

West Contra Costa High-Capacity Transit Study
DRAFT TECHNICAL MEMORANDUM #15
Final Evaluation



February 2017



With
Kimley-Horn

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Acronyms and Abbreviations

BART	San Francisco Bay Area Rapid Transit District
BRT	bus rapid transit
HCT	high-capacity transit
HOV	high-occupancy vehicles (also known as carpools)
I-80	Interstate 80
O&M	Operating and maintenance
PDA	Priority Development Area(s)
MTC	Metropolitan Transportation Commission
SR-4	State Route 4
UPRR	Union Pacific Railroad
WCCTAC	West Contra Costa Transportation Advisory Committee
WCCTAC TAC	WCCTAC Technical Advisory Committee

EXECUTIVE SUMMARY







In an effort to reduce congestion and plan for future growth, the Western Contra Costa High-Capacity Transit (HCT) Study is evaluating options for major transit investments along I-80 corridor. The study is focused on rapid and direct services that can attract new riders among the 250,000 residents and provide a viable and competitive alternative to driving. The ultimate goal of the Study is to identify, evaluate, and refine projects to improve HCT in West County, expand alternatives to driving on congested streets and highways, and improve regional air quality and quality of life.

Central to the study purpose is providing WCCTAC with the analyses necessary to determine and advance the most promising HCT alternative(s). Eight initial alternatives for enhanced public transportation in West County were identified, including express bus, bus rapid transit (BRT), commuter rail, and BART options. These alternatives were structured to serve the key travel markets in West County and underwent an initial evaluation using screening criteria developed from the Study goals and objectives. The WCCTAC Board advanced five of the eight conceptual alternatives for further study based on feedback from the Study Management Group (SMG), WCCTAC Technical Advisory Committee (TAC), and community feedback. These five alternatives, which are briefly described in Table ES-1, were refined to provide better definition and subsequently underwent a second and final round of evaluation, which is discussed in this technical memorandum.

Evaluation criteria for this second tier screening included performance measures related to ridership; transit travel speed and reliability; access and connectivity; cost and efficiency; feasibility; and community. The alternatives for Capitol Corridor and for BRT on San Pablo and Macdonald Avenues emerged as the highest-performing options followed by the BRT on 23rd Street alternative, the BART extension via Rumrill Boulevard, the BART extension via Richmond Parkway, and then Express Bus alternative.







The Capitol Corridor alternative includes a fare subsidy with build-out of the Hercules Intermodal Transit Center. It performed well in the criteria involving travel speed and reliability, as commuter rail's dedicated rights-of-way boost transit travel time and are less likely to get stuck in traffic; quality of connections, as Amtrak stations are relatively well-served by other transit providers; time to implementation, as the fare subsidy does not involve further project development; and capital and operating costs, as costs are relatively low as the subsidy does not include capital infrastructure components and do not increase operating costs substantially. BRT on San Pablo and Macdonald Avenues also performed well with criteria related to increases in total ridership, given its improvements in locations with strong transit demand and that currently lack major transit connections; service to regional transit centers and priority

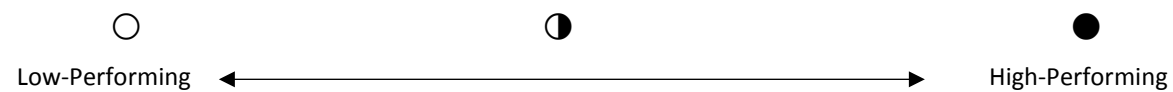
Table ES-1: Alternatives for Evaluation

Alternative	
	<p>Alternative 1: Express Bus on I-80 with expanded service between Hercules Transit Center and San Francisco and new service between Hercules Transit Center and Alameda County. For the proposed Alameda County service, trips would originate in the morning at the Hercules Transit Center and provide express service to Berkeley, Emeryville, and Oakland, with intermediate stops at the Richmond Parkway Transit Center and at a potential new Express Bus-BRT transit center at Macdonald Avenue and I-80 in Richmond.</p>
	<p>Alternative 2: San Pablo Avenue/Macdonald Avenue Bus Rapid Transit (BRT) between El Cerrito del Norte BART and Hercules Transit Center, serving the Richmond Parkway Transit Center, Hilltop Mall, Contra Costa College and a potential Express Bus-BRT Transit Center on the San Pablo alignment. A second branch would serve the Richmond BART/Capitol Corridor station on Macdonald Avenue and extend west to the Tewksbury Turnaround.</p>
	<p>Alternative 3: 23rd Street Bus Rapid Transit (BRT), from the Richmond Field Station and the Richmond Ferry Terminal to the Richmond BART/Capitol Corridor station continuing to Contra Costa College, with possible extension along San Pablo Avenue to Hilltop Mall and the Hercules Transit Center.</p>
	<p>Alternative 4: Fare subsidies on existing Capitol Corridor service for travel originating in West County or with final destinations in West County and completion of the Hercules Intermodal Transit Center, which would include a Capitol Corridor station.</p>
	<p>Alternative 6A: BART Extension from Richmond to Hercules via Rumrill Boulevard, along the UPRR right-of-way transitioning to 13th Avenue and Rumrill Boulevard (around the vicinity of Brookside Drive) before tunneling under Hilltop Mall then following the I-80 right-of-way to the Hercules Transit Center at Willow Avenue/SR-4.</p>
	<p>Alternative 6B: BART Extension from Richmond to Hercules via Richmond Parkway, along the UPRR right-of-way up to Richmond Parkway, east towards Giant Road before tunneling under Hilltop Mall then following the I-80 right-of-way to the Hercules Transit Center at Willow Avenue/SR-4.</p>

development areas (PDAs); and annualized cost per rider. The BRT on 23rd Street alternative also performed well, but this alternative's ridership projections and travel time reliability were lower than the BRT on San Pablo and Macdonald Avenues alternative. The two BART alternatives received high ratings for total and net ridership increases; transit time improvement and reliability as heavy rail's dedicated rights-of-way are conducive to trains travelling faster and not getting stuck in traffic congestion; and public and stakeholder support. But both BART alternatives' poor performance related to cost and efficiency as well as time to implementation pulled down their overall ratings. The Express Bus alternative did not perform as well as the other alternatives. While it performed well for the operating and maintenance costs criterion, its ratings for the other criteria were mediocre, including a moderate ridership increase; moderate transit travel time improvement and reliability; and service to regional transit centers and West County markets lacking major transit connections relative to the other alternatives.

Table ES-2 Summary of Criteria for Final Evaluation and Screening

EVALUATION CRITERIA	PERFORMANCE MEASURE	1. EXPRESS BUS	2. BRT ON SAN PABLO/MACDONALD AVE	3. BRT ON 23RD STREET	4. CAPITOL CORRIDOR FARE SUBSIDY + HTC	6A. BART EXTENSION VIA RUMRILL BOULEVARD	6B. BART EXTENSION VIA RICHMOND PARKWAY
 RIDERSHIP	Total riders	◐	●	◐	○	●	●
	Net new riders	○	◐	◐	○	●	●
 SPEED AND RELIABILITY	Transit travel time improvement	◐	◐	◐	●	●	●
	Transit travel time reliability	◐	◐	○	●	●	●
 ACCESS AND CONNECTIVITY	Regional transit centers served	◐	●	◐	◐	◐	◐
	Quality of connections to existing transit systems and facilities	○	◐	●	●	●	●
	Service to West County markets lacking major transit connections	◐	●	●	◐	◐	◐
 COST AND EFFICIENCY	Capital cost	◐	◐	◐	●	○	○
	Operating and maintenance cost	●	◐	◐	●	○	○
	Annualized cost per rider	◐	●	●	◐	○	○
 FEASIBILITY	Time to implementation	◐	◐	◐	●	○	○
 COMMUNITY	Consistency with local plans and policies	◐	◐	●	●	●	◐
	Public and stakeholder support	◐	◐	◐	●	●	●
	Economic and transit-oriented development (West County PDAs served)	○	●	●	○	◐	○



1 INTRODUCTION

1.1 Transportation Setting

West Contra Costa County is a sub-region within the Bay Area set between the San Francisco Bay and the East Bay hills. West Contra Costa Transportation Advisory Committee (WCCTAC) is responsible for transportation planning for the sub-region and one of four regional transportation planning committees in Contra Costa County, representing the West Contra Costa sub-area. These four committees were created in 1988 to guide transportation projects and programs included in the Measure C half-cent, transportation sales tax approved by Contra Costa voters. Measure C was succeeded by Measure J in 2004.

Transportation on Interstate 80 (I-80), the primary vehicular route running north-south through this sub-region, has major regional significance to Bay Area travelers. It is frequently one of the most congested freeway corridors in the region and often the most congested.¹ San Pablo Avenue, the former Highway 40, is a major arterial that runs roughly parallel and functions as a possible alternative to I-80 in some sections. It links each jurisdiction in West Contra Costa and is a key commercial thoroughfare for the sub-region. Interstate 580 (I-580), running perpendicular to I-80, connects travelers west to and from Marin County across the Richmond-San Rafael Bridge to I-80, and continues east through Alameda County and beyond.

Traffic is routinely congested during peak commute hours in the peak direction, as well as during off-peak hours and weekends when it is congested in both directions. Preliminary estimates indicate that work trips on the I-80 corridor are expected to increase by approximately 23 percent by 2040. Most trips originate from Richmond, San Pablo, Pinole, and Hercules and the three most frequently traveled destination zones external to the Study Area are Berkeley/Emeryville, Northeast San Francisco, and Oakland/Piedmont.²



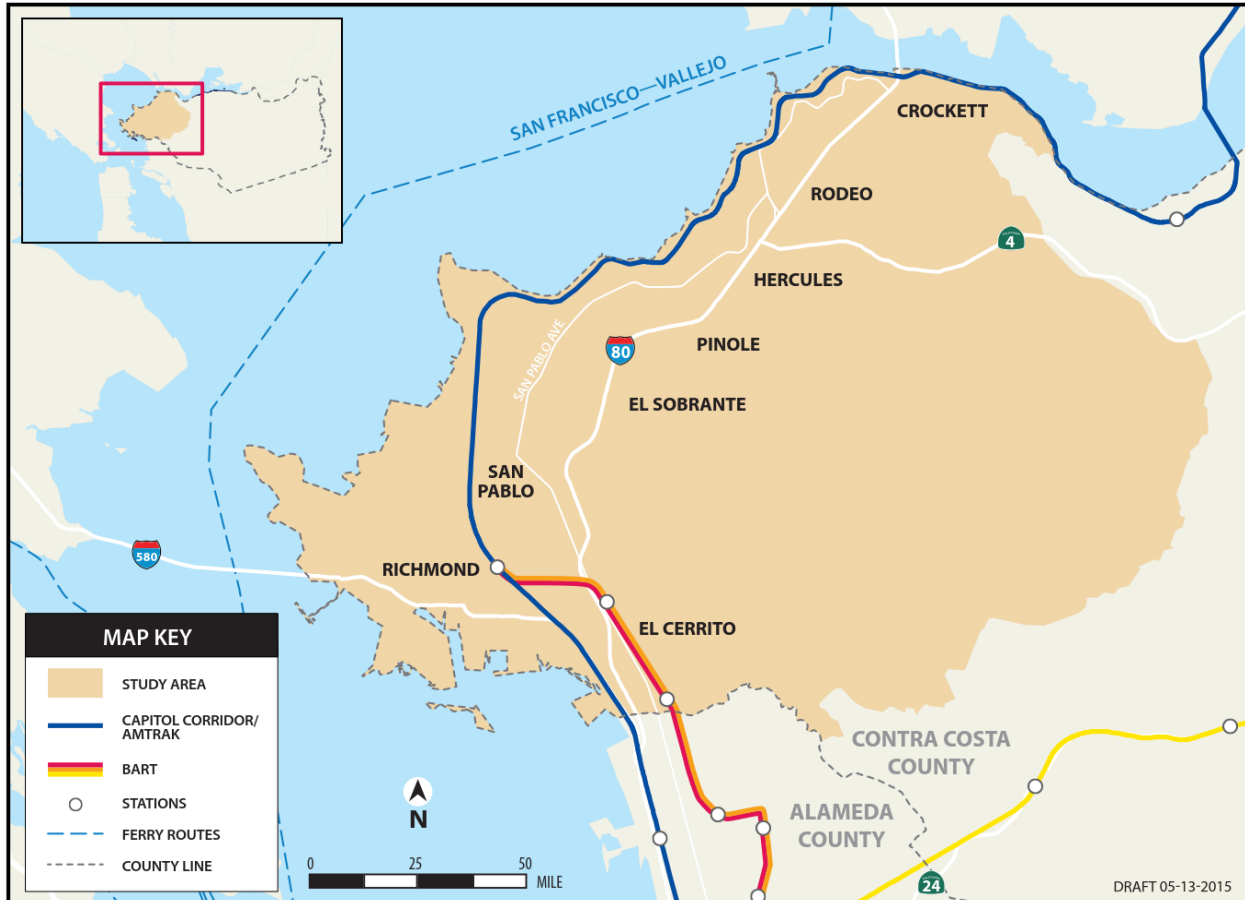
"Bay Area's Worst Commute is Westbound I-80" –
San Francisco Chronicle, December 17, 2015

¹ MTC, Vital Signs, December 2015, <http://mtc.ca.gov/whats-happening/news/fresh-data-bay-areas-vital-signs-include-new-top-10-list-freeway-congestion>

² *West Contra Costa High-Capacity Transit Study, Technical Memorandum #7, Travel Markets*, January 2016, WSP/Parsons Brinckerhoff, Kimley Horn, and Kittelson & Associates.

