

TABLE OF CONTENTS

Volume 1: Report

PREFACE	=		1
		Document?	
		This Document?	
Wha	at Happen	s Next?	6
SUMMAR	Υ		S-1
S.1		ction and Background	
0.1	S.1.1		S-6
	S.1.2	Evaluation of Need for CEQA Recirculation or NEPA	0
	0.1.2	Supplementation	S-16
S.2	Tiered I	Environmental Review: Final Statewide Program EIR/EIS and San	0 10
0.2		co to San Jose Project Section	S-17
S.3		Raised during the Scoping Process	
S.4		e of and Need for the High-Speed Rail System and the San Francisco	
0.1		Jose Project Section	S-20
	S.4.1	Purpose of the High-Speed Rail System	
	S.4.2	Purpose of the San Francisco to San Jose Project Section	
	S.4.3	CEQA Project Objectives for the High-Speed Rail System in	0 20
	0.1.0	California and in the San Francisco to San Jose Project Section	S-21
	S.4.4	Statewide and Regional Need for the High-Speed Rail System	0 2 .
	0.1.1	in the San Francisco to San Jose Project Section	S-22
S.5	Alternat	tives	
0.0	S.5.1	No Project Alternative	
	S.5.2	San Francisco to San Jose Project Section Alternatives	
	S.5.3	Common Design Features	
	S.5.4	Design Variations	
	S.5.5	Station Area Development	
	S.5.6	Maintenance Facilities	
S.6		Avoidance and Minimization Features	
S.7		ect Alternative Impacts	
S.8		ternatives Evaluation	
0.0	S.8.1	High-Speed Rail Benefits	
	S.8.2	Adverse Effects Common to All Alternatives	
	S.8.3	Comparison of Impacts for the Project Alternatives	
	S.8.4	Comparison of HSR Stations	
	S.8.5	Comparison of Maintenance Facilities	
	S.8.6	CEQA Summary of Impacts and Mitigation	
	S.8.7	Capital and Operations Costs	
S.9		4(f) and Section 6(f)	
0.0	S.9.1	Section 4(f)	
	S.9.2	Section 6(f)	
S.10		mental Justice	
		of Controversy	
		mental Process	
	S.12.1	Identification of Preferred Alternative	S-123
S.13	Next St	eps in the Environmental Process	
	S.13.1	California High-Speed Rail Authority Decision-Making	
	S.13.2	Federal Railroad Administration Decision-Making	
	S.13.3	U.S. Army Corps of Engineers Decision-Making	
	S.13.4	Surface Transportation Board Decision-Making	
	S.13.5	Project Implementation	



l	PRO		RPOSE, NEED, AND OBJECTIVES	
	1.1	Introduc	ction	
		1.1.1	The High-Speed Rail System	1-1
		1.1.2	The Decision to Develop a Statewide High-Speed Rail System	1-4
		1.1.3	Implementation of the Statewide High-Speed Rail System	1-5
		1.1.4	San Francisco to San Jose Project Section	
		1.1.5	Lead Agencies, Cooperating Agencies, and Responsible Agencies	
		1.1.6	Compatibility with Federal Transportation Policy	
	1.2		e of and Need for the High-Speed Rail System and the San	1-12
	1.2	Fulpose	e of and Need for the High-Speed Rail System and the San	1 10
			co to San Jose Project Section	
		1.2.1	Purpose of the High-Speed Rail System	
		1.2.2	Purpose of the San Francisco to San Jose Project Section	1-13
		1.2.3	CEQA Project Objectives of the High-Speed Rail System in	
			California and in the San Francisco to San Jose Project Section	1-13
		1.2.4	Statewide and Regional Need for the High-Speed Rail System	
			in the San Francisco to San Jose Project Section	
	1.3	Relation	nship to Other Agency Plans, Policies, and Programs	1-33
		1.3.1	California Transportation Plan 2040	
		1.3.2	Plan Bay Area 2040	1-34
		1.3.3	San Francisco Bay Area Regional Rail Plan	
		1.3.4	Authority Agreements with PCJPB and Other Agencies Regarding	
			Blended Service in the Caltrain Corridor	1-35
		1.3.5	Valley Transportation Plan 2040	
		1.3.6	Caltrain Strategic Plan 2015–2024	
		1.3.7	2040 Caltrain Service Plan and Caltrain Business Plan	
		1.3.7		
			San Francisco Transportation Plan 2040	
		1.3.9	San Joaquin Corridor Strategic Plan	
		1.3.10	ACE Extension Lathrop to Ceres/Merced	
		1.3.11	Valley Link	
		1.3.12	Capitol Corridor 2014 Vision Plan Update	
		1.3.13	Bay Area Rapid Transit Vision Update	
		1.3.14	San Francisco International Airport Master Plan	
		1.3.15	San Jose International Airport Master Plan	1-40
		1.3.16	Metropolitan Oakland International Airport	1-40
	1.4	Relation	nship to Other Transportation Projects in the Study Area	
		1.4.1	Salesforce Transit Center, Downtown Rail Extension, and	
			Pennsylvania Avenue Extension	1-41
		1.4.2	San Francisco Municipal Transportation Agency Central Subway	
		1.1.2	Project	1_41
		1.4.3	Bayshore Multimodal Terminal	1_41
		1.4.4	Caltrain Modernization Program and Peninsula Corridor	1-41
		1.4.4		1 11
		4 4 5	Electrification Project	1 -4 1
		1.4.5	Caltrain Grade Separations in San Mateo County	
		1.4.6	South San Francisco Caltrain Station Improvement Project	
		1.4.7	Bay Area Rapid Transit Silicon Valley Extension	
		1.4.8	Silicon Valley Express Lanes	
		1.4.9	ACE Extension Lathrop to Ceres/Merced	
		1.4.10	Valley Link	
		1.4.11	Bus Rapid Transit	1-43
,	Λι Τ Γ	EDNIATIV#	ES	2.4
<u>-</u>				
	2.1		ction	
	2.2		ndent Utility	
	2.3		ound	
	2.4		peed Rail System Infrastructure	
		2.4.1	System Design Performance, Safety, and Security	2-7



		2.4.2	Vehicles	2-8
		2.4.3	Stations	2-9
		2.4.4	Infrastructure Components	
		2.4.5	Safety and Security Modifications	
		2.4.6	Traction Power Distribution	
		2.4.7	Signaling, Train-Control Elements, and Communication Facilities	
		2.4.8	Maintenance Facilities	
		2.4.9	Dedicated High-Speed Rail Infrastructure	
	2.5		ves Considered during Alternatives Screening Process	
		2.5.1	High-Speed Rail Project-Level Alternatives Development Process	
		2.5.2	Alternatives Consideration Process and Chronology	
	2.6	-	nts, Station Sites, and Maintenance Facilities Evaluated in this Final	
	0		nie, ciadon cico, and maintenance racinace Evaluates in the rinar	2-56
		2.6.1	No Project Alternative—Planned Improvements	
		2.6.2	High-Speed Rail Alternatives for the San Francisco to San Jose	2 00
		2.0.2	Project Section	2-67
	2.7	Ridershi	p	
		2.7.1	Travel Demand and Ridership Forecasts	
		2.7.2	Ridership and High-Speed Rail System Design	
		2.7.3	Ridership and Environmental Impact Analysis	
		2.7.4	Ridership and Station Area Parking	
	2.8		ons and Service Plan	
	2.0	2.8.1	High-Speed Rail Service	
		2.8.2	Maintenance Activities	
	2.9		al High-Speed Rail Development Considerations	
	2.9	2.9.1	High-Speed Rail, Land Use Patterns, and Development around	2-121
		2.9.1	High-Speed Rail Stations	2 121
		2.9.2		2-121
		2.9.2	Right-of-Way Acquisition for Construction, Operation, and	2 422
		2.9.3	Maintenance of High-Speed Rail	2-122
		2.9.3	High-Speed Rail Development within the San Francisco Bay Conservation and Development Commission Jurisdictional Areas	2 422
	2.40	Canatau		
	2.10		ction Plan	
		2.10.1	General Approach	
		2.10.2	Pre-Construction Activities	
	0.44	2.10.3	Major Construction Activities	
	2.11	Permits.		2-147
3	AFFE	CTED EN	IVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND	
-			MEASURES	3.1-1
			tion	
	• • •	3.1.1	Federal and State Regulatory Context	
		3.1.2	State and Regional Policy Context	
		3.1.3	Chapter 3 Purpose	
		3.1.4	Chapter 3 Organization	
		3.1.5	Chapter 3 Content	
		3.1.6	Outreach to Local Agencies	
		3.1.7	Legal Authority to Implement Off-Site Mitigation	
	3.2		rtation	
	5.2	3.2.1	Introduction	
		3.2.1	Laws, Regulations, and Orders	
		_		
		3.2.3 3.2.4	Consistency with Plans and Laws Methods for Evaluating Impacts	
		3.2.4		
			Affected Environment	
		3.2.6	Environmental Consequences	
		3.2.7	Mitigation Measures	
		3.2.8	Impact Summary for NEPA Comparison of Alternatives	3.∠-11/



	3.2.9	CEQA Significance Conclusions	
3.3	Air Qualit	ty and Greenhouse Gases	
	3.3.1	Introduction	
	3.3.2	Laws, Regulations, and Orders	3.3-4
	3.3.3	Consistency with Plans and Laws	3.3-13
	3.3.4	Methods for Evaluating Impacts	3.3-13
	3.3.5	Affected Environment	
	3.3.6	Environmental Consequences	
	3.3.7	Mitigation Measures	
	3.3.8	Impact Summary for NEPA Comparison of Alternatives	
	3.3.9	CEQA Significance Conclusions	
3.4		d Vibration	
•	3.4.1	Introduction	
	3.4.2	Laws, Regulations, and Orders	
	3.4.3	Consistency with Plans and Laws	
	3.4.4	Methods for Evaluating Impacts	
	3.4.5	Affected Environment	
	3.4.6	Environmental Consequences	
	3.4.7	Mitigation Measures	
	3.4.8	Impact Summary for NEPA Comparison of Alternatives	
	3.4.9	CEQA Significance Conclusions	
3.5		agnetic Fields and Electromagnetic Interference	
3.3	3.5.1	Introduction	
	3.5.1	Laws, Regulations, and Orders	
	3.5.2	Consistency with Plans and Laws	
	3.5.4	Methods for Evaluating Impacts	
	3.5.5	Affected Environment	
	3.5.6		
		Environmental Consequences	
	3.5.7	Mitigation Measures	
	3.5.8 3.5.9	Impact Summary for NEPA Comparison of Alternatives	
2.6		CEQA Significance Conclusions	
3.6		ilities and Energy	
	3.6.1	Introduction	
	3.6.2	Laws, Regulations, and Orders	
	3.6.3	Consistency with Plans and Laws	
	3.6.4	Methods for Evaluating Impacts	
	3.6.5	Affected Environment	
	3.6.6	Environmental Consequences	
	3.6.7	Mitigation Measures	
	3.6.8	Impact Summary for NEPA Comparison of Alternatives	
	3.6.9	CEQA Significance Conclusions	
3.7		I and Aquatic Resources	
	3.7.1	Introduction	
	3.7.2	Laws, Regulations, and Orders	
	3.7.3	Consistency with Plans and Laws	3.7-14
	3.7.4	Consultation with Regulatory Agencies for Federal Endangered	
		Species Act Compliance	3.7-14
	3.7.5	Coordination with the San Francisco Bay Conservation and	
		Development Commission	
	3.7.6	Methods for Evaluating Impacts	
	3.7.7	Affected Environment	
	3.7.8	Environmental Consequences	
	3.7.9	Mitigation Measures	
	3.7.10	Impact Summary for NEPA Comparison of Alternatives	
	3.7.11	CEQA Significance Conclusions	
	3.7.12	Preliminary Federal Endangered Species Act Findings	3.7-149



3.8	Hydrolog	y and Water Resources	3.8-1
	3.8.1	Introduction	3.8-2
	3.8.2	Laws, Regulations, and Orders	3.8-3
	3.8.3	Consistency with Plans and Laws	3.8-13
	3.8.4	Methods for Evaluating Impacts	3.8-14
	3.8.5	Affected Environment	3.8-21
	3.8.6	Environmental Consequences	3.8-41
	3.8.7	Mitigation Measures	3.8-89
	3.8.8	Impact Summary for NEPA Comparison of Alternatives	3.8-89
	3.8.9	CEQA Significance Conclusions	3.8-94
	3.8.10	Vulnerability and Adaptation to Sea Level Rise	3.8-98
3.9	Geology,	Soils, Seismicity, and Paleontological Resources	3.9-1
	3.9.1	Introduction	
	3.9.2	Laws, Regulations, and Orders	3.9-2
	3.9.3	Consistency with Plans and Laws	
	3.9.4	Methods for Evaluating Impacts	3.9-7
	3.9.5	Affected Environment	3.9-13
	3.9.6	Environmental Consequences	3.9-45
	3.9.7	Mitigation Measures	3.9-70
	3.9.8	Impact Summary for NEPA Comparison of Alternatives	3.9-70
	3.9.9	CEQA Significance Conclusions	
3.10	Hazardo	us Materials and Wastes	3.10-1
	3.10.1	Introduction	3.10-1
	3.10.2	Laws, Regulations, and Orders	3.10-3
	3.10.3	Consistency with Plans and Laws	
	3.10.4	Methods for Evaluating Impacts	
	3.10.5	Affected Environment	
	3.10.6	Environmental Consequences	3.10-29
	3.10.7	Mitigation Measures	
	3.10.8	Impact Summary for NEPA Comparison of Alternatives	
	3.10.9	CEQA Significance Conclusions	3.10-57
3.11	Safety ar	nd Security	3.11-1
	3.11.1	Introduction	3.11-2
	3.11.2	Laws, Regulations, and Orders	3.11-5
	3.11.3	Consistency with Plans and Laws	
	3.11.4	Methods for Evaluating Impacts	
	3.11.5	Affected Environment	
	3.11.6	Environmental Consequences	
	3.11.7	Mitigation Measures	
	3.11.8	Impact Summary for NEPA Comparison of Alternatives	
	3.11.9	CEQA Significance Conclusions	
3.12		onomics and Communities	
	3.12.1	Introduction	
	3.12.2	Laws, Regulations, and Orders	
	3.12.3	Consistency with Plans and Laws	
	3.12.4	Methods for Evaluating Impacts	
	3.12.5	Affected Environment	
	3.12.6	Environmental Consequences	
	3.12.7	Mitigation Measures	
	3.12.8	Impact Summary for NEPA Comparison of Alternatives	
	3.12.9	CEQA Significance Conclusions	
3.13		Planning, Land Use, and Development	
	3.13.1	Introduction	
	3.13.2	Laws, Regulations, and Orders	
	3.13.3	Consistency with Plans and Laws	
	3.13.4	Methods for Evaluating Impacts	
	•		



