

CAPITOL CORRIDOR

VISION IMPLEMENTATION PLAN



FINAL

NOVEMBER 2016

ACKNOWLEDGEMENTS

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Former CCJPA Board member and Ad Hoc Vision Subcommittee Chair Steve Cohn is acknowledged for moving the CCJPA forward on the Vision Plan Update process.



INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

This report describes the Capitol Corridor Vision Implementation Plan, or VIP. The VIP is the second step in a three-step process to define a long-term vision for the rail line. Building on the design principles and conceptual alternatives developed in step one, the Vision Plan, the VIP defines an “initial study corridor” for further study – a package of preferred engineering alternatives in each segment of the line. It does not include the additional steps necessary to make a business case for the investment, including detailed economic and ridership analysis. These, along with public outreach, will occur in the third and final step, the Vision Communications Plan or VCP.

WHAT IS THE CAPITOL CORRIDOR VISION IMPLEMENTATION PLAN?



The **Capitol Corridor** is a passenger rail line between the Sacramento area and the San Francisco Bay Area.

Depending on the segment, it currently makes between one and 15 round trips per day. It takes a little over three hours to travel between San Jose and Sacramento, a distance of about 131 miles, and another hour to travel 37 miles to Auburn in the Sierra Foothills. It is part of the Amtrak system, although it is managed by a “joint powers authority” (the Capitol Corridor Joint Powers Authority, or CCJPA) made up of representatives of different transportation agencies in the corridor.

The **Vision** is a policy adopted by the CCJPA Board of Directors – an official goal to work toward – calling for a future Capitol Corridor that is faster, more frequent, more reliable, cleaner, quieter,

and better connected to other public transit lines. The Vision looks out toward service changes that may be required to serve the transportation and economic needs of the Northern California megaregion over the next 40 years.

The **Vision Implementation Plan** or VIP is a detailed plan for implementation of the Vision, including the capital improvements that are needed (such as new tracks or stations) and a strategy for funding and construction. It also includes estimated travel times, conceptual schedules including frequencies and span (or hours) of operation, preliminary cost estimates, research on possible funding sources, and improvements for freight trains that currently share tracks with the Capitol Corridor. (Again, it does not include analysis of benefits including economic and ridership gains – this analysis will occur in the next phase of the Vision process, the VCP.) The VIP recognizes that passenger and freight trains sharing the same tracks presents limitations for both. A renewed era of investment in the combined rail network in Northern California will be necessary to overcome the conditions that constrain both passenger and freight service today.

INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

WHAT IS THE CAPITOL CORRIDOR?

To understand the Vision and the VIP, it is necessary to first understand what the Capitol Corridor is today, and how it got to be that way.

When it began in 1991, the Capitol Corridor made just three round trips per day. Over the next two decades it grew and grew, to 15 round trips in its busiest segment, between Sacramento and Oakland. Ridership grew even faster, as the Capitol Corridor offered an alternative to driving on congested Interstates 80 and 880.

But the Capitol Corridor was limited in how far it could grow. This is because it does not own the tracks on which it operates – all but a couple of miles in San Jose are owned by the Union Pacific Railroad, the freight train operator. And UPRR limits how many passenger trains can be on its tracks, in order to keep its own trains running on time and preserve capacity for Port of Oakland-bound cargo, something that is vital to the regional economy.

HOW IS THE CAPITOL CORRIDOR GROWING NOW?

There are still some ways the Capitol Corridor could grow, working in cooperation with UPRR, and some of them are already proceeding.

- » CCJPA is currently adding tracks so that it can add increase service between Downtown Sacramento and the suburb of Roseville from one to three daily round trips.
- » CCJPA is making improvements to tracks that will reduce travel times by 10 minutes each way between Sacramento and San Jose.
- » Under a previous agreement with UPRR, CCJPA could make improvements between Oakland and San Jose that would allow it to add four daily off-peak round-trips each way to the current total of seven in that segment.

These sorts of improvements, however, only go so far, and funding for them has nearly disappeared in recent years. The Capitol Corridor has gone just about as far as it can on its current path. And increasingly of late, it has seemed like more dramatic changes may be called for -- especially with California's population expected to grow by roughly 28 percent, or nearly 11 million, by 2050. In contrast to the freeway



INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

system, which is largely built out and will only see ever greater congestion, passenger and freight rail have unrealized potential to transform mobility and drive economic growth in Northern California

WHY WAS A VISION NEEDED?

Before this current Capitol Corridor Vision was adopted in 2014, CCJPA had an earlier, more incremental Vision – adopted in 2005, before the State adopted a plan to combat climate change, before California High-Speed Rail was approved by voters, before both the Bay and Sacramento regions adopted their first Sustainable Communities Strategies, before the State established a new State Transportation Agency (CalSTA) tasked with developing a statewide rail plan, and before the Bay Area Rapid Transit system – BART – began seriously contemplating a second Transbay Tube.

2005 was also the year in which per-capita vehicle miles traveled by Americans peaked; even with recent increases driven by low gas prices, VMT has only returned to 1998 levels. The reasons for this are debatable, but it seems clear that the travel preferences of Millennials are different from those of previous generations.

There are other emerging trends. One is climate change. Sea level rise could affect the Capitol Corridor in two ways. First, it could affect it directly – much of the rail line is already just a few feet above the water at high tide, especially between Hercules and Martinez, where it winds along the shoreline. So solutions to protect the corridor from rising waters will be needed. But second, public transit like the Capitol Corridor has an important role to play in reducing carbon emissions and lessening climate change. A sustainable future may include electric, autonomous vehicles, but unless we're going to keep widening I-80, which is already constrained by adjacent homes and businesses, there will only be so much room for cars – and there will still be a place for high-capacity transit that is time-competitive with driving.

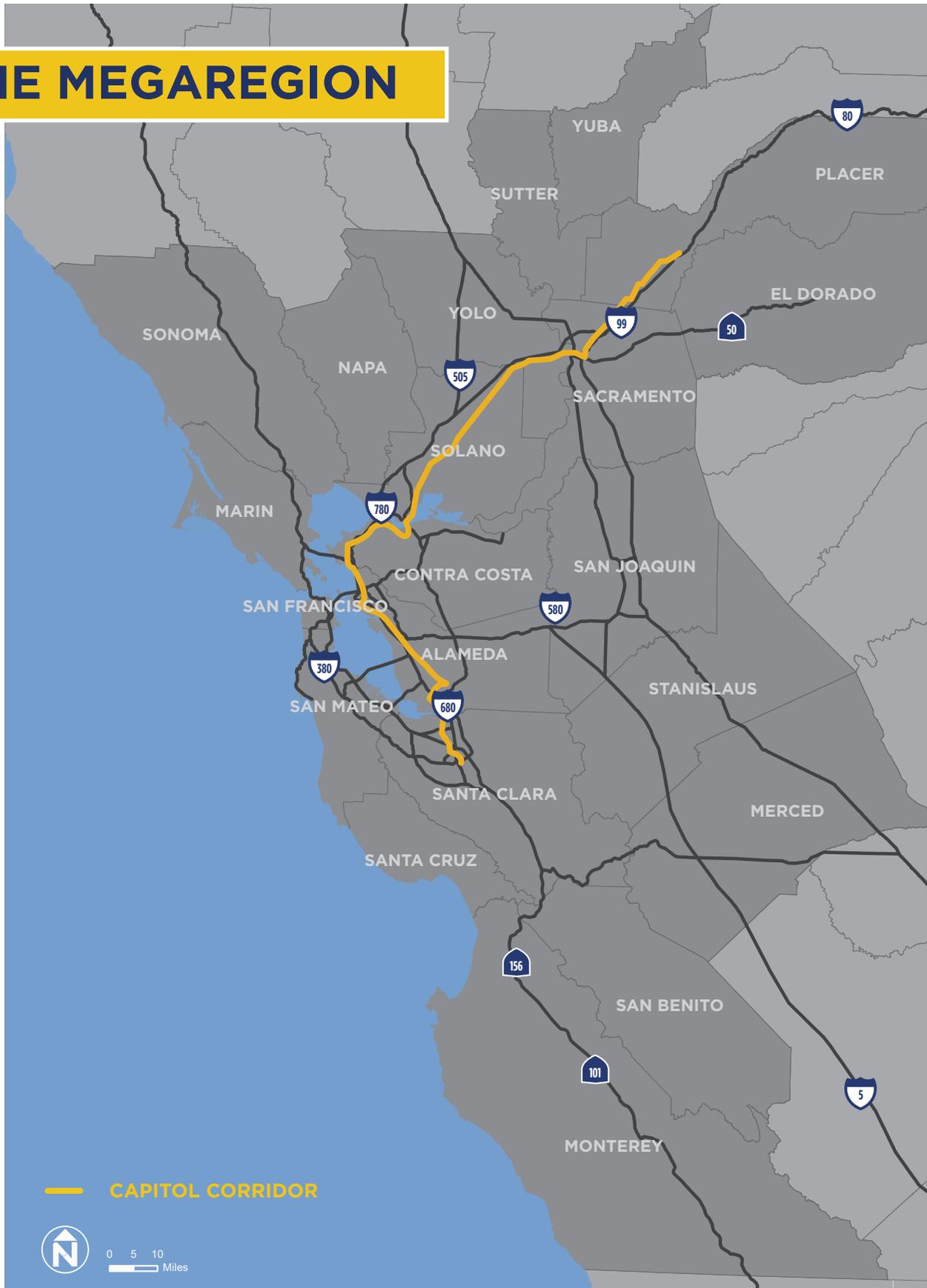


Then there's the globalizing economy, and its local impacts. Northern California, of course, is the epicenter of the tech world: Silicon Valley, at the southern end of the corridor, is the headquarters of most major computer-related companies, but many of them now have offices throughout Northern California. Increasingly, the Bay Area and Sacramento region are growing together into a single economic “megaregion.” As high housing costs in coastal areas have pushed more people and businesses inland, it has only increased the economic and social ties between the areas, which have long been closely linked, separated only by a few miles of farmland. And only one transit line connects the entire megaregion: the Capitol Corridor. (The report shown here, by the way, is by an organization representing Bay Area businesses.)

