



Transportation Concept Report State Route 1 South

District 4
April 2018



California Department of Transportation

*"Provide a safe, sustainable, integrated, and efficient transportation system
to enhance California's economy and livability"*

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<http://www.dot.ca.gov/dist4/systemplanning/>

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Cover Photo: Gray Whale Cove near Pacifica, Dean Coppola

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CALTRANS MISSION & GOALS

MISSION:

Provide a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability.

GOALS:

Safety and Health - Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.

Stewardship and Efficiency – Responsibly manage California's transportation-related assets.

Sustainability, Livability and Economy - Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.

System Performance - Utilize leadership, collaboration and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.

Organizational Excellence - Be a national leader in delivering quality service through excellent employee performance, public communication, and accountability.

ABOUT THE TRANSPORTATION CONCEPT REPORT

System Planning is the long-range, comprehensive transportation planning process for the California Department of Transportation (Caltrans). The System Planning process fulfills Caltrans' statutory responsibility (Government Code §65086) as owner/operator of the State Highway System (SHS) by identifying deficiencies and proposing improvements to the SHS. Through System Planning, Caltrans develops an integrated, multimodal transportation system that meets Caltrans goals of safety, efficiency, sustainability, stewardship, and service.

The SHS serves primarily interregional and regional travel demand. While the SHS provides access to specific destinations such as public facilities or major tourist attractions, development of the SHS is conducted in the context of the mobility of regional and statewide to-and-through movement of people and goods.

TCR Purpose

California's State Highway System needs long-range planning documents to guide the logical development of transportation systems as required by law and as necessitated by the public, other stakeholders, and system users. The purpose of the TCR is to evaluate current and projected conditions along the route and communicate the vision for the development of each route in each Caltrans District during a 25 year planning horizon. The TCR is developed with the goals of increasing safety, improving mobility, providing excellent stewardship, and meeting community and environmental needs along the corridor through integrated management of the transportation network, including the highway, transit, pedestrian, bicycle, freight, operational improvements and travel demand management components of the corridor.

STAKEHOLDER PARTICIPATION

The SR 1 South TCR is the product of the Office of System and Regional Planning, District 4, with consultation and review by Caltrans transportation partners in San Francisco and San Mateo Counties.

EXECUTIVE SUMMARY

State Route 1 (SR 1) is a major north-south corridor that runs 656 miles along California’s Pacific Ocean coast. It covers twelve counties and is the longest State route in California. In Caltrans District 4, SR 1 runs from the San Mateo/Santa Cruz County line in the south through San Mateo, San Francisco, Marin, and Sonoma Counties, terminating at the Sonoma/Mendocino County line. For purposes of TCR development the route is divided at the Golden Gate Bridge as “SR 1 North” and “SR 1 South.” This TCR covers the portion of SR 1 from the San Mateo/Santa Cruz County line in the south to the Golden Gate Bridge in the north.

Starting in a northerly direction, SR 1 begins as a two-lane conventional highway at the San Mateo/Santa Cruz County Line, becomes a freeway at Sharp Park Road in Pacifica, runs conterminously with I-280 in northern San Mateo County, and then becomes a conventional highway once again in San Francisco City and County. The route becomes 19th Avenue in San Francisco, passes through Golden Gate Park, and becomes Park Presidio Boulevard through the Presidio where it joins US 101 (Presidio Parkway) just before the Golden Gate Bridge Toll Plaza.

The 25-year Concept from existing facility to future facility is summarized below, including recommended strategies by segment.

SR 1 South Concept Summary

<u>SEGMENT</u>	<u>COUNTY</u>	<u>SEGMENT DESCRIPTION</u>	<u>EXISTING FACILITY</u>	<u>25-YR CONCEPT</u>	<u>STRATEGIES TO ACHIEVE CONCEPT</u>
Segment A PM 0.00–29.04	SM	Santa Cruz/San Mateo County Line to SR 92	2 lane Conventional Highway	2 lane Conventional Highway	<ul style="list-style-type: none"> • Monitor and plan for sea level rise • Continue to study SR1 erosion and bypass between Pescadero & San Gregorio. • Monitor and install rock slope protection and drainage • Support completion of CA Coastal Trail • Support “Connect the Coastside” plan • Improve the pedestrian environment
Segment B PM 29.04–R43.46	SM	SR 92 to Sharp Park Road, Pacifica	2-4 lane Conventional Highway	2-6 lane Conventional Highway	<ul style="list-style-type: none"> • Support “Connect the Coastside” efforts • Support completion of CA Coastal Trail • Implement new Traffic Operations Systems elements including Closed Circuit TV and Variable Message Signs • Maintain & improve Park & Ride lots • Improve coastal community safety & mobility with consistent roadway edges, shoulders, ped crossings & roundabouts • Monitor and plan for sea level rise
Segment C PM R43.46–R48.55	SM	Sharp Park Road to SM/SF County Line	4-10 lane Freeway	4-10 lane Freeway	<ul style="list-style-type: none"> • Implement new TOS elements • Implement ramp metering per 2015 Ramp Metering Plan (I-280 coterminous portion) • Monitor and plan for sea level rise • Close gaps in the parallel and intersecting corridor bicycle network • Improve pedestrian environment at I/S and I/C in areas with pedestrian demand • Support completion of CA Coastal Trail
Segment D PM 0.0–7.08	SF	SM/SF County Line to US 101	Tunnel and 4-6 lane Conventional Highway*	Tunnel and 4-6 lane Conventional Highway*	<ul style="list-style-type: none"> • Improve pedestrian environment at I/S and I/C in areas with pedestrian demand • Promote pedestrian refuges wherever possible, such as being built along the M Ocean View Muni tracks. • Close gaps in the corridor bicycle network

PM = Post Mile

*Segment D becomes a four-lane freeway at Lake Street for the final mile before joining US 101 (PM 5.96-7.08)

Concept Rationale

The 25-year Concept for SR 1 South is a two-lane conventional highway where it is currently in Segment A, from the Santa Cruz County line to Half Moon Bay. Segment B from Half Moon Bay to Pacifica remains two to four lanes conventional highway, except for the 1.3 mile segment of Calera Parkway in Pacifica which would have six lanes, pending agreement by the City of Pacifica and the San Mateo County Transportation Authority. The four to ten-lane freeway segment from Pacifica through Daly City (Segment C) remains unchanged, as does the four to six-lane conventional highway through San Francisco (Segment D).

The future concept generally keeps the route's existing capacity and function, while introducing operational improvements to manage demand and optimize system performance. Mobility efficiency and integration between all transportation modes are required to meet long-term mobility needs and the statewide goal of reducing greenhouse gas (GHG) emissions. Improvements to the bicycle and pedestrian network and improvements in transit service frequency could keep some vehicular trips off the highway system.

As with many State routes throughout California, improvements to the SR 1 South Corridor throughout its length will rely primarily on Intelligent Transportation Systems (ITS) infrastructure, implementation of Traffic Operation System (TOS) elements, and pavement preservation/rehabilitation.

Implementation strategies for this TCR are consistent with Caltrans Strategic Management Plan 2015-2020. In response to Caltrans updated mission, vision, and goals, the Strategic Management Plan 2015-2020 links strategic goals with corresponding performance measures that the Department is responsible for achieving. The tools used to implement the Plan are performance measurement, transparency, accountability, sustainability, and innovation.

CORRIDOR OVERVIEW

ROUTE DESCRIPTION

State Route 1 (SR 1) is a major north-south corridor that runs 656 miles along California’s Pacific Ocean coast. Designated an “All-American” scenic road by the Federal Highway Administration for its cultural, recreational, and scenic qualities, it is the longest State route in California, covering twelve counties. It begins at Interstate 5 (I-5) near Dana Point in Orange County and terminates at the junction of US 101 in Mendocino County. In addition to providing a scenic route to numerous attractions along the coast, in the Bay Area the route serves as a major thoroughfare in the populated cities and towns near San Francisco.

In Caltrans District 4, SR 1 runs from the San Mateo/Santa Cruz County line in the south through San Mateo, San Francisco, Marin, and Sonoma Counties, terminating at the Sonoma/Mendocino County line. For purposes of TCR development the route is divided at the Golden Gate Bridge as “SR 1 North” and “SR 1 South.” This TCR covers the 55-mile portion of SR 1 South from the San Mateo/Santa Cruz County line to the Golden Gate Bridge.

The Corridor through San Mateo and San Francisco Counties is a scenic coastal route, linking the communities of Pescadero, Half Moon Bay, El Granada, Moss Beach, Pacifica, Daly City, and San Francisco. It is generally a picturesque four-lane conventional highway, passing several State recreational areas such as Año Nuevo State Park, Pigeon Point Lighthouse, Bean Hollow State Beach, Pomponio State Beach, San Gregorio State Beach, Gray Whale Cove State Beach, and McNee Ranch State Park. In the northern portion closer to San Francisco the route passes Stern Grove and through Golden Gate Park, as well as several portions of the extensive Golden Gate National Recreation Area, including Mori Point and Sweeney Ridge in San Mateo County, and the Presidio in San Francisco. SR 1 is a multi-lane freeway in a section from Pacifica to San Francisco, with a two-mile portion of the route coterminous with I-280 through Daly City.

ROUTE SEGMENTATION

To better analyze a transportation corridor, most corridors are divided into smaller segments based on criteria such as changes in terrain, changes in facility type or function, or county and District boundaries. This approach provides a more detailed level of planning and analysis of the corridor. The following are some of the criteria used for dividing a route into route segments:

- Caltrans District boundaries
- County boundaries
- Major changes in traffic volumes or facility type
- Changes in the number of lanes
- Significant changes in grade/terrain
- Changes in route function including recreational, trucking, commuting, etc.

The SR 1 South Corridor was divided into four segments, labeled A through D, as shown in Table 1 and Figure 1.

Table 1: SR 1 South Segmentation by Post Mile

Segment #	Location Description	County/Route/ Beginning PM	County/Route/ End PM
A	Santa Cruz/San Mateo County Line to SR 92	SM 1 0.0	SM 1 29.04
B	SR 92 to Sharp Park Road, Pacifica	SM 1 29.04	SM 1 R43.46
C	Sharp Park Road to SM/SF County Line	SM 1 R43.46	SM 1 R48.55
D	SM/SF County Line to US 101	SF 1 0.0	SF 1 7.08

Figure 1: Corridor Segmentation Map



Segment A Summary

Segment A - from the San Mateo/Santa Cruz County Line to SR 92 in Half Moon Bay (29.0 miles)

Along the San Mateo County coastline, from Santa Cruz to Pacifica, SR 1 is known as the “Cabrillo Highway” and operates as a conventional highway. The route provides primary access to several coastal communities as well as access to beaches, parks, and other attractions along the coast, making it a popular route for tourists.



SR 1 near Pescadero State Beach, looking north

Photo: Google Images

Entering San Mateo County from the south, SR 1 follows the west coast of the San Francisco Peninsula, passing by the marine mammal colonies at the Año Nuevo State Reserve, and the historic Pigeon Point Lighthouse, before reaching Half Moon Bay. The Pigeon Point Lighthouse is one of the most photographed lighthouses in the U.S.



Pigeon Point Lighthouse near Pescadero

Photo: The Wandering Angel, Flickr

Unincorporated San Gregorio, at the SR 1/SR 84 interchange, is a picturesque town of rolling rangeland, and century homes. The San Gregorio General Store has been operating here since 1889.

Further north is Half Moon Bay, a coastal city in a natural setting, welcoming to tourists with its historic downtown, shops, restaurants, beaches, parks, and golf courses. There are also many farms and nurseries growing a variety of products such as strawberries, artichokes, Brussels sprouts, flowers, pumpkins, and Christmas trees. Seasonal events such as the Pumpkin Festival and the nearby Mavericks surf competition can bring multitudes of visitors and ensuing vehicle traffic.

A portion of Segment A near Half Moon Bay northward is included in the study area of a community planning effort for residents and businesses of coastal communities on SR 1 called “Connect the Coastside,” taking a comprehensive look at the transportation needs for SR 1 and the adjoining SR 92 connection to the greater Bay Area.



SR 1 at Surfers Beach near Half Moon Bay, looking south

Photo: Caltrans D4 Photography

Segment B Summary

Segment B – from SR 92 in Half Moon Bay to Sharp Park Road in Pacifica (14.4 miles)

Between Half Moon Bay and Pacifica, SR 1 is generally a two-lane road with left-turn pockets and right-turn lanes at some intersections. Near SR 92 in Half Moon Bay, and near Pacifica between Linda Mar Boulevard and Sharp Park Road, the conventional highway is four lanes. The setting varies from rural, undeveloped surroundings, where traffic movement is unimpeded, to more urbanized settings with cross traffic, parking, driveway access, and periods of congestion during work commute and school times. The route passes through the towns of Miramar, El Granada, Moss Beach, and Montara. There are periods of traffic congestion on weekends with good weather and during annual events at Half Moon Bay Airport, Pillar Point Harbor, and the City of Half Moon Bay. Visitors park in designated lots and informally along the highway shoulder at points along the route for trail and beach access.

Just south of Pacifica, the highway bypasses a treacherous stretch of the coast known as Devil's Slide. Frequent landslides and erosion along the coast here have caused portions of SR 1 to either be closed for long periods, or re-routed entirely. Devil's Slide, a particularly mountainous stretch of roadway between Half Moon Bay and Pacifica, was prone to major landslides that caused road closures for up to five months at a time. The Tom Lantos Tunnels opened here in 2013 to bypass the area. Today, the former 1.3 mile section of SR 1 operates as the Devil's Slide Trail for pedestrians, bicyclists, and horseback riders and has been designated as a California Coastal Trail segment.



Tom Lantos Tunnels, south of Pacifica

Photo: Caltrans D4 Photography



Devil's Slide Trail. Old SR 1 section replaced by the Tom Lantos Tunnel Photo: Google Images

Bicyclists can often make their way along the coast using the SR 1 road shoulders, some of which are narrow in topographically constrained segments. Pedestrian and bicycle activity is prevalent in the community areas and at locations with access to shops, beaches, surfing, hiking trails, and bicycle routes.



Pedestrians along SR 1 near Pacifica

Photo: Caltrans District 4 Photography

Segment C Summary

Segment C – from Sharp Park Road in Pacifica to San Mateo/San Francisco County Line (4.9 miles)

From Pacifica, through Daly City, and to the northern reach of San Mateo County, SR 1 operates as a freeway with controlled access. Just north of Pacifica, the route turns inland, crosses SR 35 (Skyline Boulevard), and merges with Interstate 280 in Daly City near the Serramonte Shopping Center. The corridor becomes more than ten lanes wide at this point, and shows the highest traffic volumes for the entire corridor. As it reaches the City and County of San Francisco, SR 1 splits from I- 280, where the route then becomes Junipero Serra Boulevard into San Francisco.



SR 1/ I-280 southbound

Photo: Caltrans D4 Photography



Northbound SR 1/I-280 Daly City

Photo: Google Streetview



Northbound on SR 1/I-280, Daly City

Photo: Google Streetview

Segment D Summary

Segment D – from San Mateo/San Francisco County Line to US 101 before Golden Gate Bridge (7.0 miles)

After splitting from I-280, SR 1 becomes Junipero Serra Boulevard as it enters the City & County of San Francisco. Shortly thereafter, the route makes a slight left and becomes the six-lane-wide 19th Avenue. Here the traffic can be heavy, as the route passes the Stonestown Galleria shopping center, San Francisco State University with an enrollment of 29,000 students, and the Park Merced and other residential neighborhood buildings and commercial spaces. The San Francisco Municipal Railway's M Ocean View light rail line runs in the median of the route for a portion of the corridor. After passing through the Sunset District of San Francisco, SR 1 turns into Park Presidio Boulevard as it bisects the city's Golden Gate Park. In its last mile, north of Lake Street, the route enters the federal Presidio of San Francisco as a four-lane freeway, passing through the MacArthur Tunnel, and joining US 101 at the Presidio Parkway (formerly Doyle Drive) on its approach to the Golden Gate Bridge and points north (SR 1 North).



SR 1 (19th Avenue) northbound near Rossmoor Drive,, San Francisco

Photo: Google Streetview



SR 1 (19th Avenue at Ulloa St.), San Francisco

Photo: Kim Komenich, San Francisco



General MacArthur Tunnel, San Francisco Presidio

Photo: Google Images

ROUTE DESIGNATIONS

Table 2: Route Designations

SR 1 South Route Designations and Characteristics				
Segment:	A	B	C	D
	Santa Cruz/San Mateo County Line to SR 92	SR 92 to Sharp Park Road, Pacifica	Sharp Park Road to SM/SF County Line	SM/SF County Line to US 101
California Freeway & Expressway System (F&E)	Yes	Yes	Yes	Yes
National Highway System (NHS)	Partial (North of Tunitas Creek Rd.)	Yes	Yes	Yes
Strategic Highway Network (STRAHNET)	No	No	No	No
Scenic Highway	Yes	Eligible	Eligible	Eligible
Interregional Road System (IRRS)	Yes	Yes	Yes	Yes
Federal Functional Classification	Minor Arterial/Other Principal Arterial	Other Principal Arterial	Other Freeway or Expressway/ Interstate	Other Principal Arterial/Other Freeway or Expressway
Goods Movement Route	No	No	Tier 3 (I-280 portion only)	No
Truck Designation	Terminal Access (STAA*)/ Kingpin to Rear Axle 40 ft. max	CA Legal 65' KPRA 40' max/ Restrictions in Tom Lantos Tunnel	Terminal Access (STAA*)/ Kingpin to Rear Axle 40 ft. max	CA Legal Route 65' max Kingpin to Real Axle 40 ft. max
Rural/Urban/Urbanized	Rural	Rural	Urbanized	Urbanized
Metropolitan Planning Organization/ Regional Transportation Planning Agency	Metropolitan Transportation Commission			
Congestion Management Agency	San Mateo City/County Association of Governments			San Francisco County Transportation Authority
Local Agency	San Mateo County/ City of Half Moon Bay	San Mateo County/ City of Pacifica	San Mateo County/ City of Daly City	San Francisco County Transportation Authority, City & County of San Francisco
Air District	Bay Area Air Quality Management District			
Terrain	Mountainous/ Rolling	Mountainous/ Rolling	Mountainous/ Rolling	Rolling/Flat

*STAA = federal Surface Transportation Assistance Act of 1982

SR 1 South is part of California’s Freeway and Expressway System. It is also designated in the MAP-21 National Highway System (NHS) as a “Principal Arterial.” SR 1 has been identified as one of the 93 statutory Interregional Road System (IRRS) routes for California, linking urban and rural regions of the State. The route is not part of the National Highway Freight Network for goods movement, and is not identified in the 2015 California Freight Mobility Plan. The entire corridor in San Mateo and San Francisco Counties either has California Scenic Highway status or is eligible for Scenic Highway status.

