total energy consumption would also be reduced by approximately 0.03 percent when compared to the No-Electrification Alternative.

Energy Savings. Electrification of Caltrain service would result in a net savings of propulsion energy. Diesel fuel use would decrease substantially, while electricity use would increase substantially, but not proportionately in terms of energy content. *With a small shift of autos/truck users to the new electrified Caltrain, gasoline consumption would also decrease. In 2035, the reduction in diesel fuel consumption is estimated to be almost 5.6 million gallons. The reduction in gasoline consumption as a result of motorists shifting from cars/trucks to Caltrain is estimated to be almost 1 million gallons.* The *year 2035* increase in electricity consumption is estimated to be *71* million kWh.

The increase in electricity demand would require a greater allocation of electric energy to Caltrain and increase demands on generating capacity. Although recent events in California have made it difficult to forecast the electric energy environment over the next 20 years, as discussed in Section 3.10.1, future supply is expected to be adequate to meet growth in

[22] The estimate of total energy in a kWh of electric energy is based upon generation in a new power plant with an energy conversion efficiency of 55 *percent* and a 15 *percent* loss of energy in the transmission, distribution, and conversion of electricity prior to its final consumption by electric trains.

demand, given the number of power plants in the pipeline or in planning. Electrification of Caltrain is anticipated, therefore, to have no significant adverse effect on electric energy supply or distribution.

3.10.3 *MITIGATION*

No mitigation measures are required.

3.11 NOISE AND VIBRATION

3.11.1 NOISE

3.11.1.1 Noise Metrics

Specialized metrics have been developed to measure noise. The loudness of sound is associated with its sound pressure level, most commonly measured in decibels (dB). Through a process known as "A-weighting," measurement of loudness is adjusted to account for the range of sounds audible to the human ear. This "A-weighted" decibel measurement is written "dBA." Figure 3.11-1 identifies typical sound levels (dBA) from common noise sources.

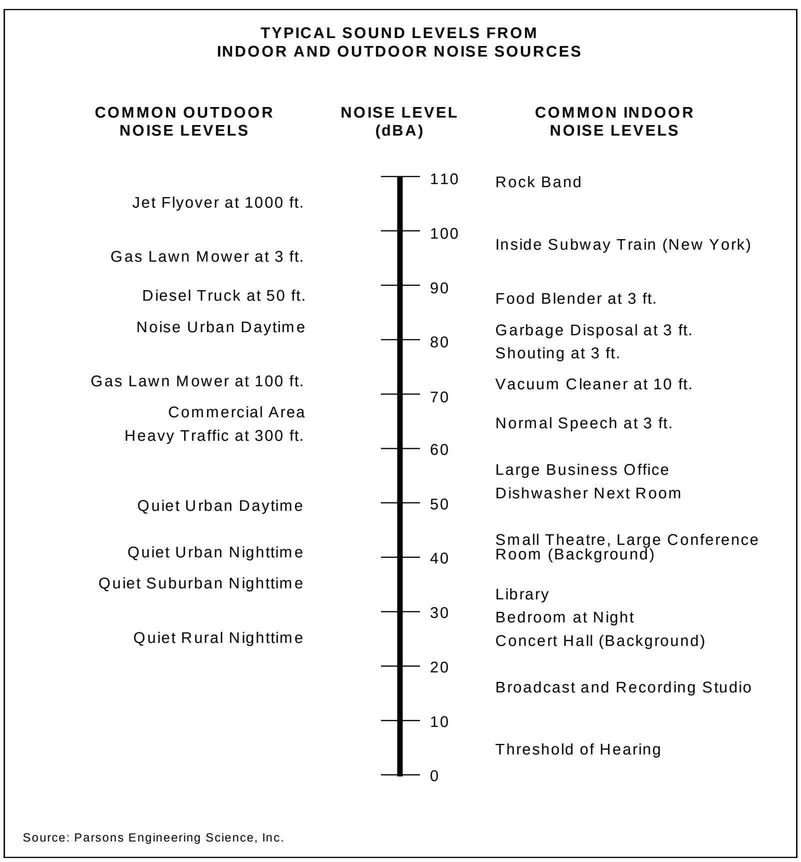


Figure 3.11-1: Typical Sound Levels *f*rom Indoor and Outdoor Noise Sources

For noise-sensitive areas with primarily daytime use, such as schools, noise impacts are evaluated based on changes in energy equivalent levels (L_{eq}). L_{eq} measures the relative average noise level (in A-weighted decibels) over a certain period, usually *1*-hour. In residential areas, where there is greater noise sensitivity at nighttime, noise is characterized by measuring changes in day-night sound levels (L_{dn}). L_{dn} measures the relative average noise level over a longer period (usually 24 hours), with a weighting of 10 dB applied to those noises that occur from 10*:00* p.m. to 7*:00* a.m. This weighting makes one event during the nighttime hours equivalent to ten of the same events during the daytime. Another descriptor, the maximum sound pressure level (L_{max}) is the greatest instantaneous sound pressure level observed during a single noise measurement interval. The sound exposure level (SEL) describes a receiver's cumulative noise exposure from a single noise event. FTA uses L_{dn} and L_{eq} to evaluate train noise impacts at the surrounding communities.

3.11.1.2 Noise Impact Criteria

Train Noise Criteria. FTA has established criteria for assessing noise impacts of transportation facilities, which were used to assess existing ambient noise levels and future noise impacts from train operations with and without the Electrification Program. These criteria were used to evaluate the impacts of train noise throughout the project corridor. The FTA Noise Impact Criteria applicable to three categories of land use are summarized in Table 3.11-1. The maximum *1*-hour L_{eq} during the period that the facility is in use is used for other noise-sensitive land uses such as school buildings and parks (Categories 1 and 3). L_{dn} is used to characterize noise exposure for residential areas and hotels (Category 2).

Table 3.11-1: Land Use Categories and Metrics for Transit Noise 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, and museums, and certain historical sites, parks, and recreational facilities are also included.

* L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity.
Source: FTA, *2006*.

There are two levels of impact included in the FTA criteria, as shown in Figure 3.11-2. The interpretation of these two levels of impact is summarized below:

- **Severe:** Noise mitigation will normally be specified for severe impact areas unless there is no practical method of mitigating the noise.
- ***Moderate* Impact:** In this range, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels.

FTA's noise criteria are based on a sliding scale that reflects the typical community reaction to noise. In areas with higher levels of existing noise, a project is allowed to result in a smaller increase in ambient noise. The horizontal axis in Figure 3.11-2 is the existing L_{dn} without any project noise, and the vertical axis is the L_{dn} that may be caused by a project. For example, as shown in Figure 3.11-3, the "impact" criterion allows a noise exposure increase of 10 dBA if the existing noise exposure is 42 dBA or less, but only a 1 dBA increase when the existing noise exposure is 70 dBA.

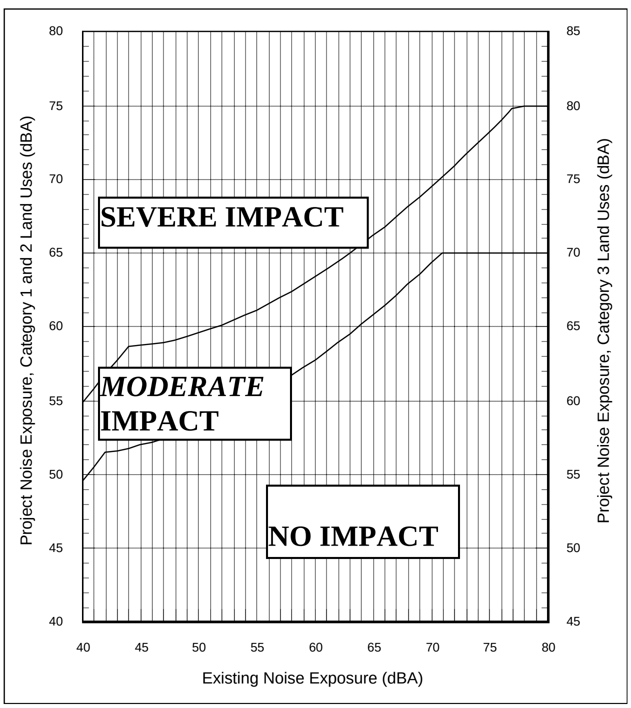
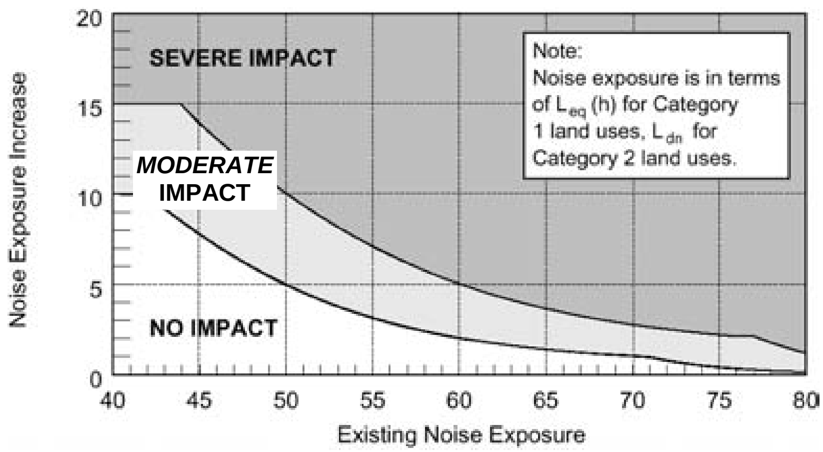


Figure 3.11-2: Noise Impact Criteria for Transit Projects

Note: Noise Exposure is in terms of L_{eq}(h) for Category 1 and 3 land uses, L_{dn} for Category 2.
Source: FTA, *2006.*



Source: FTA, *2006*

Figure 3.11-3: Increase in Cumulative Noise Levels Allowed by Criteria

__**Stationary Source Criteria.**__ The noise criteria used for stationary sources, such as substations and support facilities, are reported in Table 3.11-2. Similar stations may have different limits depending on their location. Specific criteria for stationary sources with a pure tone characteristic, such as transformers, may also differ by jurisdiction.

Table 3.11-2: Local Noise Ordinance Criteria for Stationary Sources

Jurisdiction	Noise Source	Maximum Allowable Levels or Exemption[1]
San Francisco	Stationary Source	50 dBA 10:00 p.m. to 7:00 a.m. 55 dBA 7:00 a.m. to 10:00 p.m.
Brisbane	Stationary Source	Not more than 10 dB over ambient for 15 minutes per hour, not more than 20 dB over ambient for 3 minutes per hour. Minimum ambient noise is defined as 35 dBA interior, 45 dBA exterior.
South San Francisco	General	50 dBA 10:00 p.m. to 7:00 a.m., 60 dBA 7:00 a.m. to 10:00 p.m. in single-family zones. 55 dBA 10:00 p.m. to 7:00a.m., 60 dBA 7:00 a.m. to 10:00 p.m. in multi-family zones.
San Bruno	General	Not more than 10 dB over ambient; or, not more than 20 dB over ambient if noise lasts less than 30 minutes during any 24-hour period.
San Mateo County	General	Not more than 55 dBA for 30 minutes per hour from 7:00 a.m. to 10:00 p.m.; Not more than 50 dBA for 30 minutes per hour from 10:00 p.m. to 7:00 a.m. Not more than 60 dBA for 15 minutes per hour from 7:00 a.m. to 10:00 p.m.; Not more than 55 dBA for 15 minutes per hour from 10:00 p.m. to 7:00 a.m. Not more than 65 dBA for 5 minutes per hour from 7:00 a.m. to 10:00 p.m.; Not more than 60 dBA for 5 minutes per hour from 10:00 p.m. to 7:00 a.m. Not more than 70 dBA for 1 minute per hour from 7:00 a.m. to 10:00 p.m.; Not more than 65 dBA for 1 minute per hour from 10:00 p.m. to 7:00 a.m. Not more than 75 dBA for any length of time from 7:00 a.m. to 10:00 p.m.; Not more than 70 dBA for any length of time from 10:00 p.m. to 7:00 a.m.
San Carlos	General	10 dBA above ambient, measured at 49 feet from property line.
Redwood City	Stationary	6 dBA above the ambient at the property line.
Atherton	General	At any property line: 60 dBA from 7:00 a.m. to 10:00 p.m.; 50 dBA from 10:00 p.m. to 7:00 a.m.

Table 3.11-2: Local Noise Ordinance Criteria for Stationary Sources

Jurisdiction	Noise Source	Maximum Allowable Levels or Exemption[1]
Menlo Park	Stationary	Measured at residential property: 60 dBA from 6:00 a.m. to 10:00 p.m.; and 57 dBA from 10:00 p.m. to 6:00 a.m.
Palo Alto	General	6 dB above ambient for residential; 8 dB above ambient for commercial or industrial.
Mountain View	Stationary	Measured at residential property line: 50 dBA from 10:00 p.m. to 7:00 a.m., and 55 dBA from 7:00 a.m. to 10:00 p.m.
Sunnyvale	Stationary Source	50 dBA nighttime; 60 dBA daytime at property line.
Santa Clara County	General	Single-family zone: 55* dBA from 7:00 a.m. to 10:00 p.m., 45 dBA from 10:00 p.m. to 7:00 a.m. Multi-family zone: 55* dBA from 7:00 a.m. to 10:00 p.m., 50 dBA from 10:00 p.m. to 7:00 a.m. Commercial zone: 65* dBA from 7:00 a.m. to 10:00 p.m., 60 dBA from 10:00 p.m. to 7:00 a.m. *Limits shall be reduced by 5 dB for sound characterized by a pure tone.
San Jose	General	Outdoor L_{dn}: 60 dBA for residential; 60 dBA for commercial; 70 dBA for industrial.

[1] *Noise to be measured at the property line of the affected receptor, unless otherwise noted.*
Source: *Noise and Vibration Study*, Parsons, November 2003.

3.11.1.3 Noise Setting

The distances of buildings from the Caltrain alignment vary. In some cases, single- and multi-family homes were found to be less than 50 feet from the *right-of-way* line.

Representative noise measurements were taken at selected sensitive receptors along the Caltrain alignment between December 10 and December 14, 2001, and between June 3 and June 7, 2002. Noise measurement sites were selected by proximity to the alignment and by land use. Measurements are taken with and without train noise to fully characterize the existing noise environment. Because the Caltrain corridor *subject to this analysis* is very long (*51* miles), measurements taken at these sites were used as representative measures to determine existing background levels throughout the corridor, as well as noise levels generated by the existing diesel trains as they pass by sensitive receptors.

A total of *11* short-term and *15* long-term (24-hour) measurements were taken. Long-term systems were left overnight to record 24-hour day-night levels (L_{dn}), and short-term, 20-minute average levels (L_{eq}) were recorded at the representative sites. The results are shown in Table 3.11-3.

Additional sensitive receptor sites were selected in each community to represent larger groupings of sensitive receptors, such as a city block of single-family homes. Due to the length of the project, receptors were chosen that are representative of their respective areas. This is an accepted approach to noise analyses, as the model predicts noise levels for a larger area than just one home at each location; thus, the results represent the noise exposure for a block or more of homes at each site. Existing noise at the representative locations was predicted by the model and adjusted based on measurements from sites identified in Table 3.11-3.

Table 3.11-3: Representative Sensitive Receptors and Existing Noise Measurements

Site No.	Side[1]	Land Use [2]	Address	Date	Short-Term L_{eq}, dBA	L_{dn}, dBA
2	East	SFR	92 Reddy St., San Francisco	6/6/02	66.5	--
3	East	SFR	50 Carr St., San Francisco	6/6/02	--	73.4
4	East	SFR	269 Tunnel Ave., San Francisco	6/7/02	66.4	--
5	West	SFR	88 Scott St., San Bruno	6/5/02	--	72.9
7	West	SFR	827 Huntington Ave., San Bruno	6/4/02	69.9	--
8	East	SFR	205 Pine St., San Bruno	6/5/02	--	71.8
11	East	MFR	300 San Jose Ave., Millbrae	6/4/02	64.3	--
12	West	SFR	552 Hemlock Ave., Millbrae	6/4/02	--	64.0
14	West	SFR	1100 Mills Ave., Burlingame	6/3/02	--	62.9
16	East	SFR	833 Alpine Ave., Burlingame	6/4/02	--	68.5
18	West	SFR	140 Railroad Ave., San Mateo	6/4/02	68.3	--
20	West	SFR	1523 South B St., San Mateo	6/5/02	--	66.9
22	East	MFR	106/108 Blossom Cir., Hillsdale	6/3/02	64.4	--
24	West	SFR	317 Old Country Road, San Carlos	6/3/02	--	67.0
26	East	SFR	303 Cedar St., Redwood City	6/3/02	--	70.1
27	West	MFR	198 Buckingham Ave, N. Fair Oaks	12/13/01	66.0	--
31	East	MFR	461 Burgess Dr #6, Menlo Park	12/12/01	--	67.7
34	West	Park	Peers Park, Palo Alto	13/13/01	64.5	--
36	West	SFR	4237 Park Blvd, Palo Alto	12/10/01	--	72.5
39	East	SFR	417 Nicholas Dr., Mountain View	6/4/02	--	67.2
44	West	MFR	3529 Agate St, Santa Clara	12/11/01	61.5	--
46	West	SFR	2425 Alvarado Dr., Santa Clara	6/4/02	--	71.8
47	West	SFR	2109 Main St, Santa Clara	12/10/01	--	66.3
48	West	SFR	782 Auzerais Ave, San Jose	12/12/01	60.5	--
49	East	SFR	456 Jerome St, San Jose	12/11/01	--	65.2
52	East	MH	373 Chateau LaSalle, San Jose	12/13/01	50.5[3]	--

[1] Receptor locations in relation to Caltrain alignment.
[2] SFR: Single-Family Residence; MFR: Multi-Family Residence
[3] Background measurement (without train passbys).
Source: *Noise and Vibration Study*, Parsons, November 2003.

3.11.1.4 Noise Impacts

Train noise and stationary noise impacts resulting from electrified operations in *2035* are presented in this section. Construction noise impacts are identified in Section 4*.2.9*.

Train Noise Impact

The FTA noise assessment model was used to calculate train noise levels with respect to the FTA impact criteria discussed in Section 3.11.1.2 for representative sites. As noted above, the model predicts noise levels for a larger area than just one home at each location. Based on results for the representative sites, calculations were performed to estimate the total number of single-family and multi-family residences that would experience noise impacts under the

No-Electrification (No-Project*/No Action*) and *Electrification Program Alternative* in *2035*. Those results are shown in Table 3.11-4.

Table 3.11-4: Summary of Noise Impacts from Train Operations

Segment of Project Alignment	***No Project***		***Electrification Project Year 2035***	
	Moderate Impact	***Severe Impact***	***Moderate Impact***	***Severe Impact***
San Francisco to San Bruno				
Single-Family Residential Structure	*55*	*1*	*55*	*1*
Multi-Family Residential Structure	*3*	*0*	*3*	*0*
San Bruno to San Mateo				
Single-Family Residential Structure	*143*	*23*	*135*	*23*
Multi-Family Residential Structure	*13*	*0*	*13*	*0*
San Mateo to Redwood City				
Single-Family Residential Structure	*113*	*98*	*90*	*96*
Multi-Family Residential Structure	*55*	*22*	*53*	*10*
Redwood City to Mountain View				
Single-Family Residence	*323*	*90*	*316*	*85*
Multi-Family Residence	*107*	*6*	*99*	*6*
Mountain View to San Jose (Tamien Station)				
Single-Family Residential Structure	*241*	*159*	*206*	*103*
Multi-Family Residential Structure	*127*	*22*	*109*	*19*
TOTAL RESIDENCES IMPACTED	***1,180***	***421***	***1,082***	***343***
Single-Family Residential Structure	***875***	***371***	***805***	***308***
Multi-Family Residential Structure	***305***	***50***	***277***	***35***
TOTAL CHANGE IN PERCENTAGE (%)	***n/a***	***n/a***	***-8.3***	***-18.5***
Single-Family Residential Structure	***n/a***	***n/a***	***-8.0***	***-17.0***
Multi-Family Residential Structure	***n/a***	***n/a***	***-9.4***	***-30.0***

Source: Noise and Vibration Study, Parsons, August 2008.

No-Electrification Alternative. The evaluation of the No-Electrification Alternative used FTA's SEL references for diesel locomotives and commuter rail cars. The diesel locomotive SEL accurately represents Caltrain diesel locomotives based on field measurements of the maximum noise level during 15 Caltrain passbys (at various distances and speeds). The SEL of Caltrain gallery cars could not be accurately determined from field measurements due to the dominant noise level produced by the locomotive during a passby. It should be noted that the FTA reference SEL for commuter rail cars is a conservatively high estimate for the existing Caltrain gallery cars.

Under the No-Electrification Alternative, 42 representative sensitive receptors were projected to have noise impacts at the FTA "*Moderate* Impact" level, and 8 were found to experience noise effects at the "Severe Impact" level for the entire corridor between San Francisco and Gilroy. As shown in Table 3.11-4*, 875 single-family and 305 multi-family residential* *structures would be expected to be under the moderate impact level, and 371 single-family and 50 multi-family residential structures would be expected to be severely impacted.*

Electrification Program Alternative. This alternative assumes that Caltrain would replace the locomotive and passenger car fleet with EMU rolling stock *for the portion of the corridor between San Francisco and San Jose. Diesel service would continue to operate between San Jose and Gilroy.*

The noise analysis used a reference SEL for the EMU power car of 85 dBA. This estimated SEL was based on noise levels available for other noise sources (i.e., electric locomotive and diesel multiple unit (DMU), and it is likely to represent a worst-case analysis. At the time of the noise study, there were no measured noise levels available, and no specific SEL level was given in the FTA model/guidelines. If the Electrification Program is implemented, *the* JPB would establish procurement specifications for the EMU to be used on the Caltrain service.

Under this *alternative*, *38* representative sensitive receptors were projected to experience noise at the *Moderate* Impact level, and *two* were found to experience Severe Impact over the entire corridor. As shown in Table 3.11-4, the results at these representative sites indicate that the *Moderate* Impact level of noise would occur at *805* single-family homes and *277* multi-family residential *buildings*, and the Severe Impact level would occur at *308* single family and *35* multi-family residential *structures*. *This indicates an 8.3 percent decrease in Moderate Impacts and an 18.5 percent reduction in Severe Impacts, compared with No-Electrification conditions.*

By comparing the impacted structures between the No Project and the proposed Electrification Project alternatives, it can be concluded that the Electrification Alternative would improve future noise conditions, when compared with the No-Electrification Alternative.

Impacts from Train Horns and Crossing Bells. Train horns and crossing bells are major noise sources associated with train operations. Trains sound their horns before roadway crossings and when approaching a passenger station. The number of roadway crossings and stations would not be changed as a result of the proposed Electrification Program, *however, more gate down time (crossing bells) and train horns are expected with the increased level of service. T*herefore, although the noise impacts of train engine operations would be greatly improved by electrification, the noise impacts from train horns and crossing bells *may be increased* due to the proposed Electrification Program.

Noise Impacts from Stationary Facilities. In addition to the noise generated by Caltrain operations, there also may be impacts caused by some of the supporting facilities, particularly from electrical substations. *T*he addition of electrical poles and wires *associated with the OCS required for distribution of electrical power to the electrical rolling stock* would not affect the noise environment at passenger stations.

Electrical *traction power facilities/*substations are described in Section 2.3.2.3. Noise levels for various types of equipment associated with a typical electrical substation are shown in

Table 3.11-5. The cumulative noise level at the property line is dependent upon substation layout and distance of different equipment from a property line. These configurations would be determined during final design of the project. There would be noise impacts if noise levels at the property line exceed limits set forth by local jurisdictions (see Table 3.11-2). Some local jurisdictions, such as Santa Clara County, apply a 5-dB penalty for the tonal characteristics of transformer noise.

Table 3.11-5: Noise Levels for Electrical Equipment

Equipment	Noise Level at *1 Foot*, dBA
60 MVA Transformer	*78*
Auxiliary and 10MVA Autotransformers	*68*
Cooling System Fan	72
Source: *PCJPB, 2008.*	

One paralleling station (PS) would be within *150* feet of a few residences. Noise from the paralleling station facility could affect residences depending on *its* layout. The facility is identified below:

PS5: Paralleling station PS5 would be located within *150 feet of a few residences on Alma Street at Green Meadow on the north side of the facility and on Adobe Creek on the south side.*

3.11.2 VIBRATION

3.11.2.1 Vibration Metrics

In the context of the response of humans, buildings, and equipment to vibration, velocity or acceleration is normally used to describe vibration. The vibration analysis for the current study used velocity to describe ground-borne vibration.

Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is used to evaluate the potential for building damage, although it is not suitable for evaluating the human response to vibration. It is defined as the maximum instantaneous peak of the vibration signal. RMS is used to evaluate human response, since it takes some time for the human body to respond to vibration signals. The RMS of a signal is the average of the squared amplitude of the signal. For sources such as truck or motor vehicle, PPV levels are typically 6 to 14 dB higher than RMS levels. FTA uses “VdB” abbreviation for vibration decibels to reduce the potential for confusion with sound decibel. The threshold of perception for human beings is approximately 65 VdB; however, human response to vibration is not usually significant unless the vibration exceeds 70 VdB. Vibration tolerance limits for sensitive instruments, such as MRI or electron microscopes, can be much lower than the human vibration perception limit.

Similar to the noise descriptors, L_{eq} and L_{max} can be used to describe the average vibration and the maximum vibration level observed during a single vibration measurement interval.

3.11.2.2 Vibration Impact Criteria

This section presents the guidelines, criteria, and regulations used to assess long-term vibration impacts associated with project operations.

The criteria in *Transit Noise and Vibration Impact Assessment* (FTA, 1995) were used to evaluate vibration impacts from Caltrain operations. The evaluation of vibration impacts can be divided into two categories: (1) human annoyance, and (2) building damage. Santa Clara County, which is the only jurisdiction along the Caltrain corridor that has vibration limits, uses human annoyance for its vibration criterion.

Human Annoyance Criteria. Table 3.11-6 presents the FTA criteria for various land use categories, as well as the frequency of events. The criteria are related to ground-borne vibration causing human annoyance or interfering with the use of vibration sensitive equipment. The criteria for acceptable ground-borne vibration are expressed in terms of RMS velocity levels in VdB and are based on the maximum levels for a single event (L_{max}).

All sensitive receptors within the project area fall under Land Use Category 2. Thus, the maximum vibration levels of 72 VdB were used for project criteria, since the estimated number of Caltrain train passbys is more than 70 per day and can therefore be considered a "Frequent Event."

Table 3.11-6: Ground-Borne Vibration Impact Criteria for Human Annoyance

Land Use Category	Ground-Borne Vibration Impact Levels (dB ref. 1 micro-inch/sec)		
	Frequent[1] Events	***Occasional[2] Events***	**Infrequent[3] Events**
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	*65 VdB[4]*	65 VdB[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	*75 VdB*	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	*78 VdB*	83 VdB

1 "Frequent Events" is defined as more than 70 vibration events *of the same source* per day.
2 *"Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.*
3 "Infrequent Events" is defined as fewer than *30* vibration events *of the same source* per day.
4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
Source: FTA, *2006*.

Building Damage Criteria. Normally vibration resulting from a train passby would not cause building damage*;* however, damage to fragile historic buildings located near the right-of-way can be a concern. As noted above, PPV is the vibration metric that correlates best with building damage. For fragile buildings, FTA provides a vibration damage threshold criterion of 0.50 inch per second, which is approximately 102 VdB. For extremely fragile buildings, the threshold is 0.12 inch per second, approximately 90 VdB. FTA recommends these criteria be used as a damage threshold for fragile structures located near the right-of-way of a transit project.

3.11.2.3 Vibration Setting

Representative vibration measurements of train passbys were taken at 12 sensitive receptors, which are nearest to the project alignment. The measured vibration levels are presented in Table 3.11-7.

3.11.2.4 Operation Vibration Impacts

Building Damage. Based on the vibration measurements described above, vibration impacts at the remaining sensitive receptor assessment sites were calculated using FTA procedures. FTA guidelines contain a conservative method for estimating vibration levels; therefore, the number of affected structures would likely be less than as indicated by the FTA method. The results demonstrated that the building damage criteria of 0.50 inch per second would not be exceeded at any location along the corridor due to train passbys for any of the Electrification Program Alternatives.

Human Annoyance. Table 3.11-8 summarizes vibration impacts by project segment. The results presented were based on the vibration modeling for representative sensitive receptors in each segment of the project corridor. The analysis indicated that vibration impacts would occur at 60 of the sensitive receptors modeled for the No-Electrification Alternative. For the *Electrification Program Alternative*, 20 sensitive receptors would experience vibration impacts. The total number of projected impacts was then derived from these representative sensitive receptors and is shown in Table 3.11-8.

In all areas of the alignment, the vibration levels shown in Table 3.11-8 would be *5* to 10 VdB higher when there are crossovers, turnouts, or other special trackwork present that cause an irregular rail surface, jointed track, or switches. This results in annoying transients in the vibratory level characterized by a repetitive “thump-thump” sound experienced during a train passby.

Table 3.11-7: Existing Vibration Measurements

Site Number	Side[1]	Land Use [2]	Address	Date	Distance to Near Track Centerline, feet[5]	Train Speed, mph[5]	Max RMS Velocity Level, VdB[5]	PPV[6], in/sec
1	West	MFR	1831 Palou Ave., San Francisco	6/6/02	76	53	79.4	0.023
5	West	SFR	1289 Herman St., San Bruno	12/14/01	136	45	78.3	0.025
18	East	SFR	140 N. Railroad Ave., San Mateo	12/14/01	66	50	83.7	0.043
21	East	SFR	2 Antioch Dr., San Mateo	6/3/02	105	52	77.4	0.015
27	West	MFR	198 Buckingham Ave., N. Fair Oaks	12/13/01	97	61	79.8	0.022
34	West	SFR	Peers Park, Palo Alto	12/13/01	33	41	86.7	0.062
40	East	SFR	#36 Mary Manor Estates, Sunnyvale	6/4/02	66	63	80.4	0.031
44	West	MFR	3529 Agate St., Santa Clara	12/11/01	79	29	78.4	0.047
48	West	SFR	782 Auzerais Ave., San Jose	12/12/01	45	40	86.6	0.048
56	West	SFR	11 Hayes Ave., San Jose	6/6/02	40	57	89.4	0.068

Notes:
1. Receptor locations in relation to Caltrain alignment.
2. SFR: Single-Family Residence; MFR: Multi-Family Residence.
3. Background measurement (without train passbys).
4. Union Pacific freight train.
5. If more than one train passby was measured, the averages of the distances, speeds, and velocity levels are indicated.
6. The PPV is the highest measured peak particle velocity from all passby events at a particular location.

Table 3.11-8: Vibration Impacts from Train Operations at Representative Sensitive Receptors		
Segment of Project Alignment	**No-Electrification Alternative**	**Electrification Program Alternative (EMU)**
San Francisco to San Mateo		
Single-Family Residence	69	0
Multi-Family Residence	4	0
San Bruno to San Mateo		
Single-Family Residence	478	124
Multi-Family Residence	35	4
San Mateo to Redwood City		
Single-Family Residence	273	56
Multi-Family Residence	144	33
Redwood City to Mountain View		
Single-Family Residence	633	146
Multi-Family Residence	116	18
Mountain View to San Jose (Tamian Station)		
Single-Family Residence	428	62
Multi-Family Residence	162	40
TOTALS		
Single-Family	***1,881***	***388***
Multi-Family	***461***	**95**
TOTAL	***2,342***	***483***
Source: *Noise and Vibration Study*, Parsons, May 2008.		

3.11.3 MITIGATION

The Electrification Program Alternative would reduce, but does not eliminate, train noise and vibration impacts when compared with the No-Electrification Alternative. These remaining noise and vibration impacts are not directly attributable to the Electrification Program, which represents a real *reduction* in corridor noise *and vibration* impacts relative to continued diesel operations under the no-project condition. *Caltrain* will continue to investigate abatement measures to address the remaining noise and vibration impacts, such as the ongoing grade-separation program and the use of four-quadrant gate crossings.

TPS noise levels shall comply with IEEE national standards and guidelines for electrical power facilities. Station layouts and specific noise control measures will be developed during the design phase to minimize noise impacts from the TPSs. Such mitigation measures may include the following:

I. Locate electrical substations farther away from the property lines of noise-sensitive sites, if at all possible.

II. Consider the use of special enclosures for all transformers to mitigate the low frequency noise impacts associated with them.

III. Conduct additional noise evaluations in accordance with FTA and local noise ordinance requirements during the design of these facilities to ensure compliance with the applicable noise regulations.

IV. Possible noise impacts from the ventilation system for the switchgear building can be mitigated by using acoustical louvers, line duct silencers, hoods on the vent openings, and/or by locating vents at the side of the building that is not facing residences.

3.12 POPULATION AND HOUSING

3.12.1 DEMOGRAPHIC CHARACTERISTICS

3.12.1.1 Methodology and Setting

Demographic characteristics of the Caltrain corridor were derived from the 2000 U.S. Census of Population and Housing and the ABAG *Projections 2005: Forecasts for the San Francisco Bay Area to the Year 2030. A growth factor was applied, based on ABAG 2007 Series data, to estimate 2035 numbers.* A total of *90 census* tracts directly adjacent to the Caltrain corridor were used to approximate the study area for demographic characteristics. A summary of corridor demographic characteristics based on *census* tracts is presented in Table 3.12-1.

Population. The study area population is projected to increase by *32* percent between 2000 and *2035*, which is much higher than for either San Francisco County or San Mateo County alone. The largest population increase is projected to occur in Santa Clara County, which is expected to experience a*n over 40* percent increase in population from 2000 to *2035*.

Housing. Consistent with the expectations for population growth, the greatest amount of new housing construction is expected to occur in Santa Clara County *(approximately 42* percent increase). Santa Clara County possesses the largest amount of available space for housing development of the three study area counties.

Employment. *The* greatest increase *in employment between 2000 and 2035 is* anticipated once again in Santa Clara County *as compared to San Francisco and San Mateo counties*. As described in Chapter 1, Purpose of and Need for Project, this development emphasizes the need for improved commuter service from the Peninsula to San Francisco and between Peninsula origins and destinations.

Ethnicity. An ethnicity profile of the study area population was derived from the 2000 U.S. Census Tract data. The categories used are White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other Race, Two or More Races, *and Hispanic or Latino*.

The data shown in Table 3.12-2 indicate that the Caltrain corridor consists of a diverse, multi-ethnic population whose ethnic composition is comparable to that of the three counties that comprise the area. There is greater ethnic diversity within San Francisco and within the study area *census* tracts located in the City and County of San Francisco. Santa Clara County has the highest Hispanic population, but the study area has an even higher percentage of Hispanic population than any of the three counties. Overall, approximately *55* percent of all study area residents are members of minority groups.

As mentioned above, the northern end of the corridor, which lies in San Francisco County, has a larger minority population (*56.4* percent) than is found in either San Mateo County (*50.3* percent) or Santa Clara County (*56.0* percent). *Of all* the *census* tracts along the corridor, those within San Francisco County have higher concentrations of Black/African American population (*19.7* percent compared to the county average of 7.*4* percent).

The middle section of the corridor, which lies in San Mateo County, shows a wide range in *census tract* minority population percent*ages*. The *census* tracts located in the cities of South San Francisco, San Bruno, San Mateo, and Redwood City have substantially higher percentages of minority population than San Mateo County as a whole.

The southern portion of the corridor, which lies in Santa Clara County, also shows a wide range in proportions of minority population. The *census* tracts located in the cities of Palo Alto, Sunnyvale, *and* Santa Clara, *as well as* northern and southern San Jose, have substantially higher percentages of minority population than Santa Clara County overall, *including large percentages of Hispanics*.

Income. The 1999 median household income and percentages of households below the poverty level for the study area and counties of San Francisco, San Mateo, and Santa Clara are shown in Table 3.12-3. *The average m*edian household income for the total study area *census* tracts was *$64,185*, and *8.4* percent of households were below poverty level. The lowest median household income, as well as the highest percentage of households below the poverty level, were in the San Francisco County *census* tracts, where the median household income was $55,221 for the County and $60,000 for the study area. The percentage of households below poverty level was 11.3 percent for San Francisco and 13.5 percent for the study area. Santa Clara County had the highest median household incomes for both the study area and the county as a whole. All of the study area *census* tracts in San Mateo and Santa Clara counties have lower median incomes than their respective counties; however, the study area tracts in San Francisco showed a higher median household income and a larger proportion of households below poverty.

Table 3.12-1: 2000-*2035* Population, Housing and Employment Growth in the 110 Census Tracts Bordering on the Caltrain Corridor

Area	Population				Housing				Employment (Jobs)			
	2000	*2035*	Absolute Change	% Diff	2000	*2035*	Absolute Change	% Diff.	2000	*2035*	Absolute Change	% Diff.
San Francisco County	776,733	*956,800*	*180,067*	*23.2*	*329,697*	*396,310*	*66,613*	*20.2*	*628,860*	*832,860*	*204,000*	*32.4*
San Mateo County	707,163	*861,600*	*154,437*	*21.8*	*254,104*	*312,030*	*57,926*	*22.8*	*386,616*	*522,000*	*135,384*	*35.0*
Santa Clara County	1,682,585	*2,380,485*	*697,900*	*41.5*	*565,862*	*806,210*	*240,348*	*42.5*	*1,044,145*	*1,365,810*	*321,665*	*30.8*

Source: 2000 U.S. Census Data, *ABAG Projections 2007*.

Table 3.12-2: Ethnic Populations in the Study Area

Ethnicity	County of San Francisco	Project Area within *San Francisco* County	County of San Mateo	Project Area within *San Mateo* County	County of Santa Clara	Project Area within *Santa Clara* County	Total Project Area
White	*43.6%*	*26.8%*	*49.7%*	*50.5%*	*44.0%*	*46.1%*	*45.2%*
Black/African American	*7.4%*	*19.7%*	*3.3%*	*2.4%*	*2.5%*	*2.9%*	*6.2%*
American Indian And Alaska Native	*0.3%*	*0.4%*	*0.2%*	*0.2%*	*0.3%*	*0.2%*	*0.2%*
Asian	*30.7%*	*34.1%*	*19.9%*	*11.8%*	*25.4%*	*7.9%*	*16.5%*
Native Hawaiian And Other Pacific Islander	*0.4%*	*1.3%*	*1.2%*	*1.5%*	*0.3%*	*0.4%*	*1.4%*
Some Other Race	*0.3%*	*0.2%*	*0.3%*	*0.3%*	*0.2%*	*0.2%*	*0.3%*
Two or More Races	*3.1%*	*2.9%*	*3.8%*	*3.6%*	*3.2%*	*4.4%*	*3.5%*
Hispanic or Latino (of any race)	*14.1%*	*14.6%*	*21.8%*	*29.6%*	*24.0%*	*37.8%*	*26.7%*
All *Ethnic Minority* Population	*56.4%*	*73.2%*	*50.3%*	*49.5%*	*56.0%*	*53.9%*	*54.8%*

Source: 2000 U.S. Census.

Table 3.12-3: Project Area Household Income and Poverty Status in 1999		
Area	**Median Household Income ($1999)**	**Percent *b*elow Poverty Level**
San Francisco County	55,221	11.3
San Mateo County	70,819	5.8
Santa Clara County	74,335	7.5
Total Study Area Tracts:	*64,185*	*8.4*
Within S*an* F*rancisco* County	60,000	13.5
Within S*an* M*ateo* County	61,177	7.2
Within S*anta* C*lara* County	*69,584*	*8.7*
Source: 2000 U.S. Census.		

Transit-dependent populations are defined as households without private transportation. These individuals rely on public transportation services for access to employment opportunities, school, social/recreation functions, medical appointments, and mobility in general. Table 3.12-4 shows the representation of transit-dependent populations in the project study area based on the 2000 U.S. Census data. *More than eight* percent of the households in the study area are without a private automobile. The study area *census* tracts within San Francisco County have the highest *percentage* of households without private transportation.

Table 3.12-4: Project Area Transit-Dependent Populations in 1999			
Area	**Total Households**	**Households *without* Private Transport**	**Percent of Households *without* Private Transport**
San Francisco County	329,700	94,178	28.6
San Mateo County	254,103	15,507	6.1
Santa Clara County	565,863	31,978	5.7
Total Study Area Tracts:	*134,222*	*11,459*	*8.5*
Within S*an* F*rancisc*o County	8,540	1,387	16.4
Within S*an* M*ateo* County	58,416	4,997	8.6
Within S*anta* C*lara* County	*67,266*	*5,075*	*7.5*
Source: 2000 U.S. Census.			

3.12.1.2 Impacts

No-Electrification Alternative. There would be no impacts to population and housing under the No-Electrification Alternative. Caltrain would continue diesel train operations within the existing, active commuter and freight rail corridor. There would be no need to acquire additional property to construct electrification facilities off the Caltrain right-of-way.

Electrification Program Alternative. The Electrification Program Alternative would construct OCS poles and wires within the Caltrain right-of-way and construct *10* traction power facilities along the corridor. These improvements would take place primarily within the existing, active commuter and freight rail corridor. Electrified service would not be extended into new or presently un*der*served areas. *The project area is fully urbanized; hence,* the improvements in service are expected to decrease Caltrain trip times and increase Caltrain ridership in comparison to the No-Electrification Alternative (see Section 3.15.5, Future Rail and Bus Transit and Projected Impacts), but these changes are not expected to produce changes in population or housing distribution. *By reducing train operating noise and improving air quality, electrification would improve the environment for development, including more intensive housing development, around Caltrain stations; see Section 3.9.1.4, Development Opportunities near Caltrain Stations.*

The traction power facilities would be placed primarily in areas zoned or used for transportation, *commercial/office, or* industrial uses, and *they* would not require displacements of residents or *many* employees (see Section 3.12.2, Displacements). Neither would the Electrification Program result in substantial population or housing changes along the corridor. Section 3.9.3, Community Cohesion, discusses the effects of the alternatives on neighborhoods and communities. Section 3.12.3, Environmental Justice, addresses benefits and impacts on ethnic minority, low-income, and transit-dependent populations.

3.12.1.3 Mitigation

Adverse population and housing impacts would not occur during operation of the Proposed Action; therefore, no mitigation is required.

3.12.2 DISPLACEMENTS

3.12.2.1 Setting

The primary land use in the immediate vicinity of the proposed Electrification Program Alternative is the rail right-of-way, which has existed since the 1860s. Surrounding land uses include commercial, industrial, open space, and residential uses. Land uses in the vicinity of the proposed traction power facilities are primarily industrial, however, at a few locations residential properties are within 50 to 100 feet from the existing right-of-way. These land uses are described in the following paragraphs.

3.12.2.2 Impacts

No-Electrification Alternative. Under the No-Electrification Alternative, Caltrain would continue diesel train operations in an existing commuter and freight rail corridor, and there would be no need to acquire any property to construct traction power stations along the Caltrain right-of-way or to obtain property or property easements to provide power connections between traction power facilities off the right-of-way and electrification facilities or electrified trains operating within the right-of-way. Thus, there would be no displacements under this alternative.

Electrification Program Alternative. The OCS facilities required for the Electrification Program Alternative would be placed within existing right-of-way already owned by the JPB or within UPRR right-of-way for which a dedicated easement for electrified passenger train operations would be obtained. These rights-of-way constitute an existing and active commuter and freight rail corridor.

Some property acquisitions affecting non-residential properties would be necessary to site and construct traction power *sub*stations, and to provide connections between the *sub*stations and the Caltrain line. A total of approximately *1.73 to 3.61* acres would be acquired for these facilities *depending on the alternative selected for the TPS facilities in South San Francisco and San Jose*. A summary of right-of-way acquisitions is presented in Table 3.12-5. No residential properties would be affected. *If Alternative 1 is chosen for TPS2, t*here would be displacement of *one* active *business, an auto towing business with vehicle storage, and an estimated 18 employees.* All traction power facilities are proposed to be sited in areas *used for transportation or* currently zoned for industrial use. A list of these traction power stations, sizes, and proposed locations is provided in Table 3.16-2.

Properties are assumed to be acquired permanently. Also, the number of acquisitions required could decrease, as could the amount of land required from individual parcels, based on the final design of the electrification facilities.

Table 3.12-5: Summary of Right-of-Way Acquisition for the Electrification Program Alternative

Type of Acquisition	Total
Non-JPB-Owned Property	*1.73 to 3.61* acres
Residential Displacements	0 units/residents
Non-residential Displacements	*1 unit, approximately 18 employees*[1]

[1] *Number of employees approximated with 1 job per 45 square meters factor taken from Cyburbia.com.*
Source: Parsons, *2008.*

Federal and state laws and JPB policy require consistent and fair treatment of owners of property to be acquired, including just compensation for their property. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, would be followed.

3.12.2.3 Mitigation

Property acquisitions would adhere to federal and state laws; therefore, no adverse impacts are expected and no mitigation is required.

3.12.3 ENVIRONMENTAL JUSTICE

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations), dated February 11, 1994, calls on federal agencies to identify and address disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority populations and low-income populations. In 1997, the U.S. Department of Transportation (DOT) issued its DOT Order to establish procedures for use in complying with E*xecutive* O*rder* 12898 for its operating administrations, including FTA.

Impacts and benefits of transportation projects result from the physical placement of such facilities, and also from their ability to improve or impede access to neighborhoods or portions of the region. This analysis examines whether ethnic minority and/or low-income populations in the project area would experience these types of impacts, and if they are inconsistent with the benefits created. Transit-dependent populations (households in the study area without private transportation) have also been considered in the environmental justice analysis.

3.12.3.1 Environmental Justice Setting

The Caltrain corridor as a whole consists of a variety of socio-economic neighborhoods and a diverse, multi-ethnic population. Both lower-income, ethnic minority, and affluent, white populations live close to the Caltrain alignment, and there does not appear to be a disproportionate incidence of *low-income* or non-white populations along the railroad right-of-way.

The ethnic composition for the study area, as *tabulated in* Table 3.12-2, is *generally* comparable to the counties in which it is located. The northern end of the corridor, which lies in San Francisco County, has a larger minority population than is found in either San Mateo County or Santa Clara County. *T*his is typical of San Francisco as a whole compared with either San Mateo or Santa Clara *counties*. Study area *census* tracts in both San Mateo and Santa Clara counties show a wide range in the percentage of minority populations dispersed throughout the corridor. Approximately *55* percent of all study area residents are members of minority groups, which may also include individuals of Hispanic/Latino origin. This compares to a *56.4* percent minority population in San Francisco County, a *50.3* percent minority population in San Mateo County, and a *56.0* percent minority population in Santa Clara County.

The median household income of the *census* tracts located in the project area in 1999 ranged from $34,500 to $183,956. As shown in Table 3.12-3, the overall percentage of residents in the study area below the federal poverty level was *8.4* percent in 1999. Study area *census* tracts in San Francisco had 13.5 percent of all households living in poverty, *which was the highest of the three counties studied*.

The average auto ownership for the project area was approximately one vehicle per household. *More than eight* percent of all study area households did not have private transport, which was *a higher percentage* than the tracts in Santa Clara County and *a lower percentage* than the *census* tracts in San Francisco and San Mateo counties.

3.12.3.2 Environmental Justice Impacts

No-Electrification Alternative. Under the No-Electrification Alternative, Caltrain would continue diesel train operations within the existing active commuter and freight rail corridor. These operations would continue to emit diesel exhausts and noise from diesel locomotive engines that would uniformly affect people residing along the rail corridor. Based on the analysis of population characteristics along the corridor, these proximate residents include low-, middle-, and upper-income individuals, and low-income persons would not receive a disproportionate share of these impacts. Also based on corridor population characteristics, residents along the rail corridor include both white and ethnic minority individuals, and ethnic minority persons would not receive a disproportionate share of these effects.

The No-Electrification Alternative incorporates a series of rehabilitation improvements *through the State of Good Repair Program as* described in Section 2.3.1, *The* No-Electrification (No-Project*/No-Action*) Alternative, which would provide *the same* level of service to Caltrain riders *that is provided today (2008). There* would be *no* disproportionate distribution of *project impacts* to *any* particular group.

Electrification Program Alternative. The Electrification Program Alternative would provide for the conversion of Caltrain service from diesel-hauled to *electrified* trains. This would result in reductions of corridor and regional *air* emissions and reductions in noise from diesel engine operations. These benefits would be experienced uniformly by proximate residents up and down the Caltrain right-of-way and others within the Bay region; these benefits would not be disproportionately experienced by particular income or ethnic groups.

The Electrification Program Alternative would also require the installation of some *130* to *140* single-track miles of OCS poles and wires and the construction of up to *10* traction power facilities, including substations, switching stations, and paralleling stations, between San Francisco and *San Jose*. The OCS facilities would be placed within an active commuter and freight rail corridor and would not have substantial or disproportionate adverse effects on proximate residents as reported in this environmental document. The traction power facilities would be placed primarily in areas zoned for or currently in industrial, *commercial/office, or* transportation use, and would require no displacements of residents or employees. The nearest residences to any of these facilities are *50* to *100* feet away. No disproportionate adverse effects on minority or low-income persons would result.

An increase in Caltrain ridership is anticipated with the Electrification of Caltrain facilities. This increase is within planned Caltrain train and station capacities, and, *although there would be increased demand for parking, it would* not result in substantial new traffic or parking effects on proximate neighborhoods.

3.12.3.3 Mitigation

Adverse environmental justice impacts would not occur during operation of the Proposed Action; therefore, no mitigation is required.

See Sections 3.1, Aesthetics*;* 3.3, Air Quality*;* 3.7, Hazardous Waste and Materials*;* 3.9, Land Use and Planning*;* 3.11, Noise and Vibration*;* 3.12, Population and Housing*;* 3.14, Recreation*;* 3.15, Transportation/Traffic*;* and 3.17, Electromagnetic Fields and Electromagnetic Interference, for particulars on each of these impact issues.

In summary, construction of the proposed Caltrain Electrification Alternative would have no disproportionate beneficial or adverse effects on minority *or* low-income *population*s. Such populations are not disproportionately represented among those who live adjacent to the Caltrain right-of-way. The corridor already contains active commuter and freight railroad tracks along which communities have become well-established with this physical feature in place. Therefore, the project would have neutral environmental justice implications because it would concentrate project benefits and impacts in an area with relatively average percentages of ethnic minority populations.

3.12.4 GROWTH INDUCEMENT

Although the Caltrain corridor experiences various growth pressures, the proposed transportation improvements would have virtually no effect on corridor growth. There would be commute travel time improvements on Caltrain of *up to 8* minutes per trip, *depending on total length of trip*. This time savings would not materially increase the overall growth pressure in the communities served by Caltrain. This is because Caltrain presently serves only developed areas, and the Electrification Program Alternative would not provide new access to undeveloped areas.

Reducing train operating noise and improving air quality would improve the environment for development, including more intensive residential development, around Caltrain stations; see Section 3.9.1.4, Development Opportunities near Caltrain Stations.

3.13 PUBLIC SERVICES AND FACILITIES

3.13.1 SETTING

Public services and facilities located in the Caltrain corridor *include* police, fire, medical, educational, and cultural. *These* are described in the following paragraphs.

Only those public facilities that abut or are adjacent to the Caltrain corridor or proposed traction power facilities are of interest to the impacts analysis. These are *list*ed in Table 3.13-1.

Table 3.13-1: Public and Private Services and Facilities Identified Adjacent to the Caltrain Corridor	
Name of Facility	***Location***
Lomita Park Elementary School	*San Bruno*
Burlingame Police Department	*Burlingame*
Fire Station #36	*Burlingame*
Fire Station #34	*Burlingame*
Burlingame High School	*Burlingame*
Burlingame Chamber of Commerce	*Burlingame*
Belmont Post Office	*Belmont*
Redwood Continuation High School	*Redwood City*
Fair Oaks Branch Library	*Redwood City*
Menlo Park Chamber of Commerce	*Menlo Park*
Menlo Park Library	*Menlo Park*
Santa Clara Police Department	*Santa Clara*
Bellarmine College Prep High School	*San Jose*
Fire Station #7	*San Jose*
HP Pavilion at San Jose	*San Jose*
Source: Parsons, 2008.	

3.13.1.1 Police and Fire Protection Services

Police protection and traffic enforcement in the Caltrain corridor are provided by the cities of San Francisco, South San Francisco, Brisbane, Millbrae, San Bruno, Burlingame, San Mateo, Belmont, San Carlos, Redwood City, Menlo Park, Palo Alto, Mountain View, Sunnyvale, Santa Clara, *and* San Jose*;* Town of Atherton*;* the sheriff's departments of the counties of San Francisco, San Mateo, and Santa Clara*;* and the California Highway Patrol. There are *two* police stations and *three* fire stations located adjacent to the Caltrain corridor.

There are no police or sheriff's facilities located in close proximity to the proposed traction power facility locations.

3.13.1.2 Hospitals and Emergency Medical Services

No hospitals or other major medical facilities are located adjacent to the Caltrain corridor or in close proximity to the proposed traction power facility locations.

3.13.1.3 Schools

Three high schools *and one elementary school* are located adjacent to the Caltrain corridor. No schools are located in close proximity to the proposed traction power facility locations.

3.13.1.4 Churches

No churches are located adjacent to the Caltrain corridor or in close proximity to the proposed traction power facility locations.

3.13.1.5 Cultural Facilities

The HP Pavilion of San Jose is located adjacent to the Caltrain corridor. There are also two libraries located in proximity to the corridor. No cultural facilities are located in close proximity to the proposed traction power facility locations.

3.13.2 IMPACTS

3.13.2.1 No-Electrification Alternative

Under the No-Electrification Alternative, Caltrain would continue diesel train operations at the *current* service levels *(2008)*. This service would operate within an existing, active commuter and freight rail corridor, and there would be no substantial adverse impacts to police, fire, or other emergency services delivery. There would be no need to acquire property or construct additional facilities within or off the right-of-way that would affect the visibility or accessibility of any community facilities.

3.13.2.2 Electrification Program Alternative

The Electrification Program Alternative would *involve installation of* OCS poles and wires within the Caltrain corridor from San Francisco to *central San Jose*, construct*ion of 10* traction power facilities in selected locations along the corridor, and construct*ion of one* access road *(at PS7)* and electrical conduit between these facilities and the Caltrain right-of-way. The OCS poles and wires would be constructed within the existing, active commuter and freight rail corridor.

Overall, it is anticipated that there would be a negligible effect due to project operations on emergency response. There would be no new extensions of railroad right-of-way that would interfere with *police, fire,* or *ambulance response times*. *During project operations, the frequency of down crossing gates at grade crossings along the existing railroad alignment would be increased due to the increase in level of service, however, c*rossing gate down times would be slightly shorter than under the No-Electrification Alternative, since electric trains accelerate and decelerate faster than diesel trains, even with longer train consists.[23]

The proposed locations of the traction power facilities have been selected because they are in industrial or *open space* areas, *and* generally away from residences and sensitive community

[23] The Electrification Program identifies the requirement for the existing signal system equipment to be modified/replaced as required for electrification compatibility. In addition, the "Constant Warning" at the grade crossings will have to be replaced with an electrification-compatible system as part of the program. This is anticipated to avoid any increase in “gate-down time” that may be associated with electric rail systems’ incompatibility with signal system equipment. See Section 2.3.2.7, Modification or Replacement of Signal System.

facilities. *Construction and operation of t*hese traction power and ancillary facilities would not affect the visibility or accessibility of existing public or community facilities. *The short traction power facility* access road *at PS7* would not interrupt public rights-of-way. Electrical lines from the facilities to the Caltrain right-of-way would generally be placed overhead or underground in existing roadways.

The modernized Caltrain service may offer a benefit to community facilities up and down the corridor by *fostering more* public transportation usage to *public buildings, cultural centers,* community events and facilities, and decreasing parking demand at these locations. *Additional benefits associated with t*he Electrification Program Alternative would *be less train operating noise, improved air quality including reduction of diesel fumes that could impair the continued use and enjoyment of community facilities. Please see Sections 3.1, Aesthetics; 3.3, Air Quality; 3.11, Noise and Vibration; 3.15, Transportation/Traffic; and 3.17, Electromagnetic Fields and Electromagnetic Interference.*

3.13.3 MITIGATION

Adverse public services and facilities impacts would not occur during operation of the Proposed Action; therefore no mitigation is required. Mitigation proposed as a result of construction activities is provided in Section 4.2.10.2.

3.14 RECREATION

3.14.1 SETTING

A broad range of recreational activities is available throughout the Caltrain corridor. Park facilities include neighborhood parks, community parks, regional parks, parkways, open spaces, and school parks. Only parks and recreation facilities that abut or are directly adjacent to the Caltrain corridor or proposed traction power facilities are of interest to the impact analysis. These are shown in Table 3.14-1.

Table 3.14-1: Parks and Recreation Facilities Located along the Caltrain Corridor

Name of Facility	***Location***
Herman Tot Lot	*San Bruno*
Posy Park	*San Bruno*
Lion's Field Park	*San Bruno*
Village Park	*Burlingame*
Laguna Park	*Burlingame*
Washington Park	*Burlingame*
Trinta Park	*San Mateo*
Bay Meadows Race Track and County Fairgrounds	*San Mateo*
Alexander Park	*Belmont*

Table 3.14-1: Parks and Recreation Facilities Located along the Caltrain Corridor	
Name of Facility	***Location***
Laureolia Park	*San Carlos*
Jardin de Ninos Park	*Redwood City*
Holbrook Palmer Park	*Atherton*
Burgess Park	*Menlo Park*
El Camino Park	*Palo Alto*
Alexander Peers Park	*Palo Alto*
Jerry Bowden Park	*Palo Alto*
Robles Park	*Palo Alto*
Rengstorff Park	*Mountain View*
Rex Manor Park	*Mountain View*
Bracher Park	*Santa Clara*
Biebrach Park	*San Jose*
Fuller Avenue Park	*San Jose*
Source: Parsons, 2008.	

3.14.2 IMPACTS

3.14.2.1 No-Electrification Alternative

Under the No-Electrification Alternative, Caltrain would continue diesel train operations at the *current (2008)* service levels. This service would operate within an existing, active commuter and freight rail corridor, and there would be no *direct* impacts to corridor parks and recreation areas. There would be no need to acquire property from parks or other recreational facilities or construct additional facilities off the right-of-way that would affect the visibility or accessibility of any parks or other recreational facilities.

