Chapter 2 Project Alternatives

This chapter describes the alternatives development process, the alternatives under consideration in this environmental document, and the alternatives that were considered and subsequently withdrawn from further consideration for the AC Transit East Bay Bus Rapid Transit (BRT) Project.

2.1 Alternatives Development Process

The alternatives development process included several steps. It began with a Major Investment Study (MIS), which identified service objectives, and evaluated alternative transit improvement corridors, route alignments, and vehicle and operations technologies. The MIS identified a Locally Preferred Alternative (LPA) for transit mode and general route alignment. Alternatives development and refinement of the LPA continued as part of the public scoping activities and background technical studies conducted during preparation of this environmental document. As a result of these efforts, four transit improvement alternatives with various alignment variations were identified for detailed evaluation in the Environmental Impact Statement (EIS) / Environmental Impact Report (EIR).

2.1.1 AC Transit/Berkeley/Oakland/San Leandro Major Investment Study

From 1999 to 2002, the Alameda-Contra Costa Transit District (AC Transit) conducted a MIS to examine the feasibility of providing a new or improved transit service in the Berkeley/Oakland/San Leandro corridor.[1] The MIS included substantial input and guidance from technical staff of key stakeholder agencies, leaders of community-based organizations, elected officials and the general public. The MIS accomplished four major tasks:

1) Defined the service objectives for the new transit service in the corridor;
2) Identified and narrowed corridor and vehicle/technology alternatives;
3) Evaluated the relative costs and benefits of corridor and vehicle/technology alternatives; and
4) Identified an LPA for further study.

The MIS did not define all the details of the LPA. Variations to the general alignment were left to further consideration along with specific station locations, refinement of the operating plan, and modifications of the LPA that would minimize environmental impacts. These matters were more appropriate to evaluation and determination as part of the detailed environmental assessments for this document.

2.1.2 Service Objectives

Service objectives were developed during the MIS that address the goals that AC Transit, its partner cities of Berkeley, Oakland, and San Leandro, and the public have for the proposed project (see

[1] *AC Transit Berkeley/Oakland/San Leandro Corridor MIS* (Cambridge Systematics, Inc., 2002)

Chapter 7, Consultation and Coordination, for a description of the outreach process.). The service objectives are to:

1) Improve access to major employment and educational centers and enhance connections to other AC Transit services, Bay Area Rapid Transit (BART), ferry services, and other transit providers;
2) Improve transit service reliability;
3) Provide frequent transit service;
4) Ensure security, cleanliness, and comfort while waiting for and riding on transit;
5) Support transit-oriented residential and commercial development;
6) Increase the percentage of trips made by transit and reduce the percentage by automobile;
7) Identify a set of transit improvements that has a high probability of being funded;
8) Improve ease of entry and exit on vehicles for all transit riders, including persons with disabilities; and
9) Provide an environmentally friendly transit service, contributing to air quality improvement.

2.1.3 MIS Evaluation of Vehicle/Transit Mode and Corridor Alternatives

2.1.3.1 VEHICLE/TRANSIT MODE

The MIS identified three vehicle/transit mode alternatives that could best meet the service objectives established for the project while satisfying the needs of the corridor travel market: Light Rail Transit (LRT), Bus Rapid Transit (BRT), and Enhanced Bus. Several other alternative transit modes were ruled out for the MIS study area because of their high cost, unproven nature, or lack of suitability for operations in a dense urban environment. These alternative transit modes are described in greater detail in Section 2.4, Alternatives Considered and Withdrawn.

2.1.3.2 ALIGNMENT ALTERNATIVES

Along with the alternative transit modes, two alignment alternatives were evaluated in detail for the northern portion of the MIS study area from Downtown Berkeley to Downtown Oakland: (1) Telegraph Avenue, and (2) College Avenue/Broadway. Consideration was also given to other alignments, such as Shattuck Avenue, but these did not perform as well as the Telegraph Avenue or College Avenue/Broadway alternatives and were withdrawn relatively early in the MIS process.

One alignment alternative was evaluated in detail for the southern portion of the MIS study area from Downtown Oakland to Downtown San Leandro: International Boulevard/East 14th Street. Other alignments, such as Foothill Boulevard/Bancroft Avenue and San Leandro Street (in Oakland)/San Leandro Boulevard (in San Leandro), were also considered but withdrawn relatively early because they did not perform as well as the other alignments.

The three transit modes when combined with the two northern alignment alternatives resulted in six discreet project alternatives. These alternatives were recommended for further evaluation by the Policy Steering Committee in September 2000 and approved by the AC Transit Board of Directors in October 2000. Ridership, engineering, environmental, and financial analyses were then conducted to refine and evaluate the alternatives. The results of these analyses are presented in the project MIS report (Cambridge Systematics, 2002). The vehicle/transit mode and alignment alternatives examined

during the MIS and ultimately withdrawn from further consideration as the LPA was carried forward are discussed in Section 2.4, Alternatives Considered and Withdrawn.

2.1.4 Identification of a Locally Preferred Alternative (LPA)

The LPA was identified as part of the MIS process. Based on a detailed analysis of the various vehicle/transit mode and alignment alternatives and with extensive input from key stakeholders (described in Chapter 7, Coordination and Consultation), the LPA was recommended by the Policy Steering Committee on July 11, 2001 and approved by the AC Transit Board of Directors on August 2, 2001. The LPA establishes the mode and basic project alignment evaluated as the Build Alternatives in this document. This document also evaluates variations in the LPA, such as the operating plan, transitway alignments and roadway design options, and station locations. The LPA and possible operating plan and alignment variations are discussed in greater detail in Section 2.2, Project Alternatives.

2.1.4.1 LOCALLY PREFERRED ALTERNATIVE: MODE (VEHICLE AND FEATURES)

Bus Rapid Transit (BRT), using self-propelled, low- or zero-emission buses with low floors, was identified as the LPA's preferred transit mode for the corridor. BRT was adopted with the understanding that light rail transit (LRT) should be considered as a long-term goal and that design and construction of BRT should not preclude conversion to LRT in the future. The BRT mode would be similar to systems currently in use in metropolitan Los Angeles, California; Orlando, Florida; Vancouver, Canada; and Curitiba, Brazil among other locations. BRT offers greater operating flexibility compared to rail because buses are not constrained to stay within the guideway over the entire route. Moreover, compared to rail, BRT has substantially lower construction costs because it does not require laying rails or installing overhead wires.

The BRT system would include such features as dedicated lanes along arterial streets, signal priority treatments to reduce travel delays at intersections, wider station spacing when compared to existing local bus service in order to improve travel speeds and decrease travel times, stations with various passenger amenities, off-vehicle fare payment for faster boarding, and high frequency service. The proposed features of BRT are described in more detail in Section 2.2.2, Build Alternatives.

2.1.4.2 LOCALLY PREFERRED ALTERNATIVE: ALIGNMENT

The LPA alignment identified in the MIS would primarily use Telegraph Avenue in the northern portion of the study area and International Boulevard/East 14th Street in the southern portion. Although the MIS analyses indicated that a transit corridor following College Avenue/Broadway in the northern portion would attract somewhat more riders, Telegraph Avenue was selected because it would provide for a more reliable and faster service at a lower construction cost and have fewer traffic and construction impacts. The Telegraph Avenue alignment also has greater capacity for redevelopment and better meets the service objectives established for the project. Several variations of the basic alignment are under consideration in Downtown Berkeley and East Oakland; these variations are discussed in detail in Section 2.2.2, Build Alternatives: General Alignment and Features. Two operating plans that vary the spacing of BRT stations and the level of local versus

BRT service in the project corridor are under consideration and have been incorporated into the four Build Alternatives discussed in Section 2.2.2.

2.1.5 Draft EIS/EIR Scoping Process

The adoption of the LPA at the culmination of the MIS identified BRT as the preferred mode and Telegraph Avenue–International Boulevard/East 14th Street as the preferred general alignment. The LPA provides the basis of the Build Alternatives in this document. A Notice of Preparation to prepare an EIR was issued in May 2003 and a Notice of Intent to prepare an EIS was issued in January 2004. During the course of the conceptual engineering and environmental assessment for the project, numerous public and agency meetings were conducted to further define the project and the issues to be addressed in the environmental analysis. A description of the public outreach process for the project appears in Chapter 7, Consultation and Coordination.

2.2 Project Alternatives

Five alternatives are evaluated in this environmental document: a No-Build Alternative and four Build Alternatives. The Build Alternatives represent different levels of BRT improvements AC Transit is considering within the project corridor. The improvements vary in the length of the BRT alignment and the number of stations and are referred to collectively as the East Bay BRT Project. The specific features of each of the Build Alternatives are described in Section 2.2.2.

The No-Build Alternative would include all transportation improvements that are currently planned and programmed in the project area except for the East Bay BRT Project itself. No-Build Alternative improvements include bus operational improvements, such as express stops and transit signal priority at key intersections, and adding amenities to curbside bus stops. These improvements are currently under construction throughout the corridor and will be in operation in the spring or summer 2007. The No-Build Alternative is described in detail in the next section.

Each of the Build Alternatives adds to the No-Build Alternative the basic features of the proposed East Bay BRT Project including full transit priority at signalized intersections, new passenger stations, and dedicated travel lanes throughout most of the proposed project alignment.

2.2.1 No-Build Alternative

The No-Build Alternative includes all currently planned and programmed projects in the study area, such as the Uptown Transit Center, MacArthur BART Station Transit Village, San Leandro BART Station Transit Village (Phase 1), Fruitvale Transit Village (Phase II), and expansion of express bus services in various transportation corridors throughout the Bay Area. Section 1.4, Related Projects, provides further detail on these projects.

Currently, AC Transit operates several local and limited stop bus services within the transportation corridors connecting Downtown Berkeley, Downtown Oakland and southern San Leandro. The services between Berkeley and Oakland include Route 51 in the College Avenue-Broadway corridor, Route 40/40L in the Telegraph Avenue corridor, Route 15 in the Martin Luther King Junior Way corridor, and Route 43 in the Shattuck Avenue-Telegraph Avenue corridor. The main services

between Oakland and San Leandro include Route 40/40L in the Foothill Boulevard-Bancroft Avenue corridor and Route 82/82L in the International Boulevard/East 14th Street corridor. Figures 2.2-1a and 2.2-1b show the location of these routes.

These routes carry some of the highest ridership in AC Transit's service area. Route 82/82L has over 20,000 boardings on the average weekday, for example. To accommodate high demand during peak commute periods, service frequencies (the time between bus arrivals at a particular location) are as often as every six minutes on Routes 51 and 82/82L. However, service reliability can be poor and travel times highly variable due to problems of operating in congested mixed-flow traffic lanes (see Chapter 1, Purpose and Need).

AC Transit is therefore implementing major capital and service improvements in these corridors as part of its Rapid Bus program to partially address existing problems.[2] The improvements are included in the No-Build Alternative. The No-Build/Rapid Bus enhancements will consist of low-floor buses, widened stop spacing to improve travel time, improvements to selected bus stops (benches, shelters, maps/signs, and bus arrival information), and some of the intelligent transportation system (ITS) technology elements described for the Build Alternatives. The main ITS element is transit signal priority, which would allow Rapid Bus vehicles to communicate with traffic signals and receive favorable timing for avoiding long delays at traffic signals.

These Rapid Bus capital facility and service enhancements are in the process of implementation by AC Transit in the Telegraph Avenue–International Boulevard/East 14th Street corridor, which is also the focus of the proposed BRT project improvements. A new Rapid Bus route, designated Route 1R, will operate in mixed-traffic lanes generally along the following roadways:

Berkeley-Oakland	Oakland-San Leandro
Shattuck Avenue	Broadway
Bancroft Way and Durant Avenue	11th Street and 12th Street
Telegraph Avenue and Dana Street	International Boulevard
20th Street/Thomas Berkeley Way	East 14th Street

The Route 1R alignment is shown in Figures 2.2-2a and 2.2-2b. Tables 2.2-1 and 2.2-2 summarize features of existing and proposed transit service along the alignment for Route 1R.

Rapid Bus stops will be spaced approximately 0.4 to 0.5 miles apart along the route and located near major activity centers and transfer points. Service frequencies will be every 12 minutes during peak periods. In addition to Rapid Bus service, local bus service will continue in the corridor. Local bus stops will be spaced similarly to existing spacing, but the service frequencies, and therefore bus arrivals, will be slightly less frequent than for Rapid Bus service. Local bus frequencies will range from 12 minutes along the International Boulevard/East 14th Street segment of the corridor to 15 minutes along the Telegraph Avenue segment. The combined service frequencies of Rapid Bus and local buses throughout the alignment for Route 1R will average from six to seven minutes during peak periods.

[2] AC Transit has already implemented Rapid Bus improvements along San Pablo Avenue connecting the cities of Oakland, Emeryville, Berkeley, Albany, El Cerrito, Richmond, and San Pablo.

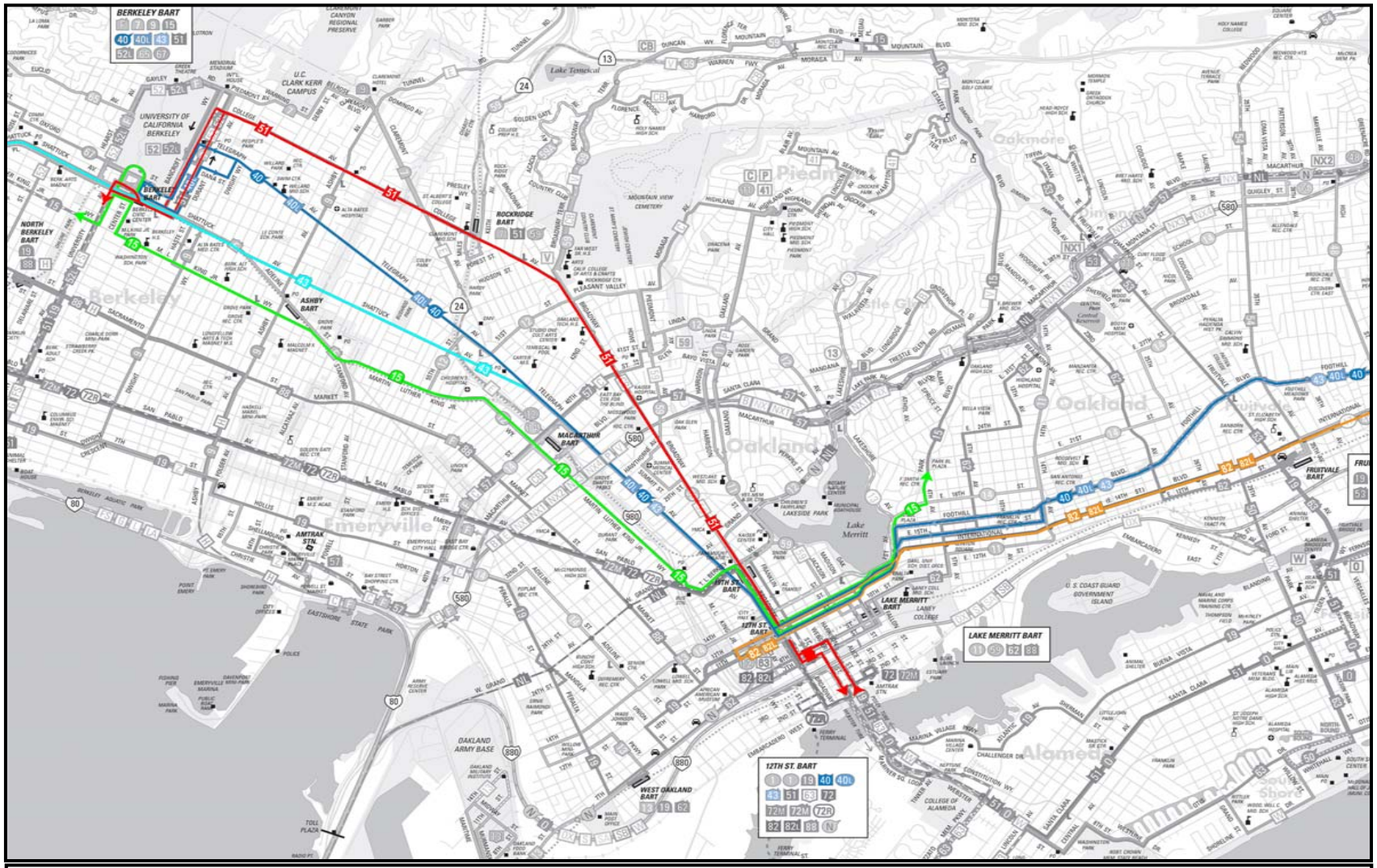


Figure 2.2-1a: Major AC Transit Routes Connecting Downtown Berkeley-Downtown Oakland-San Leandro [North]

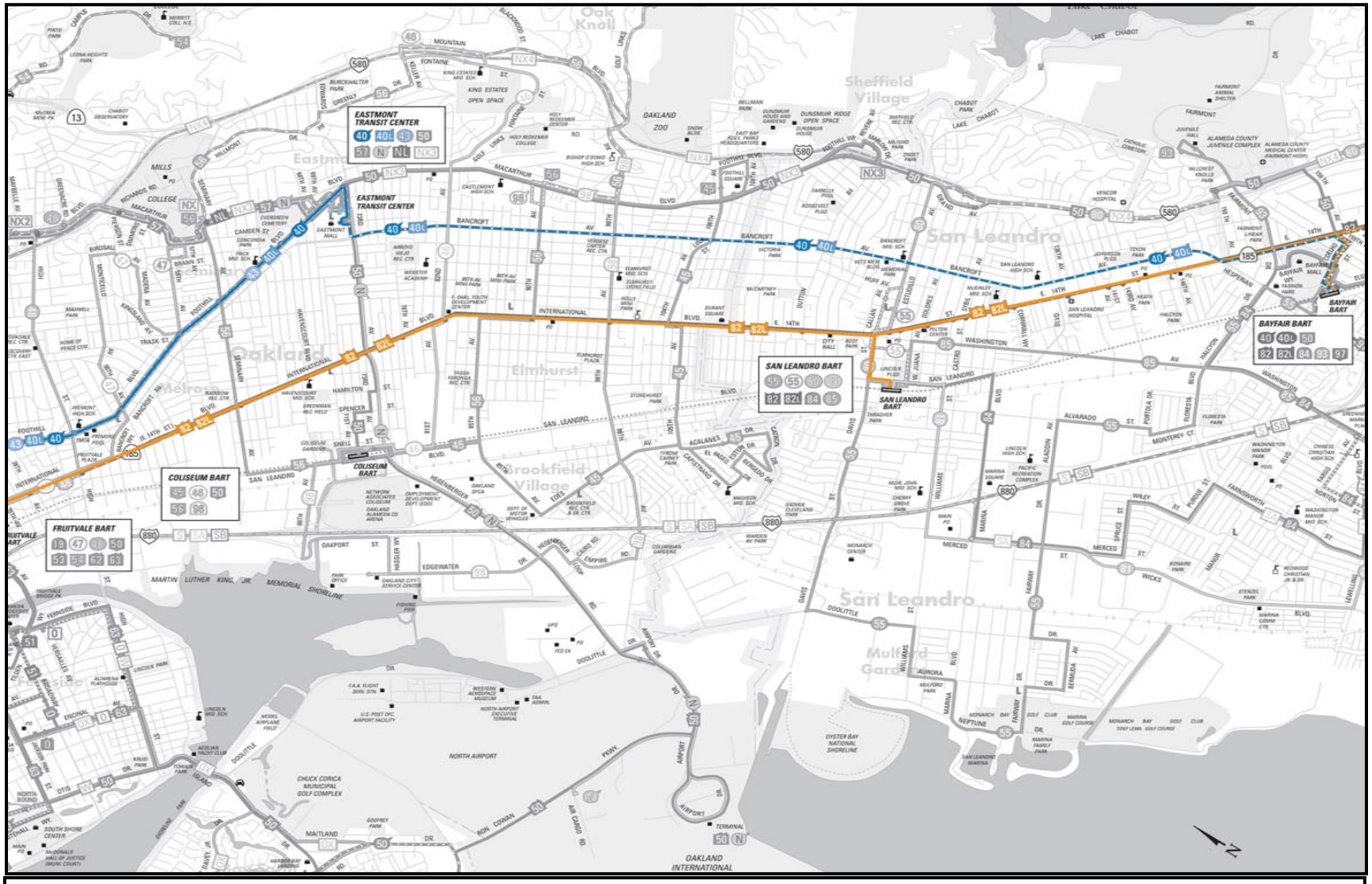


Figure 2.2-1b: Major AC Transit Routes Connecting Downtown Berkeley-Downtown Oakland-San Leandro [South]

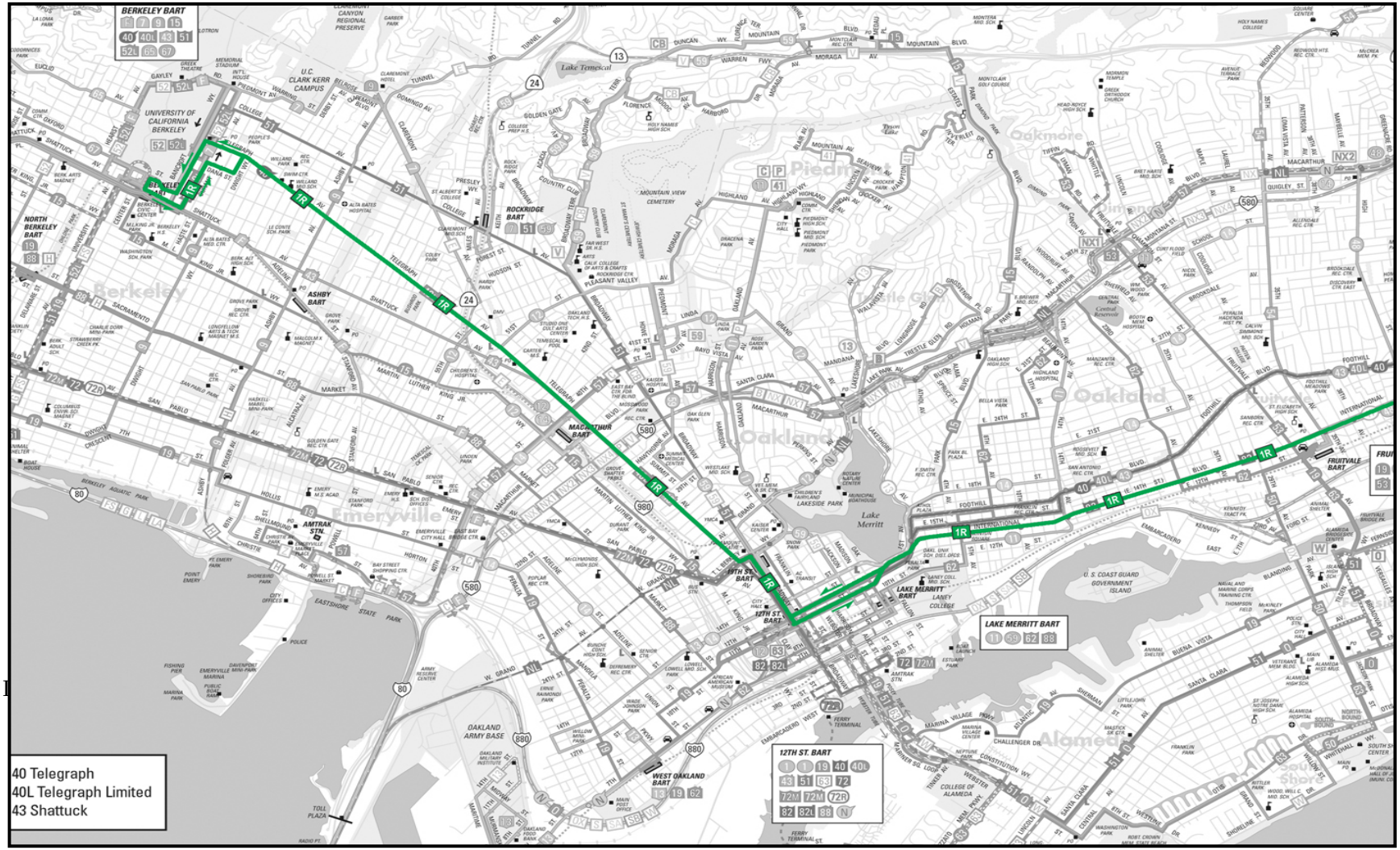


Figure 2.2-2a: No-Build (2025) - Route 1R Connecting Downtown Berkeley-Downtown Oakland-San Leandro [North]

