

Second Draft Preliminary Planning Study for
HIGHWAY 1 CONGESTION & SAFETY IMPROVEMENT PROJECT



June 8, 2015

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ADL	aerially deposited lead
ASR	Archaeological Survey Report
SMCTA	San Mateo County Transportation Authority
Caltrans	California Department of Transportation
CFR	Code of Federal Regulations
CNDDDB	California Natural Diversity Database
Corps	U.S. Army Corps of Engineers
County	San Mateo County
CTMP	Comprehensive Transportation Management Plan
EDR	Environmental Data Resources, Inc.
FHWA	Federal Highway Administration
HDM	Highway Design Manual
HPSR	Historic Properties Survey Report
IRRS	Interregional Road System
LCP	Local Coastal Program
mph	mile(s) per hour
MSE	mechanically stabilized embankment
MUTCD	Manual for Uniform Traffic Control Devices
MWSD	Montara Water and Sanitary District
NACTO	National Association of City Transportation Officials
NES	Natural Environment Study
NHS	National Highway System
NWIC	Northwest Information Center
PDPM	Project Development Procedures Manual
PEAR	Preliminary Environmental Analysis Report
PG&E	Pacific Gas and Electric Company
PPS	Preliminary Planning Study
RRFB	Rapid Rectangular Flashing Beacon
Sponsor	San Mateo County Department of Planning and Building
TASAS-TSN	Traffic Accident Surveillance and Analysis System-Traffic System Network
USFWS	U.S. Fish and Wildlife Service
veh/hr	vehicles per hour

Executive Summary

The San Mateo County Transportation Authority (SMCTA) as the Implementing Agency, in cooperation with the San Mateo County Department of Planning and Building (Sponsor), has prepared this Draft Preliminary Planning Study (PPS) to address congestion, throughput and vehicular, pedestrian and bicyclist safety along a 7-mile-stretch of Highway 1. The projects are in the unincorporated San Mateo County Midcoast that stretches from Devil's Slide south to Mirada Road in Miramar (See Attachment A). The types of improvements proposed for this section of Highway 1 include designated pedestrian crossings, left-turn lanes, acceleration lanes, and raised medians.

Improvements were grouped into 5 general locations, including (1) Mirada Road in Miramar, (2) S. Etheldore Street to California Avenue in Moss Beach, (3) 16th Street in Montara, (4) 1st through 9th Streets in Montara, and (5) Gray Whale Cove. The Moss Beach segment includes proposed improvements at Cypress Avenue. Improvements at each of the locations could be implemented independently of one another as separate or combined projects depending on feasibility, public acceptance, and available funds. Generally, two alternatives were evaluated for each location, which represent the minimum and maximum cost and impacts. A 3rd alternative was developed for the locations of 1st - 9th streets, in Montara, and S. Etheldore Street to California Avenue, in Moss Beach, subsequent to the 3rd Public workshop, held on March 11, 2015.

This study screened each of the alternatives for environmental impacts, impacts to utility facilities, capital costs, and anticipated implementation timeframe which is dependent on the ability to secure funding. The anticipated implementation timeframe is summarized in Table 1-1 below:

Table 1-1: Highway 1 Preliminary Planning Study Alternatives Matrix

Location	Alternative	Estimated Capital Cost (in thousands)	Estimated Construction Completion	Environmental Impact	Utility Impact
Mirada Road	1	\$380	2018	Low	None
	2	\$4,130	2020	Med	Low
Moss Beach	1A	\$680	2018	Low	None
	1B	\$580	2018	Low	None
	2	\$7,410	2020	Med	Low
16 th Street Montara	3	\$2,950	2019	Low	None
	1	\$380	2018	Low	None
	2	\$3,300	2020	Med	Med
1 st - 9 th Street Montara	1	520	2018	Low	None
	2	\$7,250	2020	Med	High
	3	\$4,110	2019	Low	Med
Gray Whale Cove	1	\$960	2020	Med	Med
	2	\$1,060	2020	Med	Med

Notes:

Does not include support cost

Refer to schedule assumptions

Low = Minimizes impacts
Med = Some impacts or potential mitigation

Low > \$50K
> Med > \$150K < High

Each of the above factors play a key role in the feasibility of the project(s) moving forward. This draft report presents the implications of the alternatives, such as capital cost, environmental impacts, and anticipated implementation schedules, for public review and comment. As public acceptance of the alternatives is a key factor for this project moving forward, recommendations will be provided following the circulation and public comment period for this report. Recommendations will also include proposed Caltrans project delivery process, including Project Initiation Document (PID), Project Approval and Environmental Document (PA/ED), and whether the project(s) may qualify for a Permit Engineering Evaluation Report (PEER). The final recommendations and report will be released during the summer of 2015.

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1. INTRODUCTION

The San Mateo County Transportation Authority (SMCTA) as the Implementing Agency, in cooperation with the San Mateo County Department of Planning and Building (Sponsor), has prepared this Draft Preliminary Planning Study (PPS) to address congestion, throughput and vehicular, pedestrian and bicyclist safety along a 7-mile-stretch of Highway 1. The projects are in the unincorporated San Mateo County Midcoast that stretches from Devil's Slide south to Mirada Road in Miramar (See Attachment A). The types of improvements proposed for this section of Highway 1 include designated pedestrian crossings, left-turn lanes, acceleration lanes, and raised medians. This study has been conducted to address the following:

- Evaluate the selected short-term vehicular, pedestrian and bicyclist mobility and safety improvements proposed for Highway 1 in the Highway 1 Safety and Mobility Improvement Study Phase 1 and Phase 2, adopted by the San Mateo County Board of Supervisors in 2010 and 2012, respectively, for feasibility and consistency with the purpose and need for the project.
- In the event that a short-term improvement is deemed infeasible, determine if another feasible option exists that satisfies the intent of the proposed improvement and can be substituted.
- Identify what design exceptions (if any) are required for each alternative and the probability of obtaining approval from the California Department of Transportation (Caltrans).
- Perform cost-benefit analysis for the feasible improvements.

This project is funded through the San Mateo County Transportation Authority Measure A Funds.

Improvements were grouped into 5 general locations, including (from south to north): (1) Mirada Road in Miramar, (2) S. Etheldore Street to California Avenue in Moss Beach, (3) 16th Street in Montara, (4) 1st through 9th Streets in Montara, and (5) Gray Whale Cove. The Moss Beach segment includes proposed improvements at Cypress Avenue. Improvements at each of the locations could be implemented independently of one another as separate or combined projects depending on feasibility, public acceptance, and available funds. Generally, two alternatives were evaluated for each location, which represent the minimum and maximum cost and impacts. In the locations of Montara and Moss Beach a 3rd alternative has been developed to illustrate an intermediate option between the minimum and maximum impacts, as a result of community input. The project(s) implemented may be a combination of any of the alternatives.

2. BACKGROUND

2.1 PHASE 1

The Highway 1 Safety and Mobility Improvement Study: Phase 1 (completed in 2010), focused on transportation improvements along the Highway 1 corridor between the Half Moon Bay Airport, south to Frenchmans Creek Road on the San Mateo County Midcoast, and encompassing the Midcoast communities of Princeton, El Granada, and Miramar. The study conducted several community workshops, which engaged citizens in developing conceptual short- and long-term vehicular, pedestrian and bicyclist transportation improvement strategies.

Phase 1 recommended developing a consistent roadway edge through each context zone (rural areas, transitional areas, and village areas), improving intersection visibility, adding entry treatments and roundabouts, managing access, and adding walkways and bikeways. The study was limited to providing corridor observations and issues developed through community involvement.

2.2 PHASE 2

Phase 2 of the Highway 1 Safety and Mobility Improvement Study (Completed in 2012), focused on motor vehicle, pedestrian, and bicycle safety and mobility challenges and solutions for the Highway 1 corridor between Half Moon Bay Airport and Devil's Slide. The recommended improvements included the use of raised medians in community areas, designated pedestrian and bicycle crossings in high-demand areas, consideration of roundabouts, pedestrian and bicycle trails along parallel routes, and parking re-configurations for beach and trail access. In November 2012, the San Mateo County Board of Supervisors adopted the study.

2.3 EXISTING FACILITY

Highway 1 is a north-south highway that runs along most of the Pacific coastline; it begins near Dana Point in Orange County and runs north to Legget in Mendocino County. Highway 1 is part of the California Freeway and Expressway System and is maintained and operated by Caltrans. The section covered within this study area is often referred to as the Cabrillo Highway. For this study, the location is bounded by Half Moon Bay to the south and Devil's Slide to the north. In this location, Highway 1 was constructed as a two-lane road in the early 1950s. Routine widening and the addition of left-turn pockets have continually occurred along the highway as population and traffic demands have increased. Current speed limits range from 45-55 miles per hour and the condition of the roadway differs throughout the corridor. Rural areas between town centers see higher speed limits and observe free-flowing movement, whereas town centers see slightly lower speed limits with the presence of driveways, street parking, and local intersections.

The highway, which follows the coastline for the most part, crosses multiple creeks within the project limits. On the northern end of El Granada, Highway 1 crosses both Deer Creek and Denniston Creek. In the vicinity of Moss Beach, just south of Marine Boulevard, San Vicente Creek crosses under the highway. Within the town limits of Montara, Montara Creek passes beneath the highway just north of 16th Street, and Martini Creek crosses beneath the highway just north of the town center and discharges at Montara State Beach.

Major recreational destinations within the project limits include the Half Moon Bay Airport, Pillar Point Air Force Station, Pillar Point Harbor, Point Montara, Montara State Beach, the Fitzgerald Marine Reserve, McNee Ranch State Park, Rancho Coral de Tierra and Gray Whale Cove State Beach. Due to the recreational nature of the area, peak travel demands often occur on weekends.

Figure 1 shows the project vicinity.



Figure 1: Project Vicinity Map

The Devil’s Slide Trail, just north of the project area, was opened in 2014. The trail provides pedestrian, bicycle, and equestrian connectivity from Montara to Pacifica via the old Highway 1 alignment. The County of San Mateo redesignated the old roadway in early 2014 as a scenic area and a hiking/biking trail. This redesignation has attracted additional recreational users to the area.

Within project limits, Highway 1 has seen very few pedestrian upgrades/improvements. Currently, the only pedestrian crossings on this stretch of highway are at the two signalized intersections in El Granada (Coronado Street and Capistrano Road). There are currently no crossings to provide safe access from inland to the coast for residents of, and visitors to, the towns of Moss Beach, Montara, and Miramar. Figure 2 shows pedestrians crossing Highway 1 at Gray Whale Cove.



Figure 2: Pedestrians Crossing Highway 1 at Gray Whale Cove

Highway 1 in San Mateo County is functionally classified by Caltrans as a rural “Other Principal Arterial” and is considered a Federal-Aid route in the National Highway System (NHS). Highway 1 is also listed as an Interregional Road System (IRRS) route, which is defined as a state highway route outside of urban areas that provides access to, and a link between, the state’s economic centers, major recreational areas, and urban and rural regions.¹

The project area is entirely within the 2010 Urban Area defined by FHWA. The Urban Area is identified by the United States Census Bureau every 10 years. The route is designated as part of the California Legal Truck Network, which allows California Legal Trucks with a maximum length of 65 feet to use the route.

Highway 1 within the project limits is an Eligible State Scenic Highway, but it has not been officially designated as a scenic highway. It is not classified as a Landscaped Freeway.

2.4 DEFICIENCIES

2.4.1 Safety

Mirada Road

At Mirada Road, residents and visitors cross Highway 1 to access Miramar Beach and the California Coastal Trail, providing the only safe, off-highway pedestrian and bicyclist access to Half Moon Bay. There is an existing bus stop adjacent to the intersection of Highway 1 and Mirada Road. Motorists travel at high speeds (45 mph speed limit) through this area, which makes crossing the highway challenging for visitors, residents, and transit users.