Indirect impacts to corridor parks and recreation areas due to noise and air pollution would continue under the No-Electrification Alternative. These impacts are described in Sections 3.3, Air Quality, and 3.11,Noise and Vibration, respectively.

3.14.2.2 Electrification Program Alternative

The Electrification Program Alternative would *involve installation of* OCS poles and wires within the Caltrain corridor from San Francisco to *central San Jose*, construct*ion of 10* traction power facilities in selected locations along the corridor, and construct*ion of an* access road *(at PS7)* and electrical conduit between these facilities and the Caltrain right-of-way. The OCS poles and wires would be constructed within the existing, active commuter and freight rail corridor. *CPUC clearance requirements for safe train operations will require trimming of trees that currently lean into or hang over the Caltrain right-of-way, including trees in Holbrook-Palmer Park, which borders the Caltrain corridor. One eucalyptus tree in the park currently has heritage tree status and large branches that hang over and into the safety envelope. These branches would need to be trimmed, which would result in a reduction of the tree canopy at this corner of the park. This visual impact is discussed and mitigated in Section 3.1, Aesthetics. There would be no take of park land or impaired use of the park due to the trimming.*

The proposed locations of the traction power facilities have been selected because they are in industrial or *open space* areas, and generally away from residences and other sensitive land uses. No *park or recreational facility* propert*ies* would need to be acquired. The traction power and ancillary facilities would not affect the visibility or accessibility of existing public parks or recreation facilities. *There would be no impacts to any of the parklands or other recreational facilities identified in Table 3.14-1.*

*Modernized Caltrain service may offer a benefit to recreationists by enhancing public transportation usage to public parks and recreation facilities and decreasing parking demand at these locations. Additional benefits associated with t*he Electrification Program Alternative would *be less train operating noise, and improved air quality, including reduction of diesel fumes that could impair the continued use and enjoyment of these* public parks and recreation areas. Please see Sections 3.1, Aesthetics*;* 3.3, Air Quality*;* 3.11, Noise *and Vibration;* 3.15, Transportation/Traffic*;* and 3.17, Electromagnetic Fields and Electromagnetic Interference.

3.14.3 MITIGATION

Adverse recreation impacts would not occur during operation of the Proposed Action; therefore, no mitigation is required.

3.15 TRANSPORTATION/TRAFFIC

This section describes the transportation network and existing conditions in the project study area, as well as the transportation and traffic impacts of the project alternatives. Projected future conditions with and without the proposed Electrification Program, including projected Caltrain ridership, traffic, and parking impacts, are described herein. Additional details are included in the ridership report.

3.15.1 EXISTING RAIL AND BUS TRANSIT

3.15.1.1 Caltrain

Caltrain provides commuter rail service between Santa Clara County and San Francisco. The *51*-mile *portion of the* Caltrain rail line *within the project limits* serves *27* stations in San Francisco, San Mateo, and Santa Clara counties. The northern, San Francisco, terminus at Fourth and King streets is approximately 0.75-mile from the Transbay Terminal at Mission and First streets. On weekends and during off-peak hours, Caltrain's southern terminal is the Tamien Station in San Jose, which provides a connection with the Santa Clara County light-rail system. Of the *98* one-way weekday train trips on Caltrain, *three* morning trips originate and *three* evening trips terminate at the Gilroy Station. Figure 1.2-1 shows the Caltrain corridor and stations.

At the Fourth and King *Street* Station, Caltrain connects with the Muni N-Judah light rail and *eight* Muni bus lines. The station is also served by an Amtrak bus connection to the Amtrak rail station in Emeryville. Connections with SamTrans bus services are available at or within one block of 11 South Bay Caltrain stations. Connections with VTA bus lines are available within one block of 11 mid-Peninsula Caltrain stations.

There is also a direct connection between Caltrain and BART at the Millbrae Intermodal Station, which provides a cross-platform transfer between the two systems. *The Altamount Commuter Express Train, commonly known as ACE, connects with Caltrain at the Santa Clara and San Jose Diridon Stations. Amtrak train service to Sacramento, the San Joaquin Valley, Los Angeles, and Seattle connects with Caltrain at the San Jose Diridon Station. At the Atherton Station, Caltrain connects with shuttle buses to local schools.* Table 3.15-1 summarizes Muni, SamTrans, and VTA connecting bus services and other transit services at Caltrain *between San Francisco and Tamien* stations.

On weekdays, Caltrain offers a combination of express and local service from 4:30 a.m. to *1:30 a.m*. Frequencies during the weekday peak period vary between *5 and 23* minutes. During the midday, trains run every 30 minutes. During evenings, trains run every *hour on the half-hour, from 7:30 p.m. to 10:30 p.m., plus a final southbound train departs from San Francisco at 12:01 a.m. On weekends, Caltrain offers hourly local service to all regular stations from San Francisco to San Jose. A special shuttle bus takes passengers between the San Jose Diridon and Tamien Stations. On Sundays, service begins a little later and ends earlier, when compared to Saturdays. On holidays, Caltrain operates on a Sunday schedule.*

Caltrain is a proof-of-payment type of system, and tickets must be purchased before boarding the train. Caltrain's fares are based upon travel zones that were *last* adjusted *April* 2, 200*7*. The system is divided into six fare zones. One-way adult fares vary from $*2.25* for travel within one zone to $*11*.00 for traveling the entire *San Francisco to Gilroy* corridor. *Both full and discount fare one-way tickets, ten-ride tickets, and day passes are also available.* Disabled patrons and seniors ride for approximately half the regular one-way adult fare. A youth fare is available for passengers 17 years old or younger with valid high school identification. One child *4* years old or younger may ride free when accompanied by a fare-paying adult. *Additional* children *with the fare-paying adult* must travel on youth tickets. A

Table 3.15-1: Connecting Bus Service *and Other Transit* at Caltrain Stations

Caltrain Station	Feeder Bus Service
Fourth & King	Muni 10, 30, 45, 47, 76 *(Sundays & Some Holidays)*, N-Judah Light Rail, *T-Third Light Rail, Amtrak Bus, 3 Shuttles*
22nd Street	Muni 48
Bayshore	Muni 9*X*, 9*AX*, *9BX* 56, *T-Third Light Rail*; SamTrans 292, *2* Shuttle*s*
South San Francisco	*4* Shuttles
San Bruno	SamTrans 140
Millbrae	SamTrans MX, 342, 390, 391, 397 (Owl Service), BART, *6 Shuttles*
Broadway	SamTrans 292, *46, 1 Shuttle*
Burlingame	SamTrans 292, *46, 1 Shuttle*
San Mateo	SamTrans 250, 292, 295
Hayward Park	*1* Shuttle
Hillsdale	SamTrans 250, 251, 262, 390, 391, 292, 294, 295, 397 *(Owl Service), 54; AC Transit M, MA, 5* Shuttles
Belmont	SamTrans KX, PX, 260, 262, 390, 391, 397 (Owl Service)
San Carlos	SamTrans KX, PX, 260, 295, 390, 391, 397 (Owl Service), *4* Shuttles
Redwood City	SamTrans KX, PX, RX, 270, 271, 274, 295, 296, *297*, 390, 391, 397 (Owl Service), *2* Shuttle*s*
Atherton	*Shuttle bus service to local schools*
Menlo Park	SamTrans KX, 390, 295, 296, *85* SCVTA 22, and 4 Shuttles
Palo Alto	SamTrans KX, 280, 281, 297, 390, 397; SCVTA 22, 35, *88, Rapid 522*, Dumbarton Express *DB, 3* Shuttles
Stanford	*No connecting Bus or Shuttle Service*
California Avenue	SCVTA 88, 2 Shuttles
San Antonio	SCVTA 23, 32, 34, 35, 40
Mountain View	SCVTA 34, 35, 51, 52, 304 *(limited)*, 305 *(limited), Mountain View-Winchester Light Rail Line, 4* Shuttle*s*
Sunnyvale	SCVTA *26*, 32, 53, 54, 55, 140
Lawrence	*4* Shuttles
Santa Clara	SCVTA 10, 22, 32, 44, 60, 305, *Rapid 522, ACE, 1* Shuttle
College Park	*SCVTA 36, 62*
San Jose	SCVTA 22, 63, 64, 65, 68, 180, 305, *Mountain View-Winchester Light Rail Line, DASH,* Amtrak *Coast Starlight, Capitol Corridor*, Hwy. 17 *Express, ACE, MST 55,* 1 Shuttle
Tamien	SCVTA 25, 82, *Alum Rock-Santa Teresa* Light Rail, *1 Shuttle*

Source: SCVTA: Santa Clara Valley Transportation Authority*, SamTrans, Muni, ACE, Amtrak, Caltrain Short-Range Transit Plan FY 2004-2013, November 2008 (information about shuttle buses).*

monthly *pass* is available for unlimited rides between specified zones. On weekends and holidays, a monthly *pass* is valid for travel between all zones served by Caltrain. A Caltrain monthly *pass* valid for two or more zones is good as local fare credit on all SamTrans *buses* and VTA bus *and light-rail service*s. Discount monthly *passes* are available to persons 17 years old and younger with a valid ID, seniors, disabled patrons, or high school students.

Weekday Caltrain ridership *during FY07* was estimated at *34,867* passengers. *The Caltrain Web site reports that ridership has increased each year since the introduction of the Baby Bullet service in June 2004. Caltrain's total ridership increased by almost 3 million passengers between FY04 and FY07. Based on year 2007 counts,* almost *23* percent of the daily passengers board at the San Francisco Fourth and King *Street* Station. During the morning peak, 27 percent of the passengers exit at the San Francisco terminus. During the afternoon peak, 39 percent of the passengers exit at Caltrain stops in San Mateo County, and 44 percent exit at stops in Santa Clara County. Trips to or from the Gilroy segment of the rail line comprise *7* percent of the total ridership. Conversely, 93 percent of the trips on Caltrain begin and end between the Tamien Station in San Jose and the San Francisco terminus at *the* Fourth and King *S*treet *Station*. Table 3.15-2 shows the weekday boardings and alightings at *all* Caltrain stations*, including those stations located south of the project limits (south of Tamien).*

3.15.1.2 BART

The BART San Francisco International Airport (SFO) Extension extended BART service from northern San Mateo County at Colma to SFO in June 2003. The extension continues south from SFO to Millbrae, where BART interfaces with Caltrain and SamTrans bus services at the new Millbrae Intermodal Station.

3.15.1.3 Muni

Muni service is limited to the City and County of San Francisco. As summarized by Table 3.15-1, Muni operates *eight* bus lines that serve the Fourth and King Street Caltrain Station: the 10-Townsend, 30-Stockton, *45-Union/Stockton,* 47-Van Ness, *76-Marin Headlands*, 80x-Caltrain Express, 81x-Caltrain Express, 82x-Presidio, and Wharves Express. The N-Judah *and T-Third* Muni Metro light-rail lines also serve the station.

3.15.1.4 SamTrans

Table 3.15-1 lists the SamTrans connecting bus service to Caltrain stations. *SamTrans connects with Caltrain at, or within one block of, 11 Caltrain stations*. SamTrans provides commute service on *eight* bus lines between San Mateo County and downtown San Francisco. Seven of these lines operate only during peak periods. SamTrans *has* introduced a variety of changes to improve the efficiency of its core system. The changes reallocated service from areas of little demand to areas of greater demand. Many routes were consolidated to increase service efficiency and permit increased frequency.

Table 3.15-2: Caltrain Weekday Boardings and Alightings by Station

Station	Typical Headway in Minutes					Weekday Boardings and Alightings (*February 2007*)[1]
	Weekday			Saturday	Sunday	
	Peak 5-23	Base 30	Evening 60-90	Base 60	Base 60	
San Francisco County						
Fourth & King						*15,456*
22nd Street						*1,697*
Bayshore						*337*
San Mateo County						
South San Francisco						*1,147*
San Bruno						*800*
Millbrae						*3,938*
Broadway						--
Burlingame						*1,195*
San Mateo						*2,551*
Hayward Park						*464*
Hillsdale						*3,625*
Belmont						*800*
San Carlos						*1,781*
Redwood City						*3,798*
Atherton						--
Menlo Park						*2,469*
Santa Clara County						
Palo Alto						*6,711*
California Avenue						*1,623*
San Antonio						*1,030*
Mountain View						*5,933*
Sunnyvale						*2,974*
Lawrence						*1,097*
Santa Clara						*1,319*
College Park						*252*
San Jose Diridon						*4,837*
Subtotal - San Francisco to San Jose						*66,840*
Tamien						*1,006*
Capitol						*68*
Blossom Hill						*134*
Morgan Hill						*244*
San Martin						*110*
Gilroy						*286*
Subtotal- San Jose to Gilroy						*842*
Caltrain Total Daily Boardings & Alightings						*67,682*
Caltrain Total Daily Riders						*33,841*

Table 3.15-2: Caltrain Weekday Boardings and Alightings by Station

	Typical Headway in Minutes					
	Weekday			Saturday	Sunday	**Weekday Boardings and Alightings (*February 2007*)[1]**
	Peak	**Base**	**Evening**	**Base**	**Base**	
Station	5-23	30	60-90	60	60	

[1] Caltrain's Web site reports that since the introduction of Baby Bullet Service and reintroduction of weekend service, Caltrain ridership is up by approximately 35.7 percent, and weekday ridership is more than 34,000 riders (July 2007).

Sources: Caltrain published schedule, March 3, 2008. Caltrain Short-Range Transit Plan FY 2004-2013, February 2008.

3.15.1.5 VTA

VTA provides bus and light-rail service in Santa Clara County. Table 3-15.1 lists the VTA connecting service that covers all regular Caltrain stations in Santa Clara County, plus the Menlo Park Caltrain Station in San Mateo County. In addition to the connecting bus service at all stations, VTA's *Mountain View-Winchester light-rail line connects with Caltrain at the Mountain View and San Jose Diridon Stations, and the Alum Rock-Santa Teresa* light-rail line connect*s* with Caltrain at the Tamien *Station*.

VTA Line 22 operates parallel to Caltrain from downtown San Jose to Menlo Park, providing local service along The Alameda and El Camino Real (*State* Route 82). Line 22 is the backbone of the VTA bus network, providing service along the east-west length of Santa Clara County from the transit center at Eastridge Shopping Center in San Jose to the *Palo Alto Transit Center*. Line 22 runs roughly every *12* minutes during weekdays and is VTA's most heavily used line, carrying *approximately 15,65*0 riders daily and representing *15.7* percent of VTA's total bus ridership. The line operates near capacity, with many buses at standing room only.

Line 22 is supplemented by Line *(Rapid) 522, which provides faster, more frequent, and direct service* along generally the same corridor. *This new line is a precursor to Bus Rapid Transit (BRT) service in Santa Clara County*. Lines 22 and *35* connect with regional rail services (Table 3.15-1) , as well as 5*3* VTA bus lines. A major connection occurs in downtown San Jose, where Line 22 intersects the north-south *Alum Rock-Santa Teresa* Light-Rail Line.

3.15.2 EXISTING HIGHWAYS AND TRAFFIC

3.15.2.1 Existing Traffic Volumes

US 101 and I-280 are the major freeways that run parallel to the Caltrain corridor on the Peninsula between San Francisco and San Jose. *State* Route 82, *which is coterminous with* El Camino Real *for most of its length*, is an important arterial that extends the length of the Peninsula.

Between San Francisco and San Jose, the Peninsula has a well-developed, dense street network. The major north-south roadways are the US 101 freeway and Route 82, which is a conventional multi-lane highway.

Table 3.15-3 reports the current traffic volumes on these highways, giving annual average daily traffic (AADT), peak-month average daily traffic (ADT), and peak-hour traffic at selected locations. Of the two freeways, US 101 carries the highest AADT and peak-month ADT, with volumes ranging from a low of *22,500* to 22,700 vehicles per day (vpd) in San Francisco (*I-80 Junction*) to a high of *253,000 to 260,000* vpd in San Mateo. I-280 AADT and peak-month ADT range from *101,000 to 104,000* vpd in Palo Alto to *203,000 to 217,000* vpd in Daly City. *Largest p*eak-hour traffic volumes on I-280 are *approximately 35 percent greater than* on US 101, reaching *23,100* vehicles per hour (vph) *at the Route 87 Junction in San Jose*. The maximum peak-hour volume on US 101 is *17,000* vph in *San Mateo*.

Traffic volumes on arterial El Camino Real are considerably lower than freeway volumes, but still very substantial. Table 3.15-3 indicates that both the maximum and minimum traffic volumes on El Camino Real occur in San Jose. The maximum AADT of *59,000* vpd occurs in San Jose at *US* 101, while the minimum AADT of *14,900* vpd also occurs close to downtown San Jose (Montgomery Street). Peak-hour volumes range from *1,250* vph in *San Jose (Montgomery Street) to 4,900 vph in San Jose at US 101*.

3.15.2.2 *Existing Highway Speeds*

Between San Francisco and San Jose, many roadway segments are at or over capacity during the peak commute hour on US 101 and I-280. Travel speed studies conducted in 2006 by Caltrans for segments with HOV lanes indicate that major delays occur. The peak congestion generally occurs while going into Silicon Valley in the morning and going out in the afternoon. The following paragraphs quantify the delay, which occurs mostly in the mixed-flow lanes, by listing the speeds in segments with delay. Speeds without delay would be 65 to 70 mph. Delay in US 101 HOV lanes is discussed separately; there is no substantial delay in HOV lanes on I-280. [24]

US 101 within San Jose (I-280/I-680 – I-880). *During the morning commute in the northbound direction, almost the entire segment of US 101 in San Jose is congested, with average speeds ranging from 25 to 30 mph; however, in the northbound direction during the evening commute, congestion is worse in 22 percent of the segment, with average speeds of 10 mph. The rest of this segment operates at 25 to 35 mph.*

[24] *California Department of Transportation, District 4, Office of Highway Operations, Speed Profiles, 2006.*

Table 3.15-3: Highway Traffic Volumes, 2006

Location	Traffic Volumes Peak Hour (veh/hour)	Peak Month ADT (veh/day)	AADT (veh/day)
US 101 Bayshore Freeway			
Tully Road Interchange (San Jose)	15,000	239,000	228,000
Fair Oaks Avenue Interchange (Sunnyvale)	10,300	158,000	152,000
Jct. Rte. 85 South (Mountain View)	15,500	229,000	223,000
San Antonio Road Interchange (Palo Alto)	14,600	215,000	210,000
Whipple Avenue Interchange (Redwood City)	14,400	218,000	212,000
Jct. Rte. 92, 19th Avenue Interchange (San Mateo)	17,000	260,000	253,000
Millbrae Avenue Interchange (Millbrae)	16,200	244,000	235,000
San Francisco Airport Interchange	16,400	250,000	240,000
Candlestick Park Connections (Brisbane)	14,200	195,000	191,000
Jct. I-280, Alemany Boulevard Intg. (San Francisco)	14,800	246,000	246,000
Jct. I-80 (San Francisco)	1,350	22,700	22,500
Broderick Street (San Francisco)	4,150	63,000	59,000
Jct. Rte. 1 (San Francisco)	8,600	121,000	114,000
Route 82 El Camino Real			
Jct. Rte. 101 (San Jose)	4,900	62,000	59,000
Montgomery Street (San Jose)	1,250	15,700	14,900
Jct. I-880 (San Jose)	2,600	30,500	30,000
Lawrence Expressway (Santa Clara)	3,400	46,500	44,500
Jct. Rte. 85 (Mountain View)	4,100	52,000	51,000
Charleston Road (Palo Alto)	3,850	49,000	48,000
Jct. Rte. 84, Woodside Road (Redwood City)	3,400	40,000	39,500
Jct. Rte. 92 (San Mateo)	4,600	58,000	53,000
Millbrae Avenue (Millbrae)	2,750	34,000	31,500
Mission Street (Daly City)	1,350	15,300	15,000
I-280 Junipero Serra Freeway			
Jct. Rte. 101; Jct. I-680; Begin Freeway	14,300	152,000	147,000
Jct. Rte. 87 (San Jose)	23,100	247,000	238,000
Sunnyvale Road/De Anza Boulevard (Cupertino)	12,600	134,000	130,000
Alpine Road (Palo Alto)	10,100	104,000	101,000
Sand Hill Road	10,600	109,000	106,000
Hillcrest Boulevard (Millbrae)	11,200	110,000	107,000
Jct. I-380 East (San Bruno)	13,300	178,000	174,000
Westborough Boulevard (South San Francisco)	14,200	190,000	186,000
Junipero Serra (Eastmoor Avenue) (Daly City)	15,900	217,000	203,000
Jct. Rte. 1 North (Daly City)	10,600	142,000	138,000

Source: Caltrans, 2008.

- ***US 101, San Jose through Sunnyvale (I-880 to SR 237).*** *In the southbound direction, 76 percent of this segment is congested during the evening commute, with speeds averaging between 20 to 30 mph. In the northbound direction, for morning commuters, average speeds on 67 percent of the segment range between 25 and 30 mph. The average speed on approximately 6 percent of this segment in the northbound direction* ***is approximately 40 mph.***

- ***US 101, Sunnyvale through Redwood City (SR 237 to Whipple Avenue).*** *During the morning commute in the northbound direction, 18 percent of this US 101 segment operates at 25 mph. During the same time period and in the same direction, 53 percent of this segment operates at average speeds of 30 to 35 mph and 21 percent of this segment operates at average speeds of 40 to 45 mph. During the evening commute in the southbound direction, there is practically no congestion between Route 237 and Shoreline Boulevard, 18 percent of the segment. However, from Shoreline Boulevard to Woodside Road, 72 percent of the segment, the average speeds drop as low as 20 mph and vary between 20 to 30 mph.*

  From Marsh Road to Woodside Road, 14 percent of the segment, the freeway is congested in both directions. It is congested in both directions during the AM peak period and in the southbound direction during the PM peak period.

- ***US 101 – HOV Lanes.*** *In the segment between I-280/I-680 and I-880, in both directions, the average speeds are slightly higher than what they are on other lanes at corresponding locations, ranging from 15 to 45 mph northbound during the AM peak period and 25 to 40 mph southbound during the PM peak period. The pattern of increase or decrease in speeds remains consistent with that in the mixed-flow lanes at corresponding locations.*

  In the southbound direction during the PM peak period, the HOV lane between 13th Street (South of I-880) and Fourth Street (north of I-880) operates at an average speed of approximately 35 to 40 mph. In the northbound direction during the AM peak period at the short segment between Guadalupe Parkway and halfway between Trimble Road and Montague Expressway, the HOV lane is congested, allowing an average speed of approximately 45 mph.

- ***I-280 – Mixed-Flow Lanes.*** *In the AM peak period in the northbound direction between I-880 and Route 85, the average speed is approximately 30 mph. In the southbound direction in the AM peak period, between I-880 and Lawrence Expressway, the average speed range is between 40 and 45 mph. In the PM peak period and in the northbound direction, between I-880 and Saratoga Avenue, the average speed ranges between 20 and 30 mph. In the southbound direction, between I-880 and De Anza Boulevard, the average speed ranges between 20 and 30 mph.*

3.15.3 EXISTING CALTRAIN PARKING FACILITIES

Parking is provided for a nominal fee (usually $2.00), or free, at 23 of the 27 Caltrain Stations between San Francisco and San Jose Tamien. Table 3.15-4 summarizes existing Caltrain station parking capacity and level of utilization as of February 2007. This information includes street parking or parking facilities owned by others for parking supply at the Millbrae, San Mateo, Menlo Park, and Mountain View stations. As shown in Table 3.15-4, there is a total of 6,015 parking spaces at 23 stations, with an overall utilization of 57.1 percent (February 2007). At the high-boarding express stations, parking occupancy on weekdays is between 90 and 100+ percent. Approximately 7,416 parking spaces are provided by the JPB at stations systemwide, with almost 26 percent of the total spaces at the stations on the Gilroy extension. Stations without JPB-owned parking lots are served either by street parking, third-party parking facilities, or a combination of both. Four stations in the Caltrain system have no parking provided by the JPB: the two San Francisco stations, Atherton Station, and the College Park Station.

Table 3.15-4 indicates that seven stations had parking at or close to capacity in February 2007: Millbrae, Hillsdale, Menlo Park, Palo Alto, Mountain View, Sunnyvale, and San Jose Diridon. Some stations, such as Fourth and King Street *(San Francisco)*, 22nd Street, San Mateo, and Hillsdale, have parking owned by others in the vicinity of the station, which is also used by Caltrain patrons. As discussed above*, the parking demand at stations served by Baby Bullets (i.e., San Jose, Mountain View, Palo Alto, Hillsdale, and Millbrae) has increased substantially since this service was introduced in 2004.*

3.15.4 EXISTING NON-MOTORIZED TRANSPORTATION

Public transit serving the area accommodates bicycles. BART (at some stations during the off-peak periods) and Caltrain allow bicycles on trains. Most of *Alameda Contra Costa Transit District's (*AC Transit*)* Transbay buses and most of SamTrans' buses are equipped with bicycle racks. *All VTA buses and light-rail vehicles are also equipped with bicycle racks*. Caltrain has bicycle racks on certain cars, and each train is able to accommodate up to 32 bicycles, *with the exception of Baby Bullet equipment, which can hold 16 bicycles. On some consists, during the peak hours, as many as 64 bicycles can be accommodated.*

Bike lockers are available at most Caltrain stations, with 1,021 lockers at stations within the project area as of January 2008. The San Francisco (Fourth and King Street), Palo Alto, Mountain View, and Sunnyvale stations have substantial bicycle storage. A "BikeStation" has been established at the 4th and King Street Station and Palo Alto Station, which includes guarded parking, bicycle rentals, and other bicycle services. Some of these lockers are maintained and administered by VTA. San Francisco - Fourth and King Street (18 percent), Palo Alto (11 percent), and the Mountain View Station (11 percent) have the highest number of bike lockers.

Table 3.15-*4*: Caltrain Parking

Station	JPB Parking	In Use	Vacant	Parking Spaces In Use (%)
San Francisco	-	N/A	N/A	-
22nd Street	-	N/A	N/A	-
Bayshore	*38*	*12*	*26*	*31.6*
So*uth* San Francisco	*75*	*38*	*37*	*50.7*
San Bruno	*171*	*38*	*133*	*22.2*
Millbrae	*317*	*322*	*-5*	*101.6*
Broadway	*137*	*22*	*115*	*16.1*
Burlingame	*58*	*40*	*18*	*69.0*
San Mateo	*165*	*151*	*14*	*91.5*
Hayward Park	*213*	*16*	*197*	*7.5*
Hillsdale	*518*	*520*	*-2*	*100.4*
Belmont	*375*	*18*	*357*	*4.8*
San Carlos	*212*	*85*	*127*	*40.1*
Redwood City	*557*	*280*	*277*	*50.3*
Atherton	*0*	N/A	*0*	*N/A*
Menlo Park	*300*	*210*	*90*	*70.0*
Palo Alto	*389*	*386*	*3*	*99.2*
Stanford Stadium	-	N/A	N/A	-
California Avenue	*185*	*64*	*121*	*34.6*
San Antonio Road	*199*	*58*	*141*	*29.1*
Mountain View	*490*	*482*	*8*	*98.4*
Sunnyvale	*439*	*448*	*-9*	*102.1*
Lawrence	*122*	*31*	*91*	*25.4*
Santa Clara	*289*	*74*	*215*	*25.6*
College Park	-	-	-	-
San Jose Diridon	*581*	*597*	*-16*	*102.8*
Tamien	*275*	*232*	*43*	*84.4*
TOTAL	***6,105***	***4,124***	***1,981***	***57.1***

Note: Inventory only includes Caltrain parking. It does not include street parking, and it does not include parking facilities owned by others, except for parking supply at Millbrae, San Mateo, Menlo Park, Mountain View, and San Antonio Road stations.
Sources: JPB Parking Capacity, 2007.

All regular Caltrain stations, except *the* 22nd Street *and Menlo Park stations*, have bike lockers*; however, Menlo Park has a shared-access bike storage shed*. Lockers can be rented for $33 for *6* months (plus a refundable $25 key deposit). The availability of bike lockers depends on the popularity of bicycles at individual stations. Many locations are currently fully rented and have waiting lists.

3.15.5 FUTURE RAIL AND BUS TRANSIT AND PROJECTED IMPACTS

3.15.5.1 Caltrain

Projected Ridership. This section outlines future Caltrain patronage forecasts with and without the Caltrain Electrification Program. Caltrain's current and projected daily boardings and alightings by station for *2007* and *2035* are shown in Table 3.15-5. *The 2007 data are from the February 2007 Passenger Count Survey. The projected ridership is demand driven and unconstrained (i.e., not affected by parking supply); an example schedule was used to model the ridership.*

Under the No-Electrification Alternative systemwide, *2035* Caltrain ridership is expected to grow by *93.5* percent. For the No-Electrification Alternative, with a *98*-train Caltrain weekday schedule, the system is projected to carry approximately *64,700* riders per weekday. *With the exception of the 22nd Street, Broadway, Atherton, and College Park stations, sizable increases in ridership are projected for all Caltrain stations with the No-Electrification Project Alternative.*

Table 3.15-5 also shows projected Caltrain daily boardings and alightings by station for the year *2035* with the proposed Electrification Program Alternative. For a *114*-train weekday schedule, ridership is projected to increase to *approximately 71,001* trips per day on the basis of travel time savings, *which is* an increase of *approximately 6,300* trips or *9.7* percent over the projected *2035* No-Electrification Alternative ridership. This would be an increase of *112* percent over the February *2007* ridership of *33,420* trips per day.

In addition to the projected ridership increases, a further boost in ridership is possible given that a major deficiency of the current Caltrain service has been its image of an outmoded operation that dates back to the freight rail-oriented Southern Pacific. The continued use of diesel locomotives and resultant slower train operations *has* been an important factor in sustaining this image even as the JPB has bought new rolling stock and increased service. Electrifying the Caltrain service *has long been suggested to* increase its consumer appeal and should increase ridership.[26] The Electrification Program would more closely meet Caltrain riders' vision of an updated, clean, high-tech type Caltrain.

[26] *Lovelock, Christopher H., Consumer Oriented Approaches to Marketing Urban Transit, Ph.D. Thesis, Stanford University, 1972.*

Table 3.15-5: Caltrain *Current and Projected* Daily Boardings and Alightings *(Weekday)*

Station	*2007*	Alternative	
		***2035* No-Electrification**	***2035* Electrification**
San Francisco-Fourth & King	*15,456*	*22,905*	*24,513*
22nd Street	*1,697*	*1,563*	*2,104*
Bayshore	*337*	*1,071*	*1,455*
So*uth* San Francisco	*1,147*	*2,562*	*2,966*
San Bruno	*800*	*1,407*	*1,454*
Millbrae	*3,938*	*6,372*	*5,747*
Broadway	--	*0*	*2,099*
Burlingame	*1,195*	*2,421*	*2,242*
San Mateo	*2,551*	*4,709*	*5,018*
Hayward Park	*464*	*1,953*	*2,436*
Hillsdale	*3,625*	*9,152*	*9,085*
Belmont	*800*	*2,046*	*2,483*
San Carlos	*1,781*	*4,335*	*4,312*
Redwood City	*3,798*	*9,044*	*9,368*
Atherton	--	*0*	*957*
Menlo Park	*2,469*	*4,341*	*4,246*
Palo Alto	*6,711*	*13,114*	*14,362*
California Ave.	*1,623*	*3,756*	*3,657*
San Antonio	*1,030*	*2,557*	*3,018*
Mountain View	*5,933*	*8,987*	*9,231*
Sunnyvale	*2,974*	*5,325*	*6,181*
Lawrence	*1,097*	*2,255*	*2,757*
Santa Clara	*1,319*	*3,587*	*4,252*
College Park	*252*	*64*	*216*
San Jose Diridon	*4,837*	*14,262*	*15,771*
Tamien	*1,006*	*1,565*	*2,072*
Total Ons and Offs	*66,840*	*129,356*	*142,002*
Riders (Ons only)	*33,420*	*64,678*	*71,001*

Source: *February 2007 Passenger Count Survey; Santa Clara Valley Transportation Authority's Travel Demand Ridership Model using 2005-2030 ABAG Series Land Use Series. Growth factor applied to 2030 ridership results using ABAG 2007-2035 Land Use Series data, 2008.*

In addition to ridership increases, the Electrification Program Alternative would have other important benefits. Electrification would *improve operating cost effectiveness by enabling more peak-period riders to be served on longer trains without degrading train speeds and reducing fuel use and costs; electrification would* be an important step in modernizing

Caltrain and would also accommodate high-speed rail, which would not otherwise be practical on the San Francisco Peninsula. Lastly, the Electrification Program Alternative would have important air quality and noise benefits, which would include a *90 to* 95 percent reduction in train-related emissions and a net decrease in automobile emissions. *See Section 3.3.2.3, Impacts of the No-Electrification and Electrification Program Alternatives, Table 3.3-4, Emissions Comparison Summary (Five-Car Trains).*

While electrification is expected to increase total ridership *somewhat*, it is expected to have only a slight impact on ridership patterns. *The primary effect would be to spread the ridership among stations as higher performance of the Electrification Program Alternative allows faster trains and more stops—a primary benefit of the Electrification Program.*

Travel Time. With the Electrification Program Alternative*, most Caltrain users would experience average travel time savings of 1 to 8 minutes from faster and more frequent peak-period trains.* Table 3.15-6 shows travel time comparisons on Caltrain for nine selected trips between central origins and destinations in corridor and other Bay Area cities. These travel time estimates are *based on existing and planned Caltrain schedules*. The travel times are door-to-door times for trips in the *AM* peak period and thus include the time to travel to and from Caltrain stations as well as wait time. The trip times include transfers to other transit providers as appropriate for the respective trip ends *(*e.g., to Muni for downtown San Francisco or to BART for the San Francisco Airport or the East Bay destinations*). The trip time savings reported reflect the average of trips made on all AM peak-period trains; time savings on the Baby Bullet trains would be slight due to their making only four to five intermediate stops between San Jose and San Francisco.*

3.15.5.2 BART

The BART SFO Extension, which was opened to the public in June 2003, extended BART service from its previous southern terminus at the Colma Station to SFO. The extension continues south from SFO to a new Millbrae intermodal station, which enables cross-platform transfers between BART and Caltrain. The Caltrain Electrification Program *would be expected* to enhance BART ridership.

3.15.5.3 Muni

A new Third Street *(T-Third)* light-rail service in San Francisco's Bayshore corridor *started in April 2007 and was revised June 30, 2007. The T-Third line runs from the Castro Street Station along Market Street (via the subway), along the Embarcadero, Third Street, and Bayshore Boulevard, and it terminates at the Sunnydale Station.* The *T-Third consists of* 5*.1* miles *of light rail and 18 stations*. Bus service changes connected with the Third Street Light-Rail Line include*d* elimination of the 15-Third*;* extensions of the 9X, 9AX, 9BX lines to cover portions of the 15-Third not covered by the new light rail*;* and rerouting of the *10-Townsend and 54-*Felton.

Table 3.15-*6*: Estimated Transit Travel Times for Selected Trips on Caltrain

Origin*	Destination	Travel Time (hour:min*utes*) 2007	*2035* No-Electrification	*2035* Electrification	Projected Total Travel Time Savings with Electrification (minutes)
Gilroy**	Downtown San Francisco	*2:51*	*2:51*	*2:43*	*8*
Downtown San Jose	Downtown San Francisco	*1:44*	*1:44*	*1:38*	*6*
Sunnyvale	Downtown San Francisco	*1:32*	*1:32*	*1:30*	*2*
Millbrae	Downtown San Francisco	*0:56*	*0:56*	*0:52*	*4*
San Bruno	Downtown San Francisco	*1:04*	*0:58*	*0:55*	*8*
*Palo Alto****	San Francisco Airport	*0:50*	*1:02*	*1:01*	*1*
Redwood City	Concord	*2:09*	*2:07*	*2:03*	*4*
Downtown Oakland	San Carlos	*1:40*	*1:32*	*1:28*	*4*

* The travel times are door-to-door times for average *AM* peak-*period* conditions between central origins and destinations in the cited cities.

** *The times for Gilroy trains assume no transfer to Baby Bullets. With transfer to Baby Bullets in San Jose, possible only with No-Electrification schedules, the No-Electrification trips times would be 5 minutes faster than with Electrification.*

****2035 airport access times reflect BART eliminating direct service from Millbrae to San Francisco Airport in January 2008.*

Source: *Parsons, May 2008.*

Muni and the City and County of San Francisco are actively pursuing funding for construction of the Central Subway, *Phase 2 of the Third Street Light-Rail Project. This* proposed light-rail *project* would *involve a* northward *extension* from the *current* Third Street Light-Rail Service *terminus* at King Street. *From King Street, the adopted Locally Preferred Alternative (LPA) alignment extends northerly* along *Fourth* Street, entering a new Central Subway near *Harrison* Street, crossing beneath Market Street and running under Stockton *Street* to Stockton and *Washington* streets. A total of *three* underground subway stations are planned at Moscone Center, Union Square*/Market Street*, and Chinatown. A surface station would be built at *Fourth* and *Brannan streets*. The Central Subway project is scheduled to be constructed *between 2010 and 2016*, but *it* is not presently funded. Th*is* project is *assumed as part of* the No-Project Alternative in anticipation of funding being identified in time for the Central Subway to be completed within the horizon year for the *Caltrain Electrification* project.

3.15.5.4 SamTrans

Beginning in 2008, SamTrans *will begin preparing a 20-year Strategic Plan outlining the future direction of service changes and funding strategy. Over the next 10 years, it is* *assumed that overall service levels for fixed-route bus service will remain stable. This does not preclude incremental improvements that may be needed to achieve the goal of increasing ridership while providing a basic level of service for transit-dependent customers.*

3.15.5.5 VTA

VTA *opened Phase One of the* Vasona Light Rail Line between downtown San Jose *to the Winchester Station, south of downtown Campbell on October 1, 2005. The 5.3-mile, eight-station Vasona extension is a part of the Mountain View-Winchester Light-Rail line. The Vasona extension creates a major transfer point between the VTA light-rail system and the Mountain View and San Jose Diridon Caltrain Stations. The schedule for Phase Two, from Winchester Station in Campbell to Vasona Junction in Los Gatos, is dependent on available funding.*

VTA plans to transform Line 22 into a BRT Corridor and will implement a variety of improvements over the next 4 years by providing faster, more reliable service and better passenger information and security at stops. The complete package of improvements needed to transform Line 22 into a BRT corridor includes a combination of the following features:

- *Queue jump lanes at congested locations,*
- *Advanced communication system,*
- *Signal prioritization for buses to reduce delay,*
- *Improved passenger facilities at stops,*
- *High-capacity, easy-access, and cleaner buses, and*
- *More frequent and direct service.*

3.15.5.6 Impacts on Corridor Transit Patronage

*As shown in Table 3.15-7, t*he Electrification Program Alternative would increase transit *boardings* in the corridor in the year *2035* by an estimated *5,000* trips per day, from *approximately 1,298,932* to *1,304,561* trips per day. *Based on this increase in transit boardings, the Electrification Program Alternative would increase the transit mode share in the corridor slightly.*

The Caltrain Electrification Program Alternative could cause a slight decrease in the ridership of SamTrans and VTA buses in the parallel corridors because of the faster trip times on Caltrain. On the other hand, Muni, SamTrans, and VTA buses connecting with Caltrain stations may have a slight increase in ridership. *Overall, SamTrans ridership is projected to decrease slightly, while VTA ridership is projected to increase slightly.* There may also be an increase in ridership on Muni Metro's N-Judah and T-Third light rail lines at Fourth and Townsend because of increased transfers from Caltrain, but ridership on BART is expected to be about the same.

Table 3.15-7: Current and Projected Boardings by Operator				
Operator	*2006/2007 Observed*	*2005 Modeled*	*2035 No Project*	*2035 Project*
Caltrain	*32,021*	*33,517*	*65,865*	*72,025*
SamTrans Local	*41,507*	*52,665*	*88,070*	*87,453*
SamTrans Express	*3,352*	*8,015*	*9,611*	*9,273*
Dumbarton Express (DBX)	*936*	*1,211*	*1,038*	*979*
AC Dumbarton Service (U)	*-*	*-*	*109*	*106*
AC Dumbarton Service (M)	*-*	*-*	*1,064*	*1,007*
Capitols	*NA*	*2,501*	*7,243*	*7,244*
ACE	*2,851*	*2,561*	*12,950*	*13,149*
BART	*319,652*	*326,101*	*755,432*	*755,468*
VTA LRT Guadalupe	*21,812*	*23,551*	*58,140*	*58,388*
VTA LRT Mtn. View-Winchester	*12,141*	*13,444*	*49,217*	*49,154*
VTA Bus	*109,127*	*141,190*	*250,193*	*250,314*
All Operators	***543,399***	***604,756***	***1,298,932***	***1,304,561***
Source: Santa Clara Valley Transportation Authority's Travel Demand Ridership Model using 2005-2030 ABAG Series Land Use Series. Growth factor applied to 2030 ridership results using ABAG 2007-2035 Land Use Series data, 2008.				

3.15.6 FUTURE HIGHWAY IMPROVEMENTS, TRAFFIC DEMAND, AND PROJECTED IMPACTS

In the face of rapid growth in Silicon Valley, a variety of highway improvements are planned, *under construction, or just completed*. Major programmed (committed) highway improvements in the corridor include the following: [28]

- Widen US 101 from four lanes to six lanes between Metcalf Road and Cochraine Road *(completed in 2003)*;
- Widen Guadalupe Expressway (Route 87) from four-lane expressway to six-lane freeway, including two HOV lanes from US 101 to Julian Street *(completed in 2004)*;
- Add HOV lanes on Route 87 from Julian Street to I-280 and from I-280 to Route 85 *(completed in 2007)*;
- Complete Route 85 and US 101 interchange and connector ramps in South San Jose and widen US 101 to eight lanes from Bernal Road to Metcalf Road *(completed in 2004)*;

[28] MTC, *Draft EIR, 2001 Regional Transportation Plan,* August 2001

- Widen US 101 from six lanes to eight lanes with HOV lanes from Metcalf *Road* to Cochrane *Road (completed in 2003)*;
- Add US 101 auxiliary lane from Route 87 to Montague Expressway *(completed in 2004)*;
- Construct Route 85/US 101 interchange improvements in Mountain View *(completed in 2006)*; and
- Add US 101 auxiliary lanes from the Santa Clara County line to Marsh Road, from Marsh Road to Route 92, from Third Avenue to Millbrae, from San Bruno Avenue to Grand Avenue, and from Sierra Point to the San Francisco County line *(Segments between Marsh Road and Route 92 were opened in fall 2004.)*.

The draft *2001 Regional Transportation Plan EIR* indicates that increasing congestion is expected on US 101 and I-280 in the Caltrain corridor.

The ridership analysis projected that the Electrification Program Alternative would *increase peak period travel capacity within the corridor. This would make it possible for more people to reach origins and destinations during periods of peak travel demand, thereby increasing overall mobility, and could also lead to small reductions in automobile travel times* on Peninsula corridor roadways. *According to the ridership analysis*, the Electrification Program Alternative *would attract enough additional riders—riders who would otherwise have driven their cars and taken up space on area roadways—that automobile travel* between origins in the US 101 corridor and San Francisco *would decrease slightly. As a result, travel times would be reduced by approximately* one minute *as* compared with the No-Electrification Alternative.[29] Even this very modest time *improvement* would result in daily *corridor-wide* travel time savings of *approximately* 4,700 person hours, which includes 4,200 person hours saved for Caltrain riders and 500 person hours for roadway travelers in the corridor. Using FTA procedures, this represents an approximate \$16 million per year savings (4,700 hours/day x \$13.38/hour x 250 work days/year).

*D*aily VMT on all roadways in the region are projected to decrease slightly from 145,993,000 to *145,881,000* VMT, *which amounts to* a savings of *112,000* VMT per day, with the Electrification Program Alternative compared with the No-Electrification Alternative condition. *These* savings *are* based on an average trip length *of 21 miles* by new Caltrain riders.

It is important to note that the reductions in automobile travel stemming from the electrification program could be tempered by latent demand for roadway space. This is to say that the space freed up on area roadways by drivers who switch to Caltrain as a result of the electrification program, which would reduce travel times along roadways within the same corridor, could attract new auto trips to the corridor. These trips would likely consist of diverted vehicle trips, including trips shifted in time, route and destination, as well as induced vehicle travel, including shifts from other modes, longer trips and new vehicle trips.

[29] Parsons Transportation Group, October 2001.

3.15.7 FUTURE CALTRAIN PARKING FACILITIES AND PROJECTED IMPACTS

Table 3.15-*8* presents projected Caltrain parking demand and supply based upon expected parking lot sizes and projected Caltrain demand for the No-Electrification and Electrification Program alternatives in *2035*. By *2035 under the No-Electrification Alternative*, Caltrain *stations would experience* increased parking demand*, for* a *total projected* demand of *6,931* spaces. *D*emand would exceed supply at *10* stations that provide parking*;* the project*ed* parking supply shortfall of *approximately 963* spaces would occur *for* the No-Electrification Alternative.

The Electrification Program Alternative *is projected to* increase the *No Electrification* parking demand to *7,417* spaces *by year 2035. Demand would exceed supply at 11 stations; the projected parking supply shortfall of approximately 1,312 spaces would occur for the Electrification Alternative.*

In 2035, the Electrification Program Alternative's demand is projected to exceed the No-Electrification Alternative's demand for parking by 486 spaces. When compared with the No-Electrification Alternative, the Electrification Program Alternative has a larger shortfall of supply, by 349 spaces.

Parking provisions and controls can directly affect the volume of traffic on residential streets, particularly where these streets are used for parking by commuters, shoppers, and other unrelated traffic attracted by nearby nonresidential destinations. See Section 3.15.9.2 for a discussion of potential mitigation related to parking.

3.15.8 FUTURE NONMOTORIZED TRANSPORTATION AND PROJECTED IMPACTS

Caltrain has upgraded the bicycle-carrying capacity of its trains so that the cab cars now carry 32 bicycles instead of 24. Many Caltrain train consists now have two cab cars, thus providing a 64-bicycle carrying capacity on these trains. The Baby Bullet cars carry only 16 bicycles per cab car. Electrification is expected to have a positive impact on nonmotorized transportation by slightly increasing the demand for bicycles on Caltrain.

3.15.9 MITIGATION MEASURES

3.15.9.1 Ridership and Travel Times

Impacts due to ridership numbers or patterns, and associated effects on other transit agencies, are not expected to be significant with the proposed action. The project would result in improved travel times compared with the No-Electrification condition. Given these considerations, no mitigation measures are required.

3.15.9.2 *Parking*

Caltrain has an ongoing program for improving station access by, among other actions, increasing parking. Caltrain works with local governments on improving station access. The JPB maintains surveillance over parking supply and usage at its Caltrain stations on an ongoing basis. The JPB's Capital Improvement Program has identified financial resources *to address the need for additional parking and other access improvements as it becomes necessary. Parking demand at individual stations will be periodically reviewed and appropriate actions developed with Caltrains' partner agencies.*

Table 3.15-*8*: *2035* Caltrain Parking Demand and Supply Projections

Station	No-Electrification Alternative			Electrification Program Alternative			*Project vs. No-Project Surplus or Shortfall*
	Demand	Parking Capacity[1]	*Surplus or Shortfall*	Demand	JPB Capacity	*Surplus or Shortfall*	
San Francisco	0	0	0	0	*0*	*0*	0
22nd Street	*0*	0	*0*	*0*	0	0	*0*
Bayshore	*84*	*38*	*-46*	*122*	*38*	*-84*	*-38*
S. San Francisco	*53*	*75*	*22*	*68*	*75*	*7*	*-15*
San Bruno	*40*	*171*	*131*	*38*	*171*	*133*	*2*
Millbrae[2]	*382*	*317*	*-65*	*388*	*317*	*-71*	*-6*
Broadway	-	*137*	-	*62*	*137*	*75*	*75*
Burlingame	*56*	58	*2*	*32*	*58*	*26*	*24*
San Mateo[2]	*312*	*165*	*-147*	*325*	*165*	*-160*	*-13*
Hayward Park	*54*	213	*159*	*82*	*213*	*131*	*-28*
Hillsdale	*1265*	*518*	*-747*	1,*251*	*518*	*-733*	*14*
Belmont	*45*	375	*330*	*75*	*375*	*300*	*-30*
San Carlos	*304*	212	*-92*	*269*	*212*	*-57*	*35*
Redwood City	*784*	*557*	*-227*	*800*	*557*	*-243*	*-16*
Atherton	-	*0*	-	*217*	*0*	*-217*	*-217*
Menlo Park [2]	*343*	*300*	*-43*	*244*	*300*	*56*	*99*
Palo Alto	*658*	*389*	*-269*	*688*	*389*	*-299*	*-30*
California Ave.	*182*	*185*	*3*	*180*	*185*	*5*	*2*
San Antonio	*148*	199	*51*	*160*	*199*	*39*	*-12*
Mountain View[2]	*895*	*490*	*-405*	*909*	*490*	*-419*	*-14*
Sunnyvale	*532*	*439*	*-93*	*585*	*439*	*-146*	*-53*
Lawrence	*57*	*122*	*65*	*67*	*122*	*55*	*-10*
Santa Clara	*84*	*289*	*205*	*105*	*289*	*184*	*-21*
College Park	*0*	0	*0*	*0*	*0*	*0*	*0*
San Jose Diridon	*407*	*581*	*174*	*449*	*581*	*132*	*-42*
Tamien	*246*	275	*29*	*301*	*275*	*-26*	*-55*
Total	*6,931*	*5,968*[3]	*-963*	*7,417*	*6,105*	*-1,312*	*-349*

[1] *JPB Parking Capacity 2007.*
[2] *Shared parking facilities being used at these locations. Parking capacities shown in the table reflect the following additional shared spaces: Millbrae=197; San Mateo=125; Menlo Park=145; Mountain View=150.*
[3] *Excludes 137 spaces at Broadway station due to no weekday service at this station, under the No-Electrification alternative.*

Source: *Santa Clara Valley Transportation Authority's Travel Demand Ridership Model using 2005-2030 ABAG Series Land Use Series. Growth factor applied to 2030 ridership results using ABAG 2007-2035 Land Use Series data, 2008.*

3.16 UTILITIES AND SERVICE SYSTEMS

3.16.1 SETTING

This section identifies existing utilities within the Peninsula Corridor right-of-way or in the vicinity of proposed Caltrain TPS*s* between the cities of San Francisco and *San Jose, with the terminus at PS7, approximately 3 miles from the Tamien Station*. The utilities include storm drain and sanitary sewer systems, water service, gas and electric service, and telecommunications services. These utility systems frequently cross the Caltrain right-of-way, and some telecommunication services are located along the Caltrain right-of-way, using it as a primary transmission corridor on the Peninsula.

Table 3.16-1 provides a general summary of the utilities by city, defining the utility provider and the approximate number of locations of interest. Table 3.16-2 summarizes the utilities at the proposed TPS locations. It is acknowledged that the information on utilities presented in Tables 3.16-1 and 3.16-2 may be incomplete; however, as part of the Electrification Program's final design, Caltrain will coordinate with all appropriate local jurisdictions and utility providers to ensure that all utilities that cross or run longitudinally along the Caltrain right-of-way are identified. The following paragraphs discuss the utility setting, describing storm drain and sanitary sewer systems, water service, gas and electric service, and telecommunications services in turn.

Table 3.16-1: Summary of Existing Utilities *w*ithin the Peninsula Corridor Right-of-Way

	Utility Type and Locations	*Owner*
1	Underground fiber-optic cable. They typically run parallel to right-of-way.	MCI, Sprint, AT&T, Qwest, and Brook Fiber
2	Cable Service. Provides cable service throughout the Peninsula Corridor, excluding the cities of San Bruno, San Carlos, Palo Alto, and San Jose.	AT&T Cable
3	Telephone Service. *Aerial fiber-optic cables* are parallel and cross the Caltrain right-of-way within numerous cities.	Pacific Bell *and Western Union*
4	Gas and Electricity. Excluding the cities of Palo Alto and Santa Clara, PG&E provides electricity to all Peninsula Corridor cities. Gas is provided to all cities. Underground gas lines and overhead electrical wires cross and are parallel to the Caltrain right-of-way at numerous locations.	PG&E
5	Jet Fuel. Pipe crosses right-of-way near San Francisco/San Mateo County Line. This facility also follows the right-of-way in South San Francisco. It is carried on the Caltrain bridge over Colma Creek and goes underground on both approaches on the east side of the tracks.	Santa Fe Pacific Pipe Line
6	Water Service. Provides water service for South San Francisco, San Mateo, San Carlos, unincorporated areas of Redwood City, and Sunnyvale. Water mains vary from 6 to 24 inches and run parallel with streets that cross the Caltrain right-of-way.	California Water Service Company (CWSC)

Table 3.16-1: Summary of Existing Utilities *w*ithin the Peninsula Corridor Right-of-Way

	Utility Type and Locations	***Owner***
7	Combined Storm Drain and Sanitary System. This system crosses the right-of-way at approximately 21 locations. The system parallels the right-of-way near Townsend Street, Pennsylvania Avenue, and Tunnel Avenue.	San Francisco Department of Public Works
8	*Water Service. Provides retail water service to San Francisco and wholesale water service to 28 suburban agencies in Alameda, Santa Clara, and San Mateo counties.*	San Francisco Water Department
9	Maintains sanitary sewers in Redwood City. Sanitary Sewers cross the right-of-way at approximately 4 locations. An abandoned sewer is parallel to the right-of-way at one location.	County of San Mateo Public Works Department
10	City provides water service and maintains sewers.	City of Brisbane
11	CWSC provides water service.	City of South San Francisco
12	City maintains water and cable service. In 2001, as a result of the BART to SFX extension project, sewers and storm drains have been installed parallel to the right-of-way between I-380 and Angus Avenue. NEXTLINK, Williams Communications, Level III, and Pacific Bell fiber-optic cables cross the right-of-way at Euclid Avenue**.**	City of San Bruno
13	City provides water service.	City of *Millbrae*
14	City provides water service.	City of Burlingame
15	City maintains sewer system. CWSC provides water service. The City and CWSG will provide locations of sewer and water mains that cross the Caltrain right-of-way, respectively.	City of San Mateo
16	City provides water service and maintains sewer system.	City of Belmont
17	CWSC provides water service. City maintains storm drains and sewer system.	City of San Carlos
18	CWSC provides water service in unincorporated Redwood City. City provides water service for remaining areas.	City of Redwood City
19	*City provides and maintains storm drain system.*	City of Atherton
20	*City provides water service and maintains storm drain system.*	City of Menlo Park
21	The city provides water, electricity, and cable service. It also maintains the storm drain and sewer systems.	City of Palo Alto

Table 3.16-1: Summary of Existing Utilities *w*ithin the Peninsula Corridor Right-of-Way

	Utility Type and Locations	*Owner*
22	City provides water service and maintains sewer and storm drains. • Water Mains cross the right-of-way at approximately 7 locations, including an 8-foot main at the Stevens Creek Freeway. Water mains are parallel to the right-of-way and Central Expressway • Sanitary Sewers cross the right-of-way at approximately 13 locations. The sanitary sewers are parallel to the right-of-way and Alma Street. • Storm Drains cross the right-of-way at approximately 9 locations. The storm drains are parallel to the right-of-way and Central Expressway.	City of Mountain View
23	City provides water service.	City of Sunnyvale
24	City provides water and electric services and maintains sanitary sewer and storm drain systems. • Water Mains ranging from 8 to 24 inches in diameter cross the right-of-way at approximately 7 locations. A 27-inch main for recycled water crosses the right-of-way at one location. • Overhead electrical wires cross the right-of-way at approximately 7 locations. The wires have 12-*k*V capacity. • Sanitary Sewers ranging from 8 to 27 inches in diameter cross the right-of-way at approximately 11 locations. • Storm Drains ranging from 12 to 60 inches in diameter cross the right-of-way at approximately 8 locations. A 54-*inch by* 66-inch elliptical pipe is located approximately 600 feet east of Bower Avenue.	City of Santa Clara
25	City provides water and cable service. San Jose Water Company and Great Oaks Water (privately owned) also provide water service. City maintains sewers.	City of San Jose

Source: Utility companies, city *W*eb sites, and public works/utilities departments. November 2001, *updated May 2008.*

Table 3.16-2: Utilities *n*ear Proposed Traction Power Locations *

No.	Proposed Traction Power Station	Milepost	Size (feet)	City and Location	Utility Description
1	PS1	*1.27*	*40 x 80*	San Francisco/*Near Mariposa Street at Pennsylvania Avenue.*	*12' reinforced concrete pipe (RCP) storm drain. Underground fiber-optic cables*.
2	PS2	4.95	*40 x 80*	San Francisco/Near *Blanken Avenue at Bayshore Boulevard.*	Underground fiber-optic cables.
3	TPS1 – *Preferred Location*	*8.65*	*150* x 250	South San Francisco/*North of Airport Boulevard.*	*Adjacent to 115kv PG&E substation. 115 kV transmission lines cross over are or in the vicinity of TPS-1. 25kv Ductbank required.*
4	*TPS1 – Alternative A*	*8.65*	*150 x 250*	*South San Francisco/North of Airport Boulevard.*	*115 kV transmission lines cross over are or in the vicinity of TPS-1. 115kV and 25kV Ductbanks required.*
5	*TPS1 – Alternative B*	*8.65*	*150 x 250*	*South San Francisco/ North of Airport Blvd.*	*25 kV transmission lines are in the vicinity of TPS-1. 25kv Ductbank required.*
6	PS3	15.*0*	*40 x 80*	Burlingame/Between *Summer and Lincoln*. In right-of-way.	*Underground fiber-optic cables*.
7	PS4	20.*05*	*40 x 80*	San Mateo/*North of the* Hillsdale and El Camino Real intersection.	*Aerial fiber-optic cables*.
8	SWS1	26.62	*60* x 150	Redwood City/Between Buckingham and Nottingham.	Underground fiber-optic cables.
9	PS5	33.*05*	*40 x 80*	Mountain View/*Near West Meadow Drive.*	*Aerial fiber-optic cables. Underground fiber-optic cables*.
10	PS6	*38.85*	*40 x 80*	Sunnyvale/ *Murphy Avenue.*	*Aerial fiber-optic cables. Underground fiber-optic cables.*
11	TPS2 *Preferred*	45.85	*150 x 250*	*Santa Clara/North of Newhall Street in VTA/BART property*.	*Adjacent to 115-kv PG&E Substation. 115-kV transmission lines cross over or are in the vicinity. Aerial fiber-optic cables. 115-kv Ductbank required.*
12	TPS2 *Alternate 1*	*45.95*	*150 x 250*	*Santa Clara/South of Stockton Avenue, east of Highway 880 in private property.*	*115-kV transmission lines cross over are or in the vicinity. Aerial fiber-optic cables. 115-kv Ductbank required.*
13	TPS2 *Alternate 2*	*46.8*	150 x 250	San Jose/At *Lenzen Avenue in JPB* property.	115-kV transmission lines cross over are or in the vicinity of ATF-2A.
14	PS7	*51.02*	*40 X 80*	San Jose/Near *Curtner Avenue* in right-of-way.	Underground fiber-optic cables.