DEMOGRAPHICS

Table 3: 2040 Population, Household, and Employment Projections

COUNTY	POPULATION		% CHANGE	# HOUSEHOLDS		% CHANGE	EMPLOYMENT		% CHANGE
	2010	2040		2010	2040		2010	2040	
Alameda	1,510,000	1,988,00	32%	545,000	705,000	29%	694,000	948,000	37%
Contra Costa	1,049,000	1,338,000	27%	375,000	464,000	24%	345,000	467,000	35%
Marin	252,000	285,000	13%	103,000	112,000	9%	111,000	129,000	17%
Napa	136,000	164,000	20%	49,000	56,000	14%	71,000	90,000	27%
San Francisco	805,000	1,086,000	35%	346,000	447,000	29%	569,000	759,000	34%
San Mateo	718,000	905,000	26%	258,000	315,000	22%	345,000	445,000	29%
Santa Clara	1,782,000	2,423,000	36%	604,000	818,000	35%	926,000	1,230,000	33%
Solano	413,000	512,000	24%	142,000	169,000	19%	132,000	180,000	36%
Sonoma	484,000	598,000	24%	186,000	221,000	19%	192,000	257,000	34%
Total	7,151,000	9,306,000	30%	2,608,000	3,307,000	27%	3,385,000	4,505,000	33%

Source: Jobs Housing Connection Strategy, ABAG 2013

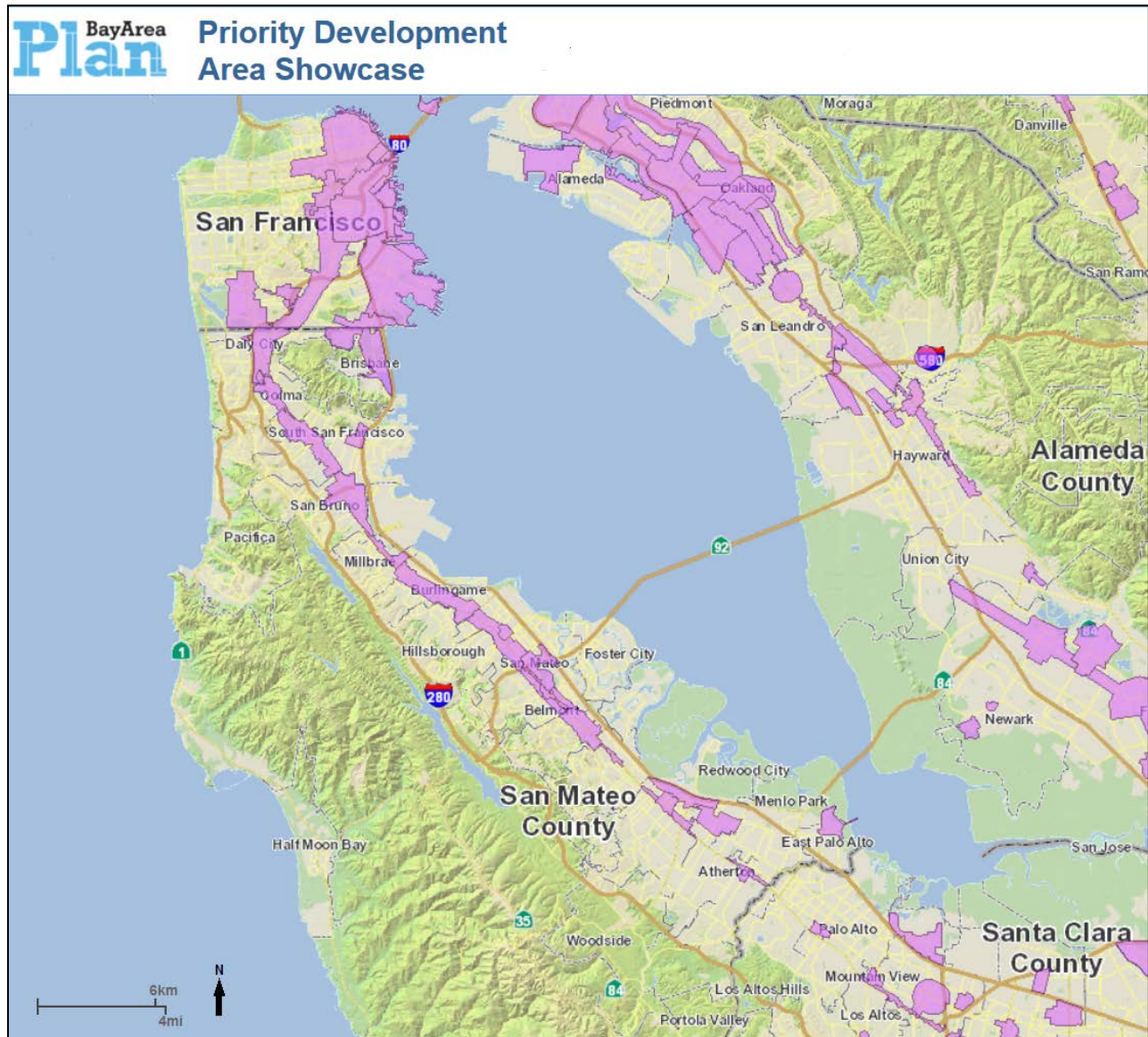
There will be considerable growth by 2040 for both San Mateo and San Francisco Counties in terms of population, number of households, and jobs. San Mateo County population is projected to grow by about a quarter (26%) and San Francisco County by over a third (35%).

Both counties expect large increases in employment and household growth, which will place more demand on the

Plan Bay Area – The Bay Area in 2040: “Between 2010 and 2040, the nine-county San Francisco Bay Area is projected to add 1.1 million jobs, 2.1 million people, and 660,000 homes, for a total of 4.5 million jobs, 9.3 million people, and 3.4 million homes.”

transportation system. Plan Bay Area 2040, the region’s Regional Transportation Plan to the Year 2040, concentrates development along transit corridors in Priority Development Areas (PDAs) (See Figure 2). In San Mateo County, development will be focused along the transit-rich El Camino Real (SR 82)/Caltrain rail corridor. PDAs here are adjacent to the Caltrain Peninsula stations, such as Caltrain’s Hayward Park Station in San Mateo and the BART stations from Millbrae northward. In San Francisco County, the PDAs are generally within proximity to the BART stations, eastern neighborhoods, and downtown San Francisco.

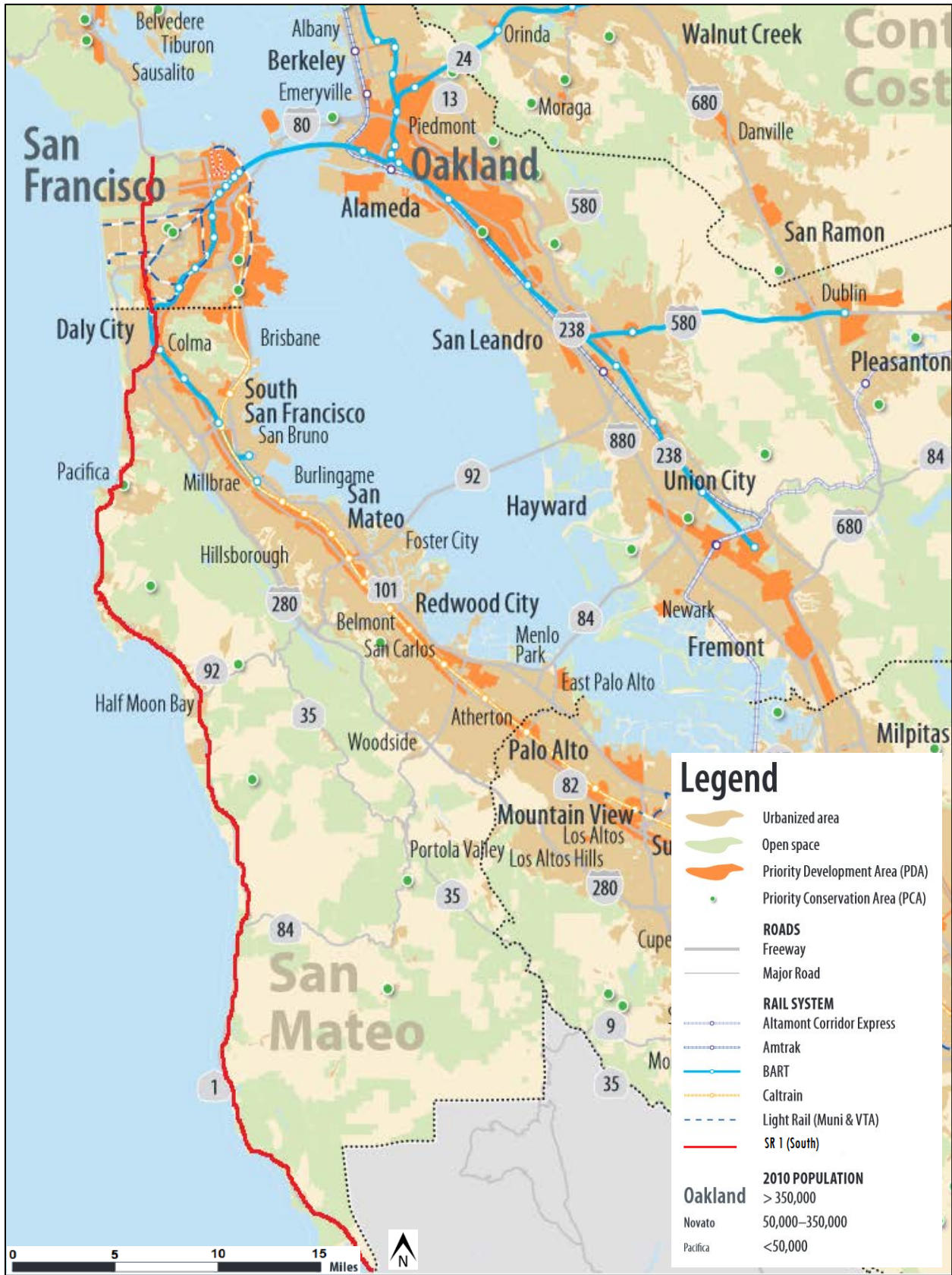
Figure 2. Priority Development Areas in San Mateo and San Francisco Counties



LAND USE

SR 1 covers a wide variety of land uses along its 55-mile length from rural southern San Mateo County to very densely-developed San Francisco. Throughout most of the scenic corridor, the route traverses farms, grazing land, parks, and protected open space with very little development. Residential use is limited to farms and ranches, with rural towns and commercial establishments appearing in San Gregorio and Half Moon Bay. Further north small coastal communities give way to suburban communities such as Pacifica and Daly City. Here medium-density residential and office space/commercial areas line the freeway corridor. In San Francisco, the corridor cuts through the dense residential neighborhoods of Lake Merced, Ingleside, and the Sunset and Richmond districts. The route bisects San Francisco's Golden Gate Park and the Presidio, which is part of Golden Gate National Park Recreation Area. Figure 3 shows the mix of transportation and land uses along SR 1 South, from open space to urbanized areas, and areas where more development will be concentrated.

Figure 3. Transportation and Land Uses in Corridor



Source: Plan Bay Area, MTC/ABAG, 2013

Urbanized Land and Open Space

The pattern of land use in the Bay Area includes a mix of open space, agriculture, intensely developed urban centers, a variety of suburban employment and residential areas, and scattered smaller towns. The Pacific coastal region in particular is primarily agricultural and open space, with a mix of public lands and small residential communities.

Public lands in the SR 1 South Corridor (shown in green in Figure 4) are managed by several agencies, including Golden Gate National Recreation Area (GGNRA), California State Parks, Peninsula Open Space Trust, California Coastal Conservancy, San Mateo County Parks, and San Francisco Recreation and Parks.

Figure 4. Public Lands in SR 1 South Corridor



Source: Bay Area Protected Areas Database, Bay Area Open Space Council, 2012

SYSTEM CHARACTERISTICS

Table 4: SR 1 South Facility and Lane Characteristics

Segment	A	B	C	D
	Santa Cruz/San Mateo County Line to SR 92	SR 92 to Sharp Park Road, Pacifica	Sharp Park Road to SM/SF County Line	SM/SF County Line to US 101
Existing Facility (2015)				
Facility Type	C	C	F	C/F
General Purpose Lanes	2	2-4	4-10	4-6
Lane Miles				
Centerline Miles	29.04	14.42	4.89	7.08
Median Width	0-12'	0-46'	8-46'	4-14'
Median Characteristics	Striped	Striped/Barrier	Barrier	Raised Island/Barrier
HOV Lanes	0	0	0	0
Auxiliary Lanes	0	0	Yes	Partial
Truck Climbing Lanes	0	0	0	0
Distressed Pavement (2012 Survey)	5%	20%	20%	30%
ROW	<100'	<100'+	100'+	100'+
Concept Facility (2040)				
Facility Type	C	C	F	C/F
General Purpose Lanes	2	2-6	4-10	4-6
Lane Miles	58	79	30	40
Centerline Miles	29.04	14.42	4.89	7.08
HOV /HOT Lanes	0	0	0	0
Aux Lanes	0	0	0	0
Truck Climbing Lanes	0	0	0	0
TMS Elements				
TMS Elements (Base Year)		CCTV CMS	CCTV TMS	CCTV HAR VMS
TMS Elements (Horizon Year)		CCTV CMS VMS	CCTV TMS VMS	CCTV HAR VMS

C = Conventional Highway
F = Freeway

CCTV = Closed Circuit Television
CMS = Changeable Message Signs
HAR = Highway Advisory Radio
TMS = Traffic Monitoring Stations
VMS = Variable Message Signs

Travel Modes

For much of the San Francisco Bay Area, the car is the predominant mode of transportation to work. San Francisco County stands apart from other Bay Area counties in that San Francisco residents show greater percentages of people using public transportation, walking, or bicycling to work. For the two counties covering the SR 1 South Corridor, as shown below in Figure 5, a sizeable 70.2% of San Mateo County residents drive alone to work, whereas only 36.2% of San Francisco residents do the same. Carpooling is more predominant in San Mateo County (11.0%) than it is in San Francisco County (7.5%). San Francisco residents are more than three times as likely to take public transportation (32.9%) as their counterparts in San Mateo County (8.9%). Bicycling to work is about three times more likely in San Francisco County, and walking about four times as likely.

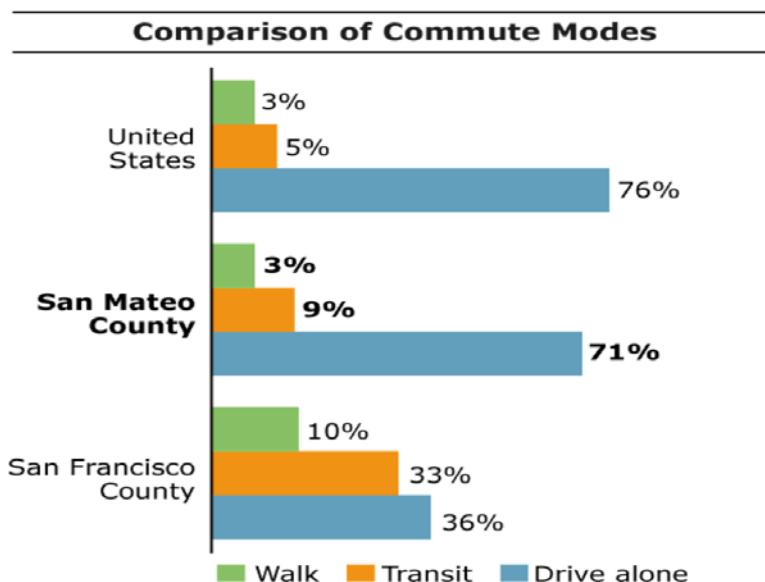
Figure 5. Mode of Transportation to Work –San Mateo and San Francisco Counties

Mode of Transportation to Work for Employed Residents, 2014 Estimates				
Mode	San Mateo County		San Francisco County	
	2014	% of Total	2014	% of Total
Car, Truck, or Van	301,126	81.2%	199,565	43.7%
Drive Alone	260,333	70.2%	165,315	36.2%
Carpool	40,793	11.0%	34,250	7.5%
Public Transportation	33,005	8.9%	150,244	32.9%
Walked	9,271	2.5%	47,037	10.3%
Motorcycle/Taxi/Other	4,079	1.1%	10,047	2.3%
Bicycle	4,821	1.3%	17,353	3.8%
Worked at Home	18,542	5.0%	32,424	7.1%
Total Employed	370,844	100.0%	456,670	100.0%

Source: U.S. Census Bureau, American Community Survey, 2014

San Mateo County, with its more expansive land area is more typical of the U.S. as a whole in terms of commute modes where driving alone is favored. Compact San Francisco County shows a more even mode split between walking, transit, and driving alone, as shown in Figure 6.

Figure 6. Comparison of Commute Modes – San Mateo and San Francisco Counties



Source: U.S. Census Bureau, American Community Survey, 2012 – Sustainable San Mateo

BICYCLE FACILITIES

While the percentage of bicycle trips compared to all trips is relatively small in the Bay Area, it varies greatly from community to community. U.S. Census Bureau data (American Community Survey, 2014) showed 3.8% of all trips within San Francisco County were made by bicycle; 1.3% was the bike share of all trips in San Mateo County. A growing number of people now bike for recreation, work, and shopping, and there is recognition that with an expanded and improved bicycle network, the mode share will increase.

Bicyclists are legal users of all State conventional highways and most expressways.

Bicyclists are also allowed to travel on about 1,000 miles or 25 percent of California's freeway miles. (*Caltrans Complete Streets Program*).

In the Bay Area bicyclists are prohibited from most freeways, with the exception of freeway sections where no reasonable alternative/parallel route exists.

COMPLETE STREETS

Deputy Directive 64-R2, Complete Streets – Integrating the Transportation System, highlights the Department's commitment to developing multi-modal projects and to improving access and safety within California's bicycle network and pedestrian facilities.

"The Department views all transportation improvements as opportunities to improve safety, access, and mobility for all travelers in California and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation system." (Caltrans Deputy Directive 64-R2, 2014)

In April 2014 the Department endorsed the National Association of City Transportation Officials (NACTO) guidelines that include innovations such as buffered bike lanes and improved pedestrian walkways. In September 2014, the passage of State legislation (AB 1193) allowed for greater flexibility in bike facility design on State highways and local roads.

In its 2015-2020 Strategic Management Plan, Caltrans set a statewide goal of tripling bicycling trips by 2020 (baseline: 2010-2012 California Household Travel survey)

Existing Conditions

State highways provide bicycle access to rural, scenic, or remote areas, as SR 1 does to the coastal parts of San Mateo County from the southern reaches of the county up through Half Moon Bay to the more populated northern portions of the corridor. However, the shoulders are narrow (less than four feet) in many locations along this scenic road, and traffic can be fast moving.

Bicycling is prohibited on the freeway segment of SR 1 South (Segment C), between Sharp Park Road in Pacifica and the northern junction with I-280 at the San Mateo/San Francisco County Line. Additionally, the final portion of the route through the San Francisco Presidio from Lake Street northward to US 101 does not allow bicycle travel. Parallel routes do exist on local roads (a mix of shared roadways, bike lanes, and separated bike paths), but the system is not always continuous and connected, and requires some out-of-direction travel. The freeway itself often creates a barrier to east-west bicycle network connectivity.

The San Mateo County Comprehensive Bicycle and Pedestrian Plan of 2011 identifies the SR 1 South Corridor as the "Pacific Coast Bikeway," one of the key corridors for the County. The bikeway includes both existing and proposed improvements for Class I, II, and III segments along its length. Additionally, County maps in the 2011 plan show unpaved paths where better access to the coast may be available, such as the Pillar Point Bluff near Moss Beach.

