WCCTAC
West Contra Costa Transportation Advisory Committee

West Contra Costa High-Capacity Transit Study

FINAL TECHNICAL MEMORANDUM #12

Ridership Estimates

April 2017

WSP | PARSONS BRINCKERHOFF

With
Kittelson Associates

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Acronyms and Abbreviations

AC Transit	Alameda-Contra Costa Transit District
BART	San Francisco Bay Area Rapid Transit District
BRT	bus rapid transit
CCTA	Contra Costa Transportation Authority
HCT	high-capacity transit
I-80	Interstate 80
MTC	Metropolitan Transportation Commission
RPTC	Richmond Parkway Transit Center
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 improve transit choices and plan for future growth, the West Contra Costa High-Capacity Transit (HCT) Study is evaluating options for major transit investments along I-80 corridor. The Study is focused on rapid and direct services that can attract new riders among the 250,000 residents and provide a viable and competitive alternative to driving. The ultimate goal of the Study is to identify, evaluate and refine projects to improve high-capacity transit in West County, expand alternatives to driving on congested streets and highways, and improve regional air quality and quality of life.

Central to the study purpose is providing WCCTAC with the analyses necessary to determine and advance the most promising HCT alternative(s). Eight initial alternatives for enhanced public transportation in West County were identified, including express bus, bus rapid transit (BRT), commuter rail, regional intermodal transit center (RITC) and BART options. These alternatives were structured to serve the key travel markets in West County and underwent an initial evaluation using screening criteria developed from the Study goals and objectives. The WCCTAC Board advanced five of the eight conceptual alternatives for further study based on feedback from the Study Management Group (SMG), WCCTAC Technical Advisory Committee (TAC), and community feedback.

This Technical Memorandum #12 presents travel forecasts and transit ridership forecasts for the five alternatives advanced for further study in the West Contra Costa High-Capacity Transit Study. The transit improvements were evaluated as part of five packages that were crafted to determine how the proposed improvements performed as part of an overall enhanced transit network in West County. The assumptions for the five packages are summarized below.

2020 Packages

- Package A: Express Bus + San Pablo Bus Rapid Transit (BRT)/ Macdonald BRT
- Package B: Express Bus + 23rd Street BRT

2040 Packages

- Package C: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC) + BART Rumrill Boulevard alignment
- Package D: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC) + BART Richmond Parkway alignment
- Package E: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC)

Methodology

Travel forecasts were prepared for the 2020 and 2040 study years using the Contra Costa County regional travel model developed by The Contra Costa Transportation Agency (CCTA). The travel model includes estimates of travel between origins and destinations throughout the nine-county Bay Area, for all trip purposes and travel modes.

The demographic forecasts and transportation improvement assumptions are consistent with the Metropolitan Transportation Commission (MTC) Plan Bay Area regional transportation plan. Transit ridership is summarized for weekday daily conditions in all tables.

2020 Forecasts

Table E-1 provides a summary of the total daily West County transit ridership in 2020 for all packages. Each of the two medium-range improvement packages would increase 2020 daily transit ridership compared to the No Build scenario.

Package A, which includes the San Pablo/Macdonald Avenue BRT, would increase 2020 total daily West County transit ridership by about 12 percent compared to the 2020 No Build scenario (from 45,160 to 50,530 total daily boardings). The San Pablo/Macdonald BRT is projected to carry about 8,660 daily West County passengers.

The ridership increases associated with Package B (23rd Street BRT) would be about 11 percent compared to the 2020 No Build scenario (from 45,160 to 50,050 total daily boardings), with the 23rd Street BRT carrying about 4,100 daily passengers.

Table E-1: 2020 West Contra Costa County Weekday Total Daily Transit Boardings

Service	2014/2015 Observed	2020 No Build	2020 Package A	2020 Package B
BART	17,640	21,100	21,980	20,880
AC Transbay	2,160	2,440	3,160	3,590
AC BRT	-	-	8,660	4,700
AC Local	14,080	15,940	9,190	13,230
WestCAT	5,000	5,680	6,420	6,420
Express Buses	-	-	1,120	1,230
Total	38,880	45,160	50,530	50,050

Source: Kittelson and Associates, 2017

Source: BART, 2015 observed data, www.bart.gov/about/reports/ridership

Source: AC Transit observed data, 2014 Annual Route Performance Report

Source: WestCAT observed data, Email Communication from Charles Anderson, GM, WestCAT, May 2015, & WestCAT website www.westcat.org/schedules/fixedroute.html#express

2040 Forecasts

Table E-2 provides a summary of the total daily West County transit ridership in 2040 for all packages.

Each of the three long-range improvement packages would significantly increase 2040 total daily transit ridership compared to the No Build scenario. Packages C and D with BART extensions would result in about a 28 percent increase in 2040 total daily West County transit ridership compared to No Build conditions. Package E with bus improvements and without a BART extension would result in a 17 percent increase in daily transit ridership.

With this unconstrained demand forecast, the BART extensions are projected to attract 6,000 to 6,400 new total daily BART passengers compared to the 2040 No Build scenario. The increases could be greater if potential constraints on station parking and system capacity are included in the No Build analysis, reducing the No Build ridership forecast.

The San Pablo BRT is projected to carry a total of 8,200 to 9,800 daily West County passengers, and the Macdonald BRT would carry about 3,000 daily passengers. Ridership on the 23rd Street BRT would be about 5,300 daily passengers.

Table E-2: 2040 West Contra Costa County Weekday Daily Total Daily Transit Ridership

Service	2014/2015 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E
BART	17,640	26,160	32,530	32,170	27,220
AC Transbay	2,160	3,010	3,380	3,770	3,780
AC BRT	-	-	18,150	16,800	16,500
AC Local	14,080	21,080	10,990	11,030	10,500
WestCAT	5,000	7,410	6,650	8,480	7,330
Express Buses	-	-	1,580	1,560	2,060
Commuter Rail RITC	-	--	430	430	440
Total	38,880	57,660	73,710	74,240	67,830

Source: KIttelson and Associates, 2017

Source: BART, 2015 observed data, www.bart.gov/about/reports/ridership

Source: AC Transit observed data, 2014 Annual Route Performance Report

Source: WestCAT observed data, Email Communication from Charles Anderson, GM, WestCAT, May 2015, & WestCAT website www.westcat.org/schedules/fixedroute.html#express

Note: Capital Corridor boardings at the RITC derived from the Hercules Intermodal Transit Center Study, prepared by DKS and HDR, February 10, 2010.

With the transit improvements, peak hour traffic volumes on highway segments are not projected to decrease compared to No Build conditions. This is due to demand exceeding capacity. Any decrease in traffic on the highways from the implementation of the alternatives would be replaced by drivers who otherwise would use city streets (as a result, it is expected that increased transit service and diversion back to the highways would result in improved traffic conditions on local city streets). However, the packages including BART extensions would provide systemwide benefits in the West County study area including a 6.5 percent reduction in peak period vehicle-hours and a two percent reduction in vehicle-miles of travel (VMT).