Figure 2.2-2b: No-Build (2025) - Route 1R Connecting Downtown Berkeley-Downtown Oakland -San Leandro [South]

Table 2.2-1: Features of Existing Service along Route 1R Alignment

Feature	North Corridor (Berkeley to Oakland)		South Corridor (Oakland to San Leandro)	
	Route 40/40L Downtown Berkeley to Downtown Oakland	**Route 43** Shattuck/Telegraph Ave to Downtown Oakland	**Route 82L** Downtown Oakland to BayFair BART	**Route 82**[1] Downtown Oakland to Downtown San Leandro
Length	5.5 miles	2.2 miles	11.3 miles	8.6 miles
Bus Stops (bidirectional)	40-43	16	41-44	53
Avg. Bus Stop Spacing	0.13 miles	0.14 miles	0.27 miles	0.16 miles
Service Frequency (peak period)	15 min.	15 min.	12 min	12 min.
Peak Travel Time	33 min.	13 min.	60 min.	47 min.
Weekday Boardings (within corridor)	4,530	1,585	17,790	(included in 82L total)
Base Fare	$1.75	$1.75	$1.75	$1.75

Notes:
[1]Route 82 during peak periods terminates at San Leandro BART. Statistics shown are for this alignment. During evenings and at night, service extends to BayFair BART and Route 82L service is discontinued.
Source: AC Transit route schedules; *Technical Memorandum, East Bay BRT Operating Plan and Cost Analysis*, November 2005 by Nelson\Nygaard Consulting Associates; Cambridge Systematics, 2006

Table 2.2-2: Features of Future Service along Route 1R Alignment (2025 No-Build)

Feature	North Corridor (Berkeley to Oakland)		South Corridor (Oakland to San Leandro)	
	Route 1R Downtown Berkeley to Downtown Oakland	**Routes "X" and 43**[1] Downtown Berkeley to Shattuck/Telegraph Ave to Downtown Oakland	**Route 1R** Downtown Oakland to BayFair BART	**Route 82**[2] Downtown Oakland to Downtown San Leandro
Length	5.5 miles	5.5 miles	11.3 miles	11.3 miles
Bus Stops (bidirectional)	13	40-43	22	68-69
Avg. Bus Stop Spacing	0.42 miles	0.13 miles	0.51 miles	0.16 miles
Service Frequency (peak period)	12 min.	15 min.	12 min.	12 min.
Peak Travel Time	26 min.	33 min.	51 min.	64 min.

Notes:
[1]Route "X" is yet to be designated a formal number. It extends from Downtown Berkeley to Telegraph Ave. at Shattuck Ave. Route 43 extends along the alignment from Shattuck Ave. to Downtown Oakland. The two routes provide complementary local service to express Route 1R.
[2]Route 82 will be extended to BayFair BART during all service periods. It provides complementary local service to Route 1R.
Source: AC Transit Service Planning; *Technical Memorandum, East Bay BRT Operating Plan and Cost Analysis*, November 2005 by Nelson\Nygaard Consulting Associates; Cambridge Systematics, 2006

Compared to existing bus service within the corridor, Route 1R service will improve service quality and convenience. Peak period travel time savings between Berkeley and San Leandro are projected to be on the order of 15 minutes (the existing bus travel time is 92 minutes). These improvements are expected to increase weekday corridor boardings by 4,200 and annual boardings by approximately 1.25 million by 2025. AC Transit estimates the capital costs to implement Rapid Bus improvements will be $22 to $25 million when complete. The annual cost of operating Rapid Bus services is estimated to be $23.8 million (2005 dollars), or $4.2 million more than the cost of existing operations. The costs assume adding five peak buses on Route 1R and complementary local routes. Although Rapid Bus service is scheduled to begin in the spring or summer 2007, incremental improvements would continue as the service matures and ridership grows.

The No-Build Alternative does not include the East Bay BRT Project, as described in the following sections.

2.2.2 Build Alternatives: Alignment, Service Options, and Features

The four Build Alternatives under consideration for the East Bay BRT Project have many common attributes: general alignment, station designs and amenities, priority treatments for transit, and fare collection, among others. The differences are primarily in the length of the overall BRT alignment and the type of service options, which also affect the number of BRT stations.

2.2.2.1 ALIGNMENT AND SOUTHERN TERMINUS

Between Berkeley and San Leandro, each alternative would follow the general alignment identified for the LPA during the MIS, which is also the basic alignment for Route 1R. All four alternatives would begin, proceeding north to south, in Downtown Berkeley, proceed along the south side of the UC Berkeley campus to Telegraph Avenue, then along Telegraph Avenue to Downtown Oakland, then along International Boulevard to San Leandro. In San Leandro, two different alignments and termini for BRT improvements would be possible: (1) along East 14th Street, through Downtown San Leandro to BayFair Center and then the BayFair BART Station near the southern city limit with unincorporated Alameda County, or (2) along East 14th Street to Davis Street, then San Leandro Boulevard to San Leandro BART, on the west edge of downtown.

2.2.2.2 SERVICE OPTIONS (OPERATING PLAN)

Two service options are under consideration for the East Bay BRT project. Under either option, AC Transit would increase service frequencies compared to the No-Build Alternative. AC Transit would use the various analyses reported in this EIS/EIR to determine the preferred option.

Separate BRT and Local Service

The *Separate BRT and Local Service* operating plan would have BRT buses operating in the designated BRT transitway as an express service and regular buses operating in the adjacent mixed-flow traffic lanes as a supplementary local service. Under this option, BRT service would be high frequency, every five minutes during the peak, while local service would be lower frequency, every 12 to 15 minutes. To support fast service and because the background local bus service and stops would remain, BRT stations would be fairly widely spaced, from 0.4 to 0.5 miles apart. Local bus

stops would be reduced from the current level but still be closely spaced, every two to three blocks, and located at the curb.

Combined BRT and Local Service

The *Combined BRT and Local Service* operating plan proposes that all bus service in the project corridor be combined and operated solely in the BRT transitway. Corridor local bus service would be removed from the mixed-flow traffic lanes and be replaced by BRT service operating in the BRT transitway. To compensate for removal of many local bus stops, the *Combined BRT and Local Service Option* would space BRT stations closer together, from 0.25 to 0.35 miles apart, to allow and encourage use of the BRT for local trips along the corridor. In comparison to Separate BRT and Local Service, there would be more BRT stations per mile.

2.2.2.3 DEFINITION OF BUILD ALTERNATIVES

The two possible termini in San Leandro and two possible operating plans for the East Bay BRT Project result in four basic build alternatives. These are designated as follows:

Alt 1: Separate BRT and Local Service to BayFair BART ***(Alternative 1)***

Alt 2: Separate BRT and Local Service to San Leandro BART ***(Alternative 2)***

Alt 3: Combined BRT and Local Service to BayFair BART ***(Alternative 3)***

Alt 4: Combined BRT and Local Service to San Leandro BART ***(Alternative 4)***

Graphical descriptions of the Build Alternatives are shown in Figures 2.2-3 through 2.2-6. Table 2.2-3 summarizes several of the key features of each of the alternatives, including length, stations, and peak period service frequencies. To maintain a comparable level of capacity among alternatives, measured in terms of vehicle-seats operated per hour past any major activity center along the project alignment, AC Transit proposes to offer higher BRT (express bus) frequencies for Alternatives 3 and 4 than for Alternatives 1 and 2, since the former do not offer any local bus service. The combined service frequencies of Alternatives 1 and 2, which offer both BRT and local service simultaneously, are, however, comparable to the BRT service frequencies for Alternatives 3 and 4.

Each of the Build Alternatives would provide a full complement of BRT improvements in the project corridor. They include six major elements:

1. BRT Transitway
2. Stations with Improved Passenger Amenities
3. Simplified Fare Collection
4. Intelligent Transportation System (ITS) Components
5. Low-floor Buses
6. Ability to Convert to LRT

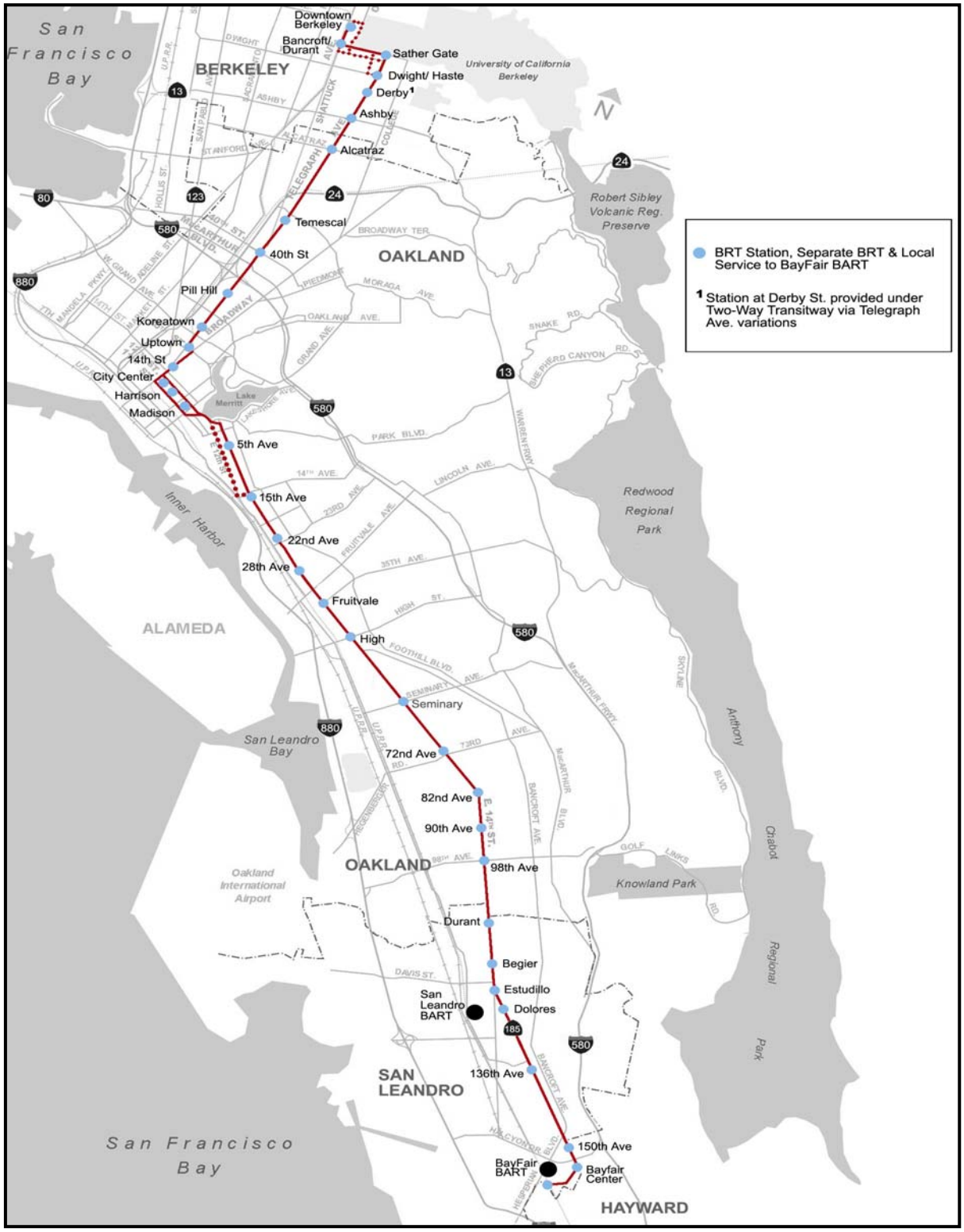


Figure 2.2-3: Alt 1: Separate BRT and Local Service to BayFair BART

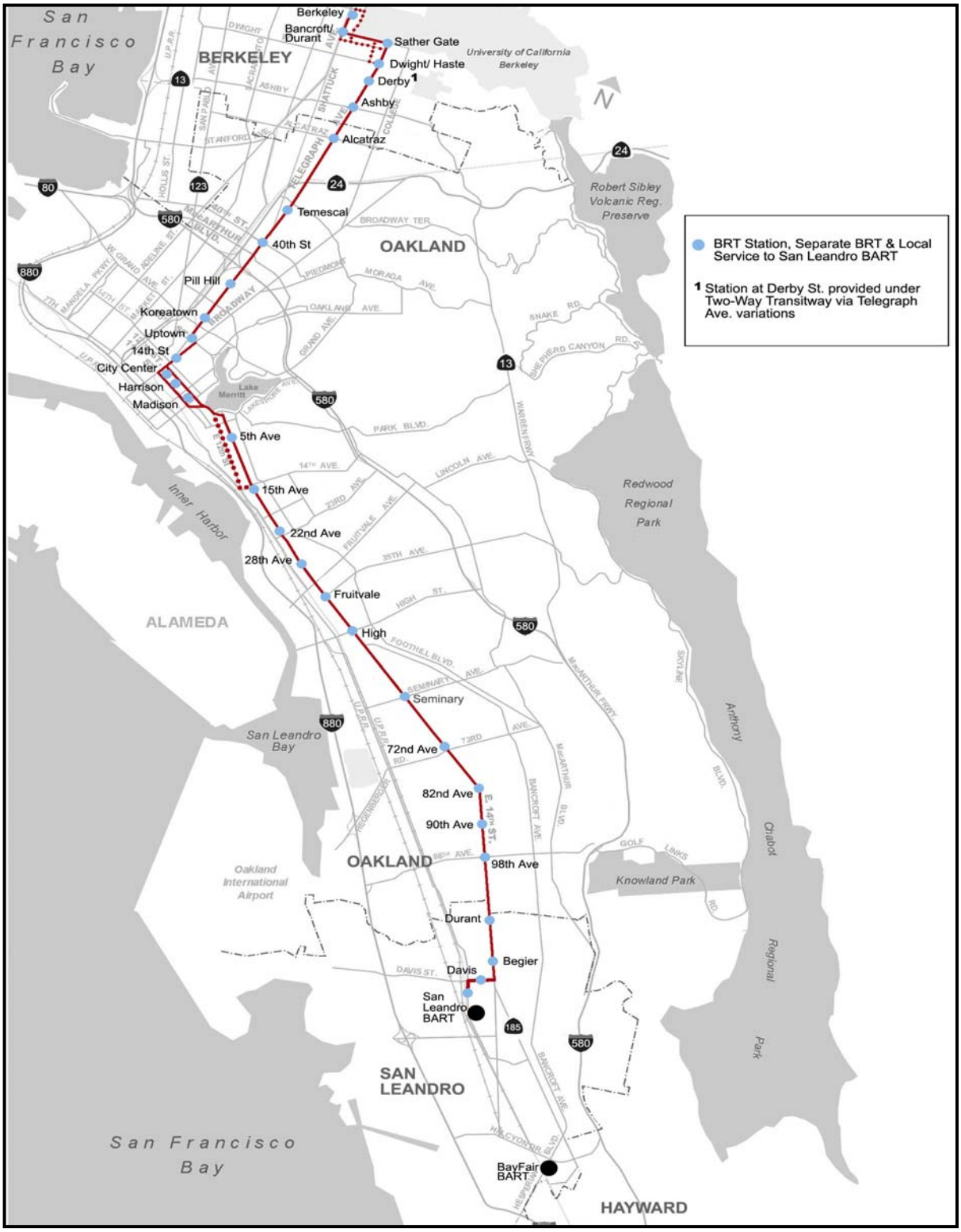


Figure 2.2-4: Alt 2: Separate BRT and Local Service to San Leandro BART

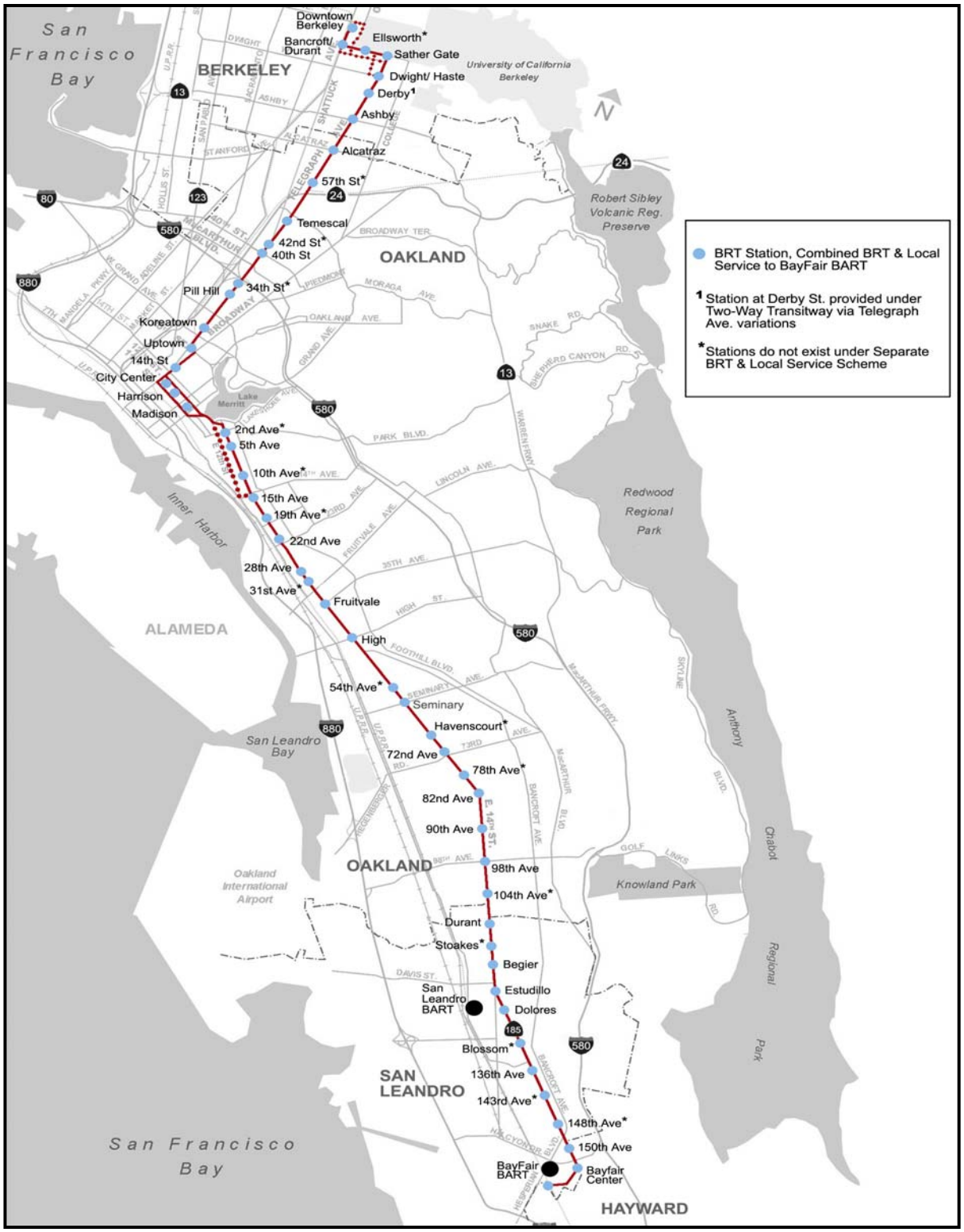


Figure 2.2-5: Alt 3: Combined BRT and Local Service to BayFair BART

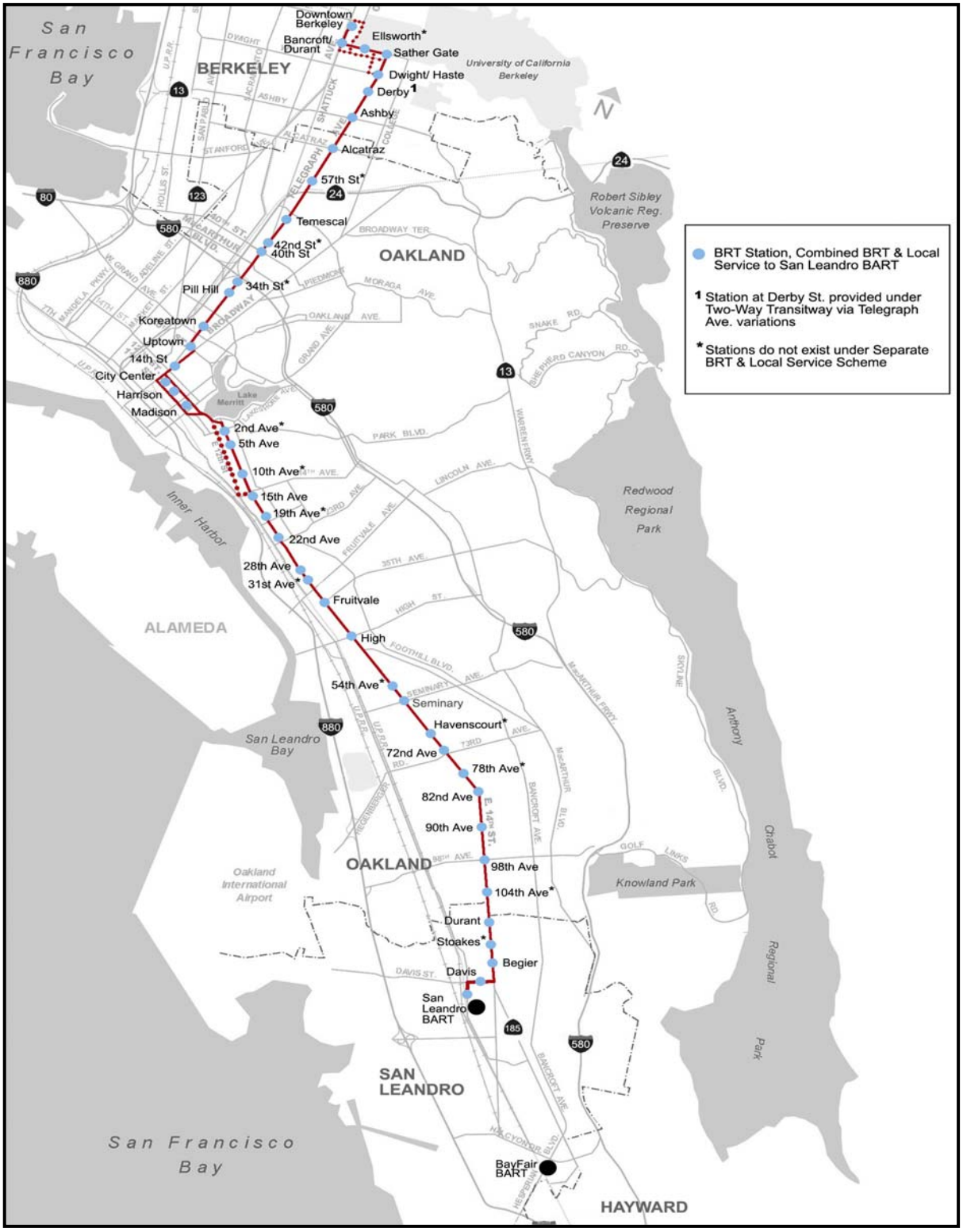


Figure 2.2-6: Alt 4: Combined BRT and Local Service to San Leandro BART

Table 2.2-3: Features of Build Alternatives Compared				
Feature	**Alt 1 Separate BRT and Local Service to BayFair BART**	**Alt 2 Separate BRT and Local Service to San Leandro BART**	**Alt 3 Combined BRT and Local Service to BayFair BART**	**Alt 4 Combined BRT and Local Service to San Leandro BART**
Length	16.8 miles	14.7 miles	16.8 miles	14.7 miles
Total BRT Stations	35	31	51	44
BRT Station Spacing	0.40 - 0.50 miles	0.40 – 0.50 miles	0.25 - 0.35 miles	0.25 - 0.35 miles
BRT Service Frequency (peak period)	5.0 min.	5.0 min.	3.6 min.	3.6 min
Local Bus Frequency (peak period)	15 min.[north] 12 min.[south]	15 min.[north] 12 min.[south]	Replaced by additional BRT express service	Replaced by additional BRT express service
BRT and Local Service Frequency Combined (peak period)	3.75 min.[north] 3.53 min.[south]	3.75 min.[north] 3.53 min.[south]	3.6 min. [north & south]	3.6 min. [north & south]
Source: *Technical Memorandum, East Bay BRT Operating Plan and Cost Analysis*, November 2005 by Nelson\Nygaard Consulting Associates; Parsons, 2006 (station spacing)				

1. BRT Transitway

The transitway is the lane or lanes in which BRT buses would operate. There are three basic types of transitways proposed for the East Bay BRT Project:

- BRT-only lanes
- BRT lanes shared to a limited extent with mixed traffic, and
- Mixed-flow traffic lanes in which BRT buses are provided no special treatments.

