WCCTAC
West Contra Costa Transportation Advisory Committee

West Contra Costa High-Capacity Transit Study

FINAL TECHNICAL MEMORANDUM #4

Summary and Evaluation of Prior Studies

September 2015

PARSONS BRINCKERHOFF

Document Version Control

Revision Date	Updated By	Organization	Description of Revision
8/14/2015	Doris Lee	Parsons Brinckerhoff	Incorporate feedback from BART Board Member
8/20/2015	Doris Lee	Parsons Brinckerhoff	City of Richmond staff requested that South Richmond Transportation Connectivity Plan be included. Tech memo updated to note that this plan is covered in Section 2.15
8/27/2015	Doris Lee	Parsons Brinckerhoff	Incorporated edits to address SMG and TAC feedback
9/16/15	Tam Tran	Parsons Brinckerhoff	Made minor edits related to tense

Document Sign-off

Name	Date	Signature
Rebecca Kohlstrand	09/16/15	

Table of Contents

Table of Figures

Acronyms and Abbreviations

AC Transit	Alameda-Contra Costa Transit District
Alameda CTC	Alameda County Transportation Commission
AT&SF	Atchison, Topeka and Santa Fe Railway
BART	Bay Area Rapid Transit
BNSF	Burlington Northern Santa Fe Railroad
BRT	Bus Rapid Transit
Caltrans	California Department of Transportation
CCTA	Contra Costa Transportation Authority
CCJPA	Capitol Corridor Joint Powers Authority
COA	Comprehensive Operations Analysis
CTP	Comprehensive Transportation Plan
DMU	Diesel Multiple Unit
EIR	Environmental Impact Review
HOV	High Occupancy Vehicle
I-80	Interstate 80
I-580	Interstate 580
LOS	Level of Service
LRT	Light Rail Transit
MTC	Metropolitan Transportation Commission
PDA	Priority Development Area
RM	Regional Measure
ROW	Right-of-way
RTP	Regional Transportation Plan
SRTP	Short-Range Transit Plan

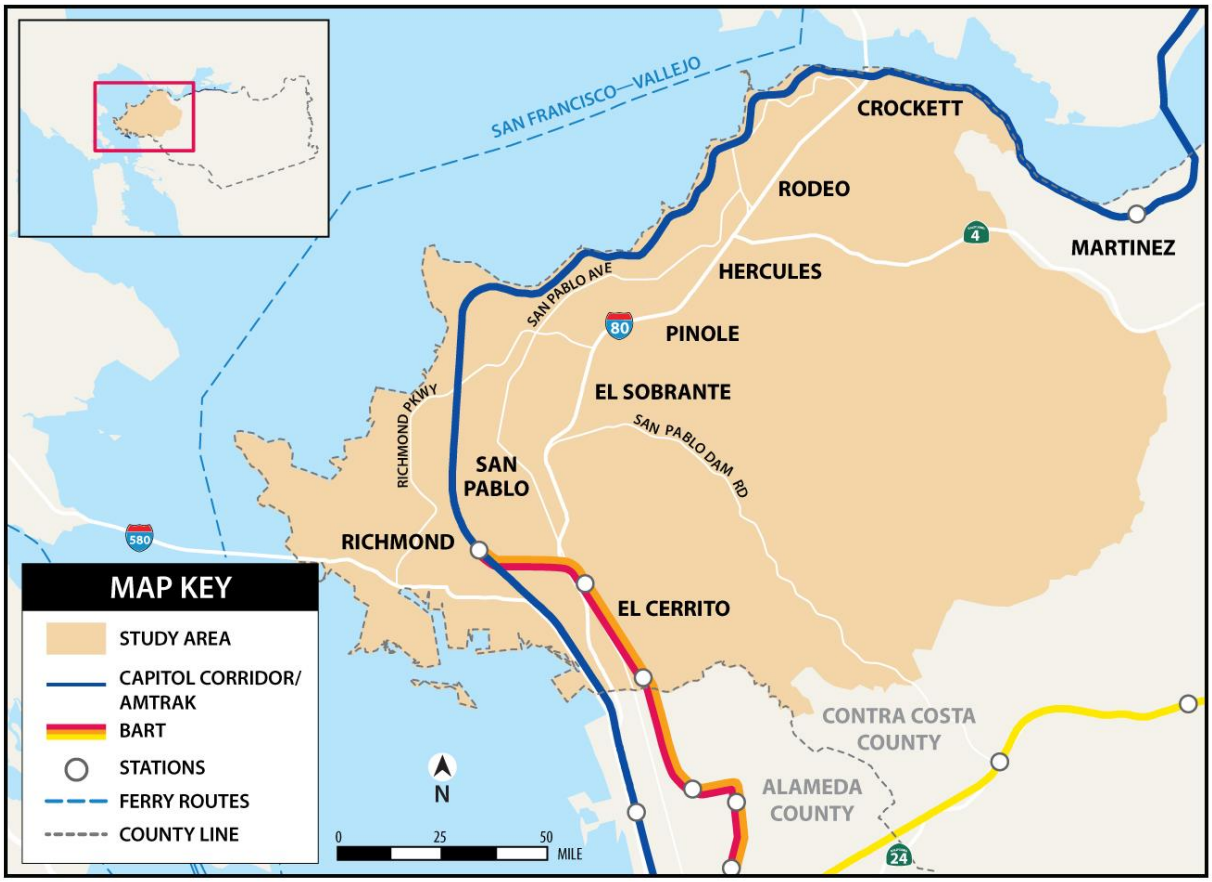
TOD	Transit-Oriented Development
TSP	Transit Signal Priority
TSP	Transit Sustainability Project
UPRR	Union Pacific Railroad
WCCTA	Western Contra Costa Transit Authority
WCCTAC	West Contra Costa Transportation Advisory Committee
WestCAT	Western Contra Costa Transit Authority Transit Service
WETA	Water Emergency Transportation Authority

1 INTRODUCTION

1.1 West Contra Costa County Transportation Setting

West Contra Costa County is a sub-region located in the Bay Area between the San Francisco Bay and the East Bay hills. It contains a mixture of residential and commercial development, with some notable heavy industrial land use. The study area is identified in **Figure 1**. The primary vehicular route through the County is Interstate 80 (I-80), which runs from the Carquinez Bridge to the Alameda County line and is considered one of the most congested corridors in the San Francisco Bay Area. San Pablo Avenue is the major arterial that runs north-south, parallel to I-80. It serves as an alternative to I-80 and is a major linkage of jurisdictions in West Contra Costa County. Interstate 580 (I-580) connects to I-80 in Richmond and provides an east-west connection between West Contra Costa County and Marin and Sonoma counties. Highway 4 (John Muir Parkway) provides an east-west connection into East Contra Costa County from Hercules to Concord and Pittsburg.

Figure 1: Study Area



Source: Parsons Brinckerhoff, Kimley Horn, 2015

West Contra Costa County is also served by several transit operators, including:

- Alameda-Contra Costa Transit District (AC Transit) provides numerous local and express bus services in West County and a Rapid bus service on San Pablo Avenue. San Pablo Avenue and MacDonald Avenue are the two main corridors served by AC Transit in West County.
- Bay Area Rapid Transit (BART) serves the southern portion of West Contra Costa County (West County) via the Richmond line. There are three BART stations in West County: El Cerrito Plaza, El Cerrito del Norte, and Richmond. The El Cerrito del Norte station has the highest ridership of all BART stations in Contra Costa County and, due to its proximity to I-80, serves as a major transit center providing connections from various bus services to BART. AC Transit, Golden Gate Transit, Fairfield-Suisun Transit, Soltrans, Vallejo Transit, and WestCAT all provide connections to BART at the El Cerrito del Norte BART station. AC Transit and Golden Gate Transit also provide connections to the Richmond BART/Amtrak station.
- The Capitol Corridor (Amtrak) commuter service runs from Auburn to San Jose and stops at the Richmond BART station in West Contra Costa. The Capitol Corridor service operates on the Union Pacific Railroad right-of-way (ROW).
- The Western Contra Costa Transit Authority (WestCAT) provides local bus service to the northern portion of West County to Crockett, Rodeo, Hercules, Pinole, and parts of El Sobrante. WestCAT also provides express bus service connecting Pinole and Hercules to the El Cerrito del Norte BART station and San Francisco.
- WETA is working with the City of Richmond to construct a new ferry terminal at the southern point of Ford Peninsula on the Richmond waterfront. The site is approximately 1.5 miles from downtown Richmond. Ferry service is expected to be operational by 2017.

1.2 Study Purpose

The purpose of the West Contra Costa High-Capacity Transit Study is to evaluate the feasibility and effectiveness of improving high-capacity transit service in the West Contra Costa County travel corridor, which includes I-80, San Pablo Avenue, and Capitol Corridor service on the Union Pacific railroad, extending from the Alameda County line to the vicinity of the Carquinez Bridge. This will require understanding travel markets and the demand for high-capacity transit in the corridor as part of the larger regional transit network, identifying the high-capacity transit options in West Contra Costa County, and understanding the costs and potential funding sources for these options.

For over 30 years, the region has been studying the opportunities for introducing high-capacity transit in West Contra Costa County due to growing congestion on I-80. The potential for a BART extension has been studied every decade, and consideration has also been given to new commuter rail service, expansion of Capitol Corridor service, express bus, and new ferry service. Each of these studies has shown the potential for capturing additional transit ridership. During the past 20 years, Capitol Corridor service has been expanded, new express bus services introduced, and ferry service to Vallejo initiated. With the exception of a study conducted by MTC in the mid-1990s, little consideration has been given to the integration of transit services and how modal options can complement each other to improve transit ridership and maximize linkages throughout the county.

The investments that have been made have not kept pace with demand as travel in the study area and the I-80 corridor has steadily grown. Congestion, as that experienced on I-80, is a positive indicator of the region's desirability and economic prosperity. It is evident that people want to live, work, and raise their families in the area. However, due to latent demand for travel, the ability to reduce congestion is limited. As such, the goal of the study is not to "end" congestion but to assess current conditions, identify future travel markets, and develop feasible alternatives that optimize existing resources. The study will focus on how to most effectively capture a larger share of the market on transit so as to reduce the impacts of growth.

The purpose of this study then is to look at these evaluations to gain an understanding of what has been considered in the past and to take a fresh look at multi-modal solutions to increase high-capacity transit in the West Contra Costa travel corridor.

High-capacity transit is defined as a service or system that provides substantially higher levels of passenger capacity, speed, and service frequency as compared to community-based or local bus services. Transit options that will be evaluated as part of this study include: freeway-based express bus, bus rapid transit, and/or light rail, extension of BART service, commuter rail improvements, and ferry service expansion. It is the type of transit that people often use for their daily commute to work.

1.3 Purpose of this Technical Memorandum

The purpose of this technical memorandum is to summarize prior studies that have been undertaken to address congestion in the study area. The information collected as part of this technical memorandum will be used to inform subsequent tasks.