All of this suggests that the Capitol Corridor can't go on forever making just 15 daily round trips, at an average speed of less than 45 miles per hour.

As the only transit line between adjacent metropolitan areas with a combined population of 12 million – and growing – it has to evolve with the times.

THE MEGAREGION



WHAT IS THE VISION?

So if the Capitol Corridor is to go in a new direction – what should that direction be?

To develop the updated Vision, the Capitol Corridor’s staff and consultants first looked across the country and around the world to see what intercity rail lines like the Capitol Corridor look like in places with higher rail ridership. For one, they are more modern. While the Capitol Corridor uses the same technology that has been used by most American railroads for decades – trains pulled by diesel-powered locomotives – trains in other locations are often now powered by overhead electric wires. These trains are not only cleaner and quieter, but they can accelerate and decelerate faster. This is why Caltrain, the rail line between San Francisco and San Jose, is planning to electrify.

Another thing that East Coast, Western European and East Asian trains are is faster (the Capitol Corridor’s top speed today is 79 mph). And we’re not just talking about high-speed trains – that technology, as we’ve learned, is very expensive, but it’s possible to operate trains at speeds up to 125 or 150



SOURCE: JOHN GRAY

mph for far less money, as curves can be tighter and grades can be steeper, requiring less new right-of-way and fewer tunnels and bridges.

Another common element of modern intercity rail lines is greater frequency. Even at its most frequent, the Capitol Corridor runs only every 40 minutes, a limitation of sharing the freight corridor. Even in the Bay Area, Caltrain, a commuter rail line using the same technology as the Capitol Corridor, runs up to five trains per hour (every 12 minutes average), and will run up to six trains per hour once it is electrified.

Finally, there is a long list of additional things that the Capitol Corridor could do differently, and better. Along with offering faster and more frequent service, it could be made more reliable, less subject to freight trains in its path or the century-old drawbridge it uses to cross the Carquinez Strait. It could be more seamlessly integrated with connecting transit, allowing for easier transfers, including timed transfers like those BART makes between its trains in Oakland. It could connect to BART in central Oakland, enabling quick trips into San Francisco. It could have raised platforms level with train floors so that passengers could walk (or roll) right onto or off of trains, rather than having to climb stairs – and this would speed up the boarding process, further reducing travel times for everybody. And its schedule could be based on easier-to-remember “clockface” headways, with departures and arrivals every 15, 30 or 60 minutes (and departures from major stops on the hour or half-hour).

This, in essence, is the Vision that the CCJPA Board adopted in 2014 – a series of guiding principles based on international best practices and global standards in modern railroading. But there were also a few additional details.

When the Capitol Corridor Board adopted the updated Vision in 2014, it also advanced a series of conceptual alternatives designed to serve as a starting point for analysis in the VIP.

VISION ELEMENTS

SPEED



FREQUENCY



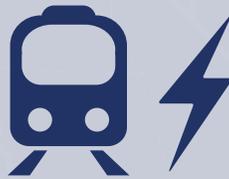
RELIABILITY



CONNECTIVITY



ELECTRIFICATION



LEVEL BOARDING



CLOCKFACE HEADWAYS



WHAT WERE THE VISION ALTERNATIVES?

Starting with a long list of options – different alignments and a range of capital improvements – Vision planners completed preliminary assessments of cost and engineering feasibility and of ridership potential.

This allowed them to “screen” or narrow the options down to a small number of alternatives, which were advanced to the VIP. Preliminary analysis of travel times was then completed, and ridership was estimated for the alternatives using a model, to confirm that faster, more frequent and more reliable service would actually result in much greater ridership, and was really worth pursuing.

Each step in the process could further be described as follows:

- » **Based on screening, between one and three alignments were advanced in each segment:** San Jose-Oakland Coliseum, Central Oakland, Oakland-Richmond, Richmond-Suisun/Fairfield, and Suisun/Fairfield-Sacramento (Sacramento-Auburn, where there is less service, was not included in this phase).
- » **Travel times were estimated.**
- » The different alignments in each segment were packaged into **corridor-level alternatives.**
- » **Conceptual schedules were developed for each alternative** based on the travel time estimates and a common service plan including express service and service every 15 minutes during peak periods.
- » Using the Amtrak model, **ridership was estimated for each alternative**, and compared to estimated ridership without the improvements.

The Amtrak model has its limitations: It is designed to gauge impacts from incremental improvements to service, not major changes such as new alignments, much faster service and new transit connections. Nonetheless, the results it generated suggested that the Vision alternatives were worthy of further analysis: ridership increases in the 170 to 200 percent range.

The alternatives advanced from the Vision Plan to the VIP in each segment are described in the following pages. In each segment, an overriding factor was the need for dedicated passenger rail-only right-of-way allowing for capacity and service levels to be expanded beyond the current limits, allowing for greater reliability and enabling electrification.

INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

San Jose-Oakland

Between Oakland and Diridon Station in Downtown San Jose, several possible rights-of-way already exist. Each is a freight corridor, and the Capitol Corridor currently uses segments of two of them. If the Capitol Corridor had exclusive use of any of the alignments – with existing freight relocated to another right-of-way – then service could be greatly expanded prior to electrification and other improvements to speed up service.

The potential alignments are shown in the map on the following page. The Capitol Corridor currently uses the Niles Subdivision north of Fremont and the Coast Subdivision south of Newark, along with the Niles Cutoff connector between them. The Vision analysis found that:

» **Alternative A**, the Coast Subdivision alignment currently used by the Amtrak Coast Starlight, would be faster than either the current alignment or a modified version of it (Alternative C), but would bypass existing stops in Hayward and Fremont (a stop could be added near the Dumbarton Bridge

on the Fremont/Newark border). Both this alternative and Alternative C would require double-tracking of the existing single-track segment through the Alviso Wetlands at the southeastern tip of San Francisco Bay.

- » **Alternative B**, the inland alignment – a combination of the Niles and Warm Springs subdivisions – would be fastest, but it would bypass Fremont as well as two existing stops in Santa Clara, a jobs-rich area near the center of Silicon Valley.
- » **Alternative C**, the hybrid alignment, would use the Oakland rather than the Niles Subdivision and a new Niles Cutoff tunnel replacing the slowest segment of the existing alignment; while it would remain the slowest of the three alignments, it would maintain all existing stops.

All three alternatives were advanced to the VIP for further analysis.



INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

Jack London

The single greatest bottleneck on the existing alignment is in Downtown Oakland, where trains run down the middle of a city street, Embarcadero, through the waterfront Jack London district. An elevated viaduct would increase noise and visual blight and would almost certainly be rejected by neighbors and the City. Tunneling, meanwhile, would be complicated by several factors, including constraints to both the north and south (the West Oakland Yard and Lake Merritt Channel) – but the greatest challenge is the relatively shallow depth of the Posey and Webster Tubes auto tunnels under the Oakland Estuary. Here as in other segments between Oakland and Sacramento, service cannot be expanded, at all, in the existing right-of-way shared with freight; UPRR could agree to allow more passenger “slots,” but this segment provides mainline access to and from the busy Port of Oakland. Increased passenger service here would come at the expense of goods movement.

The map on the next page shows various possible alignments for a tunnel.



SOURCE: PAUL SULLIVAN

The Vision analysis found that:

- » The existing Embarcadero right-of-way could be grade-separated and the Posey and Webster Tubes could be avoided, but it would require a shallow trench capped by a raised berm. Embarcadero would be closed, restricting access to businesses fronting it, and there would be a visual barrier along the Oakland waterfront.
- » It might be possible to tunnel under Fifth Street, thereby avoiding the Posey and Webster Tubes, and connect to a new viaduct alongside the BART tracks through West Oakland – but this would require further analysis, including analysis of whether a new viaduct could “thread the needle” between columns supporting the Interstate 880 viaduct. A new viaduct in West Oakland would also require some property takings.
- » A long tunnel from just east of Jack London to just south of Emeryville Station would pass directly beneath the core of Downtown Oakland, and a new station there could connect to the 19th Street/Oakland BART Station, but this would be very expensive, on the order of several billion dollars for roughly three-and-a-half miles of new tracks.

One non-tunnel concept – construction of a viaduct in the median of Interstate 880 – was considered but was not advanced to the VIP.

Because more detailed engineering analysis was required to determine the feasibility of the Fifth Street alternative, all three alternatives were advanced to the VIP for reasons of cost and engineering feasibility. For purposes of estimating travel times and ridership, an Embarcadero alignment was assumed in all three Vision alternatives.

