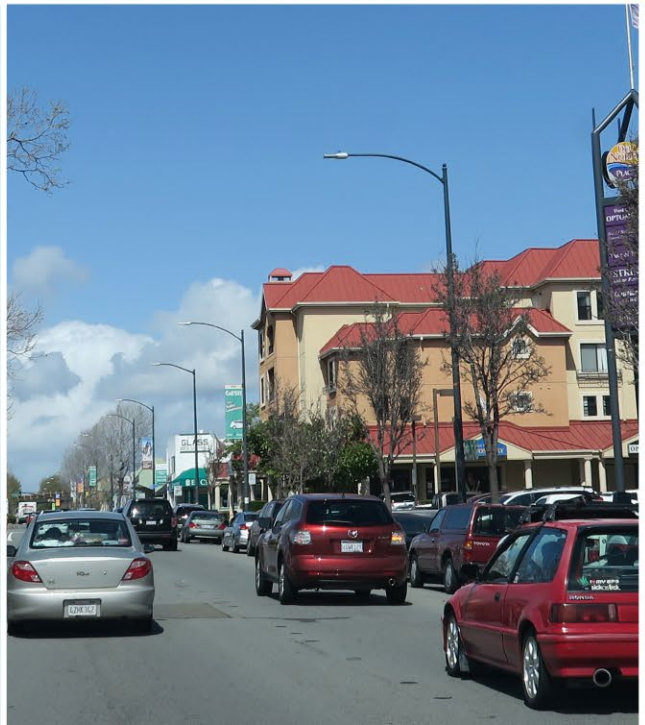
SAN PABLO AVENUE MULTIMODAL CORRIDOR STUDY PHASE 2

May 2022 TAC Meeting
Evaluation Summary

CONTRA COSTA transportation authority

WCCTAC

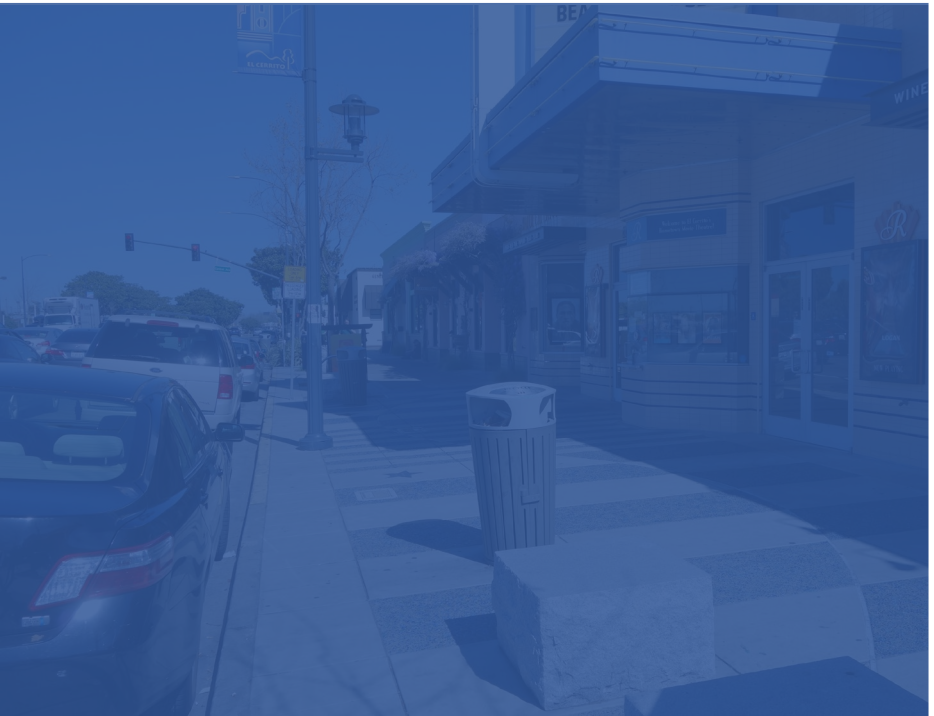
Kimley»Horn



Agenda

1. Phase 2 Purpose and Process
2. Corridor Conditions Today
3. Project Need
4. Potential Solutions
5. Simulation Analysis
6. Bicycle + Parking Options
7. Key Takeaways
8. Next Steps

Phase 2 Purpose & Process



Corridor Study Purpose

Improve multimodal mobility, efficiency, and safety to sustainably meet current and future transportation needs and help support strong growth along the corridor while still maintaining local contexts.

Goals

- Effectively and efficiently accommodate anticipated **growth**
- Improve **comfort and quality** of trips for all users
- Enhance **safety** for all travel modes
- Support **economic development** and adopted **land use policies**
- Promote **equitable** transportation and design solutions

Phase 2 Project Process

Process:

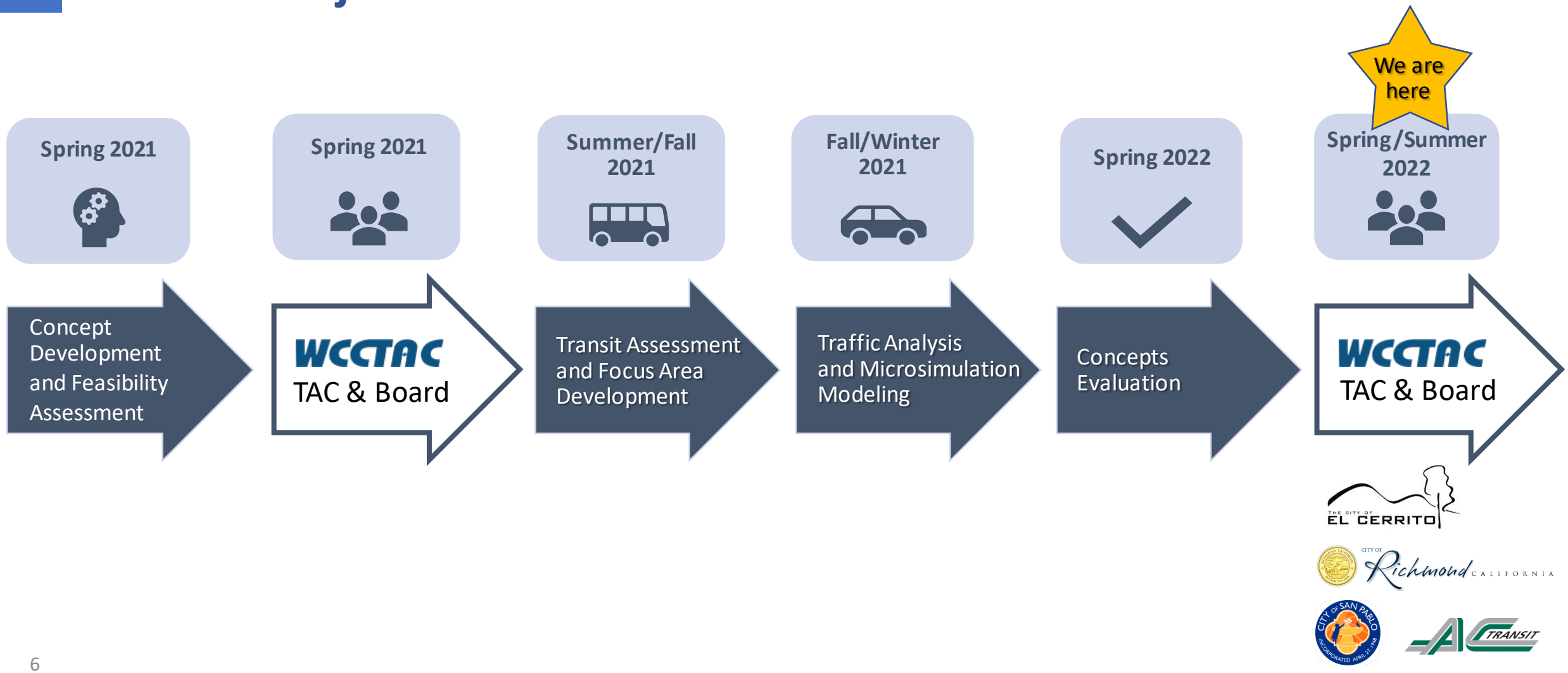
- Identify concept alternatives for specific locations
- Assess feasibility and implications on connectivity
- Quantitatively evaluate transit and auto performance
- Consider outreach feedback received in Phase 1
- Summarize evaluation findings

Desired Study Outcome:

Identify **viable alternatives** that can be advanced in **future project phases** and that can be **referenced** in ongoing and future projects on the corridor

Phase 2 - Agency Partners and Study Limits

Phase 2 Project Process



Corridor Conditions Today

Conditions on the corridor today

- Overlapping Local and Rapid Bus service provides bus service every 7 minutes south of Macdonald
- Bike lanes only in some segments in the City of San Pablo and newly constructed in El Cerrito (approx. 20% of corridor)
- Long gaps between pedestrian crossings and many uncontrolled crossings (e.g., multiple 0.4 mile gaps in protected crossings in El Cerrito)
- Sidewalks are continuous, but narrow and not well buffered from traffic in some locations
- Corridor curb-to-curb width varies significantly

Parking on the corridor today

- On-street parking on both sides of San Pablo Avenue on most blocks
- Many commercial properties have off-street parking
- Pre-pandemic parking occupancy was low (<60% on most blocks)
  - Area around El Cerrito Plaza BART Station had highest utilization