* Source: HNTB. January 2002, *updated July 2008*. All utilities are in proximity of the proposed Traction Power Station locations.

Each city and county department of public works through which Caltrain passes maintains a storm drain and sanitary sewer system. The systems vary by age, size, and type depending on the municipality. The City and County of San Francisco Department of Public Works maintain a combined storm drain and sewer system that consists of vitrified clay pipe (VCP); older iron/steel pipe (ISP); very old brick collector sewers; medium-sized reinforced concrete interceptor sewers, and large reinforced concrete consolidation sewers. *Reinforced concrete pipe (RCP) facilities generally used for storm drain and sewer systems also cross the project alignment at a number of locations.*

Depending on the municipality, water service also varies within the Peninsula Corridor. The San Francisco Public Utilities Commission (SFPUC) provides water service to the City and County of San Francisco, as well as many cities on the Peninsula. Its water source is from snow falling on more than 650 square miles of watershed land in Yosemite National Park and the Stanislaus National Forest. As the snow melts, it collects in the Hetch Hetchy storage reserves. From the storage reserves, water flows by gravity through 150 miles of pipeline and tunnels from the crest of the Sierras to the Crystal Springs Reservoir on the Peninsula.[30]

Nearly all cities in San Mateo County provide water service to customers through their public works or utilities departments. Water service in South San Francisco, San Mateo, San Carlos, and unincorporated areas of Redwood City is provided by the privately owned California Water Service Company *(CWSC)*. Water sources for cities in San Mateo County are from the SFPUC and local wells. A public works or utilities department also provides water service in most Santa Clara County cities. A combination of public and private water service is provided in the cities of Sunnyvale and San Jose. In Sunnyvale, service is provided by the Public Works Department and by *CWSC*. The San Jose Municipal Water System and two privately owned companies (San Jose Water Company and Great Oaks Water) provide service to the City of San Jose. For cities in Santa Clara County, the water source can vary from well water, to the Los Gatos Creek watershed, Santa Clara Valley Water District, and SFPUC. Water *pipelines* range between 2 and 30 inches in diameter in most municipalities.

PG&E provides electricity and gas service to all but two cities within the Peninsula Corridor. The cities of Palo Alto and Santa Clara provide electricity for their customers. Gas, however, is provided by PG&E. Overhead power and underground gas lines both cross and run parallel to the Caltrain Corridor right-of-way. The City and County of San Francisco owns and operates the Hetch Hetchy water and power hydroelectric generating facilities that provide power to San Francisco via *PG&E*'s electrical transmission and distribution system. Excluding Palo Alto and Santa Clara, power is sold to all Peninsula Corridor cities by PG&E. Palo Alto gets its power from WAPA. Santa Clara buys 40 percent of its power from WAPA and 20 percent from the market. The remaining 40 percent is provided by local power plants that are owned by the *C*ity. Electricity service is provided primarily from underground reinforced concrete vaults through a network of buried conduit and duct banks. Along the Peninsula Corridor, PG&E maintains older, low-pressure cast iron natural gas lines (San Francisco), as well as new, high-pressure plastic lines.

[30] Hetch Hetchy Water and Power, San Francisco Public Utilities Commission Web site, November 2001.

Communication networks, such as MCI and Sprint, typically run underground fiber-optic cable parallel to the Peninsula Corridor. The majority of communication equipment is owned and operated by Pacific Bell. *The Metromedia Fiber-Optic Network Services, Inc., has developed a 113-mile-long network in the San Francisco Bay Area. The network includes both newly installed and existing conduit routes. The newly installed segments encircle the San Francisco Bay along railroad rights-of-way to form a framework for the network. The framework includes the Caltrain right-of-way from 4th and Berry streets in San Francisco south along the Peninsula to Luther Junction in San Jose. In addition, Metromedia uses Pacific Bell's conduit (known as the Pacific Bell structure) to augment the framework segments and provide fiber-optic service to northern and eastern regions of the Bay Area. The Pacific Bell structure runs approximately parallel to the Metromedia Peninsula segment along the Caltrain right-of-way.*

3.16.2 IMPACTS

3.16.2.1 No-Electrification Alternative

The No-Electrification Alternative would not have *the* potential to affect utilities crossing or running longitudinally along the Caltrain corridor.

3.16.2.2 Electrification *Program* Alternative

There is low to moderate potential for the Caltrain Electrification Program facilities to affect underground utilities that cross the Caltrain right-of-way. Pole placement can generally be modified to avoid them. The situation is somewhat more difficult for overhead utilities and utilities that run underground longitudinally within or along the right-of-way. In these cases, constructing OCS pole foundations, overhead facilities, and TPS would have the potential to encroach upon existing utilities. The following *design features* would be used to avoid adverse effects and service disruptions to customers:

- Underground utilities *will be relocated if required to accommodate the installation of OCS and TPS equipment and facilities. The relocation will be coordinated with the utility owner and will be conducted in a manner which minimizes disruption to the utility and its customers.*
- Large underground and longitudinally running utilities would be avoided *to the extent possible by design modifications.*
- Overhead utility *conflicts will be avoided by raising the existing utility wires over the OCS wires or relocating them under the tracks,* per federal, state, and local code requirements. If relocation of overhead wires were required, a taller pole would be installed. The existing wires would be transferred to the taller pole and removed from the shorter pole. *If relocation underground is required, the overhead wires would be removed once the underground service is established.*
- In most cases, the JPB has reserved the right to have utilities relocated if they interfere or conflict with planned railroad facilities. In the event that a longitudinal or transverse

utility line is in conflict with a proposed electrification facility, the utility owner would be requested to relocate it.

3.16.3 MITIGATION

The design features listed in Section 3.16.2.2 Electrification Program Alternative Impacts are recommended.

Careful and continuous coordination with all utility providers *and local jurisdictions* would be initiated during preliminary engineering and would continue through final design and construction to ensure that all potentially conflicting utility locations are identified. To prevent damage to utility systems and minimize disruption or degradation of utility service to local customers, utilities would be avoided while constructing OCS pole foundations, power stations, and overhead facilities insofar as possible. Coordination efforts would focus on identifying potential conflicts, planning utility reroutes, and formulating strategies for overcoming problems that may arise.

3.17 ELECTROMAGNETIC FIELDS (EMF) AND ELECTROMAGNETIC INTERFERENCE (EMI)

3.17.1 *SETTING*

EMF describes electromagnetic radiation that is on the lower frequency end of the electromagnetic spectrum.[31] The electromagnetic spectrum includes the various wave forms of energy, from electrical fields to radio waves to light to x-rays. Energy frequencies at the high end of the spectrum are termed ionizing because they break chemical bonds and thereby can damage living cells and DNA. Energy frequencies at the lower end are termed non-ionizing since they do not break chemical bonds and would not have the same biological effects as ionizing radiation.

EMF is both naturally occurring and human-made. Movement within the earth’s molten core generates a significant electromagnetic field. Stars and sunspot activity generate EMF, as do certain biological processes. Human-made sources have become increasingly prevalent in the last 100 or so years and prominent among these are electrical equipment, telecommunications, and electricity supply facilities. Human-made sources of EMF and EMF’s environmental effects are *the* focus of *this* environmental *document* since electrification of Caltrain service will increase electric energy use and require additional electrical systems, thereby increasing sources of EMF in the study corridor.

Electrical systems produce both electric and magnetic fields. Electric fields result from the strength of the electric charge, while magnetic fields are generated from the motion of the charge. Electric field strength is measured in units of kilovolts per meter (kV/m) and is greater the higher the voltage. Field strength deteriorates rapidly with distance from the

[31] The frequency of electromagnetic radiation is the rate at which the electromagnetic field changes direction, expressed in terms of cycles per second, or Hertz (Hz). Frequencies of less than around 3,000 Hz are considered extremely low frequency (ELF) and include alternating current electrical fields that oscillate at 60 Hz.

source. Electric fields are easily blocked by most objects, including household objects, buildings, and vegetation. Electric fields can be blocked by insulating sources from potential receptors. Electric appliances in the home or office and power lines outside are the major sources of exposure to electric fields.

Magnetic field strength is measured in units of milliGauss (mG), or magnetic flux density, and is greater the higher the current flow. It is also higher for direct current (DC) than for alternating current (AC). Another common unit of magnetic field strength is the microTesla (μT), with 10 mG equivalent to one μT. Like electric fields, magnetic fields decrease rapidly with increasing distance from the source but, unlike electric fields, are not easily blocked. Magnetic fields pass readily through most objects. Magnetic fields are usually the radiation of concern when evaluating EMF. Consequently, EMF intensity, or exposure level, is measured in terms of mG.

3.17.1.1 Background EMF

As noted, EMF from human-made sources is common and increasing in urban areas. Most people are exposed on a daily basis to a variety of sources and field strengths. Overall average exposures are still considered low *and not likely to produce adverse health effects* by most experts, but this conclusion *has been* questioned *by some analysts* (see Section 3.17.*1.4*). The average home in the U.S. has background *AC* magnetic field levels of approximately *1*-mG even when a person is not directly exposed to an electric appliance.[32] Background EMF and the durations of EMF exposure at home or at work would be expected to increase in the future as electrical and electronic systems multiply—unless measures to shield or reduce exposures *are implemented.*

In the U.S., EMF related to electrical systems is measured *at* or around the frequency of 60 Hz, which is in the Extremely Low Frequency (ELF) portion of the electromagnetic spectrum. AC electric energy is generated and distributed at various voltages but always at 60 Hz. Sixty-Hz electric currents have associated characteristic electric and magnetic fields that are distinguishable from other AC frequencies *and* from DC current. Examples of magnetic field strengths of 60-Hz appliances commonly found in the home or office and of magnetic field strengths of electric transmission facilities found in many communities are listed *in Table 3.17-1*.

For the first three appliances, the maximum field strength is listed for which EMF exposure would be direct (the appliances are used close to the body) but probably limited in duration. The magnetic field strengths from a television or computer are for a range of models and represent the continuous level of exposure (appliance plus background) a person would experience while observing or working with the product over an extended period.

[32] Working with or directly handling an electrical appliance would increase the exposure level.

Table 3.17-1 Magnetic Field Strengths	
Electrical Appliances in Home or Office	
Dishwasher	***4 mG (at 1 foot)***
Vacuum Cleaner	***200 mG (at 1 foot)***
Hair Dryer	***80 mG (at 1 foot)***
Electric Shaver	***100 mG (at 1 foot)***
Video Display	***6 mG (at 1 foot)***
Other Environmental Sources	
Electric power distribution/subtransmission lines	
Within right-of-way	**10 *to* 75 mG**
Edge of right-of-way	**5 *to* 10 mG**
High-voltage transmission lines	
Within right-of-way	**60 *to* 600 mG**
Edge of right-of-way	**11 *to* 90 mG**

Magnetic fields under and alongside the right-of-way of electric power transmission and distribution lines are also listed. There is considerable variability among these sources, a function of the voltage (e.g., a 500-kV line would generate fields *approximately* four times as strong as a 115-kV line), the height of the power line, and the width of the right-of-way for exposures measured at the edge of right-of-way. The duration of EMF exposure could be quite short if, for example, one is simply driving by, or extended, if one is in a residence or other structure adjacent to the power line right-of-way.

3.17.1.2 EMF Levels along Existing Caltrain Alignment

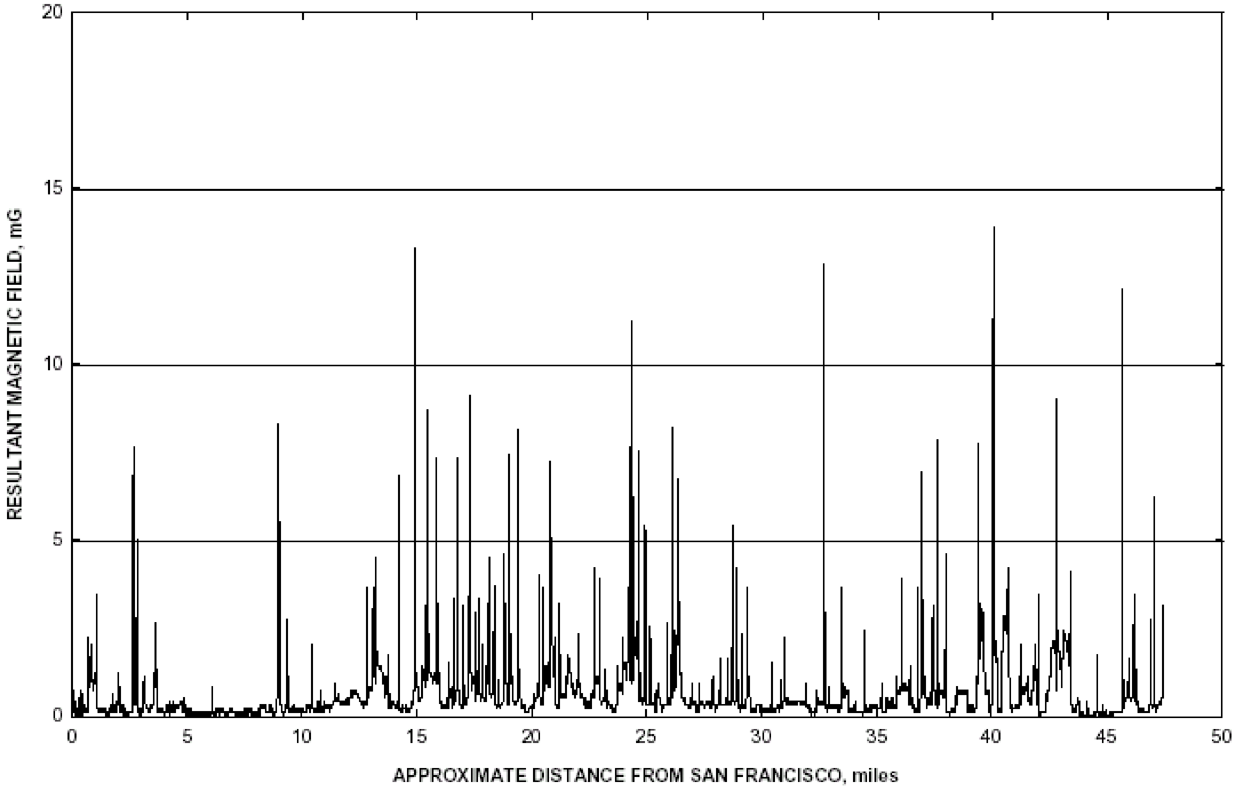
The Caltrain corridor proposed for electrification is approximately *52* miles long and passes through urban *and* suburban environments. Land uses within urbanized areas vary from industrial to commercial to residential. The existing EMF environment in the Caltrain corridor was unknown prior to initiation of this environmental document. Field measurements were completed in 2001 *and are presented in the Environmental Assessment of Electric and Magnetic Fields Associated with Proposed Electrification of the Caltrain Commuter Rail Line: San Francisco-Gilroy (Exponent Health Group, 2001). The data and measurements presented for the corridor from San Francisco to San Jose establish existing EMF conditions for this project. Because estimated Caltrain-induced exposure levels are expected to be low and further, and because the evidence concerning potential health effects are inconclusive, the field measurements collected in 2001 are presumed to remain valid for purposes of the impact analysis presented in this environmental document.* Magnetic field strengths were measured over a frequency spectrum of 40 to 800 Hz. One reason for measuring fields over a range above and below 60 Hz was that sources of EMF other than 60-Hz electrical systems might be present along the corridor. Also, *although Caltrain would be electrified by implementing a 25-kV (25,000-Volt) AC delivery system oscillating at 60 Hz,* conversion of electric energy at the drive motors and for auxiliary systems would occur, and both voltage and oscillations would vary *somewhat* from the supplied 25 kV, 60 Hz. Finally, with variable voltage and current draw, and because there are different types of equipment onboard trains and in use by businesses and residences along the corridor, harmonic frequencies will normally be present. Harmonic frequencies are multiples of the fundamental 60-Hz frequency and would have associated magnetic fields. Therefore, to include all reasonable potential sources of EMF, magnetic field measurements covering a somewhat broader source range were appropriate.

Magnetic-field data loggers, or meters to record field strengths, were located in the caboose of a special non-revenue train running mainly on the southbound Caltrain track between San Francisco and San Jose. One meter recorded broadband (40 *to* 800 Hz) fields at 1.5-second intervals, and the other meter recorded broadband and harmonic (100 *to* 800 Hz) fields at *3*-second intervals. With *the* train speed averaging approximately 10 mph, broadband measurements were taken *approximately* 26 feet apart and harmonic measurements *approximately* 56 feet apart along the *52*-mile alignment. The position of the train at the time each measurement was made was determined using a global positioning system receiver.

Table 3.17-*2* summarizes the results of the broadband and harmonic field measurements. Figure 3.17-1 show*s* graphically the results of the field measurements for San Francisco to San Jose. Along the route, relatively low magnetic fields were observed. *T*he average broadband magnetic field was 0.6-mG and the maximum was 1*3.9* mG.

Table 3.17-*2*: Broadband (40 *to* 800 Hz) and Harmonic (100 *to* 800 Hz) Magnetic Field Measurements along Caltrain Corridor (2001)

	San Francisco to San Jose	
	Broadband	**Harmonic**
Measurements	9,452	4,724
Average, mG	0.58	0.14
Standard Dev., mG	0.88	0.22
Maximum, mG	13.9	3.0
Source: Exponent Health Group, 2001.		



Note: The data displayed on this figure extends to milepost 47.0, whereas the terminus of the currently proposed electrification project is at 52.0 miles. Review of broadband field measurements taken between mileposts 47.0 and 52.0 are well within the ranges shown on Figure 3.17-1; therefore, these data are used to represent the entire revised corridor.

Source: Exponent Health Group, 2001.

Figure 3.17-1: Broadband Magnetic Field Measurements at 1.5-*S*econd Intervals *a*long Caltrain Corridor, San Francisco to San Jose

Magnetic field strength will vary depending upon electrical loads. Although the field measurements along the Caltrain alignment were made on a Sunday, to avoid conflicts with commute-hour train operations, the low fields observed would not be expected to increase substantially on a heavy load weekday. The broadband fields measured in the Caltrain corridor do not exceed those found in other urban and suburban environments. The magnetic fields in the Caltrain corridor were found to be “consistent with those found in residential and occupational environments that are not associated with high-voltage or high-current equipment” (*E*xponent Health Group, 2001).

3.17.1.3 Regulatory Setting

Neither the federal government nor State of California *has* set emission standards for EMF. The Federal Drug Administration, Federal Communications Commission, Department of Defense, and *EPA* at various times have considered guidelines, but none ha*ve* yet been adopted. The California Energy Commission (CEC) recommends that transmission lines be designed so electric fields at the edge of right-of-way do not exceed 1.6 kV/meter; no recommendation is provided for magnetic fields, however. The CEC's current position is that EMF exposure at utility right-of-way limits should not constitute a significant effect "if emissions have been mitigated to the extent achieved by engineering practice" *(Instructions to the California Energy Commission Staff for the Review of and Information Requirements for an Application for Certification*, California Energy Commission, 1992, as cited in Exponent *Health Group*, 2001). 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.

Two states and several countries do have emission standards for EMF exposures. New York has set limits of 1.6 kV/meter for electric field strength and 150 mG for magnetic field strength at the edge of right-of-way for new transmission lines. Florida has limits of 2 kV/meter and 150 mG. These standards are not based upon demonstrated effects of EMF on human health.

Various organizations and technical groups have recommended "whole-body occupational" and "public exposure" limits for 60-Hz electric and magnetic fields, from any source, as precautionary measures to protect public health. These limits[33], which are upper bounds for daily (whole workday) exposures, range from:

	Electric Field	Magnetic Field
Occupational Limits	8.3 to 12 kV/m	4.2 to 16 G
General Public Limits	4.2 to 12 kV/m	0.83 to 16 G

As with the limits for transmission lines, these exposures are not based upon demonstrated health effects.

3.17.1.4 EMF Health Effects

Considerable research has been undertaken to determine whether EMF at the low frequencies associated with commercial power systems has any health effects. Although some findings *conclude otherwise*, the great majority of peer-reviewed and accepted studies have concluded that scientific evidence for any health risks from extremely low-frequency EMF is weak. Objective scientific reviews of animal data, from which some human health risks have been extrapolated, have also concluded that the data are inadequate to indicate a potential risk of cancer, *which is* the main human health risk assumed for EMF exposure.

One area of continuing debate has been associations of two forms of cancer and extended exposures to EMF: childhood leukemia and, in occupationally exposed adults, chronic lymphocytic leukemia. The associations between cancer and EMF, however, have not been

[33] The lower limits in each classification are guidelines of the International Committee for Non-ionizing Radiation Protection (1998), while the upper limits are guidelines promulgated by the National Radiation Protection Board (1993). Other groups have established similar limits but within the listed ranges.

demonstrated in scientifically controlled mechanistic (cause-effect) studies or experimental studies of animals. The most recent study to conclude preliminarily that an association – although weak but nonetheless potentially detrimental and therefore to be avoided – exists between EMF and childhood leukemia was performed for the California EMF Program of the Department of Health Services. Its conclusions differ from others reviewing the same data. The study *does not include* policy recommendations.

3.17.2 IMPACTS

3.17.2.1 No-Electrification Alternative

The No-Electrification Alternative does not include new electrical power facilities or operations to the existing Caltrain corridor; Caltrain operations would remain diesel-powered. No impacts from EMF are anticipated with the No-Electrification Alternative.

3.17.2.2 Electrification Program Alternative

Electrification of Caltrain operations would likely increase the level of EMF along the corridor from San Francisco to *San Jose*. The electric and magnetic fields generated near the tracks would increase the background levels described in Section 3.17.2*; however, because electric and magnetic fields are vectors,* the *increase in background levels* would not be strictly additive. Because EMF field strength, its variation, and the duration of maximum exposure are critical variables in assessing the potential for adverse impacts (radiation at high levels is acknowledged to have health effects or at least a greater potential for health effects than radiation at low levels), it is important to establish the EMF characteristics of electrified commuter rail operations.

Two approaches were followed to establish EMF levels in the electrified Caltrain corridor. The first estimated average and maximum fields, measured in terms of mG, by examining the performance of two other relevant systems: Amtrak's electrified Northeast Corridor (NEC) service, which extends from Washington, D.C. to Boston, and France's Train A Grande Vitesse (TGV) system, which provides electrified high-speed intercity rail service centered on Paris.

The second approach involved modeling and calculating EMF fields at critical, maximum load points along the Caltrain corridor under electrification conditions. The proposed design for the system near major substations was incorporated into a model of two- and four-track electrified operations. The system was simulated with peak and off-peak trains drawing power from the OCS and power supply network. EMF field strengths were estimated over an alignment cross-section extending 58 feet beyond the centerline of the outside track. This yielded a profile of potential EMF exposures both within and alongside the railroad right-of-way. The maximum calculated EMF represented a worst case situation for EMF exposure through the entire corridor.

Table 3.17-3 summarizes the measured EMF field strengths for the NEC and TGV systems and the calculated field strengths for electrified Caltrain at two general locations: on-board coaches/passenger cars and along the railroad right-of-way. Onboard passenger cars, average

EMF fields for the NEC and TGV were measured at 52 mG and 31 mG, respectively. EMF fields within the passenger coaches were not estimated for Caltrain since new vehicle specifications are yet to be finalized. Maximum field strength, experienced when a vehicle is accelerating rapidly and/or operating a dense, multi-train track segment, was found to be several times the average EMF exposure, varying from 165 mG on TGV trains to 305 mG on NEC trains. It is assumed these average and maximum values would bracket the EMF field strengths generated in Caltrain passenger cars operating on an electrified system.

Wayside EMF exposure levels would vary by proximity to the outside track's centerline. The field strengths for the NEC of 3 mG average and 21.7 mG maximum were measured at approximately 58 feet from the track. This approximates where public access points and occupied structures would be located. The calculated values for Caltrain are at a similar distance, with the maximum EMF exposure estimated to be less than that for the NEC. TGV values for locations just outside of the railroad right-of-way are very close to those for the NEC.

Table 3.17-3: EMF Field Strength of Caltrain and Related Electrified Rail Transportation System

Location	Magnetic Field Strength in milliGauss (mG)					
	Amtrak NEC[1]		Caltrain Elect.[1]		French TGV[2]	
	Avg.	Max	Off-Peak	Max	Avg.	Max
Passenger Coach [3]	52	305	NA	NA	31	165
Wayside—Outside Track right-of-way[4]	3.4	21.7	1.9 – 4.5	11.4	1.7 – 7.2	8.7 – 24.0
--Edge of right-of-way[5]	NA	NA	4 – 11	35 – 41	NA	NA
--Overpass	NA	NA	NA	NA	118	467

[1] Amtrak Northeast Corridor is a 25kV, 60 Hz AC system, the same as the proposed electrified Caltrain system. NEC values are field measurements. Caltrain values are calculated for worst case/maximum traffic line segment.

[2] The French Train A Grande Vitesse (TGV) measurements apply 50 Hz AC powered segments, with power supply via a 24kV network.

[3] Measurements typically represent field strength several feet above car floor and where passengers stand.

[4] On NEC and Caltrain, measurements or calculations were made 58 ft. (four tracks) from the electrified track centerline. This represents approximately where structures might be located or where there are public rights-of-way.

[5] For Caltrain, this is the calculated field strength at the right-of-way line, approximately 15 ft. from the track.

Source: Amtrak NEC and Caltrain Electrification data from *Exponent Health Group*, 2001; TGV data from Federal Railroad Administration, 1993.

The surveys of France's TGV also measured EMF fields immediately above the track right-of-way on a railroad overpass, and found relatively high exposures. These exposures would be encountered infrequently and for short durations. The Caltrain calculations also include estimated exposures at the right-of-way limit. The higher values at the edge of right-of-way, which would be expected since that location is closer to the source of electric current (OCS), are about three times the field strength at 58 feet from centerline.

Not shown in table 3.17-3 are measured exposures on the TGV systems for other locations along the alignment where passengers or workers could frequent. These include passenger stations, where average magnetic field strength was 5.9 mG and maximum field strength was 43.8 mG; onboard locomotives, where the average was 87 mG and the maximum was 367 mG; and at the perimeter of electrical substations, where the average was 5.0 mG and the maximum was 9.0 mG.

With the possible exception of passenger coach or TGV electric locomotive interiors, the average field strengths for all three systems are not much higher than observed background EMF levels along the existing non-electrified Caltrain corridor.

The EMF exposure for passengers onboard electrified Caltrain trains would be considerably higher than background levels but the duration of exposure would be limited to the in-vehicle travel time. Also, these average and maximum exposures would still be less than individuals experience from many home appliances.

In October 2006, the FRA released the report "EMF Monitoring on Amtrak's Northeast Corridor (NEC): Post-Electrification Measurements and Analysis" detailing the effects of that project's electrification. Amtrak's NEC is a 25-kV, 60-Hz ac system, the same as the proposed Electrification Program Alternative; therefore, it is reasonable to assume that the effects of NEC's electrification would be similar to the potential effects of this proposed project. Table 3.17-4 summarizes the measured EMF field strengths for several systems, including detailed measurements taken within the Amtrak NEC. Measurements were taken in proximity to traction power stations, nearby to the tracks during train passbys, and inside passenger compartments.

As shown in Table 3.17-3, post-electrification EMF measurements nearby to traction power stations were substantially higher than the pre-electrification values; the same is true for the electric field measurements. When compared with the established public health exposure standards, however, the measured post-electrification values were far below those exposure limits, on the order of one percent or less. Magnetic field measurements associated with train passbys or inside passenger compartments were an order of magnitude less than the traction power station values. As shown in the table, expected exposure of the general public to magnetic fields produced by electrified train operation is well below established exposure limits and is comparable to typical household appliances.

In summary and in light of the recent NEC Post-Electrification Report, the EMF environment resulting from the Electrification Program Alternative would have field levels similar to those of household electrical appliances. The EMF fields from electrified Caltrain operations would be highest only during peak revenue operations, lessening during lower volume periods to become nominal during the late night when train service is discontinued and/or only line maintenance is proceeding. The field strengths are well below the ranges subject to scientific studies that have determined there is no discernible link between low frequency EMF and human health effects. For these reasons, there would be minimal or no associated health risks from the electrified Caltrain operations. The California Department of Education "prudent avoidance" policy was consulted and the proposed project is in *accordance with this policy, in that evidence of potential health risk has been assessed and considered in the context of costs and benefits of the proposed project.*

Table 3.17-3 Measured Magnetic and Electric Field Values - Amtrak Northeast Corridor [1]			
Magnetic Field Measurements Proximate to Traction Power Stations [2] *(0-3,000 Hz; expressed in milligauss - mG)*			
	Minimum	***Maximum***	***Average***
Pre-Electrification Measurements	*0.0*	*12.9*	*1.6*
Post-Electrification Measurements	*0.1*	*110.3*	*14.7*
Electric Field Measurements Proximate to Traction Power Stations [2] *(0-3,000 Hz; expressed in milligauss - mG)*			
	Minimum	***Maximum***	***Average***
Pre-Electrification Measurements	*0*	*106*	*11.2*
Post-Electrification Measurements	*0*	*744*	*136.4*
Magnetic Field Measurements at Three Distances from Five Electrified Train Pass-Bys *(0-3,000 Hz; expressed in milligauss - mG)*			
	Distances		
	5 m (16.5 ft)	***10 m (33.0 ft)***	***15 m (49.5 ft)***
Minimum	*25*	*3*	*negligible*
Maximum	*84*	*25*	*7*
Average	*54.4*	*11.4*	*2.0*
Magnetic Field Measurements within Passenger Compartments [3] *(expressed in milligauss - mG)*			
	Position		
	Head	***Waist***	***Ankle***
Average Values (2 - 3,000 Hz)	*19.2*	*18.4*	*19.1*
Magnetic Field values from Typical Household Appliances (measured at a distance of one foot; expressed in milligauss – mG)			
	60 Hz		
Dishwasher	*4*		
Vacuum Cleaner	*200*		
Hair Dryer	*80*		
Power Drill	*60*		
Electric Shaver	*100*		
Video Display	*6*		

[1] Data collected as part of Post-Electrification Measurement & Analysis study, for electrified portion of Northeast corridor extending from New Haven, Connecticut to Boston, Massachusetts.
[2] Long-term measurements taken at 10 traction power station locations.
[3] Measurements averaged from seven train systems operating along Northeast Corridor.
Source: USDOT / FRA; 2006.

3.17.3 MITIGATION

The Electrification Program Alternative as part of its basic design would incorporate measures to reduce potential EMF exposures by reducing emissions of magnetic fields. The *ATF* system selected for electrification generally reduces magnetic field strength by minimizing current flow for train operations. The phasing of current flow is also more favorable to canceling out, or reducing, EMF fields. These measures would help reduce the potential for EMF exposure.

Because modeled field strength and EMF impacts are estimated to be minimal, no mitigation measures are *required*.

3.17.4 ELECTROMAGNETIC INTERFERENCE (EMI)

3.17.4.1 Setting

Another concern of EMF generation is the potential interference to other electromagnetic systems, including the Caltrain signal system, that can result when new or more intense sources of radiation are introduced into the environment. These effects are better understood and well documented. EMI may include the 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.

The main sources, or generators, of transient EMI disturbances from electrification would be switching currents produced by switching loads, relays, power controllers, and switch mode power supplies. High-current electronic switches and more controls are capable of producing transient signals that can be transmitted along the power supply network to other electronic systems.

The potential for EMI effects from the Electrification Program Alternative can be minimized by ensuring that all electronic equipment is operated with a good electrical ground and that proper shielding is provided for electronic system cords, cables, and peripherals. Installing specialized components, such as filters, capacitors, and inductors, can also reduce EMI susceptibility of certain systems. The design of the system would consider and incorporate, where practicable, the latest standards relevant to minimizing the effects of EMI to other systems, including the Caltrain signal system. The *ATF* system selected for electric power distribution results in lower electric fields and generally lower magnetic fields within and adjacent to the railroad right-of-way compared to other power distribution systems. This would also help minimize EMI effects.

No additional restrictions or protective measures for EMI effects attributable to the Electrification Program Alternative would be warranted.

3.17.4.2 Impacts

There would be no significant EMI impacts due to the Proposed Action.

3.17.4.3 Mitigation

Adverse EMI impacts would not occur due to the Proposed Action; therefore no mitigation is required.

3.18 CUMULATIVE IMPACTS

NEPA defines cumulative impact as "the impact…which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." CEQA defines cumulative impacts as "two or more individual effects which, when considered together are considerable," and suggests that cumulative impacts may "result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355). NEPA includes cumulative impacts within the scope of impacts to be considered in an environmental document. CEQA documents are required to include a discussion of potential cumulative effects *when those effects are significant*, and the State CEQA Guidelines suggest two possible methods for assessing potential cumulative effects (State CEQA Guidelines Section 15130). The first method is a list-based approach, which considers a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts. The second method is projections-based, and uses a summary of projections contained in an adopted general plan or related planning document that is designed to evaluate regional or areawide conditions.

While the use of regional projections is one possible method of analyzing cumulative effects under CEQA, it is the required method under NEPA. FTA guidelines require that regional growth projections from the *MPO* (MTC in this case) be used as input for the assumed future year conditions.

The San Francisco County Transportation Authority (SFCTA) countywide travel demand forecasting model (SFCTA Model) was used to develop the travel forecasts for development and growth through the year *2035* in the region. The most up-to-date version of the SFCTA Model estimates future traffic and transit travel demand for the entire nine-county Bay Area region based on land use and employment forecasts prepared by the San Francisco Planning Department for the county, plus regional growth estimates developed and adopted by ABAG in *2007* (Projections *2007*) for the remainder of the Bay Area region.

3.18.1 REGIONAL CONTEXT

Because this document is based on accepted, regional land use forecasts for *2035*, and assumes transportation improvements programmed within the same time frame, effects evaluated with the project include the cumulative effects of development within the region. Thus, additional analysis of potential cumulative effects related to specific development and transportation improvement projects within the region is not necessary. Impact categories for which the project effects presented in Chapter 3 already present such cumulative conditions include land use, transportation (including traffic and transit), air quality, *EMF* radiation and interference, and noise.

3.18.2 LOCAL CONTEXT

Cumulative effects are not always regional in scope, and the current project was analyzed to determine whether less than significant environmental effects that would be experienced locally could become significant when considered in combination with other reasonably foreseeable future projects in the project area. Reasonably foreseeable future projects are here defined as the projects assumed in the 20*35* No-Electrificat*i*on Alternative described in Section 2.3.1, *The* No-Electrification (No-Project*/No Action*) Alternative and the other related projects described in Section 1.3, Other Related Projects.

Impact issues considered in this context include aesthetics, takings of agricultural land, impacts to biological resources, impacts to cultural resources, contributions to incompatible development in the floodplain, and environmental justice. The air quality and noise impacts of the Electrification Program are beneficial both locally and regionwide. Thus, the project would contribute to an overall reduction in cumulative effects for these categories (see Sections 3.3, Air Quality, and 3.11, Noise and Vibration).

3.18.2.1 Aesthetics

The Caltrain Elect*r*ification Program would introduce OCS poles and wires, *trim trees that lean or hang into the CPUC required safety clearance for train operations,* and *construct* traction power facilities within various locations on the San Francisco Peninsula, an urbanized area comprising the full complement of urban land uses. Other projects contributing new transportation facilities within these areas include *T-Third Light Rail Project, Phase 2;* the Dumbarton Rail Corridor; and the Vasona Light Rail *Line, Phase 2*. Each of these related projects would introduce new visual elements relating to rail trackage and right-of-way protection, such as station facilities, OCS poles and wires, traction power, and maintenance facilities. These facilities would be built for the most part in the most highly urbanized portions of the three-county area, and *they* would be similar to transportation facilities that are familiar elements of the urban scene. The Caltrain Electrification Program's visual elements would be limited to the areas of the Caltrain corridor and the proposed traction power facility sites. The combined facilities of these various projects would not constitute a considerable impact when considered in *the* context of all of the other present and future development in this broad and continually growing area.

3.18.2.2 Takings of Agricultural Land

The Caltrain Electrification Program would not require the conversion of *any* agricultural land to transportation uses. Based on the environmental documents for these projects, the *T-Third Light Rail and Dumbarton Rail Corridor projects* would not require conversion of agricultural land, and the Vasona Light Rail project *would* take only a very minimal amount of agricultural land. The area from San Francisco to San Jose wherein the majority of these project facilities are being implemented has long ago converted its historical agricultural land to urban *uses*, and none of the general or land use plans in the local jurisdictions advocate retention of agricultural land uses in the vicinity of the proposed transit improvements. Nearly all of the jurisdictions throughout the corridor, however, advocate improvements in transit services and ridership to decrease corridor dependence on the automobile, with its related congestion, air quality, and noise effects. The combined impact in takings of agricultural land is not considered an adverse cumulative effect.

3.18.2.3 Impacts to Biological Resources

The Caltrain Electrification Program would have no impacts to jurisdictional areas or habitat for special-status species*, nor would the trimming of large trees on adjacent private property to meet CPUC safety requirements*. *Given these considerations, electrification* would not contribute to cumulative effects on biological resources.

3.18.2.4 Impacts to Cultural Resources

The Caltrain Electrification Program is not expected to have any adverse effect on identified historic resources within the *APE* for the project facilities. Mitigation measures are proposed to avoid effects to archaeological resources. Tunnels 1 and 2 have been designated by the San Francisco Landmarks Commission as contributors to the proposed Dogpatch local historic district, but crown mining of these tunnels (required for Tunnel 4) would not affect the status of these resources within the district or the district as a whole. Thus, the Caltrain project would not contribute to cumulative adverse effects on cultural resources.

3.18.2.5 Contributions to Incompatible Development in the Floodplain

The Caltrain corridor, like other transportation system facilities along the San Francisco Peninsula and Santa Clara County, passes through areas of 100-year floodplain. Improvements to the Caltrain system and other transit and highway facilities in the general area, including the *Dumbarton Rail Corridor* and Vasona Rail Corridor projects, will include encroachments in the historic floodplain. There is no increased flood risk to riders of these systems, because each project will incorporate the necessary drainage facilities to ensure safe system operations. Although these various projects would improve travel opportunities within and among the three counties, they would not provide access to new floodplain areas or areas currently not served by transportation or give rise to incompatible development within the floodplain. The three counties are already well developed, and Santa Clara is rapidly growing. Factors affecting location decisions, such as the availability of employment and affordable housing, are the dominant influences on further growth in the area.

3.18.2.6 Environmental Justice

The *beneficial and adverse* effects of the Electrification Program would be shared by all residents living directly adjacent to the Caltrain alignment or Caltrain stations. Demographic analysis reveals that low-income, transit-dependent, and ethnic minority population groups, as well as more affluent majority population groups live along the Caltrain corridor; *hence*, there would be no disproportionate aesthetic effects on disadvantaged groups. Improvements in Caltrain service and reductions in air and noise emissions of diesel engines would similarly be enjoyed by all population groups within the corridor. The Peninsula Corridor and Santa Clara *County* areas in which the related *T-Third*, Vasona, and Dumbarton projects would be implemented are similarly diverse. The benefits of improved transportation system services would outweigh the adverse effects of these projects. No disproportionate effects on low-income, minority, or transit-dependent groups are highlighted; indeed, the improved services on all three systems would benefit transit-dependent individuals.

3.19 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The No-Electrification Alternative would involve the use of resources and assumes implementation of *the State of Good Repair Program as* described in Section 2.3.1 (*The* No-Electrification *[No-Project/No-Action]* Alternative). The Caltrain Electrification Program would involve *installation of* the *OCS* and traction power facilities along the *51*-mile *project* corridor, which would require money, materials, and labor, as shown in Tables 2.3-*4, 2.3-6 through 2.3-8, 2.3-10, and 2.3-11*. Total capital costs of the electrification program are estimated to be approximately $*1,225* million *in year-of-expenditure dollars,* assuming electrified operations would begin in *2015*.

Although both the No-Electrification and Electrification Program alternatives would require energy to power Caltrain locomotives, the Electrification Program Alternative would use less energy for vehicle propulsion. An energy analysis was conducted, as described in Section 3.10, which compared the energy required for train propulsion under the two alternatives. The electrification options were found to consume *less than one-third* of the energy (measured in BTUs) consumed by *the* No-Electrification Alternative. The difference in energy consumption can be attributed to the relative efficiency of electric-powered vehicles and the relative inefficiency of diesel-powered vehicles.

Permanent visual alterations would result from the Electrification Program Alternative, comprising the introduction of poles and wires, and *TPS*s. Additionally, some trees and mature vegetation would be trimmed back and may require some removal of trees *within the Caltrain right-of-way* to enable placement of the poles and wires. As documented in Section 3.1.2, these physical changes would alter views from residential or business areas in various locations along the corridor, but they would not introduce visual elements that are substantially out of character with existing land uses or obscure a scenic view or vista. Head spans will be used to lighten the visual effect of overhead elements in sensitive areas, including all historic stations. *The* JPB will develop design guidelines in coordination with local jurisdictions.

The Electrification Program Alternative would introduce a new source of EMF along the project alignment. As detailed in Section 3.17.3, the electrification program would likely increase the level of EMF along the perimeter of the Caltrain right-of-way, and at locations that passengers and workers frequent, such as passenger stations, on-board passenger coaches and locomotives, and at the perimeter of electrical substations. The EMF environment resulting from the Caltrain Electrification Program would have field levels similar to those in the vicinity of moderate voltage utility transmission and distribution lines, but unlike the utility environment, the EMF fields from electrified Caltrain operations would be highest only during peak revenue operations, lessening during lower volume periods to become nominal during the late night when train service is discontinued and/or only line maintenance is proceeding. The field strengths are within the ranges subject to scientific studies that have determined there is no discernible link of low-frequency EMF and human health effects. For these reasons, there would be minimal or no associated health risks from the electrified Caltrain operations.

3.20 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Electrification Program Alternative would involve short-term uses of the environment during the construction period through the use of fuel and construction materials, temporary increases in noise levels and air pollutants, stormwater runoff from construction sites, and increased truck traffic around the sites of *TPS*s. These short-term effects and uses of resources would result in long-term benefits, such as improved travel times within the project corridor *and* a corresponding increase in transit ridership, as well as reductions in noise and vibration associated with diesel train service, reduced long-term energy demand for train propulsion, and localized improvements in air quality due to discontinuation of diesel locomotives. *Electrification also makes it possible to improve efficiency of passenger travel along the corridor by adding one train per direction in the peak hour without altering the fixed facilities or trackage.* These improvements would contribute to the long-term livability, and therefore productivity, of the region.

Chapter 4: Temporary Effects during Construction

CHAPTER 4: TEMPORARY EFFECTS DURING CONSTRUCTION

4.1 CONSTRUCTION STAGING AND METHODS

Construction activities for the Electrification Program Alternative would consist of the installation of OCS poles and wires; the construction of *TPS*s, switching stations, and paralleling stations; the installation of pantograph inspection platforms; and the erection of overbridge protection barriers on roadway bridges that cross the Caltrain alignment. Installation of wiring and storage tracks within the Central Equipment Maintenance Operations Facility at the Lenzen Yard are also included.

The following paragraphs describe construction activities and staging for these facilities.

4.1.1 CONSTRUCTION OPERATIONS

4.1.1.1 Overhead Contact System Installation

Construction of the electrification infrastructure from San Francisco to *San Jose* would take approximately *3* years and would occur at different locations during different periods.

Pole foundations would be excavated by means of *3*-foot-diameter augers, and the soil would be removed to a depth of approximately 15 feet. Alternately, a steel casing would be vibrated into place by ultrasonic vibrators. The casing would be sunk to the full 15-foot depth, and soil would be excavated to a depth of only *5* to *7* feet to place the pole foundation. This latter procedure would be used in areas that are close to drainages paralleling the rail corridor to reduce impacts to the drainage banks and vegetation, or in areas where there is potential for encountering contaminated soils or groundwater.

Spoils resulting from the excavations for OCS pole foundations would be relatively small in quantity. These spoils would be disposed of by spreading them along the railroad right-of-way in the vicinity of the excavation. Any spoils found to be contaminated with hazardous waste would not be spread within the right-of-way; the disposal of such material is addressed in Section 3.7 (Hazardous Waste *and Materials*).

Construction would typically occur along *1*- to *2*-mile sections of the route and would involve several “passes” per track. One pass would install the foundations, a second would place the poles, and another would install the feeder wires and support arms; these would then be followed by additional passes for installation of the messenger and contact wires. The final pass would involve a system check to ensure proper installation. This sequence is consecutive; however, construction could occur in several segments simultaneously, with different activities occurring at any or all of those locations.

The construction equipment required for these operations may include hi-rail tandem axle trucks or flatcars, on which would be mounted various items of construction equipment. These may include auger/drill rigs, concrete batch plants, ultrasonic vibratory pile drivers, 15-ton cranes, and telescoping boom bucket trucks. There would be other support vehicles, many of which would be fitted with hi-rail equipment, since the primary access to the construction sites for the catenary system would be from the tracks.

The track windows required for the installation of the OCS poles and foundations would be different from those required for other tasks, depending upon whether there is off-track access for the contractor to perform the construction, or whether there are natural resources or the potential for archaeological resources in the immediate vicinity. Off-track work is best for minimizing impacts to train operations, but on-track work may be preferable where feasible to avoid impacts to sensitive resources. Based upon the current and planned track alignment, *approximately* 20 to 30 percent of the poles and foundations (1,600 to 2,400 total poles/foundations) could be installed with off-track equipment and with minimal impact to train operations. The remaining 70 to 80 percent (some 5,600 to 6,400 poles/foundations) would be installed with on-track equipment, requiring single-track access work windows. This work would need to be performed during off-peak operations such as:

9:00 a.m. to 2:30 p.m., Monday through Friday
5:00 a.m. to 5:00 p.m., Saturday and Sunday

These construction windows would take advantage of the improved single-tracking capabilities afforded by the new CTC signaling system and remotely controlled crossovers, and *they* would enable this work to be carried out during daylight hours. The CTC system will be installed under the Caltrain Express (CTX) capital improvement project.

The windows for the installation of the OCS conductors, such as static wires, parallel feeders, and messenger and contact wires, would use on-track equipment and require nighttime and weekend track occupancies, including weekend outages that would require total suspension of passenger revenue service. These track windows would also take advantage of the improved single-tracking capabilities with the new CTC signaling system and remotely controlled cross-overs, but *they* would require some multiple track shutdowns to install the OCS conductors at the complex interlockings. The majority of such OCS wirework would need to be accomplished during the nighttime using single-track windows, but some portions of the work could *only* be installed by using complete weekend outages, requiring suspension of passenger service to increase working efficiency and reduce public safety risks. Typical work windows for on-track equipment *would* be:

10:00 p.m. to 5:00 a.m., Sunday through Thursday
10:00 p.m. to 7:00 a.m., Friday and Saturday
5:00 a.m. to 5:00 p.m., Saturday and Sunday

4.1.1.2 Overbridge Protection Barriers

Bridge barrier installation would consist generally of installing prefabricated components onto the existing parapets of the overhead bridges that traverse the Caltrain Corridor. Work crews would install anchor bolts into the existing bridge structure and then mount the bridge barrier. Equipment used would typically be pickups, dump trucks, and flatbed trucks. *The JPB would coordinate with Caltrans to obtain the required permit approvals for barriers on State roadways.*

The installation of overbridge protection barriers would occur almost entirely with the use of off-track equipment. Any work requiring the use of on-track equipment would be minimal and would be coordinated with the on-track window requirements for OCS wire installation.

4.1.1.3 Substation, Switching, and Paralleling Stations and Lay-Down Area

The sites proposed for the location of Caltrain electrification substations, switching stations, and paralleling stations are presently in industrial or *open space* areas, transportation use, or proximate to existing high-voltage facilities; see Section 3.9, Land Use and Planning, for evaluation of the use of these sites. Site preparation would include clearing, grubbing, and grading with bulldozers and dump trucks. *Site access* would be prepared concurrently with the site operations. Schedule duration for this activity would vary from site to site, but would generally take less than *3* months.

A ground grid composed of copper wire and driven ground rods, which is necessary for the protection of personnel and equipment during operation of the electrical systems, would be placed below each traction power facility at a depth of *approximately 3* feet and then covered by fill.

Interconnections between electrical equipment would be accomplished in part by raceways contained in concrete encased conduits (duct banks). These duct banks would be installed as follows:

- *D*ig a *4*-foot-deep trench with backhoe,
- *C*onstruct forms as necessary (plywood and 2x4s),
- *A*rrange conduits per design plans,
- *P*our encasement concrete, and
- *R*emove forms and backfill with soil.

Concrete foundations would be required for the mounting of freestanding electrical transformers, circuit breakers, and disconnect switches, as well as for the prefabricated control and medium voltage switchgear building. Foundations would generally be constructed as follows:

- *W*ith bulldozer and backhoe, dig to bottom grade per design plan,
- *C*onstruct forms as necessary (plywood and 2x4s),
- *A*rrange reinforcing steel, anchor bolts, grounding connections, and conduits (extensions of duct banks) as required per design plans,
- *P*our concrete, and
- *S*trip forms and backfill.

Electrical equipment to be installed would include outdoor high-voltage switches, transformers, and cables, as well as the prefabricated control and switchgear room. Some of the equipment would be mounted on small steel structures. Equipment weights range from several hundred pounds to 100,000 pounds*;* therefore, the installation rigs would range from small truck-mounted cranes to larger track-mounted units. The equipment would be electrically connected together by cable or by buss (open air copper or aluminum tubes). Small truck-mounted cranes would be used to move and arrange the reels of cable and to support buss work during installation.

The primary service from the local utility network would be via either underground or overhead transmission lines. The installation would be either through duct banks or via direct connections to the transmission lines. Station sites would typically be finished with fencing along the entire periphery. Ground surfaces would be covered with clean crushed rock.

The electrical system would be tested prior to initiation of electrified train operations. Testing would be in two main phases, the first being with no power to verify that the installation complies with the design, the second being with the system energized to verify performance and to adjust system protective devices.

The installation of the substation, switching, and paralleling stations would be done with off-track equipment. The work window requirements for constructing the interface facilities to the OCS conductors would be coordinated with the installation of the OCS wires.

4.1.2 CONSTRUCTION SCHEDULE

The activities described above are not sequential; construction could occur simultaneously at several locations.

Figure 4.1-1 shows an estimated schedule for construction of the Electrification Program Alternative.

4.2 CONSTRUCTION-PHASE IMPACTS

The following sections describe anticipated construction-phase impacts of the Electrification Program Alternative and propose avoidance, *minimization*, and mitigation measures wherever practical. Under the No-Electrification Alternative, Caltrain would continue diesel train operations in the existing, active commuter and freight rail corridor, and there would be no need to construct electrification facilities within or along the right-of-way*; t*herefore, the No-Electrification Alternative would not have construction-phase impacts. The No-Electrification Alternative is *referred to as either the No-Action or* No-Project Alternative for NEPA and CEQA, *respectively*. The rest of this section focuses on and discusses construction phase impacts and mitigation measures for the Electrification Program Alternative.

Figure 4.1-*1*: Estimated Construction Phasing for Caltrain Electrification Program Alternative

Activity	Est. Duration (Mon*ths*.)	Year 1: Mos. 1-6 *	Year 1: Mos. 7-12	Year 2: Mos. 13-18	Year 2: Mos. 19-24	Year 3: Mos. 25-30	Year 3: Mos. 31-36	Year 4: Mos. 37-42	Year 4: Mos. 43-48
Traction Power Stations									
Clearing and Grading	3-6								
Construct Power Station Access Roads, if needed	3-6								
Install Ground Grid	3-6								
Construct Foundations	3-6								
Install Electrical Equipment	6-15								
Provide Electrical Equipment Interconnections	3-6								
Perform Testing	3-6								
OCS Poles and Wires									
Construct Foundations	6-18								
Place Poles	6-15								
Install Feeder Wires Support and Arms	6-15								
Install Messenger and Contact Wires	6-15								
Perform System Check	3-6								
Overbridge Barriers									
Anchor Bolt and Mount Prefabricated Barrier	12								
Rolling Stock Manufacturing and *Commissioning*									
Commissioning	6-9								
Manufacture *Electric Vehicles*	30-36								
Pre-Revenue Testing	6-9								

* Preparing contract documents, procurement, and award.

4.2.1 AESTHETICS

Project construction would be multi-phased and would occur in different locations at different times. All construction activities, whether for OCS poles and wires or traction power facilities, would involve the use of a variety of construction equipment, stockpiling of soils and materials, and other visual signs of construction. While evidence of construction activity would be noticeable to area residents and others in the vicinity, such visual disruptions would be short-term and are a common and accepted feature of the urban environment. Work would be conducted during off-peak periods and on weekends to minimize disruption to commuter train service. Some construction would be accomplished at night. The JPB would require the project contractor to ensure that construction crews working at night direct any artificial lighting onto the worksite, to minimize “spill over” light or glare in adjacent residential areas. *Tree trimming needed to provide safe clearance for electrified train operations in accordance with CPUC requirements is discussed in Section 3.1.2, Aesthetic Impacts, and Section 3.4.2, Biological Resources Impacts.*

4.2.2 AIR QUALITY

4.2.2.1 Impacts

Construction of the Electrification Program Alternative has limited potential to generate air quality impacts, as it would involve only erection of poles and wires within the Caltrain right-of-way, plus the construction of substations at *10* nearby locations. The majority of the construction activities would be within or adjacent to existing transportation corridors, industrial, or *open space* areas. *Three (3)* of the substations would be constructed in residential areas.

During the construction phase of the Electrification Program Alternative, *NO_2*, *CO*, hydrocarbons, oxides of sulfur, and particulate matter would be emitted from construction equipment and exhausts of workers’ vehicles. Additional dispersion of particulate matter would occur through grading and vehicular travel on unpaved areas. These impacts would all be of temporary duration and would cease *when* construction *is* completed.

4.2.2.2 Mitigation

All traffic mitigation measures identified in Section 4.2.11, Transportation Effects during Construction, *will* be implemented to reduce congestion and resultant localized CO concentrations. B*MP*s, including dust control measures such as watering and covering materials hauled in trucks, will be used during construction to minimize fugitive dust. Construction *documents will include a provision that construction* equipment *shall* be tuned and maintained in good working condition to minimize emissions of criteria pollutants and particulates.

4.2.3 BIOLOGICAL RESOURCES

4.2.3.1 Impacts

Temporary impacts to natural resources from construction activities typically include air pollution from dust and construction equipment, increased runoff and soil erosion, and construction noise. Construction activities and related impacts may disturb *habitat* of California red-legged frog, San Francisco garter snake, and Monarch butterfly, and nesting behavior of several swallow species. Preconstruction surveys are recommended for these species to ensure that no incidental take of the species would occur. All sensitive habitat and wetland areas would be identified for avoidance during project design.

4.2.3.2 *Mitigation*

Short-term construction impacts to trees and other mature vegetation *will* be minimized by trimming trees *in accordance with arboricultural industry recommended practices*. *A Vegetation Management Plan will be developed to minimize impacts to trees and other mature vegetation (see Section 3.4.3 for details of the Plan).*

To minimize effects to special-status species and protected habitats, a Biological Resources Management and Mitigation Plan will be developed in coordination with a professional biologist during final design, and will include B*MP*s as identified in the SWPPP described in Section 4.2.6. The following preven*ta*tive measures would adequately address construction-related impacts to wetland areas and special-status species. These measures will be reviewed by all agencies involved, including USFWS, CDFG, and ACOE.

- Precautions to prevent pollution of streams, waterways, and other bodies of water during construction;
- Dust control through watering of appropriate surfaces;
- Clearing and grubbing procedures that specify that only trees and plants designated for removal shall be removed;
- Excavation techniques to ensure the stability of subsurface materials as well as retention of excavated materials within the construction areas;
- Materials and fluids generated by construction activities *will* be placed at least 30 m*eters* (100 f*ee*t) from wetland areas or drainages until they could be disposed of at a permitted site; and
- All natural communities and wetland areas located outside the construction zone that could be affected by construction activities will be temporarily fenced off and designated Environmentally Sensitive Area(s) (ESAs) to prevent accidental intrusion by workers and equipment.

The Biological Resources Management and Mitigation Plan will also include the following measures to minimize effects on special-status species:

California Red-legged Frog and San Francisco Garter Snake

- All potential California red-legged frog and San Francisco garter snake habitat that can be avoided by construction activities shall be flagged by a USFWS-approved biologist prior to grading or other construction activities. All California red-legged frog and San Francisco garter snake habitat will be protected by a 3-meter (10-foot) buffer with exclusionary fencing to make it easily avoided by construction crews.
- A Worker Environmental Awareness Training Program for construction personnel shall be conducted by the JPB. The program will provide workers with information on their responsibilities with regard to the federally listed, threatened California red-legged frog and federally and state-listed endangered San Francisco garter snake.
- The construction site shall be monitored by a qualified and federally permitted biologist during all phases of construction to remove any California red-legged frogs and San Francisco garter snakes found in the construction area. Individual frogs and snakes shall be moved immediately to a site that is a minimum of 100 meters from the construction boundary. The relocation site shall be determined prior to commencement of construction activities.
- Construction activities near drainages identified as potential migration corridors shall take place between May 15 and October 31 when the California red-legged frog and San Francisco garter snake are least likely to be present in the project impact area.
- To discourage California red-legged frogs from entering the project impact areas via the freshwater ditches west of the impact areas, the ditches will be equipped with lightweight, one-way flow gates. These will be designed so that water can easily pass from the project site to the ditches, but small vertebrates such as the frog cannot move upstream from the ditches to the project site.