Moss Beach

¹ Streets and Highway Code, Section 164.10–164.20.

Throughout Moss Beach, there are closely spaced intersections with shops, restaurants, parks, residential roads and driveways on, or adjacent to, Highway 1. Motorists traveling in the northbound direction enter the town of Moss Beach at high speeds (50 mph speed limit). Destinations such as the Pillar Ridge Manufactured Home Community, Fitzgerald Marine Reserve and Pillar Point Bluffs exist on the west side of Highway 1 with no designated pedestrian crossings for those accessing from the east.

At Cypress Avenue, visitors and residents cross the highway to access Seal Cove neighborhood, Pillar Point Bluffs and Fitzgerald Marine Reserve. The users of the existing bus stop on Cypress Avenue west of Highway 1 need to cross the highway to access the neighborhoods on the east side of Highway 1.

At Virginia and California Streets, pedestrians cross Highway 1 to access Fitzgerald Marine Reserve and the shops and restaurants on both sides of Highway 1, and Moss Beach Park which is on the east side of Highway 1. The high speeds of motorists pose a challenge for vehicles accessing the highway from side streets and driveways as well as pedestrian connectivity and safety throughout Moss Beach.

Montara

At 16th Street in Montara, residential neighborhoods are located east of Highway 1. An informal path that runs parallel to the highway northbound lane is the only pedestrian path connecting Montara and Moss Beach. On the west side of the highway, there is an existing bus stop just south of the intersection of Highway 1 and 16th Street. The Montara Water and Sanitary District and Montara Lighthouse Hostel are on the west side of Highway 1 at 16th Street. Transit users cross the highway to access the residential neighborhood. There is a history of rear-end collisions near the 16th Street intersection; these collisions are likely caused by speeding and poor visibility due to a bend in the road.

The town center which is located between 10th and 7th street has numerous shops including a gas station on the east side of the highway. Closely spaced intersections and driveway openings are displayed in this area. No pedestrian access currently exists for communities on the east side to coastal bluffs on the west side of Highway 1.

Near 1st and 2nd Streets, pedestrians cross the highway to access Montara State Beach and La Costanera on the west side of Highway 1. The east side of the highway is mostly residential, with an existing bus stop on 2nd Street between Main Street and Highway 1. Visitors park along the shoulders of Highway 1 in this area and cross the highway where motorists travel at high speeds in excess of the posted speed limit of 50 miles per hour. There are currently no roadway traffic calming features that define the town center from the rural area north of Montara.

Gray Whale Cove

At Gray Whale Cove, visitors park at the lot on the east side of Highway 1 and access nearby trails or cross Highway 1 to access the beach at Gray Whale Cove. Motorists traveling northbound and southbound along the highway approaching Gray Whale Cove have poor visibility and are traveling at high speeds, which pose a safety concern for pedestrians crossing the highway and southbound vehicles accessing the parking lot. Pedestrians attempting to cross at this location have poor views of the approaching vehicles due to the natural topography and overgrown vegetation along the highway creating a blind turn.

2.4.2 Accident Analysis

The Caltrans Traffic Accident Surveillance and Analysis System-Traffic System Network (TASAS-TSN) identified accident data for Highway 1 through the study corridor between post miles 30.0 and 38.31 for the 3-year period between April 9, 2009, and March 31, 2012, as summarized in Table 3-1. A total of 168 accidents were reported on Highway 1 during the 3-year period, 78 of which occurred in the northbound direction and 83 in the southbound direction. Table 2-1 illustrates accident rate in accidents per million vehicle miles showing that fatality rates are slightly higher than the statewide average for similar facilities with the combined total accident rate being slightly less.

Table 2-1: Caltrans 3-Year Accident History for Highway 1 from April 1, 2009, to March 31, 2012

Accident History for Highway 1									
Facility	Number of accidents			Accident Rate (accidents/million vehicle miles)					
	Total	Fatal	Injury	Accident Rate			State Average		
				Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
NB & SB Highway 1 Mainline from SM PM 30.0 to 38.31	168	3	78	0.017	0.44	0.95	0.012	0.46	1.13

Note: Shading denotes locations that exceed the statewide average.
 Source: Caltrans, District 4 TASAS data between April 1, 2009, and March 31, 2012.
 NB = northbound
 PM = post mile(s)
 SB = southbound
 SM = San Mateo County

From the total reported accidents in both directions, 42.2% were caused by speeding, 16.1% were caused by improper turning, 6.2% were alcohol related, 3.7% were due to following too close, 11.8% were due to failure to yield, and 20.0% were caused by other factors. As shown in Table 2-2, 43% of the recorded accidents were rear-end collisions, which are typically associated with congested conditions.

Table 2-2: Type of Collision: Northbound and Southbound Highway 1

Collision Type	No.	%
Head-on	12	7%
Sideswipe	18	11%
Rear-end	73	43%
Broadside	28	17%
Hit object	19	11%
Auto-pedestrian	7	4%
Other	11	7%
Total	168	100%

Accident concentrations by location were evaluated to determine areas of concern. Accident data by post mile (PM) and type of collision are summarized in Table 2-3.

Table 2-3: Type of Collision by Location

Type of Collision by Location																		
Project Location	Begin PM	End PM	Head-On		Sideswipe		Rear-End		Broadside		Hit Object		Auto-Ped.		Other		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mirada Road	31.10	31.25	0	0%	0	0%	0	0%	1	33%	1	33%	0	0%	1	33%	3	100%
Moss Beach	34.55	35.45	0	0%	1	6%	2	11%	10	56%	2	11%	2	11%	1	6%	18	100%
16th St., Montara	35.70	36.02	0	0%	0	0%	5	56%	1	11%	2	22%	1	11%	0	0%	9	100%
1st St.–9th St., Montara	36.16	36.70	0	0%	1	9%	1	9%	5	45%	2	18%	1	9%	1	9%	11	100%
Grey Whale Cove	37.85	38.02	0	0%	1	14%	4	57%	0	0%	0	0%	0	0%	2	29%	7	100%

At Mirada Road, 3 accidents were recorded over the study period, all of which occurred in the absence of daylight. In Moss Beach, 18 accidents were recorded over the study period, the majority of which (56%) were broadside accidents. There were 2 recorded auto-pedestrian conflicts in Moss Beach, both of which occurred in the absence of daylight.

At 16th Street in Montara, a high number of rear-end collisions occurred; all 5 of them were due to speeding. One auto-pedestrian conflict was recorded at the intersection. Between 1st and 9th Streets in Montara, 5 broadside collisions were recorded. For the northern limits of Montara between 1st and 4th Streets, 4 of the 6 accidents occurred in the absence of daylight. In Gray Whale Cove, the majority of the collisions occur on the weekends. The majority (57%) of the accidents were rear-end collisions due to speeding, 3 of which occurred in the southbound direction and one in the northbound direction.

2.4.3 Speed

Vehicles traveling at higher speeds take longer to stop for objects in the roadway or crossing pedestrians. The visibility of both motorists and crossing pedestrians is important for the safety of all users. Highway lighting and advance warning signs promote visibility and are required at pedestrian crossings and other design features, such as raised medians. Speed limits also dictate the types of design features considered for this project.

Statistical sampling methods are typically employed in order to study the feasibility of adjusting vehicular speed limits. “Studies of the effects of establishing, raising and lowering speed limits include federal studies FHWA-RD-92-084 and FHWA-RD-98-154. These studies demonstrate that the most effective attribute in establishing the speed limit is to determine the 85th percentile speed and set the posted speed close to that value. The empirical data in these studies demonstrates that setting the speed limit too high or too low can increase collisions. Speed limits that are set near the 85th percentile speed of free-flowing traffic are safer and produce less variance in vehicle speeds. Because of the results of these studies, the 85th percentile is used to establish the upper limit of operating speeds that are considered reasonable and prudent.”³ Speed limits are

³Caltrans, *California Manual for Setting Speed Limits*, Division of Traffic Operations, California Department of Transportation, Division of Traffic Operations, <http://www.dot.ca.gov/hq/traffops/engineering/muted/pdf/california-manual-for-setting-speed-limits.pdf> (Sacramento, CA: Caltrans, 2014), p. 13.

set based on a formal procedure in accordance with Federal Highway Administration (FHWA and Caltrans Standards). These surveys are valid for five years and based on the 85th percentile of traffic speeds.⁴

Typically, speed surveys are conducted on state highways every 5 to 10 years. The last conducted speed survey of Highway 1 in the project area was out of date, as it was based on data collected in 2008; this survey was covered only a portion of the project area. Prior to that, the most recent speed survey in the project area was conducted in 2000. Thus, San Mateo County, along with the California Highway Patrol, requested a speed survey in late 2014. In response, Caltrans conducted a speed study between Moss Beach and Montara. The study recommended that the existing speed limits be maintained. A copy of the Caltrans Speed Survey is provided in Attachment E. Figure 3 shows the existing speed limits within the project limits.

Established speed limits influence design speed of a facility. Design speed is defined as "a speed selected to establish specific minimum geometric design elements for a particular section of highway". These design elements include vertical and horizontal alignment of the roadway, and sight distance⁵. The selected design speed should be high enough so that an appropriate regulatory speed limit will be less than or equal to it.⁶ The use of curbs is discouraged for design speeds greater than 40 mph. The project assumes a Caltrans Type B-4 or Type D (sloped face) curb, as shown in Figure 4 on page 4-1, is appropriate for facilities with design speeds greater than 50 mph, and would be used for the raised medians.

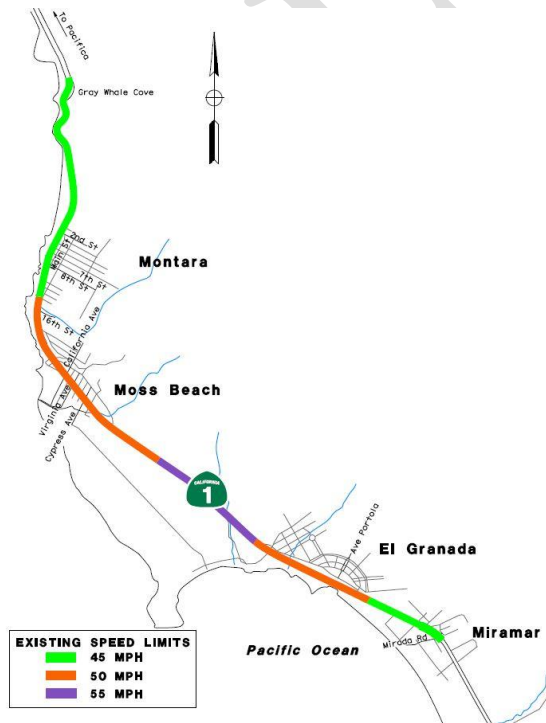


Figure 3: Existing Speed Limits within Project Limits

⁴ <http://www.dot.ca.gov/hq/traffops/engineering/muted/pdf/california-manual-for-setting-speed-limits.pdf>

⁵ Caltrans, *Highway Design Manual*, <http://www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm>, (Sacramento, CA: Caltrans, 2014).

⁶ Federal Highway Administration, *Mitigation Strategies for Design Exceptions*, Chapter 3, Design Speed, http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_designspeed.cfm (Washington, DC: FHWA, 2014).

2.4.4 Congestion and Travel Demand

In Moss Beach, motorists turning from eastbound Cypress Avenue onto northbound Highway 1 experience delay due to high volumes and speeds on northbound Highway 1. An acceleration lane at this location is warranted but would eliminate the southbound left turn pocket to Cypress Avenue.