SAN FRANCISCO BAY

ALTERNATIVES
JOIN IN
EXISTING ROW

TUNNEL UNDER
DOWNTOWN OAKLAND

5TH STREET SUBWAY/
NEW VIADUCT IN BART ROW

EMBARCADERO
TRENCH/BERM

I-880 ROUTE

ALTERNATIVES
JOIN IN
EXISTING ROW



SAN PABLO

MARKET

TELEGRAPH

BROADWAY

GRAND

WEBSTER
HARRISON

14TH

3RD



JACK LONDON

OAKLAND INNER
HARBOR

BART
WEST OAKLAND
STATION

BART
19TH STREET
STATION

LAKE
MERRITT



0 0.5 1 Miles

INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

Oakland-Richmond

In this segment, there is no feasible alternative from a cost or engineering perspective other than the existing right-of-way. There are no other rights-of-way available – no parallel railroads or freeways other than I-80, which is constrained by the Bay on one side and development on the other – the area is heavily urbanized, and a tunnel from central Oakland to North Richmond, where development begins to recede, would be roughly 13 miles long. Because an elevated viaduct would itself be prohibitively expensive (and would likely encounter community opposition), widening of the existing right-of-way by between 20 and 30 feet would be necessary to accommodate passenger-only tracks. This would require some eminent domain or takings of properties. In most of this segment, adjacent land uses are light industrial.

Richmond-Suisun/Fairfield

Between Richmond and Suisun/Fairfield Station, numerous paths are possible. The map on the following page shows alternatives that were advanced as well as options that were screened out for cost and engineering feasibility reasons. The latter category includes I-80 as well as an existing rail right-of-way through Vallejo and American Canyon. The I-80 alignment would require reconstruction of a series of freeway overpasses, while the rail right-of-way includes a segment in Vallejo that is extremely narrow and runs through residential neighborhoods, with homes coming within a few feet of the tracks.

Ultimately, two alternatives were advanced:

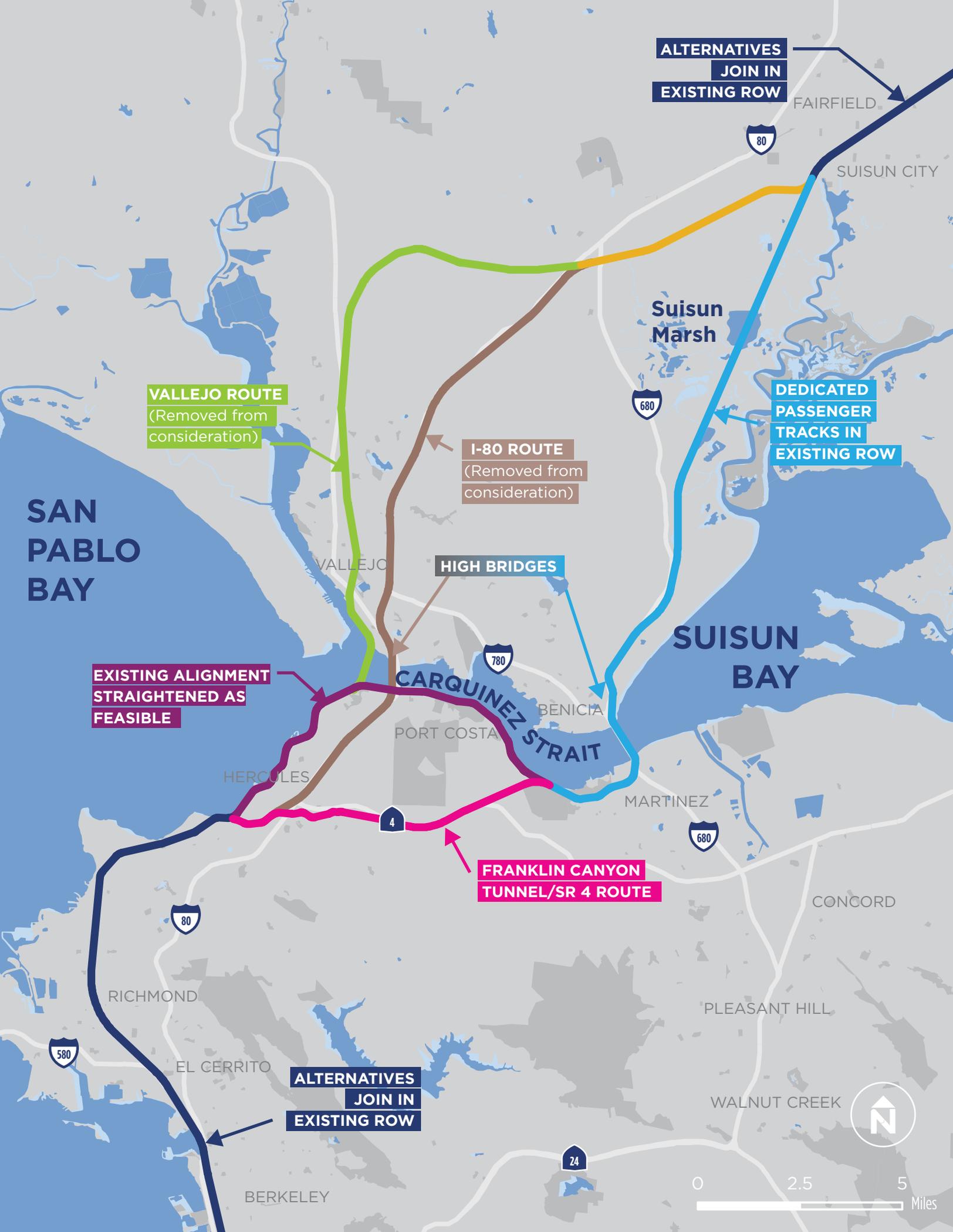
- » The existing alignment with the following modifications to the curving shoreline segment between Pinole and Martinez:
 - Widening the right-of-way to provide passenger-only tracks
 - Raising the tracks to protect against sea level rise

- Straightening curves wherever practical

This alternative would have the lowest cost but would also net the least travel time savings – and perhaps more importantly, it would result in environmental impacts to San Pablo Bay and the Carquinez Strait requiring extensive review, permitting and mitigation.

- » A new alignment deviating from the existing right-of-way just south of Pinole onto a freight corridor owned by the BNSF Railway. The alignment would follow this right-of-way inland through Hercules to a new tunnel in Franklin Canyon, roughly paralleling State Route 4. From there it would continue onto a viaduct and new elevated station on the Martinez waterfront. While costly, this would provide a more direct alignment, reducing one-way travel time by several minutes.

Each alternative assumes a new high crossing of the Carquinez Strait near the existing 1920s drawbridge. Both alternatives were advanced to the VIP.



**ALTERNATIVES
JOIN IN
EXISTING ROW**

FAIRFIELD



SUISUN CITY

**Suisun
Marsh**

VALLEJO ROUTE
(Removed from
consideration)

**DEDICATED
PASSENGER
TRACKS IN
EXISTING ROW**

I-80 ROUTE
(Removed from
consideration)

**SAN
PABLO
BAY**

HIGH BRIDGES

**EXISTING ALIGNMENT
STRAIGHTENED AS
FEASIBLE**

VALLEJO

CARQUINEZ STRAIT



BENICIA

**SUISUN
BAY**

PORT COSTA

HERCULES

MARTINEZ



**FRANKLIN CANYON
TUNNEL/SR 4 ROUTE**

CONCORD



RICHMOND

PLEASANT HILL



EL CERRITO

**ALTERNATIVES
JOIN IN
EXISTING ROW**

WALNUT CREEK



BERKELEY



INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

Suisun/Fairfield-Sacramento

In this segment, unlike the circuitous and built-up segments to the south, high speeds could be achieved at relatively low cost – the existing right-of-way is nearly flat and remains straight over long stretches as it crosses the Central Valley. It also provides access to a series of cities within the I-80 corridor. However, it is shared with freight trains, limiting passenger capacity to the current 15 daily round-trips.