BRT-Only Lanes

BRT-only lanes would be used by BRT and emergency vehicles, the latter when necessary for expedited travel, while shared BRT lanes and mixed-traffic lanes would be used by all types of vehicles. BRT-only lanes would be located in the median of the street or, in some limited cases, in the outside travel lanes (the lane closest to the curb). The choice of location would depend on traffic and land-use conditions in the particular area under consideration. Cross traffic would not be allowed to cross BRT-only lanes except at signalized intersections where space for turning movements would be carefully integrated into the transitway design. BRT-only lanes would be provided on streets such as Shattuck Avenue, Telegraph Avenue, International Boulevard/East 14th Street, and under certain alignment options, along other arterial street segments. An example of a BRT-only lane configuration is provided in Figure 2.2-7.

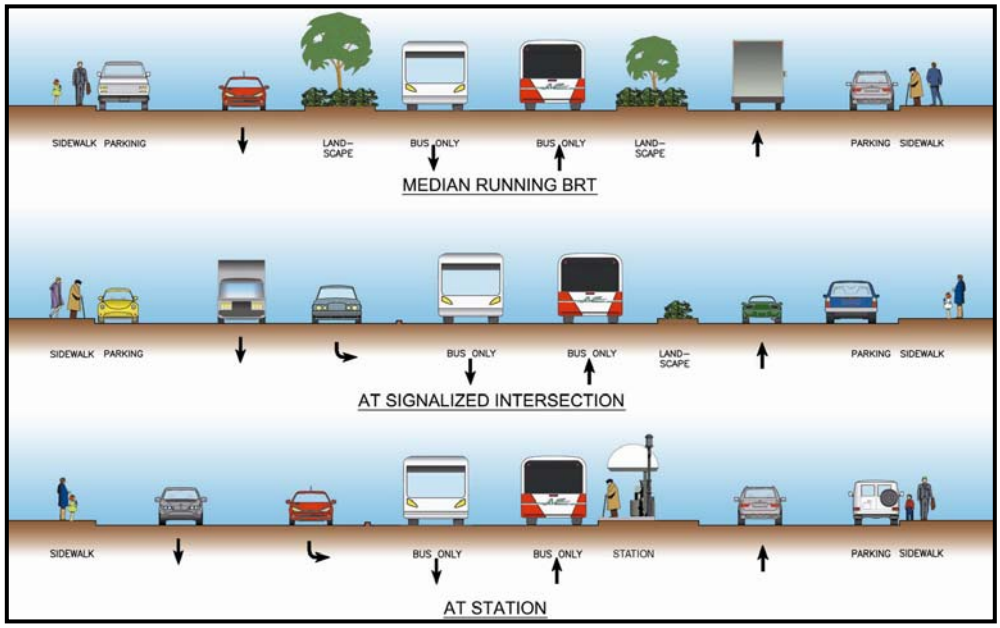


Figure 2.2-7: Roadway Cross Section with BRT-only Lanes, Median Running

Shared BRT Lanes

Shared BRT lanes are proposed where other vehicles need to access the lanes to make turns or for entering or exiting parking spaces. Shared lanes would be either next to the curb or the curbside parking lanes. The configuration is referred to as side running. An example of a shared BRT lane is shown in Figure 2.2-8. Use of the lanes by through traffic is restricted. Cross traffic would be allowed to cross shared BRT lanes between signalized intersections. Shared BRT lanes would be implemented on one-way arterials and roadways with limited opportunities for median BRT improvements

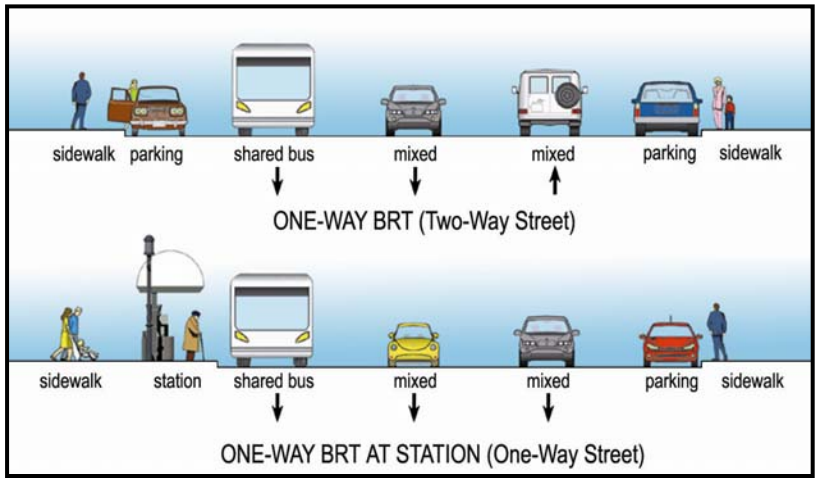


Figure 2.2-8: Roadway Cross Section with Shared BRT Lane, Side Running

Mixed-Flow Traffic Lanes

Mixed-flow lanes for BRT operations are proposed in areas where dedicated or shared lanes are not feasible. These locations include very high traffic bus-auto zones and narrow, capacity-constrained streets where local auto access must be maintained. Figures 2.2-9 (Alternatives 1 and 3) and 2.2-10 (Alternatives 2 and 4) are graphical summaries of the transitway alignments for the Build Alternatives and depict the type of transitway to be implemented along each segment of the East Bay BRT Project.

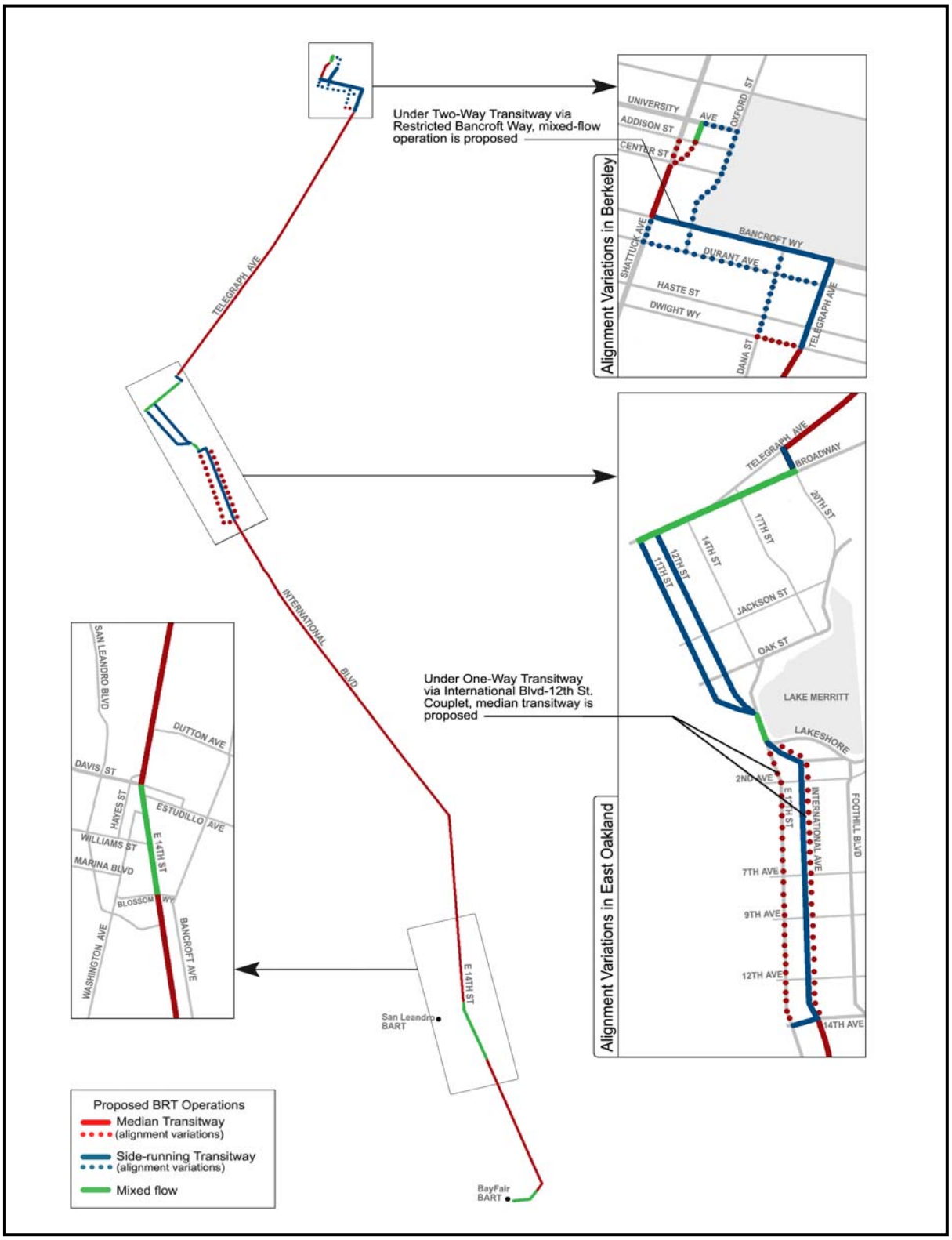


Figure 2.2-9: Alignment Type/BRT Operations for Alternatives 1 and 3 (BayFair BART)

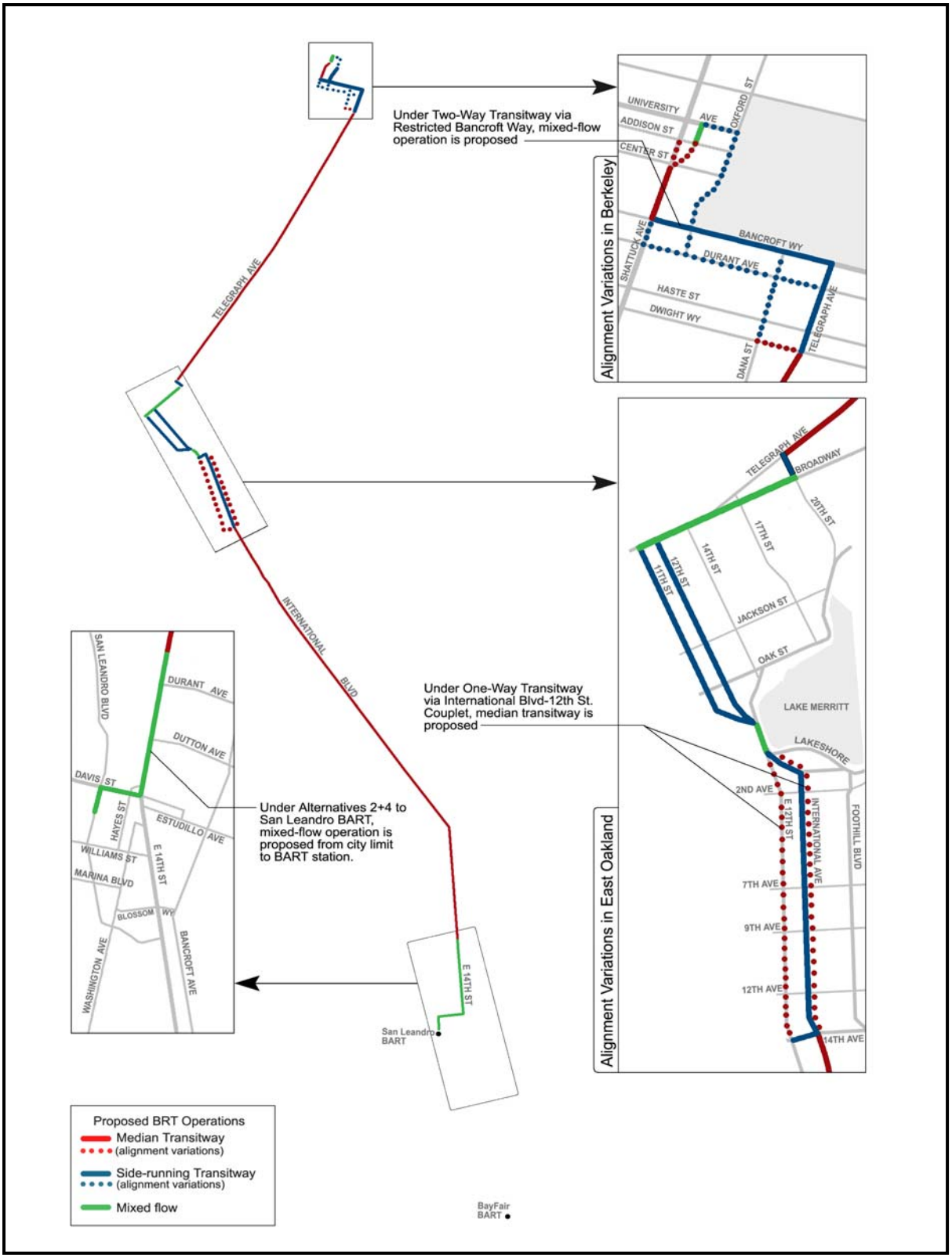


Figure 2.2-10: Alignment Type/BRT Operations for Alternatives 2 and 4 (San Leandro BART)

The majority of the East Bay BRT Project alignment, whether continuing to BayFair or San Leandro BART, would be constructed as **BRT-only lanes** in the roadway median (shown in red in Figures 2.2-9 and 2.2-10). The main streets in which a median bus-only transitway is proposed include:

- Shattuck Avenue (Addison Street to Bancroft Way/Durant Avenue in Berkeley);
- Telegraph Avenue (Dwight Way in south Berkeley to 20th Street in north Oakland); and
- International Boulevard (14th Avenue to Bristol Boulevard at the Oakland-San Leandro city limit).

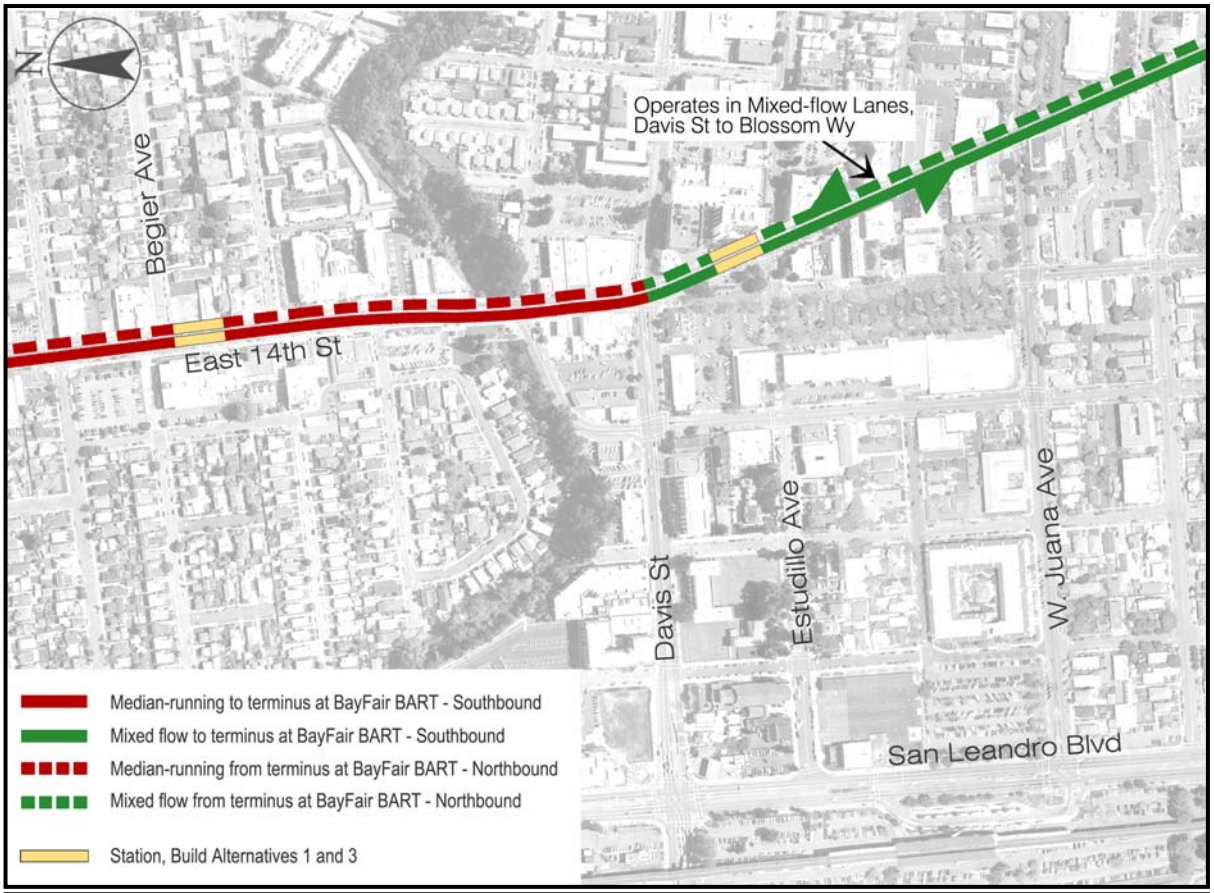
For Build Alternatives terminating at BayFair BART (Alternatives 1 and 3), the median transitway would continue through San Leandro along East 14th Street to Davis Street, be dropped through downtown, and then resume from Blossom Way to BayFair Drive at Bayfair Center where the alignment turns west and follows BayFair Drive and the BART access roadways to the BayFair Station. This is shown in Figure 2.2-11.

For Build Alternatives terminating at San Leandro BART (Alternatives 2 and 4), the median transitway would end at Bristol Avenue. The alignment is shown in Figure 2.2-12.

Shared or side-running BRT lanes (shown in blue) are proposed along several roadway segments in Downtown Berkeley and Berkeley Southside; along 20th Street (Thomas Berkley Way) through the Uptown Transit Center between Telegraph Avenue and Broadway in Downtown Oakland; along 11th and 12th Streets between Broadway and Lake Merritt in Downtown Oakland; and along International Boulevard between East 1st and East 14th Avenues in East Oakland. The configuration of shared transitways in Downtown Berkeley, Berkeley Southside, and East Oakland depends upon the specific alignment variation for the East Bay BRT Project in these locations. The configuration is independent of the Build Alternative selected. Alignment variations, including transitway type and BRT operations, are described in more detail in Section 2.2-3.

Mixed-flow lanes are proposed in limited locations (shown in green). Under each of the Build Alternatives, BRT buses would share mixed-flow lanes with autos and other buses along Broadway between 20th Street and 11th Street through Downtown Oakland with one exception. Between 19th and 20th Streets, a northbound bus-only left turn lane would be striped to allow buses uncongested access to the Uptown Transit Center on 20th Street. In the vicinity of Lake Merritt, BRT buses would also operate in mixed-flow lanes along a newly constructed 12th Street crossing of the Lake Merritt dam and estuary (from approximately Oak Street to and including 1st Avenue).

Other locations where mixed-flow operations are proposed depend upon the Build Alternatives or its alignment variation. Alt 1: Separate BRT and Local Service to BayFair BART and Alt 3: Combined BRT and Local Service to BayFair BART would operate in mixed-flow lanes through Downtown San Leandro, between approximately Davis Street and Blossom Way, due to the limited street right-of-way. This is shown in Figure 2.2-11. BRT buses would also operate in mixed-flow lanes when entering or leaving the BayFair BART Station. Alt 2: Separate BRT and Local Service to San Leandro BART and Alt 4: Combined BRT and Local Service to San Leandro BART also propose BRT operations in mixed-flow lanes, beginning at the Oakland-San Leandro city limit and continuing to the end of line station at San Leandro BART. This configuration is shown in Figure 2.2-12.

