# Section 5
# Alternatives

## 5.1 INTRODUCTION

The California Environmental Quality Act (Public Resources Code, Section 21000 et seq.; CEQA) and the CEQA Guidelines (California Code of Regulations, Title 14, Section 15000 et seq.) require that an Environmental Impact Report (EIR) "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives" (CEQA Guidelines Section 15126(d)). If a project alternative would substantially lessen the significant environmental effects of a proposed project, the lead agency should not approve the proposed project unless it determines that specific technological, economic, social, or other considerations make the project alternative infeasible (PRC Section 21002, CEQA Guidelines Section 15091(a)(3)). The EIR must also identify alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and should briefly explain the reasons underlying the lead agency's determination (CEQA Guidelines Section 15126(d)(2)).

One of the alternatives that must be analyzed is the "No Project" Alternative. The No Project analysis must discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved and development continued to occur in accordance with existing plans and consistent with available infrastructure and community services (CEQA Guidelines, Section 15126(d)(4)). This section includes an evaluation of four alternatives: the No Project Alternative, Bus Rapid Transit (BRT), Light Rail Vehicle (LRV), and the extension of BART.

## 5.2 DESCRIPTION OF ALTERNATIVES

The goal of the Proposed Project is to extend transit service into east Contra Costa County. A comprehensive list of specific objectives is included in Section 1, Introduction. The full array of project objectives is reproduced here, since project alternatives should feasibly attain most of the basic objectives of the project, as noted above:

- Improve overall transportation service and enhance mobility in the State Route 4 corridor;
- Enhance access to transit systems;
- Enhance connectivity and seamlessness of the transit system, both from home to transit and from one form of transit to another;
- Promote transit-oriented land use initiatives and policies;

- Enhance project return on financial investment;
- Balance short, medium, and long-term strategies;
- Protect and enhance the environment;
- Implement the mandate of Contra Costa voters as described in Measure J; and
- Provide a cost effective and technologically appropriate system.

## No Project Alternative

The No Project Alternative represents a baseline scenario against which the other "build" alternatives can be compared. It represents continued operation of the existing transit services that serve the East County study area – BART and Tri Delta Transit. This alternative also assumes that other programmed highway and transit improvements within the study area and the region would occur. Anticipated improvements include Caltrans widening of SR 4, BART system extension to San Jose, and increases in and changes to service routes and schedules for Tri Delta Transit.

**Technology.** BART provides regional rail access to east Contra Costa County, via its Concord Line, which terminates at the Pittsburg/Bay Point BART Station. This station provides 2,036 public parking spaces. It also provides an intermodal bus transfer facility, which provides connections between BART and the local, public, and express bus services provided by Tri Delta Transit.

Tri Delta Transit is the local public bus transit service provider in east Contra Costa County. It provides local fixed-route transit services and express bus services. The fixed-route services are operated using conventional 40-foot buses. On some of the express bus routes, Tri Delta Transit operates commuter bus coaches with comfortable, high-back seats.

**Route.** BART service to the Pittsburg/Bay Point BART Station is provided by the Concord Line (C-Line), which extends to the San Francisco International Airport via Oakland, the Transbay Tube, and San Francisco. Concord Line passengers can transfer to the Fremont – Richmond line via a timed transfer at the MacArthur Station. BART plans to extend BART southward from Fremont through Warm Springs and, in partnership with the Santa Clara Valley Transportation Authority, to downtown San Jose. The No Project Alternative assumes the completion of these extensions as part of the regional transit service.

Tri Delta Transit provides service on 18 fixed routes, of which six routes offer express services. Ten of these routes provide a connection to BART at the Pittsburg/Bay Point BART Station. The following commuter-oriented express routes serve the study area:

- 300 Express – from the Brentwood Park-and-Ride Lot to the Pittsburg/Bay Point BART Station via SR 4 with a stop at the Hillcrest Park-and-Ride Lot.
- Martinez-Delta Express – from the Hillcrest Park-and-Ride Lot via SR 4 and the Pittsburg/Bay Point BART Station to the Amtrak Station in Martinez.
- Livermore-Delta Express – from the Hillcrest Park-and-Ride Lot via SR 4 and the Brentwood Park-and-Ride Lot to the Lawrence Livermore Laboratories and Scandia Labs in Livermore.
- Dublin-Delta Express – from the Hillcrest Park-and-Ride Lot via SR 4 and the Brentwood and Discovery Bay Park-and-Ride Lots to the Hacienda Business Park and Dublin/Pleasanton BART Station.

Two other express routes (390 east and westbound) provide long-distance, limited-stop service along the SR 4 corridor.

Tri Delta Transit serves four park-and-ride lots in the SR 4 corridor. These lots are located in the City of Pittsburg near the Railroad Avenue interchange, in the City of Antioch at the Hillcrest Avenue interchange, and in the City of Brentwood, just north of the downtown. There is also a small park-and-ride lot at Discovery Bay.

**Ridership.** Tri Delta Transit served approximately 2.5 million passengers in 2007, with an average weekday ridership of 10,000 passengers. Therefore, approximately 14 percent of the Tri Delta Transit patrons were traveling to or from the Pittsburg/Bay Point BART Station. The Pittsburg/Bay Point BART Station currently serves about 10,400 riders (entrances and exits) during the average weekday, based on statistics from May 2008. A survey of BART passengers conducted in 2002 revealed that 13 percent of the BART riders at Pittsburg/Bay Point BART Station rode Tri Delta Transit to or from the BART station. This represents about 1,300 riders per day.

The ridership projections for the No Project Alternative for the year 2030 indicate 14,600 daily BART riders at the Pittsburg/Bay Point BART Station. This forecast assumes no constraints on available parking at the station. The Pittsburg/Bay Point BART Station currently has 2,036 parking spaces. According to the BART website, the existing parking spaces fill by 7:25 a.m. every weekday morning and as many as an additional 500 vehicles are parked on the streets south of the station impacting the adjacent neighborhoods.[1] Ridership at the Pittsburg/Bay Point BART Station has been in the 9,000 to 10,500 riders per day range for a number of years, and 10,500 riders is effectively the maximum number of riders the station can handle without a substantial increase in the parking supply or an increase in feeder transit service. In terms of availability for public parking, the Pittsburg/Bay Point Station is effectively at capacity. However, even though the lot fills up due to the early morning commute, the station

[1] San Francisco Bay Area Rapid Transit District. Pittsburg/Bay Point Station Overview. Accessed March 11, 2008. Available at http://www.bart.gov/stations/stationGuide/stationOverview_BAYPT.asp.

can continue to operate without impacting the number of riders because there are trains and buses operating at the station throughout the day. There is also a kiss and ride drop-off area. One potential source of new ridership is the proposed transit-oriented development around the station. The Pittsburg/Bay Point BART Station Area Specific Plan prepared by Contra Costa County and the City of Pittsburg calls for increased density of development around the station, which would result in additional ridership from the immediate station area.

**Reliability.** BART service tends to be very reliable compared to other transportation modes. BART has a performance standard of 95 percent on-time service and in 2007 achieved 94 percent. In comparison, Tri Delta Transit's operations in the SR 4 corridor are subject to the traffic delays and congestion that plague the area. The possible slow-down is minimized by the buses using the high-occupancy vehicle (HOV) lanes on a portion of SR 4. These lanes now extend from SR 242 in Concord to Railroad Avenue in the City of Pittsburg and would be extended east to the junction of SR 4 with the SR 4 Bypass in the City of Antioch. As these lanes are extended, the reliability of Tri Delta Transit's freeway express service should improve, but would remain in flux, as traffic continues to increase through the area.

**Schedule and Headways**. The BART system has the following schedule of service:[2]

- Monday through Friday: 4:00 a.m. to Midnight
- Saturday: 6:00 a.m. to Midnight
- Sunday: 8:00 a.m. to Midnight

BART trains on the Concord Line run at least every 15 minutes on weekdays and Sundays. On Saturdays, trains run every 20 minutes during the day and every 15 minutes at night. During peak periods, trains run more frequently to meet demand.

Tri Delta Transit's 300 Express route (which follows SR 4) operates from 4:15 a.m. to 10:00 p.m. on weekdays at 30-minute intervals. During the peak periods, additional buses are provided and headways, which are the time intervals between two buses, are reduced to as low as eight minutes. Typically, headways are about 12 minutes. The other nine Tri Delta Transit routes that serve the Pittsburg/Bay Point BART Station typically operate from roughly 4:00 a.m. to midnight with base headways of either 30 minutes or 1 hour. Additional buses are usually put into service during peak period on most of the routes.[3]

**Fares and Fare Collection.** BART uses a distance-based fare structure with a surcharge for trips through the Transbay Tube. There is also a surcharge for trips to San Francisco International Airport. From Pittsburg/Bay Point, the adult one-way fares to the following locations are:[4]

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2 Schedule according to the BART website. Available at http://www.bart.gov/stations/schedules/lineSchedules.asp, Accessed March 6, 2008.

3 Tri Delta Transit. Available at http://trideltatransit.com. Accessed March 11, 2008.

4 Fares based on the online fare calculator. Available at http://www.bart.gov. Accessed March 5, 2008.

- Walnut Creek – $1.50
- Oakland 12th Street/City Center – $4.05
- Montgomery (Downtown San Francisco) – $5.60
- SFO Airport – $8.00

BART uses an electronic fare collection system. Electronically coded tickets are purchased from machines in the stations and the fares are automatically deducted as the transit rider passes through the fare gates that control access and ingress/egress from the stations. EZ Rider cards are now available from BART. EZ Rider cards are "smart" cards that riders only need to "touch" to the top of the fare gate to operate it.

Tri Delta Transit's adult single-trip fare on its local routes is $1.25. Riders leaving the BART station can obtain a BART transfer accepted by Tri Delta Transit with payment of an additional $0.75 fare. Monthly transit passes are also available for $40.00. Fares on the long-distance Delta Express services are higher: $1.50 on the Martinez route and $5.00 on the Livermore/Dublin route. Fares are paid on board the buses or by displaying a valid pass or ticket which can be purchased at various retail outlets or online.

**Costs.** No additional costs are anticipated to occur under the No Project Alternative.

## Bus Rapid Transit (BRT) Alternative Analysis

A Bus Rapid Transit (BRT) Alternative for the SR 4 corridor was developed to mirror the speed, reliability, convenience, and the spatial separation from road traffic of modern fixed guideway (rail) systems, while still taking advantage of the flexibility and potential capital cost savings of a bus-based system. The objective was to define a BRT Alternative that would offer high levels of rider comfort, reliability, convenience, reduced travel time, and a convenient direct transfer between BRT and the existing BART system. One of the inherent qualities of a bus-based system is its flexibility to tailor the level of service to the demand, and its ability to leave its special right-of-way and operate in existing roadway lanes.

BRT is based on innovative operating concepts as it is on new vehicles and technology. In addition to non-traditional buses, BRT can include dedicated guideways, more sophisticated control systems, off-vehicle fare collection and much improved information systems. BRT becomes an entirely new type of service with unique advantages by operating more frequently, operating in a dedicated right-of-way, benefiting from preferential treatment when in traffic, and by offering level (faster) boarding. The BRT Alternative was developed in consultation with Tri Delta Transit**.**

**Technology.** The Federal Transit Administration (FTA) has sponsored research efforts that have classified BRT vehicles and have organized their specifications. "Standard" transit vehicles can be used to offer BRT type service, but lack some of the improved characteristics that many believe important for BRT vehicles. BRT vehicles incorporate design changes to the

vehicle while simultaneously offering passenger amenities such as improved seating comfort and improved propulsion systems with reduced emissions through the use of compressed natural gas or cleaner-burning diesel.

**Vehicles.** The proposed BRT vehicle would include the following characteristics:

- *Low Floors* – Generally, low floors allow for easier loading and unloading of regular as well as handicapped riders. The purpose of this feature is to allow boarding and alighting to take place at a faster rate, thus allowing for shorter periods at stations, speeding up the entire service.
- *Wide Doors* – These features allow faster and easier boarding. In addition to width, some designs allow for doors on both sides of the vehicle, allowing for more flexibility in station design, and even a greater total number of doors.
- *Panoramic Windows* – Newer construction methods for all vehicles are allowing for more expansive areas of glass. Transit vehicles, especially BRT vehicles, can use this to their advantage to offer a feeling of spaciousness and freedom to the vehicle and thus enhance the patron's overall experience of the trip.
- *Applied Ergonomics* – Vehicle interiors with better feel and comfort and wider aisles for movement within the vehicle during the trip.
- *Upgraded Seating* – This feature offers more rider comfort.
- *Improved Accessibility* – This feature is available for those who need it and it speeds boarding and alighting.
- *Upgraded Electronics* – This feature offers improved information signs and other media, better lighting, and temperature control.
- *New Propulsion Systems* – The following engine systems have been proven to reduce emissions and greenhouse gases:
  - Hybrids
  - Natural gas
  - Upgraded conventional diesel

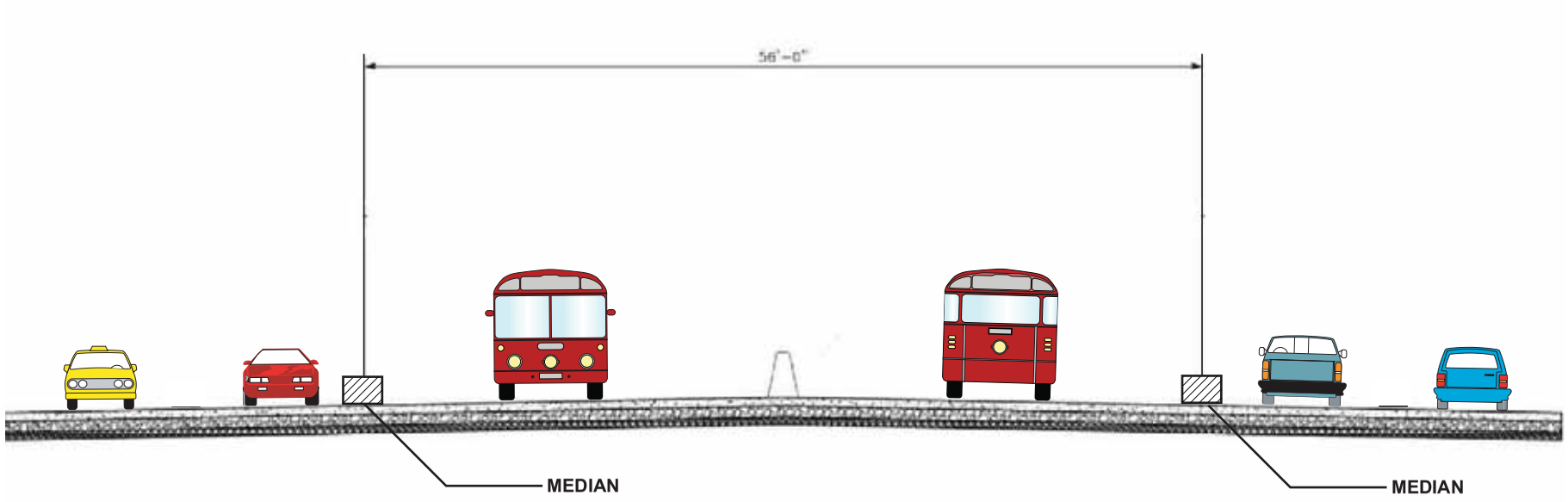
For the BRT Alternative, it is assumed that a stylized, articulated vehicle, similar to that depicted below would be used.

**Propulsion.** BRT buses can operate with a standard diesel engine; however, many buses today are powered by compressed natural gas which reduces emissions of carbon dioxide and water, and produces extremely small percentages of sulfur dioxide and nitrogen oxide emissions. In addition, newer technologies are incorporating hybrid diesel/electric configurations and at the cutting edge, some BRT offerings are powered by fuel cells. For this analysis, a conventional diesel vehicle and propulsion system was assumed for the BRT service as this is the most cost-effective form of propulsion. However, conventional diesel technology would be the largest

emitter of pollutants compared to the other mentioned options. A conventional diesel system would still meet all state and federal air quality requirements. However, unlike a conventional diesel fueled system, a conventional gasoline-powered system would not be feasible as it would not provide the same torque and pulling power needed to operate the large and heavy buses that are required to adequately serve the ridership demands. Natural gas and biodiesel fuels are considered viable fuel alternatives for BRT system applications. The actual selection of the propulsion technology to be used is a complex technical process which goes beyond the level of definition of this conceptual BRT plan. Many factors such as fuel availability, storage requirements and safety, maintenance requirements, vehicle compatibility, and suitability would need to be fully considered before a fueling technology is chosen. While the choice of technology will impact the costs and the emissions of the BRT options, it would not substantially change the comparison between the project alternatives and the Proposed Project. This is because the emissions reductions which result from auto trips diverted to the BRT system will far outweigh the added emissions generated by the BRT buses. The incremental changes in BRT emissions that would result from changing to a cleaner propulsion technology would be small in comparison to the total change in emissions generated by implementation of BRT.

**Route.** The BRT Alternative would use the same right-of-way as the DMU project – the SR 4 median and would have stations at Railroad Avenue and Hillcrest Avenue. Buses would run along two 13-foot-wide median "bus-only" lanes (1 lane in each direction) with 10-foot wide shoulders. In addition, a 4-foot buffer would separate the bus lane from a 12-foot HOV lane and an adjacent 12-foot mixed flow lane on both the east and westbound sides of SR 4. Figure 5-1 provides a visual depiction of a typical cross-section of the median bus-only lanes. Operating in the median dedicated for buses would allow them to travel without mixing with other vehicles, as would occur in both the HOV and regular lanes. The savings in travel time would be a key benefit of the BRT Alternative, and the availability of the right-of-way, because of the SR 4 widening project, makes this alternative cost effective.

The bus-only right-of-way would start at the existing Pittsburg/Bay Point BART Station (two options for serving this station are described later) and proceed approximately three miles east in the median of SR 4 to a station within the SR 4 median in the City of Pittsburg, below the Railroad Avenue overpass, in the vicinity of the Pittsburg City Hall. Continuing in the median, BRT service would then proceed approximately 7.25 miles to the terminus station which would be east of Hillcrest Avenue in the City of Antioch. For most of the BRT




Source: WSA, 2008.

**TYPICAL BRT GUIDEWAY SECTION**
FIGURE 5-1

alignment, the buses would operate along a fixed roadway in the center of the median. However, to access the Pittsburg/Bay Point Station as well as the proposed Hillcrest Avenue Station, the buses would leave the dedicated roadway median, as described below.

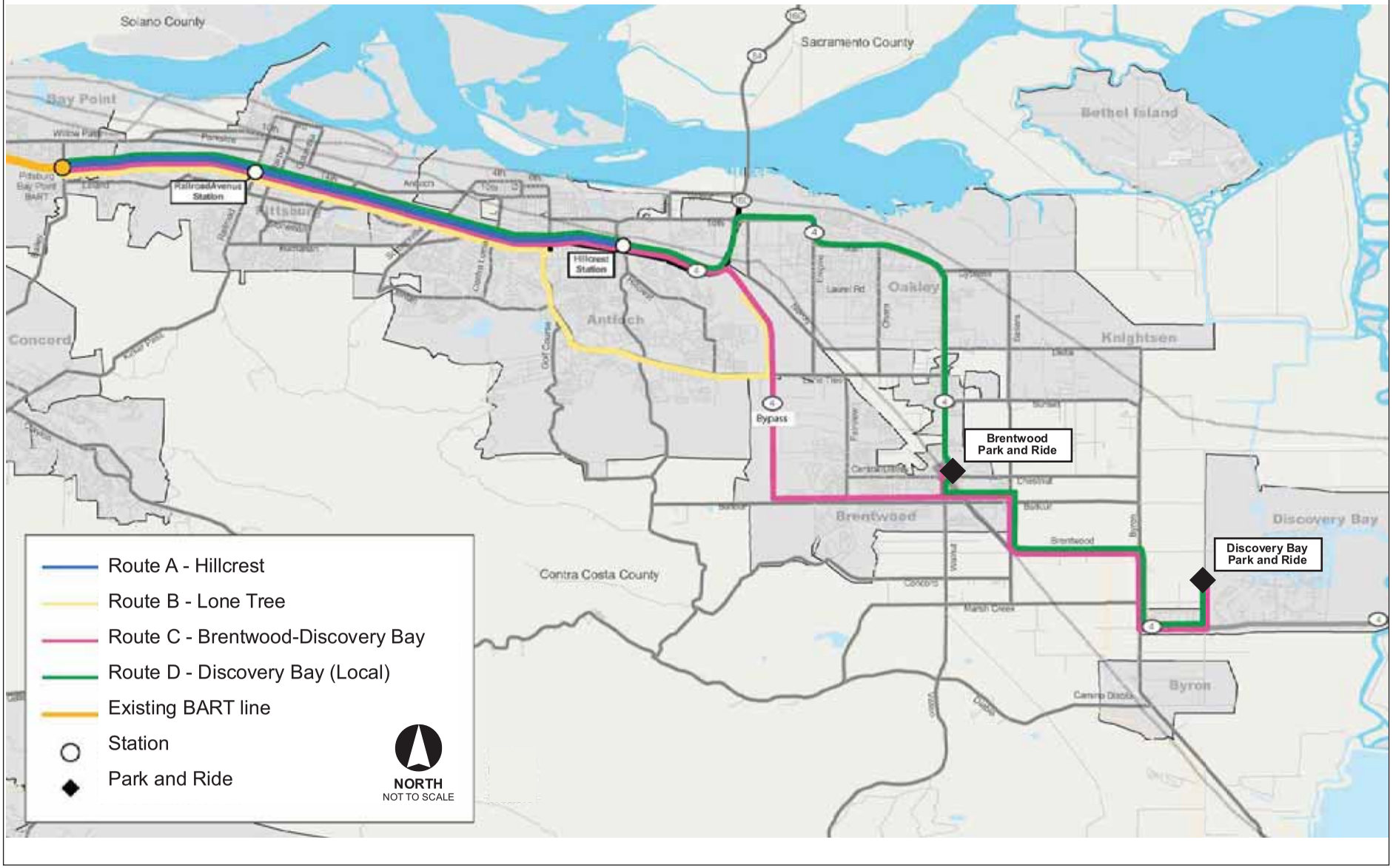
The typical roadway cross section between the Pittsburg/Bay Point BART Station and Loveridge Road would consist of two bus-only lanes in the median between the two median barriers, creating a "busway" with four freeway traffic lanes in each direction including an HOV lane. In the vicinity of Loveridge Road, the bus-only lanes in the median would transition from between the median barriers to become an additional bus-only lane that would be added to either side of the freeway in each direction with no barrier separation from the adjacent freeway lanes. This configuration, with five lanes in each direction, including the HOV lane and the bus-only lane, would continue east to the Hillcrest Avenue interchange. The purpose of this lane configuration design is to allow the buses using the bus lanes to enter or exit the lanes at points in between Loveridge Road and Hillcrest Avenue.

At Hillcrest Avenue there are two options for providing a connection to the Hillcrest Avenue BRT Station. These options are discussed later in this section under the discussion on the BRT stations.

As conceived, the BRT Alternative offers the benefit of multiple routes, taking advantage of the flexibility of bus operations (able to operate outside a fixed guideway) as compared to rail service. Under the BRT Alternative, BRT vehicles would leave the busway and serve four different routes to provide better coverage of the East County (see Figure 5-2). These route variations are described progressing from the western end of the line (Pittsburg/Bay Point BART Station) eastward.

*Route A – Hillcrest*. This route would primarily serve northern Antioch and Oakley. Route A would operate as a trunk line, providing express busway service between the Pittsburg/Bay Point BART Station and Hillcrest Avenue BRT Station. The route would start at Pittsburg/Bay Point BART Station traveling in the center median of SR 4, making a stop at Railroad Avenue, and proceeding to the end of the line, at the Hillcrest Avenue BRT Station slightly east of the present Hillcrest Park-and-Ride Lot.

*Route B – Lone Tree*. This route would primarily serve central and eastern Antioch. Route B would begin at the Pittsburg/Bay Point BART Station and proceed in the median of SR 4, making a stop at the Railroad Avenue BRT Station. It would exit SR 4 at Lone Tree Way and continue on Lone Tree Way making local stops through Antioch to the SR 4 Bypass. It would enter the northbound SR 4 Bypass and continue north to the Laurel Road interchange where it would exit the Bypass to reverse direction and return to the Pittsburg/Bay Point BART Station via the same route. Along the route, proposed stations and major stops include the Pittsburg/Bay Point BART Station, Railroad Avenue, a stop in or near the Somersville/County




Source: WSA, 2008.

**BRT ROUTE MAP**
FIGURE 5-2

East Mall, and in the Laurel Road interchange area along the SR 4 Bypass. Local bus connections can be made along Lone Tree Way to the bus routes currently serving this area (Routes 380, 388, and 392).

*Route C – Brentwood – Discovery Bay – Peak Service*. This route would serve southwest Brentwood and Discovery Bay. Route C would start at the Pittsburg/Bay Point BART Station and travel in the median of SR 4 in the designated bus lanes until Hillcrest Avenue. The route would continue on SR 4 beyond Hillcrest Avenue and proceed onto the SR 4 Bypass, where it would operate in mixed-flow traffic. In this stretch, along the bypass, the buses would run on the shoulders of the bypass when traffic is congested. This on-shoulder running of buses is a relatively new concept, but has been implemented in many areas of the country, including Interstate 805 in San Diego. The buses would continue southeast on the SR 4 Bypass, exit at Balfour Road, and follow the existing 385 bus route through downtown Brentwood. The route would terminate at the existing Brentwood Park-and-Ride Lot at Walnut Boulevard and Oak Street on 15-minute headways. One bus per hour would continue to the Discovery Bay Park-and-Ride Lot.

*Route D – Oakley – Brentwood – Discovery Bay – Off-Peak Service*. This route would serve northeast Brentwood and Discovery Bay. Route D would start at the Pittsburg/Bay Point BART Station and travel in the median of SR 4, until Hillcrest Avenue where it would stop at the BRT station slightly east of the present Hillcrest Park-and-Ride Lot. The route would rejoin SR 4 via the Hillcrest Avenue interchange (see Figure 5-3) and continue along SR 4 where it would operate in mixed-flow traffic. It is proposed that the route would make local stops along SR 4 through Oakley, Brentwood, and Discovery Bay during off-peak service hours. Major stops include the Brentwood and Discovery Bay Park-and-Ride Lots.

**Stations/Stops.** The proposed BRT stations are identified above under the description of the route and include the same two locations as the Proposed Project, at Railroad Avenue and just east of Hillcrest Avenue. The BRT platform would have power and communication utilities (public address system and closed circuit television). The platform would also contain benches, windscreens, signage, trash receptacles, lighting, canopies, and cabinets for maps and schedules. BRT stops would be the same as conventional on-street transit stops with a bus stop sign and a passenger shelter.

Two options are proposed for the station configurations and BRT connections at both the Pittsburg/Bay Point and Hillcrest Avenue Station. Option A was designed to provide a lower cost BRT Alternative that would still be attractive to riders in terms of travel times and convenience. In contrast, Option B was developed to explore the advantages of providing a very high level of connectivity between the BRT and BART systems and minimizing any BRT operations in mixed traffic. As a result, Option B is a higher cost alternative compared to Option A. Option A and Option B are described in greater detail below.


Source: WSA, 2008.

**HILLCREST AVENUE BRT STATION - CONCEPTUAL PLAN/OPTION A**

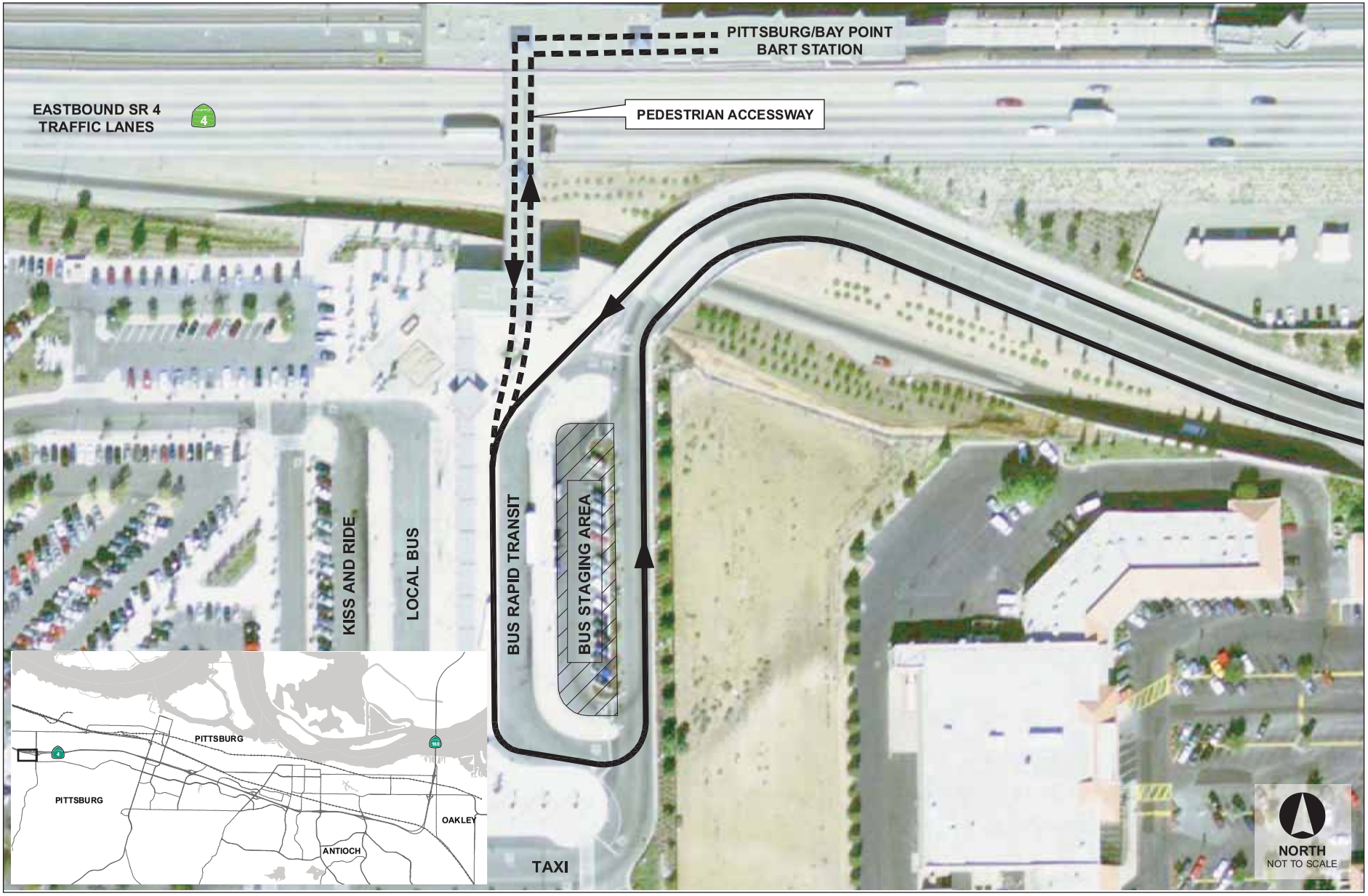
FIGURE 5-3

*Option A*. This BRT Alternative is lower cost and proposes that BRT vehicles enter and exit the bus-only lanes in the SR 4 median via existing SR 4 on- and off-ramps.

- *Pittsburg/Bay Point – BART-BRT Interface Station*. Buses would exit the proposed dedicated roadway in the median of SR 4, merge across general traffic lanes on SR 4, and use the current freeway on- and off-ramps to access the current bus transfer center at the Pittsburg/Bay Point BART Station. As shown in Figure 5-4, the existing bus intermodal terminal would be modified to accommodate the BRT buses.
- *Railroad Avenue Station*. This station would be located in the median of SR 4, similar to the Proposed Project. This station would be designed to allow buses to bypass the station and not stop, even when other buses are present in the station. The station would have platforms that extend to either side (west and east) of the Railroad Avenue overcrossing that spans SR 4. Pedestrians would access the station via the Railroad Avenue overcrossing and use either an elevator or stairs leading to the station platforms below. About 300 parking spaces would be provided for riders by the year 2030.
- *Hillcrest Avenue Station*. The station would be located east of the current Hillcrest Avenue Park-and-Ride Lot, between SR 4 and the Union Pacific right-of-way (UP ROW). The station would be at grade and provide facilities for buses to pick up and load passengers, as well as to turn around and stop for driver layovers. About 1,800 parking spaces would be provided for park-and-ride patrons at the proposed station (see Figure 5-3). The station would be approximately 20 acres with an approximately 5-acre maintenance facility adjoining it to the east. The BRT buses would access this station via the local street network. Eastbound buses on SR 4 would exit the bus lane west of Hillcrest Avenue and merge across the general traffic lanes on SR 4 to use the eastbound off-ramp to Hillcrest Avenue. They would then proceed via Hillcrest Avenue and Slatten Ranch Road to the station. Westbound buses departing the station would reverse this route using the westbound on-ramp at the Hillcrest interchange to access the freeway. The buses would experience some delay while merging across the freeway lanes and using local streets).

*Option B*. This BRT Alternative is higher cost and proposes that BRT vehicles enter and exit the bus-only lanes in the SR 4 median via dedicated busways to the terminus stations.

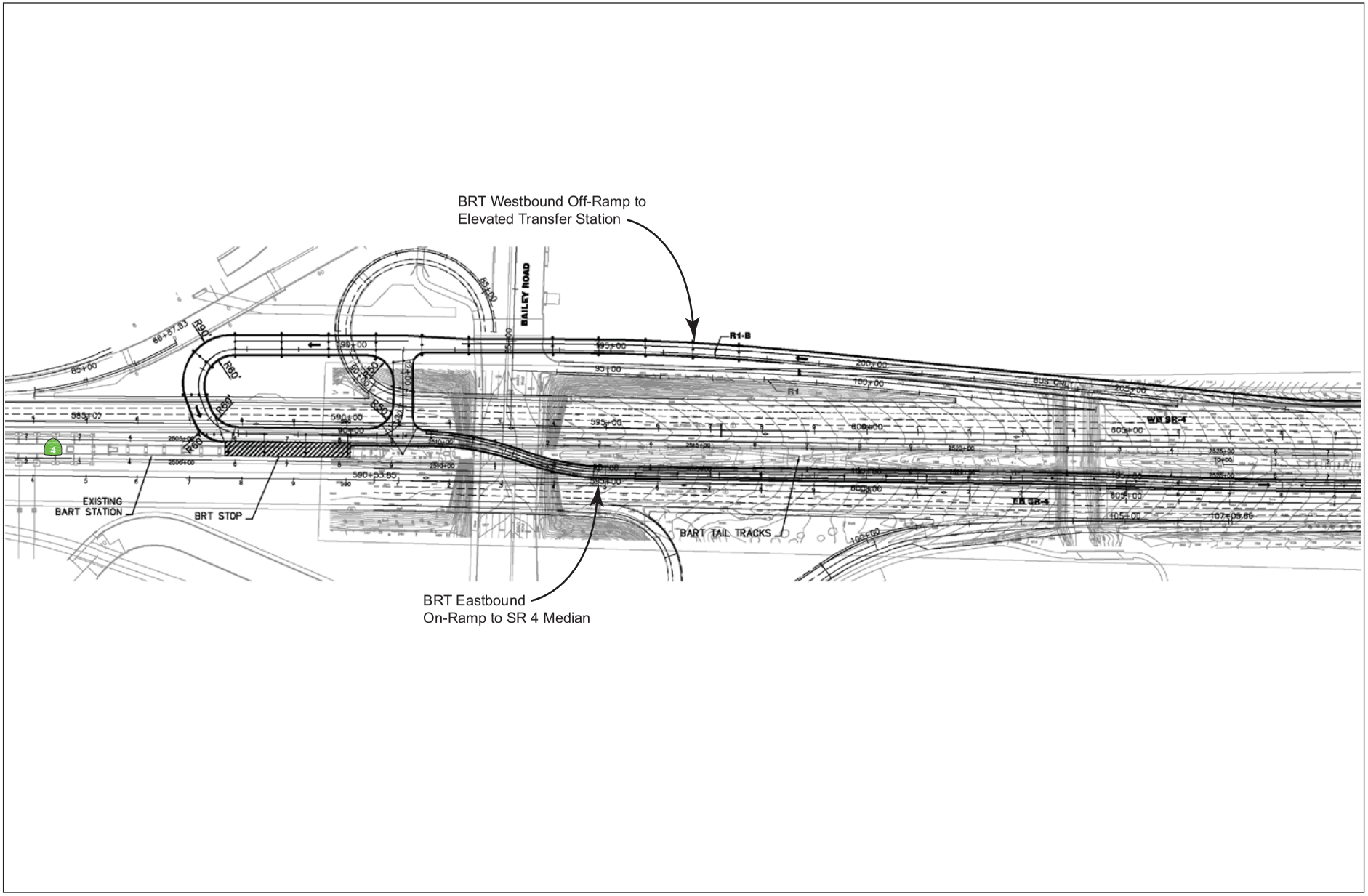
- *Pittsburg/Bay Point – BART-BRT Interface Station*. Under Option B, the proposed BRT station would be built above the existing BART station in the median of SR 4 (see Figure 5-5 and 5-6). Eastbound BRT buses would exit the station, traveling down an aerial ramp to re-enter the SR 4 median dedicated roadway. Buses traveling west on SR 4 would leave the median and enter regular traffic, and merge across traffic to the slow lane where the buses would exit at a dedicated off-ramp. The off-ramp would become aerial, allowing the buses to cross above westbound SR 4 traffic to enter the station. BRT passengers would use escalators, stairs or an elevator to travel down one




Source: WSA, 2008.

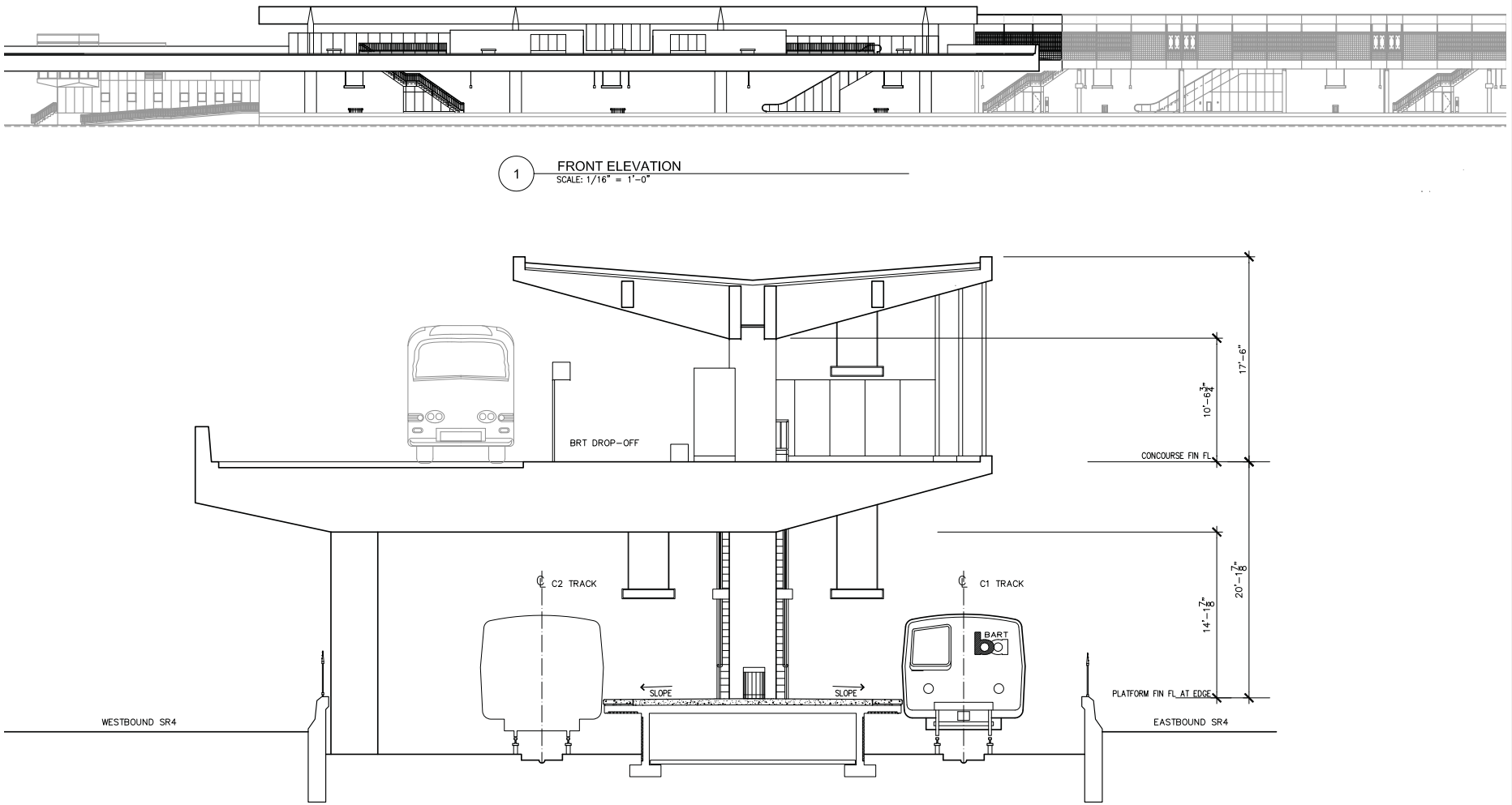
**BRT TRANSFER STATION - CONCEPTUAL SITE PLAN/OPTION A**

FIGURE 5-4




Source: PGH Wong, 2008.

**BRT TRANSFER STATION PLAN - OPTION B**
FIGURE 5-5




Source: PGH Wong, 2008.

**BRT TRANSFER STATION ELEVATION AND SECTION - OPTION B**

FIGURE 5-6

level to the BART platform. They would not have to pass through fare gates to make this transfer, as they would already be in the BART system when they board the BRT bus. This option is more elaborate and costly than Option A, but would provide the most direct connection between BRT and BART trains.

- *Railroad Avenue Station*. This station would be located in the median of SR 4, the same as Option A and similar to the Proposed Project. Three hundred parking spaces would be provided by the year 2030.
- *Hillcrest Avenue Station*. This option eliminates the potential traffic delays to the BRT buses that would occur with Option A by providing a direct tunnel connection from the SR 4 median bus lanes to the BRT station east of Hillcrest Avenue. The BRT station would be in the same location as the Northside West Station option of the Proposed Project and would have the same tunnel configuration to connect the median busway and the Hillcrest Avenue BRT Station. The station layout would be similar to that described for Option A with passenger loading facilities for buses to pick up and load passengers, as well as to turn around and stop for driver layovers. About 1,800 parking spaces would be provided for park-and-ride patrons at the proposed station by the year 2030 (see Figure 5-7).

**Ridership.** BRT Alternative Option A uses the existing bus transfer area at the Pittsburg/Bay Point BART Station and the general traffic on- and off-ramps to access the Hillcrest Avenue Station. In 2030, the projected daily ridership for the BRT Alternative (including all four routes) is expected to be 10,400 daily riders (entrances and exits). Of these passengers, 5,900 would be new transit riders. Option B, which offers a direct connection at the Pittsburg/Bay Point BART Station to the BRT vehicles and a direct tunnel access to the Hillcrest Avenue Station, would decrease the transfer and waiting time for BART compared to Option A. Because of this faster transfer to BART, the year 2030 daily ridership for Option B is estimated at 12,000 daily riders. Of these passengers, 6,500 trips would be new transit riders. Table 5-1 summarizes these ridership projections for the BRT Alternative. Station access mode splits are shown in Table 5-2. Compared to the Proposed Project, the BRT Alternative would attract similar or higher levels of total ridership, depending on which BRT option (A or B) is selected. However, the comparison between the BRT options and Proposed Project is somewhat biased in favor of BRT as the BRT options provide service all the way to Brentwood and Discovery Bay, while the Proposed Project terminates at the Hillcrest Avenue Station. The BRT bus routes would provide service beyond the Hillcrest Avenue BRT Station, reducing the need for transit users to drive to Hillcrest Avenue in order to access the BRT system. To the extent that riders board the BRT at outlying stops, fewer riders will need to board at the Hillcrest Avenue BRT Station, in comparison to the ridership at the Hillcrest Avenue station for the Proposed Project. Thus, directly comparing ridership for the BRT and the Proposed Project, with their different configurations, may be considered an “apples-to-oranges” comparison.


Source: WSA, 2008.

**HILLCREST AVENUE BRT STATION - CONCEPTUAL PLAN/OPTION B**
FIGURE 5-7

**Table 5-1**
**Ridership Summary – BRT Alternative vs. Proposed Project**

| | Option A | Option B | Proposed Project |
|---|---|---|---|
| Daily Riders | 10,400 | 12,000 | 10,100 |
| Transfers from/to | 9,700 | 11,700 | 9,750 |
| Entries and Exits | | | |
| Railroad Avenue | 1,950 | 2,250 | 1,900 |
| Hillcrest Avenue | 4,000 | 4,820 | 8,200 |
| New Transit Trips | 5,900 | 6,500 | 5,400 |

*Source:* Wilbur Smith Associates, 2008.

**Table 5-2**
**BRT Alternative – Station Access Mode Split**

| | Percentage | | Option A | | Option B | |
|---|---|---|---|---|---|---|
| | Railroad Avenue | Hillcrest Avenue | Railroad Avenue | Hillcrest Avenue | Railroad Avenue | Hillcrest Avenue |
| Total One-Way Riders | – | – | 1,950 | 4,000 | 2,250 | 4,820 |
| Round Trips | – | – | 975 | 2,000 | 1,125 | 2,410 |
| Car – Park & Ride | 40% | 62% | 390 | 1,240 | 450 | 1,494 |
| Car – Drop-off | 20% | 18% | 195 | 360 | 225 | 434 |
| Bus/Transit | 10% | 16% | 98 | 320 | 113 | 386 |
| Bicycle | 2% | 1% | 20 | 20 | 23 | 24 |
| Walk | 28% | 3% | 273 | 60 | 315 | 72 |

*Source:* Wilbur Smith Associates, 2008.

If the BRT were to end at the Hillcrest Avenue Station, then the total ridership for Option A would be 5,950 one-way trips and for Option B 7,070 one-way trips. This is less than the comparable ridership for the Proposed Project which is 10,100 trips. Another way to look at the comparison is to consider the added ridership the Proposed Project would experience if it were extended further east. The ridership forecast for a one station extension to Oakley would add 3,900 riders for a total of 14,000 daily one-way trips, which would exceed the total ridership for either BRT option.

An important ridership consideration is the reliability of the BRT options as is discussed in the next section. The ridership model does not consider the potential implications of the service reliability characteristics of BRT. The forecasts are based on average travel times as predicted by the model and do not reflect the variations that would naturally occur due to changes in traffic conditions on SR 4 and the other roads that the BRT buses would utilize.

**Reliability.** Except for the local pick up and drop off at some route ends, the BRT Alternative Option B would utilize an exclusive busway for a major portion of the trip. As a result, the BRT Alternative Option B would be subject to less congestion and would be more likely to maintain schedules than the No Project Alternative. BRT Option A would use segments of SR

4 near the Pittsburg/Bay Point BART and Hillcrest Avenue Stations to merge through general freeway traffic to access the existing on and off-ramps. The time required to make these transition movements in general traffic would vary with the nature of traffic conditions and the amount of congestion on each given day. As a result, BRT Option A would be significantly less reliable in terms of travel time than BRT Option B and the project alternatives.

The BRT Alternative could utilize off-vehicle fare collection and low-floor vehicles with multi-door boarding and alighting, all leading to faster loading and unloading and thus smaller dwell times at stops. These features would allow better schedule adherence.

**Schedule and Headways.** Table 5-3 shows the assumed service characteristics for each of the four BRT routes. The figures reflect an assumption that the BRT system would have the same hours of service as the BART system. The travel times shown in Table 5-3 are for Option A. For Option B which has improved connections to the BRT stations at both Pittsburg/Bay Point BART and Hillcrest Avenue Station, the one-way travel times would be reduced by about 5 minutes and the round trip travel times would be reduced by 10 minutes over what is shown in the table.

**Fleet Size.** The proposed peak period operating schedule for the BRT service would require 23 buses. A total fleet of 28 buses would be acquired, allowing five spare vehicles to adjust for vehicle breakdowns/routine maintenance and spikes in peak hour usage.

**Fares and Collection.** In-station (off vehicle) fare cards would be purchased in advance and access to the vehicles would be unimpeded by fare collection on the vehicle. EZ Rider cards are now available for use by BART. EZ Rider cards are "smart" cards that riders only need to "touch" to the top of the fare gate to operate it. This would allow a single integrated fare collection system to be used for the combined BART and BRT system. The BRT fares would be consistent with BART's current distance-based fare policy. Under this policy, the current fare from Hillcrest to Pittsburg/Bay Point BART Station on BRT would be $3.40. The fare from Hillcrest Avenue Station to downtown San Francisco would be $6.40.

**Table 5-3**
**BRT Alternative Option A - Route Features and Proposed Service Headways**

| | One-Way Length | | Round Trip | Proposed Headways (minutes) | | | |
|---|---|---|---|---|---|---|---|
| Route | Miles | Minutes | Minutes | Peak Period Peak Direction | Off Peak/ Base | Evening Period | Sat/ Sun |
| Route A – Hillcrest | 9 | 25 | 50 | 12 | 12 | 0 | - |
| Route B – Lone Tree | 14 | 74 | 148 | 6 | 15 | 30 | 60 |
| Route C – Brentwood/ Discovery Bay Peak | 24 | 84 | 168 | 15 | 30 | 30 | - |
| Route D – Brentwood/ Discovery Bay Local | 24 | 138 | 276 | 30 | 30 | 60 | 60 |

Source: *Wilbur Smith Associates, 2008.*

**Maintenance and Servicing Facilities.** The BRT maintenance facility would be located east of the proposed Hillcrest Avenue Station, in the currently vacant area north of SR 4, and would occupy 5.2 acres. At the facility, vehicles would receive servicing (cleaning, daily safety and fluid checks, etc.), in addition to light and heavy maintenance. Office space and parking for operators and staff, and marketing and administrative functions would also be provided.

**Cost.** The BRT Alternative has two capital costs, reflecting the two options. Under Option A, which uses a more conventional (and currently existing) bus passenger facility at the Pittsburg/Bay Point BART Station and uses the existing freeway ramps to access the Hillcrest Avenue Station, estimated capital and construction costs of $393 million are projected (in 2009 dollars). The costs of BRT Option A would be less than the Proposed Project, principally because there is no transfer station associated with BRT Option A, and the BRT station and maintenance facility at Hillcrest Avenue are less elaborate than those of the Proposed Project. Unlike the Proposed Project, which requires a new DMU transfer platform, Option A does not require a new transfer station at or near the Pittsburg/Bay Point BART Station. Option B would involve construction of aerial ramps and a new structure over the freeway to a direct transfer at the Pittsburg/Bay Point BART Station. It would also involve a tunnel connection from the freeway bus lanes to the Hillcrest Avenue Station. This option is estimated to cost $611 million in capital and construction costs in year 2009 dollars.

The annual operating cost for the BRT Alternative with Option A is $10.2 million; with Option B, $11.0 million (in 2009 dollars). The higher cost for Option B is due to the need to maintain the aerial station and structures of this option.

Options A and B were designed to represent a full range of BRT performance versus costs. Other options which include some of the elements that differentiate Option B from Option A could also be considered. In this case, it is important to consider that Option B is estimated to cost 55 percent more than Option A and gain 15 percent more ridership as a result of the added costs. This makes it clear that adding investment to Option A would not likely result in a new alternative that would be more cost effective than either Option A or Option B. In addition, because both options were designed to cover most of east Contra Costa County, adding additional investment to improve the service east of the Hillcrest Avenue Station would also not likely yield dramatically improved performance.

**Construction Scenario.** The major construction activities associated with the BRT Alternative include modifications and construction at the existing Pittsburg/Bay Point BART Station; the construction of new stations in the vicinity of Railroad Avenue and Hillcrest Avenue; roadway and median[5] construction; and the construction of support facilities including parking lots as well as related reconstruction, demolition, and utility relocation and installation work.

[5] The median concrete barriers along the east and west bound lanes would be improved to comply with BART standards.

As described in Section 2, Project Description, Caltrans is currently widening SR 4 from approximately the Loveridge Road interchange east to the SR 160 flyover. The construction of BRT service in the median of SR 4 would be coordinated with the Caltrans' widening project, to reduce impacts to local residents and traffic. BART would construct roadwork and infrastructure along the alignment, any facilities to support overhead structures (for example, at road overcrossings), BRT stations, parking and access roads, and maintenance facilities.

Construction of the BRT Alternative would be completed in stages, beginning at the existing Pittsburg/Bay Point Station. Work would proceed eastward, with the majority of construction occurring within the SR 4 median. The overall schedule, phases, and duration described for the Proposed Project would apply to the BRT Alternative. Construction would be complete by late 2014.

*Phase 1A (Pittsburg/Bay Point to Loveridge Road)*. Construction Phase 1A would begin at the existing Pittsburg/Bay Point BART Station.

- *Transfer Station*. Under Option B, the BRT transfer station would be constructed directly over the eastern portion of the existing BART station. As a result, major construction would occur at the existing station as well as the area west and east of the station. Westbound aerial ramps crossing over the westbound lanes before circling back to the Pittsburg/Bay Point Station would require extensive construction for support piers and structures. An eastbound aerial ramp would be constructed to allow the BRT buses to reenter the SR 4 median. Heavy equipment would be required during the construction of the aerial ramps. Access to the median would be through the interior SR 4 east and westbound lanes. Temporary openings would be created within the concrete traffic barriers to allow vehicle and equipment access. Due to the location of the proposed BRT transfer station, major delays in normal BART service to and from the station would be expected. Option A which uses the existing intermodal transfer center at the station does not involve any major construction at the station.