1 INTRODUCTION

1.1 Purpose of the Study

West Contra Costa County is a sub-region within the Bay Area set between the San Francisco Bay and the East Bay hills. The West Contra Costa Transportation Advisory Committee (WCCTAC) is responsible for transportation planning for the sub-region and is one of four regional transportation planning committees in Contra Costa County

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

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

Why do we need this study?

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

Since its inception in 1988, WCCTAC's policy goals have called for facilitating the use of transit, encouraging transit projects aimed at congestion relief, and participating in studies focused on transit capital investments. West County action plans since that time have included consideration and prioritization of transit improvements such as express bus expansion, ferry implementation, a BART extension, and other types of rail improvements. For example, the most recent 2014 Action Plan called for participation in a study of HCT options in the I-80 corridor.[1]

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.

1.2 Study Area

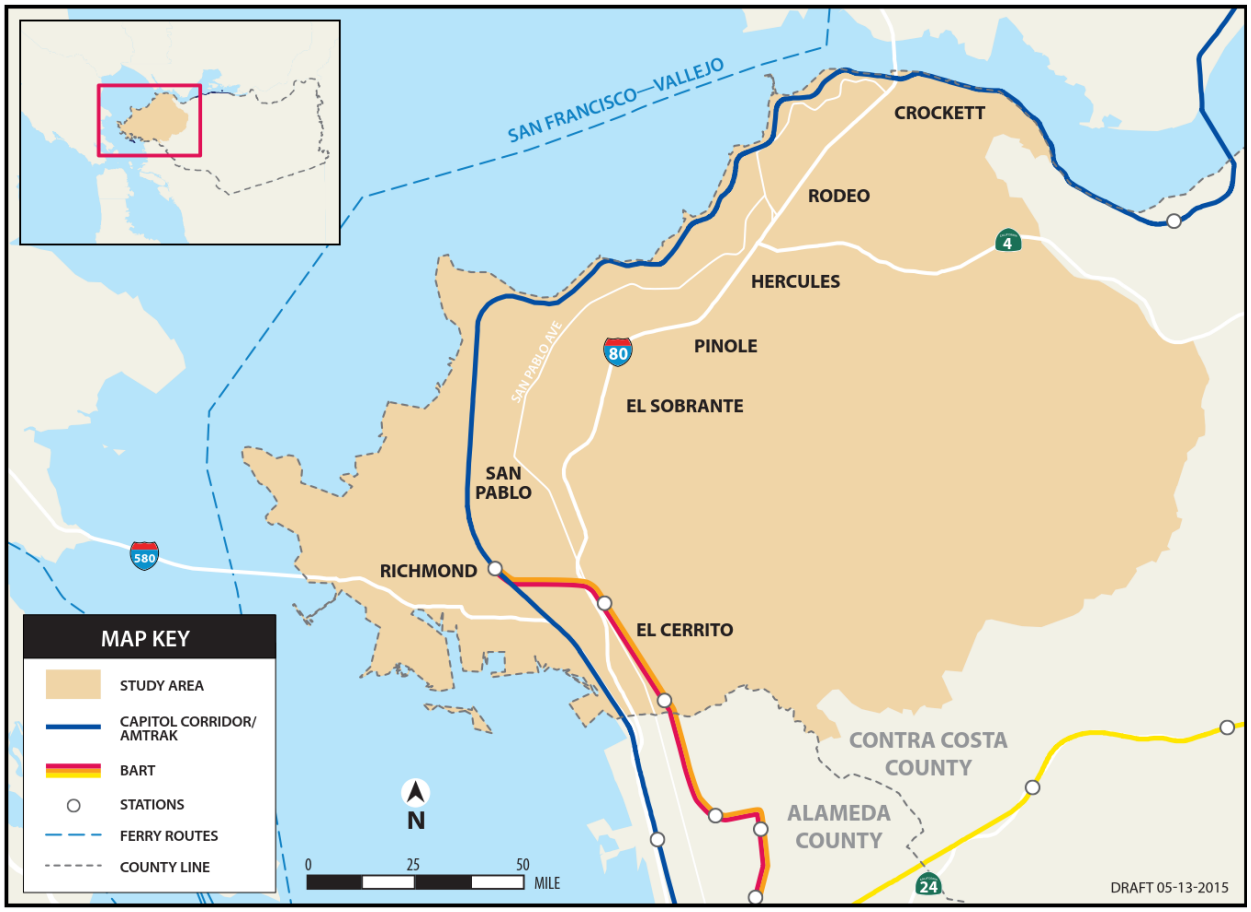
The study area encompasses West Contra Costa County (West County) from the southern boundary at the Alameda County line north to the Carquinez Bridge and Solano County line.

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

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.

Figure 1-1 displays a map of the core Study Area, which includes Interstate 80 (I-80), Interstate 580 (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

1.3 Purpose of this Technical Memorandum

Technical Memorandum #12, Ridership Estimates, provides projected weekday ridership on existing and proposed transit services for the 2020 and 2040 horizon years. It also provides forecasts of changes in auto traffic, and overall system performance measures for the West County sub-region.

The transit improvements were evaluated as part of five packages that were crafted to determine how the proposed improvements performed as part of an overall enhanced transit network in West County as well as individually. The assumptions for the five packages are summarized below.

2020 Packages

- Package A: Express Bus + San Pablo/Macdonald BRT
- Package B: Express Bus + 23rd Street BRT

2040 Packages

- Package C: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC) + BART Rumrill Blvd alignment
- Package D: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC) + BART Richmond Parkway alignment
- Package E: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC)

The memorandum includes a discussion of the ridership methodology (Section 2) and a description of the ridership estimates and travel characteristics for each of the future analysis years, 2020 (Section 3) and 2040 (Section 4).

2 RIDERSHIP METHODOLOGY

This section includes a brief description of the primary tool used for ridership estimates, the Contra Costa County Travel Model, as well as the background assumptions, and the adjustments applied to ensure a reasonable comparison between alternatives.

2.1 Travel Model

The primary tool used for the ridership estimates was the Contra Costa County Travel Model (Contra Costa model). The model is a standard trip-based regional travel forecast model developed and maintained by the Contra Costa Transportation Authority (CCTA).

The Contra Costa model was based on the regional BAYCAST travel model that was developed and operated by the Metropolitan Transportation Commission (MTC). The MTC model has since been updated to a newer system (Model One), but the Contra Costa model has been updated to use similar assumptions as MTC Model One to maintain some level of consistency.

2.1.1 Model Study Area

The Contra Costa model includes all of the nine Bay Area counties, similar to the MTC travel models. Within Contra Costa County, the Contra Costa model has a more detailed representation of land uses and the transportation network than the MTC model.

Travel to and from areas outside the nine-county Bay Area is represented as “gateway” vehicle trips. The growth in gateway vehicle trips is forecast based on historical growth rather than specific demographic assumptions. The model does not explicitly represent non-auto trips outside the Bay Area (such as Capitol Corridor trips to and from Sacramento).