At Gray Whale Cove, the existing facility currently has no left-turn pocket for motorists entering the parking lot from the southbound direction or acceleration lane for motorists exiting the parking lot in the southbound direction. Because there is no turn pocket, motorists queue in the travel lane, which causes delay for the southbound through movement and a safety risk of rear-end collisions. This location has a high number of rear-end accidents in the southbound direction, likely due to motorists queuing in the traveled lane.

2.5 COMPLETE STREETS

The Complete Streets Act (Assembly Bill 1358) was signed into law in September 2008. It requires cities and counties to account for the needs of all roadway users when updating their general plans. Caltrans released Deputy Directive 64, originally signed in October 2008 and renewed in October 2014, which embraces Complete Streets as a policy for all phases of highway projects. The policy states that projects shall provide for the needs of travelers of all ages and abilities in planning, programming, design, construction, and operations and maintenance activities on the State Highway System. Considerations include accessibility, safety, mobility, land use, and community needs.

In 2012, Caltrans updated its Highway Design Manual (HDM) to facilitate the design of Complete Streets. In 2013, Caltrans published Main Street California: A Guide for Improving Community and Transportation Vitality, which provided interim guidance and help in navigating the various policies and standards, including the Manual for Uniform Traffic Control Devices (MUTCD), HDM, and the Project Development Procedures Manual (PDPM). Caltrans released the Complete Streets Implementation Action Plan in November 2014; this plan provides 109 action items to further integrate Complete Streets into all Caltrans functions and processes. In April 2014, Caltrans endorsed the National Association of City Transportation Officials' (NACTO) guidelines for innovative transportation solutions to better suit community needs. Examples of innovative features include buffered bike lanes, bike boxes, and sidewalk design.

2.6 OTHER PLANNED PROJECTS WITHIN THE PROJECT LIMITS

Several other projects are planned for the stretch of Highway 1 included in the project limits which were considered as part of this study. The proposed project will not preclude implementation of these planned improvements. Below are brief descriptions of the planned projects:

Plan Princeton: Plan Princeton is a study being conducted by San Mateo County to update the land use plan, development polices and zoning regulations for the Princeton area. The project is being funded by the San Mateo County Board of Supervisors. In 2013, the Board approved a contract to conduct the study. An existing conditions report was released in May 2014 and Project Alternatives were released for public review in September 2014 with the intent to identify the preferred alternative in the near future. The study is expected to be completed in early 2016. The goal of the project is to update the land use policies, plans and s regulation for the area to:

- Enhance coastal access, recreation, research, and education opportunities.
- Support and expand coastal-dependent and coastal-related uses.
- Provide facilities needed by the commercial fishing industry and recreational boaters.
- Promote economic development.
- Abate neighborhood blight and zoning violations.
- Address parking, circulation, and infrastructure needs.

- Identify and evaluate potential solutions to shoreline erosion problems.
- Protect and restore water quality and sensitive habitats.
- Maintain compliance with the State Coastal Act and State airport compatibility requirements.

Connect the Coastside: The San Mateo County's Midcoast Update to the Local Coastal Program (LCP) mandates a Comprehensive Transportation Management Plan (CTMP) be prepared to evaluate the impacts residential and non-residential development in the region has had, and will have, on roadway capacity. Connect the Coastside is the process of developing the CTMP. In 2013, the San Mateo County Board of Supervisors appropriated \$600,000 to conduct this study. The study will assess current and future sources and levels of congestion on Highway 1, Highway 92, and other arterial routes. The study will also identify policies, programs and projects that will mitigate existing and future congestion levels based on traffic forecasts, data and a development build-out analysis. The limits of the study are Highway 1 just south of Devil's Slide Tunnel to the southerly city limits of Half Moon Bay, and Highway 92 east of Highway 1 to lower Skyline. Connect the Coastside is anticipated to be completed at the end of 2015.

Big Wave: Big Wave is a private development project that will consist of housing for developmentally disabled adults and commercial office buildings. It will be located off of Airport Boulevard in Moss Beach adjacent to Pillar Ridge Manufactured Home Community. The project's traffic impact analysis projects increased congestion at the intersections of Cypress and Highway 1 and Capistrano Road and Highway 1. Big Wave is privately funded. Big Wave was approved by the San Mateo County Board of Supervisors on May 19, in May 2015.

San Mateo County Coastside Access Study: The San Mateo County Coastside Access Study is being conducted by a consultant through a partnership between San Mateo County, Golden Gate National Recreation Area (GGNRA), and California State Parks. The goal of the assessment is to identify all current parking facilities along the coastside serving beach visitors and recreation destinations. It will also look at how the County, GGNRA, and California State Parks can collectively improve parking and coastal access, to serve all populations, by sharing existing facilities and identifying potential sites for future lots.

Surfer's Beach Shoreline Protection Device Project: The Surfer's Beach Shoreline Protection Device Project will provide interim protection of Highway 1's embankment at Surfer's Beach in Half Moon Bay and adjacent to El Granada. The project scope consists of constructing a Rock Slope Protection retaining wall, a 400-foot-long segment of the California Coastal Trail, and a staircase to provide safe pedestrian access to the beach. The project is funded through various sources, including the County of San Mateo, City of Half Moon Bay, the State Coastal Commission, Caltrans, and grant funds from the Cosco Busan Oil Spill Settlement Fund (through the National Fish & Wildlife Foundation). The project started the planning process in 2014 and will be completed at the end of 2015.

U.S. Army Corps of Engineers CAP111 Study: The CAP111 Study is a federally funded study looking at what role Pillar Point Harbor's outer breakwater, constructed by the U.S. Army Corps of Engineers (Corps) in the 1960s, has played in the increased rate of coastal erosion at adjacent Surfer's Beach and south. If it is determined that the Corps' project has a direct impact on the increased rate of erosion, and the federal government has a financial benefit to fixing the problem, the federal government will appropriate funds to conduct a project. The project currently being considered is dredging sediment deposited into Pillar Point Harbor and relocating it to adjacent Surfer's Beach. It is expected to be 3 to 5 years before any project is conducted.

The Parallel Trail: The Parallel Trail is a multi-modal trail that will run parallel to Highway 1 throughout the Midcoast. The first segment that has received funding is between Alto Avenue and Coronado Street. San Mateo County will conduct the planning, permitting, and design of the project, which is expected to commence in July 2015. This project was derived from the Highway 1 Safety and Mobility Improvement Study: Phase 1.

The Green Valley Trail: The Green Valley Trail is a recreational trail that will connect the Gray Whale Cove parking lot and Devil's Slide Trail. It is a critical piece in improving parking and access to the new trail. Currently, in the absence of the trail, people park at the Gray Whale Cove parking lot and walk on the highway shoulder. Trail design and permitting are underway, with public meetings conducted in May 2015 and more meetings planned for summer 2015. After planning, design, and permitting, construction is anticipated in summer or fall 2016. The project is jointly funded by the County and California Coastal Conservancy

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3. PURPOSE AND NEED

3.1 PURPOSE

The purpose of the project is to:

- Provide safe access to the beaches, coastal areas, and local communities along Highway 1 between Gray Whale Cove and Mirada Road;
- Alleviate traffic congestions along Highway 1; and
- Improve pedestrian and bicycle crossings for the residents and visitors along Highway 1.

3.2 NEED

Motorists traveling along Highway 1 are traveling at high speeds (speed limits range from 45-50 mph) through the town limits, in part because there are currently no features that define the context of the town centers. Residents and visitors frequently cross Highway 1 on foot to access beaches, neighborhoods and other destinations along the route. There has been a history of pedestrian-vehicle and vehicle-to-vehicle conflicts in this corridor due to high motorist speeds, poor visibility and the nature of recreational destinations on the coastline paired with residential neighborhoods inland separated by Highway 1. Deficiencies have been identified that create a need for the proposed project discussed in more detail below.

4. ALTERNATIVES

The areas of consideration for improvements (Attachment B) are Mirada Road in Miramar, Cypress Avenue, Virginia Avenue, and California Avenue in Moss Beach; and 16th Street, 7th Street, and 2nd Street in Montara as well as Gray Whale Cove just north of Montara. Early investigation and alternatives were developed for Avenue Portola in El Granada, but it was later determined that the improvements would be better suited as a separate project due to issues with access and parking.

The proposed improvements vary by location and scope, depending on the need identified in previous studies, public comments, or traffic and accident data. Improvements may simply include installation of warning flashing beacons, highway lighting, and pavement striping, which would be considered early implementation alternatives due to the low capital cost and minimal impacts to the natural environment. Such improvements, sometimes referred to as the “low-hanging fruit” projects in the public workshops, can be implemented within a few years of completion of this study.

Alternatives involving pavement widening, drainage improvements and utility relocations require additional environmental studies and cost substantially more to construct. Implementation of these projects would take several years due to the environmental documentation and permitting needed. General improvements included in this study are described below:

Pavement Resurfacing: It is recommended that a smooth pavement surface (i.e., slurry and crack seal or other method) be provided for all alternatives to improve the visibility of the new striping. This type of improvement will also promote the longevity of the existing roadway surface while alerting drivers to the upgraded condition and changed environment within this area.

Drainage Improvements: Drainage improvements are required where pavement widening is proposed. Median improvements on horizontal curves will affect sheet flow and may require inside-shoulder improvements such as edge drains and/or drainage inlets.

Raised Medians: Raised medians are proposed where feasible as a traffic-calming measure and to consolidate turning movements within town centers. The medians are proposed to be hardscaped with pavers or architecturally-treated concrete, which is a low-maintenance option for the project. Landscaped medians are not being considered because of the maintenance involved. The feasibility of architecturally-treated and/or landscaped medians will be further evaluated through the preliminary engineering of the project. The project has considered the Caltrans Type B-4 or D curbs (see Figure 4), which are appropriate for facilities greater than or equal to 45 miles per hour (mph) per Table 303.1 in the HDM.

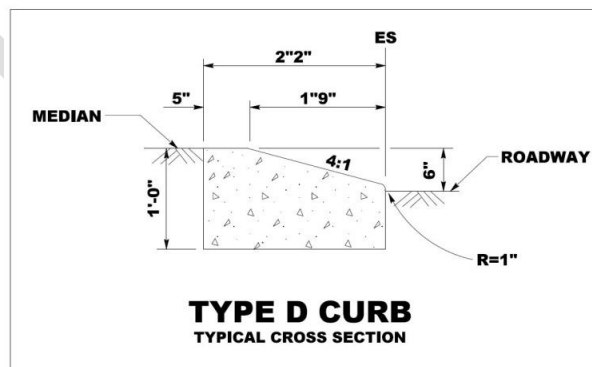


Figure 4: Type D Curb Detail

Pedestrian Refuge: Where feasible, the project proposes pedestrian refuge islands in the median to enhance safety for pedestrians crossing the highway. “Providing raised medians or pedestrian refuge areas at pedestrian crossings at marked crosswalks has demonstrated a 46 percent reduction in pedestrian crashes. At unmarked crosswalk locations, pedestrian crashes have been reduced by 39 percent. Installing raised pedestrian refuge islands on the approaches to unsignalized intersections has had the most impact reducing pedestrian crashes.”⁷ Caltrans HDM mandates that the minimum median width used for pedestrian refuges is 6 feet (HDM Section 405.4(3)), which will require highway widening in order to achieve standard widths.

Highway Lighting: Absence of highway lighting poses a safety concern for motorists and crossing pedestrians throughout the corridor in non-daylight hours. The project proposes to add highway lighting at pedestrian crossings to improve safety and visibility. Highway lighting will also need to be provided at any proposed raised medians for driver safety, to improve visibility of these objects within the roadway.

Pavement Markings: Reflective thermoplastic pavement markings are proposed for all alternatives. Advance pavement warning markings and yield markings are proposed at each pedestrian crossing. New lane delineation will be included to upgrade the project areas and create consistency throughout the corridor.