  Aerial structures and aerial roadways are generally constructed in four stages. The first stage involves the installation of piles[6] that would support the weight of the structure and the loads it would carry. These piles are generally long steel or concrete poles that are driven into the ground by pile driving equipment unless CIDH (cast-in-drilled-hole)[7] piles are possible. The second stage is the pile cap, which joins all the piles and is constructed of reinforced concrete and is approximately four to five feet thick.

  The third stage involves the construction of the columns. Columns are constructed of reinforced concrete which is typically poured inside a reusable steel form. The shape of the column can vary; however, a circular column approximately 5 feet in diameter is

[6] Piles are deep foundations typically used to support large structures.

[7] Involves digging a deep hole (shaft), placing the pile into the hole, and then filling the remainder with concrete.

generally used. The fourth and final stage of construction involves the placement of the girders.[8] The placement of the girders can begin after the column concrete has cured for a sufficient time, typically 14 days.

The cast-in-place concrete[9] bridges require the erection of formwork to support the concrete while it cures. Depending on the length of the spans, formwork can be several feet deep. If the bridge is spanning a roadway (as is the case), then the bridge must be designed with sufficient clearance. Fabricated steel structures do not usually require this formwork.

- *Roadway*. Roadway construction would occur from the Pittsburg/Bay Point Station to the west side of the Loveridge Road interchange. However, grading and roadway construction would occur along the median. Access to the median during construction would be from the interior east and westbound lanes. Temporary K-rail traffic barriers[10] would be provided while the BRT barrier walls are built. General construction of the roadway within the SR 4 median would require grading and subsequent fill with concrete/asphalt.

- *Railroad Avenue Station*. The Railroad Avenue Station would be constructed in the median of SR 4 beneath the Railroad Avenue overpass. Construction would require heavy equipment access to the median, which would be provided through the interior SR 4 lanes.

  Construction of the Railroad Avenue Station would be similar to the construction of the BRT transfer station, involving cast-in-place concrete and formwork. Station furnishing would then be installed. The stations would be constructed of standard building materials such as concrete, steel, aluminum, and heavy plastic. Further, minor construction would occur along the Railroad Avenue overpass to allow for stair and elevator access to and from the station.

- *Staging, Equipment, and Materials*. Staging areas for equipment storage and management offices would be located at three different locations along the corridor (the same sites as identified for the Proposed Project). Table 5-4 identifies the staging locations and general materials that would be required for Phase 1A construction. While designated haul routes have not been determined, care would be taken to utilize roadways resulting in the least impact to residents and businesses. Construction of the transfer station above the Pittsburg/Bay Point Station, the Railroad Avenue Station, and the bus-only lanes in the median is anticipated to take approximately 24 months. Equipment for construction of the stations and roadway could include dump trucks, self

[8] A girder is the main horizontal support of a structure that supports the structure's surface and vehicle loads.

[9] Cast-in-place concrete is transported in an unhardened state, commonly referred to as ready-mix cement. The concrete is then poured into wooden "casts" and allowed to dry on site.

[10] A K-rail traffic barrier is a 3-foot-tall concrete barrier that can be used as a temporary traffic barrier during construction.

propelled earth-scrapers, water trucks, bulldozers, grade-alls, truck-mounted cranes, loaders, excavators, rollers, concrete ready mix trucks, lubrication/fueling service trucks, concrete pumps and diesel driven generators and compressed air units for construction power, equipment and tools.

**Table 5-4**
**Phase 1A BRT Alternative - Staging Locations, Equipment, and Material**

| Location | Staging Locations | Material Amount |
|---|---|---|
| Pittsburg/ Bay Point Station | North of Canal Road/East of Madison Avenue as well as south of SR 4 | To be determined |
| Roadway | Spread across the alignment. These locations would occur on vacant lots north and south of SR 4 | 3,250 truckloads of various materials |
| Railroad Avenue Station | Proposed Railroad Avenue Station parking lot, south of SR 4 and east of Railroad Avenue | 40 truckloads of various materials |

*Source*: PGH Wong Engineering, *East Contra Costa County Transit Project (eBART) - Construction Implementation Report, Preliminary Engineering*, November 30, 2007.

- *Utility Relocation and Potential Service Disruptions/Traffic Delay*. To reduce construction impacts on the traffic and service along SR 4, major material deliveries and heavy equipment use would occur during off-peak hours. However, a traffic mitigation plan would be developed that would address lane closures for delivery and equipment access. Vehicle and pedestrian movement on the Railroad Avenue overpass could be delayed during the construction of Railroad Avenue Station. Service delays would be expected for BART riders during Phase 1A under Option B as the BRT transfer station would be constructed directly on top of the existing Pittsburg/Bay Point BART Station. No major utility relocation would occur during this phase of the project. Temporary utilities in the form of electricity, sewer, and water would be provided to the equipment maintenance yards and staging areas during the construction phases. The yards would be graded and based with rock to allow for vehicle and equipment use. There would be two temporary maintenance yards for Phase 1A. These yards would consist of temporary buildings and security lighting, all within secured areas. Drainage and erosion control plans for the maintenance yards would be implemented and maintained throughout the construction process. Each parking lot would include night and security lighting, as would each of the station platforms.

*Phase 1B (Loveridge Road to Hillcrest Avenue)*

- *Roadway*. Construction would begin on the BRT roadway east of the Loveridge Road interchange. Most work along the median would require minor roadway grading and pavement pouring. Access to the median would be through the interior SR 4 lanes, potentially causing traffic delays. However, these delays would occur during off-peak hours. The same six aerial overpass spans required for the Proposed Project would be needed for the BRT Alternative.

Aerial structures would typically be constructed of concrete, but steel girders may be used for the longer spans or in special circumstances. The construction of the aerial roadways would be constructed in the same process and using similar equipment as described for the Proposed Project. All construction within the SR 4 median would occur simultaneously with Caltrans improvement activities, thereby reducing the overall impact on traffic in the area. Primary access to these sites would be through the SR 4 interior lanes and concrete barriers.

- *Hillcrest Avenue Station*. The planned station at Hillcrest Avenue would include patron parking, bus turn-arounds, and at-grade passenger bus loading areas. The station would be constructed with steel and cast-in-place concrete and would be located north of SR 4 on a currently vacant site just east of Hillcrest Avenue, occupying approximately 1.9 acres. Access to the BRT station from the SR 4 median would be via the existing freeway ramps (Option A) or via a tunnel connection (Option B). This BRT Alternative would include a maintenance yard of about 5 acres east of the station. Construction of the station would be similar to the methods described for the Proposed Project. Construction and equipment required for the Hillcrest Avenue Station and maintenance yard would be similar to those identified for the Proposed Project, particularly for Option B which would involve a tunnel connection between the station and the freeway median.

- *Staging, Equipment, and Materials*. Table 5-5 identifies the staging locations and general materials that would be required for Phase 1B construction. While designated haul routes have not been determined, care would be taken to utilize roadways resulting in the least impact to residents and businesses. Construction of the roadway and Hillcrest Avenue Station is anticipated to last approximately 15 months. The same equipment identified for Phase 1A construction is expected during Phase 1B. Additional equipment for the aerial structures and tunnels include drilling rigs, possible specialized water jet excavators, trucks to remove excavated soil, transit mix concrete trucks and concrete pumps, specialized truck trailers to deliver pre-cast concrete beams, cranes, trucks to deliver forms, rebar, pavement saws, and pre-cast concrete post tensioning jack.

**Table 5-5**
**Phase 1B BRT Alternative - Staging Locations and Material**

| Location | Staging Locations | Material Amount |
|---|---|---|
| Roadway | Spread across the alignment. These locations would occur on vacant lots north and south of SR 4 | 3,200 truckloads of various materials |
| Hillcrest Avenue Station | Proposed Hillcrest Avenue Station parking lot, north of SR 4 | To be determined |

*Source:* PGH Wong Engineering, *East Contra Costa County Transit Project (eBART) - Construction Implementation Report, Preliminary Engineering,* November 30, 2007.

- *Utility Relocation and Potential Service Disruptions/Traffic Delays*. Similar to the Phase 1A construction, a drainage and erosion mitigation control plan would be implemented for the parking lot/temporary maintenance yard to be located on a currently vacant lot north of SR 4 and east of Hillcrest Avenue. New utility infrastructure, including water, power, communication, and sewer utilities would be required. Lane closures would be expected along portions of Hillcrest Avenue, as this would be the likely source for new water and sewer service utilities to serve the maintenance yard and future Hillcrest Avenue Station. The temporary maintenance yard and staging area would include security lighting and office trailers within a gated area. The future parking lot and station would also include security, ambient night, and perimeter lighting fitted with sharp cut-off fixtures. In addition, the existing storm drainage system along Hillcrest Avenue would also require construction modifications. Other detours/delays could be expected along segments of SR 4 as well as along the cross streets at which the previously mentioned aerial structures would be constructed. Specifically, delays would be expected along Hillcrest Avenue due to the BRT ramps entering and exiting the SR 4 median.

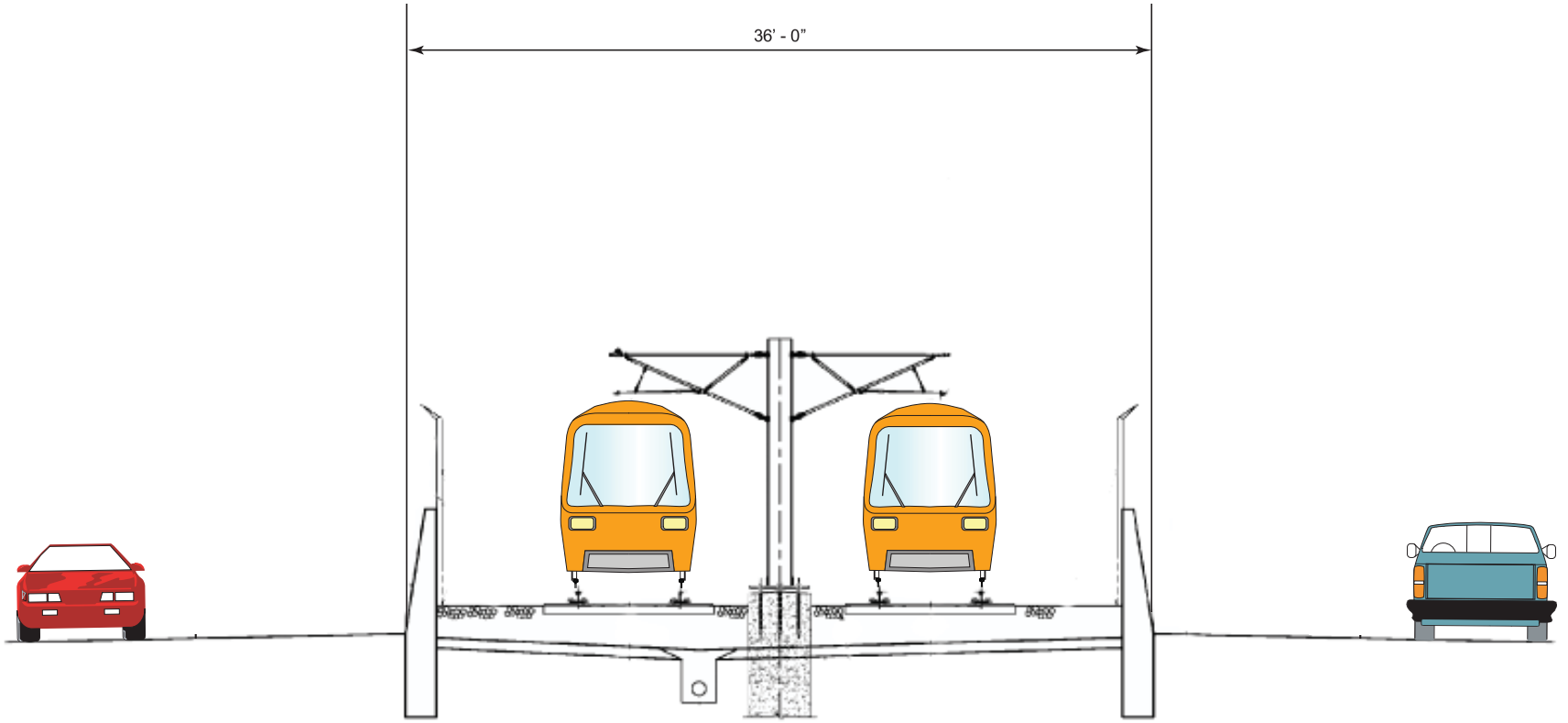
## Light Rail Vehicle (LRV) Alternative

This alternative proposes the use of electric Light Rail Vehicles (LRV) along the SR 4 median, between the Pittsburg/Bay Point BART Station and the proposed terminus station at Hillcrest Avenue. The LRV Alternative would follow the same alignment and use the same station locations as the Proposed Project. The main differences, described below, relate to vehicle technology: the LRV Alternative would be powered by electricity, in contrast to the Proposed Project which would utilize diesel fuel.

**Technology.** Light rail vehicles can operate in dedicated, grade-separated rights-of-way as well as along local streets. The SR 4 median would require 36 feet of width to accommodate the two-track system to propel the light rail vehicles (see Figure 5-8). Normally, light rail vehicles have a maximum speed of 55 miles per hour (mph) within the enclosed rights-of-way. However, there are LRVs currently being manufactured that will travel at speeds of 70 to 80 mph.

Similar to the Proposed Project, light rail vehicles operate on standard gauge tracks.

**Vehicles.** The trains, similar in look and style to the proposed DMU vehicles, are approximately 8 feet wide and 15 feet high. Inside, a variety of seating schemes are available to maximize the amount of sitting and standing room available. Doors would be provided on both sides of the cars, to allow easy boarding from either side.




Source: WSA, 2008.

**TYPICAL LRV SECTION**
FIGURE 5-8

**Propulsion.** Light rail vehicles receive power from overhead catenary systems, which transfer electrical current to the vehicles' electric motors. Along the route, six traction power substations, similar to those required by the BART trains, would be distributed along the route to power the trains.

**Route.** The route for the LRV Alternative would be identical to that described for the Proposed Project.

**Stations.** The transfer platform and LRV stations would be identical to those described for the Proposed Project.

**Ridership.** Ridership forecasts for the LRV Alternative would be identical to that described for the Proposed Project.

**Reliability.** The reliability of the LRV Alternative would be identical to that described for the Proposed Project with the exception that localized electrical power failures could impact LRV services. A larger regional power alternative would impact all of the alternatives as the BART system would be disrupted.

**Schedules and Headways.** The operating plan for the LRV Alternative would be identical to that described for the Proposed Project.

**Fleet Size.** The number of vehicles required for the LRV Alternative would be identical to that described for the Proposed Project.

**Fares and Collection.** These features of the LRV Alternative would be identical to those described for the Proposed Project.

**Maintenance and Servicing Facilities.** These facilities and associated activities of the LRV Alternative would be identical to those described for the Proposed Project.

**Cost**. This option is estimated to cost $528.0 million in capital costs in year 2009 dollars. This cost is higher than the costs of the Proposed Project due to the added cost of the overhead wiring and electrical power distribution system, although the LRV vehicles would be slightly less expensive than the DMU vehicles.

The annual operating cost for the LRV Alternative is $6.9 million in year 2009 dollars. The operating cost for the LRV alternative would be less than that for the Proposed Project, due to the savings related to the use of electrical energy as compared to diesel fuel.[11]

**Construction Scenario.** Construction of the LRV Alternative would be similar to the Proposed Project. The only significant difference would be the construction of the overhead contact wire system, which would be approximately 20 to 25 feet above the top-of-rail. Also, the LRV Alternative would require the construction of traction power substations to provide electricity along the route to propel the vehicles. All other construction-related equipment and materials would be similar to the Proposed Project.

## BART Extension Alternative

This alternative would extend the existing BART system and technology east from its present terminus at the Pittsburg/Bay Point BART Station to a new terminus station near Hillcrest Avenue in the City of Antioch.

**Technology.** BART utilizes "heavy rail" electric trains that run on a grade-separated right-of-way, reaching maximum speeds of 80 mph. "Heavy rail" typically refers to the standard intercity rail transit, built for heavy use and high speed. Heavy rail is almost always built on its own dedicated right-of-way, separate from road and pedestrian traffic. In the U.S., the term "heavy rail" is used as a general term for metro systems (underground systems and systems that are not running below the ground but are similar to underground systems in other respects). Heavy rail is distinguished from light rail services, which are generally slower and intermixed between grade separated and at grade portions of the alignment.

The existing BART trains can achieve a centrally-controlled maximum speed of 80 mph and provide a system-wide average speed of 33 mph with 20-second station dwell times. Trains can operate with a maximum length of 10 cars.

The existing BART system has had two distinguishing technological features from its inception, its vehicles (described below) and its track gauge. At inception, BART was designed to be a "broad gauge" rail system. Broad gauge refers to the width of the track measured from one rail to the other. Standard railroad gauge is 4 feet 8.5 inches wide. BART uses a 5-foot 6-inch gauge. The greater width was intended to provide a more stable ride, using vehicles that were highly advanced by contemporary standards, with sophisticated suspensions, braking and propulsion systems and constructed of lighter fiberglass, composite, and aluminum materials. The wider gauge has allowed for wider vehicles with more interior room. However, broad gauge also makes engineering more difficult. The non-standard gauge requires that trains be custom built, instead of using common designs for standard gauge. Additionally, track building and maintenance equipment must be custom built.

[11] The cost of diesel fuel was assumed to be $4.00 per gallon in this analysis.

BART was one of the first US systems of any size to have substantial automated operations. The trains are computer-controlled from a central operations control center. On-board train operators are present to make announcements, close doors, and operate the train in case of unforeseen difficulties.

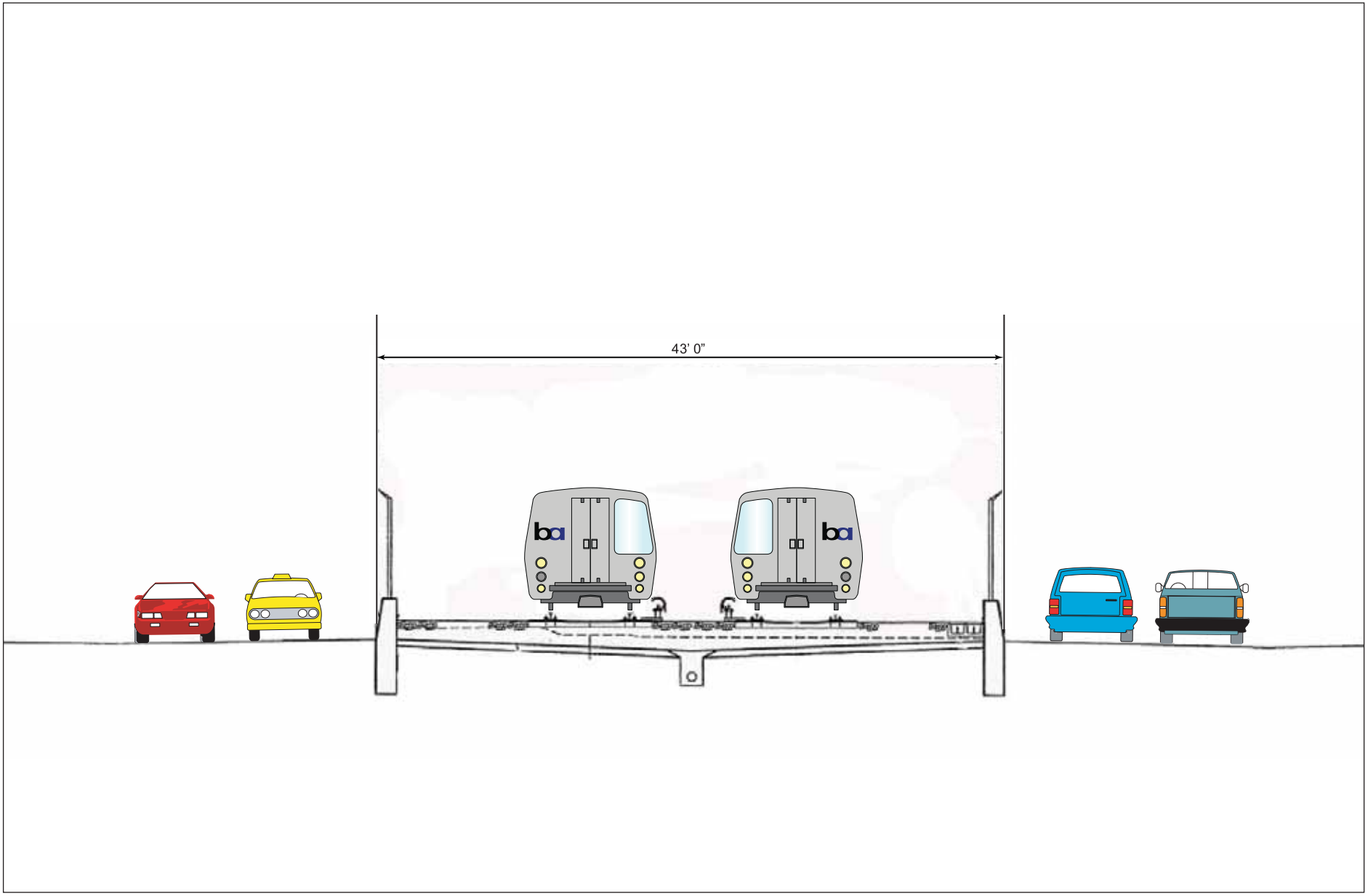
**Vehicles.** BART vehicles are specially designed heavy rail vehicles for use with the system. The cars have aluminum bodies that vary in length, either 70-feet-long without cab (B-Car) or 75-feet-long with cab (A-Car). All cars are 10 feet 6 inches high, 10 feet 6 inches wide, with 6 feet 9 inches of headroom. Each car has four electric motors per car with one 150 horsepower motor per axle.

**Propulsion.** Propulsion power is delivered to the trains by electric current over a third rail, delivering 1,000 volts of direct current electricity. The position of the third rail alternates relative to the context of the train. Inside stations, the third rail is always on the side furthest from the passenger platforms. This design feature eliminates the danger of a passenger either falling directly on the third rail, or stepping onto it to climb back to the platform should they fall off. On ground-level track, the third rail also is alternated from one side of the track to the other, providing breaks in the third rail to allow for emergency evacuations across the tracks.

**Guideway.** The guideway, which is a structure that supports and guides the trains, would be BART broad gauge railroad track on concrete ties mounted on a ballast gravel bed and would be constructed in the SR 4 median. Figure 5-9 shows a typical cross-section of the BART Extension Alternative in the median of SR 4.

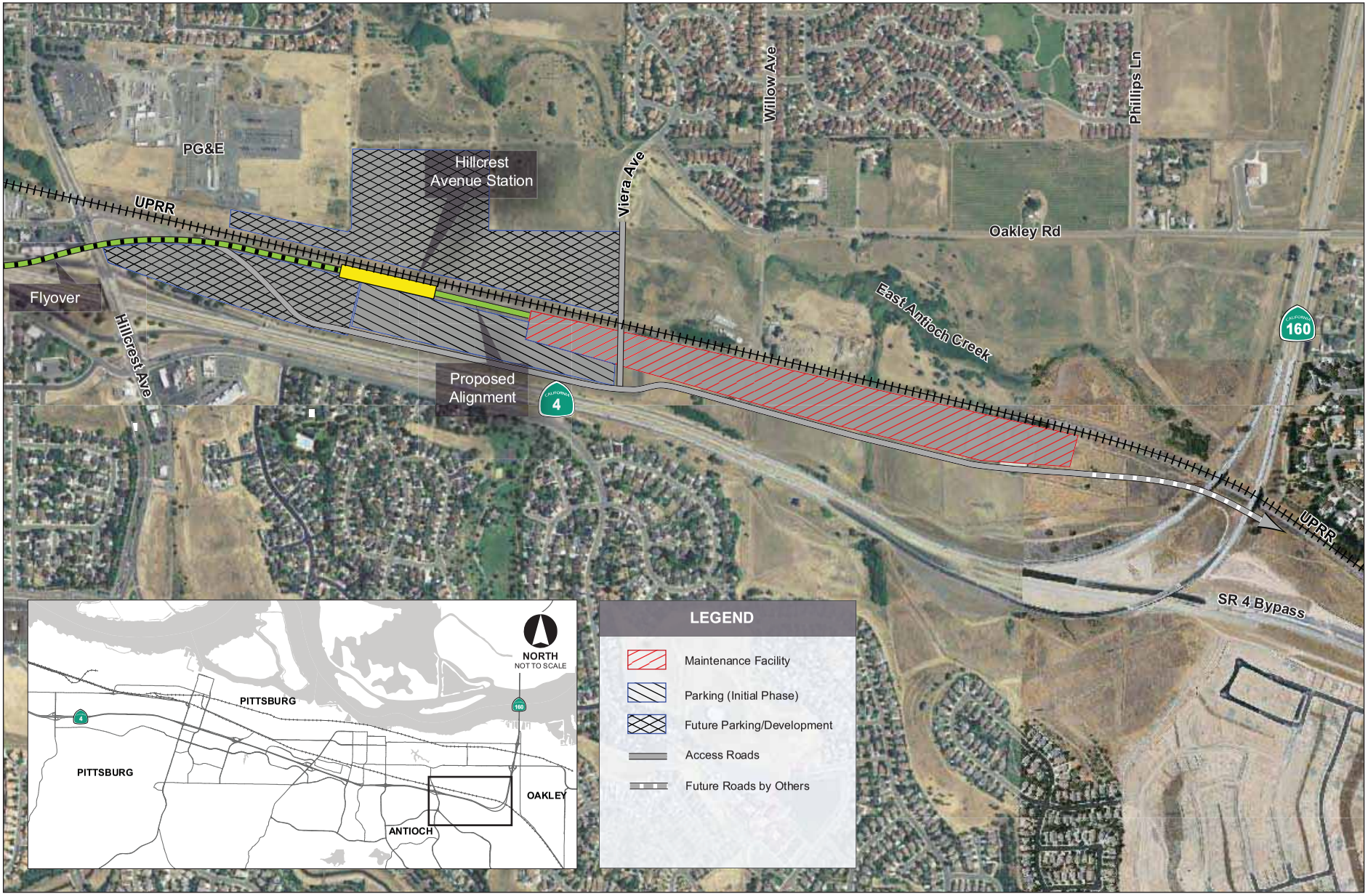
**Route.** Similar to the other project alternatives, the extension of BART from Pittsburg/Bay Point Station to Hillcrest Avenue Station would use the median of SR 4 to the terminus, east of Hillcrest Avenue in Antioch. The terminus station would be out of the SR 4 median, in the area north of SR 4 and alongside the UP ROW. BART trains would exit the median and enter the proposed station north of SR 4 and east of Hillcrest Avenue via a flyover extending over Hillcrest Avenue and the westbound SR 4 lanes.

**Stations/Stops.** The Pittsburg/Bay Point BART Station would not have to be modified in order to accommodate the extension of BART to the east. Passengers would simply continue riding the system and would not need to transfer. The new eastern terminus of the system would be the Hillcrest Avenue Station. The Hillcrest Avenue Station would be located east of Hillcrest Avenue and north of SR 4, near the UP ROW (see Figure 5-10). A pedestrian




Source: WSA, 2008.

**TYPICAL BART EXTENSION SECTION**
FIGURE 5-9




Source: WSA, 2008.

**HILLCREST AVENUE BART STATION AREA AND CONCEPTUAL STATION PLAN**
FIGURE 5-10

concourse would lead to the stairs, escalators, and an elevator providing access to the upper-level platform. The station would have 3,500 parking spaces for park-and-ride patrons by 2030. Under this alternative, there would be no station at Railroad Avenue.

**Ridership.** In the year 2030, the BART Extension Alternative is projected to attract 12,000 daily riders, the most of the project alternatives evaluated in this EIR. Of these passengers, 6,600 would be new transit riders (see Table 5-6).

The Hillcrest Avenue Station access mode split is shown in Table 5-7.

**Table 5-6**
**Ridership Summary – BART Extension Alternative vs. Proposed Project**

| | BART Extension | Proposed Project |
|---|---|---|
| Daily Riders | 12,000 | 10,100 |
| Entries and Exits | | |
| Railroad Avenue | n/a | 1,900 |
| Hillcrest Avenue | 12,000 | 8,200 |
| New Transit Trips | 6,600 | 5,400 |

*Source:* Wilbur Smith Associates, 2008.

**Table 5-7**
**BART Extension Alternative – Station Access Mode Split**

| | Percentage | Daily Riders |
|---|---|---|
| Total One-Way Riders | – | 12,000 |
| Round Trips | – | 6,000 |
| Car – Park & Ride | 62% | 3,720 |
| Car – Drop-off | 18% | 1,080 |
| Bus/Transit | 16% | 960 |
| Bicycle | 1% | 60 |
| Walk | 3% | 180 |

*Source:* Wilbur Smith Associates, 2008.

**Reliability.** Because BART trains operate in a fully exclusive right-of-way, there are no conflicts with vehicular traffic or pedestrians that could interfere with train schedules. The computer systems that control BART operations and BART's everyday operational procedures have proven to provide very reliable service. In 2007, 94 percent of BART passengers were delivered to their destination on-time.[12]

**Schedule and Headways.** The running time of the BART Extension Alternative from the Pittsburg/Bay Point BART Station to the Hillcrest Avenue Station would be 9 minutes. The

[12] BART, *BART Sets Ridership Record*, June 14, 2007. Available at www.bart.gov/news/press

extended services would operate the same hours as the BART system: 20 hours on weekdays, 18 hours on Saturdays, and 16 hours on Sundays. The headways that would be provided would be the same as those of the BART system.

**Fleet Size.** During the peak periods, ten-car BART trains would be operated every 15 minutes as is typical of the BART system. To provide this service on the extension to Hillcrest Avenue, two new ten-car BART trains are required plus three spare vehicles, for a total fleet of 23 new vehicles.

**Fares and Collection.** Fare collection for the BART Extension Alternative would be the same as for the rest of the BART system. In-station (off vehicle) fare cards would be purchased in advance and access to the vehicles would be unimpeded by fare collection. EZ Rider cards are now available from BART. EZ Rider cards are "smart" cards that riders only need to "touch" to the top of the fare gate to operate it.

**Ancillary Facilities.** Key ancillary facilities needed to support the BART Extension Alternative include maintenance and servicing facilities and control and signal equipment, as described below.

*Maintenance and Servicing Facilities*. A maintenance facility would be required for the extension of BART service into east Contra Costa County. The facility would be located just east of the Hillcrest Avenue Station. Approximately 25 acres of land would be required to house the maintenance activities, shops, and service areas. It would be a full service yard and maintenance facility. The closest maintenance yard is located in the City of Concord. This maintenance facility is currently at capacity and does not have the ability to accommodate the additional rail cars that would be required to serve an extension to Hillcrest Avenue. In addition, it is far more efficient to locate the train maintenance at the end of the line so that the trains can be staged directly into service at the beginning and end of their service cycles.

*Traction Power Substation*. A traction power substation (TPSS)[13] would be constructed within the proposed maintenance yard. Six substations along the route would provide power to the electrified third rail which powers the trains.

*Controls and Signals*. BART trains are controlled by a centralized computer system, and train operators do not control the trains under normal operations. Wayside computers, sensors, and signals provide redundant control systems to assure that trains maintain safe separation at all times. In the event of system problems or other incidents, the operators can take over train control at much reduced speeds. The BART extension would also require train control huts (bungalows). They would be at fewer locations than required for the Proposed Project, but the structures are larger, approximately 28 feet by 41 feet for the building, and the fenced enclosure is 76 feet by 54 feet.

[13] The TPSS would be a one-story, fenced block building approximately 65 feet by 188. This station would provide the necessary power for the 34.5 kV power cable and 1000 volt DC feeder cable that supply electricity to the BART vehicles.

*Interface with Existing Transit Services*. Because the BART Extension Alternative involves the extension of the existing BART system, it is the only alternative that would not require passengers to transfer at the Pittsburg/Bay Point BART Station. Tri Delta Transit would provide local transit connections to the Hillcrest Avenue Station. These connections would be accomplished through a reconfiguration of the existing Tri Delta Transit route system. The changes to the system would involve the elimination of routes that would duplicate the extended BART service and increases in the number of buses and routes serving the BART stations.

**Costs.** The BART Extension Alternative from Pittsburg/Bay Point Station to Hillcrest Avenue Station is projected to have a capital cost of $1.173 billion and an annual operating cost of $14.0 million (in 2009 dollars).

**Construction Scenario.** The construction activities associated with the BART Extension Alternative include minor modifications and construction at the existing Pittsburg/Bay Point BART Station; the construction of a new station in the vicinity of Hillcrest Avenue; guideway and median construction; and the construction of support facilities including parking lots and a maintenance area, as well as related reconstruction, demolition, and utility relocation and installation work.

As described in Section 2, the Project Description, Caltrans is currently widening SR 4 from approximately Loveridge Road east to the SR 160 flyover. The construction of BART service in the median of SR 4 would be coordinated with the Caltrans road widening project to the degree possible, to reduce potential adverse impacts to local residents and traffic.

Construction of the BART Extension Alternative would be completed in stages, beginning at the existing Pittsburg/Bay Point BART Station. Work would proceed eastward, with the majority of construction occurring within the SR 4 median. The schedule phases and locations described for the Proposed Project would apply to the BART Extension Alternative. Construction is projected to be complete by late 2014.

*Phase 1A (Pittsburg/Bay Point to Loveridge Road)*. Construction Phase 1A would begin at the existing Pittsburg/Bay Point Station. As the station already accommodates BART transit, only minor modifications to signage would occur at the station. No disruption in service would be anticipated. Construction would extend the existing tailtracks east of the station along the SR 4 median. Access to the median would occur primarily through the interior SR 4 east and westbound lanes. Temporary openings would be created within the existing concrete traffic barriers to allow vehicle and equipment access. Access would also occur through the easternmost end of the existing Pittsburg/Bay Point Station.

- *Guideway*. Guideway construction would occur from the Pittsburg/Bay Point Station to the east side of the Loveridge interchange. New construction would generally consist of minor grading for the guideway, track installation and, in those areas where median improvement would be required, barriers, grading, and installation of a sub-terrain

drainage system. The barriers would be constructed using cast-in-place concrete to build four-foot-high traffic barriers and top-mounted chain-link security fencing.

General construction of the guideway would begin with the removal of any existing tracks and existing gravel. Earth removal equipment would then be used to grade the median to allow even track placement. Track construction would generally consist of one layer of compacted material similar to that used for roadways, plus ballast. Rails and ties would be imported by truck and installed with specialized rail-mounted equipment. Access to the median during construction would be from the interior east and westbound lanes, as described previously. Temporary K-rail steel rod reinforced concrete traffic barriers would be provided while the BART standard concrete steel bar reinforced barrier walls are constructed.

While there are no plans for a BART station at Railroad Avenue, construction would occur within the median beneath the Railroad Avenue overpass. An electrified third rail would be constructed along the entire guideway. In order to power the third rail, construction would include the installation of underground, concrete-encased duct banks for power cables and a buried system-wide cable trench. A TPSS would be constructed directly south of SR 4 in the vacant lot west of Harbor Street. As a result of the electrified third rail, additional work would be required along the barriers to ground the traffic barrier rebar and chain-link fencing from stray volts.

- *Staging, Equipment, and Materials*. Staging areas for equipment storage and management offices would be located at two different locations along the corridor for Phase 1A. Table 5-8 identifies the staging locations and general materials that would be required for Phase 1A construction. While designated haul routes have not as yet been determined, care would be taken to utilize roadways resulting in the least adverse impact to residents and businesses. Construction of the Pittsburg/Bay Point BART Station modifications as well as the guideway and electrified third rail is anticipated to take approximately 24 months. Equipment for construction of the guideway and third rail would include equipment similar to that required by the other alternatives. While no significant structures would be constructed during Phase 1A, the TPSS and the installation of tracks would require the use of the heavy equipment identified previously, such as the boom crane.
- *Utility Relocation and Potential Service Disruptions/Traffic Delays*. This work would be performed in the same fashion as described for the other “build” alternatives.

**Table 5-8**
**Phase 1A BART Extension Alternative - Staging Locations, Equipment, and Material**

| Location | Staging Locations | Material Amount |
|---|---|---|
| Guideway | Spread across the alignment. These locations would occur on vacant lots north and south of SR 4 | 45,000 CY/3,250 truckloads of ballast and sub-ballast<br>Concrete ties and 80-foot rail lines |
| Traction Power Substation | On vacant lot south of SR 4, east of Railroad Avenue | To be determined |

*Source:* PGH Wong Engineering, *East Contra Costa County Transit Project (eBART) - Construction Implementation Report, Preliminary Engineering,* November 30, 2007.

*Phase 1B (Loveridge Road to Hillcrest Avenue)*

- *Guideway*. Construction would begin on the BART Extension Alternative guideway east of the Loveridge interchange. Most of the work along the median would require minor guideway grading and track and third rail installation, similar to work during Phase 1A. As before, access to the median would be through the interior SR 4 lanes, potentially causing traffic delays. However, these delays would occur during off-peak hours, with material delivery and traffic sensitive work occurring during the nighttime. Construction of the at-grade guideway would utilize the same processes and equipment as identified for Phase 1A. Due to the existing nature of the median, there are sections within Phase 1B that would require overpasses be constructed for track use. These are the same overpasses that are required for the other "build" project alternatives. Construction materials and techniques would also be the same, except for the installation of the electrified third rail.

- *Hillcrest Avenue Station*. The proposed Hillcrest Avenue Station would be north of SR 4 and adjacent to the UP ROW. The station would be connected to the SR 4 median guideway via an aerial structure extending over Hillcrest Avenue and the westbound SR 4 lanes. The construction techniques for the aerial flyover would be identical to those described for aerial overpasses for the Proposed Project. Station construction would be similar to that described for Phase 1A (i.e., cast-in-place, steel-reinforced concrete and formwork to construct a slightly elevated platform along with stairs) and standard building materials such as concrete, steel, aluminum, and heavy plastic for the station facilities. Construction of the maintenance facilities would utilize similar equipment and processes, as described previously.

- *Staging, Equipment, and Materials*. Table 5-9 identifies the staging locations and general materials that would be required for Phase 1B construction. Staging, equipment, and materials would be similar to the other "build" alternatives.

**Table 5-9**
**Phase 1B BART Extension Alternative - Staging Locations and Material**

| Location | Staging Locations | Material Amount |
|---|---|---|
| Guideway | Staging would occur at either locations identified at Railroad Avenue and north of SR 4, east of Hillcrest Avenue | 44,800 CY/3,200 truckloads of ballast and sub-ballast<br>Concrete ties and 80-foot rail lines |
| Hillcrest Avenue Station | Proposed Hillcrest Avenue Station parking lot, north of SR 4 | To be determined |

*Source:* PGH Wong Engineering, *East Contra Costa County Transit Project (eBART) - Construction Implementation Report, Preliminary Engineering,* November 30, 2007.

- *Utility Relocation and Potential Service Disruptions/Traffic Delays*. Utility relocation would be more intensive than those outlined for the proposed DMU project and BRT Alternative due to the propulsion methods of the BART Extension Alternative. Otherwise, utility requirements during construction, storm drainage modifications, and traffic detours along SR 4 and cross streets would be similar to the other "build" alternatives.

### Alternatives Comparison

To assist in the review and comparison of the project alternatives, Table 5-10 summarizes key attributes of each of the project alternatives.

## 5.3 ENVIRONMENTAL ANALYSIS OF PROJECT ALTERNATIVES

The purpose of this impact assessment is to identify whether the above-described alternatives would reduce the potentially significant adverse impacts identified for the Proposed Project or would generate other secondary or tertiary adverse impacts different from those identified for the Proposed Project.

In order to determine impacts for each resource, a level of significance is determined and reported in the impact statement. Conclusions of significance are defined as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as "significant and unavoidable effects (SU)."

**Table 5-10**
**Summary Comparison of eBART Project Alternatives**

| Feature/ Component | Proposed Project | No Project | BRT | LRV | BART |
|---|---|---|---|---|---|
| Technology |  Diesel Multiple Unit |  Continuation of existing Tri Delta Transit buses and BART |  Modern Bus |  Light Rail Vehicles |  BART |
| Route | About 10 miles from existing Pittsburg/Bay Point BART Station to terminus east of Hillcrest Avenue in Antioch | Continuation of existing Tri Delta transit routes | Four routes:<br>A: in the SR 4 median between the Pittsburg/Bay Point BART Station and Hillcrest BRT Station<br>B: in the SR 4 median between Pittsburg/Bay Point BART Station, then exiting and proceeding on Lone Tree Way, then along the SR 4 Bypass to Laurel Road and then back<br>C: in the SR 4 median between Pittsburg/Bay Point BART Station, past Hillcrest Avenue, onto the SR 4 Bypass, exiting at Balfour Road, and then following the existing 385 bus route through downtown Brentwood and terminating at the existing Brentwood Park-and-Ride Lot<br>D: in the SR 4 median from Pittsburg/Bay Point BART Station to Hillcrest Avenue, and then along SR 4 where it would make local stops through Oakley, Brentwood, and Discovery Bay | About 10 miles from existing Pittsburg/Bay Point BART Station to terminus east of Hillcrest Avenue in Antioch | About 10 miles from existing Pittsburg/Bay Point BART Station to terminus east of Hillcrest Avenue in Antioch |
| Stations/Stops (parking spaces in 2030) | • BART – DMU transfer platform<br>• Railroad Avenue (300)<br>• Hillcrest Avenue (2,600) | No change to existing local and express stops | Major stop at Hillcrest Avenue, multiple local and express stops along routes<br>• Railroad Avenue (300)<br>• Hillcrest Avenue (1,800) | • BART – LRV transfer platform<br>• Railroad Avenue (300)<br>• Hillcrest Avenue (2,600) | • Hillcrest Avenue (3,500) |
| Ridership (daily in 2030) | 10,100; 5,400 new transit riders | | • Option A: 10,400; 5,900 new transit riders<br>• Option B: 12,000; 6,500 new transit riders | 10,100; 5,400 new transit riders | 12,000; 6,600 new transit riders |
| Travel Times | | | | | |
| • Hillcrest to Pittsburg/ Bay Point | 10 minutes | 21 minutes | Opt. A-13 min. Opt. B, 11 min. | 10 minutes | 8 minutes |
| • Hillcrest to Oakland City Center | 53 minutes | 64 minutes | Opt. A-56 min. Opt. B, 52 min. | 53 minutes | 48 minutes |
| • Hillcrest to SF Embarcadero | 65 minutes | 76 minutes | Opt. A-68 min. Opt. B, 64 min | 65 minutes | 60 minutes |
| Fleet Size | 8 DMU vehicles, including 2 spares | | 28 buses, including 5 spares | 8 LRV trains, including 2 spares | 23 BART cars, including 3 spares |
| Maintenance Facility | DMU facility to be located east of Hillcrest Avenue Station | Existing BART facility at Concord | BRT facility to be located east of Hillcrest Avenue Station | LRV facility to be located east of Hillcrest Avenue Station | Additional BART facility to be located east of Hillcrest Avenue Station |
| Capital Costs (in millions of dollars, 2009) | $486.0 | | • Option A: $393.0<br>• Option B: $611.0 | $528.0 | $1,173 |
| Operational And Maintenance Costs (in millions of dollars, 2009) | $8.3 | | • Option A: $10.2<br>• Option B: $11.0 | $6.9 | $14.0 |

*Source:* Wilbur Smith Associates, 2008; PBS&J, 2008.

## No Project Alternative Analysis

No action would be taken under the No Project Alternative, by definition. Accordingly, under this alternative, no mitigation measures are provided for significant impacts.

### Transportation

The transportation scenario under the No Project Alternative is discussed extensively in Section 3.2, Transportation, for purposes of comparison to impacts of the Proposed Project. Please refer to Section 3.2 for the complete analysis and determination of impact significance.

**Intersection Operations.** Intersections impacts are considered significant for those intersections that would operate at unacceptable Levels of Service (LOS) under No Project Alternative conditions. The same 31 study intersections were evaluated during the AM and PM peak periods for all the alternatives. During the Year 2030 AM Peak, 7 of the 31 study intersections would operate at unacceptable LOS:

- Railroad Avenue/SR 4 WB Ramp
- Leland Road/Harbor Street
- Leland Road/Freed Avenue
- Harbor Street/California Avenue
- Hillcrest Avenue/E. 18th Street
- Larkspur Drive/Hillcrest Avenue
- Davison Drive/Hillcrest Avenue – Deer Valley Road

During the PM Peak, the following 10 intersections would operate under unacceptable conditions:

- Railroad Avenue/SR 4 EB Ramp
- Railroad Avenue/Leland Road
- Leland Road/Harbor Street
- Leland Road/Freed Avenue
- California Avenue/SR 4 WB Ramps
- Harbor Street/California Avenue
- Hillcrest Avenue/E. 18th Street
- Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway
- SR 4 EB Ramps/Hillcrest Avenue
- Davison Drive/Hillcrest Avenue – Deer Valley Road

Based on the analysis presented in Section 3.2, Year 2030 No Project intersection operations would deteriorate and congestion would increase at the above intersections. This reduction in LOS would be a significant impact. **(S)**

For comparison purposes, the Proposed Project, by diverting drivers to transit and reducing traffic demand, would improve LOS and reduce impacts at the following intersections compared to the No Project Alternative:

- Leland Road/Freed Avenue
- Larkspur Drive/Hillcrest Avenue
- Davison Drive/Hillcrest Avenue – Deer Valley Road
- California Avenue/SR 4 WB Ramps
- Harbor Street/California Avenue and Davison

**Freeway Operations.** Freeway impacts are considered significant for those freeway segments that would operate at unacceptable LOS under No Project Alternative conditions. The same 12 freeway segments along SR 4 were evaluated for both the AM and PM peak periods. During the Year 2030 AM Peak, 9 of the 12 study segments would operate at an LOS E or worse:

- West of Bailey Road (WB)
- Bailey Road – Range Road (WB)
- Range Road – Railroad Avenue (WB)
- Railroad Avenue – Loveridge Road (WB)
- Loveridge Road – Somersville Road (WB)
- Somersville Road – Contra Loma Boulevard/L Street (WB)
- Contra Loma Boulevard/L Street – A Street (WB)
- A Street – Hillcrest Avenue (WB)
- Laurel Road – Lone Tree Way (WB)

During the PM Peak, eight of the segments would operate under unacceptable conditions.

- West of Bailey Road (EB)
- Bailey Road – Range Road (EB)
- Range Road – Railroad Avenue (EB)
- Railroad Avenue – Loveridge Road (EB)
- Loveridge Road – Somersville Road (EB)
- Somersville Road – Contra Loma Boulevard/L Street (EB)
- Contra Loma Boulevard/L Street – A Street (EB/WB)
- A Street – Hillcrest Avenue (EB)

Unacceptable Year 2030 freeway operations for the segments identified above would be a significant impact of the No Project Alternative. **(S)**

For comparison purposes, the Proposed Project, by diverting drivers to transit and reducing traffic demand, would improve LOS and reduce the impacts at all of the freeway segments noted above compared to the No Project Alternative.

## Land Use

**Land Use Compatibility.** The No Project Alternative would not result in any changes to land uses within the project corridor. Instead, this alternative would rely on improvements to the Tri Delta Transit bus system, with no major transit improvements proposed for the area. In the absence of any substantive investment in transit facilities or operations, there would be no

impetus or catalyst to change existing land uses within the project corridor. On the other hand, the No Project Alternative would not result in land use conflicts or displacement. Also, because there would be no development of major transit improvements, this alternative would not result in the physical division of communities or the conversion of farmland located along the project corridor. Therefore, no significant adverse land use impacts would be anticipated to occur. Compared to the Proposed Project and the other transit alternatives, the No Project Alternative would not be effective in encouraging transit-oriented development and higher density infill development patterns within the project corridor. **(NI)**

**Consistency with Local Land Use Policies.** Although this alternative would not interfere with existing land uses, it would not support local and regional policies designed to increase transit ridership, reduce environmental impacts associated with traffic, relieve traffic congestion, and provide more transit options and greater connectivity within the Bay Area to the residents of east Contra Costa County. The cities of Pittsburg and Antioch both have policies that aim to focus development opportunities around future transit stations geared toward denser, more efficient smart growth land use patterns. The No Project Alternative would not necessarily prevent the development of these types of land use patterns, but to the extent that the Proposed Project or some other form of rapid transit system does not occur, then the desired land use patterns within Pittsburg and Antioch are less likely. This alternative would not be consistent with the General Plan policies of the Contra Costa County, City of Pittsburg, City of Antioch, and City of Oakley. As a result, the inability of the No Project Alternative to support local land use and transportation policies is considered a significant impact of this alternative. **(S)**

## Population and Housing

The population of Railroad Avenue Specific Plan and the Hillcrest Station Area Specific Plan currently underway would support the Proposed Project by providing for higher density development around proposed stations, commonly referred to as transit-oriented development. The No Project Alternative would not provide the rapid transit service or catalyst for these types of development. As such, the No Project Alternative would not be expected to induce the population and employment growth that is planned by the cities. The long-term projections for population, housing, and jobs within the project corridor would not change significantly under the No Project Alternative, but the growth is more likely to occur dispersed throughout the community in a lower-density, automobile-oriented development pattern. The No Project Alternative would not support local transit-oriented development policies, but it would not result in substantial unplanned development, loss of population, or employment due to project-related land acquisition, or displacement of housing or businesses. Therefore, for the most part, the No Project Alternative would have no direct effect on population and housing. **(NI)**

## Visual Quality

Under the No Project Alternative, there would be no implementation of an eBART project and therefore no changes to existing physical and visual conditions within the project corridor.

There would be no station platform construction or installation of passenger shelters and other passenger amenities at the platform locations. There would be no implementation of a rail guideway, no installation of utilities or signaling devices, and no construction of maintenance buildings and related fueling and repair facilities. BART facilities and equipment as currently exist at the Pittsburg/Bay Point BART Station would remain in place with no modifications to accommodate changes in storage track, pedestrian station access or other features and components of the Proposed Project east of the Pittsburg/Bay Point Station site. Also, the significant impacts identified for the Hillcrest Avenue Station parking lots due to change in visual character and glare would not occur. As a result, the No Project Alternative would not alter views, visual resources, or ambient light and glare conditions. **(NI)**

### Cultural Resources

The No Project Alternative would not involve the construction or operation of new transit service or facilities along the project corridor. Therefore, there would be no potential disturbance of known or unknown cultural deposits or human remains, and this alternative would result in no impact to cultural resources. **(NI)**

### Geology, Soils, and Seismicity

Because the No Project Alternative would not involve the construction or operation of new transit service or facilities along the project corridor, there would be no new structures subject to strong seismic groundshaking, liquefaction, lateral spreading, subsidence, or expansive/erosive soils. This alternative would not expose substantial new population to these geologic or seismic hazards. As a result, the No Project Alternative would have no impacts with respect to geology, soils, or seismicity. **(NI)**

### Hydrology and Water Quality

The No Project Alternative would not involve the construction or operation of new transit service or facilities along the project corridor. As a result, there would be no alteration to existing drainage patterns or water quality. In addition, this alternative would have no effect on flood hazards. In light of these considerations, the No Project Alternative would have no hydrologic or water quality impacts. **(NI)**

### Biological Resources

The No Project Alternative would not involve the construction or operation of new transit service or facilities along the project corridor. Therefore, this alternative would have no impacts on biological resources, sensitive habitats, or species known to occur in the project corridor. **(NI)**

## Noise and Vibration

Because the No Project Alternative would not involve the construction or operation of new transit service or facilities along the project corridor, there would be no change in ambient noise or vibration levels. This alternative would not expose substantial new population to noise or vibration impacts. As a result, the No Project Alternative would have no impacts with respect to noise or vibration. **(NI)**

## Air Quality

**CO Concentrations from Traffic at Congested Intersections.** No additional stations would be built under the No Project Alternative, so there would be no project-associated traffic entering or leaving station areas that could worsen intersection operations and adversely affect CO levels. Under No Project conditions, the project area attains state ambient CO standards. The area is expected to continue to meet state ambient CO standards, as there has been a downward trend in ambient CO concentrations for the past 20 years. **(NI)**

**Greenhouse Gas, Regional Criteria Pollutants, and Toxic Air Contaminant (TAC) Emissions**. Greenhouse gas, criteria pollutant, and TAC emission levels would continue to follow current trends as projected for future conditions without the Proposed Project. Greenhouse emissions, in terms of carbon dioxide ($CO_2$), would continue to increase as regional vehicle miles traveled (VMT) would continue to increase under the No Project Alternative. However, criteria pollutant and TAC emissions would decrease between 2007 and 2030 under the No Project Alternative due to improved tailpipe emission standards in future vehicle model years, with the exception of particulate matter, which would increase slightly due to tire/brake wear.