Figure 1-1 displays a map of the Study Area, which encompasses West Contra Costa County (West County) from the southern boundary at the Alameda County line north to the Carquinez Bridge and Solano County line. It also includes I-80, I-580, and State Route 4 (SR-4), as well as major surface streets, including San Pablo Avenue and Richmond Parkway.

Figure 1-1: Study Area



Source: WSP/Parsons Brinckerhoff and Kimley-Horn, 2015

1.2 Purpose of the Study

WCCTAC is conducting the West Contra Costa High-Capacity Transit Study to review multimodal high-capacity transit (HCT) options for reducing congestion and to plan for future growth, with consideration of costs and funding opportunities. HCT provides substantially higher levels of passenger capacity with typically fewer stops, higher speeds, and more-frequent service than community-based or local public bus services.

The purpose of this study is to identify and evaluate the feasibility and effectiveness of HCT options in West County for WCCTAC's consideration. Central to the study purpose is providing WCCTAC with the analyses necessary to determine and advance the most promising HCT alternative(s).

Why do we need this study?

Interstate 80 is one of the most congested corridors in the Bay Area, and the Richmond BART line often reaches full capacity during commute hours.

Since its inception in 1988, WCCTAC's policy goals have called for facilitating the use of transit, encouraging transit projects aimed at congestion relief, and participating in studies focused on transit capital investments. West County action plans since that time have included consideration and prioritization of transit improvements such as express bus expansion, ferry implementation, a BART extension, and other types of rail improvements. For example, the most recent 2014 Action Plan called for participation in a study of HCT options in the I-80 corridor.³

This study's investment strategy will position WCCTAC to be competitive for transportation funds within the county and to leverage outside funding sources. The transit capital investments will also benefit a wide range of people and trip types in West County.

1.2.1 Study Activities to Date

Eight initial conceptual alternatives for enhanced public transportation in West County were identified, including express bus, bus rapid transit, commuter rail, and BART options. These alternatives were structured to serve the key travel markets in West County, providing alternatives to driving on I-80 and transit options for getting around and within West County.⁴ These alternatives were evaluated against screening criteria developed from the study goals and objectives.⁵ Preliminary capital and operating cost estimates were also prepared. This information was presented to the Study Management Group (SMG), WCCTAC Technical Advisory Committee (TAC), and at general community open houses in spring of 2016 as well as on the study's website. The WCCTAC Board advanced five of the eight conceptual alternatives for further study.

³ Item #46 of the 2014 West County Action Plan.

⁴ West Contra Costa High-Capacity Transit Study, Technical Memorandum #7, Travel Markets, January 2016, WSP/Parsons Brinckerhoff, Kimley Horn, and Kittelson & Associates.

⁵ West Contra Costa High-Capacity Transit Study, Technical Memorandum #8, Preliminary Alternatives, January 2016, WSP/Parsons Brinckerhoff, Kimley Horn, and RL Banks.

West Contra Costa High-Capacity Transit Study, Technical Memorandum #10, Preliminary Evaluation and Screening, May 2016, WSP/Parsons Brinckerhoff, Kimley Horn, and MLee Corporation.

These five alternatives, which are briefly described in Table 1-1, were refined to provide better definition and to determine how the improvements might be phased in over the short-term (one to five years); medium-term (five to 15 years) and long-term (more than 15 years).

Technical Memorandum #11: Alternatives Refinement includes a full description of the alternatives.⁶

More detailed capital and operating cost assumptions were developed for each of the refined alternatives, to refine the capital and operating cost estimates presented in Phase 1. The range of alternatives offer a framework for development of a sound transit network in West County. If the WCCTAC Board decides to carry these options forward for further study, project development and environmental review would occur under the guidance of the Board, staff, and stakeholders.

⁶ *West Contra Costa High-Capacity Transit Study, Technical Memorandum #11, Alternatives Refinement*, November 2016, WSP/Parsons Brinckerhoff, Kimley Horn, WCCTAC.

Table 1-1: Alternatives for Evaluation







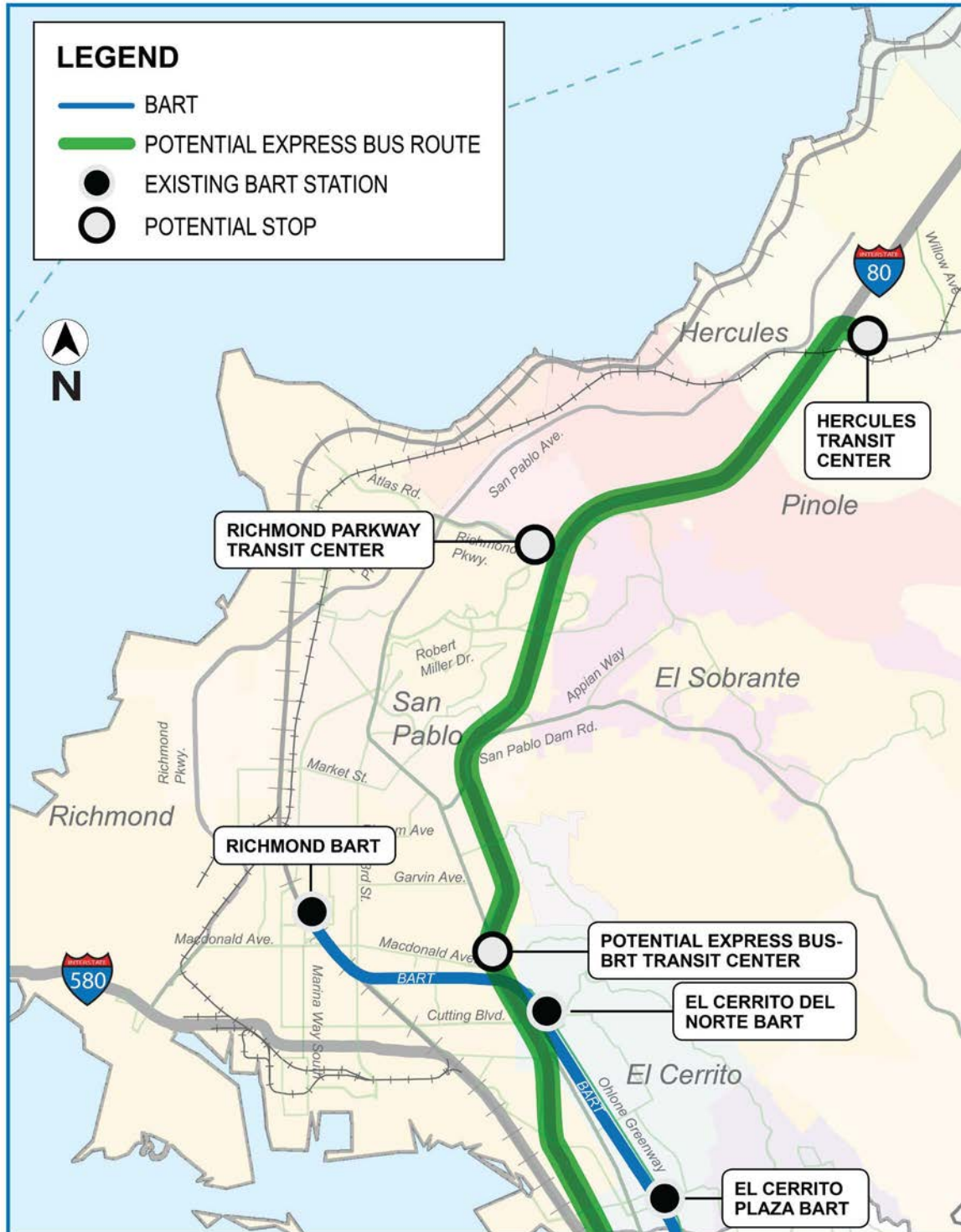
Alternative	
	<p>Alternative 1: Express Bus on I-80 with expanded service between Hercules Transit Center and San Francisco and new service between Hercules Transit Center and Alameda County. For the proposed Alameda County service, trips would originate in the morning at the Hercules Transit Center and provide express service to Berkeley, Emeryville, and Oakland, with intermediate stops at the Richmond Parkway Transit Center and at a potential new Express Bus-BRT transit center at Macdonald Avenue and I-80 in Richmond. (See Figure 1-2 and Figure 1-3.)</p>
	<p>Alternative 2: San Pablo Avenue/Macdonald Avenue Bus Rapid Transit (BRT) between El Cerrito del Norte BART and Hercules Transit Center, serving the Richmond Parkway Transit Center, Hilltop Mall, Contra Costa College and a potential Express Bus-BRT Transit Center on the San Pablo alignment. A second branch would serve the Richmond BART/Capitol Corridor station on Macdonald Avenue and extend west to the Tewksbury Turnaround. (See Figure 1-4.)</p>
	<p>Alternative 3: 23rd Street Bus Rapid Transit (BRT), from the Richmond Field Station and the Richmond Ferry Terminal to the Richmond BART/Capitol Corridor station continuing to Contra Costa College, with possible extension along San Pablo Avenue to Hilltop Mall and the Hercules Transit Center. (See Figure 1-5.)</p>
	<p>Alternative 4: Fare subsidies on existing Capitol Corridor service for travel originating in West County or with final destinations in West County and completion of the Hercules Intermodal Transit Center, which would include a Capitol Corridor station.</p>
	<p>Alternative 6A: BART Extension from Richmond to Hercules via Rumrill Boulevard, along the UPRR right-of-way transitioning to 13th Avenue and Rumrill Boulevard (around the vicinity of Brookside Drive) before tunneling under Hilltop Mall then following the I-80 right-of-way to the Hercules Transit Center at Willow Avenue/SR-4. (See Figure 1-6.)</p>
	<p>Alternative 6B: BART Extension from Richmond to Hercules via Richmond Parkway, along the UPRR right-of-way up to Richmond Parkway, east towards Giant Road before tunneling under Hilltop Mall then following the I-80 right-of-way to the Hercules Transit Center at Willow Avenue/SR-4. (See Figure 1-7.)</p>

Figure 1-2: Refined Alternative 1: Express Bus Service – Service in West County



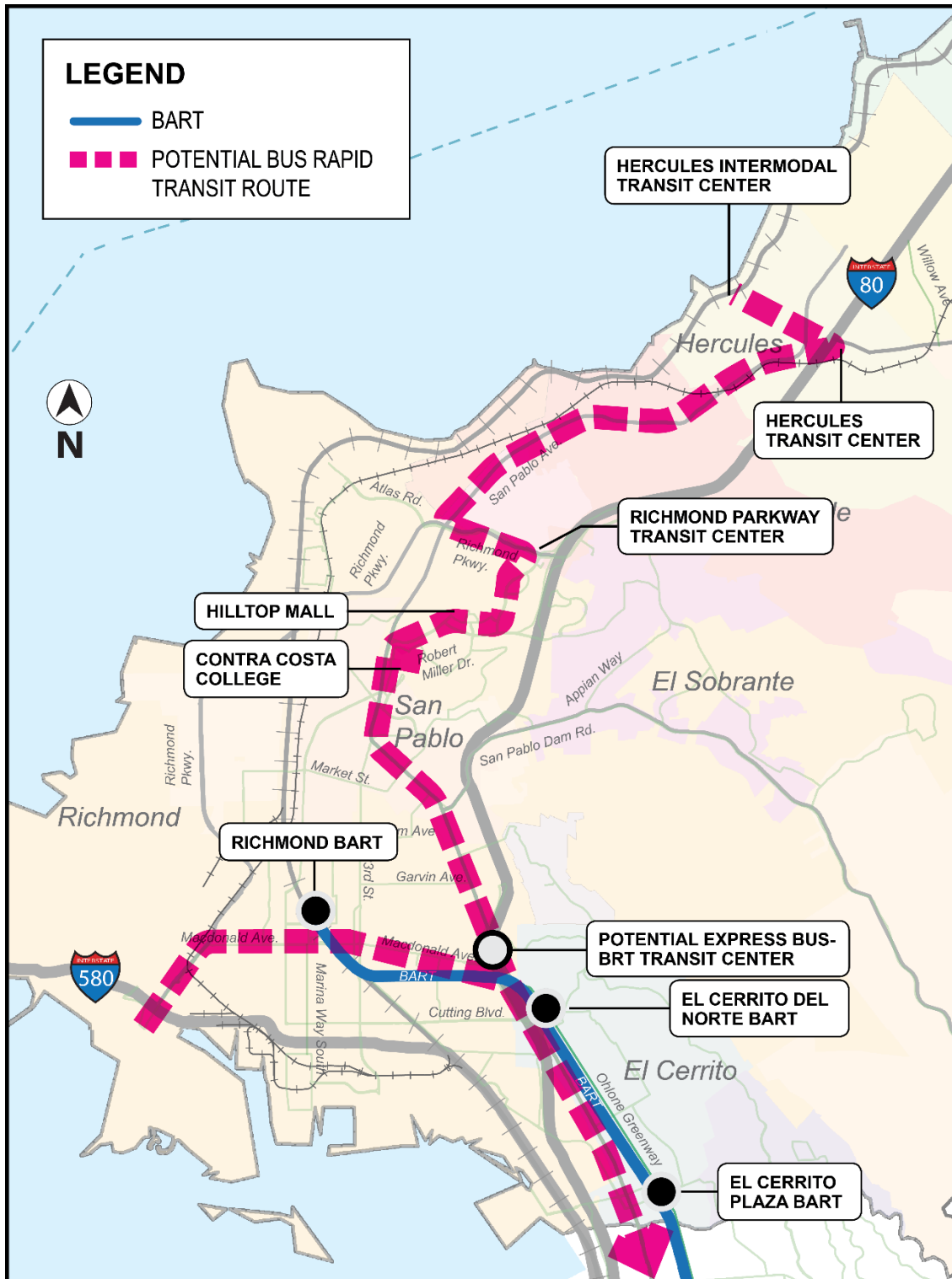
Source: Kimley-Horn and WSP/Parsons Brinckerhoff, 2016