Monarch Butterfly

No formal mitigation is required*;* however, it is recommended that any trimming of *Eucalyptus* trees should be completed prior to the winter roosting season (September *to* February) to avoid take of individual Monarch butterflies. In accordance with CDFG recommendations, trees *will* be surveyed prior to trimming, and if Monarch butterflies are present, then trimming *will* be delayed until the trees were unoccupied.

Nesting Swallows

- Prior to construction activities, a USFWS-approved biologist *will* conduct a preconstruction survey of all potential nesting habitat for purple martins and other swallow species that use cavities in human-made structures (i.e., overpasses) as nest sites or construct nests that adhere to the aforementioned human-made structures to record the presence and location of nesting swallows.
- If construction during the breeding season cannot be avoided, then USFWS-approved exclusionary devices such as netting, panels, or metal projectors *will* be installed over the entrances to the identified cavities and/or nest sites prior to the birds' arrival in mid-

March. No exclusionary devices shall be installed after the breeding season begins (i.e., March 15 through August 15), nor shall the cavities or external nests be blocked if birds are occupying them. All installation of exclusionary devices *will* be supervised by the USFWS-approved biologist.

- Alternatively, no preconstruction surveys would be conducted*; h*owever, all drainage holes or other cavities, or suitable nest substrates associated with human-made structures within the project corridor that may be used by nesting swallows would be fitted with the exclusionary devices described above prior to the birds' arrival in mid-March.
- All exclusionary devices *will* be monitored and maintained throughout the breeding season to ensure that they are successful in preventing the birds from accessing the cavities or nest sites. Upon the project's completion, the exclusionary devices *will* be removed from the site unless otherwise authorized by USFWS.
- *One (1) traction power facility site (PS3) is recommended for nesting bird surveys in advance of construction activities if trees are to be removed during the breeding season.*

4.2.4 CULTURAL AND HISTORICAL RESOURCES

4.2.4.1 Archaeological Resources

It is not anticipated that construction activities would disturb buried cultural materials. All construction within site boundaries and *in or adjacent to archaeologically* sensitive zones *will* be conducted using *methods selected to minimize the size of the excavation and the amount of soil removed, thereby lessening potential impacts on buried cultural resources.* If buried cultural resources are inadvertently discovered during any ground-disturbing activities, all work would stop within 100 feet of the area until a qualified archaeologist can assess their significance.

As described in the Cultural Resources Programmatic Agreement discussed in Section 3.5.3.3, the JPB will comply with the City of Santa Clara's Archaeological Monitoring and Treatment Plan for construction activities in archaeologically or culturally sensitive zones within Santa Clara's jurisdiction. The JPB will similarly comply with adopted city archeological monitoring and treatment plans affecting its construction activities within other cities' jurisdictions.

4.2.4.2 Historic Architectural Resources

No construction-period adverse impacts to any of the historic resources identified within the project APE are anticipated. Construction workers would be informed in advance of the significance of historic resources within or along the Caltrain corridor. No excavations or vibration effects are anticipated that would threaten the structural integrity of historic properties. Temporary noise or visual impacts would not affect the attributes contributing to the historic eligibility of these properties. *Prior to any activity potentially affecting the historic tunnels, structural investigations will be conducted to evaluate the probable effects on the structural integrity of the tunnels. Design approach and construction methods will be developed to minimize any potential impact to the brick lining of Tunnels 1-4.*

4.2.5 HAZARDOUS WASTES

4.2.5.1 Impacts

Two principal types of hazardous wastes or materials may cause impacts during construction of the Electrification Program Alternative facilities: hazardous materials used during the construction process and hazardous wastes that may be encountered or generated during construction. Section 3.7, Hazardous *Waste and* Materials, discusses the potential for encountering pre-existing hazardous wastes within the Caltrain right-of-way or proposed traction power sites and identifies appropriate mitigation measures.

Some hazardous materials, including fuels and motor oils, paints, cleaners, degreasers, and insulating materials, would be used during construction. Electrification facilities may contain hazardous materials, such as battery acids in the transformers or sulfa-hexafluoride gas insulation materials that would be hazardous if there were a spill or rupture of the equipment chamber containing the material. While many of these materials are commonly used, they are considered hazardous materials (fuels, for example, are flammable) based on their physical properties, and improper handling could endanger workers and the public or result in contamination of soil and/or water.

Contact with contaminants from pre-existing hazardous wastes in the project area could have adverse effects on workers, the public, and environmental health and safety. *The contaminants of concern along the Caltrain right-of-way are arsenic, lead, and total petroleum hydrocarbons.* Workers could be exposed to soil and/or groundwater containing hazardous substances via direct contact (ingestion or through the skin) or via airborne pathways (inhalation of vapors or minute particles). The public and environment could be exposed to contaminants transported offsite during construction. The degree of hazard associated with these impacts on human or environmental receptors would depend upon the chemical properties, concentrations, or volumes of contaminants, the nature and duration of construction activities, and contaminant migration pathways. The largest potential exposure risk is to the construction worker.

Construction of facilities for the Electrification Program Alternative would not require deep excavations or large earth movements. Foundations for the 13 traction power facilities would not be deep, although they may cover a relatively large area, up to 115 by 200 feet for a large primary substation. OCS pole foundations will be sunk up to 15 feet, but the hole to be excavated is only *3* feet in diameter. *Given the construction techniques used and mitigation measures in place, the potential for large-scale releases of contaminants is limited.* Groundwater is shallow in many places along the Caltrain corridor, however, and site dewatering within existing contaminated areas could increase the migration of contaminants to surface water and other groundwater zones along the alignment. Disposal of contaminated soil or water would transport contaminants out of the project area.

4.2.5.2 Mitigation

Mitigation measures and other protections may be handled as design features or construction specifications developed during final design of the project.

Handling and storage of fuels and other flammable materials during construction *will* follow California *Occupational Safety and Health Administration (*OSHA*)* and local standards for fire protection and prevention. These measures include appropriate storage of flammable liquids and prohibition of open flames within 50 feet of flammable storage areas.

As part of the focused Phase II site investigation and Risk Assessment discussed in Section 3.7.4 Hazardous Wastes and Materials, Mitigation, the following is recommended: Prior to construction, the potential presence of contaminants in soil and groundwater *will* be investigated using conventional drilling, sampling, and chemical testing methods. Based on the chemical test results, a mitigation plan *will* be developed to establish guidelines for the disposal of contaminated soil and discharge of contaminated dewatering effluent, and to generate data to address human health and safety issues that may arise as a result of contact with contaminated soil or groundwater during construction. *Caltrain will provide a copy of this plan to the California DTSC for their review and approval prior to starting work on the project.*

There are typically two different management strategies that can be employed to address contaminated soil handling and disposal issues. Contaminated soil can be excavated and stockpiled at a centralized location and subsequently sampled and analyzed for disposal profiling purposes in accordance with the requirements of the candidate disposal landfill. Alternatively, soil profiling for disposal purposes can be done in-situ so when soil is excavated it is loaded directly on to trucks and hauled to the appropriate landfill facility for disposal based on the in-situ profiling results. The project could also combine both strategies.

Transformers will be placed within spill containment structures to prevent contamination of soil or groundwater in the unlikely event of a rupture.

Soils removed during excavation and grading activities that remain at a centralized location for an extended period of time *will* be covered with plastic sheeting to prevent the generation of fugitive dust emissions. Additionally, dust control measures *will* be implemented during construction grading and excavation as necessary to minimize offsite migration of contaminants. Soil for disposal at a landfill or recycling facility *will* be transported by a licensed waste hauler, under appropriate manifests or bill of lading procedures, as required.[2]

Chemical test results for groundwater samples along the right-of-way *will* be used to obtain necessary permits (*RWQCB*, State D*TSC*, local jurisdictions). If required, treatment may include:

- Settling to allow particulate matter (total suspended solids) to settle out of the effluent in order to reduce the sediment load, as well as reduce elevated metal and other contaminant concentrations that may be associated with suspended sediments; and/or
- Construction of a small-scale batch wastewater treatment system to remove dissolved contaminants *(*mainly organic constituents such as petroleum hydrocarbons *[*gas, diesel, and oils*]; benzene, toluene, ethylbenzene, and xylene;* and *volatile organic compounds)* from the dewatering effluent prior to discharge to the sanitary sewer. A treatment system would also likely employ the use of filtration to remove suspended solids.

Workers performing activities onsite that may involve contact with contaminated soil or groundwater *will* be required to have appropriate health and safety training in accordance with 29 CFR 1910.120. A Worker Health and Safety Plan (HSP) *that meets the provisions of California Code of Regulations (Title 22, Section 5192) will* be developed for the project and monitored for the implementation of the plan on a day-to-day basis by a Certified Industrial Hygienist. The HSP *will* include provisions for:

- Conducting preliminary site investigations and analysis of potential job hazards;
- Personnel protective equipment;
- Safe work practices;
- Site control;
- Exposure monitoring;
- Decontamination procedures; and
- Emergency response actions.

The HSP *will* specify mitigation of potential worker and public exposure to airborne contaminant migration by incorporating dust suppression techniques in construction procedures. The plan *will* also specify mitigation of worker and environmental exposure to contaminant migration via surface water runoff pathways by implementation of comprehensive measures to control drainage from excavations and saturated materials excavated during construction.

4.2.6 WATER QUALITY

4.2.6.1 Impacts

Construction grading and utility excavations at substation sites would increase the sediment load in stormwater during rainfall events. Installation of electric poles would also result in some increase in sediment loads. Sediment sources created during construction include soil stockpiles and soil tracked across construction areas, debris resulting from the installation of electric pole foundations using the standard augering technique (described in Section 4.1), and soil transported by wind.

The project would disturb more than one acre of land*;* therefore, a SWPPP will be required, in accordance with Section 402 of the federal *CWA*, as amended. The purpose of a SWPPP is to reduce the amount of construction-related pollutants that are transported by stormwater runoff to surface waters.

Impacts to groundwater *can* be *minimized through careful pole foundation siting and* by using *special construction techniques* in areas where groundwater is known to be high. There remains the potential to encounter groundwater during electric pole excavations in areas where depth to groundwater is unknown. Due to the *51*-mile length of the project corridor, it is not practicable to conduct site-specific studies for the entire corridor.

4.2.6.2 Mitigation

The following design features are recommended for the project:

A SWPPP will be prepared and will identify construction-period B*MP*s to reduce water quality impacts. The SWPPP will emphasize standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas.

Where the project alignment is adjacent to water resources and riparian habitat, and in areas where the groundwater table is known to be high, *careful pole foundation siting and/or construction techniques (including* vibration *ultrasonic steel casing method) will be considered to minimize the potential for impacts, as* described in Section 4.1.1.1.

In the event groundwater is encountered during construction, dewatering would be conducted locally. Dewatering effluent would be tested for contamination. Contaminated effluent would be disposed of in accordance with applicable federal, state and local regulations.

4.2.7 NEIGHBORHOODS AND BUSINESSES

4.2.7.1 Impacts

Construction of OCS poles and wires within the Caltrain right-of-way would have short-term, temporary noise and vibration impacts that would be heard and felt by individual residents and neighborhoods as the construction proceeded up or down the corridor. There may be short-term, temporary traffic detours or occasional street closures to facilitate construction of electrification facilities on or off the right-of-way. These detours and closures would *be scheduled so they would neither* affect the ability of businesses to operate nor disrupt neighborhoods and communit*ies any more than is necessary*. It is anticipated that *some* construction activities would be carried out on weekends, during the off-peak midday periods, and at night to avoid disruption of normal rail operations.

It is not anticipated that construction of the traction power facilities and connections would affect the functioning of neighborhoods or businesses. *Most of these* facilities have been proposed to be located in areas where there are no close-by sensitive receptors. *In residential areas, construction will be planned to minimize noise impacts to the extent possible*.

4.2.7.2 Mitigation

Residential and business property line noise and vibration restrictions established prior to construction would minimize temporary and intermittent construction noise intrusion on residences and sensitive businesses. *These mitigation requirements are provided in Section 4.2.9.3.*

JPB *will* coordinate with the traffic departments of the local jurisdictions and with homeowner associations as practicable in developing traffic management measures affecting local streets.

*Construction documents will include a provision that requires the contractor to notify n*eighborhood residents, *schools,* and business owners in the *work* vicinity in advance of construction *to discuss the* schedule and any impending street closures or re-routings and their duration.

4.2.8 CONSTRUCTION EMPLOYMENT

Given the size of the Bay Area economy, the Electrification Program Alternative would not result in changes to regional socioeconomics beyond current regional planned and forecasted growth.

4.2.8.1 Methodology and Impacts

Table 4.2-1 provides an estimate of the number of positions and level of economic activity created by the expenditure of construction funds for the Electrification Program Alternative. Estimates are based in part on an input/output study of construction activity in Texas by the F*HWA* (Politano and Roadifer, 1989). Funds created in economic output include the multiplier effect of direct construction being re-spent in service or other sectors of the economy. Economic activity generated by the proposed project is anticipated to benefit the San Francisco Bay Area region and would also follow the labor and material markets for transportation-related construction.

Table 4.2-*1*: Impacts from Construction Investment in the Caltrain Electrification Program* (Millions of *Year-of-Expenditure* dollars)

Alternative	Construction Value**	Regional Economic Output	Total Earnings	Job Creation (Person Years of Employment)	
				Onsite	Total
Electrification Program Alternative	$*785*	$*1,400*	$*350*	*2,200*	*4,800*
No-Electrification Alternative	N/A	N/A	N/A	N/A	N/A

* Construction impacts are based on preliminary estimates for construction value and exclude purchase of rolling stock.

** Construction value includes administration costs.

N/A = Not Applicable

Sources:

A.L Politano and Carol J. Roadifer, <u>REIMHS: A Prototype Model for Regional Economic Analysis of Highway Projects and Systems</u>, Federal Highway Administration, presented at TRB 68th Annual Meting, Washington D.C., January 1989. (Model adjusted to reflect inflation.)

Parsons, *2009*.

With respect to job creation, FHWA found nationally in the early 1980s that a *$1* million investment in transportation construction would directly generate 10 onsite, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.6 PYE positions to reflect inflation through 2003. When offsite, construction-related and service-industry-related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of full-time PYE positions created rises to *approximately* 12.1, adjusting for inflation, for each *$1* million investment. Onsite and total PYE positions have been adjusted by half to reflect jobs generated specifically by rail construction.

Compared with the No-Electrification Alternative, capital costs for construction of the Electrification Program Alternative would be $*785* million *in year-of-expenditure dollars*, exclusive of rolling stock. Construction expenditures would generate approximately *2,200* onsite full-time construction positions (PYE) and *4,800* total positions (PYE), including direct, indirect, and induced, as compared to the No-Electrification Alternative.

The impact of this direct and indirect employment added to the regional economy would be positive.

4.2.8.2 Mitigation

As the impacts are beneficial, no mitigation is proposed.

4.2.9 CONSTRUCTION NOISE AND VIBRATION

4.2.9.1 Construction Noise

Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately estimate levels of construction noise.

Three construction stages have been identified for the Electrification Program Alternative for the purpose of determining construction noise exposure. These stages include: *(*1) O*CS*, *(*2) Overbridge Protection Barriers, and *(*3) Substation, Switching, and Paralleling Stations. Each stage has several activities that could create high noise levels.

Noise Sources. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment, the engine, which is usually diesel, is the dominant noise source. Table 4.2-2 identifies the major pieces of construction equipment associated with the various stages of construction. Typical maximum noise emission levels (L_{max}) are summarized, based on construction equipment operating at full power at a reference distance of 50 feet, and an estimated equipment usage factor based on experience with other similar construction projects. The usage factor is a fraction that accounts for the total time during an *8*-hour day in which a piece of construction equipment is producing noise under full power. Although the noise levels in Table 4.2-2 represent typical values, there can be wide fluctuations in the noise emissions of similar equipment based on two important factors: (1) the operating condition of the equipment (e.g., age, presence of mufflers and engine cowlings); and (2) the technique used by the equipment operator (aggressive vs. conservative).

Table 4.2-2: Typical Construction Equipment Noise Emission Levels

Equipment	Maximum Noise Level, dBA, 50 feet from Source	Equipment Usage Factor	Total 8-Hour Leq Exposure, dBA at Various Distances [1] 50 feet	100 feet
Overhead Contact System Installation				
Foundation Installation *w*ithout Casing			**85**	**79**
Auger/drill rigs	85	0.50	82	76
Concrete truck	82	0.50	79	73
Telescoping boom bucket trucks	81	0.10	71	65
Front *l*oader	80	0.30	75	69
Dump *t*ruck	71	0.15	63	57
Generator to vibrate the concrete	82	0.15	74	68
Foundation Installation *w*ith Casing			**86**	**80**
Auger/drill rigs	85	0.25	79	73
Concrete truck	82	0.25	76	70
Telescoping boom bucket trucks	81	0.20	74	68
Front Loader	80	0.30	75	69
Vibratory hammer	85	0.50	82	76
Dump *t*ruck	71	0.15	63	57
Generator to vibrate the concrete	82	0.15	74	68
OCS Pole Installation			**73**	**67**
Diesel construction train (stationary)	70	0.06	58	52
Diesel construction train (in transit)	77	0.0007	45	39
Telescoping boom bucket trucks	81	0.06	69	63
Generator (nighttime lighting)	82	0.06	70	64
OCS Wiring			**75**	**69**
Diesel construction train (stationary)	70	0.09	60	54
Diesel construction train (in transit)	77	0.008	56	50
Telescoping boom bucket trucks	81	0.09	71	65
Generator (nighttime lighting)	82	0.09	72	66
Overbridge Protection Barriers				
Installation of Barriers to Roadway Bridges			**81**	**75**
Pneumatic drill (in concrete)	85	0.30	80	74
Utility truck (with crane)	*81*	*0.30*	*76*	*70*
Flat bed truck	*78*	*0.10*	*68*	*62*
Substation, Switching, and Paralleling Stations				
Ground Clearing Stage – one site only			**83**	**77**
Dozer	85	0.50	82	76
Front *l*oader	80	0.30	75	69
Dump *t*ruck	71	0.25	65	59

Table 4.2-2: Typical Construction Equipment Noise Emission Levels				
Equipment	Maximum Noise Level, dBA, 50 feet from Source	Equipment Usage Factor	Total 8-Hour Leq Exposure, dBA at Various Distances [1] 50 feet	100 feet
Compactor	81	0.25	75	69
Ground Grade			**81**	**75**
Backhoe	80	0.30	75	69
Hammer to drive rods (small vibrator)	86	0.25	80	74
Concrete Foundations			**84**	**78**
Flat bed truck	78	0.10	68	62
Wood saw to construct forms	88	0.25	82	76
Concrete truck	82	0.25	76	70
Utility truck (with crane)	81	0.30	76	70
Generator to vibrate the concrete	82	0.15	74	68
Electrical Equipment Installation			**83**	**77**
Flatbed truck	78	0.15	70	64
Forklift	80	0.27	74	69
Large crane	85	0.50	82	76

Source: Parsons.
Note: 1. Distances are measured from the center of the noise producing activities associated with the construction phase.

Construction Noise Impact Criteria. There are various jurisdictions along the proposed project alignment, each with different construction noise and vibration limits. These criteria, summarized in Table 4.2-3, typically specify limits for construction noise and vibration levels and/or permit construction activities only during certain hours.

Table 4.2-3: Summary of Local Ordinances Governing Construction Noise

Jurisdiction	Noise/Vibration Source	Maximum Allowable Levels or Exemption
San Francisco	Construction	Daytime: 80 dBA measured at 100 feet from construction equipment. Nighttime: not more than 5 dBA above background noise at the nearest property line.
Brisbane	Construction	83 dBA at 25 feet for individual equipment; 86 dBA at project property line. Construction permitted weekdays 7:00 a.m. to 7:00 p.m.; and weekends from 9:00 a.m. to 7:00 p.m.
South San Francisco	Construction	90 dBA at 25 feet for equipment or at property plane of the project. Construction permitted weekdays from 8:00 a.m. to 8:00 p.m.; Sundays or holidays from 9:00 a.m. to 8:00 p.m.; Saturdays from 10:00 a.m. to 6:00 p.m.
San Bruno	Construction	85 dBA at 100 feet, 7:00 a.m. to 10:00 p.m.; 60 dBA at 100 feet, 10:00 p.m. to 7:00 a.m.
Millbrae	Construction	Permitted weekdays from 7:00 a.m. to 6:00 p.m., and Saturdays and Sundays from 9:00 a.m. to 5:00 p.m.
Burlingame	Construction	Permitted weekdays from 7:00 a.m. to 7:00 p.m., Saturdays from 8:00 a.m. to 6:00 p.m.; and Sundays from 10:00 a.m. to 6:00 p.m.

Table 4.2-3: Summary of Local Ordinances Governing Construction Noise

Jurisdiction	Noise/Vibration Source	Maximum Allowable Levels or Exemption
San Mateo (County)	Construction	*Permitted Monday through Friday from 7:00 a.m. to 6:00 p.m. and Saturdays from 9:00 a.m. to 5:00 p.m. Not permitted at any time on Sundays, Thanksgiving, and Christmas.*
San Mateo (City)	*Construction*	*Permitted Monday through Friday from 7:00 a.m. to 7:00 p.m. and Saturdays from 10:00 a.m. to 6:00 p.m., and Sundays from 12:00 p.m. to 4:00 p.m. Deliveries to construction site are prohibited between 7:30 a.m. and 8:30 a.m., and from 4:00 p.m. to 5:00 p.m.*
Belmont	Construction	Permitted Monday *through* Friday from 8*:00* a.m. to 5*:00* p.m. and Saturdays from 10*:00* a.m. to 5*:00* p.m.; prohibited on Sundays.
San Carlos	Construction	Permitted weekdays from 7*:00* a.m. to 6*:00* p.m., and weekends and holidays from 9*:00* a.m. to 5*:00* p.m.
Redwood City	Construction	110 dBA measured at the property line. Permitted Monday *through* Friday from 7*:00* a.m. to 8*:00* p.m.; *no noise exceeding ambient levels on Saturday, Sunday, and holidays in residential areas except for emergency construction or repairs.*
Atherton	Construction	Exempt from general noise regulations from 8*:00* a.m. to 5*:00* p.m., Monday *through* Friday only.
Menlo Park	Construction	85 dBA: measured 50 feet from equipment. Permitted Monday *through* Friday from 8*:00* a.m. to 6*:00* p.m.; and Saturday, Sunday, or holidays from 9*:00* a.m. to 5*:00* p.m.
Palo Alto	Construction	110 dBA at 25 fe*e*t for individual equipment or at property plane of project. Permitted weekdays from 8*:00* a.m. to 8*:00* p.m.; 9*:00* a.m. to 8*:00* p.m. Saturday; 10*:00* a.m. to 6*:00* p.m. Sundays *and* holidays.
Santa Clara County	Construction (Mobile Equipment)	75 dBA, Mon*day through* Satu*rday*, 50 dBA Sundays, 7*:00* a.m. to 7*:00* p.m., single-family zone. 80 dBA, Mon*day through* Satu*rday*, 55 dBA Sundays, 7*:00* a.m. to 7*:00* p.m., multi-family zone. 85 dBA, Mon*day through* Satu*rday*, 60 dBA Sundays, 7*:00* a.m. to 7*:00* p.m., commercial zone.
	Construction (Stationary Equipment)	60 dBA, Mon*day through* Satu*rday*, 50 dBA Sundays, 7*:00* a.m. to 7*:00* p.m., single-family zone. 65 dBA, Mon*day through* Satu*rday*, 55 dBA Sundays, 7*:00* a.m. to 7*:00* p.m., multi-family zone. 70 dBA, Mon*day through* Satu*rday*, 60 dBA Sundays, 7*:00* a.m. to 7*:00* p.m., commercial zone.
San Jose	Construction	Permitted only from 7*:00* a.m. to 7*:00* p.m. *Monday through Friday*, when within 500 fe*e*t of a residential unit.

Source: *Noise and Vibration Study*, Parsons, November 2003.

Table 4.2-4 presents *FTA allowable construction noise levels, which are* the recommended noise limits for *construction of* the proposed project. These limits are for 8-hour average noise levels (L_{eq}) at the property line of the nearest location to the construction site. *During the construction process, if complaints occur, project management will consult with the affected local jurisdiction to determine if a more stringent local ordinance is more appropriate for a specific situation.*

Table 4.2-4: Allowable Construction Noise Levels		
Land Use	**Daytime (7 a.m. to 10 p.m.) L_{eq} [1]**	**Nighttime (10 p.m. to 7 a.m.) L_{eq} [1]**
Residential	80	70
Commercial	85	85
Industrial	90	90

[1] L_{eq} for 8 hours.
Source: FTA, 1995.

Construction Noise Impacts. Total construction noise impact was determined by first calculating the noise exposure for each piece of equipment, and then combining the noise exposures for all equipment to be used during a construction stage. The results of these calculations are shown in Table 4.2-2. The equipment noise levels within a particular stage were combined together to obtain a total noise exposure for each stage (listed as bolded entries in Table 4.2.2*)*. Noise levels of different stages were not combined because the different stages would not occur at the same time in a given area.

To assess impacts sensitive to receptors, a calculation was performed to determine the distance from the construction activities where an 80-dBA exposure would occur over an 8-hour period. This exposure level represents the limit for daytime construction noise at residential land uses. Table 4.2-5 shows the results of those calculations.

Table 4.2-5: Distance to Noise Impact *d*uring Construction Stages [1]	
Construction Stage	**Distance to Leq of 80 dBA Based on 8-Hours/Day of Exposure to Construction Noise [1] (Feet)**
Overhead Contact System Installation	
Foundation installation without casing	30
Foundation installation with casing	35
OCS pole installation	25
OCS wiring	30
Overbridge Protection Barriers	
Installation of barriers to roadway bridges	60
Substation, Switching, and Paralleling Stations	
Ground Clearing Stage – one site only	75
Ground grade	55
Concrete foundations	80
Electrical equipment installation	70

[1] Based on the construction noise limit criteria of 80 dBA for daytime hours at residential land uses. Distances are measured from the center of the noise producing activities associated with the construction phase.
Source: Noise and Vibration Study, Parsons, November 2003.

Based on the distances calculated in Table 4.2-5 and the daytime noise impact criteria of 80 dBA for residential properties, construction noise impacts would occur along the rail corridor when construction activities come within 60 to 125 feet of residences and remain within that distance for at least an 8-hour period. When those conditions occur, noise mitigation would be required. Because some construction activities are expected to be performed during nighttime hours, the number of affected residences would be greater since the nighttime criterion is 10 dBA lower, or 70 dBA.

4.2.9.2 Construction Vibration

Two types of construction vibration impact were analyzed: (1) Human annoyance; and (2) building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. The potential for vibration annoyance and building damage was analyzed for major vibration-producing construction equipment that would be used for the Electrification Program Alternative.

Construction Vibration Sources. The vibration produced by construction equipment, shown in Table 4.2-6, was obtained from FTA procedures (FTA, 1995) and from field measurements.

Table 4.2-*6*: Vibration Source Levels for Construction Equipment

Equipment	PPV(1) at 25 ft (in/sec)	Approximate Velocity Level(2) at 25 ft (VdB)
Large bulldozer	0.089	87
Loaded trucks	0.076	86
Small bulldozer	0.003	58
Auger/drill rigs	0.089	87
Vibratory hammer	0.07[3]	85[3]
Vibratory compactor/roller	0.55[4]	103[4]

[1] Peak particle ground velocity measured at 25 feet unless noted otherwise.
[2] Route mean square amplitude ground velocity in decibels (VdB) referenced to 1 micro-inch/second.
[3] Measured at 88 feet by Parsons.
[4] Measured at 15 feet by Parsons.
Source: FTA, 1995.

Construction Vibration Impacts. Table 4.2-7 presents FTA's vibration impact criteria. The distances at which vibration impacts would occur were calculated according to these criteria and the FTA procedures, which are described in Section 3.11.2.

Table 4.2-*7*: Ground-Borne Vibration Impact Criteria for Human Annoyance

Land Use Category	Ground-Borne Vibration Impact Levels (dB ref. 1 micro-inch/sec) Frequent[1] Events	Infrequent[2] Events
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[3]	65 VdB[3]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB

[1] "Frequent Events" is defined as more than 70 vibration events per day.
[2] "Infrequent Events" is defined as fewer than 70 vibration events per day.
[3] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
Source: FTA, 1995

Table 4.2-8 shows the minimum distances at which short-term construction vibration impacts would occur, resulting from various types of equipment. Mitigation would be required if construction equipment were to operate within the distances shown in Table 4.2-8 from light-frame buildings located along the Caltrain right-of-way. Vibration with potential to damage adjacent buildings is not anticipated, based on the distances shown.

Table 4.2-*8*: Construction Equipment Vibration Impact Distances

Equipment	Distance to Vibration Annoyance[1] in feet	Distance to Vibration Building Damage[2] in feet
Large bulldozer	45	<10
Loaded trucks	40	<10
Small bulldozer	--	<10
Auger/drill rigs	45	<10
Vibratory hammer	130	25
Vibratory compactor/roller	85	15

[1] This is the distance at which the route mean square amplitude velocity level is 80 VdB or less at the inside of the building structure (see Section 3.11.2). When propagating from the ground surface to the building structure foundation, there is a vibratory coupling loss of approximately 5 dB; however, this loss is offset by the building amplification in light-frame construction. Thus, no additional adjustments are applied.
[2] This is the distance at which the peak particle velocity is 0.50 inch/sec or less (see Section 3.11.2).
Source: *Noise and Vibration Study*, Parsons, November 2003.

Construction vibration impacts sufficient to cause some annoyance are anticipated at residential locations that are within 40 to 130 feet from the construction activity, based on the impact assessment presented in Table 4.2-8. These kinds of construction impacts are of a temporary nature, and construction is a necessary part of any project*;* however, mitigation measures are proposed to reduce the impacts.

4.2.9.3 Mitigation

To minimize noise and vibration impacts at nearby sensitive sites, construction activities *will* be conducted during daytime hours to the extent feasible. Nighttime construction *could* be unobtrusive and therefore preferable in some locations (e.g., in commercial districts where most businesses do not operate at night). Nighttime construction may also be necessary to avoid unacceptable *disruptions in* rail *or traffic* service during daytime hours. *Such construction will (A) be limited to non-sensitive areas, to the extent feasible, or (B) incorporate appropriate noise reduction methods to reduce noise levels as much as practicable.* Once details of the construction activities become available, *the* JPB *will* develop an approach to reduce interference with the business and residential communities, and minimize traffic disruptions and the duration of the construction *at specific work locations*.

There are a number of measures that can be taken to reduce intrusion without placing unreasonable constraints on the construction process or substantially increasing costs. These include noise and vibration monitoring to ensure that contractors take all reasonable steps to minimize impacts when near sensitive areas; noise testing and inspections of equipment to ensure that all equipment on the site is in good condition and effectively muffled; and an active community liaison program. The community liaison program should keep residents informed about construction plans so they can plan around noise or vibration impacts; it should also provide a conduit for residents to express any concerns or complaints.

Including the following measures *in the Contract Documents will* minimize noise and vibration disturbances at sensitive areas during construction:

1. Use newer equipment *fitted* with the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
2. Perform all construction in a manner to minimize noise and vibration. Use construction methods or equipment that will provide the lowest level of noise and ground vibration impact near residences and consider alternative methods that are also suitable for the soil condition. The contractor should be required to select construction processes and techniques that create the lowest noise levels.
3. Perform noise and vibration monitoring to demonstrate compliance with the noise limits. Independent monitoring should be performed to check compliance in particularly sensitive areas. Require contractors to modify and/or reschedule their construction

activities if monitoring determines that maximum limits are exceeded at residential land uses.

4. Conduct truck loading, unloading and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent.
5. *Design i*ngress and egress to and from the staging area *to* be on collector streets or higher street designations (preferred)*, and through routes for trucks will be designed to the extent feasible to minimize the frequency of backup alarm sound*.
6. Turn off idling equipment.
7. *Use t*emporary noise barriers, as practicable, to protect sensitive receptors against excessive noise from construction activities. Consider mitigation measures such as partial enclosures around continuously operating equipment or temporary barriers along construction boundaries.
8. Minimize construction activities *within residential areas* during evening, nighttime, weekend, and holiday periods to the extent feasible.
9. *By contract specification, require t*he construction contractor to comply with *FTA construction noise and vibration limits. Local agencies will be consulted on a case-by-base basis, and if necessary,* local noise and vibration ordinances *may also be applied*.

It is expected that ground-borne vibration from construction activities would cause only intermittent localized *disturbance* along the rail corridor. Although processes such as earth moving with bulldozers or the use of vibratory compaction rollers can create annoying vibration, there should be only isolated cases where it is necessary to use this type of equipment in close proximity to residential buildings. Following are some procedures that can be used to minimize the potential for annoyance or damage from construction vibration:

1. When possible, limit the use of construction equipment that creates high vibration levels, such as vibratory rollers operating within 110 feet of residential structures.
2. Require vibration monitoring during vibration-intensive activities.
3. *Minimize* the hours of vibration-intensive equipment *usage,* such as vibratory rollers, so that impacts to residents are minimal (e.g., weekdays during daytime hours only, when as many residents as possible are away from home).

A combination of the mitigation techniques for equipment noise and vibration control, as well as administrative measures, when properly implemented, would provide the most effective means to minimize the impacts of construction activities. Application of these mitigation measures will reduce the construction impacts; however, temporary increases in noise and vibration would likely *exceed applicable noise limits* at some locations.

4.2.10 Public Services and Facilities

4.2.10.1 Impacts

Construction of OCS poles and wires within the Caltrain right-of-way could involve short-term, temporary detours or street closures. These are not expected *to be significant or* to have substantial adverse effects on public or emergency service delivery or the ability of people to access public facilities. The traction power stations are *all located either within or adjacent to the right-of-way, which has the effect of reducing* impacts on local public services and community facilities. Construction of *an* access road *(PS7 only)* or connections from the traction power facilities to the Caltrain right-of-way could involve short-term street closures, but *it* is not expected to disrupt or delay public or emergency services delivery or affect accessibility to public and community facilities.

4.2.10.2 Mitigation

To maintain acceptable response times and performance objectives for emergency response services, a Traffic Management Plan (TMP) will be developed for implementation during the construction period. The TMP will address traffic management procedures (e.g., roadway closures, detour routes, manual traffic operations) during construction. Construction effects would be minimized by limiting street closures and consequent detours of transit and vehicular traffic to one location at a time, with a construction time frame of 24 to 48 hours for each closure. For local roadways where lane closures and restricted travel speeds would be required for longer periods, traffic control measures would be implemented to minimize traffic conflicts and delays to the traveling public. *For additional measures to include in the TMP, see Section 4.2.11.2 Transportation Effects During Construction, Mitigation.*

All affected emergency routes will be identified in the TMP. The JPB would coordinate with the traffic departments of the local jurisdictions and with all corridor emergency service providers in developing detour routes and other traffic handling plans.

The JPB would provide advance notice of all Electrification Program construction-related street closures and detours to local jurisdictions, emergency service providers, and motorists.

4.2.11 Transportation Effects *D*uring Construction

4.2.11.1 Impacts

During the construction phase of the Electrification Program Alternative, traffic in the vicinity of the proposed traction power stations or along the route of power conduits to the rail right-of-way could be disrupted by construction equipment and traffic. Although much of the installation of poles and wires on the rail right-of-way will take place from on-track vehicles, public roadways would be used to access the rail right-of-way. Use of rail vehicles and the rail right-of-way for construction could involve disruption of normal rail operations.

*With the exception of PS4, c*onstruction activities for the Electrification Program Alternative are not expected to have any substantial impact on the availability of parking. Construction workers would be expected to park onsite or on the rail right-of-way. No impacts to nonmotorized traffic, other than those affecting general traffic, are anticipated, as bicycles and pedestrians are prohibited within the Caltrain right-of-way, and construction activities for the Electrification Program Alternative will not affect bicycle or pedestrian trails off the right-of-way.

4.2.11.2 Mitigation

Construction staging plans will be developed to minimize impacts to Caltrain service and to existing roadways. Contractors will be required to coordinate with rail dispatch to minimize disruption of rail service in the corridor. Closure of one or more tracks for construction activities will be limited to off-peak periods and weekends, when service is less frequent, or late night, when no passenger service is scheduled. A *TMP* will be developed*, as discussed in Section 4.2.10.2 Public Service and Facilities, Mitigation,* and will include measures to address rail service and other transportation issues. The JPB will coordinate with Caltrans and the local jurisdictions to provide the public with advance notice of any proposed traffic detours and their duration. Construction crews will follow established safety practices to protect work crews while working within an active rail right-of-way, including flaggers, and – if track conditions are affected – speed restrictions (slow orders). Provisions will be incorporated into the construction contracts to designate areas for construction worker parking and to avoid substantial parking impacts to residential or business areas.

4.2.12 UTILITIES

4.2.12.1 Impacts

The JPB would coordinate with all utility providers *and local jurisdictions* during the design phase of the project to identify all subsurface and overhead utilities so that effective design treatments and construction procedures can be developed to avoid adverse impacts to existing utilities and prevent disruptions in service. *The* JPB is conducting a survey of existing overhead utilities to give each owner advance warning of the Electrification Program and to provide time to plan for relocation to minimize disruptions. Design treatments and construction procedures are described in Section 3.16, Utilities *and Service Systems*. The potential exists, nonetheless, for construction activities to encounter unexpected utilities within the Caltrain right-of-way. Relocations of affected utilities that cross the Caltrain right-of-way will be the responsibility of the utility owner and may require short-term, limited interruptions of service. No interference with existing utility service is anticipated during installations of connections to existing high-voltage power transmission facilities because the utility will put customer loads on alternate feeders during the connection activity.

4.2.12.2 Mitigation

If unanticipated underground utilities are discovered, OCS pole foundations *will* be adjusted to avoid them.

Any short-term, limited service interruptions would be scheduled well in advance and appropriate notification provided to users.

Chapter 5: CEQA Findings of Significance

CHAPTER 5: CEQA FINDINGS OF SIGNIFICANCE

This chapter describes those environmental effects identified in Chapters 3 and 4 that would be considered significant under CEQA. Cumulative impacts are also described, and the potential for the project to stimulate unplanned growth is considered.

This combined environmental document complies with NEPA requirements for the preparation of an EA, and with CEQA requirements for an EIR. Use of the term "significant" differs under these two laws. CEQA requires that an EIR include a determination of significant impacts, while under NEPA, an EA is prepared to determine whether a project will have a significant impact on the environment and, if no unmitigable significant impact would occur, then a FONSI is made. Given these differences, the CEQA significance criteria and the determination of significant impacts have not been specifically addressed in other sections of this combined NEPA/CEQA EA/EIR. These criteria and determinations are grouped for discussion in this chapter.

It should be noted that although the presence of mitigation creates a presumption of significant impacts under CEQA, NEPA encourages mitigation for all *adverse* impacts of a project. For this reason, some mitigation measures described in this document and in this section are wholly appropriate under NEPA, although the impacts they address may not be considered significant under CEQA.

5.1 SIGNIFICANCE CRITERIA

CEQA requires that an EIR identify the significant environmental effects of the project (CEQA Guidelines Section 15126), but does not promulgate specific thresholds for significance. Instead, CEQA Guidelines Section 15064(b) states that "the determination...calls for careful judgment on the part of the public agency involved*…*" and that "an ironclad definition of significant effect is not possible because the significance of an activity may vary with the setting." CEQA encourages lead agencies to develop and publish their own thresholds of significance for the purpose of determining the significant effects of their projects. The fundamental definition of significant effect under CEQA is "a substantial adverse change in physical conditions." This criterion underlies the evaluation of environmental impacts for most of the impact issues identified in the CEQA Environmental Checklist Form (Guidelines Appendix G).

Some impact categories lend themselves to scientific or mathematical analysis, and therefore to quantification. Some categories have significance thresholds established by regulatory agencies, such as the California Department of Conservation or the regional air quality management district. For other impact categories that are more qualitative or are entirely dependent on the immediate setting, a hard-and-fast threshold is not generally feasible, and the "substantial adverse change in physical conditions" *significance criterion* is applied.. In the current analysis, the *JPB* has given careful consideration to the issue of significance and has applied the significance criteria shown in Table 5.1-1 to evaluate the significance of the effects of the Caltrain Electrification Program under CEQA. *The first column identifies the corresponding EA/FEIR section where the environmental effects for the respective impact category can be found.*

CEQA does not require a discussion of socioeconomic effects except where they would result in physical changes *to the environment*, and states that social or economic effects shall not be treated as significant effects (see CEQA Guidelines Sections 15064(f) and 15131). Given also that the Electrification Program will not have socioeconomic effects that either cause or result from physical changes, socioeconomic impact categories are not included in Table 5.1-1.

Table 5.1-1: CEQA Significance Threshold for Selected Environmental Impact Categories

EA/*FEIR* Sec*tion* N*umbers*	**Impact Category**	**Explanation of CEQA Significance Threshold**	**Source(s)**
3.1	Aesthetics	The project would have a significant effect on the environment if it would (a) have a substantial adverse effect on a scenic vista; (b) substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway; (c) substantially degrade the existing visual character or quality of the site and its surroundings; or (d) create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.	State CEQA Guidelines, Appendix G Checklist
3.2	Agricultural Resources	The project would have a significant effect on the environment if it would (a) convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use; (b) conflict with existing zoning for agricultural use, or a Williamson Act contract; *or* (c) involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use.	State CEQA Guidelines Appendix G Checklist
3.3, 4.2.*2*	Air Quality	A significant impact would occur if the project would *(a) conflict with or obstruct implementation of an applicable air quality plan*; *(b) violate any air quality standard to an existing or projected air quality violation; (c)* result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable ambient air quality standard; *(d)* expose sensitive receptors to substantial pollutant concentrations; or *(e)* create objectionable odors affecting a substantial number of people.	State CEQA Guidelines, Appendix G Checklist; US EPA; BAAQMD

Table 5.1-1: CEQA Significance Threshold for Selected Environmental Impact Categories

EA/*FEIR* Sec*tion* N*umbers*	**Impact Category**	**Explanation of CEQA Significance Threshold**	**Source(s)**
3.4	Biological Resources	A significant impact would occur if the project would (a) have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies or regulations or by CDFG or USFWS; *(*b) have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by CDFG or USFWS; (c) have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the *CWA through direct removal, filling, hydrological interruption, or other means*; (d) interfere substantially with the movement of native resident or migratory fish or wildlife species, wildlife corridors, or wildlife nursery sites; (e) conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; *or* (f) conflict with the provisions of an approved local, regional, or state habitat conservation plan.	State CEQA Guidelines, Appendix G Checklist
3.5	Cultural Resources	A significant impact would occur if the project would *(a)* cause a substantial adverse change in the significance of a historical or archaeological resource as defined in Public Resources Code Section 15064.5; *(b)* directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or *(c)* disturb any human remains, including those interred outside of formal cemeteries. No quantitative threshold exists.	State CEQA Guidelines, Appendix G Checklist, and CEQA Sec. 21084.1.
3.6	Geology*, Soils, and* Seismicity	A significant impact would occur if the project would (a) expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving (i) rupture of a known earthquake fault, (ii) strong seismic ground shaking, (iii) seismic-related ground failure, including liquefaction*, or* (iv) landslides; (b) result in substantial soil erosion or loss of topsoil; (c) be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse; *or* (d) be located on expansive soil as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.	State CEQA Guidelines, Appendix G Checklist

Table 5.1-1: CEQA Significance Threshold for Selected Environmental Impact Categories

EA/*FEIR* Sec*tion* N*umbers*	**Impact Category**	**Explanation of CEQA Significance Threshold**	**Source(s)**
3.7	Hazardous *Waste and* Materials	A significant impact would occur if the project would (a) create a significant hazard to the public or the environment through the routine transport, use, or disposal o*f* hazardous materials; (b) 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; (c) emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within *0.25*-mile of an existing or proposed school; (d) 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, created significant hazard to the public or the environment; (e) *for a project located within an airport land use plan or within 2 miles of a public airport or public use airport or within the vicinity of a private airstrip* result in a safety hazard for people residing or working in the project vicinity; (f) impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; *or* (g) expose people or structures to a significant risk of loss, injury, or death involving wildland fires.	Derived from State CEQA Guidelines, Appendix G Checklist
3.8	Hydrology, Floodplain, *and* Water Quality	A significant impact would *occur if the project would* (a) violate any water quality standards or waste discharge requirements; (b) substantially deplete groundwater supplies or interfere substantially with groundwater recharge; (c) substantially alter the existing drainage pattern of the site or area in a manner *that* would result in substantial erosion or siltation on- or off-site; (d) substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site; (e) create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; (f) otherwise substantially degrade water quality*; (g) place housing within a 100-year flood hazard area; (h) place within a 100-year flood hazard area structures that would impede or redirect flood flows; (i) expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or (j) inundation by seiche, tsunami, or mudflow.*	State CEQA Guidelines, Appendix G Checklist

Table 5.1-1: CEQA Significance Threshold for Selected Environmental Impact Categories

EA/*FEIR* Sec*tion* N*umbers*	**Impact Category**	**Explanation of CEQA Significance Threshold**	**Source(s)**
3.9	Land Use and Planning	A significant impact would occur if the project would (a) physically divide an established community; (b) conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project *adopted for the purpose of avoiding or mitigating an environmental effect*; or (c) conflict with any applicable habitat conservation plan or natural community conservation plan.	State CEQA Guidelines Appendix G Checklist
3.10	Mineral and Energy Resources	A significant impact would occur if the project would (a) result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or (b) result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. A significant impact would occur if the project would result in a substantial increase in energy consumption to the extent that energy generation capacity is exceeded, based on currently available projections, or unacceptable demands are placed on energy supply and distribution systems.	State CEQA Guidelines, Appendix G Checklist
3.11	Noise and Vibration	A significant noise impact would occur if the project would result in (a) exposure of persons to or generation of noise levels in excess of standards established in local general plans or noise ordinances; (b) exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels (vibration of 75 VdB is generally considered intrusive for residential uses); (c) a substantial permanent increase in ambient noise in the project vicinity (an increase of 10 db, perceived as a doubling of noise, is generally considered substantial); (d) a substantial temporary or periodic increase in ambient noise levels in the project vicinity*; or (e) for a project located within an airport land use plan or within 2 miles of a public airport or public use airport or within the vicinity of a private airstrip expose people residing or working in the project area to excessive noise levels.*	State CEQA Guidelines, Appendix G Checklist, FTA Noise and Vibration Criteria
3.12	Population and Housing	A significant impact would occur if the project would (a) induce substantial population growth in an area, either directly or indirectly; *or* (b) displace substantial numbers of existing housing units or people, necessitating the construction of replacement housing elsewhere.	State CEQA Guidelines, Appendix G Checklist

Table 5.1-1: CEQA Significance Threshold for Selected Environmental Impact Categories

EA/*FEIR* Sec*tion* N*umbers*	Impact Category	Explanation of CEQA Significance Threshold	Source(s)
3.13, 3.16	Public Services and Facilities	A significant impact would occur if the project would result in substantial adverse physical impacts associated with the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection, police protection, schools, parks, or other public *utilities and* facilities.	State CEQA Guidelines Appendix G Checklist
3.14	Recreation	A significant impact would occur if the project would (a) increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; *or* (b) include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.	State CEQA Guidelines Appendix G Checklist
3.15	Transportation/ Traffic	A significant impact would occur if the project would (a) cause an increase in traffic *that* is substantial in relation to the existing traffic load and capacity of the street system; (b) exceed, either individually or cumulatively, a level of service standard established by the local county congestion management agency; (c) substantially increase hazards due to a design feature; (d) result in inadequate emergency access; (e) result in inadequate parking capacity; *or* (f) conflict with adopted policies, plans, or programs supporting alternative transportation.	State CEQA Guidelines Appendix G Checklist.
3.17	Electromagnetic Fields and Electromagnetic Interference	A significant impact would occur if the project would (a) increase the ambient electromagnetic field strengths (AC) to a level where demonstrated adverse human health effects are likely to result; *or* (b) cause substantial interference and disruption of other electronic devices, resulting in substandard performance.	Peninsula Corridor Joint Powers Board
Chapter 4	Temporary Construction Period Effects	Construction phase impacts on traffic, transit, noise, air quality, and the visual environment would generally not be considered significant since construction-related changes are by their nature temporary. A significant impact would occur only if temporary effects substantially affected accessibility to an area for a long period of time, caused the loss or relocation of substantial numbers of businesses or residences, or posed a severe health or safety threat.	Derived from State CEQA Guidelines, Section 15382

Source: Parsons Transportation Group and other sources as noted, December 2001.

5.2 UNAVOIDABLE SIGNIFICANT ADVERSE EFFECTS UNDER CEQA

With the mitigation measures *and design features* identified in Chapters 3 and 4 of this document, no unavoidable significant impacts would result from the proposed project.

5.3 CUMULATIVE EFFECTS

CEQA defines cumulative impacts as “two or more individual effects which, when considered together are considerable,” and suggests that cumulative impacts may “result from individually minor but collectively significant projects taking place over a period of time” (State CEQA Guidelines Section 15355). CEQA documents are required to include a discussion of potential cumulative effects *when those effects are significant* and the State CEQA Guidelines suggest two possible methods for assessing potential cumulative effects (State CEQA Guidelines Section 15130). The first method is a list-based approach, which considers a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts. The second method is projections-based and uses a summary of projections contained in an adopted general plan or related planning document that is designed to evaluate regional or areawide conditions. The projections-based method is generally used by *the* JPB in evaluating projects within its jurisdiction.

While the use of regional projections is one possible method of analyzing cumulative effects under CEQA, it is the required method under NEPA. FTA guidelines require that regional growth projections from the *MPO* (MTC in this case) be used as input for the assumed future year conditions.

Since both NEPA and CEQA require discussion of cumulative effects, the cumulative impacts evaluated for this project are described in Section 3.18. No significant cumulative impacts were identified.

5.4 GROWTH INDUCEMENT

CEQA requires a consideration of a project’s capacity to induce growth. Growth inducement would occur if the amount of population or employment growth projected to occur as a result of the project would exceed planned levels. Increased development and growth in an area are dependent on a variety of factors, including employment and other opportunities, availability of developable land, and availability of infrastructure, water, and power resources.

A growth inducement analysis was conducted for the Electrification Program Alternative, as described in Section 3.12.4. This analysis determined that *the* proposed project would *only* result in *minor* travel time savings *and* it would have virtually no effect on the overall growth pressures in the project corridor. Because Caltrain serves only developed areas within a well-established rail corridor and does not extend this corridor or provide access to undeveloped areas, the reduced travel times would not materially induce growth.

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Chapter 6: Consultation and Coordination

CHAPTER 6: CONSULTATION AND COORDINATION

This environmental document was prepared on the basis of consultation and coordination with federal, state, and local agencies, and with elected officials, community leaders, organizations, and other individuals from the communities within the Caltrain Corridor. Coordination and consultation *was* achieved through publication of formal notices, informational meetings and mailings. Public hearings *were* held during the circulation period for this environmental document.

6.1 PUBLIC INVOLVEMENT AND INFORMATION PROGRAM

The Public Involvement and Information Program integrated two "tracks" of activities: public involvement and public information. Public involvement activities provide opportunities for the public, as well as agency personnel, to express issues of concern to help guide the preparation of the environmental studies and to review project impacts as determined by the studies. Public information activities enable citizens and agencies alike to learn about the project, developing issues, the environmental studies, and the planning process.

6.1.1 PUBLIC INVOLVEMENT ACTIVITIES

Two rounds of public meetings were *conducted* to present the project and obtain input on the environmental studies and any issues of particular concern to individuals or constituencies. Each round was designed to facilitate participation by members of all communities throughout the Peninsula Corridor by scheduling meetings at four different locations in the Caltrain corridor. Notification of the meetings was by direct mailing and/or publication in newspapers of general circulation.

The early round of meetings satisfied the requirements of NEPA and CEQA for public input to the project alternatives and the scope of the environmental studies, and enabled participants to become better informed about the project, the environmental studies, and the planning process. Public hearings *were* also held in four *dispersed corridor* locations during the circulation period for the environmental document, to enable participants to comment on the environmental study results. The responses to comments raised during the public hearings *are presented in Volume 2 of this EA/Final EIR; they* will be used by decision makers to determine whether to approve the project.

6.1.1.1 Scoping

<u>Environmental Scoping / Initiation of Studies Meetings.</u> Environmental Scoping Meetings were held between September 6 and September 21, 2000. Meetings were conducted in San Francisco, San Carlos, Santa Clara, and Morgan Hill to announce the initiation of environmental studies for the Electrification Program and to obtain public and agency input to the project alternatives to be evaluated and the scope of the environmental studies. The meeting format included formal presentations on the Electrification Program and environmental studies, as well as the other Caltrain system and facility rehabilitation and enhancement activities being carried out by the JPB. All meetings provided translation into other languages and signing for the hearing impaired, and all locations were accessible by

Caltrain. The presentations were followed by a question-and-answer period to address participants' concerns and obtain their comments regarding the Caltrain Electrification Program project alternatives and scope and content of the environmental studies.

A unique feature of these meetings was a "visioning" process designed to elicit participants' aspirations for the longer-term future of Caltrain service throughout the corridor. The visioning process was held after and as a separate agenda item from the Electrification Program scoping meeting.

The meetings were advertised in flyers directly mailed to all residential and business addresses within *0.5*-mile of the Caltrain corridor from San Francisco to Gilroy. Also, press releases were sent to newspaper, radio, and television contacts throughout the corridor, and flyers were delivered to city halls and main libraries and distributed on Caltrain cars during the several weeks prior to the meetings. *More than* 275 members of the public and agency representatives attended these meetings and provided numerous oral comments and *approximately* 10 written comments regarding their concerns for the project. The comments were recorded and summarized in the "Initiation of the Environmental Review Public Meetings: Summary Report," October 2000.

Written comments were also received during the 30-day scoping comment period. Written comments were received from the following agencies:

U.S. Environmental Protection Agency (EPA)
California Department of Toxic Substances Control *(DTSC)*
Caltrans
San Mateo County Council/League of Women Voters of San Mateo County
Santa Clara Valley Transportation Authority (VTA)
City of Burlingame Planning Department
City of Burlingame Public Works Department
City of San Bruno Community Development Department
City and County of San Francisco, Planning Department
City of Sunnyvale
Town of Colma Planning Department
City/County Association of Governments of San Mateo County
Office of the City Manager, City of Mountain View

Approximately 40 letters and e-mails from individuals and *3* letters from associations (San Bruno Chamber of Commerce, San Francisco Tomorrow, and Regional Alliance for Transit [RAFT]) were received during the scoping comment period. All of the comments received have been taken into consideration in developing the project alternatives and environmental technical studies.

6.1.1.2 Public Hearings

Public hearings *were* held during the comment period on *the* Draft EA/EIR document. Hearings *were* conducted in the following San Francisco, San Carlos, *Sunnyvale*, and Morgan Hill *locations* to facilitate participation by individuals throughout the corridor communities:

600 Townsend Street (at 7th Street)
San Francisco, CA
Thursday, April 22, 2004; 6:00 until 8:00 p.m.

Sunnyvale Community Center Arboretum
550 Remington Drive, Sunnyvale, CA
Saturday, April 24, 2004; 10:00 a.m. until noon

Morgan Hill Cultural and Community Center
17000 Monterey Road
Morgan Hill, CA
Wednesday, April 28, 2004; 6:00 until 8:00 p.m.

Caltrain Headquarters
1250 San Carlos Avenue
San Carlos, CA
Saturday, May 1, 2004; 10:00 a.m. until noon

The hearings *were* scheduled in the middle of the comment period to enable community members to become familiar with the environmental document prior to the meetings, but also to have time to review the document and comment on it following the meetings. These meetings *were* advertised in flyers directly mailed to all *individuals and organizations on the project mailing list. Meeting announcements were posted at Caltrain stations, and "take one" cards advertising the meetings were provided on trains. Also, display ads were placed in newspapers of general circulation for 4 weeks, including 2 weeks prior to the meetings and the 2 weeks encompassing the meetings. Finally*, press releases *were provided to major media outlets throughout the Caltrain corridor*.

A formal presentation, followed by a question-and-answer period, *was provided at* each meeting. Informational materials and displays present*ed* the results of the environmental studies and the findings of the environmental document. Written comments *were* solicited, *and oral comments were tape recorded*. Written responses *to* all written comments on the Draft EA/Draft EIR received at the public hearings or during the public comment period *are provided in Volume 2 of this EA/Final EIR.*

Approximately 100 people attended the 4 meetings, at which 36 oral comments were recorded and 12 comment cards collected. As presented in Volume 2, 24 federal, state, local, transit, or regional agencies; 7 associations and organizations; and 87 businesses and individuals provided written comments for which written responses were prepared. The public hearings are summarized in the "Caltrain Electrification Program Review of Draft Environmental Document Public Meetings Summary Report," May, 2004.

The JPB has considered all of the comments received on the Draft EA/Draft EIR in identifying the Electrification Program as the preferred alternative and EMUs as the preferred rolling stock as described in Chapter 2. The JPB will consider all of the comments received on the Draft EA/Draft EIR before certifying the EIR at a duly noticed JPB meeting that incorporates a public hearing.

6.1.2 PUBLIC INFORMATIONAL MEETINGS

An update on the Electrification Program was provided to the public at an informational meeting in the JPB Board room on November 15, 2001. A formal presentation described the Electrification Program design criteria; the traction power system study report; electrification facilities, including rolling stock, power supply station facilities and equipment, and *OCS* pole and wiring configurations; and provided the preliminary capital cost estimate. The presentation was followed by a question-and-answer period that enabled participants to comment about the project.

It is anticipated that *one or more* informational meetings will be held prior to formal *certification* of the environmental document *or the project action decision*. These meetings will include a formal presentation of the results of the environmental studies, present details of the preferred alternative, and disclose the anticipated schedule for completion and construction of the electrification facilities. It is anticipated that these meetings will be advertised through direct mailings, flyers, and press releases, *and that* meeting locations will be accessible by Caltrain.

