SUMMARY

S.1 PURPOSE OF THIS DOCUMENT

This Environmental Assessment (EA) analyzes the potential environmental impacts associated with the proposed seismic retrofit of the San Francisco Bay Area Rapid Transit (BART) system from the west portal of the Berkeley Hills Tunnel in Oakland, California, to the Montgomery Street Station in San Francisco (Figure 1-1). This EA is prepared in accordance with the National Environmental Policy Act (NEPA) because project funding is being provided by the U.S. Department of Transportation Federal Highway Administration. This document does not address the requirements of the California Environmental Quality Act (CEQA) because the Legislature has enacted a statutory exemption from CEQA for the proposed project (Public Utility Code section 29031.1). Pursuant to this exemption, on February 10, 2005, the BART Board of Directors adopted the proposed project for purposes of CEQA. In addition, completion of NEPA compliance by means of this EA is necessary in order to qualify for federal funding.

All figures cited in this section that start with a "1" are located in Chapter 1: Purpose and Need, and the figures beginning with a "2" appear in Chapter 2: Project Alternatives.

S.2 PROJECT SUMMARY

BART is conducting a comprehensive seismic retrofit program of its system in anticipation of a potential future major earthquake. The project area is located in the cities of Oakland and San Francisco, California (Figure 1-1). There would be no increase in capacity (number of BART trains or ridership) as a result of the seismic retrofit, and substantial changes in BART service are not expected to result during or as a result of the retrofit.

The project includes seismic retrofits of several facilities: the Transbay Tube (the portion of the BART system located beneath San Francisco Bay [Figure 1-2]); San Francisco Transition Structure (Figure 2-9); Oakland Transition Structure (Figure 2-7); the aerial (elevated) guideways that carry the tracks between the west portal of the Berkeley Hills Tunnel to the Oakland Transition Structure (Figure 2-16); and, Rockridge Station, MacArthur Station, and West Oakland Station. Every BART train crossing the Bay must pass through the Transbay Tube. Although the BART system could be operated independently on either side of the Bay due to crossovers at each end that allow BART to turn trains around, an impact to the Transbay Tube rendering it inoperable would immediately cut off train access to the opposite side of the Bay.

A variety of different retrofit methods would be used, depending on the BART facility to be retrofitted, as described below. Additional details of the project and each retrofit method are provided in Chapter 2, and associated construction activities are summarized in Table S-1. The proposed seismic retrofit activities would be conducted with no substantial impact to BART service. The project would require a total of approximately 6 years to complete, although the project could potentially take longer than 6 years if limited funds required the deferral of some retrofit activities. The analysis in this document is based on the assumption that adequate funding is available and, therefore, project activities would be completed in 6 years.

Table S-1. Summary of Project-Related Construction Activities

Construction Activity	*Transbay Tube*	*San Francisco Transition Structure*	*Oakland Transition Structure*	*Aerial Guideways*	*Stations*	*Other Retrofits*
In-water Excavation/Dredging	X	X				
Dredged Material Disposal	X	X				
In-water Pile Installation	X	X				
Sediment Strengthening	X	X				
Foundation Strengthening				X	X	
Column Strengthening				X	X	
Land-based Pile Installation				X	X	
Building Frame Strengthening			X		X	X

Proposed seismic retrofits of the Transbay Tube include either micropile anchorage (installing small tension piles through the floor of the Tube to connect it to more stable clay soils below San Francisco Bay [Figure 2-2]), or vibro-replacement (compacting the sediment surrounding the Tube and reinforcing these sediments with stone columns for the length of the Tube under San Francisco Bay and onshore at the Port of Oakland [Figures 2-3 and 2-4]). In addition, stitching the Tube near both transition structures (installing clusters of large-diameter steel piles around the Tube [Figures 2-5 and 2-6]) and installing a tunnel liner sleeve at one of the seismic joints is proposed (Figure 2-8).

Proposed seismic retrofits at the San Francisco Transition Structure include either a combination of activities called the Steel Piles Retrofit Concept (Figures 2-10 and 2-11) or the Isolation Walls Retrofit Concept (Figures 2-14 and 2-15). The Pile Array Retrofit Concept consists of pile array (installing about 100 steel pipe piles beneath the Ferry Plaza Platform west of the transition structure), piles and collar anchorage (installing large-diameter steel piles around the transition structure and connecting them together with a large collar), containment structures (installing a water-resistant structure around the seismic joints), and sacrificial walls (installing concrete walls around the transition structure from the mud line up to the immediate underside of the Ferry Plaza Platform). The Isolation Walls Retrofit Concept consists of isolation and support walls (installing 2 rows of large concrete piles or reinforced concrete walls along both the north and south sides of the transition structure), pile array (installing about 26 steel pipe piles beneath the Ferry Plaza Platform west of the transition structure), and similar to the Pile Array Retrofit Concept, containment structures and sacrificial walls. To strengthen the sediments around the BART approach tunnels west of the transition structure, either retrofit concept would also include soil jet grouting (pumping a slurry mixture into the deep Bay mud around the BART approach tunnels). Part of the Ferry Plaza Platform would be temporarily removed during seismic retrofits at the San Francisco Transition Structure, but would be replaced once completed. Installation of steel pipe piles would use oscillating or rotating techniques, to the extent feasible. Seismic retrofits requiring excavation or dredging would be conducted within a temporary construction steel sheet pile wall placed from just below the mud line to the water's surface, to reduce turbidity and release of construction debris into Bay water. The above-grade portion of the Oakland Transition Structure requires strengthening the existing steel bracing with newly reinforced concrete shear walls.