	3.13.5	Affected Environment	3.13-13
	3.13.6	Environmental Consequences	3.13-39
	3.13.7	Mitigation Measures	
	3.13.8	Impact Summary for NEPA Comparison of Alternatives	3.13-78
	3.13.9	CEQA Significance Conclusions	3.13-83
3.14	Parks, R	ecreation, and Open Space	3.14-1
	3.14.1	Introduction	3.14-4
	3.14.2	Laws, Regulations, and Orders	3.14-5
	3.14.3	Consistency with Plans and Laws	
	3.14.4	Methods for Evaluating Impacts	
	3.14.5	Affected Environment	
	3.14.6	Environmental Consequences	
	3.14.7	Mitigation Measures	
	3.14.8	Impact Summary for NEPA Comparison of Alternatives	
	3.14.9	CEQA Significance Conclusions	
3.15		cs and Visual Quality	
	3.15.1	Introduction	
	3.15.2	Laws, Regulations, and Orders	
	3.15.3	Consistency with Plans and Laws	
	3.15.4	Methods for Evaluating Impacts	
	3.15.5	Affected Environment	
	3.15.6	Environmental Consequences	
	3.15.7	Mitigation Measures	
	3.15.8	Impact Summary for NEPA Comparison of Alternatives	
	3.15.9	CEQA Significance Conclusions	
3.16		Resources	
5.10	3.16.1	Introduction	
	3.16.2	Laws, Regulations, and Orders	
	3.16.3	Consistency with Plans and Laws	
	3.16.4	Coordination of Section 106 Process with NEPA and CEQA	
	3.10.4	Compliance	2 16 12
	3.16.5	Methods for Evaluating Impacts	2 16 16
	3.16.6	Affected Environment	
	3.16.7		
		Environmental Consequences	
	3.16.8	Mitigation Measures	
	3.16.9	Impact Summary for NEPA Comparison of Alternatives	
0.47	3.16.10	CEQA Significance Conclusions	
3.17		Growth	
	3.17.1	Introduction	3.17-1
		Laws, Regulations, and Orders	
	3.17.3	Consistency with Plans and Laws	
	3.17.4	Methods for Evaluating Impacts	
	3.17.5	Affected Environment	
	3.17.6	Environmental Consequences	
	3.17.7	Mitigation Measures	
	3.17.8	Impacts Summary	
3.18		ve Impacts	
	3.18.1	Introduction	
	3.18.2	Laws, Regulations, and Orders	
	3.18.3	Methods for Evaluating Impacts	
	3.18.4	Cumulative Projects and Growth Forecasts	
	3.18.5	Organization of Cumulative Impacts Analysis	
	3.18.6	Cumulative Impacts Analysis	
	3.18.7	Cumulative Impact Summary	
3.19	Design V	ariant to Optimize Speed	3.19-1



4	FINA	L SECTION 4(f)/6(f) EVALUATIONS	4-
	4.1	Introduction	
		4.1.1 Laws, Regulations, and Orders	4-3
		4.1.2 Resource Study Area	
		4.1.3 Section 4(f) Applicability	
		4.1.4 Section 4(f) Use Definition	4-8
	4.2	Section 4(f) Coordination	
	4.3	Purpose and Need	
	4.4	Alternatives	
	7.7	4.4.1 No Project Alternative	
		4.4.2 Alternative A	
		4.4.3 Alternative B	
	4.5	Section 4(f) Applicability Analysis	
	4.5	4.5.1 Parks and Recreational Facilities	
		4.5.1 Fairs and Recreational Facilities	
	4.6		
	4.0	Section 4(f) Use Assessment	
		4.6.2 Cultural Resources	
	4 7		
	4.7	Avoidance Alternatives	
	4.0	4.7.1 Individual Resource Avoidance Assessments	
	4.8	Measures to Minimize Harm	
	4.9	Section 4(f) Least Harm Analysis	4-208
		4.9.1 Least Harm Analysis for San Francisco to San Jose Project	4.000
		Alternatives	
		4.9.2 Net Harm to Section 4(f) Property	4-274
	4.40	4.9.3 Impacts on Environmental Resources Outside of Section 4(f) Uses.	
		Final Section 4(f) Determination	
	4.11	Section 6(f)	4-2/3
5	ENVI	RONMENTAL JUSTICE	5-1
	5.1	Introduction	5-2
		5.1.1 Definition of Resources	5-4
	5.2	Laws, Regulations, and Orders	5-4
		5.2.1 Federal	
		5.2.2 State	5-6
		5.2.3 Regional and Local	
	5.3	Methods for Evaluating Effects	
		5.3.1 Definition of Reference Community and Resource Study Area	
		5.3.2 Methods for Effects Analysis	
	5.4	Affected Environment	
		5.4.1 Overview	
		5.4.2 Low-Income Populations	
		5.4.3 Minority Populations	
		5.4.4 Other Sensitive Populations	
	5.5	Environmental Justice Engagement and Documentation	
	0.0	5.5.1 Affected Populations and Communities	
		5.5.2 Issues and Concerns	
	5.6	Assessment of Effects	
	0.0	5.6.1 Overview	
		5.6.2 No Project Alternative	
		5.6.3 Project Alternatives	
	5.7	Summary of Disproportionately High and Adverse Effects	
	5.8	Measures to Minimize Harm	
	5.9	California High-Speed Rail Authority's Environmental Justice Determination	
_		·	
6		JECT COSTS AND OPERATIONS	
	6.1	Introduction	6-´



	6.2	Capital Costs	
		6.2.1 High-Speed Rail Project Alternatives	6-2
		6.2.2 Light Maintenance Facilities	
	6.3	Operations and Maintenance Costs	
		6.3.1 Operating Speeds	6-5
		6.3.2 Development of Operation and Maintenance Costs	6-5
7	OTHI	ER CEQA/NEPA CONSIDERATIONS	7-1
•	7.1	Unavoidable Adverse Effects and Significant and Unavoidable Impacts	
		7.1.1 Adverse Effects that Cannot Be Avoided under NEPA	
		7.1.2 Significant and Unavoidable Impacts under CEQA	
	7.2	Project Benefits	
		7.2.1 Transportation Benefits	
		7.2.2 Environmental Benefits	
		7.2.3 Safety and Security Improvements	
		7.2.4 Economic and Employment Benefits	
	7.3	Relationship between Short-Term Use of the Environment and the	
		Enhancement of Long-Term Productivity	7-6
	7.4	Significant Irreversible Environmental Changes or Irretrievable Commitment	
		of Resources	7-7
_	DDE		
8		FERRED ALTERNATIVE	
	8.1	Introduction	
	8.2	Summary of Key Stakeholder Input	
		8.2.1 Local Communities	
		8.2.3 Native American Tribes	
		8.2.4 Transportation Agencies and Public Works Departments	
		8.2.5 Businesses	
		8.2.6 Environmental Justice Outreach	
	0.2	8.2.7 Feedback on the Staff-Recommended Preferred Alternative	
	8.3 8.4	Preferred Alternative	
	0.4	8.4.1 Review of Alternative Key Differentiators by Subsection	
		8.4.2 Preliminary Cost Estimate by Alternative	
		8.4.3 Additional Policy Considerations: Caltrain Business Plan	
		8.4.4 Preferred Alternative Identification	
	8.5	Environmentally Superior Alternative	
	8.6	Environmentally Preferable Alternative	
	8.7	Least Environmentally Damaging Practicable Alternative	
		, , ,	
9	PUBI	LIC AND AGENCY INVOLVEMENT	
	9.1	Environmental Justice Outreach	
	9.2	Initial Planning for Four-Track System (2009 to 2010)	9-3
		9.2.1 Public and Agency Scoping (2009)	
		9.2.2 Alternatives Analysis Process (2009 to 2010)	
	9.3	Transition to a Two-Track Blended System (2011 to 2016)	9-8
		9.3.1 Alternatives Analysis Process for Two-Track Blended System	
		9.3.2 Public Outreach during the Transition to the Two-Track System	
	9.4	Current Planning for Two-Track Blended System (2016 to Present)	
		9.4.1 Public and Agency Scoping (2016)	9-9
		9.4.2 Further Outreach, Consultation, and Alternatives Refinement (2016	
		to Present)	9-13
	9.5	Notification and Circulation of the Draft EIR/EIS and Revised/Supplemental	
		Draft EIR/EIS, and Release of the Final EIR/EIS	9-29
10	DIST	RIBUTION LIST	1∩_1
	10.1	Repository Locations	
			5 2



	10.2	Federal A	Agencies	10-3
	10.3		encies	
	10.4		Officials	
		10.4.1	Federal Elected Officials	10-5
		10.4.2	State Elected Officials	10-5
		10.4.3	County Boards of Supervisors	
		10.4.4	Mayors	
		10.4.5	City Council Members	
	10.5		I/Local Agencies	
	10.6		ations and Businesses	
	10.0	10.6.1	Commerce Organizations	
		10.6.2	Cultural and Historical Interest Groups and Agencies	
		10.6.3	Labor Organizations	
		10.6.4	Neighborhood Organizations	
		10.6.5	Public Interest/Advocacy Organizations	
		10.6.6	Rotary Clubs	
		10.6.7	Transportation Organizations	
	40.7	10.6.8	Other Organizations	
	10.7		merican Contacts	
	10.8		and Districts	
		10.8.1	Belmont-Redwood Shores Elementary School District, Belmont, CA	
		10.8.2	Brisbane Elementary School District, Brisbane, CA	
		10.8.3	Burlingame Elementary School District, Burlingame, CA	
		10.8.4	Millbrae Elementary School District, Millbrae, CA	10-19
		10.8.5	Mountain View Whisman Elementary School District, Mountain	
			View, CA	
		10.8.6	Palo Alto Unified School District, Palo Alto, CA	
		10.8.7	Redwood City Elementary School District, Redwood City, CA	
		10.8.8	San Bruno Park Elementary School District, San Bruno, CA	
		10.8.9	San Francisco Unified School District, San Francisco, CA	
		10.8.10	San Jose Unified School District, San Jose, CA	
		10.8.11	San Mateo Union High School District, San Mateo, CA	10-20
		10.8.12	San Mateo-Foster City Elementary School District, Foster City, CA.	10-20
		10.8.13	Santa Clara Unified School District, Santa Clara, CA	10-20
		10.8.14	Sequoia Union High School District, Redwood City, CA	10-20
		10.8.15	Sunnyvale School District, Sunnyvale, CA	10-20
		10.8.16	Private Schools	10-20
	LICT		MARERO	44.4
11			PARERS	
			a High-Speed Rail Authority	
	11.2	Federal	Railroad Administration (prior to the July 23, 2019 NEPA Assignment	
	44.0			
	11.3		Management Team – Rail Delivery Partners	
	11.4	Regiona	l Consultant Environmental Team	11-8
12	RFFF	RENCES	8	12-1
_				
			ject Purpose, Need, and Objectives	
			rnatives	
	Chap	tor 2, Alle	ected Environment, Environmental Consequences, and Mitigation	12-12
	Спар			10 17
			25	
			3.1, Introduction	
			3.2, Transportation	
			3.3, Air Quality and Greenhouse Gases	
			3.4, Noise and Vibration	
		Section :	3.5, Electromagnetic Fields and Electromagnetic Interference	12-30



	Section 3.6, Public Utilities and Energy	12-32
	Section 3.7, Biological and Aquatic Resources	12-38
	Section 3.8, Hydrology and Water Resources	12-44
	Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources	12-49
	Section 3.10, Hazardous Materials and Wastes	12-54
	Section 3.11, Safety and Security	
	Section 3.12, Socioeconomics and Communities	12-64
	Section 3.13, Station Planning, Land Use and Development	12-67
	Section 3.14, Parks, Recreation and Open Space	12-69
	Section 3.15, Aesthetics and Visual Quality	12-76
	Section 3.16, Cultural Resources	12-77
	Section 3.17, Regional Growth	
	Section 3.18, Cumulative Impacts	
	Section 3.19, Design Variants	
	Section 3.20, Millbrae Station Reduced Site Plan Design Variant	
	Chapter 4, Section 4(f)/6(f) Evaluation	
	Chapter 5, Environmental Justice	
	Chapter 6, Project Costs and Operations	
	Chapter 7, Other CEQA/NEPA Considerations	
	Chapter 8, Preferred Alternative	
	Chapter 9, Public and Agency Involvement	12-96
13	GLOSSARY OF TERMS	13-1
14	INDEX	14-1
15	ACRONYMS AND ABBREVIATIONS	15-1



Tables

Table S-1 Summary of Design Features for Project Alternatives	S-24
Table S-2 Number and Locations of Four-Quadrant Gate Applications in the Project Section	S-26
Table S-3 HSR Impact Avoidance and Minimization Features	
Table S-4 Comparison of Construction Impacts by Alternative	
Table S-5 Comparison of Operations Impacts by Alternative	
Table S-6 Summary Comparison of Impacts between Millbrae Station Design and RSP Design Variant	S-93
Table S-7 CEQA Summary of Resources with Significant Impacts and Applicable Mitigation Measures	S-105
Table S-8 Significant and Unavoidable Impacts After Mitigation by Alternative	S-121
Table S-9 Capital Cost by Alternative (2021\$, in millions)	S-121
Table S-10 Community and Environmental Factors by Alternative	S-124
Table S-11 San Francisco to San Jose Project Section Milestone Schedule	S-129
Table 1-1 Population Growth in California and the Counties of the San Francisco to San Jose Project Section	1-15
Table 1-2 Unemployment and Income in California and in the Counties of the San Francisco to San Jose Project Section	1-16
Table 1-3 Jobs-to-Housing Ratio: San Francisco to San Jose Project Section Region, 2015 and 2040	1-20
Table 1-4 Current and Projected Vehicle Miles Traveled	1-23
Table 1-5 Travel Growth for Intercity Highways	1-24
Table 1-6 Commercial Air Travel in the San Francisco to San Jose Project Section Region	1-26
Table 1-7 Estimated Total Travel Times (Door-to-Door in Hours and Minutes) between City Pairs by Auto, Air, and Rail (Peak Conditions)	1-28
Table 2-1 Blended System Rail Performance Criteria	2-7
Table 2-2 2013 Evaluation of Passing Track Options	2-39
Table 2-3 2016 Evaluation of Passing Track Options	2-42
Table 2-4 Summary of Light Maintenance Facility Sites Evaluation	2-46
Table 2-5 Alternatives Refinement Process for the San Jose Diridon Station Approach Subsection	2-47
Table 2-6 San Jose Diridon Station Approach Subsection: Design Options Considered in the San Jose to Merced Project Section Alternatives Analyses, Checkpoint B, and Other Alternatives Development Processes	2-50
Table 2-7 San Jose Diridon Station Approach Subsection: Design Options Considered for the Draft and Final EIR/EIS	
Table 2-8 Regional Projected Population and Employment, 2015 and 2040	
Table 2-9 Planned Highway Improvements—No Project Alternative	
Table 2-10 Planned Passenger Rail Projects—No Project Alternative	
Table 2-11 Planned Passenger Bus Improvements—No Project Alternative	
Table 2-12 Existing and Assumed Future Freight Train Operations—No Project Alternative	
Table 2-13 Planned Port Improvements—No Project Alternative	
Table 2-14 Number and Locations of Four-Quadrant Gate Applications within the Project Section	