2.1.2 Model Inputs

Inputs to the travel model include descriptions of demographic characteristics that define demand for transportation, and representations of the transportation network that represents supply. These input assumptions are described in Section 2.2 below.

In addition to the demographic and network inputs that vary by scenario, there are a set of factors that define travel behavior and choices. These factors are set during model calibration, and are based on survey data and observed travel behavior. The factors are then generally held constant for future forecasts.

2.1.3 Model Outputs

The outputs from the model include:

- Trip Tables – matrices of trips from each origin to each destination by trip purpose, travel mode and/or time period
- Vehicle Volumes – Maps or listings of the road network with projected traffic volumes on each segment, by time period
- Transit Volumes – Listings of volumes on individual transit routes, by segment, as well as estimated activity at each transit stop. All transit volumes represent weekday daily boardings.

From these basic results, additional performance measures can be calculated including percentages of trips using each travel mode (mode split), vehicle-miles of travel, vehicle-hours of travel and unconstrained parking demand at transit stations.

2.1.4 Model Process

The Contra Costa model follows a standard "four step" process used by many regional travel forecast models:

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

2.1.5 Adaptation of the Model for This Study

The Contra Costa County travel model contains all of the functionality required to evaluate the alternatives for the HCT study. However, the model was set up primarily for regional analysis and consistency with the MTC regional travel model. A significant amount of retrofitting was required to provide the correct responses to the HCT study alternatives. The updates and modifications included:

- Update the representation of the local and express bus routes in the West County area
- Update the current and future BART operating plans
- Update all schedule times based on current route information
- Recalibrate factors to represent perception of travel time on different types of transit service (this is an iterative process, as there is no direct measurement for perception of time)

- Update factors used to identify the radius of residences that each BART station and park-and-ride lot serves

The need for many of these modifications was not identified until the packages had been defined and the model was tested with the new transit services. The model did not initially correctly identify reasonable amounts of diversion to the new transit services. At that point, many of the assumptions that had been "hard-wired" for consistency with the prior versions of the MTC regional model had to be redone in order to provide reasonable estimates of the attractiveness of new transit service.

2.2 Forecast Assumptions

The key assumptions for the ridership estimates include demographic forecasts and transportation improvements.

2.2.1 Demographic Forecasts

The forecasts of population and employment are consistent with the projections from the Association of Bay Area Governments (ABAG) known as ABAG Projections 2013. These forecasts were used for the current adopted MTC Regional Transportation Plan (RTP) known as Plan Bay Area, published in 2013. Within Contra Costa County, the Plan Bay Area land use forecasts were further disaggregated based on information from local jurisdictions on zoning and planned development.

2.2.2 Transportation Improvements

The transportation improvements assumed for forecasts are consistent with those used for MTC Plan Bay Area.

2.3 Travel Model Adjustments

Several adjustments were applied to the travel model to provide more representative forecasts of travel patterns and transit ridership.

2.3.1 Origin-Destination Adjustments based on Big Data

The choices of travel destinations in the travel model are primarily based on measures of auto accessibility, rather than transit accessibility. As a result, the model could potentially underestimate the attractiveness of transit-friendly destinations.

As an early step in the modeling process, "big data" was used to validate the model assumptions on trip origins and destinations. The dataset was purchased from AirSage. AirSage compiles data using anonymous signals from mobile sources including cell phones and GPS

units, and provides estimates of weekday travel patterns between selected origins and destinations. The data is described in more detail in Technical Memorandum 7: Travel Markets.[2]

The adjustments were applied within the modeling process by factoring the model's estimates of destination choices to more closely resemble the patterns from the AirSage data. The factors were calculated for the model base year (2013), and then the same adjustment factors were applied to 2040. In other words, if the model was underestimating the percentage of work trips from Pinole to San Francisco by a factor of two in the base year, the model's standard estimates of future work trips between Pinole and San Francisco would be increased by a factor of two.

The AirSage adjustments were only applied to work trips, and only to trips to and from or through the West Contra Costa County study area.

2.3.2 Post-Model Adjustments

The travel model was calibrated to provide reasonable estimates of changes in travel behavior and trip volumes in response to changes in assumptions. However, the model does not represent every person's behavior and every choice precisely enough to replicate ridership on each individual transit route or traffic volumes on each individual road segment. Therefore, an adjustment process is applied to the model output to compensate for the model errors.

The adjustments are calculated by comparing the model's estimates of base year (2013) ridership or traffic to the observed base year count. A factor, calculated as base year observed/base year model estimate, is applied to the future forecasts. Where counts were available for individual transit lines, an adjustment factor was calculated for each line. For BART, factors were calculated for each station in West County. For WestCAT, factors were calculated for three service types. For example, if the observed ridership on a specific AC Transit line was 22 percent higher than the base year model estimate, a factor of 1.22 would be applied to the model's forecasts for that line.

For proposed service that did not exist in the base year, the adjustment factor was based on the total base year ridership for that service type (for example, AC Transit Transbay or WestCAT LYNX) and applied to the future forecasts.

2.3.3 Park and Ride Demand Methodology

The model results were used to estimate the demand for parking spaces at park-and-ride locations. These parking demand numbers are for transit passengers only. They do not include parking demand related to ridesharing.

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

For BART stations, the parking demand was estimated by multiplying total estimated boardings by the share of passengers arriving by auto and parking (as opposed to drop-off). The arrival percentages were derived from the 2008 BART Station Profile Study, and range from 37 percent at Richmond to 48 percent at El Cerrito del Norte.

For other park-and-ride locations such as transit centers, the parking demand was estimated based on the travel model estimates of drive-access transit passengers at each location. The number of boarding passengers was converted to vehicles using an average auto occupancy of 1.1, a typical value for commute trips. Since some passengers arrive later in the morning or leave earlier in the afternoon, the peak required spaces is not identical to the total arriving passengers over the 24 hour daily period. Prior surveys of BART stations indicate that the peak simultaneous parking demand is about 20 to 30 percent lower than the total 24 hour number of arriving vehicles.[3] Therefore, the estimate of arriving vehicles is divided by 1.2 to estimate the peak demand for parking spaces.

[3] Dowling Associates, "BART to Livermore Extension Program EIR Ridership Forecasts," July, 2009.

3 2020 TRAVEL FORECASTS

Travel forecasts and transit ridership estimates for the 2020 forecast year are provided for three scenarios:

- No Build
- Package A: Express Bus + San Pablo/Macdonald BRT
- Package B: Express Bus + 23rd Street BRT

The results are presented in terms of transit ridership, mode choice, and road system performance measures including volumes, speeds, vehicle-miles of travel (VMT) and vehicle-hours of travel (VHT).

3.1 Transit Ridership

All transit ridership is summarized for weekday daily conditions, and all results represent total boardings unless specified as net new boardings.