This alternative would not support the Bay Area's Clean Air Plan[14] which specifically calls for a rapid transit system for east Contra Costa County and relies on this improvement to attain air quality standards because the rapid transit system would reduce VMT further. Because the No Project Alternative would conflict with the Clean Air Plan and not support regional and state efforts to reduce greenhouse gas emissions, the impacts to air quality would be significant. **(S)**

## Public Health and Safety

Because the No Project Alternative would not involve the construction or operation of new transit service or facilities in the project corridor, this alternative would not expose people to existing soil or ground water contamination; involve the use, handling, or disposal of hazardous materials; or increase the risk of potential accidents. Similarly, since there would be no additional improvements to the transit system, there would be no greater risk from terrorist

[14] Bay Area Air Quality Management District. Bay Area 2005 Ozone Strategy. Available at: http://www.baaqmd.gov/pln/plans/ozone/2005_strategy/adoptedfinal_vol1.pdf, Table 13. Accessed on February 12, 2008.

attacks than under current conditions. As a result, the No Project Alternative would have no impacts on public health and safety. **(NI)**

### Community Services

The No Project Alternative would not create an increased demand for police or fire protection services, since transit improvements under this alternative would be minimal. As a result, this alternative would have no impacts on community services. **(NI)**

### Utilities

The No Project Alternative would have no effect on utility service due to relocation of utilities, since it would not involve construction or excavation. The No Project Alternative would result in a limited increase in demand for water and wastewater capacity, since the proposed service expansion would be modest and could slightly increase water consumption for bus maintenance. Because the increase in utility demand would be minimal, no adverse impacts to utilities are anticipated for the No Project Alternative. **(LTS)**

### Energy

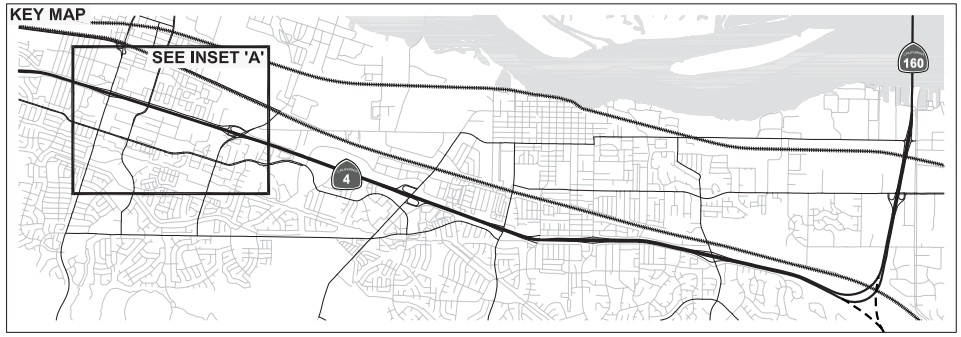
The No Project Alternative would have a limited effect on energy consumption due to the modest increases in bus service by Tri Delta Transit. The increase in service would be consistent with the planned improvements by Tri Delta Transit and would not use energy resources in a wasteful or inefficient manner. Even with the increases in bus services, overall vehicle miles traveled in the region is expected to increase by about 30 percent in 2030 compared to 2007 levels, thereby increasing overall transportation energy usage. The No Project Alternative would not offer substantial improvements in net regional energy consumption. **(S)**

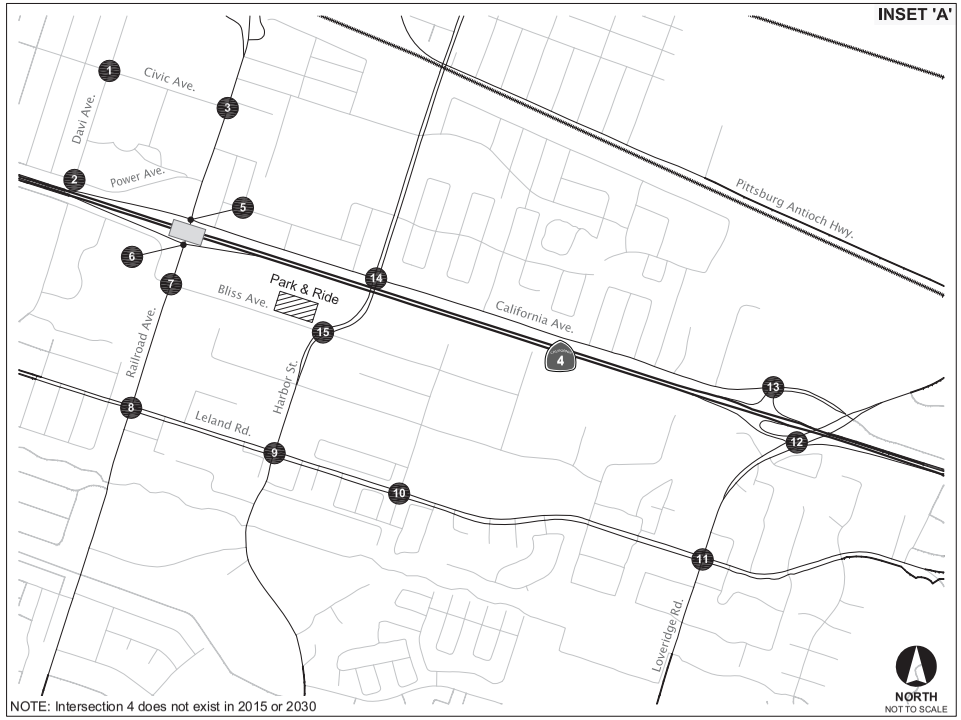
## Bus Rapid Transit (BRT) Alternative

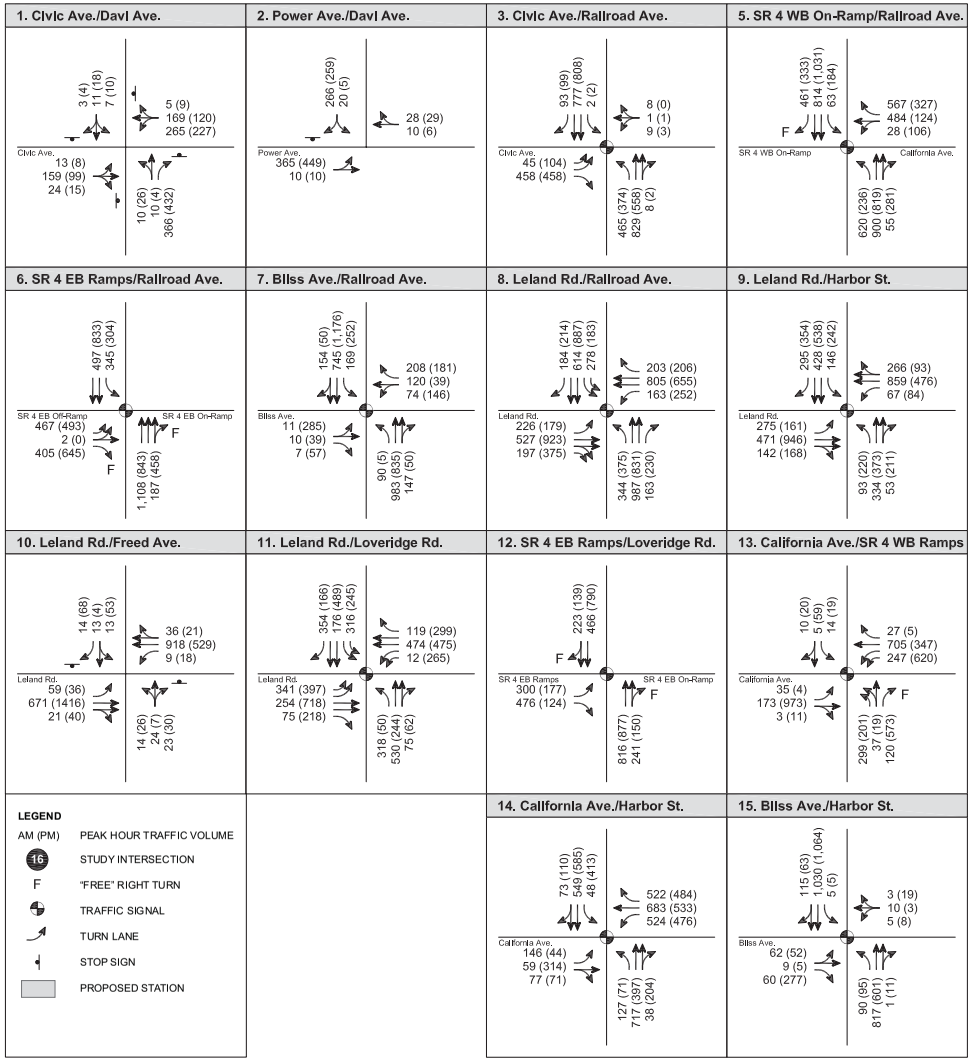
### Transportation

In the following assessment, the intersection and freeway segment analysis was performed for Option A only, because the impacts of the two options under consideration are expected to be similar, varying only slightly in proportion to forecasted ridership.

**Intersection Operations.** Intersection level of service (LOS) was evaluated at the same 31 study intersections as studied for the Proposed Project. The BRT Alternative intersection analysis is based on a projection of vehicle trips from the adjusted CCTA model. The intersection volumes are shown in Figures 5-11 and 5-12. A summary of the study intersection LOS for the BRT Alternative compared to the No Project and Proposed Project conditions is shown in Table 5-11 (AM Peak) and Table 5-12 (PM Peak). The BRT Alternative involves several different routes along which the buses operate. Some of these routes would potentially

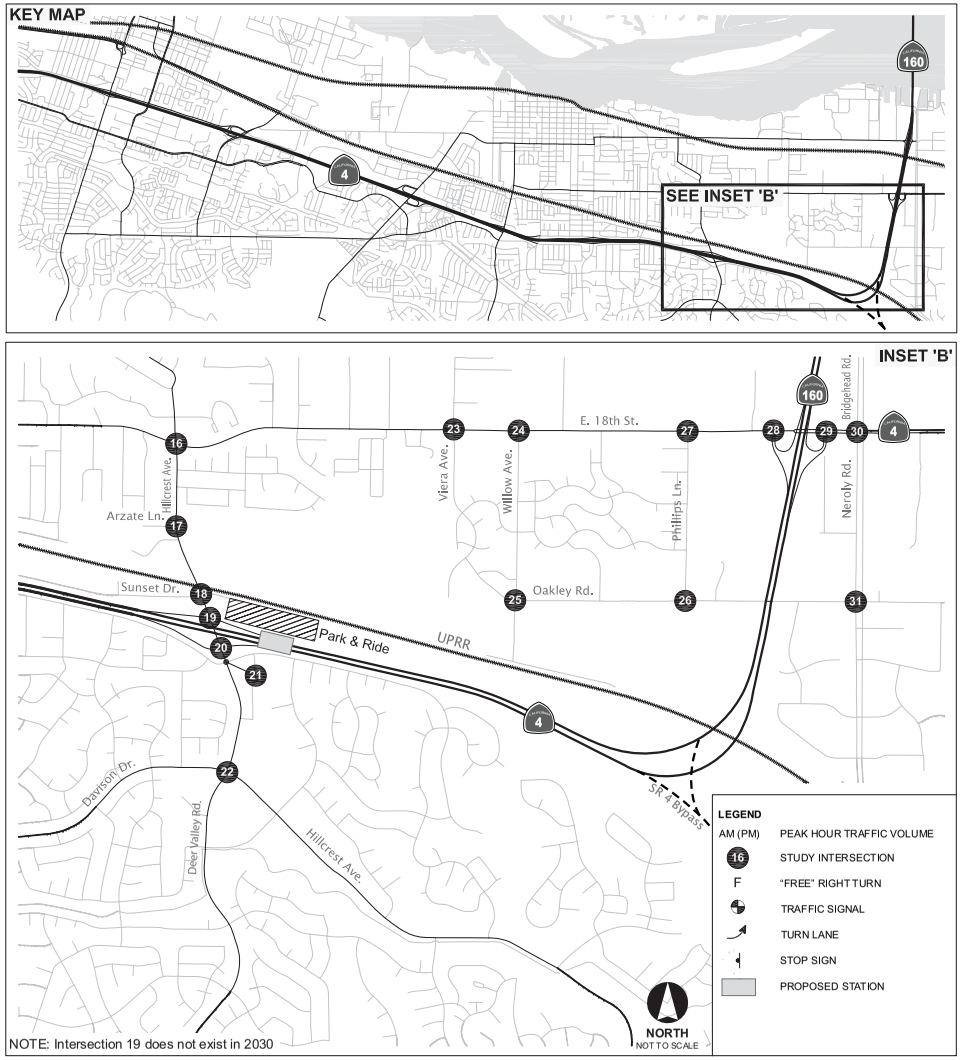


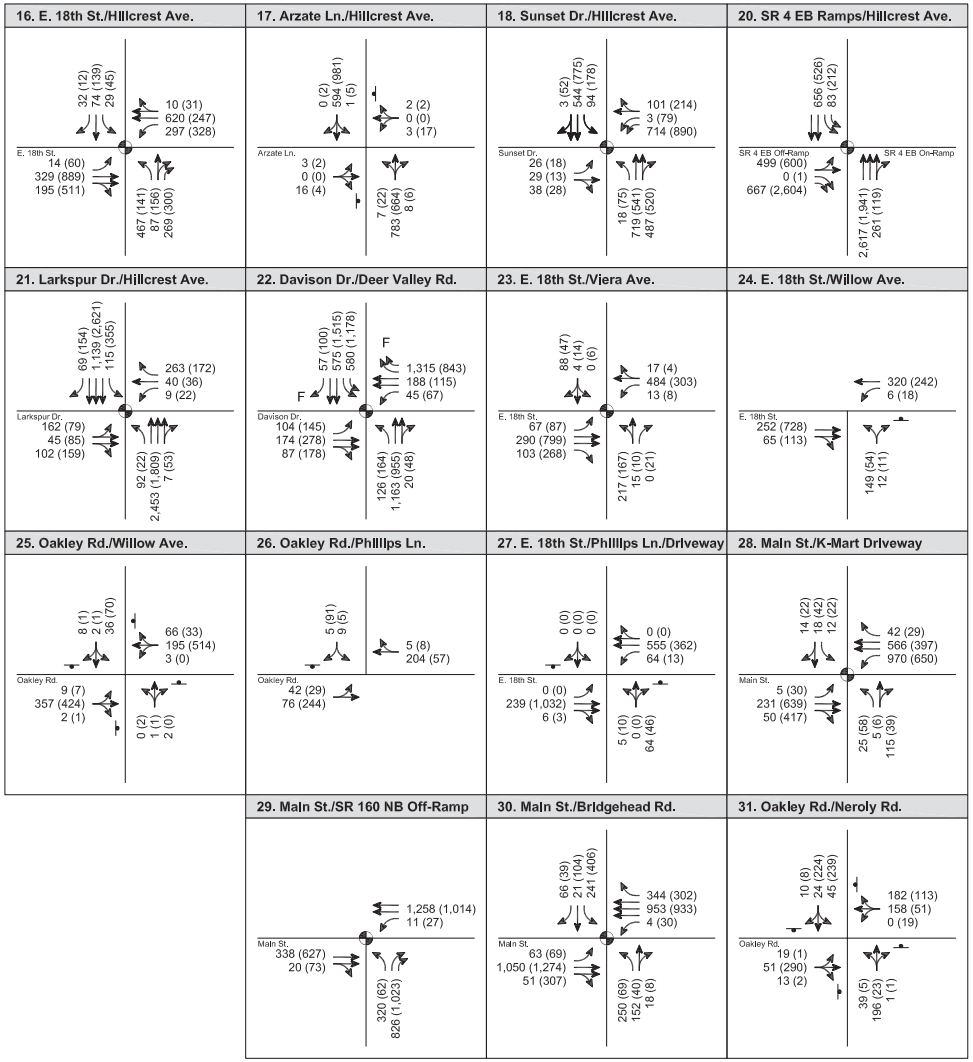




Source: WSA, 2008.

**RAILROAD AVENUE AREA INTERSECTIONS – YEAR 2030 WITH BRT ALTERNATIVE**
FIGURE 5-11




Source: WSA, 2008.

**HILLCREST AVENUE AREA INTERSECTIONS – YEAR 2030 WITH BRT ALTERNATIVE**
FIGURE 5-12

**Table 5-11**
**BRT Alternative – 2030 AM Peak Hour Intersection Operation**

| | | BRT Alternative | | | No Project | | | Proposed Project | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | V/C | Delay | LOS | V/C | Delay | LOS | V/C | Delay | LOS |
| 1 | Civic Avenue – W.17th Street/Davi Avenue | | 19.7 | C | | 27.2 | D | | 19.7 | C |
| 2 | Power Avenue/Davi Avenue | 0.36 | 11.5 | B | 0.44 | 12.4 | B | | 11.5 | B |
| 3 | Railroad Avenue/Civic Avenue | 0.74 | 31.8 | C | 0.85 | 43.2 | D | 0.74 | 31.9 | C |
| 4 | Railroad Avenue/Center Drive | Not present in future | | | Not present in future | | | Not present in future | | |
| 5 | Railroad Avenue/SR 4 WB On-ramp | 1.05 | 51.4 | D | **1.33** | **>80** | **F** | 1.05 | 45 | D |
| 6 | Railroad Avenue/SR 4 EB Ramps | 0.75 | 22.8 | C | 0.85 | 21.4 | C | 0.75 | 21.3 | C |
| 7 | Railroad Avenue/Bliss Avenue | 0.69 | 21.4 | C | 0.94 | 23.7 | C | 0.69 | 18.7 | B |
| 8 | Railroad Avenue/Leland Road | 0.93 | 43.1 | D | 0.93 | 55.6 | E | 0.90 | 45.0 | D |
| 9 | Leland Road/Harbor Street | 0.96 | 36.6 | D | **1.15** | **>80** | **F** | 0.91 | 40.8 | D |
| 10 | Leland Road/Freed Avenue | **1.42 (SB)** | **>50 (SB)** | **F** | **3.18** | **>50 (SB)** | **F** | **1.41 (SB)** | **>50 (SB)** | **F** |
| 11 | Leland Road/Loveridge Road | 0.70 | 33.3 | C | 0.75 | 42.6 | D | 0.70 | 40.6 | D |
| 12 | Loveridge Road/SR 4 EB Ramps | 0.67 | 9.0 | A | 0.77 | 13.2 | B | 0.64 | 10.2 | B |
| 13 | California Avenue/SR 4 WB Ramps | 0.72 | 19.9 | B | 0.81 | 36.1 | D | 0.71 | 20.5 | C |
| 14 | Harbor Street/California Avenue | 0.86 | 41.5 | D | **1.09** | **>80** | **F** | 0.83 | 41.4 | D |
| 15 | Harbor Street/Bliss Avenue | 0.66 | 9.0 | A | 1.05 | 47.1 | D | 0.63 | 9.6 | A |
| 16 | Hillcrest Avenue/E. 18th Street | 0.90 | 47.7 | D | **0.93** | **60.2** | **E** | 0.90 | 47.7 | D |
| 17 | Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway | 0.04 (WB) | 15.5 (WB) | C | 0.03 (WB) | 12.4 (WB) | B | 0.09 (EB) | 11.7 (EB) | B |
| 18 | Sunset Drive/Hillcrest Avenue | 0.85 | 30.3 | C | 0.78 | 31.7 | C | 0.87 | 32.3 | C |

**Table 5-11**
**BRT Alternative – 2030 AM Peak Hour Intersection Operation**

| | | BRT Alternative | | | No Project | | | Proposed Project | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | V/C | Delay | LOS | V/C | Delay | LOS | V/C | Delay | LOS |
| 19 | SR 4 WB Ramps/Hillcrest Avenue | Not present in future | | | Not present in future | | | Not present in future | | |
| 20 | SR 4 EB Ramps/Hillcrest Avenue | 1.11 | 52.9 | D | 1.04 | 52.8 | D | **1.12** | **56** | **E** |
| 21 | Larkspur Drive/Hillcrest Avenue | **1.02** | **59.5** | **E** | **1.09** | **67.1** | **E** | **1.04** | **63.4** | **E** |
| 22 | Davison Drive/Hillcrest Avenue – Deer Valley Road | **1.13** | **>80** | **F** | **1.15** | **>80** | **F** | **1.15** | **>80** | **F** |
| 23 | E. 18th Street/Viera Avenue | 0.85 | 44.9 | D | 0.85 | 47.1 | D | 0.85 | 44.9 | D |
| 24 | E. 18th Street/Willow Avenue | 0.54 (NB) | 25.1 (NB) | D | 0.54 (NB) | 26.1 (NB) | D | 0.54 (NB) | 25.1 (NB) | D |
| 25 | Oakley Road/Willow Avenue | | 14.3 | B | | 14.2 | B | | 14.3 | B |
| 26 | Philips Lane/Oakley Road | 0.04 (SB) | 11.0 (SB) | B | 0.05 (SB) | 10.9 (SB) | B | 0.04 (SB) | 11.0 (SB) | B |
| 27 | E. 18th Street/Philips Lane – Dirt Driveway. | 0.14 (NB) | 10.5 (NB) | B | 0.09 (NB) | 10.4 (NB) | B | 0.14 (NB) | 10.5 (NB) | B |
| 28 | SR 4 WB Ramps– K-Mart Driveway/Main Street | 0.77 | 18.9 | B | 0.84 | 26 | C | 0.76 | 18.8 | B |
| 29 | Main Street/SR 160 NB Ramps | 0.67 | 19.8 | B | 0.73 | 19.3 | B | 0.67 | 21.8 | C |
| 30 | Main Street/Neroly Road – Bridgehead Road | 0.78 | 33.8 | C | 0.79 | 42 | D | 0.77 | 36.4 | D |
| 31 | Oakley Road/Neroly Road | | 12.1 | B | | 15.6 | C | | 12.1 | B |

*Source:* Wilbur Smith Associates, April 2008

*Notes:*

Delay presented in seconds per vehicle.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

**Bold** type indicates unacceptable values.

**Table 5-12**
**BRT Alternative – 2030 PM Peak Hour Intersection Operation**

| | | BRT Alternative | | | No Project | | | Proposed Project | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | V/C | Delay | LOS | V/C | Delay | LOS | V/C | Delay | LOS |
| 1 | Civic Avenue – W.17th Street/Davi Avenue | | 17.0 | C | | 32.4 | D | | 17 | C |
| 2 | Power Avenue/Davi Avenue | 0.30 | 10.3 | B | 0.38 | 11 | B | | 10.3 | B |
| 3 | Railroad Avenue/Civic Avenue | 0.66 | 23.6 | C | 0.74 | 26.4 | C | 0.62 | 25.3 | C |
| 4 | Railroad Avenue/Center Drive | Not present in future | | | Not present in future | | | Not present in future | | |
| 5 | Railroad Avenue/SR 4 WB On-ramp | 0.71 | 16.6 | B | 0.9 | 24.2 | C | 0.7 | 18.5 | B |
| 6 | Railroad Avenue/SR 4 EB Ramps | 1.02 | 30.9 | C | **1.11** | **56.4** | **E** | 0.99 | 32 | C |
| 7 | Railroad Avenue/Bliss Avenue | 0.98 | 46.8 | D | 0.93 | 30.1 | C | 0.93 | 33.1 | C |
| 8 | Railroad Avenue/Leland Road | 1.10 | 73.6 | E | **1.27** | **>80** | **F** | 1.15 | 67.8 | E |
| 9 | Leland Road/Harbor Street | 0.91 | 45.3 | D | **1.03** | **71.7** | **E** | 0.91 | 41 | D |
| 10 | Leland Road/Freed Avenue | **2.66 (NB)** | **>50 (NB)** | **F** | **7.38** | **>50 (NB)** | **F** | **2.65 (NB)** | **>50 (NB)** | **F** |
| 11 | Leland Road/Loveridge Road | 0.63 | 25.8 | C | 0.71 | 32.8 | C | 0.59 | 26.7 | C |
| 12 | Loveridge Road/SR 4 EB Ramps | 0.49 | 6.9 | A | 0.71 | 7.2 | A | 0.47 | 8.9 | A |
| 13 | California Avenue/SR 4 WB Ramps | **1.11** | **78** | **E** | **1.24** | **>80** | **F** | **1.10** | **77.9** | **E** |
| 14 | Harbor Street/California Avenue | **1.10** | **74.9** | **E** | **1.3** | **>80** | **F** | **1.09** | **73.9** | **E** |
| 15 | Harbor Street/Bliss Avenue | 0.60 | 10.4 | B | 0.7 | 17.3 | B | 0.51 | 15.3 | B |
| 16 | Hillcrest Avenue/E. 18th Street | **1.00** | **73.7** | **E** | **0.99** | **72.9** | **E** | **1.00** | **73.7** | **E** |
| 17 | Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway | 0.18 (WB) | 19.0 (WB) | C | **0.19** | **19.5 (WB)** | **C** | 0.18 (WB) | 19.0 (WB) | C |
| 18 | Sunset Drive/Hillcrest Avenue | **1.00** | **72** | **E** | 0.88 | 40.6 | D | 1.11 | >80 | **F** |

**Table 5-12**
**BRT Alternative – 2030 PM Peak Hour Intersection Operation**

| | | BRT Alternative | | | No Project | | | Proposed Project | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | V/C | Delay | LOS | V/C | Delay | LOS | V/C | Delay | LOS |
| 19 | SR 4 WB Ramps/Hillcrest Avenue | Not present in future | | | Not present in future | | | Not present in future | | |
| 20 | SR 4 EB Ramps/Hillcrest Avenue | **1.64** | **>80** | **F** | **1.64** | **>80** | **F** | **1.72** | **>80** | **F** |
| 21 | Larkspur Drive/Hillcrest Avenue | 0.85 | 33.2 | C | 0.9 | 38.4 | D | 0.85 | 33.5 | C |
| 22 | Davison Drive/Hillcrest Avenue – Deer Valley Road | 0.92 | 54.6 | D | **0.98** | **67** | **E** | **0.92** | **55.6** | **E** |
| 23 | E. 18th Street/Viera Avenue | 0.57 | 17.2 | B | 0.57 | 18.2 | B | 0.57 | 17.2 | B |
| 24 | E. 18th Street/Willow Avenue | 0.29 (NB) | 23.0 (NB) | C | 0.25 | 22.0 (NB) | C | 0.29 (NB) | 23.0 (NB) | C |
| 25 | Oakley Road/Willow Avenue | | 34.8 | D | | 29.6 | D | | 34.8 | D |
| 26 | Philips Lane/Oakley Road | 0.13 (SB) | 9.3 (SB) | A | 0.15 (SB) | 9.4 (SB) | A | 0.13 (SB) | 9.3 (SB) | A |
| 27 | E. 18th Street/Philips Lane – Dirt Driveway. | 0.29 (NB) | 23.6 (NB) | C | 0.20 (NB) | 26.4 (NB) | D | 0.29 (NB) | 23.6 (NB) | C |
| 28 | SR 4 WB Ramps– K-Mart Driveway/Main Street | 0.85 | 32.2 | C | 0.8 | 36.7 | D | 0.85 | 32.2 | C |
| 29 | Main Street/SR 160 NB Ramps | 0.66 | 18.4 | B | 0.76 | 35.7 | D | 0.66 | 18.4 | B |
| 30 | Main Street/Neroly Road – Bridgehead Road | 0.88 | 48.8 | D | 0.93 | 50.6 | D | 0.88 | 48.8 | D |
| 31 | Oakley Road/Neroly Road | | 23.2 | C | | 24.6 | C | | 23.2 | C |

*Source:* Wilbur Smith Associates, April 2008

*Notes:*

Delay presented in seconds per vehicle.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

**Bold** type indicates unacceptable values.

impact intersections beyond the 31 study intersections considered in the analysis. However, it was determined that the number of additional buses that would operate on these streets would not be sufficient to create any noticeable change in traffic conditions. The affected streets already experience bus traffic, and the net effect would be a small incremental increase in the number of buses operating.

Under the BRT Alternative, during the Year 2030 AM peak conditions, three of the study intersections would operate at unacceptable conditions, meaning worse than the threshold specified by its jurisdiction:

- Leland Road/Freed Avenue
- Larkspur Drive/Hillcrest Avenue
- Davison Drive/Hillcrest Avenue – Deer Valley Road

During the PM peak, six of the study intersections would operate at unacceptable conditions:

- Leland Road/Freed Avenue
- California Avenue/SR 4 WB Ramps
- Harbor Street/California Avenue
- Hillcrest Avenue/E. 18th Street
- Sunset Drive/Hillcrest Avenue
- SR 4 EB Ramps/Hillcrest Avenue

For this analysis, an impact is identified if the alternative results in deterioration in LOS compared to the No Project Alternative and the intersection does not meet the LOS standards of its jurisdiction.

*Comparison to No Project*. Of the intersections identified above, only the intersection of Sunset Drive/Hillcrest Avenue during the PM Peak would experience deterioration in LOS under the BRT Alternative compared to the No Project scenario. Thus, the intersection would be significantly impacted. **(S)**

MITIGATION MEASURES. Implementation of the same mitigation measure recommended for the Proposed Project for this intersection (Mitigation Measure TR-2.2) would improve the LOS to meet the standards. The resulting change in LOS is summarized in Table 5-13 and would reduce the impact to less than significant. **(LTS)**

**Table 5-13**
**BRT Alternative – 2030 Mitigated Intersection Operations**

| | | BRT Alternative | | | Mitigated | | |
|---|---|---|---|---|---|---|---|
| **Intersection** | **Peak** | **V/C** | **Delay** | **LOS** | **V/C** | **Delay** | **LOS** |
| Sunset Drive/Hillcrest Avenue | PM | 1.00 | 72.0 | E | 0.82 | 32.2 | C |

*Source:* Wilbur Smith Associates, April 2008.

*Comparison to Proposed Project*. During the AM peak period in Year 2030, the BRT Alternative would result in a worse LOS compared to the Proposed Project at the following two intersections:

- Railroad Avenue/Bliss Avenue
- Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway

As with the Proposed Project, the BRT Alternative also shows improved operations at six of the 31 study intersections compared to the Proposed Project.

During the PM peak, the BRT Alternative would result in a worse LOS at the intersection of Railroad Avenue/Bliss Avenue compared to the Proposed Project. Also, two of the study intersections would experience an improvement in LOS over the Proposed Project.

**Freeway Operations.** Freeway segment service levels were used to evaluate traffic impacts of the BRT Alternative and also for comparison to the No Project Alternative and the Proposed Project. A summary of the freeway segment LOS for the three alternatives is shown in Table 5-14 (AM Peak) and Table 5-15 (PM Peak).

As shown in Table 5-11, during the Year 2030 AM Peak, eight of the nine freeway segments identified as impacted under No Project conditions (the exception is Laurel Road – Lone Tree Way) operate worse than LOS D in the westbound direction with the BRT Alternative. As shown in Table 5-12, during the PM Peak, seven of the eight freeway segments that operate worse than LOS D with the No Project Alternative (the exception is A Street – Hillcrest Avenue) would also experience unacceptable levels of congestion with the BRT Alternative, including one in both directions.

*Comparison to No Project*. During both the AM and PM peak periods, the BRT Alternative results in no significant deterioration in LOS along the freeway compared to the No Project scenario. Also, two of the segments during the AM peak and four of the segments during the PM peak would experience an improvement in LOS over the No Project scenario. In addition, all segments operate at an LOS equal to or better than 2030 No Project conditions. Thus, this impact is beneficial. **(B)**

*Comparison to Proposed Project*. During both the AM and PM peak periods, the BRT Alternative results in no significant deterioration in LOS along the freeway compared to the Proposed Project. Also, the BRT Alternative improves LOS on one segment in the AM peak and one segment in the PM peak as compared to the Proposed Project.

**Parking.** Parking demand was estimated by using the projected number of park-and-ride passengers and average auto occupancy rates for access to both stations. Table 5-16 shows the estimated parking demand for both options of the BRT Alternative, along with the planned number of parking spaces at the stations. This parking demand estimate is based on unconstrained travel demand forecasts, without consideration of the number of actual proposed spaces. In the Year 2030, the BRT Alternative would result in a parking shortfall of 74 spaces

**Table 5-14**
**BRT Alternative – 2030 AM Freeway Segment Operation**

| Segment | BRT Alternative | | | | No Project | | | | Proposed Project | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | | WB | | EB | | WB | | EB | | WB | |
| | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS |
| West of Bailey Road | 22.8 | C | **> 45** | **F** | 22.9 | C | **> 45** | **F** | 22.8 | C | **> 45** | **F** |
| Bailey Road – Range Road | 26.5 | D | **> 45** | **F** | 26.7 | D | **> 45** | **F** | 26.6 | D | **> 45** | **F** |
| Range Road – Railroad Avenue | 26.3 | D | **> 45** | **F** | 26.7 | D | **> 45** | **F** | 26.4 | D | **> 45** | **F** |
| Railroad Avenue – Loveridge Road | 24.6 | C | **> 45** | **F** | 25.4 | C | **> 45** | **F** | 24.6 | C | **> 45** | **F** |
| Loveridge Road – Somersville Road | 23.6 | C | **> 45** | **F** | 25.4 | C | **> 45** | **F** | 23.7 | C | **> 45** | **F** |
| Somersville Road – L Street | 24.0 | C | **> 45** | **F** | 25.9 | C | **> 45** | **F** | 24.1 | C | **> 45** | **F** |
| L Street – A Street | 24.0 | C | **> 45** | **F** | 26.1 | D | **> 45** | **F** | 24.1 | C | **> 45** | **F** |
| A Street – Hillcrest Avenue | 19.5 | C | **> 45** | **F** | 21.0 | C | **> 45** | **F** | 19.6 | C | **> 45** | **F** |
| Hillcrest Avenue – SR 160 | 15.6 | B | 28.5 | D | 16.3 | B | 32.6 | D | 15.7 | B | 29.7 | D |
| SR 160 – Laurel Road[a] | 17.0 | B | 30.6 | D | 17.5 | B | 33.5 | D | 17.1 | B | 32.4 | D |
| Laurel Road – Lone Tree Way[a] | 16.8 | B | 33.3 | D | 17.4 | B | **37.0** | **E** | 16.9 | B | **35.1** | **E** |
| SR 4 Ramp – 18th Street | 23.1 | C | 19.2 | C | 24.5 | C | 21.7 | C | 23.1 | C | 19.2 | C |

*Source:* Wilbur Smith Associates, April 2008.

*Notes:*

**Bold** type indicates unacceptable values

a. HOV lane not present

**Table 5-15**
**BRT Alternative– 2030 PM Freeway Segment Operation**

| | BRT Alternative | | | | No Project | | | | Proposed Project | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | | WB | | EB | | WB | | EB | | WB | |
| Segment | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS |
| West of Bailey Road | **> 45** | **F** | 24.1 | C | **> 45** | **F** | 24.7 | C | **> 45** | **F** | 24.2 | C |
| Bailey Road – Range Road | **> 45** | **F** | 26.9 | D | **> 45** | **F** | 27.1 | D | **> 45** | **F** | 27.0 | D |
| Range Road – Railroad Avenue | **> 45** | **F** | 26.2 | D | **> 45** | **F** | 26.6 | D | **> 45** | **F** | 26.3 | D |
| Railroad Avenue – Loveridge Road | **> 45** | **F** | 29.3 | D | **> 45** | **F** | 30.8 | D | **> 45** | **F** | 29.5 | D |
| Loveridge Road – Somersville Road | **> 45** | **F** | 31.3 | D | **> 45** | **F** | 32.8 | D | **> 45** | **F** | 31.4 | D |
| Somersville Road – L Street | **41.3** | **E** | 30.1 | D | **> 45** | **F** | 32.4 | D | **41.6** | **E** | 30.2 | D |
| L Street – A Street | **> 45** | **F** | **35.4** | **E** | **> 45** | **F** | **36.4** | **E** | **> 45** | **F** | **35.6** | **E** |
| A Street – Hillcrest Avenue | 30.9 | D | 29.3 | D | **37.6** | **E** | 30.5 | D | 30.9 | D | 29.5 | D |
| Hillcrest Avenue – SR 160 | 16.2 | B | 18.7 | C | 14.2 | B | 18.4 | C | 16.9 | B | 18.8 | C |
| SR 160 – Laurel Road[a] | 17.8 | B | 19.7 | C | 19.3 | C | 21.0 | C | 18.8 | C | 19.8 | C |
| Laurel Road – Lone Tree Way[a] | 19.9 | C | 19.2 | C | 21.1 | C | 19.5 | C | 20.7 | C | 19.4 | C |
| SR 4 Ramp – 18th Street | 19.0 | C | 25.3 | C | 21.3 | C | 27.2 | D | 19.0 | C | 25.3 | C |

*Source:* Wilbur Smith Associates, April 2008.

*Notes:*

**Bold** type indicates unacceptable values

a. HOV lane not present

for Option A and 132 spaces for Option B at the Railroad Avenue Station, compared to a shortfall of 65 spaces for the Proposed Project. As part of the Specific Plan for the Railroad Avenue Station area which is being prepared by the City of Pittsburg, the amount of transit-related parking would be limited to discourage auto access to transit in order to support the transit village concept of the plan. The parking deficit could result in spillover into neighboring residential or commercial areas, making this a significant impact. **(S)**

MITIGATION MEASURE. The same measures identified for the Proposed Project to reduce the impact of parking demand (Mitigation Measure TR-7.1) would be applicable to the BRT Alternative in the area around the proposed Railroad Avenue Station. The implementation of these measures would reduce this impact to less than significant. **(LTS)**

**Table 5-16**
**BRT Alternative – Station Parking Demand, Year 2030**

| | Option A | | Option B | |
|---|---|---|---|---|
| | **Railroad Avenue** | **Hillcrest Avenue** | **Railroad Avenue** | **Hillcrest Avenue** |
| Riders Using Parking | 390 | 1,240 | 450 | 1,494 |
| Auto Occupancy | 1.04 | 1.06 | 1.04 | 1.06 |
| Parking Demand | 374 | 1,170 | 432 | 1,409 |
| Parking Supply | 300 | 1,800 | 300 | 1,800 |
| Occupancy | 125% | 65% | 144% | 78% |
| Excess Demand | 74 | --- | 132 | --- |

*Source:* Wilbur Smith Associates, 2008.

**BART Ridership and System Capacity.** The BRT Alternative is expected to generate 5,900 and 6,500 new transit trips on the BART system for Options A and B, respectively. This would result in a greater average peak hour load factor (riders/per car) on the BART system than with the Proposed Project. This comparison is shown in Table 5-17. BART's operations staff has determined that an average load of 112 passengers per car represents a realistic measure of practical train capacity. However, BART has ongoing programs of fleet expansion, train control system enhancement, and fleet modernization which are designed to address the capacity needs of system and would be adequate to accommodate the increased loads associated with the BRT options. Conservatively, it is has been estimated that these improvements would increase the acceptable average load to 124 persons per vehicle and reduce the number of seats per vehicle to 59. An average load of 124 passengers per car and 59 seats represents a load factor of 2.10 passengers per seat. BRT Option B would have the highest load factors in the year 2030, with a 2.04 load factor in the Transbay Tube in the PM peak hour as compared with a 2.02 load factor for the Proposed Project. Both of these load factors are below the 2.10 factor, which represents practical capacity. **(LTS)**

**Table 5-17**
**BRT Alternative -- Average Load Factor[a], Year 2030**

| | Westbound AM Peak | | | Eastbound PM Peak | | |
|---|---|---|---|---|---|---|
| | BRT Option A | BRT Option B | Proposed Project | BRT Option A | BRT Option B | Proposed Project |
| Pittsburg/Bay Point[b] | | | | 0.79 | 0.83 | 0.77 |
| North Concord/Martinez | 0.76 | 0.80 | 0.74 | 0.94 | 0.97 | 0.92 |
| Concord | 0.93 | 0.97 | 0.92 | 1.31 | 1.34 | 1.29 |
| Pleasant Hill | 0.80 | 0.82 | 0.80 | 1.11 | 1.13 | 1.11 |
| Walnut Creek | 1.18 | 1.20 | 1.17 | 1.32 | 1.34 | 1.31 |
| Lafayette | 1.41 | 1.43 | 1.40 | 1.46 | 1.48 | 1.45 |
| Orinda | 1.53 | 1.55 | 1.52 | 1.59 | 1.61 | 1.59 |
| Rockridge | 1.66 | 1.67 | 1.65 | 1.82 | 1.84 | 1.81 |
| MacArthur | 1.84 | 1.86 | 1.83 | 1.82 | 1.84 | 1.81 |
| 19th Street/Oakland | 1.92 | 1.93 | 1.91 | 1.75 | 1.76 | 1.74 |
| 12th Street/Oakland City Center | 1.83 | 1.85 | 1.83 | 1.97 | 1.98 | 1.97 |
| West Oakland | 1.72 | 1.73 | 1.72 | 2.02 | 2.04 | 2.02 |
| Embarcadero | 1.80 | 1.81 | 1.79 | 1.36 | 1.37 | 1.36 |
| Montgomery St. | 1.14 | 1.15 | 1.14 | 0.70 | 0.70 | 0.70 |
| Powell St. | 0.91 | 0.92 | 0.91 | 0.76 | 0.76 | 0.75 |
| Civic Center | 0.70 | 0.71 | 0.70 | 0.38 | 0.38 | 0.37 |
| 16th Street Mission | 0.38 | 0.38 | 0.38 | 0.29 | 0.29 | 0.29 |
| 24th Street Mission | 0.31 | 0.31 | 0.31 | 0.22 | 0.22 | 0.22 |
| Glen Park | 0.27 | 0.27 | 0.26 | 0.19 | 0.19 | 0.19 |
| Balboa Park | 0.25 | 0.25 | 0.25 | 0.06 | 0.06 | 0.06 |
| Daly City[b] | 0.06 | 0.06 | 0.06 | | | |

*Source:* Wilbur Smith Associates, April 2008.

*Notes:*

a. Load Factor is defined as the ratio of passengers carried versus the total passenger seating capacity of the train.

b. The load factor represents the load on the trains arriving at the station. For this reason, there are no loads shown at Pittsburg/Bay Point westbound, and Daly City eastbound.

## Land Use

**Land Use Compatibility.** Within the segment of the Pittsburg/Antioch SR 4 corridor, the BRT Alternative (Route A) would follow the same route as the Proposed Project, from the Pittsburg/Bay Point Station to the proposed Hillcrest Avenue Station, via bus-only guideways within the SR 4 median. Since buses on Route A would operate along the same alignment as the Proposed Project, the same less-than-significant impacts identified for the Proposed Project would apply to the BRT Alternative. The development of the station facilities and expansion of the park-and-ride lot would not conflict with the surrounding uses. The Railroad Avenue BRT Station in the median of SR 4 would be physically separated from nearby land uses by the SR 4 traffic lanes and would not interfere with the activities and character of the uses to the north and south, beyond the SR 4 right-of-way. The Hillcrest Avenue BRT Station and park-and-ride lot are proposed for a vacant area between SR 4 and the UP ROW, so there are no existing sensitive uses that could be adversely affected by bus operations. While bus service from SR 4 to the Hillcrest Avenue BRT Station would operate along existing rights-of-way under Option A, Option B would disrupt undeveloped land to the west of the station during tunnel construction; however, this would be temporary.

Outside the Pittsburg/Antioch SR 4 corridor, bus routes, stops, and park-and-ride lots under the BRT Alternative would introduce transit service and facilities into areas that are neither served nor affected by the Proposed Project. On these other routes, buses would operate along existing streets or the SR 4 Bypass. The only construction within the communities along Routes B, C, and D would be for bus stops. The bus stops would represent only minor changes in land use, since they would not introduce substantial structures that could contrast with neighboring uses. Their presence would not be expected to adversely affect the operations, activities, or character of surrounding uses, since the hours of operation and the intensity of use would not conflict with existing uses. **(LTS)**

**Division of an Established Community.** By operating BRT service along existing streets (e.g., Lone Tree Way, SR 4, and the SR 4 Bypass), the BRT Alternative under Option A would not result in new physical or visual barriers within the surrounding communities. Option B proposes a tunnel connecting the BRT service within the SR 4 to the Hillcrest Avenue Station. The tunnel would cross land that is currently undeveloped. Construction of the tunnel would be temporary, and land would revert back to undeveloped land. Because no neighborhoods would be affected by the Option B tunnel, this option would not divide an established community. **(NI)**

**Farmland Conversion.** The BRT Alternative would not require the conversion of farmland. Proposed Route A would operate within the bus-only guideways within the SR 4 median, while Route B would also operate within the SR 4 median, as well as on existing streets within the City of Antioch. Both of these routes are located entirely within urban areas where agricultural

activities are not present. Routes C and D would also operate within the SR 4 median and along existing city streets, but would travel through existing agricultural areas between Brentwood and Discovery Bay. However, the buses would operate along existing roads and would not interfere with existing agricultural production or processing operations. Bus stops and park-and-ride lots that would be constructed under this alternative would not be located in areas with active agricultural operations or interfere with such activities. In addition to construction of bus stops and park-and-ride lots, the BRT Alternative would require the construction of a maintenance facility where buses would receive servicing and maintenance. The facility is proposed to be located in the area east of the proposed Hillcrest Avenue BRT Station (Options A and B) north of SR 4. This area is currently undeveloped, but is not used for agricultural activities. Therefore, operation of the proposed BRT routes would not result in the conversion of active farmland, the loss of existing prime agricultural soils, or the interference with farmland activities or operations. **(NI)**

**Consistency with Local Land Use Policies.** Pursuant to California Government Code Section 53090, BART is exempt from local land use plans, policies, and zoning ordinances. Therefore, were the BRT Alternative implemented by BART and inconsistent with such local requirements, such inconsistency would not be determined to be a significant impact and mitigation would not be required. BART nevertheless provides this information to disclose to the public and to local jurisdictions the extent to which the project is consistent with the local plans and policies.

The BRT Alternative would extend transit services into eastern Contra Costa County. The extension of transit services along the project corridor would be consistent with many of the local land use policies calling for more transit-oriented development in order to improve mobility within the region. However, bus systems and facilities, compared to rail technologies, are not as effective at stimulating local transit-oriented development, or serving as focal points for economic development. Private developers in general are more amenable to making long-term real estate investments around a rail station than a bus station. Although bus route corridors can accommodate high density transit-oriented development similar to that of rail transit corridors, there is less evidence at this time to support this benefit. Thus, neither BRT option would promote transit-oriented land uses as well as rail technologies.

This alternative would be consistent with the BART System Expansion Policy by expanding transit services into east Contra Costa County and providing a link between this area and the rest of the greater San Francisco Bay Area. In particular, this alternative would meet the specific criteria of the System Expansion Policy by enhancing regional mobility; generating new ridership by extending transit services to areas not previously served; providing a cost-effective alternative to traditional rail services, providing greater access to traditional BART technologies; and by working with local communities to ensure that the project would meet the needs of local residents. The BRT Alternative Option A is projected to deliver 10,400 daily riders in 2030 and would, therefore, satisfy the BART System Expansion Policy ridership

threshold for Option A, adjusted for the cost of the system, of 4,709 daily riders. Likewise, the BRT Alternative Option B is projected to deliver 12,000 daily riders in 2030 and would, therefore, satisfy the BART System Expansion Policy ridership threshold for Option B of 7,321 daily riders.

With respect to the Metropolitan Transportation Commission (MTC) Transit Oriented Development (TOD) policy (Resolution #3434), the BRT Alternative would have a per-station target threshold of an average of 2,750 dwelling units within a one-half mile radius of each station. According to the Pittsburg/Bay Point BART Station Area Specific Plan Final EIR and the Pittsburg and Antioch General Plans, the Pittsburg/Bay Point Station, Railroad Avenue Station, and Hillcrest Avenue Station would have 2,195 dwelling units, 4,591 dwelling units, and 1,975 dwelling units, respectively, within one-half mile of the station. The average of all three stations would be 2,920 units without the proposed Ridership Development Plans (RDPs). Consequently, this alternative would satisfy the MTC Resolution #3434 threshold of an average of 2,750 units within a one-half mile radius of the stations for BRT.

This alternative would support TOD in east Contra Costa County by extending BART transit services along the SR 4 corridor. This alternative would still allow for the development of RDPs, which would increase density and provide affordable housing around the proposed BRT stations. In fact, because the BRT Alternative would extend farther into east Contra Costa County than the other alternatives, this would help further increase ridership and aid in smart growth in the areas surrounding the proposed BRT routes.

Local goals and policies would also be met by this alternative, including Contra Costa County General Plan Roadway and Transit goals 5-H and 5-K, which call for compatibility of major transportation facilities with adjacent land uses and basic mobility to be provided to all sectors of the public including the elderly, disabled, and transit dependent, respectively, as well as Roadway and Transit Policy 5-3, which calls for transportation facilities to use public and semi-public rights-of-way where feasible. The City of Pittsburg General Plan includes Land Use – Railroad Avenue Goal 20G-20, which calls for the extension of BART to Railroad Avenue and for the surrounding area to be developed as mixed-use transit-oriented development. The City of Antioch General Plan includes Land Use Policy 4.3.2a, which promotes close land use and transportation relationships that promote alternative transportation systems to minimize single-occupant vehicle travel. Antioch also has Circulation Policy 7.5.2a, which calls for the development of a “transit oasis” that could include rail transit centers, priority transit lanes, and dedicated travel lanes. Many of these policies specifically call for rail services, so that the BRT Alternative would not directly meet these policies, although a BRT system could still meet the policies seeking improved mobility and connectivity. As noted above, the BRT stations would not be regarded as conducive to transit-oriented development as rail systems.

In addition, because buses would operate on existing transportation corridors, they would not interfere with agricultural operations, consistent with Contra Costa County General Plan Land Use Goal 3-M and Agricultural Resources Goal 8-H, both of which call for the conservation and protection of agricultural lands. The BRT Alternative would be consistent with goals and policies associated with the extension of transit services into east Contra Costa County.

## Population and Housing

**Induced Housing and Employment.** Investment in the BRT Alternative could encourage new housing development around BRT stations and spur economic development. As a result, the BRT Alternative could affect development pattern in the cities of Pittsburg and Antioch by shifting projected growth towards the stations. The provision of new housing in these locations would be determined by local planning efforts, such as the preparation of the Ridership Development Plans. With respect to employment, the BRT Alternative Option A would create 19 indirect and 22 induced jobs in Contra Costa County, which is four indirect and four induced jobs more than the 15 indirect and 18 induced jobs created with the Proposed Project. Option B would generate 20 indirect and 24 induced jobs in Contra Costa County, which is five indirect and six induced jobs more than those created with the Proposed Project. Similar to the Proposed Project, the estimated development would not cause substantial new population and employment beyond what is anticipated by the cities in their general plans. Therefore, the BRT Alternative would result in less-than-significant effects on population and employment growth. **(LTS)**

**Land Acquisition/Displacement.** The BRT Alternative would include a similar route to the Proposed Project, following the median of SR 4 from the Pittsburg/Bay Point Station to Hillcrest Avenue Station (Route A), plus an extension of the bus service to Oakley, Brentwood, and Byron/Discovery Bay via Routes B, C, and D. Although to a lesser degree than the Proposed Project, land acquisition on undeveloped lands in the Hillcrest Avenue BRT Station area under both Option A and Option B would be required for the transit platforms, park-and-ride lot, and maintenance facility. The land acquisition and potential displacement of existing residents and businesses for station facilities would be a significant impact. **(S)**

> MITIGATION MEASURE. Implementation of Mitigation Measure PH-2.1, which was identified for the Proposed Project and requires compensation and relocation assistance in accordance with state relocation laws, would reduce this impact of the BRT Alternative to a less-than-significant level. **(LTS)**

## Visual Quality

**Alteration to Visual Quality from the Pittsburg/Bay Point BART Station to Hillcrest Avenue.** Because either option of the BRT Alternative would use the same right-of-way as the Proposed Project within the SR 4 median beginning at the Pittsburg/Bay Point BART Station and ending at the Hillcrest Avenue Station, there would be no substantial change in visual

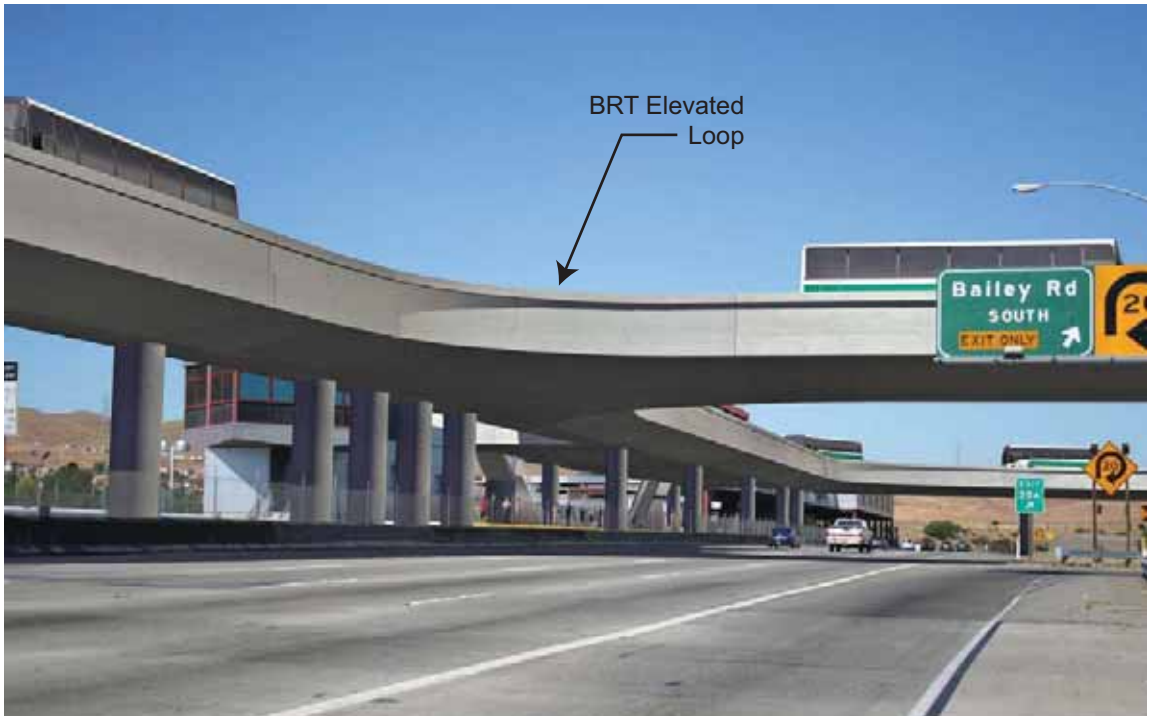
impacts east of the Pittsburg/Bay Point Station, compared to the Proposed Project. Distinctions between the two BRT options include access to the Hillcrest Avenue Station and slight modifications to the Hillcrest Avenue Station layout. Under this alternative, "bus-only" lanes would be provided in lieu of rail guideways within the SR 4 median. Key new visual features associated with BRT structures are identified and assessed below.

Figure 5-13 shows an existing view of the Pittsburg/Bay Point BART Station. As show in this figure, hills beyond to the southwest can be seen intermittently beyond the station buildings and structures. Figure 5-13 also shows a visual simulation of the BRT transfer station and aerial ramps crossing over SR 4. As indicated in the visual simulation, BRT structures would cross over the westbound lanes of SR 4. The new aerial ramps would also close in the gap between the existing Pittsburg/Bay Point BART Station buildings and block some views of the hills from this viewpoint. This portion of SR 4 has been identified as eligible for designation as a State Scenic Highway. Because the Pittsburg/Bay Point BART Station within the SR 4 median includes existing buildings that block views, the addition of the aerial structures under this alternative would not significantly change views of the hills from this viewpoint. Also, no sensitive views are identified along this portion of SR 4.