Figure 5: Advance Yield Markings at a Pedestrian Crossing

Signage: Proposed signage concepts follow MUTCD standards for all alternatives. Existing warning signs within this corridor were recently upgraded to fluorescent yellow green. The proposed warning signs within this corridor will also be reflective yellow green to maintain uniformity of the signs. Proposed signs will consist of pedestrian signs (sign designation W11-2 from California MUTCD), as seen in Figure 6, accompanied by a downward arrow (sign designation W16-7P from California MUTCD). Advance warning signs will also be included with an ahead (sign designation W16-9P-2 from California MUTCD) plaque fixed to the sign post. “Yield Here” signs will accompany the pavement markings to better alert drivers and create a recognizable crossing. Where raised medians are proposed, “Keep Right” keep right signs (sign designation R4-7 from California MUTCD) will be installed at the nose of the median to improve the visibility of the raised object.



Figure 6: Typical Pedestrian Crossing Signage (W11-2 & W16-7P)

At each location, a minimum of two alternatives were evaluated for this study. In general, Alternative 1 includes features that have minimal impacts to the natural environment with a low capital cost, allowing early implementation. Alternative 2 includes features that would involve pavement widening with a higher capital cost (than the cost of Alternative 1), potential for utility relocations, and environmental impacts. Alternative 3 was added for Moss Beach and Montara, following comments from the 3rd public meeting, and represent an alternative in-between that of Alternatives 1 & 2. At Gray Whale Cove, both Alternatives 1 and 2 have equal pavement widening and impacts. All project alternatives are discussed in detail below:

⁷ Federal Highway Administration, *safety Benefits of Raised Medians and Pedestrian Refuge Areas*, http://safety.fhwa.dot.gov/PED_BIKE/tools_solve/medians_brochure/ (Washington, DC: FHWA, 2014).

4.1 MIRADA ROAD

An at-grade pedestrian crossing is proposed at the intersection of Mirada Road and Highway 1 to enhance pedestrian connectivity and improve safety. Traffic-calming measures such as enhanced pavement markings and signage are recommended at this location, as are improvements to visibility for both motorists and crossing pedestrians. Highway lighting will be installed at the pedestrian crossing. Figure 7 shows the Mirada Road/Highway 1 intersection looking northeast.



Figure 7: Mirada Road Intersection Looking Northeast

Alternative 1 Mirada Road (Attachment B - Mirada Road Alternative 1): Alternative 1 proposes to install Rapid Rectangular Flashing Beacons (RRFBs) at the proposed at-grade pedestrian crossing. Highway lighting is proposed to improve visibility at the intersection. New pavement markings and advance warning signs (Figure 5 and 6) would be added to warn motorists of the approaching pedestrian crossing. This alternative would not require any pavement widening, drainage improvements, or utility relocations.

Alternative 2 Mirada Road (Attachment B - Mirada Road Alternative 2): Alternative 2 proposes a new at-grade pedestrian crossing at the intersection, with raised medians and a pedestrian refuge in the median of Highway 1. Highway lighting is proposed to improve visibility at the intersection as well as at proposed raised medians. New pavement markings and advance warning signs (figure 5 and 6) would be added to warn motorists of the approaching pedestrian crossing.

Alternative 2 would require pavement widening to accommodate the new raised median and inside shoulders. Improvements would include the extension of a 60-inch drainage culvert, reconstruction of the drainage headwall, and installation of a new median drainage system at the super-elevated section of the roadway. Potential utility relocations include an underground communications line and extension of the casing of a distribution gas line. Four bus stops would need to be reconstructed to accommodate the widening.

4.2 MOSS BEACH

A median is proposed south of Moss Beach as a traffic-calming measure to slow down motorists entering the town center. This location would be between S. Etheldore Street and Marine Boulevard to alert northbound motorists that the context of the corridor is changing from rural to town center. An at-grade pedestrian crossing is proposed at Cypress Avenue, Virginia Avenue, and/or California Avenue to enhance pedestrian connectivity and safety in the town center. The project also proposes a new acceleration lane on Highway 1 for motorists traveling eastbound on Cypress Avenue and then turning onto northbound Highway 1. Figure 8 shows the California Avenue intersection with Highway 1 looking north.



Figure 8: California Avenue Intersection Looking North on Highway 1

Alternative 1 Cypress Avenue (Attachment B - Etheldore-Cypress Ave Alternative 1): This alternative proposes a high-visibility painted median between Etheldore Street and Marine Boulevard as a traffic-calming measure. RRFBs are proposed for the at-grade pedestrian crossing at Cypress Avenue. This alternative would convert the existing, southbound left-turn pocket on Highway 1 (to access eastbound Cypress Avenue) into an acceleration lane for motorists traveling eastbound on Cypress Avenue, to turn northbound onto Highway 1. Highway lighting is also proposed to improve visibility at the Cypress Avenue intersection. New pavement marking and advance warning signs (Figure 5 and 6) would be added to warn motorists of the approaching pedestrian crossing. This alternative would not require any pavement widening, drainage improvements, or utility relocations.

Alternative 1A California Avenue and Virginia Avenue (Attachment B - California Ave Alternative 1A): This alternative proposes at-grade pedestrian crossings at both Virginia Avenue and California Avenue with RRFBs. Highway lighting is proposed to improve visibility at the intersections. New pavement marking and advance warning signs (Figure 5 and 6) would be added to alert motorists of the approaching pedestrian crossings. This alternative would not require any pavement widening, drainage improvements, or utility relocations.

Alternative 1B California Avenue and Virginia Avenue (Attachment B - California Ave Alternative 1B): This alternative proposes an at-grade pedestrian crossing at California Avenue with RRFBs. This alternative also proposes to convert the eastbound and westbound Virginia Avenue intersection to a “right-in/right-out” intersection and lengthen south- and northbound left-turn pockets, to access westbound California Avenue and eastbound Vermont Ave., Eliminating the left turn movement from Virginia Avenue to Highway 1 would

reduce turning movements and vehicular conflicts as well as require left-turning traffic to be re-routed to California Avenue or Vermont Avenue. This rerouting would improve left-turn storage (i.e., turning vehicle queue) for both intersections.

Highway lighting is proposed to improve visibility. New pavement marking and advance warning signs (Figure 5 and 6) would be added to alert motorists of the approaching pedestrian crossing. This alternative would not require any pavement widening, drainage improvements, or utility relocations.

Alternative 2 Cypress Avenue, Virginia Avenue and California Avenue (Attachment B – Etheldore-Cypress & California Alternative 2): This alternative proposes a raised median beginning south of S. Etheldore Street as a traffic-calming measure and to inform motorists that the context of the corridor is changing. The raised median would continue through the town of Moss Beach north of the Vallemar Street intersection. The alternative would convert the existing left-turn pocket, from southbound Highway 1 to eastbound Cypress Avenue, to an acceleration lane for motorists traveling eastbound on Cypress Avenue and turning onto northbound Highway 1. An at-grade pedestrian crossing is proposed at Virginia Avenue with a pedestrian refuge in the median. No crossing is proposed at Cypress in this alternative.

Alternative 2 would require pavement widening to accommodate the new median and inside shoulders. Improvements would include the extension of two 48-inch box culverts at San Vicente Creek, modifications to cross culverts, and installation of a new median drainage system at the super-elevated section. A sanitary sewer line would potentially need to be relocated. Highway lighting is proposed to improve visibility.

Alternative 2 is aimed at improving the motorist and pedestrian safety in Moss Beach by consolidating the left-turn movements while providing a designated pedestrian crossing. Reducing the number of movements across Highway 1 is expected to help address the high number of broadside accidents recorded during the collision study period. Providing a designated pedestrian crossing with advance warning signs (Figure 6) should enhance safety for crossing pedestrians. The addition of street lighting would improve visibility for both motorists and crossing pedestrians.

Alternative 3 Cypress Avenue, Virginia Avenue and California Avenue (Attachment B – Etheldore-Cypress & California Alternative 3): Alternative 3 proposes a combination of Alternative 1 & Alternative 2. This alternative features raised medians at the entrances or “gateways” to Moss beach. The locations of the proposed raised medians are from north of Etheldore St to Marine Blvd and just north of Vallemar Street. An acceleration lane is proposed at Cypress Avenue for left turning traffic onto northbound Highway 1. A pedestrian crossing is introduced at Virginia Ave with a raised median and pedestrian refuge, which utilizes the existing median width, and requires no additional widening for crossing.

Pavement widening will be required at town entrances where raised medians are proposed in order to accommodate standard inside and outside shoulder widths. Improvements due to widening would include the extension of two 48-inch box culverts at San Vicente Creek. Highway lighting is proposed at pedestrian crossings as well as raised medians to improve nighttime visibility. Alternative 3 is intended to provide traffic calming, reduce turning movements and increase pedestrian safety for users crossing Highway 1 throughout Moss Beach.

4.3 16TH STREET, MONTARA

An at-grade pedestrian crossing is proposed at the intersection of 16th Street and Highway 1 to enhance pedestrian connectivity and improve safety. The pedestrian crossing would be on a blind bend and RRFBs are proposed to alert motorists and enhance pedestrian safety. Highway lighting would be installed at the pedestrian crossing. Both alternatives address speeding and visibility issues by providing advance warning signs (Figure 6). Both alternatives also address pedestrian safety and visibility for motorists and crossing pedestrians by providing RRFBs and highway lighting. Figure 9 shows the 16th Street intersection with Highway 1 looking south along Highway 1.



Figure 9: 16th Street Intersection Looking South on Highway 1

Alternative 1 16th Street (Attachment B – 16th Street Alternative 1): Alternative 1 proposes to install RRFBs at the proposed at-grade pedestrian crossing. Highway lighting is proposed at the intersection. New pavement marking and advance warning signs (Figure 5 and 6) would be added to alert motorists of the approaching pedestrian crossing. This alternative would not require any pavement widening, drainage improvements, or utility relocations.

Alternative 2 16th Street (Attachment B – 16th Street Alternative 2): Alternative 2 proposes the same improvements as alternative 1 except a raised median island with a pedestrian refuge for traffic calming and enhanced pedestrian safety is proposed on Highway 1.

Alternative 2 would require pavement widening to accommodate the new median and inside shoulders, which could potentially eliminate the informal pedestrian path on the east side of Highway 1. Improvements would include modifications to the drainage system and construction of a new retaining wall on the southbound edge of Highway 1. A sanitary sewer line and a gas line would potentially need to be relocated.

4.4 1ST STREET–9TH STREET, MONTARA

Different median treatments are proposed through Montara as traffic-calming measures to slow down motorists. At-grade pedestrian crossings are proposed at 2nd and 7th Streets to enhance pedestrian connectivity and safety in the town center. Figure 10 shows the intersection of 7th Street and Highway 1 looking north on Highway 1.



Figure 10: 7th Street Intersection Looking North on Highway 1

Alternative 1 7th and 2nd Street (Attachment B – 7th Street & 2nd Street Alternative 1): This alternative proposes at-grade pedestrian crossings at both 2nd Street and 7th Street with RRFBs. Additional highway lighting is proposed at the crossing to improve visibility at the intersections. New pavement striping and advance warning signs (Figure 5 and 6) would be added to warn motorists of the approaching pedestrian crossings. High-visibility painted medians are proposed where motorists would be entering a town center, including south of 9th Street, north of 6th Street, south of 2nd Street, and north of 1st Street.

Alternative 2, 7th and 2nd Street (Attachment B – 7th Street & 2nd Street Alternative 2): This alternative proposes raised medians through Montara. Pedestrian refuges are proposed at the at-grade pedestrian crossings at the 2nd Street and 7th Street intersections. Highway lighting is proposed to improve visibility at the intersections as well as at raised medians. New pavement striping and advance warning signs (Figure 5 and 6) would be added to warn motorists of the approaching pedestrian crossing. This alternative would physically consolidate turning movements and calm traffic by installing the raised median and eliminating the two-way left-turn lane in the median between 8th Street and 9th Street. A new acceleration lane is proposed for motorists turning onto northbound Highway 1 from the restaurant parking lot at the 1st Street intersection.