3.1.1 BART Boardings

Average weekday daily boardings for the three BART stations in West Contra Costa County are summarized in Table 3-1. The growth in the region with no transit improvements (No Build) would cause BART ridership to increase by 20 percent between 2015 and 2020. Package A, with the implementation of the Express Bus and San Pablo/Macdonald BRT projects, would result in a slight increase in BART ridership compared to No Build, most likely due to some increased accessibility to BART stations. Package B, with the implementation of the Express Bus and 23rd Street BRT projects, is estimated to result in a slight decrease in BART boardings. This is most likely because improved bus service would attract a small component of local BART passengers.

Table 3-1: 2020 BART Weekday Total Daily Boardings

Station	2015 Observed	2020 No Build	2020 Package A	2020 Package B
El Cerrito Plaza	4,810	5,890	6,670	5,710
El Cerrito del Norte	8,560	10,160	10,460	9,700
Richmond	4,270	5,050	4,850	5,470
Total	17,640	21,100	21,980	20,880

Source: KIttelson and Associates, 2017

Source: BART observed data, 2015, www.bart.gov/about/reports/ridership,

3.1.2 AC Transit Boardings

Average weekday total daily boardings for the AC Transit lines serving West Contra Costa County are summarized in Table 3-2. These values are for total daily boardings in West Contra Costa County only; several of the lines such as the existing 72 or proposed San Pablo BRT would have additional boardings in Alameda County.

Table 3-2: 2020 AC Transit Weekday Total Daily Boardings (West County)

Line	2014 Observed	2020 No Build	2020 Package A	2020 Package B
Transbay				
G	360	410	370	410
H	600	680	670	610
L	1,200	1,350	2,120	2,570
Total Transbay	2,160	2,440	3,160	3,590
BRT				
San Pablo BRT	-	-	6,320	-
Macdonald BRT	-	-	2,340	-
23rd Street BRT	-	-	-	4,700
Total BRT	-	-	8,660	4,700
Local				
7	730	820	640	810
25	840	980	860	960
70	1,190	1,330	1,410	1,810
71	1,750	1,880	1,690	1,620
72/72R	3,970	4,450	-	3,700
72M	1,620	1,940	-	1,780
74	1,370	1,660	1,590	-
76	2,610	2,880	3,000	2,550
Total Local	14,080	15,940	9,190	13,230
Total AC Transit	16,240	18,380	21,010	21,520

Note: Boardings in West Contra Costa County Only

Source: Kittelson and Associates, 2017

Source: AC Transit observed data, 2014 Annual Route Performance Report

Note: San Pablo BRT replaces 72 and 72R

Macdonald BRT replaces 72M

23rd Street BRT replaces 74

3.1.2.1 Transbay Service

Regional growth to 2020 with no transit improvements (No Build) would cause Transbay ridership to increase by 13 percent between 2014 and 2020. Both packages A and B would result in a significant increase in ridership on the L lines, as both packages include an improvement in headways from 20 to 10 minute frequencies. In total, Package A would result in

a 30 percent increase in Transbay ridership compared to No Build, while Package B would result in a 47 percent increase. This significant increase in use of the AC Transit Transbay service would most likely explain the slight decrease forecast in BART ridership with Package B.

3.1.2.2 Bus Rapid Transit (BRT)

Package A, with the implementation of the San Pablo/Macdonald BRT, would significantly increase ridership compared to the current Line 72/M/R services they would replace, resulting in a 36 percent increase in ridership on the corridors.

The 23rd Street BRT included in Package B would attract over 4,000 total daily riders.

3.1.2.3 AC Transit Local Service

Regional growth with no transit improvements (No Build) would cause total daily local ridership to increase by 13 percent between 2015 and 2020. While Package A would increase ridership overall compared to the no-build, there is a reduction in ridership on local lines, primarily due to the replacement of the 72/R/M with the San Pablo/Macdonald BRT. This occurs due to riders switching to the new BRT service with improved frequency and travel times. Similarly, Package B would reduce local daily ridership by a smaller amount, about 2,100 daily riders compared to the 2020 No Build, but there would still be a net increase in AC Transit ridership.

3.1.3 WestCAT Boardings

Average weekday total daily boardings for the Western Contra Costa Transit Authority service (WestCAT) are summarized in Table 3-3. The growth in the region with no transit improvements (No Build) would cause WestCAT ridership to increase by 14 percent between 2015 and 2020. Both Package A and Package B would include service frequency improvements on the Express and LYNX services, causing a 13 percent increase in daily ridership compared to the 2020 No Build scenario.

Table 3-3: 2020 WestCAT Weekday Total Daily Boardings

Service	2015 Observed	2020 No Build	2020 Package A	2020 Package B
Local & Regional	1,600	1,820	1,920	1,940
Express (J,JX,JPX)	2,400	2,640	3,130	3,130
LYNX	1,000	1,220	1,370	1,350
Total	5,000	5,680	6,420	6,420

Source: Kittelson and Associates, 2017

Source: WestCAT observed data, Email Communication from Charles Anderson, GM, WestCAT, May 2015, & WestCAT website www.westcat.org/schedules/fixedroute.html#express

3.1.4 Proposed Express Bus Boardings

Average weekday boardings for the three proposed express bus services to employment centers in Berkeley, Emeryville and Oakland are summarized in Table 3-4. These lines are projected to attract ridership similar to the daily ridership on several of the current AC Transit Transbay lines.

Table 3-4: 2020 Express Bus Total Daily Boardings

Line	2014 Observed	2020 No Build	2020 Package A	2020 Package B
Express Berkeley	-	-	430	470
Express Emeryville	-	-	190	150
Express Oakland	-	-	500	610
Total	-	-	1,120	1,230

Source: Kittelson and Associations, 2017

3.1.5 Total Transit Boardings

The total daily transit ridership for all services in West Contra Costa County is summarized in Table 3-5. The No Build growth in transit ridership would be 16 percent between 2015 and 2020, or about 3.3 percent per year. Package A would increase 2020 transit ridership by about 12 percent compared to No Build, due to service frequency improvements and high projected ridership on the San Pablo BRT corridor. Package B would result in an 11 percent increase in 2020 ridership compared to No Build conditions.

Table 3-5: 2020 West Contra Costa County Weekday Total Daily Transit Boardings

Service	2014/2015 Observed	2020 No Build	2020 Package A	2020 Package B
BART	17,640	21,100	21,980	20,880
AC Transbay	2,160	2,440	3,160	3,590
AC BRT	-	-	8,660	4,700
AC Local	14,080	15,940	9,190	13,230
WestCAT	5,000	5,680	6,420	6,420
Express Buses	-	-	1,120	1,230
Total	38,880	45,160	50,530	50,050

Source: Kittelson and Associates, 2017

Source: BART, 2015 observed data, www.bart.gov/about/reports/ridership

Source: AC Transit observed data, 2014 Annual Route Performance Report

Source: WestCAT observed data, Email Communication from Charles Anderson, GM, WestCAT, May 2015, & WestCAT website www.westcat.org/schedules/fixedroute.html#express

3.2 Park and Ride Demand

The potential demand for parking spaces at park-and-ride lots was estimated for each scenario (Table 3-6).

