WCCTAC
West Contra Costa Transportation Advisory Committee

West Contra Costa High-Capacity Transit Study

DRAFT TECHNICAL MEMORANDUM #11

Alternatives Refinement

November 2016

WSP | PARSONS BRINCKERHOFF

With
Kimley-Horn
WCCTAC

Table of Contents

Executive Summary ..... **i**

1 Introduction **1**

1.1 Transportation Setting 1

1.2 Purpose of the Study 3

1.3 Purpose of this Technical Memorandum 3

2 Alternative 1: Express Bus on I-80 ..... **6**

2.1 Alignment Description 6

2.2 Phasing 6

3 Alternative 2: San Pablo Avenue/Macdonald Avenue Bus Rapid Transit **23**

3.1 Alignment Description 23

3.2 Phasing 23

3.3 Parking 28

4 Alternative 3: 23rd Street Bus Rapid Transit **31**

4.1 Alignment Description 31

4.2 Phasing 33

4.3 Parking 34

5 Alternative 4: UPRR Commuter Rail **35**

5.1 Hercules Regional Intermodal Transit Center 35

5.2 Fare Sensitivity Analysis 36

6 Alternative 6: BART Extension from Richmond **40**

6.1 Rumrill Boulevard Alignment 45

6.2 Richmond Parkway Alignment 55

6.3 Terminus Station and Storage Tracks at/near Hercules Transit Center 62

6.4 Other Options Considered 70

6.5 Phasing 72

7 Summary **75**

8 Next Steps **75**

Figures

Figure 1-1: Study Area 2
Figure 2-1: Refined Alternative 1: Express Bus Service – Service in West County 7
Figure 2-2: Refined Alternative 1: Express Bus Service – Service in Alameda County 8
Figure 2-3: Refined Access to Hercules Transit Center – Tunnel and Underpass Option 15
Figure 2-4: Refined Access to Hercules Transit Center – Direct Access Ramp Option 16
Figure 2-5: Refined Access to Richmond Parkway Transit Center – Direct Access Ramp Option #1 18
Figure 2-6: Refined Access to Richmond Parkway Transit Center – Direct Access Ramp Option #2 19
Figure 2-7: Potential Transit Center at Macdonald Avenue and I-80 in Richmond 22
Figure 3-1: Refined Alternative 2: San Pablo Avenue/Macdonald Avenue BRT 25
Figure 4-1: Refined Alternative 3: 23rd Street BRT 32
Figure 6-1: Potential Alternative 6: BART Extension Alignment Options on Rumrill Boulevard and Richmond Parkway 41
Figure 6-2: Typical Section of Viaduct 42
Figure 6-3: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment 47
Figure 6-4: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Segment from Richmond BART Station to Contra Costa College 48
Figure 6-5: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Platform near Contra Costa College – Option 1 49
Figure 6-6: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Platform near Contra Costa College – Options 1 and 2 50
Figure 6-7: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Segment from Contra Costa College to Richmond Parkway Transit Center – Options 1 and 2 51
Figure 6-8: Refinement of Alternative 6: Richmond BART Extension – Rumrill Boulevard Alignment – Platform at Richmond Parkway Transit Center 52

Figure 6-9: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment 56
Figure 6-10: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Segment from Richmond BART Station to Hilltop Mall 57
Figure 6-11: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Station Platform at Hilltop Mall 58
Figure 6-12: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Segment from Hilltop Mall to Appian/I-80 59
Figure 6-13: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Station Platform at Appian/I-80 60
Figure 6-14: Potential Alignment Options for Terminus Station at/near Hercules Transit Center 62
Figure 6-15: BART Storage Tracks North of Richmond Station 63
Figure 6-16: Hercules Terminus Station – Platform Option 1: Parallel to SR-4 66
Figure 6-17: Hercules Terminus Station – Platform Option 2: Southwest of Hercules Transit Center 67
Figure 6-18: Hercules Terminus Station – Platform Option 3: West of I-80 69
Figure 6-19: Hercules Terminus Station – Platform Option 4: East of I-80 71

Tables

Table 1-1: West Contra Costa High-Capacity Transit Alternatives 4
Table 5-1: Comparison of Cost and Time between Richmond BART/Amtrak and Emeryville Amtrak 36
Table 5-2: Comparison of Cost and Time between Richmond BART/Amtrak and Martinez Amtrak 37
Table 5-3: Estimated Costs and Ridership Changes of a Three-Year Pilot Fare Subsidy Program 39
Table 6-1: Potential Locations for Terminus Station and Storage Track 64

Appendices

Appendix A: Conceptual Maps of Alternative 2: San Pablo Avenue/Macdonald Avenue Bus Rapid Transit
Appendix B: Conceptual Maps of Alternative 3: 23rd Street Bus Rapid Transit

Acronyms and Abbreviations

AC Transit	Alameda-Contra Costa Transit District
Alameda CTC	Alameda County Transportation Commission
BART	San Francisco Bay Area Rapid Transit District
BNSF	Burlington Northern Santa Fe
BRT	bus rapid transit
CCTA	Contra Costa Transportation Authority
EIR	environmental impact report
EIS	environmental impact statement
FTA	Federal Transit Administration
HCT	high-capacity transit
HOVs	high-occupancy vehicles (also known as carpools)
I-580	Interstate 580
I-80	Interstate 80
MTC	Metropolitan Transportation Commission
PSR	Project Study Report
ROW	right-of-way
RPTC	Richmond Parkway Transit Center
SR-4	State Route 4
TBM	tunnel boring machine
UPRR	Union Pacific Railroad
WCCTAC	West Contra Costa Transportation Advisory Committee
WestCAT	Western Contra Costa Transit Authority Transit Service

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 HCT Study is to identify, evaluate and refine projects to improve high-capacity transit in West County, expand alternatives to driving on congested streets and highways, and improve regional air quality and quality of life. The HCT Study is jointly funded by CCTA, BART, MTC and WCCTAC, who is also managing the planning study.

Findings from past studies and an analysis of key demographic and transportation factors informed the development of goals and objectives early in the study process. A set of evaluation criteria was also established to screen the conceptual alternatives. A market analysis was performed to identify the key transit corridors for their transit sensitivities and potential for future growth. Finally, public Input from the study's outreach process and agency and stakeholder consultations helped shape the development and refinement of these alternatives.

Refinements to the five conceptual alternatives are presented in this Task 11 Technical Memorandum. These conceptual alternatives include express bus on I-80, arterial-based bus rapid transit (BRT) on San Pablo Avenue and 23rd Street, short- and mid-term improvements on UPRR commuter rail, and a BART extension from Richmond. For the express bus alternative, additional detail is provided for operational enhancements and transit-supportive facilities, including expanded operations to Alameda County and direct access improvements at two existing transit centers and a potential new express bus-BRT transit center. Refinements of the two BRT alternatives include progressive implementation of bus-priority treatments, including those associated with Rapid Bus service (e.g., transit signal priority, queue jumps) and those related to full-fledged BRT service (e.g., level boarding, dedicated bus lanes). Analysis of the commuter rail alternative honed in on providing fare subsidies on existing Amtrak/Capitol Corridor service to and from select origins and destinations and on efforts to complete the Hercules Intermodal Transit Center. Refinement of the BART alternative included examination of two potential alignments that would extend north from the Richmond station and operate to the Hercules Transit Center – either via Richmond Parkway or via Rumrill Boulevard – with various intermediate stations.

The refinements for each mode varied in their scope, intensity and cost, but all five alternatives were organized by the same three implementation timeframes: short-term being 1 to 5 years, medium-term being 5 to 15 years, and long-term improvements that are more than 15 years.

The refinements presented in this memorandum provide preliminary descriptions of potential transit investments in the study area. Additional design detail of these concepts will be prepared and studied at subsequent stages of project development with direction from the WCCTAC Board and staff.

The next steps of the study will include modeling of potential transit ridership for the alternatives that will move forward in the next phase of evaluation. Refinement of preliminary cost estimates and identification of potential funding options will also be performed on the refined set of alternatives. A second tier of screening would be conducted using the results of ridership modeling, cost estimation, and funding assessment, as well as, input from agency and key stakeholders. The final recommendation and a financial strategy for implementation will be developed in the spring of 2017.

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 sal es 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.

The study area 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. The study area essentially encompasses the Metropolitan Transportation Commission's (MTC) Superdistrict 20, which includes the cities of El Cerrito, Hercules, Pinole, Richmond, and San Pablo and the unincorporated communities of Crockett, El Sobrante, and Rodeo.

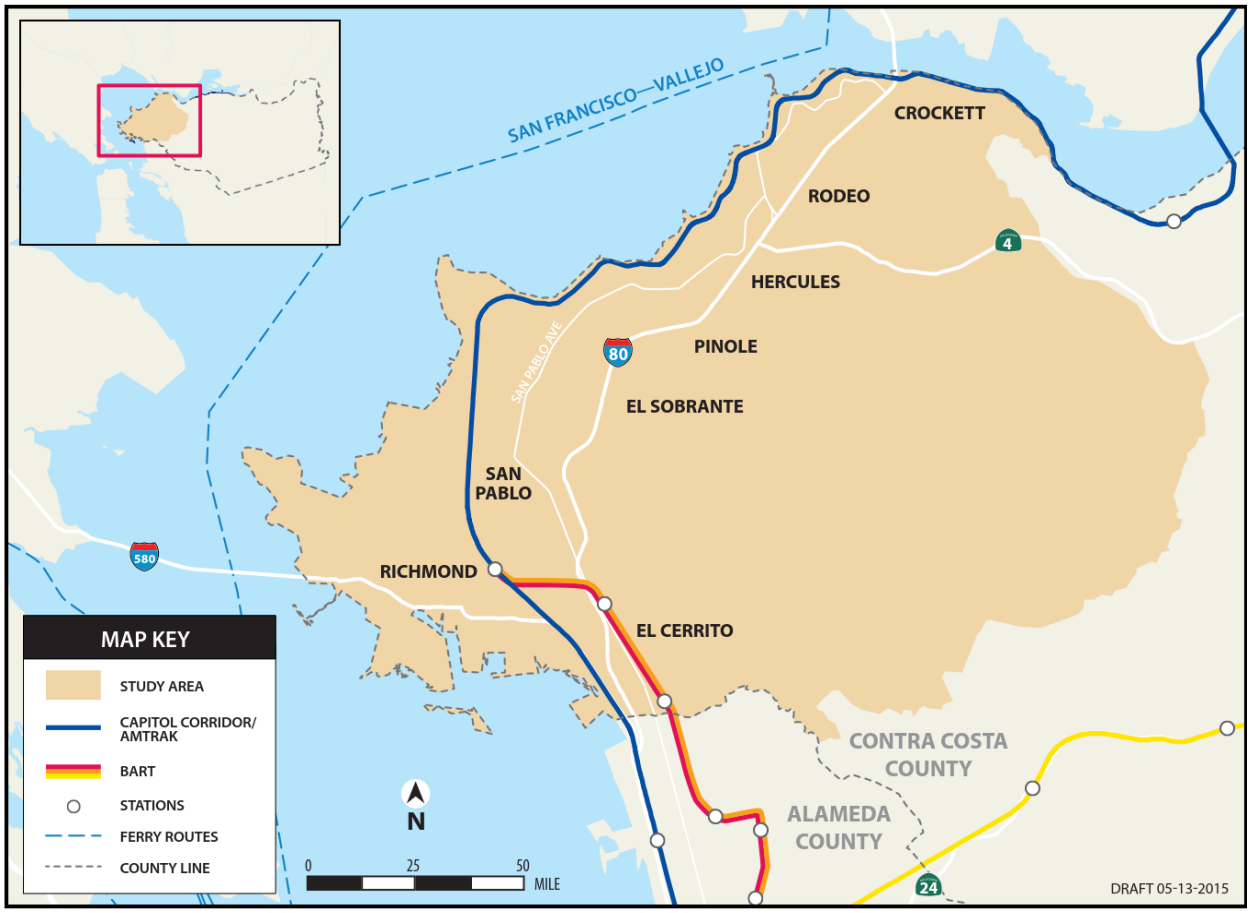
What are superdistricts?

Traffic analysis zones (TAZs) are the basic geographic unit used in transportation planning. Superdistricts are TAZs that have been grouped that share common characteristics and geographical boundaries.

There are 34 superdistricts in the nine-county Bay Area, which are used in the analysis of sub-county demographic and travel forecasts.

Figure 1-1 displays a map of the core Study Area, which includes I-80, I-580, and State Route (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 options for reducing congestion and to plan for future growth, with consideration of costs and funding opportunities. High-capacity transit (HCT) pro vides 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]

The investment strategy outlined by this study 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.

1.3 Purpose of this Technical Memorandum

Numerous studies have identified the benefits of major West County transit enhancements - mobility, traffic congestion relief, development strategies and environmental improvements - and have proposed strategies to implement these enhancements. While a few of these studies have resulted in projects, such as the planned Richmond ferry service and express bus service expansion, most have not led to major transit investments. A market analysis was conducted as part of this study to identify the corridors that are the most suitable for future transit investments based on a transit suitability matrix and how well they link to the demand for travel to and from the study

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

area.[4] The most promising conceptual HCT alternatives to meet this market demand were then identified and evaluated.[5] The study team subsequently received guidance from the WCCTAC Board to advance five of the eight conceptual alternatives. (See Table 1-1.)

Table 1-1: West Contra Costa High-Capacity Transit Alternatives

Alternative	Yes	No
Alt. 1: Express Bus on I-80	✓	
Alt. 2: San Pablo/MacDonald BRT	✓	
Alt. 3: 23rd Street BRT	✓	
Alt. 4: UPRR Commuter Rail (short & mid-range options)	✓	
Alt. 5: BNSF Commuter Rail		✗
Alt. 6: BART Extension from Richmond	✓	
Alt. 7A: BART Extension from El Cerrito del Norte		✗
Alt. 7B: BART DMU Extension from El Cerrito del Norte		✗

Source: WSP | Parsons Brinckerhoff, 2016

The purpose of this technical memorandum is to present refinements to these five conceptual alternatives that would meet the study's purpose. The alternatives include freeway-based express bus, arterial-based bus rapid transit (BRT), commuter rail, and a BART extension. The refinements for each mode vary, but a common time horizon for project development and/or implementation is used:

- Short-term improvements - 1 to 5 years
- Medium-term improvements - 5 to 15 years
- Long-term improvements - more than 15 years

[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.

As part of the alternatives refinement task, meetings were held with AC Transit, BART, and WestCAT staff to present preliminary ideas and receive feedback from each operator. Meetings were also held with local jurisdictions and the WCCTAC Study Management Group (SMG) and Technical Advisory Committee (TAC) to review the proposed refinements to alternatives.

For the three bus alternatives (Alternatives 1, 2 and 3), short-term improvements would include operational adjustment (e.g., more-frequent bus service and new destinations) and lower-cost capital investments (e.g., transit signal priority) to provide immediate benefits where possible. Longer-term improvements would include incremental deployment of more capital-intensive changes, such as improved park-and-ride lots for Alternative 1: Express Bus and further implementation of BRT features, such as bus-only lanes (Alternatives 2 and 3).

For Alternative 4: UPRR Commuter Rail, WCCTAC Board focused on improvements that would optimize the existing Capitol Corridor rail service on the Union Pacific Railroad (UPRR) right-of-way (ROW), including potential fare subsidies for select trips beginning or ending in West County. The WCCTAC Board also supported the completion of the Hercules Intermodal Transit Center to provide another commuter rail gateway to and from West County.

The refined Alternative 6: BART Extension from Richmond would extend BART service from the Richmond station to the Hercules Transit Center. Alignments along Richmond Parkway and Rumrill Boulevard were identified with variants on station location and the I-80 corridor alignment. Potential stations were located at transit hubs supporting major activity centers and at locations with easy freeway access where possible. Station pairs were identified for the Richmond Parkway and Rumrill Boulevard alignments that were evenly spaced and approximately 2 to 3 miles apart to distribute the benefits of BART access along the corridor.

The refined alternatives provide preliminary descriptions of potential transit investments for HCT in West County. The concepts offer a basis for further discussion and engineering design at subsequent stages of project development and environmental review under the guidance of the WCCTAC Board, staff, and stakeholders.

2 ALTERNATIVE 1: EXPRESS BUS ON I-80

2.1 Alignment Description

The preliminary Alternative 1: Express Bus included freeway-flyer express service operations on both I-580 and I-80 in West County, converging in Albany in Alameda County.[6] The WCCTAC Board recommended advancing the I-80 portion of this concept, increasing service to San Francisco, as well as introducing new service to destinations in 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 in West County at the Richmond Parkway Transit Center and at a potential new Express Bus-BRT transit center at Macdonald Avenue and I-80 in Richmond. The refined alternative is shown in Figure 2-1 and Figure 2-2.

2.2 Phasing

Proposed phasing for Alternative 1 would include a combination of operational and capital improvements. Service frequency could increase in the near-term to San Francisco and new service introduced to East Bay destinations, while more capital-intensive investments, such as expansion or construction of park-and-ride lots, could be completed as funding becomes available.

2.2.1 Short-term Improvements (1-5 years)

2.2.1.1 Service Frequency

Increasing the frequency and availability of express bus service could make it a more attractive alternative to the automobile, with the potential for reducing the number of cars on I-80, especially during commute hours. If demand warrants, peak period frequencies of 10 to 12 minutes throughout peak hours (an increase of the current 15 minute plus frequencies during peak hours) would allow drivers to shift to express buses without experiencing a significant auto-to-transit transfer penalty. Transit-preferential treatments, including queue jump signals and lanes and transit-priority signals on local roadways and freeways, would improve express bus performance. Once on the freeway, express service travel times would be competitive with the auto if operating with limited or no stops.

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

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

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

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

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

These short-term improvements related to increased frequency and transit-priority improvements are proposed for express bus service into San Francisco and connecting to BART. Increasing frequencies to 10 minutes during the morning and afternoon peak period on WestCAT's existing Route J and Lynx service and AC Transit's transbay Route L would provide greater commute options.[7] Currently, WestCAT's Express routes JL and JR serve Rodeo, Hercules, San Pablo, Tara Hills, Pinole, and Richmond along I-80 to the El Cerrito del Norte BART station at 20- to 30-minute frequencies during peak periods. Its Express lines JX and JPX transport riders between neighborhoods in Hercules, Pinole, and Richmond and the El Cerrito del Norte BART station at 15-minute frequencies during peak periods. WestCAT's transbay Lynx route operates between Rodeo, Hercules, and downtown San Francisco at a 15-minute frequency during peak periods. AC Transit's transbay Route L serves the Richmond and San Pablo areas and a portion of El Sobrante during peak periods with frequencies that generally range from 15 to 30 minutes, with a couple of runs having a spacing of 7 to 10 minutes apart.

2.2.1.2 Service to Alameda County

Travel trends show a growing market potential for express buses serving major East Bay employment centers.[8] The market analysis identified Berkeley, Emeryville, and Oakland as major destinations that lack fast, high-capacity bus connections from West County.

BART provides direct service to and from West County to the East Bay on the Richmond-Fremont and Richmond-San Francisco lines, but BART is reaching its capacity during peak periods. Current transit service requires transfers for most trips to these proposed East Bay destinations. For example, someone travelling from Hercules, Pinole, or San Pablo to an Alameda County location not close to a BART station would need to drive or take a bus to the El Cerrito del Norte BART station, ride BART to an Alameda County station, and then take another bus to their final destination. This can be a long trip requiring multiple transfers and fare payment. People often see transfers as an inconvenience (often referred to as a "transfer penalty"), and this lack of direct service from northern West County can deter people from using transit and turn to driving. BART service also has more limited potential to divert auto travelers from I-80 in West County as access to BART parking areas requires leaving the freeway and using local, typically congested, streets. BART parking is fee-based ($3.00 for parking at BART stations in West County) and often at capacity. Alternatively, express bus service would

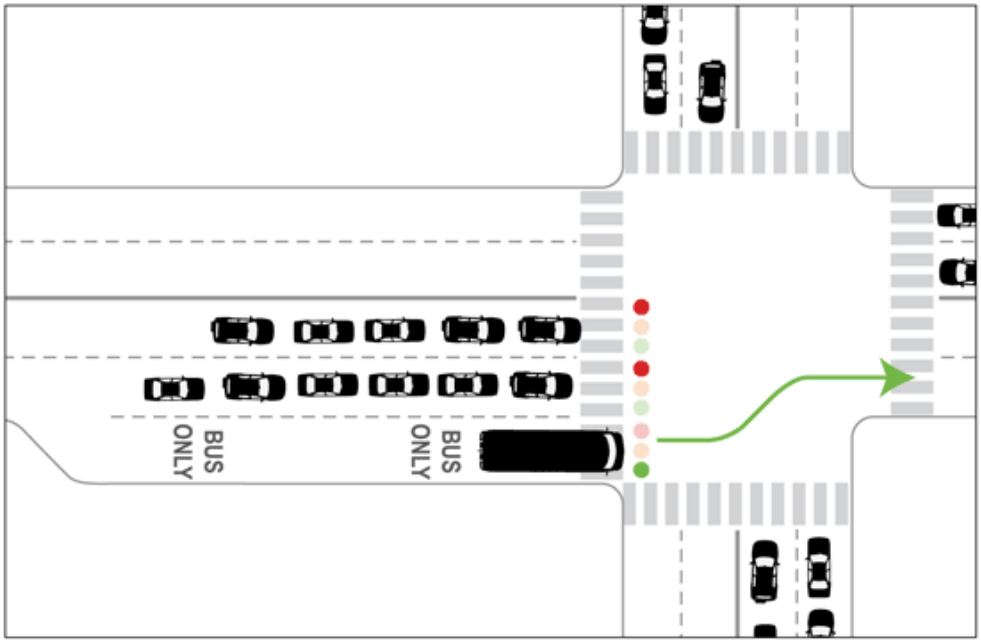
[7] Average daily ridership for these express bus lines are as follows (for 2014 calendar year): WestCat Lynx: 1000 passengers; WestCAT Routes J, JX, JPX: 2400 passengers (combined); and AC Transit Route L: 648 passengers. (Source: West Contra Costa High-Capacity Transit Study, Technical Memorandum #5, Existing and Planned Network, January 2016, WSP | Parsons Brinckerhoff, Kimley Horn, and RL Banks)

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

offer a direct "one-seat ride" from home to work (and vice versa), eliminating the transfer and fare penalties.