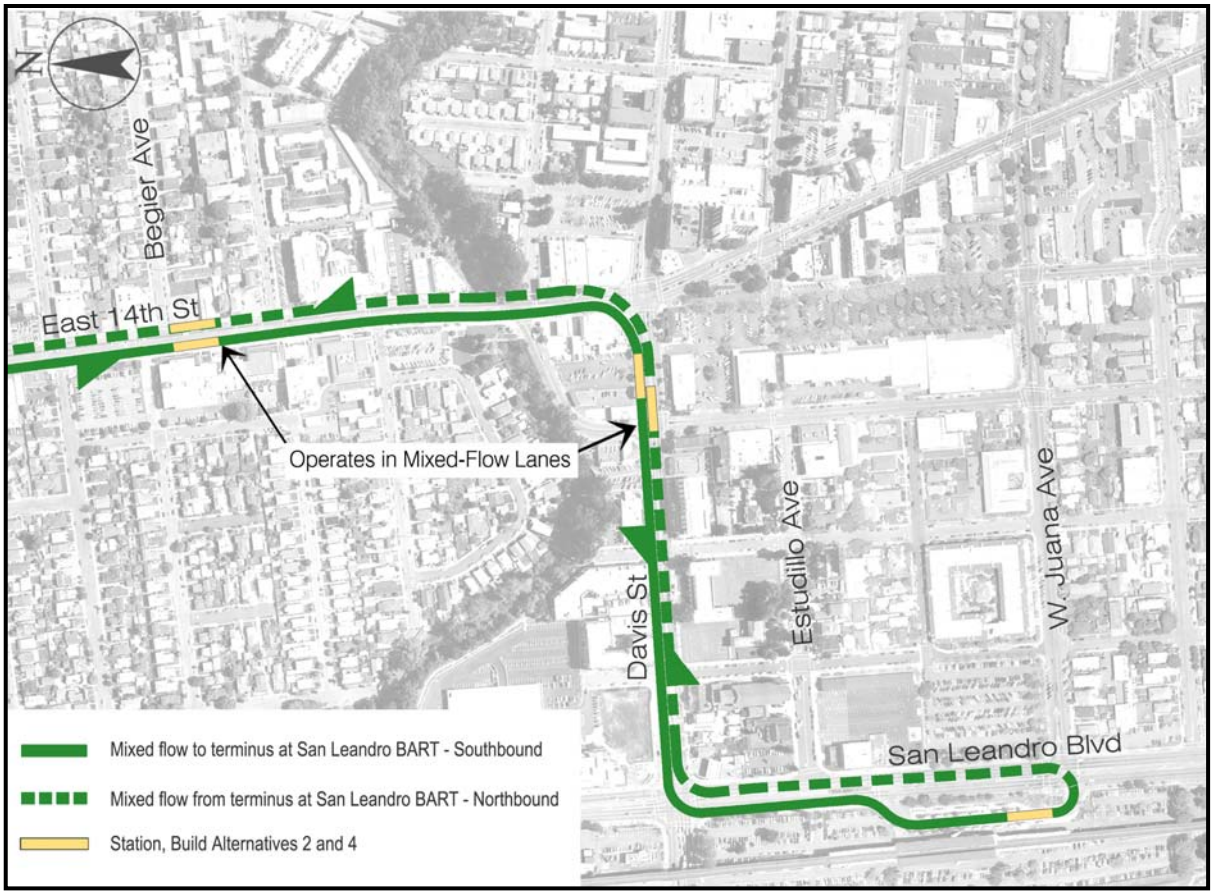


Alt 1: Separate BRT and Local Service to BayFair BART and Alt 3: Combined BRT and Local Service to BayFair BART would operate in the median of East 14th Street from the Oakland city limit to Davis Street and then in mixed-flow lanes through downtown.

Figure 2.2-11: BRT Service through Downtown San Leandro, Alternatives 1 and 3

Finally, depending upon the alignment variation, limited mixed-flow operations are under consideration along certain roadways in Downtown Berkeley, Berkeley Southside, and in East Oakland. Section 2.2-3 provides additional information on mixed-flow options at these locations.

BRT buses would transition between the different transitway types at signalized intersection where the movements of both buses and autos are controlled. In certain locations, BRT buses would be provided approximately a one-block-long transition area to move from median to side running or the reverse. BRT buses would be provided priority treatments, including a special signal phase and short transition lane, termed queue jumps, where appropriate to ensure traffic safety by separating conflicting bus and auto movements.



Alt 2: Separate BRT and Local Service to San Leandro BART and Alt 4: Combined BRT and Local Service to San Leandro BART would operate two-way in mixed-flow from the Oakland-San Leandro city limit to San Leandro BART along East 14th Street, Davis Street, and San Leandro Boulevard.

Figure 2.2-12: BRT Service to San Leandro BART, Alternatives 2 and 4

At the conclusion of the environmental process, in conjunction with identifying the preferred alignment variation in each area, and the overall project alignment, the preferred transitway types would also be identified.

Bicycle Lanes

Existing bicycle lanes would be retained throughout the project corridor except through signalized intersections and station areas. Impacts to bicycle travel are discussed in Section 3.3, Non-Motorized Traffic, in Chapter 3.

2. BRT Stations

For passengers, BRT stations would be the most recognizable feature of the East Bay BRT Project. They are the points of access to and egress from BRT service. Stations would be designed to provide passenger platforms 8- to 10-feet wide and typically 60-feet long, raised a minimum of 10 inches above the top of roadway pavement. Platforms would be at or slightly lower than the floor level of

BRT buses, allowing fast and convenient passenger loading and unloading. Buses would pull into the station for boarding and alighting through right-side doorways. The distance between the bus doorway and platform edge would be minimized to avoid any safety concerns of a large gap. Buses would include a ramp at the right front door, which could be extended to provide a continuous surface between the bus floor and platform for individuals with limited mobility and/or wheelchairs. All station elements would be ADA-compliant (i.e., conform to design standards established by the Americans with Disabilities Act of 1990 [“ADA”], as amended). [3]

The typical BRT operational configuration is to have only one bus picking up or dropping off passengers at a station at any time. In certain locations, where local buses could also stop to pick up and drop off passengers, stations would be extended to 120 feet to accommodate two buses simultaneously.

BRT stations would provide a high level of amenities and provide convenient, safe and secure areas for system users. All stations would include the following features:

- Raised platforms with lighting.
- Ticket vending machines and ticket validators, a minimum of one at each station platform. Passengers would be able to buy fare cards using cash and credit/debit or smart cards (see Section 2.2.2.3, Fare Collection).
- Passenger information kiosks featuring (a) active data displays and ADA-compliant audio capability for announcing information such as actual bus-arrival times, and (b) display space for maps, schedules, and other passenger information.
- Windscreens and framed canopy shelters with benches for the comfort of waiting passengers. Canopy shelters would be well lit and open to view from the street. Example canopy shelters and other station features are shown in Section 4.6, Visual/Aesthetics.
- ADA-compliant routes of access and egress from the street crosswalk or sidewalk.
- Emergency telephones/intercoms at all major transfer stations.
- Tactile warning bands along platform edges. The bands would be of contrasting color and include detectable materials to indicate to passengers that they are at or approaching the station platform edge, which would be raised at least 10 inches above street level.[4] The bands are similar to those incorporated into rail platforms and would be ADA compliant.

A representative schematic of a BRT station, showing a top-down and side view of features, is shown in Figure 2.2-13. A photosimulation of a station with opposite side platforms is shown in Figure 2.2-14.

[3] Americans with Disabilities Act, Public Law 336 of the 101st Congress, was enacted July 26, 1990. The ADA prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, state and local government services, public accommodations, commercial facilities, and transportation.

[4] Top of platform would be at or just below bus floor height at doorways (approximately 13.5 inches on the Van Hool articulated bus), allowing essentially level boarding and alighting.

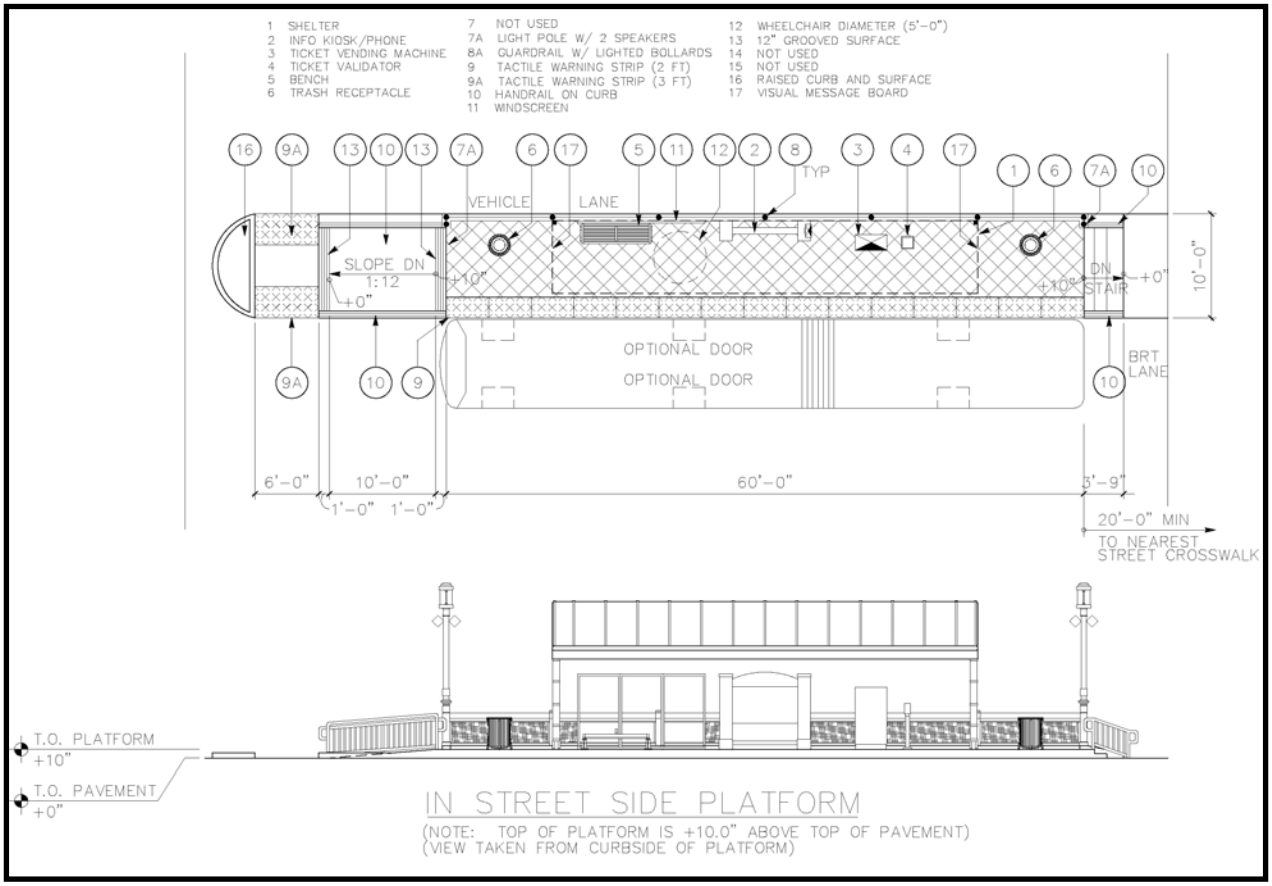


Figure 2.2-13: Schematic of Typical BRT Station (Street Median)

Figure 2.2-14: Perspective of Station in Street Median, Opposite Side Platforms

Station Placement

BRT stations would be constructed either in the street median or along the outside curb—the latter designated "curbside" stations. Median stations would serve transitways constructed in the middle of the street and would therefore not be affected by curb and sidewalk activities (e.g., parking maneuvers and pedestrian traffic).

The typical design width for median stations is 10 feet. Passenger access ramps would connect the platforms to pedestrian crosswalks at nearby intersections, sloping no more than 8 percent in conformance with the design requirements of ADA for the mobility impaired. A median station would have two platforms, one serving each direction of travel. All stations would be on the right side of the transitway for right-side vehicle boarding. Figure 2.2-14 is an example of a median station.

Curbside stations would be integrated into existing facilities, such as sidewalks and pedestrian plazas, and platforms would extend into the street to serve BRT buses operating in the outside, or curbside, travel lane. Stations would typically be eight feet wide (that is, extend out from the curb eight feet) and also a minimum of 10 inches above the top of the street pavement at the platform's edge. Where space allows, bike lockers and landscaping could be added.

Depending upon the Build Alternatives, the number of stations would vary, from 31 for Alt 2: Separate BRT and Local Service to San Leandro BART to 51 for Alt 3: Combined BRT and Local Service to BayFair BART. The general locations of BRT stations for each of the Build Alternatives are shown in Figures 2.2-3 through 2.2-6.

A station would normally include both southbound and northbound platforms. Southbound is defined as BRT service proceeding from Berkeley to Oakland to San Leandro; northbound is defined as BRT service proceeding from San Leandro to Oakland to Berkeley. (At times, the streets on which the BRT buses would operate will be oriented in other directions but the general alignment of the project corridor is north-south.)

3. Simplified Fare Collection

The proposed East Bay BRT fare system would be barrier-free self-service, proof-of-payment fare collection. Passengers would be responsible for having a valid fare—validated ticket, pass, or fare receipt—prior to boarding a vehicle and be subject to random checks that their fares are valid. Passengers riding the system without proof-of-payment would be subject to fines. As noted above, all BRT stations would have ticket vending machines so that passengers could pay their fares in advance of the bus arriving, thereby speeding up passenger boarding. Passengers could board buses using other prepaid fare media (for example passes, prepaid tickets sold at outlets, and also TransLink, the debit card system being implemented for use on all major San Francisco Bay Area transit systems). Single ride fares, including tickets, would require a receipt validated at the boarding station showing date and time of initial use. Ticket validating machines would be provided alongside ticket vending machines for this purpose. Under self service fare collection, passengers could use any door to board buses, which would greatly reduce bus idling time at bus stops during fare collection.

4. Intelligent Transportation Systems (Passenger Information; Signal Priority)

The East Bay BRT Project would include technologically advanced passenger information and traffic control features, referred to as intelligent transportation systems (ITS). These systems will be included with Rapid Bus Route 1R under the No-Build Alternative and would be enhanced under each of the Build Alternatives, where practicable. There are two primary elements of ITS:

- Real-time bus arrival information, which is displayed (and announced) at stations as well as available on the internet, and
- Transit signal priority for buses at traffic signals along the alignment with real-time adjustments to maintain even spacing between buses.

Real-time bus arrival information is based on the current progress of the bus along the route rather than scheduled arrival time. Under the Build Alternatives, with BRT buses operating mainly in dedicated lanes, the reliability of service—and predictability of bus arrival times—would be enhanced. Compared to the No-Build Alternatives, passenger information would become more accurate and, as appropriate, more detailed, and would possibly include transfer options, advisories, and other information.

Traffic signal priority means that the traffic signals are (1) timed to the average speed of the bus; this serves to lessen the number of traffic signal stops a bus makes on its route; and (2) where traffic signal conflicts exist, the bus transmits a signal to the traffic light controller that modifies, when feasible given certain traffic signal operational parameters, the signal aspect to provide green time for the bus to proceed without substantial delay. This is done by extending the "green phase" available for an approaching bus, beginning the green phase earlier for an approaching bus, or inserting into the signal cycle a special phase that facilitates bus movement through an intersection. East Bay BRT service under all Build Alternatives would be provided a higher level of traffic signal priority than Rapid Bus Route 1R service under the No-Build Alternative. This is possible because BRT vehicle locations and travel times would be more reliable.[5] Improved priority through traffic signals can be offered without degrading conditions for other vehicles.

5. Low-Floor BRT Buses

Initially, AC Transit would deploy on East Bay BRT service the same or similar buses as assigned to Rapid Bus Route 1R. The standard Route 1R and BRT vehicle would be a low-floor, 60-foot articulated bus similar to AC Transit's current articulated Van Hool coach, shown in Figure 2.2-15. An articulated bus has two body segments connected by a rotating joint in a flexible accordion-fold frame, which allows the bus to turn easily at street intersections. Standard 40-foot low-floor buses

[5] A higher level of progression is possible with minimum additional traffic impacts because dedicated transitways result in more consistent travel times between intersections. Traffic signals can be timed to accommodate predictable travel. Also, the frequent signal phasing disruptions required to provide priority for random bus arrivals at intersections, which is the case with transit operations in congested mixed-flow traffic lanes, can be reduced.

could also be used for BRT service, if necessary. The current Van Hool articulated bus uses clean diesel technology.[6]

Figure 2.2-15: Articulated Van Hool Bus (BRT Prototype)

The low-floor bus is well suited to fast, convenient boarding and alighting. Low-level boarding and alighting, combined with off-vehicle fare payment, would result in a shorter average bus dwell time for boarding and alighting passengers compared to Rapid Bus service. Shorter dwell times reduce bus travel times and improve operating efficiency.

AC Transit continues to evaluate buses using alternative fuels, ranging from gas-electric hybrids to hydrogen-fuel cell powered buses. In the future, it is possible that articulated, alternative fuel buses with improved fuel economy would be available to operate on East Bay BRT service. In any case, AC Transit is committed to procuring new diesel buses with low emissions that meet the California Air Resources Board exhaust standards for heavy duty urban bus engines and the Fleet rule for Transit Agencies, Urban Bus Requirements, which has established stringent exhaust emission standards.[7] Recent and proposed AC Transit bus procurements meet these standards.

6. Ability to Convert to LRT

The BRT transitway and stations would be designed for future conversion to LRT service. Placement and configuration of BRT facilities would be consistent with requirements for upgrading the BRT transitway to an LRT guideway and extending the low-platform BRT stations to serve up to two low-floor light rail vehicles. No timeline or program for such a conversion has been established.

2.2.2.4 FAILURE OPERATIONS (SERVICE INTERRUPTIONS AND BREAKDOWNS)

When in revenue service, BRT buses would normally operate only in their designated lanes. As is standard for mixed traffic, buses would operate on the right side of a bidirectional median transitway or next to the rightside parking lane or curb when in a one-way side-running transitway. Buses

[6] Clean diesel engines equipped with a particulate matter (PM) trap and ultra-low sulfur diesel fuel produces less PM emissions than Compressed Natural Gas (CNG) powered alternatives. In 2002, a California Air Resources Board study found that a clean diesel bus equipped with the latest technology outperformed a natural gas bus in eight of 11 emissions tests. Clean diesel is also more cost-efficient for reducing emissions. Clean diesel buses are 20 to 25 percent less expensive and do not require the costly fueling infrastructure and maintenance necessary for CNG fleets. Source: http://www.dieselforum.org/california-corner/clean-diesel-and-natural-gas-regulation/

[7] Title 13, California Code of Regulations, sections 1956.1, 2020, 2023, 2023.1 & 2023.4. The Rule was adopted February 2000 and regulates agency reporting and vehicle emissions requirements. The latter include baselines for maximum emissions of nitrous oxides and particulate matter and future year reductions through 2009. Also, since January 1, 2002, transit agencies have been required to use ultra low sulfur diesel.

normally would not pass. However, in the event of a breakdown in operations, for example a bus blocking the normally used BRT lane, other buses could pass the blockage by moving to the transitway lane or traffic lane to the left, as long as there was no oncoming bus (median transitway) or other conflicting traffic. Buses in a median transitway could also leave the transitway and move to the rightside adjacent mixed traffic lane in order to bypass an obstacle. A bus stalled in the station could be bypassed similarly, although passenger boarding and alighting would be allowed only at stations or designated curb stops where rightside access would be safe. This flexibility in at-grade (in street) BRT service would be one of its advantages compared to rail or other vehicles confined to fixed track or restricted guideways. All failure operating procedures for East Bay BRT service would be incorporated in a bus operations plan and operator rules would be established by AC Transit.

2.2.3 Build Alternatives: Alignment Variations

Several alignment variations for the Build Alternatives are under consideration in the downtown area of Berkeley, Berkeley Southside, and in East Oakland through the Eastlake District. These areas are highlighted in Figure 2.2-16. The alignment variations are under consideration for all Build Alternatives—the proposed project terminus in San Leandro and the operating plan would not affect the feasibility of any variation. The variations would not markedly affect the capital cost, operating cost, or the potential ridership of any Build Alternative. As described in Chapters 3 and 4, alignment variations would not substantially influence environmental impacts except for parking displacements and, to a limited extent, roadway and intersection operations. Alignment variations could, however, be important considerations in city decisions about the types and locations of development, including transit-oriented development, that are desired. They could also be important for planning local access, circulation, and parking.

In Downtown Berkeley and Berkeley Southside, the most feasible alignment variation for one area could depend on the variation selected in an adjacent area. Otherwise, it is possible to select any combination of variations in Berkeley and East Oakland.