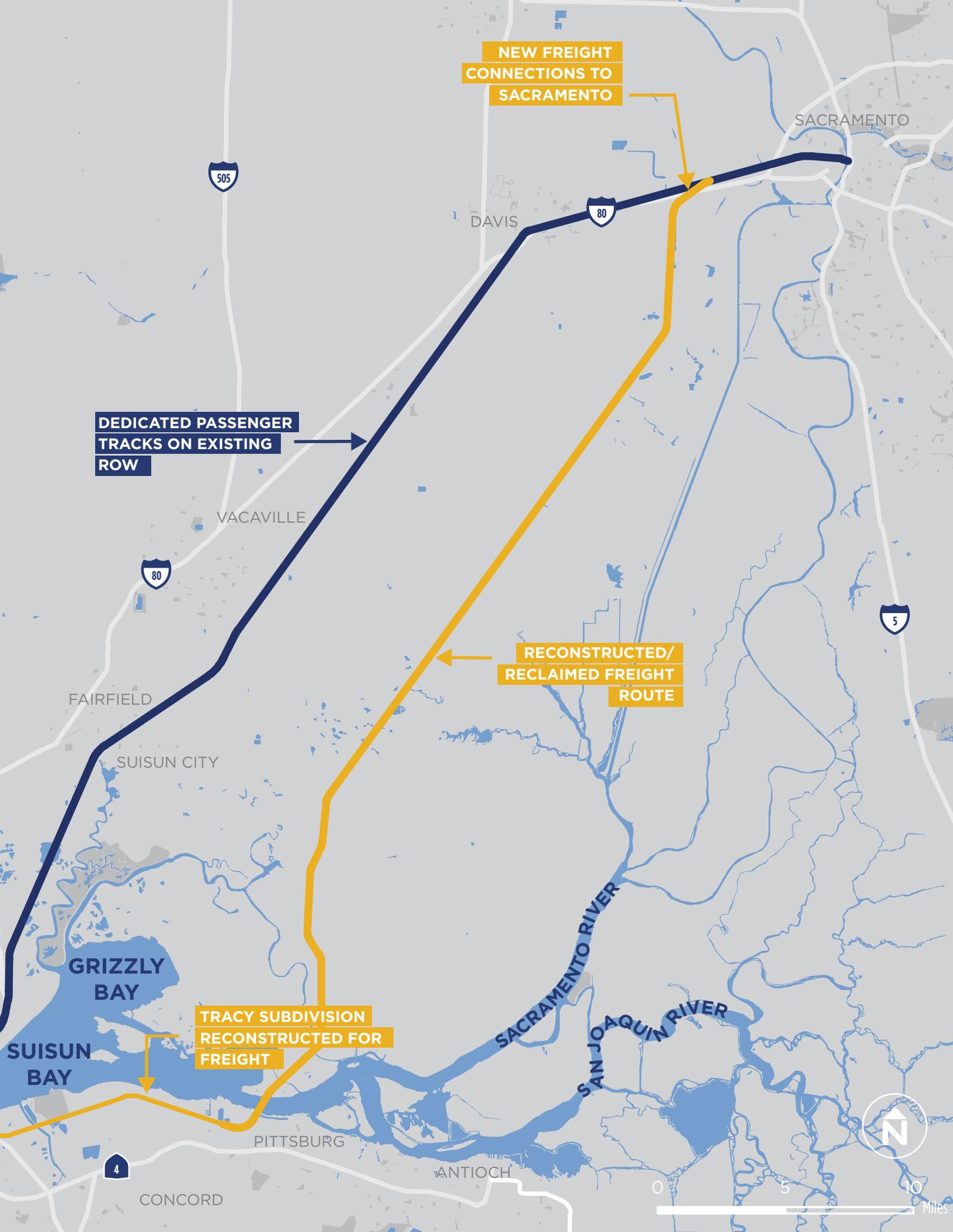
The solution, then, might be to make the existing alignment passenger-only by providing freight with an alternative right-of-way. Fortunately, while there is no existing parallel railroad, there is right-of-way remaining from an earlier railroad – the Sacramento Northern, on which freight trains operated until the 1960s. Much of the alignment still exists between Suisun Bay and the community of Saxon, 11 miles

southwest of Sacramento. With connections via the Tracy Subdivision used by freight as well as Amtrak San Joaquin trains between Martinez and Pittsburg, a new Delta crossing just east of Suisun Bay, and new right-of-way connecting to the existing right-of-way in West Sacramento, a brand new freight railroad could be built in the Sacramento Northern right-of-way, as shown in the map on the following page.

Sacramento-Auburn

This segment was not evaluated as part of the Vision process, but was included in the VIP process described in the following pages.





NEW FREIGHT CONNECTIONS TO SACRAMENTO

SACRAMENTO

DAVIS



DEDICATED PASSENGER TRACKS ON EXISTING ROW

VACAVILLE



FAIRFIELD

SUISUN CITY

RECONSTRUCTED/RECLAIMED FREIGHT ROUTE

GRIZZLY BAY

SUISUN BAY

TRACY SUBDIVISION RECONSTRUCTED FOR FREIGHT

SACRAMENTO RIVER

SAN JOAQUIN RIVER

PITTSBURG

ANTIOCH



CONCORD



HOW WAS THE VISION IMPLEMENTATION PLAN DEVELOPED?

As part of the Vision planning process, conceptual alternatives to achieve the Vision principles were identified.

In some segments, however, up to three alternatives remained at the end of the process. Additional, more detailed analysis was needed to narrow down the alternatives to define a single cost-effective and viable “initial study corridor” that could serve as a basis for future segment-level planning processes – the feasibility studies, alternatives analyses and environmental reviews required to advance recommended alternatives into final design and construction. In addition, a deeper assessment was needed of a variety of operational considerations, such as station modification and rolling stock needs. This was the primary purpose of the VIP. Analysis of benefits including ridership and economic impacts will occur in the next phase of the Vision process, the VCP.

The initial study corridor is briefly described in the following chapter, and is described in more detail in the appendices to this document. Below, the process for developing the initial study corridor is described. In short, the VIP was developed by “working backwards” from the ultimate vision, identifying steps along the way.

The process was driven by more detailed engineering analysis, informed by a collaborative planning process guided by a number of principles. These included the Vision service and physical design principles described earlier – the goals of faster, more frequent, more reliable, cleaner and quieter service, along with more seamless transit connectivity, level boarding and clockface

VISION ALTERNATIVES ADVANCED TO THE VIP

SAN JOSE-OAKLAND

- Coast Subdivision (Coast Alignment)
- Warm Springs Subdivision (Inland Alignment)
- Oakland Subdivision/Niles Cutoff Improvements (Hybrid Alignment)

JACK LONDON

- Embarcadero Trench/Berm
- 5th Street Subway/West Oakland Viaduct
- Downtown Oakland Tunnel

OAKLAND-RICHMOND

- Widen Existing ROW

RICHMOND-SUISUN/FAIRFIELD

- Improve Existing Alignment
- BNSF ROW/Franklin Canyon Tunnel

SUISUN/FAIRFIELD-SACRAMENTO

- Purchase Existing Alignment/ New Freight ROW

SACRAMENTO-AUBURN

- (to be evaluated in VIP)

INTRODUCTION TO THE VISION IMPLEMENTATION PLAN

headways. The decision-making process was also guided by cost concerns – as described later in this document, the recommendations would be relatively expensive, but costlier alternatives such as long segments of new, grade-separated right-of-way and extensive property takings were rejected as infeasible. In each segment, related improvements were developed for freight trains that would no longer share tracks with passenger service, in order to “keep freight whole” and, in so doing, support goods movement and the regional economy. Finally, protecting the corridor against future sea level rise was a core concern. *(One thing the VIP alternatives do not attempt to do is to make recommendations for other passenger rail operators. Separate design efforts will be needed to address connections with BART, high-speed rail and other systems, as well as future service on other commuter and intercity rail lines such as ACE and the Amtrak San Joaquin.)*

The actual decision-making process consisted of analysis by CCJPA staff and consultants of the Vision alternatives for each segment (and, in some cases, development of new alternatives based on new information – see the Jack London section in the next chapter), narrowing down of the alternatives to a single alternative in each segment, further design development to confirm the cost and engineering feasibility of the desired direction, and presentations of draft recommendations for each segment to an Ad Hoc Committee of the CCJPA Board. The entire process took about a year-and-a-half, and finally culminated in adoption of the initial study corridor by the full CCJPA Board in November 2016.



THE VISION IMPLEMENTATION PLAN

THE INITIAL STUDY CORRIDOR

The initial study corridor is a package of proposed capital improvements or construction projects that would allow Capitol Corridor service to, one day, operate in its own, electrified right-of-way at higher speeds and increased frequencies. While it defines a vision for the Capitol Corridor, it is not cast in stone – before any of the projects described in the following pages could proceed, a series of additional project-specific studies would need to be completed, studies that could take the Capitol Corridor in an entirely different direction. The initial study corridor itself could also change as part of future Vision Plan updates. Finally, negotiations with the UPRR could result in changes to plans.

However, the initial study corridor can provide a basis for these future planning and design efforts – in particular, for the projects envisioned for the segment between San Jose and Oakland, which are proposed to proceed within the next few years and replace the previous plan to make incremental improvements to the existing right-of-way in the segment.

The following corridor-level and segment-by-segment descriptions are focused on the passenger-only right-of-way; these are followed by descriptions of proposed improvements to freight rights-of-way. More detailed descriptions can be found in the appendices to this document.

Corridor

The following major improvements would be made in all segments between San Jose and Auburn:

- » Electric train infrastructure would be added, including overhead wires and substations as well as new electric multiple unit (EMU) vehicles.
- » Signaling systems would be upgraded to allow trains to safely run closer together.
- » Curves would be straightened and grades leveled to enable faster speeds (up to 125 mph north of the Carquinez Strait, with lower maximums in the Bay Area).
- » Existing stations would be retrofitted to provide high center-island platforms for level boarding, as well as other enhancements such as expanded access facilities (e.g., new bus bays).
- » Grade separation of all at-grade intersections, to be planned and funded in collaboration with local partners (some minor intersections would be closed).

San Jose-Oakland

In this segment, the proposed Capitol Corridor right-of-way would consist of the Oakland Subdivision through East Oakland, the Coast Alignment from Oakland south to Santa Clara, and the existing Caltrain-owned alignment south to San Jose – essentially, Alternative A from the Vision Plan (see previous chapter). The Coast Subdivision north of Newark Junction is currently used by the Amtrak Coast Starlight, and is currently the primary southbound freight route out of the Port of Oakland. Most freight trains would be relocated to the Oakland and Niles Subdivisions (freight trains could continue to serve local destinations overnight), and improvements would be made for them there (as described in the following pages). The Coast alignment is more direct than the current alignment, and while it would bypass existing stations in Hayward and Fremont, it would retain service to the center of Silicon Valley, and allow for a new station near the Dumbarton Bridge, potentially with bus rapid transit connections to Palo Alto and nearby cities. It would serve as a western “express” alternative to the Oakland-San Jose BART line farther east, which will include more stops, and would provide a variety of timely connections to Silicon Valley job centers.