How does a queue jump work?

Queue jumps consist of a queue jump lane and an early green light for buses to "jump" the queue. As shown in the illustration below, buses in the queue jump lane are given a green light while autos are stopped at a red light. This head start for the bus can improve bus reliability by allowing buses to move ahead of traffic at congested intersections.



Source: Ontario, Ministry of Transportation, Transit-Supportive Guidelines

Refinement of this alternative focused on expanding express bus service to major Alameda County destinations (see Figure 2-2). South of the El Cerrito, service on I-80 would branch to three destinations in Alameda County: Berkeley, Emeryville, and Oakland. The stops in Alameda County described below and shown in Figure 2-2 are preliminary and may be modified as coordination with communities and operators progresses in future studies.

- **Express Bus Service between West County and Downtown Berkeley.** The Berkeley line would exit I-80 and follow University Avenue and Shattuck Avenue to the Downtown Berkeley BART station near the University of California, Berkeley campus. Intermediate stops would be provided at major commercial cross streets and employment centers including 6th Street, San Pablo Avenue, and Martin Luther King Jr. Way. This line could take

advantage of multimodal improvements on University Avenue proposed by Alameda County Transportation Commission (Alameda CTC) and AC Transit.

- **Express Bus Service between West County and Emeryville and Oakland.** This line would exit I-80 at Ashby Avenue to serve express bus stop locations in Emeryville and Oakland, including 7th Street and Ashby Avenue, Hollis and Powell Streets, Hollis and 40th Streets, 40th Street and San Pablo Avenue, and the MacArthur BART station. These locations include several employers and commercial corridors.
- **Express Bus Service between West County and Downtown Oakland/Jack London Square.** This line would exit I-80 at Grand Avenue and operate on this street to downtown Oakland with routing on San Pablo Avenue to 20th Street, Broadway, and then Embarcadero for its terminus at the Jack London Square Amtrak station. Other stops on this line would include the Uptown Transit Center/19th Street BART station and the 12th Street BART station in downtown Oakland, where major employers are located, including the City of Oakland government offices. This line could take advantage of bus lane upgrades on Grand Avenue envisioned by MTC and AC Transit.

2.2.2 Medium-term Improvements (5-15 years)

Medium-term improvements for Alternative 1 would include expanding two existing park-and-ride facilities along I-80 to meet anticipated demand from expanded express bus service. Changes would also be geared toward more capital-intensive improvements to improve circulation for transit vehicles so that buses can enter and exit the facilities with the least amount of delay and turning movements as well as for passengers so that they can travel between the buses and their cars or bicycles safely and efficiently. Such improvements would require more intensive studies, design, and funding than those proposed for the short-term horizon above and are thus envisioned for the medium-term.

Expanded Park-and-Ride Lot at Hercules Transit Center

The Hercules Transit Center, located on Willow Avenue near the interchange of I-80 and SR-4 in Hercules, is owned by BART and managed by the City of Hercules. It includes a park-and-ride facility with 422 parking spaces[9] and 16 lockers and 8 bicycle rack parking spaces.[10] Several WestCAT routes, including the Lynx express bus service, use this transit center. Improvements to this facility could include:

[9] WestCAT, www.westcat.org/schedules/transitcentres.html

[10] 511.org, www.511contracosta.org/wp-content/uploads/2011_Commuter_Handbook/11-Park-Ride-Locations.pdf

- **Expansion of parking by constructing a parking structure on the northern half of the surface parking area.** The potential multi-level garage is tentatively projected to increase the existing park-and-ride capacity. Some existing surface parking would be expanded while some would be displaced. The preliminary proposal assumes an appropriate doubling of the current capacity. Ridership modeling will provide further information on the anticipated demand. Future planning studies would refine the site plan.
- **Related park-and-ride internal circulation improvements.** Circulation improvements would provide convenient access to the parking structure, separating the movements of surface parking and kiss-and-ride drop-off facility users from those accessing the garage.
- **Protected bus passenger pathways between the garage and bus loading/unloading areas.** This would increase users' comfort as they move between these two areas.

2.2.2.1 Expanded Park-and-Ride Lot at Richmond Parkway Transit Center

AC Transit operates the Richmond Parkway Transit Center (RPTC), located at the corner of Blume Drive and the Richmond Parkway in the city of Richmond. The transit center contains a park-and-ride lot with 182 spaces and a bus transfer station used by AC Transit and WestCAT lines.[11, 12] In 2005, the RPTC Planning Group, a consortium of public agencies, prepared planning and conceptual design studies to expand the existing facility.[13] The study estimated that potential demand was in the range of 600 to 800 parking spaces and advanced three site plan options.[14]

Caltrans also prepared a project study report (PSR),[15] which considered alternatives from the RPTC Consortium's study, but did not include them in Caltrans' preferred alternatives. The direct bus access ramps from Richmond Parkway to and from the transit center identified in the RPTC Consortium study are rejected in the Caltrans report, but are not completely excluded from future consideration. The Caltrans PSR left the door open for another entity to re-consider the ramps "in the future as a possible addition to the proposed project." The RPTC Consortium's report included other improvement options for the transit center, but did not identify a preferred option.

[11] WestCAT, www.westcat.org/schedules/transitcentres.html
[12] Caltrans, www.dot.ca.gov/dist4/highwayops/parkandride/
[13] The RPTC Planning Group consisted of a consortium of public agencies, including AC Transit, Caltrans, City of Richmond, WCCTAC, and WestCAT.
[14] RPTC Planning Group, Richmond Parkway Transit Center Planning and Conceptual Design, Final Report, 2005
[15] Caltrans, Project Study Report for the Richmond Parkway Transti Center, EA-4A0200, 2010

Building off of these earlier findings, this study team's proposed improvements to the park-and-ride lot include:

- **Construction of a multi-story parking garage of 500 or more autos** (similar capacity to Hercules Transit Center). Internal circulation improvements would provide unconstrained access to the structure by separating remaining surface lot parking traffic from garage traffic.
- **Reconfiguration of bus circulation and loading/unloading areas to provide space for the footprint of the parking garage**, to be located in the northeast quadrant of the site. This location is recommended since it is convenient to buses using the existing direct access ramps to and from I-80 off of Richmond Parkway. In the longer-term, the proposal is to provide express bus stations/platforms on the existing or new direct access ramps, with pedestrian connections improved to the park-and-ride lot and parking garage.
- **Physical and operational improvements for access from adjacent streets to the park-and-ride facility.** These changes draw on recommendations of prior studies that included refinements to street geometry and modified lane striping, and also add transit signal priority at the intersections of (1) Blume Drive and the park-and-ride access roadway (south of Richmond Parkway); (2) Blume Drive and Richmond Parkway; and (3) Richmond Parkway/Fitzgerald Drive and the direct access ramps to I-80 on the south side of the freeway overcrossing.
- **A protected pedestrian pathway connecting the bus passenger loading/unloading to the garage.** The pathway would increase users' comfort as they move between these two areas.

2.2.3 Long-term Improvements (15+ years)

Long-term infrastructure improvements include freeway ramp improvements at the Hercules Transit Center and the RPTC as well as a potential new Express Bus-BRT transit center at Macdonald Avenue and I-80. Improvements to the Hercules Transit Center and RPTC could be done in cooperation with Contra Costa Transportation Authority (CCTA), which is also considering improvements to this transit center as part of its express bus study.[16]

Two ramp access alternatives have been identified for the Hercules Transit Center area: a tunnel under SR-4 and a direct access ramp to I-80. The ramp improvements at the Richmond Parkway Transit Center include adding direct access ramps for buses and high-occupancy vehicles (HOVs) at the north side of the interchange with I-80, complementing the direct access ramps already in place on the south side.

[16] CCTA's report is being finalized and could be available in winter 2017.

2.2.3.1 Tunnel Access at Hercules Transit Center

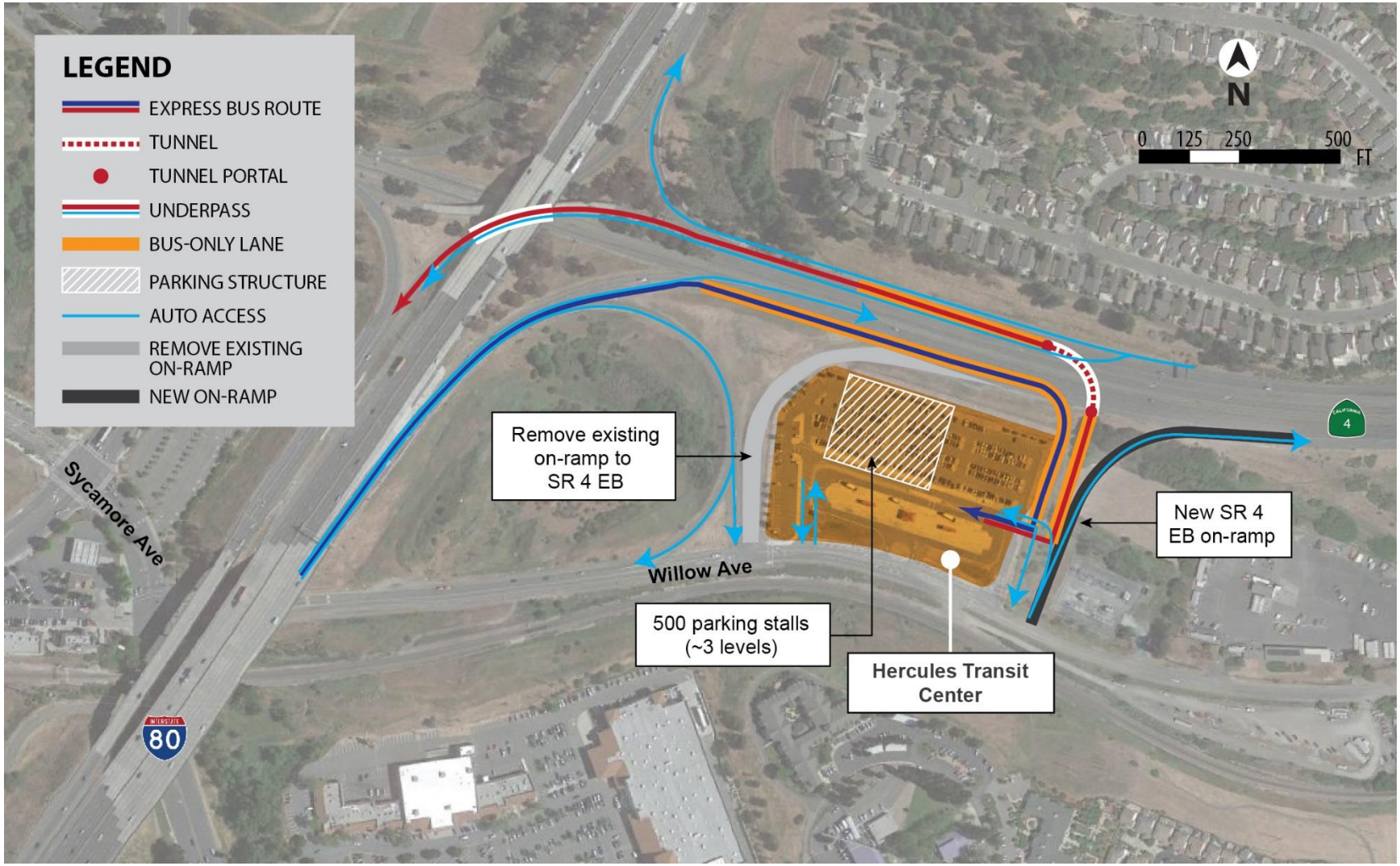
The existing access between the Hercules Transit Center and I-80 is not convenient due to the circuitous ramps serving the I-80/SR-4 interchange. Traveling from the transit center to I-80 southbound, requires buses to travel along westbound Willow Avenue to Sycamore Avenue and then continue to northbound San Pablo Avenue and eastbound John Muir Parkway to reach the southbound freeway on-ramp. To make the connection more direct and reduce travel time, a transit-only tunnel under SR-4 from the transit center is proposed. The tunnel would emerge on the north side of the roadway next to the transit center, turn west and join the westbound SR-4 to the southbound I-80 auto on-ramp. Access could also be provided to westbound SR-4 from northbound on-ramp east of the transit center, since the two ramps diverge at about this location. Bus and autos would both use the mixed-flow ramp to reach I-80. Figure 2-3 shows a general design concept for the tunnel and ramp access.

Bus access from northbound I-80 to the Hercules Transit Center is proposed for both buses and autos. The northbound off-ramp to eastbound SR-4 and the adjoining off-ramp to Willow Avenue eastbound and westbound would be reconfigured to provide a bus-only lane along the north side of the transit center. A new road on the east side of the transit center would provide more direct bus access. The Willow Avenue northbound off-ramp would substantially remain in its current configuration for auto traffic, but the Willow Avenue to SR-4 eastbound on-ramp would be relocated from next to the off-ramp on the west side of the transit center to become a new ramp on the east side of the facility. This separation of the two ramps will improve traffic flow around the transit center and remove congestion at the intersection of Willow Avenue and the existing I-80 off-ramp and SR-4 on-ramp. Figure 2-3 shows the reconfiguration of ramps for this concept.

2.2.3.2 Direct Access Ramp at Hercules Transit Center

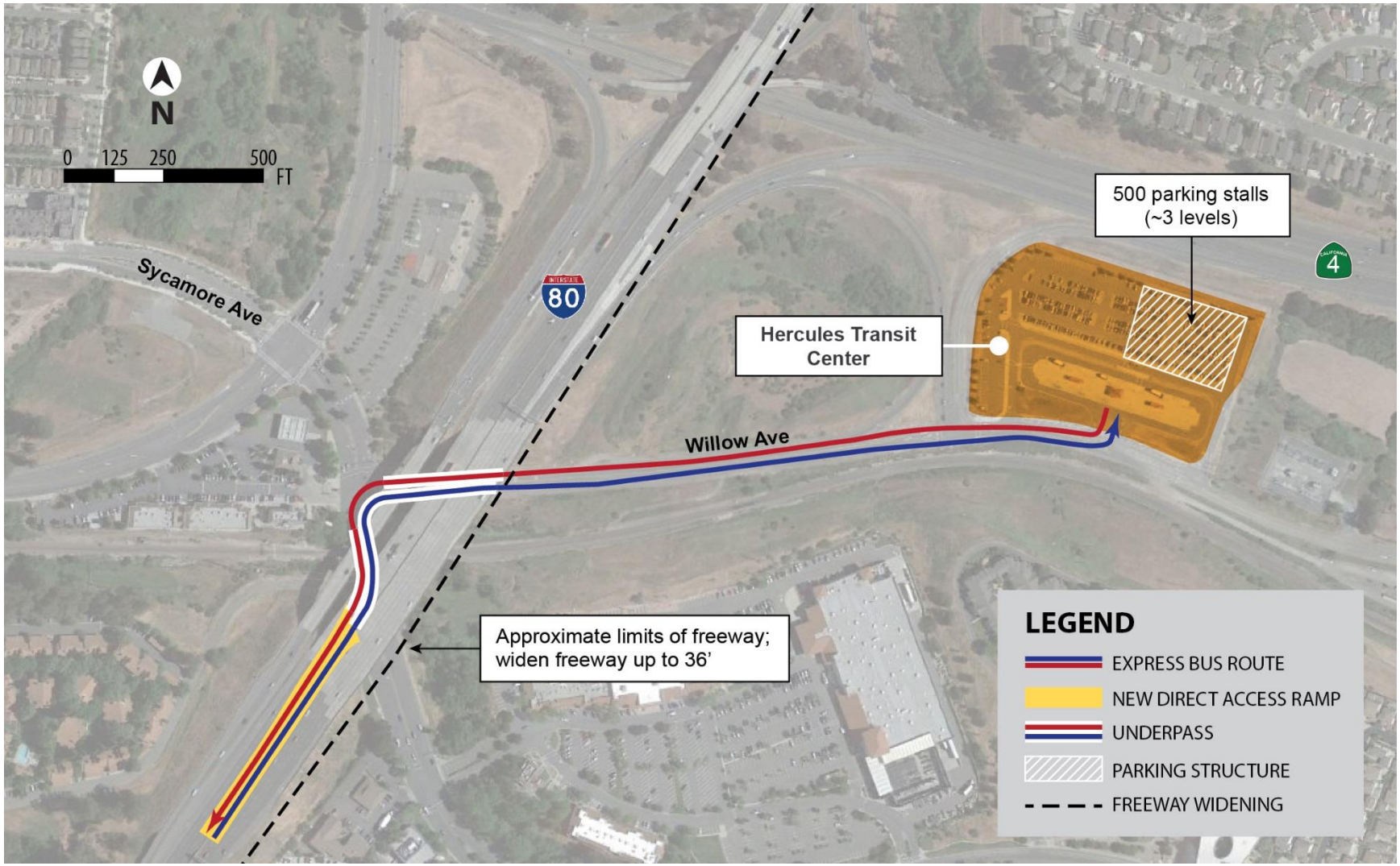
A second option for improving bus access to and from I-80 at the transit center would provide direct access ramps from Sycamore Avenue and Willow Avenue, to the median HOV lanes on I-80. Figure 2-4 shows the general configuration for these direct access ramps. The southbound ramp would serve buses and HOVs entering I-80 from Sycamore Avenue, and the northbound ramp would serve buses and HOVs exiting northbound I-80 to Sycamore Avenue. To provide for ramps entering/leaving the freeway median would require freeway widening (about 36 feet in width and about 400 to 500 feet in length, by initial estimates; this would depend on further studies and design). These modifications would extend existing HOV lanes through the interchange by widening the lanes where the direct access ramps enter and exit the elevated freeway. While the direct freeway access ramps would provide a convenient and quick way of connecting I-80 and the transit center, the freeway widening is expensive and may be disruptive to adjacent land uses.