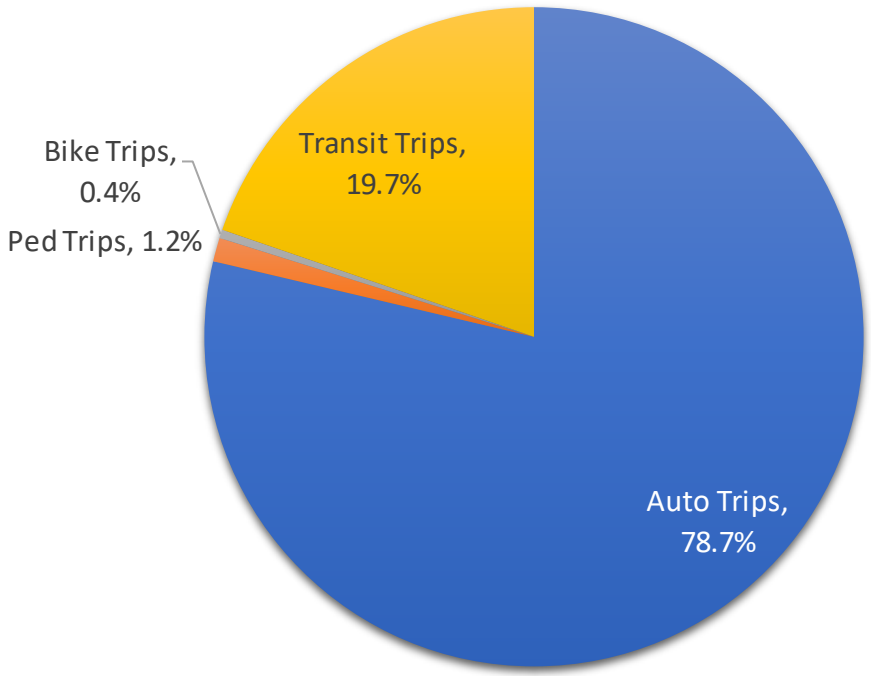
Existing Parking Locations

Trip-making on the corridor today

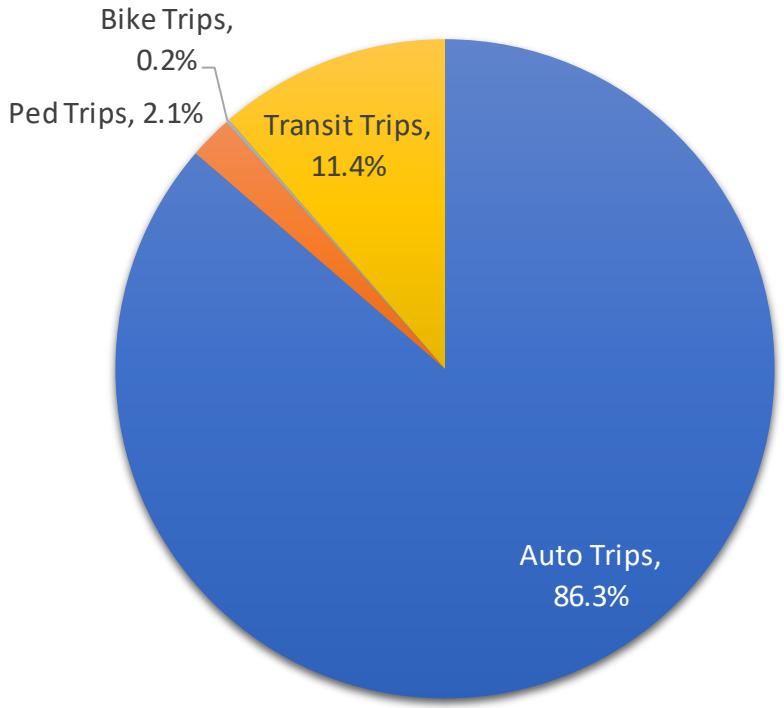
- Used as an alternative to I-80 for longer-distance trips
  - 1/3 of auto trips are just passing through
  - Most frequent pass-through area: El Cerrito-Richmond border to Road 20
- Data indicates potential for auto to bus mode shift
- 1,200 to 1,500 cars per direction in peak hour in most segments
  - Somewhat higher than in Alameda County (which peaks at around 1,300)

Mode split on the corridor today

North of Cutting Blvd



South of Church Lane

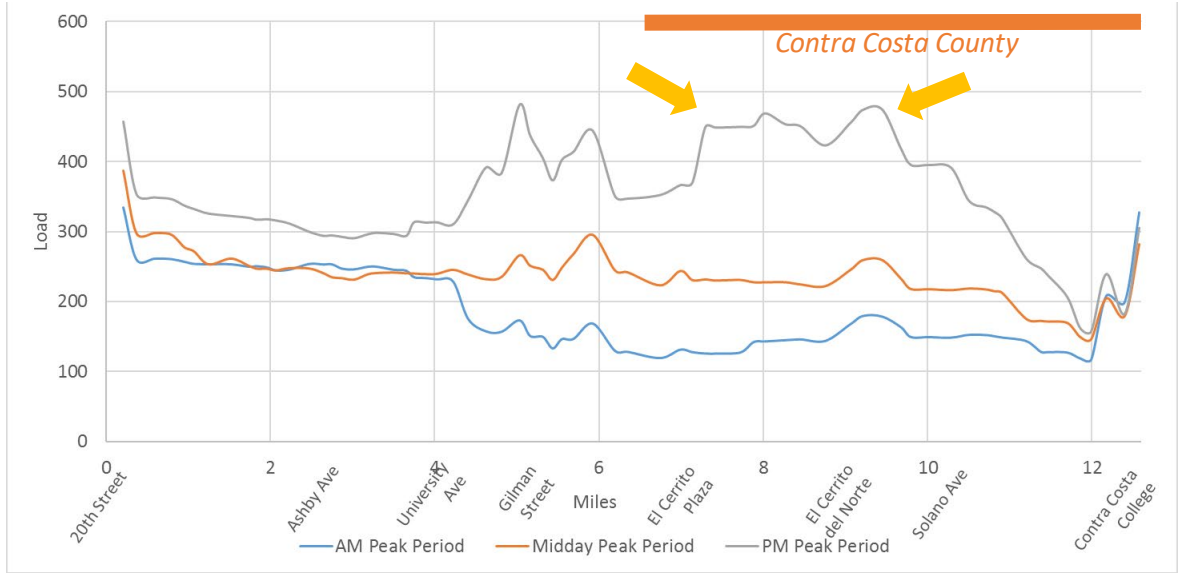


Note: Transit trips include trips on 72 series routes only
Represents pre-Covid conditions

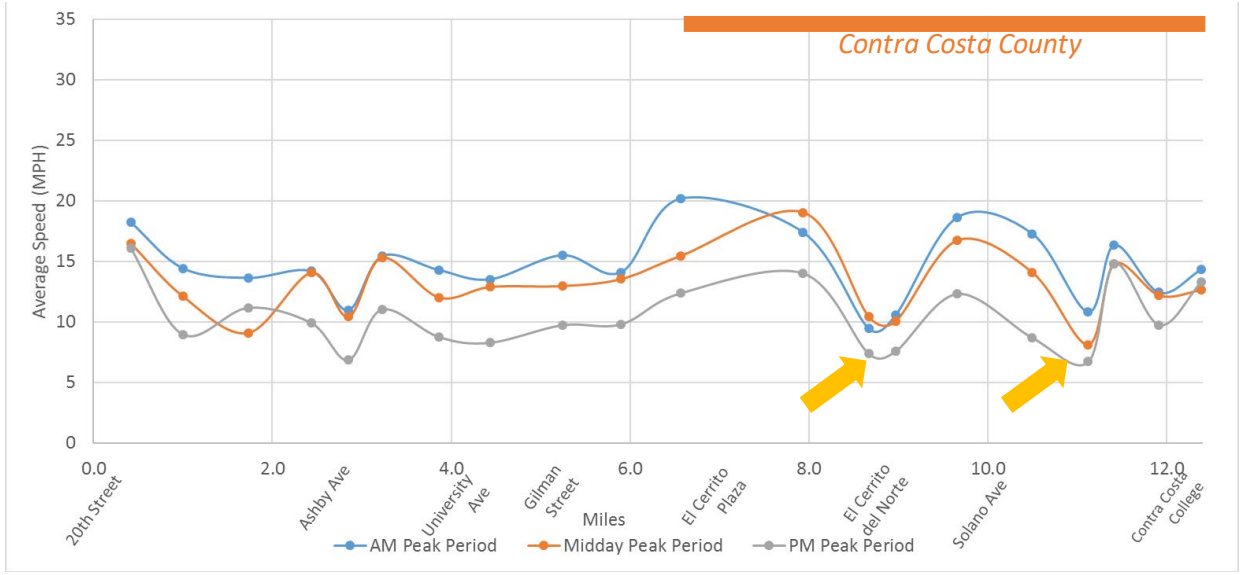
Source: Kimley-Horn and Associates, Inc.

Where transit improvements are most needed

Northbound Total Average Load by Weekday Peak Period



Northbound Average Weekday Travel Speed – Line 72R

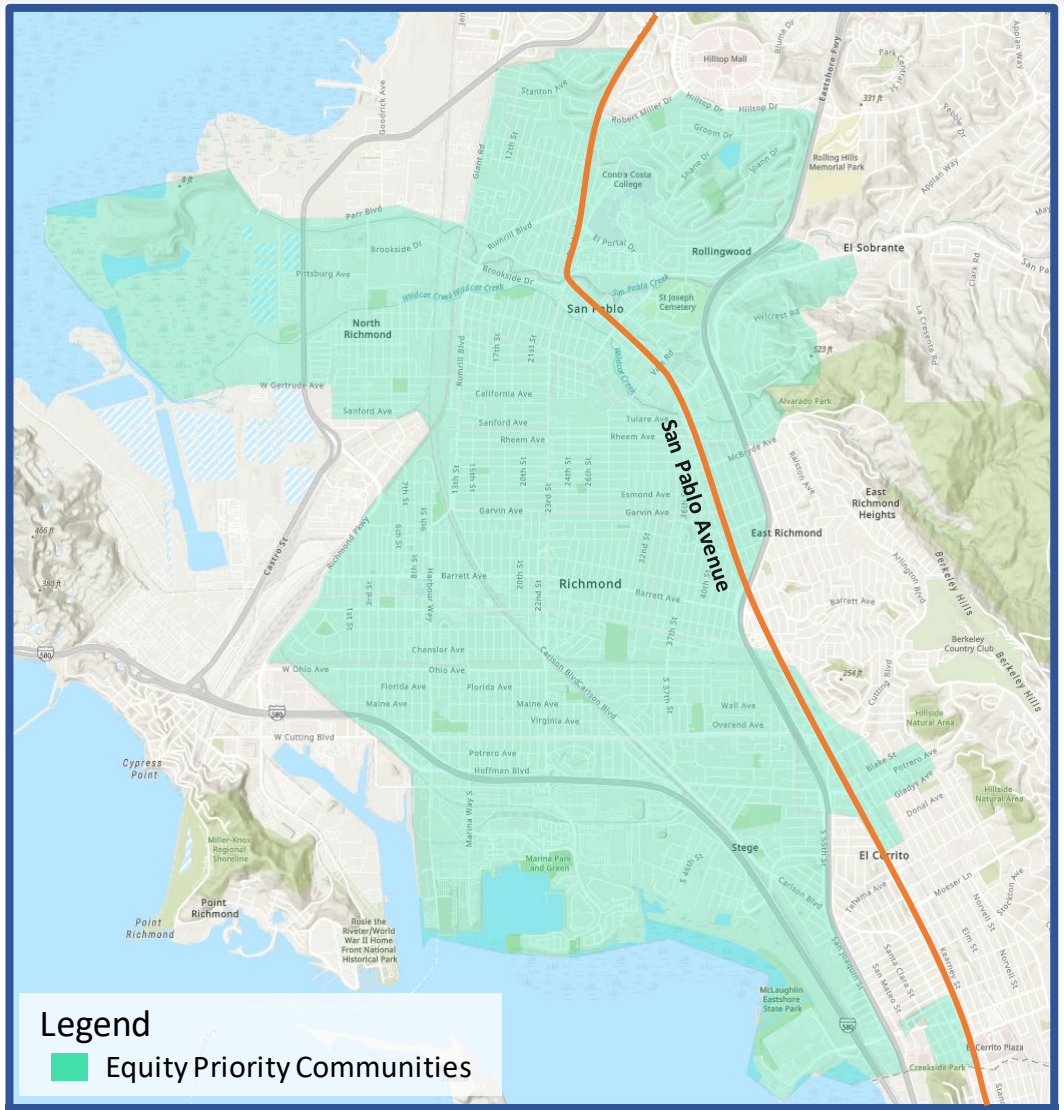


Sources: AC Transit (2017), Kimley-Horn and Associates, Inc.