Table 2-15 New Right-of-Way Acquisitions Common to both Alternatives by City/Community and Project Element	2-70
Table 2-16 Summary of Design Features for Alternative A	
Table 2-17 Summary of Design Features for Alternative B	
Table 2-18 High-Speed Rail System Ridership Forecasts from the 2016 Business Plan	2-101
(in millions per year)	2-114
Table 2-19 Total Daily Train Operations—San Francisco to San Jose Project Section	2-119
Table 2-20 Right-of-Way Acquisitions (acres)	2-122
Table 2-21 Project Elements within BCDC Jurisdictional Areas	2-127
Table 2-22 Construction Schedule North of Scott Boulevard	2-130
Table 2-23 Construction Schedule, Scott Boulevard to West Alma Avenue	2-131
Table 2-24 Estimated Construction Durations by Project Component	2-135
Table 2-25 Estimated Earthwork Volumes by Alternative (cubic yards)	2-137
Table 2-26 Potential Major Environmental Permits and Approvals	2-148
Table 3.1-1 Comparison of Project Alternative Impacts for Air Quality and Greenhouse Gases (Example)	3.1-12
Table 3.1-2 CEQA Significance Conclusions and Mitigation Measures for Air Quality and Greenhouse Gases (Example)	3.1-13
Table 3.2-1 Definition of Transportation Resource Study Area	3.2-10
Table 3.2-2 2029 and 2040 Ridership at High-Speed Rail Stations	3.2-13
Table 3.2-3 2029 and 2040 Passenger Trip Generation at High-Speed Rail Stations	3.2-14
Table 3.2-4 2029 and 2040 Passengers per Vehicle by Mode	3.2-15
Table 3.2-5 2029 and 2040 Vehicle Trip Generation at High-Speed Rail Stations	3.2-15
Table 3.2-6 2040 Vehicle Trip Generation at the Brisbane Light Maintenance Facility	3.2-16
Table 3.2-7 Existing and Planned Future Train Service Levels	3.2-18
Table 3.2-8 Signalized Intersection Level of Service Definitions	3.2-19
Table 3.2-9 Unsignalized Intersection Level of Service Definitions	3.2-20
Table 3.2-10 Existing Rail Ridership at Stations	3.2-33
Table 3.2-11 Commercial Air Travel in the San Francisco to San Jose Project Section	
Region	
Table 3.2-12 2029 and 2040 No Project Conditions Roadway Improvements	
Table 3.2-13 2029 and 2040 No Project Intersection Operations	
Table 3.2-14 2029 and 2040 No Project and Plus Project Vehicle Miles Traveled	3.2-60
Table 3.2-15 Permanent Roadway Closures and Changes by Subsection and Alternative	3.2-65
Table 3.2-16 Temporary Displacement of Parking Adjacent to Diridon Station	3.2-71
Table 3.2-17 Permanent Displacement of Parking Adjacent to Diridon Station	3.2-74
Table 3.2-18 2029 and 2040 No Project Transit Improvements	3.2-80
Table 3.2-19 Bus Performance Delays from Vehicle Trips and Increased Gate-Down Time at At-Grade Crossings	3.2-86
Table 3.2-20 Changes in Caltrain System Average Weekday Ridership with the Project, 2040	
Table 3.2-21 Average Operational Service Times for Caltrain (4th and King Street Station to San Jose Diridon Station) during Peak Hour	3.2-92
Table 3.2-22 2029 and 2040 No Project Conditions Bicycle and Pedestrian	
Improvements	3.2-93



Table 3.2-23 Existing and Estimated Future Freight Train Operations	3.2-98
Table 3.2-24 Construction Activities and Temporary Effects on Freight Rail Operations (Alternative A)	3.2-103
Table 3.2-25 Construction Activities and Temporary Effects on Freight Rail Facilities (Alternative A)	3.2-103
Table 3.2-26 Construction Activities and Temporary Effects on Freight Rail Operations (Alternative B)	
Table 3.2-27 Construction Activities and Temporary Effects on Freight Rail Facilities (Alternative B)	3.2-104
Table 3.2-28 Transportation-Specific Mitigation Measures	3.2-109
Table 3.2-29 Comparison of Project Alternative Impacts for Transportation	3.2-120
Table 3.2-30 CEQA Significance Conclusions and Mitigation Measures for Transportation	3.2-127
Table 3.3-1 State and Federal Ambient Air Quality Standards	
Table 3.3-2 Definition of Air Quality and Greenhouse Gas Resource Study Areas	
Table 3.3-3 General Conformity de minimis Thresholds for the Project	3.3-26
Table 3.3-4 BAAQMD, MBARD, and SJVAPCD Regional Mass Emission Thresholds	3.3-28
Table 3.3-5 BAAQMD, MBARD, and SJVAPCD Cancer and Noncancer Health Risk Thresholds	3.3-31
Table 3.3-6 Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations along the Project Section	3.3-37
Table 3.3-7 Federal and State Attainment Status within the SFBAAB, NCCAB, and SJVAB	3.3-41
Table 3.3-8 Sensitive Receptor Locations within 1,000 Feet of the 4th and King Street, Millbrae, and San Jose Diridon Stations, and the East and West Brisbane LMF	3.3-42
Table 3.3-9 State Implementation Plans	3.3-49
Table 3.3-10 Estimated Statewide Emissions, No Project Condition—Medium Ridership Scenario	3.3-52
Table 3.3-11 Estimated Statewide Emissions, No Project Condition—High Ridership Scenario	3.3-53
Table 3.3-12 Construction-Related Criteria Pollutant Emissions in the SFBAAB under Alternative A	3.3-55
Table 3.3-13 Construction-Related Criteria Pollutant Emissions in the SFBAAB under Alternative B	3.3-56
Table 3.3-14 Construction-Related Criteria Pollutant Emissions in the NCCAB under Alternative A	3.3-59
Table 3.3-15 Construction-Related Criteria Pollutant Emissions in the NCCAB under Alternative B	3.3-60
Table 3.3-16 Construction-Related Criteria Pollutant Emissions in the SJVAB for Alternative A	3.3-63
Table 3.3-17 Construction-Related Criteria Pollutant Emissions in the SJVAB for Alternative B	3.3-64
Table 3.3-18 Criteria Pollutant Concentration Effects from Construction of Alternative A (μg/m) Compared to 1- to 24-hour California Ambient Air Quality Standards	3.3-67
Table 3.3-19 Criteria Pollutant Concentration Effects from Construction of Alternative A (μg/m) Compared to 1- to 24-hour National Ambient Air Quality Standards	3.3-70
Table 3.3-20 Criteria Pollutant Concentration Effects from Construction of Alternative B (μg/m) Compared to 1- to 24-hour California Ambient Air Quality Standards	3.3-73



Table 3.3-21 Criteria Pollutant Concentration Effects from Construction of Alternative B (μg/m) Compared to 1- to 24-hour National Ambient Air Quality Standards	3.3-76
Table 3.3-22 Criteria Pollutant Concentration Effects from Construction of Alternative A (μg/m) Compared to Annual National Ambient Air Quality Standards and California Ambient Air Quality Standards	3.3-79
Table 3.3-23 Criteria Pollutant Concentration Effects from Construction of Alternative B (μg/m) Compared to Annual National Ambient Air Quality Standards and California Ambient Air Quality Standards	3.3-81
Table 3.3-24 Excess Cancer, Noncancer, and PM _{2.5} Concentration Health Risks Associated with Project Construction in the San Francisco Bay Area Air Basin	3.3-84
Table 3.3-25 Changes in Regional Criteria Pollutant Emissions from Project Operations (under the Medium and High Ridership Scenarios) Relative to the 2015 Existing Conditions	3.3-88
Table 3.3-26 Changes in Regional Criteria Pollutant Emissions from Operation of the Project (under the Medium and High Ridership Scenarios) Relative to 2029 No Project Conditions	3.3-89
Table 3.3-27 Changes in Regional Criteria Pollutant Emissions from Operation of the Project (under the Medium and High Ridership Scenarios) Relative to the 2040 No Project Conditions	
Table 3.3-28 Carbon Monoxide Modeling Concentration Results at Roadway Intersections	
Table 3.3-29 Summary of Changes in Cancer and Noncancer Health Risks from Freight Trains on Shifted Track Relative to Existing Conditions and No Project Conditions	3.3-97
Table 3.3-30 Maximum PM _{2.5} Concentrations from Operation of Emergency Generators at Project Stations and the Light Maintenance Facility	3.3-99
Table 3.3-31 Comparison of Carbon Dioxide–Equivalent Construction Emissions for the Project Alternatives	3.3-101
Table 3.3-32 Changes in Statewide Greenhouse Gas Emissions from Project Operations under the Medium and High Ridership Scenarios Compared to Existing, 2029, and 2040 No Project Conditions	3.3-103
Table 3.3-33 NEPA Comparison of Project Alternative Impacts for Air Quality and Greenhouse Gases	3.3-107
Table 3.3-34 CEQA Significance Conclusions and Mitigation Measures for Air Quality and Greenhouse Gases	3.3-113
Table 3.3-35 Estimated Incidence of Health Outcomes Based on Total Directly Emitted NO _x , SO _x , and PM _{2.5} Emissions during Construction of Alternative B (Viaduct to I-880)	2 2 110
Table 3.4-1 Definition of Noise and Vibration Resource Study Areas	
Table 3.4-2 Federal Railroad Administration-Recommended Screening Distances for Evaluation of High-Speed Rail Noise Impacts	
Table 3.4-3 Federal Railroad Administration-Recommended Screening Distances for Vibration Assessments	
Table 3.4-4 Key Assumptions for the Operational Noise and Vibration Analysis	
Table 3.4-5 Detailed Assessment Criteria for Construction Noise	
Table 3.4-6 Federal Railroad Administration Land Use Categories for Noise Exposure	3.4-18
Table 3.4-7 Assumed 2029 and 2040 HSR Operations for Noise Impact Assessment	
Table 3.4-8 Federal Railroad Administration Construction Vibration Damage Criteria	
Table 3.4-9 Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for	0.4.0=
General Assessment	3.4-27



Table 3.4-10 Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for Special-Use Buildings	3.4-28
Table 3.4-11 Ambient Noise Measurement Results	
Table 3.4-12 Existing Vibration Measurement Locations	3.4-36
Table 3.4-13 Vibration Propagation Measurement Locations	
Table 3.4-14 Construction Activity Noise Levels	
Table 3.4-15 Summary of 2029 No Project and 2029 Plus Project Noise Impacts	3.4-49
Table 3.4-16 Summary of 2040 No Project and 2040 Plus Project Noise Impacts	3.4-49
Table 3.4-17 2029 and 2040 Number of Roadway Segments with Traffic-Related Noise Increases More than 3 dBA above Existing Conditions	3.4-65
Table 3.4-18 Traction Power Facility Noise Analysis—Number of Affected Receptors	3.4-66
Table 3.4-19 2040 Plus Project Potential Vibration Impacts	
Table 3.4-20 Vibration Mitigation Procedures and Descriptions	3.4-88
Table 3.4-21 Proposed Noise Barriers without Quiet Zones—Alternatives A and B	3.4-91
Table 3.4-22 Proposed Noise Barriers with Quiet Zones—Alternatives A and B	3.4-108
Table 3.4-23 Noise Mitigation Effectiveness—Alternative A	3.4-122
Table 3.4-24 Noise Mitigation Effectiveness—Alternative B	3.4-123
Table 3.4-25 Comparison of Project Alternative Impacts for Noise and Vibration	3.4-124
Table 3.4-26 CEQA Significance Conclusions and Mitigation Measures for Noise and Vibration	3.4-129
Table 3.4-27 Noise Mitigation Effectiveness	3.4-131
Table 3.5-1 Relationship between Typical Frequencies and Their Wavelengths	3.5-4
Table 3.5-2 Typical Magnetic Field Strengths	3.5-4
Table 3.5-3 Typical Electromagnetic Field Levels for Transmission/Power Lines	3.5-6
Table 3.5-4 IEEE C95.6 Magnetic Field Maximum Permissible Exposure Levels for the General Public	3.5-8
Table 3.5-5 IEEE C95.6 Electric Field Maximum Permissible Exposure Levels for the General Public	3.5-8
Table 3.5-6 Radio Frequency Emissions Safety Levels Expressed as Maximum Permissible Exposure	3.5-10
Table 3.5-7 Maximum Permissible Exposure Levels to Determine CEQA Significance	3.5-15
Table 3.5-8 Location and Description of Electromagnetic Field Measurement Sites	3.5-17
Table 3.5-9 Measured 60-Hertz Magnetic Field Strengths	3.5-24
Table 3.5-10 Estimated Electromagnetic Field Strength for Caltrain Operations	3.5-25
Table 3.5-11 Sensitive Receptors and Facilities Potentially Affected by Project Construction and Operations	3.5-26
Table 3.5-12 Predicted Magnetic Field Strengths at Measurement Locations	3.5-33
Table 3.5-13 Predicted Magnetic Field Strengths at Receptor Locations	3.5-34
Table 3.5-14 Summary of HSR Exterior Electromagnetic Field Levels	3.5-38
Table 3.5-15 Comparison of Project Alternative Impacts for Electromagnetic Fields and Electromagnetic Interference	3.5-46
Table 3.5-16 CEQA Significance Conclusions and Mitigation Measures for Electromagnetic Fields and Electromagnetic Interference	3.5-49
Table 3.6-1 Definition of Public Utilities and Energy Resource Study Area	3.6-11
Table 3.6-2 Summary of Utility and Energy Providers in the Resource Study Areas	3.6-16
Table 3.6-3 Major Utility Lines within the Public Utility Resource Study Area	3.6-21