THE VISION IMPLEMENTATION PLAN

From south to north, major proposed improvements include:

- » A new storage and maintenance facility near Tamien Station, south of Diridon Station and Downtown San Jose.
- » Improvements to Diridon Station to allow it to serve as a high-capacity hub for Capitol Corridor, Caltrain, California High-Speed Rail and VTA light rail trains. These improvements would largely be funded by and take place as part of the CAHSR project and would include high platforms for level boarding of Capitol Corridor trains.
- » Additional tracks in the segment shared with Caltrain and high-speed rail near Diridon, to accommodate more trains.
- » Reconstruction of the existing stations in Santa Clara.
- » Double-tracking of the existing single-track right-of-way through the Alviso Wetlands. This is an environmentally sensitive area, and the project would need to be carefully planned and carried out in collaboration with partners from various permitting agencies. As part of the project, the existing berm on which the Capitol Corridor's tracks run could be replaced by an open bridge, improving tidal flow and circulation, and the tracks could be raised, protecting against sea level rise.
- » A new station at or near the Ardenwood Park-and-Ride Fremont/Newark border. The park-and-ride is served by Dumbarton Express bus routes to Menlo Park and Palo Alto, and SamTrans has recently proposed improvements to transit in the corridor including bus rapid transit service to Redwood City. Timed connections here could effectively extend the reach of the Capitol Corridor into San Mateo County and onto the San Francisco Peninsula.
- » Double-tracking of remaining single-track segments north to Oakland.
- » A new viaduct in the Oakland Subdivision right-of-way in East Oakland, adjacent to the existing BART viaduct, with a new intermodal Oakland Coliseum Station providing direct connections to both BART and the BART to OAK shuttle train to Oakland International Airport.

Shifting from the existing alignment to a mostly passenger-only Coast Subdivision, with most freight relocated to another right-of-way, would mean that trips would no longer have to begin or end in Oakland due to capacity constraints to the south. This would allow the Capitol Corridor to immediately increase service between Oakland and San Jose from seven to 15 daily round trips, equivalent to the current level of service between Sacramento and Oakland, or potentially more. For this reason, shifting to the Coast Subdivision is the first priority of this plan. Remaining projects to further increase capacity and speed in this segment are recommended to occur around the same time, as they would allow for fast, frequent service between Oakland, Newark, Santa Clara and San Jose as a complement to the BART service farther east. However, they could be completed later.

THE VISION IMPLEMENTATION PLAN

Jack London

Jack London was identified during work planning for the VIP as an especially challenging segment that would require special attention, and an all-day workshop was held early in the VIP process with members of the project team as well as staff from the City of Oakland to review design concepts. The earlier Vision alternatives included a partial trench that would result in a raised berm along the Oakland waterfront; a short tunnel leading to a viaduct that might not be physically possible due to constraints, and would require property takings in West Oakland; and a long, expensive tunnel from East Oakland to Emeryville. Prior to the workshop, Caltrans staff provided the project team with construction drawings of the Posey and Webster Tubes. These drawings indicated that the upper segments of the Tubes serve as ventilation ducts and that the Tubes could be modified in order to allow for a deeper trench than previously thought possible - essentially, a tunnel completely below-grade with the exception of a short (two-block) segment in which street level would need to be raised a few feet. The recommended improvements for this segment, then, consist of:

- » A roughly half-mile passenger rail tunnel below 2nd Street, potentially accompanied by a freight rail tunnel below Embarcadero, thereby removing all trains from the street and from the surface (alternately, the passenger tunnel

could be located between Embarcadero and 2nd, allowing the raised segment to be located off-street, where new buildings could be erected on top of it).

- » A new subway station, ideally with a direct connection to a new BART station to be built as part of the second Transbay Tube project, which is now in early stages of planning (and could include standard-gauge tracks directly connecting to the Capitol Corridor to the north or south of Jack London, thereby allowing direct service to San Francisco; nothing in this plan would conflict with that). The location of this station would be dependent on the BART project. A connection to BART in Jack London would effectively extend the reach of the Capitol Corridor into San Francisco, and Downtown Oakland BART stations would be a short train ride away.

During the workshop, a number of non-rail but related projects were discussed, including the possibility of replacing the Posey and Webster Tubes with a pair of bridges over the Oakland Estuary (an auto-oriented extension of Adeline Street, along the edge of the Port of Oakland's Howard Terminal redevelopment site, and a transit- and pedestrian-oriented crossing at the foot of Broadway), thereby allowing the Jack London tunnels to be entirely below-grade.

SAN FRANCISCO BAY



EMERYVILLE STATION

POWELL



SAN PABLO

TELEGRAPH

BROADWAY

MARKET

GRAND

BART CONNECTIONS

NEW SUBWAY



3RD



WEBSTER HARRISON

14TH

LAKE MERRITT



OAKLAND JACK LONDON STATION



OAKLAND INNER HARBOR



0 0.5 1 Miles

THE VISION IMPLEMENTATION PLAN

Oakland-Richmond

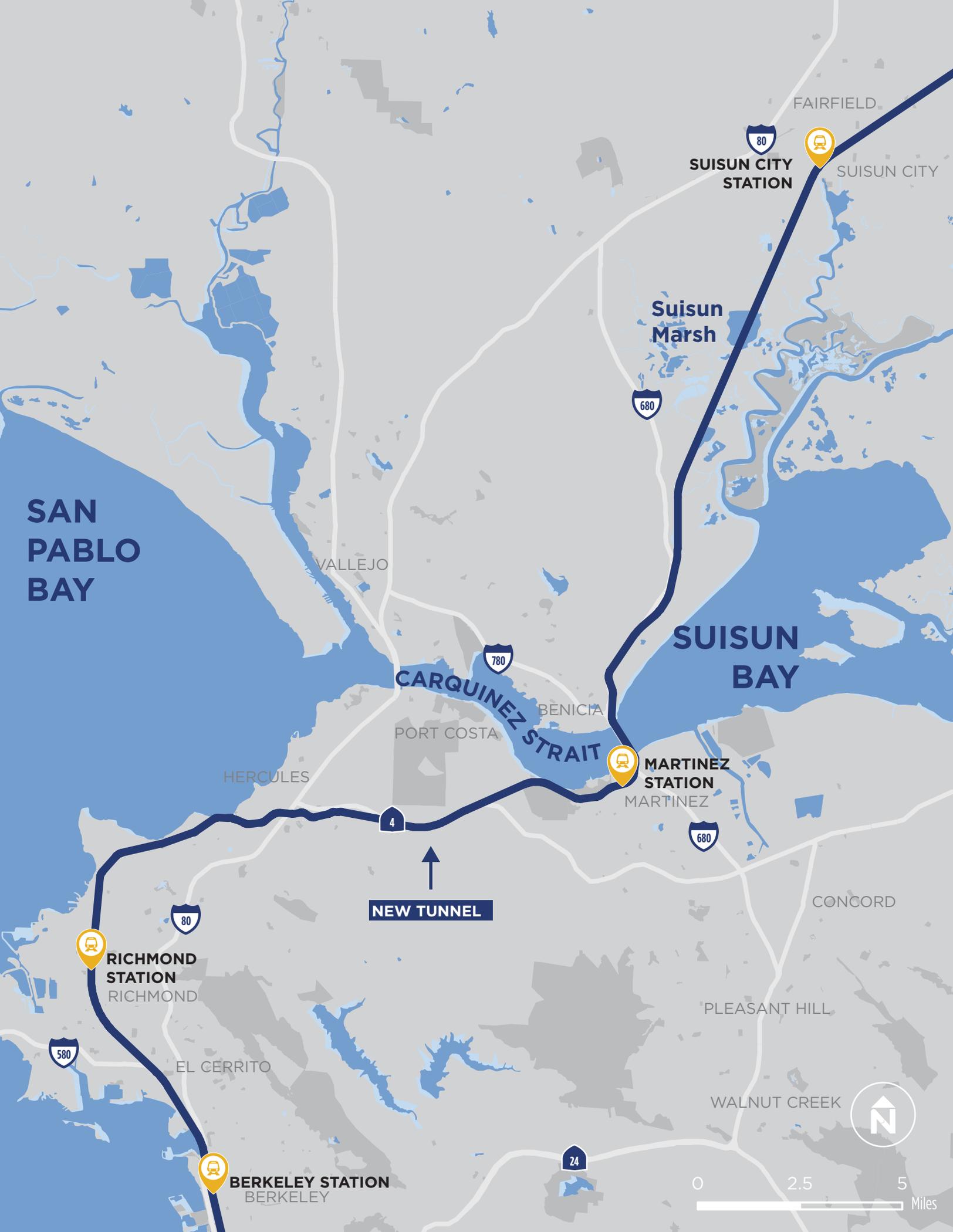
In this segment, the existing right-of-way would be expanded to accommodate new passenger-only tracks, as identified in the Vision Plan. The resulting capacity would be more than enough to accommodate the four trains per hour identified in the Vision Plan, and either the Capitol Corridor or another operator, such as BART, might provide additional service to the major employment and retail center of Emeryville (for example, a “short line” between Richmond and Oakland) as well as additional stops not served by the Capitol Corridor, such as a new stop near the University of California Richmond Field Station site. Existing stations would have to be rebuilt, including the existing hub for Capitol Corridor and other Amtrak trains at Emeryville.

Richmond-Suisun/Fairfield

In this segment, the earlier Vision Plan identified two alternative alignments: upgrades to the existing circuitous right-of-way along the shoreline of San Pablo Bay and the Carquinez Strait, or a new, more direct alignment featuring a five-mile tunnel in Franklin Canyon, between Hercules and Martinez. For the initial study corridor, the latter was selected – while it would cost more, it would reduce travel time by several minutes per trip (including trips on Amtrak San Joaquin and Coast Starlight trains, which share the Capitol Corridor right-of-way between Oakland and Martinez) and would avoid the environmental impacts associated with the shoreline alignment. This alignment would require partial use of an existing segment of BNSF right-of-way, new right-of-way alongside SR 4 and a new, elevated station on the Martinez waterfront.