The following Table 5 summarizes existing bicycle facilities along the corridor, along with possible parallel route bicycle facilities where bicycle access is prohibited on SR 1 South.

Table 5: Bicycle Facilities

SR 1 South Bicycle Facilities									
Segment	SR 1 South Bicycle Facility						Parallel Bicycle Facility		
	Post Mile	Location Description	Bicycle Access Prohibited	Facility Type	Parallel Facility Present	Posted Speed Limit	Name	Location Description	Class
A	SM 0.00 to SM 29.04	SM/SCruz County Line to SR 92	No	Shared Roadway; no dedicated bikeway	Portion	55 mph		Naomi Patridge Trail, 3.5 mile multipurpose trail through Half Moon Bay	I
B	SM 29.04 to SM R43.46	SR 92 to Sharp Park Rd, Pacifica	No	Shared Roadway; no dedicated bikeway	Portion	55 mph		Devil's Slide Trail, a 1.3-mile multi-use trail, converted from a former segment of Highway 1	n/a
C	SM R43.46 to SM R48.22	Sharp Park Rd, Pacifica to SM/SF County Line	Yes	Bicycling Prohibited on freeway	Yes	65 mph		Bradford Way Francisco Blvd. Lakeside Ave. Palmetto Ave. Esplanade Ave. Skyline Blvd. Junipero Serra Blvd.	II/III
D	SF 0.00 to SF 7.08	SM/SF County Line to US 101	Portion from Lake Street northward	Shared Roadway to Lake Street	Yes	30 mph		Beverly St. Lunado Way Winston Dr. 20 th Ave. 23 rd Ave. Lincoln Blvd.	II/III

Class I: Bike path
 Class II: Bike lane
 Class III: Bike route

Bicyclists' Needs

The wide range of development patterns and terrain on the SR 1 South Corridor, from urban to rural and from mountainous to flat, precludes a one-size-fits-all approach to planning for bicyclists' needs. Freeways such as I-280 and congested roads such as 19th Avenue are barriers to bicycle travel and present significant challenges for bicycling. Major roadways such as Junipero Serra Boulevard provide bicycle access but shoulders and interchanges are often not designed for the best accommodation of bicyclists. Critical to understanding bicyclists' needs, it is important to understand that there are different "types" of bicyclists and their needs will vary, from the "strong and fearless" minority who will ride in any condition, to the bulk of riders who are more careful and concerned, and will ride only when they feel safe and comfortable under more protected conditions. The challenge to Caltrans is to provide the safest and most comfortable bicycling opportunities throughout the corridor for this important and growing mode of transportation. As roadway improvements such as routine maintenance, pavement overlay, or larger reconstruction projects are planned and programmed over time, giving greater attention to the bicycling public by providing items such as enhanced shoulders for bicyclists should be a priority consideration.



Bicyclist on SR 1

Photo: Caltrans D4

In March 2018 Caltrans completed a District 4 Bicycle Plan that is a comprehensive and visionary planning document to improve safety and mobility for bicyclists on and across the State transportation network in the nine-county Bay Area. The D4 Bike Plan can be found at www.dot.ca.gov/d4/bikeplan. In addition, a link to the District 4 State Highway System Bike Map is available at that site.

PEDESTRIAN FACILITIES

Unlike other modes of transportation which rely on extended networks to travel long distances, most walking “trips” are short by comparison, and occur within a relatively small area. While planning for pedestrians often takes place at the local level, it is important to look at the pedestrian environment from a broader view to understand the effects that the larger transportation system, such as the State Highway System, can have on neighborhoods. Also, the linkages of pedestrians to other modes of transportation are vitally important to the trips that people take. Walking is a transportation mode common to most people, leading them to their cars or bikes, to the bus, train, or ferry, and ultimately to their travel destination.



Pedestrians on SR 1 near Half Moon Bay

Photo: Caltrans D4 Photography

Existing Conditions

Pedestrians are permitted by State law to cross the highway portions of SR 1 unless there is a sign prohibiting crossings.

A common issue for pedestrians along the SR 1 South Corridor are long crossing distances at intersections, as well as crossing points that lack marked crosswalks. Also particularly troublesome for pedestrians are loop ramps, large curb radii (which allow higher-speed turning vehicles), missing sidewalks, and areas where crossing is prohibited. Several locations along the corridor are surrounded by housing, offices, businesses, and shopping centers where walking is a viable mode, yet is discouraged by unpleasant conditions for the pedestrian. Planning better pedestrian treatments at these locations will improve access around the SR 1 South facility and decrease the need to drive to destinations that are within walking distance. Intersections along the corridor that present the greatest challenges for pedestrians are shown in the matrix in Table 6.

Attention to pedestrian needs on the State Highway System is important as Caltrans has in its Strategic Management Plan 2015-2020 a target goal to double the number of pedestrian trips by 2020.

(Baseline: 2012 CA Household Travel Survey)

Where can pedestrians legally cross State Route 1?

Under California law, a crosswalk exists at every intersection, whether or not it is marked, unless there is a sign prohibiting crossings at that location. Crosswalks exist between intersections only when they are marked. California law requires drivers to yield to pedestrians at marked or unmarked crosswalks. Pedestrians cannot step into the path of a vehicle that is so close there is an immediate hazard. Pedestrians may cross where there are no crosswalks unless the adjacent intersections are controlled by signals or officers, but they must yield to drivers.

Source: Highway 1 Safety & Mobility Improvement Study, San Mateo County, Nov 2012

Pedestrian Needs

There is a need to connect existing trails, add new trails, and complete missing links in pedestrian movements throughout the corridor. Constructing medians in some community areas can have the added benefit of providing a refuge area for pedestrians trying to cross the road, so that they would only have to gauge traffic and cross in one direction at a time. Highway facilities and treatments must account for highway users of all modes, including bicycling and walking. Additional trails and striped shoulders would enable residents and visitors to make more trips by foot or bicycle instead of solely by car.

Within fringe and community areas, additional enhancements could include striping of Class II bike lanes and/or painted shoulders to further delineate separation of the bikeway from the vehicle travel way, and to provide improved sight lines and visibility for pedestrians, bicyclists, and motorists preparing to cross or enter the travel way, and space for motorists to move for passing emergency responders. These improvements could also be used to signal a change in context, and help narrow the perceived lane width to encourage speed reduction in high activity areas. Caltrans uses the principles of Context Sensitive Solutions (CCS) to gauge and plan for the appropriate treatment of highway facilities in a variety of corridor settings, taking into account the needs of all users.

Table 6: SR 1 South Pedestrian Intersections

SR 1 South High Priority Pedestrian Intersections										
Seg	Co	PM	City	Intersection	Long Crossing Distance	Loop Ramp	Crossing Prohibited (or Partial)	No Marked Crosswalks	Missing Sidewalks	Potential to Reduce Corner Radius
A	SM	26.43	Half Moon Bay	Miramonte Point Rd.			X		X	
A	SM	28.75	Half Moon Bay	Kelly Ave.	X		X	X	X	X
A	SM	29.03	Half Moon Bay	SR 92	X	X		X	X	X
B	SM	29.12	Half Moon Bay	Main St.	X					
B	SM	31.99	El Granada	Coronado St.	X		X		X	
B	SM	32.86	Unincorporated.	Capistrano Rd.	X		X			
B	SM	37.92	Unincorporated.	Gray Whale Beach parking lot				X		
B	SM	40.95	San Mateo	Lindamar Blvd.	X		X	X	X	
B	SM	41.27	San Mateo	Crespi Dr.			X	X	X	
B	SM	42.01	San Mateo	Fassler Ave.	X		X	X	X	
B	SM	43.08	San Mateo	Westport Dr.					X	
C	SM	43.46	San Mateo	Sharp Park Rd.				X	X	
D	SF	0.00	San Francisco	19 th Ave./Junipero Serra Blvd.	X		X			
D	SF	0.94	San Francisco	Holloway Ave.	X	X	X			
D	SF	1.35	San Francisco	Winston Dr.	X	X	X			
D	SF	4.09	San Francisco	Martin Luther King, Jr. Drive			X			

California Coastal Trail

In 2001, through Senate Bill 908, the Governor and the Legislature directed the California State Coastal Conservancy to report on a proposed trail that would stretch 1,200 miles along the entire California coast, across a multitude of jurisdictions from the Oregon border to the border with Mexico, including the entire

San Mateo County and San Francisco County coastline. Still under development and about half complete today, the vision for the California Coastal Trail is a continuous interconnected public trail system along the California coast, designed to foster appreciation and stewardship of the scenic and natural resources of the coast, and to implement aspects of Coastal Act policies promoting non-motorized transportation. The trail system was envisioned to be located on a variety of terrains, including the beach, bluff edge, hillsides providing scenic vantage points, and within the highway right-of-way. The trail might take the form of informal footpaths, paved sidewalks, or separated bicycle paths. When no other alternative exists, it sometimes connects along the shoulder of the road. While primarily for pedestrians, the trail also accommodates a variety of additional user groups, such as bicyclists, wheelchair users, equestrians, and others as opportunities allow. As a State department, to the extent feasible, Caltrans is committed “to cooperate with respect to planning and making lands available for the completion of the trail, including constructing trail links, placing signs, and managing the trail.” [SB 908, February 23, 2001]



Devil's Slide Trail, Pacifica 2014, looking north

Photo: Ari Burack



Devil's Slide Trail, Pacifica 2014,

Photo: Tony Perrie

TRANSIT FACILITIES

While rail transportation along the corridor is absent today, historical records show there used to be rail service along large portions of the rugged coast. In 1905 construction began on the Ocean Shore Railroad to connect San Francisco with Santa Cruz along the coast to the south. The great San Francisco Earthquake of 1906 severely damaged the railroad, with almost a mile of right-of-way slipping into the ocean near Pacifica. Reconstruction began, and in 1908 the Ocean Shore Railway Company ran revenue passenger and freight trains at both ends of the line, mostly beachgoers from the north, and lumber shipping from the south near the Santa Cruz Mountains. The full railway was never completed, however, and the entire operation fell into receivership in 1910. Resurrected by investors in 1912, the idea for a complete railroad persisted until 1920 when efforts were abandoned. The railroad company lasted into the 1970s, primarily to settle finances and land holdings.



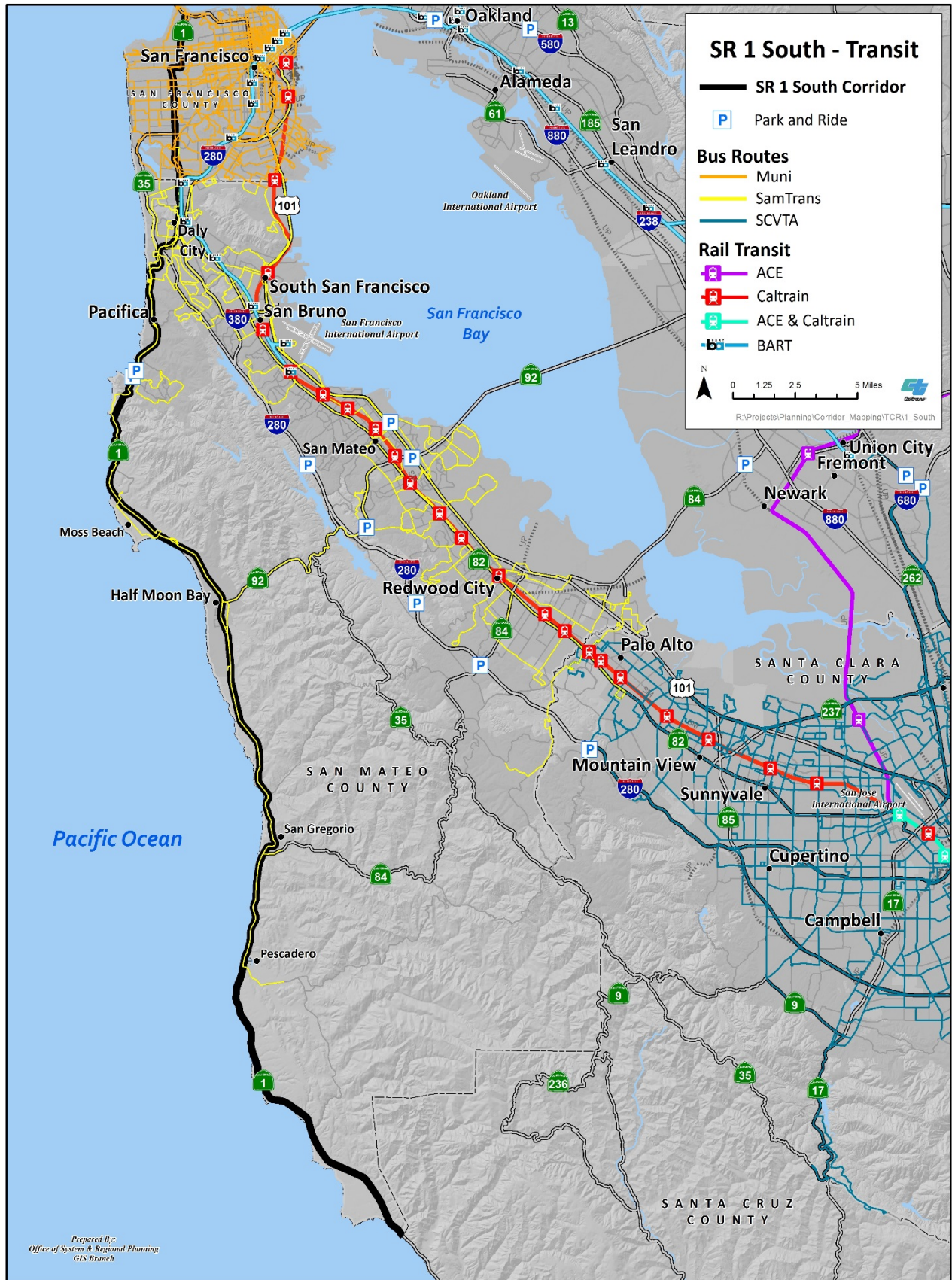
Photos: Pacifica Historical Society

Today, transit rider options for travel along the SR 1 South Corridor are mostly confined to the northern reaches of the corridor (Segments C & D) where San Francisco Muni and Bay Area Rapid Transit (BART) trains move many people up the San Francisco Peninsula to and through downtown San Francisco, and to neighboring Marin, Alameda, and Contra Costa Counties. The southern reaches of the SR 1 South Corridor are quite remote, with limited bus service offered by San Mateo County Transit District (SamTrans) from Pescadero northward. There are no transit services south of Pescadero, population 643.

In San Francisco County, the San Francisco Municipal Railway (MUNI) operates several bus lines along SR 1 South, including Routes 28, 28L, 29, NX, GG, and the M Line light rail. The 28 and 28L lines connect to the Daly City BART Station. In San Mateo County, SamTrans operates bus lines 16, 19, 49, 110, 112, and 118, with lines 17 and 18 operating between Pacifica and Half Moon Bay, with occasional extensions to Pescadero.

Caltrain operates rail service on a parallel route to the SR 1 South Corridor, from Gilroy and San Jose north to downtown San Francisco, but is not in close proximity to the route itself, and is difficult to access from the coast because of the Santa Cruz and Montara Mountain ranges. For travel by transit or by car, heading away from the coast is usually a faster option. Along the coast the journey by bus from Pescadero to the Golden Gate Bridge can take three to four hours and involve several transfers.

Figure 7: Schematic of Transit Network in relation to SR 1 South



Park and Ride Lots

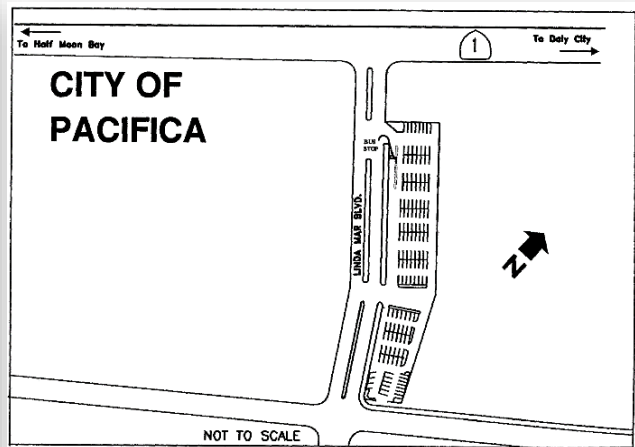
Park and Ride lots are designed to offer a convenient location to transfer from a car or bicycle to local or regional bus, transit, carpool, or vanpool. There are two designated Caltrans Park and Ride lots along SR 1 South (listed in Table 7), both in Pacifica, offering connections to public transportation with SamTrans. The Linda Mar lot is maintained and operated by SamTrans, and the Crespi lot is maintained and operated by the City of Pacifica. The Crespi Park and Ride facility offers 10 bicycle storage lockers.

Table 7. Park and Ride Facilities

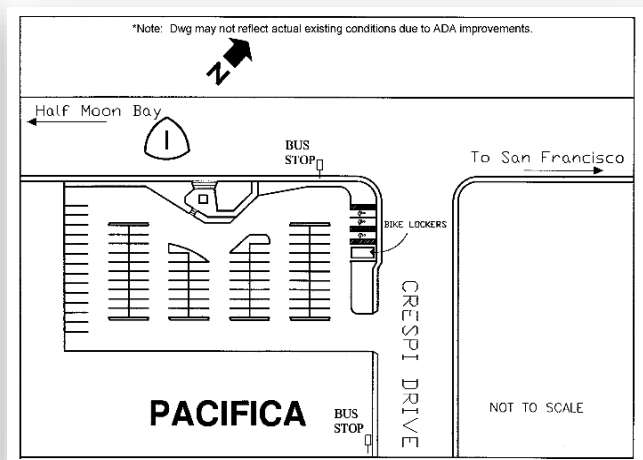
SR 1 South Corridor Park and Ride Lots						
Seg #	Facility	Name	Location	Post Mile	# of Parking Spaces	SamTrans Routes Served
B	Park & Ride Lots	Linda Mar	NE quadrant of SR1/Linda Mar Blvd.	SM 1 40.96	160	14, 17, 19, 110, 112, 118, FLX
B		Crespi	SE quadrant of SR1/Crespi Drive	SM 1 41.2	87	110, 112, 118



Linda Mar Blvd, Pacifica SM 1 (PM 40.96)
(160) Spaces Available // No Bike Lockers // Transit: Sam Trans



Crespi Drive, Pacifica SM 1 (PM 41.2)
(87) Spaces Available // (10) Bike Lockers // Transit: Sam Trans



Source: Caltrans D4 Office of Traffic Systems/Park and Ride Program

FREIGHT

From a regional and interregional perspective, SR 1 South sees low levels of truck travel for goods movement in and around the San Francisco Bay Area. The route primarily serves local populations along its winding and hilly terrain. SR 1 South is a designated Surface Transportation Assistance Act (STAA) Terminal Access route for much of its length, allowing truck travel with few limitations except for the Tom Lantos Tunnels where no explosives, flammables, or combustibles are allowed. The heaviest percentage of truck traffic on the route occurs in Half Moon Bay (3.18% of traffic), while the greatest volumes of truck traffic occur on the small portion of shared routing with I-280 through Daly City.