Project Need

What will happen to mobility if no changes to San Pablo Avenue are made?

- 69% increase in PM traffic delay by 2035
- 12 minutes of additional Route 72R travel time
- Continued safety issues
  - 293 injuries or fatalities in recent 5-year period
  - 73 involving pedestrians or cyclists, including 3 deaths
- Walking and biking will remain difficult
  - Discontinuous bicycle facilities
  - Challenges crossing San Pablo Avenue and side-streets
- Equity Priority Communities will be most impacted
  - 93% of study area within ¼ mile of an equity priority community
  - More difficult/time-consuming to access jobs and recreation

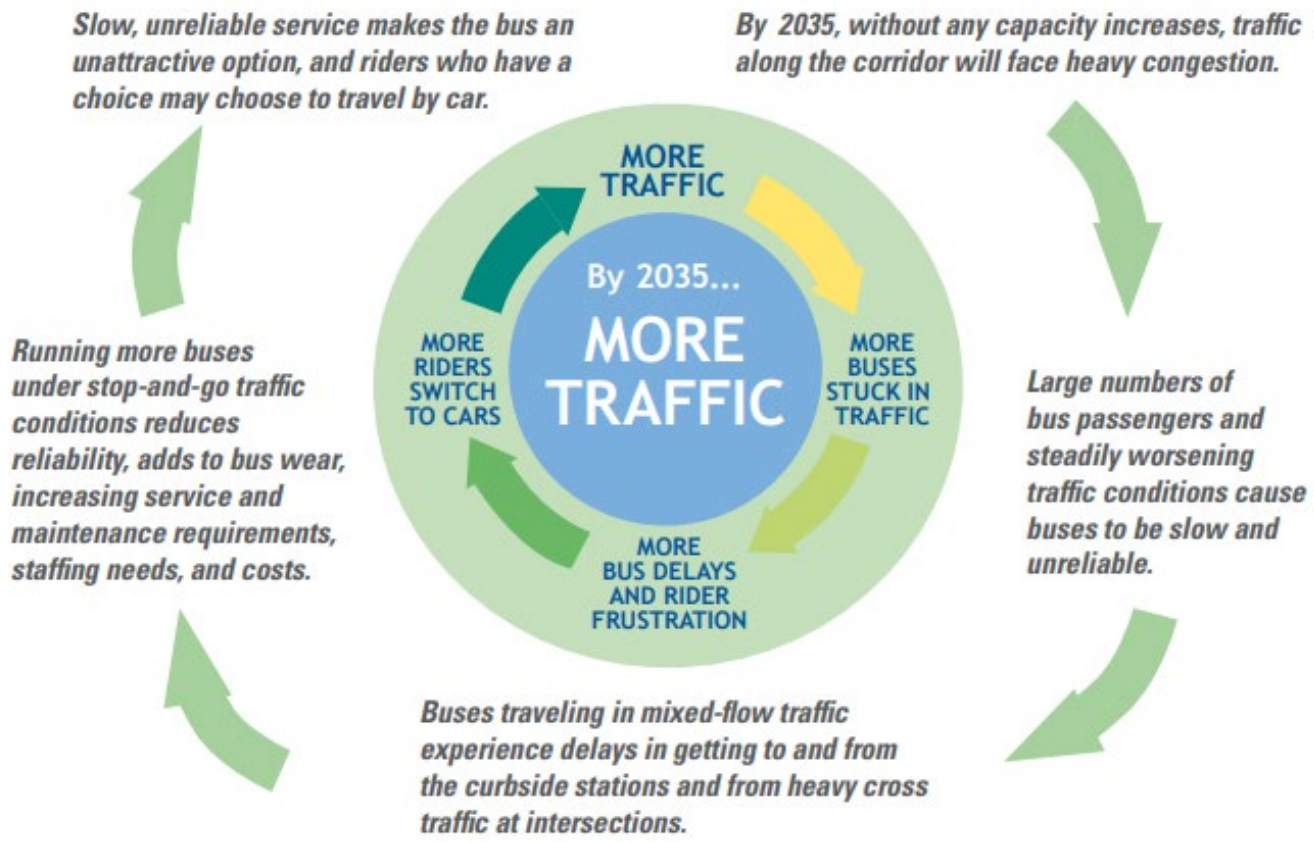


Source: Equity Priority Communities for Plan Bay Area 2050

Source: Kimley-Horn and Associates, Inc.

Effects of unabated congestion increases

- Increase in cut-through traffic on neighborhood streets
- Impacts to accessing commercial businesses
- May curtail desirability of economic development
- Longer transit travel times, increasing transit operating cost

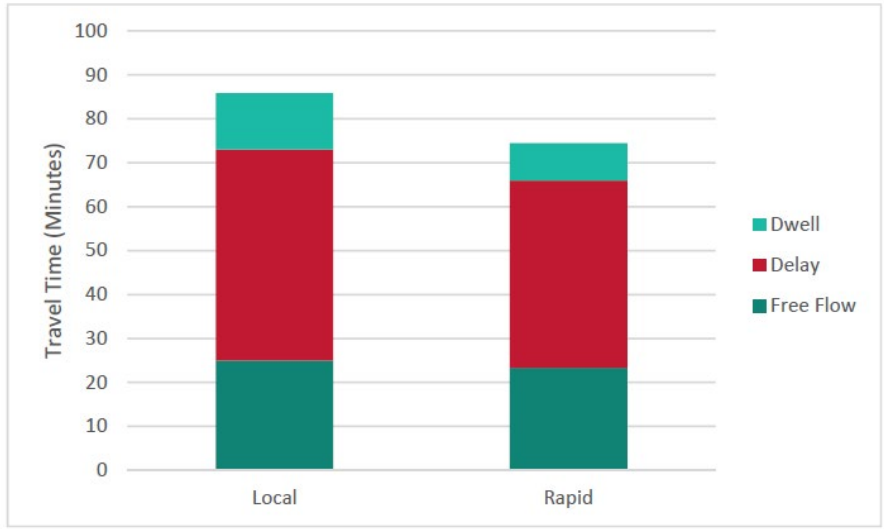


Source: AC Transit, East Bay Bus Rapid Transit

Why should improving transit be a priority?

- Well-utilized today
  - 12,500 daily bus riders (approx. half in Contra Costa County)
  - More riders on 72-series routes than any other AC Transit route (14% of the entire system ridership)
- During peak period, Rapid buses spend 57% of travel time stuck in congestion
- Bus speeds are about 30% slower than auto speeds and speeds for both have consistently been degrading
- Improving transit in this corridor is an equitable solution
  - 77% of 72 series passengers are non-white
  - 61% of 72 series passengers make less than $50,000 per year

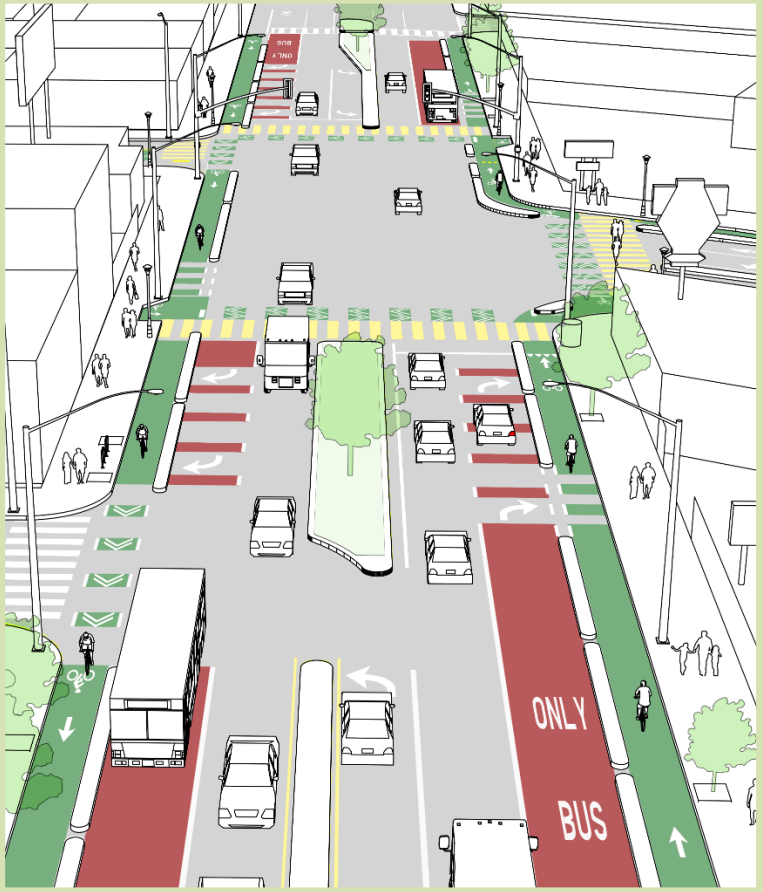
PM Peak Period Northbound Bus Travel Time



Sources: San Pablo Avenue Speed and Delay Study; AC Transit 2017-2018 on-board passenger survey; AC Transit Short Range Transit Plan, 2019-2029

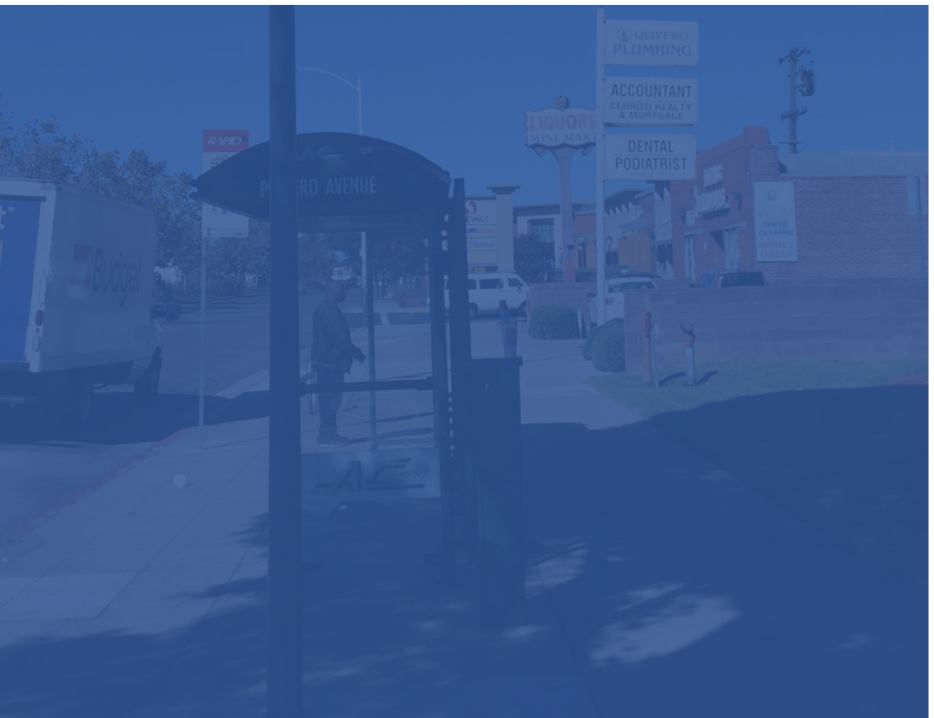
How does this relate to what's happening in Alameda County?