6.1.3 OTHER PUBLIC INFORMATION MECHANISMS

6.1.3.1 Newsletters and Flyers

Flyers announcing project information meetings and hearings have been prepared throughout the studies. The first information flyer announced the initiation-of-studies meetings and was directly mailed to all residential and business addresses within *0.5*-mile of the Caltrain corridor, distributed to city halls and main libraries throughout the corridor, and made available on Caltrain cars. The second information flyer announce*d* the *availability* and public hearings for the environmental document *and was mailed to all parties on the project mailing list. A third information flyer to summarize the results of the hearings and the environmental process is anticipated.*

6.1.3.2 Media Relations and Publicity

The project team maintains a current list of print, radio, and television media representatives for the purpose of distributing press releases about the project and project meetings.

6.1.3.3 Circulation of the Draft Environmental Document

The EA/Draft EIR was made available for online review on the Caltrain Web site, and 238 printed copies were directly mailed to agencies and individuals. Copies were also made available for review at Caltrain's Headquarters in San Carlos, at the San Francisco Central Library on Larkin Street, and at the main libraries of cities located within the Caltrain corridor. Additional compact disc copies were provided on request to agencies and individuals during the comment period. Direct mail flyers and display ads noticing the availability of the environmental document and the times and places for the public hearings were mailed and placed as described in Section 6.1.1.2, Public Hearings. The document was released for public review on April 5, 2004, and the public comment period officially closed on May 25, 2004.

6.2 CONSULTATIONS

6.2.1 CONSULTATION MEETINGS WITH COVENANT HOLDER FOR HISTORIC RAILROAD STATIONS

Consultation meetings were held March 19, 2001, and November 20, 2001, in JPB offices in San Carlos with Lorie Garcia, South Bay Historical Railroad Society, Covenant Holder for the six historic railroad stations within the Caltrain corridor. The first meeting was conducted to present the Electrification Program and obtain Ms. Garcia's input regarding the potential effects of the project facilities on the corridor's historic station resources and to identify preferred approaches to avoid impacts on these resources. The second meeting was held to present plans for the OCS facilities at all six historic stations and review visual simulations of the OCS facilities at the Cahill (Diridon) and Santa Clara stations to obtain Ms. Garcia's reactions and input regarding any remaining concerns. These comments were taken into consideration in developing OCS configurations and pole placement and treatments in the vicinity of the historic stations.

6.2.2 OTHER CONSULTATIONS

All public agencies formally or informally contacted and consulted during the preparation of this environmental document, including those *that* received notice or a copy of this EA/EIR, *are listed below*:

Bureau of Indian Affairs
Native American Heritage Commission
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
California Office of Historic Preservation
California Department of Fish and Game
California Air Resources Board
California Public Utilities Commission
Caltrans, District 4
Sonoma State University Information Center
Covenant Holder, South Bay Historical Railroad Society
Bay Area Air Quality Management District
Metropolitan Transportation Commission
San Francisco Public Utilities Commission
San Mateo County Transportation Authority
Santa Clara Valley Transportation Authority
Santa Clara County Historical Heritage Commission
Heritage Council of Santa Clara County
San Mateo County Historical Association *and Museum*
Gilroy Historical Society
Historical Preservation Society of Santa Clara
Milpitas Cultural Resources Preservation Board
Milpitas Historical Society
Morgan Hill Architectural Cultural Resources Board
Morgan Hill Historical Society and Museum
Mountain View Pioneer and Historical Society
Palo Alto Historic Resources Board
Palo Alto Historical Association
Preservation Action Council of San Jose
San Jose Historical Landmarks Commission
Santa Clara Historical Landmarks Commission
Sunnyvale Heritage Preservation Commission
Sunnyvale Historical Society and Museum *Association*
Millbrae Historical Society
Redwood City Heritage Association
Foundation of San Francisco's Architectural Heritage
San Francisco Historical Society
South Bay Historical Railroad Society, Inc.
California Trolley and Railroad Corporation
Central Coast Chapter, N*ational* R*ailway* H*istoric* S*ociety*
City of San Francisco
City of South San Francisco
City of Brisbane
City of San Bruno
City of Millbrae
City of Burlingame
City of San Mateo
City of Belmont
City of San Carlos
City of Redwood City

City of Foster City
City of Menlo Park
City of Palo Alto
City of Mountain View
City of Sunnyvale
City of Santa Clara
City of San Jose
City of Morgan Hill
City of Gilroy
Town of Atherton

*Public and p*rivate entities, groups, and individuals contacted and consulted during preparation of this environmental document are listed below:

Dennis Kennedy, Mayor of Morgan Hill
Patricia Dixon, Michael Barber, Ed Stoehr, Citizens Advisory Committee of San Mateo County Transportation Authority
Howard Mason, City of Belmont
Lee Panza, City of Brisbane
Bob Bates, Metropolitan Transportation Commission
Frank Sharpless, Jennifer Reilly, Rudy Lemus, Ann Catherine Vinickas, Santa Clara Valley Transportation Authority
Lisa Nissan, City of Mountain View
Richard Yee, City of Santa Clara
Jack Witthaus, City of Sunnyvale
Chris Stampolis, Santa Clara Planning Commission
Mike Learned, U.S. Census
Sila Warner, AC Transit
Jason Lee, B*ay* A*rea* R*apid* T*ransit*
Joseph M. Steffanic, U*nited* S*tates* D*epartment of* T*ransportation* – F*ederal* R*ailroad* A*dministration*
Anthony Lee, Caltrans
John Hronowski, JPB Citizens Advisory Committee
Gary Bonte, Redwood City Planning Department
Pacific Gas and Electric Company
Union Pacific Railroad
Amtrak
Liquid Carbonic (LNG for Locomotives)
Southwest Research Institute (LNG and Clean Diesel Locomotives)
Energy Conversions (Clean Diesel Locomotives)
Bay Rail Alliance (formerly Peninsula Rail 2000)
Sierra Club Transportation Committee (Loma Prieta Chapter)
AT&T
Pacific Bell
MCI Worldcom

6.3 CEQA NOTICING

6.3.1 NOTICE OF PREPARATION

On September 6, 2000, a Notice of Preparation *(NOP)* to prepare an *EIR* was published and distributed to California *state* agencies and other interested parties. NOP packages were distributed through the *Governor's* Office of Planning and Research (State Clearinghouse). Approximately 60 written comments to the NOP were received during and following the 30-day scoping period. These comments were taken into consideration in developing the project alternatives and scoping the environmental technical studies reported on in this environmental document.

6.3.2 NOTICES OF COMPLETION AND DETERMINATION

A Notice of Completion was sent to the Office of Planning and Research (State Clearinghouse) on March 29, 2004, to announce the completion of the draft environmental document and request its distribution to state agencies for comment. Should the Electrification Program be approved, the JPB will file a Notice of Determination with the county clerk in San Francisco, San Mateo, and Santa Clara counties and with the Governor's Office of Planning and Research.

6.4 PERMITS AND APPROVALS

The permits and approvals involving other local, state, and federal agencies that may be required prior to project implementation and uses of this document by other agencies are described in Sections 1.4 and 1.5.

6.5 CHRONOLOGY OF COORDINATION

Following is a chronology of consultation and coordination activities conducted in conjunction with the preparation of the environmental studies and this environmental document:

- Information Meetings/Electrification Program Update:
  - Santa Clara – March 28, 2000
  - San Mateo City Council – April 3, 2000
  - Menlo Park City Council – May 9, 2000
  - San Bruno – July 11, 2000
- Project Information Flyer #1 – Issued August 26, 2000
- Scoping/Re-initiation of Studies Meetings: September 6, 13, 14, and 21, 2000
- Information Meetings/Electrification Program Update:
  - San Carlos Chamber of Commerce – November 16, 2000
  - Palo Alto City Hall – January 17, 2001
- Information Meeting/EMUs – February 1, 2001

- Consultation Meeting with Covenant Holder on historic railroad stations – March 19, 2001
- Information Meetings/Electrification Program Update – November 15, 2001
- Consultation Meeting with Covenant Holder on *historic* railroad stations – November 20, 2001
- *Draft* EA/Draft EIR issued April 5, 2004
- Project Information Flyer #2 issued April 6, 2004
- Public Comment period for *Draft* EA/Draft EIR – April *5* until May 25, 2004
- The JPB Board is provided a quarterly update on the status of ongoing projects *on a regular basis.* The Caltrain Electrification Program was discussed with public comment at the following JPB Board meetings:
  - February 7, 2002
  - May 2, 2002
  - September 5, 2002
  - October 31, 2002
  - February 6, 2003
  - May 1, 2003
  - August 7, 2003
  - November 6, 2003
  - *February 5, 2004*
  - *May 6, 2004*
  - *August 5, 2004*
  - *November 4, 2004*
  - *Public Hearings and Presentations on the Draft EA/Draft EIR:*
    - *April 22, 2004, San Francisco*
    - *April 24, 2004, Sunnyvale*
    - *April 28, 2004, Morgan Hill*
    - *May 1, 2004, San Carlos*
  - *Coordination and update meetings:*
    - *January 29, 2008 South San Francisco*
    - *February 5, 2008 San Mateo*
    - *February 6, 2008 Sunnyvale*
    - *February 11, 2008 Redwood City*
    - *February 11, 2008 Burlingame*
    - *February 14, 2008 Sunnyvale*
    - *February 27, 2008 San Francisco*
    - *March 20, 2008 Mountain View*
    - *April 21, 2008 Burlingame*

Appendix A: Environmental Checklist Form

ENVIRONMENTAL CHECKLIST FORM

The following checklist has been prepared according to the CEQA Guidelines and was used to identify physical, biological, and socioeconomic impacts of the project. Evaluation of environmental impacts is documented in Chapter 3, "*Environmental* Setting *and* Consequences," for each impact category and issue in turn. *B*ased upon technical studies performed for the Caltrain Electrification Program, *Chapter 3* provide*s* impact *assessments for* issues where potential impacts are indicated on the checklist. Mitigation measures for effects of the Caltrain Electrification Program are also discussed *in Chapter 3* under each impact category and issue.

Environmental Issues	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporation**	**Less Than Significant Impact**	**No Impact**
I. AESTHETICS -- Would the project:				
a) Have a substantial adverse effect on a scenic vista?				☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			☒	
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			☒	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?			☒	
II. AGRICULTURE RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?			☒	
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?			☒	
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?				☒
III. AIR QUALITY -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				☒
d) Expose sensitive receptors to substantial pollutant concentrations?				☒
e) Create objectionable odors affecting a substantial number of people?				☒

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES -- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				☒
V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?			☒	
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?				☒

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				☒
d) Disturb any human remains, including those interred outside of formal cemeteries?				☒
VI. GEOLOGY AND SOILS -- Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				☒
ii) Strong seismic ground shaking?				☒
iii) Seismic-related ground failure, including liquefaction?				☒
iv) Landslides?				☒
b) Result in substantial soil erosion or the loss of topsoil?				☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				☒

Environmental Issues	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporation**	**Less Than Significant Impact**	**No Impact**
VII. HAZARDS AND HAZARDOUS MATERIALS -- Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				☒
b) 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?				☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			☒	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				☒
VIII. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements?				☒

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?				X
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?			X	
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?			X	
j) Inundation by seiche, tsunami, or mudflow?				X
IX. LAND USE AND PLANNING -- Would the project:				
a) Physically divide an established community?				X

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			☒	
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				☒
X. MINERAL RESOURCES -- Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				☒
XI. NOISE -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			☒	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				☒

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				☒
XII. POPULATION AND HOUSING -- Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				☒
XIII. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?				☒
Police protection?				☒
Schools?				☒
Parks?				☒
Other public facilities?				☒

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XIV. RECREATION --				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				☒
XV. TRANSPORTATION/TRAFFIC -- Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				☒
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				☒
c) 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 risks?				☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				☒
e) Result in inadequate emergency access?				☒
f) Result in inadequate parking capacity?			☒	
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				☒
XVI. UTILITIES AND SERVICE SYSTEMS -- Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				☒

Environmental Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project’s projected demand in addition to the provider’s existing commitments?				☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project’s solid waste disposal needs?				☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?				☒
XVII. MANDATORY FINDINGS OF SIGNIFICANCE --				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				☒

Environmental Issues	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporation**	**Less Than Significant Impact**	**No Impact**
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?				☒
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				☒

Appendix B: Definitions, Abbreviations, and Acronyms

APPENDIX B: DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

Definitions and Abbreviations

acre – A unit of measurement of area equivalent to 43,560 square feet.

alluvium – Deposits resulting from the operations of water including floodplains, lakes, rivers, and fans at the foot of mountain slopes.

aquifer – A permeable region of rock or soil through which groundwater can move.

aquitard – A material of low permeability that greatly slows the movement of groundwater.

British thermal unit (BTU) – A unit of heat energy defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. One BTU equals approximately 778.169 foot pounds, 1.055 056 kilojoules, or 0.293 071 watt hour.

candidate species – Any species of fish, wildlife, or plant *that* has been determined to be a candidate for listing under Section 4 of the Endangered Species Act of 1973 (amended).

catenary – A messenger wire that sags between support points (much like a utility transmission line), which supports, by means of intermediate wire hangers, an essentially level contact wire for the overhead contact system (OCS).

California Environmental Quality Act (CEQA) – Modeled after NEPA, this California state law encourages the protection of the environment through policies and procedural requirements.

***consist** – The number of vehicles assembled together into a train.*

cultural resources – Archaeological and historic resources that could potentially be affected by a given project. Cultural resources include buildings, sites, districts, structures, or objects having historical, architectural, archaeological, cultural, or scientific importance.

cumulative impact – The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

dBA – A sound level in decibels *(dB)*, measured with a sound-level meter having metering characteristics and frequency weighting specified in American National Standard Specifications for sound-level meters ANSIS1.4-1971. It is common to refer to numerical units of an A-weighted sound level as "dBA."

Environmental Assessment/Draft Environmental Impact Report (**EA/DEIR**) – A report that determines whether the project will have a*n adverse* effect on the environment in accordance with NEPA, and identifies and analyzes *potentially significant* environmental effects of project alternatives in accordance with CEQA.

electromagnetic field (EMF) – electromagnetic fields associated with electromagnetic radiation.

electromagnetic interference (EMI) – Electromagnetic interference may include the interruption, obstruction, or other degradation in the effective performance of *electronics and electrical equipment.*

fill – Earth used to create embankments or to raise low-lying areas in order to bring them to grade.

Finding of No Significant Impact/Final Environmental Impact Report (FONSI/FEIR) – A report that responds to comments received on the EA/DEIR, presents a finding of no significant impact in accordance with NEPA, and identifies and analyzes environmental effects of a preferred project alternative in accordance with CEQA.

floodplain – The part of the ground surface inundated with water on a recurring basis, usually associated with the one percent recurrence interval (100-year) flow.

g – horizontal ground acceleration

gram – Unit of measurement of mass, metric system.

ha – hectare – *a unit of surface area equal to* 10,000 square meters *or approximately 2.47 square acres*

High-Occupancy Vehicle (**HOV**) – A "carpool" or vehicle occupied by two or more persons.

High-Occupancy Vehicle lane (HOV Lane) – A system of exclusive lanes signed and striped for use by vehicles with multiple occupants (two or more persons) or ridership. HOV lanes are designed on roadways to reduce traffic congestion, improve safety, reduce fuel consumption, and improve air quality.

Kilo – Prefix used in metric measurement, 1,000.

KiloJoule – kJ – A common metric unit of work or energy, comparable to the British thermal unit (BTU). One kiloJoule equals approximately 0.947 817 Btu, 0.277 778 watt hour, or 737.562 foot-pounds.

kiss-and-ride – A passenger loading area where vehicles can pick up and drop off passengers.

L_{dn} – Day-Night Equivalent Sound Level – A 24-hour equivalent sound level with a 10-dB penalty assessed to noise events occurring at night (10*:00* p.m. to 7*:00* a.m.).

L_{eq} – Equivalent Sound Level – A measure of sound energy over a period of time, or a sound level which, in a stated period of time, would contain the same acoustical energy as the time-varying sound during the same period.

Level of Service (LOS) – *A term used to describe t*he operating level of an intersection or roadway segment. LOS is a qualitative description of traffic operation based on delay and maneuverability. For roadways, it can range from “A” – representing free flow conditions – to “F” – representing gridlock. Intersection LOS is determined on the basis of delay.

liter – Unit of measurement of volume (metric system).

L_{max} *– Maximum Sound Pressure Level – The greatest instantaneous sound pressure level observed during a single noise measurement level.*

milliGauss (**mG**) – A unit of magnetic flux density equal to 0.001 Gauss or 0.1 microTesla. The magnetic fields generated by power lines and electronic equipment are often measured in milliGauss.

mitigation – Measures taken to minimize adverse environmental impacts. Mitigation could reduce the magnitude and extent of an impact from a level of significance to a level of insignificance.

microTesla (**µT**) – A common unit of magnetic field intensity equal to 10^{-6} Tesla. The unit is widely used to measure the strength of electromagnetic fields generated by powerlines or electronic equipment. By comparison, the strength of the Earth's own magnetic field at the surface is *approximately* 50 microTeslas. One microTesla equals 0.01 Gauss.

National Environmental Policy Act (**NEPA**) – The United States' basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.

National Historic Preservation Act of 1966 – The primary federal law pertaining to protection of cultural resources.

National Register of Historic Places – A federal listing of historic resources protected under the National Historic Preservation Act of 1966.

National Register-eligible – Cultural resources determined eligible for inclusion on the National Register of Historic Places.

nonpoint source – Pertains to the discharge of pollutants into waters or air where the pollutant sources come from an area rather than a single source that can be pinpointed.

overhead contact system (OCS) – An overhead system that provides power to electric vehicles. A mainline OCS typically comprises two conductors above each track in a catenary configuration. Both main wires are energized and are electrically common. Power is supplied from the contact wire to the pantograph.

ozone – A major component of photochemical smog, which is formed in the atmosphere by the chemical reaction between nitrogen dioxide and organic gases in the presence of sunlight. Excessive levels of ozone can cause eye irritation, reduced visibility, vegetation damage and aggravation of respiratory conditions. The biggest source of these gases is the automobile.

pantograph – Mounted on top of an electric vehicle, the pantograph slides under the contact wire and collects the traction current from it.

park-and-ride – A parking area intended for transit riders who arrive at transit stations by car.

$PM_{2.5}$ – Particulate matter less than 2.5 microns in diameter, considered to be fine particulate matter*; o*ne micron is equal to one-millionth of a meter.

PM_{10} – Particulate matter less than 10 microns in diameter*; o*ne micron is equal to one-millionth of a meter.

PPV – Peak particle velocity. The maximum instantaneous peak in the velocity of an object's vibratory motion. The PPV is used to define thresholds of potential building damage from vibration.

right-of-way – Land dedicated to the transportation facility.

Root-mean-square amplitude (**RMS**) **–** The average energy of vibration measured over a short time interval, usually one second. RMS vibration velocity is considered the best available measure of potential human annoyance from ground-borne vibration.

Section 106 – Section 106 of the National Historic Preservation Act of 1966.

SEL *– Sound Exposure Level – A receiver's cumulative noise exposure from a single noise event.*

State Implementation Plan (**SIP**) – *A* plan for attaining national ambient air quality standards required by the Clean Air Act.

U.S. Army Corps of Engineers (ACOE) – Federal agency with jurisdiction over wetlands and waters of the U.S.

U.S. Environmental Protection Agency (EPA) – The federal agency responsible for maintaining environmental quality including air quality, *water quality*, noise, and hazardous waste management.

U.S. Fish and Wildlife Service (**USFWS**) **–** The federal agency that administers the federal Endangered Species Act and is involved in protection of fish and wildlife habitat including wetland areas.

Vdb – Decibels of vibration velocity. An expression of ground-borne vibrations.

watershed – That part of the earth's surface from which stormwater runoff flows to a single point.

wetlands – According to the U.S. Army Corps of Engineers, wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, under normal conditions, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and similar areas, and *they* are subject to protection under Executive Order 11990 and Section 404 of the Clean Water Act (CWA).

Glossary of Acronyms

AADT	*average annual daily traffic*
AAR	*Association of American Railroads*
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ac	*a*lternating current
ACE	*Altamont Commuter Express*
ACIH	*American Conference of Industrial Hygienists*
ACOE	*U.S. Army Corps of Engineers*
AC Transit	Alameda Contra Costa Transit District
ADA	Americans with Disabilities Act
ADT	*a*verage *d*aily *t*raffic
Advisory Council	*Advisory Council on Historic Preservation*
APE	*a*rea of *p*otential *e*ffect
ATC	*a*utomatic train control
ATF	*a*uto-*t*ransformer *f*eed
BAAB	Bay Area Air Basin
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BCDC	*San Francisco Bay Conservation and Development Commission*
bgs	*below ground surface*
BMPs	*Best Management Practices*
BRT	*bus rapid transit*
BTU	British thermal unit
CAA	Clean Air Act of 1970
CAAQS	California Ambient Air Quality Standards
California Register	*California Register of Historical Resources*
Caltrans	California Department of Transportation
CAP	*2000 Clean Air Plan*
CARB	California Air Resources Board

CCAA	California Clean Air Act
CDFG	California Department of Fish and Game
CEC	*California Energy Commission*
CEMOF	*centralized equipment maintenance and operations facility*
CEQ	*Council on Environmental Quality*
CEQA	California Environmental Quality Act
CESA	*California Endangered Species Act*
CFR	*Code of Federal Regulations*
CHSRA	*California High-Speed Rail Authority*
CMAQ	*Congestion Management Air Quality*
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	*c*arbon *m*onoxide
CPUC	*California Public Utilities Commission*
CTC	California Transportation Commission or Centralized *Traffic* Control
CTX	*Caltrain Express*
CWA	*Clean Water Act*
CWSC	*California Water Service Company*
c.y.	*c*ubic yards
dB	*decibel*
dc	*d*irect current
DCF	*direct center feed*
DMU	*diesel multiple unit*
DOT	*United States Department of Transportation*
DTSC	*California Department of Toxic Substances Control*
EA/FEIR	Environmental Assessment/*Final* Environmental Impact Report
ECRMP	*El Camino Real Master Plan*
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELF	*extremely low frequency*
EMF	*electromagnetic field*
EMI	*electromagnetic interference*
EMU	Electric Multiple Unit
EPA	*United States* Environmental Protection Agency
ESA	*environmentally sensitive area*
FEIR	Final Environmental Impact Report
FEMA	*Federal Emergency Management Agency*
FESA	*Federal Endangered Species Act*
FHWA	Federal Highway Administration

FIRM	*Flood Insurance Rating Maps*
FOE	*Finding of Effects*
FONSI	Finding of No Significant Impact
FRA	*Federal Railroad Administration*
FTA	Federal Transit Administration
FY	Fiscal Year
HHP	*high horsepower*
HOV	High-Occupancy Vehicle
HP	*horsepower*
HRI	*Historic Resources Inventory*
HSP	*Health and Safety Plan*
HSR	*high-speed rail*
Hz	Hertz
I-280	Interstate 280
I-380	*Interstate 380*
I-880	*Interstate 880*
IEEE	*Institute of Electrical and Electronic Engineers*
IRIS	*Integral Risk Information System*
ISP	*i*ron/*s*teel *p*ipe
ITIP	Interregional Transportation Improvement Program
JPB	Peninsula Corridor Joint Powers Board
kV	*kilovolt*
kV/m	*kilovolts per meter*
kWh	*kilowatt hour*
LNG	*liquefied natural gas*
LOS	*l*evel *o*f *s*ervice
LPA	Locally Preferred Alternative
LRT	*light-rail transit*
MARC	*Maryland Area Regional Commuter service operated by the Maryland Transit Administration*
MCE	*maximum credible earthquake*
mG	*milliGauss*
mg/m^3	*milligrams per cubic meter*
$\mu g/m^3$	*micrograms per cubic meter*
MNRR	*Metro-North Railroad*
mph	*miles per hour*
MPO	Metropolitan Planning Organization
MSAT	*mobile source air toxics*
μT	*microTesla*

MTC	Metropolitan Transportation Commission
Muni	San Francisco Municipal Railway
MVA	*m*illion-volt-amperes
NAAQS	National Ambient Air Quality Standards
NATA	*National Air Toxics Assessment*
NEC	*Northeast Corridor*
NEPA	National Environmental Policy Act
NES	*Natural Environment Study*
NJT	*New Jersey Transit*
NOI	*Notice of Intent*
NOP	Notice of Preparation
NO_2	*nitrogen dioxide*
NO_X	*n*itrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic *Places*
NTSB	*National Transportation Safety Board*
O_3	*o*zone
O&M	*operations* and *m*aintenance
OCS	Overhead Contact System
OHP	*Office of Historic Preservation*
OSHA	Occupational Safety and Health Administration
Pb	*lead*
PCBs	*polychlorinated biphenyls*
PG&E	*Pacific Gas & Electric Company*
pphm	*parts per hundred million*
ppm	*parts per million*
PPV	*peak particle velocity*
PRC	*Public Resources Code*
PS	*paralleling station*
PSD	*Prevention of Significant Deterioration*
PYE	*person years of employment*
RCP	*reinforced concrete pipe*
RMS	*root mean square*
ROG	*reactive organic gases*
RTEP	*Regional Transit Expansion Program*
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality *Control* Board
S*amTrans*	San Mateo County Transit District
SCVWD	*Santa Clara Valley Water District*

SEPTA	*Southeastern Pennsylvania Transportation Authority*
SFCTA	*San Francisco County Transportation Authority*
SFO	San Francisco International Airport
SFPUC	*San Francisco Public Utilities Commission*
SHPO	State Historic Preservation Officer
SMCTA	*San Mateo County Transportation Authority*
SO_2	sulphur dioxide
SR	*State Route*
STP	*Surface* Transportation Program
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	*State Water Resources Control Board*
SWS	*switching station*
TGV	*Train A Grade Vitesse*
THPO	*Tribal Historic Preservation Officer*
TIP	Transportation Improvement Program
TMDLs	*total maximum daily loads*
TMP	*Traffic Management Plan*
tpph	*trips per peak hour*
TPS	Traction Power Substation
UBC	*Uniform Building Code*
UPRR	Union Pacific Railroad
US 101	U.S. Highway 101
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCP	Vitrified Clay Pipe
VMT	Vehicle Miles of Travel
vpd	*vehicles per day*
vph	*vehicles per hour*
VTA	*Santa Clara Valley Transportation Authority*
WAPA	*Western Area Power Administration*
WDRs	*waste discharge requirements*
WPRR	*Western Pacific Railroad*
YOE	*year of expenditure*

Appendix C: Agency Correspondence

Agency Correspondence

Correspondence is included from the following agencies, in the order given below:

Federal Agencies

Agency	Date
U.S. Environmental Protection Agency	September 26, 2000
U.S. Fish and Wildlife Service	November 14, 2001
Natural Resources Conservation Service	February 22, 2002

State Agencies

Agency	Date
Department of Toxic Substances Control	August 31, 2000
Caltrans	September 25, 2000
Native American Heritage Commission	December 12, 2001
Native American Heritage Commission	*January 16, 2008*
Office of Historic Preservation (includes requesting letters from FTA)	December 9, 2002
Office of Historic Preservation (includes requesting letters from FTA)	July 15, 2003

Regional Agencies

Agency	Date
City/County Association of Governments of San Mateo County	August 30, 2000
Santa Clara Valley Transportation Authority	September 28, 2000

Local Agencies

Agency	Date
City of San Mateo	August 2, 2002
City of San Francisco Architectural Heritage	July 29, 2002
City of Brisbane	July 26, 2002
City of Burlingame	July 29, 2002; August 30 and September 8, 2000
Town of Colma	August 31, 2000
City and County of San Francisco	September 6, 2000
City of Sunnyvale	September 15, 2000
City of Mountain View	September 19, 2000
City of San Bruno	July 25, 2002; September 27, 2000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

September 26, 2000

Marie Pang, Environmental Manager
Peninsula Commute Service Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

Dear Ms. Pang:

The U.S. Environmental Protection Agency (EPA) has reviewed the Notice of Preparation to prepare an Environmental Assessment/Environmental Impact Report (EA/EIR) for **The Caltrain 25 kV, 60 Hz ac Electrification Program.** Our comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's (CEQ's) NEPA Implementation Regulations at 40 CFR 1500-1508, and Section 309 of the Clean Air Act.

The proposed project is to convert Caltrain's diesel-hauled trains to electric-hauled trains. Two power feeding systems and two rolling stock options will be considered.

We appreciate this opportunity for early participation in the environmental assessment of the Caltrain Electrification Program and applaud your goal of improving regional air quality by increasing train ridership and by reducing the use of diesel-powered locomotives. Since the Bay Area is Nonattainment for ozone (O_3), EPA is very concerned about air quality in the San Francisco Bay Area. Because of the rising demand for electricity in the State, EPA is also very concerned with the environmental impacts of new energy generation. For this reason, we strongly recommend that the EA/EIR identifies the source of electricity for Caltrain Electrification Program. In addition, the EA/EIR should thoroughly investigate the environmental impacts associated with the generation of the additional electricity needed to operate Caltrain's electric trains. The Joint Powers Board may want to consider including a section in the EA/EIR that analyzes the environmental impacts of various potential power sources.

In addition to a discussion of the power generation needed for the electrification program, we encourage the Joint Powers Board to include information on the positive environmental benefits of increased train ridership and transit-oriented development around train stations. Specifically, we would like to see descriptions of Caltrain programs that encourage train ridership and cluster development around Caltrain stations.

Again, thank you for this opportunity to comment. We look forward to receiving a copy of the EA when it is completed. If you have any questions, please feel free to contact me at 415-744-2089 or *blazej.nova@epa.gov*.

Sincerely,

Nova Blazej, Environmental Planner
Federal Activities Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO
1-1-02-SP-223

November 14, 2001

Ms. Jeannette Owen
Parsons Harland Bartholomew & Associates
2233 Watt Avenue, Suite 330
Sacramento, California 95825

Subject: Species List for Caltrain Electrification Project, Santa Clara, San Francisco and San Mateo Counties, California

Dear Ms. Owen:

We are sending the enclosed list in response to your November 13,2001, request for information about endangered and threatened species (Enclosure A). The list covers the following U.S. Geological Survey 7½ minute quad or quads: Morgan Hill, Mt. Madonna, Gilroy, Santa Teresa Hills, San Jose West, San Jose East, Mountain View, Palo Alto, Cupertino, Woodside, Redwood Point, San Francisco South, Montara Mountain, San Mateo and San Francisco North Quads.

Please read *Important Information About Your Species List* (enclosed). It explains how we made the list and describes your responsibilities under the Endangered Species Act. Please contact Harry Mossman, Biological Technician, at (916) 414-6674, if you have any questions about the attached list or your responsibilities under the Endangered Species Act. For the fastest response to species list requests, address them to the attention of Mr. Mossman at this address. You may fax requests to him at 414-6712 or 6713.

Sincerely,

Cecilia Brown

for Jan C. Knight
Chief, Endangered Species Division

Enclosures

Important Information
About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute *quads*. The United States is divided into these quads, which are about the size of San Francisco. If you requested your list by quad name or number, that is what we used. Otherwise, we used the information you sent us to determine which quad or quads to use.

Animals

The animals on your species list are ones that occur within, *or may be affected by projects within*, the quads covered by the list. Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.

Plants

Any plants on your list are ones *that have actually been observed* in the quad or quads covered by the list. We have also included either a county species list or a list of species in nearby quads. We recommend that you check your project area for these plants. Plants may exist in an area without ever having been detected there.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. For plant surveys, we recommend using the enclosed *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species*. The results of your surveys should be published in any environmental documents prepared for your project.

State-Listed Species

If a species has been listed as threatened or endangered by the State of California, but not by us nor by the National Marine Fisheries Service, it will appear on your list as a Species of Concern. *However you should contact the California Department of Fish and Game for official information about these species.* Call (916) 322-2493 or write Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814.

Your Responsibilities Under the Endangered Species Act

All plants and animals identified as *listed* on Enclosure A are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the *take* of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

> If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a *formal consultation* with the Service. Such consultation would result in a *biological opinion* addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
>
> If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an *incidental take permit*. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project. Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that mitigates for the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the mitigation plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as *critical habitat*. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Maps and boundary descriptions of the critical habitat may be found in the *Federal Register*. The information is also reprinted in the *Code of Federal Regulations* (50 CFR 17.95).

Candidate Species

We recommend that you address impacts to *candidate* species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Your list may contain a section called *Species of Concern*. This term includes former *category 2 candidate species* and other plants and animals of concern to the Service and other Federal, State and private conservation agencies and organizations. Some of these species may become candidate species in the future.

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed, candidate and special concern species in your planning, this should not be a problem. We also continually strive to make our information as accurate as possible. Sometimes we learn that a particular species has a different range than we thought. This should not be a problem if you consider the species on the county or surrounding-quad lists that we have enclosed. If you have a long-term project or if your project is delayed, please feel free to contact us about getting a current list. You can also find out the current status of a species by going to the Service's Internet page: *www.fws.gov*

GUIDELINES FOR CONDUCTING AND REPORTING BOTANICAL INVENTORIES FOR FEDERALLY LISTED, PROPOSED AND CANDIDATE PLANTS
(September 23, 1996)

These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:

    a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species.

    b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name.

    c. survey dates and survey methodology(ies).

    d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made.

    e. a comprehensive list of all vascular plants occurring on the project site for each habitat type.

    f. current and historic land uses of the habitat(s) and degree of site alteration.

g. presence of target species off-site on adjacent parcels, if known.

h. an assessment of the biological significance or ecological quality of the project site in a local and regional context.

5. If target species is(are) found, report results that additionally include:

a. a map showing federally listed, proposed and candidate species distribution as they relate to the proposed project.

b. if target species is (are) associated with wetlands, a description of the direction and integrity of flow of surface hydrology. If target species is (are) affected by adjacent off-site hydrological influences, describe these factors.

c. the target species phenology and microhabitat, an estimate of the number of individuals of each target species per unit area; identify areas of high, medium and low density of target species over the project site, and provide acres of occupied habitat of target species. Investigators could provide color slides, photos or color copies of photos of target species or representative habitats to support information or descriptions contained in reports.

d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of target habitat.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of target plants in subsequent years. Project sites with inventories older than three years from the current date of project proposal submission will likely need additional survey. Investigators need to assess whether an additional survey(s) is (are) needed.

8. Adverse conditions may prevent investigator(s) from determining presence or identifying some target species in potential habitat(s) of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any year. An additional botanical inventory(ies) in a subsequent year(s) may be required if adverse conditions occur in a potential habitat(s). Investigator(s) may need to discuss such conditions.

9. Guidance from California Department of Fish and Game (CDFG) regarding plant and plant community surveys can be found in Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities, 1984. Please contact the CDFG Regional Office for questions regarding the CDFG guidelines and for assistance in determining any applicable State regulatory requirements.

ENCLOSURE A

Endangered and Threatened Species that May Occur in or be Affected by

Projects in the Area of the Following California Counties

Reference File No. 1-1-02-SP-223

November 14, 2001

SAN FRANCISCO COUNTY

Listed Species

Mammals

sei whale, *Balaenoptera borealis* (E)

blue whale, *Balaenoptera musculus* (E)

finback (=fin) whale, *Balaenoptera physalus* (E)

right whale, *Eubalaena glacialis* (E)

humpback whale, *Megaptera novaeangliae* (E)

sperm whale, *Physeter catodon (=macrocephalus)* (E)

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Guadalupe fur seal, *Arctocephalus townsendi* (T)

Critical Habitat, Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Birds

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

Reptiles

leatherback turtle, *Dermochelys coriacea* (E)

loggerhead turtle, *Caretta caretta* (T)

green turtle, *Chelonia mydas (incl. agassizi)* (T)

olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

Critical habitat, winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, Central California coastal steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, Central Valley steelhead, *Oncorhynchus mykiss* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

delta smelt, *Hypomesus transpacificus* (T) *

Invertebrates

white abalone, *Haliotes sorenseni* (E)

mission blue butterfly, *Icaricia icarioides missionensis* (E)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

Presidio (=Raven's) manzanita, *Arctostaphylos hookeri ssp. ravenii* (E)

Presidio clarkia, *Clarkia franciscana* (E)

San Francisco lessingia, *Lessingia germanorum* (E)

Marin dwarf-flax, *Hesperolinon congestum* (T)

marsh sandwort, *Arenaria paludicola* (E) *

beach layia, *Layia carnosa* (E) *

Proposed Species

Birds

short-tailed albatross, *Diomedea albatrus* (E)

Candidate Species

Invertebrates

black abalone, *Haliotes cracherodii* (C)

Species of Concern

Mammals

gray whale, *Eschrichtius robustus* (D)

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

black rail, *Laterallus jamaicensis coturniculus* (CA)

bank swallow, *Riparia riparia* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

Snowy Egret, *Egretta thula* (MB)

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

American bittern, *Botaurus lentiginosus* (SC)

ferruginous hawk, *Buteo regalis* (SC)
Vaux's swift, *Chaetura vauxi* (SC)
olive-sided flycatcher, *Contopus cooperi* (SC)
hermit warbler, *Dendroica occidentalis* (SC)
white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)
common loon, *Gavia immer* (SC)
saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)
Harlequin duck, *Histrionicus histrionicus* (SC)
loggerhead shrike, *Lanius ludovicianus* (SC)
Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)
long-billed curlew, *Numenius americanus* (SC)
ashy storm-petrel, *Oceanodroma homochroa* (SC)
rufous hummingbird, *Selasphorus rufus* (SC)
Allen's hummingbird, *Selasphorus sasin* (SC)
elegant tern, *Sterna elegans* (SC)
Xantus' murrelet, *Synthliboramphus hypoleucus* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
southwestern pond turtle, *Clemmys marmorata pallida* (SC)
California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

green sturgeon, *Acipenser medirostris* (SC)
river lamprey, *Lampetra ayresi* (SC)
Pacific lamprey, *Lampetra tridentata* (SC)
longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)
sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)
globose dune beetle, *Coelus globosus* (SC)
Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)
bumblebee scarab beetle, *Lichnanthe ursina* (SC)

Plants

salt marsh owl's clover (=johnny-nip), *Castilleja ambigua ssp. ambigua* (SC)
San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)
San Francisco wallflower, *Erysimum franciscanum* (SC)
fragrant fritillary, *Fritillaria liliacea* (SC)
San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)

Marin checkermallow, *Sidalcea hickmanii ssp. viridis* (SC)
Mission Delores campion, *Silene verecunda ssp. verecunda* (SC)
Pacific cordgrass (=California cordgrass), *Sparina foliosa* (SC)
San Francisco owl's-clover, *Triphysaria floribunda* (SC)
San Francisco popcornflower, *Plagiobothrys diffusus* (CA) *
alkali milk-vetch, *Astragalus tener var. tener* (SC) *
compact cobweb thistle, *Cirsium occidentale var. compactum* (SC) *
Diablo helianthella (=rock-rose), *Helianthella castanea* (SC) *
Kellogg's (wedge-leaved) horkelia, *Horkelia cuneata ssp. sericea* (SC) *
adobe sanicle, *Sanicula maritima* (SC) *
San Francisco manzanita, *Arctostaphylos hookeri ssp. franciscana* (SC) **
coast lily, *Lilium maritimum* (SC) ?*

SAN MATEO COUNTY

Listed Species

Mammals

sei whale, *Balaenoptera borealis* (E)
blue whale, *Balaenoptera musculus* (E)
finback (=fin) whale, *Balaenoptera physalus* (E)
right whale, *Eubalaena glacialis* (E)
humpback whale, *Megaptera novaeangliae* (E)
sperm whale, *Physeter catodon (=macrocephalus)* (E)
salt marsh harvest mouse, *Reithrodontomys raviventris* (E)
Guadalupe fur seal, *Arctocephalus townsendi* (T)
southern sea otter, *Enhydra lutris nereis* (T)
Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Birds

California brown pelican, *Pelecanus occidentalis californicus* (E)
California clapper rail, *Rallus longirostris obsoletus* (E)
California least tern, *Sterna antillarum (=albifrons) browni* (E)
Critical habitat, marbled murrelet, *Brachyramphus marmoratus* (T)
marbled murrelet, *Brachyramphus marmoratus* (T)
Critical habitat, western snowy plover, *Charadrius alexandrinus nivosus* (T)
western snowy plover, *Charadrius alexandrinus nivosus* (T)
bald eagle, *Haliaeetus leucocephalus* (T)

Reptiles

leatherback turtle, *Dermochelys coriacea* (E)
San Francisco garter snake, *Thamnophis sirtalis tetrataenia* (E)
loggerhead turtle, *Caretta caretta* (T)

green turtle, *Chelonia mydas (incl. agassizi)* (T)

olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Critical habitat, coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, Central California coastal steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, Central Valley steelhead, *Oncorhynchus mykiss* (T)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

delta smelt, *Hypomesus transpacificus* (T) *

Invertebrates

white abalone, *Haliotes sorenseni* (E)

mission blue butterfly, *Icaricia icarioides missionensis* (E)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

callippe silverspot butterfly, *Speyeria callippe callippe* (E)

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Ohlone tiger beetle, *Cicindela ohlone* (E) *

Plants

San Mateo thornmint, *Acanthomintha duttonii* (E)

fountain thistle, *Cirsium fontinale var. fontinale* (E)

Santa Cruz cypress, *Cupressus abramsiana* (E)

San Mateo woolly sunflower, *Eriophyllum latilobum* (E)

San Francisco lessingia, *Lessingia germanorum* (E)

white-rayed pentachaeta, *Pentachaeta bellidiflora* (E)

Marin dwarf-flax, *Hesperolinon congestum* (T)

robust spineflower, *Chorizanthe robusta var. robusta* (E) *

Hickman's potentilla (=cinquefoil), *Potentilla hickmanii* (E) *

Proposed Species

Birds

short-tailed albatross, *Diomedea albatrus* (E)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Invertebrates

black abalone, *Haliotes cracherodii* (C)

Species of Concern

Mammals

gray whale, *Eschrichtius robustus* (D)

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

black rail, *Laterallus jamaicensis coturniculus* (CA)

bank swallow, *Riparia riparia* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

Snowy Egret, *Egretta thula* (MB)

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

American bittern, *Botaurus lentiginosus* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

olive-sided flycatcher, *Contopus cooperi* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

common loon, *Gavia immer* (SC)
saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)
Harlequin duck, *Histrionicus histrionicus* (SC)
least bittern, western, *Ixobrychus exilis hesperis* (SC)
loggerhead shrike, *Lanius ludovicianus* (SC)
Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)
long-billed curlew, *Numenius americanus* (SC)
ashy storm-petrel, *Oceanodroma homochroa* (SC)
rufous hummingbird, *Selasphorus rufus* (SC)
Allen's hummingbird, *Selasphorus sasin* (SC)
elegant tern, *Sterna elegans* (SC)
Xantus' murrelet, *Synthliboramphus hypoleucus* (SC)
California thrasher, *Toxostoma redivivum* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
southwestern pond turtle, *Clemmys marmorata pallida* (SC)
California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

green sturgeon, *Acipenser medirostris* (SC)
river lamprey, *Lampetra ayresi* (SC)
Pacific lamprey, *Lampetra tridentata* (SC)
longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)
Edgewood blind harvestman, *Calicina minor* (SC)
sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)
globose dune beetle, *Coelus globosus* (SC)
Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)
Leech's skyline diving beetle, *Hydroporus leechi* (SC)
Marin elfin butterfly, *Incisalia mossii* (SC)
bumblebee scarab beetle, *Lichnanthe ursina* (SC)
Edgewood microblind harvestman, *Microcina edgewoodensis* (SC)
unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

San Bruno Mountain manzanita, *Arctostaphylos imbricata* (CA)
Point Reyes meadowfoam, *Limnanthes douglasii ssp. sulphurea* (CA)
Montara manzanita, *Arctostaphylos montaraensis* (SC)

marsh milkvetch (=brine milk-vetch, =marsh locoweed), *Astragalus pycnostachyus var. pycnostachyus* (SC)

salt marsh owl's clover (=johnny-nip), *Castilleja ambigua ssp. ambigua* (SC)

San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

clustered lady's-slipper, *Cypripedium fasciculatum* (SC)

coast wallflower, *Erysimum ammophilum* (SC)

San Francisco wallflower, *Erysimum franciscanum* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)

Diablo helianthella (=rock-rose), *Helianthella castanea* (SC)

Point Reyes horkelia, *Horkelia marinensis* (SC)

legenere, *Legenere limosa* (SC)

Crystal Springs lessingia, *Lessingia arachnoidea* (SC)

San Mateo tree lupine, *Lupinus arboreus var. eximius* (SC)

Dudley's lousewort, *Pedicularis dudleyi* (SC)

Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)

Marin checkermallow, *Sidalcea hickmanii ssp. viridis* (SC)

Mission Delores campion, *Silene verecunda ssp. verecunda* (SC)

Pacific cordgrass (=California cordgrass), *Sparina foliosa* (SC)

San Francisco owl's-clover, *Triphysaria floribunda* (SC)

northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *

Kellogg's (wedge-leaved) horkelia, *Horkelia cuneata ssp. sericea* (SC) *

coast lily, *Lilium maritimum* (SC) *

SANTA CLARA COUNTY

Listed Species

Mammals

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

riparian brush rabbit, *Sylvilagus bachmani riparius* (E) *

Birds

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Least Bell's vireo, *Vireo bellii pusillus* (E)

marbled murrelet, *Brachyramphus marmoratus* (T)

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

Reptiles

San Francisco garter snake, *Thamnophis sirtalis tetrataenia* (E)

Alameda whipsnake, *Masticophis lateralis euryxanthus* (T)

Critical habitat, Alameda whipsnake, *Masticophis lateralis euryxanthus* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, Central California coastal steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, South Central California steelhead, *Oncorhynchus mykiss* (T)

South Central California steelhead, *Oncorhynchus mykiss* (T)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

delta smelt, *Hypomesus transpacificus* (T) *

Invertebrates

vernal pool fairy shrimp, *Branchinecta lynchi* (T)

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

Tiburon paintbrush, *Castilleja affinis ssp. neglecta* (E)

Coyote ceanothus, *Ceanothus ferrisae* (E)

Santa Clara Valley dudleya, *Dudleya setchellii* (E)

Metcalf Canyon jewelflower, *Streptanthus albidus ssp. albidus* (E)

robust spineflower, *Chorizanthe robusta var. robusta* (E) *

Contra Costa goldfields, *Lasthenia conjugens* (E) *

California sea blite, *Suaeda californica* (E) *

showy Indian clover, *Trifolium amoenum* (E) *

Proposed Species

Birds

mountain plover, *Charadrius montanus* (PT)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

black rail, *Laterallus jamaicensis coturniculus* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

Snowy Egret, *Egretta thula* (MB)

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

American bittern, *Botaurus lentiginosus* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

olive-sided flycatcher, *Contopus cooperi* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

common loon, *Gavia immer* (SC)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

least bittern, western, *Ixobrychus exilis hesperis* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC) long-billed curlew, *Numenius americanus* (SC)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

California thrasher, *Toxostoma redivivum* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

San Joaquin coachwhip (=whipsnake), *Masticophis flagellum ruddocki* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

green sturgeon, *Acipenser medirostris* (SC)

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Edgewood blind harvestman, *Calicina minor* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

California linderiella fairy shrimp, *Linderiella occidentalis* (SC)

Hom's microblind harvestman, *Microcina homi* (SC)

Jung's microblind harvestman, *Microcina juni* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

Sharsmith's onion, *Allium sharsmithae* (SC)

Mt. Hamilton harebell, *Campanula sharsmithiae* (SC)

Mt. Hamilton thistle, *Cirsium fontinale var. campylon* (SC)

South Bay clarkia, *Clarkia concinna ssp. automixa* (SC)

Mt. Hamilton coreopsis, *Coreopsis hamiltonii* (SC)

clustered lady's-slipper, *Cypripedium fasciculatum* (SC)

interior California larkspur, *Delphinium californicum ssp. interius* (SC)

Brandegee's woolly-star, *Eriastrum brandegeae* (SC)

Ben Lomond buckwheat (= naked buckwheat), *Eriogonum nudum var. decurrens* (SC)

Hoover's button-celery, *Eryngium aristulatum var. hooveri* (SC)

San Francisco wallflower, *Erysimum franciscanum* (SC)

talus fritillary, *Fritillaria falcata* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

delta tule-pea, *Lathyrus jepsonii var. jepsonii* (SC)

smooth lessingia, *Lessingia micradenia var. glabrata* (SC)
Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)
Mt. Diablo phacelia, *Phacelia phacelioides* (SC)
Salinas Valley popcornflower, *Plagiobothrys uncinatus* (SC)
rock sanicle, *Sanicula saxatilis* (SC)
Pacific cordgrass (=California cordgrass), *Spartina foliosa* (SC)
most beautiful (uncommon) jewelflower, *Streptanthus albidus ssp. peramoenus* (SC)
Mt. Hamilton jewelflower, *Streptanthus callistus* (SC)
alkali milk-vetch, *Astragalus tener var. tener* (SC) *
valley spearscale, *Atriplex joaquiniana* (SC) *
northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *
caper-fruited tropidocarpum, *Tropidocarpum capparideum* (SC) **
pappose spikeweed [=Congdon's tarplant], *Hemizonia parryi ssp. congdonii* (SC) *
San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(PX)	*Proposed Critical Habitat*	Proposed as an area essential to the conservation of the species.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	Other species of concern to the Service.
(D)	*Delisted*	Delisted. Status to be monitored for 5 years.
(CA)	*State-Listed*	Listed as threatened or endangered by the State of California.
*	*Extirpated*	Possibly extirpated from the area.
**	*Extinct*	Possibly extinct
	Critical Habitat	Area essential to the conservation of a species.

ENCLOSURE A

Endangered and Threatened Species that May Occur in
or be Affected by Projects in the Selected Quads Listed Below
Reference File No. 1-1-02-SP-223
November 14, 2001

QUAD : 406B MORGAN HILL

Listed Species

Mammals

riparian brush rabbit, *Sylvilagus bachmani riparius* (E) *

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

Birds

bald eagle, *Haliaeetus leucocephalus* (T)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

Tiburon paintbrush, *Castilleja affinis ssp. neglecta* (E)

Coyote ceanothus, *Ceanothus ferrisae* (E)

Santa Clara Valley dudleya, *Dudleya setchellii* (E)

Metcalf Canyon jewelflower, *Streptanthus albidus ssp. albidus* (E)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC) southwestern pond turtle, *Clemmys marmorata pallida* (SC)

San Joaquin coachwhip (=whipsnake), *Masticophis flagellum ruddocki* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Edgewood blind harvestman, *Calicina minor* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Hom's microblind harvestman, *Microcina homi* (SC)

Jung's microblind harvestman, *Microcina juni* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

Mt. Hamilton thistle, *Cirsium fontinale var. campylon* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

smooth lessingia, *Lessingia micradenia var. glabrata* (SC)

most beautiful (uncommon) jewelflower, *Streptanthus albidus ssp. peramoenus* (SC)

QUAD : 406C MT. MADONNA

Listed Species

Mammals

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

Birds

bald eagle, *Haliaeetus leucocephalus* (T)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Least Bell's vireo, *Vireo bellii pusillus* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

South Central California steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

Santa Clara Valley dudleya, *Dudleya setchellii* (E)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

rufous hummingbird, *Selasphorus rufus* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Edgewood blind harvestman, *Calicina minor* (SC)

Hom's microblind harvestman, *Microcina homi* (SC)

Jung's microblind harvestman, *Microcina juni* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

smooth lessingia, *Lessingia micradenia var. glabrata* (SC)

QUAD : 406D GILROY

Listed Species

Mammals

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

Birds

bald eagle, *Haliaeetus leucocephalus* (T)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Least Bell's vireo, *Vireo bellii pusillus* (E)

Amphibians

California red-legged f.og, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

South Central California steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

Santa Clara Valley dudleya, *Dudleya setchellii* (E)

Metcalf Canyon jewelflower, *Streptanthus albidus ssp. albidus* (E)

showy Indian clover, *Trifolium amoenum* (E) *

Proposed Species

Birds

mountain plover, *Charadrius montanus* (PT)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC) grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

rufous hummingbird, *Selasphorus rufus* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

San Joaquin coachwhip (=whipsnake), *Masticophis flagellum ruddocki* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

valley spearscale, *Atriplex joaquiniana* (SC) * smooth lessingia, *Lessingia micradenia var. glabrata* (SC)

most beautiful (uncommon) jewelflower, *Streptanthus albidus ssp. peramoenus* (SC)

QUAD : 407A SANTA TERESA HILLS

Listed Species

Mammals

riparian brush rabbit, *Sylvilagus bachmani riparius* (E) *

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

Birds

marbled murrelet, *Brachyramphus marmoratus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

Santa Clara Valley dudleya, *Dudleya setchellii* (E)

Metcalf Canyon jewelflower, *Streptanthus albidus ssp. albidus* (E) *

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Edgewood blind harvestman, *Calicina minor* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Hom's microblind harvestman, *Microcina homi* (SC)

Jung's microblind harvestman, *Microcina juni* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

Mt. Hamilton thistle, *Cirsium fontinale var. campylon* (SC)

smooth lessingia, *Lessingia micradenia var. glabrata* (SC) ?

most beautiful (uncommon) jewelflower, *Streptanthus albidus ssp. peramoenus* (SC)

QUAD : 427C SAN JOSE WEST

Listed Species

Birds

bald eagle, *Haliaeetus leucocephalus* (T)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

robust spineflower, *Chorizanthe robusta var. robusta* (E) *

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

- Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)
- greater western mastiff-bat, *Eumops perotis californicus* (SC)
- small-footed myotis bat, *Myotis ciliolabrum* (SC)
- long-eared myotis bat, *Myotis evotis* (SC)
- fringed myotis bat, *Myotis thysanodes* (SC)
- long-legged myotis bat, *Myotis volans* (SC)
- Yuma myotis bat, *Myotis yumanensis* (SC)
- San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

- tricolored blackbird, *Agelaius tricolor* (SC)
- grasshopper sparrow, *Ammodramus savannarum* (SC)
- Bell's sage sparrow, *Amphispiza belli belli* (SC)
- short-eared owl, *Asio flammeus* (SC)
- western burrowing owl, *Athene cunicularia hypugaea* (SC)
- ferruginous hawk, *Buteo regalis* (SC)
- Costa's hummingbird, *Calypte costae* (SC)
- Lawrence's goldfinch, *Carduelis lawrencei* (SC)
- Vaux's swift, *Chaetura vauxi* (SC)
- black tern, *Chlidonias niger* (SC)
- black swift, *Cypseloides niger* (SC)
- hermit warbler, *Dendroica occidentalis* (SC)
- white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)
- little willow flycatcher, *Empidonax traillii brewsteri* (CA)
- American peregrine falcon, *Falco peregrinus anatum* (D)
- saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)
- loggerhead shrike, *Lanius ludovicianus* (SC)
- Lewis' woodpecker, *Melanerpes lewis* (SC)
- long-billed curlew, *Numenius americanus* (SC)
- bank swallow, *Riparia riparia* (CA)
- rufous hummingbird, *Selasphorus rufus* (SC)
- Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Hom's microblind harvestman, *Microcina homi* (SC)

Jung's microblind harvestman, *Microcina juni* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

QUAD : 427D SAN JOSE EAST

Listed Species

Mammals

riparian brush rabbit, *Sylvilagus bachmani riparius* (E) *

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

Birds

bald eagle, *Haliaeetus leucocephalus* (T)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

Santa Clara Valley dudleya, *Dudleya setchellii* (E)

Contra Costa goldfields, *Lasthenia conjugens* (E) *

Metcalf Canyon jewelflower, *Streptanthus albidus ssp. albidus* (E)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Edgewood blind harvestman, *Calicina minor* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Hom's microblind harvestman, *Microcina homi* (SC)

Jung's microblind harvestman, *Microcina juni* (SC)

Plants

Mt. Hamilton thistle, *Cirsium fontinale var. campylon* (SC)

South Bay clarkia, *Clarkia concinna ssp automixa* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

pappose spikeweed [=Congdon's tarplant], *Hemizonia parryi ssp. congdonii* (SC) *?