Figure 2-3: Refined Access to Hercules Transit Center – Tunnel and Underpass Option



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

Figure 2-4: Refined Access to Hercules Transit Center – Direct Access Ramp Option



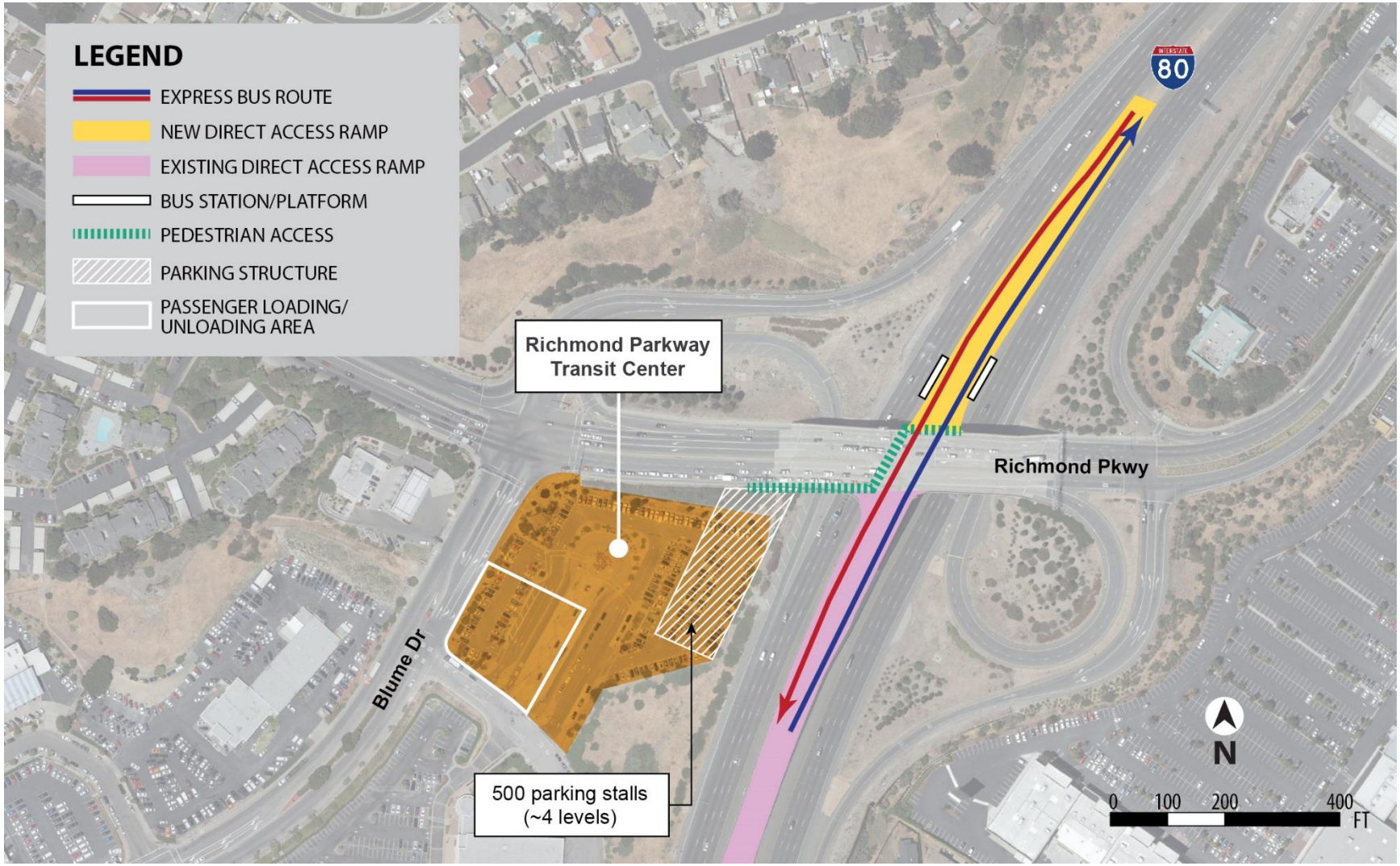
Source: Kimley-Horn and WSP | Parsons Brinckerhoff, 2016

2.2.3.3 Options for Direct Access Ramps at I-80 and Richmond Parkway Transit Center

Right-of-way exists in the median of I-80 just north of Richmond Parkway to construct direct access ramps similar to those already existing on the south side of the interchange. Southbound and northbound direct freeway median access ramps to the north of Richmond Parkway would allow buses using the median HOV lanes to enter or exit the freeway without having to leave the median HOV lanes and cross over heavily congested mixed-flow lanes. While it is possible the proposed improvements could be implemented in the medium-term because there are fewer potential impacts than at the Hercules Transit Center, the concept is considered a long-term improvement due to funding and lead time for planning and design.In Option 1, as shown in Figure 2-5, the provision of direct access ramps on the north side of the interchange would be complemented by the inclusion of bus stations on the outside of each ramp, allowing buses to stop on the ramps and not have to circulate along local arterials and through the RPTC to pick-up and drop-off passengers. This would further reduce bus travel times, although it would likely add to bus passenger walk distance (about 600 feet, depending on the location and configuration of the platforms) to reach the express bus stations/platforms. Pedestrian improvements would be provided to facilitate movement between express bus stations/platforms and the parking garage at the RPTC. The garage could be configured to provide direct access to the sidewalks on Richmond Parkway by internal elevators and stairs to ground level.

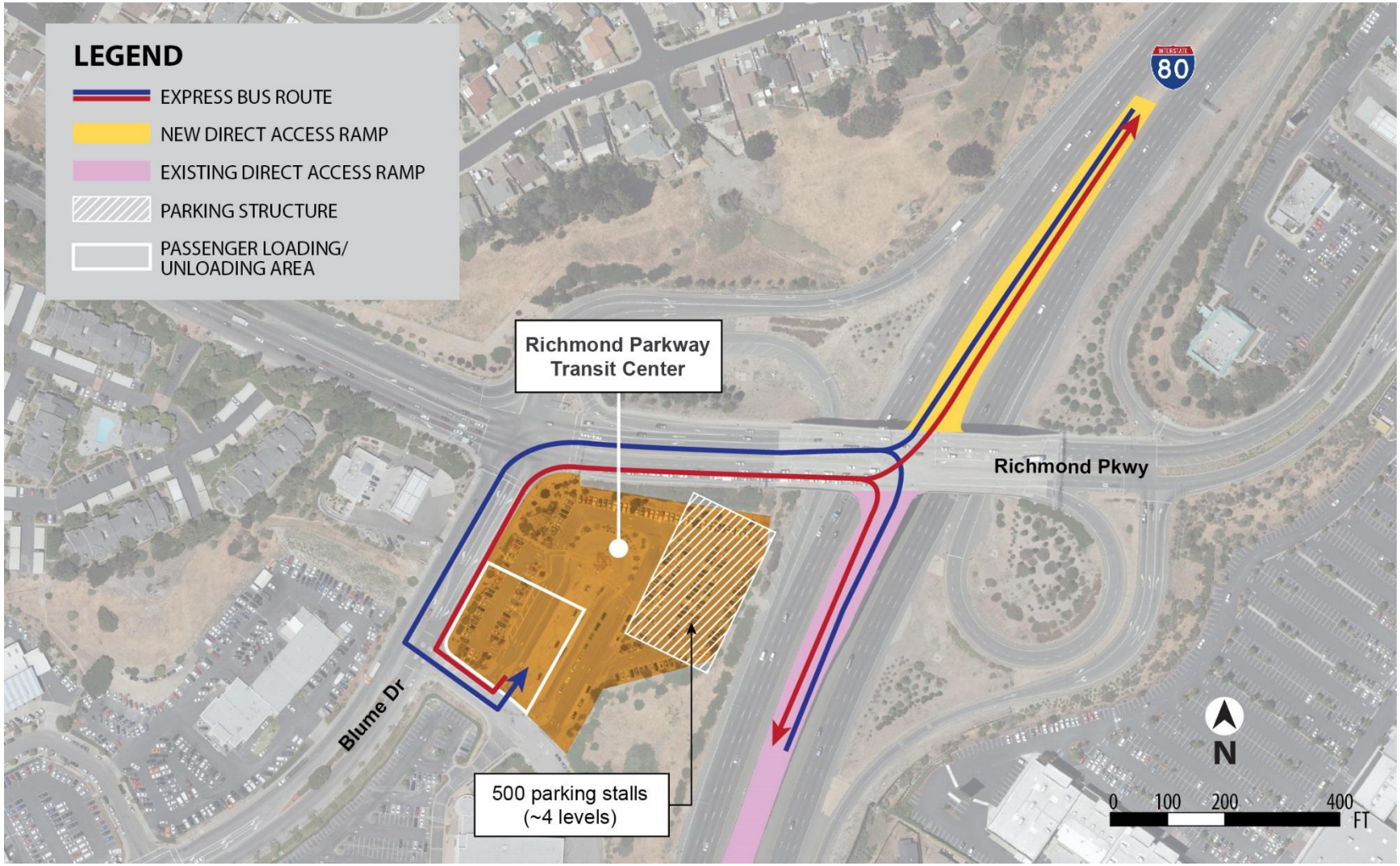
Currently bus maneuvers to enter or exit the freeway to reach the RPTC are time-consuming, operationally difficult during heavy traffic, and at times a safety concern. Providing the HOV ramps as shown in Option 2 in Figure 2-6 would reduce delays associated with crossing from the HOV lanes to the outside lane to exit the freeway.

Figure 2-5: Refined Access to Richmond Parkway Transit Center – Direct Access Ramp Option #1



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

Figure 2-6: Refined Access to Richmond Parkway Transit Center – Direct Access Ramp Option #2



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

2.2.3.4 Potential Transit Center at Macdonald Avenue and I-80

The intersection of San Pablo Avenue/Macdonald Avenue/I-80 is an attractive area for adding a subregional transit center, since it could connect express bus and Alternative 2 BRT service (discussed in Section 3) with other local area bus routes. BRT services are being considered for both San Pablo and Macdonald Avenues, which serve heavily used AC Transit arterial bus routes. The intersection is close to the El Cerrito Del Norte BART station, which is at capacity for parking and experiences heavy bus traffic during peak periods. Given the potential disadvantage for bus transfers at the El Cerrito del Norte BART station, a new transit center at Macdonald Avenue/I-80 would have BRT buses stopping here instead of entering the parking/bus-drop off area at the El Cerrito del Norte BART station. This would be advantageous, as the BRT buses would not add to the existing bus congestion and circulation challenges at that BART station. This could also reduce congestion at El Cerrito del Norte for non-BART trips, particularly for transfers between bus lines or for drop-off and pick-up connections to bus lines.

Transfers between Express buses and BRT buses need to be made in such a manner that does not add substantial travel time to either mode. The transit center concept at Macdonald Avenue and I-80 would have buses stopping at stations located on direct access ramps on the northbound and southbound median HOV lanes on I-80. This would help maintain fast transit travel times, as buses would not have to take the extra time to exit and re-enter the freeway to pick up and drop off passengers.

This potential transit center could occupy underutilized parcels south of Bissell Avenue at San Pablo Avenue. While there is an existing auto repair shop and convenience store/deli that would be displaced by a new transit center, the other lots fronting Bissell Avenue are used for warehousing or storage, vacant, or available for leasing. The Richmond Greenway trail is located on the site's south side, which would provide multimodal access to the transit center. Parking is not proposed for this site other than spaces for dropping off and picking up bus passengers and for transit supervisory staff.

Another potential transit center location is the site between Macdonald and Bissell Avenues. Locating a transit center here would involve displacement of several active businesses although there is a large amount of surface area devoted to parking. A site selection study would be undertaken if the concept to place a transit center in this vicinity is advanced.

BRT buses would enter and exit the site either from San Pablo Avenue at Bissell Avenue or from Macdonald Avenue at Wilson Avenue. BRT buses that are traveling west/northbound on San Pablo Avenue to reach Macdonald Avenue can turn into the transit center at Bissell Avenue and exit at Wilson Avenue, thereby serving the center directly and avoiding the San Pablo

Avenue/Macdonald Avenue intersection. East/southbound BRT buses can enter the transit center along Wilson Avenue and exit at Bissell Avenue to continue southbound along San Pablo Avenue, thereby also avoiding the San Pablo Avenue/Macdonald Avenue intersection.

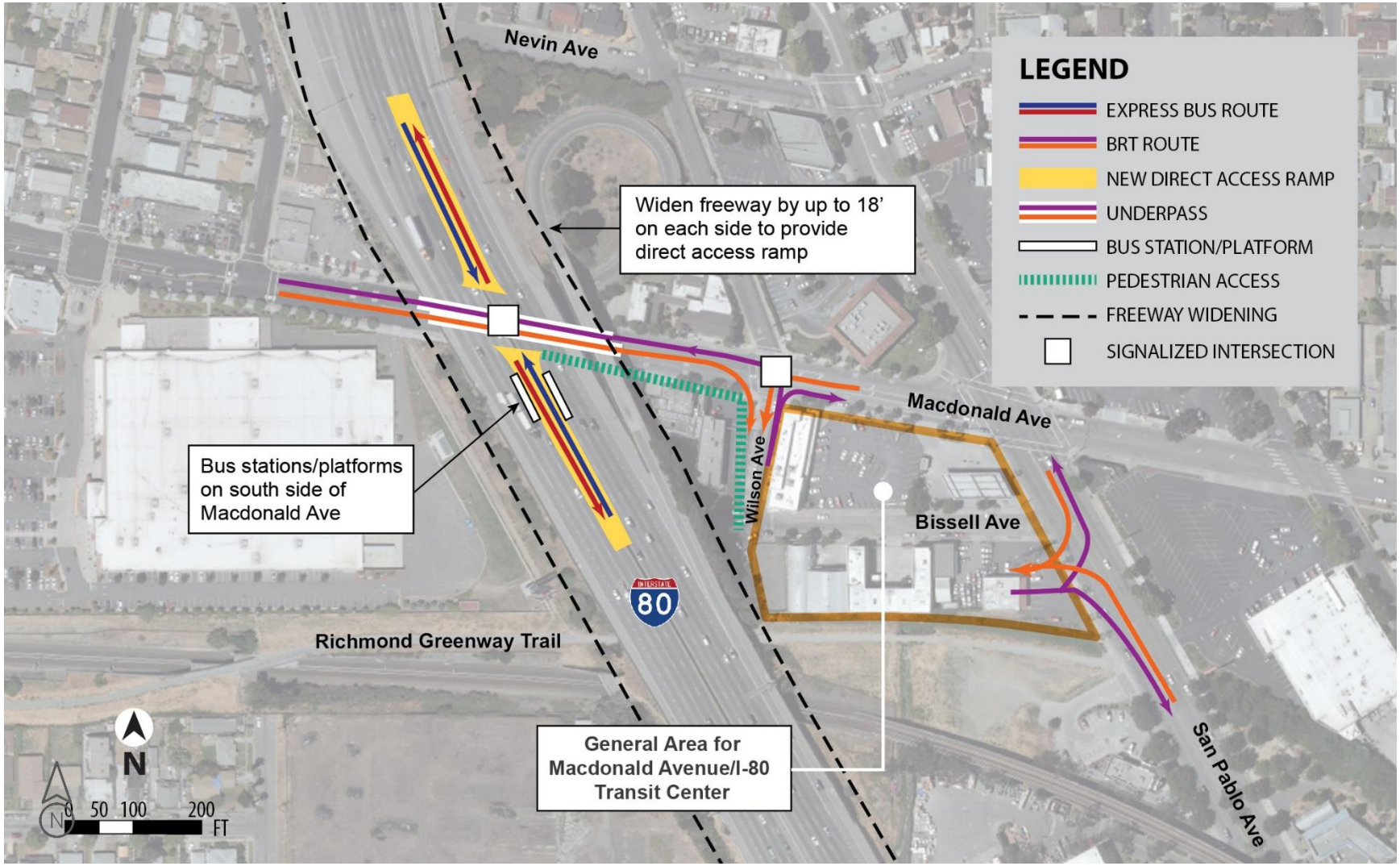
To avoid having BRT buses incur additional travel time to enter and exit the transit center, BRT stations can be placed on San Pablo Avenue in both directions between Macdonald and Bissell Avenues. Enhanced pedestrian access to and from these BRT stations would need to be considered, e.g., high-visibility crosswalks and platforms, pedestrian countdown signals, etc. These types of access details would be worked out in future studies.

The viability of the new center improves if served by I-80 San Francisco and East Bay express buses with direct on and off-ramps from the HOV median lanes. The I-80/Macdonald Avenue interchange ramps connect the local street network to the freeway and would provide access to the proposed transit center location (east of I-80 near Macdonald Avenue at San Pablo Avenue). The new HOV direct access and exit ramps would also eliminate the current delays associated with buses crossing mixed-flow traffic lanes to get on and off the freeway.

As at Richmond Parkway, express bus stations/platforms could be provided alongside the ramps at ground level next to Macdonald Avenue or access (about 700 feet) could be provided via local streets to the proposed transit center. With stations on the freeway ramps, buses could exit from the freeway median and then continue directly back to the freeway median after picking up or dropping off passengers without changing lanes. Figure 2-7 shows the concept.

To provide direct access HOV ramps to the freeway median and stations on the ramps would, as at Sycamore Avenue, require widening an elevated segment of I-80. The combination of improvements would need further study to assess the widening impacts and is therefore considered a long-term improvement.

Figure 2-7: Potential Transit Center at Macdonald Avenue and I-80 in Richmond



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

3 ALTERNATIVE 2: SAN PABLO AVENUE/MACDONALD AVENUE BUS RAPID TRANSIT

3.1 Alignment Description

Alternative 2: San Pablo Avenue/Macdonald Avenue BRT approximates the well-utilized existing AC Transit Route 72R Rapid Bus services along San Pablo and Macdonald Avenues. It would extend bus service from the current Route 72R terminus at Contra Costa College Transit Center north to Hercules along the heavily traveled San Pablo Avenue and Hilltop Drive corridors. This extension would introduce high-capacity and high-frequency transit service to areas not served by the existing Rapid Bus service.

This alternative aligns with the long-term BRT investment included in AC Transit's Major Corridors Study for San Pablo Avenue and Macdonald Avenue. BRT improvements for this corridor are being included in CCTA's project list update for its Countywide Comprehensive Transportation Plan[17] and with Alameda CTC Countywide Transit Plan and AC Transit's Major Corridor Study.

Figure 3-1 shows the San Pablo Avenue/Macdonald Avenue BRT alignment. Appendix A provides maps of the full alignment by segment, including cross-sections.

3.2 Phasing

3.2.1 Short-term Improvements (1-5 years)

In the short-term, transit signal priority and select queue jumps at signalized intersections along San Pablo and Macdonald Avenues are feasible. Signal priority already exists along San Pablo Avenue to Contra Costa College, installed as part of the 72R Rapid Bus project by AC Transit a number of years ago. The signal system is in the process of being upgraded with newer, more reliable technology. Queue jumps could be installed at intersections with adequate space to accommodate a queuing lane. Queue jumps requiring significant construction would be deferred for a medium-term program. Expansion of real-time passenger information systems may also be possible in the short-term, subject to funding availability.

[17] AC Transit, Staff Report to AC Transit Board, October 8, 2014, Report No. 14-261, Update on Contra Costa Countywide Comprehensive Transportation Plan, http://www.actransit.org/wp-content/uploads/board_memos/14-261%20Contra%20Costa%20Transportation%20Plan.pdf

Overview of BRT Features

A great advantage of BRT is its flexibility and suitability for incremental implementation. Changes can be made relatively quickly in the short- and medium-term and usually without interfering with current bus operations.

The elements that comprise BRT projects form a continuum that range from Rapid Bus improvements to high-level BRT improvements. Both Rapid Bus and high-level BRT concepts include operational as well as facility improvements. In this study, Rapid Bus improvements are defined as:

- **Transit signal priority**, which gives favorable treatment to buses along signalized arterials. For example, traffic signals can be programmed to reduce stopped delay for buses by offering extended green light time, shortened red light time, or possibly a separate bus-only signal phase.
- **Queue jumps** at critical intersections, where the bus is provided a short, separate lane on approaching a signalized intersection and is given an early green to advance ahead of other traffic through the intersection.
- **Off-board fare payment**, generally combined with proof-of-payment fare enforcement, which allows bus boarding and alighting through any door.
- **Passenger stops with amenities,** such as canopies, real-time bus arrival information, security lightin d information kiosks.

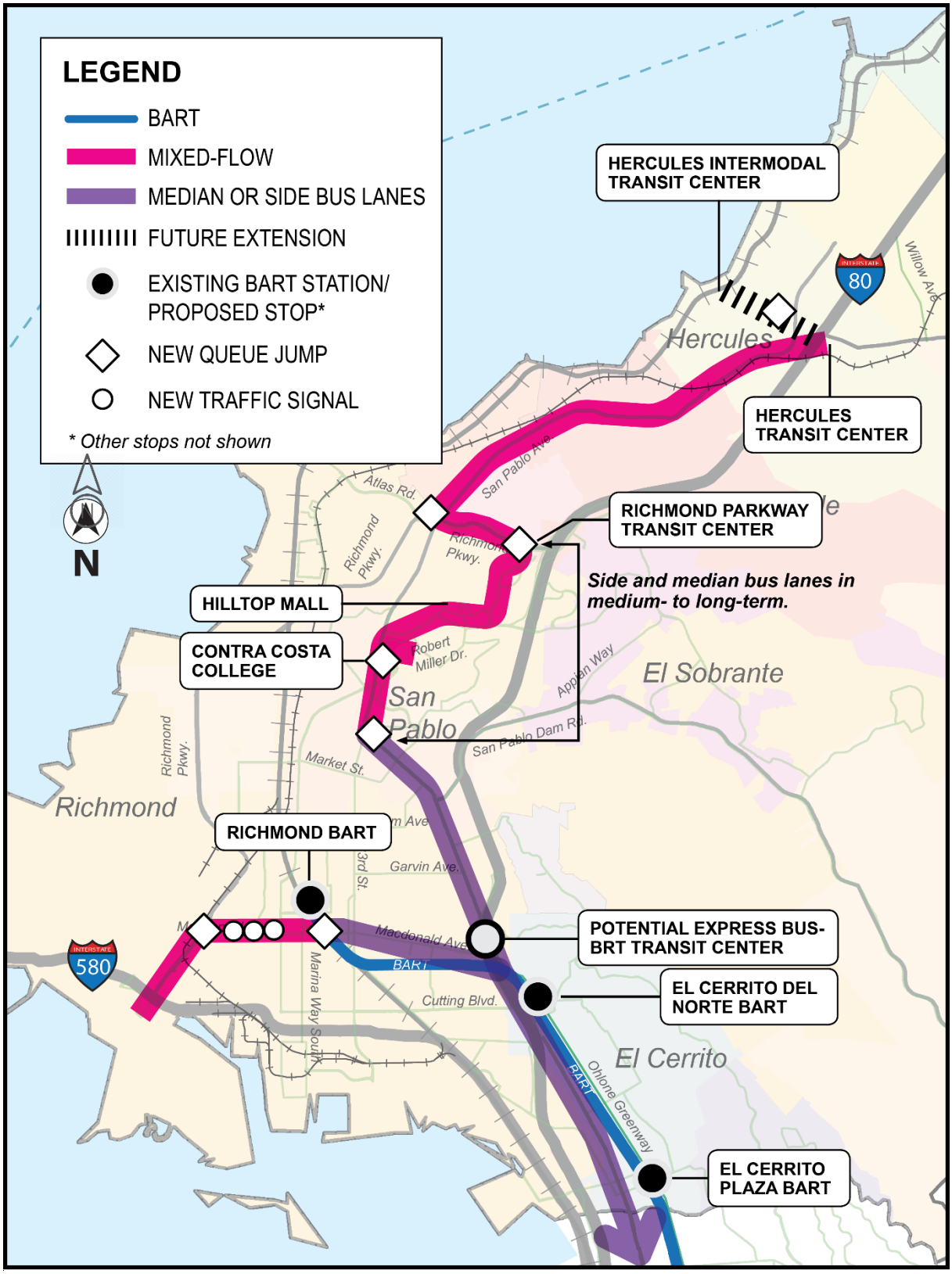
In the second category of full BRT improvements, all of the above may be included in addition to:

- **Dedicated bus lanes**, either side-running or median-running, to be used by transit buses and emergency vehicles (i.e., fire and police) only.
- **Level boarding**, where bus stops/stations are raised to at or just below the bus's floor height, helps riders get on and off the bus more easily, especially passengers with parcels, strollers, or luggage. Level boarding also eliminates the need for wheelchair access ramps or lifts, as it bridges the horizontal gap between the bus and curb or platform.
- **Extended bus stops/stations** for side-running BRT buses (buses operate in the lane next to the curb or parking lane) to provide dedicated boarding and alighting areas for bus passengers separate from sidewalk traffic.
- **Raised bus stations** for median-running BRT configurations separated from mixed-flow traffic lanes and protected access to stations from the sidewalk (through pedestrian signals, for example).
- Other enhancements, including high-amenity stations with seating, lighting, landscaping, public art, and other features.