Near-Term Design Concept



- Safety Enhancements Throughout Corridor
  - Focused on pedestrian safety and accessibility and bicycle crossings
  - Bus bulbs provide additional space at bus stops and to allow in-lane stopping for transit
- Oakland, Emeryville, and South Berkeley Demonstration Project
  - Convert auto lane to bus lane
  - Convert parking lane to protected bike lane
    - Parking and loading moved to side streets in most locations
  - Protected intersections and other bicycle treatments
  - Evaluation phase after project implementation
- Continue planning efforts in Berkeley and Albany
  - In the meantime, provide bike improvements on parallel network

Potential Solutions



Constraints and Priorities

- Within the current right-of-way
- Maintain existing driveways
- Safety is a priority
- Maintain or enhance existing bike facilities where they exist today
- Can be implemented using reasonable funding sources, within governmental framework, and consistent with adopted design guidelines

What are the options to improve walking conditions?

- Widen sidewalks
- Provide landscape buffers
- Provide bulbouts to shorten crosswalks
- Install high-visibility crosswalks
- Upgrade curb ramps to meet ADA standards
- Install pedestrian lighting, particularly at crossings and bus stops
- Improve sidewalk conditions
- Add new crossings
- Improve safety of crossings with signalization (pedestrian hybrid beacons) and rapid rectangular flashing beacons

Pedestrian Lighting

Image Source: Google

Signalization

Image Source: Google

Widen sidewalks and provide landscape buffers

Image Source: NACTO

Shortened crosswalks

Image Source: Google

What are the options to improve biking conditions?

- New protected bicycle lanes (cycle tracks)
- Improved bicycle crossing markings
- New signalized bicycle crossings (pedestrian hybrid beacons or signals)
- Protected intersection treatments
- Transit islands to avoid bus-bike conflicts at bus stops

New signalized bicycle crossings

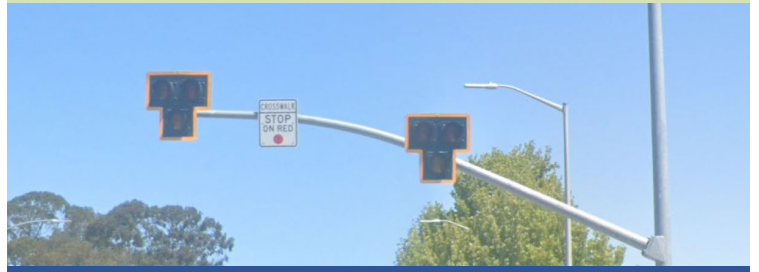


Image Source: Google

Protected intersection treatments

Image Source: Google

New & protected bike facilities and crossings

Image Source: CATSIP

What options are feasible for bicycle facilities?

Class II Bike Lane

Image Source: Google

Buffered Class II Bike Lane

Image Source: Google

Protected Class IV Cycle Track

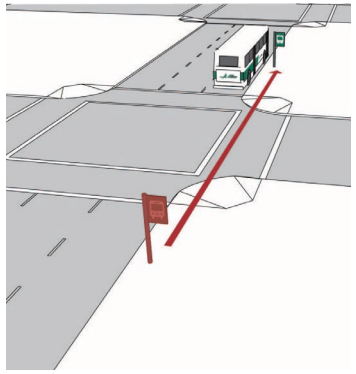
Image Source: NACTO

Shared Bus and Bike Lane

Image Source: NACTO

What are the options to improve transit?

Stop Relocation



Level Boarding

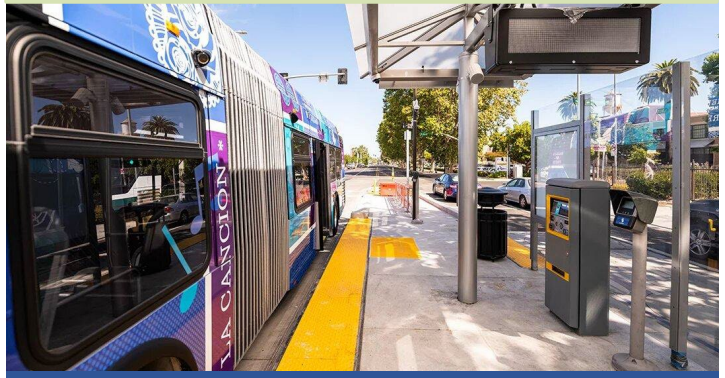
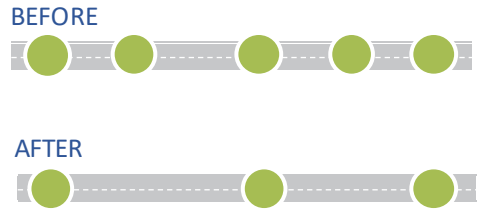
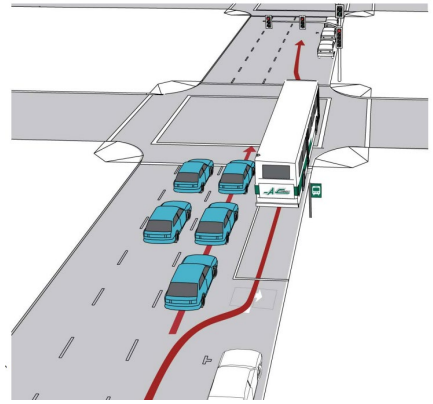


Image Source: AC Transit

Stop Consolidation



Queue Jumps



In-Lane Stops

Transit Signal Priority

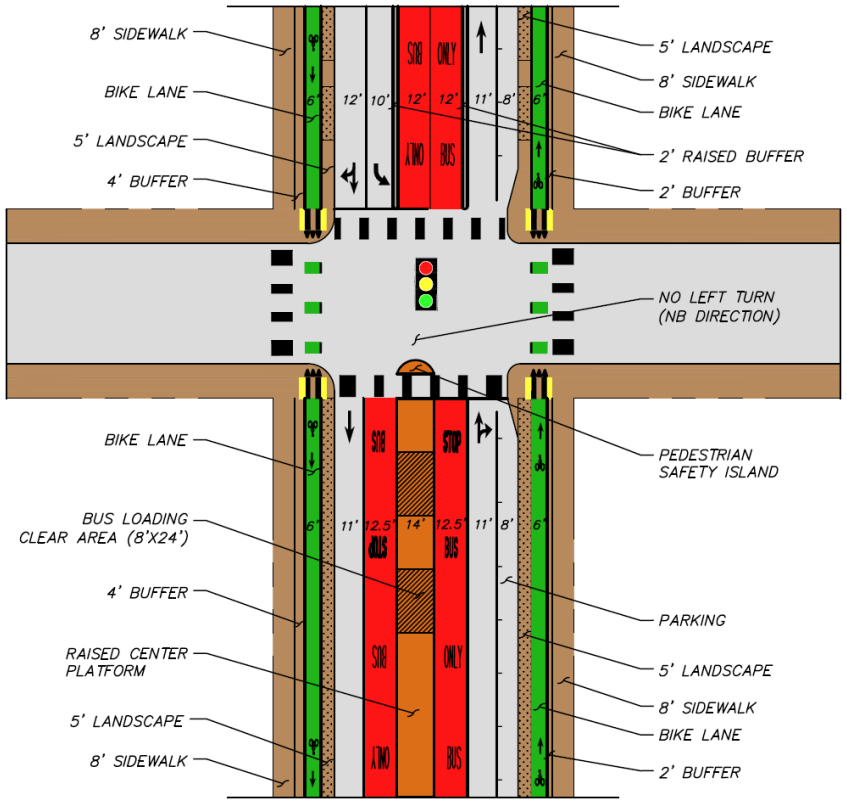
What are the options to improve transit? (continued)

Side-Running Bus Lanes

Center-Running Bus Lanes

Image Source: SFMTA

How could a center-running BRT be configured in this corridor?



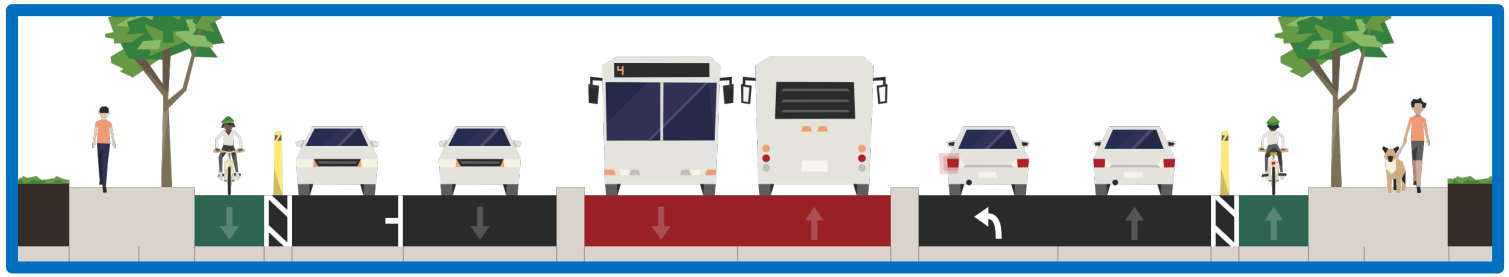


Image Source: Google

What benefits would a center-running BRT provide?

- Reduce transit travel time by 30%-45% in peak direction relative to No-Build
- Increased transit reliability by >60% in peak direction relative to No-Build
- Greatest benefits in northern segment due to greater amount of congestion (Richmond/San Pablo)
- Improved waiting areas for users
- Improved travel time reliability can allow for more frequent service for same cost

Image Source: AC Transit

Source: Kimley-Horn and Associates, Inc.

What are the challenges of BRT?