ENVIRONMENTAL CONSIDERATIONS

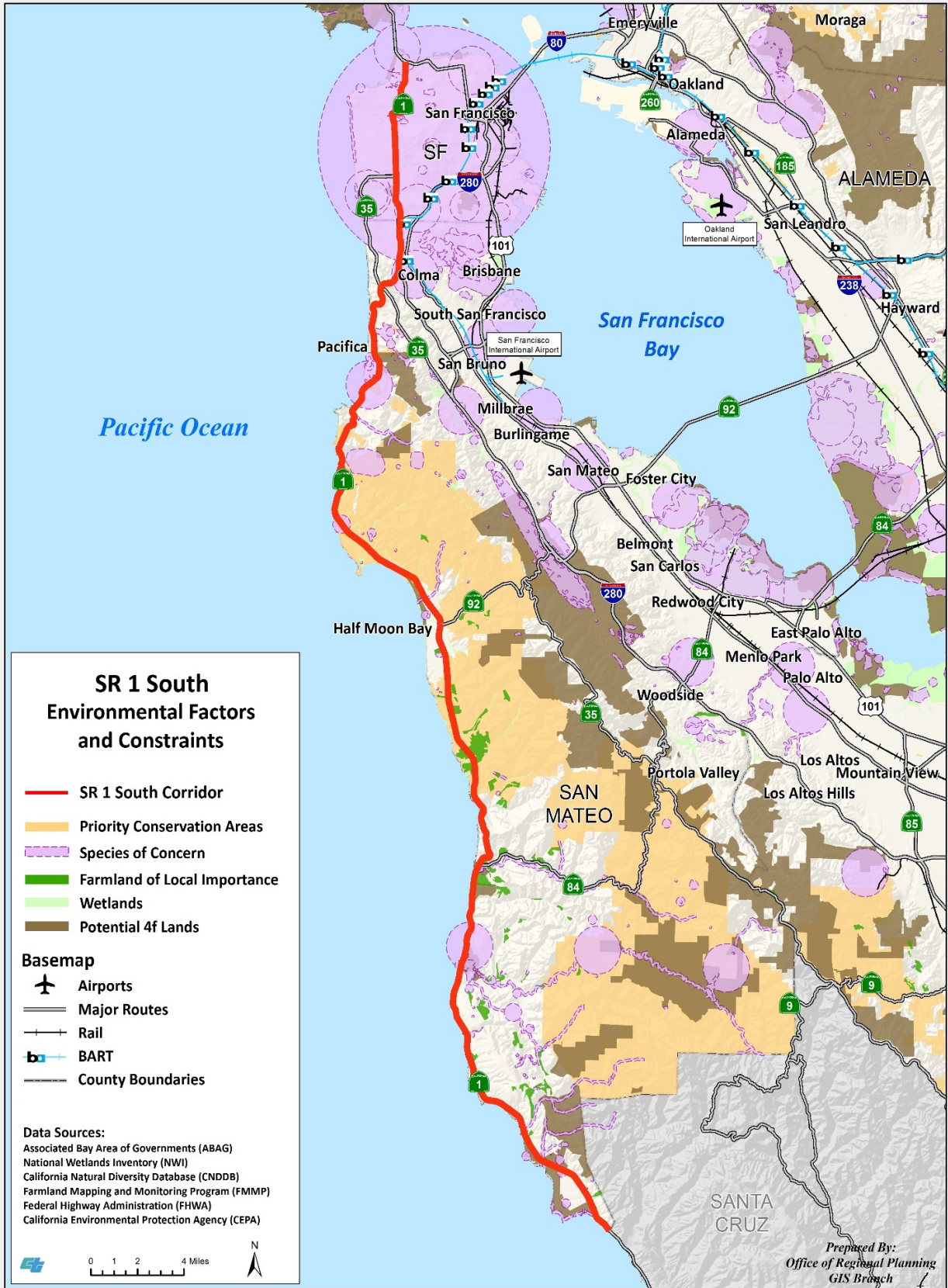
All transportation corridors, including SR 1 South, traverse areas of varying degrees of environmental concern. These concerns include the possible presence of hazardous materials or facilities, habitats of threatened or potentially threatened species, wetlands and other sensitive habitats, and the presence of cultural and archeological sites, historic bridges, or other structures to name a few. This information needs to be taken into consideration when proposing any improvements or modifications to State facilities within the corridor.

The California Natural Diversity Data Base (CNDDDB) is a repository of plants and animals maintained by the Habitat Conservation Division of the California Department of Fish & Wildlife. The database indicates the following sensitive species may be found within the route limits:

<u>Latin Name</u>	<u>Species</u>	<u>Federal Listing</u>	<u>State Listing</u>
<i>Arctostaphylos montana ravenii</i>	Presidio manzanita	Endangered	Endangered
<i>Arenaria paludicola</i>	Marsh sandwort	Endangered	Endangered
<i>Callophrys mossii bayensis</i>	San Bruno elfin butterfly	Endangered	None
<i>Charadrius alexandrinus nivosus</i>	Western snowy plover	Threatened	None
<i>Clarkia franciscana</i>	Presidio clarkia	Endangered	Endangered
<i>Eucyclogobius newberry</i>	Tidewater goby	Endangered	None
<i>Hesperolinon congestum</i>	Marin western flax	Threatened	Threatened
<i>Layia carnosa</i>	Beach layia	Endangered	Endangered
<i>Lessingia germanorum</i>	San Francisco lessingia	Endangered	Endangered
<i>Oncorhynchus mykiss irideus</i>	Steelhead –central California	Threatened	None
<i>Plagiobothrys diffusus</i>	San Francisco popcornflower	None	Endangered
<i>Plebejus icarioides missionensis</i>	Mission blue butterfly	Endangered	None
<i>Potentilla hickmanii</i>	Hickman’s cinquefoil	Endangered	Endangered
<i>Rana draytonii</i>	California red-legged frog	Threatened	None
<i>Riparia riparia</i>	Bank swallow	None	Threatened
<i>Speyeria zerene myrtleae</i>	Myrtle’s silverspot	Endangered	None
<i>Thamnophis sirtalis tetrataenia</i>	San Francisco garter snake	Endangered	Endangered
<i>Trifolium amoenum</i>	Showy Rancheria clover	Endangered	None

Figure 8 depicts environmental considerations in the SR 1 South Corridor, including Priority Conservation Areas (a regional Sustainable Communities Strategy), farmlands, wetlands, parklands, and areas with Species of Concern.

Figure 8: SR 1 South - Environmental Factors Map



Source: California Natural Diversity Database, ABAG 2015

Fish Passage

California Senate Bill SB 857(2006) directs Caltrans to address barriers to natural fish migration, or “fish passage.” The goal is to eliminate or reduce stream and river barriers to this natural migration. Caltrans Environmental Planners are tasked with assessing fish passage barriers at highways, submitting annual reports on barrier status, and ultimately eliminating fish passage barriers within Caltrans right-of-way. Along the SR 1 South Corridor, Caltrans biologists have identified two priority fish passage remediation sites (ID #7 and #8)*, as indicated in the map and table below.

Figure 9: Fish Passage Priorities and Remediation Map



Table 8. District Priority Fish Passage Locations for Remediation

District 4 SR 1 South – Priority Fish Passage Locations for Remediation					
Map ID#*	Caltrans District	County-Route-PM	ID #	Stream Name	Tributary To
7	4	SM -1- PM 4.32	705302	Whitehouse Creek	Pacific Ocean
8	4	SM -1- PM 22.75	716835	Lobitos Creek	Pacific Ocean

*Caltrans 2016 Fish Passage Annual Report



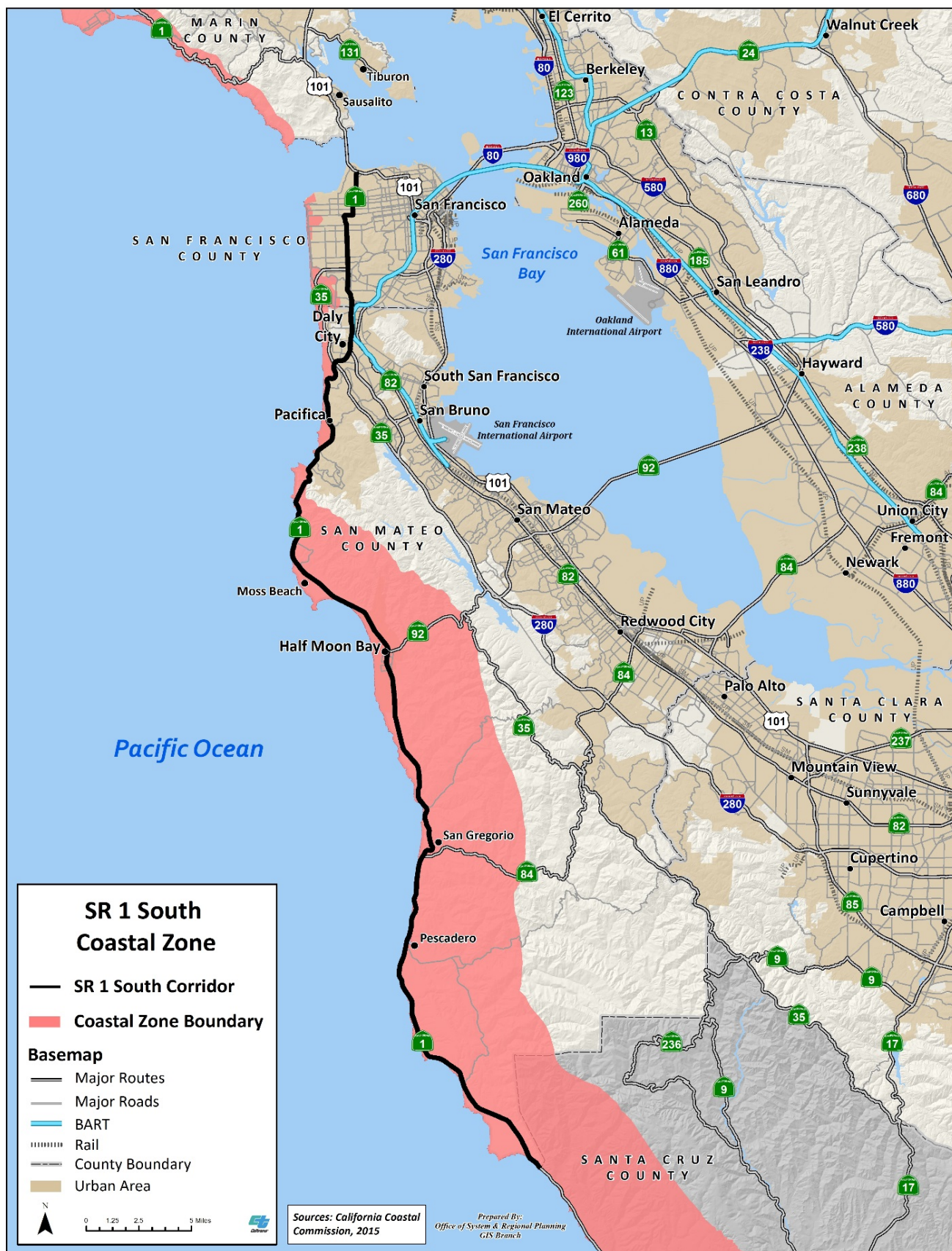
Fish Passage, San Mateo County Coast; 2016 Fish Passage Annual Report

California Coastal Zone

The California Coastal Commission is a State agency that has regulatory oversight over land use and public access in the California Coastal Zone (Figure 10), including much of SR 1 South. Since the California Coastal Act of 1976, the agency is tasked with protection of coastal resources, including shoreline public access and recreation, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. As such, the State authority controls construction and development along the State's shoreline, and should be contacted for proper permitting. Local Coastal Programs (LCPs) have been created for San Mateo County, plus Daly City, Pacifica, and Half Moon Bay.

In 2017, Caltrans entered into a Partnership Agreement with the California Coastal Commission. Both agencies agree to promote the integration of transportation, coastal and environmental planning through participation in related activities including future Transportation Concept Report development. Recommendations to improve coordination and communication between the two agencies are documented in the Plan for Improved Agency Partnering (Dec 2016), with a focus in two areas: Sea Level Rise and the California Coastal Trail. Caltrans is currently finalizing the District 4 Climate Change Vulnerability Assessment which studies the potential effects of Climate Change on the State Highway System. Caltrans also encourages and supports the California Coastal Trail Concept as delineated in the Plan for Improved Agency Partnering and will work with the Coastal Commission and other agencies to incorporate existing oceanfront trails and paths and support facilities of public shoreline parks and beaches into the California Coastal Trail network.

Figure 10. SR 1 South Coastal Zone



The San Mateo County Local Coastal Program (LCP) was approved by the County Board of Supervisors and the California Coastal Commission in 1980. All development in the Coastal Zone requires either a Coastal Development Permit or an exemption from permit requirements. For a permit to be issued, the development must comply with policies of the LCP and those ordinances adopted to implement the LCP. San Mateo County amended its LCP policies in 2013 with recommendations for:

- Maintaining SR 1 as a scenic two-lane route in rural areas
- Development of a midcoast pedestrian/bicycle/multi-purpose path parallel to SR 1
- Preferential treatment for buses and shuttles in congested locations
- Recreational transit services; transit service for special events
- Improvements of bicycle and pedestrian facilities and crossings
- Limitations on new road or driveway connections to SR 1

Climate Change and Sea Level Rise

Sea Level Rise (SLR) is one of the best documented and widely accepted impacts of climate change. Data from tide gauges in the State collected over the past several decades indicate an upward trend of approximately 20 centimeters (7.9 inches) per century. Observation of sea levels along the California coast and projections indicate that areas along the San Francisco Bay will experience rising sea levels of 16 inches by mid-century (2050) and up to 55 inches by the end of this century (2100).

The effects of SLR and flooding are expected to increasingly impact transportation infrastructure in low-lying coastal areas of the San Francisco Bay Area, including parts of SR 1 South. The Federal Emergency Management Agency (FEMA), the Pacific Institute, and the U.S. Geological Survey have prepared inundation maps for the San Mateo County and San Francisco shorelines.

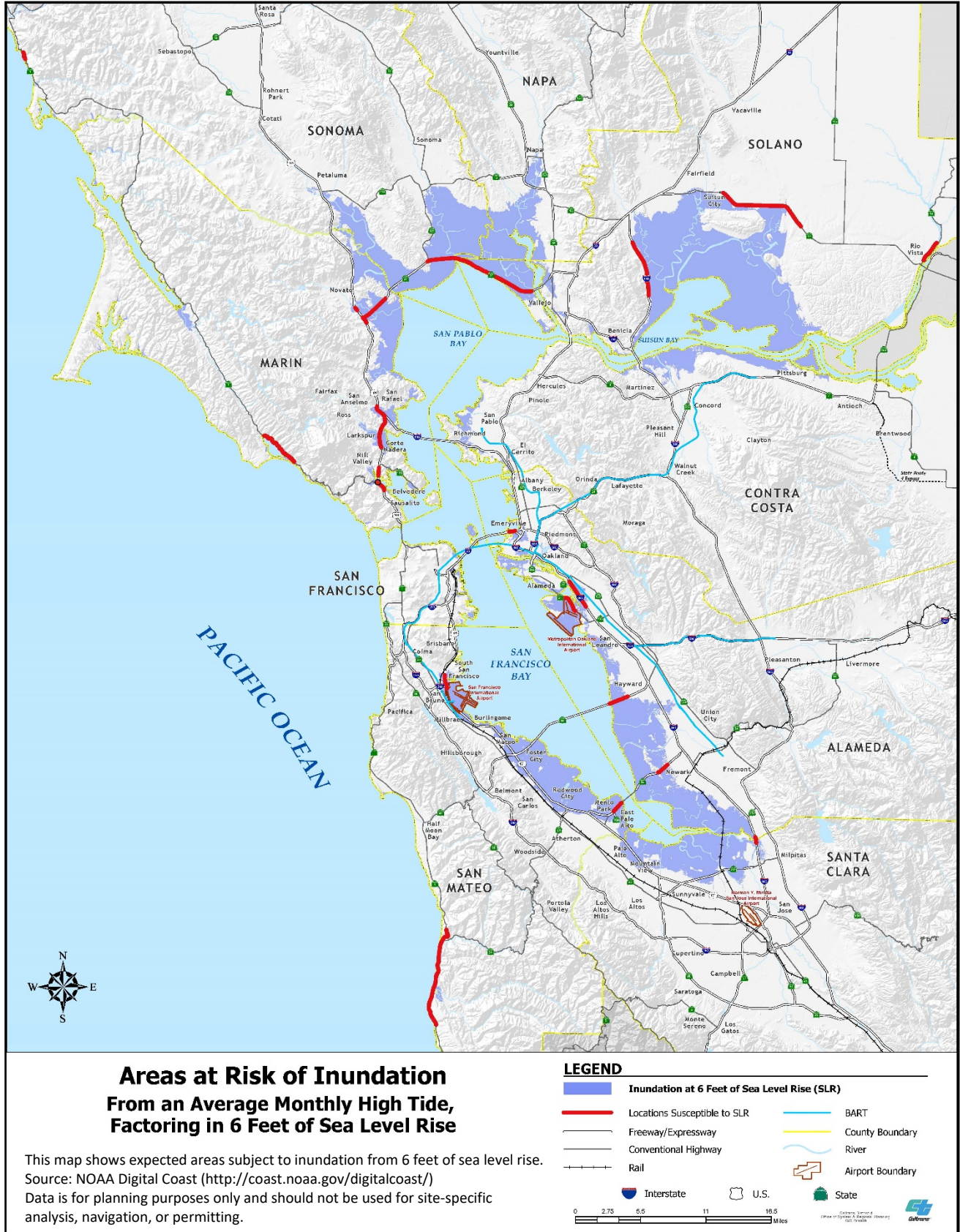
In April 2017, the County of San Mateo released the Draft Sea Level Rise Vulnerability Assessment Report. The report serves as the first step of the Sea Change San Mateo County Initiative, whose purpose is to increase the resilience of the County’s economy, environment, and communities through collaborative planning and projects. The following maps in Figures 11 and 12 reveal areas in which there are transportation assets and other facilities that would be vulnerable to the overlapping risks of inundation and flood hazard by wave and tidal action.