Proposed seismic retrofit of the aerial guideways would typically include enlargement of the existing foundation, jacketing of the concrete columns with steel casings or collars, placement of additional shear keys at the hammerhead caps, and installation of additional piles, if needed (Figure 2-16). Installation of new piles would use impact hammer and non-impact drilling techniques (i.e., an oscillating or rotating hydraulic installation system). Some of the multi-column piers (piers that have between two to six columns instead of just one) also would require infill concrete walls between the columns. At some abutment[1] locations, concrete catchers or seat extenders would be added to increase the available seating area for the girders on the abutments.

BART stations along the project alignment are located on elevated platforms (aerial platforms), at-grade, or underground. Rockridge Station and West Oakland Station, both aerial stations, would require similar types of seismic retrofits described above for the aerial guideways to minimize structural damage and prevent potential collapse. For example, new column steel jacketing would be installed on the columns, and new concrete blocks would be placed at the top of some pier caps at Rockridge Station (Figure 2-19). At West Oakland Station, new concrete grade beams would be installed to connect all of the column footings together, and joint connections of the platform canopies would be strengthened. Installation of any necessary piles at the stations would use impact hammer and non-impact drilling techniques (i.e., an oscillating or rotating hydraulic installation system).

Proposed seismic retrofit at MacArthur Station, an at-grade station, would include adding piles and enlarging footings using similar methods to those described above. The station walls would be thickened, new footings installed, and joint connections of the platform canopies strengthened. The four underground stations associated with the project area (19th Street-Oakland, Oakland City Center/12th Street, Embarcadero, and Montgomery Street) do not require seismic retrofitting.

Proposed seismic retrofit measures for the Oakland Yard and Shop area, located on BART property (see number 38 on Figure 2-18), would include additional diagonal bracing of framing elements and strengthening of structural joints within the existing frame to minimize the effects of a potential earthquake.

S.3 IDENTIFICATION OF AGENCY ROLES

BART is the applicant for this project. The federal lead agency under NEPA is the U.S. Department of Transportation Federal Highway Administration (FHWA). Money from FHWA will pass through the Local Assistance Program of the California Department of Transportation (Caltrans) to fund the proposed seismic retrofits. This document has thus been prepared with the input of FHWA, as well as BART and Caltrans, who are acting as nonfederal co-lead agencies under NEPA. Cooperating agencies for this project include National Oceanic and Atmospheric Administration (NOAA) Fisheries, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Coast Guard, Regional Water Quality Control Board, San Francisco Bay Conservation and Development Commission, California Department of Fish and Game, State Lands Commission, City of Oakland, Port of Oakland, and Port of San Francisco.

1 An abutment is a wall supporting the end of a bridge or span and sustaining the pressure of the abutting earth.

S.4 PURPOSE OF THE PROJECT

The purpose of the project is to protect life safety[2] and the massive public capital investment represented by the permanent stationary facilities of the BART system, and to prevent prolonged interruption of BART service to the public. The portion of the BART system proposed for seismic retrofit is important to the overall transportation system in the region, and disruption could severely affect local transportation and circulation, especially across the San Francisco Bay. BART carries as many passengers during weekday rush hour as the San Francisco-Oakland Bay Bridge (BART 2004a). The proposed seismic retrofit would reduce the risk to, and improve the safety of, BART patrons and personnel during an earthquake. The project is designed to enhance the safety of passengers and personnel and to enable the BART system to return to operation within a reasonable timeframe after an earthquake. More detail on the purpose of the project is included in Chapter 1.

S.5 SUMMARY OF ENVIRONMENTAL IMPACTS

The project would result in environmental impacts only during construction. Once the proposed seismic retrofit work is completed, there would be no environmental impact. There would be construction related impacts on eleven environmental resource areas: water resources; noise; cultural resources; transportation (ground and vessel); geology/seismicity; hazardous materials; risk of upset/safety; visual resources; biological resources; air quality; and social (or community) resources. All impacts would be avoided or limited by implementation of procedures proposed as part of the project, and by mitigation measures described in this document.

Chapter 3 describes the impacts and mitigation measures for the project.

2 For the purposes of the seismic retrofit project, life safety is the level of retrofit that will provide a low risk of endangerment to human life for any event likely to affect the retrofitted structure. In general, non-collapse of a structure is considered adequate to provide life safety.