Alternative 2 would require pavement widening to accommodate the new median and inside shoulders. Improvements would include reconstruction of and modifications to the drainage system and construction of three retaining walls. Potential utility relocations would include a distribution gas line, an overhead electric line, and a sanitary sewer line. Alternative 2 would improve motorist and pedestrian safety by consolidating the left-turn movements while providing designated pedestrian crossings. Reducing the number of movements across Highway 1 would help address the high number of broadside accidents recorded during the study period. Also, providing a designated pedestrian crossing with advanced warning signs (Figure 6) would enhance safety for crossing pedestrians. Adding street lighting would improve visibility for both motorists and crossing pedestrians.

Alternative 3, 7th and 2nd Street (Attachment B – 7th Street & 2nd Street Alternative 3): This alternative is a combination of Alternative 1 and Alternative 2. It contains raised medians at the entrances to town centers at 1st and 4th street as well as 7th and 10th street, for traffic calming. Proposed pedestrian crossings at both 2nd

and 7th Streets would provide amenities that improve nighttime visibility, alert drivers, and help protect pedestrians. Highway lighting is proposed at the crossings as well as raised medians. New pavement striping and advance warning signs (Figure 5 and 6) would be added to warn motorists of the approaching pedestrian crossing.

Pavement widening will be required in areas where raised medians are proposed in order to accommodate standard inside and outside shoulder widths. Improvements also include reconstruction of and modifications to the drainage system and construction of three retaining walls. Potential utility relocations would include a distribution gas line, an overhead electric line, and a sanitary sewer line.

4.5 GRAY WHALE COVE

The proposed improvements at Gray Whale Cove include a new left-turn lane for motorists traveling southbound on Highway 1 that are turning into the parking lot. A new acceleration lane is proposed on both alternatives for motorists exiting the parking lot to turn left onto southbound Highway 1. Pavement widening would be required for both proposed alternatives to accommodate the additional width needed to provide the left-turn lane and the acceleration lane. Some pavement widening, grading, and drainage improvements would also be required within the existing parking lot. This work would require coordination with California State Parks and Caltrans. One underground electric vault would potentially need to be relocated.

A new at-grade pedestrian crossing is proposed near the north side of the parking lot to enhance pedestrian connectivity to Gray Whale Cove State Beach and improve safety. The location of the at-grade crossing was chosen to maximize the sight distance in both directions for both motorists and pedestrians. An advance warning overhead sign with flashing beacons is proposed for southbound traffic to provide adequate warning where sight distance is limited. Figure 11 shows Highway 1 at Gray Whale Cove looking north.



Figure 11: Gray Whale Cove Looking North on Highway 1

Traffic-calming measures are recommended at this location because motorists travel at high speeds and because such measures would improve visibility for both motorists and crossing pedestrians. Highway lighting would be installed at the pedestrian crossing to enhance motorist awareness and pedestrian visibility at the intersection.

Alternative 1 Gray Whale Cove (Attachment B – Gray Whale Cove Alternative 1): This alternative proposes RRFBs for the proposed at-grade crossing.

Alternative 2 Gray Whale Cove (Attachment B – Gray Whale Cove Alternative 1): This alternative is identical to Alternative 1 except that a Pedestrian Hybrid Beacon (Exhibit B) is proposed in lieu of the RRFBs. The Pedestrian Hybrid Beacon mandates that oncoming traffic stop and provides increased driver compliance and pedestrian safety. Pedestrian Hybrid Beacons have been widely used for mid-block designated pedestrian crossings.

4.6 DESIGN EXCEPTIONS

The Caltrans Highway Design Manual establishes uniform policies and procedures for geometric design on the state highway system. The proposed projects will meet the Caltrans mandatory and advisory design standards outlined in the Caltrans HDM⁸, with the exceptions listed below. Early engagement with Caltrans District 4 and Headquarters design has assisted in developing the general assumptions for the design, such as design speeds, shoulder widths, and lane widths.

Exceptions to design standards will be sought as part of the Caltrans project approval through the preparation and approval of Fact Sheets. This section lists the anticipated exceptions to the Caltrans design standards.

4.6.1 Mirada Road

The anticipated exceptions to the Caltrans design standards at the Mirada Road location are listed in Table 4-1.

Table 4-1: Design Exceptions at Mirada Road

Design Standard	Alternative 1	Alternative 2
405.2.2d Deceleration Length Standard: 50 mph design speed = 435 feet	Existing: Varies from 255 to 345 feet Proposed: Varies from 255 to 345 feet	Existing: Varies from 255 to 345 feet Proposed: Varies from 255 to 345 feet
302.1 Shoulder Width Standard: 8-foot shoulder	Existing: Varies from 4 to 8 feet Proposed: Varies from 4 to 8 feet	Not applicable (N/A)

See the Caltrans HDM for details.

4.6.2 Moss Beach

The anticipated exceptions to the Caltrans design standards at the Moss Beach location are listed in Table 4-2.

Table 4-2: Design Exceptions at Moss Beach

Design Standard	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3
405.2.2d Deceleration Length Standard: 50 mph design speed	Existing: Varies from 150 to 350 feet Proposed: Varies from 150 to 350 feet	Existing: Varies from 150 to 350 feet Proposed: Varies from 150 to 350 feet	Existing: Varies from 150 to 350 feet Proposed: Varies from 150 to 350 feet	Existing: Varies from 150 to 350 feet Proposed: Varies from 150 to 350 feet

⁸ <http://www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm>

SECTIONFOUR

Alternatives

= 435 feet				
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See the Caltrans HDM for details.

4.6.3 16th Street, Montara

The anticipated exceptions to the Caltrans design standards at the 16th Street, Montara, location are listed in Table 4-3.

Table 4-3: Design Exceptions at 16th Street, Montara

Design Standard	Alternative 1	Alternative 2
302.1 Shoulder Width Standard: 8-foot shoulder	Existing: Varies from 4 to 8 feet Proposed: Varies from 4 to 8 feet	Existing: Varies from 4 to 8 feet Proposed: Varies from 4 to 8 feet

See the Caltrans HDM for details.

4.6.4 1st Street–9th Street, Montara

The anticipated exceptions to the Caltrans design standards at the 1st Street through 9th Street, Montara, location are listed in Table 4-4.

Table 4-4: Design Exceptions at 1st Street through 9th Street, Montara

Design Standard	Alternative 1	Alternative 2	Alternative 3
405.2.2a Left Turn Lane Width Standard: 12 feet	Existing (2nd Street and Montara southbound): 11 feet Proposed: 11 feet	N/A	N/A
405.2.2d Deceleration Length Standard: 50 mph design speed = 435 feet	Existing: Varies from 130 to 175 feet Proposed: Varies from 130 to 175 feet	Existing: Varies from 130 to 175 feet Proposed: Varies from 130 to 175 feet	Existing: Varies from 130 to 175 feet Proposed: Varies from 130 to 175 feet
302.1 Shoulder Width Standard: 8-foot shoulder	Existing: Varies from 2 to 8 feet Proposed: Varies from 2 to 8 feet	Existing: Varies from 2 to 8 feet Proposed: Varies from 6 to 8 feet	Existing: Varies from 2 to 8 feet Proposed: Varies from 6 to 8 feet

See the Caltrans HDM for details.

4.6.5 Gray Whale Cove

The anticipated exceptions to the Caltrans design standards at the Gray Whale Cove location are listed in Table 4-5.

Table 4-5: Design Exceptions at Gray Whale Cove

Design Standard	Alternative 1	Alternative 2
405.2.2d Non Standard Deceleration Length Standard: 50 mph design speed =	Existing: N/A Proposed: 170 feet	Existing: N/A Proposed: 170 feet

SECTIONFOUR

Alternatives

435 feet		
203.2 Non Standard Curve Radius Standard: 50 mph design speed = 850 feet	Existing: 715 feet Proposed: 715 feet	Existing: 715 feet Proposed: 715 feet
302.1 Non Standard Shoulder Width Standard: 8-foot shoulder	Existing: Varies from 2 to 8 feet Proposed: Varies from 2 to 8 feet	Existing: Varies from 2 to 8 feet Proposed: Varies from 2 to 8 feet

See the Caltrans HDM for details.

4.6.6 Coordination Efforts

Caltrans District 4 Traffic Safety and Headquarters Design provided feedback on the design in meetings on May 16, 2014, and October 29, 2014. Caltrans comments have been incorporated into the project design. Coordination with Caltrans will continue throughout this study and in future phases of the project.

4.7 TRAFFIC ANALYSIS

A Traffic Analysis Methodology Memorandum (Attachment F) was prepared and approved by San Mateo County and the SMCTA. The memo outlines the procedure that was used to analyze traffic operations within the project corridor. Traffic analysis was completed to assess the feasibility of various alternatives or variations per location for the proposed pedestrian crossings, left-turn lanes, acceleration lanes, and raised median treatments.

The traffic analysis was based on existing traffic and pedestrian counts obtained from the County of San Mateo and Caltrans. The preliminary traffic study was conducted for existing conditions only (2014) and was structured to assess the operational deficiencies and benefits of the alternatives (variants) for comparative purposes.

Pedestrian Crossings: Only weekday pedestrian counts are available, and the pedestrian volumes are low, as compared to anecdotally higher pedestrian traffic on weekends. Due to the recreational attractions in the project area, -pedestrian traffic is expected to be significantly higher on the weekends. *It is recommended that the pedestrian counts be conducted on weekends during further analysis in the next phase.* Adding pedestrian crossings is expected to improve safety for both pedestrians and vehicle occupants, by creating awareness of Pedestrians throughout the corridor and limiting pedestrian vehicle conflicts which can generate large delays. In this project, eight pedestrian crossings are proposed based on the Highway 1 Safety and Mobility Improvement Study and Community inputs. The eight pedestrian crossings are:

- Hwy 1/Mirada Rd
- Hwy 1/Cypress Ave
- Hwy 1/Virginia Ave
- Hwy 1/California Ave
- Hwy 1/ 16th St
- Hwy 1/ 7th St
- Hwy 1/ 2nd St
- Hwy 1/Gray Whale Cove

Raised Medians and Left-Turn Pockets: Raised medians are proposed at various locations for each Alternative and traffic redistributions are needed at locations where direct access to and from Highway 1 is

eliminated. Redistributions will help to better understand rerouted vehicle behaviors to ensure adequate left turn pocket lengths. Left-turn pockets are proposed/modified or removed at five locations:

- Southbound Hwy 1/Vermont Ave – Alternative 2 & 3 (modified)
- Northbound Hwy 1/California Ave – Alternative 2 & 3 (modified)
- Northbound & Southbound Hwy 1/Virginia Ave – Alternative 1B & 3 (removed)
- Southbound Hwy 1/8th St – Alternative 2 & 3 (modified)
- Southbound Hwy 1/Gray Whale Cove – Alternative 1 & 2 (proposed)

Analysis to determine the required length of the left-turn lanes at un-signalized intersections of two-lane roadways was conducted based on the gap acceptance theory and American Association of State Highway and Transportation Officials (AASHTO) standards.

The left-turn length requirement based on gap acceptance theory was derived from “Lengths of Left-Turn Lanes at Un-signalized Intersections,” (Transportation Research Record 1500). A critical gap of 7.0 seconds (the minimum time headway (spacing in seconds) in the opposing vehicle flow that is required for a driver to complete a left-turn maneuver) and a length of 30 feet per vehicle were used to estimate the required storage length.

AASHTO suggests the following procedure to calculate the left-turn storage length: “the storage length may be based on the number of turning vehicles likely to arrive in an average 2-minute period within the peak hour.” Table 4-6 summarizes the storage requirement for the left-turn lane based on both methods.