Figure 1-3: Refined Alternative 1: Express Bus Service – Service in Alameda County



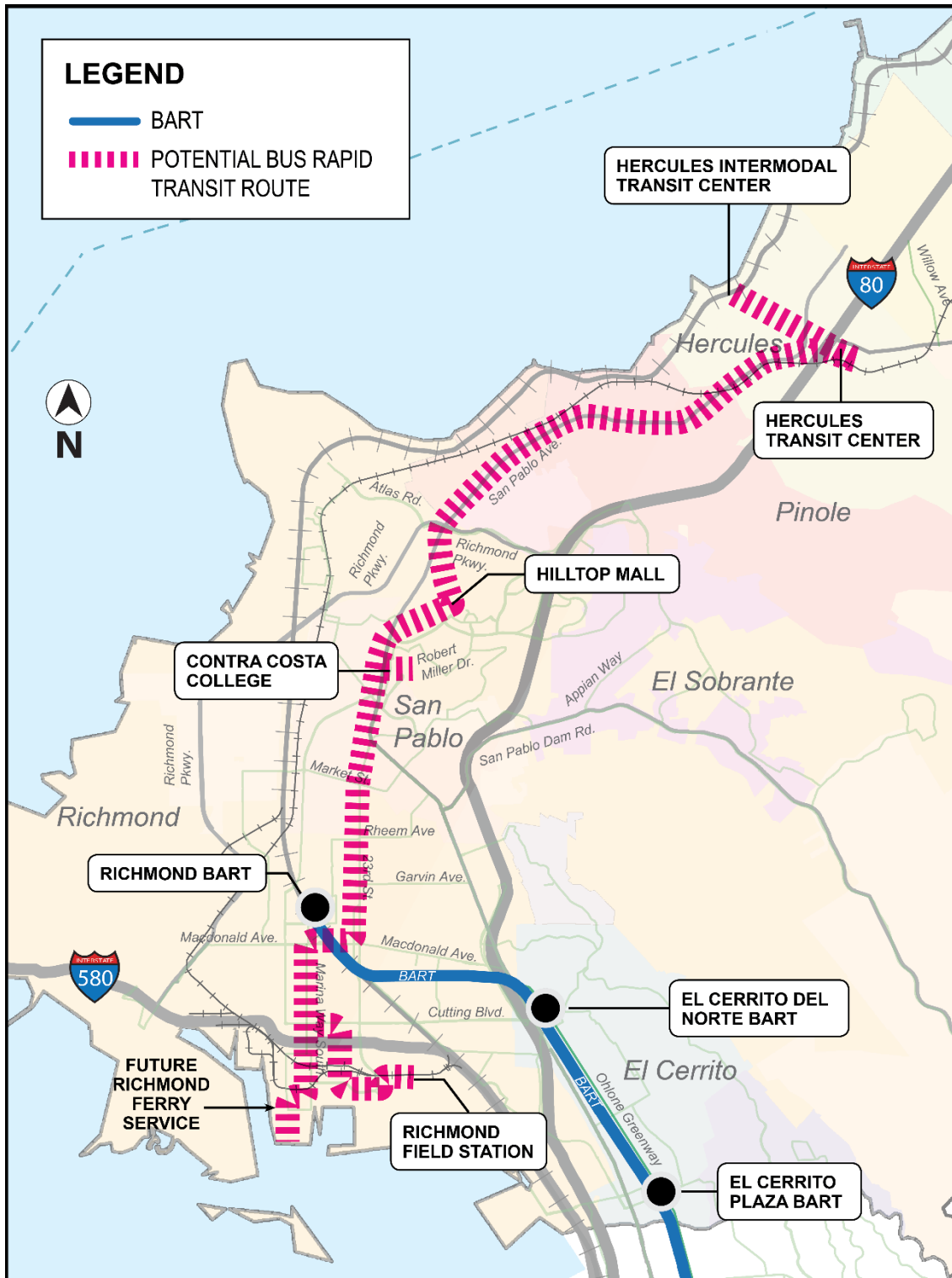
Source: Kimley-Horn and WSP/Parsons Brinckerhoff, 2016

Figure 1-4: Refined Alternative 2—San Pablo Avenue/Macdonald Avenue BRT



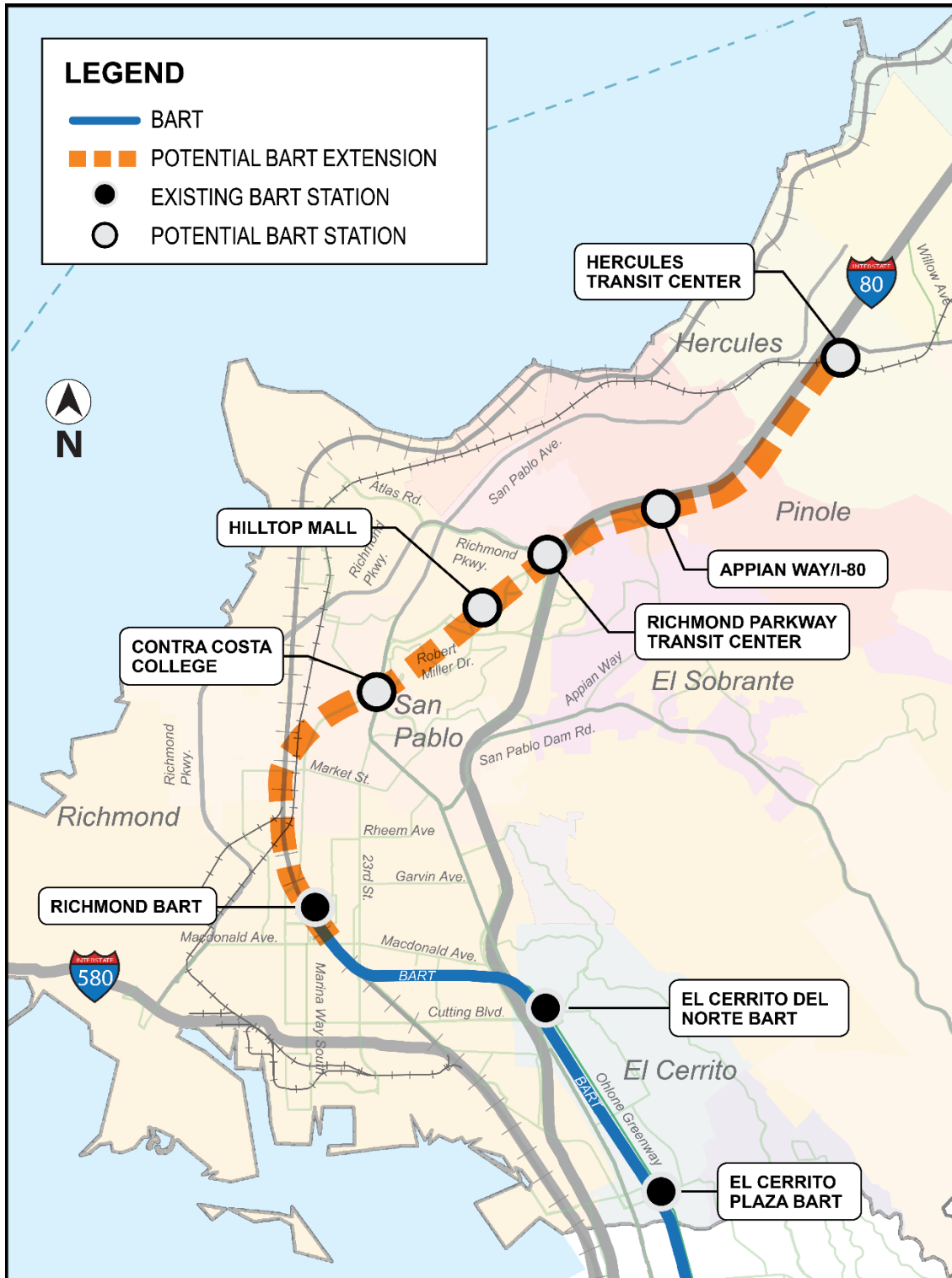
Source: Kimley-Horn, WSP/Parsons Brinckerhoff, 2016

Figure 1-5: Alternative 3—23rd Street BRT



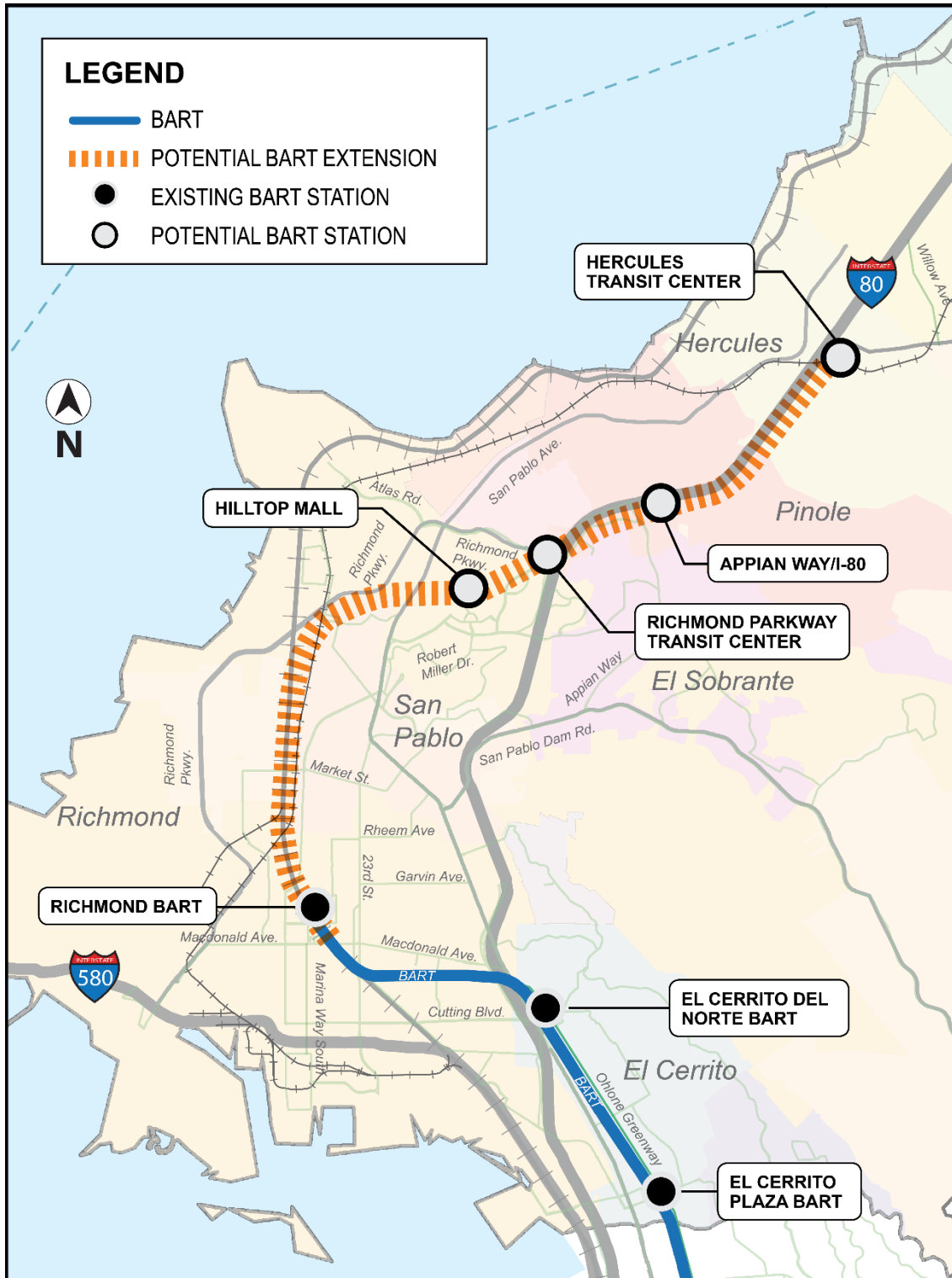
Source: Kimley-Horn, WSP/Parsons Brinckerhoff, 2016