Surfers Beach erosion, Half Moon Bay

Source: Caltrans Photography

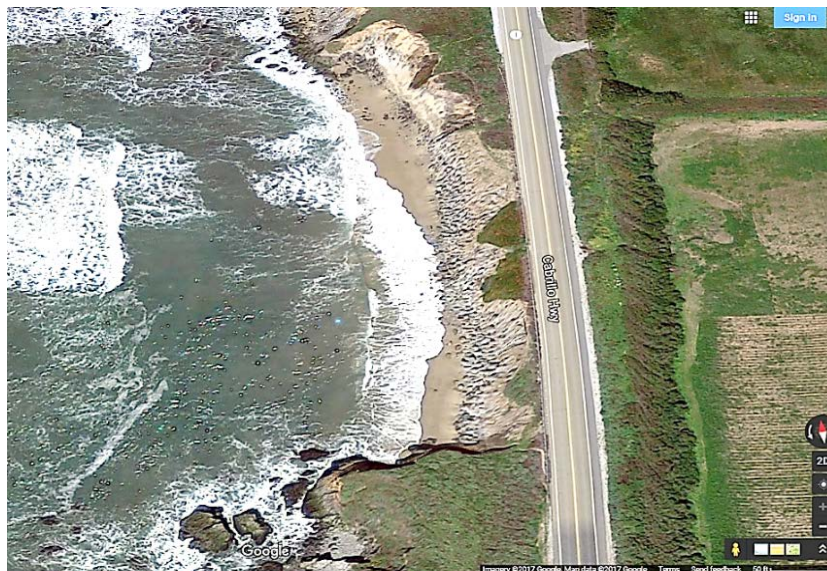
Figure 11. Areas at Risk of Inundation



Of immediate concern along the SR 1 South Corridor is an 8.75 mile portion of the route near SR 84 (Figure 11) between Pescadero and San Gregorio (PM 10.70 – PM 19.45) that has been experiencing severe erosion for many years, with erosion approaching the roadbed itself. Here coastal armoring is used to delay the erosion, but the long-term plan includes additional study to reroute the corridor further inland, along with other possible long-term adaptation strategies. Other portions of SR 1 South are seeing the need for coast armoring and monitoring for flooding and the effects of Sea Level Rise (Figure 12).

Severe Erosion: San Mateo SR 1 Pescadero to San Gregorio

- Caltrans has received coastal development permits from the California Coastal Commission and San Mateo County for coastal armoring with riprap in emergency situations. However, recent permits are only for temporary approval until longer-term solutions can be found. The Coastal Commission has asked Caltrans to study all possible alternatives for providing transportation through the corridor in the face of high erosion rates, including potentially replacing 8.75 miles of SR 1 with an inland bypass (blue line).
- The erosion rate is currently 3 to 5 feet per year, and is expected to accelerate due to sea level rise and climatic change.
- Caltrans completed a Preliminary Environmental Assessment Report (PEAR) for the “Realignment of State Route 1 at Pescadero” in 2008.



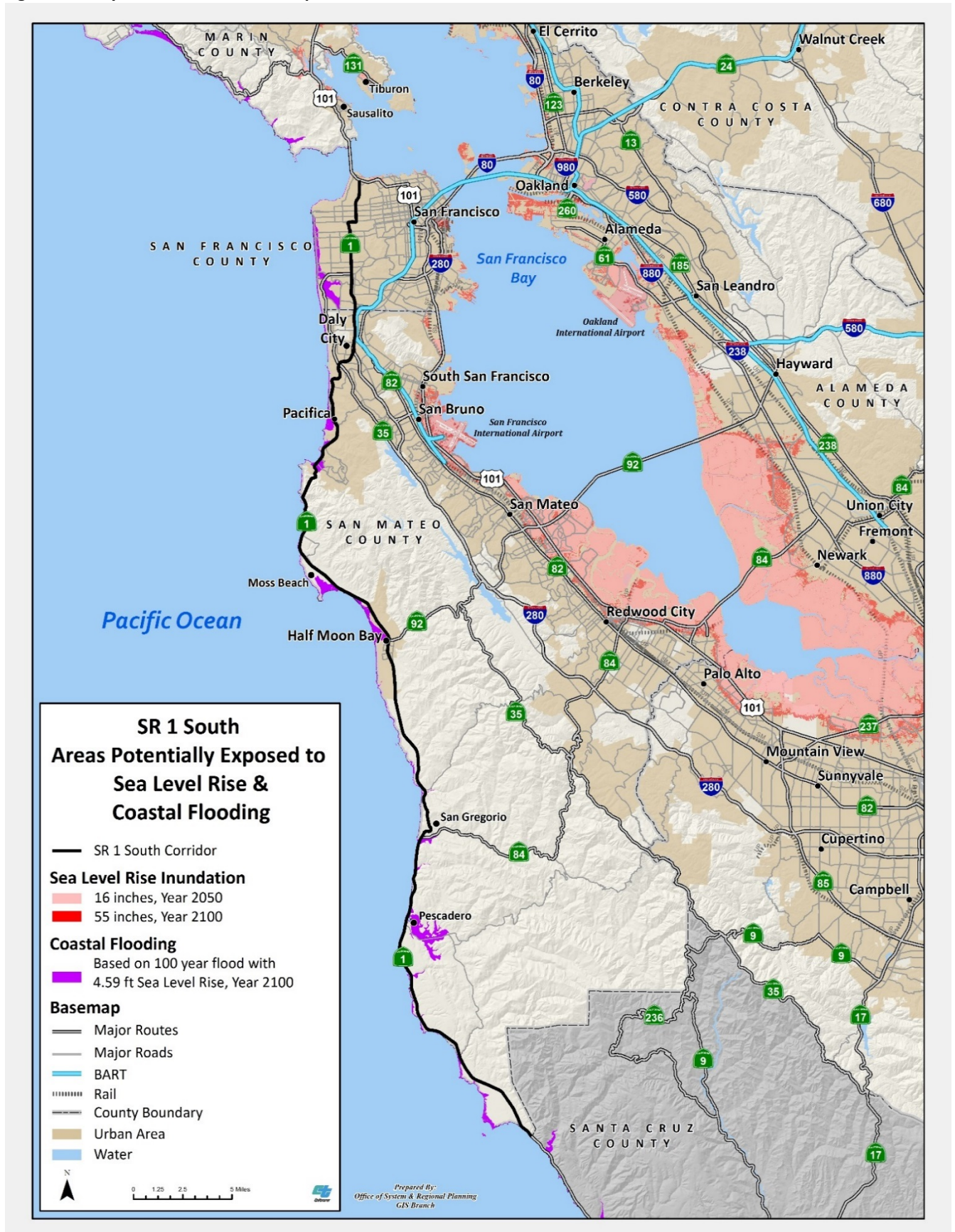
Shore erosion near Pescadero

Source: Google Maps 2017

Other examples of assets vulnerable to Sea Level rise were identified in an assessment by the County of San Mateo, identified in their April 2017 draft report, “Sea Change San Mateo County”:

- A 1.2 mile segment of the California Coastal Trail at Poplar Beach in Half Moon Bay
- Surfer’s Beach in El Granada, north of Half Moon Bay, currently exposed to wave erosion
- A 3-mile intertidal habitat and recreational area at Fitzgerald Marine Reserve near Moss Beach
- 2000 linear feet of Pacifica State Beach in Linda Mar, south of Pacifica
- The Beach Boulevard Seawall in Pacifica where exposure to trails, utilities, and housing is possible.

Figure 12. Bay Area Sea Level Rise Map



CORRIDOR PERFORMANCE

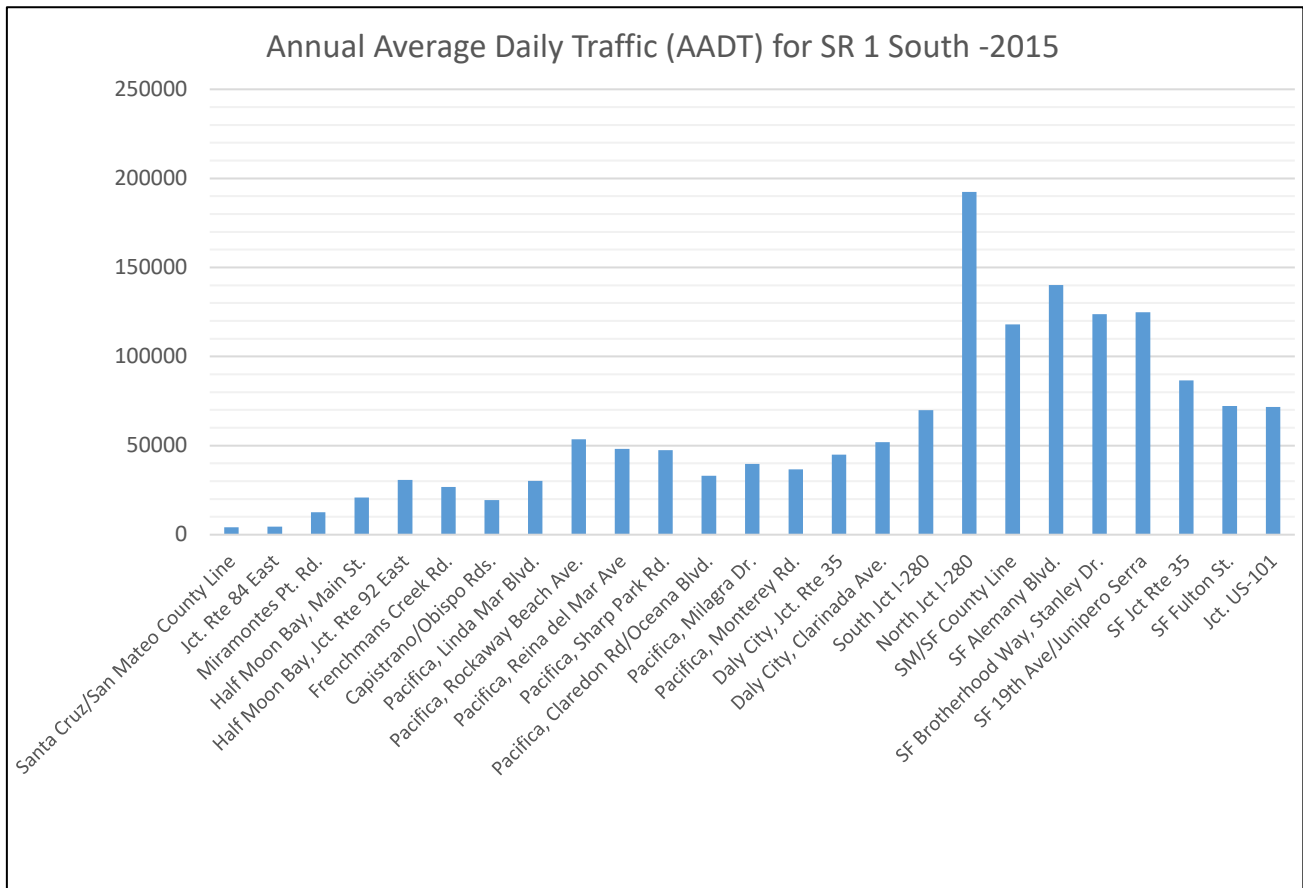
The SR 1 South Corridor begins at the Santa Cruz/San Mateo County line where traffic volume is quite low in this rural area, with just a few thousand vehicle trips per day. There is an increase in traffic volume north of the intersections with SR 84 near San Gregorio, and SR 92 near Half Moon Bay, where some 30,000 vehicle trips occur. Traffic volume increases where population is greater, and in Pacifica and Daly City the volume continues to grow to beyond 50,000 vehicle trips. The traffic volume more than triples where the freeway segment of the route merges with I-280 in Daly City. Here traffic volume is the highest in the entire corridor at close to 200,000 vehicle trips. The volume tapers off slightly as SR 1 enters San Francisco, but remains elevated through the City to the TCR’s terminus with US 101 just before the Golden Gate Bridge.

This TCR presents the baseline traffic data from 2015, along with the projected traffic data forecasts for 2040.

Existing Conditions

Figure 13 below is a graphical representation of the Annual Average Daily Traffic (AADT) for 2015 charted by intersection, showing the relatively light traffic in the southern portion of the corridor, increasing near the major junction with SR 92 in Half Moon Bay and at Rockaway Beach Avenue in Pacifica, and then growing in volume at the north I-280 junction, with slight fluctuation through San Francisco northward to US 101 and the Golden Gate Bridge where AADT drops.

Figure 13. AADT 2015 for SR 1 South



The following Table 9 shows the AADT in 2015 by corridor segment, post mile, and location, including the number of lanes.

Table 9. AADT 2015 for SR 1 South Details

Annual Average Daily Traffic (AADT) SR 1 South - 2015							
Segment	County	Route	Post Mile	Location	AADT	# Lanes	
A	SM	1	0.00	Santa Cruz/San Mateo County Line	4150	2	
A	SM	1	18.19	Jct. Rte 84 East	4600	2	
A	SM	1	26.43	Miramontes Pt. Rd.	12600	2	
A	SM	1	27.75	Half Moon Bay, Main St.	20884	2	
B	SM	1	29.04	Half Moon Bay, Jct. Rte 92 East	30800	2	
B	SM	1	30.23	Frenchmans Creek Rd.	26800	2	
B	SM	1	33.36	Capistrano/Obispo Rds.	19400	2	
B	SM	1	40.96	Pacifica, Linda Mar Blvd.	30200	4	
B	SM	1	42.01	Pacifica, Rockaway Beach Ave.	53600	4	
B	SM	1	R 42.58	Pacifica, Reina del Mar Ave	48100	6	
C	SM	1	R 43.46	Pacifica, Sharp Park Rd.	47400	4	
C	SM	1	R 43.74	Pacifica, Claredon Rd/Oceana Blvd.	34000	4	
C	SM	1	R 44.88	Pacifica, Milagra Dr.	33038	4	
C	SM	1	R 45.39	Pacifica, Monterey Rd.	36740	4	
C	SM	1	R 46.72	Daly City, Jct. Rte 35	44900	5	
C	SM	1	R 47.27	Daly City, Clarinda Ave.	51975	9	
C	SM	1	R 47.80	South Jct I-280	69858	8	
C	SM	1	R 48.36	North Jct I-280	192365	10	
D	SM	1	R 48.56	SM/SF County Line	118000	10	
D	SF	1	R 0.11	SF Alemany Blvd.	140180	6	
D	SF	1	R 0.31	SF Brotherhood Way, Stanley Dr.	123796	6	
D	SF	1	R 0.68	SF 19th Ave/Junipero Serra	124911	6	
D	SF	1	1.90	SF Jct Rte 35	66381	6	
D	SF	1	5.00	SF Fulton St.	72200	4	
D	SF	1	7.08	Jct. US-101	71695	4	

Examining the areas where the highest traffic volumes occur within each of the SR 1 South Corridor segments, SR 1 South has an AADT ranging from 31,000 to 193,000 (combined northbound and southbound directions).

Along with data that Caltrans uses for corridor monitoring, the Congestion Management Agencies for San Mateo County and San Francisco County both report on route performance using Level of Service (LOS) in their 2015 Congestion monitoring studies. These monitoring studies are part of the Congestion Management Program (CMP) that each county is required by State law to develop and update biennially.

Governor Brown signed Senate Bill 743 (SB 743) in 2013, which creates a process to change the way that transportation impacts are analyzed under the California Environmental Quality Act (CEQA). SB 743 requires an amendment to the CEQA Guidelines to provide an alternative to LOS for evaluating transportation projects. Particularly applicable to areas served by transit, alternative criteria must promote the reduction of GHG emissions, the development of multimodal transportation networks, and a diversity of land uses. SB 743 will allow alternate measures of traffic impacts, such as Vehicle Miles Traveled (VMT). However, in these County Congestion monitoring studies LOS was used as a performance measure.

San Mateo County 2015 Congestion Management Program

The City/County Association of Governments of San Mateo County (C/CAG), is the Congestion Management Agency for San Mateo County. C/CAG prepares the Congestion Management Program (CMP) to identify strategies to respond to future transportation needs, develop procedures to alleviate and control congestion, and promote countywide solutions. The CMP is required to be consistent with the Metropolitan Transportation Commission (MTC) planning process that includes regional goals, policies, and projects for the Regional Transportation Improvement Program (RTIP). The 2015 San Mateo County CMP, consistent with MTC’s regional “Plan Bay Area,” provides updated program information and performance monitoring results for the CMP roadway system.

The 2015 CMP is the first monitoring cycle during which C/CAG has used commercially available travel speed data from INRIX, a traffic data firm from Washington State, integrated into a Geographic Information System (GIS) to monitor the LOS on the transportation network. All freeway segments in the network were monitored using this INRIX travel time data. The floating car method, using an actual car on road with differential Global Positioning System (GPS) technology, was also used for segments for which INRIX data was not available.

The San Mateo CMP roadway system consists of 53 roadway segments and 16 intersections in the County. SR 1 South represents four of those roadway segments and one of the intersections. As determined by the LOS ratings by the County, all roadway segments and intersections on SR 1 South met their LOS monitoring standards, and were compliant with the LOS standard set for that segment after certain allowances or “exemptions” to conformance requirements were calculated. These results are shown in Table 10 and Table 11.

Table 10. San Mateo 2015 CMP Roadway Segment LOS

2015 CMP Roadway Segment Level of Service (LOS)				
Route	Roadway Segment	LOS Standard	2015 LOS	
			AM	PM
1	San Francisco County Line to Linda Mar Blvd	E	A	A
1	Linda Mar Blvd. to Frenchmans Creek Road	E	D	D
1	Frenchmans Creek Road to Miramontes Road	E	E	E
1	Miramontes Road to Santa Cruz County Line	D	B	C

Table 11. San Mateo 2015 CMP Intersection LOS

2015 CMP Intersection Level of Service (LOS)			
Intersection	LOS Standard	AM	PM
SR 1 & SR 92	E	C	C

San Francisco County 2015 Congestion Management Program

The San Francisco County Transportation Authority (SFCTA) is the Congestion Management Agency for the City and County of San Francisco. The Transportation Authority Board of Commissioners consists of the eleven members of the San Francisco Board of Supervisors, acting as Transportation Authority Commissioners. The purpose of the 2015 San Francisco Congestion Management Program (CMP), prepared by SFCTA, is to:

- Comply with State law by adopting a biennial CMP and submitting it to the Metropolitan Transportation Commission for a conformance finding.
- Guide San Francisco agencies involved in congestion management;
- Outline the congestion management work program; and
- Set forth policies and technical tools to implement the CMP work program.

The traffic LOS standard for San Francisco is consistent with CMP mandated criteria and was established at LOS E in the initial (1991) CMP network. Facilities that were already operating at LOS F at the time of baseline monitoring are legislatively exempt from the LOS standards. CMP segments that are within a designated Infill Opportunity Zone (IOZ) are also exempt from LOS conformance requirements.

Starting with the 2013 San Francisco County CMP update, SFCTA transitioned to using commercial speed data provided by vendor INRIX, as the primary source to calculate official speed and LOS results. Most freeway and arterial segments were monitored using commercial speed data; the floating car method was used only for segments for which INRIX data was not available.

The results of the 2015 Roadway Segment LOS are shown below in Table 12. The LOS standard was met in all segments except for the Junipero Serra segment, from Brotherhood Way to 19th Avenue in the PM peak period.

Table 12. San Francisco 2015 CMP Roadway Segment LOS

2015 San Francisco CMP Roadway Segment Level of Service (LOS)				
Route	Roadway Segment	LOS Standard	2015 LOS	
			AM	PM
1	19th Avenue/Park Presidio – from Lincoln Way to Sloat Boulevard	E	C	B
1	19th Avenue/Park Presidio – from Lake Street to US 101	E	A	D
1	Junipero Serra – from Brotherhood Way to 19 th Avenue	E	E	F

Designation of much of San Francisco as an “Infill Opportunity Zone” (IOZ) affords SFCTA the opportunity to employ multimodal performance measures appropriate to a dense, multimodal, urban environment, as compared to many suburban environments. Under CMP legislation, CMP segments within an IOZ are exempt from minimum LOS standards. The SR 1 South segment along Junipero Serra, from Brotherhood Way to 19th Avenue, is within an IOZ and therefore is exempt from LOS conformance requirements. Since all segments measured at LOS F in the 2015 monitoring study were exempt and did not represent a deficiency, no deficiency plan was needed by the San Francisco 2015 CMP.