The following studies were reviewed:

- AC Transit Major Corridors Study, in progress
- AC Transit Service Expansion Plan (formerly known as Comprehensive Operations Analysis), in progress

- BART West Contra Costa Extension Study, 1983
- BART West Contra Costa Extension Alignment Study, 1992
- BART Contra Costa-Solano Rail Feasibility Study, 2003
- BART Vision Plan, 2014
- Capitol Corridor Business Plan, 2014
- Capitol Corridor Vision Plan, 2014
- Contra Costa Transportation Authority (CCTA) Ferry Feasibility Study, 2014
- CCTA Express Bus Study, 2001
- Metropolitan Transportation Commission (MTC) I-80 Corridor Study, 1996
- MTC Regional Rail Plan, 2007
- WestCAT Short Range Transit Plan, 2013
- West Contra Costa Transportation Advisory Committee (WCCTAC) Additional West County Train Station Site Evaluation, 1999

In addition, a review of the General Plans of the cities of El Cerrito, Hercules, Pinole, San Pablo, and Richmond was conducted, along with a number of additional plans that fall within the study area.

2 REVIEW OF PRIOR STUDIES

The following section provides a brief description of each study and summarizes issues and findings that are relevant to the West Contra Costa High-Capacity Transit Study.

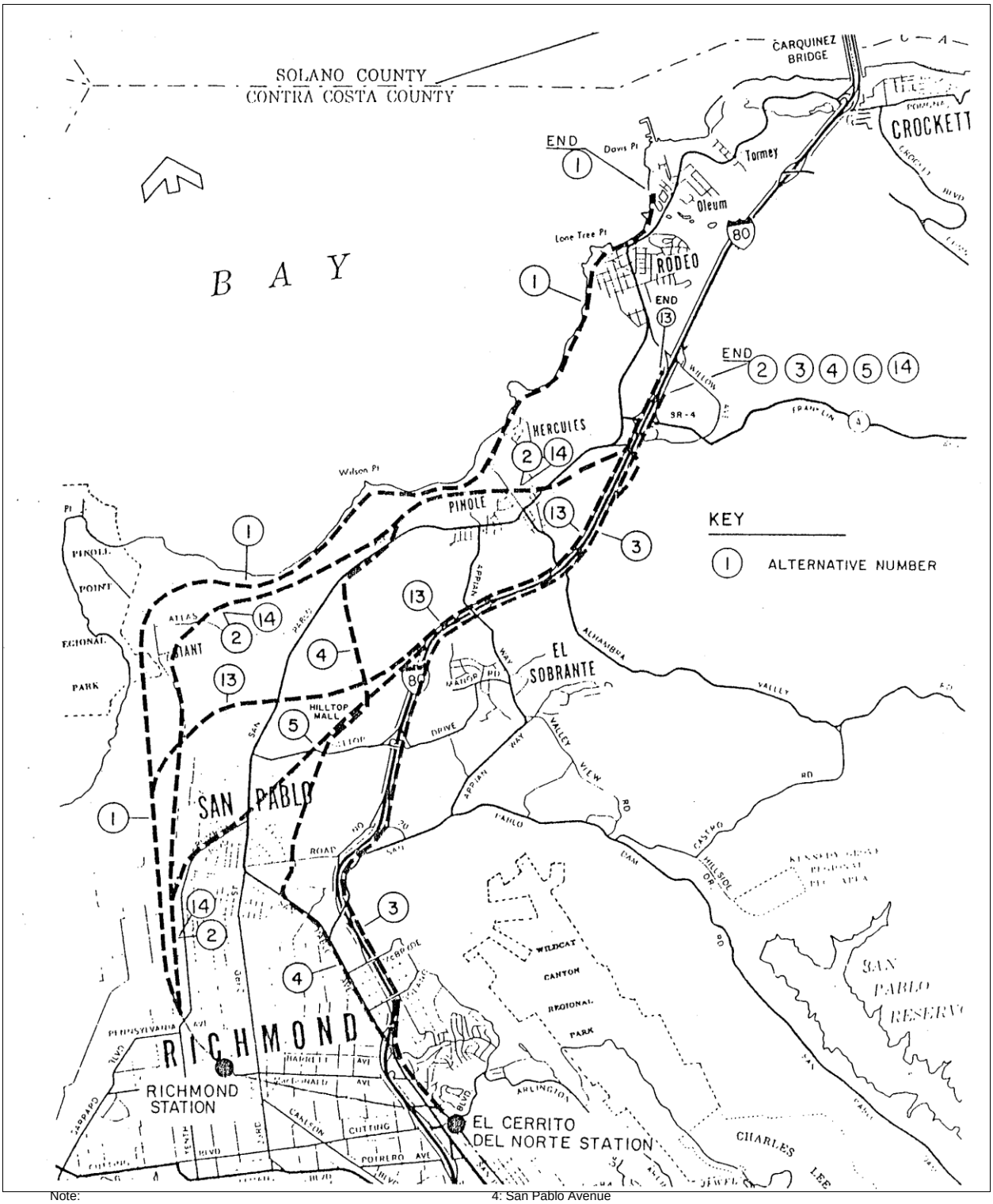
2.1 BART West Contra Costa Extension Study, 1983

The first regional study to evaluate options for high-capacity transit was the 1983 BART West Contra Costa Extension Study. This study evaluated 15 alternatives to extend BART's Richmond line into northwest Contra Costa County and was the first time that the BART Board looked at the feasibility of extending BART service further north in West Contra Costa County. The study looked at alignment options and station sites connecting via the Richmond or El Cerrito del Norte BART stations.

From the original 15 alternatives, seven were advanced as being the most promising and recommended to be advanced for further study. These alternatives are described below and illustrated in **Figure 2**:

- **Southern Pacific:** Extension directly north from Richmond BART station within the Southern Pacific ROW and following the bayfront with the potential for four stations. This alternative would require considerable amounts of aerial structures to avoid conflicts with utilities and spur tracks. At a total distance of 9.9 miles, this was the longest alternative by one mile.
- **Atchison, Topeka and Santa Fe Railway (AT&SF):** Extension directly north from Richmond BART station using the existing AT&SF ROW. This alternative would require additional ROW acquisition and dislocation of existing structures. This alternative included three stations.
- **Interstate 80:** Extension from El Cerrito del Norte BART station with the alignment paralleling the eastern side of I-80. Three potential stations were identified. This alternative would require extensive earth cuts and fill, aerial structures, some tunneling, and construction of a new yard. Under this alternative, train speeds would be limited due to the grades along the alignment. This alternative would also involve design complexities due to crossing the Hayward Fault on an aerial structure.
- **San Pablo Avenue:** Extension from El Cerrito del Norte BART station with an aerial structure down the median of San Pablo Avenue and four potential stations. The study considered this alternative as the most expensive of the seven alternatives since this option would require extensive tunneling near Hilltop Mall, aerial structures, and a new yard.
- **Rumrill/Hilltop/I-80:** Extension directly north from Richmond BART station with an aerial structure in the median of Rumrill Boulevard and extensive tunneling near Hilltop Mall. This alternative would result in four potential stations and had the shortest alignment length.
- **Hilltop/I-80:** Extension directly north from Richmond BART station requiring earth cuts and fills and some tunneling with four potential stations. This alternative would conflict with the I-80 high occupancy vehicle (HOV) lane project.
- **AT&SF Railway/I-80:** Extension directly north from Richmond BART station using the existing AT&SF ROW with additional ROW acquisition and dislocation of existing structures. This alternative would offer potential stations at three locations and would require construction of a new yard.

Figure 2: 1983 BART West Contra Costa Extension Study Alternatives for Consideration



Note:

1: Southern Pacific

2: AT&SF Railway

3: I-80

4: San Pablo Avenue

5: Rumrill/Hilltop/I-80

13: Hilltop/I-80

14: AT&SF Railway/I-80

Source: BART 1983 West Contra Costa Extension Study

Key findings of the study included:

- The vicinity of I-80 and State Route 4 was identified as a logical northern terminus. This area had sufficient undeveloped and relatively flat land for construction of a BART station and end-of-the-line train storage track, and future flexibility for a BART extension to the north or east.[1]
- Extension north from the Richmond BART station was considered more advantageous than extension from the El Cerrito del Norte station, due to requirements for a new yard at the El Cerrito del Norte station.
- Extensions further north to either Crockett or Cummings Skyway were not considered to be advantageous when considering the added capital and operating costs versus the added ridership.
- Depending on the alternative, projected farebox recovery ranged from 23 to 43 percent.
- A shuttle service with passengers transferring at the end of the extension would result in substantial cost savings ($2 million per year in 1983 dollars), but would have reduced patronage as compared to through service.
- Trade-offs would exist for capital costs initially invested and patronage or total benefit.

Following the completion of the 1983 study, a preferred alignment from the existing Richmond BART station through the City of San Pablo, under the Hilltop Mall area, and along the western side of I-80 to the vicinity of the City of Crockett was adopted by the BART Board.[2]

2.2 BART West Contra Costa Extension Alignment Study, 1992

The 1992 West Contra Costa Extension Alignment Study evaluated potential rail transit alternatives within the I-80 corridor for transit alignments and station sites in West Contra Costa County and limited portions of Solano County. The 1992 study reexamined the feasibility of rail extensions previously identified in the 1983 West Contra Costa Alignment Study and was initiated due to major changes in land use, population, and growing travel demand in the region. BART was also interested in undertaking a more detailed analysis of the alignments that were evaluated in the 1983 study and in assessing the potential for light rail transit (LRT) as an alternative to conventional BART technology. Initial screening for this study evaluated six grade-separated heavy rail alignments, three corridor-long LRT alignments, and two existing railroads for commuter rail service.

[1] A BART park-and-ride facility has been developed at this location.