Figure 1-6: Refined Alternative 6A—BART Extension from Richmond Station to Hercules via Rumrill Boulevard



Only one or two BART stations would be constructed.
 Source: WSP/Parsons Brinckerhoff, 2016

Figure 1-7: Alternative 6B—BART Extension from Richmond Station to Hercules via Richmond Parkway

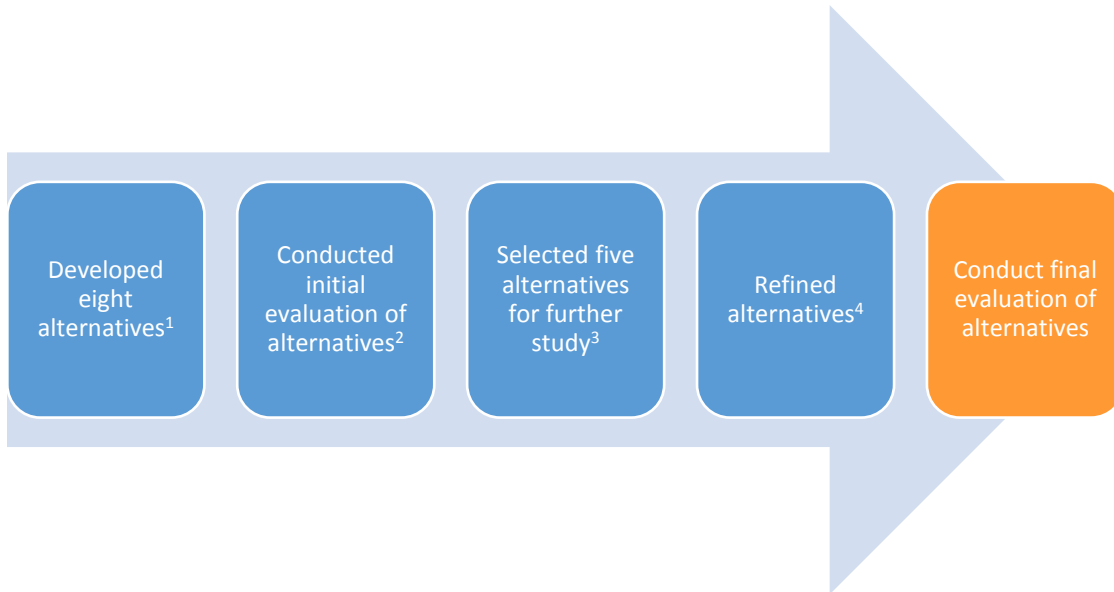


Only one or two BART stations would be constructed.

Source: WSP/Parsons Brinckerhoff, 2016

1.3 Purpose of this Technical Memorandum

The refined alternatives were evaluated against a set of six key criteria summarized in Table 1-2 along with the methodology that was used to assess each performance measure. The results are presented in this document for the WCCTAC Board to review each alternative’s various features prior to making decisions about which one(s) to advance for further development.









¹ See *West Contra Costa High-Capacity Transit Study: Technical Memorandum #8, Preliminary Alternatives*, January 2016

² See *West Contra Costa High-Capacity Transit Study: Technical Memorandum #10, Preliminary Evaluation and Screening*, May 2016

³ WCCTAC Board action, May 27, 2016

⁴ See *West Contra Costa High-Capacity Transit Study: Technical Memorandum #11, Alternatives Refinement*, November 2016

Table 1-2: Criteria, Performance Measure, and Methodology for Final Evaluation and Screening

EVALUATION CRITERIA	PERFORMANCE MEASURE	METHODOLOGY
 RIDERSHIP	Total riders	Results from ridership modeling*
	Net new riders	Results from ridership modeling*
 SPEED AND RELIABILITY	Transit travel time improvement	Change in travel time with and without project improvements
	Transit travel time reliability	Length of route in exclusive guideway or dedicated transit lanes
 ACCESS AND CONNECTIVITY	Regional transit centers served	Existing BART stations, multimodal transit centers, and major business districts with high levels of transit that are directly served by alternative
	Quality of connections to existing transit systems and facilities	Ease of movement and transfers between different modes of transit and/or within the same mode
	Service to West County markets lacking major transit connections	Service to markets currently lacking major transit connections
 COST AND EFFICIENCY	Capital cost	Order-of-magnitude capital cost
	Operating and maintenance cost	Annualized O&M cost
	Annualized cost per rider	Annualized capital and annualized O&M cost per rider (total annualized costs/total annual riders)
 FEASIBILITY	Time to implementation	Time to benefit, i.e., improvements can be made in shorter time period
 COMMUNITY	Consistency with local plans and policies	Consistency with local plans and policies
	Public and stakeholder support	Public and stakeholder support for proposed alternative
	Economic and transit-oriented development (West County PDAs served)	West County PDAs served

* See West Contra Costa High-Capacity Transit Study, Technical Memorandum #12, Ridership Estimates, February 2017, Kittelson & Associates.

Table 2-1: Packages for Travel Demand Forecasting

Package	Time Horizon	Description
A	2020	Express Bus + San Pablo BRT
B	2020	Express Bus + 23rd Street BRT
C	2040	Express Bus + San Pablo BRT + 23rd Street BRT + BART Rumrill Boulevard alignment
D	2040	Express Bus + San Pablo BRT + 23rd Street BRT + BART Richmond Parkway alignment
E	2040	Express Bus + San Pablo BRT + 23rd Street BRT

Table 2-2: 2020 Transit Ridership Forecasts

Transit Operator	2020	2020 Package A		2020 Package B	
	No Build	Total	Net New	Total	Net New
BART West County Ridership ¹	21,103	21,979	876	20,888	(215)
<i>Richmond</i>	5,051	4,831	(198)	5,471	420
<i>El Cerrito del Norte</i>	10,156	10,461	305	9,704	(452)
<i>El Cerrito Plaza</i>	5,896	6,665	769	5,713	(183)
AC Transit Local	7,896	7,591	(305)	7,754	(142)
AC Transit San Pablo/Macdonald Corridor (Total Corridor) ²	17,117	29,906	12,789	16,007	(1,110)
<i>AC Transit San Pablo Corridor (West County only)</i> ²	4,453	6,316	1,863	3,701	(752)
<i>AC Transit Macdonald Corridor (West County only)</i> ²	1,935	3,701	400	1,775	(160)
AC Transit 23rd Street Corridor ³	NA	NA	NA	4,108	4,108
AC Transit Transbay ⁴	2,441	3,151	710	3,954	1,153
AC Transit Express Bus to Alameda County ⁵	NA	1,116	1,116	1,231	1,231
WestCAT Local & Regional ⁶	1,822	1,924	102	1,941	119
WestCAT Express & Transbay ⁷	3,863	4,494	631	4,477	614
Capitol Corridor ⁸	NA	NA	NA	NA	NA

Source: Kittelson Associates, February 2017. Further documented in *West Contra Costa High-Capacity Transit Study: Technical Memorandum #12*, February 2017, Kittelson & Associates

- ¹ All BART Alternatives include ridership at the following BART stations: El Cerrito Plaza, El Cerrito del Norte, and Richmond. Package C includes BART stations at Contra Costa College, Richmond Parkway, and Hercules Transit Center. Package D includes BART stations at Hilltop Mall, Appian Way, and Hercules Transit Center. Package E includes bus improvements with no BART extension.
- ² AC Transit counts include existing Bus Rapid Transit on San Pablo Avenue transitioning to BRT/Rapid Bus on San Pablo Avenue and Macdonald Avenue (72, 72R, and 72M).
- ³ AC Transit count for 23rd Street BRT does not include 74 line.
- ⁴ AC Transit transbay counts include the G, H, and L lines.
- ⁵ AC Transit Express to Alameda County includes express bus lines to Berkeley, Emeryville, and Oakland.
- ⁶ WestCAT local and regional lines include lines serving West Contra Costa County except express and transbay routes.
- ⁷ WestCAT express routes include J, JX, and JPX.
- ⁸ Capitol Corridor ridership reflects the estimated ridership at the proposed Hercules Intermodal Station assumed as part of the No Build scenario.

Table 2-3: 2040 Transit Ridership Forecasts

Transit Operator	2040 No Build	2040 Package C		2040 Package D		2040 Package E	
		Total	Net New	Total	Net New	Total	Net New
BART West County Ridership ¹	26,157	32,534	6,377	32,163	6,006	27,216	1,059
<i>Hercules Transit Center</i>	NA	7,085	7,085	6,540	6,540	NA	NA
<i>Appian Way</i>	NA	NA	NA	3,646	3,646	NA	NA
<i>Richmond Parkway Transit Center</i>	NA	2,883	2,883	NA	NA	NA	NA
<i>Hilltop Mall</i>	NA	NA	NA	2,393	2,393	NA	NA
<i>Contra Costa College</i>	NA	4,543	4,543	NA	NA	NA	NA
<i>Richmond</i>	6,538	5,883	(1,155)	6,776	238	6,827	289
<i>El Cerrito del Norte</i>	12,845	4,580	(7,905)	4,635	(7,850)	12,343	(142)
<i>El Cerrito Plaza</i>	7,134	8,060	929	8,173	1,039	8,046	912
AC Transit Local ²	10,626	10,074	(552)	10,392	(264)	9,722	(904)
AC Transit San Pablo/Macdonald Corridor (Total Corridor) ²	23,542	40,761	17,219	39,422	15,880	38,823	15,281
<i>AC Transit San Pablo Corridor (West County only)²</i>	5,657	9,795	4,138	8,452	2,796	8,227	2,570
<i>AC Transit Macdonald Corridor (West County only)²</i>	2,593	3,007	414	3,009	416	3,005	422
AC Transit 23rd Street Corridor ³	NA	5,335	5,335	5,341	5,341	5,247	5,247
AC Transit Transbay ⁴	3,012	3,382	370	3,764	752	3,778	766
AC Transit Express Bus to Alameda County ⁴	NA	1,580	1,580	1,558	1,558	2,050	2,050
WestCAT Local & Regional ⁶	2,291	2,494	203	3,281	990	2,006	(285)
WestCAT Express & LYNX ⁷	5,123	4,160	(963)	5,198	75	5,315	192
Capitol Corridor ⁸	420	427	7	425	5	436	16

Source: Kittelson Associates, February 2017. Further documented in *West Contra Costa High-Capacity Transit Study: Technical Memorandum #12*, February 2017, Kittelson & Associates

¹ All BART Alternatives include ridership at the following BART stations: El Cerrito Plaza, El Cerrito del Norte, and Richmond. Package C includes BART stations at Contra Costa College, Richmond Parkway, and Hercules Transit Center. Package D includes BART stations at Hilltop Mall, Appian Way, and Hercules Transit Center. Package E includes bus improvements with no BART extension.

² AC Transit counts include existing Bus Rapid Transit on San Pablo Avenue transitioning to BRT/Rapid Bus on San Pablo Avenue and Macdonald Avenue (72, 72R, and 72M).

³ AC Transit count for 23rd Street BRT does not include 74 line.

⁴ AC Transit transbay counts include the G, H, and L lines.

⁵ AC Transit Express to Alameda County includes express bus lines to Berkeley, Emeryville, and Oakland.

⁶ WestCAT local and regional lines include lines serving West Contra Costa County except express and transbay routes.

⁷ WestCAT express routes include J, JX, and JPX.

⁸ Capitol Corridor ridership reflects the estimated ridership at the proposed Hercules Intermodal Station assumed as part of the No Build scenario.

2.1.1 Total Riders

This criterion focuses on the anticipated total transit ridership generated under each package of improvements. In other words, which packages of improvements would generate the greatest overall transit ridership and what is the relative contribution of each of the alternatives to achieving the ridership. By packaging the alternatives, we were able to account for the benefits gained by having an integrated transit network that provides a full range of services.







The two BART alternatives and the San Pablo/Macdonald Avenues BRT would generate the most substantial ridership. The BART Rumrill Boulevard alternative, with stations at Contra Costa College, Richmond Parkway, and Hercules Transit Center, is projected to have 14,510 riders in 2040. The BART Richmond Parkway alternative, with stations at Hilltop Mall, Appian Way, and Hercules Transit Center, would generate a slightly lower projected ridership at 12,580 riders in 2040. Additional analysis on the stations is warranted if the BART projects move forward, however. Based on current analysis, the intermediate stations at Contra Costa College and Appian Way would generate the highest ridership.