Table 3-6: 2020 Estimated Peak Parking Demand at Park-and-Ride Locations

Location	2015 Observed	2020 No Build	2020 Package A	2020 Package B
BART Stations				
El Cerrito Plaza	747	2,190	2,470	2,120
El Cerrito del Norte	2,159	4,810	4,950	4,590
Richmond	626	3,200	3,070	3,460
Transit Centers				
Hercules	n/a	110	200	290
Hercules Intermodal	n/a	-	10	10
Richmond Parkway	n/a	20	60	70

Source: Kittelson and Associates, 2017

Source: BART observed parking data, 2008 BART Station Profile Report

The peak parking demand shown for the BART stations is not identical to the number for on-site parking spaces. This demand includes all vehicles parking anywhere in the area to use BART, including on-site and off-site parking. Table 2-6 summarizes the current observed number of total on-site vehicles parked at each of the BART stations from the 2008 BART Station Profile Report. There is no information on how many off-site vehicles are parked nearby each BART station.

The demand shown for the Hercules Intermodal Transit Center is for bus service only, as ferry service is not projected to be available at this location by 2020, and rail service is on the cusp for 2020 as the timing will depend on the availability of funding for implementation.

3.3 Daily Mode Split

Improvements in transit service can induce shifts in the travel modes selected by travelers. The travel modes for work trips and all trips were summarized from the travel model (

Table 3-7).

Packages A and B would induce similar shifts in mode split from auto to transit. The transit share for all work trips in West County would increase by 0.4 percent compared to No Build (from 19.9% to 20.3%), and by 0.2 percent for all trip purposes. The mode shares for automobile trips would decrease by about 0.4 for work trips and by 0.2 percent for all trips. As is shown in Table 3-7, while the change in daily mode split percent may appear small among packages when compared to the no-build, but given there are millions of daily trips, even a 1% shift from auto to transit and other modes could equate to a noticeable benefit to the system in terms of reduction in congestion and travel times.

Table 3-7: 2020 West Contra Costa County Daily Person Trips by Mode

Location	2013 Estimated	2020 No Build	2020 Package A	2020 Package B
Work Trips				
Automobile	79.7%	79.0%	78.6%	78.6%
Transit	19.2%	19.9%	20.3%	20.3%
Bicycle	0.3%	0.3%	0.3%	0.3%
Walk	0.8%	0.9%	0.8%	0.8%
Total	100.0%	100.0%	100.0%	100.0%
All Trips				
Automobile	87.8%	87.5%	87.3%	87.3%
Transit	6.2%	6.7%	6.9%	6.9%
Bicycle	0.6%	0.5%	0.5%	0.5%
Walk	5.4%	5.3%	5.3%	5.3%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kittelson and Associates, 2017

Source: CCTA Travel Demand Model with Plan Bay Area Projections, 2014

3.4 Road System Performance Measures

The effects of the transit improvements on road system performance are measured in two ways:

- Traffic volumes on specific segments of highways
- Systemwide measures which include all roads and segments

3.4.1 Highway Volumes

The existing and projected volumes on selected highway segments are listed in

Table 3-8. Very few differences in peak traffic volumes are forecasted on the highways, even when the transit alternatives are diverting travel from automobile to transit. This is because the highways are already at capacity during peak hours and diverting traffic to local streets. When auto volumes are reduced, drivers who otherwise would use the local streets would find that the highway is now a faster route. As a result, the major highways fill back up to capacity, but there should be benefits on parallel roads. These benefits are best captured by systemwide measures as described in the next section.

Table 3-8: 2020 Peak Hour Traffic Volumes

Route	Segment	Direction	2010 Count	2020 No Build	2020 Package A	2020 Package B
AM Peak Hour						
I-80	Carquinez Bridge	EB	2,546	2,816	2,821	2,817
		WB	5,650	6,152	6,136	6,167
I-80	South of SR-4	EB	4,292	4,486	4,452	4,474
		WB	5,100	5,801	5,751	5,788
I-80	S. of Richmond Parkway	EB	4,503	4,882	4,870	4,884
		WB	6,617	6,710	6,715	6,721
I-80	Ala/CC County Line	EB	3,968	4,064	4,062	4,061
		WB	7,146	7,883	7,772	8,006
I-580	San Rafael Bridge	EB	2,071	2,623	2,617	2,627
		WB	3,098	3,353	3,356	3,354
I-580	Ala/CC County Line	EB	3,153	3,541	3,520	3,424
		WB	2,810	3,063	3,070	3,052
SR 123	Ala/CC County Line	NB	676	716	719	717
		SB	1,035	1,148	1,122	1,129
PM Peak Hour						
I-80	Carquinez Bridge	EB	4,679	5,055	5,061	5,068
		WB	4,148	4,404	4,405	4,406
I-80	South of SR-4	EB	4,521	5,046	5,026	5,023
		WB	3,038	3,432	3,438	3,452
I-80	S. of Richmond Parkway	EB	6,604	6,789	6,766	6,767
		WB	5,111	5,411	5,404	5,407
I-80	Ala/CC County Line	EB	6,070	6,573	6,582	6,538
		WB	4,538	4,768	4,773	4,764
I-580	San Rafael Bridge	EB	3,401	3,748	3,754	3,751
		WB	2,331	3,150	3,151	3,143
I-580	Ala/CC County Line	EB	2,765	2,958	2,957	2,951
		WB	3,392	3,723	3,714	3,685
SR 123	Ala/CC County Line	NB	1,408	1,500	1,453	1,484
		SB	983	1,167	1,164	1,159

Source: Kittelson and Associates, 2017 with the CCTA Travel Demand Model with Plan Bay Area Projections, 2014

3.4.2 Systemwide Performance Measures

Systemwide performance measures are calculated for all roads in West Contra Costa County based on the distances, traffic volumes, congested speeds and congested travel times for all segments in the travel model (

Table 3-9). The calculations cover the four hour AM peak period from 6:00 to 10:00 AM.

Table 3-9: 2020 AM Peak 4-Hour Road System Performance Measures

Measure	2013 Estimated	2020 No Build	2020 Package A	2020 Package B
Vehicle Miles of Travel (AM Peak 4-Hour Period)				
VMT	1,423,248	1,568,189	1,563,782	1,564,293
% Change from No Build	-	-	-0.28%	-0.25%
Vehicle-Hours of Travel (AM Peak 4-Hour Period)				
VHT	38,866	46,590	46,206	46,238
% Change from No Build	-	-	-0.82%	-0.76%

Source: Kittelson and Associates, 2017 with the CCTA Travel Demand Model with Plan Bay Area Projections, 2014

Compared to 2020 No Build conditions, Packages A and B would both reduce AM peak period vehicle-miles of travel by about one-quarter percent, and would provide close to a one percent decrease in vehicle-hours throughout West Contra Costa County. These measures cover travel in all directions throughout the study area; it is possible that the reductions in vehicle-hours would be more noticeable on the specific corridors where transit improvements are implemented.