QUAD : 428A MOUNTAIN VIEW

Listed Species

Mammals

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

bald eagle, *Haliaeetus leucocephalus* (T)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

California sea blite, *Suaeda californica* (E) *

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)

long-billed curlew, *Numenius americanus* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC) western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Plants

alkali milk-vetch, *Astragalus tener var. tener* (SC) *

northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *

delta tule-pea, *Lathyrus jepsonii var. jepsonii* (SC)

Pacific cordgrass (=California cordgrass), *Spartina foliosa* (SC)

QUAD : 428B PALO ALTO

Listed Species

Mammals

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

marbled murrelet, *Brachyramphus marmoratus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

San Mateo thornmint, *Acanthomintha duttonii* (E) *

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Plants

South Bay clarkia, *Clarkia concinna ssp. automixa* (SC)

Hoover's button-celery, *Eryngium aristulatum var. hooveri* (SC)

delta tule-pea, *Lathyrus jepsonii var. jepsonii* (SC)

Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)

Pacific cordgrass (=California cordgrass), *Spartina foliosa* (SC)

caper-fruited tropidocarpum, *Tropidocarpum capparideum* (SC) **

QUAD : 428D CUPERTINO

Listed Species

Birds

marbled murrelet, *Brachyramphus marmoratus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus analum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

South Bay clarkia, *Clarkia concinna ssp. automixa* (SC)

Ben Lomond buckwheat (= naked buckwheat), *Eriogonum nudum var. decurrens* (SC)

caper-fruited tropidocarpum, *Tropidocarpum capparideum* (SC) **

QUAD : 429A WOODSIDE

Listed Species

Birds

Critical habitat, marbled murrelet, *Brachyramphus marmoratus* (T)

marbled murrelet, *Brachyramphus marmoratus* (T) bald eagle, *Haliaeetus leucocephalus* (T)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Reptiles

San Francisco garter snake, *Thamnophis sirtalis tetrataenia* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

San Mateo thornmint, *Acanthomintha duttonii* (E)

fountain thistle, *Cirsium fontinale var. fontinale* (E)

Marin dwarf-flax, *Hesperolinon congestum* (T)

white-rayed pentachaeta, *Pentachaeta bellidiflora* (E)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC) grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

Pacific lamprey, *Lampetra tridentata* (SC)

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Edgewood blind harvestman, *Calicina minor* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Edgewood microblind harvestman, *Microcina edgewoodensis* (SC)

Plants

San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

Crystal Springs lessingia, *Lessingia arachnoidea* (SC)

Dudley's lousewort, *Pedicularis dudleyi* (SC)

Mission Delores campion, *Silene verecunda ssp. verecunda* (SC)

QUAD : 447C REDWOOD POINT

Listed Species

Mammals

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Reptiles

Alameda whipsnake, *Masticophis lateralis euryxanthus* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

vernal pool fairy shrimp, *Branchinecta lynchi* (T)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC) long-billed curlew, *Numenius americanus* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

California linderiella fairy shrimp, *Linderiella occidentalis* (SC)

Plants

northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *

Pacific cordgrass (=California cordgrass), *Sparina foliosa* (SC)

QUAD : 448B SAN FRANCISCO SOUTH

Listed Species

Mammals

Guadalupe fur seal, *Arctocephalus townsendi* (T)

sei whale, *Balaenoptera borealis* (E)

blue whale, *Balaenoptera musculus* (E)

finback (=fin) whale, *Balaenoptera physalus* (E)

right whale, *Eubalaena glacialis* (E)

Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

sperm whale, *Physeter catodon (=macrocephalus)* (E)

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

marbled murrelet, *Brachyramphus marmoratus* (T)

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Reptiles

loggerhead turtle, *Caretta caretta* (T)

green turtle, *Chelonia mydas (incl. agassizi)* (T)

leatherback turtle, *Dermochelys coriacea* (E)

olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

Critical habitat, bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

white abalone, *Haliotes sorenseni* (E)

mission blue butterfly, *Icaricia icarioides missionensis* (E)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

callippe silverspot butterfly, *Speyeria callippe callippe* (E)

Plants

Presidio (=Raven's) manzanita, *Arctostaphylos hookeri ssp. ravenii* (E) *

robust spineflower, *Chorizanthe robusta var. robusta* (E) *

San Francisco lessingia, *Lessingia germanorum* (E)

white-rayed pentachaeta, *Pentachaeta bellidiflora* (E) *

Proposed Species

Birds

short-tailed albatross, *Diomedea albatrus* (E)

Candidate Species

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Invertebrates

black abalone, *Haliotes cracherodii* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

gray whale, *Eschrichtius robustus* (D)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

Harlequin duck, *Histrionicus histrionicus* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

QUAD : 448C MONTARA MOUNTAIN

Listed Species

Mammals

Guadalupe fur seal, *Arctocephalus townsendi* (T)

sei whale, *Balaenoptera borealis* (E)

blue whale. *Balaenoptera musculus* (E)

finback (=fin) whale, *Balaenoptera physalus* (E)

right whale, *Eubalaena glacialis* (E)

sperm whale, *Physeter catodon (=macrocephalus)* (E)

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

Critical habitat, marbled murrelet, *Brachyramphus marmoratus* (T)

marbled murrelet, *Brachyramphus marmoratus* (T)

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Reptiles

San Francisco garter snake, *Thamnophis sirtalis tetrataenia* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead. *Oncorhynchus mykiss* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

white abalone, *Haliotes sorenseni* (E)

mission blue butterfly. *Icaricia icarioides missionensis* (E)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

white-rayed pentachaeta, *Pentachaeta bellidiflora* (E) *

Hickman's potentilla (=cinquefoil), *Potentilla hickmanii* (E) *

Proposed Species

Birds

short-tailed albatross, *Diomedea albatrus* (E)

Candidate Species

Invertebrates

black abalone, *Haliotes cracherodii* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

gray whale, *Eschrichtius robustus* (D)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

Harlequin duck, *Histrionicus histrionicus* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

ashy storm-petrel, *Oceanodroma homochroa* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

elegant tern, *Sterna elegans* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

Pacific lamprey, *Lampetra tridentata* (SC)

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)

globose dune beetle, *Coelus globosus* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Leech's skyline diving beetle, *Hydroporus leechi* (SC)

bumblebee scarab beetle, *Lichnanthe ursina* (SC)

Plants

Montara manzanita, *Arctostaphylos montaraensis* (SC)

San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)

Point Reyes horkelia, *Horkelia marinensis* (SC)

Crystal Springs lessingia, *Lessingia arachnoidea* (SC)

San Mateo tree lupine, *Lupinus arboreus var. eximius* (SC)

Mission Delores campion, *Silene verecunda ssp. verecunda* (SC)

Pacific cordgrass (=California cordgrass), *Sparina foliosa* (SC)

QUAD : 448D SAN MATEO

Listed Species

Mammals

Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

marbled murrelet, *Brachyramphus marmoratus* (T)

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Reptiles

loggerhead turtle, *Caretta caretta* (T)

green turtle, *Chelonia mydas (incl. agassizi)* (T)

leatherback turtle, *Dermochelys coriacea* (E)

olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

San Francisco garter snake, *Thamnophis sirtalis tetrataenia* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

mission blue butterfly, *Icaricia icarioides missionensis* (E)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

San Mateo thornmint, *Acanthomintha duttonii* **(E)** *

fountain thistle, *Cirsium fontinale var. fontinale* **(E)**

San Mateo woolly sunflower, *Eriophyllum latilobum* (E)

Marin dwarf-flax, *Hesperolinon congestum* (T)

white-rayed pentachaeta, *Pentachaeta bellidiflora* (E) *

Candidate Species

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Costa's hummingbird, *Calypte costae* (SC)

Lawrence's goldfinch, *Carduelis lawrencei* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)

long-billed curlew, *Numenius americanus* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Edgewood blind harvestman, *Calicina minor* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Plants

San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *

fragrant fritillary, *Fritillaria liliacea* (SC)

Crystal Springs lessingia, *Lessingia arachnoidea* (SC)

coast lily, *Lilium maritimum* (SC) *

San Mateo tree lupine, *Lupinus arboreus var. eximius* (SC)

Pacific cordgrass (=California cordgrass), *Sparina foliosa* (SC)

QUAD : 466C SAN FRANCISCO NORTH

Listed Species

Mammals

Guadalupe fur seal, *Arctocephalus townsendi* (T)

sei whale, *Balaenoptera borealis* (E)

blue whale, *Balaenoptera musculus* (E)

finback (=fin) whale, *Balaenoptera physalus* (E)

right whale, *Eubalaena glacialis* (E)

Critical Habitat, Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

sperm whale, *Physeter catodon (=macrocephalus)* (E)

salt marsh harvest mouse, *Reithrodontomys raviventris* (E) *

Birds

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E) *

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

delta smelt, *Hypomesus transpacificus* (T)

Critical habitat, coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

Central Valley steelhead, *Oncorhynchus mykiss* (T)

Critical habitat, winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

white abalone, *Haliotes sorenseni* (E)

mission blue butterfly, *Icaricia icarioides missionensis* (E)

San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

Presidio (=Raven's) manzanita, *Arctostaphylos hookeri ssp. ravenii* (E)

marsh sandwort, *Arenaria paludicola* (E) *

Presidio clarkia, *Clarkia franciscana* (E)

Marin dwarf-flax, *Hesperolinon congestum* (T)

beach layia, *Layia carnosa* (E) *

San Francisco lessingia, *Lessingia germanorum* (E)

Proposed Species

Birds

short-tailed albatross, *Diomedea albatrus* (E)

Candidate Species

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Critical habitat, Central Valley fall/late fall-run chinook, *Oncorhynchus tshawytscha* (C)

Invertebrates

black abalone, *Haliotes cracherodii* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

gray whale, *Eschrichtius robustus* (D)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Point Reyes jumping mouse, *Zapus trinotatus orarius* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

grasshopper sparrow, *Ammodramus savannarum* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

short-eared owl, *Asio flammeus* (SC)

western burrowing owl, *Athene cunicularia hypugaea* (SC)

ferruginous hawk, *Buteo regalis* (SC)

Vaux's swift, *Chaetura vauxi* (SC)

black tern, *Chlidonias niger* (SC)

black swift, *Cypseloides niger* (SC)

hermit warbler, *Dendroica occidentalis* (SC)

white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (CA)

American peregrine falcon, *Falco peregrinus anatum* (D)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

Harlequin duck, *Histrionicus histrionicus* (SC)

loggerhead shrike, *Lanius ludovicianus* (SC)

black rail, *Laterallus jamaicensis coturniculus* (CA)

Lewis' woodpecker, *Melanerpes lewis* (SC)

long-billed curlew, *Numenius americanus* (SC)

ashy storm-petrel, *Oceanodroma homochroa* (SC)

bank swallow, *Riparia riparia* (CA)

rufous hummingbird, *Selasphorus rufus* (SC)

Allen's hummingbird, *Selasphorus sasin* (SC)

elegant tern, *Sterna elegans* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)

globose dune beetle, *Coelus globosus* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

bumblebee scarab beetle, *Lichnanthe ursina* (SC)

Plants

San Francisco manzanita, *Arctostaphylos hookeri ssp. franciscana* (SC) **

alkali milk-vetch, *Astragalus tener var. tener* (SC) *

San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)

Kellogg's (wedge-leaved) horkelia, *Horkelia cuneata ssp. sericea* (SC) *

San Francisco popcornflower, *Plagiobothrys diffusus* (CA) *

adobe sanicle, *Sanicula maritima* (SC) *

Marin checkermallow, *Sidalcea hickmanii ssp. viridis* (SC)

Mission Delores campion, *Silene verecunda ssp. verecunda* (SC)

Pacific cordgrass (=California cordgrass), *Sparina foliosa* (SC)

San Francisco owl's-clover, *Triphysaria floribunda* (SC)

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(PX)	*Proposed Critical Habitat*	Proposed as an area essential to the conservation of the species.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
(MB)	*Migratory Bird*	Migratory bird
(D)	*Delisted*	Delisted. Status to be monitored for 5 years.
(CA)	*State-Listed*	Listed as threatened or endangered by the State of California.
(*)	*Extirpated*	Possibly extirpated from this quad.
(**)	*Extinct*	Possibly extinct.
	Critical Habitat	Area essential to the conservation of a species.

United States Department of Agriculture
NRCS Natural Resources Conservation Service

2337 Technology Parkway, Suite C
Hollister, CA 95023
Tel.: (831) 637-4360
FAX: (831) 636-7643

February 22, 2002

Ms. Karla J Nicholas
Parsons Transportation Group
120 Howard Street, Suite 850
San Francisco, CA 94105

Subject: Caltrain Electrification Program - San Francisco to Gilroy
Farmland Conversion Impact Rating

Dear Ms. Nicholas:

You will find enclosed Form AD-1006 with the NRCS sections completed. Only site ATF-3 and ATF-3 (alternate) is farmland and the Farmland Protection Policy Act applies. Information in Parts III and IV applies only to these two alternative sites.

Site SWS-2/PS8 in on the site of the Metcalf Energy Center and is committed to industrial use. Likewise site PS-8/PS-9 is in a built up area and zoned industrial. The FPPA doses not apply to these two sites.

Sincerely yours,

Bruce E Eisenman

Bruce E. Eisenman

Enclosures

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FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)	Date Of Land Evaluation Request FEBRUARY 13, 2002
Name Of Project CALTRAIN ELECTRIFICATION PROGRAM	Federal Agency Involved FEDERAL TRANSIT ADMINISTRATION
Proposed Land Use TRANSPORTATION/PUBLIC	County And State SANTA CLARA COUNTY, CA
PART II (To be completed by NRCS)	Date Request Received By NRCS 2-15-02

Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply – do not complete additional parts of this form).	Yes ☒	No ☐	Acres Irrigated 17,000	Average Farm Size 324
Major Crop(s) Vegtables, Grapes, Orchard	Farmable Land In Govt. Jurisdiction Acres: 40,000 % 49		Amount Of Farmland As Defined in FPPA Acres: 49,000 % 5.9	
Name Of Land Evaluation System Used Land Capability Class	Name Of Local Site Assessment System None		Date Land Evaluation Returned By NRCS 2-25-02	

		Alternative Site Rating			
PART III (To be completed by Federal Agency)		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0.53	~~.73~~	~~0.73~~	0.53	
B. Total Acres To Be Converted Indirectly		—	—		
C. Total Acres In Site		~~0.0~~ 6.36	~~0.0~~ 6.36	0.0	0.0
PART IV (To be completed by NRCS) Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		.53	.53		
B. Total Acres Statewide And Local Important Farmland		0	0		
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		<.01	<.01		
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		NOT	AVAILABLE		
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)		~~0~~ 100	~~0~~ 100	0	0

PART VI (To be completed by Federal Agency) Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))	Maximum Points	ATF-3	ATF-3 (ALT.)		
1. Area In Nonurban Use	15	7	7		
2. Perimeter In Nonurban Use	10	6	6		
3. Percent Of Site Being Farmed	20	20	20		
4. Protection Provided By State And Local Government	20	20	0		
5. Distance From Urban Builtup Area	0	0	0		
6. Distance To Urban Support Services	0	0	0		
7. Size Of Present Farm Unit Compared To Average	10	4	4		
8. Creation Of Nonfarmable Farmland	25	0	0		
9. Availability Of Farm Support Services	5	4	4		
10. On-Farm Investments	20	10	10		
11. Effects Of Conversion On Farm Support Services	25	2	2		
12. Compatibility With Existing Agricultural Use	10	4	4		
TOTAL SITE ASSESSMENT POINTS	160	0 77	0 57	0	0
PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)	100	0 100	0 100	0	0
Total Site Assessment (From Part VI above or a local site assessment)	160	0 77	0 57	0	0
TOTAL POINTS (Total of above 2 lines)	260	0 177	0 157	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Caltrain Electrification Program

Farmland Conversion Impact Rating Form (AD-1006)
SITE ASSESSMENT CRITERIA AND POINT RATING

The Farmland Protection Policy Act (7 CFR Ch. VI Part 658) requires federal agencies to take into account the adverse effects of their projects on the protection of farmland, in part, by requiring an inventory, description, and classification of affected farmlands as well as early consultation with the Natural Resources Conservation Service (NRCS) and processing of Form AD 1006 (Farmland Conversion Impact Rating Form). The site assessment criteria, as described in 7 CFR 658.5, were developed by the U.S. Secretary of Agriculture in cooperation with other federal agencies. Each criterion is given a score on a scale of 0 to the maximum points established. Conditions suggesting top, intermediate and bottom scores are indicated for each criterion. The maximum points for each criterion are shown on the Form AD 1006. The farmland site assessment criteria and scores for the Caltrain Electrification Program are described below.

1. **Are in Nonurban Use.** How much land is in nonurban use within a radius of 1.0 mile from where the project is intended?

ATF 3:	Approximately 70 percent.	(7 points)
ATF 3 (Alt.):	Approximately 70 percent.	(7 points)

2. **Perimeter in Nonurban Use.** How much of the perimeter of the site borders on land in nonurban use?

ATF 3:	Approximately 75 percent.	(6 points)
ATF 3 (Alt.):	Approximately 75 percent.	(6 points)

3. **Percent of Site Being Farmed.** How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last ten years?

ATF 3:	Greater than 90 percent.	(20 points)
ATF 3 (Alt.):	Greater than 90 percent.	(20 points)

4. **Protection Provided By State and Local Government.** Is the site subject to State or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?

ATF 3:	Site is currently enrolled in a Williamson Act contract.	(20 points)
ATF3 (Alt.):	Site is not protected by State/local government.	(0 points)

5. **Distance from Urban Built-up Area.** How close is the site to an urban built-up area?

ATF 3:	The site is adjacent to railroad corridor.	(0 points)
ATF 3 (Alt.):	The site is adjacent to railroad corridor.	(0 points)

6. **Distance to Urban Support Services.** How close is the site to water lines, sewer lines and/or other local facilities and services whose capacities and design would promote nonagricultural use?

ATF 3:	All of the services within one-half mile of site.	(0 points)
ATF 3 (Alt.):	All of the services within one-half mile of site.	(0 points)

7. **Size of Present Farm Unit Compared to Average.** Is the farm unit(s) containing the site (before the project) as large as the average-size farming unit in the county?

ATF 3:	20 percent less than average farm size (324 acres).	(4 points)
ATF 3 (Alt.):	20 percent less than average farm size (324 acres).	(4 points)

8. **Creation of Non-farmable Farmland.** If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?

ATF 3:	Less than five percent of total.	(0 points)
ATF 3 (Alt.):	Less than five percent of total.	(0 points)

9. **Availability of Farm Support Services.** Does the site have available adequate supply of farm support services and markets, i.e. farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?

ATF 3:	Most required services are available.	(4 points)
ATF 3 (Alt.):	Most required services are available.	(4 points)

10. **On-Farm Investments.** Does the site have substantial and well-maintained on-farm investments such as barns, other storage buildings, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?

ATF 3:	Moderate amount of on-site investment.	(10 points)
ATF 3 (Alt.):	Moderate amount of on-site investment.	(10 points)

11. **Effects of Conversion on Farm Support Services.** Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?

ATF 3:	Small reduction in demand for support services.	(2 points)
ATF 3 (Alt.):	Small reduction in demand for support services.	(2 points)

12. **Compatibility with Existing Agricultural Use.** Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use?

ATF 3:	Project is tolerable to existing agricultural use.	(4 points)
ATF 3 (Alt.):	Project is tolerable to existing agricultural use.	(4 points)

Department of Toxic Substances Control

Edwin F. Lowry, Director
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

August 31, 2000

Ms. Marie Pang
Peninsula Commute Joint Powers Board
1250 San Carlos Avenue
San Carlos, California 94070-1306

Dear Ms. Pang:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for the Caltrain Electrification Program draft Environmental Impact Report (EIR) [SCH#2000082093]. As you may be aware, the California Department of Toxic Substances Control (DTSC) oversees the cleanup of sites where hazardous substances have been released pursuant to the California Health and Safety Code, Division 20, Chapter 6.8. As a resource agency, DTSC is submitting comments to ensure that the environmental documentation prepared for this project to address the California Environmental Quality Act (CEQA) adequately addresses any required remediation activities which may be required to address any hazardous substances release.

The NOP identifies probable environmental impacts from pre-existing hazardous wastes. The EIR should identify all known and potential hazardous wastes/substance sites within the project area. We strongly recommend that sampling be conducted to determine whether any hazardous wastes/substances are present and need to be addressed in the CEQA compliance document. If hazardous substances have been released, they will need to be addressed as part of this project.

For example, if the remediation activities include the need for soil excavation, the CEQA document should include: (1) an assessment of air impacts and health impacts associated with the excavation activities; (2) identification of any applicable local standards which may be exceeded by the excavation activities, including dust levels and noise; (3) transportation impacts from the removal or remedial activities; and (4) risk of upset should be there an accident at the Site

DTSC can assist your agency in overseeing characterization and cleanup activities through our Voluntary Cleanup Program. A fact sheet describing this program is enclosed. We are aware that projects such as this one are typically on a compressed schedule, and in an effort to use the available review time efficiently, we request that DTSC be included in any meetings where issues relevant to our statutory authority are discussed.

Please contact Lynn Nakashima of my staff at (510) 540-3839 if you have any questions or would like to schedule a meeting. Thank you in advance for your cooperation in this matter.

Sincerely,

Barbara J Cook

Barbara J. Cook, P.E., Chief
Northern California - Coastal Cleanup
Operations Branch

Enclosures

cc without enclosures

Governor's Office of Planning and Research
State Clearinghouse
P. O. Box 3044
Sacramento, California 95812-3044

Guenther Moskat
CEQA Tracking Center
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

DEPARTMENT OF TRANSPORTATION
P O BOX 23660
OAKLAND, CA 94623-0660
Tel. (510) 286-4444
Fax (510) 286-5513
TDD (510) 286-4454

September 25, 2000

SF/SM-101-000
2000082093
SM101319

Ms. Marie Pang
Peninsula Corridor Joint Powers Board
1250 San Carlos Avenue
San Carlos, CA 94070

Dear Ms. Pang:

Notice Of Preparation (NOP) for Caltrain Electrification Program Draft Environmental Assessment/Environmental Impact Report (EA/EIR); Peninsula Corridor Joint Powers Board

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. We have examined the NOP and are generally satisfied with the document. However, please ensure that the draft EA/EIR includes an analysis of all potential construction impacts to state transportation facilities along the U.S. 101 corridor between the cities of San Francisco and Gilroy. We would appreciate receiving a copy of the draft EA/EIR when completed.

If you have any questions regarding this letter, please call Nandini N. Shridhar, AICP, of my staff at (510) 622-1642.

Sincerely,

HARRY Y. YAHATA
District Director

By Jean CR Finney

JEAN C. R. FINNEY
District Branch Chief
IGR/CEQA

c: Ms. Katie Schulte (State Clearinghouse)

STATE OF CALIFORNIA Gray Davis, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

December 12, 2001

Mr. Erik Olafsson
Caltrain
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, California 94070-1306

RE: Proposed Caltrain Train Service: San Francisco to Gilroy, San Francisco, San Mateo & Santa Clara Counties.
Sent by Fax: (650) 508-6365
Pages Sent: 3

Dear Mr. Olafsson:

A record search of the sacred lands file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend other with specific knowledge. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received

If you receive notification of change of addresses and phone numbers from any these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

NATIVE AMERICAN CONTACTS
San Francisco, San Mateo, & Santa Clara Counties
December 12, 2001

Marjorie Ann Reid 19279 Lexington Lane Redding, CA 96003	Ohlone/Coastanoan	Amah San Juan Band Charles Higuera 1316 Buena Vista Ave. Pacific Grove, CA 93950 (831) 375-9581 - work (831) 375-5045- home matuzwest@aol.com	Ohlone/Costanoan
Ella Rodriguez PO Box 1411 Salinas, CA 93902 (831) 632-0490	Ohlone/Costanoan Esselen	Amah San Juan Band Marion Martinez 26206 Coleman Avenue Hayward, CA 94544 (510) 732-6806 - home comncompy@hotmail.com - email	Ohlone/Costanoan
Jakki Kehl 5461 Beaver Lane Byron, CA 94514 (925) 516-1670	Ohlone/Costanoan	Amah/Mutsun Tribal Band Michelle Zimmer 4952 McCoy Avenue San Jose, CA 95130 (408) 364-1391 - Home (408) 364-1393 - Fax (408) 210-8061 - Cell	Ohlone/Costanoan
Katherine Erolinda Perez 1234 Luna Lane Stockton, CA 95206 (209) 941-1900 work	Ohlone/Costanoan Northern Valley Yokut Bay Miwok	Amah/MutsunTribal Band Irene Zwierlein, Chairperson 789 Canada Road Woodside, CA 94062 (650) 851-7747 - Home (650) 851-7489 - Fax (408) 364-1393 - Cell	Ohlone/Costanoan
Thomas P. Soto PO Box 269 Foresthill, CA 95631 (530) 367-4402 (530) 367-5083	Ohlone/Costanoan	Indian Canyon Mutsun Band of Costanoan Ann Marie Sayer, Chairperson P.O. Box 28 Hollister, CA 95024-0 (510) 637-4238	Ohlone/Costanoan

This list is current only as of the date of this document.

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This list is only applicable for contacting local Native Americans with regards to the cultural assessment for the proposed Caltrain Train Service: San Francisco to Gilroy, San Francisco, San Mateo, & Santa Clara Counties.

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152 — Ohlone/Costanoan
Mission San Jose, CA 94539
(510) 656-0787 - Voice
(510) 882-0527 - Cell
(510) 656-0760 - Fax
chochenyo@AOL.com

Trina Marine Ruano Family
Ramona Garibay, Representative
37974 Canyon Hts. Drive — Ohlone/Costanoan
Fremont, CA 94536
(510) 792-1642
(510) 673-5029 - Cell

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This list is only applicable for contacting local Native Americans with regards to the cultural assessment for the proposed Caltrain Train Service: San Francisco to Gilroy, San Francisco, San Mateo, & Santa Clara Counties.

December 17, 2007

Ms. Debbie Pilas-Treadway
Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

Re: Caltrain Electrification Project

Dear Ms. Pilas-Treadway:

The Peninsula Corridor Joint Powers Board (PCJPB) is continuing a project to electrify Caltrain commuter rail service from San Francisco at 4th and King Streets, south along the Caltrain right-of-way to the Tamien Station in San Jose. This linear project crosses San Francisco, San Mateo, and Santa Clara counties. The enclosed map (Figure 1) shows the current project line, which is the same as previously described. Two changes have occurred since you were last informed about this project: (1) the extent of the line to be electrified now extends to San Jose (for a distance of 52 miles) rather than extending to Gilroy (a distance of 77 miles), and (2) the electrification equipment now includes only ten (10) traction power substations, rather than the 13 that were previously required. Eight of these sites are in new locations. Figure 2 shows the locations of the traction power substations proposed as part of the project.

Construction of the substations will typically involve excavation up to six feet deep in an area about 30 by 60 feet. Inside the substations will be equipment gantries with a three foot diameter foundation that will be 15 to 18 feet deep. Along the tracks, catenary support poles will be placed approximately every 180 feet, and these excavations will be up to 36 inches in diameter and 15 to 20 feet deep. These details are essentially the same as previously stated.

In December 2001, the PCJPB sent letters about the project to members of the Native American community, but received no responses. During that previous project phase Far Western Anthropological Research Group, Inc. (Far Western) conducted an archaeological resources assessment of the project area, and found ten archaeological sites (eight prehistoric, one multicomponent, and one historic) in the Caltrain Area of Potential Effects (APE), an additional nine prehistoric sites potentially within the APE, and two archaeological resource-sensitive zones (Hamilton shell mound and mission-era). The goal of this project is to avoid all archaeological resources but if avoidance is not feasible, testing prior to construction is recommended.

The PCJPB and Federal Transit Administration (FTA) are updating the project archaeological assessment with a records search, a sensitivity study for buried soils and potentially buried resources, and pedestrian survey of the new substation locations. Far Western is assisting in that effort.

PENINSULA CORRIDOR JOINT POWERS BOARD
1250 San Carlos Avenue – P.O. Box 3006
San Carlos, CA 94070-1306 (650)508-6269

This letter requests a check of the Sacred Lands file for the vicinity of the project area. We would also appreciate addresses and phone numbers of Native Americans who live in the region.

Please feel free to contact me at (650) 508-6338 or pangm@samtrans.com, or Laura Leach-Palm at (530) 756-3941 or laura@farwestern.com, if you have further questions regarding the project.

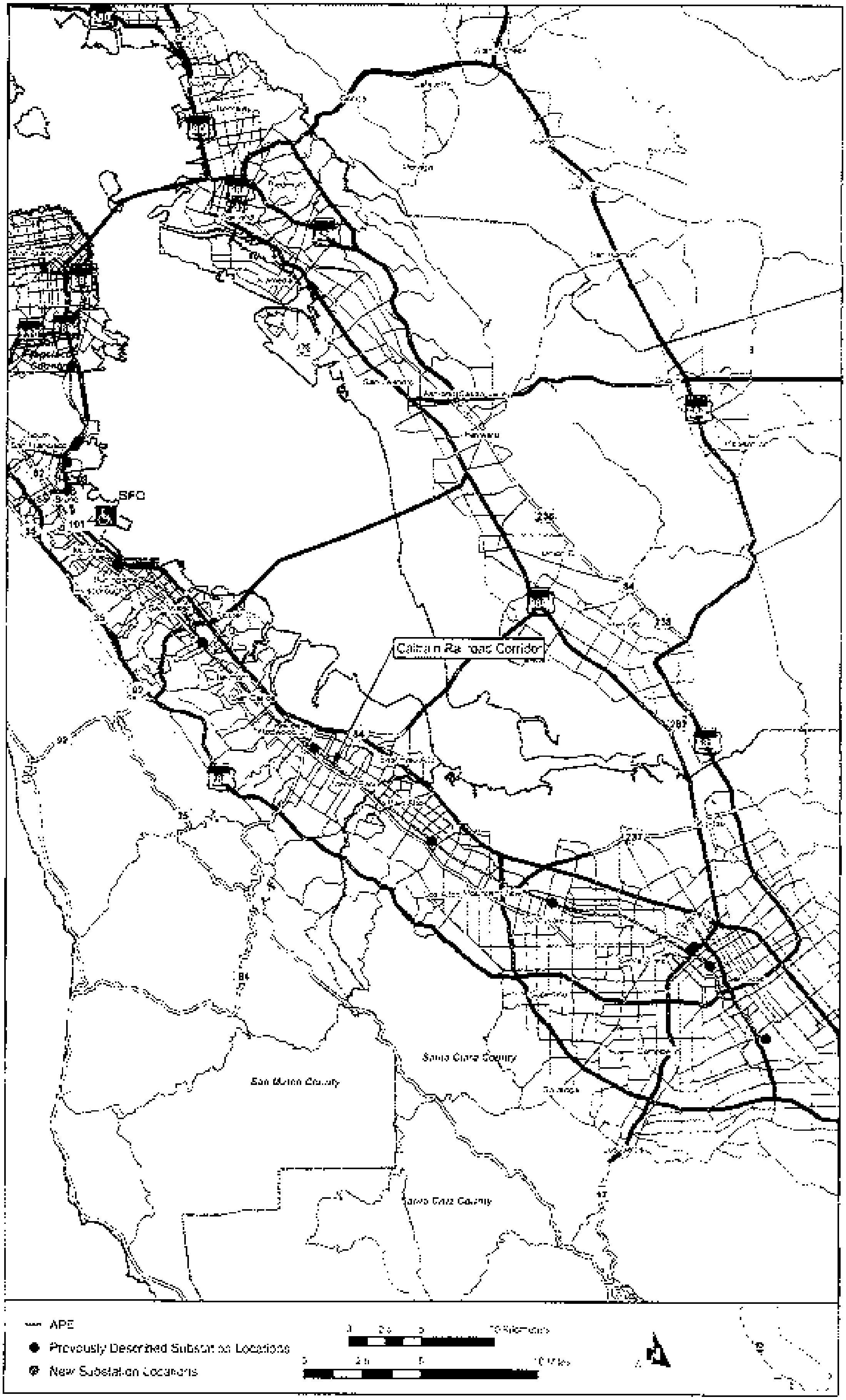
Sincerely,

Marie Pang

Marie Pang
Environmental Manager

encl. maps; list of USGS quadrangles, with township, range, section.

CALTRAIN ELECTRIFICATION PROGRAM 2007					
County	**Quad**	**Town-ship**	**Range**	**Section**	**Land Grant**
SAN FRANCISCO	SAN FRANCISCO SOUTH			0	RINCON DE LAS SALINAS Y POTRERO VIEJO
	SAN FRANCISCO SOUTH			0	CANADA DE GUADALUPE
SAN MATEO	SAN FRANCISCO SOUTH			0	CANADA DE GUADALUPE
	SAN FRANCISCO SOUTH			0	CANADA DE GUADALUPE LA VISITACION
	SAN FRANCISCO SOUTH			0	BURI BURI
	MONTARA MTN			0	BURI BURI
	SAN MATEO			0	BURI BURI
	SAN MATEO			0	SAN MATEO
	SAN MATEO			0	PULGAS
	SAN MATEO	04S	04W	33	
	REDWOOD POINT			0	PULGAS
	WOODSIDE			0	PULGAS
	PALO ALTO			0	PULGAS
	PALO ALTO			0	SAN FRANCISQUITO
SANTA CLARA	PALO ALTO			0	RINCONADA DEL ARROYO DE SAN FRANCISQUITO
	PALO ALTO			0	SAN FRANCISQUITO
	PALO ALTO			0	RINCON DE SAN FRANCISQUITO
	MOUNTAIN VIEW			0	RINCON DE SAN FRANCISQUITO
	MOUNTAIN VIEW			0	PASTORIA DE LAS BORREGAS
	CUPERTINO			0	PASTORIA DE LAS BORREGAS
	CUPERTINO	06S	01W	32	
	SAN JOSE WEST			0	LOS COCHES
	SAN JOSE WEST			0	SAN JUAN BAUTISTA
	SAN JOSE WEST	07S	01W	2, 3	
	SAN JOSE WEST	06S	01W	32, 33, 34, 35	
	SAN JOSE WEST			0	EL POTRERO DE SANTA CLARA
	SAN JOSE WEST			0	PUEBLO LANDS OF SAN JOSE
	SAN JOSE EAST			0	PUEBLO LANDS OF SAN JOSE



CalTrain Electrification Project Corridor 2007

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

January 16, 2008

Marie Pang
Environmental Manager
Caltrain
1250 San Carlos Avenue – P.O. Box 3006
San Carlos, CA 94070-1306

Sent by Fax: N/A
Number of Pages: 3

Re: Proposed Caltrain Commuter Rail Service Project, San Francisco, San Mateo, and Santa Clara County.

Dear Ms. Pang:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
San Francisco, San Mateo, & Santa Clara Counties
January 15, 2008

Jakki Kehl
720 North 2nd Street — Ohlone/Costanoan
Patterson, CA 95363
jakki@bigvalley.net
(209) 892-2436
(209) 892-2435 - Fax

Amah/MutsunTribal Band
Irene Zwierlein, Chairperson
789 Canada Road — Ohlone/Costanoan
Woodside, CA 94062
amah_mutsun@yahoo.com
(650) 851-7747 - Home
(650) 851-7489 - Fax

Amah MutsunTribal Band
Valentin Lopez, Chairperson
3015 Eastern Ave, #40 — Ohlone/Costanoan
Sacramento, CA 95821
vlopez@amahmutsun.org
(916) 481-5785

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28 — Ohlone/Costanoan
Hollister, CA 95024
ams@garlic.com
831-637-4238

Amah MutsunTribal Band
Edward Ketchum
35867 Yosemite Ave — Ohlone/Costanoan
Davis, CA 95616 — Northern Valley Yokuts
aerieways@aol.com

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
PO Box 360791 — Ohlone / Costanoan
Milpitas, CA 95036
muwekma@muwekma.org
408-434-1668
408-434-1673

Amah/Mutsun Tribal Band
Michelle Zimmer, Cultural Resource Cor
P O Box 3892 — Ohlone/Costanoan
Clear Lake, CA 95422
408-375-4281

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152 — Ohlone/Costanoan
Mission San Jose, CA 94539 — Bay Miwok
chochenyo@AOL.com — Plains Miwok
(510) 656-0787 - Voice — Patwin
(510) 882-0527 - Cell
(510) 687-9393 - Fax

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This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Caltrain Commuter Rail Service project, San Francisco, San Mateo, & Santa Clara Counties.

Native American Contacts
San Francisco, San Mateo, & Santa Clara Counties
January 15, 2008

Trina Marine Ruano Family Ramona Garibay, Representative 16010 Halmar Lane Lathrop , CA 95330 510-300-5971 - cell	Ohlone/Costanoan Bay Miwok Plains Miwok Patwin

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This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Caltrain Commuter Rail Service project, San Francisco, San Mateo, & Santa Clara Counties.

FAR WESTERN
ANTHROPOLOGICAL RESEARCH GROUP, INC.

February 1, 2008

Mr. Valentine Lopez, Chairperson
Amah Mutsun Tribal Band
3015 Eastern Ave. #40
Sacramento, CA 95821

Dear Mr. Lopez:

This letter is to inform you about a continuing cultural resources investigation, and to ask you for any comments or concerns you might have about the project. The Peninsula Corridor Joint Powers Board (PCJPB) is continuing a project to electrify Caltrain commuter rail service from San Francisco at 4th and King Streets, south along the Caltrain right-of-way to the Tamien Station in San Jose. This linear project crosses San Francisco, San Mateo, and Santa Clara counties. The enclosed map shows the current project line, which is the same as described in a letter sent in 2001. Two changes have occurred since you were last informed about this project: (1) the extent of the line to be electrified now extends to San Jose (for a distance of 52 miles) rather than extending to Gilroy (a distance of 77 miles), and (2) the electrification equipment now includes only ten (10) traction power substations, rather than the 13 that were previously required.

Construction of the substations will typically involve excavation up to six feet deep in an area about 30 by 60 feet. Inside the substations will be equipment gantries with a three foot diameter foundation that will be 15 to 18 feet deep. Along the tracks, poles will be placed approximately every 180 feet, and these excavations will be up to 36 inches in diameter and 15 to 20 feet deep. These details are essentially the same as previously envisioned.

In December 2001, the PCJPB sent letters about the project to members of the Native American community, but received no responses. During that previous project phase Far Western Anthropological Research Group, Inc. (Far Western) conducted an archaeological resources assessment of the project area, and found ten archaeological sites (eight prehistoric, one multicomponent, and one historic) in the Caltrain Area of Potential Effects (APE), an additional nine prehistoric sites potentially within the APE, and two archaeological resource-sensitive zones (Hamilton shell mound and mission-era). The goal of this project is to avoid all archaeological resources but if avoidance is not feasible, testing prior to construction is recommended.

The PCJPB and Federal Transit Administration (FTA) are updating the project archaeological assessment with a records search, a sensitivity study for buried soils and potentially buried resources, and pedestrian survey of the new substation locations. Far Western is assisting in that effort.

Please contact me at (530) 756-3941 or laura@farwestern.com, if you have any questions or comments regarding the project.

Sincerely,

Laura Leach-Palm
Project Director

encl. one map
cc: R. Cambra, A. Galvan, R. Garibay, I. Kehl, E. Ketchum, A. Sayers, M. Zimmer, I. Zwierlein

MAIN OFFICE 2727 DEL RIO PLACE, SUITE A, DAVIS, CALIFORNIA 95618 • PHONE: 530-756-3941 • FAX: 530-756-0811
CENTRAL COAST BRANCH 1725 DIABLO DRIVE, SAN LUIS OBISPO, CALIFORNIA 93405 • PHONE: 805-547-0489
GREAT BASIN BRANCH PO BOX 758, VIRGINIA CITY, NEVADA 89440 • PHONE: 775-847-0223 • FAX: 775-847-0224
DESERT BRANCH 2860 E. FLAMINGO ROAD, SUITE E, LAS VEGAS, NEVADA 89121 • PHONE: 702-982-3691 • FAX: 702-982-3693

AMAH MUTUSN TRIBAL BAND
3015 EASTERN AVENUE #40
SACRAMENTO, CA 95821

Date: 3/1/08

To: Laura Leach - Palm

Thank you for your letter dated 2 / 1 / 08 which gives the Amah Mutsun Tribal Band the opportunity to review the development proposal for the PCSPB ______. We understand that per your initial review this site has not been identified as a known archaeological or prehistoric site. Based on our review of your development plan the category(ies) checked below identifies our findings and or recommendation.

____ 1. We consider this site sacred or of significant cultural importance. We request consultation. Please contact us immediately.

____ 2. We believe this site has a high probability of containing archaeological resources. Consequently we are requesting that the entire site be surveyed and that a Native American monitor be present to observe all underground construction Tribal members are available to consult regarding our position.

____ 3. We cannot ascertain how promising this type of locations and terrain are for the discovery of culturally important materials. As a general rule, we ask that where construction is to be completed with 300 feet of a natural waterway that a monitor be hired to observe construction within this area. Tribal members are available to consult regarding our position.

____ 4. Based on our review we have determined that it is doubtful that culturally important material will be located on this construction site. In the event that cultural material is found, please notify us immediately.

_X_ 5. The location of this site is outside of our traditional tribal boundaries. We suggest that you contact ______ as they may have knowledge and specific concerns regarding this site. - Amah Mutsun Territory starts at the 680 + 101 and runs south

Additionally, we request that when a Native American monitor is used, that only monitors who have been certified by a Registered Professional Archaeologist and a member/consultant to the Heritage Resources Management Committee of the California Archaeologist society be used. This request ensures professional, competent, and consistent monitoring of the site.

Our Tribal interest regarding these notifications is to ensure that construction companies are aware of and comply with the steps required by 26 CFR 800.13 (B). Archaeological resources that may be discovered during this project include: ceremonial sites, mythological sites, social/cultural meeting sites, resources gathering sites (i.e., basket materials and traditional food items, trails, historical events and sites and others). In the event that any of the above items are found I request that our Tribe be contacted immediately.

On behalf of the Amah Mutsun Tribal Band I want to thank you for the opportunity to review this proposal.

Sincerely,

Valentin Lopez, Chairman
Amah Mutsun Tribal Band
(916) 481-5785

FAX TO. Laura Lynch-Palm
FAX #: 530-756-0811
PH #: 530-756-3941

STATE OF CALIFORNIA – THE RESOURCES AGENCY GRAY DAVIS, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@mail2.quiknet.com

RECEIVED

DEC 1 6 2002

December 9, 2002

REPLY TO: FTA021021A

Leslie T. Rogers, Regional Administrator
Federal Highway Administration
Region IX
201 Mission Street, Suite 2210
SAN FRANCISCO CA 94105-1839

Re Caltrain Electrification Program, San Francisco, San Mateo, and Santa Clara Counties.

Dear Mr. Rogers:

Thank you for submitting to our office your October 217, 2002 letter, Historic Resources Inventory and Evaluation (HRIE), Archeological Inventory (AI), and Finding or Effect (FOE) documentation regarding the proposed Caltrain Electrification Program in the counties of San Francisco, San Mateo, and Santa Clara. The proposed project would electrify the Caltrain system from its current northern terminus at Fourth and King Streets in San Francisco to the southern terminus at the Gilroy Station in downtown Gilroy in Santa Clara County. The project's implementation is being coordinated by the Peninsula Corridor Joint Powers Authority (JPB) in cooperation with the Federal Transit Administration (FTA). The project is expected to increase Caltrain ridership, improve regional air quality by eliminating diesel emissions and reducing vehicle miles of travel, and modernize the Caltrain service.

FTA and JBP have selected the following as the chosen alternative for the project:

- **The Electrification Program Alternative** - would provide for the conversion from diesel-hauled to electric-hauled trains and would require the installation of some 180 to 200 single track miles of overhead contact system (OCS) for the distribution of electrical power to the electric rolling stock. Electric rolling stock would consist of locomotives or electrical multiple unit (EMU) cars. The OCS would be powered from a 25 kilovolt (kV), 60 Hertz (Hz), single-phase, alternating current (ac) supply system consisting of traction power supply substations, switching stations, and paralleling stations.

Detailed descriptions of the OCS, the substations, switching stations, paralleling stations, and overhead protection structures are contained in your letter and supporting documentation. The Archeological Area of Potential Effects (APE) and the Historic Architectural APE for this project, as delineated, were determined, by consensus, to meet the definitions set forth in 36 CFR 800.16(d).

The AI identified ten (10) archeological sites within the project APE. An additional nine prehistoric sites are potentially within the APE. Documentary research also identified two archeological resource-sensitive zones. Previous investigations indicate that one site has been determined eligible to the National Register of Historic Place (NRHP) and another has been assumed eligible. Neither site has been listed. FTA has not evaluated any sites within the APE since its proposed project will avoid all archeological properties.

FTA is seeking our comments on its determination of the eligibility of 94 previously unevaluated pre-1956 architectural properties for inclusion on NRHP in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. FTA is also seeking our comments on its determination of the effects the proposed project will have on historic properties in accordance with 36 CFR 800. Our review of the submitted documentation leads us to make the following comments regarding the aforementioned properties:

- We concur with FTA's determination that the following properties are eligible for inclusion on the NRHP under applicable criteria established by 36 CFR 60.4:

1. Tunnel No. 3 (P.M. 03.19), San Francisco. Criteria A and C
2. Tunnel No. 4 (P.M. 04.27), San Francisco. Criteria A and C
3. Schlage Lock Company Main Office Building, 2201 Bayshore Boulevard, San Francisco, Criterion A.
4. Airport Boulevard Underpass/South San Francisco Subway (P.M. 09.59), South San Francisco, Criteria A and C.
5. The San Mateo 1903 Underpasses (Criteria A and C):
    - East Poplar Avenue Underpass (P.M. 17.20), San Mateo.
    - East Santa Inez Avenue Underpass (P.M. 17.34), San Mateo.
    - Monte Diablo Avenue Underpass (P.M. 17.45), San Mateo.
    - Tilton Avenue Underpass (P.M. 17.45), San Mateo.

6. Atherton Station, Station Lane, Atherton, Criterion A.
7. San Francisquito Bridge, (P.M. 29.69), Criteria A and C.
8. University Avenue Underpass (P.M 30.13), Criterion A.
9. Embarcadero Underpass (P.M. 30.70), Palo Alto, Criterion A
10. Santa Clara Tower at Benton and Railroad Street (P.M. 44.70), Santa Clara, Criterion C.

11. Coyote Station, 8215A Monterey Road, Coyote, Criteria A and C.
12. Madrone Underpass, (P.M. 66.50), Morgan Hill, Criterion A.

The aforementioned railroad/highway properties either have strong associations with the development of Southern Pacific coastal railroad and/or highway transportation corridors connecting San Francisco with San Mateo and Santa Clara counties to the south, or with the development of grade separation structures that eliminated hazardous automobile grade crossings. In addition, these structures served as models for the construction of later grade separation structures along the Southern Pacific's Coast line. The Schlage Main Office Building has strong associations with the Schlage Lock Company, an ongoing innovator in the development of lock products and related technologies that helped to revolutionize the security lock industry for home, business, and industrial uses. Those properties that were eligible for inclusion on the

NRHP under Criterion C have retained sufficient integrity of design, materials, setting, feeling, and association to convey their respective historical periods of significance.

The remaining pre-1956 properties reviewed in the submitted HRIE are not eligible for inclusion on the NRHP under any criteria established by 36 CFR 60.4. The properties have no strong associations with significant historical events or persons and are not examples of outstanding architectural or engineering design or function.

On the basis of the above comments, we can now concur with FTA's determination that the proposed project, as described, will have no adverse effect on historic properties. The proposed work is reversible and will not significantly alter or change those characteristics that qualify the properties either individually or collectively for inclusion on the NRHP. In addition, the proposed OCS will in no way be physically attached to any of the historic structures or buildings evaluated in the HRIE.

Thank you again for seeking our comments on your project. If you have any questions, please contact staff historian Clarence Caesar at by phone at (916) 653-8902 or by e-mail at ccaes@ohp.parks.ca.gov.

Sincerely,

Dr. Knox Mellon
State Historic Preservation Officer

U.S. Department
of Transportation
Federal Transit
Administration

REGION IX
Arizona, California,
Hawaii, Nevada, Guam

201 Mission Street
Suite 2210
San Francisco, CA 94105-1839
415-744-3133
415-744-2726 (fax)

OCT 17 2002

Mr. Daniel Abeyta
State Historic Preservation Officer
Office of Historic Preservation
Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

Re: Request for Concurrence with
Finding of No Historic Properties
Affected for the Caltrain Electrification
Project

Dear Mr. Abeyta:

Enclosed for your review are the Historic Property Survey Report, Archaeological Survey Inventory Report and Inventory and Evaluation of Historic Resources Report prepared for the above referenced project proposed by the Peninsula Corridor Joint Powers Board (JPB). The Federal Transit Administration (FTA) is requesting the State Historic Preservation Officer's review and concurrence with the Finding of No Historic Properties Affected for the Caltrain Electrification Project.

The project is eligible to receive federal funding assistance from the FTA and is subject to federal regulatory requirements to identify cultural resources pursuant to Section 106 of the National Historic Preservation Act. Far Western Anthropological Research Group completed the work for Parsons Consulting on behalf of JPB for this project.

Please review the enclosed material, and if it meets your approval on the determination of no historic properties affected, forward your concurrence to:

Mr. Michael J. Scanlon
Executive Director
Peninsula Corridor
Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos CA 94070-1306

Please also forward a copy of your letter to FTA.

If you have any questions, please call Jerome Wiggins, FTA Transportation Representative, at (415) 744-2819.

Sincerely,

Leslie T. Rogers
Regional Administrator

Enclosures

cc: Marie Pang, JPB
Pat Gelb, Parsons

STATE OF CALIFORNIA - THE RESOURCES AGENCY

GRAY DAVIS, *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@mail2.quiknet.com

July 15, 2003

REPLY TO: FTA021021A

Leslie T. Rogers, Regional Administrator
Federal Transit Administration
Region IX
201 Mission Street, Suite 220
SAN FRANCISCO CA 94105-1839

Re: Amended Finding of Effect for the Caltrain Electrification Project, San Francisco, San Mateo, and Santa Clara Counties.

Dear Mr. Rogers:

Thank you for submitting to our office your June 20, 2003 letter and Finding of Effect Amended (FOEA) documentation regarding the proposed Caltrain Electrification Project in San Francisco, San Mateo, and Santa Clara Counties. The proposed project would electrify the Caltrain system from its current northern terminus at Fourth and King Streets in San Francisco to the southern terminus at the Gilroy Station in downtown Gilroy in Santa Clara County. The project is being coordinated by the Peninsula Corridor Joint Powers Authority (JPB) in cooperation with the Federal Transit Administration (FTA). In my letter of December 9, 2003, I concurred with FTA's determination that 12 architectural and engineering properties located within the project Area of Potential Effects (APE) were eligible for inclusion on the National Register of Historic Places (NRHP). I also concurred with FTA's finding that the proposed project, as then described, would have no adverse effect on historic properties.

In light of recent modifications to the proposed project in terms of three historic resources (the San Francisquito Bridge, Tunnel #3, and Tunnel #4), FTA is submitting for my review its FOEA documentation. FTA is once again seeking my comments on the effects the amended proposed project will have on these historic properties in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. A detailed description of the proposed project changes is included on Pages 5 through 8 of the FOEA document. A review of the FOEA leads me to concur with FTA's determination that the amended proposed project, as described, will have no adverse effect on the aforementioned historic properties. The proposed work is reversible and will not significantly alter or change those characteristics that qualify the properties for inclusion on the NRHP.

Thank you again for seeking my comments on your project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

[signature] for

Dr. Knox Mellon
State Historic Preservation Officer

FTA 021021A

prev. proj

U.S. Department
of Transportation
Federal Transit Administration

REGION IX
Arizona, California,
Hawaii, Nevada, Guam
American Samoa,
Northern Mariana Islands

201 Mission Street
Suite 2210
San Francisco, CA 94105-1839
415-744-3133
415-744-2726 (fax)

JUN 2 0 2003

Dr. Knox Mellon
State Historic Preservation Officer
California Department of Parks and Recreation
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296-0001

SUBJECT: Caltrain Electrification Project Section 106 Amendment Document

Dear Dr. Mellon:

You previously concurred with a Finding of Effect (FOE) document for the Caltrain Electrification Project on December 9, 2002 (see attached). Since that time, the project description has been modified in terms of project activities relative to three historic resources, the San Francisquito Creek Bridge, Tunnel #3 and Tunnel #4. This amended FOE document applies the Criteria of Effect and Adverse Effect as they appear in 36 CFR 800.5 and follows guidelines for documentation in 36 CFR 800.11, to the three historic resources affected by the modified project description. It is concluded that the project will have no adverse effects on the historic resources identified.

Enclosed is a copy of the following Section 106 document that has been prepared pursuant to 36 CFR 800.

- *Final Finding of Effect Amendment Caltrain Electrification Project* dated May, 2003

The Federal Transit Administration seeks SHPO's concurrence with the Finding of Effect Amendment.

Sincerely,

Leslie T. Rogers
Regional Administrator

Enclosures:
Final Finding of Effect Amendment Caltrain Electrification Project dated May, 2003

C/CAG

City/County Association of Governments
of San Mateo County

Atherton • Belmont • Brisbane • Burlingame • Colma • Daly City • East Palo Alto • Foster City • Half Moon Bay • Hillsborough • Menlo Park • Millbrae Pacifica • Portola Valley • Redwood City • San Bruno • San Carlos • San Mateo • San Mateo County • South San Francisco • Woodside

August 30, 2000

Peninsula Commute Service Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

Attention: Marie Pang, Environmental Manager

Marie
Dear ~~Ms.~~ Pang:

The C/CAG staff has reviewed the Notice of Preparation for the Caltrain Electrification Program and we have no comments to offer at this time. We look forward to participating in the process and reviewing the draft EIR when it becomes available.

Sincerely,

Richard Napier, Executive Director

555 County Center, Redwood City, CA 94063 Phone: 650.599.1406 Fax: 650.361.8227

SANTA CLARA
Valley Transportation Authority

September 28, 2000

Ms. Marie Pang, Environmental Manager
Peninsula Commute Service Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

Subject: Caltrain Electrification Program
Notice of Preparation

Dear Ms. Pang:

Santa Clara Valley Transportation Authority (VTA) staff have reviewed the Notice of Preparation for the Caltrain Electrification Program, which will examine electrification options to improve commuter rail service within the corridor generally following U.S. Highway 101 between San Francisco and the City of Gilroy. We have the following comments.

Impacts on Bicycle Projects

VTA requests that the Environmental Assessment (EA)/Environmental Impact Report (EIR) identify potential impacts to existing or planned bicycle facilities near or along the Caltrain right-of-way. VTA recommends that the proposed project should maintain or enhance bicycle access to trails in the vicinity of the Caltrain tracks and should protect existing track crossings currently accessible to bicycles. In addition, we recommend that the project should preserve the ability of local agencies to carry out bicycle projects near or along the Caltrain right-of-way.

Impacts to Light Rail Transit

VTA requests that the EA/EIR identify any impacts to VTA's AFO track circuits caused by the 25kv traction power voltage.

VTA appreciates the opportunity to provide comments on the proposed project. If you have any questions, please call Christina Jaworski of my staff at (408) 321-5751.

Sincerely,

Roy Molseed
Senior Environmental Analyst

RM:CTJ:kh

cc: F. Sharpless, Transportation Policy & Program Manager

3331 North First Street • San Jose, CA 95134-1906 • Administration 408.321.5555 • Customer Service 408.321.2300

DEPARTMENT OF COMMUNITY DEVELOPMENT

330 West 20th Avenue
San Mateo, CA 94403-1388
Web Site: www.ci.sanmateo.ca.us

August 2, 2002

Erik Olafsson, Senior Planner
Peninsula Corridor Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

RE: Historical Resources Comments

Dear Erik:

In response to your letter of July 22, 2002, the following comments address the City's issues regarding historic resources within the rail corridor and any effect upon such resources that electrification of the rail line may engender.

In terms of completing a survey along the line, recall that the EIR/EIS for the Downtown Transit Station included information on the rail bridge over San Mateo Creek. That report referenced an existing historic survey of rail bridges. It is possible that various other rail bridges in the city may be on that list.

Another resource is the Hillsdale Station. I believe it is, or is close to, 50 years old. Information on that structure may be separately available in your offices. As a result of the passing track design work underway for that general location, the Hillsdale Station will be moved north several hundred feet. What has not been addressed in the planning stages of that work is the design of that station and the disposition of the existing structure.

The last resource that I can think of is the Downtown Transit Station. (Although a new structure, it seems to meet the definition contained in your letter.) I believe that the original design of this structure anticipated electrification of the rail line, but in terms of final design, the City requests that the catenary support poles be located to minimize visual impact for those patrons utilizing the station. It would be preferable for the poles to "frame" the station rather than have one placed directly in front of the station.

Building Division 522-7172 / Fax 522-7171 * Code Enforcement 522-7150 * Economic Development & Business Assistance 522-7240
Neighborhood Improvement & Housing 522-7220 * Planning Division 522-7202 * Office Fax 522-7201 * TDD/TTY 522-7047 - (Area Code '650' for all numbers)

Finally, as a clarification to the projects defined in your letter under the heading Other Improvements Included in the Electrification Program Alternative, it is my understanding that a four-track passing configuration is being designed for the Hillsdale/Bay Meadows area as well as those listed in your letter.

I hope this is helpful. Please contact me with any further questions, at 650-522-7207 or at sscott@cityofsanmateo.org.

Sincerely,

Stephen W. Scott
Senior Planner

cc: Ronald Munekawa, Chief of Planning

SAN FRANCISCO
ARCHITECTURAL
HERITAGE

July 29, 2002

Mr. Erik Ólafsson, Senior Planner
Peninsula Corridor Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070

Dear Mr. Ólafsson:

Thank you for contacting our organization regarding the evaluation of historical resources within the Caltrain Electrification project area.

San Francisco Architectural Heritage is interested in the impact this project may have on any such resources, but only within the City and County of San Francisco. That interest extends to any structure in the built environment.

Our own surveys have included the area around the Fourth and Townsend depot and the right-of-way to about 17th Street. From that point to the county line, we have no survey data. Consequently, we will be interested in the findings of your inventory and evaluation and look forward to the opportunity to comment on those.

Future communications should be directed to me. You should remove the name of Maria Goodwin from your records. Also please note a change in our name from The Foundation for San Francisco's Architectural Heritage, to San Francisco Architectural Heritage.

Sincerely,

Charles Edwin Chase, AIA
Executive Director

ARCHITECTURAL
HERITAGE
2007 FRANKLIN ST.
SAN FRANCISCO
CALIFORNIA 94109

CITY OF BRISBANE

50 Park Place
Brisbane, California 94005-1310
(415) 508-2100
Fax (415) 467-4989

July 26, 2002

Erik Olafsson
Senior Planner
Peninsula Corridor Joint Powers Board
P.O. Box 3006
San Carlos, CA 94070

Re: Caltrain Right-of-Way

Dear Mr. Olafsson:

In response to your inquiry, I am enclosing a copy of the City of Brisbane's Historic/Cultural Resources Inventory from one of the City's General Plan background reports. From the accompanying map, you should be able to identify any such resources that may be located in any "off-right-of-way parcels" within the City of Brisbane, since none appear to be within the JPB's existing right-of-way. Of greatest concern is the Roundhouse, which is specifically identified in the City's General Plan (see enclosed excerpt) as an historic resource to be preserved.

For a more-specific response, please provide a detailed map showing the extent of the proposed third and fourth track improvements in the corridor segment from Bayshore to Brisbane and the proposed locations of any substations or switching stations within or near the City of Brisbane. Also be advised that there are other environmental concerns (including those associated with development atop municipal refuse landfill) that should be addressed in the vicinity of the JPB's right-of-way through the City of Brisbane.

Please do not hesitate to call me at 415-508-2120.