East of the Pittsburg/Bay Point Station, the Railroad Avenue Station would be located in the SR 4 median similar to the Proposed Project, and contain the same features for eBART patron circulation and comfort. As a result, the visual impact in the SR 4 median would be less than significant. **(LTS)**

**Change in Visual Character in Hillcrest Avenue Area.** The Hillcrest Avenue Station under either Option A or Option B would be located between SR 4 and the UP ROW, east of the existing Hillcrest Avenue Park-and-Ride Lot. Maintenance and servicing facilities would be reduced in scale and scope compared to the Proposed Project. Construction of the station, parking lots, and maintenance facilities would involve conversion of undeveloped land. With the BRT Alternative, approximately 21 acres of land for up to 1,800 parked vehicles would be converted. This change would substantially alter the existing rural character east of Hillcrest Avenue. This change in the visual landscape would be a significant impact, similar to the Proposed Project. **(S)**


**A** **Existing View**




**B** **Simulated View**

Source: WKA, 2008.

**WESTWARD VIEW TOWARD PITTSBURG/BAY POINT BART STATION AND BRT STATION (OPTION B)**

FIGURE 5-13

MITIGATION MEASURE. As discussed under Impact VQ-3 for the Proposed Project, there are no mitigation measures available to reduce the change in visual character impact to a less-than-significant level. Therefore, the parking lots and maintenance facilities at the Hillcrest Avenue BRT Station under both Option A or Option B would result in a significant and unavoidable impact. **(SU)**

**Glare from Hillcrest Avenue BRT Station Parking Lots.** Like the Proposed Project, construction of the Hillcrest Avenue BRT Station under both Options A and B would involve conversion of undeveloped land to a large surface parking area creating new sources of light to the area. The proposed parking lots for the BRT Alternative would accommodate 1,800 cars. Projected to be 65 to 80 percent occupied in 2030 (see Table 5-16), the parking lots would generate considerable glare from reflective glass and automobile surfaces that would likely be an annoyance. Therefore, it is expected that the Hillcrest Avenue BRT Station parking lots under both Option A and B would result in potentially significant glare impacts. **(PS)**

MITIGATION MEASURE. The BRT Alternative would result in similar significant glare impacts identified in Impact VQ-7 for the Proposed Project. This impact can be reduced (see Mitigation Measure VQ-7.1, which calls for landscaping the parking lots to screen glare from vehicles), but the size of the parking lots and the number of cars that could produce glare would still result in a significant and unavoidable impact. **(SU)**

**Alteration to Visual Quality outside the Pittsburg/Antioch SR 4 Corridor.** The BRT Alternative would extend transit services east of the Hillcrest Avenue Station. No new roadways would be constructed for the bus services and the buses would operate on existing roadways that currently accommodate a mix of car, bus, and truck traffic on a daily basis. Therefore, under either option of this alternative, no new visual impacts resulting from potential BRT operations on Routes B, C, and D, such as loss of scenic views, disturbance to visual resources, substantial negative change to visual character, or substantial new sources of light and glare, would be expected. **(NI)**

**Construction Impacts.** Under this alternative, the BRT transfer station (Option B) would be constructed at the existing Pittsburg/Bay Point Station in lieu of constructing the transfer platform east of the station under the Proposed Project. Under Option A, there would be little change to the visual setting, since the connection from SR 4 median to the Pittsburg/Bay Point BART Station would be via existing on- and off-ramps and existing roadways. Under Option B, however, a westbound aerial bus ramp crossing over the SR 4 westbound lanes before circling back to the Pittsburg/Bay Point BART Station would require extensive construction for steel and concrete support piers and structures. In addition, an eastbound ramp would be constructed to reconnect the BRT buses with the SR 4 median. Under Option B of the Hillcrest Avenue BRT Station, this alternative would include construction of a tunnel similar to

Northside West and Northside East options for the Hillcrest Avenue DMU Station. These activities would be temporary and the tunnel construction would not be close to any sensitive uses. Nevertheless, because of the extent of construction, primarily at the Pittsburg/Bay Point BART Station and at the Hillcrest Avenue Station, visual impacts from construction activities would be potentially significant. **(PS)**

> MITIGATION MEASURES. Mitigation Measure VQ-8.1 recommended for the Proposed Project would apply to the Option A and Option B of the BRT Alternative and calls for screening of construction staging areas and yards and locating these areas out of public views as much as possible. Similar to the Proposed Project, this mitigation measure would reduce construction-related visual effects to less than significant. **(LTS)**

## Cultural Resources

**Disturbance to Known Historic Resources**. As with the Proposed Project, the Contra Costa Canal is the only identified significant resource in the project corridor. This 48-mile canal crosses SR 4 in a channelized undercrossing just east of Bailey Road in the City of Pittsburg. In this area, the BRT Alternative would use the same right-of-way as the Proposed Project – the SR 4 median. However, the BRT Alternative under Option B proposes an aerial bus ramp from the westbound travel lanes to provide a convenient connection to the new transfer station that would be built above the Pittsburg/Bay Point BART Station. The ramp would extend westward between the existing SR 4 right-of-way and the Contra Costa Canal. The aerial bus ramp would be constructed over a portion of the canal that is in a culvert crossing under SR 4. The canal reaches the surface to the north of where the ramp would be constructed. Because the BRT Alternative Option B westbound ramp would be constructed over a portion of the canal that is underground and the structure of the canal would not be affected, BRT Alternative Option B would not directly or indirectly affect the canal's historic features or integrity. **(LTS)**

**Disturbance to Unknown Cultural Deposits or Human Remains.** Construction of the BRT Alternative would require excavation, grading, fill placement, and other ground-disturbing activities in the SR 4 median and at the Railroad Avenue and Hillcrest Avenue BRT Station locations, similar to those described for the Proposed Project. The significant difference between the BRT Alternative and the Proposed Project is under Option A, the buses would reach the terminus stations on existing roads, and under Option B, by aerial ramps at the Pittsburg/Bay Point BART Station and by a tunnel at the Hillcrest Avenue Station. Option B would therefore involve substantially more ground disturbance than Option A, resulting in a greater potential to affect unknown cultural deposits.

Outside the SR 4 median, the proposed bus routes B, C, and D would follow existing surface streets and create minimal to no construction effects along these bus route corridors. Minor ground disturbance could occur where new bus stops are designated and bus shelters are installed. There would also be future construction of a park-and-ride lot at Lone Tree Avenue

and possible modifications to or expansions of existing park-and-ride lots in Brentwood and Discovery Bay.

Research for this EIR indicates that previously unidentified buried archaeological resources, both prehistoric and historic could be present within the BRT Alternative service area. As a result, construction has the potential to damage or destroy undocumented archaeological resources, including possible human remains. **(PS)**

> MITIGATION MEASURES. The mitigation measures identified for the Proposed Project (Mitigation Measures CR-2.1 and CR-2.2) would be equally effective for the BRT Alternative and would reduce the potentially significant impact on unknown cultural deposits or human remains to less than significant. These measures call for following established procedures in the event that archeological resources or human remains are encountered, respectively. **(LTS)**

## Geology, Soils, and Seismicity

**Exposure to Geotechnical and Seismic Hazards.** For the BRT Alternative, operational impacts with respect to geologic hazards would generally be less than significant, since the BRT route would primarily run along existing roadways.

For the BRT Alternative at the Pittsburg/Bay Point Station under Option A, buses would use the current freeway on- and off-ramps, and geotechnical and seismic hazards would be similar to existing conditions and would be less than significant. Option B for the BRT Alternative at the Pittsburg/Bay Point Station would include a bus terminal that would connect to the station through a second-level platform. The second-level station would require an elevated roadway structure with exit and entrance ramps from SR 4 to and from the station, which would be located in the SR 4 median (see to Figure 5-5). Pier/foundations for the aerial structure along the canal would require special support and underpinnings for the canal structure. The additional structural requirements to support the bus ramp and the aerial BRT station could pose greater safety risks from seismic events and geotechnical hazards, such as differential settlement or liquefaction.

Options A and B for the BRT Alternative at the Railroad Avenue Station are the same with platforms that extend to either side of the Railroad Avenue overcrossing. Potential geotechnical and seismic impacts at the Railroad Avenue Station would be similar to the Proposed Project.

The BRT station at Hillcrest Avenue under Option A, would be at grade and immediately north of SR 4. Impacts related to geology and seismicity for the station would be minimal compared to the Proposed Project and would require basic grading, paving and drain system operations. Under Option B, the BRT station would be in the same location as the Northside West Station option of the Proposed Project and would have the same tunnel configuration. Therefore,

impacts related to geology and seismicity would be similar to the Northside West Station option of the Proposed Project, which were identified as less than significant.

In addition, the BRT Alternative includes four route options that would extend transit service to areas within Oakley, Brentwood, and Byron/Discovery Bay. However, these areas of the BRT route would primarily run along existing roadways and would require few modifications, if any at all, to accommodate BRT vehicles. Therefore, operation impacts with respect to geologic hazards would be minimal as there would be no structures to be affected by seismic events or weak soils.

Potential impacts on BRT structures from ground shaking, seismic-related ground failure, lateral spreading, subsidence, and expansive soils are anticipated to be minimal with the incorporation of recommendations from the geotechnical investigations to be performed during the design phase and compliance with standards and guidelines contained in the California Building Code. **(LTS)**

**Construction Impacts.** As with the Proposed Project, construction activities associated with the BRT Alternative may cause soil erosion or sloughing in excavated areas. The construction associated with Option B, which involves new bus ramps from the SR 4 median to a BRT station above the Pittsburg/Bay Point BART Station, could cause erosion and soil stability concerns because of the foundation work needed to support the aerial facilities. Option A under the BRT Alternative would use the Bailey Road off-ramp, instead of a dedicated and elevated bus roadway, to access the Pittsburg/Bay Point BART Station. Potential construction impacts from this alternative option would be minimal. Potential construction impacts for the Railroad Avenue Station would be similar to those for the Proposed Project, which were described as less than significant. Under Option A, the BRT station at Hillcrest Avenue would be at grade, and buses would enter and exit from the station via the local street network and by merging across general traffic lanes on SR 4. Construction activities and impacts related to geology and seismicity for the station would be minimal compared to the Proposed Project and would require basic grading, paving and drain system operations. Under Option B, the BRT station at Hillcrest Avenue would include a tunnel providing a connection from the SR 4 median bus lanes to the BRT station east of Hillcrest Avenue. The BRT station would be in the same location as the Northside West Station option of the Proposed Project and would have the same tunnel configuration as with this option. Therefore, construction impacts would be similar to the Proposed Project, which would be potentially significant.

In addition, the BRT Alternative includes four route options that would extend transit service to areas within Oakley, Brentwood, and Byron/Discovery Bay. However, these areas of the BRT route would primarily run along existing roadways and would require few modifications, if any at all, to accommodate BRT vehicles. Therefore, construction impacts with respect to geologic hazards would be minimal as the new structures that would be constructed to serve passengers would be small-scale bus stops.

Given that soil erosion may occur as a result of construction of the BRT Alternative, specifically with Option B involving construction of new bus ramps at the Pittsburg/Bay Point BART Station and a tunnel at Hillcrest Avenue Station, construction impacts for the BRT Alternative may be potentially significant. **(PS)**

> MITIGATION MEASURE. The mitigation measure identified for the Proposed Project (Mitigation Measure GEO-7.1) would be equally effective for the BRT Alternative and would reduce potentially significant soil erosion impacts to less than significant. This measure calls for implementing erosion control BMPs (e.g., slope stabilizers, dust suppression, construction of berms and ditches, and sediment barriers). **(LTS)**

## Hydrology and Water Quality

**Drainage.** Under the BRT Alternative, both options at the Pittsburg/Bay Point Station would be built and sited on already paved and developed areas and would, therefore, not contribute additional impervious surfaces that could alter local drainage.

For the BRT Alternative at the Railroad Avenue Station, Options A and B are the same with platforms that extend to either side of the Railroad Avenue overcrossing. Because the Railroad Avenue Station would be constructed on already developed areas, the new station and its related parking would not add new impervious surface and would, therefore, not contribute additional surface runoff that could affect and/or alter drainage.

The routes in the SR 4 median from the Pittsburg/Bay Point Station to Hillcrest Avenue, and those that follow the SR 4 Bypass or local roads, use existing roadways that already have drainage collection and discharge facilities. Operation of the BRT Alternative along the SR 4 median would involve a paved road surface for the BRT vehicles. The stormwater runoff from the BRT Alternative in SR 4 would be collected at drainage inlets and discharged to existing longitudinal highway cross culverts that run along SR 4 using pipe-to-pipe or pipe-to-culvert connections. The additional impervious surface would contribute increased runoff volumes to the existing culverts and local water bodies, including areas with culvert deficiencies, particularly at East Kirker Creek, east of Loveridge Road. However, the additional peak stormwater runoff in these roadway segments would be minimal compared to the runoff volumes from the existing watersheds.

The Hillcrest Avenue BRT Station, under Options A and B, would be at grade and immediately north of SR 4. The station, maintenance facility, and bus storage yard would add approximately 7 acres of impervious surface. Parking for both options would add approximately an additional 20 acres of impervious surface. Drainage at this area currently either percolates into the soil or flows from south to north into culverts that pass under the Mococo Line and discharge into East Antioch Creek.

The additional runoff from these options would be diverted into local storm drain facilities and would eventually flow into East Antioch Creek and into the Oakley and Trembath detention basins. As described for the Proposed Project, the additional runoff from development in the area has been accounted for in the sizing of the Oakley and proposed Trembath Basins. As such, it is anticipated that the detention basins can accommodate additional runoff and drainage from the Hillcrest Avenue Station facilities. Impacts from additional impervious surfaces are expected to be less than significant.

Because the BRT Alternative adds relatively little additional runoff within the SR 4 ROW, and because there are planned drainage improvements in those areas where the BRT Alternative would substantially increase runoff (primarily the Hillcrest Avenue area), drainage impacts from this alternative would be less than significant. **(LTS)**

**Groundwater Resources.** Impacts to groundwater resources by the BRT Alternative would be less than significant, similar to those of the Proposed Project. Operation of the BRT Alternative would have no impact on groundwater depletion because it would not involve extraction of groundwater. Although the BRT Alternative would contribute impervious surfaces along SR 4 and around the Hillcrest Avenue BRT Station area, impacts to groundwater recharge would be less than significant because the clay loamy soils underlying the project area have low recharge potential. The Pittsburg/Bay Point BART Station and Railroad Avenue Station areas are already developed and covered by impervious surfaces, and their further development would also have a less-than-significant impact on groundwater recharge. Additionally, portions of the BRT Alternative along surface streets would not require any major construction and would not introduce additional impervious areas. Finally, the BRT Alternative would not affect drinking water from groundwater extraction wells near the area of the Hillcrest Avenue. As such, similar to the Proposed Project, the BRT Alternative would have a less-than-significant impact on groundwater recharge. **(LTS)**

**Flooding.** Since the BRT Alternative would follow the SR 4 median, it would traverse minor floodplains at Los Medanos Wasteway, Markley Creek, and West Antioch Creek. These minor floodplains would not significantly affect proposed BRT facilities or operations because the SR 4 profile would not result in overtopping of the road during the 100-year storm event at these locations (see Table 3.8-1).[15]

During a 100-year storm, the BRT busways in the vicinity of Loveridge Road would flood, adversely affecting bus operations and potentially placing people and property within a flood hazard. Drainage improvements such as longitudinal underdrains for the transit guideway would be constructed by Caltrans as part of the SR 4 widening project. In addition, the City of Pittsburg is proposing a flood relief project for this same area. Combined, these drainage improvements are expected to alleviate flood hazards in this segment of SR 4. The Hillcrest Avenue BRT Station and maintenance facility would not be located in a flood zone as shown on

[15] WRECO, *East Contra Costa BART Extension Draft Hydrology Report*, 2007.

the Federal Emergency Management Agency 100-year flood hazard maps for the City of Antioch. **(LTS)**

**Water Quality.** Similar to the Proposed Project, the main pollutants of concern associated with operation of the BRT Alternative in the SR 4 median and on local streets would be sediments and potential diesel spills that could be discharged to receiving water bodies. At the Railroad Avenue and Hillcrest Avenue Station parking areas, auto-related pollutants, such as oils, hydrocarbons, and trace metals, would be of concern, as with the DMU project. Finally, discharge of maintenance facility pollutants including hydrocarbons, oil, and trace metals from automated bus washing, and potential spill or leaks from the fueling of buses could adversely affect water quality. Similar to the Proposed Project, water quality could be adversely affected by BRT Alternative operations. **(PS)**

> MITIGATION MEASURE. Mitigation Measure HY-5.1 identified for the Proposed Project would reduce water quality impacts associated with the BRT Alternative to less than significant. These measures include implementation of stormwater management BMPs, such as strip retention strips to treat runoff prior to discharge; oil/water separators to prevent pollutants from entering drainage system; and additional detention basins/pervious pavement to allow infiltration and pollutant removal. **(LTS)**

**Construction Erosion Impacts**. Construction activities, such as site clearing, grading, and excavation, could expose soil to potential erosion. If transported by wind or water, silt and sediment can accumulate in storm drains and local water bodies, restricting stormwater flow.

At the Pittsburg/Bay Point BART Station, additional construction would result from the new bus ramps proposed under Option B. At the Hillcrest Avenue BRT Station, grading would be needed to accommodate the station area north of the SR 4, the 1,800 car surface parking lot, and the approximately 5-acre maintenance facility. In addition, under Option B, excavation and stockpiling of dirt from the tunnel excavation could pose significant soil erosion, which could accumulate in storm drains and/or local water bodies restricting stormwater flow. Although the Hillcrest Avenue BRT Station would disturb less undeveloped land than the Proposed Project, it would still have potentially significant impacts on erosion and siltation because of the undeveloped nature of the land. **(PS)**

> MITIGATION MEASURE. Implementation of Mitigation Measure HY-6.1 identified for the Proposed Project would reduce construction-period erosion impacts of the BRT Alternative to less than significant. These measures require the development and implementation of a SWPPP outlining specific erosion and sediment BMPs. **(LTS)**

**Construction Water Quality Impacts**. Construction of the BRT Alternative could result in water quality impacts to local water bodies from the following activities: 1) sediment release into storm drains and local waterbodies as a result of ground-disturbing activities; 2) mishandling, storage, and disposal of construction materials that contain chemicals (including

fuels for fueling construction material and materials associated with fabrication shops); and 3) mismanagement of construction equipment, such as fuel leaks and other contaminants. Similar to the Proposed Project, these construction water quality impacts would be considered potentially significant. **(PS)**

> MITIGATION MEASURES. Implementation of Mitigation Measures HY-8.1 and HY-8.2 identified for the Proposed Project would reduce construction-period water quality impacts of the BRT Alternative to less than significant. These measures require that the BART contractor develops and implements a SWPPP that would govern construction activities. The SWPPP would outline specific stormwater discharge BMPs and specific measures to prevent and control hazardous materials releases during construction. **(LTS)**

## Biological Resources

**Wetlands, "Waters of the U.S." and "Waters of the State."** The BRT Alternative would use the same right-of-way as the Proposed Project - the SR 4 median. SR 4 intersects several "waters of the U.S." including Willow Creek, Kirker Creek, Los Medanos Wasteway, Markley Canyon Creek, Marsh Creek, West Antioch Creek, East Antioch Creek, and several unnamed tributaries. All of these watercourses have been historically channelized, altered, and culverted (in either reinforced concrete boxes or concrete pipes) to some extent beneath SR 4. The existing highway culverts of these "waters of the U.S.," would be modified or extended prior to the construction of the busway for the BRT Alternative by the SR 4 widening project. Runoff from the BRT Alternative would connect to existing storm drain systems. BART would also have to comply with the Contra Costa Clean Water Program (CCCWP) Phase 1 National Pollutant Discharge Elimination System (NPDES) Permit. To comply with this storm water permit, and to minimize water quality impacts from disturbed soil areas and added impervious areas created by the BRT Alternative, appropriate best management practices (BMPs) would be implemented.

One notable difference of the BRT Alternative relative to the Proposed Project with respect to biology is the Option B connection from SR 4 to above the Pittsburg/Bay Point BART Station. This option would require an elevated roadway structure near the Contra Costa Canal. The Contra Costa Canal is located approximately 117 feet north of SR 4. The busway would cross over a portion of the canal near where it would emerge from the SR4 undercrossing. Pier/foundations for the busway would be designed to avoid the canal so that no additional impacts to wetland, "waters of the U.S." and/or "waters of the State" would be expected.

According to the verified wetland delineations, no wetlands are located at the Railroad Avenue and Hillcrest Avenue BRT Stations and the maintenance facility. Since no wetlands were found, no impacts to wetlands or "waters of the U.S." would occur.

For BRT Alternative Routes B, C, and D, bus operations would occur on existing roads and at existing park-and-ride lots. New bus stops would involve minimal grading or other land disturbance. As a result, for these portions of the BRT Alternative that extend transit services to Oakley, Brentwood, and Discovery Bay, no impacts to wetlands or waters of the U.S. are expected.

In summary, none of the BRT facilities, including the parking and maintenance areas would affect a wetland, "waters of the U.S." or "waters of the State." **(NI)**

**Swainson's Hawk Foraging Habitat.** Potentially suitable foraging habitat for the Swainson's hawk exists within the non-native grassland/ruderal vegetation communities of the proposed Hillcrest Avenue BRT Station area. The nearest Swainson's hawk nest to the proposed Hillcrest Avenue BRT Station is approximately 3 miles. The California Department of Fish and Game (CDFG) considers a 10-mile flight distance between active nest sites and suitable foraging habitats as a standard for direct impact analysis. Their recommended mitigation ratio for the loss of foraging habitat located between 1 and 5 miles from an active nest is 1 to 0.75. Therefore, for each acre impacted, 0.75 acre of preserved land is required. Loss of 33.2 acres of foraging habitat under BRT Alternative Option A or 33.95 acres under BRT Alternative Option B. From construction of the parking area, maintenance facility and access roads would be considered a significant impact, similar to the Proposed Project. **(S)**

> MITIGATION MEASURE. Either Mitigation Measure BIO-3.1 or Mitigation Measure BIO 3.2 recommended for the Proposed Project would reduce this impact to less than significant. Mitigation Measure BIO-3.1 calls for compensating for the loss of Swainson's hawk foraging habitat by providing an appropriate number of acres (as approved by CDFG) of agricultural land, annual grasslands, or other suitable raptor foraging habitat. Mitigation Measure BIO-3.2 would require participation in the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP), which would require payment of a development fee that would offset any impacts to foraging habitat. **(LTS)**

**Disturbance to Special-Status Nesting Birds.** Suitable nesting habitat for special-status birds has been identified within the proposed Hillcrest Avenue Station areas for the BRT Alternative. These special-status birds include, but are not limited to, Swainson's hawk, burrowing owl, and loggerhead shrike. The tri-colored blackbird is not impacted by this alternative since no suitable marsh habitat for this species occurs within this alternative.

During site visits, burrowing owls, white-tailed kites, northern harriers, and red-tailed hawks were observed foraging within the proposed Hillcrest Avenue BRT Station area. The presence of foraging birds indicates the potential for nesting activity within the project area. Construction of the Hillcrest Avenue BRT Station, parking lot, and maintenance facility would involve grading and thus removal of suitable habitat for these species. Implementation of the

BRT Alternative would result in a significant impact to special-status bird species, similar to the Proposed Project. **(S)**

> MITIGATION MEASURES. The same measures recommended for the Proposed Project, Mitigation Measures BIO-4.1 through BIO-4.4 or Mitigation Measure BIO-4.5 would reduce this impact to less-than-significant level. These measures call for conducting pre-construction surveys for special status nesting birds, avoiding active nest/burrows by creating a no-disturbance buffer zones and avoiding the initiation of intensive disturbances (e.g. heavy equipment operation associated with construction, grading activities or the use of cranes) within the established buffer zones of an active nest between the nesting season. **(LTS)**

**Impacts to the Valley Elderberry Longhorn Beetle**. Since the only occurrence of elderberry shrubs is outside the BRT Alternative footprint, no impact to valley elderberry longhorn beetle would occur. **(NI)**

**Conflicts with the provisions of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP).** The suggested mitigation measures for the BRT Alternative mirror the conditions on covered activities and conservation measures presented in the ECCC HCP/NCCP. Additionally, construction of the BRT Alternative would not alter the effectiveness of the ECCC HCP/NCCP, since the implementation of the BRT Alternative would occur largely in previously developed urban areas. Implementation of the BRT Alternative would have no impact with respect to consistency with the ECCC HCP/NCCP. **(NI)**

**Removal of trees that could be Protected by a Local Tree Preservation Policy or Ordinance.** Similar to the Proposed Project, construction activities for the BRT Alternative would result in the grading and removal of trees within the project corridor. Although BART is exempt by state law from compliance with local land use ordinances and as such is not legally required to comply with local ordinances, BART considers loss of protected trees a significant impact. **(S)**

> MITIGATION MEASURE. The same measure recommended for the Proposed Project, Mitigation Measure BIO-6.1 would reduce this impact to less-than-significant level. This measure calls for tree surveys to be completed to identify and evaluate trees that would be removed. Trees that meet specific criteria would be replaced after construction and monitored to ensure health and survival. **(LTS)**

**Impacts to Common Biological Resources.** Similar to the Proposed Project, **c**onstruction activities would result in the loss of habitat used by common plant and wildlife species. Much of the BRT Alternative would be constructed in areas that have already been developed. While the BRT Alternative would result in displacement of common plant and wildlife species, it

would not result in a significant decline of their population or their range. Therefore, this impact would be less than significant. **(LTS)**

## Noise and Vibration

**Noise from BRT Vehicles.** The BRT buses would travel on rubber tires rather than metal tracks, producing less noise than the Proposed Project. The FTA Guidelines specify an $SEL_{ref}$ of 82 dBA for diesel buses and 85 dBA for DMU vehicles. The BRT Alternative, however, uses more vehicles and its four routes would bring noise from transit vehicles closer to sensitive receptors than the Proposed Project.

The BRT Alternative has four main routes (Routes "A" through "D"), as shown in Figure 5-2. Some of these routes overlap, so receptors may be exposed to noise from multiple routes. Table 5-18 summarizes the routes and the average peak hour, daytime hour, and night hour traffic volumes. In this assessment, the portion of the BRT service that extends from Brentwood to Discovery Bay is referred to as $C_{ext}$.

**Table 5-18**
**BRT Routes and Bus Volumes**

| Segment Description | Route Names | Peak Hour (Bus/hr) | Average Daytime (7 am to 10 pm) (buses/hr) | Average Nighttime (10 pm – 7 am) (buses/hr) |
|---|---|---|---|---|
| On SR 4 between Bailey Road, Pittsburg, to Lone Tree Way, Antioch | A+B+C +D | 42 | 29.1 | 12.9 |
| On SR 4 between Lone Tree Way, Antioch, to SR 4 Bypass, Antioch | A+C+D | 22 | 17.6 | 7.9 |
| On SR 4 between SR 4 Bypass, Antioch, to SR 160, Antioch + On Main Street between SR 160 and Brentwood Park & Ride, Brentwood | D | 4 | 3.7 | 1.8 |
| On Walnut Blvd between Brentwood Park & Ride and Balfour | D+C+$C_{ext}$ | 12 | 10.8 | 5.4 |
| On Balfour between Walnut Blvd. and Sellers Ave., Brentwood + On SR 4 Roadway between Balfour, Brentwood and Bixler, Discovery Bay + On Bixler, Discovery Bay | D+$C_{ext}$ | 6 | 5.4 | 2.5 |
| On Lone Tree Way between SR 4 and SR 4 Bypass | B | 20 | 11.5 | 4.9 |
| On SR 4 Bypass, North of Lone Tree Way | B+C | 28 | 16.8 | 7.5 |
| On SR 4 Bypass, South of Lone Tree Way + On Balfour between SR 4 Bypass and Walnut Ave. | C | 8 | 5.4 | 2.6 |

*Source:* ERM, 2008

Based on these bus volumes, Table 5-19 shows the predicted day-night noise levels along various portions of the BRT routes assuming use of a diesel engine. Engines powered by alternative fuels such as natural gas are expected to be quieter than diesel engines while hybrid engines may either be quieter or noisier than diesel engines depending on the design. Table 5-20 presents the calculated hourly noise level for portions of the segment where a school, church, or park is adjacent to the roadway. The significance criterion takes into account the existing noise levels shown in the tables. These levels are based on a combination of measured data and noise levels recommended by the FTA Guidelines. The methodology is explained in greater detail in Section 3.10, Noise, of this EIR.

The FTA Guidelines specify an existing day-night noise level of 70 dBA (for receptors within 50 feet of the roadway) for roadways with traffic traveling at 55 mph but with no trucks, or city streets with traffic traveling at 30 mph with trucks present. The analysis for this EIR takes a conservative approach by assuming these types of roadways have ambient noise levels that are 3 dBA lower than the FTA Guidelines (67 dBA). Thus, for the proposed SR 4 Bypass and segments of SR 4 where the posted speed limit is 55 mph, 67 dBA is used as the existing noise level. In addition, 67 dBA is used for Lone Tree Way, which is a regional artery with posted speed limits ranging from 35 to 45 mph.

Several other assumptions in the methodology have been incorporated that yield a conservative analysis. On the surface streets, the BRT would travel in mixed traffic on either side of the roadway. The predicted noise levels assume all buses are traveling in the lane closest to the sensitive receptor. However, at most, only half would be traveling in the closest lane, because the other half would be traveling on the other side of the roadway in the other direction. In addition, the existing noise levels do not account for the reduction in non-BRT traffic along the roads. Lastly, the hourly predicted levels show the impacts to schools, churches, and parks but are based on the distance of the closest residence. The schools, churches, and parks were located farther away than the closest residence so the hourly predicted levels are conservative for these types of sensitive receptors.

The BRT vehicles would access the stations by two options: under Option A, the BRT vehicles would use the existing freeway on/off-ramps; under Option B, the BRT vehicles would use dedicated busways. In both cases, the BRT vehicles would have less-than-significant noise impacts to receptors near the on-/off-ramps; under Option A because the background noise levels near SR 4 and the on/off-ramps are already very high (and in most cases, the adjacent receptors are or will be protected by sound walls); under Option B because the BRT vehicle entry/exit routes would be moved farther from the receptors or moved underground.

Tables 5-19 and 5-20 demonstrate that predicted noise levels from the BRT buses are expected to be less than significant. Overall, noise from buses used in the BRT Alternative would be less than noise from the DMU vehicles of the Proposed Project. **(LTS)**

**Table 5-19**
**Predicted Day-Night ($L_{dn}$) Noise Level from BRT (assuming diesel engines)**

| Routes | Segment | Highest Posted Speed Limit (mph) | Monitor ID | Existing Noise Level (dBA, $L_{dn}$) | Acceptable Noise($L_{dn}$) (see Table 3.10-8a) | Distance to Receptor (ft)[c] | Sensitive Receptors Exposed to Significant Noise | Noise Level at Receptor from Project ($L_{dn}$) |
|---|---|---|---|---|---|---|---|---|
| A+B+ C+D | On SR 4 between Bailey Rd, Pittsburg to Lone Tree Way, Antioch[f] | 65 | Calculated from N18 | 74[e] | <66 | 100 | No | 65 |
| A+C+ D | On SR 4 between Lone Tree Way, Antioch to Hillcrest Avenue, Antioch[f] | 65 | Calculated from N11 | 71 | <66 | 150 | No | 61 |
| D+C | On SR 4 between Hillcrest Avenue, Antioch to SR 4 Bypass, Antioch[f] | 65 | Calculated fromN14 | 74 | <66 | 100 | No | 60 |
| D | On SR 4 between SR Bypass, Antioch to 160, Antioch | 65 | Calculated from N11 | 71 | <66 | 100 | No | 56 |
| | On Main Street between SR 160 and Brentwood Park & Ride, Brentwood | 45 | Calculated from N15[d] | 75 | <66 | 25 | No | 58 |
| D+C + xt | On Walnut Blvd between Brentwood Park & Ride and Balfour | 35 | N16[a] | 63 | <60 | 35 | No | 58 |
| | On Balfour between Walnut Blvd. and Sellers Ave., Brentwood | 35 | N16 | 63 | <60 | 45 | No | 55 |
| D+Ce xt | On SR 4 Roadway between Balfour, Brentwood and Bixler, Discovery Bay | 55 | FTA | 67 | <63 | 35 | No | 60 |
| | On Bixler, Discovery Bay | 50 | N17[b] | 63 | <60 | 50 | No | 58 |
| B | On Lone Tree Way, between SR 4 and SR 4 Bypass | 45 | FTA | 67 | <63 | 35 | No | 61 |
| C | On SR 4 Bypass, south of Lone Tree Way | 55 | FTA | 67 | <63 | 100 | No | 56 |
| | On Balfour between SR 4 Bypass and Walnut Ave. | 40 | N16[a] | 63 | <60 | 35 | No | 56 |

*Source:* ERM, 2008.

*Notes:*

a. Assume same sound as N16 measurement taken at Balfour Road. Speed limit where measurement taken was 35 mph. N16 is about 42 feet from travel lane.

b. Measurement at N17 location included 4 hours of data in afternoon. Extrapolated to $L_{dn}$ using lowest 1 hour data following FTA Guidelines (Noise measured-2 dBA). N17 is about 74 feet from travel lane.

c. Along freeway taken as centerline of freeway up until Hillcrest Avenue. East of Hillcrest Avenue and along roadways taken as center of closest lane. The distance to receptor shown for each segment represents the closest sensitive receptor.

d. N15 is a conservative measurement of that location. Nearby mobile homes provided shielding to noise from roadway. N15 is about 45 feet from travel lane.

e. Used measurement value along this segment that would generate the conservatively lowest existing noise level.

f. Numbers presented conservatively assume no sound walls in place.

**Table 5-20**
**Predicted Hourly ($L_{eq}$(hr)) Noise Level from BRT (assuming diesel engines)**

| Routes | Segment | Highest Posted Speed Limit (mph) | Monitor ID | Existing Noise Level (dBA, $L_{eq}$(hr)) | Acceptable Noise ($L_{eq}$(hr)) | Distance to Receptor (ft) | Sensitive Receptors Exposed to Significant Noise | Noise Level at Receptor from Project ($L_{eq}$(hr)) |
|---|---|---|---|---|---|---|---|---|
| A+B+C+D | On SR 4 between Bailey Rd, Pittsburg to Lone Tree Way, Antioch | 65 | Calculated from N1 | 66 | <67 | 120[b] | No | 62 |
| A+C+D | On SR 4 between Lone Tree Way, Antioch to SR 4 Bypass, Antioch | 65 | Calculated from N11 | 65 | <66 | 150[b] | No | 58 |
| D | On Main Street between 160 and Brentwood Park & Ride, Brentwood | 45 | Calculated from N15 | 65 | <66 | 25 | No | 54 |
| D+C+$C_{ext}$ | On Walnut Blvd. between Brentwood Park & Ride and Balfour | 35 | N16[a] | 51 | <59 | 35 | No | 54 |
| B | On Lone Tree Way, between SR 4 and SR 4 Bypass | 45 | N15[c] | 60 | <63 | 35 | No | 61 |
| C | On Balfour between SR 4 Bypass and Walnut Ave. | 40 | N16[a] | 51 | <59 | 35 | No | 54 |

*Source:* ERM, 2008.

*Notes:*

a. Assume same sound as N16 measurement taken at Balfour Road. Speed limit where measurement taken was 35 mph. N16 is about 42 feet from travel lane.

b. Along freeway taken as centerline of freeway up until Hillcrest Avenue. East of Hillcrest Avenue and along roadways taken as center of closest lane. The distance to receptor shown for each segment represents the closest sensitive receptor.

c. N15 is a conservative measurement of that location. Nearby mobile homes provided shielding to noise from roadway. N15 is about 45 feet from the travel lane.

**Noise from Maintenance Facility.** The BRT Alternative would have a maintenance yard to support 28 BRT vehicles, which includes five spare vehicles. The maintenance yard, which would be located east of the proposed parking lot at the Hillcrest Avenue BRT Station, would be used to service the vehicles and provide parking spaces. The FTA Guidelines specify a source reference level of 114 dBA for bus facilities that service and clean vehicles. Table 5-21 shows the predicted noise levels from a maintenance facility, assuming all 28 vehicles are serviced in the facility at some point during the day.

**Table 5-21**
**Noise Levels ($L_{dn}$) From a Bus Maintenance Facility (dBA)**

| Distance from Sensitive Receptors | 50 ft | 100 ft | 150 ft | 200 ft | 250 ft |
|---|---|---|---|---|---|
| Noise Level | 65 | 59 | 55 | 53 | 51 |

*Source:* ERM, 2008.

The estimated existing noise level at the two closest receptors (about 900 feet north and 400 feet south of the maintenance facility) is 64 dBA and 74 dBA, respectively. These receptors would experience significant noise levels if the maintenance facility were to result in a noise level greater than 60 dBA. Based on Table 5-21, 60 dBA would be reached within 100 feet of the maintenance center. Since the maintenance center for the BRT Alternative would be located more than 100 feet from the nearest receptors, noise impacts from the BRT maintenance facility would be less than significant. **(LTS)**

**Noise from Ventilation Equipment**. Under Option B, a tunnel would be required to connect the maintenance facility to the busway in the SR 4 median. A long tunnel would require ventilation equipment. At 50 feet, the day-night noise level from the ventilation equipment may reach 72 dBA. While the exact location of the vent shaft and equipment is not known at this time, it is likely to be just east of the Hillcrest Avenue overcrossing of SR 4, and immediately north of SR 4. The residential uses closest to SR 4 have an existing noise level of about 74 dBA. Ventilation noise at these receptors would be significant if the noise from the equipment would be 66 dBA or greater. However, ventilation noise would fall below 66 dBA at distances greater than 100 feet from the equipment. Since the receptors are more than 100 feet from the potential ventilation equipment, this impact would be less than significant. In addition, sound walls may be placed on the south side of SR 4 as part of the SR 4 widening project. **(LTS)**

**Noise from Automobiles near Railroad Avenue and Hillcrest Avenue Stations.** As with the Proposed Project, the BRT Alternative has a station at Railroad Avenue and Hillcrest Avenue. The BRT Alternative is expected to have about the same or somewhat more daily riders than the Proposed Project (i.e., 10,400 riders for Option A, 12,000 riders for Option B compared to 10,100 riders for the Proposed Project). For Option B, this represents an approximately 20 percent increase in ridership over the Proposed Project. Table 5-1 compares the number of riders entering and exiting the Railroad Avenue and Hillcrest Avenue Stations between the

BRT Alternative and Proposed Project. Option A is expected to have similar number of riders at the Railroad Avenue Station but fewer riders at the Hillcrest Avenue Station compared to the Proposed Project. Option B would also have fewer riders at the Hillcrest Avenue Station but about 18 percent more at the Railroad Avenue Station. The analysis for the Proposed Project showed that impacts from the local roadway traffic are expected to be less than significant. An 18 percent increase in noise levels from automobiles associated with the BRT Alternative would still have a less-than-significant impact on receptors near the Railroad Avenue. Also, with fewer automobiles in the Hillcrest Station Avenue area, impacts would also be less than significant. **(LTS)**

**Vibration**. Unlike the DMU vehicles utilized by the Proposed Project, which operate on tracks and use track switches that can generate groundborne vibration, the rubber-tired vehicles used for the BRT Alternative generally do not create groundborne vibration problems for nearby receptors. Typically, vibration occurs only if there are large bumps in the road or other discontinuities in the road surface. Therefore, the BRT Alternative under either Option A or Option B is not expected to result in significant groundborne vibration impacts. **(LTS)**

**Construction Noise.** As with the Proposed Project, construction for the BRT Alternative would last from 2011 through 2014, and occur primarily along the SR 4 median and in the vicinities of the Pittsburg/Bay Point Station, Railroad Avenue Station, Hillcrest Avenue Station, and maintenance facility east of Hillcrest Avenue Station. Instead of laying tracks along the median of SR 4, the median would be paved. In addition, the BRT Alternative may require limited construction along the surface street routes at new or existing/modified bus stops along Lone Tree Way and Balfour Road and at the existing Brentwood and Discovery Bay Park-and-Ride Lots.

Overall, construction of the BRT Alternative Option A is expected to result in a similar level of intensity compared to the Proposed Project. However, Option B is anticipated to be more intensive than the Proposed Project as a result of constructing the aerial ramps, busways, and tunnels at and near the stations, particularly at the west end around the Pittsburg/Bay Point BART Station. Construction would likely require a range of noise-generating equipment, including dump trucks, scrapers, water trucks, bulldozers, graders, truck-mounted cranes, loaders, excavators, rollers, concrete mix trucks, pavers, lubrication/fueling service trucks, concrete pumps, diesel generators, compressed air units, and pile drivers. Since construction activities would be similar to or more extensive than the Proposed Project depending on the option selected, the BRT Alternative would have significant noise and vibration impacts on nearby receptors. **(PS)**

> MITIGATION MEASURES. As with the Proposed Project, implementation of Mitigation Measures NO-6.1 and NO-6.2 would reduce the potentially significant, yet temporary, construction noise impact of the BRT Alternative. These measures would require employing noise-reducing construction practices such as limiting hours of operation and designating a noise-disturbance coordinator. However, particularly with the use of pile

drivers, the impact may remain significant and unavoidable even with these mitigation measures. **(SU)**

**Construction Vibration**. The BRT Alternative would use vibration-generating construction equipment similar to that under the Proposed Project. As with the Proposed Project, the closest residential receptors are about 100 feet from expected construction areas that would require the use of the types of rollers, drillers, cranes, bulldozers, and pile drivers that can generate high levels of vibration. At this distance, pile drivers may result in significant vibration impacts for locations where sensitive equipment is used (e.g., dentists' office), residential receptors, institutional receptors, and fragile buildings. Other equipment may also have significant vibration impacts depending on where the equipment is used. **(PS)**

MITIGATION MEASURE. Mitigation Measure NO-7.1, recommended for the Proposed Project, would also be effective for the BRT Alternative. The measure would require the use of vibration-reducing construction practices such as limiting nighttime activities and using equipment away from noise sensitive receptors. This mitigation measure would minimize temporary vibration impacts. However, the impacts are expected to remain significant and unavoidable. **(SU)**

## Air Quality

**CO Concentrations from Traffic at Congested Intersections.** The BRT Alternative would not create any violations of the state ambient CO standards. As shown on Table 5-1, Option A would have approximately the same number of riders or less at each station compared to the Proposed Project and so the localized CO concentrations are expected to be similar or less than reported for the Proposed Project. On the other hand, Option B would increase riders by about 20 percent at the Railroad Avenue Station over the Proposed Project. The increase in CO concentrations associated with additional ridership traffic at the stations is proportional to the increase in ridership.

The highest CO concentration (without background) for the year 2015 was modeled at Davison Drive and Hillcrest Avenue, at 1.7 ppm. For the year 2030, the highest modeled CO concentration (without background) was modeled at Hillcrest Avenue and 18$^{th}$ Street, at 0.6 ppm. The highest modeled CO concentrations, the percentage increase in BRT ridership over the Proposed Project, and the resulting total CO concentrations for the BRT Alternative, with ambient background CO added, are shown in Table 5-22 below. This analysis assumed the buses would all be diesel fueled, which would be the worst-case scenario for air quality emission levels. The resultant total CO impact would still be below the California Ambient Air Quality Standards. **(LTS)**

**Table 5-22**
**BRT Ridership Increase and Associated CO Concentrations (ppm)**

| | Maximum DMU Modeled Increase | | BRT/DMU Ridership Increase (%) | Total Concentration (Incl. Background) | |
|---|---|---|---|---|---|
| Year | 1-hour | 8-hour | | 1-hour | 8-hour |
| 2015 | 1.7 | 1.2 | Approximately 20 | 6.1 | 3.3 |
| 2030 | 0.6 | 0.4 | Approximately 20 | 4.8 | 2.4 |

*Source:* ERM, 2008.

*Note:* Concentrations include 1-hour and 8-hour background levels of 4.1 and 1.9, respectively.

**Greenhouse Gas and Regional Criteria Pollutants Emissions.** Assuming the BRT would use 2010 or newer buses, regional greenhouse gas and ozone precursor emissions[16] under the BRT Alternative would be less than under No Project conditions in the future, because of the reduction in vehicle miles traveled by automobiles. This reduction in the vehicle miles traveled results in reduced air emissions of these gases. Because ridership associated with the BRT Alternative would be even greater than that associated with the Proposed Project, the BRT Alternative would take more vehicles off the road and result in fewer emissions than the Proposed Project.

In the case of the ozone precursor gas emissions, emission reductions under the BRT Alternative relative to the No Project would result in a net air quality benefit for regional ozone levels. For greenhouse gases, by 2015, the BRT Alternative Option A is expected to reduce the vehicles miles traveled by 205,646 per day relative to the No Project. By 2030, Option A is expected to reduce vehicle usage by 373,841 vehicles miles traveled per day. The decrease in vehicle miles traveled results in a decrease of 179,623 and 319,941 pounds per day of $CO_2$ in 2015 and 2030, respectively. Some of this decrease is offset by the emissions from the buses. Bus emissions of $CO_2$ are 19,853 pounds per day in 2015 and 21,034 pounds per day in 2030. Based on the decrease in vehicle miles traveled and the increased bus activity, the net $CO_2$ emissions will decrease by 159,770 pounds per day in 2015 and 298,906 pounds per day in 2030. BRT Alternative Option B would reduce the vehicle miles traveled by four percent compared with Option A and therefore would result in four percent less $CO_2$ emissions than Option A. A further benefit could be achieved by using BRT buses with cleaner propulsion options such as a hybrid technology. However, the amount of this benefit would be small in comparison to the total benefit represented by the reduction in auto vehicle miles of travel, and would not be large enough to change the comparative relationships between the modal alternatives. **(B)**

**Exposure to Toxic Air Contaminants (TACs).** The BRT Alternative could increase TACs exposure to individuals living near the bus routes from diesel particulate matter, causing a potential increase in cancer risk. This increase, however, would be well below the significance threshold level. Diesel bus cancer impacts were modeled for both years 2015 and 2030, taking

[16] Nitrogen oxides (NOx) and reactive organic gases (ROG).

into account diesel bus $PM_{10}$ emissions that would decrease over time, due to expected improvements in diesel engine emissions standards required by the California Air Resources Board.

Cancer risks were modeled with respect to the maximally exposed individual (MEI). The MEI is the location of highest modeled impact at a residence and assumes an individual would be present at this location for 70 years. The location of the MEI is at a residence along Belle Drive. This modeled impact is based on 27,905 bus trips per year along Route B, which has the greatest number of annual trips and thus represents the worst-case impact from the BRT Alternative. The modeled 70-year cancer risk from exposure to diesel bus particulate matter emissions in the year 2015 is 0.6 in one million at the MEI, and in the year 2030 the modeled risk is 0.3 in one million. The Air Quality Technical Report includes emission factors, emission calculations, and model output files used in the health risk assessment. Both of these impacts are below the significance threshold level of 10 in one million.

Accidental releases associated with the operation of the BRT Alternative may include a release of diesel from BRT vehicles or from the maintenance facility. BART would respond to an accidental release by immediately contacting regulatory agencies, if required, and implementing safety and emergency plans with respect to evacuation of the public and coordination with local emergency response personnel. With these safety and emergency procedures in place, potential impacts from an accidental release to nearby residences would be less than significant, similar to the Proposed Project. **(LTS)**

**Construction Air Emissions.** Construction impacts would be the same as those described for the Proposed Project, with the Northside West Station option. In addition to the Proposed Project construction impacts, the Option B transfer connection at the Pittsburg/Bay Point BART Station would involve construction of an aerial bus ramp over the westbound SR 4 lanes. Residences between Canal Road and South Street would be exposed to construction emissions during construction of part of this ramp. **(PS)**

> MITIGATION MEASURES. The BAAQMD control measures for construction activities shown in Table 3.11-6 and described in Mitigation Measure AQ-8.1 and AQ-8.2 for the Proposed Project would reduce potential construction-related emissions of the BRT Alternative to less than significant. **(LTS)**

## Public Health and Safety

**Accidental Release of Hazardous Materials.** Similar to the Proposed Project, operation of the BRT Alternative may involve the use of hazardous materials in transit vehicles and at the maintenance facility. The use of hazardous materials would be conducted pursuant to all hazardous material handling regulations, such as worker safety and health standards established under the Federal Occupational Safety and Health Act of 1970, the California Occupational Safety and Health Act, the Resource Conservation and Recovery Act (RCRA), the

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the California Hazardous Waste Control Law.

Unlike the maintenance facility associated with the Proposed Project, which includes above ground storage tanks, the maintenance facility included as part of the BRT Alternative would include underground fuel storage tanks (UST). However, the USTs would be installed and operated in compliance with all UST regulations, including the national UST regulatory program, commonly referred to as Subtitle I of RCRA, and a state program, the state UST law. Additionally, Contra Costa County Department of Health and Safety would be responsible for enforcement of UST regulations in the project corridor. In the event of an accidental release, BART or whoever operates the BRT Alternative would immediately implement established emergency plans and procedures and notify appropriate regulatory agencies with jurisdictional control over such occurrences. However, an accidental release of hazardous materials at a maintenance facility would be discharged into stormwater outlets located throughout the facility. Therefore, the potential exists that hazardous materials could be released into stormwater resulting in a significant impact.

The BRT route would run along existing roadways that are within one-quarter mile of an existing or proposed school. The BRT Alternative would involve use of hazardous materials in transit vehicles and at the maintenance facility, which would be conducted pursuant to all hazardous material handling regulations described above. As a result, potential accidental releases that could harm students would be less than significant, similar to the Proposed Project.

As with the Proposed Project, construction activities associated with the BRT Alternative may involve handling of hazardous materials. However, the use of hazardous materials would be temporary in nature, since they would be limited to the construction period and would be conducted pursuant to all hazardous material handling regulations, such as worker safety and health standards established under the Federal Occupational Safety and Health Act of 1970 and the California Occupational Safety and Health Act, RCRA, CERCLA, and the California Hazardous Waste Control Law.

In summary, impacts related to the accidental release of hazardous materials and the attendant health risks would be similar to the Proposed Project and could be potentially significant. **(PS)**

> MITIGATION MEASURES. Mitigation Measure HS-4.1 recommended for the Proposed Project would apply to both options of the BRT Alternative and calls for the preparation and implementation of a Spill Prevention Plan outlining measures that would be in place to control hazardous materials use and storage. Similar to the Proposed Project, this mitigation measure would reduce impacts from an accidental hazardous material release to less-than-significant levels. **(LTS)**

**System Safety and Passenger Security.** Under Option B, the operation of the BRT Alternative would be similar to the Proposed Project in that buses would operate separately

from vehicle traffic on SR 4. This option proposes that buses enter and exit the bus-only lanes in the SR 4 median via dedicated busways to terminus stations. Under Option A, however, buses would merge across SR 4 traffic lanes where other vehicle traffic exists. This option presents potential safety impacts due to the additional traffic on SR 4 created by BRT vehicles. However, operation of the BRT Alternative would be conducted following standard safety requirements that include adequate training of transit personnel in the operation of BRT vehicles. In addition, impermeable materials (such as concrete block walls), chain link and security fencing and other barriers would be used to restrict public access onto the guideway portion of the BRT route, and the appropriate location and design of walkways would be implemented to ensure that riders can safely access BRT stations. The proposed BRT stations would include benches, shelters, trash receptacles, lighting and other security measures. Stations may also include facilities for Intelligent Transportation Systems (ITS) communications, which are electronics, communications, and information processing that are integrated to improve the efficiency or safety of surface transportation. Similar to the Proposed Project, with safety procedures and requirements in place, potential safety hazards from the operation of the BRT Alternative are expected to be less than significant. **(LTS)**

**Public Airport or Public Use Airport Hazards.** According to a map review of the proposed BRT route, the nearest public airport, the Buchanan Field Airport, is approximately 6.5 miles southwest of the BRT route. The portion of the BRT route outside of the SR 4 median is also located more than 2 miles away from a public airport or public use airport. Therefore, no impact is anticipated in regards to airport hazards. **(NI)**

**Exposure of People or Structures to Wildland Fires.** According to a review of aerial photographs of the BRT routes and site reconnaissance, the areas surrounding the corridor are primarily developed with residential and commercial buildings. Areas of the BRT routes within Oakley and Brentwood are surrounded by undeveloped, agricultural land. A review of the California Department of Forestry and Fire Protection (CDF) California Fire Hazard Severity Zone Map shows that the BRT routes are not zoned as a fire hazard zone.[17] Therefore, risks from wildland fires would not be expected. **(NI)**

**Risk of Terrorist Attack.** Compared to existing conditions, the risk of a terrorist attack would not significantly increase with the operation of the BRT Alternative. The existing BART system is 104 miles, and the BRT Alternative involves extending BART approximately 20 miles into eastern Contra Costa County, which includes the proposed routes to Discovery Bay. Given that the BRT Alternative involves a small increase in distance compared to the existing system, the BRT Alternative would not be a primary target compared to other existing components of the BART system. If terrorist activity occurred during BRT operation, bus personnel would be notified of the event and instructed to stop operations, if necessary. Since the BRT Alternative would not be a primary target compared to other existing components of

[17] California Department of Forestry and Fire Protection, *Contra Costa County Fire Hazard Severity Zone Map,* Available at http://www.fire.ca.gov/fire_protection/fhsz_maps/fhsz_maps_ontracosta.php, 2007.

the BART system, and safety procedures and emergency response plans would be in place to prevent and respond to a potential terrorist event, impacts related to a risk of terrorist attack would be less than significant. **(LTS)**

**Construction-Related Exposure to Hazardous Materials.** Public health and safety impacts associated with construction of the BRT Alternative would generally be less than significant, since the BRT route would run primarily on existing roadways. As with the Proposed Project, construction activities within the SR 4 median may involve soil excavation, which would create the potential to expose construction workers or the public to contaminated soil or ground water beneath the BRT routes.