For the purposes of this discussion, the overall East Bay BRT Project Alignment has been divided into the eight segments shown in Figure 2.2-16, and defined below:

1. **Downtown Berkeley**: from University Avenue to Bancroft Way/Durant Avenue;
2. **Berkeley Southside**: from Oxford/Fulton Street to Telegraph Avenue/Dwight Way;
3. **Berkeley—North Telegraph Avenue**: from Telegraph Avenue/Dwight Way to the Berkeley/Oakland city limit;
4. **North Oakland/Downtown Oakland**: from Berkeley/Oakland city limit at about Woolsey Street to 14th Street/Broadway;
5. **Downtown Oakland**: from 14th Street/Broadway to 1st Avenue;
6. **Oakland—EastLake District**: from 1st Avenue to 14th Avenue;
7. **East Oakland**: from 14th Avenue to Oakland/San Leandro city limit;
8. **San Leandro**: from Oakland/San Leandro city limit to BayFair BART or San Leandro

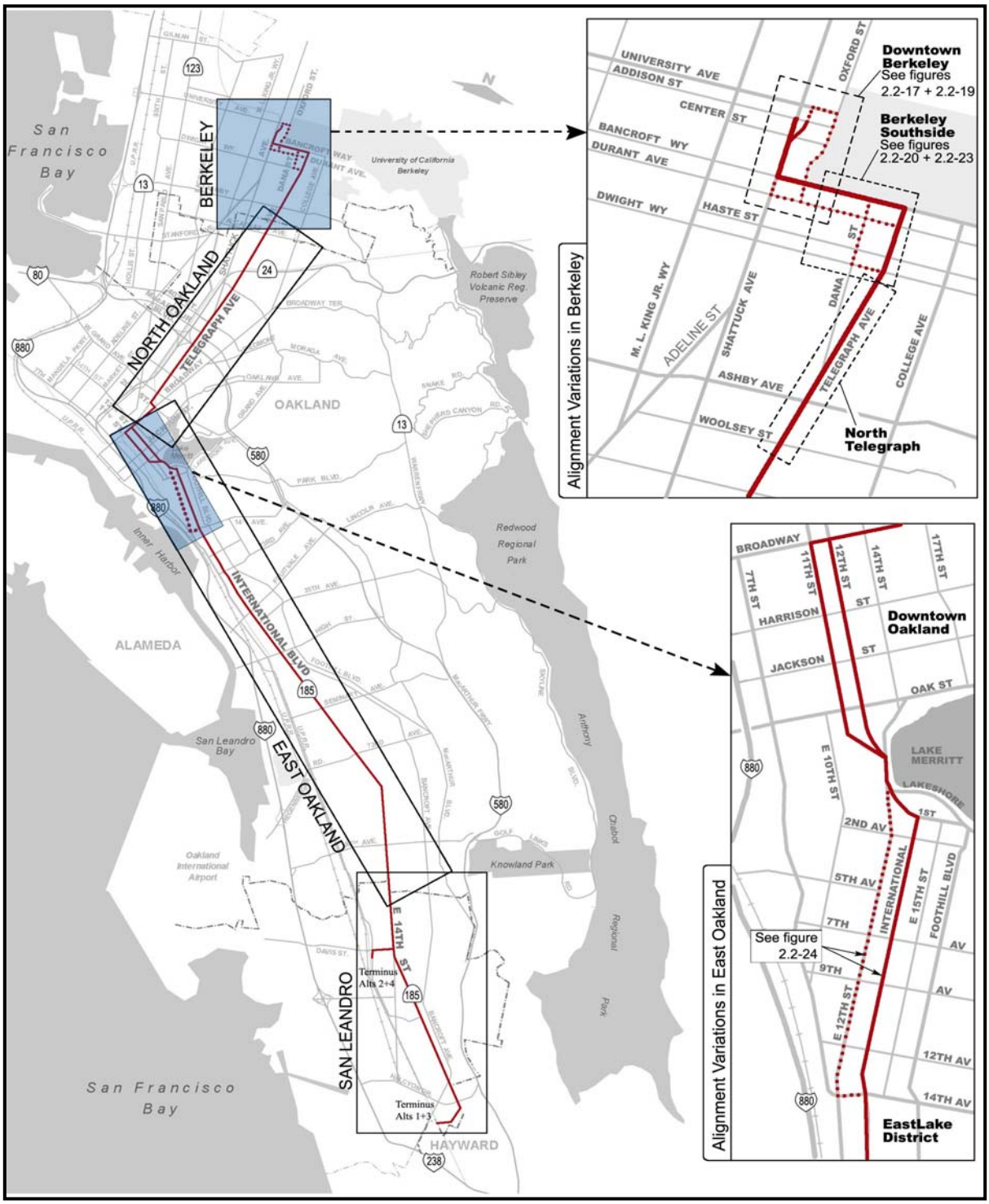


Figure 2.2-16: East Bay BRT Project BRT Alignment and Alignment Variations

The following sections describe the East Bay BRT Project alignment variations under consideration. In segments where only one alignment is proposed, the discussion provides detail on the configuration of the transitway and stations and highlights types of impacts that are addressed in Chapters 3 and 4.

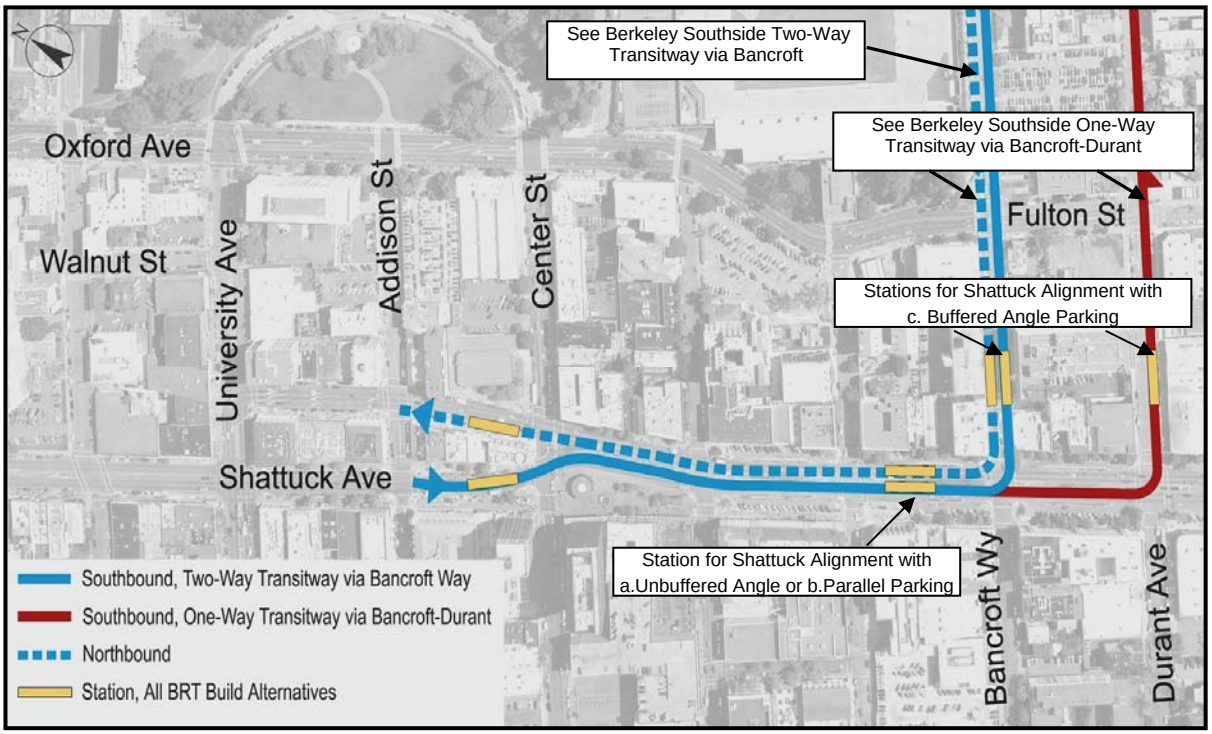
2.2.3.1 DOWNTOWN BERKELEY SEGMENT: UNIVERSITY AVENUE TO BANCROFT WAY/DURANT AVENUE

This northernmost segment of the East Bay BRT Project runs just west of the UC Berkeley campus and provides access to the Downtown Berkeley BART Station and the UC Berkeley campus. Two alignment variations are under consideration for Downtown Berkeley:

- Two-Way Transitway via Shattuck Avenue, and
- One-Way Transitway via Shattuck Avenue-Oxford Street Loop—running northbound on Shattuck Avenue and southbound on Oxford Street.

Two-Way Transitway via Shattuck Avenue

This alignment variation, as shown in Figure 2.2-17, would construct southbound and northbound BRT lanes in the median of Shattuck Avenue. The southbound lane would begin at Addison



The *Two-Way Transitway via Shattuck Avenue* variation operates in a two-way transitway along the median of Shattuck Avenue between Addison Street and Bancroft Way. The alignment would continue to Berkeley's Southside along either the *Two-Way Transitway via Bancroft Way* variation or the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* variation.

Figure 2.2-17: Downtown Berkeley Alignment Variations: Two-Way Transitway via Shattuck Avenue

Street/Shattuck Avenue and continue south along Shattuck Avenue to either Bancroft Way or Durant Avenue, depending on which alignment variation was selected for the Berkeley Southside segment of the corridor: the *Two-Way Transitway via Bancroft Way* variation or the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* variation (See description in Section 2.2.3.2). If the *Two-Way Transitway via Bancroft Way* variation was selected, then the southbound buses would turn east onto Bancroft Way. If the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* variation was selected, then southbound buses would turn east onto Durant Avenue.

Street Parking Configurations in Downtown Berkeley

Parking configurations under the East Bay BRT Project would follow existing configurations except in Downtown Berkeley. There would be three possible parking and median configurations on Shattuck Avenue between Allston Way and Durant Avenue:

a. ***Unbuffered Angle Parking***—Under this configuration, parking would be angled along the outside curb as currently exists on Shattuck Avenue. However, no traffic island would separate parked vehicles from the travel lanes. The BRT lanes would be separated from mixed-flow traffic lanes by landscaped medians.

b. ***Unbuffered Parallel Parking***—Under this configuration, parking would be parallel along the outside curb with no barrier between parked vehicles and the traffic lane. BRT lanes would be separated from mixed-flow traffic lanes by landscaped medians.

c. ***Buffered Angle Parking***—Under this configuration, parking would be the same as the current parking along Shattuck Avenue—angled along the outside curb and separated from the travel lane by a parking lane and a traffic island. There would be no landscaped medians separating the BRT lanes from the mixed-flow lanes.

These parking/median configurations are shown in Figure 2.2-18, Shattuck Avenue Parking and Median Configurations, for the *Two-Way Transitway via Shattuck Avenue* alignment variation. Section 3.4, Parking, in Chapter 3 discusses in detail the parking impacts (displacements and proposed replacement) of the Shattuck Avenue roadway cross sections and other BRT alignment variations.

The selection of parking configuration and alignment in Berkeley's Southside area would influence the locations of stations. Under the *Two-Way Transitway via Shattuck Avenue* variation, two stations serving both directions of travel are proposed: a terminus between Addison and Center streets, and a stop on either Shattuck Avenue at Bancroft Way or on Bancroft Way (northbound) and Durant Avenue (southbound), the latter for Shattuck Avenue using *Buffered Angle Parking*.

One-Way Transitway via Shattuck Avenue-Oxford Street Loop

This alignment variation would form a transitway along a one-way-loop, proceeding westbound on Bancroft Way, northbound on Shattuck Avenue, eastbound on University Avenue, and southbound on Oxford Street. The *One-Way Transitway via Shattuck Avenue-Oxford Street Loop* variation would be aligned as follows:

- **Bancroft Way**—One existing traffic lane on the north side between Oxford Street and Shattuck Avenue would be converted to a westbound BRT-only lane.
- **Shattuck Avenue**—A northbound BRT-only lane would be constructed in the median of Shattuck Avenue from Bancroft Way to Center Street. At Center Street, the BRT-only lane would shift to the east leg of Shattuck Avenue, which forms a one-way northbound-southbound couplet around Shattuck Square, and would continue as a BRT-only lane as far as Addison Street. BRT buses would travel on mixed-traffic lanes from Addison Street to University Avenue.

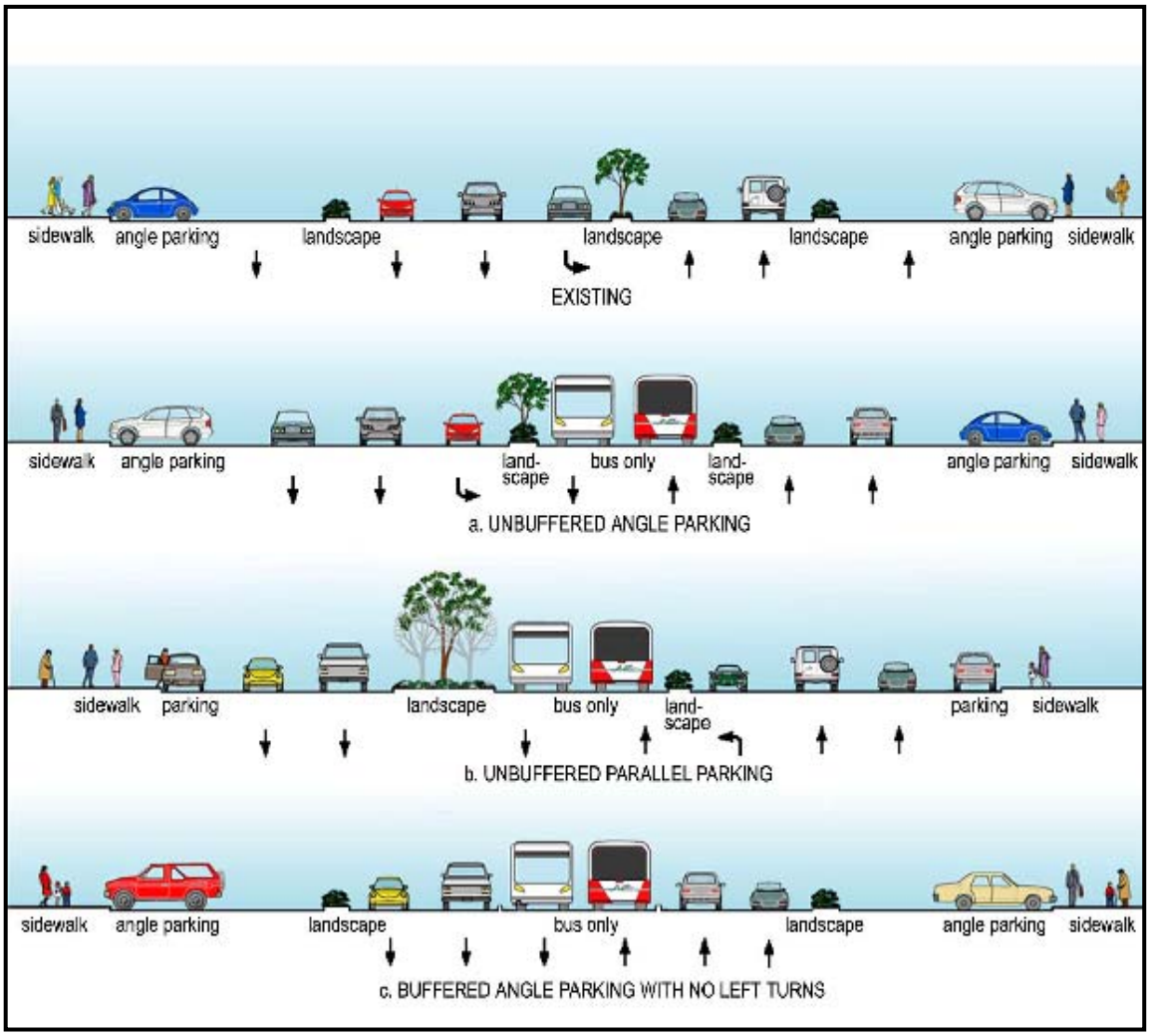
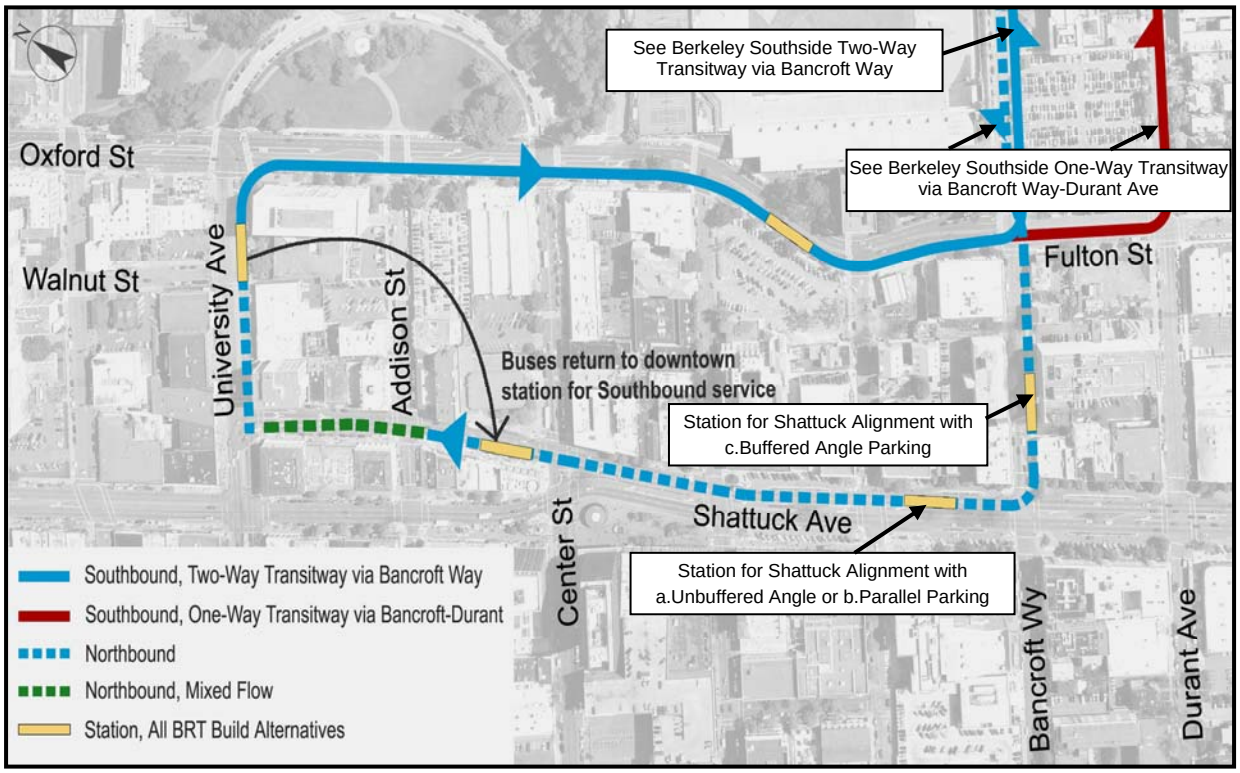


Figure 2.2-18: Shattuck Avenue Parking and Median Configurations

- **University Avenue**—Buses would continue eastbound in the eastbound mixed-traffic lane from Shattuck Avenue for one block to Walnut Street, where they would enter a BRT-only, right-turn lane on the south side of University Avenue that would continue to Oxford Street.
- **Oxford Street**—Buses would travel southbound in a BRT-only lane running on the west side of Oxford Street to complete the BRT loop at Bancroft Way.

The *One-Way Transitway via Shattuck Avenue-Oxford Street Loop* variation is shown in Figure 2.2-19.

The streets used beyond Bancroft Way would depend on which alignment variation was selected for service through Berkeley's Southside. If the *Two-Way Transitway via Bancroft Way* variation was selected then the Oxford Street transitway would turn east onto Bancroft Way. If the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* was selected, then the Oxford Street BRT-only lane would cross the westbound BRT-only lane on Bancroft Way and continue south on Fulton Street to connect to the eastbound BRT-only lane on Durant Avenue.



The *One-Way Transitway via Shattuck Avenue-Oxford Street Loop* variation would connect Downtown Berkeley and Berkeley's Southside via a one-way transit loop along Shattuck Avenue and Oxford Street. Southbound buses would operate on Oxford Street; northbound buses would operate on Shattuck Avenue. The alignment would continue along either the *Two-Way Transitway via Bancroft Way* variation or the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* variation.

Figure 2.2-19: Downtown Berkeley Alignment Variations: One-Way Transitway via Shattuck Avenue-Oxford Street Loop

The proposed stations are as shown in Figure 2.2-19. A station includes a single platform and would serve one direction of bus travel: northbound to downtown or southbound to Berkeley's Southside. The proposed stations on Shattuck Avenue between Center and Addison Streets and on University Avenue would serve buses traveling in both directions. Northbound service would terminate at the

University Avenue station after dropping off passengers at the Downtown Berkeley station. Southbound service would begin at the Downtown Berkeley station by having buses loop back to Shattuck Avenue after leaving the University Avenue station. Southbound buses would stop again at the University station for boarding passengers before turning right and continuing along Oxford Street.

If the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* was selected, then the Oxford Street BRT-only lane would cross the westbound BRT-only lane on Bancroft Way and continue south on Fulton Street

2.2.3.2 BERKELEY SOUTHSIDE SEGMENT: OXFORD/FULTON STREET TO TELEGRAPH AVENUE/DWIGHT WAY

Four BRT alignment variations are under consideration through the Berkeley Southside area. They would connect Downtown Berkeley to Telegraph Avenue south of the UC Berkeley campus:

- *Two-Way Transitway via Bancroft Way and Telegraph Avenue*;
- *Two-Way Transitway via Bancroft Way* and *One-Way Transitway via Telegraph Avenue-Dana Street Couplet;*
- *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* and *Two-Way Transitway via Telegraph Avenue*; and
- *One-Way Transitway via Bancroft Way-Durant Avenue* and *Telegraph Avenue-Dana Street Couplets.*

Two-Way Transitway via Bancroft Way and Telegraph Avenue,

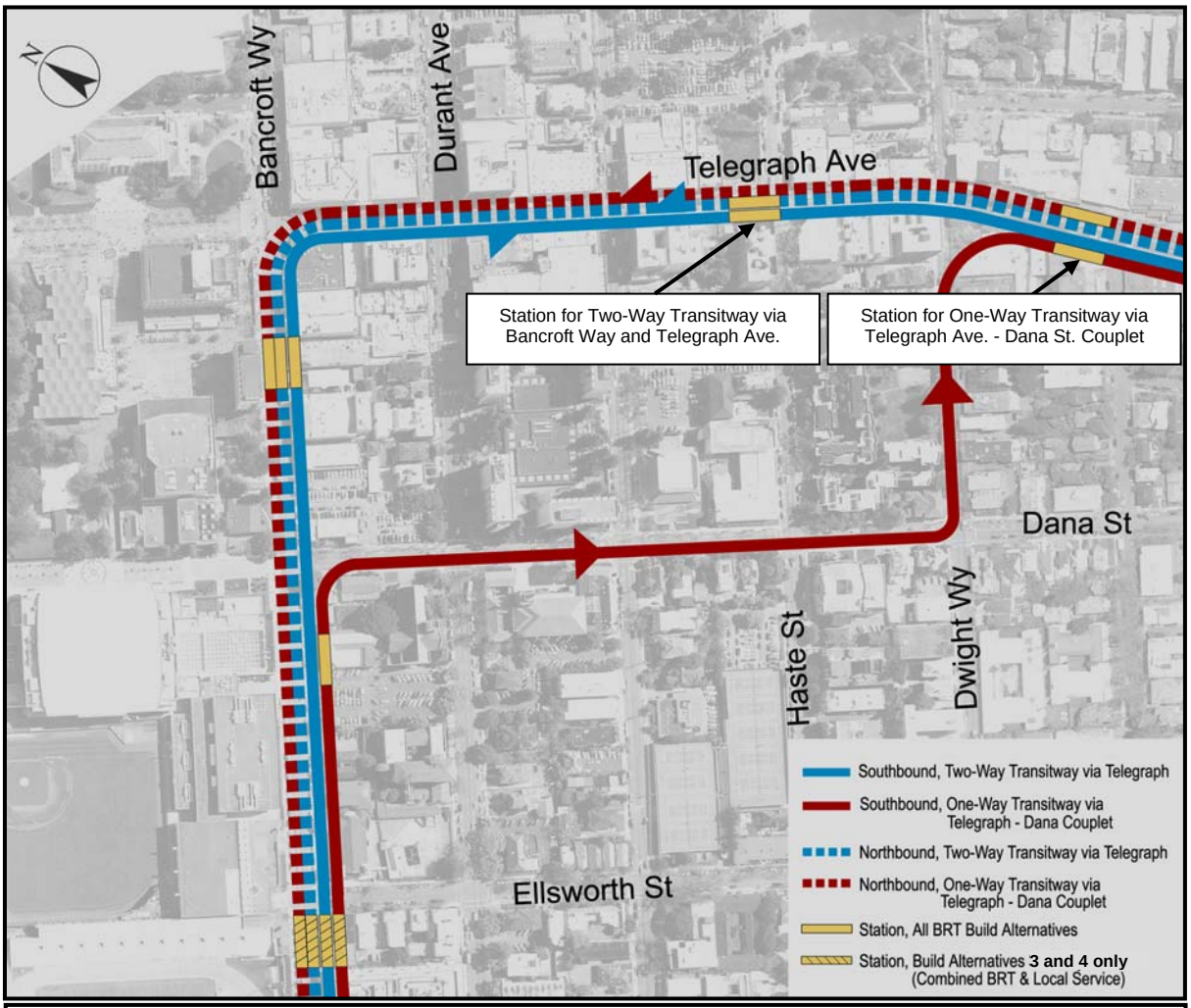
Under this alignment variation, BRT service would be operated on a two-way transitway along Bancroft Way and Telegraph Avenue. The alignment variation is shown in blue in Figure 2.2-20.