The San Pablo Avenue/Macdonald Avenue BRT alternative generates a high level of transit ridership for West County, in both the short-term and the long-term. The high ridership levels projected for the San Pablo Avenue/Macdonald Avenue corridor, about 29,910 riders in 2020 and in the range of 38,820 to 40,760 riders in 2040, reflect the high transit demand for travel within West County and connecting to northern Alameda County. The ridership for the portion solely within West County is 8,650 in 2020 and in the range of 11,240 to 12,800 for 2040. In 2040, ridership on San Pablo Avenue would be 8,230 to 9,800 riders, and 3,000 to 3,010 riders on Macdonald Avenue.

The 23rd Street BRT would generate about 4,700 riders in 2020 and up to 6,260 in 2040. Though it does not generate ridership as high as the other alternatives, the improvements on 23rd Street represent a high level of daily ridership on this corridor.

Table 2-4 summarizes the relative ratings of the alternatives as to their contribution to total transit ridership.

Table 2-4: Total Riders

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		The combined express bus and transbay transit services of AC Transit and WestCAT are projected to deliver in the range of 9,120 to 11,140 transit passengers in 2040. This is a crucial service to West County that complements the BART system. A BART extension would compete with this service for transit riders.
2. San Pablo Avenue/Macdonald Avenue BRT		The San Pablo/Macdonald corridor is expected to deliver in the range of 11,240 to 12,800 transit passengers in 2040, depending on the package of improvements implemented. Implementation of the BART extension does not appreciably affect this ridership.
3. 23rd Street BRT		The 23rd Street BRT is expected to generate from 5,250 to 5,340 transit passengers in 2040, depending on the package of improvements implemented. Implementation of the BART extension does not appreciably affect this ridership.
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		The introduction of a new Capitol corridor service would not be highly sensitive to the other new transit services proposed. This service would provide an alternative that makes regional connections to the counties to the north and south of West Contra Costa County.
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		BART, with the proposed Rumrill Boulevard Alternative, is projected to generate 14,510 transit riders at the three new stations and approximately 32,530 BART transit riders in West County in 2040. The BART system would be the second largest overall contributor to transit ridership in West County.
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		BART, with the proposed Richmond Parkway Alternative, is projected to generate 12,580 transit riders at the three new stations and approximately 32,160 BART transit riders in West County in 2040. The BART system would be the second largest overall contributor to transit ridership in West County.

2.1.2 New Riders

This criterion focuses on the anticipated net new riders that would be using the transit service provided by the study's alternatives. This is the number of total riders who would use the new transit service minus the ridership growth represented in the No Build scenario. The range in ridership is dependent on the package of improvements assumed in each package of improvements.

For example, for the Express Bus alternative, the No Build would not include AC Transit express bus service to Alameda County, as that service does not exist today. However, it does include AC Transit transbay service from the study area to and from San Francisco, which is shown to increase by 710 to 1,150 riders (or up to 47 percent) in 2020 and increase by 370 to 770 riders (or up to 25 percent) in 2040, depending on the package of improvements put in place. The introduction of new bus service to Berkeley, Emeryville, and Oakland, is projected to add 1,120 to 1,230 new riders in 2020 and 1,560 to 2,050 new riders in 2040.

Compared to the No Build scenario, ridership on the entire San Pablo Avenue/Macdonald Avenue BRT corridor (extending into Alameda County) is projected to increase by 12,790 riders (or 75 percent) in 2020 if the San Pablo/Macdonald Avenue BRT is put in place. For the portion of the corridor solely within West County, implementation of the San Pablo Avenue/Macdonald Avenue BRT would result in 2,260 net new riders in 2020 and in the range of 2,990 to 4,550 in 2040. The implementation of the BART extension would provide a boost to transit ridership on the San Pablo Avenue/Macdonald Avenue corridor.

In contrast, the 2020 ridership on entire San Pablo Avenue and Macdonald Avenue corridor would decrease by 910 riders, and ridership on 23rd Street would increase by 4,110 if only the 23rd Street BRT is implemented. In 2040, the increase in transit ridership on the 23rd Street BRT would range from 5,250 to 5,340 riders, which is higher than the projected ridership for the San Pablo Avenue/Macdonald Avenue BRT alternative.







In the future, both BRT projects are expected to be in place and would work in concert with each other to increase transit ridership. With the introduction of BART service, the ridership on the BRT lines would decrease, particularly for the BART alignment along Rumrill Boulevard as it provides enhanced service to Contra Costa College.

For the BART alternatives, an increase of 6,010 to 6,380 net new riders is anticipated by 2040 (up to 32 percent). The Hercules Transit Center, which would become the new end of the line station, would have the highest ridership out of six stations in West County. With the new BART stations, riders would be pulled away from the El Cerrito del Norte station and to a lesser degree from the Richmond Station. Ridership would decline from 7,850 to 7,910 at El Cerrito del Norte and up to 1,160 at the Richmond Station. The El Cerrito Plaza Station ridership would continue to grow under all 2040 scenarios in the range of 910 to 1,040.

The projected declines in ridership at the El Cerrito del Norte and Richmond stations are anticipated, as the BART extension northward is expected to relieve congestion and parking shortages at the El Cerrito del Norte station. Terminus rail stations tend to have larger ridership, and the BART extension would remove that status for the Richmond station, thereby curbing its ridership increase (at least by percentage).

Table 2-5 summarizes the relative ratings for the five alternatives in terms of their potential to generate new transit riders in West Contra Costa County.

Table 2-5: Net New Riders

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		The Express Bus service would add in the range of 1,580 to 2,080 new transit riders from West Contra Costa County to Alameda County and from 370 to 770 riders transbay for AC Transit. The WestCAT and LYNX service would experience either a ridership decline or only slight increases with the proposed long-range transit improvements.
2. San Pablo Avenue/Macdonald Avenue BRT		The introduction of BRT and extension of Rapid Bus on the San Pablo and MacDonald corridors, is projected to result in the largest increase in transit riders of all of the investments, ranging from 2,990 to 4,550 net new transit riders for this corridor.
3. 23rd Street BRT		The introduction of BRT and expanded BRT service to the 23rd Street corridor would result in a substantial increase of 5,250 to 5,340 net new transit riders in this corridor.
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center ¹		The proposed Hercules Intermodal Transit Center is projected to attract approximately 450 new transit riders in this corridor. With the addition of a fare subsidy, this is projected to generate in the range of 1,550 to 2,320 net new riders for the stations
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		The BART extension via Rumrill Boulevard would add approximately 6,380 net new riders to BART, with the highest ridership at the Hercules Transit Center, which would become the new end of the line station. The ridership at the El Cerrito del Norte Station was projected to decline, by 7,900 passengers.
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		The BART extension via Richmond Parkway would add approximately 6,010 net new BART riders, with the highest ridership at the Richmond Transit Center. The ridership at the El Cerrito del Norte Station would decline by about 7,850 passengers.

¹ West Contra Costa High-Capacity Transit Study, Technical Memorandum #11, December 2016, WSP / Parsons Brinckerhoff, and Kimley-Horn. Technical Memorandum #11 evaluates the potential to achieve additional ridership on the Capitol Corridor with fare subsidies. A 50 percent fare subsidy was projected to generate an additional 1,547 new riders and a 75 percent fare subsidy was projected to generate an additional 2,320 new riders in the West County corridor.

2.2 Speed and Reliability







2.2.1 Transit Travel Time Improvement

Improving transit travel time to make it a more attractive alternative than auto travel is critical. More *new* transit trips are expected to be generated if HCT alternatives provide significant decreases in travel times compared to existing service. For some alternatives, new infrastructure, such as direct access ramps for the Express Bus alternative and bus priority signals for the BRT alternatives, would improve upon existing service by helping buses move more quickly through surface streets.

Greater reductions to travel time are also possible by providing new rail transit opportunities. A new station at the Hercules Intermodal Transit Center in combination with subsidized Capitol Corridor fares for trips within West County and connecting to Berkeley, Emeryville, and Oakland would create an opportunity to take advantage of the quicker travel time on the Capitol Corridor for shorter trips. Extending BART from Richmond to Hercules would reduce the transit travel time for trips within West County and those continuing on the BART system to other regional destinations.

Table 2-6 summarizes the rates of each alternative relative to transit travel time improvements.

Table 2-6: Transit Travel Time Improvement

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		More frequent service and new infrastructure provide travel time improvement for existing service as well as new service
2. San Pablo Avenue/Macdonald Avenue BRT		More frequent service and new infrastructure provide travel time improvement for existing service
3. 23rd Street BRT		More frequent service and new infrastructure provide travel time improvement for existing service as well as new service
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		Commuter rail provides travel time improvement over existing bus transit service by making Capitol Corridor available to more potential users
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		New rail service provides travel time improvement over existing bus transit service
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		New rail serviced provides travel time improvement over existing bus transit service

2.2.2 Transit Travel Time Reliability

Travel time reliability is another major factor that makes transit more attractive and encourages people to take transit rather than drive. Reliability is directly related to travel time: the more dependable the transit alternative, the less time a user must allow in making a trip, including the time waiting for transit at a station or stop and the time spent in the transit vehicle traveling to a destination. Transit modes operating in exclusive guideways are the most reliable as they do not get stalled by traffic congestion or accidents. Exclusive guideways may be shared with similar modes (e.g., passenger and freight rail) but not mixed traffic (e.g., private automobiles). Dedicated transit lanes, which are lanes that adjoin travel lanes of other modes and whose use may at times be shared by other modes (e.g. emergency vehicles), offers the second most reliable option compared to exclusive guideways.

The alternatives are rated according to the extent of its alignment operating on exclusive guideway or dedicated lanes. The highest rating is given to rail alternatives that operate in exclusive guideway. The lowest rating is assigned to the 23rd Street BRT alternative that would operate in dedicated lanes on less than 40 percent of the corridor and therefore may experience frequent operational conflicts with other modes – although BRT features on under this alternative would likely be an improvement over existing conditions. The Express Bus and San Pablo/Macdonald BRT alternatives that have the potential to operate in exclusive lanes on more than half of the corridor are rated with moderate performance.

The results of the travel time reliability ratings are summarized in Table 2-7.

Table 2-7: Transit Travel Time Reliability

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Alignment 88% in dedicated (HOV) lanes; somewhat unreliable travel times due to HOV lane congestion and need for buses to cross mixed-flow lanes
2. San Pablo Avenue/Macdonald Avenue BRT		Alignment proposed to be 70% dedicated lanes although may not be possible; conflicts with autos likely at intersections; frequent stops although fewer than for local bus service
3. 23rd Street BRT		Alignment proposed to be 40% dedicated lanes although may not be possible; conflicts with autos likely at intersections; frequent stops although fewer than for local bus service
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		Alignment within exclusive railroad right-of-way, with some at-grade crossings. Shared use with freight rail operations can reduce reliability
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		Alignment 100% exclusive guideway with no at-grade crossings, no shared use of corridor
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		Alignment 100% exclusive guideway with no at-grade crossings, no shared use of corridor







2.3 Access and Connectivity

2.3.1 Regional Transit Centers Served

Transit needs to serve desirable destinations to be convenient for users. These can be regional transit centers that connect passengers to other services or can be destinations in themselves. Accessibility and connectivity were measured by the number of regional transit or activity centers that each alternative served. Regional transit centers include existing and planned/proposed BART stations, multimodal transit centers, rail stations, and major business districts with high levels of transit. The San Pablo Avenue/Macdonald Avenue BRT alternative would have the best accessibility and connectivity of the alternatives with the remaining alternatives comparable with moderate accessibility and connectivity.

The performance rating and number of transit centers within West County served by each alternative is shown in Table 2-8.

Table 2-8: Regional Transit Centers Served

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Connects three existing regional transit centers (Hercules Transit Center, Richmond Parkway Transit Center, and El Cerrito del Norte BART) and one potential regional transit center at Macdonald Avenue and I-80. This service level would not be achieved if only operational improvements were implemented (such as adding schedules to existing service).
2. San Pablo Avenue/Macdonald Avenue BRT		Connects eight existing regional transit centers (six along San Pablo Avenue (Hercules Transit Center, Richmond Parkway Transit Center, Hilltop Mall, Contra Costa College, El Cerrito del Norte BART, El Cerrito Plaza BART) and two along Macdonald Avenue (Richmond BART and Tewksbury Turnaround)) and one potential regional transit center at Macdonald Avenue and I-80
3. 23rd Street BRT		Connects five regional transit centers (Hercules Transit Center, Hilltop Mall, Contra Costa College, Richmond BART, and Ford Point Ferry Terminal)
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		Connects three regional transit centers (Hercules Intermodal Transit Center, Martinez Amtrak, and Richmond BART) as well as transit centers in Alameda and Santa Clara Counties served by Capitol Corridor (Oakland Jack London Square, Diridon Station)
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		Connects six regional transit centers (Hercules Transit Center; Appian/I-80, Richmond Parkway Transit Center, Hilltop Mall, or Contra Costa College (only one or two of these options would be selected); Richmond BART; El Cerrito del Norte BART; and El Cerrito Plaza BART) as well as other BART stations in the system, which serve as intermodal transit centers
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		Connects six regional transit centers (Hercules Transit Center; Appian/I-80, Richmond Parkway Transit Center, or Hilltop Mall (only one or two of these options would be selected); Richmond BART; El Cerrito del Norte BART; and El Cerrito Plaza BART) as well as other BART stations in the system, which serve as intermodal transit centers







2.3.2 Quality of Connections to Existing Transit Systems and Facilities

Quality of connections indicates the ease of movement and transfers between different modes of transit (e.g., from a bus to a train or from a ferry to a bus) and/or within the same mode. This was assessed relative to existing transit service and facilities.