Sincerely,

Tim Tune
Senior Planner

CC: Randy Breault, City Engineer

Providing Quality Services

Addendum
to the

City of Brisbane

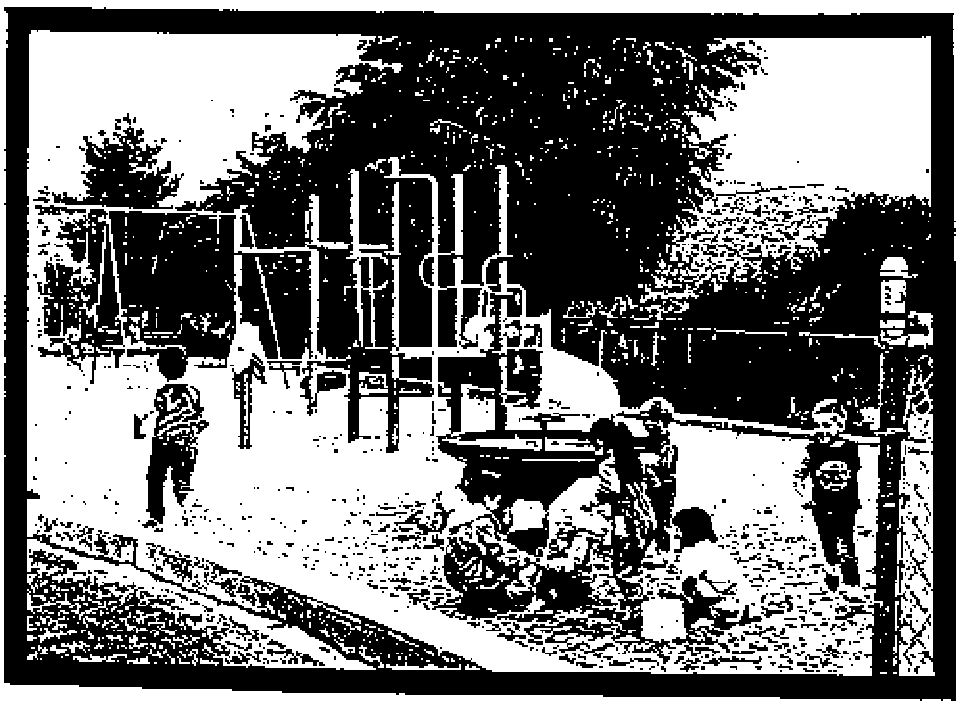
General Plan Background Report

Existing and Planned

Parks, Recreation, Historic and

Cultural Resources

March 1994



Prepared by
City of Brisbane Planning Department
150 North Hill Drive, Suite 40
Brisbane, CA 94005

HISTORIC/CULTURAL RESOURCES

Developed/Improved/Preserved

Key to Types:

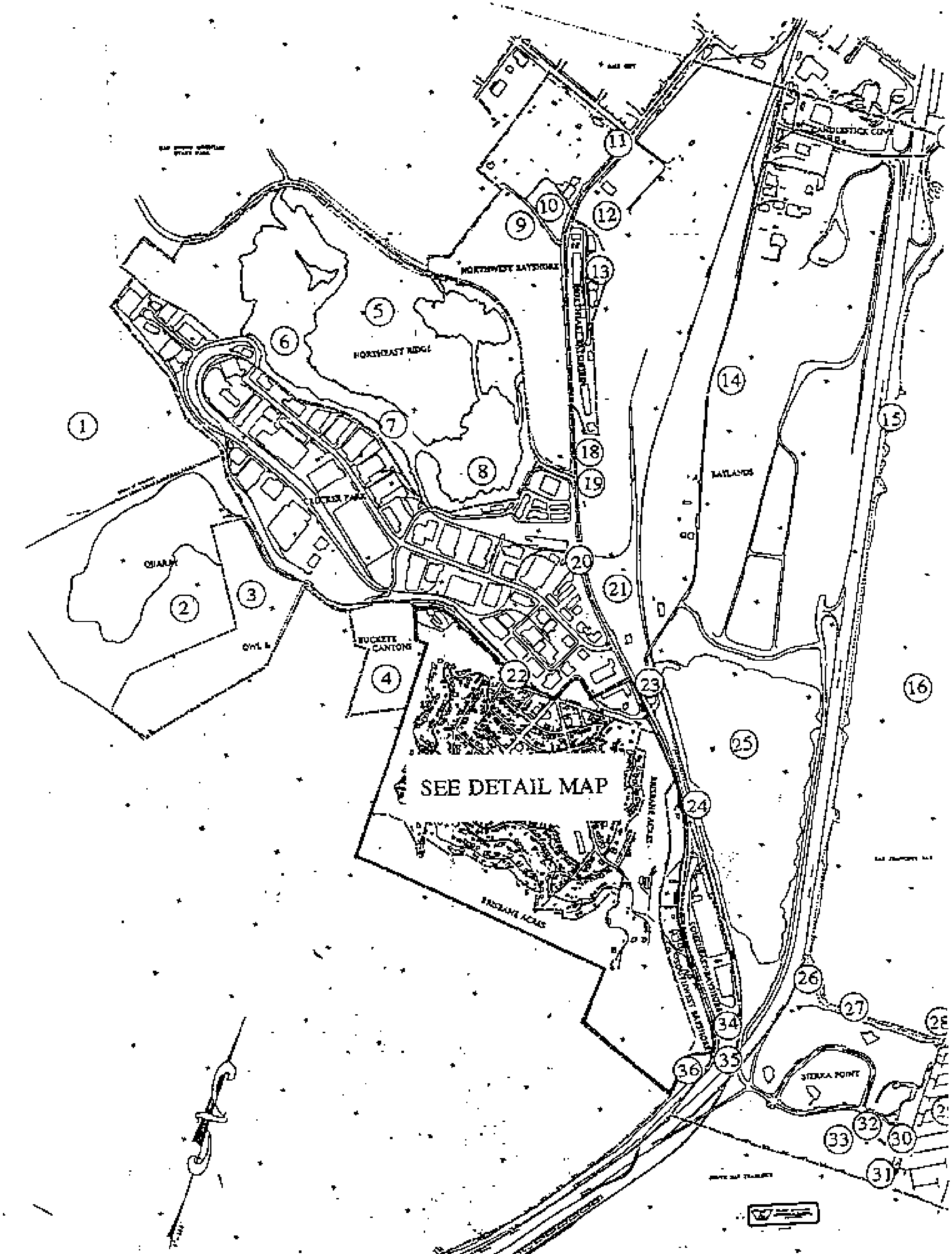
MP = Mini-Park
SU = Special Use
ONA = Other/None of the Above

#	Name	Location	Acres	Description	Ownership	Type
11.	7 Mile House	2800 Bayshore Blvd.	N/A	Historic restaurant & bar	Villacarlos & Agustin	SU
12.	Roundhouse	Bayshore Blvd. & Industrial Way	N/A	Historic brick railroad roundhouse	Tuntex	SU
13.	Moore Building	55 Industrial Way	N/A	Historic brick industrial building	Kessler & Kessler	SU
20.	Bayshore/ Crocker Tunnel	Bayshore Blvd. at Crocker Industrial Park	N/A	Railroad tunnel	SPRR easement	SU
21.	Machinery & Equipment building	3401 Bayshore Blvd.	N/A	Historic brick icehouse	Kenneth & P.L. Rowell	SU
30.	Harbor Master building	400 Marina Blvd.	N/A	Offices, meeting rooms	Redevelopment Agency	SU
34.	Corp yard tunnel	South end of the Lagoon	N/A	Historic railroad tunnel (storage)	Southern Pacific Railroad	SU
36.	Retaining wall	West side of Bayshore Blvd. above Sierra Point	N/A	Retaining wall	City of Brisbane	ONA
37.	Lipman School	1 Solano Street	N/A	Meeting room	Brisbane School District	SU
39.	Kids & Things building	4 Solano Street	N/A	Meeting facility	City of Brisbane	SU
48.	Brisbane Community Church	348 Visitacion Avenue	N/A	Church	Evangelical Free Church	SU
50.	Community Center building	250 Visitacion Avenue	N/A	Community Center and Library	City of Brisbane	SU
51.	Old Post Office	245 Visitacion Avenue	N/A	Historic building	A. & R. Cucalon	SU
52.	Plug Preserve	Visitacion Ave. & Mariposa Street	0.01 +/-	Small pocket park	Lena Mozzetti	MP
53.	23 Club building	23 Visitacion Avenue	N/A	Historic restaurant & bar	Lillian DeMarco	SU

Continued on following page

Continued from preceding page

#	Name	Location	Acres	Description	Ownership	Type
54.	23 Club BBQ area	Behind 23 Visitacion Avenue	N/A	Private patio and parking lot	Lillian DeMarco	ONA
55.	Allemand Hotel	100 San Bruno Avenue	N/A	Historic apartment building	Marsha Gay Anderson	SU
58.	Brisbane announcement sign	Old County Road	N/A	Signboard	Redevelopment Agency	SU
59.	City map sign	Old County Road	N/A	Entry sign	City of Brisbane	SU
60.	First Portuguese Speaking Baptist Church	298 San Bruno Avenue	N/A	Church	S.F.Peninsula Southern Baptist Association	SU
61.	Catholic Church	285 Alvarado Street	N/A	Church	Roman Catholic Archdiocese	SU
62.	Brisbane Elementary School	500 San Bruno Avenue	N/A	Meeting spaces, multi-purpose rooms	Brisbane School District	SU
63.	Recreation Department	500 San Bruno Avenue	N/A	Multi-purpose rooms	Brisbane School District	SU
64.	Old Fire Station	700 San Bruno Avenue	N/A	Former Fire Station	City of Brisbane	SU


SEE DETAIL MAP
NORTHWEST BAYSHORE
NORTHEAST RIDGE
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CENTRAL BRISBANE
BRISBANE ACRES
BRISBANE ACRES
SOUTHEAST BAYSHORE
SOUTHWEST BAYSHORE

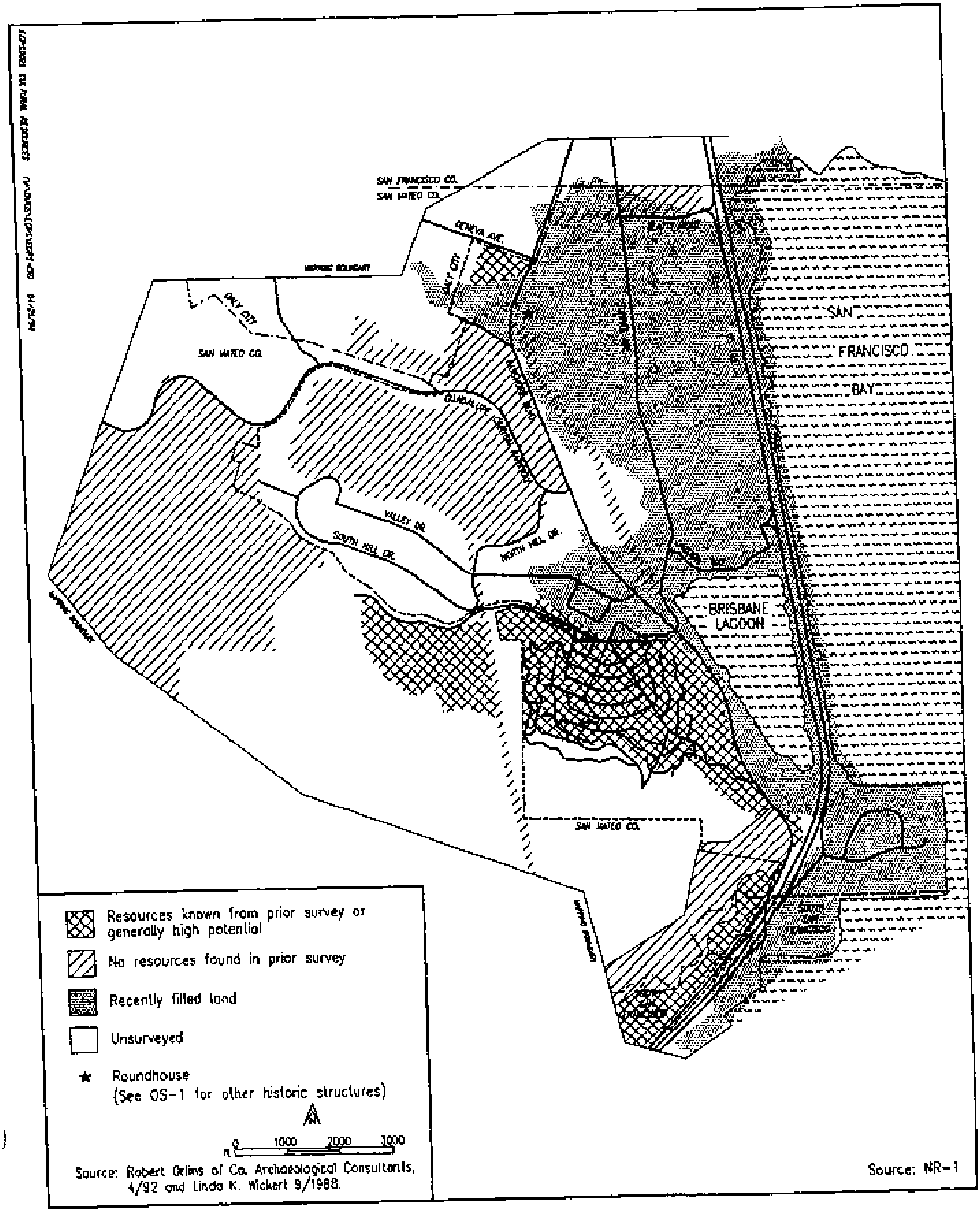
DETAIL MAP

THE 1994 GENERAL PLAN

CITY OF BRISBANE

ADOPTED BY THE BRISBANE CITY COUNCIL
RESOLUTION 94-24, JUNE 21, 1994

FIGURE IX-J


SAN FRANCISCO CO.
SAN MATEO CO.
GENEVA AVE.
DALY CITY
SAN MATEO CO.
GUADALUPE
VALLEY DR.
SOUTH HILL DR.
NORTH HILL DR.
SAN FRANCISCO BAY
BRISBANE LAGOON
SAN MATEO CO.
Resources known from prior survey or generally high potential
No resources found in prior survey
Recently filled land
Unsurveyed
Roundhouse
(See OS-1 for other historic structures)
0 1000 2000 3000
Source: Robert Orlins of Co. Archaeological Consultants, 4/92 and Linda K. Wickert 9/1988.
Source: NR-1

The City of Burlingame

PLANNING DEPARTMENT

CITY HALL 501 PRIMROSE ROAD
BURLINGAME, CALIFORNIA 94010-3997

TEL: (650) 558-7250
FAX: (650) 696-3790

July 29, 2002

Erik Ólafsson, Senior Planner
Peninsula Corridor Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070

Dear Mr. Ólafsson,

Re: Burlingame Historic Resources within Area of Potential Effect of Caltrain Electrification Program

This is in response to your request for information regarding historic resources within the area affected by the proposed Caltrain Electrification Program. Burlingame does not have an adopted list of historic resources, however the Burlingame train station located at the intersection of Burlingame Avenue and California Drive, was placed on the State Register of Historic Places in 1971 based on its architectural significance (California State Landmark No. 846) and was place on the National Register of Historic Places in 1978. This structure is recognized as the first permanent example of the Mission Revival style of architecture. It was designed by architects George H. Howard, Jr. and J. B. Mathison at the behest of the Southern Pacific Company and the Burlingame Country Club. The train station opened for business October 10, 1894.

Although it is not listed on the State register, the train station at Broadway and California Drive is also of historic interest. The building has been extensively remodeled over the years and now contains a restaurant. The station was built 1911 and was patterned after the earlier Burlingame Avenue depot. It was built to bring buyers to the recently subdivided Easton estates. A street car line was also established which took people from the train station to the top of Hillside Drive west of the station.

In addition, the Burlingame General Plan Scenic Roads and Highways Element designates the portion of California Drive between Burlingame Avenue and Trousdale Drive as a Local Scenic Route (see attached Scenic Roads and Highways Map). The General Plan Open Space Element identifies both California Drive and the adjacent railroad right-of-way as open space lands to provide links between other open space elements in Burlingame (see attached Open Space Plan Diagram). Removal of any protected trees along the Caltrain right-of-way will require a tree removal permit from the Parks and Recreation Department. A protected tree is defined as any tree with a circumference of 48 inches or more when measured 54 inches above natural grade. It is required that for each protected tree removed, a replacement tree shall be provided on the property.

I hope this information is useful to you in completing the Historic Review of the Electrification Project. If you need additional information, please call me at (650) 558-7253.

Sincerely,

Maureen Brooks

Maureen Brooks
Senior Planner

Enclosures: Map Showing Heritage Tree Groves dated January 1973
Scenic Roads and Highways Map and text
Open Space Plan Diagram and text

SCENIC ROADS AND HIGHWAYS IN BURLINGAME

STATE SCENIC HIGHWAY MASTER PLAN DESIGNATED ROUTES

Interstate Highway 280 traverses the western edge of the Burlingame Planning area. Because of its location in the established City and County of San Francisco Watershed, these lands are designated as permanent open space. The corridor for this freeway is proposed as an Official State Scenic Highway. In Burlingame only residential and public uses will be permitted to abut the Watershed.

COUNTY OF SAN MATEO SCENIC ROADWAY

Skyline Boulevard has been designated as an Official State Scenic Highway south from the Half Moon Bay Road, Route 92. The link along Route 92 down to Crystal Springs Lakes and the portion of Skyline Boulevard that extends north from Route 92 to Black Mountain Road might also be designated a Scenic Roadway. From Black Mountain Road north to Trousdale there is a frontage road that includes portions of the route that was previously Skyline Boulevard.

There is one County Scenic Road that permits a loop trip through the City of Burlingame. It is designated on the map. The route follows Skyline Boulevard to Canyon Road, down a narrow winding county road to Easton Drive and via Easton Drive to El Camino Real; then southeasterly out of Burlingame into the City of San Mateo to Crystal Springs Road; and then return to Skyline Boulevard via Crystal Springs Road.

El Camino Real from Easton Drive to Murchison Drive and Skyline Boulevard from Canyon Road to Trousdale deserve the same consideration and protection as other county scenic roads.

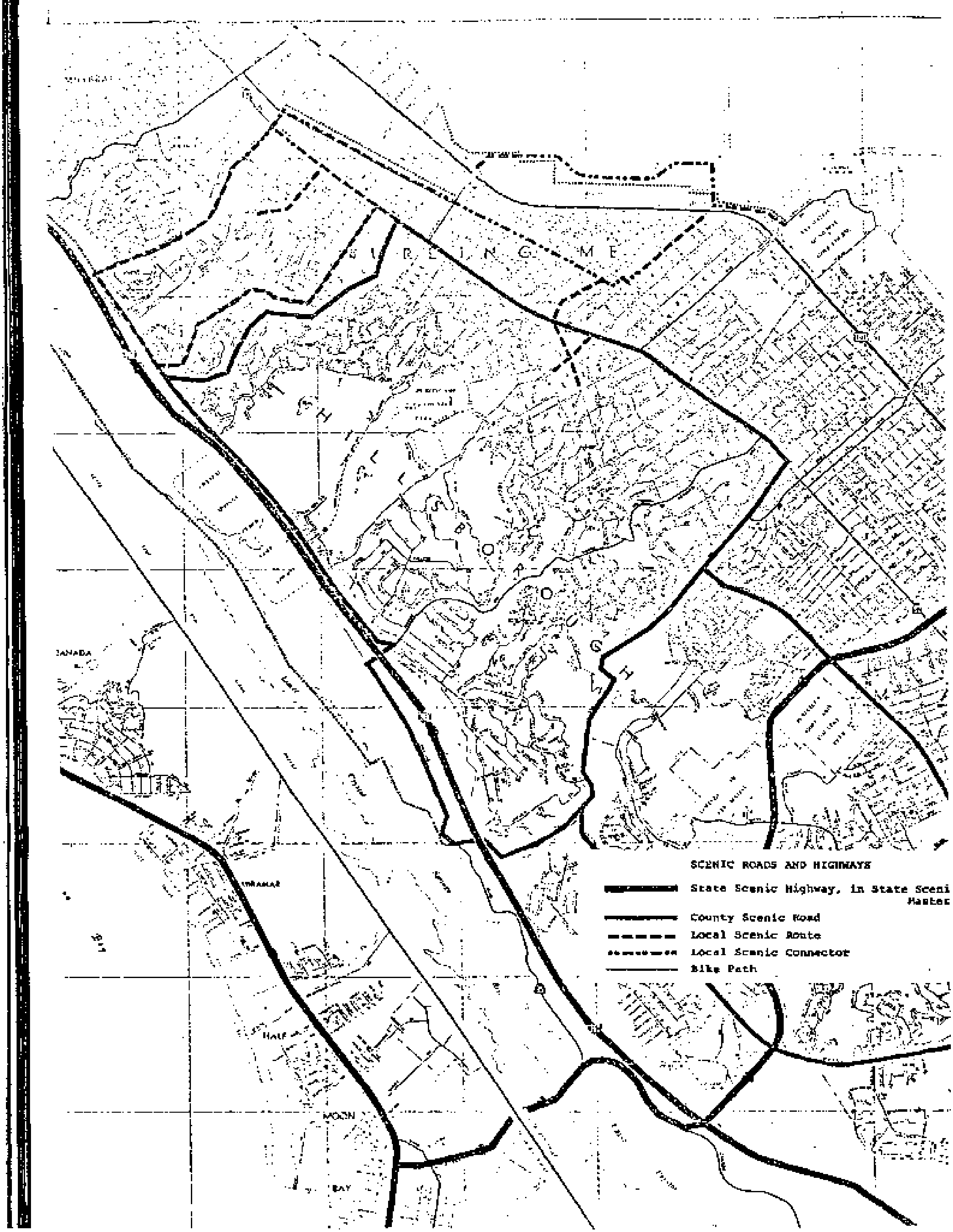
OTHER SCENIC ROUTES

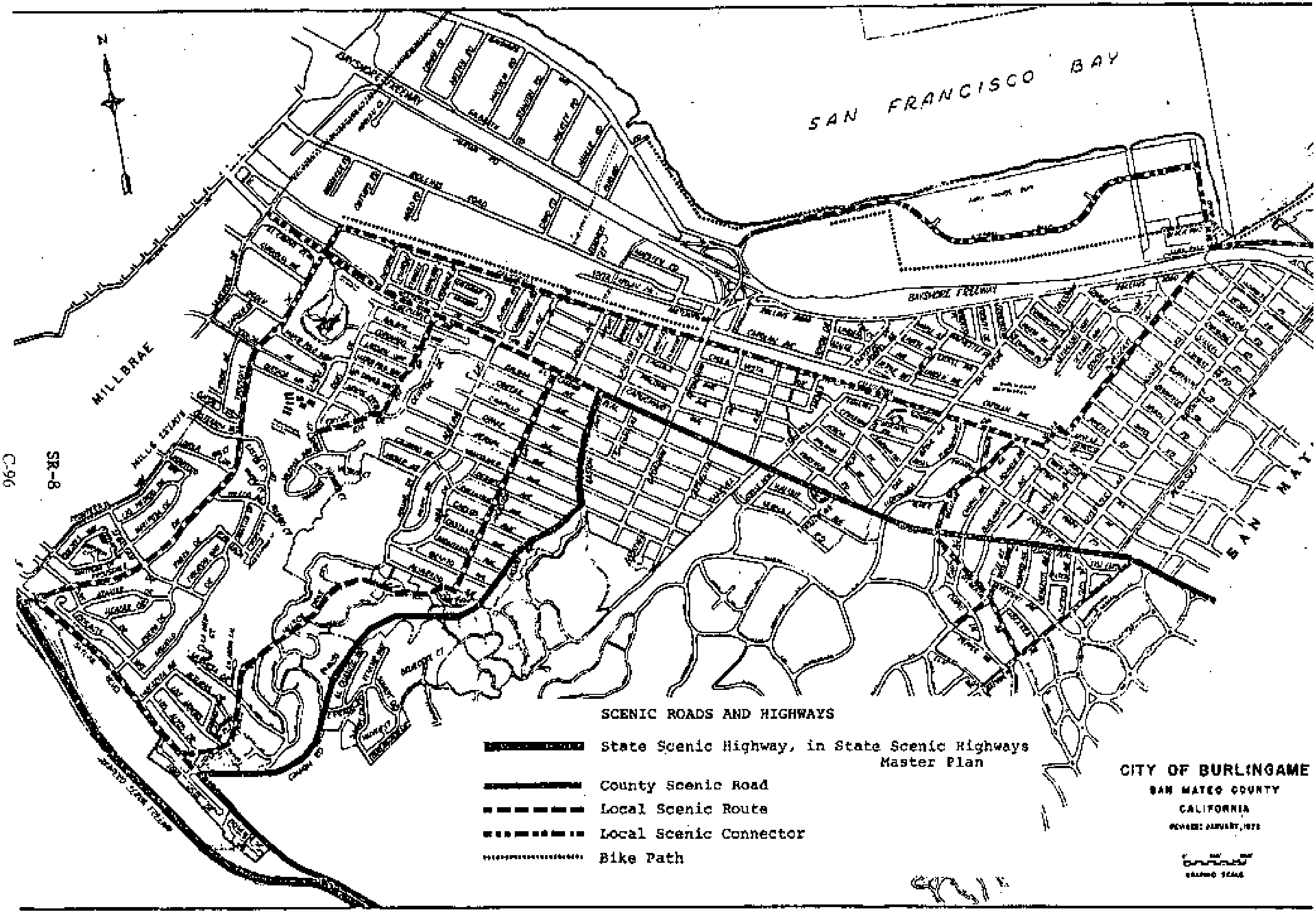
There are a number of alternate scenic roads between Skyline Boulevard and El Camino Real that have segments in Burlingame: Chateau Drive, Ralston Avenue, Hillside Drive and Trousdale Drive.

These collector streets are shown as arterials in the adopted Part III General Plan Diagram. It is proposed that the City of Burlingame protect the visual quality of these local roads and the corridors through which they pass.

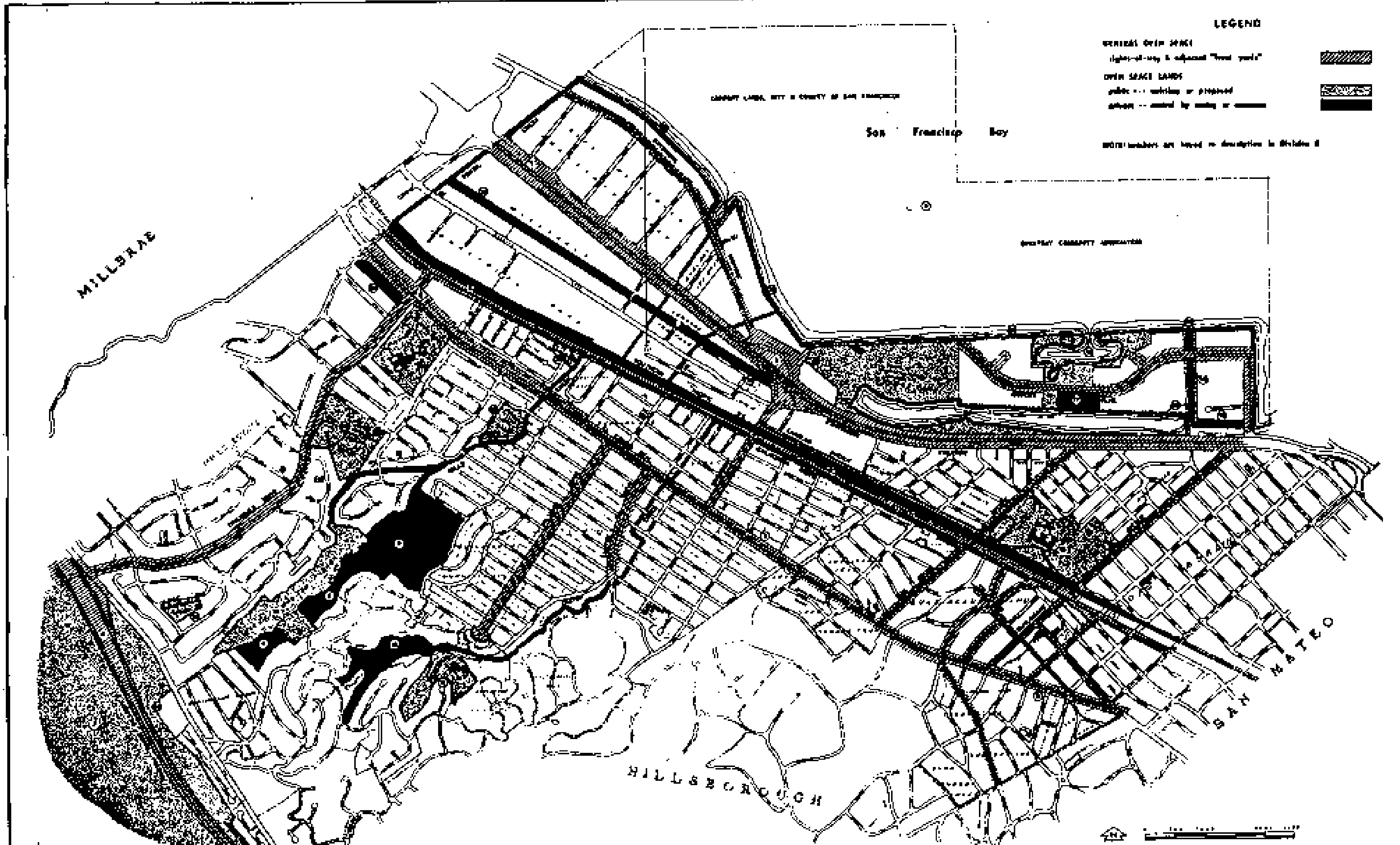
Actually the last four blocks of Trousdale from Sequoia Drive to California Drive may be called a scenic connector. The abutting property is zoned commercial and it is improved with office buildings and retail stores.

Airport Boulevard is another scenic connector except the portion within Bayside Park and along the shoreline of San Francisco Bay. Other local streets that have scenic qualities worthy of recognition and protection include Occidental Avenue, Ray Drive, Bellevue Avenue, Burlingame Avenue (east of Myrtle) and segments of California Drive.


B U R L I N G A M E
H I L L S B O R O U G H
SCENIC ROADS AND HIGHWAYS
State Scenic Highway, in State Sceni
Master
County Scenic Road
Local Scenic Route
Local Scenic Connector
Bike Path
HALF
MOON
BAY


SAN FRANCISCO BAY
BAYSHORE FREEWAY
ROLLINS ROAD
MILLBRAE
MILLS ESTATE
SAN MATEO
SCENIC ROADS AND HIGHWAYS
State Scenic Highway, in State Scenic Highways Master Plan
County Scenic Road
Local Scenic Route
Local Scenic Connector
Bike Path
CITY OF BURLINGAME
SAN MATEO COUNTY
CALIFORNIA
N

SR-8



OPEN SPACE ELEMENT — Plan Diagram	CITY OF BURLINGAME	GENERAL PLAN STUDIES	ADOPTED JUNE 4, 1973 BY RESOLUTION NO. 40-73

Rights-of-way to Provide Links

To provide a connected system of open space lands, it is proposed that the open space qualities of selected streets, alleys, and easements be enhanced and given special protection. Streets and other rights-of-way of particular importance are indicated on the Plan Diagram. Of these, the following are of city-wide or regional importance:

- Bayshore Freeway: U.S. 101
- El Camino Real
- Junipero Serra Freeway: I-280
- California Drive-Southern Pacific RR R/W
- PG&E and Drainage R/W (18) - The portion of this R/W in Millsdale Industrial Park is a combination drainage right-of-way and a PG&E right-of-way for power lines and towers. The portion in the Edwards Industrial Park and Marsten Road area is a PG&E easement. It is an open space resource, and measures to enhance its usefulness and improve its appearance should be explored.

Implementation:

Maintain and improve the open space and visual qualities of the designated streets and rights-of-way by maintaining and, where necessary, enhancing the quality of street trees and other planting. Review front yard setback requirements and determine if additional regulations are needed to prevent encroachment into existing open spaces. Underground utilities along streets. Review street lighting and "street furniture" to determine how visual quality can be improved. Where feasible, acquire easements in locations selected to provide pedestrian links to open space lands. Particular attention should be given to securing a link from Hayward Drive to Mills Canyon Park site. When appropriately located property is offered for sale in the normal course of events, consideration should be given to acquisition.

Usable Private Open Space for Each Dwelling Unit

An objective in all new development should be to secure some open space for the use of residents on each parcel. This is particularly important where higher density buildings replace lower density buildings since existing general open space is encroached upon in the process.

Implementation:

Revise zoning regulations to require usable open space in conjunction with each dwelling. Give consideration to incentive provisions providing density bonus for highly usable space such as well designed balconies or courts.

CITY OF BURLINGAME

Planning Department

City Hall - 501 Primrose Road
Burlingame, California 94010-3997

Tel. (650) 558-7250

August 30, 2000

Ms. Marie Pang
Environmental Manger
Peninsula Commute Service Joint Powers Board
P.O. Box 3006
San Carlos, CA 94070-1302

SUBJECT: Notice of Preparation, Caltrain Electrification Program

Dear Ms. Pang,

Thank you for the notification of preparation of an environmental document for the Caltrain 25 kV, 60 Hz ax Electrification Program. As you know Caltrain bisects the City of Burlingame north to south and the city is interested in any change proposed to the line. Based on your project description we would like to participate in the study of, at least, the following as they affect the portion of your line and ownership in Burlingame:

- Reduction of train headways;
- Necessary grade separations resulting from the project in Burlingame;
- Necessary street closures resulting from the project in Burlingame;
- Resulting changes in point source and ambient noise levels on adjacent land uses; and
- Visual impact of the addition of overhead lines within the Caltrain right-of-way in Burlingame, including impacts on adjacent vegetation.

If you have any questions regarding these comments or there is any additional information that the Planning Department can provide for your study please do not hesitate to call me at (650) 558-7255. Jane Gomery in the Public Works Department (650) 558-7240 is also available to provide you with information and assistance.

Sincerely yours,

Margaret Monroe

Margaret Monroe
City Planner

cc. City Council/City Manager; George Bagdon, Public Works Director;
Jane Gomery, Associate Engineer/Landscape Architect.

The City of Burlingame

PUBLIC WORKS DEPARTMENT
TEL: (650) 558-7230
FAX: (650) 685-9310

CITY HALL - 501 PRIMROSE ROAD
BURLINGAME, CALIFORNIA 94010-3997

CORPORATION YARD
TEL: (650) 558-7670
FAX: (650) 696-1598

Ms. Marie Pang
Environmental Manager
Peninsula Commute Service Joint Powers Board
PO Box 3006
San Carlos, CA 94070-1302

September 8, 2000

Re: Notice of Preparation, Caltrain Electrification Program CP 9608

Dear Ms. Pang,

Thank you for sending the Public Works Department the Notice of Preparation for the Caltrain Electrification Program. The railroad runs the entire length of Burlingame crossing major street arterials throughout the city. For the Environmental Assessment/Environmental Impact Report (EA/EIR) study we request that you include a review of the rail line as it effects the City of Burlingame in the following areas.

- Impacts to existing utilities including electric, gas, storm and sanitary sewer systems.
- Changes to existing drainage channels including creeks that cross the rail line.
- Effects of construction on existing streets, traffic patterns, and adjacent retail areas (especially construction scheduling).
- Impacts of grade crossings if proposed, on traffic patterns and adjacent commercial areas; and requirements for land acquisition and construction.

This letter is in addition to the comments sent to you from the City Planner in her August 30, 2000 letter. If you have any questions please contact me a (650) 558-7240.

Thank you,

Jane

Jane Gomery
Associate Engineer

cc. City Council/City Manager; Public Works Director; City Planner

U:\CaltrainElecEIR.let.wpd jcg

TOWN OF COLMA
PLANNING DEPARTMENT

1190 El Camino Real • Colma, California 94014
Phone: (650) 985-2590 • FAX: (650) 985-2578

August 31, 2000

Ms. Marie Pang, Environmental Manager
Peninsula Commute Services JPB
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

RE: Caltrain Electrification Program NOP

Dear Ms. Pang:

Thank you for inviting the Town of Colma to comment on the above project NOP. We have no comments at this time. Future correspondence on this topic should be sent to my attention.

Sincerely,

Malcolm C. Carpenter, AICP
City Planner
MCC/s

PLANNING DEPARTMENT

City and County of San Francisco 1660 Mission Street, Suite 500 San Francisco, CA 94103-2414

(415) 558-6378 PLANNING COMMISSION FAX: 558-6409 ADMINISTRATION FAX: 558-6426 CURRENT PLANNING/ZONING FAX: 558-6409 LONG RANGE PLANNING FAX: 558-6426

September 6, 2000

Peninsula Corridor - Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306
ATTN: Ms. Marie Pang, Environmental Manager

Re: Notice of Preparation - CalTrain Electrification Program

Thank you for sending us the Notice of Preparation (NOP) for the CalTrain Electrification Program Environmental Assessment/Environmental Impact Report (EA/EIR). As you know, the San Francisco Planning Department is designated as the lead agency for CEQA compliance within the City and County of San Francisco and the Major Environmental Analysis section takes the lead and facilitates environmental review for the City. I welcome the opportunity to work with you and your agency regarding the environmental process for the CalTrain Electrification Project.

I have assigned Joan A. Kugler of my staff as your chief contact person for this project. She has a great deal of experience in the environmental review for transportation projects and should be able to assist you while representing the City and County of San Francisco's interests. She will also be available to serve as a liaison with other City departments who will have an interest in the project such as Public Works, Parking and Traffic, and the Citywide section of the Planning Department.

Of particular interest to the City is that the EA/EIR should describe any project facilities that are proposed within the boundaries of the City and County of San Francisco. The document should detail their location, characteristics, uses, environmental impacts, and any mitigation measures that would lessen the significant impacts.

The proposed project and any related changes within the City may require City approvals, including encroachment permits, and authorization for any sidewalk or roadway changes within City jurisdiction. These actions, in turn, would require a finding of General Plan Conformity by the Planning Department and the Planning Commission. We all look forward to working with you on this very important project.

Sincerely,

Hillary E. Gitelman
Environmental Review Officer

cc: Frank Filice/DPW
Jerry Robbins/DPT
Amit Ghosh/Planning Department-Citywide
Joan A. Kugler/Planning Department-MEA

CITY OF SUNNYVALE CALIFORNIA

September 15, 2000

Ms. Marie Pang
Environmental Manager
Peninsula Commute Service Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

SUBJECT: Notice of Preparation
Caltrain Electrification Program

Dear Ms. Pang:

Thank you for the opportunity to review the Notice of Preparation (NOP) of an Environmental Assessment/Environmental Impact Report (EA/EIR) for the Caltrain Electrification Program. City staff were also able to attend one of the public meetings held by Caltrain on this issue. We appreciate your outreach effort.

Sunnyvale staff have reviewed the NOP and have the following comments:

1. Sunnyvale would like to reiterate that the California Environmental Quality Act states that "An EIR shall describe a reasonable range of alternatives to the project...which would feasibly attain most of the basic objectives of the project bout would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." (California Code of Regulations, Title 14, Division 6, Chapter 3, Section16126.6a). Only a no project alternative to the project is proposed to be studied at this time.

   At least one reasonable, feasible alternative shall be studied in the EIR. As communicated at the September 13 informational meeting held at Santa Clara University, the electrification alternative being studied for heavy rail electrification will require substantial catenary construction and equipment replacement, with accordant aesthetic and cost implications. Sunnyvale staff urge the study of an alternative that would consist of light rail electrification/coordination/extension of existing Valley Transportation Authority and San Francisco Muni services. This

ADDRESS ALL MAIL TO: P.O. BOX 3707 SUNNYVALE, CALIFORNIA 94088-3707
For deaf access, call TDD/TTY (408) 730-7501

alternative would provide information on environmental and economic impacts of extension and coordination of existing transportation modes and services. Sunnyvale staff believe substantial positive environmental impacts, or reduced negative impacts, could be achieved with this alternative over the project and the no project in the areas of aesthetics, noise, existing transportation systems, maintenance of public facilities and services, energy, and public financial investment.

2. The EA/EIR shall include noise studies of locations proximal to Sunnyvale residences along the Caltrain right of way to assess the degree of impact on Sunnyvale residences. Mitigation shall be proposed as necessary.

3. The City of Sunnyvale, in cooperation with Caltrain and the Valley Transportation Authority, is progressing with the construction of new station facilities at the downtown Sunnyvale station. The EA/EIR shall specifically address the aesthetic effects of catenary construction on the planned Sunnyvale station reconstruction.

4. The EA/EIR shall present specific information on the potential location of substations and overlaps within the Sunnyvale city limits, shall assess the aesthetic and human health impacts, and propose mitigation as necessary.

5. Installation of catenary wire protection screens could present a potential traffic safety hazard at certain locations by limiting sight distance. The EA/EIR shall assess the impact of installation of catenary wire protection screens on the Mathilda Avenue overpass in Sunnyvale on driver sight distance for drivers entering and exiting from the Evelyn Avenue on and off ramps.

6. Any proposed tree removals in Sunnyvale for catenary installation shall be identified, and consistency with Sunnyvale policy on tree removal shall be assessed. Mitigation shall be proposed, as necessary.

7. The level of increased ridership from increased service levels due to electrification shall be quantified at the Sunnyvale and Lawrence Expressway stations. Station access and parking impacts shall be identified, and mitigation proposed as necessary.

Once again, thank you for the opportunity to comment on this important document. We look forward to working with Caltrain to study the effects of electrification of the system. Please contact me with any questions or comments at (408) 730-7330.

Sincerely,

Jack Witthaus
Senior Transportation Planner

CITY OF MOUNTAIN VIEW

Office of the City Manager • 500 Castro Street • Post Office Box 7540 • Mountain View, California 94039-7540
650-903-6301 • FAX 650-962-0384

September 19, 2000

MS MARIE PANG ENVIRONMENTAL MANAGER
PENINSULA COMMUTE SERVICE JOINT POWERS BOARD
1250 SAN CARLOS AVENUE
SAN CARLOS CA 94070-1306

SCOPING COMMENTS FOR THE CALTRAIN ELECTRIFICATION PROGRAM

Dear Ms. Pang:

Thank you for the opportunity to provide comments on the scope and content of the environmental documentation for the Caltrain Electrification Program. The comments below are provided to ensure that the NEPA and CEQA environmental review processes for this project are conducted as thoroughly as possible to accurately disclose potential environmental impacts, as well as benefits, of the project. The City looks forward to the opportunity to review the draft environmental documentation for the project.

Scoping Comments:

1. The August 11, 2000, Notice of Preparation (NOP) states that two alternatives will be evaluated in the EA/EIR, a No-Project Alternative and an Electrification Alternative. The No-Project Alternative entails rehabilitation of the existing system and enhancements and capacity improvements consistent with the Caltrain Rapid Rail Program (RRP) adopted by the JPB in 1998. However, it is unclear if the Electrification Alternative will also entail the RRP improvements. If it does not, an additional alternative should be evaluated that entails RRP improvements as a first step prior to electrification. Without the RRP improvements the value of electrification will be diminished.

2. The EA/EIR should clarify the project implementation priorities, scheduling and funding between electrification and Rapid Rail Program improvements. In addition to the insufficiency of the range of alternatives being evaluated (scoping comment No. 1 above), funding for and implementation of necessary system improvements under the RRP should not be delayed/diverted to fund electrification.

3. The NOP states that electrification will increase Caltrain ridership and result in reduced traffic congestion, improvements in air quality and reductions in parking demand. The EA/EIR should provide the analysis on which these claims are based. The connection between electrification and increased service must be demonstrated, since it is not clear that service cannot be increased while retaining the diesel locomotives.

4. The EA/EIR should include diagrams/renderings of the Overhead Contact System (OCS) wires and structures. Overhead wires will create a significant negative visual and aesthetic impact; any feasible mitigation measures should also be evaluated, such as tree planting or other visual barriers (without creating safety concerns) in strategic areas of high public usage (e.g., at stations, pedestrian crossings, etc.).

5. The NOD states that there will be between three and five traction power substations, each of which is quite large (130' x 295'), with four or five switching stations that are also large (30' x 60'). There could also be 10 intermediate auto-transformer stations if that alternative is chosen. The EA/EIR should clarify the discussion of the alternative feed systems and numbers of stations required, address how close these stations need to be to the rail line itself, specific locations along the rail corridor and land area requirements. Mountain View already is host to a power substation adjacent to the Caltrain line for the Tasman West light rail. It is doubtful that there is any land large enough for a substation in Mountain View, and even the switching stations may be a challenge. These power substation issues will be a critical point of review for the City.

6. Noise reduction benefits by eliminating diesel engines should be quantified. In addition, potential noise additions from substations, transformers and any other new equipment should quantified.

7. The EA/EIR should address any potential electromagnetic field interference or health impacts. EMF issues have proven to be a source of significant public comment in the past and will require a thorough analysis in the EA/EIR, citing the most current scientific research.

8. The EA/EIR should address the ability of the power supply grid to provide the required electricity as well as mitigation measures for peak power demand overloads.

9. The NOP states there will be substantial service increases to over 114 daily trains between San Jose and San Francisco and over 20 daily trains between San Jose and

Gilroy within the next 10 years. The EA/EIR should include a traffic analysis of the impacts due to these service increases, with and without electrification.

Additionally, the City would appreciate ongoing notification of the anticipated environmental review time line for this project. Please do not hesitate to call me at (650) 903-6301 with any questions regarding the above scoping comments.

Sincerely,

Kevin S. Woodhouse
Environmental Management Coordinator

KSW/9/MGR
610-09-19-00L-E^

cc: Mr. Glenn Roberts, Public Works Director, City of Palo Alto

Mr. Marvin Rose, Public Works Director, City of Sunnyvale

City Council

CM, DCM, PP, TPM

CITY OF SAN BRUNO
COMMUNITY DEVELOPMENT DEPARTMENT

July 25, 2002

Erik Olafsson, Senior Planner
Peninsula Corridor JPB
1250 San Carlos Avenue
PO Box 3006
San Carlos, CA 94070-1306

Dear Mr. Olafsson:

In response to your letter of July 22, to my knowledge there are no historic resources that would be directly affected by Caltrain electrification. There is no exhaustive survey of local historic resources, however, we are currently in the process of putting together a report of historic buildings in San Bruno. One item of note based on the information that we have collected so far is that the Cupid Row area is potentially eligible for listing as a district on the National Register of Historic Places. It is not clear how Caltrain electrification may affect a Cupid Row nomination but the area's significance is based largely on its original development as an electric streetcar suburb. Therefore, re-electrification of the line now should not impair eligibility.

I believe BART did a survey for historic resources along the right-of-way it shares with Caltrain in San Bruno in the early 1990's as part of its environmental documentation. If you have access to their EIR, it may provide more details of interest to you.

Thank you for this opportunity to comment.

Sincerely,

Grant Wilson, AICP
Associate Planner
City of San Bruno

567 El Camino Real, San Bruno, CA 94066-4299
Voice: (650) 616-7074 • Fax: (650) 873-6749
http://ci.sanbruno.ca.us

CITY OF SAN BRUNO

George D. Foscardo, AICP
Community Development Director

COMMUNITY DEVELOPMENT DEPARTMENT

September 27, 2000

Peninsula Commute Service Joint Powers Board
Attention: Ms. Marie Pang, Environmental Manager
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

Re: City of San Bruno Comments on Scope/Content of EA/EIR
Caltrain Electrification Program

Dear Ms. Pang:

The City of San Bruno received your Notice of Preparation of an EA/EIR for the Caltrain Electrification Program. The notice was forwarded to the San Bruno City Council for comment at their September 12, 2000 meeting. At that meeting, the Council directed the City Manager to have staff prepare a response letter incorporating the Council's comments and concerns. The following letter was approved unanimously by the City Council at their September 26, 2000 meeting.

Background and Previous City Council Action

At their November 23, 1998 meeting, the City Council unanimously voted to support the elements of the San Mateo County Transportation Authority proposal relating to the use of approximately $200 million of Measure A Funds to improve and expand Caltrain.

In a letter dated November 25, 1998 to Chair Malcolm Dudley, former Mayor Ed Simon stated the San Bruno City Council position, as follows:

> "We directly support the improvement of passenger safety and convenience through rehabilitation and enhancement of the rail system, rebuilding the Dumbarton Rail Branch, extending the airport light rail system to meet Caltrain in San Bruno and contributing to the cost of engineering for electrification. However, the Council is not providing unqualified support for the electrification of Caltrain until further details relating to costs and overall effectiveness are developed on which a final position can be taken."

The comments expressed by the City Council at their meeting on September 12, 2000 and as outlined herein, remain consistent with their action on November 23, 1998.

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http://www.ci.sanbruno.ca.us

SCOPE OF ENVIRONMENTAL DOCUMENTS

In the preparation of environmental documents, the Scoping process is helpful in identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EA/EIR. In addition, Scoping can be effective in resolving the concerns of local agencies, such as the City of San Bruno, who might not be in accord with the proposed action on environmental grounds.

For these purposes, the City of San Bruno requests that any environmental documents on the Caltrain Electrification Program (The Caltrain 25kV, 60Hz ac Electrification Program) include a detailed analysis of the following alternatives, mitigation measures, and significant effects.

1. Aesthetics

According to the Notice of Preparation, the Electrification Alternative "would require the installation of some 150 to 170 single track miles of overhead contact system (OCS) for the distribution of electrical power to the electric rolling stock."

The OCS distribution system will necessarily change the physical environment of the Caltrain tracks and "substantially degrade the existing visual character or quality of the site and its surroundings." In San Bruno, the majority of the surroundings of the Caltrain tracks includes housing, as well as an elementary school and a major recreational area. Much of the adjacent housing is low-and-moderate income, with a high percentage of minority population.

In addition, the City recently completed a major project to underground the overhead utility lines adjacent to the Caltrain tracks. The undergrounding project improved safety within the community and helped to eliminate physical blight. The OCS power lines would have the effect of re-establishing those lines.

If trees along the Caltrain tracks are required to be removed due to conflicts with the overhead electric lines, substantial damage to scenic corridors and degradation of the existing visual character or quality of the Caltrain corridor and its surroundings may occur as a result. This would be particularly true for the Lomita Park residential area of San Bruno.

Removal of these trees may also result in increased noise impacts for the residents, who currently experience substantial noise from the San Francisco International Airport (SFO), including back blast noise, as well as noise from Caltrain and eventually BART.

Any discussion of aesthetics in the EA/EIR must address these issues relating to the City of San Bruno.

2. Air Quality

As stated in the Notice of Preparation, one of the primary objectives of the Caltrain

Electrification project is to "improve regional air quality." The NOP notes that in addition to the air quality benefits of reducing automobile use for commuting by increasing rail ridership, electrified locomotives are expected to produce reductions in corridor air pollution emissions when compared with diesel locomotives.

The NOP focuses on the air quality along the Caltrain corridor and the pollution emissions of electrified locomotives versus pollution emissions of diesel locomotives. Any discussion of air quality in the EA/EIR must also address air quality and emissions created by the need for additional generation of electricity at the source, which may be outside the "region" as defined by the NOP. Does this merely shift the impact or effect of degradation of air quality from one region to another? What is the net environmental benefit when these factors are taken into consideration?

3. Biological Resources

If the OCS requires the removal of trees or disturbance of land adjacent to the Caltrain in the Lomita Park residential area, there could be substantial adverse effects on endangered species, wetlands, and/or habitat areas as identified in previous environmental documents relating to the extension of BART-to-SFO. This is especially true for the landscaped areas between the Caltrain tracks and Huntington Avenue/San Antonio Avenue, which currently serves as a limited buffer between the Caltrain and BART tracks to the east and the residential areas to the west.

Any discussion of biological resources in the EA/EIR should thoroughly address these concerns.

4. Land Use Planning

The erection of OCS wires, fencing, and other apparatus will physically divide the established residential communities of Belle Air and Belle Air South on the east side of the tracks from the remainder of the community, including Downtown San Bruno and essential public services, on the west side of the tracks.

The City of San Bruno successfully fought to assure that the BART extension to SFO would be underground through the heart of City due to its effects of dividing the City along the same basic lines that Caltrain is now proposing similar action.

Discussion of land use planning in the EA/EIR must address this key issue of physically dividing our established communities, including avoidance as a mitigation measure.

5. Noise

The NOP states that one of the primary objectives of the Caltrain Electrification project is to "reduce noise". Noise emanating from the passage of electrified train sets is measurably less when compared with diesel operations.

However, the mere passing of a train, whether it is diesel or electrified, is not the only noise emanating from the project. The NOP states that "an electrified Caltrain system would set the stage for an expanded modern regional electric express service and potentially a statewide high speed rail service. If is therefore logical that an electrified Caltrain system would mean more trains and faster trains, with reduced headway in service. The result is more frequent whistles and more noise reverberating into adjacent neighborhoods.

Any discussion of noise in the EA/EIR must address the full range of noise impacts, including the sound level and intensity, as well as the frequency of occurrence. The current expansion of SFO, for example, has increased the frequency of overhead flights, even though each individual plane may be less noisy than older aircraft. That does not mean that the resident, or sensitive receptor, is not as bothered by the noise. To the contrary, residents are experiencing more noise but at a lower db level.

6. Public Services

The electrification of Caltrain could have substantial adverse impacts on numerous public services in the City of San Bruno, including fire protection, police protection, schools, and parks.

The expanded regional electric express service and potential statewide high speed rail service noted in the NOP means more trains, faster trains, and either more down-time at gate crossings or potential grade separation projects. More down-time at gate crossings could impede fire or police response to the Belle Air and Belle Air South neighborhoods on the east side of town. Both the closest fire station and the police station are located on the west side of the tracks.

The Belle Air Elementary School, Lion's Field Park, Community Gardens and 4-H Club are all located directly adjacent to the Caltrain corridor and the San Bruno Caltrain Station (at Sylvan Avenue). Express trains and high speed rail will pose serious safety concerns for young school children crossing the Caltrain tracks to school, the 4-H Club or to the heavily used Lion's Field.

Any discussion of public services in the EA/EIR must address the impacts on the City's ability to respond to fire, police, and medical emergencies, as well as the safety concern for children crossing the tracks - whether at gated street crossing or through the San Bruno Caltrain Station itself.

7. Transportation / Traffic

The electrification of Caltrain and its stated potential for an "expanded modern regional electric express service and potentially a statewide high speed rail service" could have serious negative impacts on traffic in and around the Caltrain Station (at Sylvan Avenue).

The current Caltrain service in San Bruno operates as a commuter rail system, with local residents traveling north to San Francisco or south to Silicon Valley sites. Some patrons on Caltrain also commute to San Bruno as a destination point, but the system in San Bruno is primarily geared to outbound traffic.

A potential statewide high speed rail service would drastically change the character of any San Bruno Caltrain Station (at Sylvan Avenue), especially when viewed in context to its close physical proximity to the San Francisco International Airport. The Sylvan Avenue location is sited at the end of a narrow residential street (First Avenue) adjacent to an Elementary School and heavily used Lion's Field recreation area, and has a limited parking supply. This area simply cannot sustain any significant increases in traffic or parking demand due to its functional and locational limitations.

If the San Bruno Caltrain Station (at Sylvan Avenue) becomes a key destination (or pick-up and distribution) point for SFO, the entire character of the station changes from a point of origin to a point of destination – and the impacts could become severe. Traffic impacts on adjacent streets, including First Avenue (and any of the "Avenues" in the Belle Air area), Huntington Avenue, and San Bruno Avenue cannot handle substantial increases in traffic. There may also be an adverse effect of merely shifting Highway 101, I-380, or other major traffic corridors from these major roadways onto the local street network.

Any discussion of transportation and/or traffic impacts in the EA/EIR must address the potential for "an expanded modern regional electric express service and potentially a statewide high speed rail service" to change the character of the Caltrain Station at Sylvan Avenue, to result in an inadequate parking supply, to result in changes in traffic and circulation patterns, and to potentially shift traffic from major roadways onto local streets.

The EA/EIR must also address the potential of avoiding such impacts altogether, including the potential to relocate the Caltrain Station from Sylvan Avenue to another location within the City in the event the express service or statewide high speed rail service is ever enacted. In addition, the potential of avoiding such impacts should also include the potential to relocate the Caltrain tracks from their present location in San Bruno to a location along Highway 101 to help serve the designated stop of SFO as envisioned in the statewide high speed rail service.

8. Utilities and Service Systems

With the potential electrification of Caltrain, any EA/EIR must analyze the impacts and ability of the electric power generating company to supply the needed electrical service to Caltrain without sacrificing power to other sources.

9. Cumulative Impacts

As stated in the NOP, one of the primary objectives of the Caltrain Electrification project is to "modernize Caltrain". "Additionally, an electrified Caltrain system would set the stage for an expanded modern regional electric express service and potentially a statewide high speed rail service." A key aspect of the statewide high speed rail service is the need to grade separate intersections, even though grade separation is not required to electrify Caltrain. As a probable future project and as noted in the NOP, the impacts of high speed rail service and its related grade separation requirements must be reviewed and analyzed in any EA/EIR as cumulative impacts.

When BART was originally proposed through San Bruno, the City rejected the concept of required grade separations due to the severe impacts on the adjacent roadway system, the dividing of the community, and the visual impacts. These same negative impacts are inherent in grade separations required for potential high speed rail or increased Caltrain service through our community.

With the underground cut-and-cover construction of BART through San Bruno, there may now be physical constraints with grade separating intersections in the City. These constraints should be reviewed and examined in the EA/EIR.

Once again, the EA/EIR should review the potential for avoiding such impacts altogether, including the relocation of the Caltrain tracks to Highway 101.

10. Effects on Human Beings

Any EA/EIR must review and scrutinize the potential impacts (directly or indirectly) on human beings living adjacent to the proposed electrified CalTrain corridor due to the environmental effects from EMF's or other electric fields. In San Bruno, residential areas are located within extremely close physical proximity of the Caltrain tracks, including the areas of Lomita Park, Belle Air, Belle Air South, San Bruno Park, and the Fifth Addition (Belle Air North).

11. Environmental Justice

The residential areas of San Bruno cited above (Lomita Park, Belle Air, Belle Air South, San Bruno Park, and the Fifth Addition) are comprised of numerous low-and-moderate income families and minority groups. The Federal environmental documents must review the environmental justice factors on these residential areas.

These are the same areas that must bear the brunt of the impacts from the expansion of the San Francisco International Airport, aircraft noise from overflights, aircraft noise from backblasts, noise from Highway 101, noise from Caltrain, and in the future, noise from BART.

The City of San Bruno appreciates the opportunity to respond to the Notice of Preparation and looks forward to a full discussion and analysis of the issues regarding the Caltrain Electrification Program.