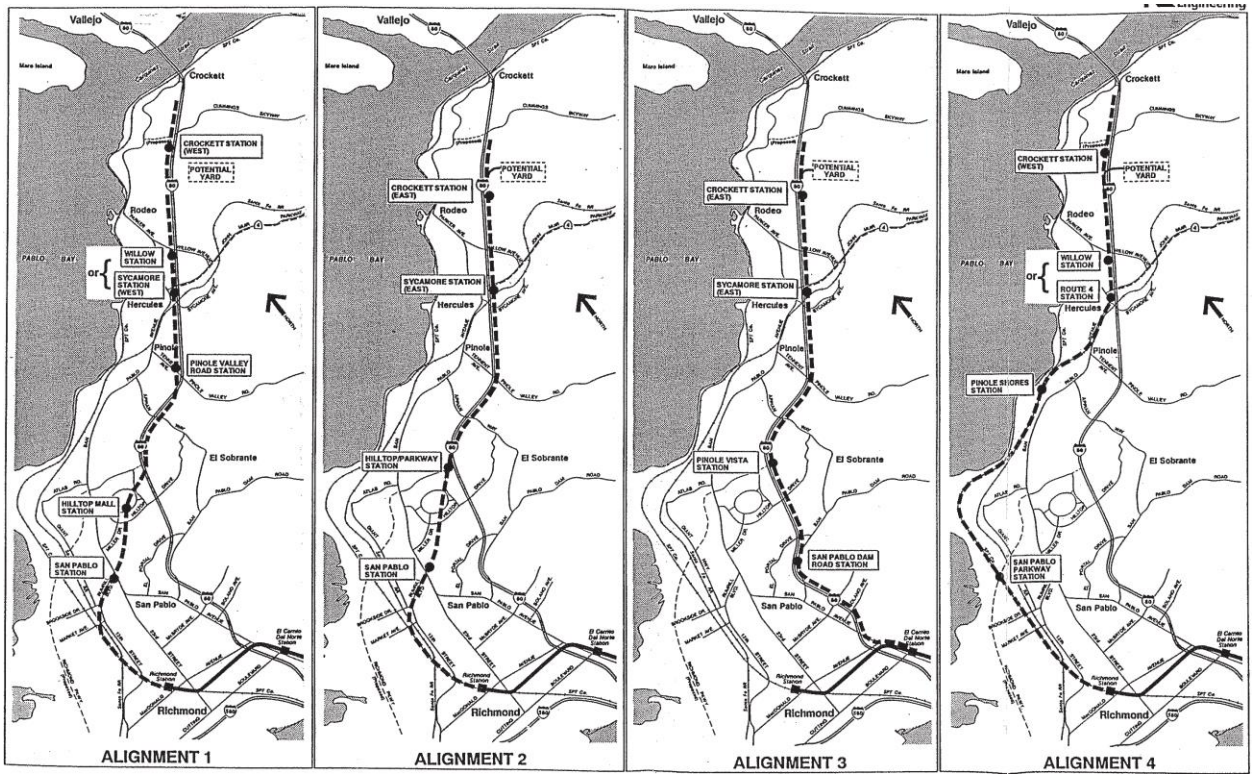
[2] BART, West Contra Costa Extension Alignment Study, 1992

The initial screening found:

- Southern Pacific and AT&SF railroad alignments were determined unsuitable for high-speed heavy rail transit, such as BART, due to the curvature of the ROW in West Contra Costa County.
- Building LRT along San Pablo Avenue would require additional ROW and major reconstruction.

From the initial study, four heavy rail alternatives that would allow for an extension of BART trackage and a potential future extension into Solano County across the Carquinez Strait were advanced (see **Figure 3**).

Figure 3: 1992 BART West Contra Costa Extension Alignment Study Alternatives



Source: BART 1992 West Contra Costa Extension Alignment Study

The study found that for the four alternatives:

- Alignment 1 ranked moderate for travel measures (e.g., passenger numbers, travel time, relief of I-80, tight curves, and staging) category, but poorly in terms of cost and impact.
- Alignment 2 had the highest ranking for travel measures and moderate relative capital costs.
- Alignment 3 ranked moderate for travel measures, cost, and impact.

- Alignment 4 ranked low for travel measures and moderate in terms of cost and impact. Alignment 4 was also found to be the least costly of the four alternatives.

Major findings of the study included:

- A BART extension could generate significant patronage.
- Due to the rolling terrain in the study corridor all alternatives would require significant amounts of guideway on structures to maintain acceptable grades.
- Screening studies identified two principal corridor routes:
    - Along the San Pablo Bay shore (route of the Southern Pacific Railroad mainline)
    - Along I-80
- Operation of commuter rail such as LRT may be an interim approach to providing heavy rail transit in the corridor and may help develop a market for rail transit. The analysis found that extending the LRT to the northern portion of the corridor would result in longer travel times and, thus, make LRT less effective than a standard commuter rail facility.

The study did not recommend a preferred alternative but provided information about the options for a new rail alignment within the I-80 corridor and outlined the next steps to take to further advance the development of a transit solution for this corridor.

2.3 MTC I-80 Corridor Study, 1996

The MTC I-80 Corridor Study was undertaken as a joint effort between Alameda, Contra Costa, and Solano counties, MTC, California Department of Transportation (Caltrans), and multiple transit agencies providing service in the I-80 corridor. The I-80 Corridor Study advanced a long-term strategy and investment plan to improve mobility within this corridor. The study looked not only at integrated transportation solutions, but also at a framework for integrating land use and transportation projects in the corridor. The study corridor extended from downtown Oakland to the Solano/Yolo county line near Davis.

The worst congestion levels in the corridor at that time, as today, occurred between the Bay Bridge and Pinole Valley Road in Contra Costa County. In addition, trucks constituted between seven to 12 percent or more of daily traffic volumes in the heavily traveled parts of the corridor.

The study analyzed 10 project alternatives that were designed to capture the full range of improvements for the corridor:

- **Alternative 1** – Projects in the 1994 Regional Transportation Plan (RTP).

- **Alternative 2** – Ramp metering in the Alameda County and Contra Costa County portions of the I-80 corridor.
- **Alternative 3 –** Express bus service improvements within and from Solano County and an HOV extension through Vallejo.
- **Alternative 4 –** Commuter rail service from Dixon to Oakland with feeder service to the rail stations and a West Oakland intermodal station connection to BART.
- **Alternative 5 –** HOV lanes and a high level of express bus service throughout the corridor and light rail service on San Pablo Avenue in Contra Costa and Alameda counties.
- **Alternative 6 –** High level of commuter rail service. Light rail service would be implemented on San Pablo Avenue and HOV lanes would be implemented throughout Fairfield and Vacaville.
- **Alternative 7 –** High levels of express bus service and high levels of commuter rail service.
- **Alternative 8 –** BART extension to Vallejo.
- **Alternative 9 –** Major express bus service from Solano County and expansion of AC Transit express bus service between Contra Costa and Alameda counties and San Francisco.
- **Alternative 10 –** BART extension to Hercules and RTP projects.

The study noted that express bus and commuter rail services, combined with a phased extension of the I-80 HOV lane, would offer a cost-effective and financially feasible strategy for providing rapid transit, increasing transit ridership, and managing congestion in the corridor. The study noted that express bus and commuter rail improvements do not attract as many new riders as a BART extension and were considered to be less costly than a BART extension alternative to address the demand for high quality transit service in the corridor.

Based on the alternatives analysis, the study recommended several transit service improvements:

- Operate ferry service between Vallejo and San Francisco (three/four round trips during peak periods).
- Operate express bus service throughout the corridor on the HOV network, providing direct service into San Francisco and connecting with BART in the I-80 and I-680 corridors.

- Provide three daily commute period roundtrips on the Capitol Corridor rail service between Sacramento and the greater Bay Area.
- Improve access to and within the Richmond and El Cerrito del Norte BART stations to accommodate increased feeder and express buses serving these stations—and rely on BART's current plans to increase its capacity by reducing headways.
- Maintain and expand the feeder bus network to bring people to corridor rail stations and provide local bus service to operate between corridor communities.[3]

The complete I-80 Corridor Investment Plan, as recommended by this study, is shown in **Figure 4**.

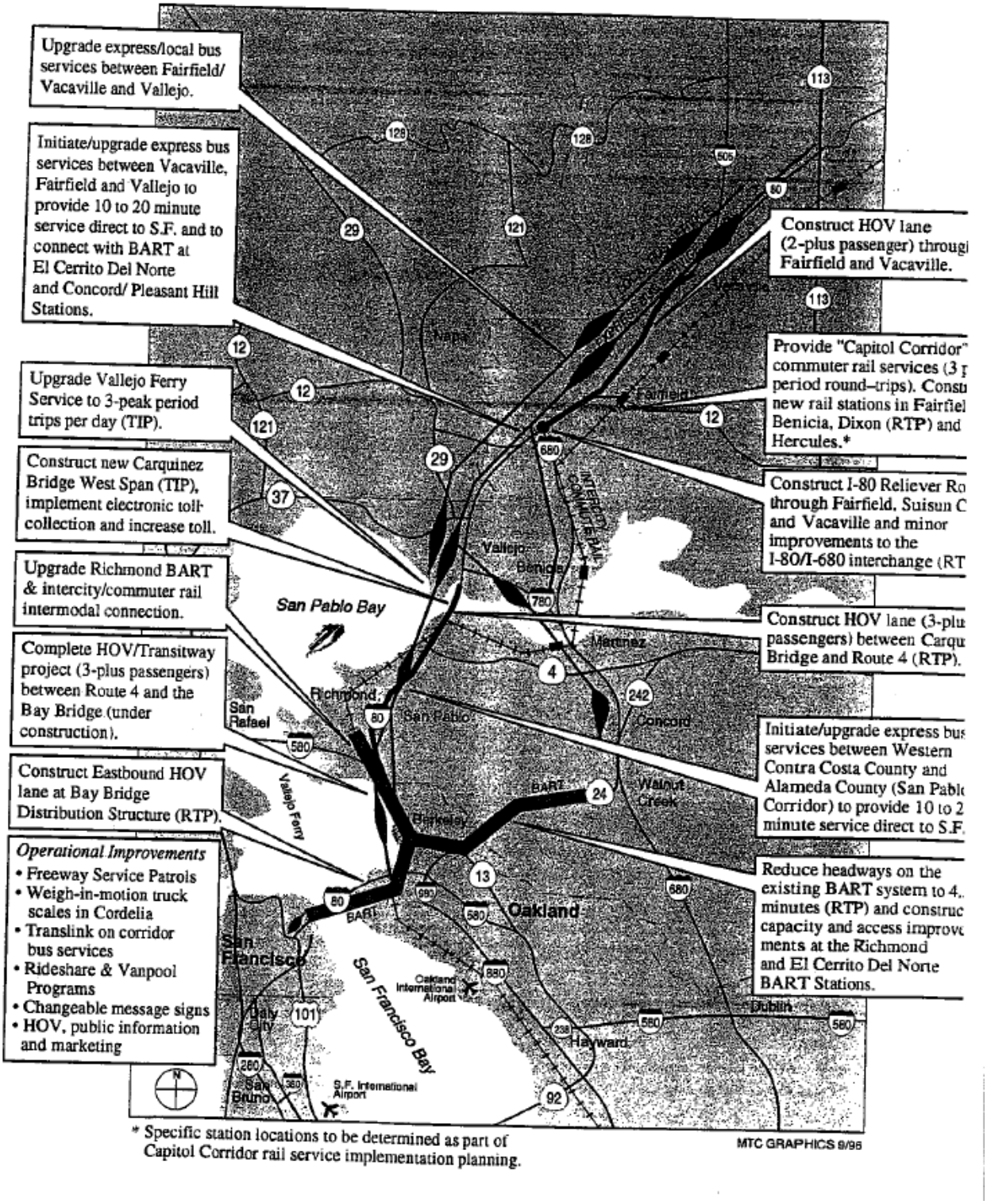
Since the completion of this study, WestCAT has implemented increased feeder bus service to the El Cerrito del Norte BART station. There are also several WCCTA express bus lines that travel on the HOV lanes on the I-80 corridor, including the JX and JPX express routes, Lynx TransBay service and the Route J service.[4] The JX provides service between the Hercules Transit Center and the El Cerrito del Norte BART station. The JPX provides service between the Hercules Transit Center, Pinole and the El Cerrito del Norte BART station. In addition, the San Francisco Bay Ferry provides year-round weekday and weekend service between Vallejo and the terminals at the San Francisco Ferry Building and Pier 41.[5]

[3] MTC, Interstate 80 Corridor Study Summary Report, Available: www.wcctac.org/wp-content/uploads/2015/01/MTC-I-80-Corridor-Study-11-20-1996.pdf

[4] Western Contra Costa Transit Authority, Short Range Transit Plan, Available: http://westcat.org/administration/srtp.html

[5] WETA, Vallejo Ferry Service, Available: https://sanfranciscobayferry.com/route/sffb/vallejo

Figure 4: Interstate 80 Corridor Investment Plan



Source: MTC, 1996 1-80 Corridor Study

2.4 WCCTAC Additional West County Train Station Site Evaluation, 1999

The 1999 Additional West County Train Station Site Evaluation was undertaken by WCCTAC in response to concerns that previous studies and outcomes of those studies had not yet fully addressed the transportation needs of West Contra Costa County and that additional study was necessary to consider rail opportunities, specifically potential new Capitol Corridor station sites. This study evaluated two candidate Capitol Corridor Station sites in Hercules and Rodeo to address concerns with I-80 congestion and the lack of rail transit service to West County. A previous proposal to extend BART from Richmond to the vicinity of Hilltop Mall never came to fruition due to the high cost and lack of available funding.