In addition to roadway segment LOS, SFCTA documents multimodal data such as transit travel times along roadway segments (2015 CMP Appendix 7 Transit Monitoring Methodology and Results) and multimodal volumes at intersection count locations (2015 CMP Chapter 4 Multimodal Performance, Table 4-11). These are shown for information purpose in Table 13 and Table 14.

Table 13. San Francisco 2015 CMP Transit Speeds

2015 San Francisco CMP Segments with Transit Speeds				
CMP Roadway Segment	Northbound		Southbound	
	AM Peak - Average Transit Speed (mph)	PM Peak - Average Transit Speed (mph)	AM Peak - Average Transit Speed (mph)	PM Peak - Average Transit Speed (mph)
19th Avenue/Park Presidio: from Junipero Serra to Sloat Boulevard	12.2	9.5	13.9	9.4
19th Avenue/Park Presidio: from Sloat Boulevard to Lincoln Way	7.9	10	11	11.1
19th Avenue/Park Presidio: from Lincoln Way to Lake Street	12.5	13.1	13.4	10
19th Avenue/Park Presidio: Lake Street to US 101	19.9	11.3	17.9	18.8
Junipero Serra: County Line to Brotherhood Way	9.8	13.2	No data	No data
Junipero Serra: Brotherhood Way to 19 th Avenue	7.2	7.9	18.9	17.2

Table 14. San Francisco 2015 CMP Multimodal Volumes

2015 San Francisco CMP Multimodal Volumes at Intersection Count Locations						
Location	AM			PM		
	Vehicle Traffic	Bicycles	Pedestrians	Vehicle Traffic	Bicycles	Pedestrians
19th Avenue and Holloway	9123	35	1803	10079	50	2297
Park Presidio Blvd and Geary Blvd	10847	11	796	11226	11	812

Congestion Management in San Francisco

San Francisco, with its extensive transit network and longstanding “Transit First” policy, recognizes that State CMP legislation was primarily focused on suburban transportation conditions, caused primarily by low density land use patterns that required an over-reliance on the single-occupant vehicle. Congestion management goals in San Francisco, within the confines of State law, tolerate some traffic congestion in order to enhance the competitiveness of transit service. The San Francisco General Plan for example specifically discourages highway capacity increases, stating that “(T)he existing vehicular capacity of the

bridges, highways and freeways entering the city should not be increased and should be reduced where possible.” (SF General Plan, Transportation Element, Objective 3, Policy 1).

By interpreting congestion management as maximizing person throughput rather than automobile throughput, the City & County hopes to build on multi-modal goals and Complete Streets efforts where there is an abundant supply of travel options, varied land uses with already high density development, and more pedestrian-friendly, less car-dependent environments. Caltrans embraces these goals as well.

Future Conditions

Future traffic projections and Volume to Capacity (V/C) ratios are derived from MTC’s Travel Demand Model, which models future land use based on the Association of Bay Area Governments (ABAG) projections for population and job growth. Per *Plan Bay Area*, the Region’s 2040 Regional Transportation Plan, growth will be focused in the more dense cities of the region, close to shopping and transit and more conducive to biking and walking. The forecast traffic volumes for SR 1 South in 2040 are shown in Table 15 below.

In terms of future corridor performance, the SR 1 South Corridor is evaluated based on projected volumes of traffic along the route compared with the route’s “capacity.” Obviously, a two-lane conventional highway has less capacity than a six-lane freeway. The V/C ratios, are calculated for each segment of highway or freeway and expressed as a number. The V/C ratio of “1.0” represents a freeway segment where volume “V” equals capacity “C,” indicating that the route is operating at full capacity. Ratios >1.0 indicate congested segments.

Table 15: 2040 Forecast Conditions

SR 1 South - 2040 Forecast Traffic Conditions											
Segment	Data Location	Directional									
		AM Peak		PM Peak		AM Peak V/C		PM Peak V/C		AADT	
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
A	Jct 92, Half Moon Bay	1200	1310	1250	1280	1.22	1.34	1.28	1.31	15,540	16,370
B	Sharp Park Road, Pacifica	2850	1340	1980	2650	0.73	0.34	0.51	0.68	26,270	24,550
C	N. Junction I-280, Daly City	7430	7590	7990	8750	0.76	0.65	0.82	0.75	101,860	170,090
D	Alemany Blvd., S.F.	4420	5630	5550	5210	0.78	0.99	0.97	0.91	75,650	74,260

Source: Caltrans D4 Office of Advance Planning, 2016 /MTC Travel Demand Model

The 2040 traffic projections indicate that SR 1 South Segment A will experience V/C ratios over 1.0 in both directions of travel for both the AM and PM peak hours, while V/C ratio for Segment D approaches 1.0 in the southbound AM and northbound PM peaks.

Traffic Operations Systems

Traffic Operations Systems (TOS) as installed on various segments of SR 1 South are shown in Table 16. TOS elements serve to improve operations in areas that experience daily delay or recurrent congestion. In particular, they help to improve the response time to accidents or breakdowns. This process involves detection and verification of an incident, deployment of appropriate emergency personnel and equipment, and informing motorists of the freeway conditions. Once an incident is cleared, the freeway can be restored to normal operations. Traffic Monitoring Stations (TMS) provide an accurate measure of vehicular speed, volume, and indirectly density (vehicles/lane-mile) for valuable information on daily system performance.



Photo: Caltrans D4 Photography

Table 16: Existing TOS Elements

Existing TOS Elements on SR 1 South (2016)						
Segment	TOS Type	County	Route	Approx. Post Mile	Direction	Notes
A	None	SM	1			
B	CCTV(f)	SM	1	38.43	N	
B	CCTV(f)	SM	1	38.43	S	
B	CCTV(f)	SM	1	38.44	N	
B	CCTV	SM	1	38.55	S	Outside Tunnels
B	CCTV	SM	1	38.55	N	Outside Tunnels
B	CMS	SM	1	38.57	N	Outside Tunnels
B	CMS	SM	1	39.36	S	Outside Tunnels
B	CCTV	SM	1	39.56	S	Outside Tunnels
C	TMS	SM	1 (280)	47.66 (25.11)	S	
C	TMS	SM	1 (280)	47.76 (25.26)	S	
C	CCTV	SM	1 (280)	47.83 (25.90)	S	
C	TMS	SM	1 (280)	47.92 (26.05)	S	
C	TMS	SM	1 (280)	48.40 (27.01)	S	
D	CCTV	SF	1	6.34	N	
D	HAR	SF	1	7.01	N	
D	VMS	SF	1	7.03	N	
D	CCTV	SF	1	7.04	S	

CCTV = Closed Circuit Television
 CCTV(f) = Fixed Closed Circuit TV
 CMS = Changeable Message Sign
 HAR = Highway Advisory Radio
 TMS = Traffic Monitoring Station
 VMS = Variable Message Sign
 N = Northbound
 S = Southbound

Closed Circuit Television systems (CCTVs) are used to identify and verify the nature of incidents and reduce response time. Generally on freeways, CCTV cameras are placed approximately every mile if the line-of-sight from vehicles is acceptable, and may be placed more closely together for bridges and tunnels. On the conventional highway portions of SR 1 South, greater spacing between CCTVs will be used. Changeable Message Signs (CMS) provide information to motorists about incidents and traffic problems are usually placed before freeway-to-freeway interchanges to help motorists make wise choices before reaching the interchange. Highway Advisory Radio (HAR) is used for longer messaging broadcast on a radio frequency available to motorists, while Variable Message Signs (VMS), which are smaller changeable message signs, alert motorists that radio broadcasting is available to them to get more detailed information. On SR 1 from south of Half Moon Bay to I-280, planned VMSs will include the display of travel times. Existing VMSs in the Tom Lantos Tunnels are used for tunnel operations. Together, all of the TOS system elements help to notify motorists of adverse traffic conditions and alternative routes to reduce overall incident delay in the system.

In addition to the TOS elements listed in the chart above, there are also TOS elements *inside* the Tom Lantos Tunnels near Devil's Slide, south of Pacifica:

- *Five northbound and five southbound CCTVs.
- *Five northbound and five southbound VMSs.
- *Seven northbound and seven southbound TMSs (single loop).

Proposed New TOS Elements

On the conventional highway portions of the corridor between the City of Half Moon Bay and Pacifica (Segment B), fixed cameras are proposed at each signalized intersection, along with a few CCTV cameras on the long stretches between signalized intersections. A few VMSs and TMSs will also be included here.

On the freeway portion of the corridor between Pacifica and Daly City (Segment C), a traffic monitoring station is proposed at each interchange, which would include mainline detection in both directions, as well as detection on the on-ramps and off-ramps. This deviates from the general strategy of a traffic monitoring station every 1/3 to 1/2 mile on the mainline. A closed circuit television camera at each interchange is also proposed. At least one variable message sign is proposed in this freeway segment in the southbound direction.

A "travel time" project between the City of Half Moon Bay and Daly City (Segments B and C) is currently being proposed to monitor and report on seasonal traffic. Travel times will be determined using Bluetooth readers installed at certain signalized intersections. Some of the southbound and northbound variable message signs proposed would be used to post travel times for motorists.


Ramp Metering on SR 1 South

Ramp metering is a traffic management strategy that uses a system of traffic signals at freeway entrances and connector ramps to regulate the volume of traffic and spacing of vehicles entering a freeway corridor. This strategy is used to maximize the efficiency of the freeway, improve mobility, and thereby minimize the total delay within the transportation corridor. Ramp metering attempts to ensure the total traffic volume entering a freeway segment, plus the entering ramp traffic, remains below the capacity of that freeway segment. Ramp metering has the potential to prevent freeway congestion by delaying its onset. It reduces freeway congestion by controlling the rate of vehicles entering the freeway by eliminating the entry of large groups of vehicles known as “platoons.” The result is increased freeway throughput, increased freeway operating speeds, and improved overall freeway operation. Ramp metering also maintains smoother and safer merging operations which improve safety by reducing rear-end and sideswipe collisions.



The Caltrans 2015 Ramp Metering Development Plan shows the following improvements to I-280 (where SR 1 is conterminous) over the next ten years. All ramp metering on this corridor, both planned and operational, occurs on the freeway segment of the corridor (Segment C) that runs conterminously with I-280. These locations on I-280 are shown below in Table 17.

Table 17 Ramp Metering Locations on SR 1 (I-280)

 2015 Ramp Metering Development Plan									
Status	District	County	Route	Postmile	Direction	Location	Ramp Type	# of Lanes	Comment
●	4	SM	280	R25.09	SB	NB Rte 1	C	1	Operational
●	4	SM	280	R25.22	SB	Sullivan Ave / D St.	D	1	Operational
	4	SM	280	R25.49	NB	NB Rte 1	C	3	Planned
	4	SM	280	R26.11	NB	Washington Ave	S	1	Planned
	4	SM	280	M26.97L	SB	SB Rte 1	C	2	Planned
●	4	SM	280	M27.01	SB	John Daly Blvd / Alemany Blvd	D	2	Operational

● Existing Meter

L = Loop
H = Hoop
C = Freeway-to-Freeway Connector
S = Slip or Diagonal
D = Collector/Distributor

KEY CORRIDOR ISSUES

Highway Operations

During the preparation of this Transportation Concept Report, various freeway operational issues were identified with Caltrans Highway Operations to improve safety and reduce congestion in the corridor.

- Roundabouts – In 2013 Caltrans updated its Traffic Operations Policy Directive 13-02 on Intersection Control Evaluation (ICE) to better examine the operational and safety benefits that alternative treatments such as roundabouts can provide at intersections, i.e. elimination of crossing conflicts, traffic calming, and lower delay. Segment B provides several possible opportunities for roundabouts at various intersections along SR 1 such as Reina Del Mar Avenue and Fassler Avenue in Pacifica, 9th Street in Montara, Valdemar Street and Cypress Avenue in Moss Beach, and Capistrano Road, Coronado Street, and Mirada Road in Half Moon Bay [Sources: Office of Assemblymember Kevin Mullin, and the Highway 1 Safety & Mobility Improvement Study, 2012]. These intersections and others should be evaluated for the benefits they may provide for highway operations.
- Calera Parkway Project (Pacifica) - Plans to widen a 1.3 mile stretch of SR 1 in Pacifica between Fassler Avenue to Westport Drive has been shelved after a Pacifica City Council vote and some opposition to the project. This segment of SR 1 South currently acts as a bottleneck to through travel primarily northbound in the morning peak period and southbound in the PM peak period. With no improvements to the project area, projections show that traffic queues will double by the Year 2035. This was a joint project sponsored by the City of Pacifica and the San Mateo County Transportation Authority, with oversight by Caltrans. The preferred alternative calls for relieving congestion by adding a lane of traffic in each direction (from a total of 4 lanes to 6 lanes), along with a bike lane and shoulder in each direction.

Safety and Mobility of Coastal Communities

A recent San Mateo County Planning effort has studied the transportation challenges for the coastal communities along SR 1 between Half Moon Bay and Montara (Segments A and B). “Connect the Coastside” (Draft, March 2016) presents a comprehensive Transportation Management Plan of preferred alternatives that looks at ways to balance future development and transportation needs of the San Mateo Midcoast, from just south of the Devil’s Slide Tunnel to the southern limits of Half Moon Bay (<http://www.connectthecoastside.com>). This Management Plan identifies multi-modal improvements needed to accommodate anticipated growth, a requirement by the California Coastal Commission before approval of the San Mateo County Local Coastal Program (LCP). The Management Plan incorporates public workshops in 2015 and will ultimately help transportation decision-making for the Midcoast area. Wherever possible, Caltrans will partner with stakeholders to improve multi-modal access and safety in this corridor, as well as along the adjoining SR 92 Corridor, which is an important link between the coast communities and the rest of the Bay Area.

In 2009 Caltrans provided a Community Based Transportation Planning grant to San Mateo County, in partnership with the Local Government Commission (LGC), a nonprofit organization committed to building livable communities. The planning grant aimed to study SR 1 from Half Moon Bay to Montara, including the communities of Princeton, El Granada, Miramar, and Moss Beach. An intensive community-based planning

process resulted in recommendations for consistent roadway edges, well-defined travel lanes and shoulders, better medians, improved pedestrian crossings, and intersection improvements that consider the use of roundabouts. The results of the Highway 1 Safety and Mobility Improvement Study (Phase 1, April 2010 and Phase 2, November 2012) have been shared widely at Caltrans and are reflected in the strategies of this TCR.

Climate Change and Sea Level Rise Vulnerability

The effects of climate change and sea level rise will have impacts to all transportation modes near the coast. Inundation and erosion of even small portions of the transportation system can disrupt connectivity and render much larger portions of the system impassable.

With the threat of sea level rise and the vulnerability of areas near SR 1 South, climate change risks should be considered in the planning, design, construction, and maintenance of infrastructure projects. This should apply to new projects as well as the maintenance and rehabilitation of existing highway infrastructure. All new investments should be made to minimize climate change risks to projects being constructed as well as minimize the long-term risks associated with infrastructure investment. Where the benefits of the project outweigh immediate climate change risks, risk management provisions should be undertaken.

Of particular concern is a stretch of SR 1 South between Pescadero and San Gregorio (Segment A). Shoreline erosion here occurs at the rate of several feet per year, prompting the study to explore the possible rerouting of SR 1 in this area to a more inland location. Caltrans has been using riprap emergency coastal armoring here to moderate the problem.

Landslides

Landslides along the California coast have caused portions of SR 1 South to either be closed for long periods of time, or be rerouted entirely. Landslides can severely damage roads, resulting in significant repair and maintenance costs. Economic losses due to increased travel distance and time can be significant to communities and the entire region if a route is closed for a significant period. In addition to the costs associated with landslide damage, some types of landslides pose a safety risk to motorists and other users.

Given the responsibility to preserve the integrity of the highway, Caltrans maintains full-time crews in the field. These maintenance crews are the often first-line of observation and action on a daily basis. Caltrans

“California’s coastline is constantly changing and continually presents us with challenges. Through hard work and determination, we continue to keep this scenic highway open.” Malcolm Dougherty, Caltrans Director, 2013.

Geotechnical also makes regular reviews of active landslide areas, which may include monitoring with scientific instrumentation to detect and record information about subtle movements.

To deal with new and ongoing landslides, Caltrans will continue to use an integrated process of prevention, response, and capital improvements. Preventive measures include stabilizing features like sheet pile walls, slope corrections, and rock netting. Response efforts include debris removal, minor road realignments, and emergency road openings. Capital improvements may be funded through the State Highway Operation and Protection Program (SHOPP) funding for repairs and construction needed to restore the facility and prevent progressive failures affecting the highway.

SR 1 SOUTH CORRIDOR CONCEPT

SR 1 South Concept Summary

The 25-year Concept from existing facility to future facility is summarized in Table 18 below, including recommended strategies by corridor segment.

Table 18: Corridor Concept Summary

<u>SEGMENT</u>	<u>COUNTY</u>	<u>SEGMENT DESCRIPTION</u>	<u>EXISTING FACILITY</u>	<u>25-YR CONCEPT</u>	<u>STRATEGIES TO ACHIEVE CONCEPT</u>
Segment A PM 0.00–29.04	SM	Santa Cruz/San Mateo County Line to SR 92	2 lane Conventional Highway	2 lane Conventional Highway	<ul style="list-style-type: none"> • Monitor and plan for sea level rise • Continue to study SR1 erosion and bypass between Pescadero & San Gregorio. • Monitor and install rock slope protection and drainage • Support completion of CA Coastal Trail • Support “Connect the Coastside” plan • Improve the pedestrian environment
Segment B PM 29.04–R43.46	SM	SR 92 to Sharp Park Road, Pacifica	2-4 lane Conventional Highway	2-6 lane Conventional Highway	<ul style="list-style-type: none"> • Support “Connect the Coastside” efforts • Support completion of CA Coastal Trail • Implement new TOS elements including CCTV and VMSs • Maintain & improve Park & Ride lots • Improve coastal community safety & mobility with consistent roadway edges, shoulders, ped crossings & roundabouts • Monitor and plan for sea level rise
Segment C PM R43.46–R48.55	SM	Sharp Park Road to SM/SF County Line	4-10 lane Freeway	4-10 lane Freeway	<ul style="list-style-type: none"> • Implement new TOS elements • Implement ramp metering per 2015 Ramp Metering Plan (I-280 portion) • Monitor and plan for sea-level rise • Close gaps in the parallel and intersecting corridor bicycle network • Improve pedestrian environment at I/S and I/C in areas with pedestrian demand • Support completion of CA Coastal Trail
Segment D PM 0.0–7.08	SF	SM/SF County Line to US 101	Tunnel and 4-6 lane Conventional Highway*	Tunnel and 4-6 lane Conventional Highway*	<ul style="list-style-type: none"> • Improve pedestrian environment at I/S and I/C in areas with pedestrian demand • Promote pedestrian refuges wherever possible, such as being built along the M Ocean View Muni tracks • Close gaps in the corridor bicycle network

PM = Post Mile

*Segment D becomes a four- lane freeway at Lake Street for the final mile before joining US 101 (PM 5.96-7.08)

CONCEPT RATIONALE

The 25-year Concept for SR 1 South is a two-lane conventional highway where it is currently in Segment A, from the Santa Cruz county line to Half Moon Bay. Segment B from Half Moon Bay to Pacifica remains two to four lanes conventional highway, except for the 1.3 mile segment of Calera Parkway in Pacifica which would have six lanes if a project to widen the roadway is approved by the City of Pacifica and the San Mateo County Transportation Authority. The four to ten-lane freeway segment from Pacifica through Daly City (Segment C) remains unchanged, as does the four to six-lane conventional highway through San Francisco (Segment D).