Along Bancroft Way from Telegraph Avenue to Shattuck Avenue, buses would operate either in a dedicated transitway or in mixed traffic lanes. Along Telegraph Avenue from Bancroft Way to Haste Street, buses would operate in a transit/pedestrian zone, discussed below. This segment is currently two lanes for one-way northbound traffic only. It would be converted to two-way, transit only.

Transit/Pedestrian Zone on Telegraph Avenue

The two-way transitway would be an integral element of the transit/pedestrian zone proposed under the *Two-Way Telegraph Avenue* alignment variations. The existing Telegraph Avenue cross section, from Bancroft Way to Dwight Way, offers space for two travel lanes. Currently the lanes are one-way mixed-flow traffic lanes. The *Two-Way Telegraph Avenue* alignment variations would preclude northbound traffic from proceeding past Haste Street; autos would be required to turn left at this point. (Vehicles intending to proceed east of Telegraph Avenue would be required to turn right at Dwight Way.) The northbound lane of Telegraph Avenue from just south of Dwight Way to Haste Street would be designated mixed flow. Autos proceeding through on northbound Telegraph Avenue past Dwight Way would be allowed to use the BRT lane to transition for a required left turn at Haste Street. From Haste Street to Bancroft Way, only buses, delivery, and emergency vehicles would be allowed to use the roadway. Restricting auto access would facilitate transit access through an otherwise congested and slow-moving section of roadway.

This section of Telegraph Avenue is noted for its lively pedestrian activity. Street merchants line the sidewalks on most days. Street festivals that close the street to vehicular traffic are frequent throughout the year (in an instance such as this, BRT buses would be rerouted to other streets). Restricting through auto traffic and facilitating transit access would make the area more attractive and safer for pedestrians.



The *Two-Way Transitway via Bancroft Way* variations would operate along Bancroft Way, which would connect to either the *Two-Way Transitway via Telegraph Avenue* variation or the *One-Way Transitway via Telegraph Avenue-Dana Street Couplet* variation (a couplet of Telegraph Avenue and Dana Street). Under the *One-Way Transitway via Telegraph Avenue-Dana Street Couplet* variation, southbound buses would follow Bancroft Way to Dana Street to Dwight Way to Telegraph Avenue and northbound buses would follow Telegraph Avenue and Bancroft Way.

Figure 2.2-20: Berkeley Southside Alignment Variations: Two-Way Transitway via Bancroft Way Variations

Figure 2.2-21 is a schematic cross section of the transit/pedestrian zone. The restrictions on through auto traffic between Bancroft Way and Haste Street would be removed during evening, late night, and early morning hours. After approximately 7:00 p.m. and until 7:00 a.m. auto traffic would be allowed to share the BRT transitway in the northbound direction as is currently allowed. Traffic volumes and congestion are substantially lower during these periods and not anticipated to adversely affect transit operations and pedestrian movements.

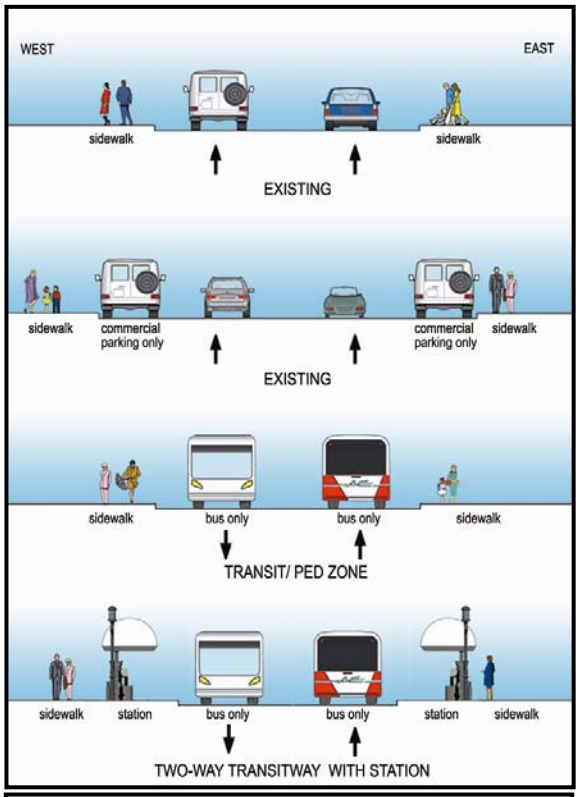


Figure 2.2-21: Telegraph Avenue Transit/Pedestrian Zone Cross Section

Two-Way Transitway via Bancroft Way and One-Way Transitway via Telegraph Avenue-Dana Street Couplet

Under this alignment variation (shown in red in Figure 2.2-20), BRT service on Bancroft Way would be bidirectional, but only to Dana Street, where it would split. Along Bancroft Way, buses would operate either in a dedicated transitway or on mixed-flow lanes. Southbound buses would turn south onto Dana Street, then east onto Dwight Way, then south onto Telegraph Avenue to serve south Berkeley and Oakland. Northbound buses from south Berkeley would proceed one way along Telegraph Avenue from Dwight Way to Bancroft Way, turn west and continue one-way to Dana Street where two-way service to and from Downtown Berkeley would resume.

Auto Restrictions on Bancroft Way

The basic configuration for Bancroft Way under the *Two-Way Transitway via Bancroft Way and Telegraph Avenue* variation and the *Two-Way Transitway via Bancroft Way and One-Way Transitway via Telegraph Avenue-Dana Street Couplet* variation would separate the BRT transitway from mixed-flow traffic lanes. BRT buses would operate in dedicated lanes along the north side of the street and autos and any trucks would operate in general purpose lanes on the south side of the street. Auto traffic would be one-way westbound.

As an optional treatment of Bancroft Way, AC Transit would consider conversion of Bancroft Way to two-way mixed-flow operation for both buses and autos, with a restriction on through movements of autos at the Bancroft Way and Telegraph Avenue intersection. This street reconfiguration, designated the Restricted Bancroft Way option, responds to a design proposal of the Berkeley Transportation Commission. The design at the Bancroft Way and Telegraph Avenue intersection is shown in Figure 2.2-22 (dedicated transit lanes are shown in orange; station platforms in blue; lane striping by black lines).

Cul-de-sacs on Bancroft Way on each side of its intersection with Telegraph Avenue would prohibit all traffic but buses, delivery, and emergency vehicles from continuing through on Bancroft Way past Telegraph Avenue, either in the eastbound or westbound directions. BRT buses would operate in mixed-flow lanes when outside the auto-restricted intersection of Bancroft Way at Telegraph Avenue. This variation would enhance the pedestrian environment and reduce the parking impacts of a two-way dedicated transitway on Bancroft Way. It would, however, limit local circulation by autos and trucks and require, under the *Telegraph Avenue-Dana Street Couplet* variation, that the block of Telegraph Avenue between Bancroft Way and Durant Street be closed to mixed traffic.

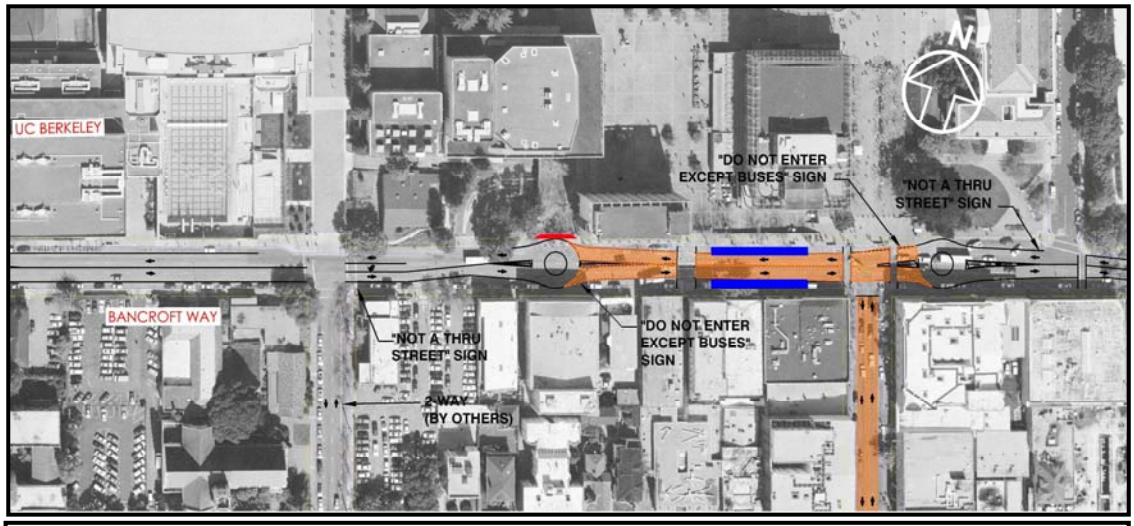
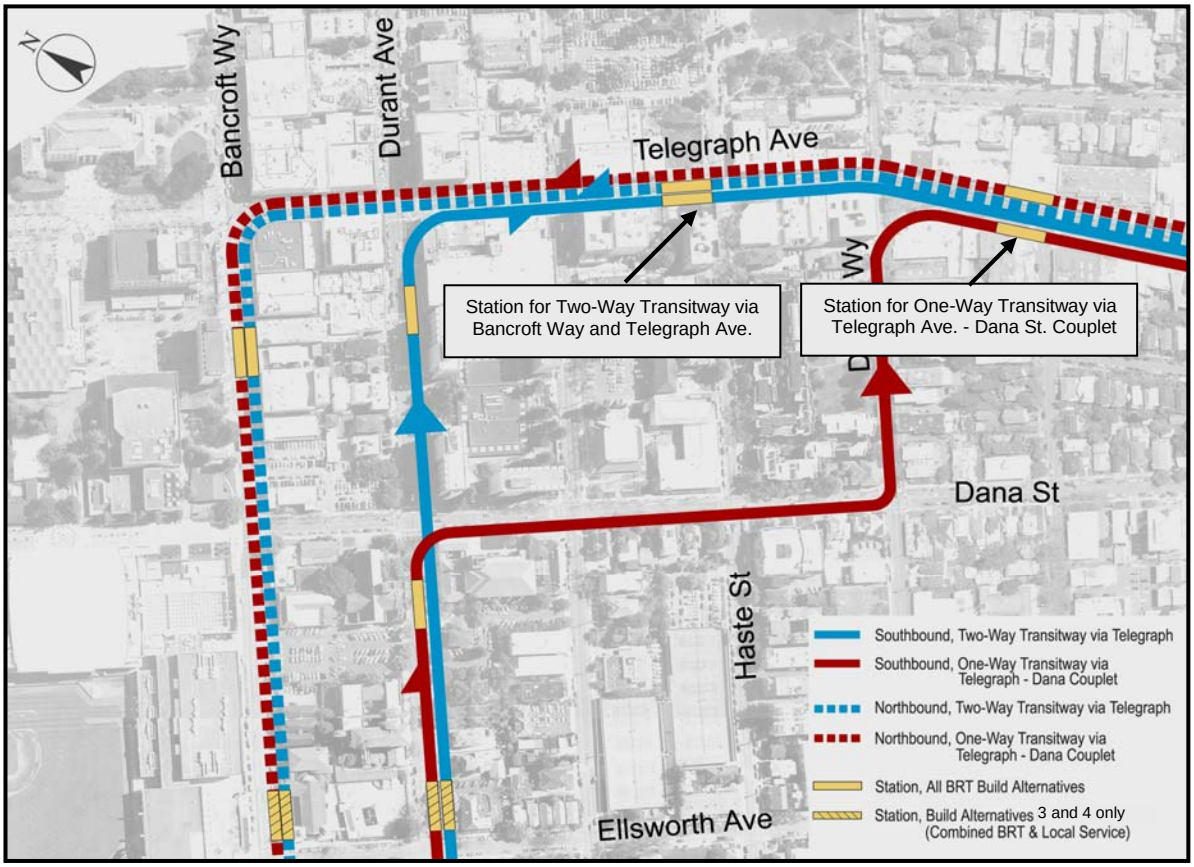


Figure 2.2-22: Two-Way Transitway via Restricted Bancroft Way

One-Way Transitway via Bancroft Way-Durant Avenue Couplet and Two-Way Transitway via Telegraph Avenue

With this alignment variation, shown in Figure 2.2-23 (as blue alignment), service between Downtown Berkeley and Telegraph Avenue would follow the one-way couplet of Bancroft Way and Durant Avenue. Telegraph Avenue from Bancroft Way to Haste Street would become a transit/pedestrian zone. Southbound buses from Downtown Berkeley would follow Durant Avenue east to Telegraph Avenue, continuing south on Telegraph Avenue to south Berkeley and Downtown Oakland. Northbound buses would follow Telegraph Avenue to Bancroft Way, turning west onto Bancroft Way and proceeding into downtown. The one-way couplet of southbound BRT service on Durant Avenue and northbound on Bancroft Way is consistent with the existing one-way traffic patterns on these two streets (Durant Avenue serves autos traveling east, Bancroft Way, autos traveling west).



The *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* variations would operate along a one-way transit couplet of Bancroft Way and Durant Avenue, which would connect to either the *Two-Way Transitway via Telegraph Avenue* variation or the *One-Way Transitway via Telegraph Avenue-Dana Street Couplet* variation. Under the *One-Way Transitway via Telegraph Avenue-Dana Street Couplet* variation, southbound buses would follow Durant Avenue, Dana Street, Dwight Way, and Telegraph Avenue. Northbound buses would follow Telegraph Avenue and Bancroft Way.

Figure 2.2-23: Berkeley Southside Alignment Variations: One-Way Transitway via Bancroft Way-Durant Avenue Couplet Variations

One-Way Transitway via Bancroft Way-Durant Avenue and Telegraph Avenue-Dana Street Couplets

Under this alignment variation (shown in red in Figure 2.2-22), southbound BRT service would operate one-way along Durant Avenue east to Dana Street. At Dana Street, southbound buses would turn south onto Dana Street, then east onto Dwight Way, then south onto Telegraph Avenue to serve south Berkeley and Oakland. Northbound buses from south Berkeley would proceed one way along Telegraph Avenue from Dwight Way to Bancroft Way, turn west and continue one-way to Dana Street where service to and from Downtown Berkeley would resume.

Station locations for Southside alignments would be as shown in Figures 2.2-20 and 2.2-23. For the two-way transitway variations, stations would serve both directions of travel—with a platform for northbound service and a platform for southbound service. For the one-way transitway variations, stations would serve one direction of travel and include a single platform.

Under all four Berkeley Southside alignment variations, northbound stations on Bancroft Way would be 120 feet long to serve both BRT and local buses. (The local buses would be routed to follow the dedicated BRT transitway along Bancroft Way.) Southbound stations under the *One-Way Transitway via Bancroft Way-Durant Avenue Couplet* variations would be on Durant Avenue and also be 120 feet long to serve both BRT and local buses.

Under the *Two-Way Transitway via Telegraph Avenue* variations, the station at Haste Street would be within the proposed transit/pedestrian zone. Under the *Telegraph Avenue-Dana Street One-Way Couplet* variations, the Telegraph Avenue station would be shifted to near Blake Street because this location could serve both northbound and southbound buses.

2.2.3.3 BERKELEY—NORTH TELEGRAPH AVENUE SEGMENT: TELEGRAPH AVENUE/DWIGHT WAY TO THE BERKELEY/OAKLAND CITY LIMIT

One alignment is under consideration for this segment of the East Bay BRT Project. It would consist of a two-way transitway in the median of Telegraph Avenue between Dwight Way and the Berkeley-Oakland border at Woolsey Street. The street cross section would be similar to that depicted in Figure 2.2-7, although Telegraph Avenue is not wide enough in this segment (and Telegraph Avenue extending to Downtown Oakland) to provide for median landscaping as well as both BRT and traffic lanes.

BRT stations along this segment of Telegraph Avenue, and its continuation through North Oakland, would be in the median and generally opposite the left turn pocket at signalized intersections. Stations would be placed outside of the transitway for right side boarding and alighting of passengers. Station locations for Alternatives 1 and 3 are shown in Figures 2.2-3 and 2-2-4 and for Alternatives 3 and 4 in Figures 2.2-5 and 2.2-6.

Curbside parking along median-running BRT alignments typically would be retained except in station areas and at signalized intersections where left-turn lanes would be provided. In these areas, the mixed-flow traffic typically would shift next to the curb and parking would be displaced. Impacts to parking are quantified with mitigation proposed in Section 3.4, Parking, in Chapter 3.

2.2.3.4 NORTH OAKLAND/DOWNTOWN OAKLAND SEGMENT: BERKELEY/ OAKLAND CITY LIMIT TO 14TH STREET/BROADWAY

One alignment is under consideration for the BRT alignment in north Oakland. This alignment would continue the two-way transitway in the median of Telegraph Avenue from the Berkeley-Oakland border to 20th Street in Downtown Oakland. Southbound buses would then turn east on 20th Street and south on Broadway to 14th Street. Northbound buses from Broadway would turn west on 20th Street and north on Telegraph Avenue. BRT buses on Broadway would operate in mixed-flow lanes with other buses and motor vehicles with the exception that a dedicated left-turn lane would be provided on Broadway between 20th and 19th Streets for northbound buses turning left onto 20th Street.

Proposed station locations along Telegraph Avenue are shown in Figures 2.2-3 through 2.2-6. The station on 20th Street, designated as the Uptown Transit Center, is currently under development by AC Transit as part of another project. The station includes curb extension platforms extending most of the

block. Each platform can serve up to three bus routes (BRT, Transbay, Rapid Bus or local). The East Bay BRT project would enhance station features by adding the full complement of BRT station amenities described in Section 2.2.2.3. A station along Broadway at 14th Street would include a curb stop in the southbound direction, with a shelter canopy and station amenities located on the existing pedestrian plaza between 14th and 13th Streets. A curb extension platform, also with shelter canopy and station amenities, would be provided between 14th and 15th Streets for northbound BRT buses.

2.2.3.5 DOWNTOWN OAKLAND SEGMENT: 14TH STREET/BROADWAY TO 1ST AVENUE

In Downtown Oakland, the BRT alignment would turn from Broadway and follow a one-way couplet on 11th Street (southbound service) and 12th Street (northbound service) to Lake Merritt and the Eastlake District. The transitway along 11th and 12th Streets would be adjacent the curb (also referred to as side running). It would be similar to that shown in Figure 2.2-8 for one-way streets. BRT stations along 11th and 12th Streets would be extensions from the curb and located at Broadway, Harrison Street, and Madison Street.

The BRT alignment along 11th and 12th Streets would merge at approximately Oak Street and follow 12th Street across the Lake Merritt dam and estuary to 1st Avenue. This segment of 12th Street between the lake and the convention center is being reconstructed as a six-lane at-grade arterial. Due to design and capacity limitations of the new roadway, dedicated BRT lanes are not feasible. BRT buses would operate in mixed-flow lanes.

2.2.3.6 OAKLAND—EASTLAKE DISTRICT SEGMENT: 1ST AVENUE TO 14TH AVENUE

In the Eastlake District, from 1st Avenue to 14th Avenue, two alignment variations are under consideration:

- *Two-Way Transitway via International Boulevard,* and
- *One-Way Transitway via International Boulevard-12th Street Couplet*.

Two-Way Transitway via International Boulevard

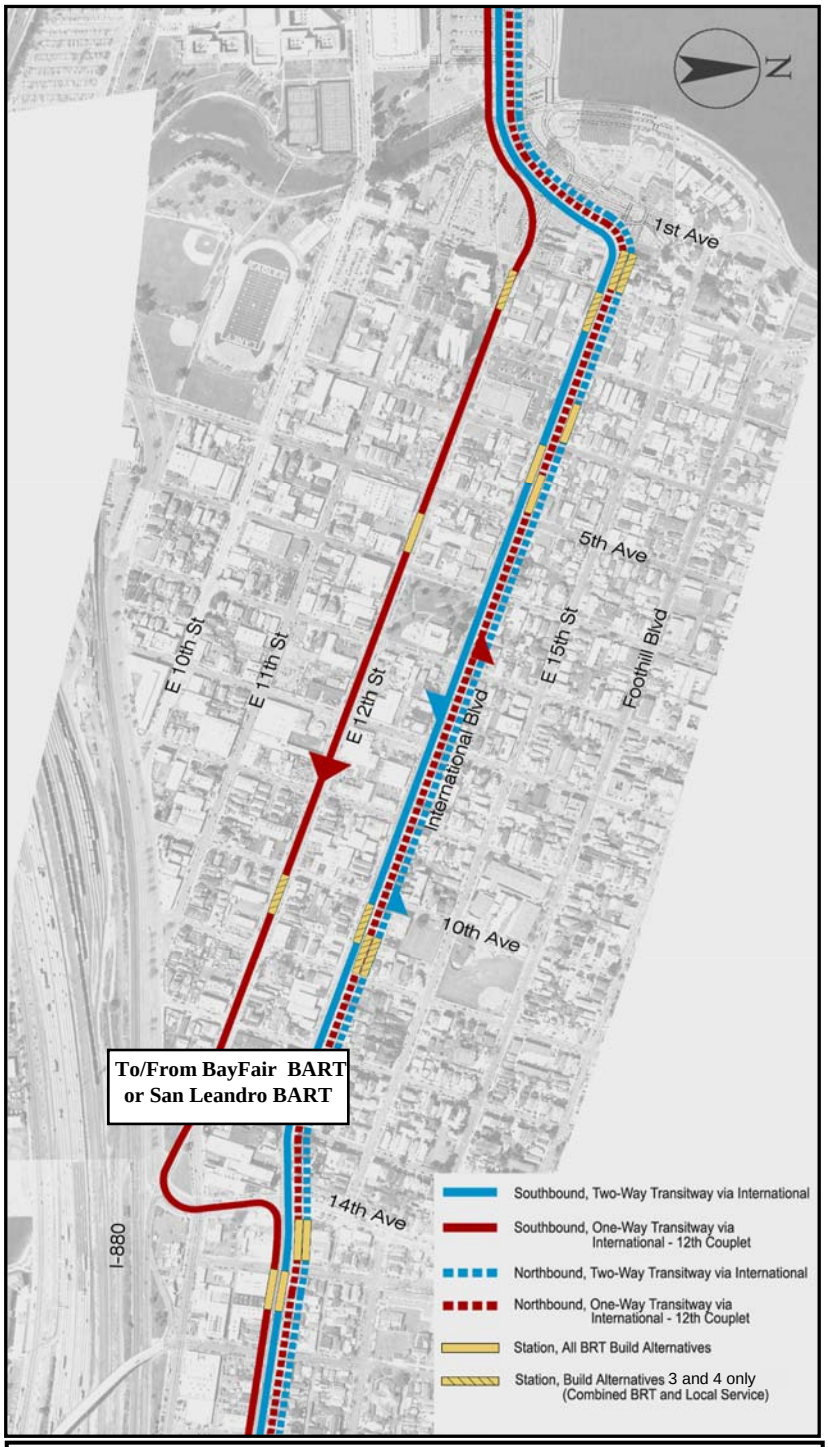
This variation, as shown Figure 2.2-24 (blue lines), would widen International Boulevard (by narrowing the sidewalk area—street curb to property line—by up to two feet on each side of the street) to accommodate two BRT lanes and two traffic lanes. The southbound BRT lane would be along the west curb or parking lane and the northbound BRT lane would be along the east curb or parking lane—a side-running configuration in both directions.