Table 3.6-4 Wastewater Treatment Plant Capacity/Demand Summary for the Resource	
Study Area	
Table 3.6-5 Solid Waste Volumes and Landfill Facility Summary	
Table 3.6-6 Solid Waste Disposal Volumes and Diversion Summary	3.6-41
Table 3.6-7 Electricity Consumption in San Francisco, San Mateo, and Santa Clara Counties, 2015	
Table 3.6-8 Fuel Sources for Electric Power in California in 2017	3.6-45
Table 3.6-9 Natural Gas Consumption in San Francisco, San Mateo, and Santa Clara Counties in 2016	3.6-48
Table 3.6-10 Major Utility Conflicts Resulting in Relocation or Protection in Place	3.6-54
Table 3.6-11 Daily Construction Water Use Summary by Alternative	3.6-58
Table 3.6-12 Nonhazardous Solid Waste Generation Estimates by Alternative in Cubic Yards	3.6-63
Table 3.6-13 Hazardous Waste Generation Estimates by Alternative in Cubic Yards	3.6-65
Table 3.6-14 Operational Water Use	3.6-67
Table 3.6-15 Operational Generation of Solid Waste	3.6-71
Table 3.6-16 Estimated Nonrecoverable Construction-Related Energy Consumption for the Project Alternatives	3.6-74
Table 3.6-17 Operational Electricity and Natural Gas Use	3.6-76
Table 3.6-18 HSR Operational Electricity Consumption (Medium and High Ridership Scenarios)	3.6-77
Table 3.6-19 Estimated Changes in Vehicle Miles Traveled and Energy Consumption (Medium and High Ridership Scenarios)	3.6-78
Table 3.6-20 Estimated Changes in Airplane Flights and Energy Consumption (Medium and High Ridership Scenarios)	3.6-80
Table 3.6-21 Summary of Regional Changes in Energy Consumption (Medium and High Ridership Scenarios)	3.6-82
Table 3.6-22 Summary of Statewide Changes in Energy Consumption (Medium and High Ridership Scenarios)	
Table 3.6-23 Comparison of Project Alternative Impacts for Public Utilities and Energy	3.6-84
Table 3.6-24 CEQA Significance Conclusions and Mitigation Measures for Public Utilities and Energy	3.6-91
Table 3.7-1 Definition of Biological and Aquatic Resource Study Areas	
Table 3.7-2 General Soil Map Units Intersected by the Alternatives in the Aquatic Resource Study Area	
Table 3.7-3 Land Cover Types within the Project Footprint and Habitat Study Area (acres)	
Table 3.7-4 Biological Resource Summary for Watercourses or Open Waters in the Habitat Study Area	
Table 3.7-5 Critical Habitat within 0.5 Mile of the Project Footprint	
Table 3.7-6 Designated Essential Fish Habitat in the Habitat Study Area	
Table 3.7-7 Roosting Patterns for Bat Species Potentially Occurring in the Habitat Study Area	
Table 3.7-8 Special-Status Plant Communities Occurring or Potentially Occurring in the Special-Status Plant Study Area	
Table 3.7-9 Aquatic Resources by Subsection	
Table 3.7-10 Public Lands within the Project Footprint	
Table 3.7-11 Land Cover Types within BCDC Jurisdiction	



Table 3.7-12 Impacts on Special-Status Species Habitat by Alternative (acres)	3.7-54
Table 3.7-13 Impacts on Special-Status Plant Communities (acres)	3.7-77
Table 3.7-14 Impacts on Aquatic Resources Considered Jurisdictional under Section 404 of the Clean Water Act and the State-Porter Cologne Act and Navigable Waters Regulated under Section 10 of the Rivers and Harbors Act, by Project	
Alternative (acres)	3.7-80
Table 3.7-15 Impacts on Resources Subject to Notification under California Fish and Game Code Section 1600 et seq. by Project Alternative (acres)	3.7-82
Table 3.7-16 Impacts on Special-Status Species Habitat within BCDC Jurisdiction by Project Alternative (acres)	3.7-92
Table 3.7-17 Impacts on Special-Status Plant Communities within BCDC Jurisdiction by Project Alternative (acres)	3.7-97
Table 3.7-18 Impacts on Aquatic Resources Considered Jurisdictional under Section 404 of the Clean Water Act and Regulated as Waters of the State that are within BCDC Jurisdiction by Project Alternative (acres)	3.7-98
Table 3.7-19 Impacts on Aquatic Resources Subject to Notification under California Fish and Game Code Section 1600 et seq. within BCDC Jurisdiction by Project Alternative (acres)	3 7-99
Table 3.7-20 Potential Nonbiological Impacts of Compensatory Mitigation Implementation	
Table 3.7-21 Comparison of Project Alternative Impacts for Biological and Aquatic Resources	
Table 3.7-22 CEQA Significance Conclusions and Mitigation Measures for Biological and Aquatic Resources	3.7-133
Table 3.7-23 Summary of Effects for Federally Listed Species and their Critical Habitat \dots	3.7-150
Table 3.8-1 Municipal Separate Storm Sewer System Permit Requirements	3.8-6
Table 3.8-2 Definition of Hydrology and Water Resources Resource Study Area	3.8-14
Table 3.8-3 Summary of Data Sources	
Table 3.8-4 Temperature and Precipitation Summary	3.8-22
Table 3.8-5 Hydrologic Regions, Units, and Areas and Planning Watersheds in the Resource Study Area	
Table 3.8-6 Aquatic Resources by Subsection	
Table 3.8-7 Groundwater Basins and Subbasins in the Resource Study Area	
Table 3.8-8 Beneficial Uses of Groundwater Basins	
Table 3.8-9 Depth to Groundwater (2006–2016)	
Table 3.8-10 Groundwater Recharge Areas	
Table 3.8-11 Depths of Drinking Water Supply Wells by Groundwater Subbasin	
Table 3.8-12 FEMA Flood-Hazard Zones in the Floodplain Resource Study Area	3.8-38
Table 3.8-13 Flood Risks Posed to Existing Caltrain Bridges, Culverts, and Railbed Sections	3.8-40
Table 3.8-14 Aquatic Resources Anticipated to Experience Minor Disturbances	3.8-44
Table 3.8-15 Anticipated Work in Aquatic Resources	
Table 3.8-16 Earthwork Volumes for Major Construction Elements	
Table 3.8-17 Aquatic Resources Anticipated to Experience Permanent Impacts	
Table 3.8-18 Estimated Areas and Sources of New and Rebuilt Impervious Surfaces Table 3.8-19 Aquatic Resources with Intermittent Bridge/Culvert Maintenance and	
Vegetation Management	
Table 3.8-20 Maximum Estimated Amount of Disturbed Soil Areas	3.8-63



Table 3.8-21 Pre- and Post-Project Median Pollutant Concentrations	3.8-68
Table 3.8-22 Aquatic Resources with Continuous Impacts from the Release of Contaminants from Trains	3.8-74
Table 3.8-23 Estimates of Impervious Surfaces Built in Designated Groundwater Recharge Zones	3.8-79
Table 3.8-24 Proposed New or Modified Hydraulic Structures in 100-Year Floodplains	3.8-86
Table 3.8-25 Comparison of Project Alternative Impacts for Hydrology and Water Resources	3.8-90
Table 3.8-26 CEQA Significance Conclusions and Mitigation Measures for Hydrology and Water Resources	3.8-94
Table 3.8-27 Sea Level Rise Projections in the Floodplain Resource Study Area	3.8-99
Table 3.8-28 Sea Level Rise Vulnerability Assessment of the Mainline Tracks using Probabilistic Projections	3.8-100
Table 3.9-1 Definition of Geology, Soils, and Seismicity Resource Study Areas	3.9-8
Table 3.9-2 Definition of Paleontological Resource Study Area	3.9-11
Table 3.9-3 Evaluation of Paleontological Sensitivity/Paleontological Potential	3.9-12
Table 3.9-4 Summary and Distribution of Geologic Units throughout Resource Study Area	3.9-20
Table 3.9-5 Association Characteristics throughout the Geology, Soils, and Seismicity Resource Study Area	3.9-25
Table 3.9-6 Summary of High to Very High Liquefaction Susceptibility	3.9-36
Table 3.9-7 Summary of Susceptibility to Lateral Spreading	3.9-38
Table 3.9-8 Paleontological Potential of the Geologic Units Underlying the Resource Study Area	3.9-42
Table 3.9-9 Previously Recorded UCMP Fossil Vertebrate Localities Near (within 1 mile) of the Resource Study Area	3.9-43
Table 3.9-10 Distribution of Geologic Units by Subsection in the Resource Study Area	3.9-44
Table 3.9-11 Potential for Construction below the Groundwater Table	3.9-47
Table 3.9-12 Potential for Construction to be Affected by Soft Soil Conditions	3.9-49
Table 3.9-13 Potential for Construction of New Structures in Areas with Expansive Soils	3.9-51
Table 3.9-14 Construction of Project Elements Involving Concrete or Steel in Contact with Potentially Corrosive Soils	3.9-53
Table 3.9-15 Potential for Construction of Project Elements to Result in Soil Erosion	3.9-55
Table 3.9-16 Potential for Construction of Project Elements to be Affected by Liquefaction	
Table 3.9-17 Potential for Construction of Project Elements to be Affected by Lateral Spreading	
Table 3.9-18 Comparison of Project Alternative Impacts for Geology, Soils, Seismicity, and Paleontological Resources	
Table 3.9-19 CEQA Significance Conclusions and Mitigation Measures for Geology, Soils, Seismicity, and Paleontological Resources	
Table 3.10-1 Definition of Hazardous Materials and Wastes Resource Study Areas	
Table 3.10-2 Methodology for Risk Level Evaluation for Items of General Environmental Concern	
Table 3.10-3 Summary by Subsection of Medium- and High-Risk Potential	
Environmental Concern Sites in the Resource Study Area	3.10-19
Table 3.10-4 Risk of Railway Effects by Subsection	3.10-21
Table 3.10-5 Risk of Lead-Based Paint by Subsection	



Table 3.10-6 Risk of Asbestos-Containing Materials by Subsection	3.10-22
Table 3.10-7 Risk of Pesticides by Subsection	3.10-23
Table 3.10-8 Risk of Polychlorinated Biphenyls by Subsection	3.10-23
Table 3.10-9 Risk of Aerially Deposited Lead by Subsection	3.10-24
Table 3.10-10 Risk of Naturally Occurring Asbestos by Subsection	3.10-24
Table 3.10-11 Risk of Landfills by Subsection	3.10-25
Table 3.10-12 Risk of Oil and Gas Wells by Subsection	3.10-25
Table 3.10-13 Summary of Airport Occurrence by Subsection	3.10-26
Table 3.10-14 Risk of Airports by Subsection	3.10-26
Table 3.10-15 Schools within the Schools Resource Study Area	3.10-26
Table 3.10-16 Summary by Alternative of Medium- and High-Risk Potential Environmental Concern Sites in the Resource Study Area	3.10-34
Table 3.10-17 Summary by Alternative of Schools in the Resource Study Area	3.10-46
Table 3.10-18 Comparison of Project Alternative Impacts for Hazardous Materials and	
Wastes	3.10-50
Table 3.10-19 CEQA Significance Conclusions and Mitigation Measures for Hazardous	0.40.50
Materials and Wastes	
Table 3.11-1 Definition of Safety and Security Resource Study Areas	3.11-14
Table 3.11-2 Service Areas and Response Times for Police and Sheriff Departments in the Resource Study Area	3.11-26
Table 3.11-3 Response Times for Municipal and County Fire Departments and Emergency Medical Services	3.11-29
Table 3.11-4 Required Response Times for Contracted Ambulance Services	3.11-34
Table 3.11-5 Airports and Heliports in the Airport Resource Study Area	3.11-40
Table 3.11-6 Schools within the Schools Resource Study Area by Subsection	3.11-41
Table 3.11-7 High-Risk Facilities within 2 Miles of the Project Footprint	3.11-45
Table 3.11-8 Existing Tall Structures within 2 Miles of the Project Footprint	3.11-46
Table 3.11-9 Number and Location of Roadway Modifications with the Potential to Result in Temporary Lane Closures or Periodic Road Closures Affecting Emergency Response Time	3 11-52
Table 3.11-10 Proposed Improvements to At-Grade Crossings in the Project Section	
Table 3.11-11 Airport Influence Area Encroachment Area for the Project Alternatives	
Table 3.11-12 Communication Towers Requiring Federal Aviation Regulation Part 77 Notification for the Project Alternatives	
Table 3.11-13 Blended and Dedicated Track for Each Alternative (miles)	
Table 3.11-14 Safety and Security Mitigation Measures	
Table 3.11-15 Comparison of Project Alternative Impacts for Safety and Security	
Table 3.11-16 CEQA Significance Conclusions and Mitigation Measures for Safety and Security	
Table 3.12-1 Definition of Socioeconomics and Communities Resource Study Areas	
Table 3.12-2 Cities/Communities by Subsection	
Table 3.12-3 Community and Public Facilities within 0.5 Mile of the Project Alternatives	
Table 3.12-4 School Year 2015–2016 Funding for School Districts in the Resource Study Area	
Table 3.12-5 General Property Tax Levies by County for Fiscal Year 2014/2015	
Table 3.12-6 Roadway Modifications with the Potential to Result in Temporary Lane	0. 12-00
Closures or Periodic Road Closures	3.12-36