High-amenity BRT stations can include the following elements, as shown in this photo of Las Vegas' Max BRT system: landscaping, level boarding, ticket vending machines, distinctive station, maps and other wayfinding tools, trash can, and others

Photo: Streetsblog USA

Figure 3-1: Refined Alternative 2: San Pablo Avenue/Macdonald Avenue BRT



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

Extension of existing 72R Rapid Bus service (which does not yet incorporate level boarding, off-board fare collection, and several other features of higher-level BRT improvements) to the RPTC is proposed. This Rapid Bus service would include transit signal priority, passenger information systems, and queue jumps where feasible without disrupting existing infrastructure. The alternative would extend 72R Rapid Bus line from Contra Costa College to RPTC, replacing the 72 local line service that currently ends at Hilltop Mall. The entire corridor from downtown Oakland to the RPTC would feature the same basic Rapid Bus treatments.

Implementation of basic Rapid Bus improvements, including transit signal priority and real-time passenger information systems, would also occur along Macdonald Avenue from San Pablo Avenue through downtown Richmond to the Point Richmond terminus at Tewksbury Turnaround. Three new traffic signals are proposed as short-term improvements on Macdonald Avenue (as shown in Figure 3-1), where there are currently stop signs. These traffic signals would be equipped with transit signal priority equipment to help buses move through this section of Macdonald Avenue more quickly. Otherwise, the buses would have to stop at the existing stops at each of these intersections (e.g., Second, Fourth, and Curry Streets).

3.2.2 Medium-term Improvements (5-15 years)

Over time, more intensive advanced Rapid Bus improvements and the capital infrastructure associated with full BRT could be implemented to improve reliability and travel times along the corridor. The specific location and configuration of dedicated bus lanes and possibly additional queue jumps lanes, would occur in the project development phase and impacts would be more thoroughly assessed as part of an environmental evaluation process.

As shown in Figure 3-1, preliminary assessments have identified the proposed locations for queue jumps and dedicated BRT lanes along both branches of Alternative 2. Initially, dedicated lanes would continue along the median of San Pablo Avenue to Contra Costa College. North of the college, more extensive Rapid Bus/BRT improvements could be continued, including raised stations for level boarding and more extensive passenger amenities. These could be phased, first to Richmond Parkway and then north long the Parkway and San Pablo Avenue through Pinole and Hercules to a terminus at the Hercules Transit Center. Assuming the area along John Muir Parkway west to the Hercules Intermodal Transit Center continues to develop and densify, extension of these BRT treatments between the Hercules Transit Center and the Hercules Intermodal Center could be implemented toward the end of this period. Dedicated lanes are not proposed in the medium term north of Contra Costa College, as demand is not seen as sufficient and traffic congestion not as heavy in this area during this time horizon (i.e., 5 to 15 years).

Along Macdonald Avenue, median-running BRT lanes would extend from San Pablo Avenue to just west of 21st Street in downtown Richmond where high-level Rapid Bus/basic BRT improvements would be continued, similar to those proposed for San Pablo Avenue north of Contra Costa College. Dedicated lanes are not proposed west of 21st Street on Macdonald Avenue in the medium- or long-term, given traffic operations and physical constraints. In this segment, the median BRT lane would need to transition to mixed-flow operations, as traffic merges at 19th Street onto Macdonald Avenue in the westbound direction. There is only a single through lane in each direction for traffic at 16th Street. In other words, there is no second lane that can be converted to a BRT lane. The possibility of adding bi-directional bus-only lanes (described in the sidebar on the next page) could be investigated during project development for this and other narrow segments. Reconstruction of the street would require removal of Complete Street treatments (e.g., sidewalk extensions or "bulb-outs"). Also, traffic volumes are much lower here as there are mostly lower-density residential land uses in this area.

Queue jumps would be installed at critical constraint points along segments of either BRT branch service where buses operate in mixed-flow lanes.

Where raised BRT stops and stations for level bus boarding are constructed, off-board fare collection would be implemented. Off-board fare collection could also be installed at transit signal priority and dedicated curbside Rapid Bus stops. This is more easily accomplished at dedicated BRT stops/stations that have space for fare machines.

3.2.3 Long-term Improvements (15+ years)

In the long term, residential and commercial development throughout the study area may warrant higher-level BRT frequencies and more extensive BRT infrastructure improvements. The most promising extension of BRT infrastructure would be installation of dedicated BRT bus lanes from Contra Costa College to Richmond Parkway, either in the median or in the outside traffic lane (side-running configuration). At this time, extending dedicated BRT lanes north of Richmond Parkway is not anticipated in the long term, as transit demand and traffic volumes are not anticipated to increase sufficiently to warrant the investment in this area during this time horizon (i.e., 15+ years).

Bi-directional BRT Lanes

A bi-directional BRT lane is an exclusive single lane that allows a BRT bus to pass in one direction through a constrained section. During this time, another BRT vehicle waits at a station or bypass area until it can be given the green signal to pass though the section in the other direction. This lane configuration is used when there is only enough room to put in a single bus lane and the buses' frequencies are restricted to permit travel through no more than three signalized intersections. Additionally, the signal system needs to have safeguards that "block out" the section so that only one BRT vehicle can be in the section at a time. (Source: American Public Transportation Association, "Designing Bus Rapid Transit Running Ways," 2010.)

Given Macdonald Avenue's relatively narrow width, a single bi-directional BRT lane in the median can be studied for segments of this roadway during project development, in addition to the two proposed median BRT lane concept discussed above. A two-lane through station would is recommended to provide passing lanes for buses travelling in the opposite directions.

Bi-Directional BRT Lane on Franklin Street in Eugene, OR

Photos: Lane Transit District, Eugene, OR

3.3 Parking

The implementation of dedicated BRT lanes can affect curbside parking supply. Parking displacement depends on the roadway width – the street cross-section measured from curb to curb – and treatments through intersections. Curbside parking can also be displaced for curb extension stations and at queue jumps, although the overall extent of such improvement is

limited compared to the potential curbside parking loss from BRT projects with extensive dedicated bus lanes. Parking losses can be offset be mitigation strategies, such as travel and parking demand management (e.g., parking occupancy studies, permit parking zones, parking meters), new parking spaces on side streets or off-street lots, and others.

Sheets 1-3, 13, and 14 in Appendix A show the areas of dedicated BRT lanes along San Pablo and Macdonald Avenues for the medium-term build horizon. Sheet 1 in Appendix A indicates where improvements could result in curbside parking loss. Further studies would be needed to refine these areas of impact and to develop strategies that could reduce the impacts associated with parking loss, e.g., parking occupancy studies to assess demand and gauge opportunities to re-balance parking supply; pricing and other demand management strategies; improved wayfinding to reduce space hunting; and others. Such studies require close consultation with city representatives and potentially affected residential and business communities.

BRT and Parking

Given the physical constraints of any street or roadway, there are competing uses for public space: auto lanes, bus lanes, bike lanes, sidewalks, landscaping, etc. Some locales have faced concern from community members about the loss of parking during BRT implementation, as creating a bus-only lane may require converting a parking lane to a bus-only lane.

Each situation is unique and needs to be evaluated based on the specific cost or benefit. This involves a policy decision and a community dialogue about what type of use will be prioritized and how widely the cost and/or benefit will be felt. What the loss of parking can mean depends on the individual, community, or agency. Where one person sees a benefit, another person may see an impact.

BRT improvements have been shown to improve ridership and reliability. A study of BRT projects in the U.S. found that the service generally increased ridership and improved service over the previous transit service. (See graph below.)* Another study estimated that 24 percent to 33 percent of riders served by new BRT systems are new transit users, most having switched from private car usage.**

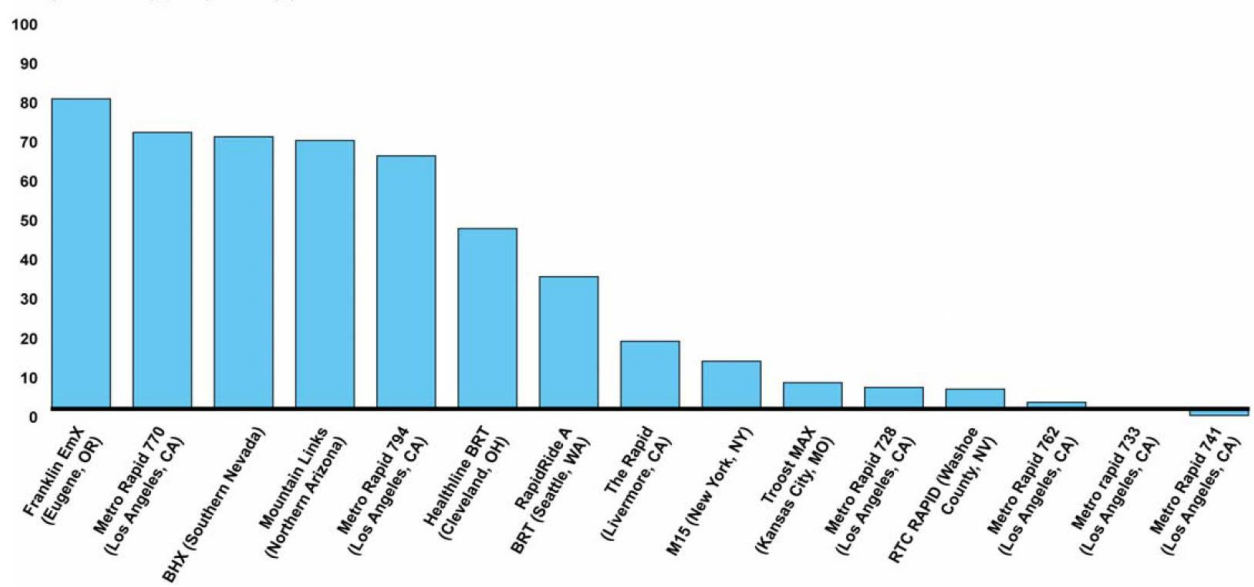
For a specific project in the planning stages, it is possible to quantify the benefits of the lane on transit travel time and reliability through the use of modeling (such as VISSIM). The costs to businesses and residents are more difficult to quantify. It often becomes a question of priorities between transit service and access to parking. On-street parking is not owned or assigned to an adjacent business and is typically not used to meet code requirements for parking.

Sources:

* US General Accounting Office. (2012). “Bus Rapid Transit: Projects Improve Transit Service and Can Contribute to Economic Development.” GAO Report GAO-12-811.

** Peak, M., Henke, C., and Wnuk, L. (2005). “Bus Rapid Transit Ridership Analysis.” FTA Report FTAACAA26A7068A 2004.1.

Change in ridership (as a percentage)for BRT projects after one year of operation (US GAO, 2012)



4 ALTERNATIVE 3: 23RD STREET BUS RAPID TRANSIT

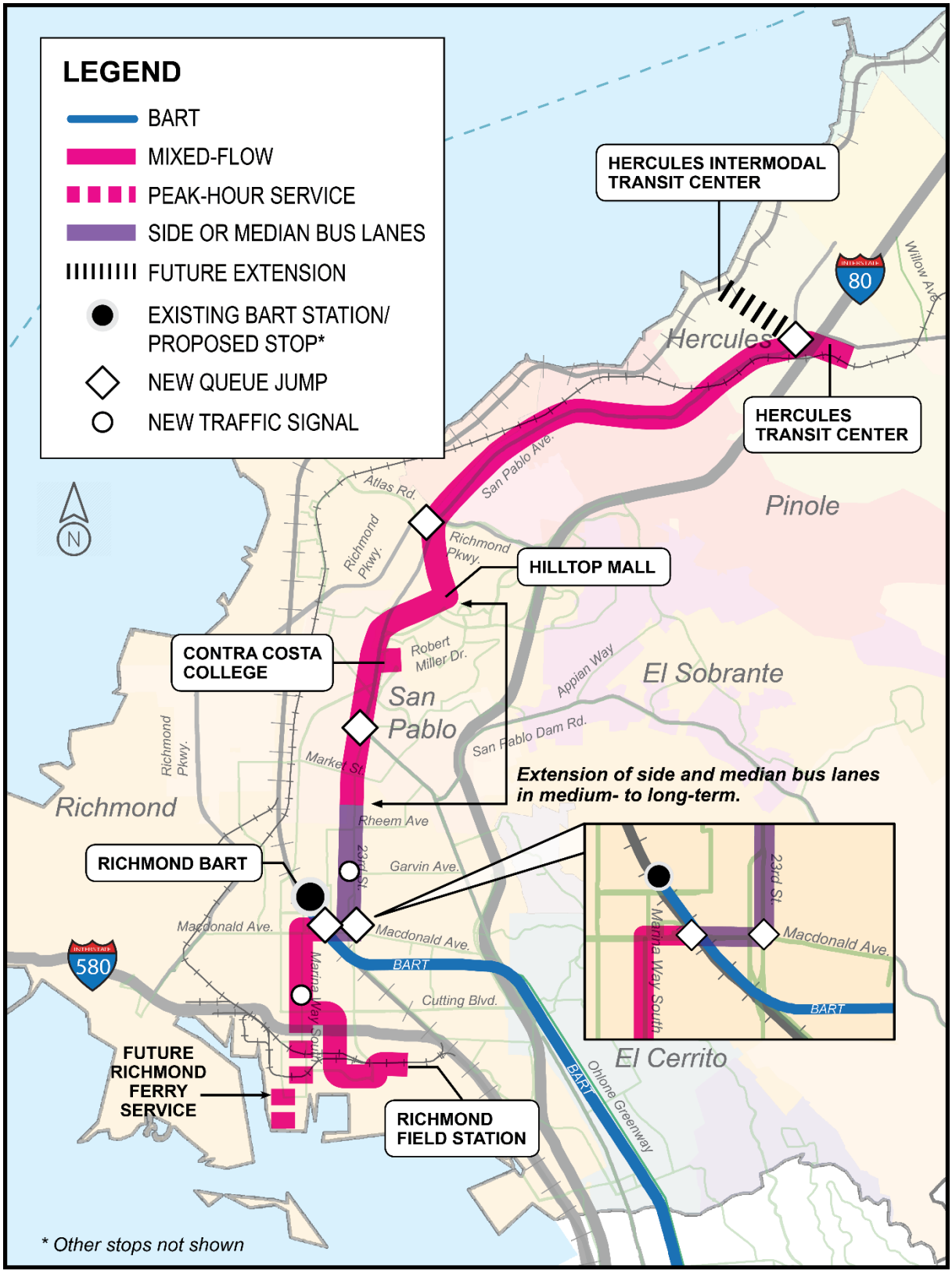
4.1 Alignment Description

Alternative 3: 23rd Street BRT is aligned south-north through the study area, beginning in the city of Richmond's Marina District and proceeding to Richmond BART along Marina Way, then to Contra Costa College following 23rd Street and San Pablo Avenue. A second major segment of the alignment continues north along San Pablo Avenue and Robert Miller Drive to Hilltop Mall, returning via Hilltop Drive to San Pablo Avenue before continuing through Pinole and Hercules to a northern terminus at the Hercules Transit Center.

In the south, the alternative offers two branches of service. The main connection—along Cutting Boulevard, Marina Bay Parkway, and Regatta Boulevard—is to the UC Berkeley field station in southeast Richmond. BRT operations along Regatta Boulevard and the expanding commercial and residential development in the Marina District would be provided all day, seven days a week. A second service branch continues along Marina Way South to Harbor Way South and Ford Point, the site of the new Richmond Ferry Terminal to be operational in 2018. The BRT branch service to Ford Point would be provided only during peak periods to connect with planned peak period ferry service. At the north end of the alignment, an extension of BRT service is proposed in the medium to long term to the Hercules Intermodal Transit Center along John Muir Parkway. This extension is also part of Alternative 2. Should both BRT alternatives be implemented, only a single service extension to the Hercules Intermodal Center would be provided. In this case, it is recommended that the San Pablo Avenue BRT service continue to the Hercules Transit Center and, when operational, to the Hercules Intermodal Transit Center as a further extension. The 23rd Street BRT service would terminate at Contra Costa College or possibly at Hilltop Mall, where there would be a timed transfer to the San Pablo Avenue BRT line for passengers wanting to continue their trip north.

Figure 4-1 shows the alignment for Alternative 3: 23rd Street BRT. Appendix B shows the potential BRT improvements for each segment of this alignment, including cross-sections.

Figure 4-1: Refined Alternative 3: 23rd Street BRT



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

4.2 Phasing

4.2.1 Short-term Improvements (1-5 years)

A phased program of operational and physical facilities improvements along the 23rd Street BRT alignment is proposed, similar to the phased improvements for Alternative 2. The program would begin with Rapid Bus improvements and progress to full BRT improvements in certain segments. Currently no Rapid Bus upgrades, such as transit signal priority and passenger information systems, exist along the 23rd Street corridor except in the several blocks of San Pablo Avenue between 23rd Street and Contra Costa College that are part of AC Transit's 72R Rapid Bus line.

In the first five years following project approval by sponsoring agencies, Rapid Bus improvements would be established in the corridor from the UC Berkeley field office and Ford Point to Hilltop Mall. These would include:

- Transit signal priority at signalized intersections
- Queue jumps at select intersections that are potential operational bottlenecks for BRT service and where space allows
- Real-time passenger information and other amenities at BRT stops

4.2.2 Medium-term Improvements (5-15 years)

Rapid Bus service could be extended from Hilltop Mall to the Hercules Transit Center and include the improvements listed above under Section 4.2.1. More capital-intensive infrastructure improvements would be made in the segment from the Richmond Marina District to Hilltop Mall, including:

- High-amenity stations, including level bus boarding and alighting, initially to Contra Costa College and then to Hilltop Mall. Toward the end of the period or alternatively in the long term, high-level stations could be extended to the Hercules Transit Center.
- Dedicated bus lanes in the segment through central Richmond in the median of Macdonald Avenue from approximately 21st Street to 23rd Street and a combination of median- and side-running dedicated lanes on 23rd Street from Macdonald Avenue to Rheem Avenue. Buses would operate in mixed-flow north of Rheem Avenue.
- Expansion of queue jumps at select intersections to maintain smooth traffic operations where minor to moderate street improvements are required.

Rapid Bus service, including transit signal priority, real-time passenger information and other amenities at BRT stops, would be implemented on an extension of BRT service to the Hercules Intermodal Transit Center.

4.2.3 Long-term Improvements (15+ years)

Extension of dedicated lanes along 23rd Street to San Pablo Avenue and then to Contra Costa College is proposed in the long term. During project development, additional analysis would be completed to assess the configuration and extent of bus-only lanes and potential benefits of implementing them. As the corridor develops, dedicated lanes could be continued to the Hilltop Mall Transit Center. Should the dedicated BRT lanes on San Pablo Avenue and Robert Miller Drive be established as part of Alternative 2, buses used for Alternative 3 could share the lanes to Hilltop Mall. Extension of dedicated BRT lanes north of Hilltop Mall along Hilltop Drive (west) and San Pablo Avenue is not anticipated, given low existing and projected traffic volumes.

4.3 Parking

Sheets 6 and 7 in Appendix B shows the locations where curb parking would likely be displaced to accommodate dedicated side-running BRT lanes in the medium term. Curb parking would be lost along the west side of 23rd Street from Macdonald Avenue to Clinton Avenue and along both the west and east sides of 23rd Street from Clinton Avenue to Rheem Avenue.

No analysis of parking displacements in the long term has been made. Should dedicated lanes be extended in the long term north of Rheem Avenue to San Pablo Avenue and along San Pablo Avenue and Robert Miller Drive to Hilltop Mall, curbside parking loss would be expected in places. Subsequent project planning studies would identify the segments where parking loss and mitigation would be anticipated.

No estimate of parking loss has been made at queue jumps or at new curbside BRT stations outside the segment of 23rd Street where dedicated lanes are proposed. These site-specific impacts are appropriately evaluated in more detailed technical studies completed during project environmental reviews. Some minor to moderate loss of parking would be expected at various sites and would be a factor in the selection of the final locations for such improvements.