The proposed Hercules station site is located along San Pablo Bay and west of Refugio Creek, while the proposed Rodeo station site is located within the East Bay Regional Park District south of John Street. The stations were evaluated based on criteria developed to conform to the Capitol Corridor Joint Powers Authority's (CCJPA) Policy on Train Station and WCCTAC requirements, which include: travel measures, site design measures, land use/environmental considerations, institutional viability, and cost measures.

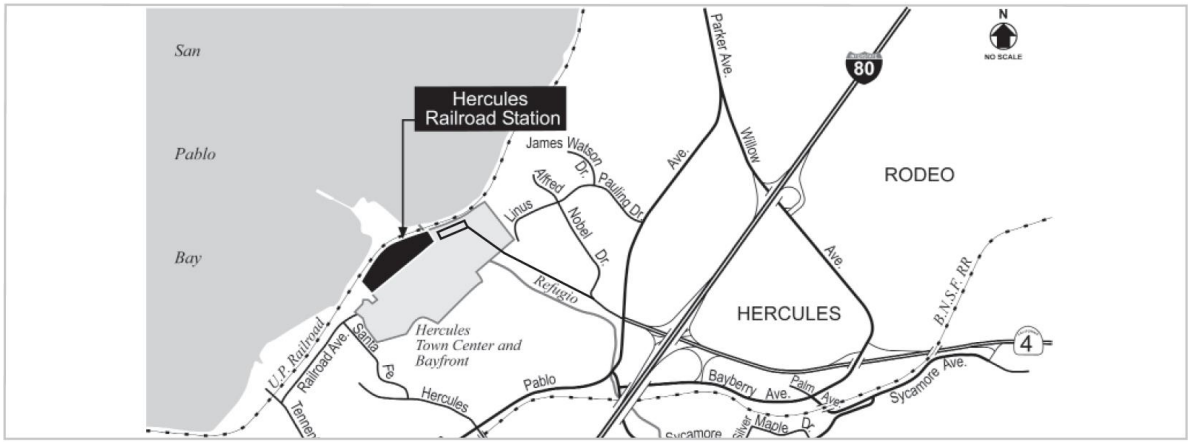
The proposed station in Hercules rated higher in every category except for cost, including:

- **Travel measures.** The proposed Hercules station was projected to have a higher increase in population than Rodeo, and the surrounding area had more development potential. Although both sites had equal automobile market share and are located a mile or less from I-80, the Hercules site was anticipated to have a pedestrian market area more than three times larger than the expected pedestrian market in Rodeo and more existing bus service near the proposed station site. The projected ridership for Hercules was 900 passengers per month, while Rodeo was 700 passengers per month.
- **Site design measures.** Although both sites met the site design requirements outlined in CCJPA's Policy on Train Stations and would have minimal traffic impacts, the Rodeo station site would require acquisition of private property. In addition, the surrounding property of the Rodeo site was mostly developed which limited expansion. In contrast, the Hercules site was then vacant and the property owner had agreed to accommodate the train station.
- **Land use/environmental considerations.** The proposed Hercules rail station was compatible with the intensity of development proposed for the surrounding region, Lower Refugio Valley. The study also acknowledged that Hercules had no parkland impacts (whereas the Rodeo site was located partially on parkland) and would not be subject to the federal Section 4(f) process.

- **Institutional viability.** The study concluded that the Hercules site had a greater potential to obtain state funding because of higher ridership projections, the advanced status of plans for development adjacent to the proposed site, and financial commitments from the City of Hercules. The Hercules station site also had joint development potential since the City of Hercules had completed approvals for a Specific Plan and Environmental Impact Report (EIR) for a town center project that included the train station.
- **Cost measures.** The Hercules site would have higher capital costs because of necessary track modifications, while the operating costs of both sites would be about the same.[6]

The study recommended that the West Contra Costa train station be located at the Hercules site, illustrated in **Figure 5**. Since the study was completed, significant progress has been made. Preliminary studies, environmental clearance, design, and ROW acquisition are completed, and the station is currently under construction, with an estimated completion in summer 2017.[7]

Figure 5: Hercules Capitol Corridor Station Site



Source: CCTA, Hercules Rail Station Fact Sheet

2.5 CCTA Express Bus Study, 2001

The Express Bus Study undertaken by CCTA in 2001 was initiated in response to concerns regarding the ongoing difficulty of long distance transit trips in Contra Costa County. Longer-distance trips required long travel times and transfers rather than a fast, single-mode trip. The integration of express bus service using the HOV lane network was a viable option to explore as a way of expanding high-level transit service.

[6] WCCTAC, Additional West County Train Station Site Evaluation, Available: www.wcctac.org/wp-content/uploads/2015/01/WCCTAC-Additonal-West-County-Train-Station-Site-Evaluation-5-1999.pdf

[7] CCTA, Hercules Rail Station Fact Sheet, Available: www.ccta.net/_resources/detail/24/2

The 2001 Express Bus Study provided an integrated express bus plan for Contra Costa County and proposed several new or expanded express bus routes intended to supplement existing services. The plan described a basic scenario, which was planned to be operational by 2007, and an enhanced scenario for 2020, which builds on the basic scenario. **Figure 6** illustrates the proposed bus service in the I-80 corridor.

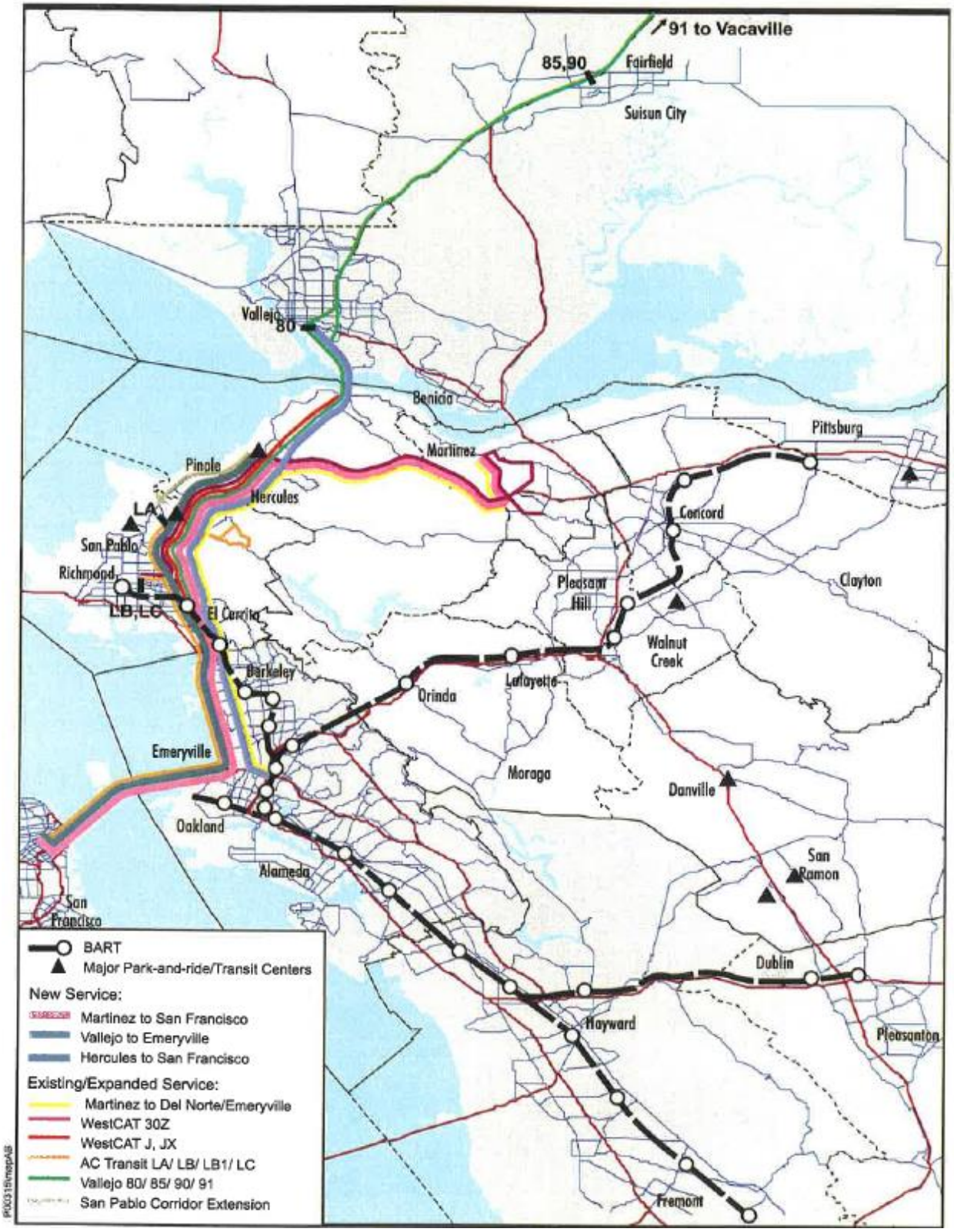
In the proposed basic scenario, bus operators would introduce improved services from Martinez that would also serve residents in West Contra Costa County, including:

- A new service connecting Martinez, Hercules, Pinole and El Sobrante residents with the San Francisco Transbay Transit Terminal.
- A new service operating during the commute period that would provide linkages for residents of Martinez, Hercules, Pinole and El Sobrante to West Berkeley and Emeryville.

In the enhanced scenario, several express bus services were proposed:

- A regularly scheduled, all-day, frequent express bus service that would connect Vallejo with the El Cerrito del Norte BART. This route would stop at locations along the I-80 corridor, and the stops would be designed to allow buses to enter and exit the median HOV lanes with minimum delay.
- A limited-stop, all-day service on a parallel arterial, San Pablo Avenue, would also operate in this corridor. This service would be extended to connect with the all-day express bus services on I-80. The proposed San Pablo Avenue route would be extended on San Pablo Avenue north of the Hilltop area, ending at the Hercules transfer point.
- All-day services would be expanded by commuter express services that would operate during peak hours, providing linkages from Martinez, the Pinole/Hercules area, and Solano County communities to areas such as Berkeley/Emeryville and the Transbay Transit Terminal.