Existing bus and rail facilities and major bus transfer hubs that would connect to the alignment of each option were identified. Each station along an alternative was rated individually, receiving a high rating for convenient connections, such as a platform integrated with a transit center, down to a low rating for challenging connections that may require significant walking, roadway crossings, and other obstacles to make a transfer. The 23rd Street BRT and the BART alternatives earned the highest rating. For 23rd Street BRT, stops would be well-integrated with minimal walking distance. BART would also perform at a high level as there is a high level of connectivity to bus services and multimodal access at BART stations. The Express Bus alternative earned the lowest ranking because of longer walk distances and access obstacles for non-auto modes along the freeway (although the latter would be addressed by building pedestrian improvements, e.g., grade-separated pathways, such as a pedestrian bridge).

Table 2-9 summarizes the rating for the quality of transit connections for each alternative.

Table 2-9: Quality of Connections to Existing Transit Systems and Facilities

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Okay connections with walking distance required at most stops along freeway corridors to nearby bus transfers and park-and-rides; close proximity to freeway ramps creates obstacles
2. San Pablo Avenue/Macdonald Avenue BRT		High-quality connections except for El Cerrito del Norte and El Cerrito Plaza BART stations, where buses will stop on San Pablo Avenue and not enter the station itself, creating significant walking distance to connections
3. 23rd Street BRT		High-quality connections assuming all stops will be well-integrated with limited walking distance to other bus, rail, and ferry connections
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		High-quality connections for proposed intermodal transit center, linking Capitol Corridor, WestCAT, and potential ferry service, with access to other connections, including AC Transit, via the Richmond Amtrak/BART station
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		High-quality intermodal connections assumed for all BART stations with bus-rail connections possible right outside BART fare gates
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		High-quality intermodal connections assumed for all BART stations with bus-rail connections possible right outside BART fare gates







2.3.3 Service to Underserved Areas

Much of West Contra Costa County has been identified as having a strong transit market.⁷ However, not all of the areas with high transit potential currently have good transit connections nor are they currently sufficiently dense to support a high level of transit. For this performance measure, each alternative's service to markets currently lacking major transit connections and the potential for an expanding transit market were examined.

The alternatives were overlaid with all existing transit systems in the study area. Areas with low transit service and high transit potential were identified and tabulated to determine the greatest opportunities for expanding service areas. The highest marks were assigned to the San Pablo Avenue/ Macdonald Avenue and 23rd Street BRT alternatives with the highest potential to connect with currently under-served transit markets.

The results of this evaluation measure are presented in Table 2-10.

Table 2-10: Service to West County Markets Lacking Major Transit Connections

Option	Performance Rating	Summary of Findings
1. Express Bus Service		Alternative expands service to markets in Hercules, Pinole, Tara Hills, El Sobrante, and south and east Richmond
2. San Pablo Avenue/Macdonald Avenue BRT		Alternative expands service to markets in Hercules, Pinole, Tara Hills, and west and central Richmond
3. 23rd Street BRT		Alternative expands service to markets in Hercules, Pinole, Tara Hills, and west, central, and south Richmond
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		Alternative expands service to Hercules and Pinole
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		Alternative expands service to markets in Hercules, Pinole, Tara Hills, San Pablo, and northern Richmond
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		Alternative expands service to markets in Hercules, Pinole, Tara Hills, and northern Richmond

⁷ West Contra Costa High-Capacity Transit Study, Technical Memorandum #7, Travel Markets, January 2016, WSP/Parsons Brinckerhoff, Kimley Horn, Kittelson & Associates.

2.4 Cost and Efficiency

This criterion evaluates the performance of the alternatives in terms of their costs and efficiencies. The high capacity alternative(s) selected for implementation will require funding from public sources, likely a combination of local, state and federal, to construct. Once completed, the alternative(s) would also require an ongoing public subsidy to operate. The operating subsidy, which is the portion of annual operating and maintenance (O&M) costs not covered by farebox and related revenues (such as marketing revenues, fees, etc.), typically comes from local sources. The total capital and O&M costs of each alternative will influence public decisions regarding funding. The required investment must be seen as a sensible and efficient use of tax revenues.

While the total cost of the alternative is important and has a significant impact on the investment decision and general assessment of project feasibility (see 2.5 Feasibility), project costs need to be compared to project benefits. The major direct benefit of an alternative is increased transit ridership. Indirect benefits include: reduced auto congestion; lower emissions of air pollutants, including greenhouse gases; lower energy use per person-trip; and reinforcement of desired development patterns. Cost per rider provides a reasonable measure of an alternative's cost to the direct benefits it generates.⁸

To assess the Cost and Efficiency, four evaluation criteria and performance measures are used for comparison of alternatives.

2.4.1 Capital Cost

The total one-time cost to implement a project, inclusive of planning, environmental, design and construction costs, varies considerably by alternative. The bus alternatives are scalable and can be implemented over time, with each investment accruing benefits in terms of increased transit ridership. In contrast, the benefits associated with rail improvements would not be experienced until the full rail investment is made. Rail projects are scalable only to the extent that stations and extensions can be incrementally added to an existing rail system.

The costs of each of the alternatives considered in this memorandum are summarized in Table 2-11. A more detailed description of the costs estimates by alternative is included in Technical Memorandum #13.2.⁹

⁸ No estimate of cost relative to total benefits (direct and indirect) has been made at this time.

⁹ *West Contra Costa High-Capacity Transit Study, Task Number 13.2, Refined Preliminary Screening Cost Estimate*, WCCTAC, prepared by M. Lee Corporation and WSP/Parsons Brinckerhoff, 1/19/2017

Table 2-11: Capital Costs of Alternatives (2017 \$ in Millions)

Alternative	Short-Term (1-5 Years)	Medium-Term (5-15 Years)	Long-Term (15+ Years)	Total Cost
1. Express Bus	\$11	\$91	\$143	\$245
2. San Pablo Ave/Macdonald Ave BRT	\$3	\$180	\$60	\$243
3. 23rd St BRT	\$17	\$99	\$63	\$179
4. UPRR Commuter Rail ¹	NA	NA	\$51	\$51
6A. BART Extension from Richmond via Rumrill Blvd.	\$56	\$74	\$3,452	\$3,582
6B. BART Extension from Richmond via Richmond Pkwy.	\$69	\$92	\$3,995	\$4,156

Source: *West Contra Costa High-Capacity Transit Study, Task Number 13.2, Refined Preliminary Screening Cost Estimate, WCCTAC, prepared by M. Lee Corporation and WSP/Parsons Brinckerhoff, 1/19/2017*

¹ The City of Hercules has identified the total cost to complete the Hercules Intermodal Station as \$68.5 million. The City is pursuing a TIGER grant for \$17.4 million, leaving a need for \$51.1 million in local match.

The lowest cost alternative is UPRR Commuter Rail which assumes a Capitol Corridor rail station in Hercules and fare incentives for travel to and from points north. This is essentially a service improvement and not a capital investment project. The capital costs for the implementation of the Hercules Intermodal Center, which will include a new Capitol Corridor station are estimated at \$81 million. Funding is available for the first two phases of the project, however, there is an unfunded amount of \$52 million needed to complete this project, which is identified here. A station in Hercules would require investment in a platform, fare collection equipment, and other passenger amenities. No major track, rolling stock, or railroad facility improvements outside of the Intermodal Center are proposed.







Implementation of the Express Bus and BRT alternatives on San Pablo/Macdonald Avenue and 23rd Street are scalable and can be implemented incrementally over time. While the costs are arrayed as short-term, medium-term, and long-term costs in this study, they would vary depending upon the intensity of incremental improvements made. For example, for the Express Bus Alternative, the introduction of new vehicles could initiate service operation without significant infrastructure costs in the short-term. As ridership builds, more intensive improvements can be added over time or eliminated from further consideration. The mid-term cost estimate includes expanded parking in structures at existing transit centers, while the long-term cost estimates include adding direct access ramps to and from I-80 at the Hercules and Richmond Parkway Transit Centers as well as the potential for an Express Bus/BRT Transit Center at I-80 and Macdonald Road.

For BRT, capital costs are largely proportional to the extent of dedicated bus lanes to be constructed, which require substantial roadway improvements. The short-term costs are for bus priority treatments and very limited segments of bus only lanes, such as for queue jumps.

In the medium-term, dedicated bus lanes would be implemented in the southernmost segments of San Pablo and Macdonald Avenues and along 23rd Street, along with expanded parking at existing transit centers. In the long-term, bus only lanes would extend to either the Richmond Parkway Transit Center (San Pablo Avenue BRT) or the Hilltop Mall Transit Center (23rd Street BRT). The costs are for BRT improvements only in West County.

Overall, because improvements would be made in existing public rights-of-way, the capital costs for the three bus alternatives are lower than if the improvements would be constructed in new right-of-way and as entirely new facilities, which is required for the BART alternatives. The BART alternatives, either along Rumrill Boulevard to Hilltop Mall and then the Hercules Transit Center or along the UPRR alignment, crossing over to Richmond Parkway and then to the Hercules Transit Center, are the highest cost alternatives because of the right-of-way and new facilities costs. Both alignments would incur substantial costs for new right-of-way or right-of-way purchase and easements, new track/guideway, stations, rail vehicles, and yard facilities. Table 2-12 summarizes the rating of the five alternatives with respect to capital costs.

Table 2-12: Capital Costs Evaluation

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Highest cost alternative for bus improvements. Though improvements can be phased or deferred, the addition of new freeway ramps for improved transit access at Hercules Transit Center, Richmond Parkway Transit Center, and the potential Express Bus/BRT Transit Center add significant costs to this alternative.
2. San Pablo Avenue/Macdonald Avenue BRT		In full build-out comparable in costs to Alternative 1. BRT lends itself to scalable improvements, which can be phased or deferred over time, but travel time reliability would be adversely impacted.
3. 23rd Street BRT		This is the lowest cost on the major bus investments. BRT lends itself to scalable improvements, which can be phased or deferred over time, but travel time reliability would be adversely impacted.
4. UPRR Commuter Rail		Lowest cost to implement. The initial costs of the Hercules Intermodal Station have been funded by others and not included in this study, however, there is an outstanding cost that does not currently have a funding commitment,
6A. BART Extension from Richmond Station via Rumrill Boulevard		Highest capital costs due to right-of-way acquisition, new facilities with substantial tunneling and elevated structure, new rolling stock, and a new train storage yard. Intermediate stations could be deferred to partially offset initial construction costs.
6B. BART Extension from Richmond Station via Richmond Parkway		Highest capital costs due to right-of-way acquisition, new facilities with substantial tunneling and elevated structure, new rolling stock, and a new train storage yard. Intermediate stations could be deferred to partially offset initial construction costs.

2.4.2 Operating and Maintenance Cost

In addition to capital costs, the costs associated with operations and maintenance of the proposed alternatives are an important consideration in determining which projects to move ahead for further development. O&M costs are lowest for enhanced intercity/commuter rail service under Alternative 4 UPRR Commuter Rail and highest for the two BART extension alternatives. In the middle are costs for bus service improvements.

The O&M costs in Table 2-13 represent net operating and maintenance costs for each alternative. This represents an estimate of the total annual costs less fare and other revenues such as advertising revenues. Fare revenues can be a substantial offsetting factor. (BART recovers over 70 percent of its O&M costs through fares, however, AC Transit and WestCAT have much lower fare recovery rates.)

Table 2-13: Net O&M Costs of Alternatives (2017 \$)

Alternative	Annual Cost, 2040 Service Levels
Express Bus ¹	\$3.2 million
San Pablo Ave/Macdonald Ave BRT ²	\$5.4 million
23rd St BRT	\$5.6 million
UPRR Commuter Rail ³	<\$1.0 million
6a. BART Extension from Richmond via Rumrill ⁴	\$59.7 million
6b. BART Extension from Richmond via Richmond Pkwy ⁴	\$62.6 million

Source: Kimley-Horn & Associates, Inc. based on local transit agency reported information in 2015 National Transit Database. Costs are escalated through 2016.

¹ Includes costs for increasing WestCAT Lynx service frequencies during peak periods to 10 minutes from current 15 minutes.

² Costs estimated only for portion of service in West County.