5 ALTERNATIVE 4: UPRR COMMUTER RAIL

Technical Memorandum #8 examined two commuter rail alternatives, one involving additional passenger service on the Union Pacific (UP) line and the other involving the establishment of new passenger rail service on the Burlington Northern Santa Fe (BNSF) line. Both of these alternatives required substantial infrastructure investment to allow for additional capacity or the ability to accommodate passenger rail operations. They also required potentially complex negotiations with railroad owners.

Given the technical assessment, the recommendation of the consultant team, and the feedback from the public, the WCCTAC Technical Advisory Committee (TAC), the Study Management Group, and the WCCTAC Board, these expensive and long-term rail alternatives were set aside for the time being. The direction from the WCCTAC Board related to commuter rail service in Contra Costa County was to focus on making the best use of the existing service on the UP line.

5.1 Hercules Regional Intermodal Transit Center

The second idea proposed by the WCCTAC Board was to complete the Hercules Intermodal Transit Center in Hercules, which is already in process and is an existing priority for WCCTAC and for CCTA. The completion of this facility provides a second point of access, in addition to Richmond, for commuter rail services in West Contra Costa. The station's proximity to I-80 is intended to attract potential riders from within the northern portion of West County and points further north. The City of Hercules plans to conduct a ridership analysis in spring 2017.

Technical Memos 4 (Summary and Evaluation of Prior Studies) and 5 (Existing and Planned Transportation Network) summarize the City of Hercules' plans for providing new service at the Hercules Intermodal Transit Center. The city envisions a future Capitol Corridor station in Hercules at this location along Bayfront Boulevard near the waterfront and early phases of implementation are underway.

Thirty Capitol Corridor trains currently run through Hercules daily. The Hercules station at this location would provide this existing high-frequency train service to the neighborhoods nearby and would provide commuters with an option to shift from driving on the congested I-80 corridor to riding the rail service. A Hercules Station would also better serve residents living in the northern half of West County.

The City of Hercules will be conducting a ridership analysis in late 2016 and is currently at work on its Path to Transit Phase, which extends the John Muir Parkway to the Intermodal Transit Center. Additionally, Hercules staff continues to work with Capitol Corridor and the UPRR to obtain approval for a station stop and develop a train schedule for the station. Implementation of the Hercules Intermodal Transit Center has and will continue to require a diverse array of

funding sources. According to city estimates, a train station in Hercules could come on line sometime between 2019 and 2021, while full build-out of the Hercules Intermodal Transit Center may require additional time.

5.2 Fare Sensitivity Analysis

The WCCTAC Board advanced two ideas. The first was to provide fare subsidies or discounts on existing passenger rail services in West Contra Costa to certain destinations to attract new riders. The thirty trains per day on the UP line represent a strong service, but the fares established by Amtrak are considerably higher than most urban transit. This puts the service out of reach of many, especially those wishing to make short trips within the vicinity of West Contra Costa. The two most popular origin and destination pairs from Richmond are Richmond-Emeryville ($9.00 one-way fare) and Richmond-Martinez (Fifteen times per day, the Capitol Corridor route makes this run for $12.00 one-way fare. Five times per day, the San Joaquin route makes this run for a $7.50 one-way fare and the California Zephyr route makes this run once per day for a $17.00 one-way fare.).

The travel time savings for passengers using these rail services is significant compared to other transit options. The tables below compares the cost and length of time for the same trip between the Richmond BART/Amtrak Station and the Emeryville Amtrak Station and the Richmond BART/Amtrak and Martinez Amtrak station:

Table 5-1: Comparison of Cost and Time between Richmond BART/Amtrak and Emeryville Amtrak

	Capitol Corridor			AC Transit + Walk	BART + AC Transit + Walk	BART + Emery-go-round
	Existing Price	50% Subsidy	75% Subsidy			
Single Ticket Price (Adult)	$9.00	$4.50	$2.25	$2.10	$4.55	$2.70
Single Ride Price w/ 10 Ride Pass Ticket	$5.60	$2.80	$1.40	n/a	n/a	n/a
Single Ride Price with Monthly Pass (assumes 35 rides)	$4.20	$2.10	$1.05	$2.14	$4.59	n/a
Length of Trip	14 minutes			64 minutes	45 minutes	29 minutes
Frequency of Service	20 one-way trips per day			35 one-way trips per day	77 one-way trips per day	3-6 one-way trips per hour

Table 5-2: Comparison of Cost and Time between Richmond BART/Amtrak and Martinez Amtrak

	Capitol Corridor			AC Transit + WestCAT	BART (via El Cerrito del Norte) + WestCAT	BART to Walnut Creek + County Connection
	Existing Price*	50% Subsidy	75% Subsidy			
Single Ticket Price	$12.00	$6.00	$3.00	$2.75	$2.95	$5.10
Single Ride Price w/ 10-20 Ride Pass	$7.40	$3.70	$1.85	n/a	n/a	$6.10
Single Ride Price with Monthly Pass (assumes 35 rides)	$5.60	$2.80	$1.40	$2.14	$1.95	$5.81
Length of Trip	25 minutes			92 minutes	62 minutes	80 minutes
Frequency of Service	21 one-way trips per day.			18 one-way trips per day	18 one-way trips per day	16 one-way trips per day

* For this comparison, only the ticket pricing for Capitol Corridor route was analyzed since that route has the most daily runs.

The cost and travel time varies considerably between the two examples given above. The fare for Capitol Corridor is at least double the cost of the other transit providers yet the time to travel the same distance is much less on Capitol Corridor.

Discounted fares on the Capitol Corridor could possibly lead to stronger local ridership, could have an impact on transit mode share, and could divert some trips from the freeway. The proposed fare subsidy concept would involve a considerably lower fare on the Capitol Corridor service for certain trips to bring it closer in price to other local, but significantly slower, transit options. The proposed fare discount would only apply to those trips that include the existing Richmond station and future Hercules station and make connections to the other stop in Contra Costa County (Martinez) or specific stops in Alameda County (Berkeley, Emeryville, and downtown Oakland/Jack London Square). These destinations offer access to nearby job centers where taking transit instead of driving could remove a vehicle trip on I-80. In the case of Martinez, as it is the county seat, increased ridership could also provide improved access for west county residents to county services and jobs.

The Victoria Transport Policy Institute's paper on Transit Elasticities and Price Elasticities (May 2016) found that, "A relatively large fare reduction is generally needed to attract motorists to transit, since they are discretionary riders. Such travelers may be more responsive to service quality (speed, frequency and comfort), and higher automobile operating costs through road or parking pricing." A subsidized fare would potentially attract transit-dependent riders but the program would also be aimed at discretionary drivers who could transfer from freeway driving to the train. The same paper states, "In most communities (particularly outside of large cities),

transit-dependent people are a relatively small portion of the total population, while discretionary riders (people who have the option of driving) are a potentially large but more price-sensitive market segment. As a result, increasing transit ridership requires pricing and incentives that attract travelers out of their car."

The West County High-Capacity Transit Study generally seeks to increase transit ridership, increase transit mode share and reduce roadway congestion by diverting auto trips to rail. To provide greater insight into how a fare subsidy might achieve these objectives, WCCTAC staff conducted an analysis. The analysis examined two different levels of discount for origins and destinations between Richmond and Martinez, Berkeley, Emeryville and Jack London Square. The price elasticity formulas used for this analysis are based on a modification of the Victoria Transport Policy Institute's paper on Transit Elasticities and Price Elasticities cited above.

The first analysis assumed that a 50% subsidy would result in a 25 percent increase in transit riders. The existing annual ridership for origins and destinations between Richmond and the following stations: Martinez, Berkeley, Emeryville or downtown Oakland/Jack London Square is 6,186 trips for fiscal year 2015. This figure includes riders using individual tickets, 10-ride passes, and monthly passes. Based on the analysis, staff estimated that a 50% subsidy would result in approximately 1,547 new riders. Because existing trips would also receive a subsidy, the total number of subsidized trips amounts to 7,733.

The analysis assumed that a 75 percent subsidy would result in a 37.5 percent increase in transit riders. The existing annual ridership between the same stations listed above is 6,186 trips for Fiscal Year 2015. Based on the analysis, staff estimated that a 75 percent subsidy would result in approximately 2,320 new trips. Because existing trips would also receive a subsidy, the total number of subsidized trips amounts to 8,506.

WCCTAC staff estimated the cost of a three-year pilot project with both a 50 percent and a 75 percent ticket subsidy. While the ticket buyer would have a lower cost for riding the train, the actual cost would still be due to Amtrak/Capitol Corridor to make them whole for operating the service, unless they were willing to accept lower revenue. Potential funding partners for a subsidy program could include WCCTAC, TRANSPAC, the Capitol Corridor Joint Powers Authority, MTC, and/or CCTA. Three years would provide an opportunity to properly advertise the discount, build momentum, and conduct evaluations. In addition to the cost of the subsidy, the budget for a subsidy program should additionally include a marketing and promotions budget to alert potential riders. Based on the sensitivity analyses above, the following costs are estimated:

Table 5-3: Estimated Costs and Ridership Changes of a Three-Year Pilot Fare Subsidy Program

	50% Subsidy	75% Subsidy
Estimated Number of New Riders	1,547	2,320
Percentage Increase Over Existing Riders	25%	37.5%
Cost per Rider	$29	$39
Cost per New Rider	$145	$143

* Number of existing Capitol Corridor riders is 6,186.

	50% Subsidy	75% Subsidy
Subsidy for New Riders**	$45,000	$90,000
Subsidy for Existing Riders**	$180,000	$240,000
Total	$225,000	$330,000

* Cost includes marketing and promotions

The cost of the three-year pilot project assumes it will take three years to reach the projected number of new riders.

This analysis recognizes that some of the "new" ridership could occur from shifting existing transit riders from one transit service to another, and not increasing overall transit mode share. A more detailed analysis would be required to make this determination.

Additionally, the analysis recognizes that in order to make the service attractive to new riders by discounting fare, existing riders could experience a "windfall" reduction. There is no easy or practical means, however, only to give discounts to "new riders" who would otherwise not be willing to pay the fare.

6 ALTERNATIVE 6: BART EXTENSION FROM RICHMOND

Alternative 6: BART Extension from Richmond focuses on refinement of an extension from the Richmond BART station to the part of West County around Hercules and Pinole. The study's transit market assessment indicated that densities and transit suitability are growing in this area with a long-term potential for generating a higher level of ridership that could justify a heavy rail investment such as BART.[18]

Two potential alignments were identified, extending from the Richmond BART station north to I-80 via Rumrill Boulevard discussed in Section 6.1 and Richmond Parkway discussed in Section 6.2. The alignments and station options for both alignments are described further below and conceptually represented in Figure 6-1.

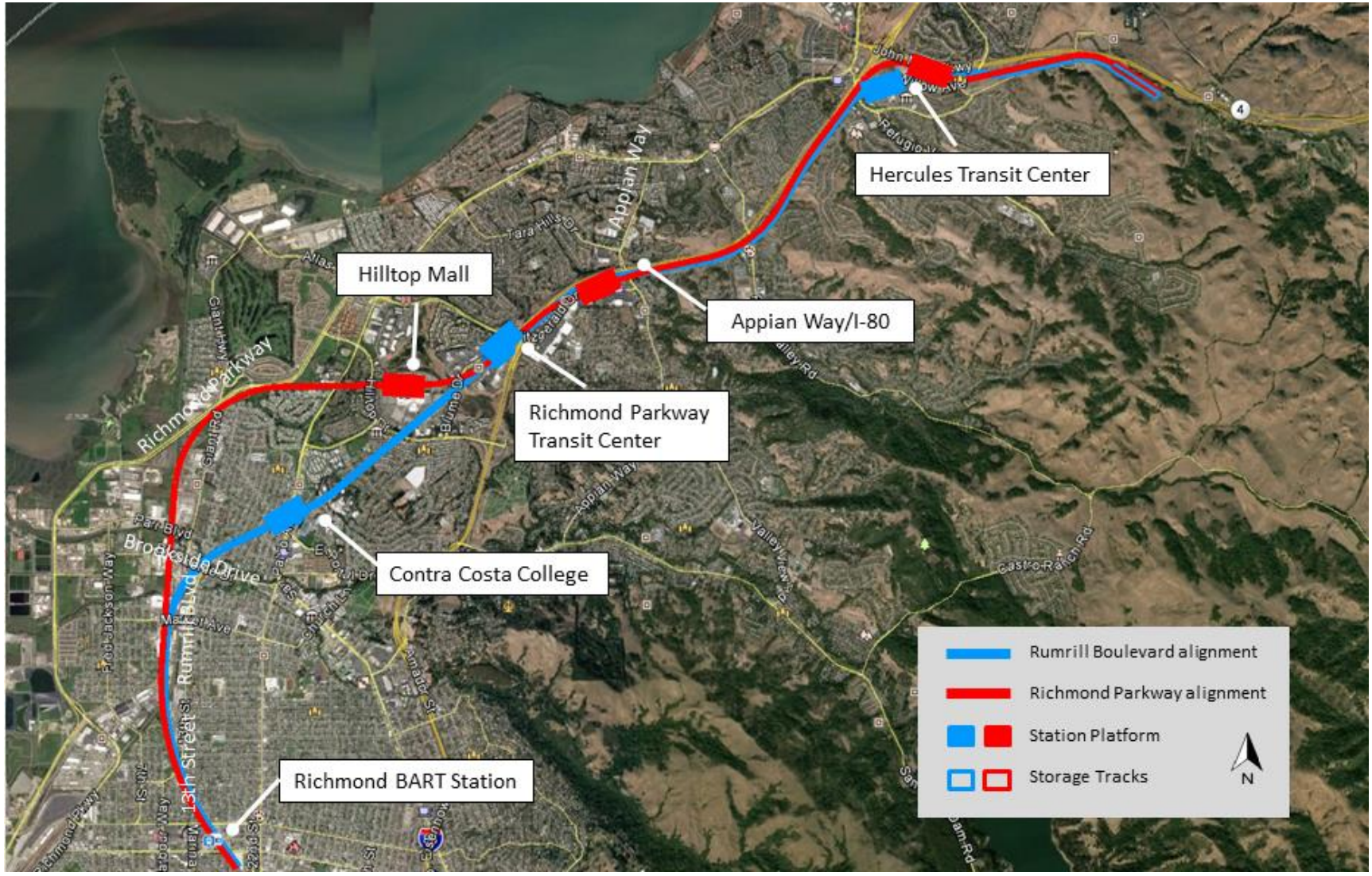
Section 6.3 describes the alignment between Appian Way/I-80 and the Hercules Transit Center, since there are multiple options for the alignment along I-80 and the Hercules terminus station and required storage tracks. Any one of the four options presented can be part of either the Richmond Parkway or Rumrill Boulevard alignment.

Because of the topography and urban nature of the study area, the potential BART corridors are limited and the alignments require BART to be either elevated or in a tunnel. Where the BART tracks are elevated, the BART tracks would be placed on aerial structures supported by viaducts. Figure 6-2 provides a conceptual typical section of a viaduct that could be used to support elevated tracks for either alignment. Where tunneling is involved, further studies would identify potential impacts and include measures to mitigate these impacts.

The alignments outlined below are preliminary and conceptual in nature. They are presented for further consideration and to aid in understanding the opportunities and challenges facing the introduction of BART service in this corridor. Further study to understand the limitations of geology and soils along the alignment and the impacts of noise and vibration on adjacent property owners would be required to more fully evaluate these alignments and station locations. This would be undertaken in the project development and environmental phase.

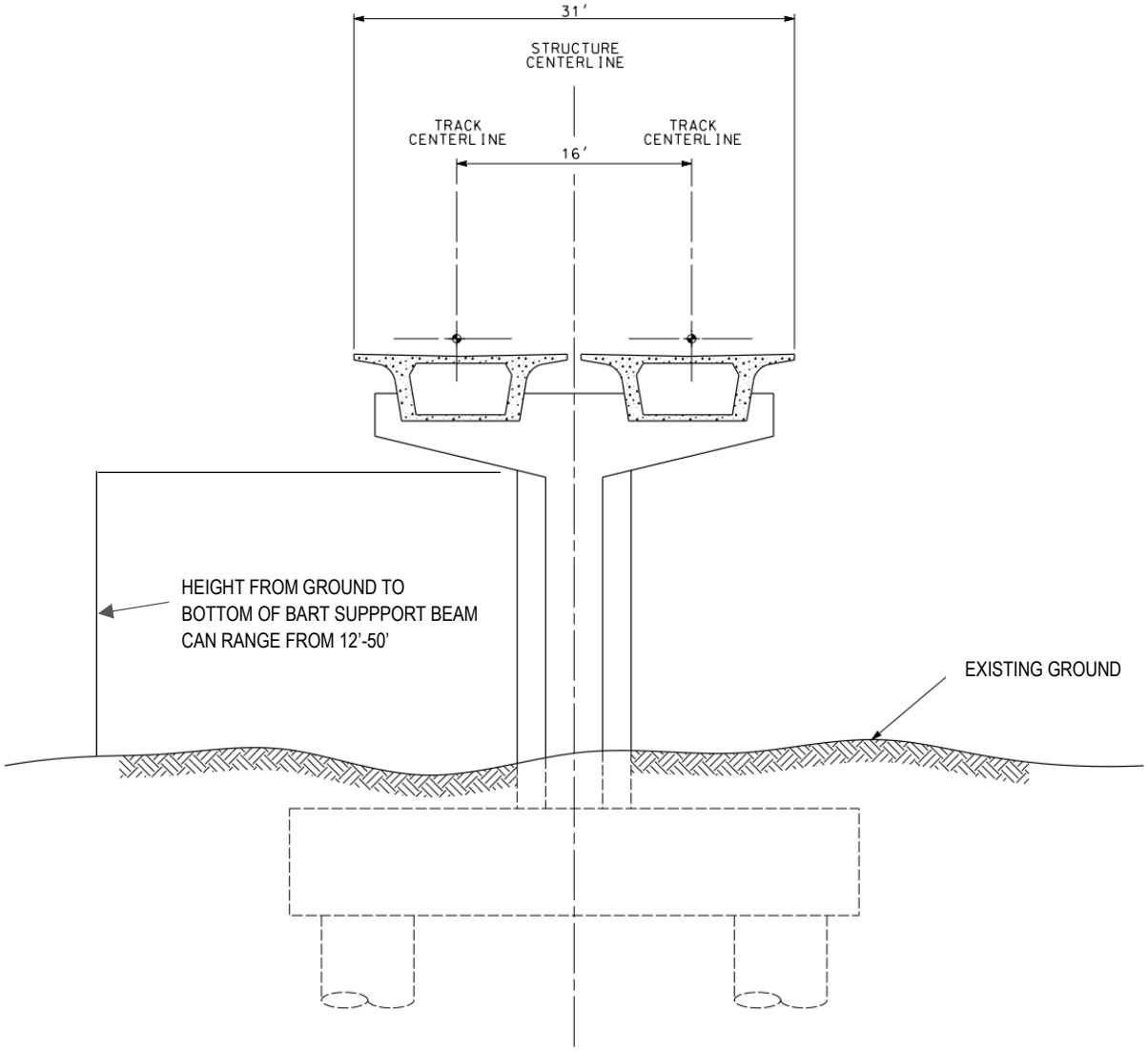
[18] West Contra Costa High-Capacity Transit Study, Technical Memorandum #7, Travel Markets, January 2016, WSP | Parsons Brinckerhoff, Kimley Horn, and Kittelson & Associates.

Figure 6-1: Potential Alternative 6: BART Extension Alignment Options on Rumrill Boulevard and Richmond Parkway



Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-2: Typical Section of Viaduct



Source: WSP | Parsons Brinckerhoff, 2016

Tunneling

Tunnels are underground passages, and for the purposes of this study, constructed to serve as a transportation connection between two points. There are three basic types of tunneling methods are described below.

1) ***Cut and cover*** involves digging a trench and building a roof or cover for the trench. Strong supporting beams are necessary to prevent the tunnel from collapsing. After the tunnel structure is built, the trench is backfilled, and the surface is restored. This method is usually best for shallow tunnels, soft ground, and isolated crossings (e.g., not a long section of deep tunnel).

   Advantages: This method can accommodate changes in tunnel width and non-uniform shapes. It is less expensive than other methods.

   Disadvantages: Potential impacts include dust, noise, and effects on existing underground services and utilities. Larger quantity of construction and demolition materials could be generated from the excavation work.

2) ***Drill and blast*** includes the controlled use of explosives and other methods to break rock for excavation.

   Advantages: Noise, dust, and visual impacts are restricted to areas located near the tunnel portal. Compared with cut and cover method, the quantity of construction and demolition materials and debris would be reduced and disturbance to local traffic and associated environmental impacts would be reduced. Blasting would significantly reduce the duration of vibration, though the vibration level would be higher compared with bored tunneling.

   Disadvantages: There are potential hazards associated with establishment of a temporary site for overnight storage of explosives.

(Continued on next page)

Excavated trench for cut and cover tunneling (left photo) and drilling machine (right photo)

Photo: Los Angeles Metro

Photo: Geotunel, www.geotunel.esp

Tunneling (continued from previous page)

3) ***Boring*** through the use of a tunnel boring machine (TBM). This machine's cutting mechanism includes a large cylindrical shield (or wheel), which includes a rotating cutterhead with discs that can bore through a wide range of materials, including solid rock.