Table 4-6: Adequate Left-Turn Length at Un-Signalized Intersections (in feet)

Left-Turn Volumes (vph)	Gap Theory- Critical Gap 7.0 second										AASHTO (feet)
	Opposing Volumes (vph)										
	100	160	220	280	340	400	460	520	580	640	
40	0 ^a	60	60	60	60	60	60	60	60	60	40
80	60	60	60	60	60	60	90	90	90	120	80
120	60	60	60	60	90	90	120	120	150	150	120
160	60	60	60	90	90	120	150	150	180	210	160
200	60	60	90	90	120	150	180	180	210	270	200
240	60	90	90	120	150	180	210	240	270	330	240
280	60	90	120	150	180	210	240	270	330	420	280
320	60	120	120	150	180	240	270	330	420	540	320
360	90	120	150	180	210	270	330	420	540	750	360
400	90	150	150	210	240	300	390	480	690	750	400

^a A zero lane length indicates that a left-turn lane is not warranted.
 Source: Transportation Research Record 1500.
 vph = vehicles per hour

Acceleration Lanes: Acceleration lanes are proposed at the following five locations:

- Northbound Highway 1/ Cypress Ave – Alternative 1,2 & 3
- Southbound Highway 1/8th St – Alternative 2 & 3
- Northbound Highway 1/7th St – Alternative 2

- Northbound Highway 1/1st St – Alternative 2 & 3
- Southbound Highway 1/ Gray Whale Cove – Alternative 1 & 2

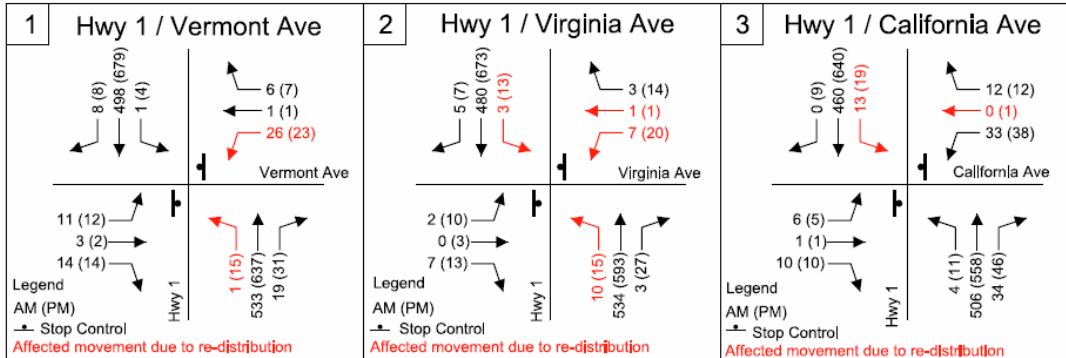
The following is the list of study intersections – proposed variation – analysis – benefits

Highway 1/Cypress Avenue (Alternative 1): A pedestrian crossing was added at Cypress Avenue to improve pedestrian safety. Also, the southbound left-turn pocket would be removed and an acceleration lane would be added for eastbound traffic turning left onto northbound Highway 1. The eastbound left-turn traffic is 64 vehicles per hour (veh/hr) in the am peak and 48 veh/hr in pm peak. Due to heavy through traffic on Highway 1, motorists find it challenging to turn northbound onto Highway 1. The southbound left-turn traffic in the pm peak shows only 9 veh/hr. Therefore, it is not anticipated that the southbound through traffic will experience delay with the removal of the left-turn pocket.

Highway 1/Cypress Avenue (Alternative 2 and 3): The southbound left-turn pocket would be removed and an acceleration lane would be added for eastbound traffic turning left onto northbound Highway 1. The eastbound left-turn traffic is 64 vehicles per hour (veh/hr) in the am peak and 48 veh/hr in pm peak. Due to heavy through traffic on Highway 1, motorists find it challenging to turn northbound onto Highway 1. The southbound left-turn traffic in the pm peak shows only 9 veh/hr. Therefore, it is not anticipated that the southbound through traffic will experience delay with the removal of the left-turn pocket.

Highway 1/Virginia Avenue (Alternative 1B & 3): A pedestrian crossing would be added at California Avenue and vehicular access to and from Virginia Avenue would be restricted. As a result, this traffic would be re-distributed to California Avenue and Vermont Avenue. Traffic volumes before and after distribution at these intersections are shown on Figure 12. The pm peak hour is more critical because of higher left-turn and opposing traffic volumes: the northbound left-turn total volume at Vermont Avenue is 30 veh/hr and the opposing Highway 1 southbound traffic at Vermont Avenue is 687 veh/hr. From Table 4-6, the required storage is 60 feet.

Before Re-distribution



After Re-distribution

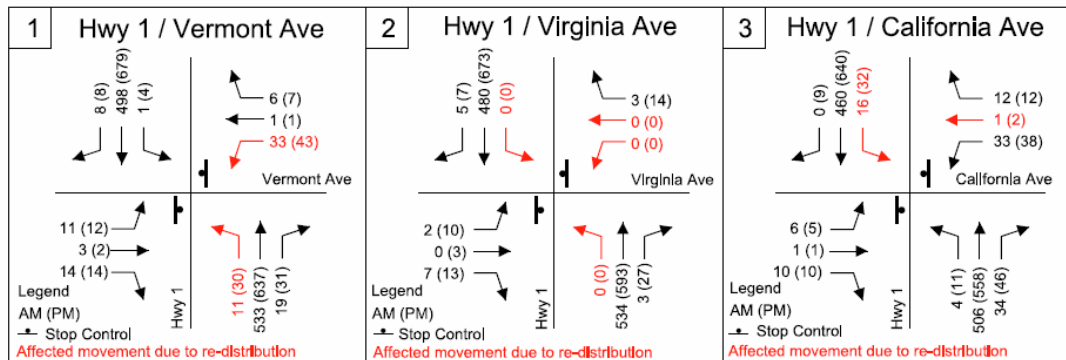


Figure 12: Traffic Volumes before and after Distribution at Virginia Avenue

Highway 1/7th Street (Alternative 2): Raised medians would be added from 10th Street to 8th Street and from 8th Street to 7th Street, which would physically eliminate the left-turn movements onto 9th Street from southbound Highway 1. The southbound turn onto 9th Street traffic would be redistributed to use 8th Street. Peak-hour southbound left-turn traffic at 8th Street was 15 veh/hr during the pm peak hour, and the opposing northbound traffic was 464 veh/hr. According to the AASHTO table, the required length of the left-turn pocket is 60 feet. The current left-turn lane storage available is approximately 65 feet. Because the required length is 60 feet, the addition of redistributed traffic is not anticipated to cause any impact in level-of-service for the intersection. It is recommended the traffic counts be conducted in the next phase for further analysis at the intersection of Highway 1/9th Street. The acceleration lanes provided for southbound Highway 1 at 8th Street and northbound Highway 1 at 7th Street are expected to reduce the delay for southbound and northbound through movements.

Highway 1/7th Street (Alternative 3): Raised medians would be added from 10th Street to 9th Street and restriping of the median lanes would physically eliminate the left-turn movements onto 9th Street from southbound Highway 1. The southbound turn onto 9th Street traffic would be redistributed to use 8th Street. Peak-hour southbound left-turn traffic at 8th Street was 15 veh/hr during the pm peak hour, and the opposing northbound traffic was 464 veh/hr. According to the AASHTO table, the required length of the left-turn pocket is 60 feet. The current left-turn lane storage available is approximately 65 feet. Because the required length is 60 feet, the addition of redistributed traffic is not anticipated to cause any impact in level-

of-service for the intersection. It is recommended the traffic counts be conducted in the next phase for further analysis at the intersection of Highway 1/9th Street. The acceleration lanes provided for southbound Highway 1 at 8th Street and northbound Highway 1 at 7th Street are expected to reduce the delay for southbound and northbound through movements.

Highway 1/Gray Whale Cove (Alternatives 1 and 2): An additional southbound left-turn pocket to access the parking lot would be added, along with an acceleration lane for entering southbound traffic. No traffic counts are available for this intersection. *It is recommended that traffic counts be conducted in the next phase for further analysis.* Providing a left-turn pocket and an acceleration lane are expected to reduce the delay for southbound through movement.

4.8 BRIDGE/STRUCTURE WORK

Several locations will require earth retention structures to accommodate the widening of Highway 1 associated with the proposed improvements for alternative 2 & 3. Generally, the east side of the highway will require walls to retain slopes that are cut into (cut walls), and the west side will require walls to retain additional roadway fill (fill walls).

The stretch of Highway 1 in the project limits is characterized by a broad, gently west-sloping marine terrace underlain by silt, sand, and gravel derived from the highly fractured and weathered granite rock of Montara Mountain which is part of the Santa Cruz Mountain Range. The project site is in a high-seismic area between the active San Andreas Fault to the east of the site and the San Gregorio Fault to the west (offshore). Because of the gentle slope at low elevation, there is very low potential for formation of slumps, translational slides, or earth flow that could damage a wall in a seismic event.

In general, soil nail walls to support the cuts should be feasible. However, site-specific data will be needed for the design of these walls. For the fill walls, Caltrans' standard plan walls (typical retaining walls with concrete footing) appear feasible provided adequate room is available for constructing the footings; otherwise, mechanically stabilized embankment (MSE) walls built from the ground up may prove more practical. Both the cut slopes and fill walls will need to be properly drained, as evidence of seepage can be observed, with the current existing slope faces being well vegetated.

Preliminary investigation has revealed the following considerations at each location, along with the anticipated wall type.

2nd Street

Alternative 2: Retaining Wall #1

This wall would retain cuts into existing slopes for approximately 1,200 feet along the east side. Wall heights would vary from about 5 to 10 feet. A soil nail wall would be a reasonable choice. The relatively short nail lengths would remain within the state right-of-way, and the concrete surface could be textured to provide some aesthetic interest. The height of the wall would warrant a cable railing at the top for maintenance personnel or others to protect against falls.

Alternative 3: Retaining Wall #2

This wall would retain cuts into existing slopes for approximately 350 feet along the east side. Wall heights would vary from about 3-5 feet. A standard concrete cantilevered wall would be the best choice at this location; the use of a soil nail wall may not prove to be cost-effective for such a low-height structure, and there appears to be room to build a standard cantilevered wall foundation.

7th Street

Alternative 2: Retaining Wall #3

This wall would retain the new fill needed for the widening of Highway 1 along the west (coastal) side of the highway for about 850 feet. The wall height would vary to about 10 feet and would need to accommodate two driveways to residences along this stretch. A standard cast-in-place concrete, cantilevered retaining wall would be an appropriate choice of wall. Further investigation may reveal limited space for the excavation of the standard wall footings or concerns about damage to the roots of adjacent cypress trees. These issues may warrant the use of an MSE wall or a soldier pile wall system that requires minimal footing excavation. Either wall type would require a vehicular barrier or guard railing at the top of the wall (edge of shoulder).

Alternative 2: Retaining Wall #4

This wall would retain the cut slope required for the highway widening to add a northbound dedicated turn lane at 9th Street. The wall would be about 4 feet high and extend for about 240 feet. A standard concrete cantilevered wall would be the best choice at this location given that the use of a soil nail wall may not prove to be cost-effective for such a low-height wall, and there appears to be room to build a standard cantilevered wall foundation.

Alternative 3: Retaining Wall #5

This wall would retain the cut slope required for the highway widening. The wall would be about 4 feet high and extend for about 240 feet. A standard concrete cantilevered wall would be the best choice at this location; the use of a soil nail wall may not prove to be cost-effective for such a low-height structure, and there appears to be room to build a standard cantilevered wall foundation.