Stations would be curbside, extending from the existing sidewalk approximately six to eight feet into the existing parking lane. The existing parking lanes would be removed at stations only under this configuration.

International Boulevard-12th Street Couplet

This alignment variation would convert one existing lane in the median of International Boulevard to a northbound BRT-only lane and one lane in the median of East 12th Street to a southbound BRT-only lane. (Both arterials, currently two traffic lanes each direction, would become one traffic lane each direction with a median BRT lane.) This configuration would extend from 1st Avenue to 14th Avenue. The southbound transitway on East 12th Street would turn east onto a BRT-only lane on the south side of 14th Avenue and travel one block to International Boulevard. The northbound transitway on International Boulevard would turn west onto 1st Avenue and join 12th Street in the vicinity of Lake Merritt.

The *International Boulevard-12th Street Couplet* variation is shown in red in Figure 2.2-24. Stations would be located in the street median. However, each station would consist of a single platform, serving the southbound direction along East 12th Street and the northbound direction along International Boulevard.



Under the *Two-Way Transitway via International Boulevard* variation, buses would operate in both directions on International Boulevard. Under the *One-Way Transitway via International Boulevard-12th Street Couplet* variation, buses would operate on East 12th Street southbound and International Boulevard northbound between 1st and 14th Avenues.

Figure 2.2-24: East Oakland Alignment Variations

2.2.3.7 EAST OAKLAND SEGMENT: 14TH AVENUE TO OAKLAND/SAN LEANDRO CITY LIMIT

From 14th Avenue to the Oakland/San Leandro city limits, BRT service would be on a two-way transitway in the median of International Boulevard. The alignment is the same for all Build Alternatives. The median configuration would be similar to Figure 2.2-7. Landscaping alongside the median transitway would be provided between signalized intersections from approximately 38th Avenue to the city limit. Stations would be in the median and include two platforms to serve southbound and northbound travel. Stations would generally be opposite the left-turn pocket at signalized intersections and placed outside of the transitway for right side boarding and alighting of passengers. They would be located as shown in Figures 2.2-3 through 2.2-6.

2.2.3.8 SAN LEANDRO SEGMENT: OAKLAND/SAN LEANDRO CITY LIMIT TO BAYFAIR BART OR SAN LEANDRO BART

From the Oakland-San Leandro border through San Leandro, the East Bay BRT Project alignment depends on the terminus.

Alt 1: Separate BRT and Local Service to BayFair BART, and
Alt 3: Combined BRT and Local Service to BayFair BART

The BRT-only transitway would continue in the median of East 14th Street, with median stations and a traffic lane on each side, to Davis Street and then transition to operate in mixed-flow lanes between Davis Street and Blossom Way. Stations in this segment would be on curbside extensions from the sidewalk. From Blossom Way to Bayfair Drive, the BRT-only transitway and stations would be in the median. Because the roadway section is wider in this segment, the transitway from approximately San Leandro Boulevard south would include a landscaped buffer separating it from the single northbound and southbound through traffic lanes. The BRT-only transitway would continue along BayFair Drive for approximately 2000 feet before buses entered mixed-flow traffic lanes connecting to the BayFair BART station. Stations would include one serving Bayfair Center located in the median of Bayfair Drive and another at the existing AC Transit center at BayFair BART. All stations except the BayFair BART terminus would include two platforms for bidirectional travel. The BayFair BART Station would be a single, extended platform capable of serving at least two BRT buses. Figures 2.2-3 and 2.2-5 show the general locations of stations.

Alt 2: Separate BRT and Local Service to San Leandro BART, and
Alt 4: Combined BRT and Local Service to San Leandro BART

The BRT-only transitway would transition to mixed-flow lanes on East 14th Street at the San Leandro border (Bristol Boulevard) and continue to a terminus at San Leandro BART. Stations would be curbside, one on each side of the street to serve both southbound and northbound travel with the exception of the station at San Leandro BART. The parking lanes, where currently provided, would be retained except where the BRT station platform would extend from the sidewalk approximately eight feet and displace parking as a result. At San Leandro BART, a single platform integrated into the existing pedestrian plaza would be provided and be long enough to accommodate at minimum two BRT buses. Station locations are shown generally in Figures 2.2-4 and 2.2-6.

At the conclusion of the environmental process, the preferred alignment variation in each area, and the overall project alignment, will be identified based upon a comparative assessment of the various factors presented in this document and public and agency comment.

2.3 Capital and Operating Costs of Build Alternatives

This section summarizes the estimated costs of constructing and operating the East Bay BRT Project. Additional detail is provided in Chapter 8, Financial Analysis and Alternatives Evaluation.

2.3.1 Capital Costs

Table 2.3-1 summaries the estimated costs of the four Build Alternatives, including a breakdown by major cost component. Dollar estimates are costs at completion of the project and, as such, include adjustments for anticipated future escalation in labor and materials costs (inflation). The implementation of Alt 1: Separate BRT and Local Service to BayFair BART would cost on the order of $360 million, including preliminary and final design, construction, and the additional BRT buses required to operate the proposed service frequencies. Alt 2: Separate BRT and Local Service to San Leandro BART would cost on the order of $310 million. The cost is lower due to the shorter length of major BRT transitway improvements and the fewer number of BRT stations.

The implementation of Alt 3: Combined BRT and Local Service to BayFair BART is estimated to cost on the order of $400 million and Alternative 4, $340 million. The higher cost of Alternative 3 relative to the other alternatives is due to the higher number of stations and station area improvements. As with Alternatives 1 and 2, the lower cost of Alternative 4 compared to Alternative 3 is due primarily to the shorter length of major improvements and fewer BRT stations.

Local alignment variations would have little impact on total cost. The cost differences among variations are not large, less than two percent of the total capital costs listed in Table 2.3-1, which are based upon an alignment using a two-way transitway via Shattuck Avenue, Bancroft Way, and Telegraph Avenue in Berkeley's Downtown and Southside, and a two-way transitway via International Boulevard in East Oakland's Eastlake District.

The estimates in Table 2.3-1 cover all direct project costs reasonably expected to implement the East Bay BRT Project following completion of this EIS/EIR and receipt of a record of decision with one exception. The estimates do not include agency administrative costs, such as AC Transit's ongoing project planning, coordination, and related costs. **Construction** of the transitway and stations is the largest capital cost component. **Right-of-Way** represents the cost of obtaining easements for construction and easements or acquisitions for minor curb adjustments at various locations along the BRT corridor. No major property acquisitions or any displacements of existing structures are anticipated at this time. The **Vehicles** cost reflects the acquisition of articulated buses required for high-frequency BRT service over and above those that would be redirected from existing Rapid Bus Route 1R service. Thus, vehicle costs are for the incremental number of buses needed to replace Rapid Bus Route 1R service with BRT service. **Other Costs**, for Traffic and Parking Mitigation, represent a reasonable allowance for mitigating the major traffic and parking impacts discussed in Chapter 3, Transportation Analysis.

Table 2.3-1: Capital Cost ($Millions) of East Bay BRT Project

Item	Build Alternatives			
	Alt 1 ***Separate BRT and Local Service to BayFair BART***	**Alt 2** ***Separate BRT and Local Service to San Leandro BART***	**Alt 3** ***Combined BRT and Local Service to BayFair BART***	**Alt 4** ***Combined BRT and Local Service to San Leandro BART***
Construction	$175.9	$149.5	$197.2	$167.1
-Transitway	*$104.6*	*$82.8*	*$110.5*	*$88.3*
- Stations[1]	*$52.5*	*$48.7*	*$66.2*	*$59.5*
- Systems[2]	*$18.8*	*$18.0*	*$20.5*	*$19.3*
Right-of-Way/Easements	$5.2	$4.6	$5.2	$4.6
Vehicles[3]	$9.7	$10.3	$7.3	$7.9
Implementation[4]	$67.7	$57.7	$75.7	$64.2
Contingencies/Reserves[5]	$27.7	$23.7	$30.8	$26.2
Subtotal:	***$286.2***	***$245.7***	***$316.2***	***$270.0***
Other Costs: Traffic & Parking Mitigation	$7.5	$6.5	$7.5	$6.5
Escalation[6]	$66.3	$57.8	$76.3	$63.5
Total Project Cost	**$360.0**	**$310.0**	**$400.0**	**$340.0**

Notes:
[1] Station structures primarily; amenities, such as information displays, receptacles, message signs, etc. are included.
[2] Traffic and BRT signals, communications ducts and lines, control center, security cameras.
[3] Cost of peak and spare buses beyond that required for No Project (Rapid Bus)
[4] Preliminary and final design and non-agency costs
[5] Unallocated contingencies and reserves
[6] Escalation from 2004, base year for estimate, to year of expenditure (estimated to be 2010)
Source: Parsons, 2006

Factors that would affect the final capital cost of the East Bay BRT Project include: higher (or lower) escalation in costs, due to price level inflation and/or real changes in labor and materials costs, than assumed in the estimates; changes in the scope of the adopted project; major utility conflicts; hazardous materials and/or cultural resources encountered during construction; delays in the project implementation process; legal disputes; and other risks to a project that surface during design and construction. AC Transit would continue to evaluate cost and schedule risks to the project during the subsequent phases of project implementation and take measures to mitigate their impacts.

2.3.2 Annual Operating Costs

East Bay BRT service operating costs, include ongoing maintenance of vehicles and facilities, are shown in Table 2.3-2. The table includes the estimated annual operating costs, the expected passenger fare revenue, and the net operating costs (operating costs less the revenue) for both the opening year and the year 2025. Costs are for BRT service and for any other service changes required to implement a Build Alternative (some existing routes would be replaced; some other services would be modified, such as service between San Leandro BART and BayFair BART under Build Alternatives 2 and 4). Similarly fare revenues reflect not just those from BRT service but from changes in ridership on other AC Transit services that would result from implementation of the East Bay BRT Project. Thus, the costs and revenues incorporate all effects, direct and indirect, of the Build Alternatives.

The resource requirements, costs, fares, and net operating costs of each Build Alternative are compared to those of the No-Build Alternative, represented by Rapid Bus service, which the East Bay BRT Project would replace.

Table 2.3-2: East Bay BRT Annual Operating Costs ($Millions, 2005)

Item	No-Build	Build Alternatives			
	Rapid Bus Route 1R to BayFair BART	**Alt 1** ***Separate BRT and Local Service to BayFair BART***	**Alt 2** ***Separate BRT and Local Service to San Leandro BART***	**Alt 3** ***Combined BRT and Local Service to BayFair BART***	**Alt 4** ***Combined BRT and Local Service to San Leandro BART***
Annual Revenue Miles	2,257,000	3,005,000	3,020,000	2,866,000	2,881,000
Annual Revenue Hours	205,000	236,000	249,000	216,000	229,000
Peak Buses	36	50	51	46	47
Annual Cost-Opening Year[1]	$25.4	$31.6	$32.7	$29.4	$30.5
Annual Fares-Opening Year[1,2]	$5.9	$7.9	$7.4	$9.2	$8.8
Net Annual Cost-Opening Year[1]	***$19.5***	***$23.8***	***$25.2***	***$20.2***	***$21.7***
Annual Cost-2025	$30.6	$38.1	$39.4	$35.5	$36.7
Annual Fares-2025[2]	$6.4	$8.6	$8.1	$10.1	$9.6
Net Annual Cost-2025	***$24.1***	***$29.5***	***$31.3***	***$25.4***	***$27.1***
Net Cost per Boarding-2025[3]	*$2.87*	*$2.61*	*$2.94*	*$1.91*	*$2.15*

Notes:
[1] Assumed to be 2010
[2] Fare revenue is adjusted to account for changes in ridership, and therefore fares, on other AC Transit services after implementation of BRT service.
[3] Boardings are adjusted to account for changes in ridership on other AC Transit services after implementation of BRT service.

Source: *Technical Memorandum, East Bay BRT EIR/EIS, Operating Plan and Cost Analysis*, Nelson\Nygaard Consulting Associates, November 2005; Cambridge Systematics (2025 ridership forecasts and fare revenue)

Alt 1: Separate BRT and Local Service to BayFair BART is projected to cost approximately $31.6 million to operate in the first full year of revenue service. This includes BRT and background local bus service on Routes 40 and 82 and other local bus service in the corridor, such as Route 43. The net annual operating cost of $23.8 million is after crediting the value of estimated passenger fares against total operating costs. This is about 10 percent greater than the net cost for No-Build/Rapid Bus service.

Alt 3: Combined BRT and Local Service to BayFair BART is estimated to cost less to operate than Alternative 1, approximately $29.4 million in the first full year of revenue service. As for Alternative 1, this is for all bus services in the corridor, including BRT and any local routes still operating in the corridor (for example Route 43 along Telegraph Avenue between 45th Street and Downtown Oakland; the service plan for each Build Alternative is discussed in Section 3.1.4, Build Alternative Conditions, in Chapter 3). The net operating cost is approximately $20.2 million, which is the lowest among the Build Alternatives and slightly more than the net cost for No-Build/Rapid Bus service.

Both BRT Build Alternatives (Alternatives 2 and 4) terminating at San Leandro BART would cost slightly more to operate than Build Alternatives terminating at the BayFair BART Station. This is because Rapid Bus service would need to be retained between BayFair BART and San Leandro BART even if East Bay BRT service ended at San Leandro BART. This cost would be part of the overall corridor service. Costs would be higher because it would be less efficient from a bus operations standpoint to break service at the San Leandro BART Station. There is additional travel involved for BRT buses going to and from San Leandro BART instead of remaining on East 14th Street and additional non-revenue hours for layover/turn back time at the San Leandro BART Station.

Of the four Build Alternatives, net annual operating costs would be lowest for the Alt 3: Combined BRT and Local Service to BayFair BART in both the opening year and 2025. The net cost for this alternative is moderately higher than that for the No-Build Alternative. On a per passenger basis, the net cost, or subsidy per passenger boarding would be lower for Alternative 3 than for Rapid Bus service. In contrast to the performance of Alternative 3, Alternative 2, Separate BRT and Local Service to San Leandro BART, has the highest net operating cost and highest net cost per passenger boarding.

2.4 Alternatives Considered and Withdrawn

Several other modal and alignment alternatives were considered in addition to the BRT mode, Build Alternatives and alignment variations described above. These alternatives to the currently proposed project were evaluated either as part of technical studies for the preceding Major Investment Study (MIS) or during the conceptual engineering and environmental studies for the East Bay BRT Project.

The alternatives were evaluated from various standpoints, including ability to satisfy service objectives, ridership, capital and operating costs, and environmental effects, among other factors. The alternatives were withdrawn from further consideration because they were determined to have flaws or to be inferior compared to components of the East Bay BRT Project that are still under consideration.

The following sections describe the major modal and alignment alternatives considered and withdrawn and the reasons why they were withdrawn from further consideration. Section 2.4.1 includes East Bay BRT modal alternatives that were withdrawn during preparation of the MIS. Section 2.4.2 includes alignment alternatives withdrawn during the preparation of the MIS or this environmental document.

2.4.1 Vehicle/Modal Alternatives Considered and Withdrawn

Various vehicle technologies, or modes, were considered during the MIS. The alternatives development process described in Section 2.1 identified three modal options that were appropriate in the study corridor and could best meet AC Transit's service objectives while satisfying the needs of the market: Light Rail Transit (LRT), Bus Rapid Transit (BRT), and Enhanced Bus (existing service with limited transit signal priority, bus queue jump lanes at congested intersections, and modified bus stop spacing). Several other modes were ruled out for this corridor because of their high cost, unproven nature, or lack of suitability for operations in a dense urban environment. These modes

included heavy rail such as BART; high speed rail, including MagLev; and other technologies not used in existing U.S. transit systems. These technologies were not carried forward for detailed evaluation. Two of the three modal options that were evaluated were withdrawn by the Policy Steering Committee as a result of the engineering, environmental, ridership, and financial evaluations. These are discussed below.

2.4.1.1 LIGHT RAIL TRANSIT ALTERNATIVE

The Light Rail Transit alternative, which was considered during the MIS phase of project development, would have been similar to light rail systems in use today in San Francisco, San Jose, and Sacramento. Stations would have been substantial structures, each with a boarding platform, shelter, proof-of-payment ticket validation, ticket vending machines, security features, and real-time vehicle arrival information. Low-floor light rail vehicles, of standard or narrow width, would have traveled between these stations with traffic signal priority and coordination along the entire alignment. A special lane of train tracks reserved for transit vehicles, separating other traffic from the tracks, would have been provided along most of the alignment. Station spacing would have been greater than current bus stop spacing. To provide service to stops without LRT service, a local background bus service would have been included.

LRT would have had much higher construction costs, on the order of $1 billion (2005 dollars), and greater construction impacts than BRT due to the necessity of laying rails and installing overhead electric wires and moving major utilities. Furthermore, LRT offers less operating flexibility than BRT as LRT vehicles are constrained to stay within a guideway over their entire route. The LRT Alternative offered potentially 15 to 20 percent higher ridership than the BRT Alternative, but the capital cost would be almost three times higher and the annual operating costs 20 to 25 percent higher than the BRT Alternative. Considering these various benefits, impacts, and costs, and with substantial public input as described in Section 6, the Policy Steering Committee adopted BRT as the Locally Preferred Alternative and LRT was withdrawn from further consideration, with the understanding that LRT should be considered a long-term goal and that design and construction of BRT should not preclude conversion to LRT in the future.

2.4.1.2 ENHANCED BUS ALTERNATIVE

The Enhanced Bus alternative, considered during the preparation of the project MIS, would have offered a lower-cost alternative than either LRT or BRT. This service would have been similar to the Los Angeles Metro Rapid. Like BRT, it would have used low-floor, low- or zero-emission buses and would have had bus signal priority and coordination along the entire alignment. To reduce costs, the Enhanced Bus service would have operated in mixed-flow traffic except in a few congested segments where peak period transit lanes or “queue jump” lanes would have been provided. This alternative would have limited amenities at stops, with no boarding platforms or proof-of-payment ticket validation, and shelter and real-time bus information would have been available only at selected stops. Enhanced Bus stop spacing would have been greater than existing bus service. To provide service to stops not served by Enhanced Bus, a local background bus service would have been provided. Also, bus stops would not have distinct platforms for boarding and alighting.

The Enhanced Bus Alternative did not generate the level of ridership and BRT vehicle travel time savings and reliability that are estimated for the East Bay BRT Project. Therefore, the Policy Steering Committee adopted BRT in preference to Enhanced Bus as the LPA for the present project. However, Enhanced Bus was determined to offer a number of features that are attractive as a low-cost, near-term solution to the transportation problems in the project corridor. Subsequent to the MIS, therefore, AC Transit incorporated the main elements of the Enhanced Bus Alternative into the Rapid Bus Alternative, a separate project currently being implemented and included in the No-Build Alternative for the present analysis.

2.4.2 Alignments Considered and Withdrawn

Other alignment alternatives were considered for their ability to address the service objectives established for the project while satisfying the needs of the market. These are presented below. The decisions to withdraw the alignments from further consideration were made by the MIS Policy Steering Committee or during the preparation of the conceptual engineering and environmental studies for the East Bay BRT Project.

2.4.2.1 College Avenue/Broadway Alignment

The MIS examined a *College Avenue/Broadway* alignment as an alternative to Telegraph Avenue between Berkeley and Oakland. Although the *College Avenue/Broadway* alignment offered better service to major employment and educational centers, this alignment also had major drawbacks. College Avenue is narrow, thus, private property would have needed to be acquired to make room for a transitway. Otherwise, transit vehicles would have to travel in mixed-flow traffic, which would make transit on College Avenue less reliable and slower than transit on Telegraph Avenue. Moreover, Telegraph Avenue has more opportunities for redevelopment that would meet the project need as described in Chapter 1, Purpose and Need. Also, a Telegraph Avenue alignment appeared to have fewer environmental impacts. In consideration of the potential environmental impacts and severe service constraints, the *College Avenue/Broadway* alignment between Berkeley and Oakland was withdrawn from further study in favor of the Telegraph Avenue alignment that is part of the LPA.

2.4.2.2 Shattuck Avenue/Telegraph Avenue Alignment

The MIS also examined a *Shattuck Avenue/Telegraph Avenue* alignment as an alternative to Telegraph Avenue between Berkeley and Oakland. The alignment appeared to do a relatively poor job of meeting the service objectives since it closely parallels existing Bay Area Rapid Transit (BART) service, thus, connecting places that are already well served by transit. As a result, the *Shattuck Avenue/Telegraph Avenue* alignment was withdrawn from further consideration.

2.4.2.3 Foothill Boulevard/Bancroft Avenue Alignment

For the southern portion of the corridor, from Downtown Oakland to Downtown San Leandro, the MIS evaluated an alignment using *Foothill Boulevard/Bancroft Avenue* as an alternative to an *International Boulevard/East14th Street* alignment. This alignment alternative did not serve the major activity centers of East Oakland as well as the *International Boulevard/East14th Street* alignment. Moreover, Bancroft Avenue is narrow in sections and would not support a dedicated transitway

without substantial displacement of parking and roadway widening. For these reasons, the MIS phase concluded that the *Foothill Boulevard/Bancroft Avenue* alignment would not meet the project purpose and need as well as the *International Boulevard/East 14th Street* alignment; therefore, this alternative was withdrawn from further consideration.

2.4.2.4 SAN LEANDRO STREET/SAN LEANDRO BOULEVARD ALIGNMENT

For the southern portion of the corridor, from Downtown Oakland to Downtown San Leandro, the MIS evaluated an alignment using *San Leandro Street (Oakland)/San Leandro Boulevard (San Leandro)* as an alternative to an *International Boulevard/East14th Street* alignment. *San Leandro Street/San Leandro Boulevard* offers a wider street cross section and therefore can accommodate a transitway; however, it is aligned through primarily industrial areas and does not serve residents of East Oakland well. Moreover, it parallels, and therefore duplicates, BART service over much of its length. For these reasons, the MIS phase concluded that the *San Leandro Street/San Leandro Boulevard* alignment would not meet the project purpose and need as well as the *International Boulevard/East 14th Street* alignment; therefore, this alternative was withdrawn from further consideration.