   Advantages: Disturbance is usually limited to the surrounding ground. Noise, dust, and visual impacts are restricted to areas located near the launching and retrieval shafts. Compared with cut and cover method, the quantity of construction and demolition materials and debris would be reduced and disturbance to local traffic and associated environmental impacts would be reduced. Avoids the need of having miners working in compressed air. TBMs can produce a smooth tunnel wall, which significantly reduces the cost of lining the tunnel, and makes them suitable to use in heavily urbanized area.

   Disadvantages: Upfront costs for TBMs can be high, as they are expensive to construct and transport. Actual tunneling time can be reduced by frequent break-downs.

Sources:

FTA, Tunnel Design and Construction, https://www.transit.dot.gov/research-innovation/tunnel-design-and-construction; and Mining and Blasting, https://miningandblasting.wordpress.com

Tunnel boring machine for Purple Line Extension in Los Angeles (left) and simulation of boring using a tunnel boring machine (right)

Photo: Los Angeles Metro

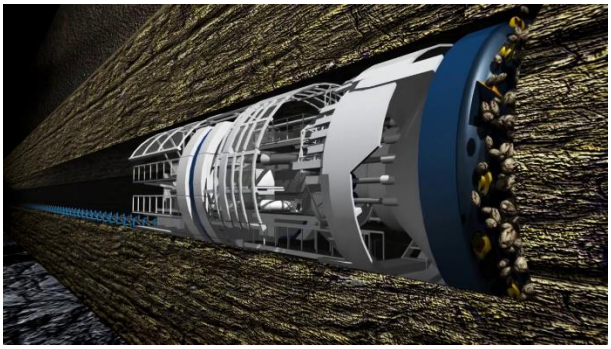


Photo: Citizens for the North South Rail Link (Boston)

6.1 Rumrill Boulevard Alignment

6.1.1 Description

This extension alternative would include new aerial tracks that run parallel to the UPRR tracks near 13th Street from the existing Richmond BART maintenance yard to Brookside Drive.[19] At Brookside Drive the alignment would turn east along Rumrill Boulevard to reach the area near Contra Costa College. A tunnel portal would be located around the northern part of the college campus to transition into underground operations that would stretch to Appian Way, where the rail would once again daylight and transition to elevated structure. From Appian Way and I-80 to the Hercules Transit Center, the alignment has four alignment options, which are described separately in Section 6.3. Figure 6-3 through Figure 6-8 illustrate the potential alignment north from the Richmond BART Station via Rumrill Boulevard.

This alignment would travel through industrial, residential, and commercial uses. To the north of the Richmond BART station, operations would be in close proximity to UPRR property, which would require negotiations and coordination with UPRR. It would also likely require re-construction of the existing UPRR freight bridge at the crossing northwest of the BART maintenance yard so the BART train could continue north on the proposed alignment. In this area, BART operations could potentially impact existing uses next to the alignment, including recreational sports fields, an iron and metal recycling plant, and an auto and truck parts shop. The extent of the impacts would be determined during the environmental phase, examining how BART construction or operations would affect existing conditions, usually in a specific resource area, such as air, noise, traffic, or visual effects. The degree of the effect would depend on the resource.

As the alignment travels east on Rumrill Boulevard, it encounters more developed areas, including residences and businesses and Contra Costa College. BART operations on Rumrill Boulevard were looked at in BART's West Contra Costa Extension Alignment Study (1992). A BART extension on this roadway was noted to provide versatile station locations (e.g., the potential to choose station sites at one of three sites in the Hilltop Mall vicinity and at one of two sites in San Pablo), but also the potential for residential displacement of 20 to 50 homes and downtown San Pablo businesses. Housing along 13th Street/Rumrill Boulevard accommodates lower-income families, which could result in environmental justice issues should new rail facilities be built in this area. Mitigation measures could be developed to address this,

[19] This study's placement of the alignment does not include encroachment on UPRR's ROW. If additional distance between UPRR ROW and BART facilities is desired, the alignment could be moved further east, which would encroach further on other private and public property.

including relocation assistance to displaced residents. Businesses in this area may also be displaced.

Further development of this alignment would have to consider compatibility with the Contra Costa College campus as well as the Richmond and San Pablo Complete Streets Study on Rumrill Boulevard and 13th Street. This 2015 study looked at potential improvements along the length of Rumrill Boulevard through San Pablo and 13th Street through Richmond. The preferred concept included lane reduction with the newly created space to be used for multimodal purposes, including new or improved crosswalks, sidewalk repair, bus shelters, Class I and Class II bike lanes,[20] and landscaping.[21]

6.1.2 Potential Station Locations

Potential stations for this alignment include Contra Costa College, RPTC, and a terminus station at Hercules Transit Center. [22] The alignment measures approximately 2.8 miles from the Richmond BART station to Contra Costa College; about 1.8 miles from Contra Costa College to the RPTC; and 3.4 miles from the RPTC to the Hercules Transit Center.

6.1.2.1 Contra Costa College

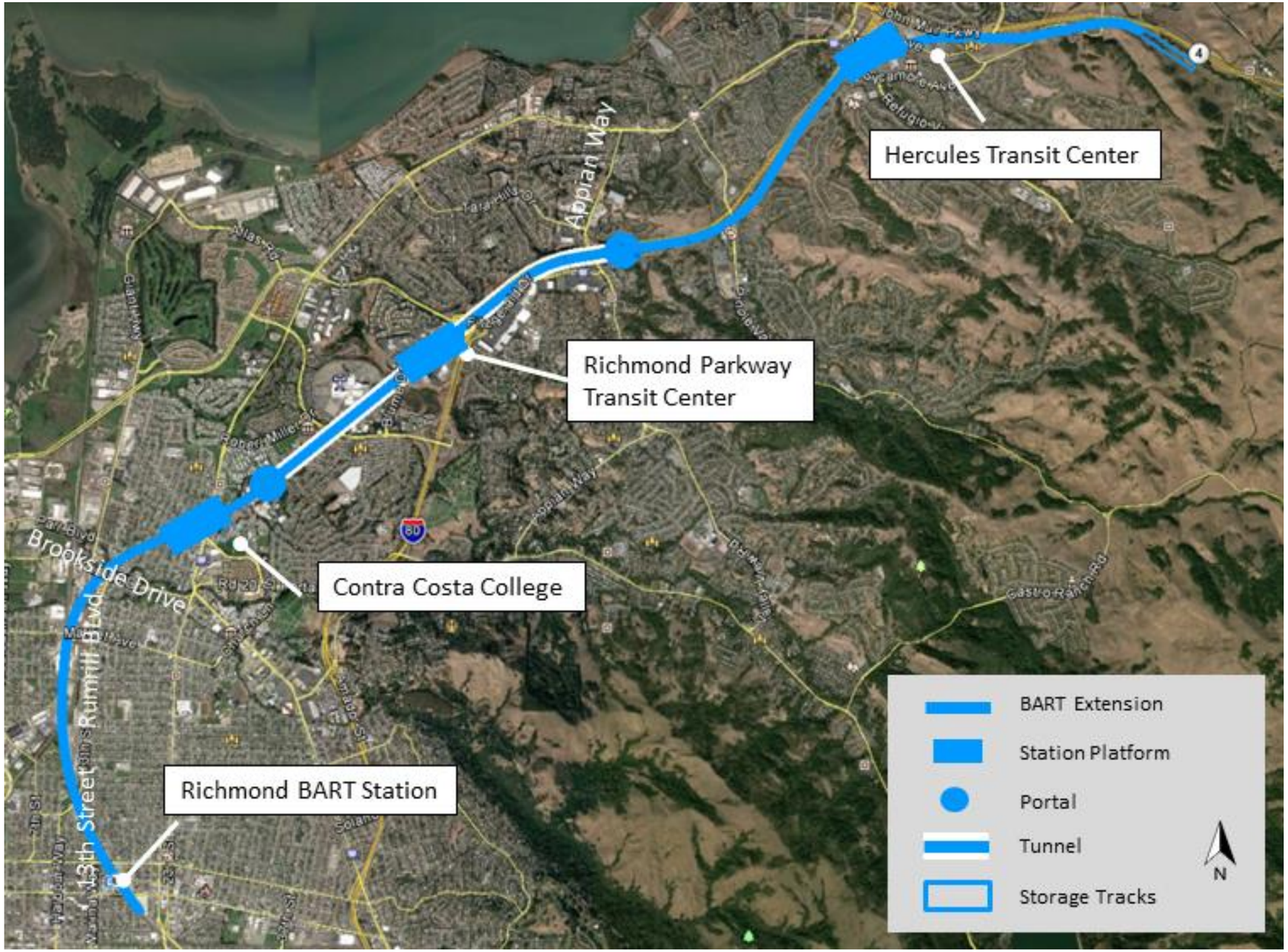
A station at Contra Costa College would likely serve many riders since the school has about 8,000 enrolled students and a few hundred employees. The college is located in a relatively dense residential area in San Pablo, whose residents could also be served by BART.

[20] A Class I bike lane includes a completely separated lane for the exclusive use of bicycles and pedestrians. A Class II bike lane is a lane for one-way bike travel on a street or highway. (Source: *Caltrans Highway Design Manual,* 2006, p. 1000-1, 1000-2.)

[21] *Rumrill Boulevard/13th Street: Final Complete Streets Study, 2015*, http://www.ci.richmond.ca.us/3161/Rumrill-Blvd-13th-St-Complete-Streets-St. Other study partners include the Local Government Commission and Contra Costa Health Services.

[22] A station at Hilltop Mall could theoretically be added on this alignment. However, given the short distances for this station combination, a stop at Hilltop may be too close to the other stations to warrant such a combination.
Distance between Contra Costa College and Hilltop Mall = 1 mile
Distance between Hilltop Mall and Richmond Parkway Transit Center = 0.75 mile

Figure 6-3: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment

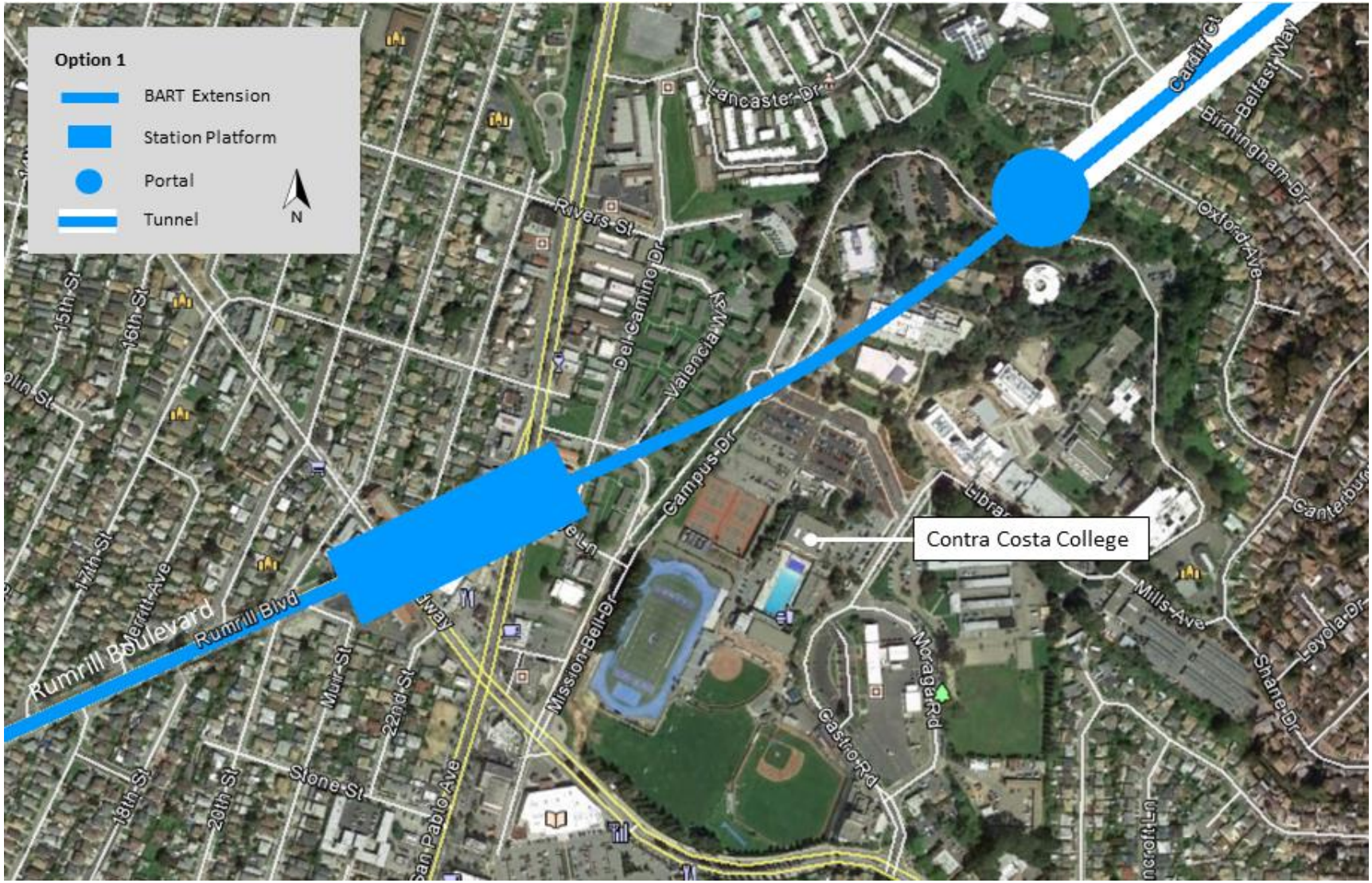


Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-4: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Segment from Richmond BART Station to Contra Costa College

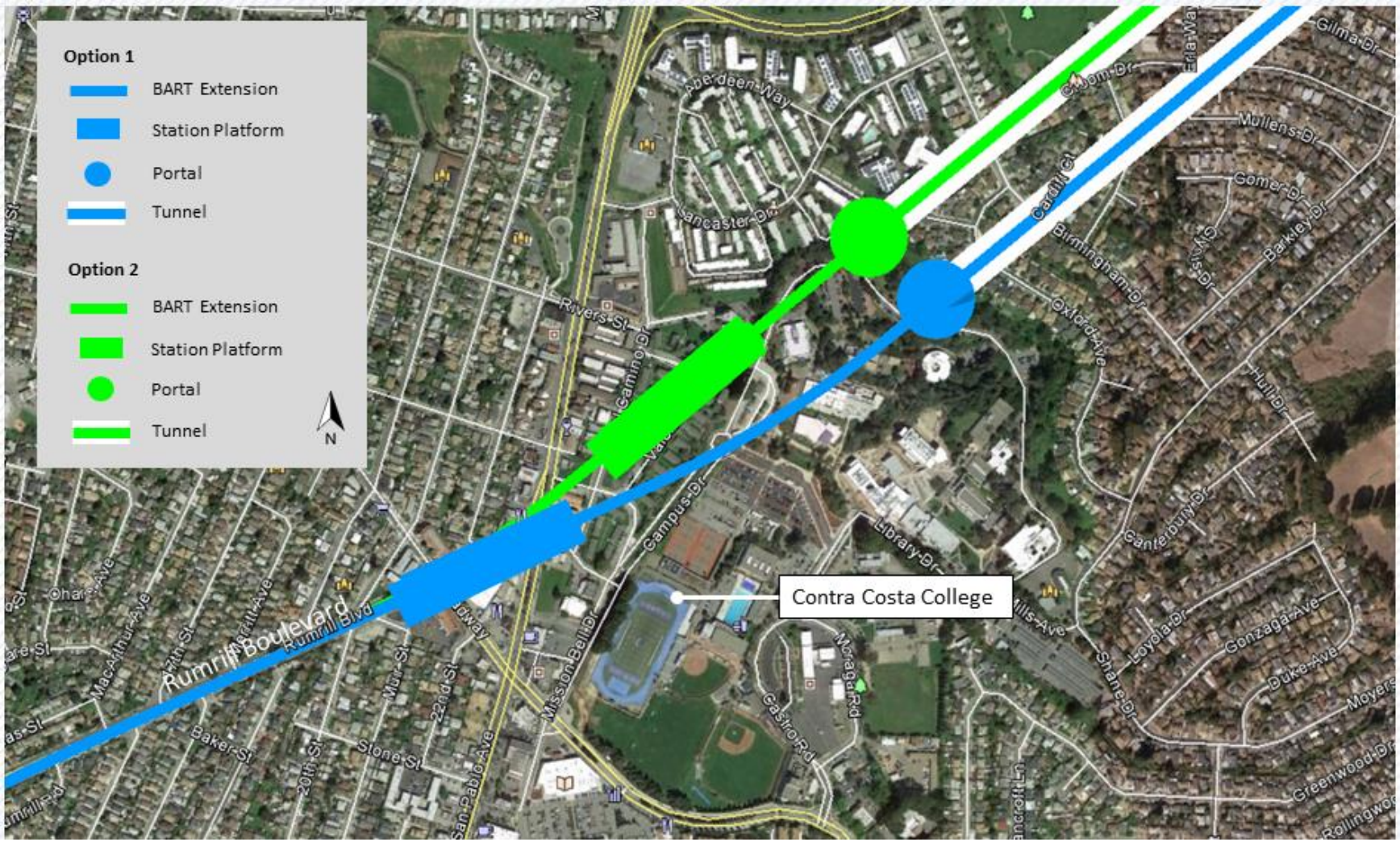
Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-5: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Platform near Contra Costa College – Option 1



Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-6: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Platform near Contra Costa College – Options 1 and 2



Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-7: Refinement of Alternative 6: BART Extension – Rumrill Boulevard Alignment – Segment from Contra Costa College to Richmond Parkway Transit Center – Options 1 and 2

Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-8: Refinement of Alternative 6: Richmond BART Extension – Rumrill Boulevard Alignment – Platform at Richmond Parkway Transit Center

Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Two station sites were evaluated in the vicinity of Contra Costa College: one located at the intersection of San Pablo Avenue, Broadway, and Rumrill Boulevard and the second to the west of Campus Drive adjacent to the college campus (see Figure 6-6). This first location abuts a triangular piece of property owned by the City of San Pablo. This parcel is occupied by commercial uses (e.g., restaurant, dollar store, nail salon), surrounded by residences, two churches, and commercial uses. The city also owns development options to the adjacent parcel. The combined area for both properties is 72,000 square feet, could be used for an intermodal rail station and transit-oriented development. Such a development is supported by policy in the City of San Pablo's planning documents, which encourage the expansion of public transportation systems and identify this location as a public transit hub. Other studies in this area have mapped out potential development scenarios for this location, including a reconfiguration of the Rumrill-Broadway intersection to include a transit center, increased development intensity, and a parking structure on this triangular parcel.[23] This site lies within a Priority Development Area (PDA). (See sidebar on next page for a description of PDAs.)

The second location is immediately to the west of Campus Drive on a site currently occupied by low- and medium-density housing. This is a site that the City of San Pablo has indicated is under consideration for alternative uses and could serve as a BART station (see Figure 6-6). This site is owned by Contra Costa County, who has been approached by the City of San Pablo about developing this area, e.g., new housing. New uses(s) for this site could be coordinated with the development of a nearby or adjacent BART station or a multimodal transit hub. A BART station platform at this location is immediately adjacent to a PDA.

The Rumrill alignment includes elevated tracks and an elevated platform. For either of these alternatives, there would be an impact to the college campus and sites surrounding the station. The elevated structure would potentially cross the college campus and enter into a tunnel at the base of the hill adjacent to the college. The footprint of the tunnel portals would need to be examined during project development to provide sufficient room for wayside facilities, such as tunnel ventilation structures. Soil investigations would need to be conducted to gauge the type and suitability of soil in all underground portions of this alignment.

As the alignment is further engineered, minimization of the impact to the campus would need to be considered. Rail construction would be disruptive to the day-to-day operations of the college as well as for nearby residents. This construction would include boring a tunnel into the base of the hill. Potential noise and vibration, visual, relocation, and traffic impacts, along with other potential impacts would need to be assessed during the project development and environmental phase.

[23] SCS by Strengthening Public Health Plan, March 2016, Description of Mission Plaza, Opportunity Site #1

What is a Priority Development Area?

Priority Development Areas (PDAs) are places identified by Bay Area communities as areas for investment, new homes, and job growth. Along with Priority Conservation Areas, PDAs are the foundation of Plan Bay Area, which the region's long-range transportation, land use, and housing strategy through 2040.

To become a PDA, an area must be: 1) within an existing community; 2) within walking distance of frequent transit service; 3) designated for more housing in a locally adopted plan or identified by a local government for future planning and potential growth; and 4) nominated through a resolution adopted by a City Council or County Board of Supervisors.

Plan Bay Area is the nine-county region's first long-range plan to meet the requirements of California's Senate Bill 375 (2008), which calls the state's 18 metropolitan areas to develop a Sustainable Communities Strategy. The strategy is developed to accommodate future population growth and reduce greenhouse gas emissions from cars and light trucks.

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

6.1.2.2 Richmond Parkway Transit Center

The RPTC is a second potential BART station site on the Rumrill Boulevard alignment. This site includes a bus transfer station used by five AC Transit lines and seven WestCAT lines and a park-and-ride lot with 182 parking spaces. An underground BART platform could be located just southwest of the transit center, as shown in Figure 6-8. This location is occupied by a church

and commercial uses, including retail stores, auto dealerships, business services, and restaurants. A BART station would need to be reviewed for its potential effects on the land uses, noise and vibration, traffic, and soils.