For Route A (the SR 4 median), potential hazardous material contamination would have been addressed with the implementation of the SR 4 widening project, which is scheduled to be constructed prior to and/or concurrently with the BRT Alternative. For Routes B, C, and D, transit services would also extend to areas within Oakley, Brentwood, and Byron/Discovery Bay. These areas of the BRT routes would primarily run along existing roadways and would require minimal modifications, if any at all, to accommodate BRT vehicles.

Although potential hazardous material contamination has been addressed as part of the SR 4 widening project, additional site grading would be required to accommodate the BRT stations, park-and-ride lot, access road, and maintenance facility located to the north of SR 4. Under Option A of the BRT Alternative, the potential for exposing hazardous materials during construction would be less than the Proposed Project since existing freeway on- and off- ramps and the local street network would be used to access station areas. Under Option B, however, the potential to expose hazardous materials would be greater than the Proposed Project at the Pittsburg/Bay Point BART Station which requires an elevated roadway structure. Option B at the Hillcrest Avenue Station would include a tunnel similar to the Northside West and Northside East Station options of the Proposed Project. Therefore, similar to the Proposed Project, due to the amount of grading and soil excavation required, there is a potential that workers or others may be exposed to hazardous materials if contaminated soils and groundwater are encountered during construction, which would result in a potentially significant impact. **(PS)**

> MITIGATION MEASURES. The same mitigation measures identified for the Proposed Project to reduce potential construction-related health risks would be applicable for the BRT Alternative. Specifically, Mitigation Measures HS-8.1, HS-8.2, HS-8.3, and HS-9.1, which call for development and implementation of a Spill Prevention Plan, file searches with the regulatory agencies for contaminated sites, further soil and groundwater contamination investigations, appropriate remediation, and asbestos surveys and appropriate precautions, would reduce potential health and safety impacts to less than significant. **(LTS)**

## Community Services

The dedicated guideway portion of the BRT Alternative would use the same right-of-way as the Proposed Project (the SR 4 median), and would have boardings and exits similar to the Proposed Project within this corridor. As a result, community service impacts within the cities of Pittsburg and Antioch would be less than significant, similar to those described for the Proposed Project. Specifically, the Pittsburg Police Department, Antioch Police Department, and Contra Costa County Fire Protection District would experience an increase in demand, but not to the extent that service levels would be adversely affected or that new facilities would need to be constructed.

In addition, Routes B, C, and D of the BRT Alternative involves service to the communities of Oakley, Brentwood, and Bryon/Discovery Bay. In these communities, community service impacts are expected to be substantially less than in Antioch and Pittsburg due to lower ridership volumes.

Finally, BART or the transit operator for the BRT Alternative would be responsible for law enforcement for its property, facilities, and patrons at the stations. In summary, community service impacts related to the BRT Alternative would be less than significant, similar to the Proposed Project. **(LTS)**

## Utilities

**Water Demand.** The Railroad Avenue Station and Hillcrest Avenue Station would not include restroom facilities or require landscaping activities that would have a water demand. Other local bus stations in Brentwood, Oakley, and Discovery Bay would have limited infrastructure consisting of bus shelters and benches. These bus and local bus shelters stations would not include restroom facilities or require landscaping activities and so would not have a water demand.

Water demand associated with the BRT Alternative would be limited to maintenance facility activities such as maintenance and servicing (including cleaning operations for the fleet of 28 buses), staff restroom facilities, and landscaping of the parking areas. As with the Proposed Project, vehicle washing would have the greatest water demand. According to Tri Delta Transit, the average water demand for each vehicle is approximately 19.5 gallons per minute (based on 1 foot per second drive through). Assuming that the average wash cycle for a transit vehicle is 2 minutes,[18] each vehicle requires approximately 39 gallons per vehicle, of which 60 percent is recycled.

The estimated water usage for a typical Tri Delta transit vehicle is assumed to be comparable to the BRT Alternative because of the similarity in the general size of the BRT vehicles. Under this assumption, the estimated total water usage per day for 28 vehicles would be

[18] Tri Delta Transit, email to ERM, May 14, 2008.

approximately 1,092 gallons of water demand per day. Anticipated water use for the BRT maintenance facility activities and staff restroom facilities would be accommodated by the CCWD's annual water supply capacity of 174 million gallons per day (mgd) and potential 2040 future capacity of 217 mgd.

In summary, the BRT Alternative would not require expanded entitlements to accommodate the water demand and would therefore have a less-than-significant impact on available water supplies. **(LTS)**

**Wastewater Capacity.** The BRT Alternative would generate wastewater only at the maintenance facility, mainly from vehicle cleaning activities. As noted above, the BRT maintenance facility would clean up to 28 vehicles daily, of which approximately 60 percent would be recycled within the reclamation system. As such approximately 40 percent would be discharged to the sanitary sewer system. This would mean that for a fleet of 28 vehicles, approximately 436.8 gallons per day of wastewater would be generated from vehicle cleaning activities. The amount of wastewater generated from operation of the BRT Alternative would not expected to exceed the Delta Diablo Sanitation District (DDSD) available capacity of 16.5 mgd and future capacity of 24 mgd, including potential future increases in wastewater generated from other maintenance activities.

As with the Proposed Project, the BRT Alternative would not exceed available wastewater capacity and would have a less-than-significant impact on wastewater treatment capacity. **(LTS)**

**Interruption of Utility Service during Construction.** The BRT Alternative Route A would follow the same route as the Proposed Project (SR 4 median), from the Pittsburg/Bay Point BART Station, with an intermediate station within the SR 4 median at Railroad Avenue and a terminus station east of the Hillcrest Avenue. East of Hillcrest Avenue, the BRT Alternative Routes B, C, and D would operate along SR 4, SR 4 Bypass, and surface streets.

*BRT Transfer Station*. Option A proposes that BRT buses enter and exit the bus-only lanes in the SR median via existing SR 4 on-and off-ramps to access the existing bus transfer station at the Pittsburg/Bay Point BART Station. This option would not involve any major construction work, and would involve modifications to the existing bus intermodal system to accommodate the BRT buses. Accordingly, substantial utility impacts due to relocation of lines and interruption of service would not be expected. Under Option B, the proposed Pittsburg/Bay Point BRT Station would be constructed above the existing BART station in the center median. This would involve extensive grading for the support piers and structures for the aerial ramps, as well as construction at the existing Pittsburg/Bay Point BART Station. These construction activities may encounter underground water, natural gas, communication, sewer utilities, and overhead power lines that would need to be relocated. Temporary interruption of utility services associated with utility relocation could cause a significant impact on utility service. In addition, support piers and structures for the intermodal BRT (Option B) station would be

constructed close to the Contra Costa Canal. Any impact on the safety or operation of the canal would be a significant impact.

*SR 4 Median*. As with the Proposed Project, grading and roadway construction activities along the SR 4 median and station areas may encounter underground water, natural gas, communication, sewer utilities, and overhead power lines that would need to be relocated. That issue was discussed in the 2005 Environmental Assessment/Initial study (EA/IS) prepared for the SR 4 widening project that encompasses the portion of the BRT Alternative from Pittsburg/Bay Point BART Station to Hillcrest Avenue. This report concluded that impacts related to relocation of subsurface or utilities within the SR 4 median would be less than significant because relocation of overhead power transmission lines would not interfere with existing utility services as PG&E would put customer loads on alternate lines until the connections are reestablished. Additionally, if unexpected underground utilities are encountered, the construction contractor would coordinate with the utility provider to develop plans to address the utility conflict, protect the utility if needed, and limit service interruptions. Furthermore, the construction contractor would schedule short-term service interruptions well in advance and provide users with appropriate notification provided.[19]

As with the Proposed Project, the BRT Alternative would be required under the California Government Code (Sections 4216-4216.9) to notify and coordinate with affected utility providers prior to commencement of the construction activities, to minimize impacts on utility service. Nevertheless, potential relocation of utilities may cause service interruptions and significant impact to wastewater, power, natural gas, and communications if service disruption to these utilities would last for more than a few minutes. Impacts to drinking water utilities would be significant if disruption to drinking water service would last for more than a few hours.

*Outside the SR 4 Median*. Components of the BRT Alternative outside the SR 4 median would include the proposed Hillcrest Avenue Station facility, located to the north of the SR 4, and a maintenance facility to the east of the station. Impacts related to the project components outside the SR 4 median have the potential to affect utilities and result in service interruptions.

BRT Routes B, C, and D from Hillcrest Avenue to Byron/Discovery Bay would be primarily along existing surface streets. These portions of the BRT Alternative would not impact utilities, because there would be no roadway construction and no major bus station construction. The bus stations would consist of bus shelters and benches.

The Hillcrest Avenue Station facilities under Options A and B would be at-grade and would have a similar configuration and components (such as passenger loading facilities and 1,800 parking spaces for park-and-ride patrons). Both options would involve minor grading for the station area and surface park-and-ride lot. Below-ground excavation would be required for the

[19] Caltrans, *State Route 4 (East) Widening Project: Loveridge Road to State Route 160 Environmental Assessment/Initial Study,* 2005.

foundation of the maintenance facility and construction of the tunnel under Option B. Ground-disturbing construction activities for the Hillcrest Avenue BRT Station and maintenance facility could encounter underground water, natural gas, wastewater and communications utilities that would also be encountered by the Proposed Project at the Hillcrest Avenue Station area. These include Shell Oil, G-Western gas, storm drain lines, natural gas pipelines that run from the former PG&E metering station to the northeast of the site, and a water line that traverses the proposed site under the Mococo Line.

As a result, potential relocation of utilities may cause service interruptions and significant impacts to water, wastewater, power, natural gas, and communications. **(PS)**

> MITIGATION MEASURES. Mitigation measures identified for the Proposed Project would also be applicable to the BRT Alternative (Mitigation Measures UT-3.1, UT-3.2, and UT-3.3). These measures include restricting utility work to off-peak service demand, such as late evenings and early morning hours when demand is limited; arranging temporary backup service to avoid inconveniencing customers; and notifying customers of planned service interruptions. Implementation of Mitigation Measure UT-7.1, which calls for confirming the location of underground utilities prior to ground-disturbing activities and was identified for the Proposed Project, would also reduce potential impacts of the BRT Alternative to a less-than-significant level.
>
> In addition, BART shall coordinate with the Contra Costa Water District. Impacts to the Contra Costa Canal and other aspects of the Water District's system will be minimized by consulting with the Water District's staff to coordinate key elements of the design, such as location of columns and support structures, in order to minimize potential impacts on the canal and other Water District facilities. **(LTS)**

## Energy

**Energy Demand.** During operation, the BRT Alternative would directly consume energy to power the buses and operate the stations and maintenance facilities. In addition, indirect energy would be consumed by the BRT Alternative as part of maintenance activities on the buses. The total direct and indirect energy consumed by the BRT Alternative would be offset by the reduction in vehicle miles traveled from removing automobiles from the road. This reduction would come from not only reducing the direct energy consumed to power the automobiles but also reducing indirect energy consumed to maintain the automobiles. The estimated reduction in annual miles traveled by automobile on the road for Option A is 59.6 million vehicle miles in 2015 and 108 million vehicle miles in 2030 (annual miles based on daily travel on 290 peak weekdays); the reduction would be greater for Option B.

Table 5-23 presents the estimated energy consumed in 2030 by the BRT Alternative Option A. For the purposes of this EIR, conservative assumptions similar to those made for the Proposed Project are made for the BRT Alternative. In particular, Table 5-23 conservatively assumes that each of the two new BRT stations (Railroad and Hillcrest) along SR 4 would consume the

same of amount of energy as the existing Lake Merritt BART Station in 2006, even though Lake Merritt was one of the higher energy-consuming stations in 2006. The BRT Alternative maintenance facility is assumed to consume the same amount of energy as the existing Tri Delta Transit Administrative and Maintenance Facility, which includes not only maintenance associated energy consumption but consumption associated with the administrative buildings. Actual energy consumption for the BRT stations and maintenance facility is expected to be less than assumed in Table 5-23. Even with these conservative assumptions, Table 5-23 shows that the BRT Alternative would reduce regional energy consumption. Option B would reduce vehicles miles traveled by people using the BRT Alternative rather than their cars by about four percent compared to Option A. Therefore, energy consumption from cars (as shown in line item "Decrease from Reducing Automobile Miles Traveled" in Table 5-23) would be reduced by about four percent compared to Option A. Therefore, the BRT Alternative would have a beneficial impact on regional energy supply and no mitigation measures are required. The BRT Alternative in 2015 would similarly have beneficial impacts on energy demand. The reduction in automobile miles traveled due to the availability of BRT more than offsets the energy consumed by the BRT vehicles, for the same reason cited in 2030. As a result, compared to the No Project conditions, the BRT Alternative, like the Proposed Project, would have a beneficial effect by significantly reducing consumption. **(B)**

**Petroleum Demand.** As with the Proposed Project, the BRT Alternative would directly consume diesel fuel to operate the BRT vehicles. In 2030, the Proposed Project would consume about 50,000 gallons of diesel fuel, which would represent about 0.01 percent of the total demand expected in California in 2030. Based on the higher annual energy consumption from the BRT vehicles, the BRT Alternative is expected to consume about seven percent more diesel fuel than the Proposed Project. However, diesel and gasoline are both derived from petroleum and overall petroleum consumption would decrease by reducing the number of automobiles on the road. Thus overall, the BRT Alternative would result in a net benefit by reducing petroleum consumption. **(B)**

**Table 5-23**
**Energy Consumption of the BRT Alternative (Option A), 2030**

| Category | Energy Consumption (Billion Btu/year) |
|---|---|
| **Direct** | |
| Increase from Operation of Buses[a] | 81.6 |
| Increase from Station Operation[b] | 13.9 |
| Increase from Maintenance Facility Operation[c] | 8.2 |
| Decrease from Reducing Automobile Miles Traveled[d] | -467.9 |
| **Indirect** | |
| Increase from Maintenance of Buses[e] | 28.0 |
| Decrease from Reducing Maintenance of Automobiles[f] | -151.8 |
| Net of Known Consumption | -488.0 |

*Source:* ERM, 2008.

**Table 5-23**
**Energy Consumption of the BRT Alternative (Option A), 2030**

| Category | Energy Consumption (Billion Btu/year) |
|---|---|

*Notes:*

a. Equal to annual miles traveled multiplied by energy intensity factor of 38,275 (Btu/mile for buses from Caltrans, *Energy and Transportation Systems, Table E-13,* July 1983).

b. Based on existing Orinda Station.

c. Based on Tri Delta Transit Administrative and Maintenance facility energy consumption in 2005.

d. Equal to annual miles traveled multiplied by energy intensity factor of 4622 Btu/mile in 2015 and 4313 Btu/mile in 2030. Passenger automobile fleet average fuel economy is assumed to increase linearly based on fuel economy standard for new passenger cars. Standard in 2004 was 27.5 miles per gallon (mpg) and standard in 2020 will be 35 mpg.

e. Equal to annual miles traveled multiplied by energy intensity factor of 13,142 Btu/mile (from Caltrans, *Energy and Transportation Systems, Table E-13,* July 1983).

f. Equal to annual miles traveled multiplied by energy intensity factor of 1,400 Btu/mile.

**Electricity Demand.** The impact to electricity demand from the BRT Alternative would be similar to that of the Proposed Project. Electricity demand would not peak during peak hours of service because electricity would only be needed for the stations and maintenance facilities and not the buses themselves, which are assumed to be powered by diesel for the purposes of this analysis. Actual electricity demand under the BRT Alternative is anticipated to be similar to that of the Proposed Project. Considering that this alternative has a relatively low electricity demand and that the electricity demand would likely not peak during the day, impacts to peak and base-period electricity demand are expected to be less than significant. **(LTS)**

**Construction Energy Impacts.** Similar to the Proposed Project, energy would be consumed as part of the BRT Alternative to construct the bus lanes, stations, and maintenance facility. Fossil fuels would be consumed by construction equipment (e.g., pavers, diesel generators, scrapers) and vehicles along the corridor as needed. Energy consumption during construction would be significant if the consumption of nonrenewable energy resources were done in a wasteful, inefficient, and unnecessary manner. At this preliminary engineering stage, energy conservation practices have not been developed for construction of the BRT Alternative. Since a detailed conservation plan is not currently in place, it is assumed that construction of the BRT Alternative may result in a potentially significant energy consumption impact, similar to the Proposed Project. Between Options A and B of the BRT Alternative, Option B would required more energy because it would require the construction of aerial ramps and a new structure over SR 4 to transfer to the Pittsburg/Bay Point BART Station. **(PS)**

> MITIGATION MEASURE. Construction energy impacts of the BRT Alternative can be reduced to less than significant by applying the Mitigation Measure EN-4.1, which is also recommended for the Proposed Project. This measure calls for the development and implementation of an energy conservation plan for the construction period. With the implementation of Mitigation Measure EN-4.1, the BRT Alternative would have a less-than-significant impact with respect to energy resources. **(LTS)**

## Light Rail Vehicle (LRV) Alternative Analysis

### Transportation

Since the LRV Alternative would be identical to the Proposed Project in terms of alignment and station locations, the transportation-related impacts of this alternative are almost identical to those of the Proposed Project. Thus, the transportation impacts of the LRV Alternative are addressed by the analysis for the Proposed Project that is presented in Section 3.2, Transportation, of this EIR.

### Land Use

**Land Use Compatibility.** Similar to the Proposed Project, the majority of the LRV track would operate within the SR 4 median in a 36-foot-wide corridor between the east and westbound lanes of traffic. Land uses along this portion of SR 4 consist of urban uses including residential, commercial, and industrial. Land uses in this area are currently bisected by SR 4. As this is an established transportation route, the addition of light rail transit services and associated infrastructure within the median of SR 4, separated from the surrounding uses by eight lanes of highway traffic would not be incompatible with surrounding land uses. The proposed station stops for the LRV Alternative would be in the same areas as the stations and station options proposed under the Proposed Project, and a similar transfer facility would be provided between the LRV and BART systems east of the Pittsburg/Bay Point BART Station. As a result, the LRV Alternative would result in less-than-significant land use compatibility impacts similar to the Proposed Project.

Aside from the use of different types of technology, the only significant differences between the LRV Alternative and the Proposed Project would be the requirement for traction power substations located at intervals along the LRV tracks and a 20- to 25-foot-high overhead contact wire system. As these facilities would be located within a designated transit area, they would be consistent with established land uses. **(LTS)**

**Division of an Established Community.** Similar to the Proposed Project, the LRV Alternative operate transit service within the SR 4 median. Operation in the median of SR 4 would not physically divide the community. In addition the Hillcrest Avenue area where station options, parking, and maintenance facilities are proposed, is predominantly undeveloped, so that there is no community that would be affected. As a result, this alternative would not divide an established community. **(NI)**

**Farmland Conversion**. Most of the project corridor is located within the urban areas of east Contra Costa County. However, the most easterly portion of the project corridor contains Farmland of Local Importance, some of which may need to be developed as a remote maintenance facility under the LRV Alternative. As explained in Section 3.3, Land Use, of this EIR, the easternmost portion of the project corridor contains land designated as Farmland of Local Importance. This alternative could result in the loss of approximately 11.2 acres of

Farmland of Local Importance if the remote maintenance facility for either the Northside West or the Northside East LRV Station option is selected for the proposed Hillcrest Avenue Station. However, this area is no longer economically viable for agricultural production. Consequently, conversion of these "farmlands" would be a less-than-significant impact, similar to the Proposed Project. **(LTS)**

**Consistency with Local Land Use Policies.** Pursuant to California Government Code Section 53090, BART is exempt from local land use plans, policies, and zoning ordinances. Therefore, were the LRV Alternative implemented by BART and inconsistent with such local requirements, such inconsistency would not be determined to be a significant impact and mitigation would not be required. BART nevertheless provides this information to disclose to the public and to local jurisdictions the extent to which the project is consistent with the local plans and policies.

The LRV Alternative would extend transit services into east Contra Costa County, which is consistent with the development goals and policies of the cities of Pittsburg, Antioch, and Oakley, as well as Contra Costa County, that concern promoting Transit Oriented Development (TOD) in order to address many of the Bay Area's issues, such as availability of housing, lack of mobility, and loss of open space. In addition to these local policies, the LRV Alternative, like the Proposed Project, is also consistent with the BART System Expansion Policy. The LRV Alternative is projected to deliver 10,100 daily riders in 2030 and would, therefore, satisfy the BART System Expansion Policy ridership threshold, adjusted for the cost of the system, of 6,327 daily riders. This alternative would also be consistent with this policy, because it would provide the same ridership and support for TOD as the Proposed Project.

With respect to MTC Resolution #3434, the LRV Alternative would have a per-station target of 3,300 dwelling units within a one-half mile radius of the stations. According to the Pittsburg/Bay Point BART Station Area Specific Plan Final EIR and the Pittsburg and Antioch General Plans, the Pittsburg/Bay Point Station, Railroad Avenue Station, and Hillcrest Avenue Station would have 2,195 dwelling units, 4,591 dwelling units, and 1,975 dwelling units, respectively. The resulting average of 2,920 dwelling units per station would not satisfy the MTC threshold of 3,300 dwelling units per station. Even if the maximum development under consideration in the Antioch ridership Development Plan for the Hillcrest Avenue DMU Station options were taken into consideration (Northside East Station option), the per-station average number of housing units would be 3,230. This would still not satisfy the MTC Resolution #3434 threshold of an average of 3,300 units within a one-half mile radius of the stations.

As explained above, under "Farmland Conversion," the easternmost portion of the project corridor contains land designated as Farmland of Local Importance, but this area is no longer economically viable for agricultural production and, therefore, designation of this parcel as Farmlands of Local Importance appears outdated. Conversion of agricultural lands within the County could be considered to be inconsistent with Contra Costa County General Plan goals and policies aimed at preserving productive agricultural land outside the County's adopted

Urban Limit Line. However, as noted for the Proposed Project, the entire project corridor is within the County's Urban Limit Line, so that development of the LRV Alternative would not extend growth-inducing transit infrastructure or development into productive agricultural areas that are meant to be conserved.

In summary, the LRV Alternative would support local and regional public policies regarding land use. However, this alternative would not achieve the MTC Resolution #3434 threshold.

## Population and Housing

**Induced Housing and Employment.** As with the Proposed Project, investment in the LRV Alternative would support existing and proposed local development policies meant to foster economic development and higher-intensity mixed uses around transit stations. The LRV Alternative would enable the cities of Pittsburg and Antioch to alter the development pattern in the cities to increase development intensities around the Railroad Avenue and Hillcrest Avenue LRV Stations. The amount and intensity would be determined by local planning efforts, such as those underway with the Ridership Development Plans for the Proposed Project. This planned development would likely seek to induce new housing and employment into these areas, similar to the Proposed Project. In terms of employment, the LRV Alternative would create 13 indirect and 15 induced jobs in Contra Costa County, which is two indirect and three induced jobs less than the 15 indirect and 18 induced jobs created with the Proposed Project. Therefore, the LRV Alternative would result in the same less-than-significant effects on population and employment growth as described for the Proposed Project. **(LTS)**

**Land Acquisition/Displacement.** The LRV Alternative would have the same station locations and follow the same alignment as the Proposed Project. As with the Proposed Project, the Hillcrest Avenue LRV Station could be at one of four locations: in the median of SR 4 or at the alternate Northside West, Northside East, or Median Station East locations. To accommodate these station location options, the LRV Alternative would require land acquisition similar to that identified for the Proposed Project, resulting in the same potential displacement of existing residents and businesses. In addition, the LRV Alternative would require the acquisition of properties for power substations (see Table 5-24), all of which are currently vacant. **(PS)**

> MITIGATION MEASURE. Implementation of Mitigation Measure PH-2.1, which was identified for the Proposed Project and provides compensation and relocation assistance in accordance with state relocation laws, would reduce this impact of the LRV Alternative to a less-than-significant level. **(LTS)**

**Table 5-24**
**Potential Land Acquisition for LRV Traction Power Substations**

| Parcel No. | Notes |
|---|---|
| 067-341-027 | Owned by City of Antioch |
| 068-252-045 | Privately-held land |
| 073-190-027 | Owned by Pittsburg Redevelopment Agency |
| 074-090-021 | Privately-held land |
| 087-030-081 | Owned by Pittsburg Redevelopment Agency |
| 088-171-020 | Owned by Contra Costa County |
| NA | Vacant land adjacent to parcel 095-352-014 |

*Source:* PBS&J, 2008.

## Visual Quality

The primary difference between the Proposed Project and the LRV Alternative concerns vehicle motive power. The LRVs would receive their power from overhead catenary systems that would supply electrical current to the vehicles' electric motors. The catenary is the cable, running above the rail guideway, from which the trolley wire is suspended. In addition, an estimated six traction power substations, one-story buildings within a fenced area of about 40 feet by 80 feet, would be needed along the corridor. The LRV Alternative would follow the same alignment and contain the same station locations as the Proposed Project. The LRV trains would be similar in appearance and style to the DMU vehicles.

**Alteration to Visual Quality from the Pittsburg/Bay Point BART Station to Hillcrest Avenue.** The catenaries would be suspended from a steel lattice arm positioned at the top of 22-foot-high poles located within the center of the SR 4 median. The poles, spaced at approximate 170-foot intervals, as well as the catenaries, would be visible to motorists along SR 4. However, as a public transit facility, visual change within the highway corridor as a result of the LRV catenary would be consistent with the perception of SR 4 as a corridor for the movement of goods and people. The traction power substations would be new structures and would alter the visual setting at their proposed locations. However, these facilities would be sited along the SR 4 right-of-way, and would appear like a small warehouse, a one-story building within a fenced parcel. Because of the isolated location of these structures and their simplistic, utilitarian design, they would not be expected to significantly detract from the character of the area. As a result, no significant new or different visual impacts are identified for the LRV Alternative compared to the Proposed Project in this segment of the corridor, with the exception of the Hillcrest Avenue Station parking lots discussed below. **(LTS)**

**Change in Visual Character in Hillcrest Avenue Station Area.** Construction of the parking lots and maintenance facilities at the Hillcrest Avenue LRV Station would involve conversion of undeveloped land and substantially alter the existing rural character east of Hillcrest Avenue. The staged conversion of approximately 40 acres of land for parking under the LRV

Alternative for up to 2,600 vehicles would result in the same visual quality impacts as identified for the Proposed Project. Therefore, the Hillcrest Avenue LRV Station parking lots would significantly change the visual character of the area, similar to the Proposed Project. (S)

> MITIGATION MEASURE. As discussed under Impact VQ-3 for the Proposed Project, there are no mitigation measures available to reduce the change in visual character impact to a less-than-significant level. Therefore, the parking lots and maintenance facility at the Hillcrest Avenue LRV Station would result in a significant and unavoidable impact. **(SU)**

**Glare from Hillcrest Avenue LRV Station Parking Lots.** The proposed parking lots for the LRV Alternative would accommodate 2,600 cars. The approximately 40 acres of parked cars would generate considerable glare from reflective glass and automobile surfaces that would likely be an annoyance. Therefore, it is expected that the Hillcrest Avenue LRV Station parking lots would result in potentially significant glare impacts, similar to the Proposed Project. **(S)**

> MITIGATION MEASURE. The LRV Alternative would result in similar significant glare impacts identified in Impact VQ-7 for the Proposed Project. This impact can be reduced (see Mitigation Measure VQ-7.1, which calls for landscaping the parking lots to screen the glare from vehicles), but the size of the parking lots and the number of cars that could produce glare would still result in a significant and unavoidable impact. **(SU)**

**Construction Impacts.** The LRV Alternative would result in construction visual effects similar to those described for the Proposed Project. The LRV Alternative would result in the additional need to install and cable the support poles with the catenaries, and the attendant materials hauling and storage. As a result, the visual impacts of this alternative during the construction period would be potentially significant, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURES. Mitigation Measure VQ-8.1 recommended for the Proposed Project would apply to the LRV Alternative and calls for screening of construction staging areas and yards and locating these areas out of public views as much as possible. Similar to the Proposed Project, this mitigation measure would reduce construction-related visual effects to less than significant. **(LTS)**

## Cultural Resources

**Disturbance to Known Historic Resources**. As with the Proposed Project, the Contra Costa Canal is the only identified significant resource in the project corridor. Because the LRV Alternative, just like the Proposed Project, would be constructed in the median of SR 4, it would not cause the physical destruction, relocation, or alteration of the historical structure, and it would not impair the canal's ability to convey historical significance. Because the

property would continue to convey historical significance, no impacts on the Contra Costa Canal are anticipated as a result of the LRV Alternative. **(NI)**

**Disturbance to Unknown Cultural Deposits or Human Remains.** The LRV Alternative would be identical to the Proposed Project in terms of alignment, station, and maintenance facility options. The only substantive difference from the Proposed Project would be the construction of an overhead contact wire system. The LRV Alternative would also require construction of traction power substations to provide electricity along the route to propel the vehicles. Due to the construction of the traction power substations, the LRV Alternative may involve slightly greater ground-disturbing consequences than the Proposed Project. Accordingly, the potential of the LRV Alternative to damage or destroy undocumented archaeological resources, including human remains as a result of excavation, grading, fill placement, and other ground-disturbing activities would be potentially significant, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURES. The mitigation measures identified for the Proposed Project (see Mitigation Measures CR-2.1 and CR-2.2) would be equally effective for the LRV Alternative and would reduce the potentially significant impact on unknown cultural deposits or human remains to less than significant. These measures call for following established procedures in the event that archeological resources or human remains are encountered, respectively. **(LTS)**

## Geology, Soils, and Seismicity

**Exposure to Geotechnical and Seismic Hazards.** While the structures and facilities associated with the LRV Alternative are different than the structures for the Proposed Project, the geological risk associated with the alternative would be less-than-significant and similar to the Proposed Project, as all development would follow local, state, and federal building codes, as identified for the Proposed Project. Therefore, the impacts associated with these alternatives are expected to be the same. The only significant difference would be the construction of an overhead catenary wire system and the power stations. These structures and facilities would be constructed to withstand the appropriate level of ground shaking in accordance with local and state building codes. Furthermore, as with the Proposed Project, potential impacts on LRV structures from seismic-related ground failure, lateral spreading, subsidence, and expansive soils are anticipated to be less than significant with the incorporation of recommendations from the geotechnical investigations to be performed during the design phase and compliance with standards and guidelines contained in the design criteria and California Building Code. **(LTS)**

**Construction Impacts.** Construction activities associated with the LRV Alternative would include grading and minor excavation to accommodate the traction power substation needed for propulsion. These activities may cause soil erosion or sloughing in excavated areas, the same as described for the Proposed Project, which would result in potentially significant impacts. **(PS)**

MITIGATION MEASURE. The mitigation measure identified for the Proposed Project (Mitigation Measure GEO-7.1) would be equally effective for the LRV Alternative and would reduce potentially significant soil erosion impacts to less than significant. This measure calls for implementing erosion control BMPs (e.g., slope stabilizers, dust suppression, construction of berms and ditches, and sediment barriers). **(LTS)**

## Hydrology and Water Quality

**Drainage**. The LRV Alternative would be similar to the Proposed Project with respect to route, parking facility location and size, and maintenance facility, and as such would result in potentially significant impacts related to surface drainage. The primary difference between the alternatives would be the LRV Alternative requirements for an overhead catenary system and traction power substations, both of which would result in more impervious surface area than estimated for the Proposed Project. Nevertheless, these additional facilities for the LRV Alternative are dispersed along the project corridor (six are proposed along the 10-mile project corridor) and are relatively small in area (traction power substations would occupy a plot of land approximately 40 feet by 80 feet), such that they would not result in a substantial difference in runoff. **(PS)**

MITIGATION MEASURE. Mitigation Measure HY-1.1, identified for the Proposed Project, would reduce drainage impacts related to storm and flood capacity of the LRV Alternative to less than significant. Mitigation Measure HY-1.1 suggests implementing BMPs that would reduce peak stormwater runoff volumes. **(LTS)**

**Groundwater Resources**. Impacts to groundwater resources by the LRV Alternative would be less than significant, similar to those by the Proposed Project. Operation of the LRV Alternative would have no impact on groundwater depletion because it would not involve extraction of groundwater. Although the LRV Alternative would result in additional impervious surfaces for traction power substations spaced about every mile, the substations would involve relatively little land area since they occupy a space approximately 40 feet by 80 feet. Impacts to groundwater recharge would be less than significant because the clay loamy soils underlying the project area have low recharge potential. Additionally, there are no known drinking extraction wells in the vicinity of the proposed Hillcrest site where major recharge occurs. **(LTS)**

**Flooding.** As with the Proposed Project, the LRV Alternative would traverse minor floodplains at Los Medanos Wasteway, Markley Creek, and West Antioch Creek. The presence of these minor floodplains would not significantly affect operation of the LRV Alternative because the SR 4 profile would not result in overtopping of the road during the 100-year storm event at these locations. In addition, since the rail guideway for this alternative would be in the SR 4 median, it would not be affected by flood waters. In the vicinity of Loveridge Road, the LRV alignment would flood because of capacity constraints on Kirker Creek, which could adversely affect rail operations, similar to the Proposed Project. However, both Caltrans and the City of Pittsburg are proposing drainage improvements that would

alleviate the flood hazards in this segment of SR 4. At the Hillcrest Avenue Station, flood hazards under the LRV Alternative would be identical to those described for the Proposed Project. Improvements to drainage facilities along East Antioch Creek would reduce flood risks to a less-than-significant impact. **(LTS)**

**Water Quality.** Similar to the Proposed Project, pollutants deposited on the tracks from rail operations could be discharged to receiving water bodies and could cause significant water quality impacts. Unlike the Proposed Project, the potential discharge of diesel by-products would not occur with the LRV Alternative, because its propulsion would be provided by electricity. At the Railroad Avenue and Hillcrest Avenue Station parking areas, car-related pollutants, such as oils, hydrocarbons, and trace metals, would be of concern, similar to the Proposed Project. Finally, discharge of maintenance facility pollutants including hydrocarbons, oil, and trace metals from vehicle maintenance and washing and blowdown from the cleaning of the undercarriage could adversely affect water quality. Wastewater from the maintenance facility activities such as train washing would be collected by an underground system and routed to an oil-water separator facility prior to discharge into the municipal sewer system. An oil-water separator is a treatment in which oil and sediment are captured and hauled away periodically. The water is then discharged to the sanitary sewer unless it can be used for irrigation or other grey water uses. Runoff from the maintenance facility parking area would be routed to a bioswale. While the exact size and location of the bioswale have not yet been designed, the bioswales would be constructed to accommodate water treatment and parking lot design. The stormwater that is not captured by the bioswale would flow into local storm drains and water bodies. Impacts from the LRV Alternative would be the same as with the Proposed Project. **(PS)**

> MITIGATION MEASURE. Mitigation Measure HY-5.1 identified for the Proposed Project would be applicable to and would reduce the water quality impacts of the LRV Alternative to less than significant. This measure includes implementation of stormwater BMPs such as strip retention strips to treat runoff prior to discharge; oil/water separators to prevent pollutants from entering drainage system; and detention basins/pervious pavement to allow infiltration and pollutant removal. **(LTS)**

**Construction Erosion Impacts.** Construction impacts for the LRV Alternative would be similar to the Proposed Project; it would involve minor grading for the installation of track sub-ballast, ballast, ties, rails, an underdrain system; excavation for the construction of aerial and bridge structures; and, in addition, support poles for the overhead catenary system and traction power substations. Construction activities, such as site clearing, grading, and excavation, could expose soil to potential erosion. Since site disturbance would be virtually the same as identified for the Proposed Project (the LRV Alternative would affect less than one acre more than the Proposed Project because of the traction power substations), impacts from the LRV Alternative construction activities on water quality would be the same as the Proposed Project. These impacts include the potential for adverse erosion impacts to occur, sediment to

accumulate in culverts under the UP ROW, and water quality deterioration in the East Antioch Creek watershed waterways, and would be considered potentially significant. **(PS)**

> MITIGATION MEASURE. Implementation of Mitigation Measure HY-6.1 identified for the Proposed Project would reduce construction-period erosion impacts of the LRV Alternative to less than significant. This measure requires the development and implementation of a SWPPP outlining specific erosion and sediment BMPs. **(LTS)**

**Construction Water Quality Impacts**. Construction of the LRV Alternative would result in similar water quality impacts as described under the Proposed Project. Impacts to local water bodies would result from the following sources: 1) sediment release into storm drains and local water bodies a result of ground disturbing activities; 2) mishandling, storage, and disposal of construction materials that contain chemicals (including fuels for fueling, construction material and materials for welding, and pre-assembly of materials associated with fabrication shops); and 3) mismanagement of construction equipment producing fuel leaks.

As with the Proposed Project, the LRV Alternative would be required to obtain coverage under the NPDES General Permit for construction to minimize water quality impacts to the maximum extent practicable. Other permit requirements include preparation of a SWPPP and a Spill Prevention Plan outlining measures to control and manage hazardous materials storage. Measures that could be included in the SWPPP include proper storage of hazardous materials storage, periodic inspection of hazardous materials storage, employee training and awareness, and spill reporting. While these measures would minimize the potential impacts from construction on water quality, impacts from construction activities on water quality would still be considered significant. **(PS)**

> MITIGATION MEASURES. Implementation of Mitigation Measures HY-8.1 and HY-8.2 identified for the Proposed Project would reduce construction-period water quality impacts of the LRV Alternative to less than significant. These measures require that the BART contractor develop and implement a SWPPP that would govern construction activities; outline specific stormwater discharge BMPs; and implement construction dewatering BMPs to manage dewatering effluent. **(LTS)**

## Biological Resources

**Wetlands, "Waters of the U.S.", and "Waters of the State."** The LRV Alternative would use the same right-of-way and affect the same parcels and habitats as the Proposed Project. Accordingly, the impacts of the LRV Alternative on wetlands, waters of the U.S., and waters of the State are virtually identical to those described for the Proposed Project. The sole difference is the additional land, totaling less than one acre, needed for traction power substations under the LRV Alternative. Closer review of these sites would be warranted if this alternative were selected. A preliminary review of aerial photographs of the potential sites identified in Table 5-24 suggests two parcels may contain drainages. As a result, the potential traction power substations may affect wetlands or waters of the U.S.

Wetland features are located in the vicinity of the Hillcrest Avenue LRV Station options. As with the Proposed Project, no wetlands would be impacted under the Median LRV Station option. The Northside West LRV Station option would impact 0.17 acres of wetlands with the maintenance facility and extension of Slatten Ranch Road. Alternatively if the remote maintenance facility were constructed, 1.42 acres of wetlands could be impacted. The Northside East LRV Station option would have the greatest wetland impacts of the Hillcrest Avenue LRV Station options as both the parking areas and the maintenance facility would encroach into wetland areas and impact 1.91 acres of wetland habitat, which is the same situation as for the Proposed Project. Finally, the Median LRV Station East would impact 0.23 acres of wetlands due to the construction of the maintenance facility. Depending on the Hillcrest LRV Station option and the selected sites for the traction power substations, the LRV Alternative would have a potentially significant impact on wetlands and waters of the U.S. **(PS)**

> MITIGATION MEASURES. The same mitigation measures identified for the Proposed Project would be effective for the LRV Alternative and would reduce wetland impacts to less than significant. Mitigation Measure BIO-8.1 and/or Mitigation Measure BIO-8.2 would require securing either a Clean Water Act Section 404 permit or applicable approvals from state agencies. If BART chooses to participate in the ECCC HCP/NCCP, compliance with Mitigation Measure BIO-8.1 and BIO-8.2 would be required; if not, then compliance with Mitigation Measure BIO-8.1 would be required. **(LTS)**

**Swainson's Hawk Foraging Habitat**. The non-native grassland/ruderal area around the Hillcrest Avenue LRV Station options could provide suitable foraging habitat for Swainson's hawk. The LRV Alternative would result in the same loss of Swainson's hawk foraging habitat as the Proposed Project (Median LRV Station; 39.51 acres). Under the different Hillcrest Avenue LRV Station options, the loss of foraging habitat would be Northside West LRV Station, 44.6 acres; Northside East LRV Station, 46.3 acres; and Median LRV Station East, 46.3 acres. Loss of this habitat would be a potentially significant impact, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURES. The same mitigation measures recommended for the Proposed Project would apply to the LRV Alternative. Either Mitigation Measure BIO-3.1 or BIO-3.2 would reduce this impact to less than significant. Mitigation Measure BIO-3.1 calls for compensating for the loss of Swainson's hawk foraging habitat by providing an appropriate number of acres (as approved by CDFG) of agricultural land, annual grasslands, or other suitable raptor foraging habitat. Mitigation Measure BIO-3.2 would require participation in the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP), which would require payment of a development fee that would offset any impacts to foraging habitat. **(LTS)**

**Disturbance to Special-Status Nesting Birds.** Suitable nesting habitat for special-status birds has been identified within the proposed staging/construction yard east of Bailey Road and north

of SR 4 and the Hillcrest Avenue LRV Station. These special-status birds include, but are not limited to, Swainson's hawk, burrowing owl, tri-colored blackbird, and loggerhead shrike. Loss of nesting habitat under the LRV Alternative as a result of the surface parking lots at the Hillcrest Avenue LRV Station would be identical to that identified for the Proposed Project and would result in a potentially significant impact to special-status bird species. **(PS)**

> MITIGATION MEASURES. Mitigation Measures BIO-4.1 through BIO-4.4 or Mitigation Measure BIO-4.5, recommended for the Proposed Project, would apply to the LRV Alternative and would reduce this impact to a less-than-significant level by conducting pre-construction surveys for special status nesting birds, avoiding active nest/burrows by creating no-disturbance buffer zones, and avoiding the initiation of intensive disturbances (e.g., heavy equipment operation associated with construction, grading activities or the use of cranes) within the established buffer zones of an active nest during the nesting season. **(LTS)**

**Impacts to Birds from the Catenary System.** The LRV alternative would require a multi-line catenary system that would provide electrical energy to run the cars. The overhead wires carry voltage to power the LRV vehicles and the power is grounded through the rails. An electrical danger for birds is unlikely because both the overhead wire and rail would have to be touched simultaneously. Furthermore, the catenary system would be relatively close to the ground (up to 25 feet above the top of the rail line), so that it would not interfere with the primary flight pattern for the birds. Therefore, no impact would occur. **(NI)**

**Impacts to the Valley Elderberry Longhorn Beetle.** As with the Proposed Project, construction of the Northside East LRV Station option could result in the disturbance or removal (from construction or operation) of elderberry shrubs that were observed in the eastern portion of the proposed parking lot for this station option. Construction of this lot would require removal of the elderberry shrubs. Elderberry shrubs are the host plant for the VELB and the USFWS considers all elderberry shrubs with stems equal or greater than one inch in diameter in the VELB range are potential habitat for the beetle. The USFWS assumes that impacts to VELB would occur wherever there is ground disturbance within 100 feet of suitable habitat. Therefore, adverse effects on the shrubs with stems equal or greater to one inch in diameter would be considered "take" under the FESA. **(PS)**

> MITIGATION MEASURES. Either Mitigation Measure BIO-10.1 or Mitigation Measure BIO-10.2 recommended for the Proposed Project would apply to the LRV Alternative and would reduce this impact to a less-than-significant level. Under Mitigation Measure BIO-10.1, the elderberry shrubs would either be avoided or a mitigation plan would be created. If the species is delisted, then Mitigation Measure BIO-10.2 would ensure that impacts to the elderberry shrubs occur in accordance with the delisting notice. **(LTS)**

**Conflicts with the Provisions of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP).** The suggested mitigation measures for the LRV Alternative mirror the conditions on covered activities and conservation measures presented in the ECCC HCP/NCCP. Construction of the LRV Alternative would not alter the effectiveness of the ECCC HCP/NCCP, since implementation of the LRV Alternative would occur largely in previously developed urban areas. Implementation of the LRV Alternative would have no impact with respect to consistency with the ECCC HCP/NCCP. **(NI)**

**Removal of Trees that could be Protected by a Local Tree Preservation Policy or Ordinance.** Similar to the Proposed Project, construction activities for the LRV Alternative would result in the grading and removal of trees within the project corridor. Although BART is exempt by state law from compliance with local land use ordinances and as such is not legally required to comply with local ordinances, BART considers loss of protected trees a potentially significant impact. **(PS)**

> MITIGATION MEASURE. The same measure recommended for the Proposed Project, Mitigation Measure BIO-6.1 would reduce this impact to less-than-significant level. This measure calls for tree surveys to be completed to identify and evaluate trees that would be removed. Trees that meet specific criteria would be replaced after construction and monitored to ensure health and survival. **(LTS)**

**Impacts to Common Biological Resources.** Similar to the Proposed Project, **c**onstruction activities would result in the loss of habitat used by common plant and wildlife species. Much of the LRV Alternative would be constructed in areas that have already been developed, within the SR 4 median. While the LRV Alternative would result in displacement of common plant and wildlife species, it would not result in a significant decline of their population or their range. Therefore, this impact would be less than significant. **(LTS)**

## Noise and Vibration

The LRV Alternative would use the same route as the Proposed Project and involve the same facilities and options as the Proposed Project, including the use of a remote transfer station at the Pittsburg/Bay Point Station. The only significant difference between the LRV Alternative and the Proposed Project is the type of train and propulsion system. Light rail vehicles travel along a track, with noise generated from the contact of the wheels and the tracks, similar to the Proposed Project. However, unlike the DMU trains of the Proposed Project, the LRV Alternative would utilize vehicles that do not require a diesel engine for power. At about 55 mph and above noise levels between the DMU and LRV are predicted to be similar, using the equations contained in the FTA Guidelines. At these high speeds, the noise from the wheels and tracks dominates the overall noise. At lower speeds, the LRV would be quieter than the DMU.

**Noise from LRV Operating At Grade and away from Railroad Switches.** The Proposed Project was determined to have less-than-significant noise impacts from the DMUs and their horns on nearby sensitive receptors where the alignment operates at grade and away from railroad switches. Since the LRV Alternative would generate similar or lower noise levels from their engines and horns compared to the Proposed Project, the LRV Alternative would also have a less-than-significant impact on noise. **(LTS)**

**Noise from Switches.** As with the Proposed Project, the LRV would generate additional noise at the railroad switches. Noise generated by the Proposed Project at the switches, in combination with noise from the DMUs and their horns, would have a less-than-significant impact on nearby sensitive receptors. The noise levels generated by the switches from the LRV Alternative, in combination with their engines and horns, are expected to be similar to the Proposed Project and so impacts are also expected to be less than significant. **(LTS)**

**Noise from Substations.** To power the LRV, traction power substations would be required along the alignment. Assuming the locations of the traction power substations are similar to the BART Extension Alternative, the traction power substations would be enclosed within a building and located within 100 to 200 feet from the tracks. The greatest impact would occur at the substation proposed near L Street, where the substation would be about 100 feet from the nearest residence. The residence is estimated to have a background day-night noise level of about 60 dBA. At this background noise level, impacts would be significant if project-associated noise was 58 dBA or greater. This receptor would experience noise not only from the substation but also the LRV traveling on the tracks. At this receptor, an unshielded substation would generate a day-night noise level of 64 dBA, and the LRV traveling on the tracks would generate a day-night noise level of 51 dBA assuming the future sound walls along SR 4 achieve a reduction of 5 dBA. The combined noise at the receptor would be 65 dBA (dominated by the noise from the substation) which is more than the 58 dBA threshold. The substation would be enclosed within a building which would substantially reduce noise levels; however, since the building designs have not been developed at this early phase of engineering, noise levels are considered potentially significant. **(PS)**

> MITIGATION MEASURE. BART shall design the substation buildings to reduce noise levels below the thresholds specified in Table 3.10-8. Based on the above assumptions, an 8 dBA reduction in noise from the substation would reduce impacts to less-than-significant levels. **(LTS)**

**Noise from Maintenance Yard.** Similar to the Proposed Project, the LRV Alternative would have a maintenance yard where the movement of LRVs would generate noise at nearby receptors. The maintenance facility would be located east of the Hillcrest Avenue LRV Station. The LRV station and maintenance facility options are anticipated to generate the same noise levels as the Proposed Project because the analysis is based on the number of vehicles being moved in a maintenance facility. To ensure that this analysis adequately addresses potential maintenance facility noise impacts, the Proposed Project analysis conservatively combined the noise from the "yards and shops", as specified by the FTA Guidelines, with

noise from trains traveling over railroad switches. For the Proposed Project, noise from the maintenance facility would have a less-than-significant impact on nearby receptors. Accordingly, the LRV Alternative would also have a less-than-significant noise impact from the maintenance facility on nearby sensitive receptors. **(LTS)**

**Noise from Automobiles near Railroad Avenue and Hillcrest Avenue**. As with the Proposed Project, the LRV Alternative would change traffic volumes near the Railroad Avenue and Hillcrest Avenue Stations. The ridership for the LRV Alternative is expected to be similar to the ridership for the Proposed Project. As a result, traffic conditions around the two stations areas under the LRV Alternative and Proposed Project would be similar. The noise levels from automobiles around the stations for the Proposed Project were found to be less than significant; thus, the LRV Alternative would also result in less-than-significant noise levels from automobiles around the two stations. **(LTS)**

**Vibration.** The LRV Alternative would generate groundborne vibration that can cause annoyance to nearby receptors. According to the FTA Guidelines, LRVs generate the same or less vibration than DMUs.[20] Nevertheless, railroad switches worsen vibration levels such that nearby receptors along the project corridor could be affected. Specifically, locations where the LRV crosses a track switch can result in particularly high vibration levels. For the LRV Alternative, as with the Proposed Project, groups of switches are planned along the main line track east of transfer platform, east of Railroad Avenue, between Somersville Road and Contra Loma Boulevard, and west of the Hillcrest Avenue Station.

The Proposed Project would use the European-style DMUs that have similar suspension and loads as LRVs and would be expected to generate vibration levels similar to an LRV. The Proposed Project was found to have vibration levels from the operation of the DMU that were below significant vibration levels. With similar vibration characteristics, the LRV is also expected to have a less-than-significant impact on vibration levels at nearby receptors. **(LTS)**

**Construction Noise Impacts**. Similar to the Proposed Project, construction for the LRV Alternative would occur from 2011 to 2014 and occur along the SR 4 median. The only additional construction associated with the LRV Alternative would include the overhead catenary system and the traction power substations, which provide electricity for the vehicles and would be located along the alignment.

Construction for the LRV Alternative would require the same noise-generating equipment as the Proposed Project. As a result, the noise generated to construct the LRV Alternative would be similar to the Proposed Project. As predicted for the Proposed Project, impacts are expected to be significant at nearby sensitive receptors. **(PS)**

> MITIGATION MEASURES. As with the Proposed Project, implementation of Mitigation Measures NO-6.1 and NO-6.2 would reduce the potentially significant, yet temporary,

[20] FTA, *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

construction noise impact of the LRV Alternative. These measures require employing noise-reducing construction practices such as limited hours of construction and designating a noise-disturbance coordinator. However, the impact may remain significant and unavoidable even with the implementation of these mitigation measures. **(SU)**

**Construction Vibration.** Vibration levels predicted for the Proposed Project would also apply for the LRV Alternative. As with the Proposed Project, the closest residential receptors are about 100 feet from expected construction areas that would require the use of the types of rollers, drillers, cranes, bulldozer, and pile drivers that can generate high levels of vibration. The use of these equipment may result in significant impacts on nearby sensitive receptors. **(PS)**

MITIGATION MEASURE. The same Mitigation Measure NO-7.1 recommended for the Proposed Project would apply to the LRV Alternative and would require the use of vibration-reducing construction practices such as limiting nighttime activities and using equipment away from noise sensitive receptors. This mitigation measure would minimize temporary vibration impacts. However, the impacts are expected to remain significant and unavoidable. **(SU)**

## Air Quality

**CO Concentrations from Traffic at Congested Intersections**. The ridership of the LRV Alternative would be equivalent to that of the Proposed Project, and the less-than-significant CO impacts would be the same as well. **(LTS)**

**Greenhouse Gas and Regional Criteria Pollutants Emissions.** Because regional vehicle miles traveled under the LRV Alternative would be less than compared to the No Project conditions, greenhouse gas and regional ozone precursor emissions would likewise be reduced, resulting in a net air quality benefit.

Unlike the Proposed Project, the LRV Alternative would not generate emissions from the diesel fuel that would have been burned by the DMUs operating in the Bay Area. Instead, electrical power would be used to operate the LRV trains, which would result in some increase of $CO_2$ and criteria pollutant emissions (i.e., ozone precursors, $PM_{10}$ and CO) from the fossil fuel power plants generating that electricity. Since most electricity used in the Bay Area is generated by power plants outside this area, the expected net result under the LRV Alternative is a slight decrease in criteria pollutant emissions from Bay Area sources. Coal-fueled power plants would be the source for some of the electricity needed to operate the LRVs. BART currently gets about nine percent of its power from coal power plants, none of which are located in California. Thus, the LRV Alternative may result in higher criteria pollutant emissions at those power plants, wherever they are located, compared to their emissions under the Proposed Project. But the criteria pollutant emissions increases at those power plants caused by the LRV Alternative may be partially offset in the future because BART is planning

to increase the renewable portion of its electricity use and reduce the portion originating from coal power plants.