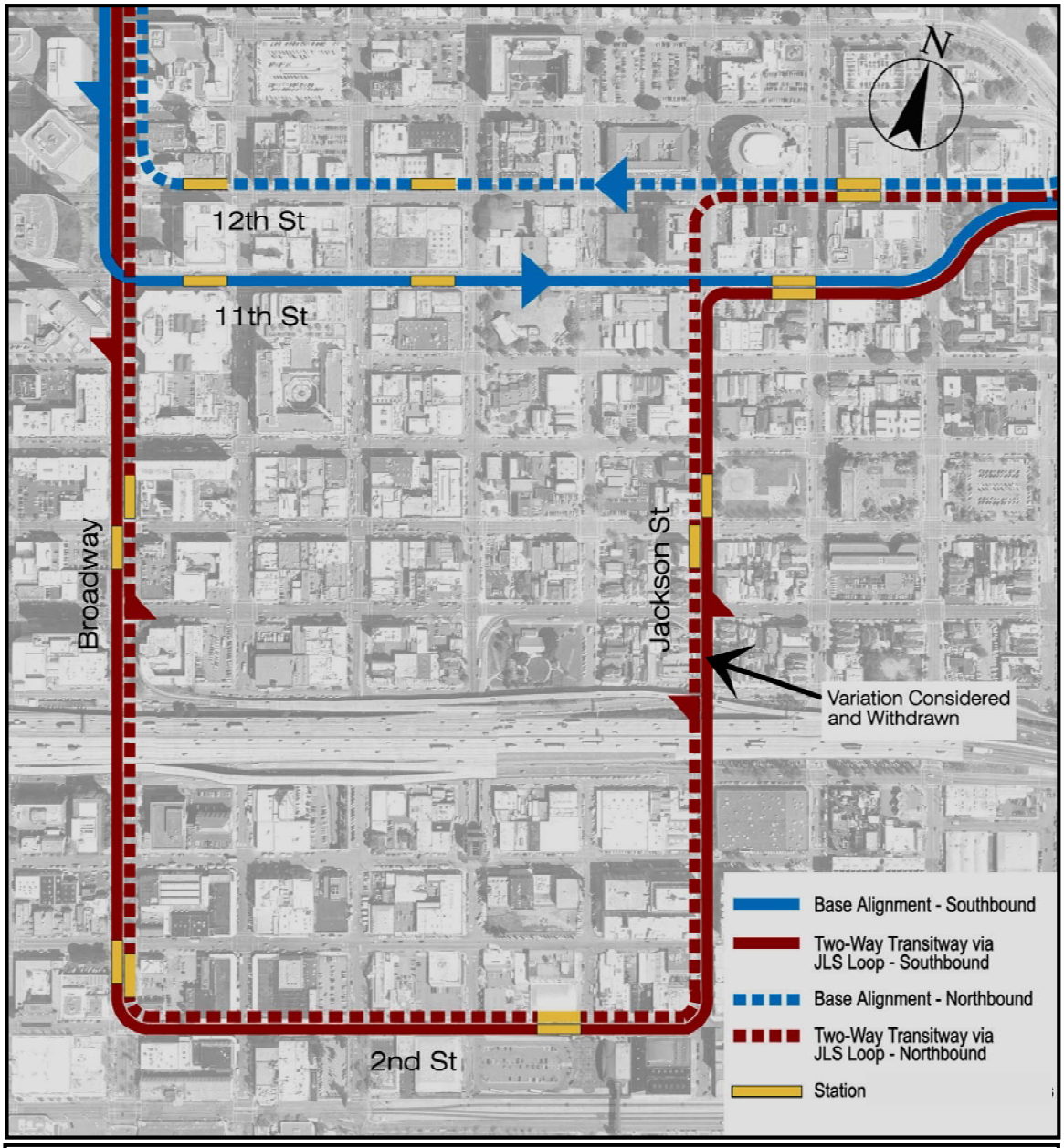
2.4.2.5 JACK LONDON SQUARE SERVICE

During the initial engineering and environmental analysis of the East Bay BRT Project, an alignment variation through *Jack London Square*, shown in Figure 2.4-1, was proposed as a means of providing direct connections to this expanding activity area from points both north along Telegraph Avenue and south along International Boulevard. North to south, it would have followed Broadway to 2nd Street at Jack London Square. Buses would have traveled in mixed-flow traffic lanes on Broadway north of 5th Street. Between 5th and 2nd Streets, the outside lanes on Broadway would be converted to northbound and southbound BRT-only lanes. These dedicated lanes would have been continued on 2nd Street between Broadway and Jackson Street, then looped north on Jackson Street to the Lake Merritt area, where the alignment would have turned onto 11th and 12th Streets to connect to the International Boulevard corridor. There would have been a short segment on Jackson between 6th and 7th Streets where the BRT buses would use mixed-traffic lanes.

Under this option, the BRT would have served the Oakland-Alameda Ferry Station at *Jack London Square*, the Capitol Corridor/Amtrak Station at 2nd Street and the Lake Merritt BART Station on Jackson Street. Stations would have been curbside extensions of the sidewalk.

The disadvantages of this option were determined to include:

- Added travel time (approximately six minutes) for through transit riders not destined for Jack London Square; around 16,000 daily riders would be adversely affected.
- Lower corridor boardings overall compared to the proposed project alignment along 11th and 12th Streets.
- Higher capital costs, approximately $10 million more than the proposed project alignment.
- Higher annual operating costs, approximately $2 million more per year than the proposed project.
- Greater displacement of parking.



The base BRT alignment would follow 11th Street southbound and 12th Street northbound to connect Downtown Oakland with the International Boulevard corridor. The Jack London Square Loop was proposed to follow Broadway, 2nd Street and Jackson Street through downtown Oakland and connect with 11th and 12th streets at Jackson Street.

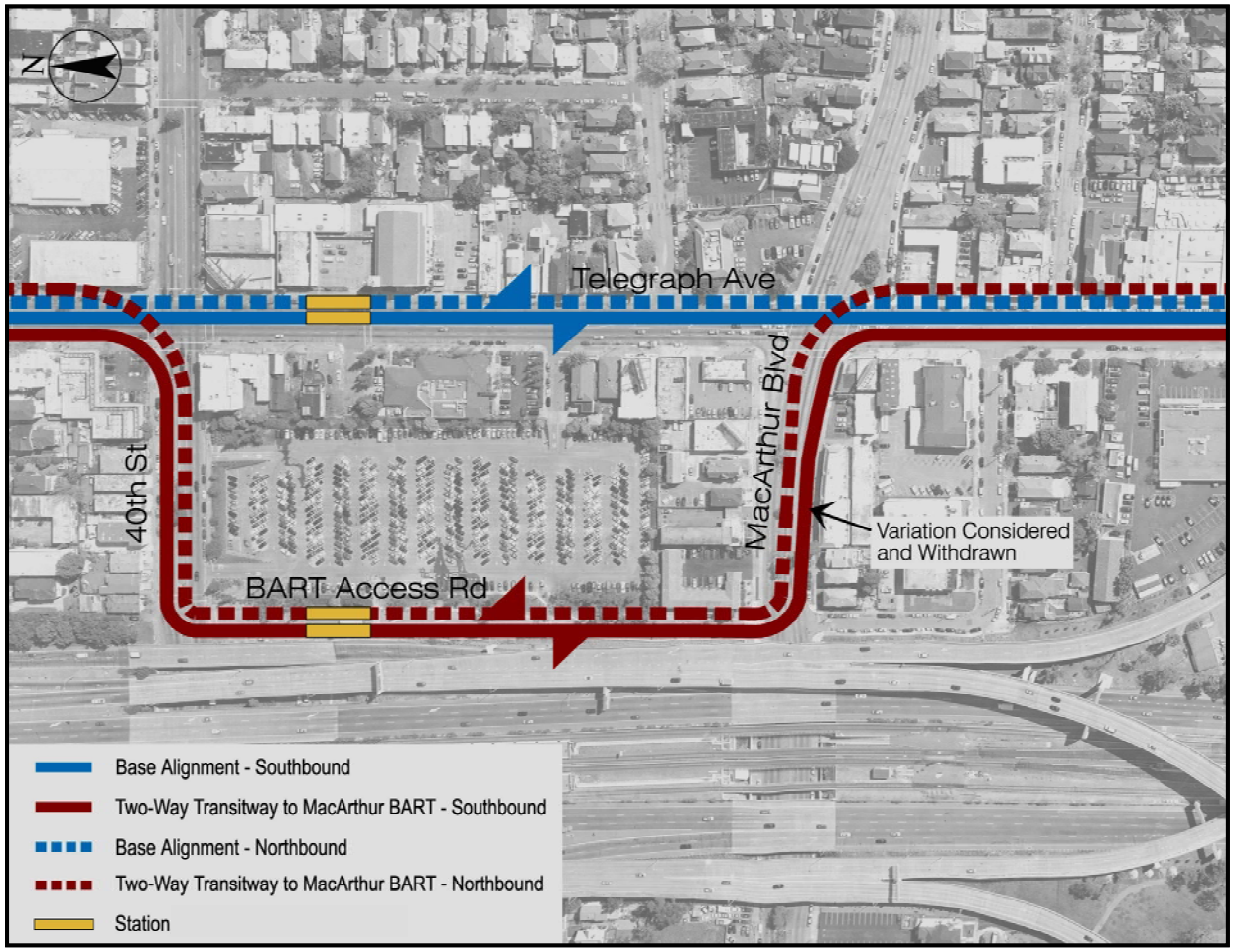
Figure 2.4-1: Jack London Square Service Alignment Variation

Given these disadvantages, it was determined to eliminate the *Jack London Square* alignment variation and retain 11th and 12th Streets as the preferred alignment from Downtown Oakland to International Boulevard. BRT service in the Jack London District is also inconsistent with the recommendation of the Policy Advisory Committee for the Jack London BART Feasibility Study, which recommended streetcar as their preferred long-term solution.

2.4.2.6 MACARTHUR BART SERVICE

As a variation to continuing BRT service in a dedicated transitway within the median of Telegraph Avenue through Oakland, an alignment providing direct service to and from the MacArthur BART Station was proposed, as shown in Figure 2.4-2.

Proceeding north to south, the alignment variation would have turned right from Telegraph Avenue into the median of 40th Street and continued along 40th Street to the MacArthur BART Station access roadway on the east side of the station. BRT buses would have turned left onto the access roadway and stopped at a new station adjacent the BART pedestrian plaza at the station entrance. BRT buses would have continued along the access road to MacArthur Boulevard, turned left into a median transitway extending to Telegraph Avenue. At Telegraph Avenue, buses would have turned right and entered the transitway median again.



As opposed to the *Two-Way Transitway via Telegraph Avenue variation*, direct service to MacArthur BART would diverge from Telegraph Avenue and follow 40th Street, the BART station access road, and MacArthur Boulevard. The BRT station would be on the east side of the BART station as opposed to median of Telegraph Avenue.

Figure 2.4-2: MacArthur BART Loop Alignment Variation

The variation was determined to be inferior to the alignment remaining on Telegraph Avenue for the following reasons:

- Ridership would be lower (800 fewer corridor transit boardings; 270 fewer transit trips) due to the increased travel time through the BART station. Patrons already on board BRT buses and not destined for BART would experience out-of-direction travel.
- Capital costs to construct this option would be higher than making improvements along Telegraph Avenue only; BRT operating costs would also be higher.
- Additional parking would be displaced along 40th Street and along MacArthur Boulevard.
- City of Oakland representatives expressed a preference for maintaining the BRT alignment on Telegraph Avenue, in part because BART parking areas and the access roadway located between the station and Telegraph Avenue are to be redeveloped as part of a proposed transit village. The BRT alignment on Telegraph Avenue is more consistent with current redevelopment plans.

For these reasons the BRT alignment variation into the MacArthur BART Station was dropped from further consideration.

2.4.2.7 LAKE MERRITT VIA 10TH STREET

During the engineering and environmental analysis of the East Bay BRT Project, two alignment variations for a two-way transitway were initially considered through the lower Lake Merritt area, as shown in Figure 2.4-3. Besides the proposed East Bay BRT Project alignment along 12th Street, an alignment variation along 10th Street to better serve Laney College and the Kaiser Convention Center was evaluated. With this variation, BRT buses from (or to) Downtown Oakland would have followed 11th Street (12th Street) and turned right onto Madison Street (Oak Street) to reach 10th Street. Service would have followed 10th Street to 2nd Avenue where buses would have turned and followed 2nd Avenue to the International Boulevard corridor.

To implement the transitway, an existing traffic lane on each side of 10th Street would have been converted to one-way BRT-only lanes and, similarly on 2nd Avenue, two existing traffic lanes would have been converted to BRT-only lanes. Curbside parking on 2nd Avenue would also have been removed to provide a parallel mixed-flow traffic lane. The disadvantages leading to the withdrawal of this alignment variation from further study included:

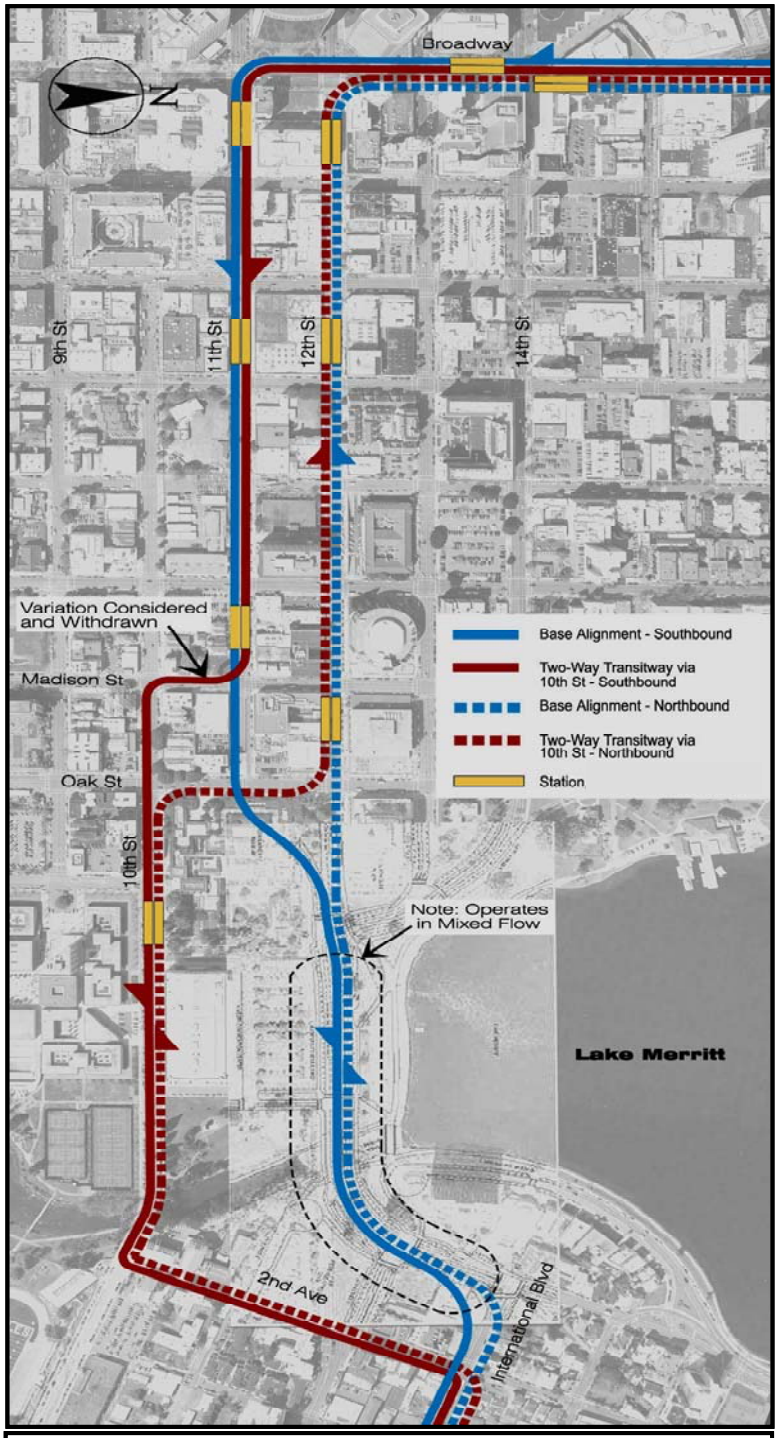
- Added in-vehicle travel time for through passengers not destined to Laney College or the Kaiser Center.
- Lower BRT ridership (1200 fewer corridor transit boardings and 390 fewer transit trips) than the proposed project alignment.
- Higher capital costs, approximately $5 million more than the proposed project alignment.
- Moderately higher operating costs compared to the base alignment.
- Greater displacement of parking.

2.4.2.8 RETAIN TWO THROUGH TRAFFIC LANES ON INTERNATIONAL BOULEVARD/ EAST 14TH STREET, 42ND AVENUE TO BAYFAIR DRIVE (SR 185)

The portion of the project corridor along International Boulevard and East 14th Street from 42nd Avenue in East Oakland south through San Leandro is part of the California state highway system. It is designated State Route (SR) 185. SR 185 is connected to the interstate highway system via SR 77 (42nd Avenue) in Oakland and SR 112 (Davis Street) in San Leandro. These two roadways interconnect with Interstate 880, which is a major north-south freeway in the East Bay region of the San Francisco Bay Area, extending between Oakland and San Jose.

As a state roadway, SR 185 is subject to special consideration by the California Department of Transportation (Caltrans) with respect to traffic capacity impacts of projects on or along its alignment. The East Bay BRT Project would reduce roadway vehicle capacity by converting two of four through traffic lanes to transit-only lanes. On the other hand, the project is intended to increase actual capacity, since more people could be carried on transit vehicles than in private vehicles.

Because of the potential traffic capacity impacts to SR 185, a design alternative was evaluated that would not substantially reduce vehicle-carrying capacity. This alternative would construct a two-way transit way in the roadway median but still retain two traffic lanes in each direction, from 42nd Avenue in Oakland to south of Bayfair Center in San Leandro, except for the segment of East 14th Street between Davis Street and Blossom Way in San



The base BRT alignment would follow 12th Street to cross the Lake Merritt dam and estuary and connect Downtown Oakland with the International Boulevard corridor. An alternative alignment would follow 10th Street and 2nd Avenue.

Figure 2.4-3: Lake Merritt/10th Street Alignment Variation

Leandro. The East Bay BRT Project does not propose altering the street configuration through Downtown San Leandro. This area of San Leandro, considered the downtown core, is a combination of four- and three-lane sections. South of Bayfair Center, East 14th Street would remain a four-lane arterial with no designated BRT or other bus lanes.

Although retaining two through traffic lanes would have provided similar vehicle through-put capacity as currently exists along SR 185, several disadvantages to the alternative were apparent, as described below.

- **Parking Displacement/Potential Right-of-Way Impacts.** All curbside parking would be eliminated on both sides of the roadway for extended roadway segments: from 42nd Avenue to 50th Avenue and from 54th Avenue to 83rd Avenue. In other segments, including 83rd Avenue to 102nd Avenue and 107th Avenue to Fairmont Drive, parking would be provided only on one side of the street. Alternatively, parking could be provided on both sides of International Boulevard in the segments south of 83rd Avenue, but only if the roadway were widened by two to four feet. This would have attendant right-of-way acquisition and displacements impacts. Parking also would be displaced at all signalized intersections with exclusive left turn lanes from 42nd Avenue to Fairmont Drive/Bayfair Center.
- **Removal of Existing and Proposed Median Landscaping.** The cities of Oakland and San Leandro are investing in streetscape plantings to advance neighborhood and business revitalization. The East Bay BRT Project seeks to support these actions. Under this alternative, space would be available only in very limited areas to provide median landscaping, which is currently being restored in various segments of International Boulevard through Oakland and which is proposed for East 14th Street south of San Leandro Boulevard in San Leandro. Landscaping between intersections in San Leandro would be possible only if even more parking were displaced.
- **Elimination of Left Turn Lanes at Various Signalized Intersections.** Exclusive left turn lanes could not be provided in the roadway segments from 42nd to 50th and 54th to 83rd Avenues and at other locations unless the roadway were widened by eight or more feet. Such widening would require right-of-way and displace existing land uses. If left-turn lanes were completely eliminated at right-of-way constrained intersections, this would result in reduced access to cross streets and increase out-of-direction travel for many vehicles using International Boulevard and East 14th Street. Alternatively, left turns could be permitted from the through-traffic lane nearest the roadway median, but this would degrade traffic operations at intersections.
- **Increased Capital Costs Relative to the East Bay BRT Project.** The roadway widening and increased right-of-way requirements to implement this alternative would increase capital costs substantially.

Substantial loss of on-street parking and the imposition of turn restrictions for long segments of International Boulevard would have an adverse effect on local businesses that rely on convenient auto (as well as transit) access. Loss of local businesses would affect neighborhood quality of life and reduce city business license revenues dramatically. Alternatively, roadway widening in right-of-way constrained areas to allow curbside parking and left turns at signalized intersections is not feasible.

The cost would be prohibitive due to the high number of residential and business displacements, while the displacements themselves would undermine community cohesion and stability. Density reduction would decrease the market for transit.

Given that many residents of the corridor are minorities and many of the businesses are minority owned and operated, the impacts of retaining two through traffic lanes on International Boulevard would raise issues of environmental justice. These impacts could be viewed as having a disproportionately adverse effect on disadvantaged populations relative to the benefits of maintaining roadway capacity.

For these reasons, modifying the East Bay BRT Project to retain two traffic lanes along with the dedicated BRT transitway on SR 185 was determined to be impractical. The alternative was withdrawn from further consideration.

2.4.2.9 SOUTHERN ALIGNMENT BEYOND BAYFAIR BART

The MIS also considered an alternative that would have extended BRT service in a dedicated transitway beyond BayFair BART into the unincorporated areas of Alameda County south of San Leandro (Ashland, San Lorenzo). The alternative was considered and withdrawn for several reasons. The density of development, both residential and commercial, tends to decrease continuing south along East 14th Street. There are no major employments or retail centers or educational institutions. Transit ridership is highly correlated with density: the higher the density of population and employment the higher the transit ridership. Preliminary assessments of demand for a BRT service extending south of Bayfair Center determined that the demand would be substantially less than demand for service extending north. Only 1,600 trips from the Ashland portion of unincorporated Alameda County (just south of Bayfair Center) to employment centers in the rest of the project corridor are forecast in 2020. The lower ridership potential would not support a major capital investment.

Development densities increase farther south, in the city of Hayward, approximately two and one-half miles south of Bayfair Center, particularly when entering the downtown centered on Foothill Boulevard and East 14th Street/Mission Boulevard at A Street. However, the downtown is well served by the Hayward BART Station and connecting bus services. The MIS concluded that a high level transit service from BayFair BART to Hayward BART was, as with service into unincorporated Alameda County, not warranted due to the high capital and operating costs. A regular trunk line service similar to what AC Transit operates at present was the preferred transit alternative for this area.