Figure 6: Proposed Bus Service



Source: DKS Associates, 2001, Contra Costa Express Bus Study

According to the study, these proposed express bus services cannot be successful without complementary infrastructure investments. The opening of the HOV lane on I-80 increased the popularity of park-and-ride lots significantly, which subsequently created a shortage of spaces. In the enhanced scenario, a major parking expansion is proposed at Hilltop/Richmond Parkway and the Hercules areas. In addition, HOV ramps at El Cerrito del Norte heading to and from the north and at Richmond Parkway headed to and from the south are also proposed for the enhanced scenario. These ramps would increase the reliability of travel times for buses.

In order to implement a successful express bus system, the study provided guidance on how to implement the recommendations discussed above:

- Form an express bus working group to address institutional issues.
- Develop a common bus stop design to establish a connected, coordinated transit system throughout the county.
- Integrate with local jurisdiction planning and project development.
- Develop a pro-active funding plan that outlines the amount of funding necessary to implement the integrated express bus program in the event funding opportunities arise.
- Gain field insights (including the opportunities and challenges associated with express bus operations) by riding express buses.[8]

Currently, there are express bus services in West County that were implemented to serve the markets noted above, though not all of the recommended measures have been put in place. The Lynx bus provides service to the San Francisco Transbay Transit Center from the Hercules Transit Center. Connections to the Lynx bus are provided at the Transit Center via the 30Z from Martinez, and the J, JX, and JPX, which operate on San Pablo Avenue or I-80. The J, JX, and the JPX also provide direct connections to the El Cerrito del Norte BART station. From Vallejo the 80 provides all day service to the El Cerrito del Norte BART station. Limited stop service (the J line) is in place on San Pablo Avenue connecting from the Hilltop Mall to the Hercules Transit Center. To date, there are no direct express bus services to the West Berkeley and Emeryville area.

2.6 BART Contra Costa-Solano Rail Feasibility Study, 2003

The BART Contra Costa-Solano Rail Feasibility Study was undertaken to look at options for providing congestion relief from the “unrelenting” congestion on I-80 and to address projected growth. The study evaluated options for operating passenger rail on existing railroad rights-of-way to provide a commute alternative along the I-80 corridor for residents of Solano and Contra Costa counties. The study examined a short-term option (integration of commuter rail service serving the Bay Area trips with intercity service along the existing Capitol Corridor route

[8] CCTA, Contra Costa Express Bus Study, Available: http://ccta.net/_resources/detail/50/1

from Solano County using the Capitol Corridor vehicles) and long-term options (local passenger rail service from Hercules to Richmond along either the Union Pacific Railroad [UPRR] or the Burlington Northern and Santa Fe [BNSF] ROW using railroad diesel multiple unit [DMU] technology).[9] For this study, it was assumed that both the short- and long-term options would connect with the Richmond BART station.

The 2003 BART study projected that the I-80 corridor would be severely congested during peak hours. It also found that existing and future conditions would include:

- Population and employment growth in the I-80 corridor.
- Commute trends existing at the time of the study would likely continue.
- Investment in highway and transit systems may not meet population and employment growth.
- Congestion on I-80 may worsen.
- Rail assets exist that may provide alternatives for commuters (though these assets will require infrastructure and capacity improvements to be used for passenger service).

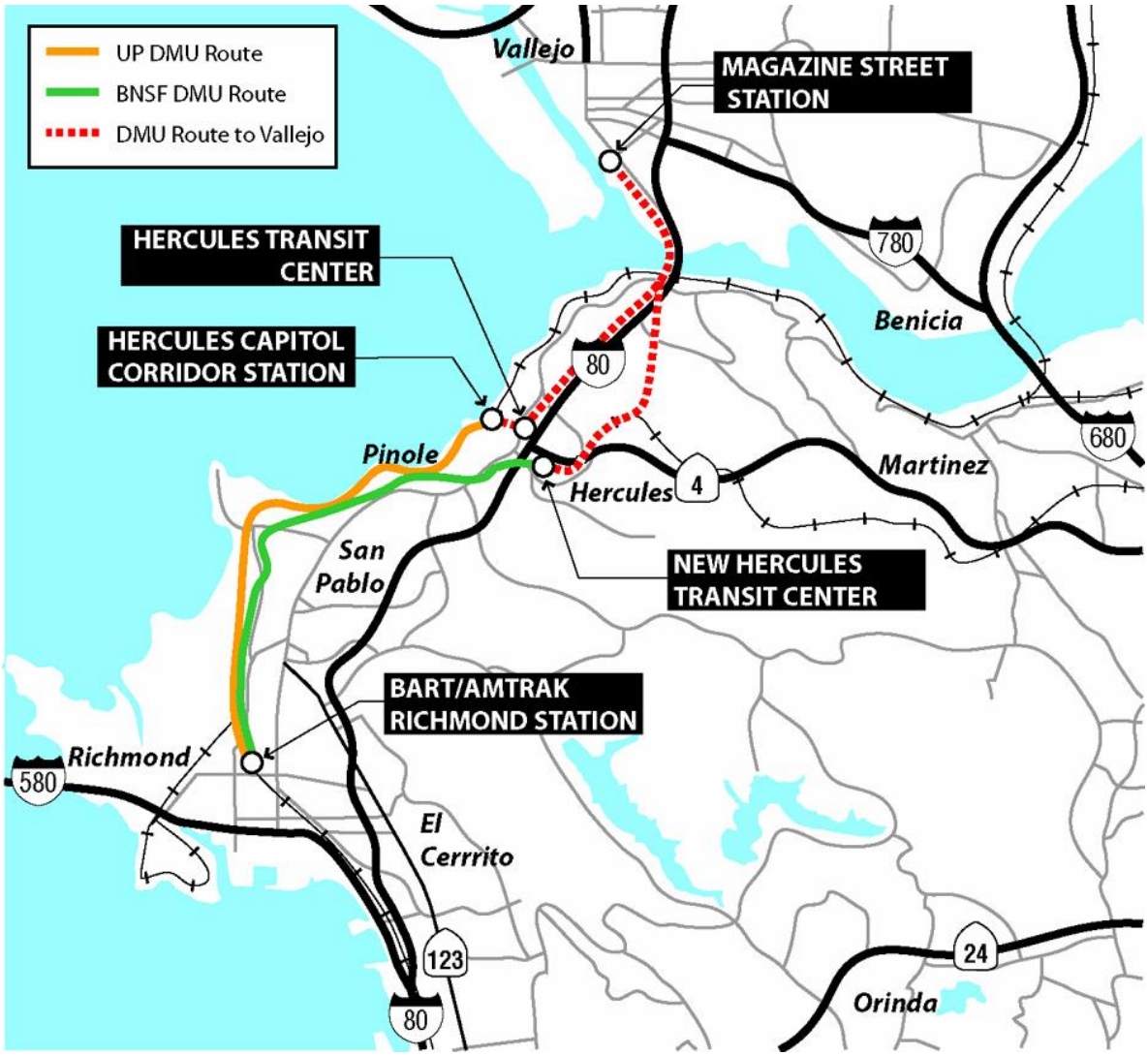
The 2003 study found that station sites with the best potential for transit-oriented development (TOD) were Market Avenue (on both UPRR and BNSF alignments), Richmond Parkway (both alignments), Montara Bay, Pinole Shores, Tennent Avenue, and a proposed Hercules Capitol Corridor station. The 2003 study found three viable alignments in the West Contra Costa area:

- Alternative 1: Railroad DMU technology on the BNSF alignment between the Richmond BART station and a proposed new Hercules Transit Center east of I-80.
- Alternative 2: Railroad DMU technology on the UPRR alignment between Richmond BART station and the proposed Hercules Capitol Corridor Station.
- Alternative 7: Same alignment as Alternative 2 but using “light” DMU technology.

Figure 7 shows the potential alignment and station locations identified in the 2003 study.

[9] A DMU is a self-propelled, diesel-powered rail passenger car arranged either for independent operation or for simultaneous operation with other similar cars, when connected to form a train.

Figure 7: 2003 Potential DMU Extensions and Stations



Source: BART 2003 Contra Costa-Solano Rail Feasibility Study

The 2003 study also presented the following findings related to the long-term rail study:

- Ridership projections from Richmond to Hercules demonstrate a viable service.
- A possible extension of rail service to Vallejo could have a positive impact in the reduction of congestion.
- The study corridor shows strong TOD potential and local jurisdictions willing to develop along TOD principles.

- DMU options provide lower cost rail alternatives with a substantial level of service for West Contra Costa County residents.[10]

To date, no extension of the eastern segment of the Richmond BART line has occurred. The current BART Vision Plan, outlined below, still identified the potential for a future BART extension in this corridor.

2.7 MTC Regional Rail Plan, 2007

The purpose of the 2007 Regional Rail Plan was to develop a new comprehensive vision for a Bay Area regional rail network. This study encompassed the entire region and identified rail connections to a statewide network, including the planned California High-Speed Rail network. The intent was to identify a region-wide system of rail improvements and expansions to guide investment decisions; create a safe, fast, reliable, and integrated passenger and rail network to address the projected growth in transportation demand; and enhance the economic vitality of Northern California, while minimizing the impact on the environment.

The Regional Rail Plan identified two alternatives for regional rail without high-speed rail to address congestion in the I-80 Corridor:

- **Alternative 1** – Develop the UPRR/Capitol Corridor line between Oakland and Sacramento with a range of capacity and operational improvements and recommended a BART extension to North Hercules. This alternative expanded the UPRR/Capitol Corridor line from three to four main tracks. The BNSF freight line, which currently connects to the UPRR line in Richmond, opposes passenger traffic since this line is a critical freight connection to the Port of Oakland.
- **Alternative 2** – Provide separate passenger-only tracks within the UPRR ROW to support the operation of lightweight passenger equipment. This alternative also revised the alignment north of Hercules to follow the I-80 corridor across a new Carquinez Bridge at Vallejo and continue on to reconnect with the UPRR line near Cordelia.

The plan recommended Alternative 1 as more favorable, with potential for local passenger services on the expanded UPRR line. The plan states that implementation of separate passenger-only tracks for lightweight equipment in Alternative 2 conflicts with UPRR policies and the long-range plan for the Capitol Corridor, whereas Alternative 1 is able to yield significant service improvements using standard equipment shared with freight.