The future concept generally keeps the route's existing capacity and function, while introducing operational improvements to manage demand and optimize system performance. Mobility efficiency and integration between all transportation modes are required to meet long-term mobility needs and the statewide goal of reducing greenhouse gas (GHG) emissions. Improvements to the bicycle and pedestrian network and improvements in transit service frequency could keep some trips off the highway system.

As with many State routes throughout California, improvements to the SR 1 Corridor throughout its length will rely primarily on Intelligent Transportation Systems (ITS) infrastructure, implementation of TOS elements, and pavement preservation/rehabilitation.

Implementation strategies for this TCR are consistent with Caltrans Strategic Management Plan 2015-2020. In response to Caltrans updated mission, vision, and goals, the Strategic Management Plan 2015-2020 links strategic goals with corresponding performance measures that the Department is responsible for achieving. The tools used to implement the Plan are performance measurement, transparency, accountability, sustainability, and innovation.

PROJECTS AND STRATEGIES TO ACHIEVE CONCEPT

PLANNED TRAFFIC OPERATIONS SYSTEMS

San Mateo County:

- From Half Moon Bay to Pacifica (Segment B):
 - On the conventional highway portions of the corridor, fixed cameras at each signalized intersection, along with a few CCTVs on the long stretches between signalized intersections.
 - VMSs and TMSs to be installed.
 - Consider roundabouts for coastal communities
- From Pacifica to Daly City (Segment C):
 - On the freeway portion of the corridor, a TMS is proposed at each interchange which would include mainline detection in both directions, as well as detection on the on-ramps and off-ramps.
 - CCTVs at interchanges
 - At least one VMS proposed in the southbound direction.
- From Half Moon Bay to Daly City (Segments B & C):

A “travel time” project is being proposed to monitor and report on seasonal traffic. Travel times will be determined using Bluetooth wireless technology. Bluetooth readers would be installed at certain signalized intersections. Some of the southbound and northbound VMSs proposed would be used to post projected travel times for motorists.

TRANSIT STRATEGIES

- Work with transit operators on the planning and implementation of projects to increase people throughput in the corridor such as: Park and Ride facilities, bus signal priority, transit stops and shelters.
- Support operations and expansion of transit service and improve amenities; increase frequency and passenger comfort and reduce travel times, including a Regional Express Bus network.
- Pave transit stops and connect them via sidewalk or path along SR 1 South.

BICYCLE STRATEGIES

- Complete Class I bike path segments along SR 1 near Half Moon Bay (Kelly Avenue to SR 92)
- Incorporate bicycle facility design treatments (bike lanes or wider shoulders, ramp reconstruction to intersect at a 90-degree angle, bike lane striping to the left of right-turn-only lane, avoidance of dual right-turn lanes) into interchange reconfiguration/reconstruction projects where feasible.
- Review and evaluate all maintenance projects for the feasibility of incorporating striping and signage improvements to enhance bicycle access and safety at ramp intersections with local roads.
- Support bicycle network improvements paralleling and crossing SR 1 South. The SR 1 and SR 35 interchange is currently being evaluated for better movement of bicyclists through the area.
- Support regional and county efforts to provide and promote connectivity of existing facilities for access to intermodal hubs.
- Improve Park and Ride lots to better serve bicyclists.

PEDESTRIAN STRATEGIES

- Remove barriers to pedestrian circulation by squaring up ramp intersections to slow down turning vehicles and shorten crossing distances, by striping crosswalks to direct pedestrians and notify motorists of their presence, and by adding pedestrian countdown signals where feasible.
- Install rectangular rapid flashing beacons or pedestrian hybrid beacons where appropriate
- Review and evaluate future interchange configuration/reconstruction projects. Based on pedestrian demand, consider the need to provide and connect sidewalks around ramp intersections.
- Analyze lane widths of road facilities to consider the addition of medians to provide pedestrian refuge and help with traffic calming.
- Work with local agencies on implementing planned and programmed pedestrian and bicycle network improvements. These may include on-street improvements or grade-separated facilities.
- Provide shoulder striping or edge treatments wherever possible to enhance the walking experience
- Support completion of the California Coastal Trail and provide trail connectivity wherever possible, recognizing the alignment goals for the trail which aim to place it within the sights, sounds, and smells of the ocean, safely protected from motorized traffic.

PLANNED AND PROGRAMMED PROJECTS

Programmed - projects included in the State Transportation Improvement Program (STIP), State Highway Operation and Protection Program (SHOPP), or California Federal Transportation Improvement Program (FTIP)

Planned - projects included in an approved State, Regional, or Countywide Transportation Plan

The following Table 19 shows all major planned and programmed projects along SR 1 South, by corridor segment. This table summarizes project description, location, Regional Transportation Plan ID number, general purpose, and implementation timeline as of 2017.

Table 19: SR 1 South Summary of Planned and Programmed Projects

Seg.	Description	Planned or Programmed	Location	Source	Purpose	Implementation Phase
A	SR 1 possible realignment because of severe erosion between Pescadero & San Gregorio.	Planned	Bean Hollow Rd. to Stage Rd. PM 10.70-19.45	Project Study Report (EA: 2S210K)	Realignment	Planning
A	Complete Class I bike & pedestrian path from Kelly Ave. to San Mateo Rd (SR 92)	Planned	Half Moon Bay	Project Recommended by Caltrans	Bike & Pedestrian Improvements	Planning
A	Intersection improvements at Kelly Ave., Coronado St., and Capistrano Rd: curve radii, curb extensions, crosswalks	Planned	Half Moon Bay to El Granada and Princeton	Project Recommended by Caltrans	Bike & Pedestrian Improvements	Planning
B						
B	Stripe Class II bike lanes with striped buffer where feasible	Planned	Half Moon Bay to El Granada and Princeton	Project Recommended by Caltrans	Bike & Pedestrian Improvements	Planning
B	Pave Transit Stops and connect stops via sidewalk or path	Planned	Half Moon Bay to El Granada and Princeton	Project Recommended by Caltrans	Transit Improvements	Planning
B	Hwy 1 operational & safety improvements in SM Co. mid-Coast. (acceleration/ deceleration lanes; turn lanes; bike lanes; pedestrian crossings; and trails	Planned \$29M	San Mateo County Midcoast	RTP 2013 Plan Bay Area ID #17060020	Highway Operational Improvements	Completion 2020
B	SR 1 Improvements in Half Moon Bay; left and right turn lanes, bike lanes, bus stops, safety lighting, median and channelization improvements	\$19M	Half Moon Bay	RTP 2013 Plan Bay Area ID #17060023	Highway Operational Improvements	Completion 2019
B	Along 7 miles of SR 1 between Half Moon Bay and Pacifica install raised medians, left turn lanes, acceleration lanes, and pedestrian crossings	Planned	Between Half Moon Bay and Pacifica	San Mateo County	SHOPP Coordination	Planning
B	Widen overcrossing at Manor Dr. & new onramp for NB SR 1 at Milagra Drive.	\$23.4M	Pacifica	RTP 2013 Plan Bay Area ID #240067	Safety	Completion 2040

B	Construct SR 1 (Calera Parkway) northbound and southbound lanes from Fassler Ave. to Westport Dr.	Programmed \$58M	Pacifica	RTP 2013 Plan Bay Area ID #17060034	Roadway Expansion	Project on Hold
B	Repair washout Rock Slope Protection due to storm waves and repair box culver	Programmed \$1.4M	El Granada, 0.1 mile N of Coronado St.	2016 SHOPP 4J060	Roadway Preservation Flood Protection	Construction April 2019
B C	Rehabilitate pavement	Programmed \$18.9M	Montara, Pacifica, & Daly City, 1.3mi N of 2 nd St to Sullivan Ave overcrossing	2016 SHOPP 4H210	Roadway Preservation	Construction Sept 2019
C	San Jose Ave. Pedestrian Overcrossing	\$8.2M	Pacifica	2016 SHOPP 4G850	Bridge Preservation	Construction Jan 2019
C	I-280 (SR 1) Improvements near D Street exit	Planned \$1M	Daly City	RTP Plan Bay Area ID #17060035	Roadway Expansion	Completion 2025
D	Presidio Parkway	\$1.59B	San Francisco	RTP Plan Bay Area ID #17050022	Highway Operational Improvements; Interchanges	Completed; Final landscaping 2017
D	Muni Metro M-Line 19 th Avenue Core Capacity Project- redesign, realignment, and grade separation	Portion of \$335M	San Francisco	RTP ID#17050017	Transit Expansion and Service Improvements	Alternatives Planning
D	Parkmerced Transportation Improvements	Planned \$76M	San Francisco	RTP Plan Bay Area ID #17050037	Transit Efficiency and Service Improvements	Completion 2021

APPENDICES

APPENDIX A GLOSSARY OF TERMS AND ACRONYMS

Acronyms

AADT – Annual Average Daily Traffic
AADTT – Annual Average Daily Truck Traffic
AB – Assembly Bill
ABAG – Association of Bay Area Governments
ADA – Americans with Disabilities Act of 1990
ADT – Average Daily Traffic
Alameda CTC – Alameda County Transportation Commission
ATP – Active Transportation Program
BAAQMD – Bay Area Air Quality Management District
BCDC – Bay Conservation and Development Commission
BRT – Bus Rapid Transit
BY – Base Year
Caltrans – California Department of Transportation
CARB – California Air Resources Board
C/CAG – City/County Association of Governments of San Mateo County
CCC – California Conservation Corps
CCTA – Contra Costa Transportation Authority
CDFW- California Department of Fish and Wildlife
CEC – California Energy Commission
CESA – California Endangered Species Act
CFAC – California Freight Advisory Committee
CFMP – California Freight Mobility Plan
CMA – Congestion Management Agencies
CMAQ – Congestion Mitigation and Air Quality
CMP – Congestion Management Plan
CSFAP – California Sustainable Freight Action Plan
CSMP – Corridor System Management Plan
CEQA – California Environmental Quality Act
CSS – Context Sensitive Solutions
CTC – California Transportation Commission
CTP – California Transportation Plan
DD – Deputy Directive
DSMP – District System Management Plan
ECA – Essential Connectivity Areas
EPA – Environmental Protection Agency
FAST Act – Fixing America’s Surface Transportation Act
FASTLANE – Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies grant program
FHWA – Federal Highway Administration
FSR – Feasibility Study Report
FSTIP – Federal Statewide Transportation Improvement Program
FTA – Federal Transit Administration
FTIP – Federal Transportation Improvement Program

GHG – Greenhouse Gas
GIS – Geographic Information System
HCP – Habitat Conservation Plan
HOT – High Occupancy Toll lane
HOV – High Occupancy Vehicle lane
HY – Horizon Year
ICM – Integrated Corridor Mobility
IGR – Intergovernmental Review
ITIP – Interregional Transportation Improvement Program
ITS – Intelligent Transportation System
ITSP – Interregional Transportation Strategic Plan
KPRA – Kingpin-to-Rear-Axle
LOS – Level of Service
MAP-21 – Moving Ahead for Progress in the 21st Century
MPO – Metropolitan Planning Organizations
MTC – Metropolitan Transportation Commission
NOA – Naturally Occurring Asbestos
NCCP – Natural Community Conservation Plan
NEPA – National Environmental Policy Act
NHS – National Highway System
NHFN – National Highway Freight Network
NMFN – National Multimodal Freight Network
NVTA – Napa Valley Transportation Authority
PAED – Project Approval/Environmental Document
PBA – Plan Bay Area
PCA – Priority Conservation Area
PDA – Priority Development Area
PFN – Primary Freight Network
PID – Project Initiation Document
PIR – Project Initiation Report
PM – Post Mile
PM 2.5 – Particulate Matter 2.5 micrometers or less in diameter
PM 10 – Particulate Matter 10 micrometers or less in diameter
PSR – Project Study Report
PR – Project Review
PTSF – Percent Time Spent Following
RHNA – Regional Housing Needs Allocation
RTP – Regional Transportation Plan
RTIP – Regional Transportation Improvement Program
RTPA – Regional Transportation Planning Agencies
SACOG – Sacramento Area Council of Governments
SAFETEA-LU – Safe, Accountable, Flexible and Efficient Transportation Equity Act, a Legacy for Users
SB – Senate Bill
SCS – Sustainable Community Strategies
SCTA – Sonoma County Transportation Authority
SFCTA – San Francisco County Transportation Authority
SHOPP – State Highway Operation Protection Program
SHS – State Highway System
SICOG – San Joaquin Council of Governments
SMF – Smart Mobility Framework

SR – State Route
STA – Solano Transportation Authority
STIP – State Transportation Improvement Program
STP – Surface Transportation Program
STRAHNET – Strategic Highway Network
TAM – Transportation Authority of Marin
TCIF – Trade Corridors Improvement Fund
TCRP – Transit Cooperative Research Program
TEA-21 – Transportation Equity Act for the 21st Century
TCR – Transportation Concept Report
TIGER – Transportation Investment Generating Economic Recovery
TDM – Transportation Demand Management
TMP – Transportation Management Plan
TMS – Transportation Management System
TOS – Traffic Operations Systems
TSN – Transportation System Network
USFWS – United States Fish and Wildlife Service
VMS – Variable Message Sign
VMT – Vehicle Miles Traveled
VTA – Santa Clara Valley Transportation Authority
VPH – Vehicles per Hour

Definitions

AADT – Annual Average Daily Traffic is the total volume for the year divided by 365 days. The traffic count year is from October 1st through September 30th. Traffic counting is generally performed by electronic counting instruments moved from location throughout the State in a program of continuous traffic count sampling. The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal influence, weekly variation and other variables which may be present. Annual ADT is necessary for presenting a statewide picture of traffic flow, evaluating traffic trends, computing accident rates, planning and designing highways and other purposes.

Base Year – The year that the most current data is available to the Districts.

Bikeway Class I (Bike Path) – Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross flow by motorists minimized.

Bikeway Class II (Bike Lane) – Provides a striped lane for one-way bike travel on a street or highway.

Bikeway Class III (Bike Route) – Provides for shared use with pedestrian or motor vehicle traffic.

Bikeway Class IV (Separated Bikeway/Cycle Track) – Provides for exclusive use for bicycles by separating bikeway from motor vehicle traffic.

Bottlenecks – A bottleneck is a location where traffic demand exceeds the capacity of the roadway.

Capacity – The maximum sustainable hourly flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, environmental, traffic, and control conditions.

Capital Facility Concept – The 20-25 year vision of future development on the route to the capital facility. The capital facility can include capacity increasing, State Highway, bicycle facility, pedestrian facility, transit facility (Intercity Passenger Rail, Mass Transit Guideway etc.), grade separation, and new managed lanes.

Conceptual Project – A conceptual improvement or action is a project that is needed to maintain mobility or serve multimodal users, but is not currently included in a fiscally constrained plan and is not currently programmed. It could be included in a General Plan or in the unconstrained section of a long-term plan.

Corridor – A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways, bicycle, pedestrian, and transit route alignments. Off system facilities are included as informational purposes and not analyzed in the TCR.

Express Lanes – Specially designated highway lanes that are toll-free for carpools, vanpools, motorcycles, buses and eligible clean-air vehicles. Solo drivers can choose to pay a toll to access the lanes for reliable travel times.

Facility Concept – Describe the Facility and strategies that may be needed within 20-25 years. This can include capacity increasing, State Highway, bicycle facility, pedestrian facility, transit facility, Non-capacity increasing operational improvements, new managed lanes, conversion of existing managed lanes to another managed lane type or characteristic, TMS field elements, Transportation Demand Management and Incident Management.

Facility Type – The facility type describes the State Highway facility type. The facility could be freeway, expressway, conventional, or one-way city street.

Freight Generator – Any facility, business, manufacturing plant, distribution center, industrial development, or other location (convergence of commodity and transportation system) that produces significant commodity flow, measured in tonnage, weight, carload, or truck volume.

Headway – The time between two successive vehicles as they pass a point on the roadway, measured from the same common feature of both vehicles.

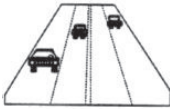
Horizon Year – The year that the future (20-25 years) data is based on.

Intermodal Freight Facility – Intermodal transport requires more than one mode of transportation. An intermodal freight facility is a location where different transportation modes and networks connect and freight is transferred (or “transloaded”) from one mode, such as rail, to another, such as truck.

IRRS – The Interregional Road System, a series of interregional State highways outside the urbanized areas that provides access to, and links between, the State’s economic centers, major recreational areas, and urban and rural regions.

ITS – Intelligent Transportation System improves transportation safety and mobility and enhances productivity through the integration of advanced communications technologies into the transportation infrastructure and in vehicles. Intelligent Transportation Systems encompass a broad range of wireless and wireline communications-based information and electronics technologies to collect and process information, and take appropriate actions.

LOS – Level of Service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of speed, travel time, freedom to maneuver, traffic interruption, comfort, and convenience. Six levels of LOS are generally categorized as follows:



LOS A describes free flowing conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway.



LOS B is also indicative of free-flow conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway.



LOS C represents a range in which the influence of traffic density on operations becomes marked. The ability to maneuver with the traffic stream is now clearly affected by the presence of other vehicles.



LOS D demonstrates a range in which the ability to maneuver is severely restricted because of the traffic congestion. Travel speed begins to be reduced as traffic volume increases.



LOS E reflects operations at or near capacity and is quite unstable. Because the limits of the level of service are approached, service disruptions cannot be damped or readily dissipated.



LOS F reflects stop-and-go, low speed conditions with little or poor maneuverability. Speed and traffic flow may drop to zero and considerable delays occur. For intersections, LOS F describes operations with delay in excess of 60 seconds per vehicle. This level, considered by most drivers as unacceptable, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection.

Multi-modal – The availability of transportation options using different modes within a system or corridor, such as automobile, subway, bus, ferry, rail, or air.

Managed Lanes – highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions.

NHFS – a federally established freight network to strategically direct Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system.

National Highway System (NHS) – a federally established interconnected system of principle arterial routes to serve major travel destinations and population centers, international border crossings, as well as ports, airports, public transportation facilities, and other intermodal facilities. The NHS must also meet national defense requirements and server interstate and interregional travel.

Peak Hour – The hour of the day in which the maximum volume occurs across a point on the highway.

Peak Hour Volume – The hourly volume during the highest hour traffic volume of the day traversing a point on a highway segment. It is generally between 6 percent and 10 percent of the ADT. The lower values are generally found on roadways with low volumes.