Table 3.12-7 Number of Community and Public Facilities within 250 Feet of Project Construction	3.12-39
Table 3.12-8 Number of Residential and Business Displacements by Subsection and Alternative	3.12-51
Table 3.12-9 Summary in Intersection Congestion and Delay by Subsection	3.12-56
Table 3.12-10 Number of Schools/Childcare Facilities within 1,000 Feet of Project Construction	
Table 3.12-11 Estimated Displacements	
Table 3.12-12 Estimated Number of Displaced Residential Units by Housing Type and Alternative	3.12-67
Table 3.12-13 Estimated Number of Residential Displacements by Alternative	3.12-68
Table 3.12-14 Estimated Number of Displaced Commercial and Industrial Businesses	
Table 3.12-15 Community and Public Facility Displacements by Alternative	
Table 3.12-16 Estimated Annual School District Funding Losses from Acquisitions	
Table 3.12-17 Annual Lost Property Tax Revenue (FY 2015/2016)	
Table 3.12-18 Construction Spending within the Region, by Alternative and Economic Sector (2021\$, in millions)	3.12-82
Table 3.12-19 Taxable Sales within the Region, by Alternative and Economic Sector (2021\$, in millions)	3.12-83
Table 3.12-20 Projected Sales Tax Revenues Generated During Construction (2021\$, in millions)	3.12-83
Table 3.12-21 Comparison of Project Alternative Impacts for Socioeconomics and Communities	3.12-87
Table 3.12-22 CEQA Significance Conclusions and Mitigation Measures for Socioeconomics and Communities	3.12-95
Table 3.13-1 Definition of Station Planning, Land Use, and Development Resource Study Areas	3.13-11
Table 3.13-2 Existing Land Uses Adjacent to the San Francisco to San Jose Project Section	3.13-14
Table 3.13-3 East Brisbane Light Maintenance Facility Components and Planned Land Uses	3.13-29
Table 3.13-4 West Brisbane Light Maintenance Facility Components and Planned Land Uses	3.13-31
Table 3.13-5 Planned Development in HSR Station and Light Maintenance Facility Areas	3.13-37
Table 3.13-6 Project Population Growth, 2015–2040	
Table 3.13-7 Permanent Right-of-Way Acquisition by City/Community and Project Element	3.13-41
Table 3.13-8 Temporary Use of Land outside the Right-of-Way for the Project Alternatives	3.13-44
Table 3.13-9 Land Use Permanently Converted by the Project Alternatives for Track Alignment	3.13-54
Table 3.13-10 Existing Land Use Permanently Converted by Stations	3.13-59
Table 3.13-11 Existing Land Uses Permanently Converted by the Light Maintenance Facility	3.13-63
Table 3.13-12 Planned Land Uses Permanently Converted by the Light Maintenance Facility	
Table 3.13-13 Permanent Impacts of the Brisbane Light Maintenance Facility on	
Schlage Lock Project	3.13-65



Table 3.13-14 Permanent Impacts of the Light Maintenance Facility on Brisbane Baylands Planned Development	3.13-65
Table 3.13-15 Comparison of Project Alternative Impacts for Station Planning, Land Use, and Development	3.13-78
Table 3.13-16 CEQA Significance Conclusions and Mitigation Measures for Station Planning, Land Use, and Development	3.13-83
Table 3.14-1 Definition of Parks, Recreation, Open Space, and School District Play Areas Resource Study Areas	3.14-9
Table 3.14-2 Parks, Recreational Facilities, and Open Space Resources by Subsection.	3.14-24
Table 3.14-3 School District Play Areas by Subsection	3.14-52
Table 3.14-4 Noise, Vibration, and Construction Emissions Impacts on Use and User Experience of Parks, Recreational Facilities, and Open-Space Resources	3.14-60
Table 3.14-5 Construction-Related Impacts on Access to and Use of Parks	3.14-101
Table 3.14-6 Construction-Related Visual Impacts on Access to or Use of Parks	3.14-112
Table 3.14-7 Permanent Visual Impacts on Access or Use of Parks, Recreational Facilities, and Open-Space Resources	3.14-118
Table 3.14-8 Permanent Parks, Recreation, and Open-Space Acquisitions, San Jose Diridon Station Approach Subsection	3.14-122
Table 3.14-9 Operational Noise Impacts on Parks and Recreational Facilities	3.14-138
Table 3.14-10 Noise, Vibration, and Construction Emissions Impacts on Use and User Experience of School District Play Areas	3.14-141
Table 3.14-11 Construction-Related Reduction in Access to or Use of School District Play Areas	3.14-149
Table 3.14-12 Permanent Visual Impacts on Users of School District Play Areas	3.14-151
Table 3.14-13 Comparison of Project Alternative Impacts on Parks, Recreation, and Open Space Resources	3.14-155
Table 3.14-14 CEQA Significance Conclusions and Mitigation Measures for Parks, Recreation, and Open Space Resources	3.14-160
Table 3.15-1 Affected Viewer Groups and Associated Sensitivities	3.15-10
Table 3.15-2 Mission Bay Landscape Unit Visual Character, Viewer Group Sensitivity,	
and Visual Quality	
Table 3.15-3 Key Viewpoints in the Mission Bay Landscape Unit	3.15-17
Table 3.15-4 Southeast San Francisco Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-18
Table 3.15-5 Brisbane Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-23
Table 3.15-6 Key Viewpoints in the Brisbane Landscape Unit	3.15-27
Table 3.15-7 South San Francisco Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-28
Table 3.15-8 San Bruno–Millbrae Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-31
Table 3.15-9 Key Viewpoints in the San Bruno-Millbrae Landscape Unit	3.15-36
Table 3.15-10 Burlingame Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-37
Table 3.15-11 San Mateo–Redwood City Landscape Unit Visual Character, Viewer	
Group Sensitivity, and Visual Quality	
Table 3.15-12 Key Viewpoints in the San Mateo-Redwood City Landscape Unit	3.15-51



Table 3.15-13 Atherton–Mountain View Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-56
Table 3.15-14 Key Viewpoints in the Atherton–Mountain View Landscape Unit	3.15-64
Table 3.15-15 Sunnyvale Landscape Unit Visual Character, Viewer Group Sensitivity, and Visual Quality	3.15-67
Table 3.15-16 Key Viewpoints Representing the Sunnyvale Landscape Unit	
Table 3.15-17 Santa Clara Landscape Unit Visual Character, Viewer Group Sensitivity,	
	3.15-71
Table 3.15-18 Key Viewpoints Representing the Santa Clara Landscape Unit	3.15-76
Table 3.15-19 Diridon Station Landscape Unit Visual Character, Viewer Groups, and	0 45 70
Table 3.15-20 Key Viewpoints Representing the Diridon Station Landscape Unit	
Table 3.15-20 Key Viewpoints Representing the Diridon Station Landscape Unit	3. 13-60
Groups, and Visual Quality	3.15-83
Table 3.15-22 Key Viewpoints Representing the San Jose Station Approach Landscape	
Unit	3.15-86
Table 3.15-23 Summary of Visual Quality Change for Project Alternatives	3.15-88
Table 3.15-24 Landscape Unit-Specific Temporary Construction Activities	3.15-91
Table 3.15-25 Comparison of Project Alternative Impacts for Aesthetics and Visual	
Quality	3.15-146
Table 3.15-26 CEQA Significance Conclusions and Mitigation Measures for Aesthetics	2 15 150
and Visual Quality Table 3.16-1 Section 106 Technical Reports and Concurrence Dates	
Table 3.16-2 Previously Identified Archaeological Resources in the Area of Potential	3.10-13
Effects	3.16-23
Table 3.16-3 Significant Built Resources	
Table 3.16-4 Summary of Mitigation Measures Applicable to Each Alternative	
Table 3.16-5 Comparison of Project Alternative Impacts on Cultural Resources	
Table 3.16-6 CEQA Significance Conclusions and Mitigation Measures for Cultural	
Resources	3.16-107
Table 3.16-7 CEQA Significance Conclusions for Impact CUL#4: Permanent	
Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting	
Table 3.17-1 RSA and County Characteristics, 2015 Estimates	3.17-10
Table 3.17-2 San Francisco, San Mateo, and Santa Clara Counties: Regional Employment by Industry, 2000–2024	3 17_13
Table 3.17-3 Regional Long-Range Employment Projections, 2015, 2020, 2024, and	
2040	3.17-14
Table 3.17-4 Labor Force Characteristics by County and City/Community in the RSA,	
2000–2015	3.17-15
Table 3.17-5 Population Growth, 2000–2015	3.17-17
Table 3.17-6 Population Projections, 2015–2040	3.17-17
Table 3.17-7 Housing Units and Vacancy Rates, 2015 and 2040	3.17-18
Table 3.17-8 Project Alternatives Costs (2021\$, in millions)	3.17-23
Table 3.17-9 Alternative A Construction Employment Impacts	3.17-23
Table 3.17-10 Alternative B (Viaduct to I-880) Construction Employment Impacts	3.17-24
Table 3.17-11 Alternative B (Viaduct to Scott Boulevard) Construction Employment	
Impacts	
Table 3.17-12 Total One-Time Economic Impact of Construction in the RSA	3.17-25



Table 3.17-13 Annual Employment Impacts during Operations and Maintenance	3.17-28
Table 3.17-14 Operations-Related Employment and Population Growth	3.17-29
Table 3.17-15 Operations-Related Employment and Population Growth, Including Increased Accessibility Impacts	3.17-30
Table 3.17-16 Summary of Regional Growth Impacts by Alternative	
Table 3.18-1 Cumulative Cancer and Noncancer Health Risks from Construction of	
Either of the Project Alternatives in the Bay Area Air Quality Management District	3.18-19
Table 3.18-2 Cumulative Cancer and Noncancer Health Risks from Operation of Freight Trains on Shifted Track	3.18-21
Table 3.18-3 Cumulative Cancer and Noncancer Health Risks from Station and	
Brisbane Light Maintenance Facility Operation	3.18-22
Table 3.18-4 Cumulative Cancer and Noncancer Health Risks from Combined Construction and Operations	3.18-23
Table 3.18-5 Summary of 2040 No Project, Plus Project, and Cumulative Plus Project Noise Impacts	3.18-31
Table 3.18-6 Summary of Cumulative Effects and Impacts	3.18-86
Table 4-1 Section 4(f) and 6(f) Evaluation Consultation Summary	4-11
Table 4-2 Summary of Design Features for Alternatives A and B	4-15
Table 4-3 Parks and Recreational Facilities not Considered Section 4(f) Resources	4-18
Table 4-4 Park and Recreation Resources Evaluated for Potential Section 4(f) Use	4-20
Table 4-5 Historic Properties in the Area of Potential Effect Listed or Eligible for Listing in the National Register of Historic Places	4-62
Table 4-6 Parks and Recreational Facilities Over 200 Feet from the Project Footprint with a Determination of No Use under Section 4(f)	4-79
Table 4-7 Section 4(f) Use Determinations for Parks and Recreation Areas within 200 feet of the Project Footprint	4-85
Table 4-8 Summary of Section 4(f) Uses of Parks, Recreation, and Wildlife and Waterfowl Refuges	
Table 4-9 Built Historic Properties Evaluated for Potential Section 4(f) Use	4-203
Table 4-10 Summary of Section 4(f) Uses of NRHP-Listed or Eligible Properties	4-263
Table 4-11 Summary of Section 4(f) Avoidance Alternatives	4-266
Table 4-12 Measures to Minimize Harm	4-267
Table 4-13 Least Harm Analysis for the San Francisco to San Jose Project Alternatives	4-270
Table 4-14 Section 6(f) Resources and Findings	4-275
Table 5-1 Overview of Reference Community and Resource Study Area Demographic Characteristics (2010–2014 Estimates)	5-15
Table 5-2 Reference Community Demographic Characteristics (2010–2014 Estimates)	5-16
Table 5-3 Cities/Communities within the Resource Study Area	5-17
Table 5-4 Resource Study Area Demographic Characteristics (2010–2014 Estimates)	5-18
Table 5-5 Station and Light Maintenance Facility Resource Study Area Demographic Characteristics (2010–2014 Estimates)	5-20
Table 5-6 Low-Income Populations within the Reference Community (2010–2014 Estimates)	5-21
Table 5-7 Median Household Incomes and Low-Income Populations within the Resource Study Area (2010–2014 Estimates)	5-21
Table 5-8 Percentage of Households Participating in the Supplemental Nutrition Assistance Program within the Resource Study Area (2010–2014 Estimates)	5-23



Table 5-9 Minority Group Representation in the Reference Community (2010–2014 Estimates)	5-31
Table 5-10 Minority Group Representation within the Resource Study Area (2010–2014 Estimates)	5-33
Table 5-11 Other Sensitive Populations within the Resource Study Area (2010–2014 Estimates)	5-41
Table 5-12 Outreach to Minority Populations and Low-Income Populations	5-45
Table 5-13 Interviews with Stakeholder Organizations and Community Service Providers	5-54
Table 5-14 Income and Ethnicity by Transit Service Provider	5-69
Table 5-15 Displacements by Type	5-72
Table 5-16 Residential and Business Displacements by Subsection and City/Community	5-73
Table 5-17 Temporary Localized Criteria Pollutant Violations by Subsection	
Table 5-18 Adversely Affected Intersection Operations after Mitigation Associated with Project Operations	5-82
Table 5-19 Mitigated Operational Noise Impacts with Noise Barriers and with Quiet Zones and Noise Barriers by Alternative (Number of Receptors with Predicted	
Noise Impact)	
Table 5-20 Ground-Borne Operational Vibration Impacts by Alternative	
Table 6-1 Capital Cost of the High-Speed Rail Project Alternatives (2021\$, in millions)	6-4
Table 6-2 Medium Scenario Revenue and Annual Operations and Maintenance Costs	6-7
Table 8-1 Community and Environmental Effects by Alternative	8-12
Table 8-2 Capital Costs of the Project Alternatives (2021\$ Millions)	8-18
Table 8-3 Communication Radio Tower Sites Included in the Preferred Alternative	8-20
Table 9-1 Public and Agency Meetings Summary, April 2016–July 2016	9-11
Table 9-2 Public and Agency Meetings Summary, July 2016–March 2022	9-13