6.2 Richmond Parkway Alignment

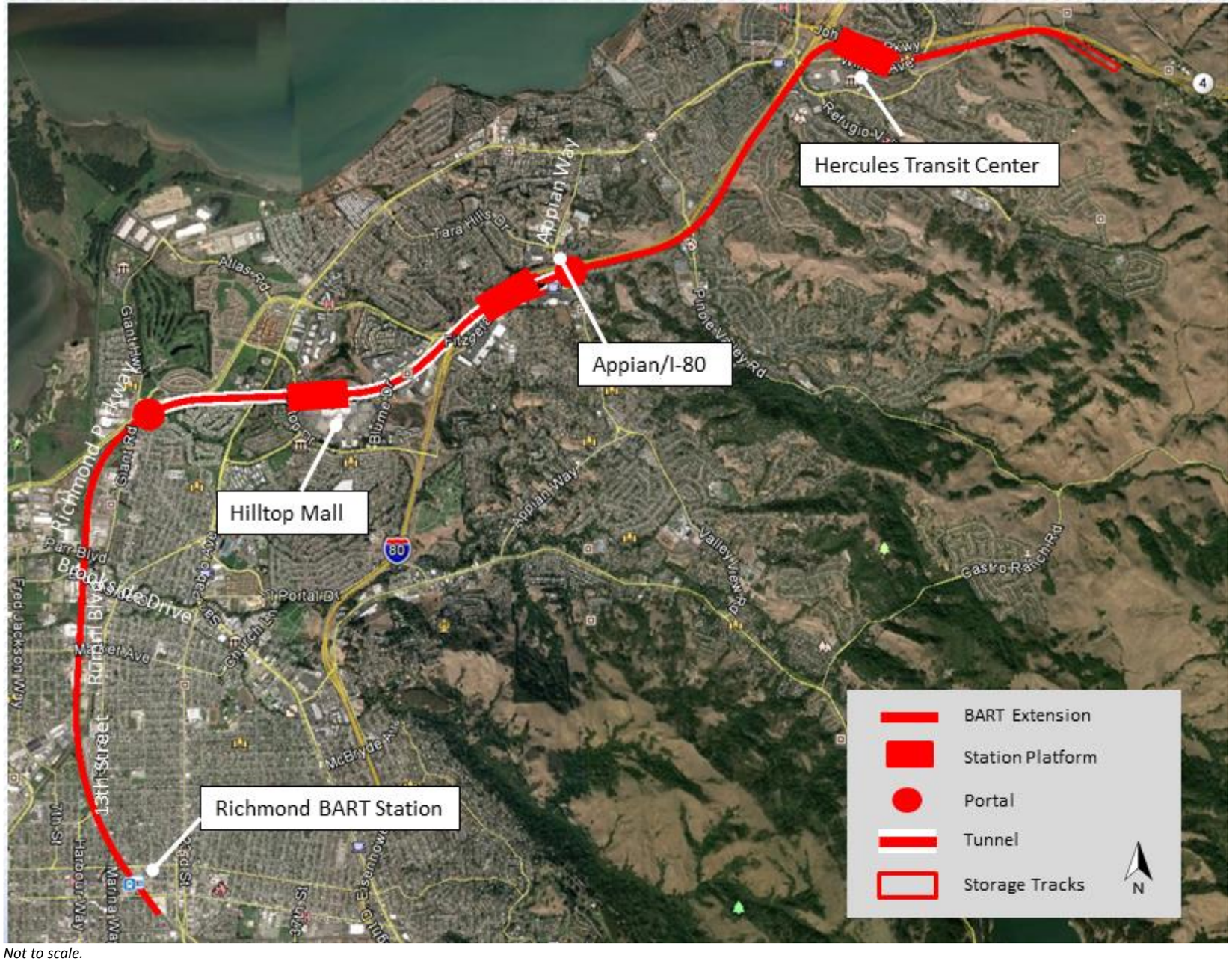
6.2.1 Description

This alignment on Richmond Parkway was developed as an alternative to the Rumrill Boulevard alignment, given the latter's routing through established neighborhoods and businesses. This alignment would extend on elevated tracks from the Richmond BART maintenance yard parallel to the UPRR tracks to Richmond Parkway. The elevated structure would continue north for a short distance on Richmond Parkway before turning east to a tunnel portal near Giant Road. The train would travel east in the tunnel under residential areas and Hilltop Mall to reach I-80 where it would transition back to elevated tracks east of Appian Way. It would follow I-80 to the Hercules Transit Center, which is located near the interchange with SR-4. The segment from Appian Way to the terminus station at the Hercules Transit Center has four alignment options, which are described in Section 6.3. Figure 6-9 through Figure 6-13 show the alignment of the Richmond Parkway alternative up to Appian Way.

This alignment has similar considerations to the Rumrill Boulevard alignment, as described in Section 6.1. UPRR would need to be consulted since the BART train would operate near its rail corridor north of the Richmond BART station. This includes travel on the existing freight bridge, which would need to be re-constructed (or expanded), as the new BART tracks would likely cross this area at-grade. The introduction of BART service on this corridor would have potential impacts, including possible relocation for existing businesses including an iron and metal recycling plant and an auto and truck parts shop.

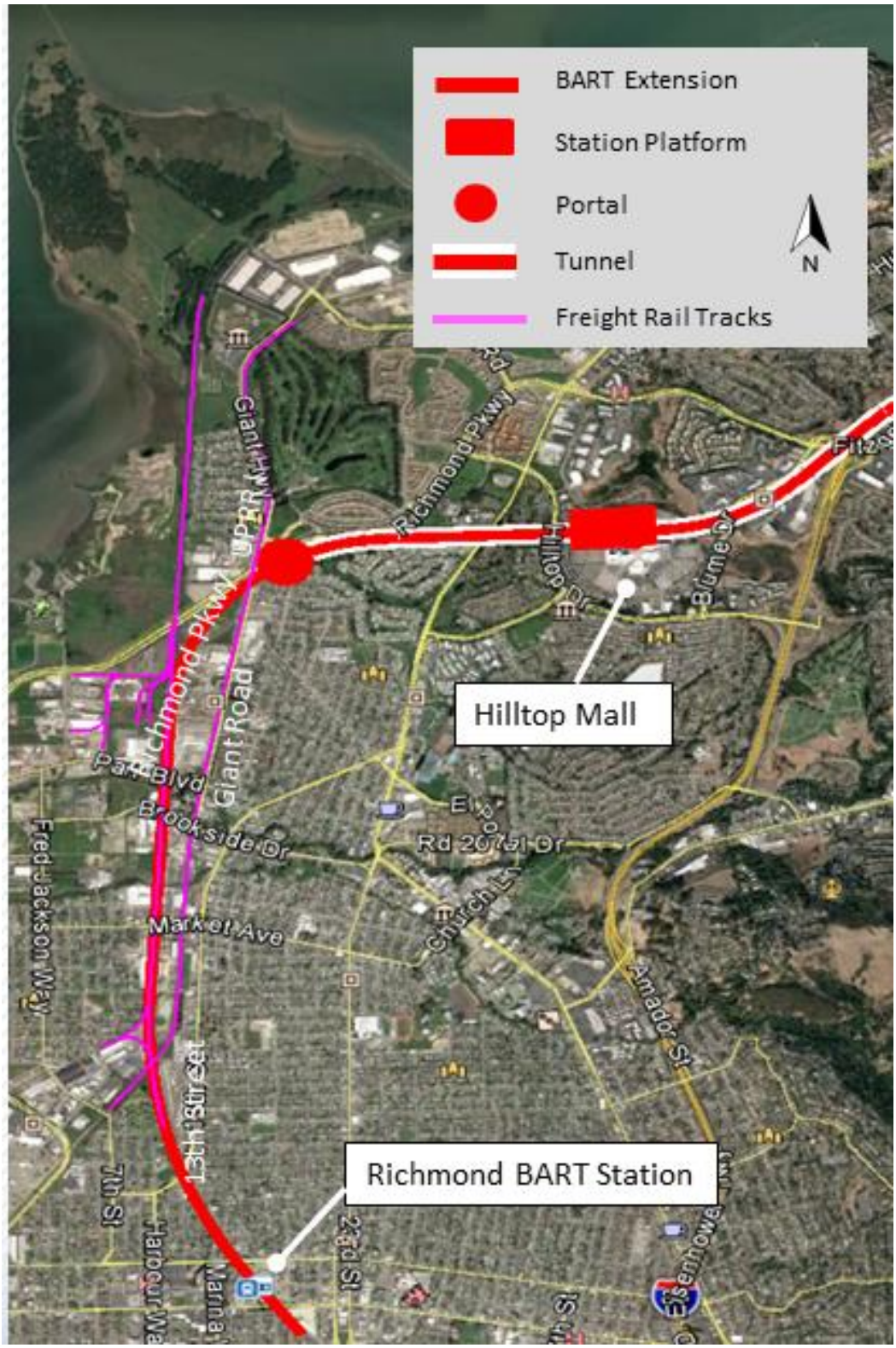
From Giant Road to Appian/I-80, the alignment would be in a tunnel to accommodate the topography. The footprint of the tunnel portals would need to be examined during project development to provide sufficient room for wayside facilities, such as tunnel ventilation structures. Soil investigations would need to be conducted to gauge the type and suitability of soil in all underground portions of this alignment.

Figure 6-9: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment



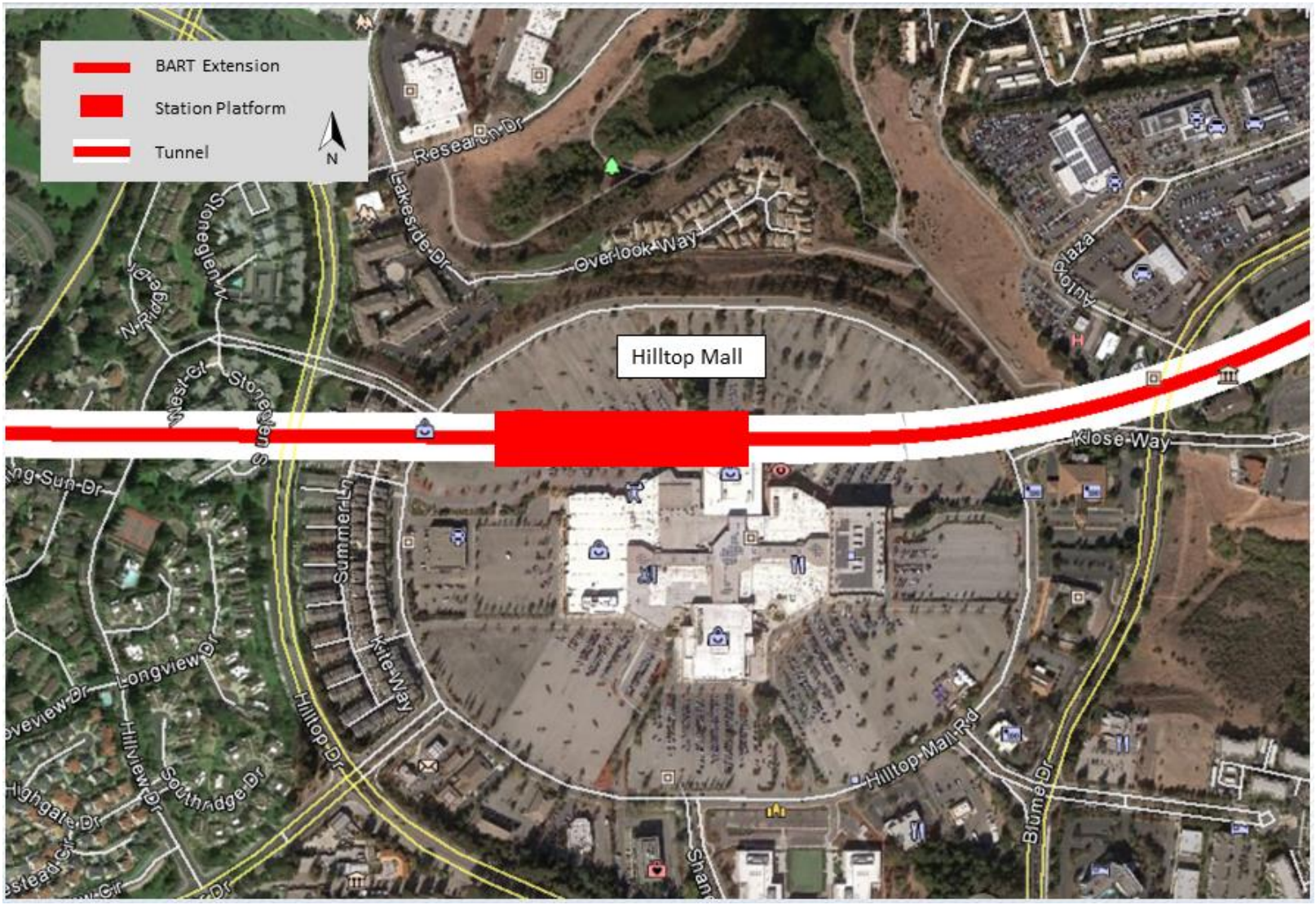
Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-10: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Segment from Richmond BART Station to Hilltop Mall



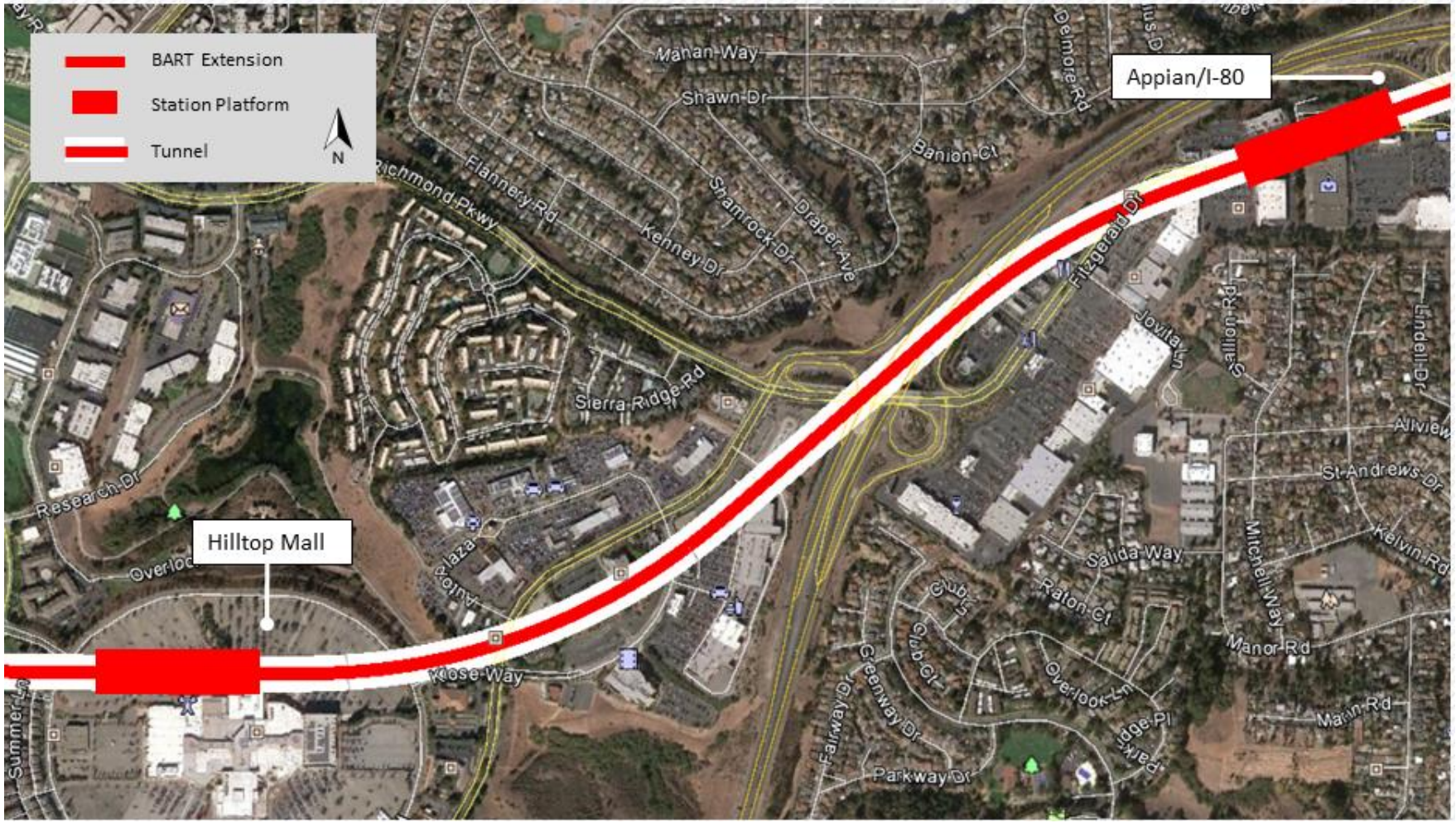
Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-11: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Station Platform at Hilltop Mall



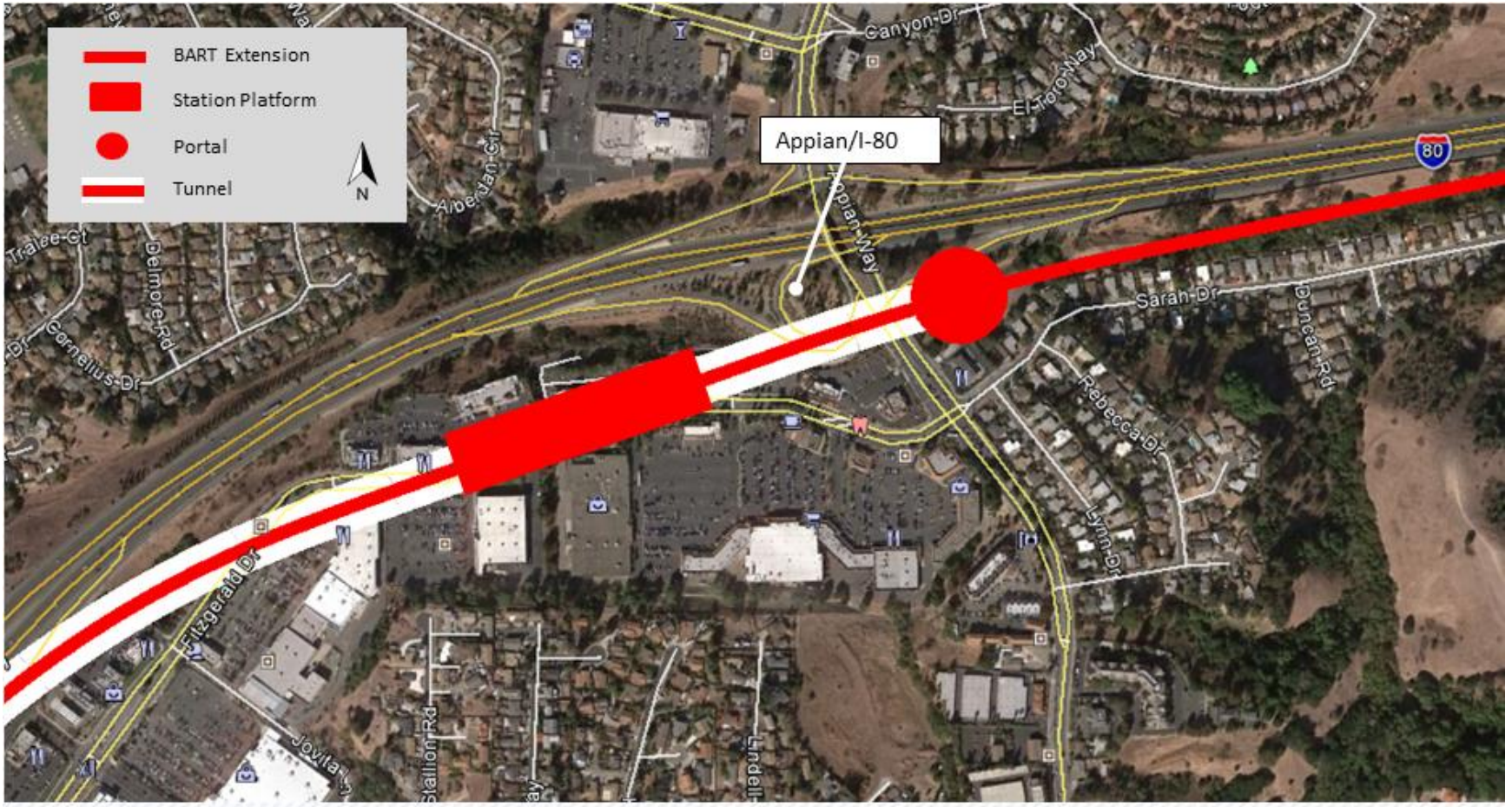
Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-12: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Segment from Hilltop Mall to Appian/I-80



Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-13: Refinement of Alternative 6: BART Extension – Richmond Parkway Alignment – Station Platform at Appian/I-80



Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

6.2.2 Potential Station Locations

Potential stations for this alignment include Hilltop Mall, Appian/I-80, and a terminus station at Hercules Transit Center. The alignment measures approximately 4.5 miles from the Richmond BART station to Hilltop Mall; about 1.8 miles from Hilltop Mall to Appian/I-80; and 2.5 miles from Appian/I-80 to the Hercules Transit Center.