Although the plan acknowledges that the cost of the BART extension to North Hercules would make the total cost of Alternative 1 similar to Alternative 2, the shared operation of freight

[10] BART, Contra Costa-Solano Rail Feasibility Study, 2003

trackage and expansion to four tracks would provide enough track capacity to provide overlay services such as wBART, which would operate on conventional rail.[11]

2.8 WestCAT Short Range Transit Plan, 2013

The 2013 Short Range Transit Plan (SRTP) is a planning tool to guide WestCAT's future investments and to maintain and develop its transit services. SRTPs are updated on a regular basis and are done within the context of more comprehensive long-range plans. WestCAT's SRTP recognized that I-80 is the most congested freeway in the San Francisco Bay Area and emphasized the need to explore more cost-effective and cost-efficient modes of travel that would divert traffic on I-80 and relieve congestion, which it noted would be more economical than a BART extension. The SRTP mentioned several existing initiatives that are focused on I-80 congestion relief include:

- **HOV lanes –** I-80 has HOV lanes in place, and there are several WestCAT express bus services and local routes that utilize the HOV lanes, including the JX express bus service and the Route J service, which both travel between the Hercules Transit Center and the El Cerrito del Norte BART station. The HOV lanes have created significant potential for express bus or bus-only ROW.
- **Increase in bus service to BART stations –** In response to growing congestion on I-80, WestCAT implemented increased feeder bus service in 2004 to the El Cerrito del Norte BART station and ridership has increased by over 50 percent since then.
- **I-80 Integrated Corridor Mobility Project –** Alameda County Transportation Commission's (Alameda CTC) I-80 Integrated Corridor Mobility Project is an intelligent transportation system project that is currently underway to address congestion issues within this corridor. The project recommends metering lights on all on-ramps in WestCAT's service area to increase mobility and improve traffic flow.
- **WestCAT Lynx.** WestCAT Lynx is a transbay service that was implemented in September 2005 and provides service between Rodeo/Hercules and the Financial District in San Francisco on weekdays during commute hours. The transbay service was implemented as a result of two studies: the Contra Costa Express Bus Study and the Bay Area Regional Express Bus Study. In 2010, WestCAT added limited midday service to this route to address the implementation of a charge for crossing the Bay Bridge in a carpool and for riders who needed to return from San Francisco during the day.[12]

[11] MTC, San Francisco Bay Area Regional Rail Plan, Available: http://www.mtc.ca.gov/library/pub/25533_1.pdf

[12] Western Contra Costa Transit Authority, Short Range Transit Plan, Available: http://westcat.org/administration/srtp.html

2.9 BART Vision Plan, 2014

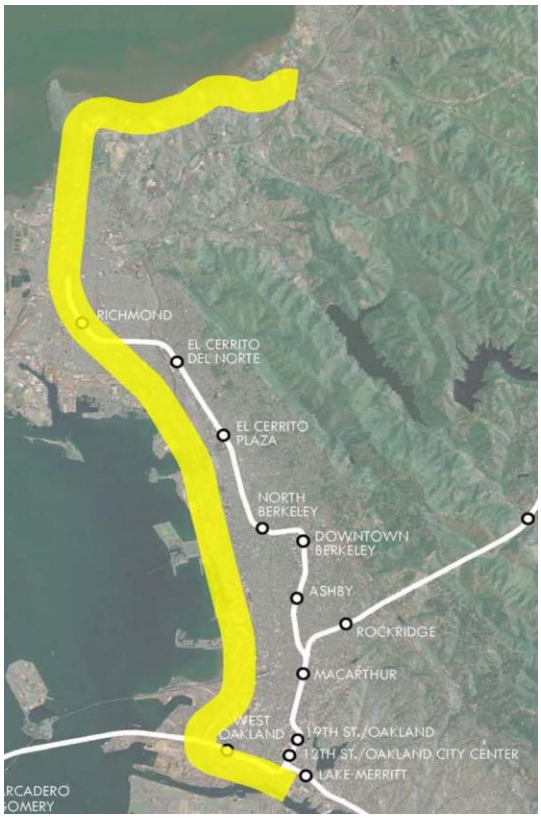
Currently under development, the BART Vision Plan is intended to be a comprehensive look at the next round of BART investments for the region weighing improvements to the existing core system, state of good repair, and potential new service extensions. The purpose of the plan is to engage the public and stakeholders and advise the BART Board regarding future investments to the BART system. The five critical elements to the future BART system as presented to the Board were:

- "Big 3 Essential Investments"
    - Railcars
    - Hayward Maintenance Complex
    - Train Control System Modernization
- State of Good Repair
- Capacity
- Stations Program
- Expansion projects
    - Infill stations
    - New corridors

The following potential projects in the West Contra Costa County area were presented to the BART Board in June 2014. **Figures 8 through 10** identify the location of these potential projects:

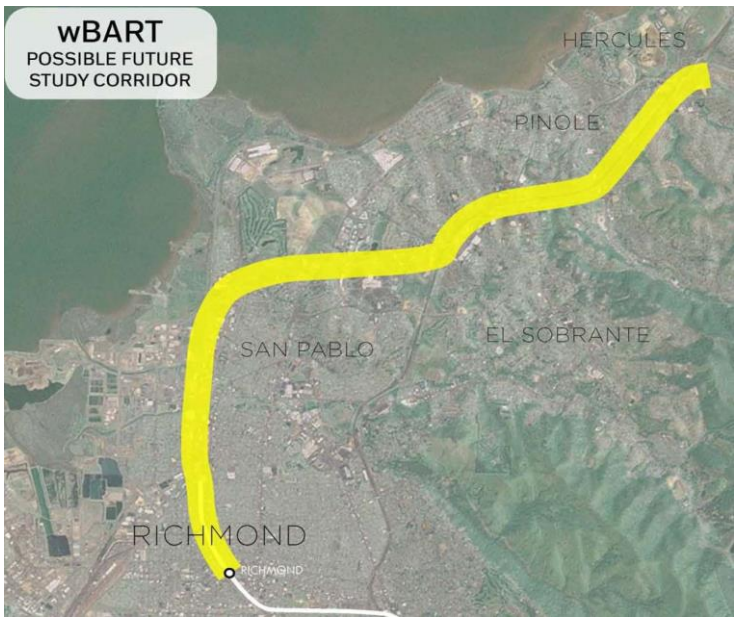
- Eastshore/Capitol Corridor Overlay – Extending DMU service from Lake Merritt BART station to Richmond BART station along the east bay shoreline and continuing north to Hercules
- wBART extending along the I-80 corridor from the Richmond BART station to Hercules
- Infill Station at Richmond/I-80

Figure 8: Possible Future Study Corridor for Eastshore DMU



Source: BART 2014. BART Vision Update Presentation to the BART Board

Figure 9: wBART Possible Future Study Corridor



Source: BART 2014. BART Vision Update Presentation to the BART Board

Figure 10: Possible Future Infill Station Study

Source: BART 2014. BART Vision Update Presentation to the BART Board

2.10 Capitol Corridor Vision Plan Update, 2014

The Capitol Corridor Vision Plan was the initial mapping of the long-term investment strategy to transform the Capitol Corridor into a modern electrified railroad built to international standards and capable of top speeds of 150 miles per hour. The Vision Plan focused on both short-term and long-term improvements and extended beyond the limits of West Contra Costa County.

In the short term, the Vision Plan was focused on service-expansion projects that the agency had been pursuing since 2005. These short-term projects, which included rail infrastructure improvements to facilitate increasing the number of round trips between Oakland and San Jose from seven to 11 trips, were envisioned to be under construction or completed in the next 10 years.

In the long-term, the Vision Plan identified major capital investments for further study. According to the plan, the section of the Capitol Corridor from Richmond to Suisun/Fairfield was one of the most challenging areas to speed up transit times and protect from sea-level rise due to its indirect route and the large number of curves that slow trains significantly through this part of the corridor. **Figure 11** shows proposed alternatives for improving this portion of the corridor. From the existing alignment on the UPRR, the alignment would join the BNSF Stockton Subdivision just north of Richmond to provide a more direct route to the north. Three alternative alignments in the northern segment described in the Vision Plan included:

- **Improve Existing Alignment Alternative** – This alternative would reconnect with the existing UPRR ROW just north of the City of Hercules. Under this alternative, curves

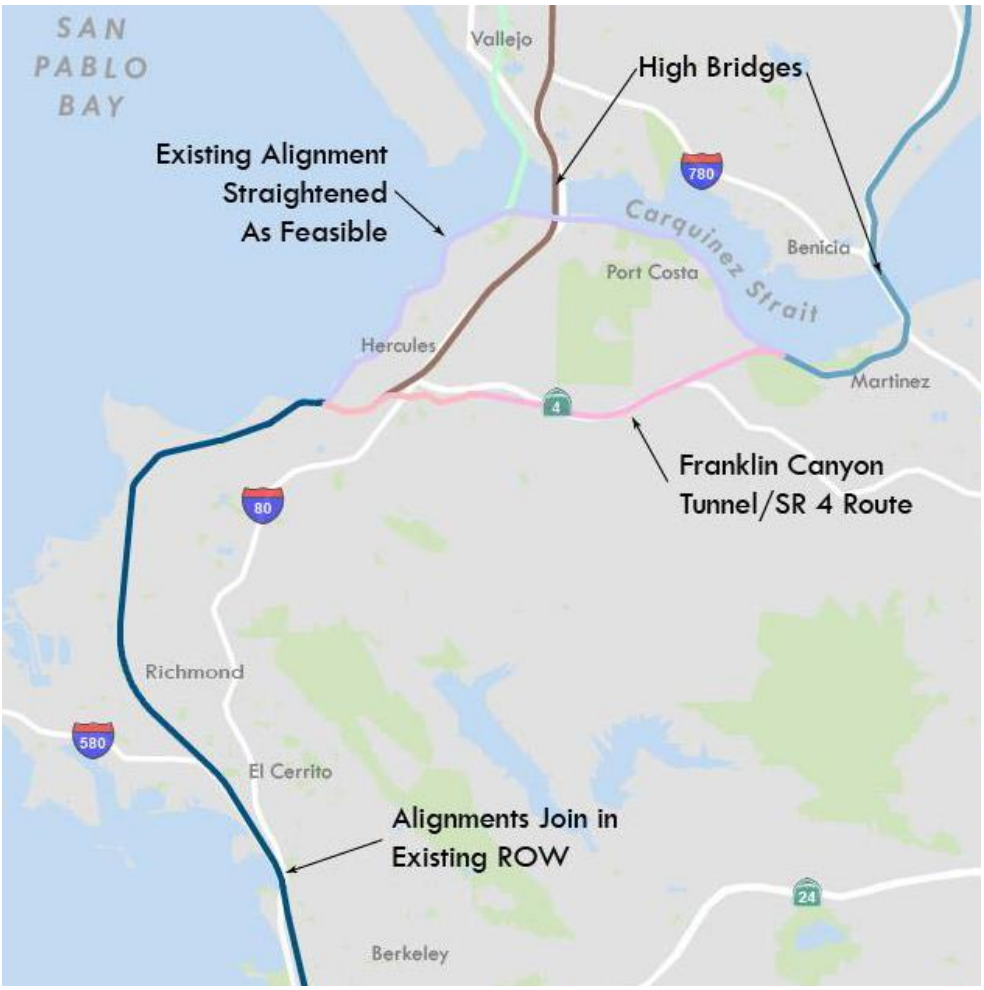
would be flattened and raised to protect against rising water levels using cut and cover engineering methods. This alternative would be one of the least expensive because it would require no tunneling or ROW acquisition but would require significant time and money to analyze and mitigate potential environmental impacts and to secure permits.