Figures

Figure S-1 California High-Speed Rail Statewide System	S-4
Figure S-2 San Francisco to San Jose Project Section	
Figure 1-1 Statewide High-Speed Rail System—Implementation Phases	1-3
Figure 1-2 Statewide High-Speed Rail System, Phase 1 and Phase 2—Project Sections	1-8
Figure 1-3 San Francisco to San Jose Project Section	1-10
Figure 1-4 Population Growth for San Francisco, San Mateo, and Santa Clara Counties	1-16
Figure 1-5 Long-Distance Intercity Trips in California (in millions)	1-17
Figure 1-6 Major Intercity Travel Routes and Airports	1-19
Figure 1-7 Most Congested Highway Segments	1-22
Figure 2-1 Proposed San Francisco to San Jose Project Section	2-4
Figure 2-2 Example of an At-Grade Profile Showing Overhead Contact System and Vertical Arms of the Pantograph Power Pickups	2-8
Figure 2-3 Examples of Japanese Shinkansen High-Speed Trains	
Figure 2-4 Examples of Existing Stations	
Figure 2-5 Two-Train Station Platform Cross Section	2-11
Figure 2-6 Four-Train Station Platform Cross Section	2-11
Figure 2-7 Typical At-Grade Cross Section for Blended System	2-13
Figure 2-8 Typical At-Grade Cross Section for Blended System in San Jose (Alternative A Only)	2-13
Figure 2-9 Typical Retained-Fill Cross Section	
Figure 2-10 Two-Track Viaduct	
Figure 2-11 Typical Straddle Bent Cross Section	2-16
Figure 2-12 Applications of Four-Quadrant Gates (Applications A and B)	
Figure 2-13 Applications of Four-Quadrant Gates (Applications B1 and C)	2-18
Figure 2-14 Applications of Four-Quadrant Gates (Applications D and E)	2-19
Figure 2-15 Proposed Caltrain Station Modifications	2-21
Figure 2-16 Illustration of Hold-Out Rule Stations	2-22
Figure 2-17 Photograph of Perimeter Fencing of Right-of-Way	2-23
Figure 2-18 Typical Cross Section of At-Grade Profile with Traction Power, Signaling, and Train Control Features	2-24
Figure 2-19 Typical Cross Section of Roadway Grade-Separated Beneath HSR Guideway	2-26
Figure 2-20 Project Alternatives Development and Screening Process	2-28
Figure 2-21 Alignment Alternatives Considered and Eliminated in Tier 1 Planning	2-30
Figure 2-22 Tier 1 Decision as Foundation for Range of Alternatives in Tier 2 EIR/EIS— San Francisco to San Jose Project Section	2-31
Figure 2-23 Alignment Alternatives and Station Locations Carried Forward from the Preliminary Alternatives Analysis	2-33
Figure 2-24 Alignment Alternatives, Station Locations, and Light Maintenance Facilities Carried Forward from the Supplemental Alternatives Analysis	2-35
Figure 2-25 Light Maintenance Facility Sites—San Francisco to San Jose Project Section	2-36
Figure 2-26 Passing Track Options Considered	2-40



Figure 2-27 Design Options Considered in the San Jose Diridon Station Approach Subsection	2-49
Figure 2-28 San Francisco to South San Francisco Subsection—Alternative A	2-76
Figure 2-29 4th and King Street Station Site Plan—Alternatives A and B	2-78
Figure 2-30 4th and King Street Station Cross Section (Northern Portion)— Alternatives A and B	2-79
Figure 2-31 4th and King Street Station Cross Section (Southern Portion)— Alternatives A and B	2-79
Figure 2-32 East Brisbane Light Maintenance Facility Layout—Alternative A	2-80
Figure 2-33 San Bruno to San Mateo Subsection—Alternatives A and B	2-85
Figure 2-34 Millbrae Station Design Site Plan—Alternatives A and B	2-86
Figure 2-35 Millbrae Station Design Cross Section (East Entrance)— Alternatives A and B	2-87
Figure 2-36 Millbrae Station Design Cross Section (West Entrance)— Alternatives A and B	2-87
Figure 2-37 Millbrae Station RSP Design Variant Site Plan	2-88
Figure 2-38 Millbrae Station RSP Design Variant Cross Section	2-89
Figure 2-39 San Mateo to Palo Alto Subsection (Northern Portion)—Alternative A	2-91
Figure 2-40 San Mateo to Palo Alto Subsection (Southern Portion)— Alternatives A and B	2-92
Figure 2-41 Mountain View to Santa Clara Subsection—Alternative A and B	2-94
Figure 2-42 San Jose Diridon Station Approach Subsection—Alternatives A and B	2-95
Figure 2-43 Conceptual San Jose Diridon At-Grade Station Plan—Alternative A	2-96
Figure 2-44 Extent of Diridon Design Variant	2-100
Figure 2-45 San Francisco to South San Francisco Subsection—Alternative B	2-103
Figure 2-46 West Brisbane Light Maintenance Facility Layout	2-104
Figure 2-47 San Mateo to Palo Alto Subsection (Northern Portion)—Alternative B	
Figure 2-48 San Carlos Station Relocation—Alternative B	2-108
Figure 2-49 Conceptual Aerial San Jose Diridon Station Plan—Alternative B	2-110
Figure 2-50 Conceptual Aerial San Jose Diridon Station Cross Section	2-111
Figure 2-51 BCDC Jurisdictional and Priority Use Areas—Part 1 of 3	2-124
Figure 2-52 BCDC Jurisdictional and Priority Use Areas—Part 2 of 3	2-125
Figure 2-53 BCDC Jurisdictional and Priority Use Areas—Part 3 of 3	2-126
Figure 2-54 Tamping Machine for Minor Lateral Track Shifts (<1 foot)	2-138
Figure 2-55 Construction of Lateral Track Shifts (<10 feet)	2-139
Figure 2-56 Overhead Contact System Contact Wire Adjustments	2-139
Figure 2-57 Typical Aerial Structure Components	
Figure 2-58 Full-Span Precast Construction on Taiwan HSR	2-146
Figure 2-59 Span-by-Span Precast Segmental Construction	2-146
Figure 2-60 Balanced Cantilever Segmental Construction	2-146
Figure 2-61 Cast-in-Place Construction on Formwork	2-146
Figure 3.1-1 Typical Resource Study Area	3.1-7
Figure 3.2-1 Regionally Significant Freeways, Expressways, and Arterial Roadways	3.2-24
Figure 3.2-2 Parking near San Jose Diridon Station and SAP Center (Off-Street within 1/2 Mile)	3.2-29



Figure 3.2-3 Parking near San Jose Diridon Station and SAP Center (Off-Street within 1/3 Mile)	2 2 20
Figure 3.2-4 Parking near San Jose Diridon Station and SAP Center (On-Street within	3.2-30
1/2 Mile)	3.2-31
Figure 3.2-5 Parking near San Jose Diridon Station and SAP Center (On-Street within	
1/3 Mile)	3.2-32
Figure 3.2-6 4th and King Street Station Existing Transit Routes	3.2-36
Figure 3.2-7 Millbrae Station Existing Transit Routes	3.2-38
Figure 3.2-8 San Jose Diridon Station Existing Transit Routes	3.2-40
Figure 3.2-9 4th and King Street Station Existing Bicycle Facilities	3.2-42
Figure 3.2-10 Millbrae Station Existing Bicycle Facilities	3.2-44
Figure 3.2-11 San Jose Diridon Station Existing Bicycle Facilities	3.2-46
Figure 3.2-12 Railroad Control Points and Subdivisions in the RSA—Part 1 of 3	3.2-48
Figure 3.2-13 Railroad Control Points and Subdivisions in the RSA—Part 2 of 3	3.2-49
Figure 3.2-14 Railroad Control Points and Subdivisions in the RSA—Part 3 of 3	3.2-50
Figure 3.2-15 Daily Freight Service Routes	3.2-51
Figure 3.2-16 Summary of Adverse Traffic Effects by Subsection before Mitigation	3.2-118
Figure 3.2-17 Summary of Adverse Traffic Effects by Subsection After Mitigation	3.2-119
Figure 3.3-1 Aggregate GHG Emissions Reductions That Would Result from the	0044
California HSR Project	
Figure 3.3-2 Regional Air Quality Resource Study Area	
Figure 3.3-3 Monitoring Station Locations	
Figure 3.3-4 Sensitive Receptors within 1,000 Feet of the 4th and King Street Station	
Figure 3.3-5 Sensitive Receptors within 1,000 Feet of the Millbrae Station	
Figure 3.3-6 Sensitive Receptors within 1,000 Feet of the San Jose Diridon Station	
Figure 3.4-1 Typical A-Weighted Maximum Sound Levels	
Figure 3.4-2 Propagation of Ground-Borne Vibration into Buildings	
Figure 3.4-3 Typical Levels of Ground-Borne Vibration and Response to Vibration	
Figure 3.4-4 State of California Land Use Compatibility Guidelines	3.4-11
Figure 3.4-5 Allowable Increase in Combined/Cumulative Noise Levels (Land Use	2.4.00
Categories 1 & 2)	3.4-20
Figure 3.4-6 Allowable Increase in Combined/Cumulative Noise Levels (Land Use Category 3)	3.4-21
Figure 3.4-7 Distance from Tracks within which Startle Can Occur for Train Passby	
Figure 3.4-8 Existing Vibration Measurement Levels	
Figure 3.4-9 2040 Plus Project Noise Impacts—Alternative A (San Francisco to South	
San Francisco Subsection)	3.4-51
Figure 3.4-10 2040 Plus Project Noise Impacts—Alternative A (San Bruno to San Mateo Subsection)	3.4-52
Figure 3.4-11 2040 Plus Project Noise Impacts—Alternative A (San Mateo to Palo Alto Subsection)	3.4-53
Figure 3.4-12 2040 Plus Project Noise Impacts—Alternative A (Mountain View to Santa Clara Subsection)	
Figure 3.4-13 2040 Plus Project Noise Impacts—Alternative A (San Jose Diridon Station Approach Subsection)	
Figure 3.4-14 2040 Plus Project Noise Impacts—Alternative B (San Francisco to South San Francisco Subsection)	



Figure 3.4-15 2040 Plus Project Noise Impacts—Alternative B (San Bruno to San Mateo Subsection)	3.4-57
Figure 3.4-16 2040 Plus Project Noise Impacts—Alternative B (San Mateo to Palo Alto Subsection)	3.4-58
Figure 3.4-17 2040 Plus Project Noise Impacts—Alternative B (Mountain View to Santa Clara Subsection)	3.4-59
Figure 3.4-18 2040 Plus Project Noise Impacts—Alternative B (Viaduct to I-880) (San Jose Diridon Station Approach Subsection)	3.4-60
Figure 3.4-19 2040 Plus Project Noise Impacts—Alternative B (Viaduct to Scott Boulevard) (San Jose Diridon Station Approach Subsection)	3.4-61
Figure 3.4-20 2040 Plus Project Vibration Impacts—Alternative A (San Francisco to South San Francisco Subsection)	3.4-72
Figure 3.4-21 2040 Plus Project Vibration Impacts—Alternative A (San Bruno to San Mateo Subsection)	3.4-73
Figure 3.4-22 2040 Plus Project Vibration Impacts—Alternative A (San Mateo to Palo Alto Subsection)	3.4-74
Figure 3.4-23 2040 Plus Project Vibration Impacts—Alternative A (Mountain View to Santa Clara Subsection)	3.4-75
Figure 3.4-24 2040 Plus Project Vibration Impacts—Alternative A (San Jose Diridon Station Approach Subsection)	3.4-76
Figure 3.4-25 2040 Plus Project Vibration Impacts—Alternative B (San Francisco to South San Francisco Subsection)	3.4-77
Figure 3.4-26 2040 Plus Project Vibration Impacts—Alternative B (San Bruno to San Mateo Subsection)	3.4-78
Figure 3.4-27 2040 Plus Project Vibration Impacts—Alternative B (San Mateo to Palo Alto Subsection)	3.4-79
Figure 3.4-28 2040 Plus Project Vibration Impacts—Alternative B (Mountain View to Santa Clara Subsection)	3.4-80
Figure 3.4-29 2040 Plus Project Vibration Impacts—Alternative B (Viaduct to I-880) (San Jose Diridon Station Approach Subsection)	3.4-81
Figure 3.4-30 2040 Plus Project Vibration Impacts—Alternative B (Viaduct to Scott Boulevard) (San Jose Diridon Station Approach Subsection)	3.4-82
Figure 3.4-31 Example of a Typical Noise Barrier	3.4-86
Figure 3.4-32 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative A (San Francisco to South San Francisco Subsection)	3.4-95
Figure 3.4-33 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative A (San Bruno to San Mateo Subsection)	3.4-96
Figure 3.4-34 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative A (San Mateo to Palo Alto Subsection)	3.4-97
Figure 3.4-35 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative A (Mountain View to Santa Clara Subsection)	3.4-98
Figure 3.4-36 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative A (San Jose Diridon Station Approach Subsection)	3.4-99
Figure 3.4-37 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (San Francisco to South San Francisco Subsection)	3.4-100
Figure 3.4-38 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (San Bruno to San Mateo Subsection)	3.4-101
Figure 3.4-39 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (San Mateo to Palo Alto Subsection)	



Figure 3.4-40 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (Viaduct to I-880) (Mountain View to Santa Clara Subsection)	3.4-103
Figure 3.4-41 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (Viaduct to I-880) (San Jose Diridon Station Approach Subsection)	3.4-104
Figure 3.4-42 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (Viaduct to Scott Boulevard) (Mountain View to Santa Clara Subsection)	3.4-105
Figure 3.4-43 Noise Barriers and Residual Noise Impacts without Quiet Zones— Alternative B (Viaduct to Scott Boulevard) (San Jose Diridon Station Approach Subsection)	
Figure 3.4-44 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative A (San Francisco to South San Francisco Subsection)	
Figure 3.4-45 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative A (San Bruno to San Mateo Subsection)	3.4-111
Figure 3.4-46 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative A (San Mateo to Palo Alto Subsection)	3.4-112
Figure 3.4-47 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative A (Mountain View to Santa Clara Subsection)	3.4-113
Figure 3.4-48 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative A (San Jose Diridon Station Approach Subsection)	3.4-114
Figure 3.4-49 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (San Francisco to South San Francisco Subsection)	
Figure 3.4-50 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (San Bruno to San Mateo Subsection)	3.4-116
Figure 3.4-51 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (San Mateo to Palo Alto Subsection)	3.4-117
Figure 3.4-52 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (Viaduct to I-880) (Mountain View to Santa Clara Subsection)	3.4-118
Figure 3.4-53 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (Viaduct to I-880) (San Jose Diridon Station Approach Subsection)	3.4-119
Figure 3.4-54 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (Viaduct to Scott Boulevard) (Mountain View to Santa Clara Subsection)	3.4-120
Figure 3.4-55 Noise Barriers and Residual Noise Impacts with Quiet Zones—Alternative B (Viaduct to Scott Boulevard) (San Jose Diridon Station Approach Subsection)	3.4-121
Figure 3.5-1 EMF Measurement Site Locations with Existing Sources of EMF and EMI: San Francisco to South San Francisco Subsection	3.5-19
Figure 3.5-2 EMF Measurement Site Locations with Existing Sources of EMF and EMI: San Bruno to San Mateo Subsection	3.5-20
Figure 3.5-3 EMF Measurement Site Locations with Existing Sources of EMF and EMI: San Mateo to Palo Alto Subsection	3.5-21
Figure 3.5-4 EMF Measurement Site Locations with Existing Sources of EMF and EMI: Mountain View to Santa Clara Subsection	3.5-22
Figure 3.5-5 EMF Measurement Site Locations with Existing Sources of EMF and EMI: San Jose Diridon Station Approach Subsection	3.5-23
Figure 3.6-1 Electric Distribution, Power, Transmission Lines, and Substations in the Resource Study Area—San Francisco to South San Francisco Subsection	3.6-22
Figure 3.6-2 Electric Distribution, Power, Transmission Lines, and Substations in the Resource Study Area—San Bruno to San Mateo Subsection	
Figure 3.6-3 Electric Distribution, Power, Transmission Lines, and Substations in the Resource Study Area—San Mateo to Palo Alto Subsection	
-	