- Removal of one through lane reduces capacity for auto vehicles and may increase diversion
- Significant cost to rebuild street
- Street reconstruction temporarily affects access to businesses
- Stops are placed further apart in order to improve travel speed and reliability for users, which may result in a longer walk to transit

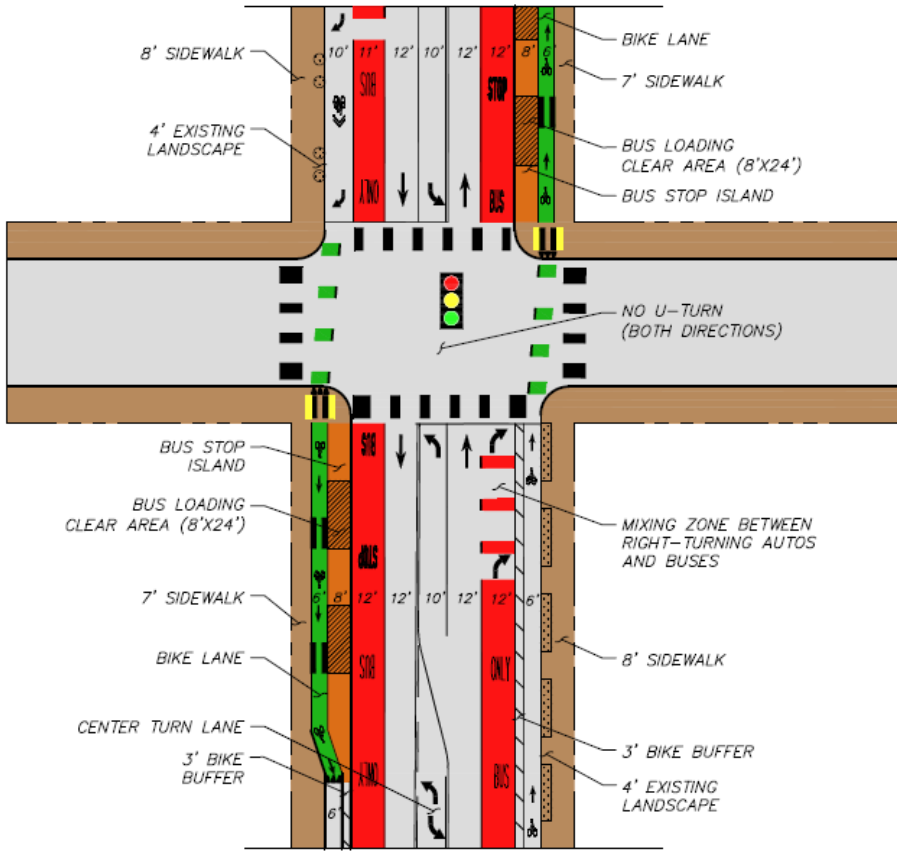
Challenges Specific to Center-Running BRT

- Community access is affected by elimination of left-turns at unsignalized intersections and at stations
- Eliminates existing medians, including street trees
- May be difficult to be used by non-BRT bus routes operating on corridor

How could some of the challenges specific to center-running BRT be addressed?

- Provide managed parking/auto lane in one direction during peak times (feasible in El Cerrito only)
  - Will require enforcement
- Add new traffic signals to reduce impact to community circulation
  - Secondary impact on travel time for buses and cars
- Locate stations set back from major streets to limit left-turn impacts
  - Could increase transfer distance for transit riders
- Explore alternative station configuration options to allow for use of corridor by non-BRT buses

How could a side-running BRT be configured in this corridor?



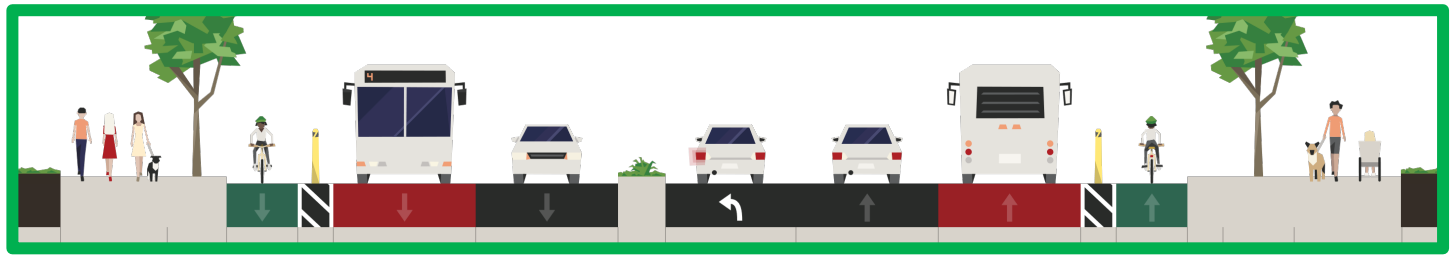


Image Source: Google

Image Source: Google

What additional challenges would a side-running BRT have relative to center-running?

- Introduces additional conflicts for bus with parking maneuvers, right-turn and driveway movements, and bike conflicts impacting travel time and reliability – travel time may be 10% slower and reliability impacted
- Stations may be more constrained due to sharing space with pedestrians or an adjacent bicycle facility (if provided)
- Does not allow for a time-managed auto/parking lane in El Cerrito

Image Source: Google

What additional benefits would a side-running BRT have relative to center-running?

- Allows for more flexibility in use of bus lane by non-BRT routes
- May be approximately 10% cheaper for the same type of improvements due to less median and signal impacts
- Likely a shorter construction duration, resulting in less business impact
- Easier to implement in phases or as a near-term "quick-build" due to less infrastructure required
- May preserve existing median street trees
- Provides additional flexibility in constrained right-of-way areas with shared bus/bike or bus/right-turn segments (would impact bus performance)
- Does not impact community access at unsignalized intersections or station locations

Can you mix and match transit lane configurations across segments/cities?

- Each occurrence where the bus has to move between side-running and center-running or passes through mixed-flow segments, a travel time penalty is incurred
- However, different configurations are acceptable
  - TEMPO BRT is a combination of side-running, center-running, and mixed-flow
- Recommend minimum 1- to 2- mile segments with continuous configuration
  - BART stations are logical transition points where the BRT would deviate into the station

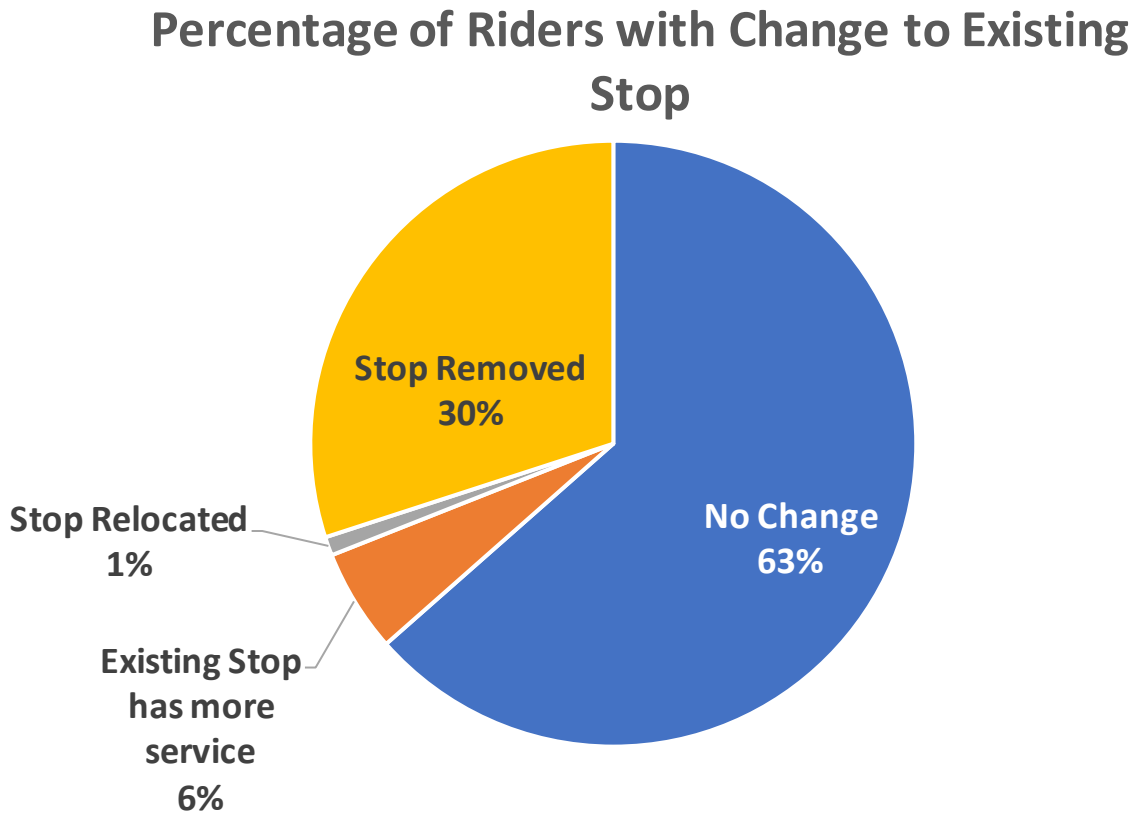
How would a BRT stop configuration affect transit access?

Stops consolidated from 1/6 mile to 1/2 mile spacing to 1/3 spacing to improve travel time and reliability for transit riders

- Average additional walking distance to nearest hybrid BRT stop - **95'-160'**

  weighted by ridership

Based on a preliminary assessment of BRT stop placement in Contra Costa County:



Source: Kimley-Horn and Associates, Inc.

What are the implications of converting a traffic lane to transit?

- Additional traffic congestion on San Pablo Avenue ➡ Some drivers will change their mode, route, or time of day with center-running and side-running BRT
- Center-running BRT: localized diversion due to left-turn restrictions
- Auto diversion in peak direction/peak hour estimated at 25%-30% for side-running and 30%-35% for center-running, including mode shift and peak spreading
  - If all diverted auto traffic went to I-80, would increase peak hour volumes on I-80 by about 4%
  - Local traffic may divert to local streets; however, local diversion routes will experience diversion even with no changes to San Pablo Avenue and may not support significant additional diversion
  - Opportunity for traffic calming on diversion streets

Source: Kimley-Horn and Associates, Inc.

What are the implications of converting a traffic lane to transit? (continued)

- After accounting for diversion:
  - End-to-end auto travel times on San Pablo Avenue expected to increase by up to 35% with side-running BRT and up to 45% with center-running BRT relative to No-Build
  - Additional delay with center-running BRT scenario associated with additional traffic signals and diversion from unsignalized intersections
  - Greatest auto delay increase with transit lanes is in northern segment (Richmond/San Pablo) in peak direction only
- With No-Build, including ongoing transit signal priority projects, transit is **7% slower** than auto in peak direction
  - With exclusive transit lanes, transit would be **35% to 50% faster** than auto

What are the implications of converting a traffic lane to transit? (continued)

- Used industry elasticities to estimate effect of travel time savings on ridership
  - Estimated 10%-12% ridership gain based on elasticities for travel time savings on transit alone
  - Represents an 8% mode shift from auto to transit on San Pablo Avenue
  - Other factors that would drive additional ridership growth include: more frequency, better stations and amenities, increased auto congestion
- 30%-35% increase in ridership typical with high-quality BRT
  - Travel demand model in project Phase 1 projected a 35%-45% ridership increase with BRT

Simulation Analysis

VISSIM Traffic Microsimulation Model Overview

Model Development

Two analysis segments

- Segment 1: Church to McBryde (1.1 mi)
  - 7 signalized intersections
  - 3 BRT side or center stations
- Segment 2: I-80 EB ramps to Cutting (1.1 mi)
  - 7 signalized intersections (includes Ohlone Greenway)
  - 2 BRT side or center stations

Measures of Effectiveness

- Transit travel time and variability
- Auto travel time
- Intersection delay and LOS
- Intersection queuing
- Network-wide metrics on delay and vehicles served

VISSIM Model Development Process

Existing Conditions = 2017
Calibrate model to 2017 conditions (volumes and travel times, transit schedules, infrastructure)

2017 volumes and travel times remain higher than 2022 conditions (see chart)

Future Year (2035) forecasts assume 15-20% growth over existing (2017) traffic volumes

Add roadway projects and TSP built/planned 2010-2035. No other transit changes are assumed.