4 2040 TRAVEL FORECASTS

Travel forecasts and transit ridership estimates for the 2040 forecast year are provided for four scenarios:

- No Build
- Package C: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC) + BART Rumrill Blvd alignment
- Package D: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC) + BART Richmond Parkway alignment
- Package E: Express Bus + San Pablo/Macdonald BRT + 23rd Street BRT + Regional Intermodal Transit Center (RITC)

The results are presented in terms of transit ridership, mode choice, and road system performance measures including volumes, speeds, vehicle-miles of travel (VMT) and vehicle-hours of travel (VHT).

4.1 Transit Ridership

4.1.1 BART Boardings

Average weekday total daily boardings for the three existing BART stations and proposed extension stations in West Contra Costa County are summarized in Table 4-1. Projected regional growth from 2015 to 2040 with no West County transit improvements (No Build) would cause BART ridership to increase by 48 percent between 2015 and 2040, about 1.9 percent per year (from 17,640 to 26,160 daily riders).

Table 4-1: 2040 BART Weekday Total Daily Ridership

Station	2015 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E
El Cerrito Plaza	4,810	7,130	8,060	8,170	8,050
El Cerrito del Norte	8,560	12,490	4,580	4,640	12,340
Richmond	4,270	6,540	5,380	6,780	6,830
Contra Costa College	-	-	4,540	-	-
Hilltop Mall	-	-	-	2,390	-
Richmond Parkway Transit Center	-	-	2,880	-	-
Appian Way	-	-	-	3,650	-
Hercules Transit Center	-	-	7,090	6,540	-
Total	17,640	26,160	32,530	32,170	27,220

Note: Ridership represents total riders. Net new riders are computed as the difference compared to the 2040 No Build.

Source: Kittelson and Associates, 2017

Source: BART, 2015 observed data, www.bart.gov/about/reports/ridership

Package C which includes a BART extension on the Rumrill Boulevard alignment would increase West County ridership by about 6,400 total daily passengers, or about a 24 percent increase compared to the 2040 No Build. The ridership demand at El Cerrito del Norte would significantly decrease, as the Hercules Transit Center would become the end of the line station capturing most of the park-and-ride passengers from the north (Solano County) and east (Martinez). The Contra Costa College station would also appear to divert some demand from the Richmond station. While the Hercules station will serve Solano County better, El Cerrito del Norte also decreases in volume because Hercules and the other intermediate stations are now accommodating West County riders who were previously going to El Cerrito del Norte. By spreading the West County riders are spread out among more stations, the overcrowding at El Cerrito del Norte is alleviated.

Package D with the Richmond Parkway alignment BART extension would have similar overall BART ridership as Package C, with similar effects on demand at El Cerrito del Norte. Compared to the Rumrill Boulevard alignment, not as many passengers would be diverted from the Richmond station, and the Appian Way station would attract more of the demand at the north end of the extension compared to the Richmond Parkway Transit Center station location.

4.1.1.1 Limitations of BART Forecast

It must be noted that these BART ridership forecasts reflect demand based on travel time and accessibility, but do not reflect the following constraints:

- Capacity of the BART system to add the extension service
- Parking capacity for auto access at each station
- Load capacity of the BART trains allowing passengers to board

The assumption is that BART can add additional capacity in terms of trains and cars to serve the extensions, therefore the forecasts did not limit ridership or account for any capacity limitations. This would require improvements to the core system in the future to accommodate the new riders.

It can often be assumed that parking areas and feeder bus services at new BART extensions can be designed to accommodate the projected demand. However, in the No Build scenario, there is no guarantee that stations such as El Cerrito del Norte and Richmond could actually accommodate the projected increases in passenger demand and therefore parking demand. An analysis that includes parking constraints could result in a lower forecast for the No Build scenario, and therefore a larger increment of additional passengers for the BART extension alternatives.

Load capacity can be a physical limitation for passengers on BART cars during peak times and in terms of station platform and escalator capacity particularly at downtown Oakland and San Francisco stations. Again, the assumption is that BART can expand load capacity to serve extensions, so these forecasts did not limit ridership for load capacity.

4.1.2 AC Transit Boardings

Average weekday total daily boardings for the AC Transit lines serving West Contra Costa County are summarized in Table 4-2. These values are for boardings in West Contra Costa County only; several of the lines such as the existing 72 or proposed San Pablo BRT would have additional boardings in Alameda County.

Table 4-2: 2040 AC Transit Weekday Total Daily Boardings (West County)

Line	2014 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E
Transbay					
G	360	540	490	500	490
H	600	820	800	780	800
L	1,200	1,650	2,090	2,490	2,490
Total Transbay	2,160	3,010	3,380	3,770	3,780
BRT					
San Pablo BRT	-	-	9,800	8,450	8,230
Macdonald BRT	-	-	3,010	3,010	3,020
23rd Street BRT	-	-	6,260	5,980	6,020
Total BRT	-	-	19,070	17,440	17,270
Local					
7	730	1,050	830	830	840
25	840	1,350	1,100	1,120	1,110
70	1,190	1,700	2,170	2,830	2,230
71	1,750	2,530	2,120	2,090	2,080
72/72R	3,970	5,660	-	-	-
72M	1,620	2,590	-	-	-
74	1,370	2,190	-	-	-
76	2,610	4,010	3,850	3,520	3,470
Total Local	14,080	21,080	10,070	10,390	9,730
Total AC Transit	16,240	24,090	32,520	31,600	30,780

Note: Boardings in West Contra Costa County Only

Source: Kittelson and Associates, 2017

Source: AC Transit observed data, 2014 Annual Route Performance Report

4.1.2.1 Transbay Service

Regional growth to 2040 with no transit improvements (No Build) would cause Transbay ridership to increase by 39 percent between 2014 and 2040 (from 2,160 to 3,010 riders), about a 42% increase or1.6 percent per year. Each of the transit improvement packages are expected to further increase Transbay ridership, including Packages C and D, which include BART extensions, primarily due to service frequency improvements on the L line assumed in all three packages. The increase in Transbay ridership from 2014 to 2040 No Build is primarily related to traffic congestion and local and regional land use growth, indicating that an express bus service increase to San Francisco would certainly increase ridership to SF. This is further demonstrated by the ridership improvements on the L line under all three packages achieved by a service frequency improvement, and even competing against BART extensions under Packages C and D.

4.1.2.2 Bus Rapid Transit (BRT)

In packages C, D and E, in 2040, the San Pablo Avenue BRT and Macdonald Avenue BRT would significantly increase total daily ridership compared to the current Line 72/M/R services they would replace, resulting in a 36 to 55 percent increase in ridership on the corridors.

The 23rd Street BRT would attract about 5,300 total daily riders with all three improvement packages in 2040. This route attracts a relatively high amount of riders primarily because there is no similar route today serving this transit corridor going to the Contra Costa College (CCC). The San Pablo Avenue BRT and Macdonald Avenue BRT do have overlapping routes for a short distance and both serve the CCC, however they have different origins and destinations, so the ridership to the college is not double counted.