6.2.2.1 Hilltop Mall

Hilltop Mall is a potential site for an underground platform on this alignment. Six AC Transit lines, including two transbay lines and four WestCAT lines, including one express bus, currently serve the mall. In addition to the mall's retail stores, there are business services and other commercial uses around the mall's perimeter. Residential homes (primarily single-family dwellings) border the mall.

Opened in the 1970s, Hilltop Mall is currently for sale. While potential buyers are unknown, the City of Richmond and others see the site as an opportunity for economic revitalization, such as a mixed-use development that could include housing, restaurants, entertainment, and a new shopping layout.[24] Such a redevelopment could bring in the density that is needed for a major transit investment such as BART. The mall is already surrounded by residential, single-family subdivisions as well as some commercial establishments that could serve as patrons for a mixed-use development as well as a new BART station. Negotiations and ongoing discussions would need to be held with the mall's new owners as well as the anchor tenants who own properties on this site.

6.2.2.2 Appian Way/I-80

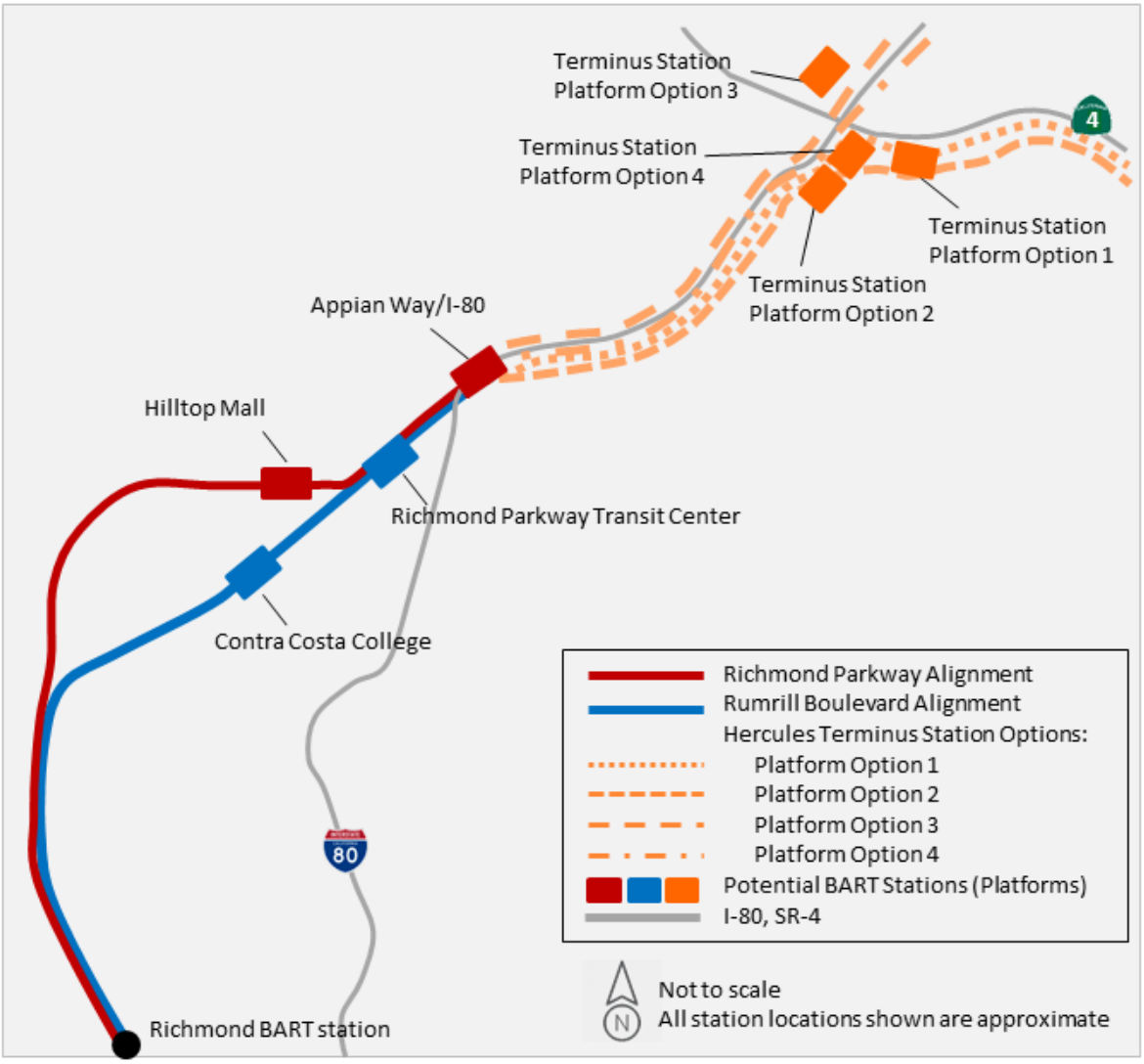
The area near Appian Way/I-80 is another potential site for an underground station on this alignment. This interchange is bordered by shopping centers on the south and a combination of residential and commercial uses on the north. Of the two shopping centers at this interchange, the Pinole Vista Shopping Center has the larger footprint to accommodate a BART station. Additionally, because the existing Hercules Transit Center is on the east side of I-80, placing a BART platform at the Pinole Vista Shopping (i.e., on the southeast of I-80) would allow the BART extension to reach the Hercules Transit Center more practically. If the area south of the Appian Way/I-80 interchange is chosen, site investigation of this area would need to look at potential impacts to existing residences and businesses, including noise and vibration, as well as on-site electrical towers and power lines near Appian Way/I-80. This site lies within a PDA.

[24] "Richmond: Hilltop Mall's Struggles a Sign of the Times," *The Mercury News*, April 7, 2016, http://www.mercurynews.com/2016/04/07/richmond-hilltop-malls-struggles-a-sign-of-the-times/

6.3 Terminus Station and Storage Tracks at/near Hercules Transit Center

Both potential alignments on Rumrill Boulevard and Richmond Parkway merge near Appian Way and I-80 and would extend north to Hercules. Both alignments also include a terminus station in the vicinity the I-80-Highway 4 interchange near the Hercules Transit Center, which lies within a PDA. Two options for the track alignment for the segment north of Appian Way were identified. Four potential options for a terminus station location in Hercules were also identified. All of the four terminus station options discussed in this section can be connected to either the Rumrill Boulevard or Richmond Parkway alignments described in previous sections and as shown in Figure 6-14. However, the one terminus station to the west of I-80 would require a rail alignment to the west of I-80 from Appian Way northward.

Figure 6-14: Potential Alignment Options for Terminus Station at/near Hercules Transit Center



Source: WSP | Parsons Brinckerhoff, 2016

While various location options for terminus station and storage tracks are discussed in the following sections, not all options may be feasible given various constraints. Technical Memo 15: Tier 2 Evaluation Screening will begin to evaluate these options. However, additional future study would be needed to more fully understand the benefits, challenges, and impacts of these options, as well as other alternatives and options presented in this technical memo.

Storage tracks are needed near or at the end rail terminus stations for storage and maintenance of vehicles. For example, a maintenance yard is located about one mile north of the Richmond BART station to house BART cars when they are not in revenue service. See Figure 6-15 for photographs of this yard. For planning purposes, space is needed to store nine to ten train sets, each of which would have nine cars.

Figure 6-15: BART Storage Tracks North of Richmond Station

Photo: BART.gov

Photo: SFGate

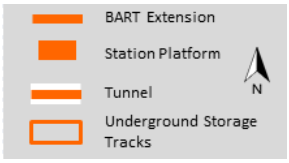
There is insufficient space at the existing Hercules Transit Center site for a BART station, platform, and storage tracks. The lack of space would require locating the storage tracks in areas outside the footprint of the transit center. Options include undeveloped land that is east of the transit center (Options 1 and 2), or undeveloped land that is northwest (Option 3) or northeast (Option 4) of the I-80/SR-4 interchange. These options are discussed below as part of the alignment from the tunnel portals located east of Appian Way/I-80 to the Hercules Transit Center.

Table 6-1 presents a general overview of potential locations for the Hercules terminus station and storage tracks. The sections following Table 6-1 provide additional description for each location option.

The I-80/Highway 4 interchange configuration is likely to change at some point in the future, as it is functionally obsolete, which may present an opportunity to consider some of these options' design implications.

Table 6-1: Potential Locations for Terminus Station and Storage Track

Potential Locations for Terminus Station and Storage Tracks
Option 1: Parallel to SR-4 (with Surface Storage Tracks) 
Option 2: Southwest of Hercules Transit Center (with Surface Storage Tracks) 
Option 3: West of I-80 (with Underground Storage Tracks) 
Option 4: East of I-80 (with Underground Storage Tracks) 



Capital costs for underground (tunneled) storage tracks are about four to five times more than the capital costs of at-grade storage tracks.

Images in Table 6-1 are not to scale. See Figures 6-16 through 6-19 for larger view of study area.

6.3.1 Hercules Terminus Station – Platform Option 1: Parallel to SR-4

In this option, the BART alignment would emerge from the tunnel portals east of the Appian Way/I-80 interchange, travel on the eastern side of I-80 along residential subdivisions, and curve east at the SR-4 interchange and parallel SR-4 to end at the Hercules Transit Center. This alignment would include aerial structures along I-80 and aerial platforms at the transit center, which would require reconfiguring the existing bus bay and parking facilities. Other effects to be studied would be the aerial structures' and BART operations' potential impacts on nearby land uses, noise and vibration, traffic, and soils.

The land immediately east of the transit center may be the most suitable location for storage tracks because of its close proximity to the facility. However, it is occupied by a PG&E substation, church, pre-school and day care center. BART would need to work with the City of Hercules and impacted properties to acquire this land and assist in the relocation of these facilities. Alternatively, the storage tracks could be located farther east (about 1.5 miles east of the transit center) on undeveloped land. In addition to acquiring this undeveloped land, BART would also need to acquire the developed property and assist in relocating the existing facilities. . This option would be most costly since tracks would need to be extended further and additional land would need to be purchased. The additional space would allow for more physical space to lay down longer tracks for train storage. Figure 6-16 shows this alignment with the station platform south of SR-4 and with the storage tracks located farther east from the transit center.

6.3.2 Hercules Terminus Station – Platform Option 2: Southwest of Hercules Transit Center

This second option is similar to the previous option, except the platform would be located south of the Hercules Transit Center. This alignment would also have the BART train operating on elevated structures east of the Appian Way/I-80 interchange and continuing north. Near Refugio Valley Road and just south of Willow Avenue, the tracks would turn east to end at a platform that would be located southwest of the Hercules Transit Center. See Figure 6-17.

This site is occupied by commercial uses, including a Home Depot and Bank of America, as well as civic and institutional uses, including the City of Hercules' City Hall, library, and senior center. Due to the potential impacts of this alignment to these uses, the City of Hercules has expressed concerns about the viability of this option. For this option, BART would need to work with the City of Hercules and impacted properties to acquire this land and assist in the relocation of these facilities. Similar to the preceding option, this option would also need to be reviewed for potential impacts on nearby land uses, noise and vibration, traffic, and soils if BART proceeded with construction and operations.

Figure 6-16: Hercules Terminus Station – Platform Option 1: Parallel to SR-4

Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Figure 6-17: Hercules Terminus Station – Platform Option 2: Southwest of Hercules Transit Center

Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

Considerations for the storage tracks would be similar to the first option since the location for the storage tracks is identical. Since the alignment on this option would have elevated tracks over the existing Hercules Transit Center, it would require more limited reconfiguration of the existing facility.

6.3.3 Hercules Terminus Station – Platform Option 3: West of I-80

BART staff noted in a meeting in August 2016 that a terminus station at the Hercules Transit Center may not be optimal as a future BART extension is more likely to the north rather than to the east. In the preceding two options, the alignment would operate along I-80 and turn east before the interchange with SR-4, while this option could accommodate a future BART extension to the north.

By locating the alignment on the west side of I-80, a terminus station site at the northwest quadrant of the I-80/SR-4 interchange was introduced. In this variant, the BART train would emerge from a tunnel east of the Appian/I-80 interchange to operate on the northwest side of the I-80 freeway. Crossing SR-4 would likely be a bridge that would be built over SR-4 to reach a surface station, with the platform located parallel to I-80 on its west side, north of SR-4. Trains would then proceed to storage tracks located underground given the steep embankment that borders I-80 on the west side. The site is located just east of the existing residential subdivision, and this land would need to be purchased. See Figure 6-18.

Considerations for pedestrian access to and from the Hercules Transit Center would need to be examined for this option. The most convenient, direct option for passengers would be to re-locate the existing transit center to this site, which would open up the land where the transit center currently sits to other development opportunities. A high-level examination indicates there is likely sufficient space to fit the existing Hercules Transit Center's footprint in this site. (Access improvements proposed in Section 2.0 would need to be disregarded as they were developed for the existing transit center location.) Less direct but still feasible would be to construct pedestrian walkways and other facilities for passengers to walk to and from the existing transit center to the BART station (about 2000 to 3000 feet, depending on where walkways are constructed). For safety reasons, these facilities would be elevated pedestrian bridges and walking paths to avoid conflicts with automobiles traveling on I-80 and SR-4.

This option includes elevated and underground structures and BART facilities that would be built near existing residences. The potential impacts on these residences and other nearby land uses, including those southeast of the I-80/SR-4 interchange would need to be examined. Other effects to be studied include visual, noise and vibration, soils, and traffic.

Figure 6-18: Hercules Terminus Station – Platform Option 3: West of I-80

Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

6.3.4 Hercules Terminus Station – Platform Option 4: East of I-80

This option presents a variation of the conceptual ideas presented in Options 2 and 3 based on input from BART and the City of Hercules. The station platform would be placed parallel to I-80, south of the SR-4 interchange, providing for a future extension to the north. The storage tracks for this option would also be parallel to I-80 but would be located north of the SR-4 interchange and be placed underground, as suggested by City of Hercules staff and shown in Figure 6-19. This alignment introduces engineering challenges as elevated structures would need to cross over the I-80/SR-4 freeway interchange, likely over a newly constructed bridge, to reach an underground storage track facility. This land would need to be purchased.

Environmental considerations for the platform's location would be similar to Option 3, given the nearby residential uses, studies would be conducted for potential impacts on visual, noise and vibration, traffic, and soils. These studies would also examine similar effects on the residences located near the portal for the underground storage tracks north of SR-4.

6.4 Other Options Considered

6.4.1 Giant Road

For the Richmond Parkway alignment, City of San Pablo staff suggested that the extension from the Richmond BART station could run along Giant Road adjacent to the existing BNSF tracks to reach Richmond Parkway instead of running parallel to the UPRR tracks with the possible introduction of a new station.

This option was evaluated, but not advanced for further consideration. The area adjacent to Giant Road is primarily residential on the east side, and commercial and industrial uses on the west side. This alignment would have a greater impact on the residential uses located to the east of Giant Road as than the Richmond Parkway alignment without additional benefits. This alignment also does not lend itself to a new station site given its proximity to Hilltop Mall (the distance between Giant Road and Hilltop Mall is about 1.3 miles). Having BART share ROW with freight rail would also require negotiations with BNSF to allow introduction of BART service.

Figure 6-19: Hercules Terminus Station – Platform Option 4: East of I-80

Not to scale.
Source: WSP | Parsons Brinckerhoff, 2016

6.5 Phasing

The phasing presented for Alternative 6, the BART alternative, would be in the same time horizon increments as that presented for the other alternatives (i.e., 1 to 5, 5 to 15 years, and more than 15 years). However, implementation of Alternative 6 would be different from the bus alternatives since BART implementation would be capital-intensive and not conducive to phased implementation whereas implementation of bus improvements could be done incrementally and as funding becomes available. For bus systems, operational and/or capital improvements could be implemented incrementally enhancing existing bus service. In other words, bus patrons could ride the bus while the system is being upgraded, whether it be operations (e.g., an increase in frequency) or capital improvements (e.g., the installation of transit-priority features like queue jumps or bus-only lanes). Rail systems, like BART, on the other hand, must be fully built and tested before they become operational. This means that the tracks must be laid, systems (e.g., train control, communications) integrated, platforms built, and access (e.g., sidewalks, elevators, escalators) to and from the station provided, and a multitude of other supporting infrastructure provided before it can be opened to the public. Steps can be taken to incrementally work toward the ultimate implementation of a BART rail extension.

6.5.1 Short-term (1-5 years)

During the first five years of project development for a BART extension, a program-level or Tier 1 Environmental Impact Report (EIR) could be prepared and certified, which can be done in conjunction with conceptual engineering design. A program-level EIR would broadly review potential environmental effects and benefits of BART service and operations in West County, as well as the Richmond Parkway and Rumrill Boulevard alignments. This could support the selection of a single BART alignment and enable early ROW preservation. Initial identification of funding sources could be explored and evaluated in the program-level EIR, including preliminary discussions with the Federal Transit Administration (FTA). If federal funding is sought, then an Environmental Impact Statement (EIS) to comply with federal environmental standards would also be required. Conceptual design, at a 15 percent to 35 percent level, could be completed at a level to allow an environmental impact assessment to be done.

Initial examination of ROW needed along the alignments could begin. This work would lay the foundation for activities needed for ROW acquisition, which could include negotiations with property owners, relocation services, and development of agreements and contracts.

Funding for the various phases of the project would need to be identified. Funding sources at initial stages, such as at planning and environmental review, may be provided by local entities. For later stages, funding may come from a combination of local, regional, state, and federal

sources, with competition for funding increasing at each successive level. For construction, federal sources (such as FTA New Starts money, which is competitive) are often looked to provide money, using local and regional funds to leverage federal dollars. The study team will identify and discuss potential funding sources in a subsequent task.

6.5.2 Medium-term (5-15 years)

A project-level or Tier 2 EIR, and EIS if federal dollars are used, would need to be prepared and certified prior to project adoption and implementation. This type of environmental review documentation evaluates the specific features of the proposed alignments more closely (e.g., project footprint, design details, and other attributes and their impacts on both built and human environment). This more detailed environmental review (i.e., project level) could build off of the work that was completed for the program-level EIR in the previous phase.

What are Tier 1 and Tier 2 environmental documents?

A Tier 1 environmental document would evaluate the broad impacts of a BART extension in West Contra Costa County – for example, the benefits and impacts of potential alignments for BART service extension from Richmond to Hercules. This type of environmental document is considered program-level.

A Tier 2 environmental document would evaluate in greater detail the impacts of a specific project or BART alignment evaluated in the Tier 1 document. This type of environmental document is considered project-level.

Conceptual or preliminary engineering design is usually completed along with the environmental review process to help assess project benefits and impacts along with any mitigation needs. This level of engineering includes more detailed design of the track alignment, station layout, and other studies, which can be used for this stage of the environmental review. For example, the engineering surveys completed as part of preliminary engineering would help inform the soils/geology sections of the project-level EIR/EIS.

6.5.3 Long-term (15+ years)

Following preparation of environmental documents and adoption of the project, final design completes the proposed project's construction plans, specifications, and cost estimates. Initial implementation of a BART extension could include full build-out to the Hercules Transit Center, with intermediate stations built at later stages (e.g., when land uses intensify). For example, for the Rumrill Boulevard alignment, initial service could include operations from the Richmond BART station directly to the Hercules Transit Center. The stations at Contra Costa College and Richmond Parkway Transit Center could be completed at a later time. Another approach is to incrementally extend BART service to the north.

This longer time horizon for BART implementation considers the potential for demographic changes in the study area over time. As these changes occur, improvements to bus service can be introduced to build the transit ridership base. The longer time frame for introduction of BART service allows intensification of the surrounding land uses and transit-oriented development to support the more intensive investment required for rail service.

7 SUMMARY

This technical memorandum presents the refinement of the five HCT alternatives that WCCTAC Board selected for additional study. These alternatives include express bus, BRT, commuter rail, and BART modes. For Alternative 1: Express Bus , additional detail was provided for operational enhancements and transit-supportive facilities, including expanded operations to Alameda County and direct access improvements at two existing transit centers and a potential express bus-BRT transit center. The two BRT alternatives, Alternatives 2 and 3, included progressive implementation of bus-priority treatments, including those associated with Rapid Bus service (e.g., transit signal priority, queue jumps) and those related to full-fledged BRT service (e.g., level boarding, dedicated bus lanes). Analysis of Alternative 4: UPRR Commuter Rail focused on providing fare subsidies for existing Amtrak/Capitol Corridor service to and from select origins and destinations and on efforts to complete the Hercules Intermodal Transit Center. Refinement of Alternative 6: BART Extension examined two potential alignments that would extend north from the Richmond station and operate to the Hercules Transit Center – either via Richmond Parkway or via Rumrill Boulevard – with various intermediate stations.

The work presented in this study provides preliminary descriptions of potential transit investments in the study area for the future. Additional design detail of these concepts be developed at subsequent stages of project development.

8 NEXT STEPS

The alternatives advanced for further study by the WCCTAC Board have been further refined in this task, by providing more specific alignments and types of improvements for each alternative. The next steps will include modeling of potential transit ridership for the narrowed alternatives; refinement of preliminary cost estimates; identification of potential funding options along with a financial strategy; and a second level screening of the alternatives based on the information that emerges from these analyses to determine which options may warrant being carried forward. Ultimately it will be the decision of WCCTAC Board to consider the results of this study and decide which alternatives, if any, it wishes to pursue further.