The initial study corridor also includes a new, high-level crossing of the Carquinez Strait.

While a station at this location is not included in the initial study corridor, it would be possible to add a station at the existing Hercules Transit Center near the interchange of SR 4 and I-80.



SAN PABLO BAY

FAIRFIELD

SUISUN CITY STATION

SUISUN CITY

Suisun Marsh

680

VALLEJO

CARQUINEZ STRAIT

780

BENICIA

PORT COSTA

MARTINEZ STATION
MARTINEZ

SUISUN BAY

HERCULES

4

NEW TUNNEL

680

CONCORD

RICHMOND STATION
RICHMOND

80

PLEASANT HILL

580

EL CERRITO

WALNUT CREEK

BERKELEY STATION
BERKELEY

24



THE VISION IMPLEMENTATION PLAN

Suisun/Fairfield-Sacramento

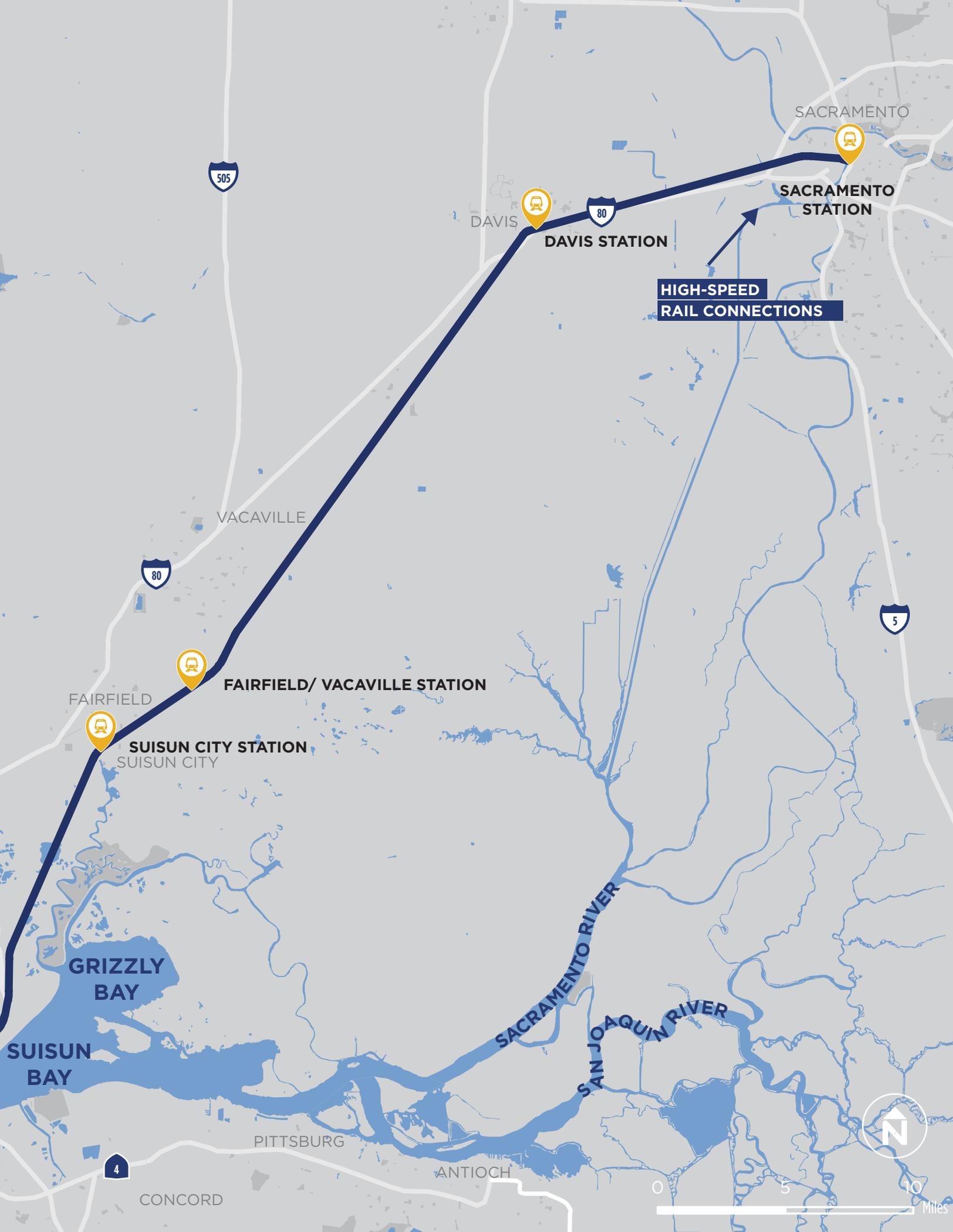
In this segment, as in the segment between Oakland and Richmond, the Vision Plan identified a single alternative: passenger-only use of the existing right-of-way (the Martinez Subdivision), and construction of a new right-of-way for freight farther east (described in the following pages).

As part of the VIP, a new element was added in this segment: a possible tunnel under Downtown Sacramento, to be shared with and partly funded by California High-Speed Rail. The tunnel would connect to new underground platforms at Sacramento Valley Station, and would allow Capitol Corridor and high-speed trains to avoid both street crossings as well as elevated viaducts. In the interim, Capitol Corridor trains could continue to access the station across the I Street Bridge.

Sacramento-Auburn

This segment was not evaluated as part of the Vision Plan. However, the initial study corridor includes passenger-only right-of-way featuring additional tracks to further expand service levels beyond the expansion currently being implemented between Sacramento and Roseville. There would also be a new elevated station in Roseville. Between Roseville and Auburn, it includes new passenger-only tracks, potentially along an existing alternative alignment, as well as a new station in Rocklin and relocated station in Auburn.





SACRAMENTO



SACRAMENTO STATION

DAVIS



DAVIS STATION



**HIGH-SPEED
RAIL CONNECTIONS**



VACAVILLE



FAIRFIELD/ VACAVILLE STATION

FAIRFIELD



SUISUN CITY STATION
SUISUN CITY



GRIZZLY BAY

SUISUN BAY

SACRAMENTO RIVER

SAN JOAQUIN RIVER

PITTSBURG

ANTIOCH



CONCORD



THE VISION IMPLEMENTATION PLAN

San Jose-Salinas

This segment is not currently part of the Capitol Corridor. However, the Transportation Agency of Monterey County (TAMC) has been planning for some time to establish new passenger rail service between Salinas and San Jose via Castroville, Pajaro/Watsonville and the existing Caltrain right-of-way in southern Santa Clara County (Salinas is currently a stop on the Coast Starlight, but it served just once daily.) As currently planned, this service would be initiated with two daily round trips, eventually expanding to six. Discussions have been held with the CCJPA Board of Directors about operating the service as part of the Capitol Corridor, but greater frequency between Oakland and San Jose would be needed to permit further extension of Capitol Corridor service to Salinas.