Alternative 3: Retaining Wall #6

This wall would retain the new fill needed for the widening of Highway 1 along the west (coastal) side of the highway for about 800 feet. The wall height would vary to about 6 feet and would need to accommodate two driveways to residences along this stretch. A standard cast-in-place concrete, cantilevered retaining wall would be an appropriate choice of wall. Further investigation may reveal limited space for the excavation of the standard wall footings or concerns about damage to the roots of adjacent cypress trees. These issues may warrant the use of an MSE wall or a soldier pile wall system that requires minimal footing excavation. Either wall type would require a vehicular barrier or guard railing at the top of the wall (edge of shoulder).

Alternative 3: Retaining Wall #7

This wall would retain cuts into existing slopes for approximately 450 feet along the east side. Wall heights would vary from about 3 to 10 feet. A soil nail wall would be a reasonable choice. The relatively short nail lengths would remain within the state right-of-way, and the concrete surface could be textured to provide some aesthetic interest. The height of the wall would warrant a cable railing at the top for maintenance personnel or others to protect against falls.

16th Street

Alternative 2: Retaining Wall #8

This fill wall would reach about 10 feet in height and extend almost 500 feet along the southbound side of the highway. Although the existing slope is steep, it appears that there is adequate room for most of the wall to be constructed as a standard cast-in-place concrete cantilevered wall. It is possible that further investigation may reveal the need to shore the existing slope during footing excavation and/or the potential for impacts to protected trees. If a fill wall becomes prohibitive; a soldier pile system with less excavation may be more appropriate. A combination of wall types along the length may also be prudent. A vehicular barrier will be required atop the wall.

Moss Beach

Alternative 2: Retaining Wall #9

This wall would retain cuts into existing slopes for approximately 675 feet along the east side just north of Vallemar Street. Wall heights would vary from about 3 to 10 feet. A soil nail wall would be a reasonable choice. The relatively short nail lengths would remain within the state right-of-way, and the concrete surface could be textured to provide some aesthetic interest. The height of the wall would warrant a cable railing at the top for maintenance personnel or others to protect against falls.

Alternative 3: Retaining Wall #10

This wall would retain cuts into existing slopes for approximately 675 feet along the east side just north of Vallemar Street. Wall heights would vary from about 3 to 10 feet. A soil nail wall would be a reasonable choice. The relatively short nail lengths would remain within the state right-of-way, and the concrete surface could be textured to provide some aesthetic interest. The height of the wall would warrant a cable railing at the top for maintenance personnel or others to protect against falls.

4.9 RIGHT-OF-WAY AND UTILITY IMPACTS

The proposed project is not expected to require permanent right-of-way acquisition. However, temporary construction easements may be required.

The project area contains overhead electric and communications lines and underground electric, gas, sanitary sewer, water, reclaimed water, communications, and fiber optic lines. Utilities in the project area were identified through site visits and reviews of utility plans obtained from Caltrans, utility providers, and local municipalities. Utility providers in the project area are listed in Table 4-7 by owner:

Table 4-7: Utility Owners within Project Limits

Utility Owner	Type of Facility
AT&T	Underground and Overhead Fiber Optics
Coastside County Water District	Water
Comcast	Underground and Overhead Fiber Optics
County of San Mateo	Drainage and Lighting
Granada Community Services District	Sewer
Montara Water and Sanitary District (MWSD)	Water and Sanitary Sewer
Pacific Gas and Electric Company (PG&E)	Gas and Electricity
Sewer Authority Mid-Coast	Sewer

Utility relocations will be necessary where there is a conflict with the proposed improvements. Every effort will be made to minimize utility conflicts and relocations.

A number of utilities are located within the Caltrans right-of-way. The majority of these utilities are not in conflict with the proposed improvements and do not adversely affect highway safety and traffic operations. Thus, the project proposes to maintain existing conditions.

Verifications of utilities will be performed in the next phase. The need for positive locating (potholing), as prescribed in the Caltrans Policy on High and Low Risk Underground Facilities within Highway Rights of Way (January 1997), is recognized. Utility relocations are anticipated for Alternative 2. Table 4-8 shows the anticipated utility relocations for the project:

Table 4-8: Anticipated Utility Relocations Construction Costs

Location	Facility	Owner	Estimated Relocation Cost
Mirada Road	6-inch distribution gas in 8-inch casing (extend casing)	PG&E	\$20,000
	Relocate 2,000 feet of existing communication lines	Comcast	\$24,000
Moss Beach	Relocate 400 feet of sanitary sewer line and manhole	MWSD	\$30,000
16th Street, Montara	Relocate existing 500 feet of sewer line and manhole	MWSD	\$102,500
	Relocate existing 200 feet of gas distribution line	PG&E	\$30,000
1st Street–9th Street, Montara	Relocate existing PG&E electrical pole	PG&E	\$200,000
	Relocate existing 200 feet of gas distribution line	PG&E	\$30,000
	Relocate existing 800 feet of sewer line and manhole	MWSD	\$80,000
Gray Whale Cove	Relocate underground electrical and vault	PG&E	\$115,000

4.10 ENVIRONMENTAL

A Preliminary Environmental Analysis Report (PEAR) checklist has been prepared for this project to evaluate the potential impacts to the environment and to identify the technical studies required to obtain environmental clearance. This checklist for both alternatives is included in Attachment D.

All alternatives are within unincorporated areas of San Mateo County (County) that are also within the State of California’s Coastal Zone. The County has an adopted a Local Coastal Program (LCP) that has been approved by the California Coastal Commission consistent with the California Coastal Act. If the County determines that a project is consistent with its LCP, normally that project also meets the requirements of the Coastal Act. The proposed improvements along Highway 1 fall within the County’s LCP Midcoast planning area. If federal funds, permits, and/or approvals are required, a Federal Consistency Certification review is likely necessary and therefore early assessment of project consistency with the policies in Chapter 3 of the Coastal Act is warranted. Concurrence in a Federal Consistency Certification should be completed before approval of the Final Environmental Document.

The project improvements are consistent with the California Coastal Act and LCP because they would continue to provide coastal access and recreational opportunities with added safety benefits for pedestrians, while minimizing impacts to sensitive natural and biological resources, and minimizing impacts to runoff and water quality.

4.10.1 Human Environment

Land Use

The project would enhance safe access to the shoreline recreational areas and residential neighborhoods and recreational resources east and west of Highway 1. Therefore, no direct or indirect changes to land uses would result from the project. The project would not change or conflict with existing land use designations or parkland.

Coastal resources potentially affected under Alternative 1 include Transportation and Traffic, Visual/Aesthetics and the Biological Environment. Coastal resources potentially affected under Alternative 2 & 3 include Transportation and Traffic, Visual/Aesthetics, Cultural Resources, the Biological Environment, Hydrology and Floodplain, and Water Quality and Storm Water Runoff. Also, the project is intended to provide safety improvements for pedestrians crossing Highway 1, including at and near state beaches such as Gray Whale Cove State Beach and Montara State Beach. Section 4(f) of the Federal Department of Transportation Act of 1966 requires consideration of alternatives and avoidance if public parks, recreation areas, wildlife and waterfowl refuges, and historic sites are affected. A state beach would be considered a Section 4(f) property, as would a defined public recreational trail. Alternative 1 is not likely to have any Section 4(f) property involvement with exception to Gray Whale Cove. If federal funding is used to complete the project, a review of potential Section 4(f) properties would be required to determine if there are impacts to Section 4(f) resources. A preliminary review identified the following potential Section 4(f) properties with respect to the proposed work areas:

- Gray Whale Cove State Beach: This State Beach is a Section 4(f) property, including the parking area that provides necessary access to the beach.
- Montara State Beach, Montara: This State Beach (a Section 4(f) property) includes a parking lot across from 2nd Street. The adjacent restaurant property and parking lot has maintained public parking and beach access as a long-time coastal development permit requirement, but the ownership is private and applications have been made to modify this public use requirement; this should be further reviewed regarding applicable Section 4(f) criteria when the alternatives are finalized.
- Three Section 4(f) properties would not be affected, but are accessed from Highway 1:
 - 16th Street, Montara: Just west of Highway 1, the Point Montara Light House is owned by the US Coast Guard, maintained by State Parks, and used as a hostel. There would be no direct effects and it would have to remain accessible during construction.
 - California Avenue, Moss Beach: California Avenue is a residential street that also provides access from State Route 1 to the James Fitzgerald Marine Reserve (maintained by the San Mateo County Parks Department). It is located about 1/3 mile from Highway 1 and would have to remain open during construction.
 - Mirada Road, Miramar: Mirada Road is signed on Highway 1 for public coastal access to the Half Moon Bay Coastal Trail and State Beach, located about 1/3 mile from Highway 1. This residential road would have to remain open during construction.

Farmlands and Timberlands

Prime farmland and farmland of local importance are adjacent to the east side of Highway 1 at the Half Moon Bay Airport and on the east and west sides between El Granada and Half Moon Bay. However, the project locations are not adjacent to these areas. Work is proposed within the existing State right-of-way, which is not used or available for farm or agricultural use.

Community Impacts

Neither alternative is expected to result in permanent/long term, negative impacts to the economy or displace or relocate any residents, change existing community boundaries, physically divide an established community, or create a new barrier to mobility within the project corridor. The project would introduce new signs and, depending on the alternative, reconfigure segments of the highway to accommodate turning lanes and medians. Community concerns have been raised at initial public meetings regarding the extent of some of the changes, and their visibility.

Under Alternative 1, all project-related activities would take place within the existing right-of-way, and acquisition or relocation of residences, businesses, or other land uses would not be required.

However, under all alternatives, temporary construction easements may be required. Construction activities could result in temporary impacts to the local community and economy associated with traffic delays and possibly some disruption of roadside parking. Access to properties during construction would normally be maintained, except for brief periods of the day. Construction of Alternative 3 is anticipated to require few construction easements due to the nature of the work (i.e. retaining walls and raised medians). Construction of Alternative 2 is anticipated to require a larger number of construction easements due to its larger footprint. Alternative 2 could potentially affect parking or access from Highway 1 at approximately 10 businesses and 15 residences. Alternative 1 and 3 are less likely to restrict access to businesses and residences because the re-striping and signage installation will mainly occur within the existing paved area, allowing vehicle access around construction crews and equipment. The degree to which these locations are temporarily affected would depend on the length of construction time.

Utilities and Emergency Services

Alternative 2 & 3 could result in utility relocations where there is a conflict with the proposed improvements (see Section 4.9 details). The proposed improvements will not permanently affect emergency services. Although reduced traffic speeds can be expected around the proposed pedestrian crossings, impacts to emergency vehicle travel times are not expected. Emergency vehicles are normally provided full access through construction zones and are not delayed; temporary delays would only result to emergency services if they are constrained by construction-related traffic congestion. This potential impact would be addressed during environmental review; each alternative would have similar potential for this effect.

Traffic and Transportation/Pedestrian and Bicycle Facilities

All 3 alternatives are anticipated to slow traffic within the project area

All alternatives are designed to improve pedestrian safety and mobility throughout the project area. Pedestrian and bicycle facilities may be temporarily impacted during construction, but will be restored to pre-construction conditions, and no long-term impacts are anticipated.

During construction of Alternative 2, a bus stop near Mirada Road in El Granada would be temporarily relocated.