Figure 3.6-4 Electric Distribution, Power, Transmission Lines, and Substations in the	2.0.05
Resource Study Area—Mountain View to Santa Clara Subsection	3.6-25
Figure 3.6-5 Electric Distribution, Power, Transmission Lines, and Substations in the Resource Study Area—San Jose Diridon Station Approach Subsection	3 6-26
Figure 3.6-6 Natural Gas Pipelines in the Resource Study Area	
Figure 3.6-7 Major Utility Fuel Pipelines in the Resource Study Area	
Figure 3.6-8 Water Distribution System Boundaries	
Figure 3.6-9 California Energy Consumption by Sector, 2016	
Figure 3.6-10 California Energy Consumption Estimates by Type, 2016	
Figure 3.6-11 Historical Trends and Projected Statewide Annual Electricity	3.0-43
Consumption Base Demand	3.6-46
Figure 3.6-12 Historical Trends and Projected Statewide Annual Electricity	
Consumption—Peak Demand	3.6-47
Figure 3.6-13 California Natural Gas Demand by Sector, 2016	3.6-48
Figure 3.7-1 Schematic of Biological and Aquatic Resource Study Areas	3.7-18
Figure 3.7-2 Watersheds and Major Hydrological Features	3.7-31
Figure 3.7-3 General Soil Map Units	3.7-33
Figure 3.8-1 Surface Water and Floodplain Resource Study Area	3.8-15
Figure 3.8-2 Groundwater Resource Study Area	3.8-16
Figure 3.8-3 Hydromodification Impact Susceptibility Map	3.8-27
Figure 3.8-4 2014–2016 Clean Water Act Section 303(d) List Impairments	3.8-30
Figure 3.8-5 Groundwater Basins, Subbasins, and Designated Recharge Areas	3.8-32
Figure 3.8-6 Floodplains in the Resource Study Area	3.8-37
Figure 3.8-7 Permanent Impacts of East Brisbane Light Maintenance Facility (Alternative A) on Existing Aquatic Resources	3.8-50
Figure 3.8-8 Permanent Impacts of West Brisbane Light Maintenance Facility (Alternative B) on Existing Aquatic Resources	3.8-51
Figure 3.8-9 Vulnerability of the Mainline Tracks to Sea Level Rise	
Figure 3.9-1 Geologic Map—San Francisco to South San Francisco Subsection	
Figure 3.9-2 Geologic Map—San Bruno to San Mateo Subsection	
Figure 3.9-3 Geologic Map—San Mateo to Palo Alto Subsection	
Figure 3.9-4 Geologic Map—Mountain View to Santa Clara Subsection	
Figure 3.9-5 Geologic Map—San Jose Diridon Station Approach Subsection	
Figure 3.9-6 Natural Resources Conservation Service Soil Associations	
Figure 3.9-7 Summary Distribution of Slides and Earth Flows	
Figure 3.9-8 Thickness of Young Bay Mud	
Figure 3.9-9 Soil Corrosion of Concrete and Steel	
Figure 3.9-10 Quaternary Faults	
Figure 3.9-11 Liquefaction Susceptibility	
Figure 3.9-12 Dams near Proposed Alignment	
Figure 3.10-1 Adjacent Land Use along the Project Section	
Figure 3.10-2 Potential Environmental Concern Sites and Schools—San Francisco to South San Francisco Subsection	
Figure 3.10-3 Potential Environmental Concern Sites and Schools—San Bruno to San	
Mateo Subsection	3.10-15



Figure 3.10-4 Potential Environmental Concern Sites and Schools—San Mateo to Palo Alto Subsection	.3.10-16
Figure 3.10-5 Potential Environmental Concern Sites and Schools—Mountain View to Santa Clara Subsection	.3.10-17
Figure 3.10-6 Potential Environmental Concern Sites and Schools—San Jose Diridon Station Approach Subsection	.3.10-18
Figure 3.11-1 Safety and Security Facilities in the Resource Study Area— San Francisco to South San Francisco Subsection	.3.11-20
Figure 3.11-2 Safety and Security Facilities in the Resource Study Area— San Bruno to San Mateo Subsection	.3.11-21
Figure 3.11-3 Safety and Security Facilities in the Resource Study Area— San Mateo to Palo Alto Subsection	.3.11-22
Figure 3.11-4 Safety and Security Facilities in the Resource Study Area— Mountain View to Santa Clara Subsection	.3.11-23
Figure 3.11-5 Safety and Security Facilities in the Resource Study Area— San Jose Diridon Station Approach Subsection	.3.11-24
Figure 3.11-6 Type of Railroad Accidents/Incidents by County, 2011–2017	.3.11-39
Figure 3.11-7 Total Railroad Accidents/Incidents and Casualties by County, 2011–2017	
Figure 3.11-8 Violent Crime Rates Reported in San Francisco, San Mateo, and Santa Clara Counties and in California, 2010 and 2015	
Figure 3.11-9 Property Crime Rates Reported in San Francisco, San Mateo, and Santa Clara Counties and in California, 2010 and 2015	.3.11-47
Figure 3.11-10 Caltrain Transit Police Enforcement Events by Type, 2015	.3.11-48
Figure 3.11-11 Conceptual Construction Stage 1 for Tunnel Road/Lagoon Road Realignment, Alternative A	
Figure 3.11-12 Conceptual Construction Stage 2 for Tunnel Road/Lagoon Road Realignment, Alternative A	
Figure 3.11-13 Conceptual Construction Stage 3 for Tunnel Road/Lagoon Road Realignment, Alternative A	.3.11-57
Figure 3.11-14 Conceptual Construction Stage 1 for Tunnel Road/Lagoon Road Realignment, Alternative B	.3.11-60
Figure 3.11-15 Conceptual Construction Stage 2 for Tunnel Road/Lagoon Road Realignment, Alternative B	.3.11-61
Figure 3.11-16 Conceptual Construction Stage 3 for Tunnel Road/Lagoon Road Realignment, Alternative B	.3.11-62
Figure 3.11-17 Existing Roadway Configuration for Brisbane Fire Station	.3.11-65
Figure 3.11-18 Proposed Roadway Configuration and Brisbane Fire Station Relocation under Alternative A	
Figure 3.11-19 Proposed Roadway Configuration and Brisbane Fire Station Relocation under Alternative B	.3.11-67
Figure 3.11-20 Fire Station Screening Analysis Results (North)	.3.11-74
Figure 3.11-21 Fire Station Screening Analysis Results (South)	
Figure 3.12-1 Communities in the Resource Study Area	
Figure 3.12-2 Community Facilities in the San Francisco to South San Francisco Subsection	
Figure 3.12-3 Community Facilities in the San Bruno to San Mateo Subsection	
Figure 3.12-4 Community Facilities in the San Mateo to Palo Alto Subsection	
Figure 3.12-5 Community Facilities in the Mountain View to Santa Clara Subsection	



Figure 3.12-6 Community Facilities in the San Jose Diridon Station Approach	2.40.00
Subsection	
Figure 3.13-1 Existing Land Uses—4th and King Street Station Area	
Figure 3.13-2 Existing Land Uses—Brisbane Light Maintenance Facility Area	
Figure 3.13-3 Existing Land Uses—Millbrae Station Area	
Figure 3.13-4 Existing Land Uses—San Jose Diridon Station Area	
Figure 3.13-5 Planned Land Uses—4th and King Street Station Area	
Figure 3.13-6 Planned Land Uses—Brisbane Light Maintenance Facility Area	
Figure 3.13-7 Planned Land Uses—East Brisbane Light Maintenance Facility Area	
Figure 3.13-8 Planned Land Uses—West Brisbane Light Maintenance Facility Area	
Figure 3.13-9 Planned Land Uses—Millbrae Station Area	
Figure 3.13-10 Planned Land Uses—San Jose Diridon Station Area	.3.13-36
Figure 3.13-11 Temporary and Permanent Project Footprint—East Brisbane Light Maintenance Facility Area	.3.13-47
Figure 3.13-12 Temporary and Permanent Project Footprint—West Brisbane Light Maintenance Facility Area	.3.13-48
Figure 3.13-13 Not-To-Preclude Transit-Oriented Development Massing Diagram at Millbrae Station	.3.13-60
Figure 3.13-14 Project Features within BCDC Priority Use Area, Northern Brisbane Lagoon (Alternative A)	
Figure 3.13-15 Project Features within BCDC Priority Use Area, Northern Brisbane Lagoon (Alternative B)	
Figure 3.14-1 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Francisco to South San Francisco Subsection (Northern Portion)	
Figure 3.14-2 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Francisco to South San Francisco Subsection (Southern Portion)	
Figure 3.14-3 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Bruno to San Mateo Subsection (Northern Portion)	
Figure 3.14-4 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Bruno to San Mateo Subsection (Southern Portion)	.3.14-16
Figure 3.14-5 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Mateo to Palo Alto Subsection (Northern Portion)	
Figure 3.14-6 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Mateo to Palo Alto Subsection (Central Portion)	.3.14-18
Figure 3.14-7 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Mateo to Palo Alto Subsection (Southern Portion)	.3.14-19
Figure 3.14-8 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—Mountain View to Santa Clara Subsection (Northern Portion)	.3.14-20
Figure 3.14-9 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—Mountain View to Santa Clara Subsection (Southern Portion)	



Figure 3.14-10 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Jose Diridon Station Approach Subsection (Northern Portion)	3.14-22
Figure 3.14-11 Parks, Recreational Facilities, Open Space, and School District Play Areas in the Resource Study Area—San Jose Diridon Station Approach Subsection (Southern Portion)	3.14-23
Figure 3.14-12 Permanent Acquisition at Reed Street Dog Park—Alternative B (Viaduct to Scott Boulevard)	.3.14-125
Figure 3.14-13 Permanent Acquisition at Reed and Grant Streets Sports Park— Alternative B (Viaduct to Scott Boulevard)	.3.14-126
Figure 3.14-14 Permanent Acquisition at Los Gatos Creek Trail—Alternative A	.3.14-127
Figure 3.14-15 Permanent Acquisition at Los Gatos Creek Trail—Alternative B	
Figure 3.14-16 Permanent Acquisition at Guadalupe River Trail (Reach 6)— Alternative B	.3.14-129
Figure 3.14-17 Permanent Acquisition at Fuller Park—Alternative A	
Figure 3.14-18 Permanent Acquisition of Highway 87 Bikeway North— Alternative A	
Figure 3.14-19 Permanent Acquisition of Highway 87 Bikeway North— Alternative B	
Figure 3.14-20 Permanent Acquisition at Tamien Park—Alternative B	
Figure 3.15-1 Project Alternatives, Key Viewpoints, and Regional Scenic Resources	
Figure 3.15-2 Visual Effects	
Figure 3.15-3 Key Viewpoints, Visual Resources, and Viewers— Mission Bay Landscape Unit	
Figure 3.15-4 Key Viewpoints, Visual Resources, and Viewers— Southeast San	
Francisco Landscape Unit	
UnitFigure 3.15-6 Key Viewpoints, Visual Resources, and Viewers— South San Francisco	
Landscape Unit	3.15-29
Figure 3.15-7 Key Viewpoints, Visual Resources, and Viewers— San Bruno–Millbrae Landscape Unit	3.15-32
Figure 3.15-8 Key Viewpoints, Visual Resources, and Viewers— Burlingame Landscape Unit	3.15-38
Figure 3.15-9 Key Viewpoints, Visual Resources, and Viewers— San Mateo–Redwood City Landscape Unit (Northern Portion)	3.15-42
Figure 3.15-10 Key Viewpoints, Visual Resources, and Viewers— San Mateo– Redwood City Landscape Unit (Central Portion)	
Figure 3.15-11 Key Viewpoints, Visual Resources, and Viewers— San Mateo– Redwood City Landscape Unit (Southern Portion)	
Figure 3.15-12 Key Viewpoints, Visual Resources, and Viewers— Atherton–Mountain View Landscape Unit (Northern Portion)	
Figure 3.15-13 Key Viewpoints, Visual Resources, and Viewers— Atherton–Mountain	
View Landscape Unit (Central Portion)	
View Landscape Unit (Southern Portion)	
Landscape Unit (Northern Portion)	3.15-65
Landscape Unit (Southern Portion)	3.15-66



Figure 3.15-17 Key Viewpoints, Visual Resources, and Viewers— Santa Clara Landscape Unit	3.15-73
Figure 3.15-18 Key Viewpoints, Visual Resources, and Viewers— Diridon Station Landscape Unit	3.15-77
Figure 3.15-19 Key Viewpoints, Visual Resources, and Viewers— San Jose Station Approach Landscape Unit	3.15-82
Figure 3.15-20 KVP 1—Baseline and Simulation with HSR: Alternatives A and B, Fourth Street to 4th and King Street Station	3.15-97
Figure 3.15-21 KVP 2—Baseline and Simulation with HSR: Alternatives A and B, 4th and King Street Station Platform Four	3.15-98
Figure 3.15-22 KVP 3—Baseline and Simulation with HSR: Alternative A, Bayshore Boulevard to Brisbane Baylands	.3.15-100
Figure 3.15-23 KVP 4—Baseline and Simulation with HSR: Alternative A, East Brisbane LMF from Kings Road, Brisbane	.3.15-102
Figure 3.15-24 KVP 3—Baseline and Simulation with HSR: Alternative B, Bayshore Boulevard to Brisbane Baylands	.3.15-103
Figure 3.15-25 KVP 4—Baseline and Simulation with HSR: Alternative B, West Brisbane LMF from Kings Road, Brisbane	.3.15-104
Figure 3.15-26 KVP 5—Baseline and Simulation with HSR: Alternatives A and B, El Camino Real, Millbrae	.3.15-107
Figure 3.15-27 KVP 6—Baseline and Simulation with HSR: Alternatives A and B, Historic Millbrae Depot Building, Millbrae	.3.15-108
Figure 3.15-28 KVP 7—Baseline and Simulation with HSR: Alternative B, South B Street, San Mateo	.3.15-110
Figure 3.15-29 KVP 8—Baseline and Simulation with HSR: Alternative B, El Camino Real at 39th Avenue, San Mateo	.3.15-111
Figure 3.15-30 KVP 9—Baseline and Simulation with HSR: Alternative B, San Carlos Caltrain Station, San Carlos	.3.15-112
Figure 3.15-31 KVP 10—Baseline and Simulation with HSR: Alternatives A and B, Broadway, Redwood City	.3.15-113
Figure 3.15-32 KVP 11—Baseline and Simulation with HSR: Alternatives A and B, Menlo Park Caltrain Station	.3.15-115
Figure 3.15-33 KVP 12—Baseline and Simulation with HSR Alternatives A and B, El Palo Alto	.3.15-116
Figure 3.15-34 KVP 13—Baseline and Simulation with HSR: Alternatives A and B, Peers Park	.3.15-117
Figure 3.15-35 KVP 14—Baseline and Simulation with HSR: Alternatives A and B, Sunnyvale Avenue	.3.15-119
Figure 3.15-36 KVP 15—Baseline and Simulation with HSR: Alternatives A and B, Main Street	.3.15-121
Figure 3.15-37 KVP 16—Baseline and Simulation with HSR: Alternatives A and B, I-880	.3.15-122
Figure 3.15-38 KVP 17—Baseline and Simulation with HSR: Alternatives A and B, West Hedding Street	.3.15-123
Figure 3.15-39 KVP 18—Baseline and Simulation with HSR: Alternative A, Caltrain from The Alameda	.3.15-125
Figure 3.15-40 KVP 19—Baseline and Simulation with HSR: Alternative A, Caltrain from West Santa Clara Street	.3.15-126
Figure 3.15-41 KVP 20—Baseline and Simulation with HSR: Alternative A, Diridon Station	.3.15-127