Estimate initial diversion %s using 2017 O-D market assessment, v/c ratios on competing paths

Iterate through diversion scenarios based on congestion and queuing levels

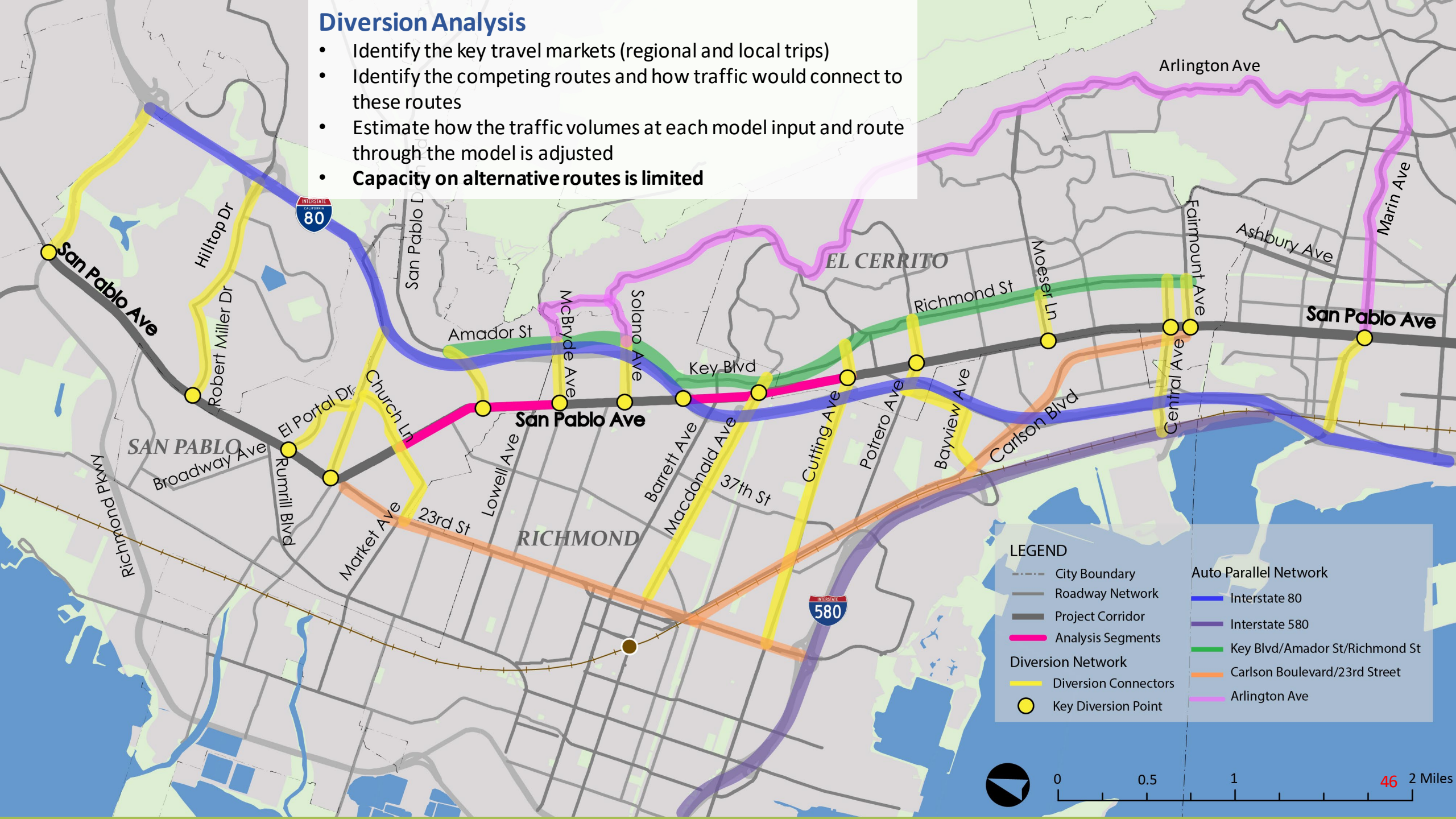
Side Running and Center Running BRT with **diversion**

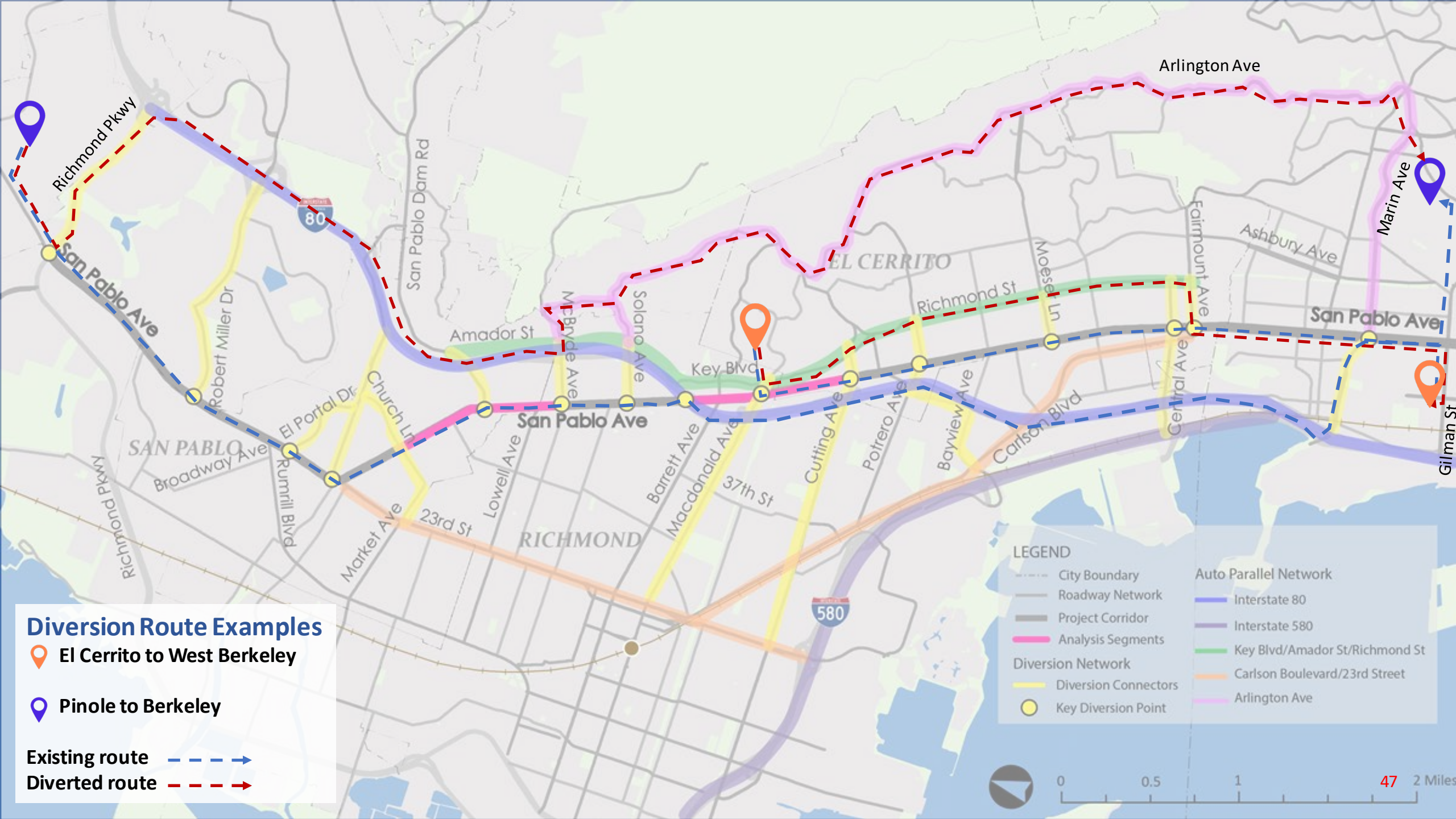
Diversion estimation process

1. Forecast future (2035) No-Build traffic growth and analyze traffic conditions
   - Traffic volumes increase by 15-20% (depending on direction/segment) from 2017 to 2035
   - In 2035, congestion and delays go to LOS E/F for most NB movements and some side street movements at key intersections
   - Throughput decreases and the network cannot "serve" all of the forecasted demand, which means queuing increases and some diversion will occur even without the project
2. Develop estimates of mode shift & diversion with the BRT project
   - Converting a mixed flow travel lane to a transit lane will do the following:
     - *Improve bus speeds, which will result in mode shift from auto to transit*
     - *Reduce auto capacity by approximately 40-50%, which will result in route diversion*
3. Adjust traffic volumes to account for **transit mode shift** and **route diversion**
4. By iterating through diversion scenarios, the simulation model tells us how much the corridor can "serve"

Diversion Analysis

- Identify the key travel markets (regional and local trips)
- Identify the competing routes and how traffic would connect to these routes
- Estimate how the traffic volumes at each model input and route through the model is adjusted
- **Capacity on alternative routes is limited**





Diversion Route Examples

El Cerrito to West Berkeley

Pinole to Berkeley

Existing route

Diverted route

Estimated reduction in peak hour auto volume on San Pablo Ave

Auto volumes divert to alternative routes, switch to another mode, or shift outside of the peak hour

	Direction	Side-Running	Center-Running
Segment 1 Church to McBryde	NB	28%	33%
	SB	16%	16%
Segment 2 I-80 Ramps to Cutting	NB	29%	34%
	SB	19%	19%

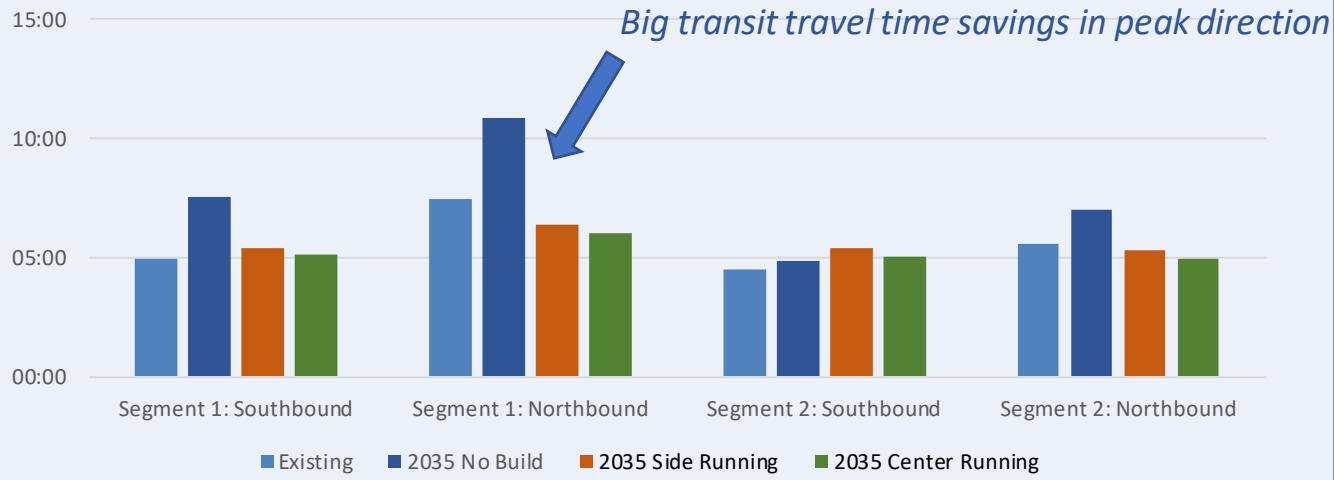
Model results shown are for the PM peak hour. Peak direction (northbound) highlighted in yellow

Source: Kimley-Horn and Associates, Inc.