³ Costs for fare incentives and maintenance of rail station.

⁴ Costs estimated only for West County BART extension service.

The costs shown in Table 2-13 account for savings in transit costs that could result from replacing or eliminating existing transit services. This is most relevant to BRT service, which would under Alternative 2 replace existing Route 72 Rapid and regular Route 72 services in the San Pablo Avenue and Macdonald Avenues corridors (and also certain WestCAT services north of Hilltop Mall in the San Pablo corridor). Under Alternative 3, the BRT would replace existing Route 74 services (and certain WestCAT services north of Hilltop Mall in the San Pablo Avenue corridor). The extension of BART service to the Hercules Transit Center would also likely result in the realignment and possible reduction of some express and transbay services in the I-80 corridor. Future studies should account for the positive effect of fares on O&M costs and the savings to the operator from reduced or eliminated local and/or Rapid Bus services to determine the net operating costs associated with the recommended service revisions.

Commuter rail O&M costs are associated with proposed fare subsidies for West County passengers getting off or on at Hercules or Richmond and traveling between Martinez and Jack London Square in Oakland and for maintenance of the new Hercules Intermodal Transit Station.

Express Bus on I-80 would be the lowest cost of the bus alternatives as limited service is planned only during the peak periods on weekdays. BRT service would operate at high frequencies, seven days a week and late into the evenings, replacing existing, high frequency arterial bus and Rapid Bus service. Because there would be about twice the vehicle hours and miles of service generated from operations of San Pablo/Macdonald Avenue BRT service compared to 23rd Street BRT service, the San Pablo/Macdonald BRT Alternative is approximately twice the cost of the 23rd Street BRT service.

BART service would be the most costly to operate because it would operate for approximately 20 to 21 hours every day, and at a high frequency level, particularly on weekdays (6 minute frequencies during peak periods and 7.5 minute frequencies during the midday). The service is assumed to operate at maximum train lengths (10 cars per train) during most periods. This intense level of service generates substantial revenue vehicle miles and hours, the factors used to estimate O&M costs.

Table 2-14 summarizes the ratings of the alternatives relative to their total annual O&M costs.

Table 2-14: O&M Costs Evaluation

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service	●	Second lowest cost alternative. Assumes operation by an entity such as AC Transit. Weekday only service, focused on peak periods, but also during midday and early evenings.
2. San Pablo Avenue/Macdonald Avenue BRT	◐	Most costly to operate of the bus alternatives due to high service frequencies and coverage 7 days a week, 20+ hours a day.
3. 23rd Street BRT	◐	Substantially increased service frequencies and operation 7 days a week for 20+ hours increase costs compared to existing conditions. 23rd Street service would not be as frequent as for San Pablo BRT, because of lower demand. Alignment is also shorter, generating fewer revenue vehicle (bus) hours and miles.
4. UPRR Commuter Rail	●	Lowest cost to operate. No new service is proposed. Capitol Corridor trains would stop in Hercules to pick-up and drop-off passengers. O&M costs are associated with station maintenance and fare subsidies.
6A. BART Extension from Richmond Station via Rumrill Boulevard	○	High O&M costs for frequent new service between Richmond and Hercules 7 days a week. Assumes operation of 10-car trains for up to 21 hours a day.
6B. BART Extension from Richmond Station via Richmond Parkway	○	High O&M costs for frequent new service between Richmond and Hercules 7 days a week. Assumes operation of 10-car trains for up to 21 hours a day.

2.4.3 Annualized Cost per Rider

This performance metric compares investment costs to returns or benefits of each alternative. Returns are measured in terms of the ridership generated for each of the transit alternatives. Historically, the focus for FTA has been on new riders, or new linked trips.¹⁰ This approach excludes existing transit users and counts only one trip per user, excluding links of a trip associated with one or more transfers to complete the trip. The benefit generated by the transit investment, therefore indicates the capacity to increase overall transit ridership. The “Cost per New Rider” is the ratio of the total annualized costs for an alternative, both capital and O&M, to the total annual new trips for the alternative as noted below. Costs represent the change in costs relative to the No Build condition, or incremental capital and O&M costs.

$$\frac{\text{Annualized Capital Cost} + \text{Annualized O\&M Cost (2017 \$)}}{\text{Annual Riders (2040 forecast of new linked trips on the transit system)}}$$

Annualized cost per rider is a measure of cost-effectiveness and is expressed in dollars as shown in Table 2-15. The tables presents costs per total riders and costs per new rider. Cost-effectiveness controls for the potentially greater ridership generated from higher cost transit investments and for the potential of a lower cost per passenger for higher capital cost projects that have high ridership.

Table 2-15: Annualized Cost per Rider (2017 \$)

Alternative	Annual O&M Cost per 2040	Annual O&M Cost per 2040
	Total Riders	New Riders
1. Express Bus ¹	\$20	\$21
2. San Pablo Ave/Macdonald Ave BRT ²	\$5	\$18
3. 23rd St BRT	\$8	\$17
4. UPRR Commuter Rail ³	\$18	\$36
6a. BART Extension from Richmond via Rumrill ⁴	\$35	\$80
6b. BART Extension from Richmond via Richmond Pkwy ⁴	\$35	\$93

Source: Kimley-Horn & Associates, Inc. based on local transit agency reported information in 2015 National Transit Database. Costs are escalated through 2016.

¹ Includes costs for increasing WestCAT Lynx service frequencies during peak periods to 10 minutes from current 15 minutes.

² Costs estimated only for portion of service in West County.







³ Costs for fare incentives and maintenance of rail station.

⁴ Costs estimated only for West County BART extension service.

Table 2-16 presents the ratings of the alternatives relative to the cost per rider. Alternatives are rated similarly if the cost per rider is of the same order of magnitude.

¹⁰ When the Federal Transit Administration (FTA) was deciding whether to commit federal funds to a new transit line or an extension of an existing line, investments that generated more new transit riders for their cost were ranked highest. Recently FTA has modified this metric to be include simply total riders carried relative to cost. See 2.4.5.

Table 2-16: Cost per Rider Evaluation

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Second lowest cost per rider.
2. San Pablo Avenue/Macdonald Avenue BRT		High ridership and high costs among the bus alternatives.
3. 23rd Street BRT		Significantly less ridership on this BRT alternative compared to Alternative 2. Thus cost per rider does not perform as well as Alternative 2 despite the lower annualized costs.
4. UPRR Commuter Rail		Although ridership is quite low, this has the lowest cost per rider because capital and O&M costs are very low.
6A. BART Extension from Richmond Station via Rumrill Boulevard		BART alternatives generates the highest transit ridership through West County, but capital and O&M costs are quite high. Thus BART alternatives have a high Cost per Rider.
6B. BART Extension from Richmond Station via Richmond Parkway		Same as for Alternative 6A although 6B is higher cost per rider due to higher annualized O&M and capital costs compared to 6A.

The BART alternatives are the most costly per rider, while the BRT investments are the most cost effective. The UPRR Commuter Rail alternative, which has relatively low cost, but also low ridership, along with the Express Bus alternative fall within the moderate range of cost effectiveness.

2.5 Feasibility

2.5.1 Time to Implementation

This measure accounts for the time needed to plan, design, and construct a project and also the time to obtain funding and consolidate political support. Often times, the lack of funding and political support can present the greatest challenges and can delay the design and construction of a project. The planning process, which includes formal environmental review of project impacts, can also be lengthy and slow the implementation of an alternative with strong public and political support.

The alternatives requiring the longest time to plan, design and construct are usually the most complex and costly, such as BART alternatives. However, BRT projects have proven to involve a lengthy planning and design process in the Bay Area. The BART extensions to Hercules and full-scale BRT improvements along San Pablo and Macdonald Avenues and along 23rd Street are expected to have the longest lead times.

A precursor to initiating further planning and design of either BART extension is establishing a reasonable project financing plan. For the foreseeable future, existing funding sources may not be adequate to fund these projects; new tax revenues or other public funding must be secured.

General funding and financing plans are currently being developed to guide staff and decision-makers in the process of securing funding for the projects they wish to pursue.

The BRT alternatives do not present comparable funding challenges as the BART projects due to the magnitude of the BART costs and the competitive nature of funds for new rail starts, but they are nevertheless significant if the object is to implement the full range of improvements—direct access freeway ramps and major parking structures under the Express Bus Alternative and extensive dedicated transit lanes under the San Pablo Avenue/Macdonald Avenue and 23rd Street BRT Alternatives. The planning timeframe can become extended based on BRT project experience elsewhere in the Bay Area (East Bay BRT, Van Ness and Geary Street BRT, Santa Clara/Alum Rock BRT). The environmental review process and obtaining local stakeholder support can take up to five to 10 years if the project is controversial, followed by the design and construction phase, that can add five to eight years more. If the alternatives are incrementally phased, with more limited improvements made initially, the time to implement can be shortened by several years.







The UPRR Commuter Rail Alternative should be the easiest, and thus fastest, to implement. The longest lead time items are obtaining interagency agreements for the introduction of a new commuter station and securing funding to complete the project.

The Express Bus Alternative is rated as favorable for time to implement. This assumes phasing with near-term service enhancements, vehicle purchases and limited infrastructure improvements at existing park and rides, with major improvements delayed to accommodate the planning, design, and construction phases. In the long-term, reconstruction of the I-80 freeway for direct access ramps and extensive garage construction at existing park-and-ride sites (Hercules Transit Center and Richmond Parkway TC) and possibly a new transit center at I-80 and Macdonald Avenue would be possible. These later improvements can be treated as standalone projects and do not preclude adoption and construction of a more limited alternative.¹¹

Table 2-17 summarizes the rating of the alternatives relative to timeliness of implementation.

¹¹ In theory the BART and BRT alternatives could also be phased and the complexity of—and timeline for—implementation somewhat reduced. However, these alternatives are substantially less viable as effective HCT alternatives if built in piecemeal fashion and their planning, design and constructions would be inefficient.

Table 2-17: Time to Implementation







Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Initial service with new buses and limited stop improvements could be implemented quickly to increase service and ridership. Major capital improvements will take time to plan, environmentally clear, design and construct.
2. San Pablo Avenue/Macdonald Avenue BRT		Improvements can be phased to improve service. Full BRT service, with dedicated lanes, will need a longer planning and environmental approval phase. Construction time itself would not be extensive.
3. 23rd Street BRT		Improvements can be phased to improve service. Full BRT service, with dedicated lanes, will need a longer planning and environmental approval phase. Construction time itself would not be extensive. First phase to CCC would be faster to implement than the first phase to CCC for Alt. 2.
4. UPRR Commuter Rail		While the quickest to implement from the perspectives of design and construction of proposed improvements, the major unknown is the time to reach agreement with Capitol Corridor on the proposed service pattern, including stopping at the Hercules Intermodal Transit Center.
6A. BART Extension from Richmond Station via Rumrill Boulevard		The planning, environmental review and design period will be prolonged. Construction will take several years. But the biggest potential delay is lack of funding in the near term, which would affect the ability to advance planning for this extension.
6B. BART Extension from Richmond Station via Richmond Parkway		The planning, environmental review and design period will be prolonged. Construction will take several years. But the biggest potential delay is lack of funding in the near term, which would affect the ability to advance planning for this extension.

2.6 Community

2.6.1 Consistency with Local Plans and Policies

Compatibility with local plans and policies was determined by examining an alternative's general consistency with local and regional jurisdictions' blueprints for development and transportation strategies. The results of this evaluation measure are presented in Table 2-18.

Table 2-18: Compatibility with Local Plans and Policies







Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Alternative does not conflict with local plans and policies, however compared to other alternatives, it provides more limited opportunities for transit-oriented development.
2. San Pablo Avenue/Macdonald Avenue BRT		The Hercules Intermodal Transit Center would align with City of Hercules' development plans for this site. The station at Hilltop Mall offers the greatest potential for transit-oriented development, consistent with the city's plans for redevelopment, but dependent on the pending sale of the land and developer's plans. There are potential conflicts with Complete Street plans for implementing bike lanes along portions of these corridors.
3. 23rd Street BRT		The Hercules Intermodal Transit Center would align with City of Hercules' development plans for this site. Station at Hilltop Mall may fit with transit-oriented development that could be built at this site, pending sale of the land and developer's plans. Service would be designed to serve both the planned Richmond ferry terminal and redevelopment planned for the Richmond field station. There are potential conflicts with Complete Street plans for implementing bike lanes along portions of these corridors.
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		The Hercules Intermodal Transit Center would align with City of Hercules' development plans for this site.
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		Station at Contra College would align with City of San Pablo's development plans for this area and would provide a station in San Pablo, which is a high priority for the city. The terminal station at Hercules would require reconciliation between the City of Hercules development plans and the transportation requirements. Right-of-way requirements are not known for maintenance facilities and storage tracks.
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		The station at Hilltop Mall offers the greatest potential for transit-oriented development, consistent with the city's plans for redevelopment, but dependent on the pending sale of the land and developer's plans. Right-of-way requirements are not known for maintenance facilities and storage tracks.