4.1.2.3 AC Transit Local Service

Regional growth with no transit improvements (No Build) would cause local total daily ridership to increase by 50 percent between 2014 and 2040, about 1.9 percent per year. Each of the three packages would reduce ridership on local lines, primarily due to the replacement of the 72/R/M with the San Pablo/Macdonald BRT.

4.1.3 WestCAT Boardings

Average weekday total daily boardings for the Western Contra Costa Transit Authority (WestCAT) service are summarized in Table 4-3. Regional growth from 2015 to 2040 with no transit improvements (No Build) would cause WestCAT ridership to increase by 48 percent between 2015 and 2040, about 1.9 percent per year (from 5,000 to 7,410 total daily riders) .

Table 4-3: 2040 WestCAT Weekday Ridership

Service	2015 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E

Local & Regional	1,600	2,290	2,490	3,280	2,010
Express (J,JX,JPX)	2,400	3,420	2,480	3,610	3,360
LYNX	1,000	1,700	1,680	1,590	1,960
Total	5,000	7,410	6,650	8,480	7,330

Source: Kittelson and Associates, 2017

Source: WestCAT observed data, Email Communication from Charles Anderson, GM, WestCAT, May 2015, & WestCAT website www.westcat.org/schedules/fixedroute.html#express

Each of the 2040 packages would have a different impact on WestCAT ridership when compared to the 2040 No Build. Note, that the WestCat service in the model represents WestCAT's existing service. Package C with the Rumrill BART alignment would reduce demand for the WestCAT express bus services, resulting in a net decrease in system ridership on WestCAT as riders opt for other modes. Package D with the Richmond Parkway BART alignment is not projected to reduce demand on the WestCAT express services, and would result in increased demand on local routes. Package E with BRT improvements and a new express bus service and no BART extension would have WestCAT ridership very similar to the No Build scenario. The ridership achieved on the new express bus service in Package E would be independent of whether it is operated by WestCat or AC Transit.

4.1.4 Proposed Express Bus Boardings

Average weekday total daily boardings for the three proposed express bus services to employment centers in Berkeley, Emeryville and Oakland are summarized in Table 4-4. These lines are projected to attract more ridership in Package E as there would be no BART extension to draw away a portion of the potential passengers. The proposed express bus service in all packages would be provided by either WestCAT or AC Transit and the forecasted ridership is independent of which operator runs it.

Table 4-4: 2040 Express Bus Total Daily Boardings

Line	2015 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E
Express Berkeley	-	-	630	630	810
Express Emeryville	-	-	300	290	440
Express Oakland	-	-	650	640	810
Total	-	-	1,580	1,560	2,060

Source: Kittelson and Associates, 2017

4.1.5 Total Transit Boardings

The total 2040 daily transit ridership for all services in West Contra Costa County is summarized in

Table 4-5. The No Build growth in transit ridership would be 48 percent between 2015 and 2040, or about 1.9 percent per year (from 38,880 to 57,660 total daily riders).

Table 4-5: 2040 West Contra Costa County Weekday Daily Transit Ridership

Service	2014/2015 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E
BART	17,640	26,160	32,530	32,170	27,220
AC Transbay	2,160	3,010	3,380	3,770	3,780
AC BRT	-	-	18,150	16,800	16,500
AC Local	14,080	21,080	10,990	11,030	10,500
WestCAT	5,000	7,410	6,650	8,480	7,330
Express Buses	-	-	1,580	1,560	2,060
Commuter Rail - RITC	-	-	430	430	440
Total	38,880	57,660	73,710	74,240	67,830

Source: Kittelson and Associates, 2017

Source: BART, 2015 observed data, www.bart.gov/about/reports/ridership

Source: AC Transit observed data, 2014 Annual Route Performance Report

Source: WestCAT observed data, Email Communication from Charles Anderson, GM, WestCAT, May 2015, & WestCAT website www.westcat.org/schedules/fixedroute.html#express

Note: Capital Corridor and Amtrak boardings at the RITC derived from the Hercules Intermodal Transit Center Study, prepared by DKS and HDR, February 10, 2010.

Each of the three improvement packages would significantly increase 2040 transit ridership compared to the No Build scenario. Packages C and D with BART extensions would result in about a 28 percent increase in 2040 West County transit ridership compared to No Build conditions. Package E with bus improvements and without a BART extension would result in a 17 percent increase in transit ridership.

4.2 Park and Ride Demand

The potential demand for parking spaces at park-and-ride lots was estimated for each package (Table 4-6).

Table 4-6: 2040 Estimated Peak Parking Demand at Park-and-Ride Locations

Location	2015 Observed	2040 No Build	2040 Package C	2040 Package D	2040 Package E
BART Stations					
El Cerrito Plaza	747	2,650	2,990	3,030	2,980
El Cerrito del Norte	2,159	5,910	2,170	2,190	5,840
Richmond	626	4,140	3,410	4,290	4,320
Contra Costa College	n/a	n/a	1,950	-	-
Hilltop Mall	n/a	n/a	-	1,030	-
Richmond Parkway Transit Center	n/a	n/a	1,240	-	-
Appian Way	n/a	n/a	-	1,570	-
Hercules Transit Center	n/a	n/a	3,830	3,540	-
Transit Centers					
Hercules	n/a	160	220	220	290
Hercules Intermodal	n/a	-	10	10	10
Richmond Parkway	n/a	20	60	70	80

Macdonald Avenue	n/a	n/a	n/a	n/a	n/a

Source: Kittelson and Associates, 2017.

Source: BART observed parking data, 2008 BART Station Profile Report

The peak parking demand shown for the BART stations is not identical to the number of on-site parking spaces. This demand includes all vehicles parking anywhere in the area to use BART, including on-site and off-site parking. There are no available data on the current observed number of total on-site and off-site vehicles parked at each of the BART stations.

The demand shown for the Hercules Intermodal Transit Center is estimated for bus service only. The travel model does not directly represent the demand for new ferry service or interregional rail service. The parking demand for these services can be estimated separately based on the specific studies for those services.

4.3 Daily Mode Split

Improvements in transit service can induce shifts in the daily travel modes selected by travelers. The travel modes for work trips and all trips were summarized from the travel model (

Table 4-7). As is shown in Table 4-7, while the change in daily mode split percent may appear small among packages when compared to the No Build, but given there are millions of daily trips, even a 1% shift from auto to transit and other modes could equate to a noticeable benefit to the system in terms of reduction in congestion and travel times.

As expected, Packages C and D with the BART Extensions would induce the largest shifts in mode split from auto to transit. The transit share for all work trips in West County would increase by 1.1 percent compared to No Build for Package C (from 21.2% to 22.3%), and 1.0% for Package D (from 21.2% to 22.2%). The mode shares for automobile trips would decrease by about 1.1 percent for work trips and by 0.5 percent for all trips.

Package E would also cause shifts from auto to transit, but at slightly smaller levels.