- **Franklin Canyon Tunnels Alternative** – This alternative would follow the BNSF alignment, turning inland at Hercules to follow Highway 4 in Franklin Canyon via a 1.3-mile tunnel. This alignment would include a station at the Hercules Transit Center, rather than the Hercules New Town Center. After following Highway 4 for nearly two miles, the alignment would enter another 2.7-mile tunnel before reconnecting with the existing alignment in Martinez. To reach a high-level crossing running parallel to the Benicia-Martinez Bridge, the route would rise for 1.9 miles through Martinez on an elevated guideway in the existing ROW. On the north side of the Carquinez Strait, the route would tunnel under I-680 to rejoin the existing ROW.
- **Vallejo Alternative** – This alternative would follow the BNSF Stockton Subdivision for 4.5 miles before transitioning to an elevated or at-grade alignment down the center of the I-80 ROW through Vallejo and the Jameson and American canyons. This alternative would connect back to the existing alignment in Suisun City via the California Northern ROW and would require a complete reconstruction of a segment of I-80. Another Vallejo alternative would pass through the heart of the city via an existing, extremely constrained rail ROW. Both of these options were viewed by the plan as unlikely for reasons of both cost and impact.

The plan identifies the alignment parallel to the existing crossing, between the twin spans of the Benicia-Martinez (I-680) auto bridge as the most promising alternative for a new, more reliable high-level crossing of the Carquinez Strait. A new bridge could connect at its southern end to the existing alignment, rather than along a new I-80 alignment through Vallejo as required for the Vallejo alternative.[13]

[13] Capitol Corridor Joint Powers Authority 2014 Capitol Corridor Vision Plan Update Final Version

Figure 11: Alternatives for Improvement along the Capitol Corridor in West Contra Costa County



Source: Capitol Corridor Joint Powers Authority 2014 Vision plan Update Final Version

2.11 CCTA Financial Feasibility of Contra Costa Ferry Service, 2014

The purpose of the CCTA Financial Feasibility of Contra Costa County Ferry Service report from 2014 was to assess the financial implications of the ferry services that had been proposed over the past decade in Contra Costa County to determine which services were the most viable for implementation and to guide future investment priorities. The report presented a feasibility analysis of four direct service ferry lines in Contra Costa County (Richmond, Hercules, Martinez, and Antioch) to help guide future planning and investment priorities. Financial feasibility was defined as generating revenues that equal or exceed costs.

The Water Emergency Transportation Authority (WETA) operates San Francisco Bay ferry service routes, and planning is underway for additional ferry service, including the routes analyzed in this report. It noted that WETA faces financial constraints associated with its key

revenue source (Bay Area bridge toll funding, Regional Measure [RM] 1 and RM2) and would need to find new or increased funding sources to sustain or improve its ferry service. Policy decisions related to allocation of funding sources affect the feasibility of expanding service to Contra Costa County.

WETA targets a minimum 40 percent farebox revenue recovery ratio, and according to the report, Richmond is the only service that would meet this criterion. The Richmond service would have strong ridership potential because the service route to San Francisco is relatively short and therefore the operating cost per passenger trip is lower compared to the other routes. During the first year of service, Richmond was projected to have more than 250,000 trips, resulting in a 45 percent farebox revenue recovery ratio. The service would only require one vessel, which would reduce operating costs significantly, and the existing docking facilities and deep water access means the Richmond terminal would have relatively low capital costs. Capital costs were estimated between $8 million and $12 million, and the purchase of two new vessels (one for daily service and one spare) would cost an estimated $34 million.

The study found the three other services to be infeasible given WETA's minimum farebox recovery target, unless each city would be able to identify additional revenue (i.e., state, regional, and/or local funding) to fund operating costs not covered by the farebox revenue:

- The Hercules service was projected to have 100,600 trips during the first year of service, resulting in a farebox revenue recovery rate of 14 percent. Initial capital costs would range from $20 million to $35 million and the purchase of three new vessels (two for daily service and one spare) would cost an estimated $51 million.

  A major constraint identified for the Hercules service is that dredging would need to occur in order for conventional floating ferry vessels to reach the Hercules ferry terminal. A two-mile channel would need to be dredged, and maintenance dredging would be required every two to three years.

- The Martinez service was projected to have 70,000 trips during the first year of service, resulting in a farebox revenue recovery rate of 12 percent. Initial capital costs would range from $14 million to $19 million and the purchase of three new vessels (two for daily service and one spare) would cost an estimated $51 million.

- The Antioch service was projected to have 67,000 trips during the first year of service, resulting in a farebox revenue recovery percentage of 19 percent. Initial capital costs would range from $6 million to $37 million and the purchase of three new vessels (two for daily service and one spare) would cost an estimated $51 million.

The study recognized that service routes could be combined into an interlined route to realize operating efficiencies (reducing the number of vessels and crews required systemwide). But the

length of the trip would increase, which could affect ridership demand. For the interlined routes Martinez-Hercules, Antioch-Martinez, and Antioch-Martinez-Hercules, additional non-farebox revenue would be required since none of the services meet WETA's minimum farebox revenue recovery target.

The study recommended several areas for further analysis that have not been studied or fully evaluated as part of the report, including various vessel technologies, potential role of the ferry system as part of Contra Costa County's emergency response plan, developing infrastructure to provide transit and/or weekend/evening service, and the potential economic impacts of ferry service.[14]

Since completion of this study, WETA proposed to establish a new ferry route between the existing San Francisco Ferry Terminal and a new ferry terminal located on the Ford Peninsula in the City of Richmond.[15] The WETA Board of Directors approved a cooperative agreement with CCTA and the City of Richmond to provide an operating subsidy for the proposed Richmond ferry service. WETA will now begin the process of securing funding for purchase of two ferry vessels. The Richmond ferry service is expected to be fully operational by 2018.[16]

2.12 AC Transit Major Corridors Study

AC Transit is undertaking an evaluation of its 10 highest ridership corridors within Alameda and Contra Costa counties to determine the potential for priority capital investments to transit operations and improve service. The Major Corridors Study's final report, which will include short-term (2020) and long-term (2040) recommendations, is currently under development and scheduled to be completed in mid-2016.

The San Pablo Avenue/Macdonald Avenue corridor that serves both Alameda County and West Contra Costa County is included as part of the study. Initial recommendations from the study include Bus Rapid Transit (BRT) infrastructure improvements on this corridor, which corresponds with transit improvements proposed on San Pablo Avenue in CCTA's Countywide Comprehensive Transportation Plan.[17]

[14] CCTA, Financial Feasibility of Contra Costa Ferry Service, 2015-2024, Available: http:// ccta.net/about/download/53a87c424d21b.pdf

[15] WETA, Richmond Ferry Terminal Project, Available: http://sanfranciscobayferry.com/weta/richmond-ferry-terminal-project

[16] WETA, WETA Approves Richmond Ferry Funding, Available: http://sanfranciscobayferry.com/weta-approves-richmond-ferry-funding

[17] AC Transit, Staff Report: Update on Contra Costa Countywide Comprehensive Transportation Plan, Available: www.actransit.org/wp-content/uploads/board_memos/14-261%20Contra%20Costa%20Transportation%20Plan.pdf

2.13 AC Transit Service Expansion Plan

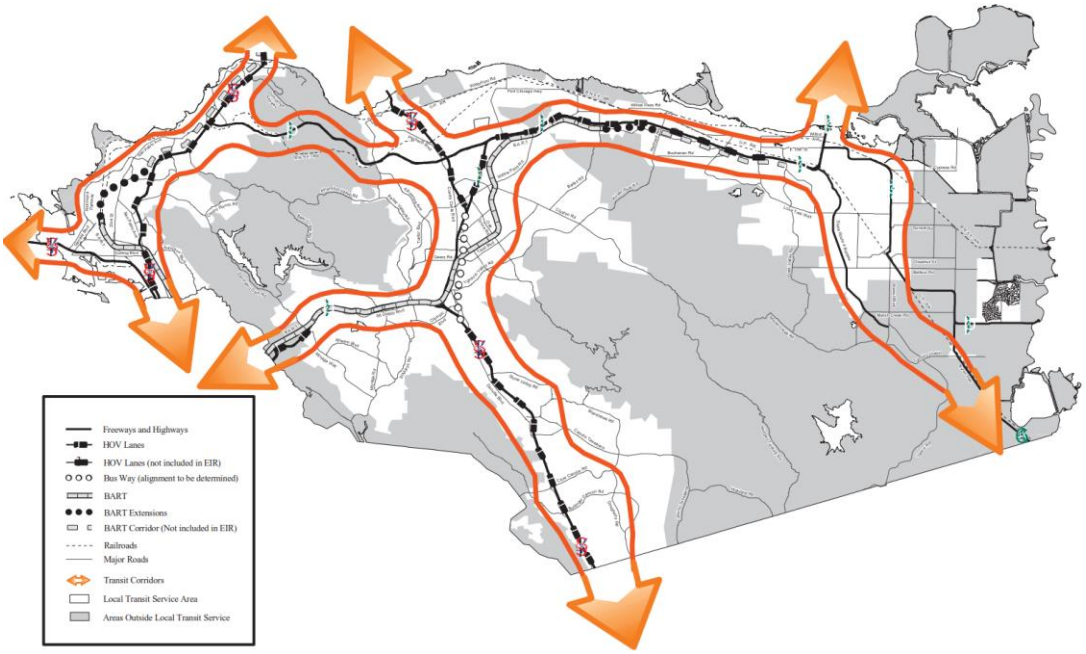
Currently in progress, AC Transit's Service Expansion Plan (formerly Comprehensive Operations Analysis) examines all of the District's routes and schedules to look for opportunities to provide more effective and efficient service for the next five years. Initial recommendations on the San Pablo Avenue/Macdonald Avenue include more frequent service on Lines 72 and 72M which travel on San Pablo Avenue. The plan's recommendations have gone through two rounds of public meetings, and final recommendations are anticipated in fall 2015.