Figure 3.15-42 KVP 18—Baseline and Simulation with HSR: Alternative B, Caltrain from The Alameda	3.15-128
Figure 3.15-43 KVP 19—Baseline and Simulation with HSR: Alternative B, Caltrain from West Santa Clara Street	3.15-130
Figure 3.15-44 KVP 20—Baseline and Simulation with HSR: Alternative B, Diridon Station	3.15-131
Figure 3.15-45 KVP 21—Baseline and Simulation with HSR: Alternative A, San Jose Skyline	3.15-133
Figure 3.15-46 KVP 23—Baseline and Simulation with HSR: Alternative A, Fuller Avenue	3.15-134
Figure 3.15-47 KVP 24—Baseline and Simulation with HSR: Alternative A, Delmas Avenue	3.15-136
Figure 3.15-48 KVP 21—Baseline and Simulation with HSR: Alternative B, San Jose Skyline from I-280	3.15-137
Figure 3.15-49 KVP 22—Baseline and Simulation with HSR: Alternative B, Gardner School	3.15-138
Figure 3.16-1 Potentially Affected Historic Property Locations—San Francisco to South San Francisco Subsection	3.16-39
Figure 3.16-2 Potentially Affected Historic Property Locations—San Bruno to San Mateo Subsection	3.16-40
Figure 3.16-3 Potentially Affected Historic Property Locations—San Mateo to Palo Alto Subsection	3.16-41
Figure 3.16-4 Potentially Affected Historic Property Locations—Mountain View to Santa Clara Subsection	3.16-42
Figure 3.16-5 Potentially Affected Historic Property Locations—San Jose Diridon Station Approach Subsection	3.16-43
Figure 3.20-1 RSP Design Variant Site Plan	3.20-3
Figure 3.20-2 RSP Design Variant Cross Section	3.20-4
Figure 3.20-3 Millbrae Station Design Site Plan	3.20-5
Figure 3.20-4 KVP 5—RSP Design Variant, El Camino Real, Millbrae	3.20-30
Figure 3.20-5 KVP 6—RSP Design Variant, Historic Millbrae Depot Building, Millbrae	3.20-32
Figure 4-1 Proposed San Francisco to San Jose Project Section	4-14
Figure 4-2 Parks and Recreational Facilities—San Francisco to South San Francisco Subsection (Northern Portion)	
Figure 4-3 Parks and Recreational Facilities—San Francisco to South San Francisco Subsection (Southern Portion)	4-51
Figure 4-4 Parks and Recreational Facilities—San Bruno to San Mateo Subsection (Northern Portion)	4-52
Figure 4-5 Parks and Recreational Facilities—San Bruno to San Mateo Subsection (Southern Portion)	4-53
Figure 4-6 Parks and Recreational Facilities—San Mateo to Palo Alto Subsection (Northern Portion)	4-54
Figure 4-7 Parks and Recreational Facilities—San Mateo to Palo Alto Subsection (Central Portion)	4-55
Figure 4-8 Parks and Recreational Facilities—San Mateo to Palo Alto Subsection (Southern Portion)	4-56
Figure 4-9 Parks and Recreational Facilities—Mountain View to Santa Clara Subsection (Northern Portion)	4-57



Figure 4-10 Parks and Recreational Facilities—Mountain View to Santa Clara Subsection (Southern Portion)	4-58
Figure 4-11 Parks and Recreational Facilities—San Jose Diridon Station Approach Subsection (Northern Portion)	4-59
Figure 4-12 Parks and Recreational Facilities—San Jose Diridon Station Approach Subsection (Southern Portion)	4-60
Figure 4-13 Built Historic Resources—San Francisco to South San Francisco Subsection (Northern Portion)	4-65
Figure 4-14 Built Historic Resources—San Francisco to South San Francisco Subsection (Southern Portion)	4-66
Figure 4-15 Built Historic Resources—San Bruno to San Mateo Subsection (Northern Portion)	4-67
Figure 4-16 Built Historic Resources—San Bruno to San Mateo Subsection (Southern Portion)	4-68
Figure 4-17 Built Historic Resources—San Mateo to Palo Alto Subsection (Northern Portion)	4-69
Figure 4-18 Built Historic Resources—San Mateo to Palo Alto Subsection (Central Portion)	4-70
Figure 4-19 Built Historic Resources—San Mateo to Palo Alto Subsection (Southern Portion)	4-71
Figure 4-20 Built Historic Resources—Mountain View to Santa Clara Subsection (Northern Portion)	4-72
Figure 4-21 Built Historic Resources—Mountain View to Santa Clara Subsection (Southern Portion)	4-73
Figure 4-22 Built Historic Resources—San Jose Diridon Station Approach Subsection (Northern Portion)	4-74
Figure 4-23 Built Historic Resources—San Jose Diridon Station Approach Subsection (Southern Portion)	4-75
Figure 4-24a San Francisco Bay Trail (Northern Portion)	
Figure 4-24b San Francisco Bay Trail (Central Portion)	
Figure 4-24c San Francisco Bay Trail (Southern Portion)	4-151
Figure 4-25 Mission Creek Park and Mission Bay Dog Park	4-152
Figure 4-26 Mariposa Park	4-153
Figure 4-27 Pennsylvania Garden	4-154
Figure 4-28 Tunnel Top Park	4-155
Figure 4-29 Palou and Phelps Park	4-156
Figure 4-30 Florence Fang Asian Community Garden	4-157
Figure 4-31a Brisbane Lagoon Fisherman's Park	4-158
Figure 4-31b Brisbane Lagoon Fisherman's Park	4-159
Figure 4-32 Brisbane Community Park, Skate Park and Basketball Courts, City Hall Dog Park, and Old Quarry Road Park and Trail	4-160
Figure 4-33 Herman Park	4-161
Figure 4-34 Posy Park	4-162
Figure 4-35 Monterey Park	4-163
Figure 4-36 Lions Park	4-164
Figure 4-37 Lomita Park Elementary School	4-165
Figure 4-38 Village Park	4-166
Figure 4-39 Laguna Park	4-167



Figure 4-40 Alpine Park	4-168
Figure 4-41 Washington Park	4-169
Figure 4-42 Hayward Park Square	4-170
Figure 4-43a Trinta Park	4-171
Figure 4-43b Trinta Park	4-172
Figure 4-44 John S. Roselli Memorial Park	4-173
Figure 4-45 Main Street Dog Agility Park	4-174
Figure 4-46 Reading Park	4-175
Figure 4-47 Holbrook-Palmer Park	4-176
Figure 4-48 Burgess Park	4-177
Figure 4-49 El Palo Alto and El Camino Parks	4-178
Figure 4-50 Peers Park	4-179
Figure 4-51 Jerry Bowden Park	4-180
Figure 4-52 Robles Park	4-181
Figure 4-53 Rengstorff Park	4-182
Figure 4-54 Centennial Plaza	4-183
Figure 4-55 Stevens Creek Trail	4-184
Figure 4-56 Plaza Del Sol	4-185
Figure 4-57 Bracher Park	4-186
Figure 4-58 San Tomas Aquino Creek Trail	4-187
Figure 4-59 Guadalupe River Park	4-188
Figure 4-60 Reed Street Dog Park	4-189
Figure 4-61 Reed and Grant Streets Sports Park	
Figure 4-62 Larry J. Marsalli Park	4-191
Figure 4-63 Newhall Park	4-192
Figure 4-64 College Park	4-193
Figure 4-65 Theodore Lenzen Park	4-194
Figure 4-66 Cahill Park	4-195
Figure 4-67 Los Gatos Creek Trail	4-196
Figure 4-68 Guadalupe River Trail (Reach 6)	4-197
Figure 4-69 Biebrach Park	4-198
Figure 4-70 Fuller Park	4-199
Figure 4-71 Tamien Park	4-200
Figure 4-72 San Francisco Auxiliary Water Supply System	4-233
Figure 4-73 Central Waterfront Historic District	4-234
Figure 4-74a Central Waterfront Historic District, Southern Pacific Railroad Tunnel No. 1	4-235
Figure 4-74b Central Waterfront Historic District, Southern Pacific Railroad Tunnel No. 2	4-236
Figure 4-75 Southern Pacific Railroad Tunnel No. 3	4-237
Figure 4-76 Southern Pacific Railroad Tunnel No. 4	4-238
Figure 4-77a Southern Pacific Railroad Bayshore Roundhouse	
Figure 4-77b Southern Pacific Railroad Bayshore Roundhouse	
Figure 4-78 Airport Boulevard Underpass/South San Francisco Subway	
Figure 4-79 Southern Pacific Railroad Depot/Millbrae Station	



Figure 4-80 Jules Francard Grove/Francard Tree Rows	4-243
Figure 4-81 Southern Pacific Railroad Depot/Burlingame Railroad Station	4-244
Figure 4-82a Southern Pacific Railroad Depot/San Carlos Station	4-245
Figure 4-82b Southern Pacific Railroad Depot/San Carlos Station	4-246
Figure 4-83a Southern Pacific Railroad Dumbarton Cutoff Linear Historic District	4-247
Figure 4-83b Dumbarton Cutoff Railroad Line	4-248
Figure 4-84 Willie Mays Jr. House	4-249
Figure 4-85 Southern Pacific Railroad Depot/Atherton Station	4-250
Figure 4-86 Carriage House and Water Tower, Holbrook-Palmer Estate (Elmwood)	4-251
Figure 4-87 Southern Pacific Railroad Depot/Menlo Park Railroad Station	4-252
Figure 4-88 Southern Pacific Railroad San Francisquito Creek Bridge	4-253
Figure 4-89 El Palo Alto	4-254
Figure 4-90 Palo Alto Southern Pacific Railroad Depot	4-255
Figure 4-91 University Avenue Underpass	4-256
Figure 4-92 Embarcadero Underpass	4-257
Figure 4-93 Tract 795, Charleston Meadows	4-258
Figure 4-94 Santa Clara Railroad Historical Complex Santa Clara Depot	4-259
Figure 4-95 Southern Pacific Depot (Diridon Station, Hiram Cahill Depot)	4-260
Figure 4-96 Sunlite Baking Company	4-261
Figure 4-97 415 Illinois Avenue	4-262
Figure 5-1 Environmental Justice Reference Community and Resource Study Area	5-8
Figure 5-2 Cities and Communities within the Environmental Justice Resource Study Area	5-10
Figure 5-3 Population Density within the Environmental Justice Reference Community	5-11
Figure 5-4 Low-Income Populations in the Resource Study Area—San Francisco to South San Francisco Subsection	
Figure 5-5 Low-Income Populations in the Resource Study Area—San Bruno to San	
Mateo Subsection	5-27
Figure 5-6 Low-Income Populations in the Resource Study Area—San Mateo to Palo Alto Subsection	5-28
Figure 5-7 Low-Income Populations in the Resource Study Area—Mountain View to Santa Clara Subsection	5-29
Figure 5-8 Low-Income Populations in the Resource Study Area—San Jose Diridon Station Approach Subsection	5-30
Figure 5-9 Minority Population Distribution	
Figure 5-10 Minority Populations in the Resource Study Area—San Francisco to South San Francisco Subsection	
Figure 5-11 Minority Populations in the Resource Study Area—San Bruno to San Mateo Subsection	
Figure 5-12 Minority Populations in the Resource Study Area—San Mateo to Palo Alto Subsection	
Figure 5-13 Minority Populations in the Resource Study Area—Mountain View to Santa Clara Subsection	
Figure 5-14 Minority Populations in the Resource Study Area—San Jose Diridon	
Station Approach Subsection	
Figure 5-15 Locations of Environmental Justice Outreach Activities	5-52



Figure 5-16 Residential Displacements—Proportional Representation by Alternative and Community	5-74
Figure 5-17 Business Displacements—Proportional Representation by Alternative and Community	5-75
Figure 5-18 Adverse Transportation Effects during Operations—Part 1 of 3	5-83
Figure 5-19 Adverse Transportation Effects during Operations—Part 2 of 3	5-84
Figure 5-20 Adverse Transportation Effects during Operations—Part 3 of 3	5-85
Figure 5-21 Adverse Effects on Emergency Response during Operations—Part 1 of 2	5-88
Figure 5-22 Adverse Effects on Emergency Response during Operations—Part 2 of 2	5-89
Figure 5-23 Operational Noise Impacts with Noise Barriers—Part 1 of 4	5-92
Figure 5-24 Operational Noise Impacts with Noise Barriers—Part 2 of 4	5-93
Figure 5-25 Operational Noise Impacts with Noise Barriers—Part 3 of 4	5-94
Figure 5-26 Operational Noise Impacts with Noise Barriers—Part 4 of 4	5-95
Figure 5-27 Operational Ground-Borne Vibration Impacts—Part 1 of 4	5-97
Figure 5-28 Operational Ground-Borne Vibration Impacts—Part 2 of 4	5-98
Figure 5-29 Operational Ground-Borne Vibration Impacts—Part 3 of 4	5-99
Figure 5-30 Operational Ground-Borne Vibration Impacts—Part 4 of 4	5-100
Figure 8-1 Preferred Alternative	8-3



This page intentionally left blank