Estimated $CO_2$ emissions of 303 pounds per hour of service to run the LRV system were obtained from an LTK energy and emissions report, prepared for BART in 2008.[21] Based on an operating plan identical to the Proposed Project (20 hours of revenue service per day), the resulting $CO_2$ emissions for the LRV Alternative would be 6,060 pounds per day. This is far less than the emissions from the proposed DMU vehicles of 33,030 pounds per day, identified under the Proposed Project. As a result, the net beneficial effects identified for the Proposed Project would be even greater with the LRV Alternative. **(B)**

**Exposure to Toxic Air Contaminants (TACs).** The LRV Alternative would not increase TACs exposure to individuals living near the alignment, because propulsion under this alternative would be from electricity. As a result, impacts from exposure to these pollutants would be even less than the less-than-significant effects identified for the Proposed Project. **(LTS)**

**Construction Air Emissions.** Construction air impacts under the LRV Alternative would be the same as those described for the Proposed Project. Fugitive dust from grading and earthmoving activities and emissions from engine exhaust of heavy construction equipment would be potentially significant, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURES. The BAAQMD control measures for construction activities shown in Table 3.11-6 and described in Mitigation Measure AQ-8.1 and AQ-8.2 for the Proposed Project would be applicable to the LRV Alternative and would reduce potential construction-related air emissions to less than significant. **(LTS)**

## Public Health and Safety

**Accidental Release of Hazardous Materials.** The operation of the LRV Alternative may involve the use of hazardous materials at the maintenance facility, similar to the hazardous materials used for the Proposed Project, except diesel fuel storage is not required for LRV operation. The use of hazardous materials would be conducted pursuant to all hazardous material handling regulations, such as worker safety and health standards established under the Federal Occupational Safety and Health Act of 1970 and the California Occupational Safety and Health Act, RCRA, CERCLA, and the California Hazardous Waste Control Law.

Operation of the LRV Alternative could accidentally release hazardous materials found at the maintenance facility. The maintenance facility would be east of the proposed Hillcrest Avenue Station away from residential neighborhoods. In the event of a release, BART would immediately contact regulatory agencies, if required, and implement safety and emergency plans with respect to evacuation of the public and coordination with local emergency response

[21] LTK Engineers Services, Draft eBART Phase I Project to Hillcrest Terminal, DMU and LRV Comparison. March 17, 2008.

personnel. However, an accidental release of hazardous materials at a maintenance facility would be discharged into stormwater outlets located throughout the facility. Therefore, the potential exists that hazardous materials could be released into stormwater resulting in a significant impact.

The LRV route is located within one-quarter mile of existing schools. The transit vehicles for this alternative, however, do not use hazardous materials or emit hazardous pollutants. As such, there would be no health risk associated with an increase in TACs.

Construction activities associated with the LRV Alternative may involve handling of hazardous materials. However, the use of hazardous materials would be temporary in nature, since they would be limited to the construction period and would be conducted pursuant to all hazardous material handling regulations, such as worker safety and health standards established under the Federal Occupational Safety and Health Act of 1970 and the California Occupational Safety and Health Act, RCRA, CERCLA, and the California Hazardous Waste Control Law.

In summary, impacts related to the accidental release of hazardous materials and the attendant health risks would be similar to the Proposed Project and could be potentially significant. **(PS)**

> MITIGATION MEASURES. Mitigation Measure HS-4.1 recommended for the Proposed Project would apply to the LRV Alternative and calls for the preparation and implementation of a Spill Prevention Plan outlining measures that would be in place to control hazardous materials use and storage. Similar to the Proposed Project, this mitigation measure would reduce impacts from an accidental hazardous material release to less-than-significant levels. **(LTS)**

**Electromagnetic Fields (EMF).** Exposure to EMF is relevant with the LRV Alternative, since this alternative requires electricity for operation. EMF consists of electric fields (voltage) and magnetic fields (the movement of electricity) that are emitted from power lines, electrical facilities, and electrical appliances. Electric field strength is measured in units of volts per meter (V/m) and becomes stronger as the voltage increases. The strength of the electric field decreases rapidly with distance from the source. For magnetic fields, there are several units to measure strength, but the most commonly used are milligauss (mG) and microTesla (μT), with 10 mG equal to 1 μT. Magnetic fields also decrease with distance from the source, but easily pass through most objects. The health concerns about EMF typically focus on radiation from magnetic fields.

Relatively weak EMF is generated from everyday living and working activities. For example, typical EMF intensities include:[22]

- Overhead power transmission line: 32 to 57 mG (range of exposure to utility workers)
- Household appliances: 8 to 165 mG (at a distance of 12 inches)

[22] Santa Clara Valley Transportation Authority, *Silicon Valley Rapid Transit Corridor Final EIR,* available at http://www.svrtc-vta.org/2006_eis_docs.asp?area=docs, November 2004.

- Computer video display: 2 to 4 mG (at 16 inches)
- Rail vehicle (electrically powered): 400 mG (at 43 inches from the vehicle floor) to 1,500 mG (at floor level)

These EMF intensities can be compared to the natural magnetic field of the earth, which varies from 300 mG at the equator to 600 mG at the magnetic poles.

Existing sources of EMF in the vicinity of the project corridor include overhead power transmission lines. In addition, a PG&E substation in Antioch east of Hillcrest Avenue is approximately 800 feet north of the project corridor.

Numerous studies have raised suspicion about the link between EMF and certain health conditions, such as cancer, although the relationship has not been scientifically proven. Studies have been conducted on the link between childhood cancer and exposure to magnetic fields from power alternating back and forth 50 times each second (50 Hertz, or Hz) and 60 Hz.[23] In 1979, Dr. Nancy Wertheimer and Dr. Ed Leeper conducted a study that suggested that children living near high current lines might be more susceptible to leukemia than those living near low current lines.[24] However, other studies published since then have not demonstrated a cause-and-effect relationship between leukemia and exposure to magnetic fields.[25]

There are no health-based standards for long-term human exposure to EMF in the United States. Federal and state agencies have reviewed past studies to determine if exposure to EMF causes adverse health effects, and have found no basis for setting health standards to date.[26] Some states and local authorities have passed laws and ordinances limiting EMF exposure by establishing minimum distances between development and electrical systems of specific voltage. In 1993, the Public Utilities Commission issued Decision 93-11-013, which established certain steps to address EMF. After an investigation to determine the Commission's role in mitigating health effects of EMF created by electrical utility power lines and cellular radiotelephone facilities, the Commission developed measures to reduce EMF levels, establish design guidelines, create EMF measurement programs, facilitate stakeholder and public involvement, and begin educational and research programs, although the study did not determine a health risk from EMF exposure.[27] Due to the inconclusive information available on the subject, researchers have recommended practicing "prudent avoidance," which means limiting exposure when possible. Measures to limit exposure to EMF include locating sources of EMF as far away as possible from receptors.

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[23] A Hertz is a measure of frequency in cycles per second. One Hertz is one cycle per second.

[24] Wertheimer, N., and E. Leeper, Electrical wiring configurations and childhood cancer, *American Journal of Epidemiology*, 109(3): 273-284, 1979.

[25] PG&E, *EMF Frequently Asked Questions*. Available at http://pge.com/education_training/about_energy/emf/ faqs/, 2006.

[26] PG&E, *EMF Frequently Asked Questions*. Available at http://pge.com/education_training/about_energy/emf/ faqs/, 2006.

[27] Public Utilities Commission, Decision No. 93-11-013, Order Instituting Investigation on the Commission's own motion to develop policies and procedures for addressing the potential health effects of electric and magnetic fields of utility facilities, December 1993.

For the LRV Alternative, sources of EMF include traction power substations and the overhead power line. The traction power substations sites would be next to SR 4 and away from residences to the maximum extent possible. In addition, the substations would be enclosed in buildings which would shield surrounding uses from electric fields. The LRV alignment would run in the median of SR 4 and for the Hillcrest Avenue LRV Station options, in an undeveloped area between SR 4 and the UP ROW. As such, the overhead power lines would be separated from schools and residences. Because the strength of EMF declines quickly with distance and health effects are speculative at this point, health impacts from EMF exposure are considered less than significant. **(LTS)**

**System Safety and Passenger Security.** Existing standards and guidelines would ensure that the LRV Alternative is designed and operated in a safe and secure manner. These standards and guidelines address safety design requirements such as surveillance systems using closed-circuit television to monitor station areas and parking structures; slip-resistant surfaces; fencing to protect LRV trackways and maintain security of BART property; traffic barriers to protect LRV trains and passengers from damage and injuries caused by entry of vehicles upon the LRV system trackway from adjoining roadways; fire protection devices, such as standpipe and hose systems; and other safety systems to prevent collisions and derailments, such as Automatic Train Control, which is a system for controlling train movement, enforcing train safety, and directing train operations. Because BART would adopt and implement these standards and guidelines, impacts related to safety hazards from the LRV Alternative are expected to be less than significant, similar to the Proposed Project. **(LTS)**

**Public Airport or Public Use Airport Hazards.** According to a map review of the proposed LRV route, the nearest public airport, the Buchanan Field Airport, is approximately 6.5 miles southwest of the LRV alignment. Therefore, no impact is anticipated in regards to airport hazards. (**NI)**

**Exposure of People or Structures to Wildland Fires.** According to a review of aerial photographs of the LRV alignment and site reconnaissance, the areas surrounding the corridor are primarily developed with residential and commercial buildings. Areas near the proposed Northside West and Northside East LRV Station options are surrounded by undeveloped, agricultural land. A review of the CDF California Fire Hazard Severity Zone Map reveals that the proposed LRV route and the station option sites are not in a fire hazard zone.[28] Therefore, there would be no risks from wildland fires, similar to the Proposed Project. **(NI)**

**Risk of Terrorist Attack.** Compared to existing conditions, the risk of a terrorist attack would not significantly increase with the operation of the LRV Alternative. The existing BART system is 104 miles, and the LRV Alternative involves extending BART approximately 10 miles into eastern Contra Costa County. Given that the LRV Alternative involves a small

[28] California Department of Forestry and Fire Protection, *Contra Costa County Fire Hazard Severity Zone Map,* Available at http://www.fire.ca.gov/fire_protection/fhsz_maps/fhsz_maps_contracosta.php, 2007.

increase in distance compared to the existing system, the LRV Alternative would not be a primary target compared to other existing components of the BART system. If terrorist activity occurred during LRV operation, LRV personnel would be notified of the event and instructed to stop operations, if necessary. Since the LRV Alternative would not be a primary target compared to other existing components of the BART system, and safety procedures and emergency response plans would be in place to prevent and respond to a potential terrorist event, impacts related to a risk of terrorist attack would be less than significant. **(LTS)**

**Construction-Related Exposure to Hazardous Materials.** Public health and safety impacts associated with construction of the LRV Alternative would generally be similar to impacts identified for the Proposed Project, because the alignments are identical and the facilities and structures to be constructed are similar. Compared to the Proposed Project, the LRV Alternative would, however, involve additional ground disturbance and grading associated with the traction power substations. Similar to the Proposed Project, construction worker exposure to hazardous materials in contaminated soil and groundwater and in structures that may contain asbestos would be potentially significant. **(PS)**

> MITIGATION MEASURES. The same mitigation measures identified for the Proposed Project to reduce potential construction-related health risks would be applicable for the LRV Alternative. Specifically, Mitigation Measures HS-8.1, HS-8.2, HS-8.3, and HS-9.1, which call for file searches with the regulatory agencies for contaminated sites, further soil and groundwater contamination investigations, appropriate remediation, and asbestos surveys and appropriate precautions, would reduce potential health and safety impacts to less than significant. **(LTS)**

## Community Services

The LRV Alternative would use the same right-of-way and involve the same stations, parking lots, and maintenance facilities as the Proposed Project. The number of riders and boardings and alightings by station would also be similar for the two systems. As reported for the Proposed Project, the Pittsburg Police Department, Antioch Police Department, and Contra Costa County Fire Protection District would experience an increase in demand as a result of new transit service, but not to the extent that service levels would be adversely affected. In addition, BART would assume law enforcement responsibility for the proposed stations. Consequently, the LRV Alternative impacts on community services in the cities of Pittsburg and Antioch would be less than significant and similar to those described for the Proposed Project. **(LTS)**

## Utilities

**Water Demand**. The LRV Alternative would have water demand impacts similar to those described for the Proposed Project. Water use would be restricted to staff restroom facilities, drinking water fountains, and cleaning operations for the station areas and maintenance activities. The greatest water demand from these activities would be associated with the train-

cleaning operation. The LRV Alternative, like the Proposed Project, would require water for the cleaning of eight LRV vehicles per day, which was estimated at 640 gallons of water per day. Similar to the Proposed Project, the LRV Alternative would not exceed available water supply nor require expanded entitlements to meet project demands, because the CCWD's existing annual 174 mgd water supply and 2040 future capacity of 217 mgd would accommodate the LRV water demand. The LRV Alternative would therefore have a less-than-significant impact on available water supplies. **(LTS)**

**Wastewater Capacity**. Impacts to wastewater under the LRV Alternative would be similar to the Proposed Project, because the two systems would have similar operations and facilities. Based on a typical BART maintenance facility, the LRV Alternative maintenance facility would generate approximately 80 gallons of water daily to clean one car, of which 60 percent is assumed to be recycled. The LRV Alternative would discharge at least 40 percent of the wastewater to sanitary sewers (approximately 30-35 gallons of wastewater per car per day). Based on the LRV fleet, the LRV Alternative would generate approximately 280 gallons of wastewater per day, which if coupled with other wastewater-generating activities, such as restroom use, would not exceed available treatment capacity of 16.5 mgd and future capacity of 24 mgd. Therefore, the LRV Alternative would have a less-than-significant impact on wastewater treatment capacity, similar to the Proposed Project. **(LTS)**

**Interruption of Utility Service During Construction.** Both the LRV Alternative and Proposed Project are likely to encounter utilities during construction. A Preliminary Engineering Utility Report conducted for BART along the UP ROW identified extensive utility lines along the Mococo Line.[29] The report indicated that underground natural gas utilities occur longitudinally within the UP ROW, and include a Chevron pipeline, Kinder Morgan fuel pipeline, gas transmission line, and other fuel transmission lines. The majority of these utilities appear to be on the south side of the ROW. The maintenance facility for the both the LRV Alternative and Northside West Station option would be located to the south of the UP ROW. Therefore, there is a potential that underground utilities may exist beneath the proposed maintenance facility site for the LRV Alternative. Relocation of these utilities could result in significant impacts to utility service.

Both the Proposed Project and LRV Alternative would be required under the California Government Code (Sections 4216-4216.9) to notify and coordinate with affected utility providers prior to commencement of the construction activities, to minimize impacts on utility service. Nevertheless, potential relocation of utilities may cause localized service interruptions and significant impact to water, wastewater, power, natural gas, and communications. **(S)**

> MITIGATION MEASURES. Mitigation measures identified for the Proposed Project would also be applicable to the LRV Alternative (Mitigation Measures UT-3.1, UT-3.2, and UT-3.3). The measures include restricting utility work to off-peak service

[29] PGH Wong Engineering, Inc., *East Contra Costa County Transit Project (eBART) Service from Pittsburg-Bay Point to Byron. Utility Report, 2007.*

demand, such as late evenings and early morning hours when demand is limited; arranging an alternate means of providing service to avoid inconveniencing customers; and notifying customers of planned service interruptions. In addition, implementation of Mitigation Measure UT-7.1, as identified with the Proposed Project calls for confirming the location of underground utilities prior to ground-disturbing activities. These mitigation measures would reduce potential impacts of the LRV Alternative to a less-than-significant level. **(LTS)**

## Energy

**Energy Demand.** During operation, the LRV Alternative would directly consume energy to power the LRV and operate the stations and maintenance facilities. In addition, indirect energy would be consumed by the LRV Alternative as part of maintenance activities on the LRV. The total direct and indirect energy consumed by the LRV Alternative would be offset by the reduction in vehicle miles traveled from removing automobiles from the road. This reduction would come from not only reducing the direct energy consumed to power the automobiles but also reducing indirect energy consumed to maintain the automobiles. The estimated total annual miles traveled by the LRV and the reduction in vehicle miles traveled on the road as result of the LRV Alternative would be similar to the Proposed Project.

The main difference between the LRV Alternative and Proposed Project is that the LRV would be powered by electricity from an overhead contact wire system while the DMU generates electricity onboard using diesel engines. The LTK report estimates that the LRV would use slightly less energy per round trip in part due to the smaller vehicle size. [30] The LTK report provides an overall fuel economy of 0.725 gallons per mile for the DMU. Based on an energy content of 138,700 Btu per gallon for diesel fuel, the energy consumed per mile would be 100,558 Btu per mile. On the other hand, the LTK report gives an energy consumption factors in terms of kilowatts per mile of 9.3 kilowatts per mile for the LRV. The US DOE Transportation Energy Data Book dated 2007 provides a conversion factor of 10,339 Btu/kWh which translates to a Btu per mile of 96,153 Btu per mile. So the LRV vehicle itself consumes about five percent less energy than the DMU vehicle. However, the total energy consumptions takes into account use of transit vehicles, stations, maintenance facilities, and automobiles. Assuming the energy consumption from stations, maintenance facilities, and automobiles are the same between the DMU and LRV options, the overall energy consumption from the LRV Alternative would be about one percent less than the Proposed Project. The Proposed Project is expected to reduce overall energy consumption (combining the increase due to project operations and the reduction due to reduced automobile usage); the LRV Alternative would likewise reduce overall energy consumption and its net benefits would be slightly greater than those identified for the Proposed Project. **(B)**

[30] LTK, et al, eBART Phase 1 Project to Hillcrest Terminal DMU and LRV Comparison, May 14, 2008.

**Petroleum Demand.** Unlike the Proposed Project, which would consume about 500,000 gallons of diesel fuel in 2030, the LRV Alternative would not consume diesel fuel to operate the LRV vehicles, which are electrically powered. The DMUs, in contrast, would consume about 550,000 gallons of diesel fuel per year. Overall, petroleum consumption would decrease; however, because riders would not be driving their private automobiles on the road. Thus, to a greater extent than the Proposed Project, the LRV Alternative would result in a net benefit by reducing petroleum consumption. **(B)**

**Electricity Demand.** The impact to electricity demand from the LRV Alternative would be greater than from the Proposed Project. Electricity would be needed not only to operate the station and maintenance facility but also to power the LRV. The ability of electricity suppliers to satisfy electricity demand depends not only on generating capacity but also on transmission capacity. With regard to generating capacity, PG&E is required to have an approximately 15 percent reserve margin to meet peak load. However, there is much uncertainty regarding the ability of California's transmission system to handle peak demand, and the Cal-ISO expects reliable transmission service to the San Francisco Bay Area only until 2010. Considering the construction of the LRV Alternative, if selected, would occur after 2010, some uncertainty exists about the state of the transmission service when operation begins.

For the LRV Alternative, peak hours of service and, hence, electricity demand are expected to be between 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. Peak statewide demand is typically in the late afternoon during hot summer months. Therefore, peak electricity demand from the LRV Alternative may coincide with the statewide peak demand. PG&E's peak load in 2006 was about 19,000 MW.[31] BART system-wide peak load in 2006 was 84 MW, less than 0.5 percent of the PG&E peak load. Based on the design of the LRV, three LRVs running on maximum power could demand about 2.7 MW (assuming an efficiency of 92 percent) which represents less than 0.02 percent of the PG&E peak load. Nevertheless, because of long-term uncertainties with transmission reliability and the possibility that peak demand for the LRV Alternative may occur during the statewide peak demand, impacts to peak electricity demand may be significant. **(PS)**

> MITIGATION MEASURE. Implementation of energy conservation measures to reduce electricity demand would be necessary to help deal with the uncertainty of electrical transmission. BART customarily adopts energy conservation techniques and would apply these to the LRV Alternative. Such techniques include operation of fewer cars during off-peak hours to reduce the load, low power consuming light bulbs, and achieving a level of energy performance above that required by CCR Title 24 (Building Energy Efficiency Standards). However, given the uncertainty of electricity supplies, the LRV Alternative would still be expected to have a potentially significant and unavoidable impact on peak electricity demand. **(SU)**

[31] California Energy Commission. Accessed June 9, 2008, http://www.energy.ca.gov/electricity/index.html#demand, "2006 Annual Non-Coincident Peak Loads"

**Construction Energy Impacts.** Similar to the Proposed Project, energy would be consumed as part of the LRV Alternative to construct the tracks, stations, maintenance facility, and substations. Energy in the form of fossil fuels would be consumed by equipment and vehicles used for construction. Overall, the LRV Alternative is expected to consume slightly more energy during construction than the Proposed Project because the LRV would require the additional construction of overhead contact wire system and traction power substations.

Energy consumption during construction would be significant if the consumption of nonrenewable energy resources were done in a wasteful, inefficient, and unnecessary manner. At this conceptual engineering stage, energy conservation practices have not been developed for construction of the LRV Alternative. Similar to the Proposed Project, since a detailed conservation plan is not currently in place, it is assumed that the construction of the LRV Alternative may result in potentially significant energy impacts. **(PS)**

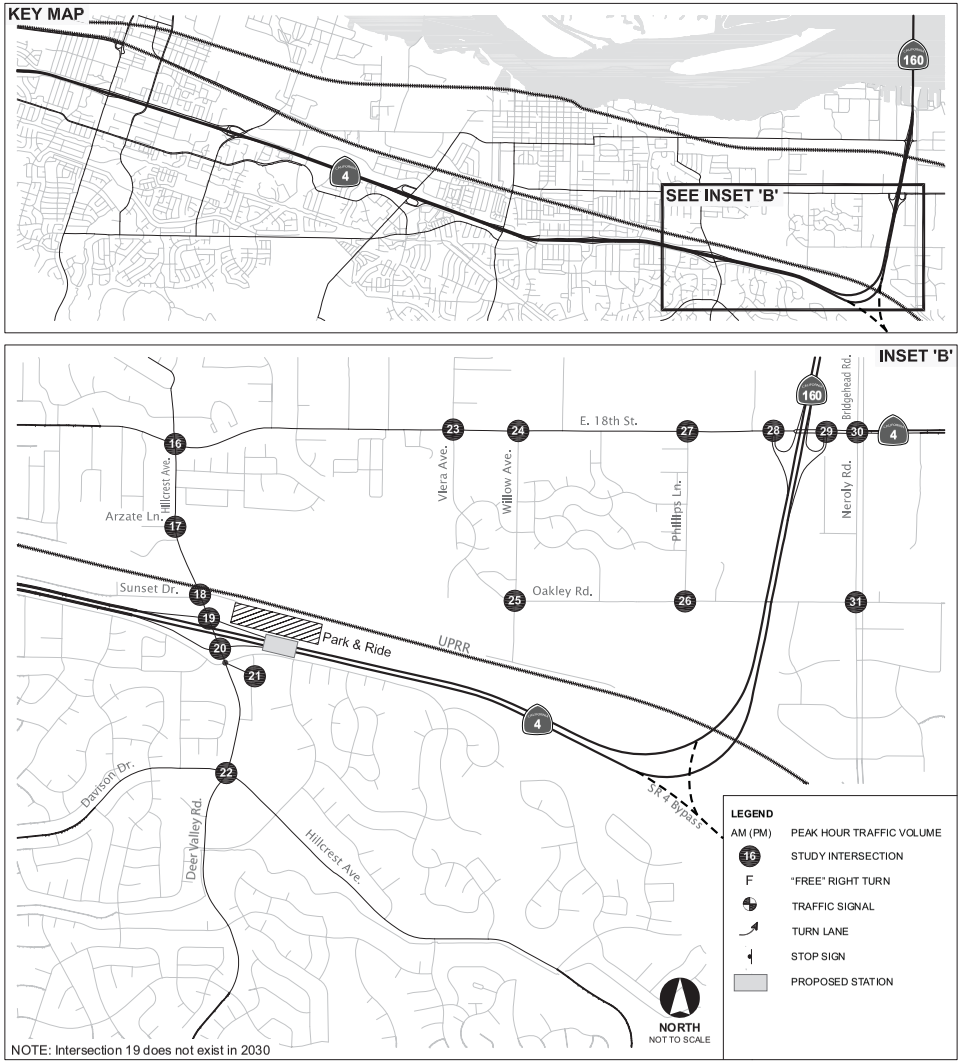
> MITIGATION MEASURE. Mitigation Measure EN-4.1 recommended for the Proposed Project would be applicable for the LRV Alternative. This measure calls for the development and implementation of an energy conservation plan for the construction period. With the implementation of this measure or an equivalent one, the LRV Alternative would have a less-than-significant impact with respect to energy resources during construction. **(LTS)**

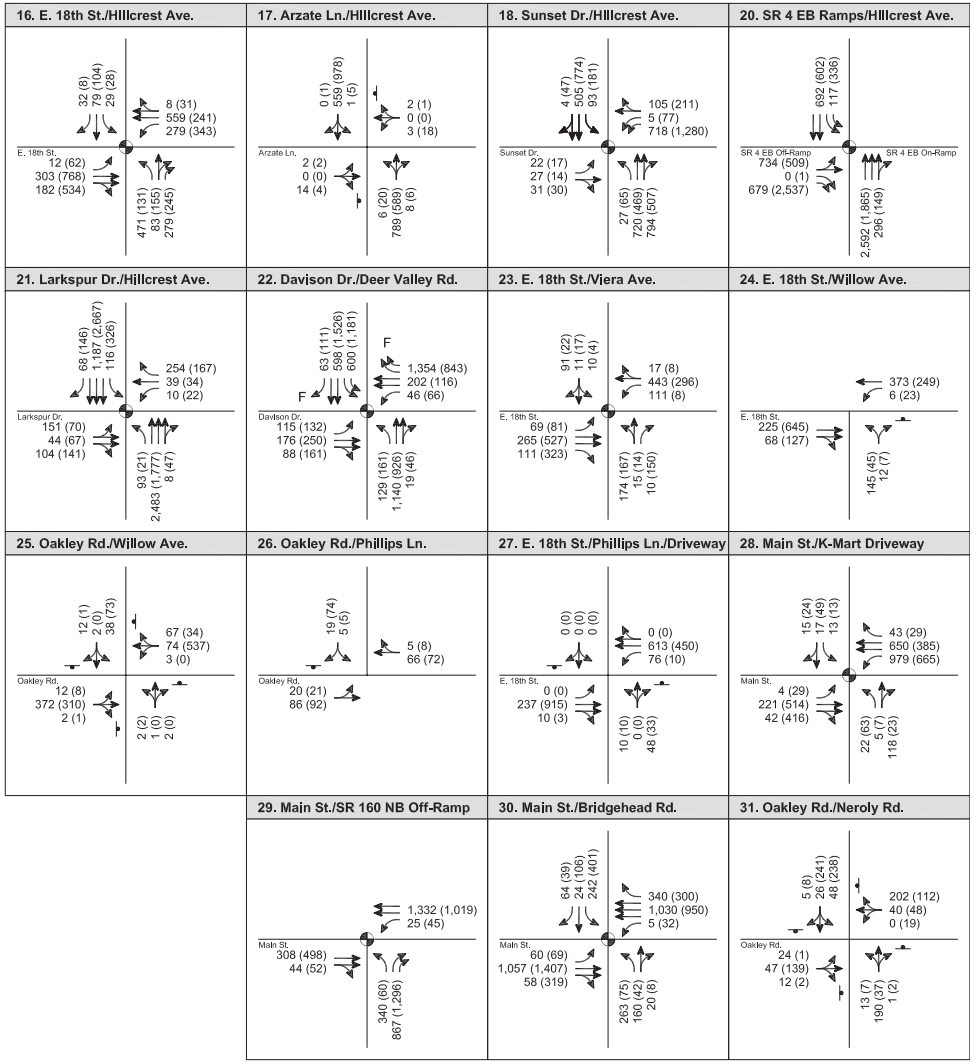
## BART Extension Alternative Analysis

### Transportation

The BART Extension Alternative would provide increased transit service in the transportation study area and would contribute to an overall reduction in traffic. However, it is expected that the alternative would impact mainly the study area surrounding the single station at Hillcrest Avenue that is part of this alternative. An evaluation of the BART Extension Alternative compared to the No Project Alternative and the Proposed Project is provided here.

**Intersection Operations.** Intersection level of service (LOS) was evaluated at the 16 study intersections around the proposed Hillcrest Avenue Station. The BART Extension Alternative intersection analysis is based on a projection of vehicle trips from the adjusted CCTA model. The intersection volumes are shown in Figure 5-14. A summary of the study intersection LOS for the BART Extension Alternative, the No Project Alternative, and the Proposed Project is shown in Table 5-25 (AM Peak) and Table 5-26 (PM Peak).




Source: WSA, 2008.

**HILLCREST AVENUE STATION AREA INTERSECTIONS - YEAR 2030 WITH BART ALTERNATIVE**
FIGURE 5-14

**Table 5-25**
**BART Alternative – 2030 AM Peak Hour Intersection Operation**

| # | Intersection | BART Alternative | | | No Project | | | Proposed Project | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | V/C | Delay | LOS | V/C | Delay | LOS | V/C | Delay | LOS |
| 16 | Hillcrest Avenue/E. 18th Street | 0.90 | 50.8 | D | **0.93** | **60.2** | **E** | 0.90 | 47.7 | D |
| 17 | Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway | 0.04 (EB) | 15.5 (EB) | C | 0.03 (WB) | 12.4 (WB) | B | 0.09 (EB) | 11.7 (EB) | B |
| 18 | Sunset Drive/Hillcrest Avenue | **0.94** | **58.6** | **E** | 0.78 | 31.7 | C | 0.87 | 32.3 | C |
| 19 | SR 4 WB Ramps/Hillcrest Avenue | Not present in future | | | Not present in future | | | Not present in future | | |
| 20 | SR 4 EB Ramps/Hillcrest Avenue | **1.30** | **>80** | **F** | 1.04 | 52.8 | D | **1.12** | **56** | **E** |
| 21 | Larkspur Drive/Hillcrest Avenue | 1.00 | 42.0 | D | **1.09** | **67.1** | **E** | **1.04** | **63.4** | **E** |
| 22 | Davison Drive/Hillcrest Avenue – Deer Valley Road | **1.15** | **>80** | **F** | **1.15** | **>80** | **F** | **1.15** | **>80** | **F** |
| 23 | E. 18th Street/Viera Avenue | 0.79 | 38.2 | D | 0.85 | 47.1 | D | 0.85 | 44.9 | D |
| 24 | E. 18th Street/Willow Avenue | 0.57 (NB) | 28.2 (NB) | D | 0.54 (NB) | 26.1 (NB) | D | 0.54 (NB) | 25.1 (NB) | D |
| 25 | Oakley Road/Willow Avenue | | 14.0 | B | | 14.2 | B | | 14.3 | B |
| 26 | Philips Lane/Oakley Road | 0.04 (SB) | 9.1 (SB) | A | 0.05 (SB) | 10.9 (SB) | B | 0.04 (SB) | 11.0 (SB) | B |
| 27 | E. 18th Street/Philips Lane – Dirt Driveway | 0.14 (NB) | 12.0 (NB) | B | 0.09 (NB) | 10.4 (NB) | B | 0.14 (NB) | 10.5 (NB) | B |
| 28 | SR 4 WB Ramps– K-Mart Driveway/Main Street | 0.76 | 25.8 | B | 0.84 | 26.0 | C | 0.76 | 18.8 | B |
| 29 | Main Street/SR 160 NB Ramps | 0.71 | 18.8 | C | 0.73 | 19.3 | B | 0.67 | 21.8 | C |
| 30 | Main Street/Neroly Road – Bridgehead Road | 0.78 | 36.4 | D | 0.79 | 42.0 | D | 0.77 | 36.4 | D |
| 31 | Oakley Road/Neroly Road | | 9.8 | A | | 15.6 | C | | 12.1 | B |

*Source:* Wilbur Smith Associates, April 2008

*Notes:*

Delay presented in seconds per vehicle.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

Bold type indicates unacceptable values.

**Table 5-26**
**BART Alternative – 2030 PM Peak Hour Intersection Operation**

| | | BART Alternative | | | No Project | | | Proposed Project | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | V/C | Delay | LOS | V/C | Delay | LOS | V/C | Delay | LOS |
| 16 | Hillcrest Avenue/E. 18th Street | **0.95** | **64.5** | **E** | **0.99** | **72.9** | **E** | **1.00** | **73.7** | **E** |
| 17 | Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway | 0.17 (WB) | 18.1 (WB) | C | **0.19** | **19.5 (WB)** | **C** | 0.18 (WB) | 19.0 (WB) | C |
| 18 | Sunset Drive/Hillcrest Avenue | **1.18** | **>80** | **F** | 0.88 | 40.6 | D | **1.11** | **>80** | **F** |
| 19 | SR 4 WB Ramps/Hillcrest Avenue | Not present in future | | | Not present in future | | | Not present in future | | |
| 20 | SR 4 EB Ramps/Hillcrest Avenue | **1.67** | **>80** | **F** | **1.64** | **>80** | **F** | **1.72** | **>80** | **F** |
| 21 | Larkspur Drive/Hillcrest Avenue | 0.78 | 28.7 | C | 0.9 | 38.4 | D | 0.85 | 33.5 | C |
| 22 | Davison Drive/Hillcrest Avenue – Deer Valley Road | **0.93** | **62.7** | **E** | **0.98** | **67** | **E** | **0.92** | **55.6** | **E** |
| 23 | E. 18th Street/Viera Avenue | 0.52 | 16.4 | B | 0.57 | 18.2 | B | 0.57 | 17.2 | B |
| 24 | E. 18th Street/Willow Avenue | 0.31 (NB) | 28.9 (NB) | D | 0.25 | 22.0 (NB) | C | 0.29 (NB) | 23.0 (NB) | C |
| 25 | Oakley Road/Willow Avenue | | 34.9 | D | | 29.6 | D | | 34.8 | D |
| 26 | Philips Lane/Oakley Road | 0.10 (SB) | 9.2 (SB) | A | 0.15 (SB) | 9.4 (SB) | A | 0.13 (SB) | 9.3 (SB) | A |
| 27 | E. 18th Street/Philips Lane – Dirt Driveway | 0.22 (NB) | 21.6 (NB) | C | 0.20 (NB) | 26.4 (NB) | D | 0.29 (NB) | 23.6 (NB) | C |
| 28 | SR 4 WB Ramps– K-Mart Driveway/Main Street | 0.82 | 25.8 | C | 0.8 | 36.7 | D | 0.85 | 32.2 | C |
| 29 | Main Street/SR 160 NB Ramps | 0.78 | 18.8 | B | 0.76 | 35.7 | D | 0.66 | 18.4 | B |
| 30 | Main Street/Neroly Road – Bridgehead Road | **0.96** | **75.7** | **E** | 0.93 | 50.6 | D | 0.88 | 48.8 | D |
| 31 | Oakley Road/Neroly Road | | 18.1 | C | | 24.6 | C | | 23.2 | C |

*Source:* Wilbur Smith Associates, April 200

*Notes:*

Delay presented in seconds per vehicle.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

Bold type indicates unacceptable values.

Under this alternative, during the Year 2030 AM peak conditions, the following three study intersections operate at unacceptable conditions, meaning worse than the threshold specified by its jurisdiction:

- Sunset Drive/Hillcrest Avenue
- SR 4 EB Ramps/Hillcrest Avenue
- Davison Drive/Hillcrest Avenue – Deer Valley Road

During the PM peak, five of the study intersections operate at unacceptable conditions:

- Hillcrest Avenue/E. 18th Street
- Sunset Drive/Hillcrest Avenue
- SR 4 EB Ramps/Hillcrest Avenue
- Davison Drive/Hillcrest Avenue – Deer Valley Road
- Main Street/Neroly Road – Bridgehead Road

For this analysis, an impact is identified if the alternative results in deterioration in LOS compared to the No Project Alternative and the intersection does not meet the LOS standards of its jurisdiction.

*Comparison to the No Project*. During the AM peak period in Year 2030, two of the intersections identified above would also experience deterioration in LOS under the BART Extension Alternative compared to the No Project scenario. These intersections are Sunset Drive/Hillcrest Avenue and SR 4 EB Ramps/Hillcrest Avenue. During the PM Peak, the intersections of Sunset Drive/Hillcrest Avenue and Main Street/Neroly Road – Bridgehead Road would operate at worse conditions compared to the No Project Alternative. Thus, the alternative would result in significant impacts on these intersections. **(S)**

MITIGATION MEASURES. The same mitigation measure as described for the Proposed Project at Sunset Drive/Hillcrest Avenue (Mitigation Measure TR-2.2) would apply to the BART Extension Alternative and improve the LOS to meet the City's standards. **(LTS)**

Operations at SR 4 EB Ramps/Hillcrest Avenue cannot be improved to acceptable levels for the same reasons identified for the Proposed Project. **(SU)**

*Improve Main Street/Neroly Road – Bridgehead Road*. Restriping the southbound through lane to a shared left-through lane would improve the intersection operation to an acceptable level. **(LTS)**

The resulting changes in LOS with these recommended mitigation measures are summarized in Table 5-27.

**Table 5-27**
**2030 Mitigated Intersection Operations – BART Extension Alternative**

| | | BART Extension Alternative | | | Mitigated | | |
|---|---|---|---|---|---|---|---|
| **Intersection** | **Peak** | **V/C** | **Delay** | **LOS** | **V/C** | **Delay** | **LOS** |
| Sunset Drive/Hillcrest Avenue | AM | 0.94 | 58.6 | E | 0.68 | 36.4 | D |
| | PM | 1.18 | >80 | F | 0.88 | 49.4 | D |
| SR 4 EB Ramps/Hillcrest Avenue[a] | AM | 1.30 | >80 | F | 1.04 | 46.5 | D |
| Main Street/Neroly Road – Bridgehead Road | PM | 0.96 | 75.7 | E | 0.77 | 37.1 | D |

*Source:* Wilbur Smith Associates, April 2008.

*Notes:*

a. Improvements would improve to this intersection have been studied by the City of Antioch, which determined these proposals to be infeasible because residential and commercial properties would be displaced in order to construct the improvements.

*Comparison to Proposed Project*. During the AM peak period in Year 2030, the BART Extension Alternative would result in worse LOS than the Proposed Project at the following three intersections:

- Hillcrest Avenue/Arzate Lane – PG&E Service Center Driveway
- SR 4 EB Ramps/Hillcrest Avenue
- Sunset Drive/Hillcrest Avenue

The BART Extension Alternative also shows improved operations at three of the 15 study intersections compared to the Proposed Project.

During the PM peak, the proposed BART Extension Alternative would result in worse LOS than the Proposed Project at the following two intersections:

- E. 18th Street/Willow Avenue
- Main Street/Neroly Road – Bridgehead Road

The BART Extension Alternative shows no improvement in LOS over the Proposed Project during the PM peak.

**Freeway Operations.** Freeway segment service levels were used to evaluate traffic impacts of the BART Extension Alternative and also for comparison to the No Project Alternative and the Proposed Project. A summary of the freeway segment LOS for the three alternatives is shown in Table 5-28 (AM Peak) and Table 5-29 (PM Peak).

During the Year 2030 AM Peak, the same nine freeway segments operate under unacceptable conditions in the westbound direction with the BART Extension Alternative as with the No Project Alternative. During the PM Peak, seven of the eight freeway segments that operate at unacceptable levels under the No Project Alternative would also be unacceptable under the BART Extension Alternative (the one exception is the segment from A Street to Hillcrest Avenue).

*Comparison to No Project*. During both the AM and PM peak periods, the BART Extension Alternative would result in no significant deterioration in LOS along the freeway compared to the No Project scenario. Also, in both peak periods, two freeway segments experience an improvement of LOS over the No Project Alternative. Since the BART Extension Alternative would improve conditions on some freeway segments compared to No Project conditions, this alternative would have beneficial freeway impacts. **(B)**

*Comparison to Proposed Project*. During both the AM and PM peak periods, the BART Extension Alternative would result in no significant deterioration in LOS along the freeway compared to the Proposed Project. Also, during the AM peak, the Railroad Avenue – Loveridge Road segment experiences an improvement of LOS in the westbound direction over the Proposed Project.

**Parking.** Table 5-30 below shows the estimated parking demand at the proposed Hillcrest Avenue Station for the BART Extension Alternative. This parking demand estimate is based on unconstrained travel demand forecasts, without considering the number of actual proposed spaces. In the year 2030, the BART Extension Alternative would not result in a parking shortfall at the proposed Hillcrest Avenue Station. **(LTS)**

**Table 5-28**
**2030 AM Freeway Segment Operation – BART Extension Alternative**

| Segment | BART Extension Alternative | | | | No Project | | | | Proposed Project | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | | WB | | EB | | WB | | EB | | WB | |
| | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS |
| West of Bailey Road | 23.0 | C | **> 45** | **F** | 22.9 | C | **> 45** | **F** | 22.8 | C | **> 45** | **F** |
| Bailey Road – Range Road | 26.8 | D | **> 45** | **F** | 26.7 | D | **> 45** | **F** | 26.6 | D | **> 45** | **F** |
| Range Road – Railroad Avenue | 26.4 | D | **> 45** | **F** | 26.7 | D | **> 45** | **F** | 26.4 | D | **> 45** | **F** |
| Railroad Avenue – Loveridge Road | 24.8 | C | **44.0** | **E** | 25.4 | C | **> 45** | **F** | 24.6 | C | **> 45** | **F** |
| Loveridge Road – Somersville Road | 24.4 | C | **> 45** | **F** | 25.4 | C | **> 45** | **F** | 23.7 | C | **> 45** | **F** |
| Somersville Road – L Street | 24.5 | C | **> 45** | **F** | 25.9 | C | **> 45** | **F** | 24.1 | C | **> 45** | **F** |
| L Street – A Street | 25.0 | C | **> 45** | **F** | 26.1 | D | **> 45** | **F** | 24.1 | C | **> 45** | **F** |
| A Street – Hillcrest Avenue | 20.6 | C | **> 45** | **F** | 21.0 | C | **> 45** | **F** | 19.6 | C | **> 45** | **F** |
| Hillcrest Avenue – SR 160 | 15.7 | B | 30.2 | D | 16.3 | B | 32.6 | D | 15.7 | B | 29.7 | D |
| SR 160 – Laurel Road[a] | 16.9 | B | 33.3 | D | 17.5 | B | 33.5 | D | 17.1 | B | 32.4 | D |
| Laurel Road – Lone Tree Way[a] | 16.8 | B | **36.0** | **E** | 17.4 | B | **37.0** | **E** | 16.9 | B | **35.1** | **E** |
| SR 4 Ramp – 18th Street | 23.1 | C | 19.2 | C | 24.5 | C | 21.7 | C | 23.1 | C | 19.2 | C |

*Source:* Wilbur Smith Associates, April 2008.

*Notes:*

**Bold** type indicates unacceptable values

a. HOV lane not present

**Table 5-29**
**2030 PM Freeway Segment Operation – BART Extension Alternative**

| | BART Extension Alternative | | | | No Project | | | | Proposed Project | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | | WB | | EB | | WB | | EB | | WB | |
| Segment | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS | Density | LOS |
| West of Bailey Road | **> 45** | **F** | 24.3 | C | **> 45** | **F** | 24.7 | C | **> 45** | **F** | 24.2 | C |
| Bailey Road – Range Road | **> 45** | **F** | 27.2 | D | **> 45** | **F** | 27.1 | D | **> 45** | **F** | 27.0 | D |
| Range Road – Railroad Avenue | **> 45** | **F** | 26.4 | D | **> 45** | **F** | 26.6 | D | **> 45** | **F** | 26.3 | D |
| Railroad Avenue – Loveridge Road | **> 45** | **F** | 29.6 | D | **> 45** | **F** | 30.8 | D | **> 45** | **F** | 29.5 | D |
| Loveridge Road – Somersville Road | **> 45** | **F** | 31.5 | D | **> 45** | **F** | 32.8 | D | **> 45** | **F** | 31.4 | D |
| Somersville Road – L Street | **41.6** | **E** | 30.3 | D | **> 45** | **F** | 32.4 | D | **41.6** | **E** | 30.2 | D |
| L Street – A Street | **> 45** | **F** | **36.0** | **E** | **> 45** | **F** | **36.4** | **E** | **> 45** | **F** | **35.6** | **E** |
| A Street – Hillcrest Avenue | 30.9 | D | 30.4 | D | **37.6** | **E** | 30.5 | D | 30.9 | D | 29.5 | D |
| Hillcrest Avenue – SR 160 | 16.9 | B | 18.5 | C | 14.2 | B | 18.4 | C | 16.9 | B | 18.8 | C |
| SR 160 – Laurel Road[a] | 18.8 | C | 20.0 | C | 19.3 | C | 21.0 | C | 18.8 | C | 19.8 | C |
| Laurel Road – Lone Tree Way[a] | 20.7 | C | 19.6 | C | 21.1 | C | 19.5 | C | 20.7 | C | 19.4 | C |
| SR 4 Ramp – 18th Street | 19.0 | C | 25.3 | C | 21.3 | C | 27.2 | D | 19.0 | C | 25.3 | C |

*Source:* Wilbur Smith Associates, April 2008.

*Notes:*

**Bold** type indicates unacceptable values

a. HOV lane not present

**Table 5-30**
**2030 Station Parking Demand – BART Extension Alternative – Year 2030**

| | Hillcrest Avenue Station |
|---|---|
| Riders Using Parking | 3,720 |
| Auto Occupancy | 1.06 |
| Parking Demand | 3,497 |
| Parking Supply | 3,500 |
| Occupancy | 99% |
| Excess Demand | 0 |

*Source:* Wilbur Smith Associates, 2008.

**BART Ridership and System Capacity.** The BART Extension Alternative is expected to generate 6,600 new daily transit trips. This level of ridership would result in an increase in the average peak hour load factor (riders/per car) on the BART system compared to the Proposed Project (see Table 5-31). BART's operations staff has determined that an average load of 112 passengers per car represents a realistic measure of practical train capacity. However, BART has ongoing programs of fleet expansion, train control system enhancement, and fleet modernization which are designed to address the capacity needs of system and would be adequate to accommodate the increased loads associated with the BRT Options. Conservatively is has been estimated that these improvements would increase the acceptable average load to 124 persons per vehicle and reduce the number of seats per vehicle to 59. An average load of 124 passengers per car and 59 seats represents a load factor of 2.10 passengers per seat. The BART Extension Alternative would have a 2.04 load factor in the Transbay Tube in the PM peak hour compared to a 2.02 load factor for the Proposed Project. Both of these load factors are below the 2.10 factor which represents practical capacity. The BART Extension Alternative would thus have a less-than-significant impact on BART capacity. **(LTS)**

**Table 5-31**
**BART Extension Alternative – Average Load Factor,[a] Year 2030**

| | Westbound AM Peak | | Eastbound PM Peak | |
|---|---|---|---|---|
| | BART | Proposed Project | BART | Proposed Project |
| Pittsburg/Bay Point[b] | | | 0.83 | 0.77 |
| North Concord/Martinez | 0.80 | 0.74 | 0.97 | 0.92 |
| Concord | 0.97 | 0.92 | 1.34 | 1.29 |
| Pleasant Hill | 0.82 | 0.80 | 1.13 | 1.11 |
| Walnut Creek | 1.20 | 1.17 | 1.34 | 1.31 |
| Lafayette | 1.43 | 1.40 | 1.48 | 1.45 |
| Orinda | 1.55 | 1.52 | 1.61 | 1.59 |
| Rockridge | 1.67 | 1.65 | 1.84 | 1.81 |
| MacArthur | 1.86 | 1.83 | 1.84 | 1.81 |
| 19th Street/Oakland | 1.93 | 1.91 | 1.76 | 1.74 |
| 12th Street/Oakland City Center | 1.85 | 1.83 | 1.98 | 1.97 |
| West Oakland | 1.73 | 1.72 | 2.04 | 2.02 |
| Embarcadero | 1.81 | 1.79 | 1.37 | 1.36 |
| Montgomery St. | 1.15 | 1.14 | 0.70 | 0.70 |
| Powell St. | 0.92 | 0.91 | 0.76 | 0.75 |
| Civic Center | 0.71 | 0.70 | 0.38 | 0.37 |
| 16th Street Mission | 0.38 | 0.38 | 0.29 | 0.29 |
| 24th Street Mission | 0.31 | 0.31 | 0.22 | 0.22 |
| Glen Park | 0.27 | 0.26 | 0.19 | 0.19 |
| Balboa Park | 0.25 | 0.25 | 0.06 | 0.06 |
| Daly City[b] | 0.06 | 0.06 | | |

*Source:* Wilbur Smith Associates, April 2008

*Notes:*

a. Load Factor is defined as the ratio of passengers carried versus the total passenger seating capacity of the train.

b. The load factor represents the load on the trains arriving at the station. For this reason there are no loads shown at Pittsburg/Bay Point westbound, and Daly City eastbound

## Land Use

**Land Use Compatibility.** As with the Proposed Project, most of the alignment under the BART Extension Alternative would be within the SR 4 median. In most of the project area, SR 4 runs through urban areas such as residential, commercial, and industrial land uses. As these communities are already separated by SR 4, the addition of BART transit services in this area would not be considered incompatible with surrounding land uses. The Hillcrest Avenue BART Station and park-and-ride lot are proposed for an undeveloped area between SR 4 and the UP ROW, and there are no existing sensitive uses that could be adversely affected by station activity. Because the area is currently undeveloped and is already traversed by an established transportation route, the extension of BART services to this portion of the project corridor would not result in incompatible land uses. **(LTS)**

**Division of an Established Community.** Similar to the Proposed Project, the BART Extension track would also run along SR 4, but only one new station at Hillcrest Avenue is proposed under this alternative. This new station would be located just to the east of the Northwest Station option site and BART trains would access the station via a new aerial flyover and raised track. In general, the site of the Hillcrest Avenue BART Station is undeveloped and a new station at this location would not affect an established community. Therefore, the BART Extension Alternative would result in no impacts associated with the division of a community. **(NI)**

**Farmland Conversion.** Most of the project corridor is located within the urban areas of east Contra Costa County. No portion of the BART Extension Alternative corridor would affect existing farmlands or important farmlands designated by the California Department of Conservation. Similar to the Proposed Project with the Median Station, which is described under Impact LU-3, the BART Extension Alternative would have no impact on farmlands. **(NI)**

**Consistency with Local Land Use Policies.** Pursuant to California Government Code Section 53090, BART is exempt from local land use plans, policies, and zoning ordinances. Therefore, if the BART Extension Alternative was implemented by BART and found to be inconsistent with such local requirements, such inconsistency would not be determined to be a significant impact and mitigation would not be required. BART nevertheless provides this information to disclose to the public and to local jurisdictions the extent to which the project is consistent with the local plans and policies, but significance findings are not provided.

The BART Extension Alternative would be consistent with the development goals and policies of the City of Antioch, as well as Contra Costa County, that concern promoting TOD in order to address many of the Bay Area's issues, such as availability of housing, lack of mobility, and loss of open space. In particular, the City of Antioch General Plan includes Land Use Policy 4.3.2a, which promotes close relationships between land use and transportation, and the

promotion of alternative transportation systems to minimize single-occupant vehicle travel. Also, Circulation Policy 7.5.2a calls for the development of a "transit oasis" that could include rail transit centers, priority transit lanes, and dedicated travel lanes. The BART Extension Alternative would not conflict with Contra Costa County Land Use Policy 3-10 and Agricultural Resources Goal 8-H, aimed at protecting agricultural interests in the County by preventing the extension of growth-inducing infrastructure and conserving productive agricultural lands outside the County's adopted Urban Limit Line. Since the entire project corridor is located within the Urban Limit Line, the BART Extension Alternative is consistent with applicable goals and policies.

Unlike the Proposed Project, the BART Extension Alternative would not include a station at Railroad Avenue in Pittsburg. As a result, TOD benefits from this station in the City of Pittsburg and the policies calling for BART to be extended to Railroad Avenue would not materialize under the BART Extension Alternative.

The BART Extension Alternative would expand transit services into east Contra Costa County and provide a link between this area and the greater San Francisco Bay Area, satisfying certain aspects of the BART System Expansion Policy. Although the BART Extension Alternative ridership would be greater than the Proposed Project with 12,000 daily riders, it would not meet the BART System Expansion Policy threshold, adjusted for the cost of the system, of 14,000 riders. With respect to the MTC Resolution #3434, the BART Extension Alternative requires a per-station threshold of 3,850 dwelling units within a one-mile radius of the stations. According to the Pittsburg Bay Point BART Station Area Specific Plan Final EIR and the Antioch General Plan, the Pittsburg/Bay Point BART Station and the Hillcrest Avenue Station would have 2,195 dwelling units and 1,975 dwelling units, respectively. The resulting average of 2,085 riders per station would not satisfy the MTC threshold. Even if the Hillcrest Avenue Station option with the greatest number of dwelling units being considered by Antioch in its RDP process were used (Northside East Station option with up to 2,900 dwelling units), the average number of dwelling units for the two stations would be 2,550. Therefore, this alternative would not satisfy the MTC Resolution #3434 per-station threshold of 3,850 units within one-half mile of the stations.

In summary, the BART Extension Alternative would support local and regional public policies regarding land use. However, this alternative would not achieve the BART System Expansion Policy, MTC Resolution #3434 thresholds, or the City of Pittsburg transit-oriented and mixed use development policies around Railroad Avenue.