Travel time findings

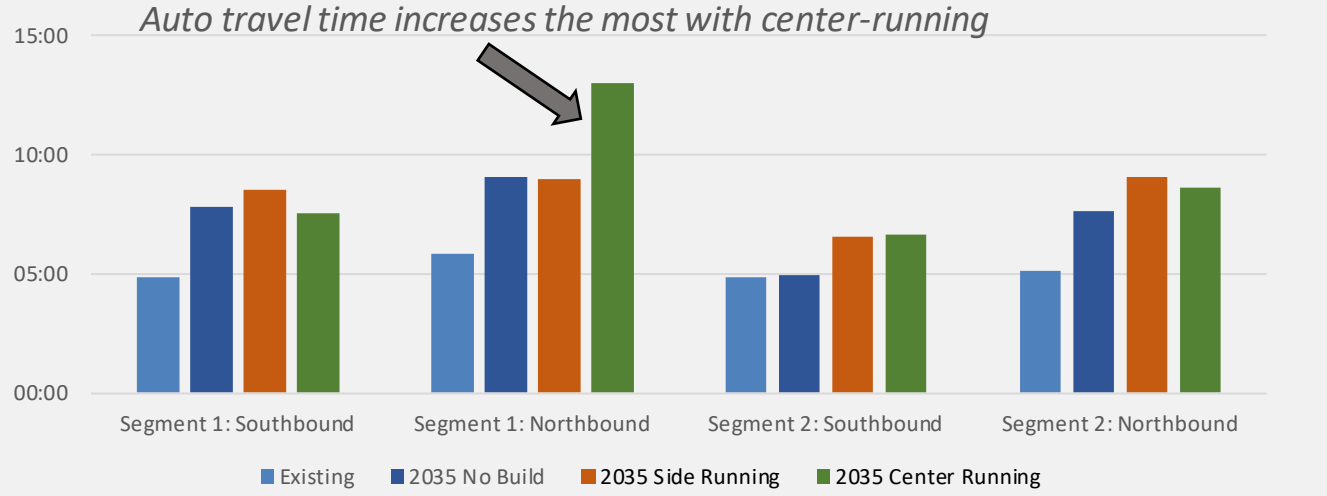
	2035 Build: Side-Running BRT	2035 Build: Center-Running BRT
SEGMENT 1 (McBryde to Church)		
Northbound	-269 seconds	-292 seconds
Southbound	-128 seconds	-144 seconds
SEGMENT 2 (Cutting to I-80 EB Ramps)		
Northbound	-100 seconds	-125 seconds
Southbound	+34 seconds	+11 seconds

Transit Travel Times



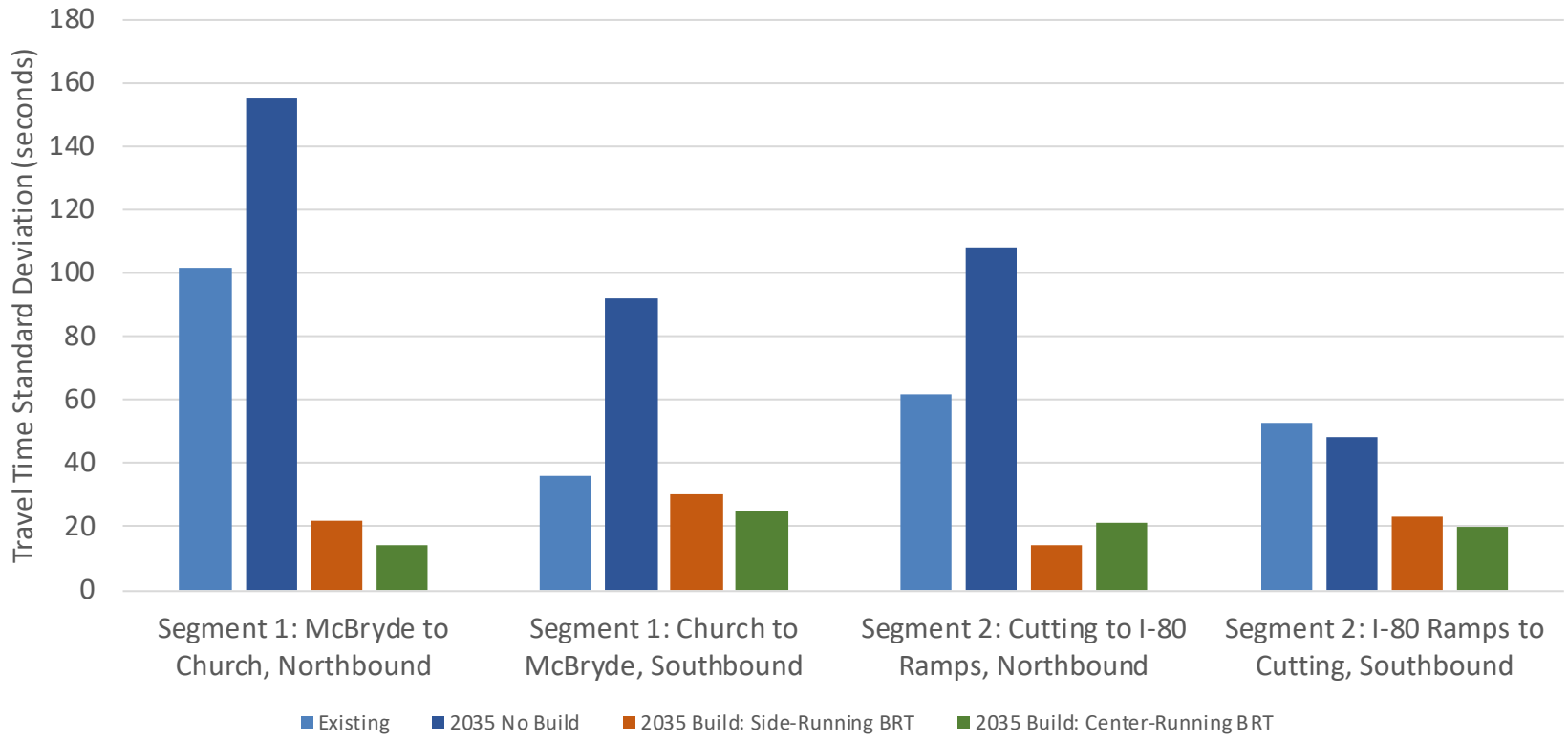
	2035 Build: Side-Running BRT	2035 Build: Center-Running BRT
SEGMENT 1 (McBryde to Church)		
Northbound	- 5 seconds	+235 seconds
Southbound	+43 seconds	-16 seconds
SEGMENT 2 (Cutting to I-80 EB Ramps)		
Northbound	+84 seconds	+60 seconds
Southbound	+100 seconds	+105 seconds

Auto Travel Times



Transit reliability findings

- Bus travel time variability improves by over 50%-80% with both center and side-running options



Source: Kimley-Horn and Associates, Inc.

Intersection delay findings

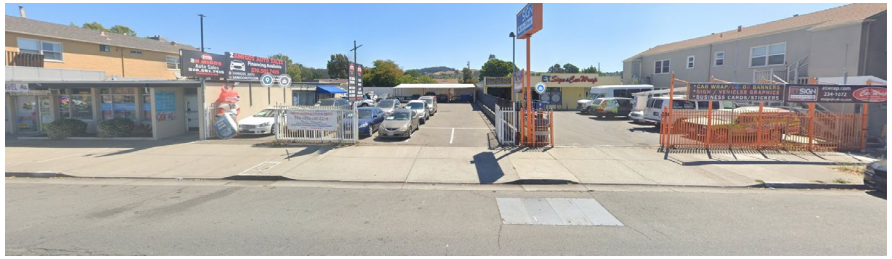
- Traffic operations get worse at a few key bottlenecks
- Location-specific strategies to address bottlenecks could be considered in future project phases, albeit with effects on parking and/or bicycle facilities

Metric	2035 No Project	2035 Side Running	2035 Center Running
Segment 1: Church to McBryde (7 intersections)			
# of LOS F intersections	0	2	2
Bottleneck locations	McBryde	McBryde San Pablo Dam	McBryde San Pablo Dam Church
Segment 2: I-80 EB Ramps to Cutting (7 intersections)			
# of LOS F intersections	1	2	3
Bottleneck locations	Macdonald	Cutting Macdonald Conlon Barrett	Cutting Macdonald Barrett I-80

Bicycle + Parking Options

Can a low-stress bicycle facility be provided on San Pablo Avenue?

- Significant number of driveways and intersections will require crossing bicycle facility
- Right-turn lanes will be needed at major intersections
  - Will require bicycle facility to be shared with autos, buses, or narrow pedestrian facility
- Projected to remain at Level of Stress 4 for cyclists (high level of stress)
- Lower stress options may be available on parallel streets south of McBryde Avenue



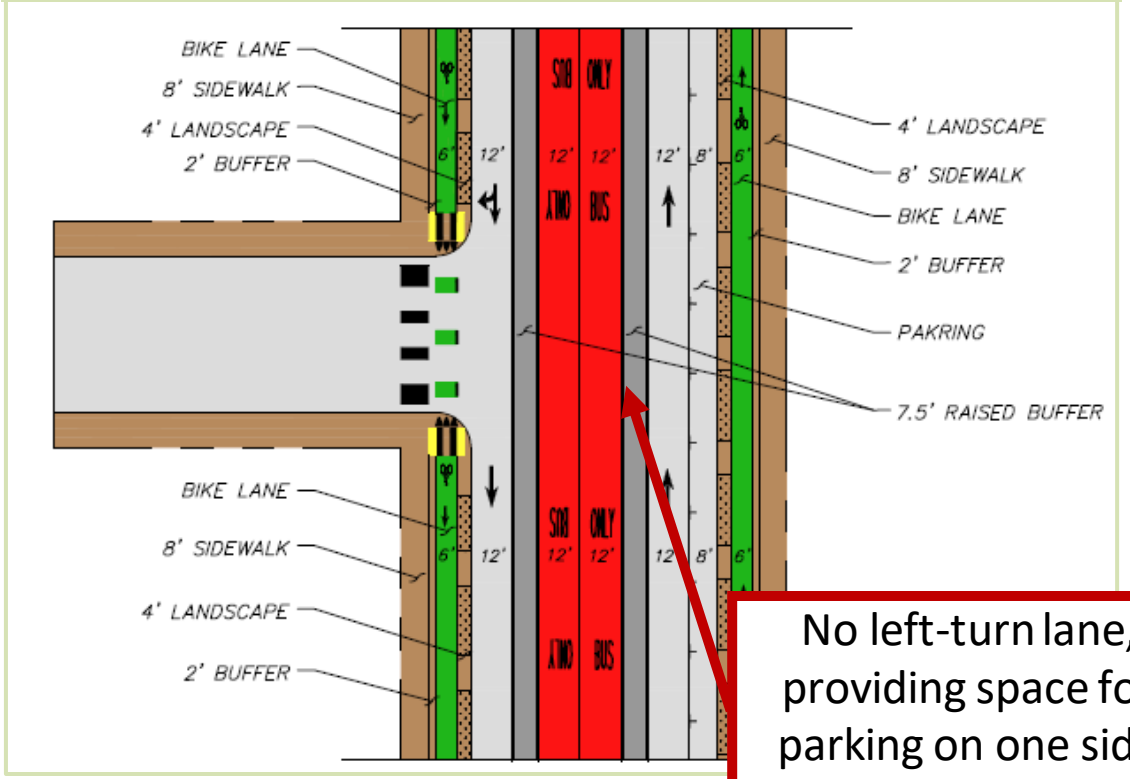
Images Source: Google

What are the options for a lower-stress parallel bikeway?