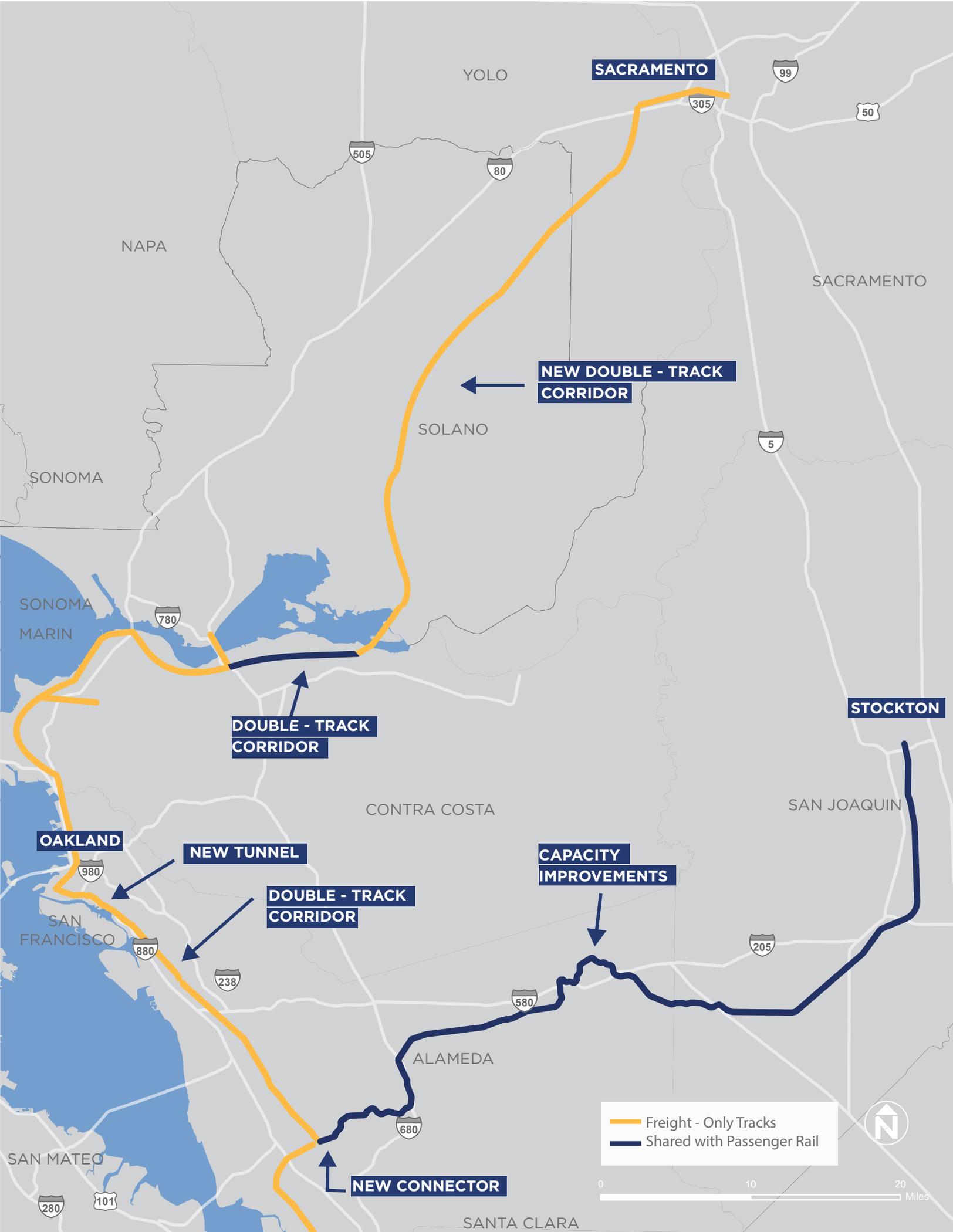
Freight Improvements

To provide passenger-only right-of-way extending from San Jose to Auburn, in the Sierra foothills, most freight trains would have to be relocated from two routes that they currently use: the Coast Subdivision and a short segment of the Oakland Subdivision between Newark and Oakland, and the Martinez Subdivision from Martinez to Sacramento (limited local access could be maintained using overnight operations and, in the case of the refineries in Benicia, via the existing Carquinez Strait drawbridge). In order to support goods movement and the regional economy by “keeping freight whole,” the following improvements to alternative routes for freight trains traveling between the Port of Oakland and inland areas are recommended:

- » Single-track segments of the Niles Subdivision between the Port of Oakland and Niles Junction would be double-tracked, and at-grade intersections would be grade-separated.
- » A new, more direct connection between the Oakland and Niles Subdivisions would be added at Shinn, near Niles Junction.
- » Sidings would be added to the east, between Niles Junction and Stockton, to further increase capacity.
- » A new tunnel could be provided at Jack London, as described in the previous pages.
- » Single-track segments of the Tracy Subdivision east of Martinez would be double-tracked.
- » A new high-level crossing of the Delta east of Suisun Bay would be built.
- » A new double-track railroad would be constructed in the former Sacramento Northern right-of-way between the Delta and the Martinez Subdivision just west of Sacramento.

Construction of a brand-new 42-mile railroad would be relatively expensive. If this proved infeasible, alternative improvements could be made to either the Tracy or Stockton Subdivisions used by the UPRR and BNSF, respectively. However, this would route freight trains well to the east, making freight trips between the Bay Area and Sacramento significantly longer.

Once these improvements are completed, the Port of Oakland will be served by two freight lines unencumbered by passenger trains.