Yours truly,

George D. Foscardo

George D. Foscardo, AICP
Community Development Director
City of San Bruno

cc: Honorable Mayor and City Council
Terri Rasmussen, City Clerk
Frank Hedley, City Manager
Steve Rogers, Assistant City Manager
Jonathan Lowell, City Attorney

P:\Planning\CalTrain Study\Caltrain Electrification - Scoping Letter 0927.wpd

Appendix D: Draft EA/EIR Distribution List

Elected Officials

The Honorable Gavin Newsom
Mayor
City of San Francisco
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102

The Honorable Karyl Matsumoto
Mayor
City of South San Francisco
400 Grand Avenue
South San Francisco, CA 94080

The Honorable Larry Franzella
Mayor
City of San Bruno
567 El Camino Real
San Bruno, CA 94066-4299

The Honorable Nadia Holober
Mayor
City of Millbrae
621 Magnolia Avenue
Millbrae, CA 94030

The Honorable Rosalie O'Mahoney
Mayor
City of Burlingame
501 Primrose Road
Burlingame, CA 94010

The Honorable Carole Groom
Mayor
City of San Mateo
330 West 20th Avenue
San Mateo, CA 94403

The Honorable George Metropulos
Mayor
City of Belmont
1070 Sixth Avenue
Belmont, CA 94002

The Honorable Michael J. King
Mayor
City of San Carlos
600 Elm Street
San Carlos, CA 94070

The Honorable Jeff Ira
Mayor
City of Redwood City
1017 Middlefield Road
Redwood City, CA 94063

The Honorable Kathy McKeithen
Mayor
City of Atherton
91 Ashfield Road
Atherton, CA 94027

The Honorable Lee Duboc
Mayor
City of Menlo Park
701 Laurel Street
Menlo Park, CA 94025

The Honorable Bern Beecham
Mayor
City of Palo Alto
3493 Greer Road
Palo Alto, CA 94303

The Honorable Matt Pear
Mayor
City of Mountain View
500 Castro Street
Mountain View, CA 94041

The Honorable John Howe
Mayor
City of Sunnyvale
P. O. Box 3707
Sunnyvale, CA 94088-3707

The Honorable Patricia M. Mahan
Mayor
City of Santa Clara
1500 Warburton Avenue
Santa Clara, CA 95050

The Honorable Ron Gonzales
Mayor
City of San Jose
801 North First Street, Room 600
San Jose, CA 95110

The Honorable Dennis Kennedy
Mayor
City of Morgan Hill
17555 Peak Avenue
Morgan Hill, CA 95037

The Honorable Al Pinheiro
Mayor
City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020

The Honorable Matt Gonzalez
President, Board of Supervisors
San Francisco City and County
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102

The Honorable Mark Church
President, Board of Supervisors
County of San Mateo
400 County Center
Redwood City, CA 94063

The Honorable Pete McHugh
Chairman, Board of Supervisors
County of Santa Clara
Office of the Board of Supervisors
70 West Hedding Street, 10th Floor
San Jose, CA 95110

The Honorable Michael Barnes
Mayor
City of Brisbane
50 Park Place
Brisbane, CA 94005

The Honorable Sal Torres
Mayor
City of Daly City
333 90th Street
Daly City, CA 94015

The Honorable Marland Townsend
Mayor
City of Foster City
610 Foster City Boulevard
Foster City, CA 944044

The Honorable Donna Rutherford
Mayor
City of East Palo Alto
2415 University Avenue
East Palo Alto, CA 94303

Sue Lempert
MTC Liaison
365 Virginia Avenue
San Mateo, CA 94402

Federal Agencies

Gene Fong, Division Administrator
Attn: Maiser Khalid, Director Project Dev. & Environmental
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APPENDIX E: BIBLIOGRAPHY

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Appendix F: List of Preparers

APPENDIX F: LIST OF PREPARERS

Federal Transit Administration (FTA)

A. Joseph Ossie, Environmental Protection Specialist, FTA Headquarters

Ray Sukes, Director, Office of Planning and Program Development, Region IX

Jerome Wiggins, Program Specialist, Region IX

Renee Marler, Regional Counsel, Region IX

Peninsula Corridor Joint Powers Board

Elizabeth M. Wiecha, P.E., Director, Capital Program Management

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Carol Wolf, Project Manager – Electrification

Rick Schmedes, Project Manager – Electrification (for updated environmental document)

Marie Pang, Environmental Manager

Erik Ólafsson, Senior Planner

Stacy Cocke, Senior Planner (for updated environmental document)

Parsons Transportation Group

Jeff Allen, Principal Transportation Planner. M.C.P., 20 years *of* experience in transportation planning. Responsible for energy, EMF/EMI, and financial feasibility analyses and documentation.

Adam Ballard, Biologist. B.S., Biology with emphasis in biological conservation. Four years *of* experience conducting biological studies. Conducted field studies and contributed to *the* Natural Environment Study.

Ron Carbone, Graphic Specialist. Thirty-five years *of* experience with all aspects of graphic design. Responsible for aesthetic simulation figures for updated environmental document.

Allen Cattell, Principal Biologist. Ph.D., Biology. Twenty years *of* experience in conducting biological studies. Provided supervisory and field support for *the* Natural Environment Study.

Dan Conaty, Principal Planner. M.A. Geography. Twenty-six years *of* experience in environmental planning. Responsible for public services and facilities, recreation, water quality and floodplains, transportation and traffic, and technical review of documents for the revised environmental document.

Pat M. Gelb, Planning Manager. M.A. Thirty years *of* experience in environmental and transportation planning. Principal author and responsible for overall document content.

Areg Gharabegian, Principal Engineer. M.S., Mechanical Engineering. Twenty-three years *of* experience conducting noise and vibration studies. Supervised noise and vibration studies and preparation of Noise and Vibration Technical Report.

Jeanne Hazemoto, Supervisor of Word Processing. *More than* 16 years *of* experience in document preparation and production.

David Johnson, Principal Planner. B.A., Geography. Thirteen years *of* experience in environmental and transportation planning. Responsible for utilities and permits and approvals sections.

Liz Koos, Senior Technical Editor. *More than 21* years *of* editing experience. Responsible for editing EA/FEIR for the revised environmental document.

Theresa M. Larson, P.E., Principal Engineer. B.S., Civil Engineering. *More than* 23 years *of* experience in project management, civil engineering, and environmental documentation of public works projects. Document coordination for administrative draft revisions.

Michael N. Lewis, C.E., P.E., Catenary Systems Resource Center Manager. H.N.D., Mechanical Engineering (U.K.). Comprehensive 37-year background in railroad, commuter rail, and rapid transit systems design and installation. Prepared Electrification Program Alternative description.

Joshua Lipscomb, Associate Air Quality Engineer. B.S., Chemical Engineering. Three years *of* experience in environmental compliance engineering with emphasis in air quality. Prepared air quality analyses.

Thanh Luc, Principal Engineer. B.S., Mechanical Engineering. Eleven years *of* experience conducting noise and vibration studies. Conducted noise and vibration studies and prepared Noise and Vibration Technical Report.

Derek McGill, Associate Planner. B.A., Geography. One year *of* experience in environmental planning. Responsible for analyzing utility and service systems, geology, soils, and seismicity for the revised environmental document.

Indu Sreedevi Menon, E.I.T., Senior Transportation Systems Analyst. M.S., Transportation Engineering. *More than* seven years *of* experience in transportation engineering and planning. Prepared ridership, energy, and construction employment sections; prepared energy section for updated environmental document.

Krisha Nand, Ph.D., Supervising Scientist. Ph.D., Physics. Thirty-five years *of* experience in health risk and air quality assessments and permitting. Supervised preparation of air quality analyses.

Andrew Nash, P.E., Project Planner. M. Eng. Civil Engineering, M. City Planning. *More than 20* years *of* experience in transportation, engineering, and planning. Assisted in preparing the final environmental document.

Karla J. Nicholas, Principal Planner. Twenty-four years *of* experience in environmental, transportation and land use planning analyses, and conducting community impact assessments. Prepared aesthetics, biology, farmlands, land use, and socio-economics sections; document coordinator.

Ljubica B. Osgood, Graphics Designer. B.F.A. *More than* 31 years *of* experience in the supervision and design of graphics and presentation materials for engineering, environmental and transportation planning projects. Responsible for graphics design and production for 2005 document and revised environmental document.

Jeannette Owen, Biologist. B.S., Biology. Ten years of experience in conducting biological studies. Biological survey team leader and primary preparer of *the* Natural Environment Study.

Gary Petersen, Sr. Project Manager. Master of Planning. *Thirty-five* years *of* experience in transportation planning and environmental analysis/documentation. Responsible for overall management of the revised environmental document.

Laura J. Prickett, A.I.C.P., Principal Planner. Masters in City Planning. Eight years *of* experience conducting environmental, transportation, and land use planning analyses, and coordinating public involvement programs. Prepared air quality, CEQA, cultural resources, geology, hazardous wastes, hydrology/floodplain/water quality, and noise sections.

Craig Richey, Assistant Planner. B.A. English. Six years *of* experience conducting socioeconomic and land use planning analyses. Prepared land use and community impacts sections for revised environmental document.

Pika Rosario, Associate Planner. B.S. Policy, Management and Planning, Master of Planning. Two years *of* environmental planning experience. Responsible for aesthetics, agricultural resources, electromagnetic fields, and interference sections, Area of Potential Effects map, document preparation for the revised environmental document.

Elia Rouzier, Supervisor of Word Processing. Document preparation and production.

Angela Schnapp, Senior Transportation Planner. B.S. Nuclear Engineering, M.S. Environmental Engineering. Fourteen years *of* experience conducting environmental analysis. Responsible for hazardous materials/waste analysis for the revised environmental document.

Gui Shearin, Ph.D., Principal Transportation Planner. Ph.D, Transportation Planning. Thirty-three years *of* experience in evaluating travel demand, traffic forecasting, land use/socioeconomic studies, and transportation planning. Prepared transportation, capital and operating and maintenance cost, and growth inducement sections; supervised preparation of utilities section, and responsible for draft impacts to other transportation modes, operating and maintenance costs, and related documentation for the revised environmental document.

Emery Tuttle, Engineer. B.S. (candidate 2002), Electrical Engineering. Twenty-two years *of* experience conducting noise and vibration studies. Contributed to noise and vibration studies and preparation of Noise and Vibration Technical Report.

Robert Verhelle, Deputy Project Manager. B.S., Electrical Engineering. Twenty-six years *of* experience in electrical engineering. Prepared construction staging section and portions of No-Electrification and Electrification Program alternatives descriptions.

Steve Volaric, Scientist. B.S., Sound. One year *of* experience conducting noise and vibration studies. Assisted with noise and vibration studies and contributed to Noise and Vibration Technical Report.

Dan Bracken, Inc.

Dan Bracken, President. Ph.D., Physics. Twenty-eight years in measurement and analysis of electric and magnetic fields from electric power systems. Conducted and reported on magnetic field measurements along rail corridor from San Francisco to Gilroy.

Electric Research & Management, Inc.

David W. Fugate, Consulting Engineer and President. Ph.D., Electrical Engineering. Twelve years *of* experience in modeling electric and magnetic fields produced by electrical equipment and systems. Developed cross-section models used to estimate electric and magnetic fields resulting from electrification of rail corridor.

ERM

John Cavanaugh, R.G. Project Manager. Responsible for Environmental Site Assessments (hazardous wastes).

Exponent

William H. Bailey, Principal Scientist. Ph.D., Neuropsychology. Twenty years of experience in bioelectromagnetics and exposure assessments of electrical systems, laboratory research, and health risk assessment. Conducted assessment of electric and magnetic field effects.

Kathyrn A. Millis, Senior Engineer. Ph.D., Electrical Engineering. Eight years of experience in power systems. Conducted research on potential electromagnetic interference issues.

Far Western Anthropological Research Group

Wendy J. Nelson, Project Director. Ph.D., Anthropology. Twelve years *of* experience in prehistoric archaeology and cultural resource management. Project management and report writing and preparation. Responsible for archaeological survey and report.

Laura Leach-Palm, Senior Staff Archaeologist. Ph.D., Anthropology; M.A., Archaeology. Twenty years *of* experience in prehistoric archaeology and cultural resource management. Conducted archival records search for updated environmental document.

Jennifer Thomas, Archaeological Technician. B.A., Anthropology. Seven years *of* experience in prehistoric archaeology and cultural resource management. Conducted archival records search.

Elizabeth Kallenbach, Archaeological Technician. B.A., Anthropology. Five years *of* experience in prehistoric archaeology and cultural resource management. Conducted archival records search.

Michael J. Darcangelo, Archaeological Crew Chief. B.A., Anthropology. Fourteen years *of* experience in prehistoric archaeology and cultural resource management. Crew Chief for archaeological field survey.

Dan Graber, Archaeological Technician. B.A., English. Six years *of* experience in prehistoric archaeology and cultural resource management. Technician for archaeological field survey.

Garcia and Associates

Joe Drennan, Wildlife Ecologist. M.S. Wildlife Ecologist. Eighteen years *of* experience conducting biological studies. Responsible for biological studies and reporting for the revised environmental document.

Jeff Steinman, Wildlife Biologist. B.S. Wildlife Biologist. Twelve years *of* experience conducting biological studies. Responsible for field surveys and database searches for the revised environmental document.

Hortiscience, Inc.

James R. Clark, Vice President. Ph.D. Certified Arborist. Responsible for arborist report.

JRP Historical Consulting Services

Meta Bunse, Principal. M.A., Public History. Eleven years *of* experience in historic resource inventory and evaluation surveys.

Rand Herbert, Principal. M.A.T., History. Twenty-two years *of* experience in historic resource inventory and evaluation surveys. Directed and conducted components of the historical survey work, research, and report preparation.

Bryan Larson, Staff Historian. M.A. candidate, Public History. Three years *of* experience in historic resource inventory and evaluation surveys.

Christopher McMorris, Architectural Historian. M.S., Historic Preservation. Three years *of* experience in historic resource inventory and evaluation surveys. Conducted historical research, fieldwork, and co-authored the Historical Architectural Survey Report (HASR) and prepared documentation.

Theresa Saputo Rogers, Architectural Historian. M.A., Public History. Five years *of* experience in historic resource inventory and evaluation surveys. Conducted historical research, fieldwork, and co-authored the HASR and prepared documentation.

Moore Iacofano Goltsman

Ed Canalin, Art Director. BA, Illustration. Twenty years *of* experience in graphic design and art direction. Provided art direction for visual simulations.

Carie DeRuiter, Director of Communication. B.A., Sociology. Twenty-five years *of* experience in graphic design and project management. Project manager for visual simulations.

Louis J. Hexter, Project Manager. B.A., Urban Studies and Architecture. Fourteen years *of* experience in community outreach and public participation. Public outreach team leader.

Julie Kirschbaum, Project Associate. B.A., History of Art and Architecture/International Relations. Four years *of* experience in transportation research and planning. Assisted in facilitation of community workshops; coordinated workshop announcements; principal author of workshop summary.

Tim Lehane, Graphic Designer. B.A. Fifteen years *of* experience in graphic design. Photographer for visual simulations.

Kayce Rane, Project Associate. M.A., City Planning. Ten years *of* public outreach and facilitation experience. Conducted Phase II Meeting Coordination.

Carolyn Verheyen, Principal-in-Charge. M.A., Environmental Psychology. Fifteen years *of* experience in public outreach and project management.

Brad Young, Graphic Designer. M.A., Graphic Arts. Eight years *of* experience in graphic design. Prepared visual simulations.

Terry Hayes and Associates

Sam Silverman, Senior Environmental Scientist. Masters in Environmental Health. Seven years *of* experience completing air quality analyses for transportation, housing, commercial, and institutional projects. Prepared the air quality section for the revised environmental document.

Appendix G: Air Quality Calculations

Caltrain Calculations - 2007 Diesel

TRAIN INFORMATION

Trip Information [a]

One Way Trips:	96	trips per day
Average Length:	50.06	miles
Total Locomotive Miles:	4,805	miles per day

Annual Miles [a]

	# trains	miles	days	miles
Saturday+modified	32	47.5	54	82,080.0
Sunday+Holiday	28	47.5	58	77,140.0
Weekday	96	50.06	253	1,215,766.2
Total*			365	**1,409,361**

***Includes 2.5% for deadheading, plus special event mileage as calculated below.**

Train Information [a]

Train Consists	Fuel use per train mile
4.5	3.6 gal/mile
5	4 gal/mile

SHUTTLE INFORMATION

Trip Information [a]

One Way Trips:	32	trips per day
Average Length:	2.40	miles
Total Shuttle Miles:	77	miles per day

Annual Miles [a]

	# buses	miles	days	miles
Saturday+modified	32	2.4	54	4,147.2
Sunday+Holiday	28	2.4	58	3,897.6
Weekday	0	0.00	253	-
Total*			365	**8,246**

***Includes 2.5% for deadheading, plus special event mileage as calculated below.**

Emission factors for Diesel [b]

TRAINS		**SHUTTLES**	
Emission Factors (g/gal)		Emission Factors (g/mile)	
HC	9.8	HC	0.176
CO	27.4	CO	3.393
NOx	177	NOx	0.867
PM	6.2	PM10	0.019

a - Trip information, annual miles, and fuel use obtained from Parsons.

b - Emission Factors obtained from EPA420-F-97-051 "Emission Factors for Locomotives", December 1997, and EMFAC2007.

	2007 Diesel Train Emissions			
	4.5 Car Trains		**5 Car Trains**	
	Daily (pounds/day)	**Annual (tons/year)**	**Daily (pounds/day)**	**Annual (tons/year)**
HC	373	55	415	61
CO	1,044	153	1,160	170
NOx	6,744	989	7,494	1,099
PM_{10} [c]	236	35	262	38
$PM_{2.5}$ [c]	217	32	241	35

	2007 Diesel Shuttle Emissions	
	Daily (pounds/day)	**Annual (tons/year)**
HC	0.03	0.00
CO	0.57	0.03
NOx	0.15	0.01
PM_{10} [c]	0.00	0.00
$PM_{2.5}$ [c]	0.00	0.00

	2007 TOTAL Diesel Emissions			
	4.5 Car Trains + Shuttles		**5 Car Trains + Shuttles**	
	Daily (pounds/day)	**Annual (tons/year)**	**Daily (pounds/day)**	**Annual (tons/year)**
HC	373.45	54.76	414.95	60.85
CO	1,044.64	153.14	1,160.64	170.15
NOx	6,744.64	989.04	7,494.03	1,098.94
PM_{10} [c]	236.25	34.64	262.50	38.49
$PM_{2.5}$ [c]	217.35	31.87	241.50	35.41

a - Trip information, annual miles, and fuel use obtained from Parsons.

b - Emission factors obtained from EPA420-F-97-051 "Emission Factors for Locomotives", December 1997.

c - Based on the South Coast Air Quality Management District's *Final-Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)*, PM_{10} was assumed to be 100% of total PM and $PM_{2.5}$ was assumed to be 92% of PM_{10}.

Caltrain Calculations - 2035 Diesel

TRAIN INFORMATION

Trip Information [a]

One Way Trips:	98	trips per day
Average Length:	50.00	miles
Total Locomotive Miles:	4,900	miles per day

Annual Miles [a]

	# trains	miles	days	miles
Saturday+modified	32	47.5	54	82,080.0
Sunday+Holiday	30	47.5	58	82,650.0
Weekday	98	50.00	253	1,239,801.2
Total*			365	**1,439,644**

***Includes 2.5% for deadheading, plus special event mileage as calculated below.**

Train Information [a]

Train Consists	Fuel use per train mile
4.5	3.6 gal/mile
5	4 gal/mile

SHUTTLE INFORMATION

Trip Information [a]

One Way Trips:	32	trips per day
Average Length:	2.40	miles
Total Shuttle Miles:	77	miles per day

Annual Miles [a]

	# buses	**miles**	**days**	**miles**
Saturday+modified	32	2.4	54	4,147.2
Sunday+Holiday	30	2.4	58	4,176.0
Weekday	0	0.00	253	-
Total*			365	**8,531**

***Includes 2.5% for deadheading, plus special event mileage as calculated below.**

Emission factors for Diesel [b]

TRAINS		**SHUTTLE**	
Emission Factors (g/gal)		**Diesel Emission Factors (g/mi)**	
HC	6.9	**HC**	0.033
CO	27.4	**CO**	1.109
NOx	122.3	**NOx**	0.137
PM	4.2	**PM**	0.025

	2035 Diesel Train Emissions			
	4.5 Car Trains		**5 Car Trains**	
	Daily (pounds/day)	**Annual (tons/year)**	**Daily (pounds/day)**	**Annual (tons/year)**
HC	268	39	298	44
CO	1,065	156	1,183	174
NOx	4,752	698	5,280	776
PM_{10} [c]	163	24	181	27
$PM_{2.5}$ [c]	150	22	167	25

	2007 Diesel Shuttle Emissions	
	Daily (pounds/day)	**Annual (tons/year)**
HC	0.01	0.00
CO	0.19	0.01
NOx	0.02	0.00
PM_{10} [c]	0.00	0.00
$PM_{2.5}$ [c]	0.00	0.00

	2007 TOTAL Diesel Emissions			
	4.5 Car Trains + Shuttles		**5 Car Trains + Shuttles**	
	Daily (pounds/day)	**Annual (tons/year)**	**Daily (pounds/day)**	**Annual (tons/year)**
HC	268.10	39.38	297.89	43.76
CO	1,064.80	156.41	1,183.10	173.78
NOx	4,751.94	698.07	5,279.94	775.63
PM_{10} [c]	163.19	23.97	181.33	26.64
$PM_{2.5}$ [c]	150.14	22.06	166.82	24.51

a - Trip information, annual miles, and fuel use obtained from Parsons.

b - Emission factors obtained from EPA420-F-97-051 "Emission Factors for Locomotives", December 1997.

c - Based on the South Coast Air Quality Management District's *Final-Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)*, PM_{10} was assumed to be 100% of total PM and $PM_{2.5}$ was assumed to be 92% of PM_{10}.

Caltrain Calculations - 2035 Electrification

TRAIN INFORMATION

Electric

Trip Information [a]

One Way Trips:	114	trips per day
Average Length:	48.09	miles
Total Locomotive Miles:	5,482	miles per day

Annual Miles [a]

	# trains	miles	days	miles
Saturday+modified	32	47.5	54	82,080
Sunday+Holiday	30	47.5	58	82,650
Weekday	114	48.09	253	1,386,997
Total*			365	1,550,520

Train Information [a]

Train Consists	**Fuel use per train mile** Electric Locomotives	EMU
4.5	43.7 KWh/mile	41.4 KWh/mile
5	48.5 KWh/mile	46.0 KWh/mile

Train Consists	**Fuel use per train mile**
4.5	3.6 gal/mile
5	4 gal/mile

Diesel

One Way Trips:	6	trips per day
Average Length:	29.7	miles
Total Locomotive Miles:	178.2	miles per day

	# trains	miles	days	miles
Saturday+modified	0	48.8	54	-
Sunday+Holiday	0	48.9	58	-
Weekday	6	29.70	253	45,085
Total*			365	45,212

Train Consists	**Fuel use per train mile**
4.5	3.6 gal/mile
5	4 gal/mile

SHUTTLE INFORMATION

Diesel

One Way Trips:	32	trips per day
Average Length:	2.4	miles
Total Miles:	76.8	miles per day

	# trips	miles	days	miles
Saturday+modified	32	2.4	54	4,147
Sunday+Holiday	30	2.4	58	4,176
Weekday	0	0.00	253	-
Total*			365	8,531

Electric Emission factors per MWh [b]

	(lbs/MWh)	(lbs/KWh)
ROC	0.01	1.00E-05
CO	0.20	2.00E-04
NOx	1.15	1.15E-03
SOx	0.12	1.20E-04
PM_{10}	0.04	4.00E-05

TRAIN

Diesel Emission Factors (g/gal) [b]	
HC	6.9
CO	27.4
NOx	122.3
PM	4.2

SHUTTLE

Diesel Emission Factors (g/mi)	
HC	0.033
CO	1.109
NOx	0.137
PM	0.025

Train Electric Emissions

	4.5 Car Trains		5 Car Trains	
	Daily (Pounds)	**Annual (Tons)**	**Daily (Pounds)**	**Annual (Tons)**
HC	2.39	0.35	2.66	0.39
CO	47.86	6.94	53.10	7.71
NOx	275.20	39.92	305.77	44.36
SOx	28.72	4.17	31.91	4.63
PM_{10}	9.57	1.39	10.64	1.54
$PM_{2.5}$ [c]	9.57	1.39	10.64	1.54

Train Diesel Emissions

	4.5 Car Trains		5 Car Trains	
	Daily (Pounds)	**Annual (Tons)**	**Daily (Pounds)**	**Annual (Tons)**
HC	9.75	1.26	10.83	1.40
CO	38.72	5.02	43.02	5.58
NOx	172.81	22.41	192.02	24.90
SOx	--	--	--	--
PM_{10} [d]	5.93	0.77	6.59	0.86
$PM_{2.5}$ [d]	5.46	0.71	6.07	0.79

Shuttle Diesel Emissions

	Daily (Pounds)	**Annual (Tons)**
HC	0.01	0.00
CO	0.19	0.01
NOx	0.02	0.00
PM_{10} [d]	0.00	0.00
$PM_{2.5}$ [d]	0.00	0.00

Total Emissions - Diesel and Electric

	4.5 Car Trains + Shuttles		5 Car Trains + Shuttles	
	Daily (Pounds)	**Annual (Tons)**	**Daily (Pounds)**	**Annual (Tons)**
HC	12.15	1.61	13.50	1.79
CO	86.77	11.97	96.30	13.30
NOx	448.03	62.33	497.81	69.25
SOx	28.72	4.17	31.91	4.63
PM_{10}	15.51	2.16	17.23	2.40
$PM_{2.5}$	15.03	2.10	16.70	2.33

a - Trip information, annual miles, and fuel use data obtained from Parsons.

b - Emission Factors obtained from the South Coast Air Quality Management's *CEQA Air Quality Handbook (1993)*, Table A9-11-B.

c - $PM_{2.5}$ was assumed to be 100% of PM_{10}.

d - Based on the South Coast Air Quality Management District's *Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)*, PM_{10} was assumed to be 100% of total PM and $PM_{2.5}$ was assumed to be 92% of PM_{10}.

Appendix H: Section 4(f) Evaluation

PURPOSE OF SECTION 4(F) EVALUATION

Section 4(f) of the United States Department of Transportation (DOT) Act of 1966 (49 U.S.C. § 303), declares that "it is the policy of the United States government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites." Further, it is specified that, "the Secretary [of Transportation] may approve a transportation program or project… requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, site), only if –

1. *There is no prudent and feasible alternative to using that land; and*
2. *The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."*

The regulations interpreting Section 4(f) state that "… any use of lands from Section 4(f) property shall be evaluated early in the development of the action when alternatives to the proposed action are under study (23 CFR 771.135[b])." The use of Section 4(f) resources occurs when: (1) land from a Section 4(f) site is permanently incorporated into a transportation facility; (2) there is a temporary occupancy of Section 4(f) land that is adverse in terms of the statute's preservation purpose, or (3) when the proximity impacts of the transportation project on the Section 4(f) site, without acquisition of land, are so great that the purposes for which the Section 4(f) site exists are substantially impaired. The latter type of use is also known as a "constructive use." Constructive use occurs when the transportation project does not incorporate land from a Section 4(f) resource, but the proximity impacts of the project are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired.

Section 6009(a) of SAFETEA-LU amended existing Section 4(f) legislation to simplify the processing and approval of projects that have only "de minimis" impacts on resources protected by Section 4(f). On December 13, 2005, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) provided <u>Guidance for Determining De Minimis Impacts to Section 4(f) Resources</u>. The Section 4(f) regulations issued on March 12, 2008, incorporate the basic requirements contained in the December 2005 guidance. De minimis impacts are those that, after consideration of any measure(s) to minimize harm (e.g., any avoidance, minimization, mitigation, or enhancement measures), do not adversely affect the activities, features, or attributes of the Section 4(f) property. A de minimis determination fulfills all Section 4(f) requirements. When a de minimis impact is determined, an evaluation of avoidance alternatives and whether or not they are feasible and prudent is not required; however, it is still necessary to implement measures to minimize harm (which must be taken into account when determining whether the impact is de minimis). A de minimis *determination cannot be made when there is a constructive use since such a use, by definition, involves impacts to a Section 4(f) resource such that the protected activities, features, and attributes would be substantially impaired (see 23 CFR Part 774.3(b)).*

The law enacted slightly different provisions for historic sites than for parks, recreation areas, and refuges.

Historic Sites *– For historic sites, a use is considered de minimis when:*

- *A "no historic properties affected" or "no adverse effect" determination is made in accordance with Section 106 of the National Historic Preservation Act, with concurrence in writing from the State or Tribal Historic Preservation Officer (SHPO/THPO) and the Advisory Council on Historic Preservation (Advisory Council) (if participating in the Section 106 consultation);*

- *The SHPO/THPO and Advisory Council, if participating, are notified by FHWA or FTA of the intent to make a de minimis impact finding based on their written concurrence in the Section 106 determination; and*

- *The views of any consulting parties participating in the Section 106 process have been considered.*

The FHWA Section 4(f) Checklist, Attachment B – Park, Recreational Facilities, Wildlife Refuges, and Historic Properties Evaluated Relative to the Requirements of Section 4(f), revised November 2003, represents their recommended "best practices" for compliance with Section 4(f) requirements. Attachment B of the checklist indicates that all archaeological and historical sites within the Section 106 area of potential effect (APE) and all public parks, recreational facilities, and wildlife refuges within approximately 0.5-mile (0.8-kilometer) of any of the project alternatives should be included in the evaluation.

Section 4(f) further requires consultation with the United States Department of the Interior and, as appropriate, the involved offices of the United States Department of Agriculture and the Department of Housing and Urban Development in developing transportation projects and programs that use lands protected by Section 4(f).

Because the Caltrain Electrification Program Alternative would involve the use of Section 4(f) properties, this evaluation identifies the significant Section 4(f) resources in the project area, describes the nature and extent of the use of these significant properties, evaluates alternatives that would avoid the use of Section 4(f) resources, and describes measures to minimize harm to the affected resources.

PROPOSED PROJECT

The Peninsula Corridor Joint Powers Board (JPB) owns and operates approximately 51 miles of primarily two-track mainline railroad right-of-way between the Fourth and King

Street Station in San Francisco and south of the Tamien Station in San Jose, Santa Clara County. Caltrain trains consist of diesel locomotive-hauled, bi-level passenger cars. As of March 2008, Caltrain operates 98 trains per day between San Jose and San Francisco. Service is frequent during the peak periods and is provided every half hour in both directions during the midday. Caltrain provides hourly service in both directions on Saturdays and Sundays.

The Electrification Program Alternative consists of converting Caltrain from diesel-hauled to electrically powered trains. It would require the installation of some 120 to 134 single-track miles of overhead contact system (OCS) for the distribution of electrical power to the new electric rolling stock. The OCS would be powered from a 25-kilovolt (kV), 60-Hertz (Hz), single-phase, alternating current (AC) supply system consisting of traction power supply substations, switching stations, and paralleling stations.

Overhead Contact System

A mainline OCS typically is comprised of two conductors above each track in what is known as a catenary configuration: a messenger wire that sags between support points (much like a utility transmission line), below which a near-level contact wire is suspended. Both main wires are energized and are part of the same circuit. The pantograph, mounted on top of the electric vehicles, slides under the contact wire and collects the traction current from it.

The poles themselves are supported by cast-in-place concrete foundations or driven pile footings, which are typically set back approximately 10 to 12 feet from the track centerline. Depending upon the clearance requirements of particular sections of the route, the contact wire height would vary from approximately 17.5 feet to 23.5 feet. Pole heights range from 30 to 50 feet. On tangent, or straight, sections of track, the OCS supports can be spaced up to 230 feet apart, though they would typically be approximately 180 to 200 feet apart.

Auto-Transformer Power Feed Arrangement

*The auto-transformer power feed system arrangement would require the installation of two supply substations (also referred to as primary substations), spaced between 29 and 37 miles apart. In addition, there would be one switching station and seven paralleling stations at a spacing of 3 to 8 miles. The paralleling stations provide additional power support to the power distribution system and permit increased spacing of the primary substations. Figures 2.3-*6 *to 2.3-1*6 *of the Environmental Assessment (EA)/Environmental Impact Report (EIR) show the proposed locations for these traction power facilities*

PURPOSE AND NEED

A complete discussion of the purpose and need for the project is provided in Chapter 1 of this EA/FEIR and is incorporated herein by reference. The primary purposes of the Caltrain Electrification Program are as follows:

- *Electric trains can accelerate and decelerate at faster rates than diesel-powered trains, even with longer train consists. With electrified trains, Caltrain can run longer consists without degrading speeds, thus increasing peak-period capacity without the additional staff and operational costs of adding trains. To add peak-period trains would also require a costly overhaul of the Caltrain signal system. Thus, electrification would enhance capacity and cost effectiveness of train operations.*
- *Noise emanating from the passage of electrified train sets is measurably less when compared with diesel operations. With the very substantial increases in peak and off-peak Caltrain service that are either underway or planned for implementation during the next 5 to 28 years, electrification becomes an important consideration for reducing noise of train passbys and maintaining Peninsula quality of life.*
- *Electrified locomotives are expected to produce substantial reductions in corridor air pollution emissions when compared with diesel locomotives, even when the emissions of electrical power generation are included in the analysis. Electrically powered trains are also more energy efficient than diesel-electric trains. Reduced energy use also translates into reduced air emissions. Reductions in air pollutant emissions represent long-term health benefits for Caltrain riders, and residents and employees along the Caltrain corridor.*
- *An electrified Caltrain system will better address Peninsula commuters' vision of an environmentally friendly, fast, reliable service. This also may stimulate ridership. Additionally, an electrified Caltrain system would set the stage for an expanded modern regional electric express service and for a statewide high-speed rail service as well. The Electrification Program facilities will be designed to accommodate high-speed rail service as well as Caltrain service.*

DESCRIPTION OF SECTION 4(F) PROPERTIES

The Electrification Program project area was subjected to background research, field surveys, interviews, and aerial photo analysis by land use planners, biologists, archaeologists, and historians in an effort to locate and describe any public parks, recreation areas, wildlife and waterfowl refuges, and historic sites (properties) potentially affected by the proposed project. No wildlife or waterfowl refuges subject to Section 4(f) have been identified within the study area. Accordingly, the following discussion of impacts to Section 4(f) resources applies only to historic properties and public parks and recreation areas.

As recommended in the FHWA Section 4(f) Checklist, all National Register of Historic Places (NRHP)-eligible historic sites within the APE were included in the evaluation. A survey of the project's APE was conducted for archaeological and historic properties. The survey identified 23 properties that qualified as listed, eligible, or potentially eligible for listing on the NRHP. These resources are summarized in Table H-*1.*

For public park facilities, only park and recreation facilities within 0.1-mile of the railroad right-of-way were considered in the impact analysis. The reason for this reduced-width assessment corridor is as follows: (1) all proposed project improvements would be located within or very near the railroad right-of-way; and (2) as determined in Sections 3.3 and 3.11, respectively, the project would result in beneficial air quality and noise impacts within the vicinity of sensitive resources such as parks. These resources are summarized in Table H-*2. All are active-use, urban parks.*

Table* H-*1: Summary of Section 4(f) Historic Resources

Section 4(f) Property	***Site Description***	***Relationship to APE***	***National Register Status***	***Current Land Use***
Hamilton Shell Mound	*Within APE*	*Crosses APE at two locations*	*Potentially Eligible*	*Urban*
CA-SCL-30/H (Third Mission Santa Clara)	*Habitation site with burial*	*Both within and outside APE; 1-mile width*	*Eligible, Not Listed*	*Urban*
CA-SCL-690	*Large prehistoric cemetery*	*Both within and outside APE*	*Potentially Eligible*	*Transportation*
Tunnel No. 1	*MP 01.33* - San Francisco*	*Within APE*	*Potentially Eligible*	*Transportation*
Tunnel No. 2	*MP 01.93* - San Francisco*	*Within APE*	*Potentially Eligible*	*Transportation*
Tunnel No. 3	*MP 03.19* - San Francisco*	*Within APE*	*Eligible, Not Listed*	*Transportation*
Tunnel No. 4	*MP 04.27* - San Francisco*	*Within APE*	*Eligible, Not Listed*	*Transportation*
Schlage Lock Factory	*MP 04.95-A* - San Francisco*	*Within APE*	*Eligible, Not Listed*	*Vacant /Future Planned Development*
Airport Boulevard Underpass	*MP 09.59 - South San Francisco*	*Within APE*	*Potentially Eligible*	*Transportation*
Millbrae Station/Building	*MP 13.70 – Millbrae*	*Within APE*	*National Register Listed*	*Transportation*
Burlingame Station	*MP 16.30 – Burlingame*	*Within APE*	*National Register Listed*	*Transportation / Museum*
East Poplar Avenue Underpass	*MP 17.20* - San Mateo*	*Within APE*	*Eligible, Not Listed*	*Transportation*
East Santa Inez Avenue Underpass	*MP 17.34* - San Mateo*	*Within APE*	*Eligible, Not Listed*	*Transportation*

Table H-1: Summary of Section 4(f) Historic Resources

Section 4(f) Property	Site Description	Relationship to APE	National Register Status	Current Land Use
Monte Diablo Avenue Underpass	*MP 17.45* - San Mateo*	*Within APE*	*Eligible, Not Listed*	*Transportation*
Tilton Avenue Underpass	*MP 17.53* - San Mateo*	*Within APE*	*Eligible, Not Listed*	*Transportation*
San Carlos Station	*MP 23.20 - San Mateo*	*Within APE*	*National Register Listed*	*Transportation*
Atherton Station	*MP 27.80 - Atherton*	*Within APE*	*Potentially Eligible*	*Transportation*
San Francisquito Bridge	*MP 29.69 - Palo Alto*	*Within APE*	*Eligible, Not Listed*	*Transportation*
Palo Alto Station	*MP 30.10 - Palo Alto*	*Within APE*	*National Register Listed*	*Transportation*
University Avenue Underpass	*MP 30.13 - Palo Alto*	*Within APE*	*Eligible, Not Listed*	*Transportation*
Embarcadero Underpass	*MP 30.70 - Palo Alto*	*Within APE*	*Eligible, Not Listed*	*Transportation*
Santa Clara Tower at Benton and Railroad Street	*MP 44.60 - Santa Clara*	*Within APE*	*National Register Listed*	*Museum*
Santa Clara Station	*MP 44.70 - Santa Clara*	*Within APE*	*National Register Listed*	*Transportation*
Santa Clara Street / Alameda Underpass (part of San Jose / Cahill Station)	*MP 47.35- San Jose*	*Within APE*	*National Register Listed*	*Transportation*
San Jose / Cahill Station	*MP 47.50 - San Jose*	*Within APE*	*National Register Listed*	*Transportation*

** Field verification noted that a previously eligible property had been changed in some manner.*
Source: Far Western Anthropological Research Group and JRP Historical Consulting Services, 2008.

Table H-2: Summary of Section 4(f) Public Park and Recreation Resources

Q1	Location	Type	Approximate Distance to Right-of-Way (mile)
Bayshore Circle Park	*East of Tanforan Shopping Center, San Bruno*	*Community Park with Basketball Court*	*0.1*
Herman Tot Lot	*East of Tanforan Shopping Center, San Bruno*	*Tot Lot*	*0.1*
Posy Park	*San Bruno*	*Community Public Space*	*0.01*
Lion's Field Park	*San Bruno*	*Baseball Fields, Active Use*	*0.02*
Village Park	*Burlingame*	*Neighborhood Park*	*0.02*
Laguna Park	*Burlingame*	*Tennis Courts, Children's Play Area*	*0.04*
Washington Park	*Burlingame*	*Tennis, Baseball, Playground, Picnic*	*0.01*
Trinta Park	*San Mateo*	*Baseball, Basketball, Play Lot*	*0.01*

Table H-2: Summary of Section 4(f) Public Park and Recreation Resources			
Q1	***Location***	***Type***	***Approximate Distance to Right-of-Way (mile)***
Bay Meadows Race Track and County Fairgrounds	*San Mateo*	*Horse Racing / Fairgrounds*	*0.01*
Alexander Park	*Belmont*	*Tennis, Basketball, Play Areas*	*0.08*
Laureolia Park	*San Carlos*	*Baseball, Basketball, Play Areas*	*0.07*
Jardin de Ninos Park	*Redwood City*	*Neighborhood Park*	*0.10*
Holbrook Palmer Park	*Atherton*	*Large Multi-use Park*	*0.01*
Burgess Park	*Menlo Park*	*Large Multi-use Park*	*0.01*
El Camino Park	*Palo Alto*	*Baseball, Soccer, Open Space*	*0.01*
Alexander Peers Park	*Palo Alto*	*Basketball, Tennis, Recreation*	*0.01*
Jerry Bowden Park	*Palo Alto*	*Community Park*	*0.01*
Robles Park	*Palo Alto*	*Community Park*	*0.04*
Rengstorff Park	*Mountain View*	*Multi-purpose Park with Pool*	*0.01*
Rex Manor Park	*Mountain View*	*Children's Playground, Picnic*	*0.03*
Bracher Park	*Santa Clara*	*Basketball, Picnic, Play Area*	*0.01*
Biebrach Park	*San Jose*	*Basketball, Picnic, Pool*	*0.06*
Fuller Avenue Park	*San Jose*	*Community Park*	*0.01*
Source: Parsons, 2008.			

PROJECT ALTERNATIVES USING SECTION 4(F) LANDS

No-Electrification Alternative

Under the No-Electrification Alternative, the Caltrain system would be rehabilitated and enhanced over time within the existing JPB-owned right-of-way. Diesel-powered train consists would continue to operate along the entire corridor. No adverse impacts to Section 4(f) resources are anticipated because the modifications would largely consist of low-profile trackwork, crossovers, switching equipment, and grade crossing improvements. These types of modifications would not be expected to result in direct or indirect adverse effects to historical or public parks and recreation resources. Unlike the Electrification Program Alternative, there would be no OCS poles and wires or other electrification facilities off the right-of-way. Given these considerations, the No-Electrification Alternative would not result in any adverse archaeological resource impacts and would be consistent with Section 4(f) de minimis criteria.

Electrification Program Alternative

As discussed above, the use of Section 4(f) properties typically occurs when there is either permanent commitment of the Section 4(f) site for a transportation project (actual use) or where the proximity of a project to the Section 4(f) site, without acquisition of land, causes *impacts such as noise, visual, or access restrictions that could impair the values and utility of the land (indirect use).*

Archaeological Resources. Table H-*1 lists 25 archaeological and historic properties that are subject to the provisions of Section 4(f) because they are listed, eligible, or potentially eligible for inclusion in the NRHP.*

In terms of archaeological resources, the following sites are considered sensitive:

- *Hamilton Shell Mound – The Hamilton shell mound overlaps the APE in two locations, one 0.4-mile long and the other 0.9-mile long. The extent of the basal deposit for shell mounds is unknown; therefore, there is potential to expose cultural materials (especially human burials) when conducting ground-disturbing activities in the vicinity. Eight other known sites lie within this sensitive zone; they will be avoided during all project activities or, where avoidance is not feasible, they will be evaluated for their National Register eligibility.*
- *Native American Burial Ground at Tamien Station – There are 125 known human burials and an archaeological deposit that could be affected during project construction.*
- *Mission Sensitivity Zone – This zone is approximately 1-mile across and includes site CA-SCL-30/H, the Third Mission Santa Clara. This site has been determined eligible to the National Register and would be avoided; however, it is very likely that structures and other remains associated with the Mission lay undetected beneath the modern ground surface within the zone.*

The project will be designed to avoid impacts to these archaeological resources. Work within the vicinity of these sites will be evaluated before any project disturbance takes place in the area. For areas within the sensitive zones, yet outside known site boundaries, testing would be performed at the planned location of OCS poles prior to construction, to confirm that the pole locations are outside the site boundaries. Pole foundations would be excavated using the ultrasonic vibrated steel casing method to minimize effects of excavation. This excavation method reduces the amount of soil that would be removed, lessening potential impacts on buried cultural resources. The project also includes measures to mitigate impacts associated with the inadvertent discovery of archaeological resources during construction. Given these considerations, the project would not result in any adverse archaeological resource impacts and would be consistent with Section 4(f) de minimis criteria. Hence, an evaluation of avoidance alternatives, and whether or not they are feasible and prudent, is not required.

Historic Resources. The potential impact of the Electrification Program Alternative on historic resources was carefully considered, and approaches were modified to ensure that design and construction treatments would have no effect or no adverse effect on such resources. These avoidance and minimization measures are described in Table H-*3.*

A Finding of Effects (FOE) report and an amended FOE report were prepared for the Electrification Program Alternative in accordance with the guidelines for documentation in 36 CFR 800.11 to assess effects for each of the 21 historic resources identified as a part of this project. In Table I-3, these findings are discussed separately by individual resource because the number and types of effects vary from one location to the next. In letters dated December 9, 2002, and July 15, 2003, SHPO concurred with FTA's determination that the project would have no adverse effect on any of these historic resources.

Table H-3 Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	*Mile Post*	*Effect*
Tunnel No. 1 (3)	*01.33*	***Not adverse.*** *Power system supports would be installed within the tunnel. These are depicted on **Figure 3.5-1.** The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 1, the pole sets would be design W110, which are side poles with power systems over the individual tracks they power. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms.*
Tunnel No. 2 (3)	*01.93*	***Not adverse.*** *Power system supports would be installed within the tunnel. These are depicted on **Figure 3.5-1.** The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 2, the pole sets would be design W110, which are side poles with power systems over the individual tracks they power. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms.*
Tunnel No. 3 (3)	*03.19*	***Not adverse.*** *Power system supports would be installed within the tunnel. These are depicted on **Figure 3.5-1.** The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 3, the pole sets would be design W110, which are side poles with power systems over the individual tracks they power. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms.*

Table H-3 Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	***Mile Post***	***Effect***
Tunnel No. 4 (3)	*04.27*	***Not adverse.*** *Power system supports would be installed within the tunnel. These are depicted on **Figure 3.5-1.** The system would be attached to the interior roof surface of the tunnel by brackets inserted into the brick lining. Installation of the main support soffit plates would require the permanent installation of eight epoxy grouted stainless bolts at each support. These bolts could be cut off at the tunnel lining, resulting in little evidence of any modification. The remainder of the tunnel support arrangements and the parallel feeder cables would be completely removable. In addition, pole sets would be installed at the portals of each tunnel. For Tunnel No. 4, the pole sets would be design W114, formed by two pole sets that provide a wide headspan to support the power system over multiple tracks. The brackets within the tunnel interiors would be set inside the tunnel mouth sufficiently far back that they would not be readily visible to passers-by or to those standing on the passenger platforms (particularly at Tunnel No. 4's southern portal, the Bayshore Station). Although crown mining of the tunnel would be required in three separate sections, it would not be visible from outside the tunnel portals.*
Schlage Lock Factory	*04.95*	***Not adverse.*** *Poles and catenaries would be installed in the railroad right-of-way running east of the Main Building. The Main Building is one of a group of buildings interconnected with a modern warehouse that will be demolished to accommodate power requirements; however, the project would not affect the Main Building portion of the Schlage Plant. The poles would be located along the railroad line at a substantial distance from the Main Building. The installation of poles in this location would have no adverse effects on the attributes that make the Main Building appear to meet the criteria for listing in the National Register, and the building will not be directly affected by construction.*
Airport Boulevard Underpass (3)	*09.59*	***Not adverse.*** *Power cables would be suspended parallel to and above the Airport Boulevard Underpass. The power cables would use W114 pole sets. The pole sets would support a headspan that crosses the track at the same angle as the roadway beneath. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and because the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.*
Millbrae Station (1)	*13.70*	***Not adverse.*** *Poles and catenaries would be installed near the location of the moved historic station. The type of pole proposed for this location is design W113; the pole sets provide a headspan with wires that span the multiple tracks at this location. They would be placed up- and down-track from the station; none would be placed directly in front of the structure. The installation of poles in this location would have no adverse effect on the attributes that made the Millbrae Station eligible for listing in the National Register nor those listed in the preservation covenant; the station would not be directly affected by construction. It was previously moved from its original location closer to Millbrae Avenue, and its setting has already been substantially altered by modern development and construction in its immediate vicinity.*
Burlingame Station (1)	*16.30*	***Not adverse.*** *Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W113. The poles would be set in pairs supporting a headspan of power wires over the tracks in this location. They would be placed between the station and the currently active Caltrain track, and there is a relatively wide concrete platform area in front of the historic station; none would be placed directly in front of the structure. The installation of poles in this location would have no adverse effect on the attributes that made the Burlingame Station eligible for listing in the National Register; the station would not be directly affected by construction, and its setting has already been substantially altered by modern development and construction in its immediate vicinity. None of the features listed in the preservation covenant would be affected by the proposed project.*
East Poplar Ave. Underpass (3)	*17.20*	***Not adverse.*** *Power cables would be suspended parallel to and above the East Poplar Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and because the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.*

Table H-3 Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	Mile Post	Effect
East Santa Inez Ave. Underpass (3)	17.34	**Not adverse.** Power cables would be suspended parallel to and above the East Santa Inez Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath, and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridges that make it appear to meet the criteria for listing in the National Register.
Monte Diablo Ave. Underpass (3)	17.45	**Not adverse.** Power cables would be suspended parallel to and above the Monte Diablo Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.
Tilton Avenue Underpass (3)	17.53	**Not adverse.** Power cables would be suspended parallel to and above the Tilton Avenue Underpass. The power cables would use W110 single poles. The poles would support the power cables that power the track beneath and would be set alongside the track. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.
San Carlos Station (1)	23.20	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W112. The poles for side pole sets that power individual sets of tracks would be placed above the historic station on the modern embankment made by the 1999 grade separation project along the currently active Caltrain track. None would be placed directly in front of the structure. The installation of poles in this location would have no adverse effect on the attributes that made the San Carlos Station eligible for listing in the National Register; the station would not be directly affected by construction; and, as noted above, its setting has already been substantially altered by construction of the grade separation project embankment in 1998-1999. None of the significant features listed in the preservation covenant would be affected by the proposed project.
Atherton Station (3)	27.80	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W118. The poles would be set in pairs that support headspans of wires that provide power to widely spaced dual tracks. The poles would be placed between the station and the currently active Caltrain track, and there would be a relatively long span between the poles that will carry the power cables above the track in front of the historic station. None of the poles would be placed directly in front of the structure, the nearest being approximately 40 feet from the station building. The installation of poles in this location would have no adverse effect on the attributes that make the Atherton Station appear to meet the criteria for listing in the National Register, and the station itself would not be directly affected by construction.
Menlo Park Station (1)	28.90	**Not adverse.** Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W118. The poles would be set in pairs that support a headspan that provides power to two widely separated tracks. They would be placed between the station and the currently active Caltrain track, and there would be at least 40 feet between the station building and the nearest pole. None would be placed directly in front of the structure. The installation of poles in this location would have no adverse effect on the attributes that make the Menlo Park Station eligible for listing in the National Register; the station would not be directly affected by construction, and modern previous improvements to the station area and in its immediate vicinity have already altered the original station setting. None of the "significant features" specified in the covenant agreement would be affected by the proposed project.

Table H-3 Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	***Mile Post***	***Effect***
San Francisquito Bridge (3)	*29.69*	***Not Adverse.*** *Power cables would be suspended from the upper portions of the San Francisquito Creek Bridge truss. The power cables would use fasteners and brackets to support the power lines. The brackets would be attached to the existing structure, but no part of the existing structure would be removed as a part of this project. Installation of the main support brackets would require no permanent modification to the bridge structure and would be completely removable. Installation of the static wire grounding brackets would require site drilling of eight 5/8-inch-diameter clearance holes with the brackets completely removable. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing railroad line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.*
Palo Alto Station (1)	*30.10*	***Not adverse.*** *Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W110. This design provides a single pole set alongside the tracks it powers. The poles would be placed between the station and the two currently active Caltrain tracks, and between the tracks away from the station and other contributing structures. Only one set of poles would be placed directly in front of the structure, but they would be located 40 feet to the east and would be separated from the station by one of the two sets of active tracks. The next nearest set of poles to the historic station would be more than 60 feet away to the northeast. The installation of poles in these locations would have no adverse effect on the attributes that make the Palo Alto Station eligible for listing in the National Register, and none of the resources listed in the nomination would be directly affected by the installation of the poles. Only the setting of the tracks would be slightly affected, in that the poles would be installed between them, and would extend over them, at this location.*
University Avenue Underpass (3)	*30.13*	***Not adverse.*** *Power cables would be suspended parallel to and above the University Avenue Underpass. The power cables would use W110 pole sets. The poles in this configuration would be set at the side of the track they power. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.*
Embarcadero Underpass (3)	*30.70*	***Not adverse.*** *Power cables would be suspended parallel to and above the Embarcadero Road Underpass. The power cables would use W110 pole sets. The poles in this configuration would be set at the side of the track they power. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.*
Santa Clara Station (1) and the Station Tower	*44.70*	***Not adverse.*** *Poles and catenaries would be installed near the current location of the historic station. The type of pole proposed for this location is W114. This design provides pole sets consisting of two poles supporting a headspan that provides power to the tracks beneath. The poles would be placed between the station and the currently active Caltrain track. The pole at the northern end of the station would be located near a modern steel and glass passenger-waiting shelter. The southernmost pole would be sited east of the old set of tracks nearest the historic station (retained as an example of the relationship of the station to the original line and no longer operative) and set in the modern poured concrete passenger platform. This is depicted on the photo-simulation included as* ***Figure 3.5-2****. The pole would be located among the modern electroliers on this platform. The poles would not be located near the speeder shed or the utility shed. Two sets of W114 poles would be located to each side of the tower, one between it and the stub of Benton Street, the other more than 50 feet to the north. The installation of poles in these locations would have no adverse effect on the attributes that made the Santa Clara Station, its tower or sheds eligible for listing in the National Register, nor would it affect features described in the preservation covenant. The station and contributing resources would not be directly affected by construction, and modern previous improvements to the station area and in its immediate vicinity have already affected – to a substantial degree – the original station setting. The original station was located adjacent to an active freight and passenger track in a relatively sparsely settled agricultural area east of the old Santa Clara mission; its current setting is a combination of industrial and commercial buildings, modern streets, and a large and active railroad freight yard.*

Table H-3 Summary of Findings of Historic Resources within the Electrification Program Alternative APE

Resource Name	*Mile Post*	*Effect*
Alameda Underpass (1)	*47.35*	***Not adverse.*** *Power cables would be suspended parallel to and above the Alameda Underpass. The power cables would use W113 pole sets north of the Alameda and W114 sets in the rail yard. In both instances, pole sets would support a headspan that crosses the track at the same angle as the roadway beneath. No poles would be set on the bridge itself. Because the historic resource would not be altered in any way, and the cables would be suspended above and parallel to the existing line, there would be no adverse effect on the characteristics of the bridge that make it appear to meet the criteria for listing in the National Register.*
Cahill/Diridon Station (1)	*47.50*	***Not adverse.*** *Poles and catenaries would be installed to extend through the butterfly passenger shelters (often called "umbrella" sheds) on the Caltrain platforms at the Cahill Station. These sheds are contributing elements to the Cahill Station National Register Historic District, a resource composed of six related resources, including the main terminal building, the passenger umbrella sheds, the tunnels connecting the terminal to the platforms, car cleaners shed, water tank, and the Alameda Underpass (grade separation). The butterfly passenger sheds are the only resource that would be directly affected by the project. The station complex is an active facility, serving Amtrak, Caltrain, and Union Pacific Railroad (UPRR) freight trains. Also, Santa Clara Valley Transportation Authority (VTA) is constructing an underground intermodal connection station to the southwest of the terminal building.*
		The butterfly passenger sheds have a generally "Y" shaped cross section, with two shed roof surfaces running parallel to the active Caltrain lines. The installation of catenaries in this location would be accomplished by removing the original "I" beam posts that support the shed roofs, and replacing them in kind with somewhat larger "I" beam posts that would extend sufficiently high above the shelters to allow installation of the power system. The system would extend beyond the passenger platforms into the rail yard west of the station, thus providing power to trains on the yard tracks. The appearance of the butterfly passenger shed posts to those waiting for trains would be slightly different because of the increased dimension required for their greater heights, but the portion of the post extending above the shelter would not be visible from beneath the shelter. It would be visible from north or south of the platform shelters, and to a limited degree by persons waiting for trains on the adjacent platform; ***Figure 3.5-3*** *provides a photo-simulation of the proposed installation. The locations of the poles are depicted on* ***Figure 3.5-3****. The types of pole proposed for this location are W118 and W114. While the installation of poles in this location would change the materials of the original butterfly passenger sheds, it would have no adverse effect on the attributes that made the sheds a contributing element of the Cahill Station National Register District. No other resource within the district would be directly affected by construction.*

(1) Listed in the National Register
(2) Determined eligible for listing in the National Register by consensus determination (by Office of Historic Preservation [OHP] or Advisory Council)
(3) Appears to meet the criteria for listing in the National Register
Source: JRP Historical Consulting Services, 2008.

Given these considerations, it has been determined that the project would not result in any adverse impacts to historic resources and would therefore be consistent with Section 4(f) de minimis criteria. Hence, an evaluation of avoidance alternatives, and whether or not they are feasible and prudent, is not required.

<u>Public Park and Recreation Areas.</u> As described in Section 3.14 of the EA/FEIR, the project would not result in any adverse impacts to public parks and recreation facilities located within the vicinity of the Caltrain rail corridor. There will be some tree trimming along a few park areas where tree branches cross within the California Public Utilities Commission (CPUC) safety envelope; however, there would not be any take of parkland or impaired use of parks due to these activities. Neither would there be any temporary occupancy of the park

for the proposed project. Section 3.14 also describes benefits associated with the Electrification Program Alternative, including less noise, improved air quality, and fewer disruptions that would otherwise impair the continued use and enjoyment of these public parks and recreation areas.

In terms of indirect use, the only potential impacts would be visual effects due to OCS poles and tree removal and or trimming adjacent to public park and recreation areas. These impacts will be reduced through the following measures: (1) The JPB will coordinate with local jurisdictions to develop design guidelines for minimizing visual effects, including use of landscaping to screen views of facilities, varying pole placement, or tapering and painting poles to blend into the surrounding environment; (2) to minimize viewshed intrusion from historic stations and parks, headspan OCS configuration designs rather than cantilever bracket arms will be used; and (3) to the extent feasible, existing visual screening (e.g., windrow trees and other mature vegetation) will be maintained consistent with safe electrified train operations and maintenance.

Given the above considerations, it can be concluded that there would be no actual direct or indirect use (including temporary occupancy) of park property as a result of implementing the Electrification Program Alternative.