Source: San Pablo Avenue Phase 1 Evaluation Report

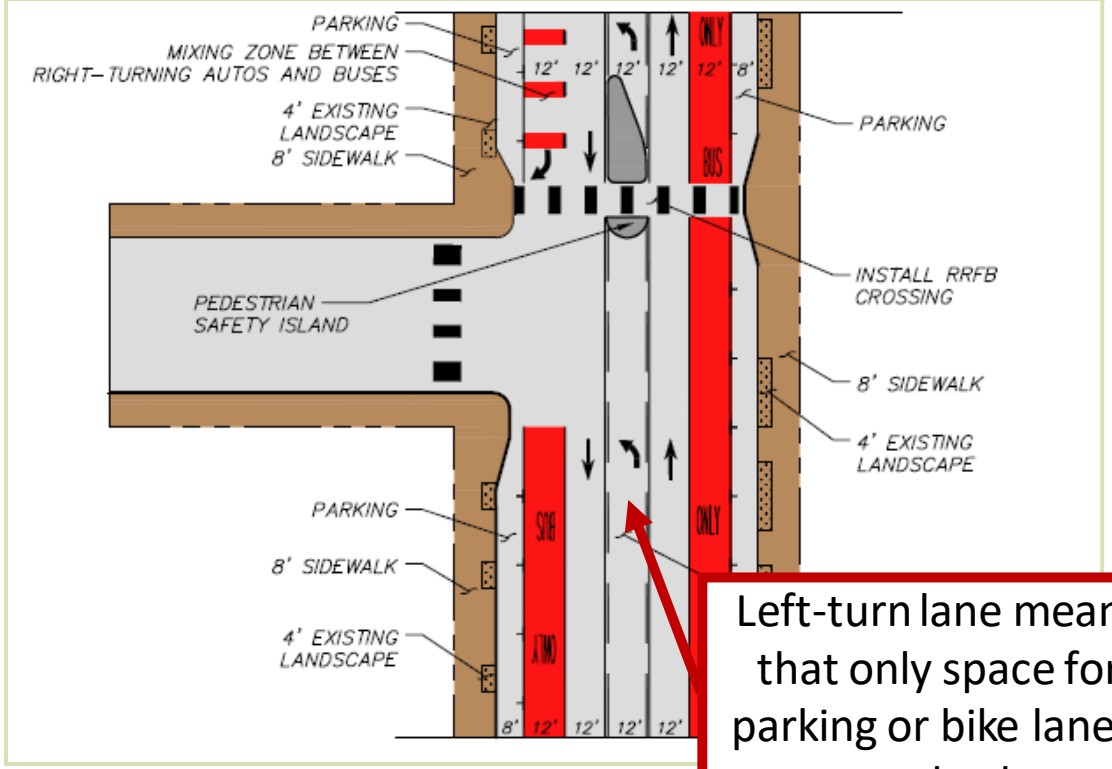
How does center-running BRT vs side-running BRT transit compare for bikes?

Center-Running BRT



No left-turn lane, providing space for parking on one side and bike lanes

Side-Running BRT (with parking)



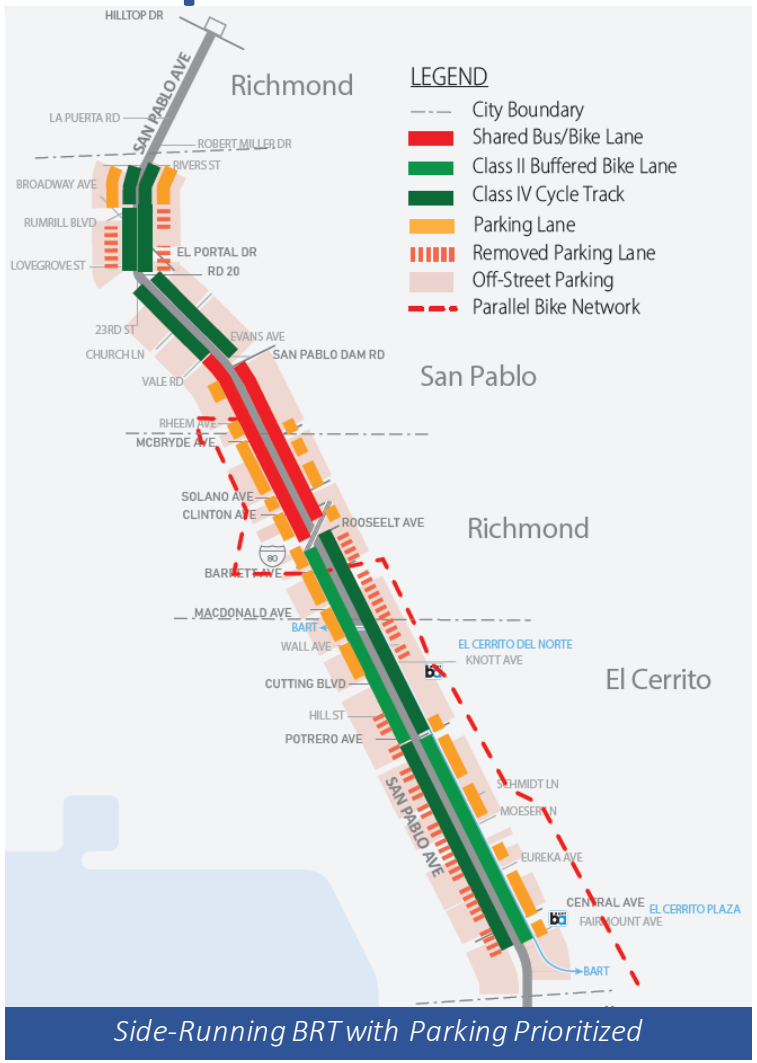
Left-turn lane means that only space for parking or bike lanes, not both

Can parking be preserved with bus and bike improvements?

- Significant stretches of San Pablo Avenue have both on-street parking and off-street lots for all parcels
- Cities have lowered parking requirements for new development, shifting some demand to on-street
- Center-running BRT: parking can be preserved on one side of the street everywhere it exists today
  - Can switch which side of the street has parking where necessary
  - Additional and safer crossings will make crossing the street easier than today
- Side-running BRT: for most of the corridor it's either parking or bike lanes, not both
  - May introduce challenges for on-street commercial loading and paratransit
  - In some locations loading, paratransit, and parking can utilize existing off-street parking areas
  - Shared bus/bike lane can allow for both parking and bike, but with impact to transit performance

Parking and bicycle lane options

Center-Running BRT with Parking on One Side



Side-Running BRT with Parking Prioritized

Side-Running with Bicycle Prioritized

What is the cost magnitude and what are the funding opportunities?

- Estimated cost of approximately $50 Million to $65 Million per mile for providing dedicated transit lanes, BRT stations, protected bicycle facility, safety upgrades, and lighting improvements
- Project anticipated to be competitive for federal capital investment grants, but requires significant non-federal match (50%+ to be competitive)

Funding Opportunities

CONTRA COSTA transportation authority	METROPOLITAN TRANSPORTATION COMMISSION	DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA	Federal Transit Administration	California Transportation Commission
Future Potential County Measure	Regional Measure 3 (RM3)	Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant	Capital Investment Grant (CIG)	Road Repair and Accountability Act of 2017 (SB1)

Costing Source: Oakland segment bus + bike lane project cost estimates developed as part of Phase 1 project

Key Takeaways

Comparison of Transit Solutions

Alternatives compared to existing conditions

	No-Build	Center-Running	Side-Running
Transit Performance	☒	☑☑☑	☑☑
Auto Performance	☒	☒☒☒	☒☒
Pedestrian Safety	☒	☑☑☑	☑☑☑
Bicycle Connectivity and Comfort	☒	☑☑	☑/☑☑
Parking and Loading	⊘	☒	☒/☒☒
Community and Business Access	☒	☒	☒
Equity	☒	☑☑	☑☑
Sustainability and Growth	☒☒	☑☑	☑☑
Ease of Implementation	⊘	☒☒	☒

☑ Better than existing
⊘ No change
☒ Worse than existing

Key Takeaways

Without improvements, congestion will significantly increase (69% increase in delays), impacting mobility options

Center-running bus lanes provide 30%-45% transit travel time savings and would be 10% faster than side-running

Side-running bus lanes avoid some of the implementation challenges of center-running and can easily be used by all bus routes

Center-running bus lanes allow for both parking and bike lanes throughout the corridor. Side-running allows for either/or in most segments

A low-stress bike facility cannot be provided but parallel route options are limited

There is community support for improvements in the corridor, but no consensus thus far on the type of improvements

Next Steps

Upcoming Presentations

Agency	Meeting Date
WCCTAC Board	Fri. May 13
San Pablo Council	Mon. June 6
El Cerrito Council	Tues. June 7
Richmond Council	Tues. June 28
AC Transit Board	Wed. June 22 (tentative)

What are some options on what to do next?

1. Advance a near-term project similar to Alameda County
   - Build community consensus on what immediate improvements are needed
   - Safety enhancements, such as pedestrian crossing improvements and ADA upgrades
   - Side-running bus lanes
   - Will need matching funds to pursue grants
2. Identify a phasing strategy and focus initial efforts on a first phase segment
3. Build community consensus on long-term project alternatives
4. Advance design efforts on long-term project alternatives
5. Develop a funding plan for long-term project

Technical areas for further study

- Block-by-block parking and loading strategies and solutions, including curb management, parking policy (minimums/maximums)
- Evaluation results from Alameda County segment Near-Term Bus/Bike Project
- Grant and funding opportunities
- 10% Concept Design and cost estimates

Questions for Decision-Makers

1. Should we continue to consider a corridor-wide bus lane solution?
2. If a bus lane is desired, is there a preference for side-running or center-running?
3. What is the priority between a parking lane and a bike lane? Does the priority vary geographically?
4. Would you support a near-term project that begins to implement transit and bike priority treatments, as in Alameda County?

Questions for TAC

1. Is any additional information needed to inform feedback/decisions on next steps?
2. Is your agency ready to take a position on the presence of and configuration of transit lanes on San Pablo Avenue?
3. Is your agency ready to take a position on converting parking lanes (one or both sides) to protected bike lanes?