2.14 General Plans

Six General Plans were reviewed as part of this task. However, none made specific recommendations related to the study area. The following summarizes the six plans' Circulation Elements:

- **Contra Costa County General Plan, 2005-2020** (adopted 2005)**:** The Transportation and Circulation Element of the County's General Plan made reference to a future BART extension in West County to Hilltop Mall. It also discussed the Transit Network Plan (see **Figure 12**) that had the intent to establish transit corridors along the county's freeways and lay the foundation for a future express bus service, rail transit service, and/or HOV facilities.[18]

Figure 12: Transit Network Plan in Contra Costa County General Plan



Source: Contra Costa County General Plan, 2005

[18] Contra Costa County General Plan (2005-2020), Chapter 5, http://www.co.contra-costa.ca.us/4732/General-Plan

- **City of El Cerrito General Plan** (adopted 1999): The Circulation Element of El Cerrito's General Plan described the necessary services, facilities, and capital improvements to facilitate the movement of automobile and trucks, pedestrians, transit, bicycle, and emergency transportation. Significant growth was forecasted for El Cerrito arterials, and the Circulation Element proposed several infrastructure improvements, including signalization and additional right-turn lanes, to attain the citywide goal of Level of Service (LOS) D or better.[19]
- **City of Hercules General Plan** (adopted 1998): The Circulation Element of the City of Hercules General Plan addressed the movement of people and commodities and local planning for scenic highways in the city. The Plan summarized existing conditions related to traffic circulation, scenic routes, public transit, and other transportation facilities, and established citywide traffic service standards for basic routes in Hercules. In addition, the Plan recommended potential circulation improvements to help alleviate some of the future congestion identified for intersections that do not meet the city's LOS goals. The main deficiency identified in Hercules at the time was located on San Pablo Avenue.[20]
- **City of Pinole General Plan** (adopted 2010)**:** The Circulation Element of the City of Pinole General Plan addressed regional traffic congestion, traffic impacts on neighborhoods, public transit, trails and parking by analyzing data related to existing and future conditions of the transportation system to inform the development of goals, policies and actions to address transportation needs. Pinole identified I-80 as a route of regional significance, along with San Pablo Avenue and Appian Way. Forecasted growth in the San Francisco Bay Area and Sacramento region was expected to increase demand on the I-80 corridor. To address this, the city chose to adopt policies to enhance bicycle, pedestrian, and public transit options to increase circulation.[21]
- **City of Richmond General Plan 2030** (adopted 2012)**:** The Circulation Element of the City of Richmond General Plan addressed the physical circulation network in Richmond by identifying a set of goals, policies, and implementing actions to guide the management of the transportation system. Richmond used a place-based approach to circulation planning, which was a place-based classification system (i.e., multi-use trail, residential street, neighborhood street, community activity street, community connector street, regional connector street, freeways) tailored to surrounding land use,

[19] City of El Cerrito, General Plan, Chapter 5: Transportation and Circulation, Available: www.el-cerrito.org/DocumentView.aspx?DID=1368
[20] City of Hercules, 1998 General Plan, Circulation Element, Available: www.ci.hercules.ca.us/index.aspx?page=196
[21] City of Pinole, General Plan, Chapter 7: Circulation, Available: www.ci.pinole.ca.us/planning/docs/City_of_Pinole_General_Plan_12.2010-Chapter7.pdf

street function, and desired character rather than the standard vehicular capacity-based hierarchy for streets (i.e., freeways, arterials, collectors, local roadways). This classification approach was envisioned to enable the City to create a more balanced street environment.

A key finding from the Circulation Element was that Richmond has an extensive transportation system that provides users with a wide range of options to meet diverse needs, but ongoing maintenance, safety, and efficiency improvements are needed as new development puts additional pressure on existing infrastructure.[22]

- **City of San Pablo General Plan 2030** (adopted 2011)**:** San Pablo's transportation planning process consists of a three pronged approach: transportation policies and programs are based on land use planning, the city's planning efforts are integrated with CCTA and Caltrans, and existing roadways are improved on an ongoing basis to accommodate future travel demand. These three strategies were developed to help San Pablo optimize the performance of its transportation system. The policies and actions identified in the Circulation Element of the General Plan incorporated Complete Streets principles to guide the development of a transportation network that accommodates the needs of all users, including transit users, pedestrians, bicyclists, and motor vehicles.[23]

2.15 Additional Relevant Studies

The following studies that are relevant to the study area were also reviewed. Those that examined Complete Streets were guided by the principle that streets should be designed, operated, and maintained to be safely accessed and used by all individuals on all types of modes. While there is no template for Complete Streets, tools include sidewalks, special bus lanes, bike lanes, comfortable and accessible transit stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, and others.[24]

- **CCTA, Countywide Comprehensive Transportation Plan (CTP), Contra Costa Transportation Authority:** The in-progress CTP, identifies projects, programs, and policies to be funded through the county's sales tax. CCTA's 2014 update of the CTP includes projects exclusively within Contra Costa County as well as those within the study area. The projects cover both capital and operational needs, such as access and

[22] City of Richmond, General Plan, Element 4: Circulation, Available: www.ci.richmond.ca.us/DocumentCenter/Home/View/8810

[23] City of San Pablo, General Plan, Chapter 5: Circulation, Available: www.sanpabloca.gov/gp2030

[24] National Complete Streets Coalition web page, http://www.smartgrowthamerica.org/complete-streets/complete-streets-fundamentals/factsheets/#benefits

amenities, roadway and streetscape improvements, calming and safety measures, bicycle and pedestrian improvements, ferry service, BART service, parking, vehicle replacement and security, information system upgrades, and regional express bus service. The CTP includes some of the largest projects, such as the I-80/San Pablo Dam Road Interchange Upgrade and Improvement, to the smallest projects, such as the Ohlone Greenway Wayfinding project.

- **South Richmond Transportation Connectivity Plan, City of Richmond:** This in-progress plan aims to address deficiencies in the local and regional transportation network in South Richmond by working with the community and other stakeholders to develop recommendations to enhance multimodal connections. The plan will focus on the anticipated demand on the current road network, transit service, and alternative modes, such as shuttles and car-sharing.[25] The plan's study area includes the San Pablo Avenue/Macdonald Avenue corridor.
- **San Pablo Avenue Complete Streets Study, Cities of Richmond and San Pablo**: The study identified and prioritized roadway modifications for multimodal access and safety on San Pablo Avenue between Hilltop Drive to the north and Rivers Street to the south. Proposed changes consisted of continuous bicycle lanes through intersections, enhanced crosswalks, new corner bulb-outs, and increased signage.[26] These proposed changes are located in the San Pablo Avenue/Macdonald Avenue corridor.
- **Livable Corridors Project, City of Richmond:** The Livable Corridors Project focused on three commercial corridors in the city, including Macdonald Avenue and San Pablo Avenue between the San Pablo/Richmond border. A draft memorandum (May 2012) recommended three alternatives be further evaluated: four lanes with median; four lanes with Class III bicycle lanes to include "green super sharrows;" and four lanes with Class II bicycle lanes. The draft memorandum acknowledged that the green super sharrows could present conflicts between bicyclists and buses. The draft memo also evaluated road diet alternatives on San Pablo Avenue but did not recommend them because of impacts to traffic and transit. The project also considered converting travel lanes on Macdonald Avenue west of Harbor Way into public space, wider sidewalks, and improved transit stops.[27]
- **San Pablo Avenue Specific Plan, City of San Pablo**: Adopted in 2011, this specific plan identified an informal transit hub next to Contra Costa College off of San Pablo Avenue, with multiple bus lines stopping between Rumrill Boulevard and El Portal Drive. The plan

[25] City of Richmond, South Richmond Transportation Connectivity Plan web page, www.ci.richmond.ca.us/srtcp
[26] Cities of San Pablo and Richmond, 2013, Final Report for the San Pablo Avenue Complete Streets Study, www.dot.ca.gov/hq/tpp/offices/ocp/dist4/fy11-12/SanPabloFinalReport.pdf
[27] City of Richmond, Livable Corridors Project web page, www.ci.richmond.ca.us/index.aspx?NID=2532

contained policies to work with AC Transit and WestCAT to establish one station of consolidated bus stops and enhanced amenities.[28]

- **San Pablo Avenue Specific Plan and Complete Streets, City of El Cerrito and Richmond**: The plan area of this Specific Plan for San Pablo Avenue includes parcels in both El Cerrito and Richmond with the length of San Pablo Avenue from Baxter Creek Gateway Park near the intersection of San Pablo and Macdonald Avenues in the north to the City of El Cerrito's border with the City of Albany. The purpose of this plan was to articulate a vision for the future of San Pablo Avenue, identify improvements, and adopt context-sensitive regulations that could be applied along the length of the plan area and to adjacent areas. The Complete Streets element of the plan sought to create a well-connected, safe, and accessible multimodal transportation network that balanced the needs of all users and encouraged mode shift to increase pedestrians, cyclists, and transit users through a set of objectives, policies, and implementation measures. The El Cerrito City Council adopted the EIR for the San Pablo Avenue Specific Plan in September 2014.[29]
- **Three Corridors Specific Plan, City of Pinole:** The Three Corridors Specific Plan identified economic and revitalization opportunities within three commercial corridors in the City of Pinole that are designated as Priority Development Areas (PDAs): San Pablo Avenue, Pinole Valley Road, and Appian Way. To support these economic and revitalization opportunities, the Plan identified a set of policies to address persistent truck congestion, traffic calming, bicycle facilities, parking and transit issues.

3 CONCLUSION

Numerous studies have identified the need to relieve congestion in West Contra Costa County and have proposed strategies to provide this relief. While implementation for some projects are moving forward from a few of these studies, such as the Richmond ferry service and express bus service expansion, most of these studies have not resulted in major transit investments.

The prior studies reviewed in this technical memorandum considered a range of transportation modes for relieving congestion in West County, including additional bus, commuter, and rail service, consolidating existing bus service, BART extensions, and ferry service. But there is little consideration given for the integration of transit services and how these modal options can complement each other to improve transit ridership and maximize linkages throughout the county. The I-80 Corridor Study prepared by MTC is the only study that attempted to capture

[28] City of San Pablo, San Pablo Avenue Specific Plan web page, www.ci.san-pablo.ca.us/index.aspx?NID=1203
[29] City of El Cerrito, San Pablo Avenue Specific Plan web page, www.el-cerrito.org/index.aspx?nid=396

the full range of potential improvements to the corridor by including express bus, commuter rail, light rail, and two BART extensions in its analysis of 10 project alternatives.

Although this High-Capacity Transit study focuses on examining transit options, proposed express bus services cannot be successful without complementary infrastructure investments. Multiple studies have identified the efficiencies that can result from combining express bus service and I-80 HOV lanes and ramps to provide rapid transit and manage congestion cost-effectively. The Express Bus Study prepared by CCTA proposed HOV ramps to increase the reliability of travel times for buses, in addition to the expansion of parking facilities at park-and-ride lots to address the shortage of spaces created by their increasing popularity.

Further analysis might also explore how the cost of each transit option compares to each other and to the benefits each option is anticipated to provide. A BART extension, for example, was proposed in five studies. While an extension attracts high ridership, it may cost significantly more than express bus or commuter rail improvements. The cost of options will need to be weighed against the potential gains in riders. For example, since I-80 already has HOV lanes in place, there is significant potential for express bus or bus-only ROW on the freeway. However, if new on- and off-ramps are required, this could increase the cost of express bus services. These are important considerations for identifying the right investments.

Another area for consideration is how improvements can be phased in over time, starting with lower cost alternatives and building up transit ridership over time, to a point where the ridership benefits are more in line with the costs of a major investment.

Funding is a key gap in these studies. Funding costly capital investments in a constrained funding environment is challenging. While many of the proposed investments have the potential to make large impacts on the current congestion in the I-80 corridor, a clear funding plan needs to be in place to generate the momentum for implementation.

The High-Capacity Transit Study will build on these prior studies by developing a practical and feasible approach to address continued growth and congestion in the I-80 corridor cost-effectively and comprehensively and to build public consensus for a path forward.

4 NEXT STEPS

The existing transportation conditions in the study area are currently being compiled and an assessment of the land use and travel demand markets undertaken. This information combined with our understanding of the past studies that have been completed or are underway, will provide the basis upon which the development of alternative investment strategies will be initiated.