## Population and Housing

**Induced Housing and Employment.** Like the Proposed Project, the BART Extension Alternative would support the City of Antioch's development policies to promote economic development and orient higher-intensity mixed uses around transit stations. The BART

Extension Alternative could have the effect of altering the development pattern in the City of Antioch to increase development intensities around the Hillcrest Avenue BART Station. As a major capital investment in infrastructure with regional mobility benefits, the BART station could function as a major catalyst for new growth that would induce substantial new population and employment. As with the other build alternatives, the amount and intensity of development will be determined by local planning efforts. The presence of a new BART station would attract development that may have occurred elsewhere in the community. In terms of employment, the BART Extension Alternative would create 26 indirect and 31 induced jobs in Contra Costa County, which are 11 indirect and 13 induced jobs more than the 15 indirect and 18 induced jobs created with the Proposed Project. Because the City has assumed that BART services would be available in its long-range General Plan, growth forecasts by the City already anticipate increased development around the station. As a result, it is not expected that the BART Extension Alternative would induce substantial growth beyond what is anticipated by the City of Antioch in its General Plan and what is planned as part of Antioch's Hillcrest Station RDP. Therefore, the BART Extension Alternative would result in less-than-significant effects on population and employment growth, similar to the Proposed Project. **(LTS)**

**Land Acquisition/Displacement.** The BART Extension Alternative would follow a route similar to the Proposed Project, proceeding in the median of SR 4 from the Pittsburg/Bay Point Station to Hillcrest Avenue. However, around Hillcrest Avenue, this alternative would leave the median of SR 4 in an elevated guideway and transition to a station along the UP ROW in the undeveloped area north of SR 4 and east of Hillcrest Avenue. Similar to the Proposed Project, there would be property acquisitions as a result of the track alignment, station facilities, parking lots with a total of 3,500 spaces, a maintenance facility, and the traction power substations. Land acquisition and potential displacement of existing residents and businesses for station facilities would be a significant impact. **(S)**

> MITIGATION MEASURE. Implementation of Mitigation Measure PH-2.1, which was identified for the Proposed Project and provides compensation and relocation assistance in accordance with state relocation laws, would reduce this impact of the BART Extension Alternative to a less-than-significant level. **(LTS)**

## Visual Quality

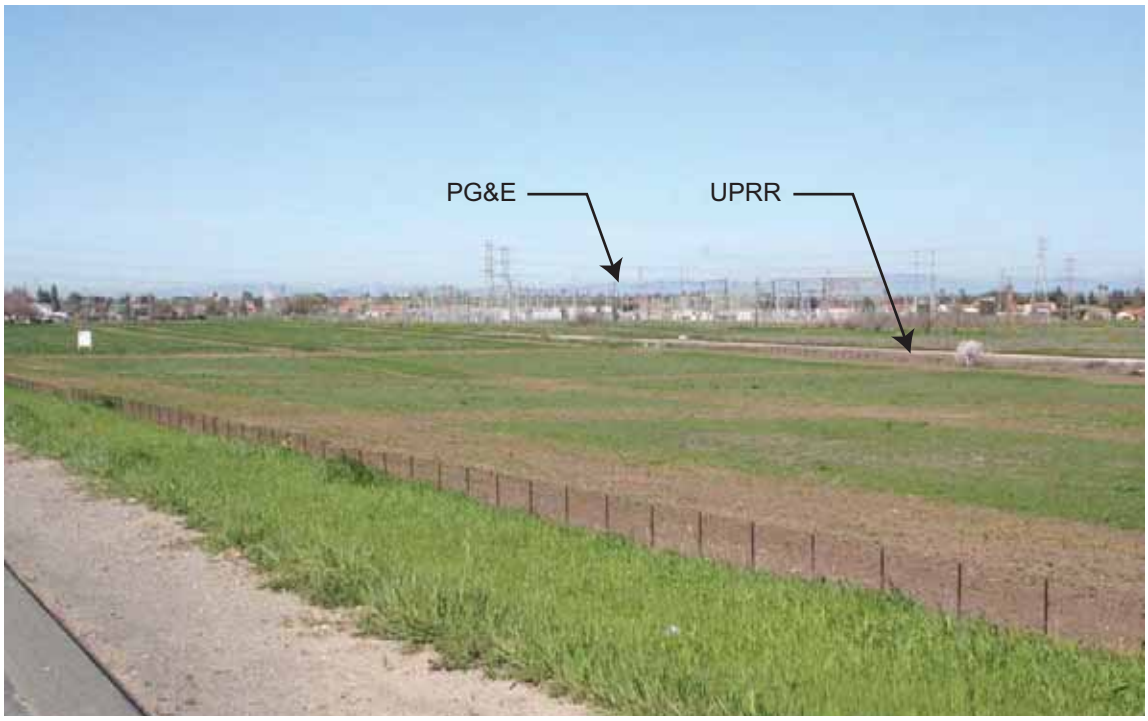
This alternative differs from the Proposed Project in several ways that have visual consequences: 1) there would be no need for a transfer platform; 2) there would be no Railroad Avenue Station; 3) there would be no Hillcrest Avenue Station in the SR 4 median and thus no pedestrian bridge to connect passengers to the parking areas north of SR 4; 4) there would be a Hillcrest Avenue BART Station about 1,300 feet east of the Northside West Station option under the Proposed Project; and 5) the Hillcrest Avenue BART Station would be connected to the BART tracks in the SR 4 median via an elevated guideway. The guideway would exit the SR 4 median via a flyover over westbound SR 4 and Hillcrest Avenue.

**Alteration to Visual Quality from the Pittsburg/Bay Point BART Station to Hillcrest Avenue.** Extending the existing BART system and technology from its present terminus at the Pittsburg/Bay Point BART Station east to the Hillcrest Avenue Station would include similar components identified for the Proposed Project, including the staff building and parking and train control huts. With respect to the first three differences from the Proposed Project, the analysis of the Proposed Project did not identify any significant visual effects with respect to these project facilities (see Section 3.5, Visual Quality). The BART Extension Alternative would avoid any changes to the visual setting at these locations since none of these elements would be constructed. Thus, for these three elements, the less-than-significant impacts identified for the Proposed Project would be "no impact" under the BART Extension Alternative. **(LTS)**

**Change in Visual Character in the Hillcrest Avenue Station Area.** The development of the Hillcrest Avenue BART Station would include a multi-story station, station parking, the flyover to access the station, and a maintenance facility. With these additions, there would be noticeable changes to the visual setting. Figure 5-15 shows an existing view from SR 4 of the sites for the Hillcrest Avenue BART Station and flyover. As indicated in the visual simulation, the flyover would appear as an elevated structure of narrow width and depth accommodating both eastbound and westbound project guideways and would clear the interchange by approximately 18 feet. The flyover would visually appear as an integrated component of the existing interchange geometry and would not constitute a significant visual change from existing conditions, would not detract from existing structures or open space, and would not be regarded as an obtrusive element substantially out of character with the visual setting.

The visual impacts of the Hillcrest Avenue BART Station would be similar to those described for the Northside West Station option under the Proposed Project. The staged conversion of about 56.2 acres of land for up to 3,500 parking spaces, along with the scale and mass of the BART station (larger than the Northside West Station option), would significantly contrast with the existing visual character of the surrounding area. Although more visually prominent than the Proposed Project, the BART Extension Alternative would not obstruct scenic views, alter the setting by eliminating scenic resources, or be visually incompatible with surrounding uses. Nonetheless, the Hillcrest Avenue BART Station parking facilities would also result in significant impacts to the visual character of the area, similar to the Proposed Project. **(S)**

> MITIGATION MEASURE. As discussed under Impact VQ-3 of the Proposed Project, there are no mitigation measures available to reduce the change in visual character impact to a less-than-significant level. Therefore, similar to the Proposed Project, the Hillcrest Avenue BART Station and related facilities would result in a significant and unavoidable impact. **(SU)**




**A** **Existing View**


**B** **Simulated View**

Source: WKA, 2008.

**NORTHWEST VIEW TOWARDS HILLCREST AVENUE BART STATION FROM SR 4 - BART EXTENSION ALTERNATIVE**

FIGURE 5-15

**Glare from Hillcrest Avenue BART Station Parking Lots.** The proposed parking lots for the BART Extension Alternative would accommodate 3,500 cars. The approximately 56.2 acres of parked cars would generate considerable glare from reflective glass and automobile surfaces that would likely be an annoyance. Table 5-30 indicates the Hillcrest Avenue BART Station is projected to be 99 percent occupied. Therefore, it is expected that the Hillcrest Avenue BART Station parking lots would result in potentially significant glare impacts. **(S)**

> MITIGATION MEASURE. The BART Extension Alternative would result in similar significant glare impacts identified in Impact VQ-7 for the Proposed Project. This impact can be reduced (see Mitigation Measure VQ-7.1, which calls for landscaping the parking lots to screen the glare from vehicles), but the size of the parking lots and the number of cars that could produce glare would still result in a significant and unavoidable impact. **(SU)**

**Construction Impacts.** The BART Extension Alternative would result in fewer construction visual impacts than described for the Proposed Project since several major facilities such as the transfer station and the Railroad Avenue Station would not be constructed. Nevertheless, guideway construction in the SR 4 median, the aerial flyover at Hillcrest Avenue, and station and maintenance facilities east of Hillcrest Avenue would result in views of major construction areas and activities. Construction materials stockpiling, construction equipment, and construction work sites would be visible and temporarily detract from the visual setting. As a result, the visual impacts of this alternative during the construction period would be potentially significant, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURE. Mitigation Measure VQ-8.1 recommended for the Proposed Project would apply to the BART Extension Alternative and calls for screening of construction staging areas and yards and locating these areas out of public views as much as possible. Similar to the Proposed Project, this mitigation measure would reduce construction-related visual effects to less than significant. **(LTS)**

## Cultural Resources

**Disturbance to Known Historic Resources**. As with the Proposed Project, the Contra Costa Canal is the only identified significant resource in the project corridor. Because the BART Extension Alternative would be constructed in the median of SR 4, it would not cause the physical destruction, relocation, or alteration of the historical structure, and it would not impair the canal's ability to convey historical significance. Because the property would continue to convey historical significance, no impacts on the Contra Costa Canal are anticipated, similar to the Proposed Project. **(NI)**

**Disturbance to Unknown Cultural Deposits or Human Remains.** Under the BART Extension Alternative, the transfer platform and the Railroad Avenue Station would not be constructed; the Hillcrest Avenue BART Station would be outside the SR 4 median, adjacent to the Union Pacific right-of-way; and the connection between SR 4 and the station would be via a flyover. The extensive ground disturbance at the Hillcrest Avenue BART Station could disturb unknown cultural deposits or human remains. Similarly, construction for the traction power substations would disturb largely vacant areas that could contain such resources. As a result, construction of the BART Extension Alternative could have a significant effect on undocumented archaeological resources, including human remains. **(PS)**

> MITIGATION MEASURES. The mitigation measures identified for the Proposed Project (Mitigation Measures CR-2.1 and CR-2.2) would be equally effective for the BART Extension Alternative and would reduce the potentially significant impact on unknown cultural deposits or human remains to less than significant. These measures call for following established procedures in the event that archeological resources or human remains are encountered, respectively. **(LTS)**

## Geology, Soils, and Seismicity

**Exposure to Geotechnical and Seismic Hazards.** The facilities associated with the BART Extension Alternative would be somewhat different than the Proposed Project. BART facilities at Hillcrest Avenue involve more land, and are taller and of larger scale than DMU facilities. However, the geological risks associated with the BART Extension Alternative and the Proposed Project, such as soil erosion and seismically induced ground failure, would be similar. Therefore, the construction and operational impacts associated with these alternatives are expected to be similar. There would be no or less-than-significant geologic or seismic effects, because the amount of ground disturbance is limited, the topography is generally flat so that slope stability would not be a substantial concern, soils with shrink-swell characteristics or a susceptibility to settle would be readily addressed by standard engineering and construction practices, and liquefaction potential is low to moderate except along some of the waterways, which would also be readily addressed by standard engineering and construction practices. The key differences with respect to guideway and station construction are listed below:

- Minor modifications at the Pittsburg/Bay Point Station to signage and signboards, and addition of a conduit to extend easterly from the station.
- Installation of an electrified third rail that includes buried, concrete encased duct banks for a 34.5 kilovolt (KV) power cable, a 1,000 voltage direct current (VDC) feeder, and a buried at-grade systemwide cable trench.
- Construction at regular intervals of traction power substations, which consist of a one-story, fenced block building.

Potential impacts to BART structures from ground shaking, seismic-related ground failure, lateral spreading, subsidence, and expansive soils are anticipated to be less than significant with the incorporation of recommendations from the geotechnical investigations to be performed during the design phase and compliance with standards and guidelines contained in the California Building Code. In addition, the BART Facilities Standards, which include seismic design criteria for addressing seismic and geotechnical hazards, would be incorporated into the BART Extension Alternative reducing potential impacts to less than significant. **(LTS)**

**Construction Impacts.** Construction activities associated with the BART Extension Alternative may cause soil erosion or sloughing in excavated areas, the same as described for the Proposed Project. **(PS)**

> MITIGATION MEASURE. The mitigation measure identified for the Proposed Project (Mitigation Measure GEO-7.1) would be equally effective for the BART Extension Alternative and would reduce potentially significant soil erosion impacts to less than significant. This measure calls for implementing erosion control BMPs (e.g., slope stabilizers, dust suppression, construction of berms and ditches, and sediment barriers). **(LTS)**

## Hydrology and Water Quality

**Drainage**. The BART Extension Alternative would be similar to the Proposed Project with respect to route and the development of station-related facilities east of Hillcrest Avenue between SR 4 and the UP ROW. The BART guideway along the SR 4 would not create additional impervious surface areas, because it would be constructed with permeable ballast that would allow water to infiltrate and be collected along the SR 4 median underdrain system and discharged to existing highway cross culverts. The additional amount of impervious surface area related to the required traction power substations would be negligible as the buildings occupy a small area, roughly 65 feet by 188 feet. Thus, along SR 4 between the Pittsburg/Bay Point BART Station and Hillcrest Avenue, drainage impacts for the BART Extension Alternative would be about the same as the less-than-significant effects of the Proposed Project.

The principal difference would be the size and scale of the Hillcrest Avenue BART Station and maintenance facilities. Parking under the BART Extension Alternative would require about 30 percent more land than for the Proposed Project. The BART Extension Alternative maintenance facility is about three times larger than the DMU maintenance facility. As a result, the ground disturbance and impervious surfaces would be substantially greater under this alternative than under the Proposed Project. While this area was planned for development with impervious surfaces when the drainage facilities were designed by the County, the proposed BART station, parking lots, and maintenance facilities would substantially alter the stormwater runoff projected to drain to the proposed detention facilities to the north, and the BART Extension Alternative could have significant drainage impacts. **(PS)**

MITIGATION MEASURE. Mitigation Measure HY-1.1, identified for the Proposed Project, would reduce drainage impacts related to storm and flood capacity of the BART Extension Alternative to less than significant. Mitigation Measure HY-1.1 suggests implementing BMPs that would reduce peak stormwater runoff volumes. **(LTS)**

**Groundwater Resources.** Impacts to groundwater resources by the BART Extension Alternative would be less than significant, similar to the Proposed Project. Operation of the BART Extension Alternative would have no impact on groundwater depletion, because it would not involve extraction of groundwater. Although the BART Extension Alternative would result in minor additional impervious surfaces for traction power substations, impacts to groundwater recharge would be less than significant because the clay loamy soils underlying the project area have low recharge potential. In addition, there are no known drinking extraction wells in the vicinity of the proposed Hillcrest site. **(LTS)**

**Flooding.** Like the Proposed Project, the BART Extension Alternative would traverse minor floodplains at Los Medanos Wasteway, Markley Creek, and West Antioch Creek. These minor floodplains would not significantly affect operation of the BART Extension Alternative, since flood waters would not overtop SR 4 or the BART guideway during the 100-year storm. In the vicinity of Loveridge Road, the SR 4 and the BART alignment would flood because of capacity constraints on Kirker Creek, which would adversely affect rail operations similar to the Proposed Project.

However, as part of the SR 4 widening project, measures to reduce flood hazards include plans to upgrade the existing pump station at the Loveridge Road interchange (to provide SR 4 with protection from a 100-year storm), improvement of the existing outfall for the Loveridge drainage system, and aggressive cleanout of the box culverts and pipes downstream of SR 4. In addition, Caltrans would install box culverts designed for a 100-year storm at the Loveridge Road interchange. Furthermore, the City of Pittsburg has initiated a SR 4 flood-relief project to alleviate flooding impacts at the Loveridge interchange and surrounding areas. Because of these flood control measures, the BART Extension Alternative would not be adversely affected by flood hazards, similar to the Proposed Project. **(LTS)**

**Water Quality.** Similar to the Proposed Project, pollutants deposited on the tracks from rail operations could be discharged to receiving water bodies and could cause significant water quality impacts. Unlike the Proposed Project, the potential discharge of diesel by-products would not occur with the BART Extension Alternative, because its propulsion would be provided by electricity. At the Hillcrest Avenue BART Station parking areas, car-related pollutants, such as oils, hydrocarbons, and trace metals, would be of concern, similar to the Proposed Project. Discharge of maintenance facility pollutants including hydrocarbons, oil, and trace metals from vehicle maintenance and washing and blowdown from the cleaning of the undercarriage could adversely affect water quality. As a result of the increased pollutant loading on impervious surfaces and the potential to degrade receiving waters, the BART

Extension Alternative could have a significant effect on water quality, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURE. Mitigation Measures HY-5.1 identified for the Proposed Project would be applicable to the water quality impacts of the BART Extension Alternative and would reduce them to less than significant. This measure includes implementation of stormwater BMPs such as strip retention strips to treat runoff prior to discharge; oil/water separators to prevent pollutants from entering drainage system; and additional detention basins/pervious pavement to allow infiltration and pollutant removal. **(LTS)**

**Construction Erosion Impacts.** Since the BART Extension Alternative would not need a transfer platform and does not propose a Railroad Avenue Station, potential erosion impacts during construction would be less than described for the Proposed Project in the segment between the Pittsburg/Bay Point BART Station and Hillcrest Avenue Station. At the Hillcrest Avenue BART Station, however, grading would be needed for the station area (0.5 acres), access roads (15 acres), the surface parking lots (56 acres for Phase I and future parking), and the maintenance facility (25 acres), all of which would consist of approximately 96.5 acres. As such, grading of this area would result in potential for erosion and siltation. **(PS)**

> MITIGATION MEASURE. Implementation of Mitigation Measure HY-6.1, recommended for the Proposed Project, would reduce construction-period erosion impacts of the BART Extension Alternative to less than significant. This measure recommends development and implementation of a SWPPP outlining specific erosion and sediment BMPs. **(LTS)**

**Construction Water Quality Impacts**. Similar to the Proposed Project, construction of the BART Extension Alternative could result in significant water quality impacts to local water bodies from the following sources: 1) sediment release into storm drains and local water bodies a result of ground-disturbing activities; 2) mishandling, storage, and disposal of construction materials that contain chemicals (including fuels for fueling construction material and materials for welding and pre-assembly of materials associated with fabrication shops); and 3) mismanagement of construction equipment such as fuel leak. Water quality impacts from construction activities for the BART Extension Alternative would be greater than those identified for the Proposed Project because of the larger area of land disturbance. **(PS)**

> MITIGATION MEASURES. Implementation of Mitigation Measures HY-8.1 and HY-8.2 identified for the Proposed Project would reduce construction-period water quality impacts of the BART Extension Alternative to less than significant. These measures require that the BART contractor 1) develop and implement a SWPPP that would govern construction activities and outline specific stormwater discharge BMPs; and 2) develop and implement a SWPPP outlining specific measures to control and prevent hazardous materials release. **(LTS)**

## Biological Resources

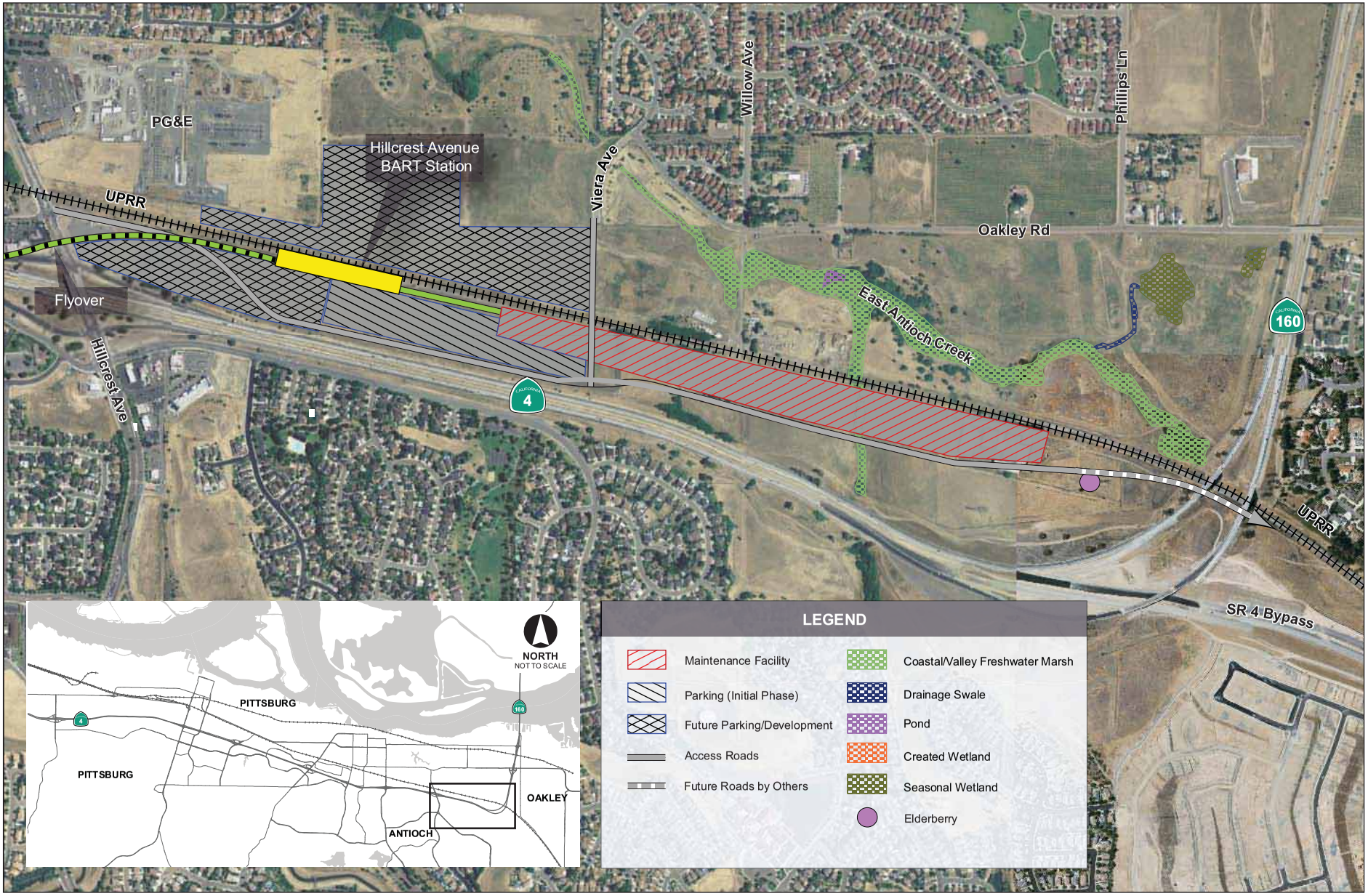
**Wetlands, "Waters of the U.S." and "Waters of the State"** Within the SR 4 right-of-way, the BART Extension Alternative would be identical to the Proposed Project in terms of impacts to wetlands, waters of the U.S. and waters of the State. The sole difference is the additional land needed for traction power substations under the BART Extension Alternative. SR 4 intersects several "waters of the U.S." including Willow Creek, Kirker Creek, Los Medanos Wasteway, Markley Canyon Creek, Marsh Creek, West Antioch Creek, East Antioch Creek, and several unnamed tributaries. All of these watercourses have been historically channelized and culverted to some extent beneath the SR 4 (in either reinforced concrete boxes or concrete pipes). The existing highway culverts for these "waters of the U.S." would be modified or extended prior to the construction of the rail line for the BART Extension Alternative by the SR 4 widening project. Runoff from the BART Extension Alternative would connect to existing storm drain systems. BART would have to comply with the Contra Costa Clean Water Program (CCCWP) Phase 1 National Pollutant Discharge Elimination System (NPDES) Permit.

Within the Hillcrest Avenue BART Station area, the BART Extension Alternative would potentially affect 0.44 acres of coastal/valley freshwater marsh and 0.01 acres of a pond (see Figure 5-16). The potential fill of these resources would be a significant effect. **(S)**

> MITIGATION MEASURES. The same mitigation measures identified for the Proposed Project would be effective for the BART Extension Alternative. Mitigation Measure BIO-8.1 would require either securing a Clean Water Act Section 404 permit, or applicable approvals from state agencies. Mitigation Measure BIO-8.2 calls for compliance with the ECCC HCP/NCCP. Either measure would reduce wetlands impacts to less than significant. **(LTS)**

**Swainson's Hawk Foraging Habitat.** The non-native grassland/ruderal area around the Hillcrest Avenue BART Station parking area and maintenance facility could provide suitable foraging habitat for Swainson's hawk (approximately 50 to 60 acres). Loss of foraging habitat due to the implementation of the BART Extension Alternative would be considered a significant impact. **(S)**

> MITIGATION MEASURES. Either of the two mitigation measures recommended for the Proposed Project would apply to the BART Extension Alternative. Mitigation Measure BIO-3.1 calls for compensating for the loss of Swainson's hawk foraging habitat by providing an appropriate number of acres (as approved by CDFG) of agricultural land, annual grasslands, or other suitable raptor foraging habitat. Mitigation Measure BIO-3.2 would require participation in the ECCC HCP/NCCP, and payment of a development fee that would offset any impacts to foraging habitat. **(LTS)**




Source: WSA, 2008.

**SENSITIVE HABITAT IN THE VICINITY OF THE HILLCREST AVENUE BART STATION**
FIGURE 5-16

**Disturbance to Special-Status Nesting Birds.** Suitable nesting habitat for special-status birds has been identified within the proposed Hillcrest BART Station area. These special-status birds include, but are not limited to, Swainson's hawk, burrowing owl, tri-colored blackbird, and loggerhead shrike. The presence of foraging birds indicates the potential for nesting activity within the project area. Construction of the Hillcrest Avenue BART Station facilities would result in the grading and thus removal of suitable nesting habitat for these species. Consequently, the BART Extension Alternative would result in a significant impact to special-status bird species. **(S)**

> MITIGATION MEASURES. Mitigation Measures BIO-4.1 through BIO-4.4 or Mitigation Measure BIO-4.5, recommended for the Proposed Project would apply to the BART Extension Alternative and would reduce this impact to a less-than-significant level. These measures call for conducting pre-construction surveys for special status nesting birds, avoiding active nest/burrows by creating a no-disturbance buffer zones, and avoiding the initiation of intensive disturbances (e.g., heavy equipment operation associated with construction, grading activities or the use of cranes) within the established buffer zones of an active nest during the nesting season. As an alternative to the above measures, BART could participate in the ECCC HCP/NCCP. **(LTS)**

**Impacts to the Valley Elderberry Longhorn Beetle**. Since the only occurrence of elderberry shrubs is outside the BART Extension Alternative footprint, no impact to valley elderberry longhorn beetle would occur. **(NI)**

**Conflicts with the Provisions of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP).** The suggested mitigation measures for the BART Extension Alternative mirror the conditions on covered activities and conservation measures presented in the ECCC HCP/NCCP. Construction of the BART Extension Alternative would not alter the effectiveness of the ECCC HCP/NCCP, since implementation of this alternative would occur largely in previously developed urban areas. Implementation of the BART Extension Alternative would, thus, have no impact with respect to consistency with the ECCC HCP/NCCP. **(NI)**

**Removal of Trees that could be Protected by a Local Tree Preservation Policy or Ordinance.** Similar to the Proposed Project, construction activities for the BART Extension Alternative would result in the grading and removal of trees within the project corridor. Although BART is exempt by state law from compliance with local land use ordinances and as such is not legally required to comply with local ordinances, BART considers loss of protected trees a significant impact. **(S)**

> MITIGATION MEASURE. The same measure recommended for the Proposed Project, Mitigation Measure BIO-6.1 would reduce this impact to less-than-significant level. This measure calls for tree surveys to be completed to identify and evaluate trees that

would be removed. Trees that meet specific criteria would be replaced after construction and monitored to ensure health and survival. **(LTS)**

**Impacts to Common Biological Resources.** Similar to the Proposed Project, **c**onstruction activities would result in the loss of habitat used by common plant and wildlife species. Much of the BART Extension Alternative would be constructed in areas that have already been developed, within the SR 4 median. While the BART Extension Alternative would result in displacement of common plant and wildlife species, it would not result in a significant decline of their population or their range. Therefore, this impact would be less than significant. **(LTS)**

## Noise and Vibration

As with the Proposed Project, BART travels on tracks and generates noise from the contact between the wheels of the BART train and tracks. However, unlike the Proposed Project, the electricity-powered BART trains do not generate noise from a diesel engine and so are quieter than a DMU. This difference in propulsion is reflected in the sound exposure level (SEL) for each vehicle: the BART and DMU SEL per car is 79 and 85 dBA, respectively. However, the BART trains would consist of more cars than a DMU train. The BART Extension Alternative is expected to operate 10 cars per train during peak hours (compared to two or three cars per train for the DMU) and six cars per train during off-peak hours (compared to one car per train for the DMU). As a result, on a per-train basis, the BART Extension Alternative would generate higher noise levels than the Proposed Project.

**Noise from BART Operating At Grade and Away from Railroad Switches.** Using the FTA Guidelines, Table 5-32 and 5-33 show the existing noise levels, acceptable noise levels (i.e., significance criteria), the distance of the closest receptor, and the predicted noise level from the BART vehicles, ignoring any existing and future sound walls. Table 5-31 represents noise at residential areas where day-night noise levels are critical because of the nighttime sensitivity of the receptors. Table 5-33 shows noise at nearby schools where peak hourly noise levels are important because of the need for quiet during teaching sessions. Other schools, churches, and parks are also located along the proposed corridor, but none are closer than the closest schools identified on Table 5-33.

As shown in these tables, segments where receptors are within 100 feet of the centerline of the freeway are predicted to experience noise levels that exceed the significance criteria. However, these projections ignore the presence of existing and future sound walls. The segment between Bailey Road and Railroad Avenue where residences are located about 100 from the tracks have sound walls. The segment between Loveridge Road and Hillcrest Avenue where residences are located about 100 feet from the tracks will also have sound walls installed as part of the SR 4 widening project. The sound walls would reduce noise levels by at least 5 dBA and reduce the impact to less-than-significant levels. **(LTS)**

**Table 5-32**
**BART Extension Alternative – Predicted Day-Night ($L_{dn}$) Noise Level**
**(at-grade and away from switches)**

| Segment | Monitor ID | Existing Noise Level (dBA, $L_{dn}$) | Acceptable Noise ($L_{dn}$) (see Table 3.10-8a) | Distance to Receptor (ft) | Sensitive Receptors Exposed to Significant Noise | Noise Level At Receptor From Project ($L_{dn}$) |
|---|---|---|---|---|---|---|
| Bailey Rd, Pittsburg to Railroad Ave, Pittsburg | Calculated from N18 | 74 | < 66 | 100 | Yes (but see note) | 66 |
| Railroad Ave, Pittsburg to Loveridge Road, Pittsburg | Calculated from N19 | 71 | < 66 | 225 | No | 62 |
| Loveridge Road, Pittsburg to Hillcrest, Antioch | Calculated from N11 | 76 | < 66 | 100 | Yes (but see note) | 66 |
| Hillcrest, Antioch Area | Calculated from N14 | 74 | < 66 | 700 | No | 57 |

*Source:* ERM, 2008.

*Note*:

The values above ignore the presence of any existing sound walls. However, the segment between Bailey Road and Railroad Avenue where residences are located about 100 from the tracks have sound walls. The segment between Loveridge Road and Hillcrest Avenue that have residences about 100 feet from the tracks will also have sound walls installed as part of the SR 4 widening project. The sound walls would reduce noise levels by at least 5 dBA. As a result, the impact between Bailey Road and Railroad Avenue and Loveridge Road and Hillcrest Avenue would be less than significant.

**Table 5-33**
**BART Extension Alternative – Predicted Peak Hourly ($L_{eq}$(hr)) Noise Level (at-grade and away from switches)**

| Facility | Monitor ID | Existing Minimum Noise Level during Operations (dBA, $L_{hr}$) | Acceptable Noise ($L_{eq}$(hr)) (see Table 3.10-8a) | Distance Threshold Reached (ft) | Distance to Receptor (ft)[a] | Sensitive Receptors Exposed to Significant Noise | Noise Level at Receptor from Project ($L_{eq}$(hr)) |
|---|---|---|---|---|---|---|---|
| Parkside Elementary | Calculated from N1 | 63 | < 65 | 65 | 150 | No | 61 |
| March Elementary | Calculated from N1 | 64 | < 66 | 55 | 120 | No | 62 |

*Source:* ERM, 2008.

*Note:*

a. Churches and parks are also located along the corridor but are no closer than the closest school above. Existing noise level based on minimum between 4 a.m. and midnight. To be conservative, the noise monitor adjacent to SR 4 with the lowest hourly noise level was used.

**Noise from Elevated Structures.** An aerial flyover with slab tracks would connect the SR 4 BART guideway and the Hillcrest Avenue BART Station. The aerial flyover would generate more noise than at-grade ballast tracks because the ballast would absorb more noise than the slab track.

According to the FTA Guidelines, an aerial with slab tracks can add 4 dBA to the noise from a train. A relatively quiet residential complex is located approximately 700 feet north of the aerial structure. Measured day-night noise level at this residential complex was 56 dBA. At this existing noise level, the predicted noise from the BART Extension Alternative would be significant if BART operational noise reaches 56 dBA. The predicted noise level from this alternative, including the 4 dBA penalty associated with the aerial structure, would be 61 dBA, a significant impact since noise exposure would exceed the 56 dBA level based on the ambient conditions and the land use. Impacts would also be significant for the residential area located just south of the aerial tracks on the other side of SR 4. The noise impact at these receptors from BART vehicles traveling on the elevated guideway would be potentially significant. **(PS)**

MITIGATION MEASURES. BART shall require the installation of sound barriers or other equivalent measures along the northern and southern side of the aerial tracks so that noise levels on Table 3.10-8 are not exceeded. This measure would reduce noise impacts of the BART Extension Alternative to less than significant. **(LTS)**

**Noise from Switches.** As a BART train travels over a railroad switch, the gaps associated with the railroad switch can result in noise levels higher than if there was no gap. The BART Extension Alternative would have three groups of railroad switches on the main track line

instead of the four groups for the Proposed Project. The BART Extension Alternative would not have a transfer platform near the existing Pittsburg/Bay Point BART Station and would not need a switch at that location. The remaining railroad switches on the main track line would be located east of Railroad Avenue, between Somersville Road and Contra Loma Boulevard, and west of Hillcrest Avenue Station.

The predicted noise levels at the railroad switches are summarized in Table 5-34. These predicted noise levels take into account the proposed sound walls to be constructed as part of the SR 4 widening project. The table shows that noise levels are predicted to exceed the moderate impact threshold specified by the FTA Guidelines for the switches east of Somersville Road. Therefore, noise from these railroad switches would have a significant impact on nearby receptors. **(PS)**

> MITIGATION MEASURE. BART shall modify the trackwork and/or implement noise attenuation measures as specified by a site-specific acoustical study to reduce noise levels for receptors near the Somersville Road switches below those specified by the FTA (as shown in Table 3.10-8). Until the feasibility of mitigation is demonstrated by the study, this impact is considered significant and unavoidable. **(SU)**

**Noise from Horns.** As a safety measure, when BART trains enter a station, they sound their warning horns with a series of short blasts. According to the FTA Guidelines, transit warning horns have a $SEL_{ref}$ of 93 dBA which would result in a day-night noise level of 58 dBA at 700 feet without any type of noise barriers. The closest sensitive receptor at the Hillcrest Avenue Station would be the sensitive receptors to the south of SR 4 which are more than 700 feet from the station. Considering the future sound walls to be placed south of SR 4 and the barriers associated with the station itself, horn-related noise levels at this receptor would likely be less than 53 dBA. The existing noise level at this location is about 74 dBA. But exiting noise levels would have to be 46 dBA or less before the increment due to the train horn would exceed the FTA criterion. Therefore, noise from transit warning horns are expected to have a less than significant impact on nearby receptors. **(LTS)**

**Noise from Substations.** To power the BART cars, traction power substations are required about every one mile along the alignment. The traction power substations would be enclosed within a building and located within 100 to 200 feet from the tracks. The substation with the greatest impact would be near L Street, about 100 feet from the nearest residence. This residence is about 350 feet from the tracks and is estimated to have a background day-night noise level of about 60 dBA. At this background noise level, impacts would be significant if project-associated noise were 58 dBA or greater. This receptor would experience noise from

**Table 5-34**
**BART Extension Alternative – Predicted Day-Night (Ldn) Noise Level (at switches)**

| Location | Distance of Each Switch from Pittsburg/Bay Point Station (ft) | Monitoring Point ID (see Table 3.10-1) | Existing Noise Level at Closest Receptor (dBA, $L_{dn}$) | Acceptable Noise ($L_{dn}$) (Moderate Impact, see Table 3.10-8a) | Distance to Receptor (track/1st switch/2nd switch/etc)(ft) | Project Generated Noise Level at Receptor ($L_{dn}$) | Noise at Sensitive Receptors Exceeding Threshold? |
|---|---|---|---|---|---|---|---|
| Switches east of Railroad Avenue Station | 16464 EB/WB[a]<br>17689 EB/WB | N19 | 71 | <66 | 225/225 | 61 | No |
| Switches between Somersville Road and Contra Loma Boulevard | 34368 EB<br>34513 WB<br>34624 WB<br>34768 EB | Calculated from N11 | 66 | <62 | 125/225/125/175/300 | 66 | Yes |
| Switches east of Hillcrest Avenue | 47490 EB<br>48030 WB | Calculated from N14 | 69 | <64 | 700/700/700 | 52 | No |

*Source:* ERM, 2008.

*Note:*

a. EB refers to eastbound tracks. WB refers to westbound tracks. Highest predicted noise level presented. Predicted noise levels take into account existing and proposed sound walls along SR 4.

not only the substation but also BART traveling on the tracks. At this receptor, an unshielded substation would generate a day-night noise level of 64 dBA, and BART traveling on the tracks would generate a day-night noise level of 55 dBA assuming the future sound walls along SR 4 achieve a reduction of 5 dBA. The combined noise at the receptor would be 65 dBA (dominated by the substation noise), more than the 58 dBA threshold. While the substation would be enclosed within a building that would substantially reduce noise levels, details on the building design are unavailable at this stage of engineering. To be conservative, substation noise is considered potentially significant. **(PS)**

> MITIGATION MEASURE. BART shall design the substation building to reduce noise levels below the thresholds specified in Table 3.10-8. An 11 dBA reduction in noise from the substation would reduce impacts to less-than significant levels. Measures to be employed may include but are not limited to the following:
>
> - Orient noise-generating components away from noise-sensitive land uses or locate buildings between noise-generating components and noise-sensitive land uses; and
> - Use acoustically rated vents to reduce noise. **(LTS)**

**Noise from Maintenance Yard.** The BART Extension Alternative would have a maintenance yard where the movement of BART vehicles would generate noise at nearby receptors. The FTA Guidelines specify a source reference level for yards and shops. To provide a conservative assessment, this analysis combines the noise from the "yards and shops" as specified by the FTA Guidelines with noise from trains traveling over railroad switches. According to Wilbur Smith and Associates, the BART Extension Alternative would require 23 BART cars. This analysis assumes that all 23 BART cars are moved into the maintenance yard at night. The existing noise at nearby receptors and the projected noise with the maintenance facility are shown in Table 5-35. This table demonstrates that, similar to the Proposed Project, noise from the maintenance facility would have a less-than-significant impact on nearby receptors. **(LTS)**

**Noise from Automobiles near Hillcrest Avenue.** While the Proposed Project would have stations at Railroad Avenue and Hillcrest Avenue, the BART Extension Alternative would construct a station at Hillcrest Avenue only. As with the Proposed Project, the BART Extension Alternative would change traffic volume conditions near Hillcrest Avenue. The BART Extension Alternative is expected to attract 12,000 daily riders compared to 10,100 daily riders for the Proposed Project. For the Proposed Project, of the 10,100 riders, 1,900 are expected to use the Railroad Avenue Station and 8,200 would use the Hillcrest Avenue Station. For the BART Extension Alternative, all 12,000 riders would use the Hillcrest Avenue Station. Thus, the ridership at the Hillcrest Avenue Station would be about 46 percent more under the BART Extension Alternative than under the Proposed Project. Assuming local traffic near the Hillcrest Avenue Station also increases by 46 percent, the corresponding increase in project-related traffic noise for the BART Extension Alternative would be less than 2 dBA over the predicted levels for the Proposed Project.

**Table 5-35**
**Predicted Day-Night ($L_{dn}$) Noise Level From BART Maintenance Facility**

| Segment | Monitor ID | Existing Noise Level (dBA, $L_{dn}$) | Representative Area of Existing Noise | Acceptable Noise ($L_{dn}$) (see Table 3.10-8a) | Distance to Receptor (feet) | Sensitive Receptors within Threshold? | Noise Level at Receptor from Project ($L_{dn}$) |
|---|---|---|---|---|---|---|---|
| Hillcrest (Antioch) | Calculated From N14 | 74 | Receptors south of maintenance facility 700 feet away from station | < 66 | 700 | No | 57 |
| | N13 | 64 | Receptors north of maintenance facility 900 feet away from station | < 61 | 900 | No | 55 |

*Source:* ERM, 2008

Of the roadways modeled for the Proposed Project, the Oakley and Phillips intersection for 2030 showed the largest increase of the total noise levels, specifically an increase from 63.5 dBA to 64.4 dBA. For the BART Extension Alternative, the resultant total noise level would be 64.8 dBA. But the total noise level would have to be greater than 65 dBA to be considered significant according to FTA Guidelines. Thus, the increase is below the significance threshold.

Since the most heavily trafficked road segment would not result in a future noise exposure impact for nearby receptors, the 2 dBA increase would not result in noise levels on other roadways in the station area that exceed the significance criteria, and therefore noise generated by the increase in traffic associated with the BART Extension Alternative near the Hillcrest Avenue Station is expected to have a less-than-significant noise impact on nearby receptors. **(LTS)**

**Vibration.** Similar to the Proposed Project, the BART Extension Alternative would generate groundborne vibration that can cause annoyance to nearby receptors. According to the FTA Guidelines, rapid transit systems such as BART typically generate less vibration than a DMU. Railroad switches worsen vibration levels. For the BART Extension Alternative, switches are planned along the main line track east of Railroad Avenue, between Somersville Road and Contra Loma, and west of Hillcrest Avenue Station.

Following the general assessment approach outlined in the FTA Guidelines, Table 5-36 shows the expected vibration levels at various distances and at track switches, and compares those levels to the maximum groundborne vibration allowed of 72 VdB.

**Table 5-36**
**Vibration Levels from the BART Extension Alternative**

| | | | Distance From Centerline of Track (feet) | | | |
|---|---|---|---|---|---|---|
| Type of Impact | Location | Criteria | 80 | 90 | 100 | 125 |
| Ground-borne Vibration (VdB) | Away From Switches | > 72 | **74** | 72 | 71 | 70 |
| | At Switches | > 72 | **79** | **76** | **74** | 72 |
| Ground-borne Noise (dBA) | Away From Switches | > 35 | 24 | 22 | 21 | 20 |
| | At Switches | > 35 | 29 | 26 | 24 | 22 |

*Source:* ERM, 2008.

*Note:* Numbers in **bold** exceed criteria.

At locations of the segment away from switches, the closest residences are 100 feet away. At locations of the segment near switches, the closest residences are 125 feet away. Comparing these distances to the distances in Table 5-36 where vibration impacts would be a concern, groundborne vibration is not expected to have a significant impact on nearby residences. **(LTS)**

**Construction Noise Impacts.** Similar to the Proposed Project, construction for the BART Extension Alternative would occur along the SR 4 median from 2011 to 2014. However, the only station to be constructed would be the Hillcrest Avenue BART Station. An aerial flyover would be constructed to connect the tracks along SR 4 and the station. In addition, the maintenance facility east of the Hillcrest Avenue Station and parking would need to be constructed. A third rail would also need to be constructed along the tracks in addition to traction power substations at regular intervals (about every mile) to provide power to the trains.

Construction noise would be noticeable along the entire 10-mile corridor but particularly in the Hillcrest Avenue Station area. Similar to the Proposed Project, construction would require a range of noise-generating equipment including dump trucks, scrapers, water trucks, bulldozers, graders, truck-mounted cranes, loaders, excavators, rollers, concrete mix trucks, lubrication/fueling service trucks, concrete pumps, diesel generators, compressed air units, and pile drivers. In addition, haul trucks would bring in sub-ballast and structural concrete. Of these pieces of equipment, impact pile drivers typically generate the most noise. Similar to the Proposed Project, impacts for the BART Extension Alternative are expected to have significant impacts to nearby sensitive receptors. **(PS)**

> MITIGATION MEASURES. Implementation of Mitigation Measures NO-6.1 and NO-6.2, recommended for the Proposed Project, would reduce the potentially significant, yet temporary, construction noise impact of the BART Extension Alternative. These measures require employing noise-reducing construction practices such as limiting hours of operation and designating a noise-disturbance coordinator. However, given the duration and intensity of construction activities, the noise impact would remain significant and unavoidable even with the implementation of these mitigation measures. **(SU)**

**Construction Vibration.** Vibration levels predicted for the Proposed Project would also apply for the BART Extension Alternative. As with the Proposed Project, the closest residential receptors are about 100 feet from expected construction areas that would require the use of the rollers, drillers, cranes, bulldozers, and pile drivers that can generate high levels of vibration. Depending on the type and number of equipment used at the same time and the location of the equipment, vibration impact on nearby sensitive receptors may be significant. **(PS)**

> MITIGATION MEASURE. The same Mitigation Measure NO-7.1 recommended for the Proposed Project would apply to the BART Extension Alternative and would require the use of vibration-reducing construction practices such as limiting night time activities and using equipment away from noise sensitive receptors. This mitigation measure would minimize temporary vibration impacts; however, the impacts are expected to remain significant and unavoidable. **(SU)**

## Air Quality

**CO Concentrations from Traffic at Congested Intersections.** The BART Extension Alternative would not create any violations of the state ambient CO standards. Even though the ridership of the BART Extension Alternative would increase 45 percent over the Proposed Project, and the increase in CO concentrations is proportional to the increase in ridership, CO impacts would remain less than significant. The highest modeled increases in CO concentrations, the percentage increase in BART ridership over the Proposed Project, and the resulting CO concentrations for the BART Extension Alternative are shown in Table 5-37 below. These values are below the California Ambient Air Quality Standards. **(LTS)**

**Table 5-37**
**BART Extension Alternative Ridership Increase and Associated CO Concentrations (ppm)**

| | DMU Modeled Increase | | BART Extension Alternative/ DMU Ridership Increase (%) | Total Concentration (Incl. Background) | |
|---|---|---|---|---|---|
| Year | 1-hour | 8-hour | | 1-hour | 8-hour |
| 2015 | 1.7 | 1.2 | 45 | 6.6 | 3.6 |
| 2030 | 0.6 | 0.4 | 45 | 5.0 | 2.5 |

*Source:* ERM, 2008.

*Note:*

Concentrations include 1-hour and 8-hour background levels of 4.1 and 1.9, respectively.

**Greenhouse Gas Emissions and Regional Criteria Pollutant Emissions.** The BART Extension Alternative would result in a reduction in vehicles miles traveled relative to the Proposed Project, resulting in a further net air quality benefit in regional criteria pollutants and greenhouse gases. Relative to the No Project Alternative, the BART Extension Alternative is expected to reduce vehicle miles traveled by 209,750 per day by 2015 and 384,641 per day by 2030.

The BART Extension Alternative would not generate emissions from the diesel fuel that would have been burned by the DMUs operating in the Bay Area. Instead, electrical power would be used to operate the BART trains, which would result in some increase of $CO_2$ and criteria pollutant emissions (i.e., ozone precursors, $PM_{10}$ and CO) from the fossil fuel power plants generating that electricity. Since most electricity used in the Bay Area is generated by power plants outside this area, the expected net result under the BART Extension Alternative is a slight decrease in criteria pollutant emissions from Bay Area sources. Coal-fueled power plants would be the source for some of the electricity needed to operate the LRVs. BART currently gets about nine percent of its power from coal power plants, none of which are located in California. Thus, the BART Extension Alternative may result in higher criteria pollutant emissions at those power plants, wherever they are located, compared to their emissions under the Proposed Project. However, the criteria pollutant emissions increases at those power plants caused by the BART Extension Alternative may be partially offset in the future because BART is planning to increase the renewable portion of its electricity use and reduce the portion originating from coal power plants.

The energy analysis for the BART Extension Alternative presents electricity consumed per BART car mile (4.51 kilowatt hours per mile). The LTK energy and emissions report, prepared for BART in 2008,[32] also provides an estimate of the $CO_2$ released by the electricity produced to meet the BART system demands, and accounts for the split in electricity production technology (e.g. natural gas, coal). This value is estimated at 217 grams per kilowatt-hour. The resulting $CO_2$ emissions (4.51 kW-hr/mi x 217 g/kW-hr, incorporating the gram-to-pound conversion of 453.6 grams per pound) would be 21,127 pounds per day, based on 9,792 daily miles traveled by BART trains in the project corridor. This emission is far less than the increase in emissions from a DMU vehicle of 33,030 pounds per day, identified under the Proposed Project. The decrease in vehicle usage and the increase of emissions from the BART trains would result in a net decrease of 162,081 pounds of $CO_2$ per day in 2015 and 308,057 pounds of $CO_2$ per day in 2030. As a result, the net beneficial effects on greenhouse gases identified for the Proposed Project would be even greater with the BART Extension Alternative. **(B)**

**Exposure to Toxic Air Contaminants (TACs).** The BART Extension Alternative would not increase TACs exposure to individuals living near the alignment because propulsion under this

[32] LTK Engineers Services, Draft eBART Phase I Project to Hillcrest Terminal, DMU and LRV Comparison. May 14, 2008.

alternative would be from electricity. As a result, impacts from exposures to these pollutants would be less than the less-than-significant effects identified for the Proposed Project. **(LTS)**

**Construction Air Emissions.** Construction air impacts under the BART Extension Alternative would be the similar to those described for the Proposed Project. Fugitive dust from grading and earthmoving activities and emissions from engine exhaust of heavy construction equipment would be potentially significant, similar to the Proposed Project. **(PS)**

> MITIGATION MEASURES. The BAAQMD control measures for construction activities shown in Table 3.11-6, and Mitigation Measures AQ-8.1 and AQ-8.2 for the Proposed Project would be applicable to the BART Extension Alternative and would reduce potential construction-related air emissions to less than significant. **(LTS)**

## Public Health and Safety

**Accidental Release of Hazardous Materials.** The operation of the BART Extension Alternative may involve the use of hazardous materials at the maintenance facility, similar to the hazardous materials used for the Proposed Project, except diesel fuel is not required for BART operation. The use of hazardous materials would be conducted pursuant to all hazardous material handling regulations, such as worker safety and health standards established under the federal Occupational Safety and Health Act of 1970 and the California Occupational Safety and Health Act, RCRA, CERCLA, and the California Hazardous Waste Control Law.

Operation of the BART Extension Alternative could accidentally release hazardous materials found at the maintenance facility. The maintenance facility would be east of the proposed Hillcrest Avenue BART Station, away from nearby residential neighborhoods. In the event of a release, BART would immediately contact regulatory agencies, if required, and implement safety and emergency plans with respect to evacuation of the public and coordination with local emergency response personnel. However, an accidental release of hazardous materials at a maintenance facility would be discharged into stormwater outlets located throughout the facility. Therefore, the potential exists that hazardous materials could be released into stormwater resulting in a significant impact.

The BART route is located within one-quarter mile of existing schools. The transit vehicles for this alternative, however, do not use hazardous materials or emit hazardous pollutants, and there would be no health risk associated with an increase in TACs.

Construction activities associated with the BART Extension Alternative may involve handling of hazardous materials. However, the use of hazardous materials would be temporary in nature, since they would be limited to the construction period and would be conducted pursuant to all hazardous material handling regulations, such as worker safety and health standards established under the Federal Occupational Safety and Health Act of 1970 and the California Occupational Safety and Health Act, RCRA, CERCLA, and the California Hazardous Waste Control Law.

In summary, impacts related to the accidental release of hazardous materials and the attendants health risks would be similar to the Proposed Project and could be potentially significant. **(PS)**

> MITIGATION MEASURES. Mitigation Measure HS-4.1 recommended for the Proposed Project would apply to the BART Extension Alternative and calls for the preparation and implementation of a Spill Prevention Plan outlining measures that would be in place to control hazardous materials use and storage. Similar to the Proposed Project, this mitigation measure would reduce impacts from an accidental hazardous material release to less-than-significant levels. **(LTS)**

**Electromagnetic Fields (EMF).** Operation of the BART Extension Alternative would involve the use of an electrified third rail and traction power substations, which are sources of EMF. For projects with EMF emissions, it is recommended that measures be implemented to limit exposure to EMF by locating sources of EMF as far away as possible from receptors. With the BART Extension Alternative, the third rail and the six traction power substations would be located along the project corridor. For the reasons cited earlier for the LRV Alternative, exposure to EMF would be less than significant. Health-related impacts from such exposure are inconclusive. Consistent with recommendations from the California Public Utilities Commission, a practice of prudent avoidance would be implemented. **(LTS)**

**System Safety and Passenger Security.** The BART Facility Design Standards would ensure that the BART Extension Alternative is designed and operated in a safe and secure manner. These existing standards and guidelines address safety design requirements such as surveillance systems using closed circuit television to monitor station areas and parking structures; slip-resistant surfaces; maximum-security fencing to deny access to BART trackways and maintain security of BART property; traffic barriers to protect BART trains and passengers from damage and injuries caused by entry of vehicles upon the BART system trackway from adjoining roadways; fire protection devices, such as standpipe and hose systems; and other safety systems to prevent collisions and derailments, such as automatic train control, which is a system for controlling train movement, enforcing train safety, and directing train operations. Because BART would comply with these standards, impacts related to safety hazards from the BART Extension Alternative are expected to be less than significant, similar to the Proposed Project. **(LTS)**

**Public Airport or Public Use Airport Hazards.** According to a map review of the proposed BART alignment, the nearest public airport, the Buchanan Field Airport, is approximately 6.5 miles southwest of the route. Therefore, no impact is anticipated in regards to airport hazards for the BART Extension Alternative, similar to the Proposed Project. **(NI)**

**Exposure of People or Structures to Wildland Fires.** According to a review of aerial photographs of the BART route and site reconnaissance, the areas surrounding the corridor are primarily developed with residential and commercial buildings. A review of the CDF California Fire Hazard Severity Zone Map revealed that the proposed BART route is not in a

fire hazard zone.[33] Therefore, there would be no risks from wildland fires for the BART Extension Alternative, similar to the Proposed Project. **(NI)**

**Risk of Terrorist Attack.** Compared to existing conditions, the risk of a terrorist attack would not significantly increase with the operation of the BART Extension Alternative. The existing BART system is 104 miles in track length, and the BART Extension Alternative involves extending BART approximately 10 miles into eastern Contra Costa County. Given that the BART Extension Alternative involves a small increase in distance compared to the existing system, the BART Extension Alternative would not cause the existing BART system to be any more of a target than it is now. If terrorist activity occurred during BART operation, BART personnel would be notified of the event and instructed to stop BART operations, if necessary. Since the BART Extension Alternative would not be a primary target compared to other existing components of the BART system, and safety procedures and emergency response plans would be in place to prevent and respond to a potential terrorist event, impacts related to a risk of terrorist attack would be less than significant. **(LTS)**

**Construction-Related Exposure to Hazardous Materials.** Public health and safety impacts associated with construction of the BART Extension Alternative would generally be similar to impacts identified for the Proposed Project, because the alignments are similar and the facilities and structures to be built are similar, although the BART Extension Alternative would not involve a transfer station or a Railroad Avenue Station. Compared to the Proposed Project, the BART Extension Alternative would involve additional ground disturbance at the Hillcrest Avenue BART Station and grading for the traction power substations; however, these facilities (apart from the larger ones that would be sited at the stations) affect plots of land about 65 feet by 188 feet, so the amount of ground disturbance is relatively minor. Nevertheless, construction worker exposure to hazardous materials in contaminated soil and groundwater and in structures that may contain asbestos would be potentially significant. **(PS)**

> MITIGATION MEASURES. The same mitigation measures identified for the Proposed Project to reduce potential construction-related health risks would be applicable for the BART Extension Alternative. Specifically, Mitigation Measures HS-8.1, HS-8.2, HS-8.3, and HS-9.1, which call for file searches with the regulatory agencies for contaminated sites, further soil and groundwater contamination investigations, appropriate remediation, and asbestos surveys and appropriate precautions, would reduce potential health and safety impacts to less than significant. **(LTS)**

## Community Services

The BART Extension Alternative would use the same right-of-way as the Proposed Project west of Hillcrest Avenue. This alternative would not, however, include a transfer platform or a stop at Railroad Avenue and would instead include a more heavily used station at Hillcrest

[33] CDF, *Contra Costa County Fire Hazard Severity Zone Map,* Available at http://www.fire.ca.gov/fire_ protection/fhsz_maps/fhsz_maps_contracosta.php, 2007.