SACRAMENTO

YOLO



NAPA

SACRAMENTO

NEW DOUBLE - TRACK CORRIDOR



SOLANO



SONOMA



SONOMA MARIN

DOUBLE - TRACK CORRIDOR



CONTRA COSTA

SAN JOAQUIN

STOCKTON

OAKLAND

NEW TUNNEL



DOUBLE - TRACK CORRIDOR



CAPACITY IMPROVEMENTS



SAN FRANCISCO



ALAMEDA



NEW CONNECTOR



Legend:
— Freight - Only Tracks
— Shared with Passenger Rail



0 10 20 Miles

SANTA CLARA

SAN MATEO

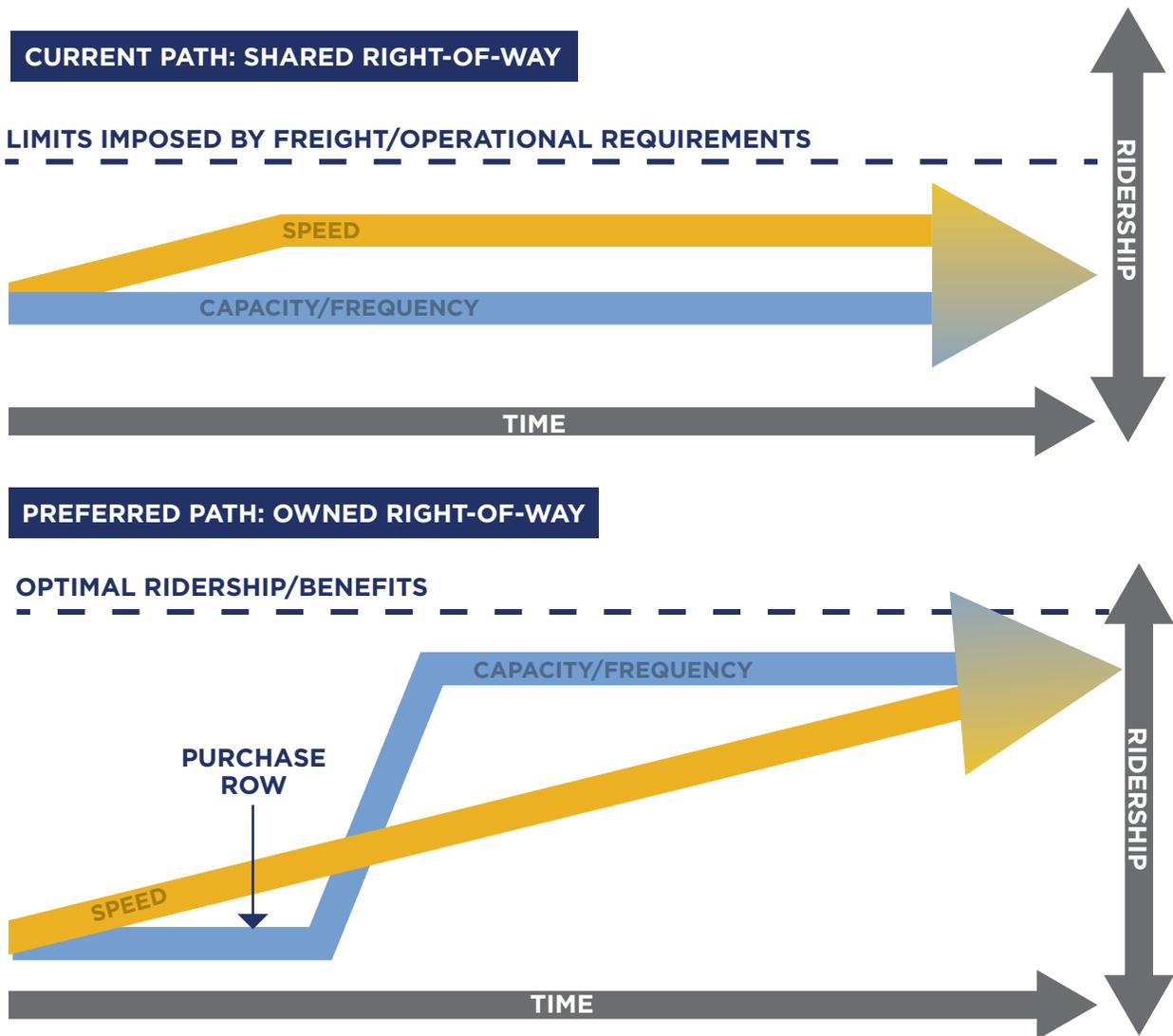


THE VISION IMPLEMENTATION PLAN

Operating Plan

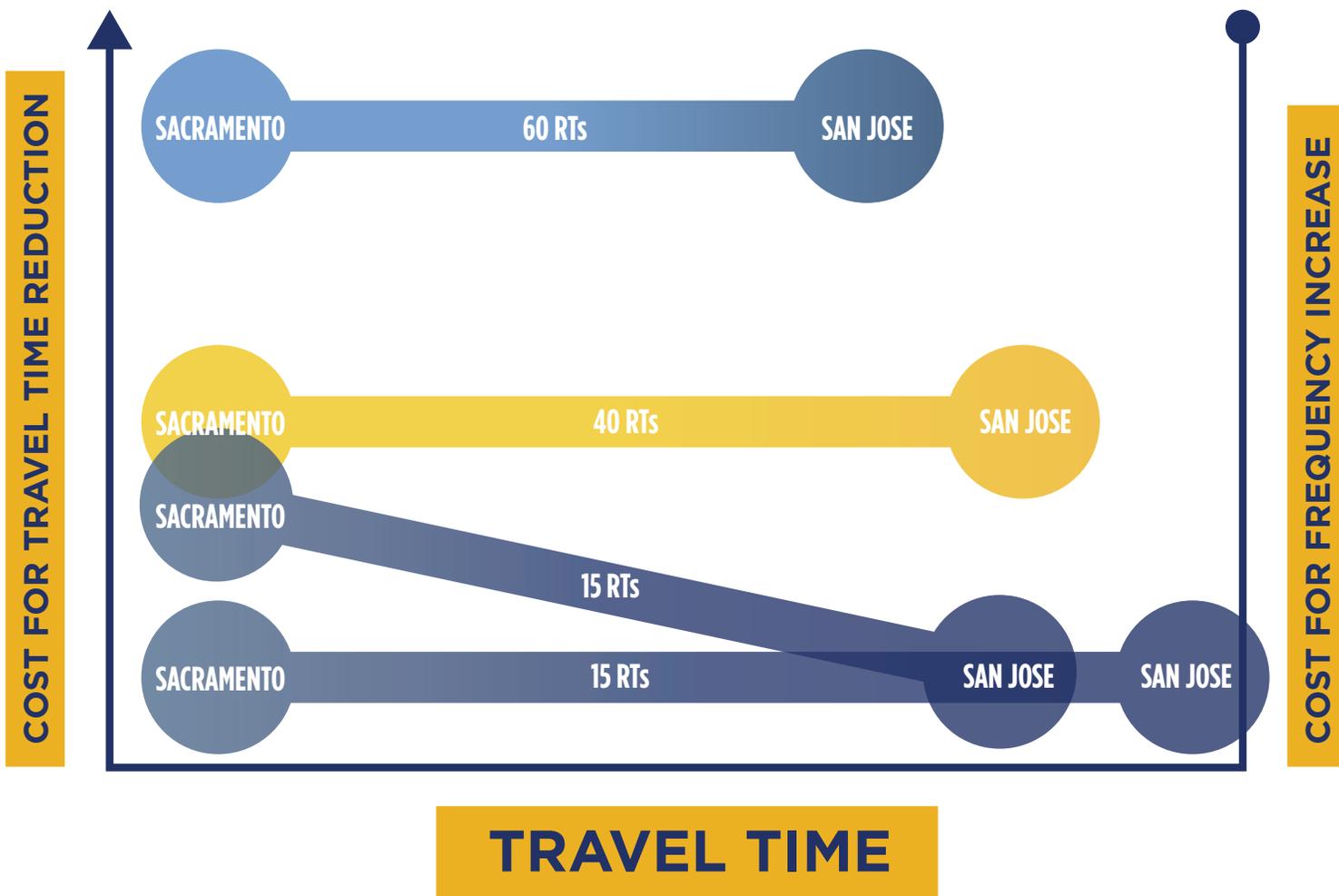
The Vision Plan called for much more frequent service than currently exists, and the improvements called for as part of the initial study corridor - including dedicated right-of-way for passenger rail service, free of conflicts with freight rail - would greatly increase the capacity of the Capitol Corridor to run more trains.

Many service configurations are possible, and the ultimate configuration of service will not be determined for some time. In planning for future service, however, we have assumed up to four trains per hour, or trains departing every 15 minutes during peak periods (rush hours). Two of these trains would be express trains making only the busiest stops (to be finalized through future analyses), while the other two would serve all stops. Outside of peak periods, all trains would make all stops. Service would run no less often than every hour from early in the morning until



late at night. In the interim, service could be increased in segments as additional capacity became available; for example, dedicated right-of-way between San Jose and Oakland would allow service levels to be increased there from seven to 15 round trips per day, matching existing service between Oakland and Sacramento.

In addition to being more frequent, future trains will be much faster. The chart on the following page shows estimated travel times between San Jose and Sacramento today and upon completion of the initial study corridor, for both local and express trains.



THE VISION IMPLEMENTATION PLAN

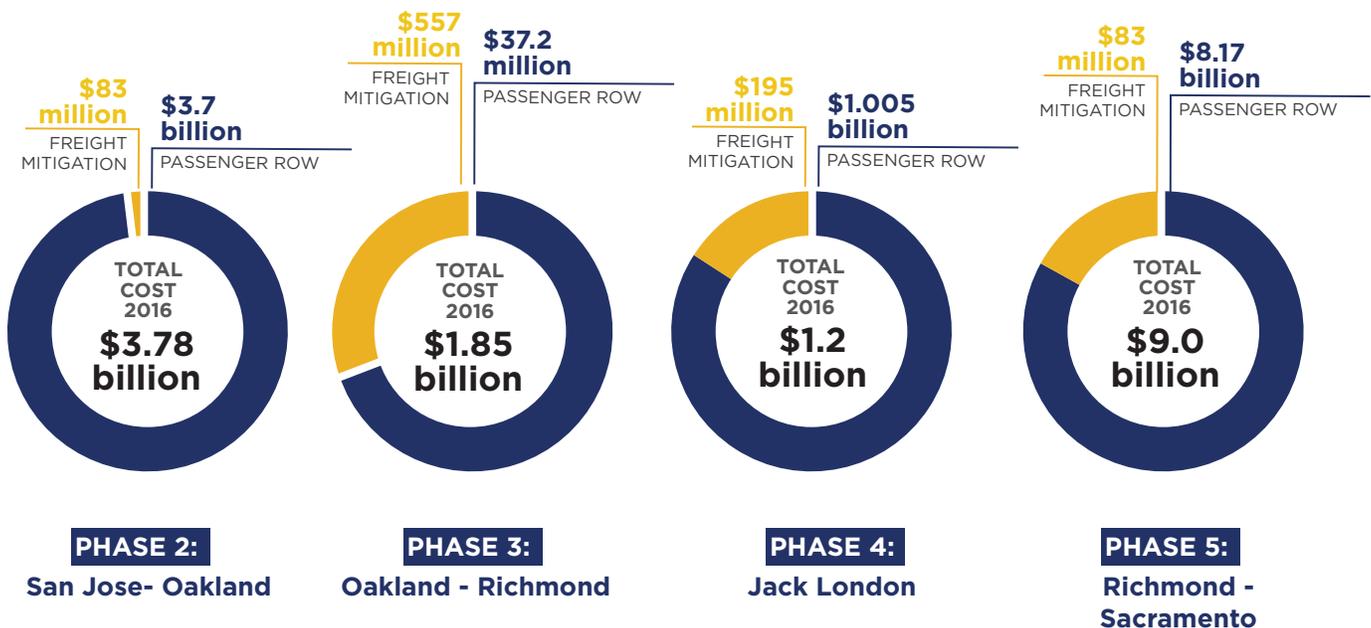
Project Prioritization

Due to its size, complexity and cost, the Vision Implementation Plan will take many decades to complete. For this reason, a strategy of incremental implementation of packages of related projects (primarily projects within each individual segments) has been developed. This strategy prioritizes packages of projects based on their ability to enable “early win” interim benefits and to “set the stage” for other projects. The prioritization strategy is shown on the following page. Note that improvements outside of the rail right-of-way such as grade separations and expanded stations could be completed on an incremental basis over the life of the project, providing accumulating benefits as they are implemented.

Costs and Funding

The Vision Implementation Plan will take many decades to fully implement. When thinking about costs, this is important to understand: It is a relatively expensive plan, but also one that would be funded and implemented over a period of decades. It is also important to understand that economic, ridership and other benefits have not yet been quantified (but will be quantified in the next phase of Vision work, as part of the Vision Communications Plan).

Estimated capital costs (in current dollars) for each phase are shown below. These estimates assume a contingency of 30 percent. They also include both “core” projects such as additional tracks, modified stations and new railcars as well as “related” projects such as grade separations. The proposed second phase of passenger improvements, between San Jose and Oakland, would cost approximately \$3.8 billion.



THE VISION IMPLEMENTATION PLAN

By way of comparison, California High-Speed Rail between the Bay Area and the Los Angeles area is currently estimated to cost \$68 billion, Los Angeles County voters recently approved a package of transportation improvements costing \$120 billion, and a new Amtrak tunnel under the Hudson River between New York and New Jersey is currently estimated to cost \$24 billion.

The appendix to this report includes a list of existing and potential funding sources that could be used to implement the Plan. It is important to understand, however, that the VIP is a long-term plan – and the funding framework for major transit capital projects has both evolved greatly over time, and continues to evolve, making future funding sources difficult to predict. State funding has declined, and federal funding

from traditional sources (such as the FTA New Starts program) has declined even as other sources (such as TIGER grants) have emerged. One major trend of late has been the emergence of so-called “P3” public-private partnerships under which the private sector takes on some combination of design, construction, operation and maintenance, for a fee. Another nontraditional possibility is so-called “value capture” strategies in which profits from private development enabled by the project are taxed to fund construction, although situations in which value capture may be used are generally limited. The Vision Communications Plan will develop a strategy to support project implementation.

Priority	1	2	3	4	5	6
Projects Status/Reason for Timing	Already have funding & approvals	Could greatly improve speed and frequency on part of line	Enable further improvements	Major projects that provide immediate benefits	Enable dedicated right-of-way, electrification	Extend dedicated right-of-way, electrification
Timeline	< 10 years	10-15 years	15-20 years	20-25 years	25-30 years	TBD
Passenger Projects	Sacramento-Roseville 3rd track	San Jose-Oakland improvements	Oakland-Richmond improvements	Oakland Jack London tunnel	Richmond-Sacramento improvements	Sacramento-Auburn improvements
Freight Projects		Oakland/Niles Connections	Oakland/Niles Double-track	Oakland Jack London tunnel	New Martinez-Sacramento right-of-way	



STEPS IN THE VISION PROCESS

Should we change the direction of the Capitol Corridor?

YES - We have reached the end of our current path, and conditions are changing

What should the Capitol Corridor of the future look like?

A high-speed feeder railroad built to modern global standards

Confirm that we should proceed

Confirm that this is achievable

Confirm that we should pursue this

Pursue the Vision of a capital and service improvement plan phased in over 30-40 years

WHAT'S NEXT?

The Capitol Corridor Board of Directors adopted the Vision Implementation Plan in November 2016. The next step in this process will be the Vision Communications Plan, or VCP, which will have the following primary purposes:

- » To develop a more detailed analysis of potential economic and other benefits, including more detailed ridership estimates; and
- » To share the initial study corridor with community and agency partners, get feedback, and start to build consensus.

The VCP will take the final, critical steps necessary to define the value of and justify the investment described in the VIP.