In general, the alternatives are compatible with local plans and policies. All alternatives would support the growth strategies of the corridor cities and provide a good range of transportation choices and mobility. Implementation of the BRT alternatives would need to be coordinated with local cities' Complete Streets plans, which include plans to build bicycle lanes in some segments of the corridors. The BART alternative would generally not displace existing housing because the construction would predominately be within the existing right-of-way. However, for BART Alternative 6A, there is a potential for a limited taking of homes along about a three-quarter mile stretch of Rumrill Boulevard in San Pablo in an area that serves lower-income families. For BART Alternative 6B, there is a potential for a limited taking of a limited number of residential parcels where the alignment moves east toward Hilltop Mall. The right-of-way requirements have not been determined for a potential new BART maintenance facility in Hercules or expansion of the Richmond maintenance facility and for the required turnback/storage tracks in Hercules.

2.6.2 Public and Stakeholder Support

The study's outreach to date has included open houses/information sessions organized in April 2016, a telephone town hall conducted jointly with Contra Costa Transportation Authority (CCTA) in November 2015, and stakeholder meetings with the cities within the study area and the county during the summer of 2015. The study team has also made regular presentations to the Study Management Group, WCCTAC TAC, and WCCTAC Board and collected feedback during these meetings. Table 2-19 summarizes the ratings for the alternatives relative to the public support expressed by the public and stakeholders.

Table 2-19: Public and Stakeholder Support

Alternative	Performance Rating	Summary of Findings
1. Express Bus Service		Alternative provides relatively quick capacity enhancements for commute trips and builds upon existing popular transit service. It can be implemented incrementally, thereby having the potential for early ridership results.
2. San Pablo Avenue/Macdonald Avenue BRT		Alternative provides ability to serve the broadest number of people and the greatest returns on ridership. It may have traffic and parking impacts on corridors and is not a familiar improvement and therefore may have more restrained support.
3. 23rd Street BRT		Alternative provides ability to serve a large number of people providing enhanced opportunity for local ridership. It may have traffic and parking impacts on corridors and is not a familiar improvement and therefore may have more restrained support.
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center		Three-year pilot for this alternative has received strong stakeholder support at the local and county level.
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard		Alternative enjoys strong public support, especially from the City of San Pablo as it would introduce a BART station serving Contra Costa College and the potential for transit-oriented development in the surrounding area. The high cost for implementation is a contravening factor.
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway		Alternative enjoys strong public support and would support the potential for transit-oriented development at Hilltop Mall, which is consistent with the City of Richmond plans. The high cost for implementation is contravening factor.

2.6.3 Economic and Transit-oriented Development

Supporting economic and transit-oriented development was examined by looking at how the alternatives serve Priority Development Areas (PDAs) in West County. These are locations that jurisdictions in the Bay Area have designated for growth, including infill sites that are vacant or under-used land that could be developed for housing or other uses. The Metropolitan Transportation Commission (MTC) defines PDTs as accessible by one or more transit services and generally located near established job centers, shopping districts, and other services.

Most of the PDAs in West County are located in north, central, and south Richmond and along the San Pablo Avenue corridor, as shown in Figure 2-1. With the exception of Hercules Transit Center, the West County's transit centers are not located in areas slated for development. This may partially be a result of the low-density development that characterizes West County or an indication that land use planning has not been historically aligned with transportation planning.

Figure 2-1: Priority Development Areas in West Contra Costa County

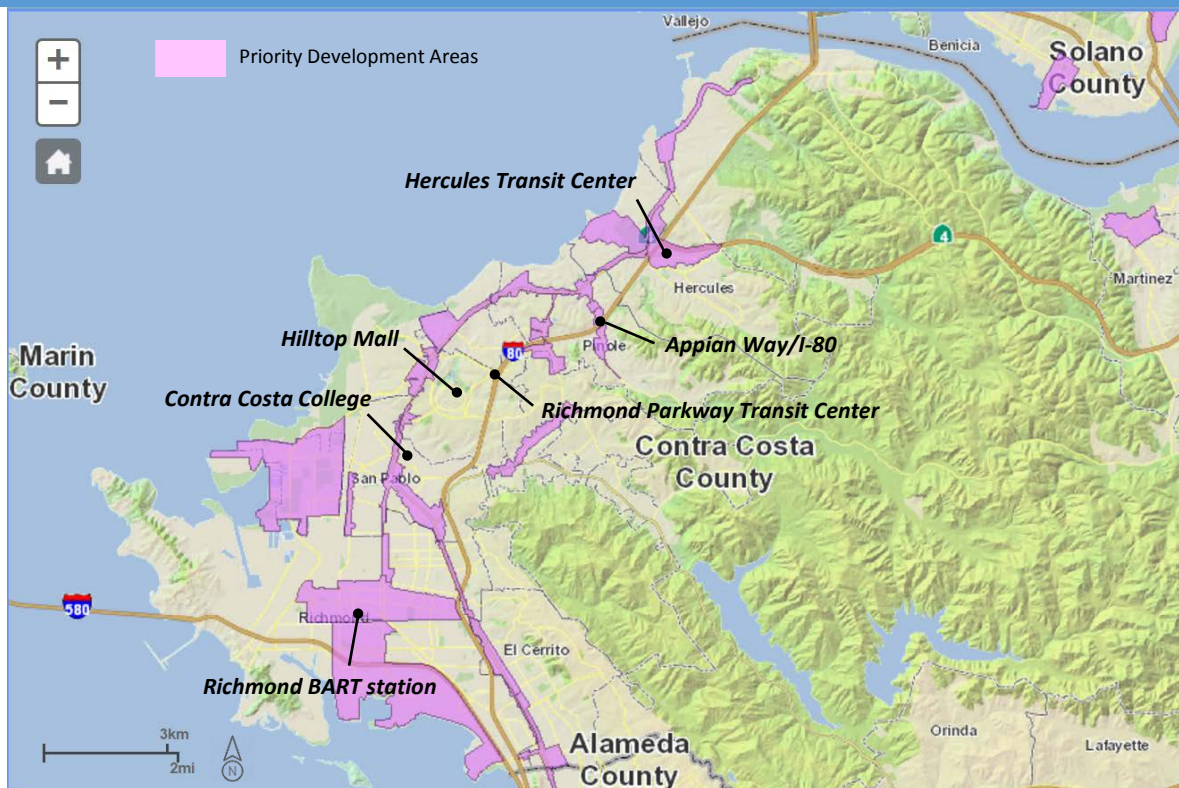


Image: Plan Bay Area, Priority Development Area Showcase, <http://gis.abag.ca.gov/website/PDAShowcase/>

The rating for serving West County PDAs was determined by the area in square miles of PDAs served within a one-half mile of the alternatives' proposed stops or stations: serves less than one square mile of PDAs (○); between one to two square miles (◐); and more than two square miles of West County PDAs (●). Table 2-20 summarizes the ratings.

Given the concentration of PDAs along San Pablo Avenue, the two BRT alternatives scored highest because they have many stations and stops in this corridor. With 35 proposed stops and the longest BRT alternative, the San Pablo Avenue/Macdonald Avenue BRT rates the highest serving 3.85 square miles of PDAs. In contrast, the Express Bus alternative and the BART alternative on Richmond Parkway were the lowest rated alternatives. The Express Bus alternatives' three stops only serve two PDAs, and the BART alternative on Richmond Parkway' three stations only serve two PDAs.

Table 2-20: West County PDAs served







Alternative	Performance Rating	Area in square miles in PDAs within one-half mile of stations	Summary of Findings
1. Express Bus Service	○	0.60	With three stop options, alternative can serve an area of 0.6 square miles of PDAs.
2. San Pablo Avenue/ Macdonald Avenue BRT	●	3.85	With 35 station options, alternative can serve an area of 3.85 square miles of PDAs.
3. 23rd Street BRT	●	3.68	With 27 station options, alternative can serve an area of 3.68 square miles of PDAs
4. Fare Subsidies on Capitol Corridor and Station at Hercules Intermodal Transit Center	○	0.90	With one new station option and one existing station, alternative can serve an area of 0.90 square miles of PDAs.
6A. BART Extension from Richmond Station to Hercules via Rumrill Boulevard	◐	1.21	With three station options, alternative can serve an area of 1.21 square mile of PDAs. (Only one or two of these station options would be built.)
6B. BART Extension from Richmond Station to Hercules via Richmond Parkway	○	0.59	With three station options, alternative can serve an area of just under 0.6 square miles of PDAs. (Only one or two of these station options would be built.)

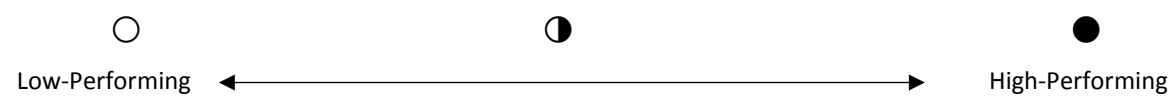
3 SUMMARY

The evaluation presented in this document involves an examination of the refined high-capacity alternatives' performance in the areas of ridership; speed and reliability; access and connectivity; cost and efficiency; feasibility; and community considerations. With all these factors in mind, the alternatives for Capitol Corridor and for BRT on San Pablo and Macdonald Avenues emerged as the highest-performing options followed by the BRT on 23rd Street alternative, the BART extension via Rumrill Boulevard, the BART extension via Richmond Parkway, and then Express Bus alternative. See Table 3-1.

The Capitol Corridor alternative includes a fare subsidy with build-out of the Hercules Intermodal Transit Center. It performed well in the criteria involving travel speed and reliability, as commuter rail's dedicated rights-of-way boost transit travel time and are less likely to get stuck in traffic; quality of connections, as Amtrak stations are relatively well-served by other transit providers; time to implementation, as the fare subsidy does not involve further project development; and capital and operating costs, as costs are relatively low as the subsidy does not include capital infrastructure components and do not increase operating costs substantially. BRT on San Pablo and Macdonald Avenues also performed well with criteria related to increases in total ridership, given its improvements in locations with strong transit demand and that currently lack major transit connections; service to regional transit centers and priority development areas (PDAs); and annualized cost per rider. The BRT on 23rd Street alternative also performed well, but this alternative's ridership projections and travel time reliability were lower than the BRT on San Pablo and Macdonald Avenues alternative. The two BART alternatives received high ratings for total and net ridership increases; transit time improvement and reliability as heavy rail's dedicated rights-of-way are conducive to trains travelling faster and not getting stuck in traffic congestion; and public and stakeholder support. But both BART alternatives' poor performance related to cost and efficiency as well as time to implementation pulled down their overall ratings. The Express Bus alternative did not perform as well as the other alternatives. While it performed well for the operating and maintenance costs criterion, its ratings for the other criteria were mediocre, including a moderate ridership increase; moderate transit travel time improvement and reliability; and service to regional transit centers and West County markets lacking major transit connections relative to the other alternatives.

Table 3-1: Summary of Criteria for Final Evaluation and Screening

EVALUATION CRITERIA	PERFORMANCE MEASURE	1. EXPRESS BUS	2. BRT ON SAN PABLO/MACDONALD AVE	3. BRT ON 23RD STREET	4. CAPITOL CORRIDOR FARE SUBSIDY + HTC	6A. BART EXTENSION VIA RUMRILL BOULEVARD	6B. BART EXTENSION VIA RICHMOND PARKWAY
 RIDERSHIP	Total riders	◐	●	◐	○	●	●
	Net new riders	○	◐	◐	○	●	●
 SPEED AND RELIABILITY	Transit travel time improvement	◐	◐	◐	●	●	●
	Transit travel time reliability	◐	◐	○	●	●	●
 ACCESS AND CONNECTIVITY	Regional transit centers served	◐	●	◐	◐	◐	◐
	Quality of connections to existing transit systems and facilities	○	◐	●	●	●	●
	Service to West County markets lacking major transit connections	◐	●	●	◐	◐	◐
 COST AND EFFICIENCY	Capital cost	◐	◐	◐	●	○	○
	Operating and maintenance cost	●	◐	◐	●	○	○
	Annualized cost per rider	◐	●	●	◐	○	○
 FEASIBILITY	Time to implementation	◐	◐	◐	●	○	○
 COMMUNITY	Consistency with local plans and policies	◐	◐	●	●	●	◐
	Public and stakeholder support	◐	◐	◐	●	●	●
	Economic and transit-oriented development (West County PDAs served)	○	●	●	○	◐	○



4 NEXT STEPS

This technical memorandum summarizes the evaluation of the refined alternatives for high-capacity transit in West County. The evaluation is the culmination of the study's analysis that examined the study area's existing and future transportation network and land use; transit markets in this sub-region as well as the larger Bay Area; preliminary environmental assessment; ridership modeling to forecast travel demand should the alternatives be built; and preliminary and refined capital cost estimates. The evaluation can serve as a tool for the WCCTAC Board and decision-makers to advance one or a combination of the alternatives, if any, to proceed into project development which would involve additional engineering analysis and environmental review.