Planned Project – A planned improvement or action is a project in a fiscally constrained section of a long-term plan, such as an approved Regional or Metropolitan Transportation Plan (RTP or MTP), Capital Improvement Plan, or local Sales Tax Measure.

Post Mile – A post mile is an identified point on the State Highway System. The milepost values increase from the beginning of a route within a county to the next county line. The milepost values start over again at each county line. Milepost values usually increase from south to north or west to east depending upon the general direction the route follows within the State. The milepost at a given location will remain the same year after year. When a section of road is relocated, new milepost (usually noted by an alphabetical prefix such as "R" or "M") are established for it. If relocation results in a change in length, "milepost equations" are introduced at the end of each relocated portion so that mileposts on the remainder of the route within the county will remain unchanged.

Programmed Project – A programmed improvement or action is a project in a near-term programming document identifying funding amounts by year, such as the State Transportation Improvement Program (STIP) or the State Highway Operations and Protection Program (SHOPP).

Route Designation – A route's designation is adopted through legislation and identifies what system the route is associated with on the State Highway System. A designation denotes what design standards should apply during project development and design. Typical designations include but not limited to National Highway System (NHS), Interregional Route System (IRRS), and Scenic Highway System.

P3 - A public-private partnership, which is a cooperative arrangement between one or more public and private sectors.

Post 25-Year Concept – This dataset may be defined and re-titled at the District's discretion. In general, the post 25-year concept could provide the maximum reasonable and foreseeable roadway needed beyond a 20 to 25 year horizon. The post 25-year concept can be used to identify potential widenings, realignments, future facilities, and rights-of-way required to complete the development of each corridor.

Relinquishment – the act and the process of legally transferring property rights, title, liability, and maintenance responsibilities of a portion or entirety of a State highway or a Park-and-Ride lot to another entity.

Rural – Fewer than 5,000 in population designates a rural area. Limits are based upon population density as determined by the U.S. Census Bureau.

Segment – A portion of a facility between two points.

TDM – Transportation Demand Management programs designed to reduce or shift demand for transportation through various means, such as the use of public transportation, carpooling, telework, and alternative work hours. Transportation Demand Management strategies can be used to manage congestion during peak periods and mitigate environmental impacts.

TOS – Traffic Operations Systems – the full range of communications and electronic technologies comprised of closed-circuit TV cameras, loop detector sensors, ramp metering, highway advisory radio, and changeable message signs, which when applied to the transportation system, better manage and improve the mobility of people and goods.

TSMO – Transportation Systems Management & Operations - Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects, describing the system operations and management elements that may be needed within 20-25 years. This can include Non-capacity increasing operational improvements (auxiliary lanes, channelization's, turnouts, etc.), conversion of existing managed lanes to another managed lane type or characteristic (e.g. HOV lane to HOT lane), TMS Field Elements, Transportation Demand Management, and Incident Management.

Urban – 5,000 to 49,999 in population designates an urban area. Limits are based upon population density as determined by the U.S. Census Bureau.

Urbanized – Over 50,000 in population designates an urbanized area. Limits are based upon population density as determined by the U.S. Census Bureau.

VMT – Is the total number of miles traveled by motor vehicles on a road or highway segments.

APPENDIX B FEDERAL, STATE, AND REGIONAL PLANS AND POLICIES

FEDERAL

[Fixing America's Surface Transportation Act \(FAST\) December, 2015](#)

FAST will provide \$305 Billion in funding for surface transportation programs and was signed into law in December 2015. The federal spending bill replaces MAP-21, Moving Ahead for Progress in the 21st Century signed into law in 2012. FAST provides funding for highway, transit, and railroad networks, most of which will be distributed to state departments of transportation and local transit agencies.

[Federal Transportation Improvement Program \(FTIP\)](#)

All federally funded projects, and regionally significant projects (regardless of funding), must be listed in the FTIP per federal law. A project is not eligible to be programmed in the FTIP until it is programmed in the *State Transportation Improvement Program (STIP)* or in the *State Highway Operations and Protection Program (SHOPP)*. Other types of funding (Federal Demonstration, Congestion Mitigation and Air Quality (CMAQ), Transportation Enhancement Activities (TEA), and Surface Transportation Program (STP) must be officially approved before the projects can be included in the FTIP.

STATE

[California Transportation Plan \(CTP\) 2040](#)

The CTP is a long-range policy framework to meet California's future multi-modal mobility needs and reduce greenhouse gas and particulate matter (PM) emissions. The CTP defines goals, performance-based policies, and strategies to achieve a collective vision for California's future Statewide, integrated, multimodal transportation system. A new updated plan was recently finalized in June 2016. It focuses on meeting new trends and challenges, such as economic and job growth, climate change, freight movement, and public health. In addition, performance measures and targets were developed to assess performance of the transportation system to meet the requirements of MAP-21.

[California Interregional Blueprint \(CIB\)](#)

Responding to Senate Bill 391 of 2009, CIB informs and enhances the State's transportation planning process. Similar to requirements for regional transportation plans under Senate Bill 375, SB 391 requires the State's long-range transportation plan to meet California's climate change goals under Assembly Bill 32. In response to these statutes, Caltrans is preparing a state-level transportation blueprint to inform CTP 2040 and articulate the State's vision for an integrated, multi-modal interregional transportation system that integrates the Regional Blueprint Program (see the Regional appendix section) and complements regional transportation plans. The CIB will integrate the State's long-range multi-modal plans and Caltrans-sponsored programs with the latest technology and tools to enhance our ability to plan for and manage a transportation system that will expand mode choices and meet future increases in transportation needs and still meet the GHG-reduction targets or SB 375.

[State Transportation Improvement Program \(STIP\)](#)

The STIP is a multi-year capital improvement program of transportation projects on and off the State Highway System, funded with revenues from the Transportation Investment Fund and other funding sources. Caltrans and the regional planning agencies prepare transportation improvement plans for submittal. Local agencies work through their Regional Transportation Planning Agency (RTPA), County

Transportation Commission, or Metropolitan Planning Organization (MPO), as appropriate, to nominate projects for inclusion in the STIP.

[Interregional Transportation Improvement Program \(ITIP\)](#)

The Interregional Transportation Improvement Program (ITIP) is a State funding program for the Interregional Improvement Program (IIP) and is a sub-element of the State Transportation Improvement Program. The 2014 ITIP is a five year program of projects from fiscal years 2014-15 through 2018-19. The IIP is a State funding category created in SB 45 for intercity rail, interregional road or rail expansion projects outside urban areas, or projects of statewide significance, which include projects to improve State highways, the intercity passenger rail system, and the interregional movement of people, vehicles, and goods. Caltrans nominates and the California Transportation Commission approves a listing of interregional highway and rail projects for 25 percent of the funds to be programmed in the STIP (the other 75 percent are Regional Improvement Program funds). Only projects planned on State highways are to be included in this program.

[Interregional Transportation Strategic Plan \(ITSP\) 2015](#)

The ITSP is a California Department of Transportation (Caltrans) document that provides guidance for the identification and prioritization of interregional State highway projects. The ITSP promotes the State of California's role of improving mobility while providing opportunity for efficient goods movement. It also provides summary information regarding other interregional transportation modes—in particular, intercity passenger rail. The ITSP highlights critical planning considerations such as system planning, complete streets, and climate change.

[District System Management Plan \(DSMP\)](#)

The DSMP provides a vehicle for the development of multi-modal and multi-jurisdictional transportation strategies. These strategies must be based on an analysis that is developed in partnership with regional and local agencies. The DSMP is the State's counterpart to the Regional Transportation Plan (RTP) for the region. The former Transportation System Development Program (TSDP) is now incorporated within this management plan as a Project List.

[State Highway Operation and Protection Program \(SHOPP\)](#)

Caltrans prepares the SHOPP for the expenditure of transportation funds for major capital improvements necessary to preserve and protect the State Highway System. The SHOPP is a four-year funding program, focusing available resources on the most critical categories of projects: safety mandates, bridge, and pavement preservation. The *10-Year SHOPP* anticipates long-term projected expansion and maintenance needs.

[10-Year SHOPP](#)

The 10-year SHOPP is a state plan for the rehabilitation and reconstruction, or both, of state highways and bridges by the SHOPP. The purpose of the plan is to identify needs for the upcoming 10 years. The plan is updated every two years. It includes specific milestones, quantifiable accomplishments and strategies to control cost and improve the efficiency of the program. 10-year SHOPP differs from SHOPP as it has no funding constraints assigned.

[Senate Bill 45 \(SB 45\)](#)

SB 45 (1997) establishes guidelines for the California Transportation Commission to administer the allocation of funds appropriated from the Public Transportation Account for capital transportation projects designed to improve transportation facilities.

[Smart Mobility Framework](#)

Caltrans released *Smart Mobility 2010: A Call to Action for the New Decade* in February 2010. SMF was prepared in partnership with US Environmental Protection Agency, the Governor's Office of Planning and Research, and the California Department of Housing and Community Development to address both long-range challenges and short-term pragmatic actions to implement multi-modal and sustainable transportation strategies in California.

Smart Mobility 2010 provides new tools and techniques to improve planning. It links land use "place types," considers growth scenarios and how growth will best gain the benefits of smart mobility. The SMF emphasizes travel choices, healthy, livable communities, reliable travel times for people and freight, and safety for all users. This vision supports the goals of social equity, climate change intervention, and energy security as well as a robust and sustainable economy.

[Caltrans Deputy Directive 64-R2](#) *Complete Streets - Integrating the Transportation System, 2008 & 2014*

This Deputy Directive expresses Caltrans commitment to provide for the needs of all travelers including pedestrians, bicyclists and persons with disabilities in all programming, planning, maintenance, construction, operations, and project development activities and products.

[State Assembly Bill 32 \(AB 32\)](#) *Global Warming Solutions Act, September 2006*

This bill requires the State's greenhouse gas emissions to be reduced to 1990 levels by the year 2020. Caltrans' strategy to reduce global warming emissions has two elements. The first is to make transportation systems more efficient through operational improvements. The second is to integrate emission reduction measures into the planning, development, operations and maintenance of transportation elements.

[Senate Bill 375 \(SB 375\)](#) *Addressing Greenhouse Gas Emissions from the Transportation Sector*

SB 375 provides a means for achieving AB 32 goals from cars and light trucks. The transportation sector contributes over 40 percent of the GHGs throughout the state. Automobiles and light trucks alone contribute almost 30 percent. SB-375 requires the California Air Resources Board (ARB) to develop regional greenhouse gas (GHG) emission reduction targets for cars and light trucks for each of the 18 Metropolitan Planning Organizations (MPOs). Through their planning processes, each of the MPOs is required to develop plans to meet their regional GHG reduction target. This would be accomplished through either the financially constrained "sustainable communities strategy" as part of their regional transportation plan (RTP) or an unconstrained alternative planning strategy. SB-375 also provides streamlining of California Environmental Quality Act (CEQA) requirements for specific residential and mixed-use developments.

[Senate Bill 391 \(SB 391\)](#) *California Transportation Plan updates, 2009*

This bill requires the department to update the California Transportation Plan by December 31, 2015, and every 5 years thereafter. The bill requires the plan to address how the state will achieve maximum feasible emissions reductions in order to attain a statewide reduction of greenhouse gas emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050. The bill requires the plan to identify the statewide integrated multimodal transportation system needed to achieve these results. CTP was finalized in June 2016.

[Senate Bill 743 \(SB 743\)](#) *California Environmental Quality Act (CEQA) updates, 2013*

This bill requires the Office of Planning and Research to update guidelines for analyzing transportation project impacts as they relate to CEQA legislation. Vehicle Miles Traveled (VMT) provides an alternative to LOS for evaluating transportation impacts. Particularly within areas served by transit, those alternative criteria must "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." Alternative criteria may include "vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated."

[Caltrans - Climate Action Plan](#)

Greenhouse gas (GHG) emissions and the related subject of global climate change are emerging as critical issues for the transportation community. Caltrans recognizes the significance of cleaner, more energy efficient transportation. On June 1, 2005 the State established climate change emissions reduction targets for California that lead to development of the Climate Action Program. This program highlights reducing congestion and improving efficiency of transportation systems through smart land use, operational improvements, and Intelligent Transportation Systems (objectives of the State's Strategic Growth Plan). The Climate Action Plan approach also includes institutionalizing energy efficiency and GHG emission reduction measures and technology into planning, project development, operations, and maintenance of transportation facilities, fleets, buildings, and equipment.

[Corridor System Management Plans \(CSMP\)](#)

In 2007, the California Transportation Commission adopted a resolution stating "...the Commission expects Caltrans and regional agencies to preserve the mobility gains of urban corridor capacity improvements over time that will be described in Corridor System Management Plans (CSMPs)." A CSMP is a transportation planning document that will study the facility based on comprehensive performance assessments and evaluations. The strategies are phased, and include both operational and more traditional long-range capital expansion strategies. They take into account transit usage, projections, and interactions with arterial network, and connection to State Highways. Each CSMP presents an analysis of existing and future traffic conditions and proposes traffic management strategies and capital improvements to maintain and enhance mobility within each corridor.

A CSMP results in a listing and phasing plan of recommended operational improvements, Intelligent Transportation System (ITS) strategies, and system expansion projects to preserve or improve performance measures within the corridor. CSMPs are required for all projects receiving Proposition 1B (2006) Corridor Mobility Improvement Account (CMIA) funding.

[California Freight Mobility Plan Dec. 2014](#)

The California State Transportation Agency (CalSTA) and Caltrans developed a state freight plan, titled the California Freight Mobility Plan (CFMP). Per Assembly Bill 14 (Lowenthal, 2013) the CFMP is a comprehensive plan that governs the immediate and long-range planning activities and capital investments of the state with respect to the movement of freight. The CFMP will also comply with the relevant provisions of the federal Moving Ahead for Progress in the 21st Century Act (MAP-21) which encourages each state to develop a freight plan. The CFMP is a modal plan contributing to the Department's ongoing *California Interregional Blueprint (CIB)* initiative. The plan will also incorporate information from the Freight Element of the *California State Rail Plan*. It will use recent freight industry information developed by seaports, railroads, airports, and others, as well as benefit from important regional freight mobility planning programs by partner agencies.

[California State Rail Plan \(CSRP\), 2013](#)

The California State Rail Plan is a plan for passenger and freight rail to address environmental, economic development, and population growth challenges such as increased travel demand, traffic congestion, and Greenhouse Gas emissions. CSRP programs additional funding for capital investments, operations, and maintenance. The plan provides a framework for improving the State's rail system, noting improvements, future needs, and plans for expansion/integration of rail services.

REGIONAL

Regional Transportation Plan (RTP) “Plan Bay Area”

Plan Bay Area is a long-range integrated transportation and land-use/housing strategy through 2040 for the San Francisco Bay Area. On July 18, 2013, the Plan was jointly approved by the Association of Bay Area Governments (ABAG) Executive Board and by the Metropolitan Transportation Commission (MTC). The Plan includes the region’s Sustainable Communities Strategy and the 2040 Regional Transportation Plan represents the next iteration of a planning process that has been in place for decades.

Plan Bay Area marks the nine-county region’s first long-range plan to meet the requirements of California’s landmark 2008 Senate Bill 375, which calls on each of the state’s 18 metropolitan areas to develop a Sustainable Communities Strategy to accommodate future population growth and reduce greenhouse gas emissions from cars and light trucks. Working in collaboration with cities and counties, the Plan advances initiatives to expand housing and transportation choices, create healthier communities, and build a stronger regional economy.

Regional Transportation Improvement Program (RTIP)

The Regional Transportation Improvement Program is a sub-element of the State Transportation Improvement Program (STIP). The Metropolitan Transportation Commission is responsible for developing regional project priorities for the RTIP for the nine counties of the Bay Area. The biennial RTIP is then submitted to the California Transportation Commission for inclusion in the STIP.

Freeway Performance Initiative (FPI)

This is the Metropolitan Transportation Commission’s ongoing effort to improve the operations, safety, and management of the Bay Area’s freeway network by deploying system management strategies, completing the HOV lane system, addressing regional freight issues, and closing key freeway infrastructure gaps.

APPENDIX C RESOURCES

CORRIDOR OVERVIEW

California Scenic Highways

http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/scenic_hwy.htm

National Highway System

<http://hepgis.fhwa.dot.gov/fhwagis/>

Bicycle and Pedestrian Plan: San Mateo County

http://www.ccag.ca.gov/CBPP_2011.html

http://www.dot.ca.gov/hq/tpp/offices/ocp/dist4/fy10-11/SanMateo_Ph_2_Study_Final_LR.pdf

Bicycle Map: San Francisco County

<https://www.sfmta.com/sites/default/files/maps/2016/SFMTA%20Retail%20Map%20-%207.16-Online.pdf>

California Coastal Trail

<https://www.coastal.ca.gov/access/coastal-trail-report.pdf>

Demographics: Jobs Housing Connection Strategy, 2012

<http://www.abag.ca.gov/abag/events/agendas/e051712a-Item%204.A.2,%20Preferred%20Land%20Use%20Scenario%20-Jobs-Housing%20Connection%20Strategy.pdf>

Environmental: California's Protected Areas Database

<http://www.calands.org/>

Transit: San Mateo County Transit District (SamTrans)

<http://www.samtrans.com/>

Transit: San Francisco Municipal Transportation Agency

<https://www.sfmta.com/>

Travel Modes: Sustainable San Mateo County, US Census

<http://www.sustainablesanmateo.org/home/indicators-report/economy/employment/transportation-mobility/>

CORRIDOR PERFORMANCE

San Mateo County C/CAG LOS and Performance Measure Monitoring Report -2015

<http://ccag.ca.gov/wp-content/uploads/2015/10/2015-San-Mateo-Monitoring-Report-091415.pdf>

San Francisco County 2015 Congestion Management Program

http://www.sfcta.org/sites/default/files/content/Planning/CongestionManagementPlan/2015/CMP_2015_FINAL.pdf

Traffic Operations – Ramp Metering

http://www.dot.ca.gov/hq/traffops/traffgmt/ramp_meter/

California Truck Network

<http://www.dot.ca.gov/trafficops/trucks/truck-network-map.html>

KEY CORRIDOR ISSUES

Sea Level Rise – Adapting to Rising Tides Vulnerability and Risk Assessment - BCDC/NOAA Nov 2011

<http://mtc.ca.gov/our-work/plans-projects/climate-change-clean-vehicles/adapting-rising-tides>

Highway Operations

<http://www.dot.ca.gov/dist4/highwayops/hoindex.html>

Non-Motorized Transportation Access – Office of Transit & Community Planning

<http://www.dot.ca.gov/dist4/transplanning/pedbikeprogram/pedbikeprogram.html>

Highway 1 Safety and Mobility Studies

<http://planning.smcgov.org/highway-1-safety-and-mobility-study>

Connect the Coastside

<http://www.connectthecoastside.com/>

CORRIDOR CONCEPT

Regional Transportation Plan – Plan Bay Area

<http://onebayarea.org/plan-bay-area/final-plan-bay-area/final-supplementary-reports.html>

State Transportation Improvement Program – STIP

<http://www.dot.ca.gov/hq/LocalPrograms/STIP.htm>

State Highway Operation and Protection Program – SHOPP

<http://www.dot.ca.gov/hq/transprog/shopp.htm>