Avenue, including a 3,500-space park-and-ride lot. This alternative would result in a greater impact to the Antioch Police Department than described for the Proposed Project, due to the greater number of boardings and alightings anticipated at the Hillcrest Avenue BART Station and the larger size of the park-and-ride lot. Nonetheless, given BART's responsibility for law enforcement at its station and the existing capacity of Antioch Police Department facilities, this impact would be less-than-significant, similar to the Proposed Project. Under the BART Extension Alternative, there would be no increased demand on City of Pittsburg staff, since there would be no Railroad Avenue Station. **(LTS)**

## Utilities

**Water Demand**. The BART Extension Alternative would have water demand impacts similar to those described for the Proposed Project. Water use would be restricted to staff restroom facilities, drinking water fountains, landscaping for the parking areas, and cleaning operations for the station areas and maintenance activities. The greatest water demand from these activities would be associated with the train-cleaning operation, which would include the cleaning of a fleet of 23 BART vehicles. The BART vehicles are similar in size to the DMU vehicles and would require the same 80 gallons of water to clean each vehicle. Therefore, the BART Alternative would require 1,840 gallons of water per day. Although this amount of water is greater than the water used for the Proposed Project, the BART Extension Alternative would not exceed available water supply nor require expanded entitlements to meet project demands, because the CCWD's existing annual 174 mgd water supply and potential 2040 future capacity of 217 mgd would accommodate the BART water demand. The BART Extension Alternative, like the Proposed Project, would therefore have a less-than-significant impact on available water supplies. **(LTS)**

**Wastewater Capacity**. Impacts to wastewater under the BART Extension Alternative would be similar to the Proposed Project because the two systems would have similar operations and facilities. Based on a typical BART maintenance facility, the BART Extension Alternative maintenance facility would generate approximately 80 gallons of water daily to clean one car, of which 60 percent is assumed to be recycled. The BART Extension Alternative would discharge at least 40 percent of the wastewater to sanitary sewers (approximately 30-35 gallons of wastewater per car per day). Based on the BART fleet, the BART Extension Alternative would generate approximately 805 gallons per day, which if coupled with other wastewater-generating activities, such as restroom use, would not exceed available treatment capacity of 16.5 mgd and future capacity of 24 mgd. As a result, the BART Extension Alternative would have a less-than-significant impact on wastewater treatment capacity, similar to the Proposed Project. **(LTS)**

**Interruption of Utility Service during Construction.** Both the Proposed Project and BART Extension Alternative would be required under the California Government Code (Sections 4216-4216.9) to notify and coordinate with affected utility providers prior to commencement of the construction activities, to minimize impacts on utility service. Nevertheless, potential

relocation of utilities may cause service interruptions and significant impacts to water, wastewater, power, natural gas, and communications.

Within the SR 4 median, the potential risks of disturbing underground utilities are similar for the Proposed Project and the BART Extension Alternative, and potential underground utilities would most likely have been addressed with the implementation of the SR 4 widening project widening project, which is scheduled to be constructed prior to and/or concurrently with, the BART Extension Alternative. Outside the SR 4 median, the BART Extension Alternative would pose a risk of disturbing utilities similar to the Northside West option of the Proposed Project, because the parking areas, maintenance facility, and station are generally in the same locations as the BART facilities. Therefore, similar to the Northside West option of the Proposed Project, the BART Extension Alternative would result in a potentially significant impact on utilities. **(PS)**

> MITIGATION MEASURES. Mitigation measures identified for the Proposed Project would also be applicable to the BART Extension Alternative (Mitigation Measures UT-3.1, UT-3.2, and UT-3.3). The measures include restricting utility work to off-peak service demand, such as late evenings and early morning hours when demand is limited; arranging temporary backup service to avoid inconveniencing customers; and notifying customers of planned service interruptions. In addition, implementation of Mitigation Measure HS-7.1, as identified for the Proposed Project, calls for confirming the location of underground utilities prior to ground-disturbing activities. These measures would reduce potential impacts of the BART Extension Alternative to a less-than-significant level. **(LTS)**

## Energy

**Energy Demand.** During operation, the BART Extension Alternative would directly consume energy to power the BART cars and operate the stations and maintenance facilities. In addition, indirect energy would be consumed by the BART Extension Alternative as part of maintenance activities on the BART cars. The total direct and indirect energy consumed by the BART Extension Alternative would be offset by the reduction in energy consumed by removing automobiles from the road. This reduction would come from not only reducing the direct energy consumed to power the automobiles, but also reducing indirect energy consumed to maintain the automobiles. The estimated total annual miles traveled by the BART cars as part of the revenue service would be 3,254,208 miles in 2015 and 2030. This estimate of vehicle miles traveled assumes 10-car trains during peak hours and six car trains during non-peak hours. The estimated reduction in total daily vehicle miles traveled on the road as a result of the BART Extension Alternative is greater than for the Proposed Project, because the BART Extension Alternative would generate more transit riders (12,000 daily riders in 2030 for BART versus 10,100 daily riders in 2030 for the Proposed Project). The estimated reduction in annual miles traveled by automobile on the road for is 60.8 million vehicle miles in 2015 and 111 million vehicle miles in 2030.

Table 5-38 presents the estimated energy consumed in 2015 and 2030 under the BART Extension Alternative. Energy consumption by BART cars is based on electricity consumption data collected for calendar year 2006 as provided by BART.[34] BART provided electricity consumed (kWh) by the BART cars and total car miles traveled for the whole system in 2006. A system-wide average kWh per car mile is estimated by dividing the 2006 kWh data by the total BART car miles (4.51 kWh/mile). To account for the fact that more energy is consumed than produced when generating electricity, the kWh per mile value is multiplied by a Btu per kWh factor to arrive at a Btu per mile factor for BART cars. The resulting factor is 46,600 Btu per mile.

The BART Extension Alternative would have a Hillcrest Avenue BART Station and a maintenance facility located north of SR 4. A flyover would connect the station with the tracks on the median of SR 4. The direct energy consumption from the stations and maintenance facilities for the BART Extension Alternative is not known at this time. However, for the purposes of this EIR, energy consumption by the single Hillcrest Avenue BART Station is based on the energy consumption at the existing Orinda BART Station. The Orinda BART Station energy consumption is adjusted to account for the additional parking spaces (Orinda Station has about 1,400 parking spaces while the Hillcrest Avenue Station for the BART Extension Alternative would have 3,500 parking spaces). The BART maintenance facility is conservatively assumed to consume the same amount as the Hayward Yard, which was one of the higher energy-consuming BART facilities in 2006. Actual energy consumed by the BART maintenance facility is expected to be less than assumed in Table 5-38. The Proposed Project is expected to reduce overall energy consumption (combining the increase due to project operations and the reduction due to reduced automobile usage); the BART Extension Alternative would likewise reduce overall energy consumption and net benefits would be less than those identified for the Proposed Project. **(B)**

**Petroleum Demand.** Unlike the Proposed Project, the BART Extension Alternative would not consume diesel fuel to operate the BART vehicles. In fact, petroleum consumption would decrease by reducing the number of automobiles on the road. Thus, to a greater extent than the Proposed Project, the BART Extension Alternative would result in a net benefit by reducing petroleum consumption. **(B)**

**Electricity Demand.** The impact to electricity demand from the BART Extension Alternative would be greater than from the Proposed Project. Electricity would be needed not only to operate the station and maintenance facility but also to power the BART trains. The ability of the electricity suppliers to satisfy electricity demand depends not only on generating capacity but also on transmission capacity. With regard to generating capacity, PG&E is required to have an approximate 15 percent reserve margin to meet peak load. However, there is much uncertainty regarding the ability of California's transmission system to handle peak demand, and the Cal-ISO expects reliable transmission service to the San Francisco Bay Area until at least 2010 only. Considering the construction of the BART Extension Alternative, if selected,

[34] Emails from BART to ERM dated December 27, 2007, and January 8, 2008.

would occur after 2010, some uncertainty exists about the state of the transmission service when the BART Extension Alternative is in operation.

**Table 5-38**
**Energy Consumption of the BART Extension Alternative**

| Category | Energy Consumption (Billion Btu/year) | |
|---|---|---|
| | 2015 | 2030 |
| **Direct** | | |
| Increase from Operation of BART Cars [a] | 151.7 | 151.7 |
| Increase from Station Operation [b] | 17.7 | 17.7 |
| Increase from Maintenance Facility Operation [c] | 59.8 | 59.8 |
| Decrease from Reducing Automobile Miles Traveled [d] | -281.2 | -481.1 |
| **Indirect** | | |
| Increase from Maintenance of BART Cars [e] | 23.0 | 23.0 |
| Decrease from Reducing Maintenance of Automobiles [f] | -85.2 | -156.2 |
| Net of Known Consumption | -114.2 | -385.1 |

*Source:* ERM, 2008.
*Notes:*

a. Equal to annual miles traveled multiplied by energy intensity factor of 46,600 Btu/mile.

b. Based on existing Orinda Station.

c. Based on existing South Alameda Yard.

d. Equal to annual miles traveled multiplied by energy intensity factor of 4622 Btu/mile in 2015 and 4313 Btu/mile in 2030. Passenger automobile fleet average fuel economy is assumed to increase linearly based on fuel economy standard for new passenger cars. Standard in 2004 was 27.5 miles per gallon (mpg) and standard in 2020 will be 35 mpg.

e. Equal to annual miles traveled multiplied by energy intensity factor of 7,060 Btu/mile (assumed equivalent to LRV factor from Caltrans, *Energy and Transportation Systems, Table E-13,* July 1983).

f. Equal to annual miles traveled multiplied by energy intensity factor of 1,400 Btu/mile.

For the BART Extension Alternative, peak hours of service and, hence, electricity demand are expected to be between 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. Peak statewide demand is typically in late afternoon during hot summer months. Therefore, peak electricity demand from the BART Extension Alternative may coincide with the statewide peak demand. PG&E's peak load in 2006 was about 19,000 MW.[35] BART system-wide peak load in 2006 was 84 MW, less than 0.5 percent of the PG&E peak load. Currently, BART typically runs 54 trains during peak hours. The BART Extension Alternative may add two trains during the BART system's peak hours potentially increasing peak hours electricity demand by four percent (about 3 MW) This increase would represent less than 0.02 percent of the PG&E peak load. Nevertheless, because of long-term uncertainties with transmission reliability and the possibility that peak demand for the BART Extension Alternative occurring during the statewide peak demand, impacts to peak electricity demand may be significant. **(PS)**

[35] California Energy Commission website accessed June 9, 2008, http://www.energy.ca.gov/ electricity/ index.html#demand, "2006 Annual Non-Coincident Peak Loads."

MITIGATION MEASURE. Implementation of the BART Facility Standards regarding energy conservation in building and landscaping design would reduce electricity demand. These standards consider building placement and configuration to optimize energy efficiency and achieve a level of energy performance above that required by CCR Title 24 (Building Energy Efficiency Standards). However, given the uncertainty of electricity supplies, the BART Extension Alternative would still be expected to have a significant and unavoidable impact on peak electricity demand. **(SU)**

**Construction Energy Impacts.** Similar to the Proposed Project, energy would be consumed as part of the BART Extension Alternative to construct the BART tracks, stations, maintenance facility, and substations. Energy in the form of fossil fuels would be consumed by equipment and vehicles used for construction. Overall, given the larger facilities associated with the BART Extension Alternative (station size, parking, maintenance facility, systems, etc.) compared to the Proposed Project, the BART Extension Alternative is expected to consume more energy during construction than the Proposed Project. Even though a transfer and a Railroad Avenue Station would not be constructed, the Hillcrest Avenue BART Station would be designed to accommodate more riders in the BART Extension Alternative (12,000 daily riders versus 10,100 daily riders for the Proposed Project in 2030).

Energy consumption during construction would be significant if the consumption of nonrenewable energy resources were done in a wasteful, inefficient, and unnecessary manner. At this conceptual engineering stage, energy conservation practices have not been developed for construction of the BART Extension Alternative. Similar to the Proposed Project, since a detail conservation plan is not currently in place, it is assumed that the construction of the BART Extension Alternative may result in potentially significant energy impacts. **(PS)**

MITIGATION MEASURE. Mitigation Measure EN-4.1 recommended for the Proposed Project would be applicable for the BART Extension Alternative. This measure calls for the development and implementation of an energy conservation plan for the construction period. With the implementation of this measure or an equivalent one, the BART Extension Alternative would have a less-than-significant impact with respect to energy resources during construction. **(LTS)**

## Summary of Impact Assessment

Table 5-39 provides a comparison of the relative severity of key environmental impacts for the Proposed Project and each project alternative. The “Project” column only includes impacts from the Proposed Project and does not include impacts from the Northside West, Northside East, and Median Station East options. In addition, cumulative impacts are only presented for those issue areas that are affected by future traffic conditions (e.g., transportation, air quality, and noise).

**Table 5-39**
**Summary of Key Impacts: Proposed Project and Alternatives**

| Impact | Proposed Project[a] | No Project Alternative | BRT Alternative | | LRV Alternative[b] | BART Extension Alternative |
|---|---|---|---|---|---|---|
| | | | Option A | Option B | | |
| **Transportation** | | | | | | |
| Intersection Operations | S/SU[c] | S/SU | S/LTS | S/LTS | S/SU | S/SU |
| Freeway Segment Operations | B | S/SU | B | B | B | B |
| Parking Demand at Stations | S/LTS | N/A | S/LTS | S/LTS | S/LTS | LTS |
| BART Passenger Volumes on Existing Systems | LTS | NI | LTS | LTS | LTS | LTS |
| Tri Delta Passenger Volume on Existing System | LTS | NI | LTS | LTS | LTS | LTS |
| Pedestrian and/or Bicycle Facilities | PS/LTS | NI | LTS | LTS | PS/LTS | LTS |
| Regional Roadway Network during Construction | S/LTS | NI | S/LTS | S/LTS | S/LTS | S/LTS |
| BART Operations during Construction | LTS | NI | LTS | LTS | LTS | LTS |
| **Land Use** | | | | | | |
| Land Use Compatibility | LTS | NI | LTS | LTS | LTS | LTS |
| Division of an Established Community | NI | NI | NI | NI | NI | NI |
| Farmland Conversion | NI | NI | NI | NI | NI | NI |
| Consistency with Local Land Use Policies | N/A | S | N/A | N/A | N/A | N/A |
| Satisfy BART System Expansion | Yes | N/A | Yes | Yes | Yes | No |
| Satisfy MTC Transit Oriented Development Policy | Yes | N/A | Yes | Yes | No | No |
| **Population and Housing** | | | | | | |
| Induced Housing and Employment | LTS | NI | LTS | LTS | LTS | LTS |
| Land Acquisition/Displacement | PS/LTS | NI | S/LTS | S/LTS | PS/LTS | S/LTS |

**Table 5-39**
**Summary of Key Impacts: Proposed Project and Alternatives**

| Impact | Proposed Project[a] | No Project Alternative | BRT Alternative | | LRV Alternative[b] | BART Extension Alternative |
|---|---|---|---|---|---|---|
| | | | Option A | Option B | | |
| **Visual Quality** | | | | | | |
| Alteration in Visual Character from Pittsburg/Bay Point to Hillcrest Avenue | LTS | NI | LTS | LTS | LTS | LTS |
| Change in Visual Character at Hillcrest Avenue Station Area | S/SU | NI | S/SU | S/SU | S/SU | S/SU |
| Glare from Hillcrest Avenue Station Parking Lots | PS/SU | NI | PS/SU | PS/SU | PS/SU | S/SU |
| Visual Impacts during Construction | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| **Cultural Resources** | | | | | | |
| Disturbance to Known Historic Resources (Contra Costa Canal) | NI | NI | LTS | LTS | NI | NI |
| Disturbance to Unknown Cultural Deposits or Human Remains | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| **Geology, Soils, and Seismicity** | | | | | | |
| Exposure to Geotechnical and Seismic Hazards | LTS | NI | LTS | LTS | LTS | LTS |
| Construction Impacts | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| **Hydrology and Water Quality** | | | | | | |
| Drainage | PS/LTS | NI | LTS | LTS | PS/LTS | PS/LTS |
| Groundwater Resources | LTS | NI | LTS | LTS | LTS | LTS |
| Flooding | LTS | NI | LTS | LTS | LTS | LTS |
| Water Quality | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| Construction Erosion Impacts | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| Construction Water Quality Impacts | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |

**Table 5-39**
**Summary of Key Impacts: Proposed Project and Alternatives**

| Impact | Proposed Project[a] | No Project Alternative | BRT Alternative | | LRV Alternative[b] | BART Extension Alternative |
|---|---|---|---|---|---|---|
| | | | Option A | Option B | | |
| **Biological Resources** | | | | | | |
| Wetlands,"Waters of the U.S.," and "Waters of the State" | PS/LTS | NI | NI | NI | PS/LTS | S/LTS |
| Swainson's Hawk Foraging Habitat | PS/LTS | NI | S/LTS | S/LTS | PS/LTS | S/LTS |
| Special-Status Nesting Birds | PS/LTS | NI | S/LTS | S/LTS | PS/LTS | S/LTS |
| Conflicts with East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP) | NI | NI | NI | NI | NI | NI |
| Removal of Trees Protected by a Local Tree Preservation Policy or Ordinance | PS/LTS | NI | S/LTS | S/LTS | PS/LTS | S/LTS |
| Impacts to Common Biological Resources | LTS | NI | LTS | LTS | LTS | LTS |
| **Noise and Vibration** | | | | | | |
| Noise from Transit Vehicle (away from switches) | LTS | N/A | LTS | LTS | LTS | LTS |
| Noise from Elevated Structures | N/A | N/A | N/A | LTS | N/A | PS/LTS |
| Noise from Transit Vehicle (near switches) | LTS | N/A | LTS | LTS | LTS | PS/SU |
| Noise from Horns | LTS | N/A | N/A | N/A | LTS | LTS |
| Noise from Substations | N/A | N/A | N/A | N/A | PS/LTS | PS/LTS |
| Noise from Ventilation Equipment | N/A | N/A | N/A | LTS | LTS | N/A |
| Noise from Maintenance Centers/Yards | LTS | NI | LTS | LTS | LTS | LTS |
| Noise from Automobiles Near Stations | LTS | NI | LTS | LTS | LTS | LTS |
| Vibration | LTS | NI | LTS | LTS | LTS | LTS |

**Table 5-39**
**Summary of Key Impacts: Proposed Project and Alternatives**

| Impact | Proposed Project[a] | No Project Alternative | BRT Alternative | | LRV Alternative[b] | BART Extension Alternative |
|---|---|---|---|---|---|---|
| | | | Option A | Option B | | |
| Construction Noise | PS/SU | NI | PS/SU | PS/SU | PS/SU | PS/SU |
| Construction Vibration | PS/SU | NI | PS/SU | PS/SU | PS/SU | PS/SU |
| **Air Quality** | | | | | | |
| CO Concentrations from Traffic at Congested Intersections | LTS | NI | LTS | LTS | LTS | LTS |
| Greenhouse Gas and Regional Criteria Pollutants Emissions | B | S | B | B | B | B |
| Exposure to Toxic Air Contaminants | LTS | LTS | LTS | LTS | LTS | LTS |
| Construction Air Emissions | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| **Public Health and Safety** | | | | | | |
| Accidental Release of Hazardous Materials | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| Exposure to EMF | N/A | N/A | N/A | N/A | LTS | LTS |
| System Safety and Passenger Security | LTS | NI | LTS | LTS | LTS | LTS |
| Public Airport or Public Use Airport Hazard | NI | NI | NI | NI | NI | NI |
| Exposure of People or Structures to Wildland Fires | NI | NI | NI | NI | NI | NI |
| Risk of Terrorist Attack | LTS | NI | LTS | LTS | LTS | LTS |
| Construction-Related Exposure to Hazardous Materials | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |
| **Community Services** | | | | | | |
| Demand for Local Police and Fire Staff | LTS | NI | LTS | LTS | LTS | LTS |
| **Utilities** | | | | | | |
| Water Demand/Wastewater Generation | LTS | LTS | LTS | LTS | LTS | LTS |
| Interruption of Utility Service during Construction | S/LTS | NI | PS/LTS | PS/LTS | S/LTS | PS/LTS |

**Table 5-39**
**Summary of Key Impacts: Proposed Project and Alternatives**

| Impact | Proposed Project[a] | No Project Alternative | BRT Alternative | | LRV Alternative[b] | BART Extension Alternative |
|---|---|---|---|---|---|---|
| | | | Option A | Option B | | |
| **Energy** | | | | | | |
| Energy Demand | B | S | B | B | B | B |
| Petroleum Demand | B | S | B | B | B | B |
| Electricity Demand | LTS | NI | LTS | LTS | PS/SU | PS/SU |
| Construction Energy Impacts | PS/LTS | NI | PS/LTS | PS/LTS | PS/LTS | PS/LTS |

*Source:* PBS&J, 2008.

*Notes:*

a. These impacts include the Proposed Project; not the Northside West, Northside East, and Median Station East options.

b. These impacts include the LRV Median Station only; not the Northside West, Northside East, and Median Station East options.

c.. Before mitigation/After mitigation (e.g. PS/LTS)

## 5.4 CUMULATIVE IMPACTS OF ALTERNATIVES

All of the "build" project alternatives have similar footprints and environmental impacts compared to the Proposed Project. There are differences in actual acres of disturbance but generally the impact classification (less than significant versus significant) are the same. As a result, cumulative impacts with the project alternatives would be similar to the cumulative impacts with the Proposed Project. In other words, the project alternatives' contribution to cumulative effects would be comparable to the contribution by the Proposed Project. Impacts of project alternatives identified as "No Impact" would not contribute to cumulative impacts. For example, if the BRT Alternative had no effect on important farmlands, by definition, there would be no cumulative effects to important farmlands. The majority of impacts for the project alternatives identified as "Less than Significant" or impacts that could be mitigated to less-than-significant levels would contribute to cumulative impacts like the Proposed Project. Potential cumulative impacts for the project alternatives that would be different than the Proposed Project are described below.

**Farmland Conversion.** The Northside West and Northside East Station options for the Proposed Project and the LRV Alternative may include a remote maintenance facility that could require the conversion of Farmland of Local Importance. This maintenance facility in combination with other cumulative projects could result in a loss of agricultural farmland, which is considered a significant cumulative impact. (The facilities associated with Median Station and the Median Station East option would not affect farmlands and thus would not contribute to cumulative farmland loss.) As discussed in Impact LU-7, the site for the remote maintenance facility is isolated and no longer economically viable for agricultural purposes. Given its current condition, bound by the Union Pacific railroad, the SR 4 Bypass, and the Contra Costa Canal, and partially occupied by a recreated wetland, this site is not in agricultural production. As a result, the loss this area, even though still designated as a Farmland of Local Importance, would not constitute a cumulatively considerable impact of the project alternatives. Therefore, the cumulative effects to farmlands with the Proposed Project and LRV Alternative would be less than significant. In contrast, the BRT and BART Extension Alternatives would not convert any farmland and would thus have no cumulative impact on farmland conversion.

**Wetlands or "Waters of the US."** The Northside West, Northside East, and Median Station East options of the Proposed Project and the LRV Alternative and the Hillcrest Avenue Station of the BART Extension Alternative would impact wetlands or "waters of the US;" however, these impacts would be mitigated to a less-than-significant cumulative impact. In contrast, the BRT Alternative would not impact wetlands and, therefore, would not have a cumulative impact on wetlands.

**Noise.** All of the build project alternatives would result in potentially significant cumulative noise effects on the nearby residential receptors in the project corridor. The principal noise source along SR 4 and the SR 4 Bypass would be automobiles, but the transit systems would contribute to the overall noise levels, both from operation of revenue service and maintenance activities. In the vicinity of the rail switches, the cumulative noise increase would be slightly elevated for the Proposed Project, the LRV Alternative, and the BART Extension Alternative. In contrast, at these locations, the BRT Alternative would have a lesser contribution to the cumulative effect, since the buses would use rubber tires on a paved road, which would not be as loud as trains operating on a rail guideway.

**Exposure to Diesel Particulate Matter.** The Proposed Project would emit diesel particulate matter; however, the system would use "clean" diesel that would meet state and federal emission regulations. The BRT Alternative could potentially use diesel engines that would emit a greater amount of diesel particulate matter than the Proposed Project, but future buses would also conform to the state and federal regulation, for clean diesel. The LRV and BART Extension Alternatives would be powered by electricity and would therefore not emit diesel particulate matter. Cumulatively, diesel particulate matter from truck traffic on the widened SR 4, the increased freight traffic on the UP Mococo Line, the Proposed Project, and the BRT Alternative (assuming diesel-fueled buses) would contribute to these emissions, but the contribution would be less than considerable because of the small amount emitted relative to the other sources and because of the more stringent air quality regulations that are being phased in. There would be no cumulative effect on diesel particulate matter with the LRV and BART Extension Alternatives.

**Electrical Demand.** The vehicles to be used by Proposed Project and BRT Alternative would not be powered by electricity and would therefore have a less-than-significant cumulative impact on electricity demand. The vehicles of the LRV and BART Extension Alternatives would be powered by electricity. As a result, the LRV and BART Extension Alternatives would contribute to cumulatively significant demands for electricity.

## 5.5 ATTAINMENT OF PROJECT OBJECTIVES AND KEY POLICY GOALS

Important objectives and policies against which the project alternatives are evaluated in this section include the project objectives, the BART System Expansion Policy, and the Metropolitan Transportation Commission (MTC) Transit-Oriented Development Policy (Resolution #3434). Table 5-40 summarizes whether the alternative fulfills or does not fulfill the objective.

**Table 5-40**
**Project Alterative Attainment of Project Objectives**

| Objectives | No Project Alternative | Proposed Project | Bus Rapid Transit (BRT) Alternative | | Light Rail Vehicle (LRV) Alternative | BART Extension Alternative |
|---|---|---|---|---|---|---|
| | | | Option A | Option B | | |
| Improve overall transportation service and enhance mobility in the State Route 4 Corridor | No | Yes | Yes | Yes | Yes | Yes |
| Enhance access to transit systems | No | Yes | Yes | Yes | Yes | Yes |
| Enhance connectivity and seamlessness of the transit system, both from home to transit and from one form of transit to another | No | Yes | No | Yes | Yes | Yes |
| Promote transit-oriented land use initiatives and policies | No | Yes | Yes | Yes | Yes | Yes |
| Enhance economic benefits | No | Yes | Yes | Yes | Yes | Yes |
| Achieve financial feasibility | Yes | Yes | Yes | No | No | No |
| Balance short, medium and long-term strategies | No | Yes | No | No | Yes | No |
| Protect and enhance the environment | No | Yes | Yes | Yes | Yes | Yes |
| Implement the mandate of Contra Costa voters as described in Measure J | No | Yes | No | No | Yes | Yes |
| Provide a cost effective and technology appropriate system | No | Yes | Yes | Yes | Yes | No |

*Source:* PBS&J, 2008.

## No Project Alternative

### Project Objectives

The No Project Alternative is not satisfactory at achieving the project objectives. Although it does include some transit service improvements in the project corridor, the No Project Alternative would not involve new transit infrastructure that could achieve the objectives of increased access to transit, connectivity of transit, and promotion of transit-oriented land use. Specifically, the No Project Alternative would be limited to changes in service routes and schedules, which would offer better transit service in East County and divert some motorists from the highways, but not at the levels envisioned by the project objectives. Furthermore, the continuation of existing bus routes and bus stops would have negligible effect in promoting transit-oriented land uses around transit facilities. As shown in Section 3.2, Transportation, the No Project conditions would result in significant delays on every segment of SR 4 studied. As a result, this alternative would not alleviate congestion in the SR 4 corridor. In addition, while the No Project Alternative would enhance connectivity to transit in the corridor because of improved express bus service, this alternative would not improve upon the transfer between Tri Delta buses and BART. Connectivity between service operators would remain unchanged, so that the objective of a seamless transfer to BART would not be realized.

The eBART project objectives include enhanced economic benefit and financial feasibility; i.e., being supportive of development investment benefits by inducing higher land values near station locations, increased rents, tax revenues to cities, and regional job creation, as well as being affordable given current funding sources. The No Project Alternative would not involve capital investments at the bus stops that could foster investment or fiscal/economic benefits to the region or induce higher land values near the existing stops. The No Project Alternative would be financially viable but would not advance either medium or long-term strategies; the No Project Alternative is largely a status quo proposal.

The No Project Alternative would increase transit ridership over existing conditions and thus offer some environmental benefits from reduced air emissions and energy consumption, compared to existing conditions. However, there would be no benefit beyond what is already anticipated in the region. As shown in Section 3.11, Air Quality, and Section 3.15, Energy, the Proposed Project would have beneficial effects because it would reduce the air emissions and energy consumption that would otherwise occur under the No Project Alternative. As such, the No Project Alternative would not advance the project objective to enhance and protect the environment.

The No Project Alternative would not be consistent with County Measure J, which resulted in a one-half cent sales tax to extend rail service into east Contra Costa County. Finally, the improvement to existing services and stops would be cost effective, but the No Project Alternative does not offer any technological advancement that would alleviate congestion along SR 4 and reduce delays.

In summary, the No Project Alternative would not fulfill the project objectives.

### BART System Expansion Policy and MTC Resolution #3434

Neither of these policies is relevant to the No Project Alternative, since this alternative would not involve an extension of BART transit services or technologies governed by MTC's Resolution #3434.

## BRT Alternative

### Project Objectives

The BRT Alternative as either Option A or B would satisfy seven of the ten project objectives, although the specific objectives attained by each option differs, as noted below. Option A would offer a transit system that would generally be comparable to the Proposed Project. This option would provide less connectivity to BART but would offer greater geographic coverage than the Proposed Project. Option B would offer excellent connectivity and higher ridership, but would be substantially more costly than the Proposed Project. Because of the estimated ridership levels (10,400 under Option A and 12,000 under Option B), both options would improve mobility in the SR 4 corridor by attracting new transit riders and diverting motorists from SR 4. Similarly, each would offer enhanced transit service to a wide network of residences and businesses in East County. However, Option A and Option B are substantially different in their ability to enhance connectivity to BART. Option A, the lower cost version of the BRT Alternative, would rely on existing SR 4 on- and off-ramps at Bailey Road to access the Pittsburg/Bay Point BART Station. This connection means that the buses would need to travel in mixed flow traffic lanes to enter and leave the busway in the SR 4 median, and that there would be no improvement to the existing transfer between buses and BART trains. As a result, this option would not enhance connectivity. On the other hand, Option B was designed to foster a relative seamless connection to BART and would achieve this project objective.

The station facilities at Railroad Avenue and in the vicinity of Hillcrest Avenue would be substantial capital investments in transit infrastructure and thus provide some impetus for land development and other economic/fiscal benefits that would accrue to the cities of Pittsburg and Antioch. However, bus systems and facilities, compared to rail technologies, are not as effective at stimulating local transit-oriented development or serving as a focal point for economic development. Private developers in general are more amenable to making long-term real estate investments around a rail station than a bus station. Thus, the BRT options would satisfy the project objective to promote transit-oriented land uses but not as well as the rail alternatives. It is expected, however, that the investment in a quality bus system would increase jobs in the region, could effect some shift in development patterns to take advantage of the accessibility afforded by transit, and thus modestly increase land values around the stations.

With respect to achieving financial feasibility, the issue is whether the alternative can be funded. Option A at an estimated $381 million in 2009 dollars would cost less than the

Proposed Project and would be feasible. On the other hand, Option B is about 26 percent more expensive than the Proposed Project at $611 million in 2009 dollars. In order to advance this option, additional funding sources would be needed. Accordingly, Option A satisfies the objective of financial feasibility but Option B does not.

The BRT Alternative would not satisfy one of the principal project objectives promoted by the eBART Partnership Policy Advisory Committee: to balance short and long-term strategies for the corridor by constructing less expensive transit improvements that can be funded in the near term, but are readily adaptable to BART technology at a later date if funding becomes available and the projected ridership would justify the greater the cost. The BRT Alternative involves construction of busway pavement and freeway bus-only lanes that would have to be removed if BRT were replaced by BART technology in the future. In addition, the station facilities at either end of the corridor for both BRT Options A and B would not be directly usable with BART technology and would need to be replaced. Construction of the BRT Alternative would also be inconsistent with Measure J passed by the County voters, which calls for extension of rail transit into East County.

As shown earlier in Section 5.3, the BRT Alternative would effectively protect and enhance the environment, similar to the Proposed Project. Option B would result in a greater diversion of motorists to transit and achieve greater reductions in air emissions and energy consumptions than the Proposed Project. As a result, the BRT Alternative (both options) rate high in terms of protecting the environment.

With respect to the final project objective of providing a cost effective, technology appropriate system, both Options A and B would achieve this objective. The BRT technology is appropriate for the ridership opportunities, the intensity of development, and the service plan envisioned for the eBART corridor. The number of BRT Alternative vehicles in operation can be readily scaled to satisfy varying demand. Likewise, given the number of riders delivered for the capital costs, the BRT options are as cost effective, if not more so, than the Proposed Project.

In summary, the BRT Alternative meets most of the project objectives but would not implement Measure J or support short, medium, and long-term strategies. Further, Option A would not achieve a seamless, or enhanced, connection to BART at the Pittsburg/Bay Point BART Station. Option B would require additional funding sources and would not be financially feasible.

### BART System Expansion Policy and MTC Resolution #3434

Both options of the BRT Alternative would satisfy the BART System Expansion Policy ridership threshold, adjusted for the differing costs of the two options. Specifically, Option A would deliver 10,400 daily trips, compared to the ridership threshold of 4,709; Option B would deliver 12,000 daily trips, compared to the ridership threshold of 7,321.

The BRT Alternative would meet the criteria of MTC threshold which establishes a per-station housing threshold of 2,750 units for BRT service. According to the Pittsburg/Bay Point BART Station Area Specific Plan Final EIR and the Pittsburg and Antioch General Plans, the average number of dwellings units within a one-half mile radius of the three stations (Pittsburg/Bay Point, Railroad Avenue, and Hillcrest Avenue) would be 2,920, which would meet the MTC ridership threshold for bus transit.

## Light Rail Vehicle Alternative

### Project Objectives

The Light Rail Vehicle (LRV) Alternative is similar to the Proposed Project and would satisfy nearly all of the project objectives to the same degree. The principal difference concerns the project objective of being financially feasible. The LRV Alternative involves construction of overhead catenary lines and traction power substations that raise the cost of this technology relative to the Proposed Project. As a result, the LRV Alternative would require additional funding if it were to be advanced. This alternative would not be financially feasible with current funding sources.

### BART System Expansion Policy and MTC Resolution #3434

The LRV Alternative would satisfy the BART System Expansion Policy ridership threshold, adjusted for the costs of the system. Specifically, the LRV Alternative would deliver 10,100 daily trips, compared to the ridership threshold of 6,327.

According to MTC Resolution #3434, the threshold for LRV technology is an average of 3,300 dwelling units per station area. According to the Pittsburg/Bay Point BART Station Area Specific Plan Final EIR and the Pittsburg and Antioch General Plans, the three stations along the corridor would average 2,920 dwelling units within a one-half mile radius of the stations, which would not justify the extension per MTC criteria. If the Hillcrest Station option with the greatest number of dwelling units were taken into account (i.e., using the Ridership Development Plan estimates for the Northside East Station option, rather than the City of Antioch General Plan), the average would increase to approximately 3,230 dwelling units. Under these assumptions, the LRV Alternative would still not satisfy the MTC threshold.

## BART Extension Alternative

### Project Objectives

The BART Extension Alternative would satisfy seven of the ten project objectives. This alternative would offer the highest level of ridership, system connectivity (without the need to transfer from BART to a DMU, BRT or LRV), diversion of motorists to transit, and reduction in SR 4 congestion. The significant investment in a BART station in the City of Antioch would be attractive to, and an incentive for, private developers to making long-term real estate

investments in the transit-oriented development sought by the City in its General Plan and in the Ridership Development Plan that is currently being prepared. The City of Antioch and the region would realize economic and fiscal benefits with the sizeable investment and infrastructure that would be associated with the Hillcrest Avenue BART Station. Although this alternative would not include a station in the City of Pittsburg, the City has indicated that its planning efforts around Railroad Avenue are not dependent on a rail extension.

In contrast, because of the cost of investing in heavy-rail BART technology, the BART Extension Alternative would not satisfy the project objectives related to cost effectiveness and affordability. In particular, this alternative would not enhance financial feasibility; balance short, medium, and long-term strategies, or provide a cost-effective technology. This alternative does not balance short and long-term strategies for the corridor because it requires construction of the most costly transit improvements that are not currently fundable, rather than constructing less costly improvements in the near term that are adaptable to BART technology at a later date. In addition, the BART Extension Alternative would terminate outside the SR4 median, at a location north of SR4 and alongside the Union Pacific Railroad (UPRR) right of way. Future extensions to serve the rest of East County would have to travel parallel to the UPRR Mococo Line, where land acquisition costs and displacements would be significant, or would need to utilize the UPRR right of way, which may be difficult given the UPRR's intent to increase freight service activity on the corridor. Thus, while satisfying Measure J and extending BART service, this alternative has limited options for future phases. The cost for this alternative of $1.173 billion is about two and one-half times more than the Proposed Project, and would require substantial additional funding sources.

### BART System Expansion Policy and MTC Resolution #3434

While the BART Extension Alternative has the highest projected potential ridership, this increased ridership is not enough to justify the increased cost of investing in heavy-rail BART technology. Specifically, the projected ridership of 12,000 daily trips for the BART Extension Alternative does not satisfy BART's System Expansion Policy ridership threshold of 14,000 daily trips for conventional BART technology.

With respect to MTC Resolution #3434, the target number of dwelling units per station is 3,850, for heavy rail systems, like BART. According to the Pittsburg/Bay Point BART Station Area Specific Plan Final EIR and the Antioch General Plan, the average number of dwelling units within a one-half mile radius of the this alternative's two stations (Pittsburg/Bay Point and Hillcrest) would be 2,085 units. As a result, this alternative would not satisfy the MTC threshold of 3,850 housing units. Even if the Hillcrest Avenue Station option with the greatest number of dwelling units were taken into account (i.e., using the Ridership Development Plan estimates for the Northside East Station option, rather than the City of Antioch General Plan), the average would increase to about 2,550 units, still not enough to achieve the minimum target.

## 5.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires that an environmentally superior alternative be selected among the alternatives analyzed. In general, the environmentally superior alternative is the project that avoids or substantially lessens some or all of the significant and unavoidable impacts of the Proposed Project (CEQA Guidelines Section 15126.6).

### The No Project Alternative

The No Project Alternative would best avoid impacts identified for the Proposed Project. In particular, the No Project Alternative would not involve land acquisition, alteration to the SR 4 median and adjacent areas along the project corridor, risk to structural or public safety due to geoseismic hazards, disturbance to biological species or habitat, vibration effects, and construction-related effects. The No Project Alternative would avoid the significant and unavoidable impacts identified for the Proposed Project with respect to unacceptable congestion at local intersections, construction noise and vibration, and alterations in the visual setting around the Hillcrest Avenue area. On the other hand, the No Project Alternative would result in more intersections and freeway segments operating at unacceptable levels, compared to the "build" alternatives. The No Project Alternative would also offer no reductions to regional air emissions, energy consumption, or releases of greenhouse gas emissions. As such, this alternative would not be supportive of the Bay Area Clean Air Plan or AB 32, the State's pioneering program to reduce greenhouse gases.

### BRT Alternative

The CEQA Guidelines indicate that when the No Project Alternative is environmentally superior, the EIR shall also identify an environmentally superior alternative among the other alternatives. Generally, between the Proposed Project (with Median Station) and the BRT Alternative, the impacts are similar. However, the BRT would result in avoidance of certain significant and unavoidable traffic impacts (Impacts TR-1, TR-2 and TR-13, all of which involve the SR 4 Eastbound Ramps/Hillcrest Avenue intersection), as well as one cumulative noise impact (Impact NO-CU-14). This alternative is therefore the environmentally superior alternative.

As to the significant and unavoidable traffic impacts, the only difference between the BRT Alternative and the Proposed Project is that the BRT Alternative results in a marginal improvement (from LOS E to LOS D, where LOS E is unacceptable pursuant to the significance thresholds) at the SR 4 Eastbound Ramps/Hillcrest Avenue intersection during the 2030 AM peak hour. The 2030 PM peak hour intersection operations are the same under both options. With respect to the cumulative noise impacts along SR 4, both the BRT Alternative and the Proposed Project would result in cumulative noise impacts on sensitive receptors in the project corridor in general (Impact NO-CU-13). The only noise impact that the BRT Alternative would avoid compared to the Proposed Project (with the Median Station) is the

cumulative noise impact specific to the locations of the rail switches (Impact NO-CU-14), which are planned at four sites along the 10-mile corridor. Thus, the benefit of avoiding or reducing these cumulative impacts is minimal.

Compared to the Proposed Project with Northside West, Northside East and Median Station East Station options, the BRT Alternative also avoids two additional significant and unavoidable noise impacts: Impact NO-11 (traffic noise associated with the Northside East Station option) and Impact NO-CU-16 (operational noise from the remote maintenance facility in combination with other noise sources). With respect to traffic-related noise, additional traffic associated with the Northside East Station option and the potential development at this station location would increase noise levels along local roads between the Union Pacific Railroad right-of-way and 18th Street. The magnitude of the traffic volume increase suggests that the cumulative noise levels may significantly affect residences that front onto the local streets. The Hillcrest Avenue BRT Station would provide some impetus for transit-oriented development and hence traffic and vehicular noise, but the amount of new development would not be as intense and, hence, generate as much traffic and noise as the DMU station. In terms of the cumulative noise effects associated with the remote maintenance facility, the major contributor to the cumulative noise impacts is traffic along the SR 4 Bypass and local streets. Thus, even without the remote maintenance facility, nearby sensitive noise receptors would be affected by traffic noise.

The BRT Alternative also results in slight reductions in the magnitude of various less-than-significant impact areas, as well as somewhat greater environmental benefits for regional air quality and energy consumption, resulting from the increased transit ridership it offers. While the BRT Alternative would offer an efficient, high quality transit service, it would not be as successful as the Proposed Project in promoting transit-oriented land use initiatives and policies; balancing short, medium, and long-term strategies; and implementing the mandate of the Contra Costa County voters as described in Measure J.

## LRV and BART Extension Alternatives

The LRV Alternative would have environmental effects similar to the Proposed Project, because the route, stations, and facilities would be identical. The principal difference is the additional visual impact from the overhead catenary system to supply power and the additional land and related impacts to accommodate the traction power substations. While these impacts are considered less than significant, they represent additional impacts that would not occur with the Proposed Project. The LRV Alternative would provide a comparable level of service and ridership as the Proposed Project. However, the LRV Alternative would cost more and require more funding than what is currently available. One of the project objectives is to achieve financial feasibility, and this alternative would not satisfy this objective.

The BART Extension Alternative would result in more environmental effects at the Hillcrest Avenue Station because of additional land requirements for station facilities. Furthermore, this alternative, while offering the most seamless connection to existing BART service, the greatest

ridership potential, and, thus, the most enhanced mobility in the SR 4 corridor, would be far more costly and additional funding would need to be identified.

### Summary

Of the build alternatives, the BRT Alternative is technically the environmentally superior alternative, because it avoids the Proposed Project's significant and unavoidable traffic impacts at a single intersection and lessens cumulative noise impacts in the vicinity of the rail switches. The difference between the BRT and the DMU with the Hillcrest Avenue Station options is somewhat greater, however, because the BRT Alternative avoids additional potentially significant and unavoidable cumulative traffic-related noise impacts specific to the Northside West, Northside East, and Median East Station options. The LRV and BART Extension Alternatives, in turn, would have greater environmental impacts than either the Proposed Project or the BRT Alternative, primarily due to the catenary power line needed for the former and greater land area needed for the latter. Since, as a practical matter, the difference between environmental impacts of the Proposed Project and the BRT Alternative is not substantial, the comparison between the Proposed Project and the BRT Alternative, in terms of ability to attain project objectives, assumes greater importance. As shown in Table 5-40, the BRT Alternative would not be as effective as the Proposed Project in attaining the project objectives. The BRT Alternative would provide effective transit service to East County, but it would not satisfy the County's Measure J policy of providing rail service and it would not satisfy the eBART Partnership Policy Advisory Committee's policy to construct a system that could readily be adapted to BART technology.

## 5.7 ALTERNATIVES CONSIDERED BUT WITHDRAWN

The range of alternatives required in an EIR is limited to those that would avoid or substantially lessen any of the significant effects of the project. Among the factors that may be taken into account when addressing the feasibility of alternatives are suitability, economic viability, availability of infrastructure, plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.

### 2002 BART Feasibility Study

### Initial List of Alternatives

In 2004, the SR 4 East Corridor Transit Study was implemented to look at transit-related alternatives that would serve to reduce congestion in east Contra Costa County as well as

provide a major link to the Bay Area's BART system and a number of other community oriented goals. Upon initial review, a number of options were presented as part of the study:

- Alternative BART Extension Alignments and Station Locations
- Express Bus and Local Bus Options
- Bus Rapid Transit Concepts
- Light Rail Alignments
- eBART or Suburban Light Rail Options
- Private Shuttles, SMART Shuttles, and other shuttle concepts
- Park-and-Ride Lots
- Intelligent Transportation Systems Projects
- Traffic Engineering Improvements to the Arterial Street Network
- HOV Lanes
- Travel Demand Management Measures
- Pedestrian Transit Oriented Development Programs and other Land Use Related Programs
- Conventional Commuter rail and Intercity Rail Programs
- Special Applications of Advanced Transit Technology
- Commuter Rail
- Pedestrian/Bicycle Access Improvements

## Summary of Options Listed After Screening Analysis

The transportation improvements options listed above were subjected to a screening and evaluation process that was designed to identify those options which had significant problems, flaws, or other deficiencies. In this manner, the list of options was narrowed by eliminating those that were found to have serious flaws. The following criteria were considered in determining which options would and would not be considered further: implementation and constructability, operational issues, environmental issues, land use compatibility, ridership potential, costs, intermodal connectivity.

The following options, although considered as potential alternatives, were eliminated from further discussion for one or more reasons.

**Alternative BART Options.** Three BART-related options were withdrawn from further consideration as a result of poor locations for terminus and/or maintenance yards. The first option proposed extending BART transit from the existing Pittsburg/Bay Point Station to

Railroad Avenue, where a terminus station and yard would be built. At this location, there is insufficient space for a terminus station and the subsequent parking spaces and maintenance facility that would accompany it. Another option proposed extending BART transit from the Pittsburg/Bay Point Station to Century Boulevard (along the SR 4 median) at which point a terminus station and maintenance yard would be built. This location also had insufficient space for a terminus station and maintenance yard. The last BART-related option to be withdrawn from further consideration included BART transit that would extend to Century Boulevard via the Union Pacific Railroad. This option, similar to the last two BART options, offered a poor location for a terminus station and maintenance yard.

**Alternative DMU Options.** One option proposed extending the DMU to the existing Union Pacific Railroad (approximately 1 mile north of SR 4) by way of Bailey Road. This option was withdrawn from further consideration due to the traffic impacts that would be created along Bailey Road and at the Bailey Road/SR 4 interchange. This option would also offer a poor connection to existing BART service. Finally, if eBART were extended northward along Bailey Road and later it was decided to extend conventional BART, all of the construction for eBART would be unusable for BART technology. If BART were to replace eBART in the future, BART would need an elevated structure to travel along Bailey Road. Diverting BART in this direction to go further east into east Contra Costa County would be unnecessarily expensive, since the SR 4 route is much shorter and most of the right-of-way is available; whereas the Union Pacific Railroad right-of-way would need to be acquired.

A second alignment option involving operation of the DMU in the Union Pacific right-of-way, along the Mococo Line was also investigated. This eBART alternative was dropped due to an inability to reach an agreement on acquisition of the Union Pacific right-of-way.

As a subset of the DMU alignment options, there were also suggestions for different station locations. The selection of the stations evaluated in this EIR were reviewed and discussed with the local jurisdictions in the corridor. The stations included in the Proposed Project or considered as optional sites were determined to offer support to local land use policies, provide opportunities to promote private developer investment and transit-oriented development, balance the demands for high travel speeds (which would suggest fewer stations) and high accessibility (which suggest more stations), and connect well to Tri Delta Transit service and facilities. By contrast, those station locations that were suggested but are not evaluated in this document involved greater impacts related to land acquisition and displacement, environmental constraints (such as wetland habitat or floodplains), inconsistencies with local development policies, and lack of transit-oriented development opportunities.

**Alternative BRT Option.** This option proposed bus rapid transit vehicles connecting the existing Pittsburg/Bay Point Station with the Union Pacific Railroad. This option was withdrawn due to the poor connection with existing BART service as well as the large, unrecoverable cost associated with construction of this option.

**Commuter Rail Option.** This option would have provided regional commuter rail through east Contra Costa County via the Burlington Northern Santa Fe Railway (BNSF) or Union Pacific Railroad. This option was withdrawn from further consideration due to the poor quality of service generally associated with commuter rail as well as the lack of direct access between the commuter rail option and existing BART service.

**Express Bus Improvement Options.** These options called for improving express bus service along SR 4 and the surrounding communities. While these options would have provided increased transit opportunities throughout east Contra Costa County, they failed to create a dedicated transit option linking the existing BART transit services to east Contra Costa County. Also, they failed to offer enough routes to carry the amount of transit riders that can be served by the Proposed Project and the alternatives evaluated in this EIR.

## "Smart Growth Alternative"

A scoping comment dated August 20, 2005, and called "Transportation Solutions Defense and Education Fund" (TRANSDEF), proposed an option which it characterized as a "Smart Growth Alternative" that would implement a DMU rail system; connect to the existing BART system at the North Concord BART station and extend to the City of Brentwood; intensify development in the proposed station areas; increase local transit service; and protect greenfields and existing neighborhoods from development.

The Proposed Project includes several components of the TRANSDEF Alternative, including implementation of a DMU rail system and coordination with the cities of Pittsburg and Antioch through the Ridership Development Plan process for intensified station area development. In addition, while providing increased local transit service is under the jurisdiction of other agencies, the Proposed Project is designed to coordinate with local service and Tri Delta Transit is planning to reconfigure existing routes to provide increased service to the proposed stations, as described in Sections 2.6 and 3.2 (Impact TR-6) of this EIR. As described in Section 1, although the original scoping notice provided for a longer 23-mile extension through Brentwood to Byron/Discovery Bay, that scope is not feasible at this time due to financial constraints. The Proposed Project represents the initial 10-mile segment of expansion in this transit corridor.

The alignment proposed by TRANSDEF would connect to the existing North Concord BART station and extend primarily along the Union Pacific Railroad right of way. Accordingly, TRANSDEF also argued, SR 4 should not be widened further to the east. The decision to widen SR 4 has been made by the agencies with jurisdiction: Federal Highway Administration, California Department of Transportation and Contra Costa Transportation Authority. Given that those agencies have decided to widen SR 4, it is more efficient to extend transit service in the highway median. Accordingly, this alignment was withdrawn from further consideration.

Finally, the Proposed Project promotes TOD and implements BART's System Expansion Policy through coordination with the Ridership Development Plans being prepared by the cities

of Pittsburg and Antioch. Intensified station-area development is also one of the stated goals of TRANSDEF's Smart Growth Alternative. Implementing such TOD for the Proposed Project would involve the development of certain undeveloped parcels in the area of Hillcrest Avenue in Antioch. However, although these parcels currently are undeveloped, their value as "greenfields"[36] is considered marginal, given their location abutting highways, railroad right of ways, an electrical substation and existing residential development.

[36] A greenfield is an area that has not previously been built on, especially an area considered as a site for expanding urban development.