Table 4-7: 2040 West Contra Costa County Daily Person Trips by Mode

Location	2013 Estimated	2040 No Build	2040 Package C	2040 Package D	2040 Package E
Work Trips					
Automobile	79.7%	77.7%	76.6%	76.7%	77.0%
Transit	19.2%	21.2%	22.3%	22.2%	21.9%
Bicycle	0.3%	0.3%	0.3%	0.3%	0.3%
Walk	0.8%	0.8%	0.8%	0.8%	0.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
All Trips					
Automobile	87.8%	87.0%	86.5%	86.5%	86.6%
Transit	6.2%	7.2%	7.8%	7.8%	7.6%
Bicycle	0.6%	0.5%	0.5%	0.5%	0.5%
Walk	5.4%	5.3%	5.2%	5.2%	5.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Kittelson and Associates, 2017

Source: CCTA Travel Demand Model with Plan Bay Area Projections, 2014

4.4 Road System Performance Measures

The effects of the transit improvements on road system performance are measured in two ways:

- Traffic volumes on specific segments of highways
- Systemwide measures which include all roads and segments

4.4.1 Highway Volumes

The existing and projected 2040 volumes on selected highway segments are listed in Table 4-8. As with the 2040 results, very few differences in peak traffic volumes are forecasted on the highways, even when the transit alternatives are diverting travel from automobile to transit. This is because the highways would already be at capacity during peak hours and diverting traffic to local streets. When auto volumes are reduced, drivers who otherwise would use the local streets would find that the highway is now a faster route. As a result, the major highways fill back up to capacity, but there should be benefits on parallel roads. These benefits are best captured by systemwide measures as described in the next section.

With Packages C and D that include BART extensions, the travel model is reporting increases in traffic across the Carquinez Bridge. These increases would appear to be related to increased park-and-ride traffic to and from the new end-of-line station at the Hercules Transit Center, which would be more convenient for commuters from Solano County. However, the model may also be overstating the net increase in traffic, as many of these park-and-ride trips should be replacing auto trips. The assumption is that the auto trips at the bridge should be approximately the same. But even if the auto traffic across the Carquinez is higher under the

Build packages, there is still a net system benefit because the assumption is these increased auto trips are traveling a much shorter distance on I-80 as park-and-ride trips to the new BART extensions rather than driving all the way to Oakland or San Francisco.

Table 4-8: 2040 Peak Hour Traffic Volumes

Route	Segment	Direction	2010 Count	2040 No Build	2040 Package C	2040 Package D	2040 Package E
AM Peak Hour							
I-80	Carquinez Bridge	EB	2,546	3,494	3,453	3,458	3,497
		WB	5,650	6,415	7,543	7,519	6,284
I-80	South of SR-4	EB	4,292	5,111	5,331	5,261	5,115
		WB	5,100	6,696	6,217	6,244	6,555
I-80	S. of Richmond Parkway	EB	4,503	5,325	5,290	5,264	5,271
		WB	6,617	7,090	7,146	7,126	7,426
I-80	Ala/CC County Line	EB	3,968	4,354	4,280	4,284	4,301
		WB	7,146	8,662	8,676	8,644	8,628
I-580	San Rafael Bridge	EB	2,071	2,833	2,818	2,824	2,860
		WB	3,098	4,106	4,109	4,113	4,083
I-580	Ala/CC County Line	EB	3,153	4,185	4,002	3,992	4,013
		WB	2,810	3,620	3,614	3,619	3,672
SR 123	Ala/CC County Line	NB	676	790	764	764	796
		SB	1,035	1,297	1,288	1,293	1,251
PM Peak Hour							
I-80	Carquinez Bridge	EB	4,679	5,149	6,156	6,168	5,072
		WB	4,148	4,841	4,771	4,775	4,825
I-80	South of SR-4	EB	4,521	5,682	5,217	5,254	5,590
		WB	3,038	4,375	4,520	4,428	4,369
I-80	S. of Richmond Parkway	EB	6,604	7,177	7,054	7,021	7,252
		WB	5,111	5,758	5,881	5,820	5,828
I-80	Ala/CC County Line	EB	6,070	7,388	7,288	7,321	7,258
		WB	4,538	5,254	5,221	5,211	5,270
I-580	San Rafael Bridge	EB	3,401	4,343	4,356	4,355	4,336
		WB	2,331	3,542	3,545	3,548	3,572
I-580	Ala/CC County Line	EB	2,765	3,288	3,278	3,279	3,326
		WB	3,392	4,290	4,178	4,228	4,181
SR 123	Ala/CC County Line	NB	1,408	1,585	1,614	1,574	1,574
		SB	983	1,386	1,310	1,301	1,340

Source:Kittelson and Associates, 2017

Source CCTA Travel Demand Model with Plan Bay Area Projections, 2014

4.4.2 Systemwide Performance Measures

Systemwide performance measures are calculated for all roads in West Contra Costa County based on the distances, traffic volumes, congested speeds and congested travel times for all

segments in the travel model (Table 4-9). The calculations cover the four hour AM peak period from 6:00 to 10:00 AM.

Table 4-9: 2040 AM Peak 4-Hour Road System Performance Measures

Measure	2013 Estimated	2040 No Build	2040 Package C	2040 Package D	2040 Package E
Vehicle Miles of Travel (AM Peak 4-Hour Period)					
VMT	1,423,248	1,805,550	1,764,849	1,763,446	1,794,324
% Change from No Build	-	-	-2.25%	-2.33%	-0.62%
Vehicle-Hours of Travel (AM Peak 4-Hour Period)					
VHT	38,866	60,096	56,126	56,219	60,791
% Change from No Build	-	-	-6.61%	-6.45%	1.16%

Source: Kittelson and Associates, 2017

Source: CCTA Travel Demand Model with Plan Bay Area Projections, 2014

Compared to 2040 No Build conditions, Packages C and D with the BART extension would reduce AM peak period vehicle-miles of travel by over two percent, and would provide approximately a 6.5 percent decrease in vehicle-hours throughout West Contra Costa County. This would be a noticeable improvement in travel time for most travelers in the study area (approximately a minute and a half savings on a typical 20 minute trip). These measures cover travel in all directions throughout the study area; it is possible that the reductions in vehicle-hours would be more noticeable on the specific corridors where transit improvements are implemented.

5 CONCLUSIONS

The ridership forecasting documented in this Technical Memorandum #12 provided a detailed high level assessment of various transit technology packages for improving mobility in the West Contra Costa County area. The packages combine a number of alternatives and technologies with the goal of maximizing transit ridership and alleviating traffic congestion. The results provided total riders and net new riders for each package that can be used to select a preferred set of transit options for future planning and funding purposes.

5.1 Next Steps

Next steps could include additional modeling with constrained parking at BART stations in West Contra Costa County. Other steps may include more detailed modeling of ferry and commuter rail modes that have currently relied on overlays from prior studies. Additional modeling could include a more detailed assessment of transfers at individual stops and transfer stations for more precise transit operations of individual routes. As the project proceeds towards CEQA/FTA compliance, more detailed ridership modeling could be done to assist in the selection of a preferred set of technologies.