Visual/Aesthetics

Highway 1 is listed as an “eligible” scenic highway between San Luis Obispo and near State Route 35 in Daly City, which includes this project limits. An eligible scenic highway is defined by its natural landscape, and the quality of the landscape and views. Highway 1 within the project limits has high visual quality. The San Mateo General Plan states, “The Cabrillo Highway is along the ocean’s edge, providing dramatic sea and coastal views to the traveler, as well as access to State and County beaches. A wide range of marine life, ecological

systems, geological features, and historical and architectural landmarks are visible from the roadway. This is one of the most interesting roads in the County and is included in the State Master Plan for Scenic Highways” (San Mateo County 1986). Highway 1 within the project corridor is bordered by cliffs, rolling hills, and grasslands to the east and the Pacific Ocean to the west. Development is present in Montara and Moss Beach on both the east side and the west side of the highway. Travelers on the highway within the project limits have views of the ocean and coastal areas interspersed with occasional development, overhead transmission lines, street lights and roadway signage. There is existing overhead street lighting along the highway, including at the intersections of 7th, 8th, and 9th Streets in Montara, Vallemar Street and Marine Boulevard in Moss Beach, and Mirada Road in El Granada. The installation of additional signage and lighting, crosswalks, raised medians, roadway widening, and left-turn pockets could result in a moderate or possibly higher level of change to the existing visual setting. Due to the location of Highway 1, this project may generate a heightened level of concern from local citizens. A Visual Impact Assessment would be required to evaluate viewer sensitivity and impacts to the visual setting. The aesthetic difference in the alternatives follows:

1. Alternative 1

Alternative 1 mainly consists of re-striping, upgrading painted medians, paving the parking lot at Gray Whale Cove, and installation of RRFBs, lighting, advance warning signs, and median markers. These changes would impact the appearance of the highway, and add increased lighting and flashing beacons, which could have a minor to moderate change in the nighttime appearance along Highway 1, and add lighting to existing views from nearby properties.

2. Alternative 2

Alternative 2 includes all the project elements of Alternative 1, plus the addition of roadway widening, retaining walls and median installation. Fewer RRFBs however greater number of highway lights are associated with Alternative 2, indicating that the impacts to the nighttime viewshed would be slightly more under Alternative 2. The changes to the daytime visual environment associated with Alternative 2 would also be greater than those proposed under Alternative 1, indicating that the intensity of the daytime visual impacts of Alternative 2 would be greater than the intensity of the impacts for Alternative 1. Alternative 2 would also involve the removal of approximately 90 roadside trees to accommodate widening, which would pose an obvious change to the visual environment.

3. Alternative 3

Alternative 3 includes all the project elements of Alternative 1, plus the addition of some elements of Alternative 2 (widening, retaining walls and median installation at gateway locations). Alternative 3 would have no RRFBs but greater highway lighting than Alternative 1, but less than that of Alternative 2. The impacts to the nighttime view shed and daytime visual environment would be slightly more than Alternative 1 and less than Alternative 2.

Cultural Resources

A preliminary review was conducted at the Northwest Information Center (NWIC) at Sonoma State University to determine the presence of previously recorded cultural resources in the vicinity of the project corridor. The preliminary review indicated that previously recorded and evaluated sites are present within and adjacent to the Highway 1 project corridor. Previously recorded sites include shell middens and habitation materials, including several sites considered eligible for listing on the National Register of Historic Places.

The project would require subsurface disturbance for the installation of signage, lighting, and widening. These proposed activities would require evaluation for their potential to impact buried cultural resources.

The risk of encountering buried cultural resources is generally similar for all three alternatives, although least risk for Alternative 1 and incrementally increasing risk for Alternatives 3 and 2 as the work area expands. If work is required in an area of a known site, such as one of the shell midden deposits, an investigation of the work area and its surroundings would have to be conducted, and at that time the differences in construction area and requirements for subsurface disturbance might have a bearing on whether one of the alternatives can avoid impacts better than the others. Prior to gaining further site specific information through record review (or potentially field studies), and defining construction requirements with respect to any known site boundaries, the differences in alternatives is relatively speculative.

An Archaeological Survey Report (ASR) and a Historic Properties Survey Report (HPSR) will be necessary during environmental review to evaluate impacts to cultural resources along the project corridor. A more thorough records search should also be conducted at the NWIC and consultation with Native Americans is recommended.

4.10.2 Physical Environment

Hydrology and Floodplain

Several creeks and drainages cross Highway 1 within the project corridor and portions of the project are within the 100-year floodplain. Any impacts to hydrology and floodplains created by Alternative 1 are likely to be incidental due to the minor increase of impervious area at Gray Whale Cove compared to the watershed area. The impacts to hydrology and floodplain created by Alternative 2 are anticipated to be the highest; Alternative 2 proposes approximately 300,000 square feet of additional impervious area within the project footprint. Alternatives 1 and 3 would add less impervious area. All three alternatives add relatively incidental increases in impervious area when compared with the watershed area.

A Location Hydraulic Study, Floodplain Encroachment Report Summary, and/or a Floodplain Evaluation Report are recommended to evaluate the impacts to hydrology and floodplain along the project corridor.

Water Quality and Storm Water Runoff

Alternative 1 and 3 would result in less than 1 acre of ground disturbance, and coverage under the statewide permit would not be necessary. Alternative 2 would result in the greatest area of ground disturbance, roughly 6 acres, necessitating coverage under the statewide permit and a Clean Water Act Section 401 permit. Alternative 2 would require design measures in the project to reduce or treat runoff flow. The extent of acreage of new impervious area (and “reworked area”) for Alternative 2 may be considered hydromodification (changes in flow resulting from the project) and require treatment of runoff, which would have to be incorporated into the design.

Air Quality (All alternatives)

This project is not expected to result in air quality impacts. The project would have no effect on vehicular volumes or levels of service and would not impact air quality. An evaluation of construction-related emissions may be necessary for the build alternatives. If the project receives federal funding, it will be necessary to demonstrate compliance or exemption from federal conformity analysis requirements per 40 Code of Federal Regulations (CFR) 93.126. Given that the project would not add capacity and is a safety measure, it can likely be shown that it is exempt, but would require that determination from the Bay Area Air Quality Task Force and Caltrans/FHWA. An Air Quality Impact Assessment would not be required.

Hazardous Materials

A preliminary review of the Envirostor database indicates that one previously contaminated site is adjacent to the project corridor. Vehicle tire and brake wear, oil, grease, and exhaust from vehicular traffic on Highway 1

have the potential to contaminate roadside soils in the immediate vicinity with aerially deposited lead (ADL) and other heavy metals. Also, some of the soils and/or groundwater encountered during construction might require special handling. A review of the Environmental Data Resources, Inc. (EDR) database and available files from the Envirostor and Geotracker databases may be necessary to obtain additional information on sites within or adjacent to the project corridor. The preparation of an Initial Site Assessment is recommended.

Noise

The project is not expected to result in significant noise impacts. Construction noise would be temporary, limited in duration, and generally at or below the existing highway noise levels. The project does not appear to affect the existing noise environment by substantially changing the horizontal or vertical alignment of Highway 1 with respect to sensitive receptors (e.g., residences) and likely would not be a “Type 1” project (a project that substantially changes the vertical or horizontal alignment of the road); therefore, a Noise Study Report addressing noise abatement (barriers) should not be required, and noise barriers would likely not be acceptable along this section of the highway due to adverse visual impacts.

Biological Environment

Review of U.S. Fish and Wildlife Service (USFWS) species occurrence information and the California Natural Diversity Database (CNDDDB) indicates the potential presence of endangered or listed species in the vicinity of the project corridor. Federally and state-listed species with the potential to occur within the project limits include the California red-legged frog (*Rana draytonii*) and the California garter snake (*Thamnophis sirtalis tetrataenia*).

Compared with Alternative 1 and 3 (both would have less than one acre of construction disturbance), Alternative 2 would involve greater widening (more than 6 acres of construction disturbance). Both Alternatives 2 and 3 would require construction of retaining walls that may encroach on potential habitat areas. The construction associated with Alternative 2 would be more intense than that associated with the other alternatives. All three alternatives would require avoidance measures to minimize effects to biological habitat during construction, but Alternative 2 may require more off-setting mitigation because of its greater area of effect. This area would be defined during the environmental review, when alternatives can be compared with identified and mapped habitats.

Roughly 90 trees would be removed under Alternative 2 to accommodate the proposed road widening. Alternative 1 would involve very little widening with minimal tree removal. Alternative 3 may impact up to an estimated 10 roadside trees, primarily in the Montara area.

A Natural Environment Study (NES) is recommended to evaluate impacts to special-status species and habitats as a result of the project. Depending on the outcome of the NES, Endangered Species Act Section 7 consultation with the USFWS and California Fish and Wildlife Code Section 1600 coordination with the California Department of Fish and Wildlife may be needed.

There are two riparian areas that border Highway 1 that could be affected by one or more of the alternatives. At an unnamed creek adjacent to Miramar Drive in El Granada, Alternative 2 would have widening and culvert work required. At San Vicente Creek, located south of Marine Boulevard in Moss Beach, Alternatives 2 and 3 would require widening near the creek. Alternative 1 in both these locations would not have any affect. Other creeks would be crossed by the proposed highway alignments but only at areas on Highway 1 where there are wide shoulders that may adequately accommodate construction work. Depending on the results of further evaluation during environmental review of habitat and resources, a California Department of Fish and Wildlife Streambed Alteration Agreement may be required where work would impact aforementioned waterways and habitats.

A potential wetland is also near the 1st Street section of the project corridor, in Montara. The widening at this location proposed under Alternatives 2 and 3 could encroach on this wetland, and a U.S. Army Corps of

Engineers Section 404 permit would be required. Also, a Section 401 Water Quality Certification would be required.

4.10.3 Summary of Potential Impacts to the Environment

The potential impacts of the project to the environment and the permits potentially needed to obtain environmental clearance are summarized in Table 4-9:

Table 4-9: Environmental Impact Comparison Chart

Resource	Alternative 1 Impacts	Alternative 2 Impacts	Alternative 3 Impacts	Anticipated Permits
Land Use	Consultation with the California Coastal Commission for impacts to coastal resources			California Coastal Act Federal Consistency Certification
Community Impacts	Fewer temporary construction easements, construction time impacts	More temporary construction easements, construction time impacts	More temporary construction easements, construction time impacts	None
Utilities and Emergency Services	Smaller project footprint = fewer impacts to utilities Fewer project features = shorter impacts to emergency vehicles	Larger project footprint = more impacts to utilities More project features = longer impacts to emergency vehicles	Medium project footprint = some impacts to utilities Medium project features = medium impacts to emergency vehicles	None
Traffic	Low			None
Transit	None	Temporary relocation of one bus stop	None	None
Pedestrian/Bicycle Facilities	Increased pedestrian safety Temporary construction impacts			None
Visual/Aesthetics	Less overall impact Greater nighttime impacts Fewer than 10 trees to be removed	More overall impact Greater daytime impact Approximately 90 trees to be removed	Medium overall impact Medium daytime & nighttime impacts Fewer than 10 trees to be removed	None
Cultural Resources	Smaller project footprint = fewer impacts to historic resources Smaller disturbed soil area = fewer impacts to archaeological resources	Larger project footprint = more impacts to historic resources Larger disturbed soil area = more impacts to archaeological resources	Larger project footprint = more impacts to historic resources Larger disturbed soil area = more impacts to archaeological resources	Alternative 1: Section 106 consultation unlikely Alternative 2: Section 106 consultation likely
Hydrology and Floodplain	Roughly 22,000 square feet of impervious area = lower potential to alter	Roughly 300,000 square feet of impervious area = higher potential to alter	Roughly 42,000 square feet of impervious area = medium potential to alter	None
Water Quality and Storm Water Runoff	Less than 1 acre of ground disturbance	More than 6 acres of ground disturbance	Less than 1 acre of ground disturbance	Alternative 1: none Alternative 2: 401 permit

SECTION FOUR

Alternatives

Resource	Alternative 1 Impacts	Alternative 2 Impacts	Alternative 3 Impacts	Anticipated Permits
				Alternative 3: none
Air Quality	No effect			None
Noise	No effect			None
Hazardous Materials	Smaller disturbed soil area = lower potential to encounter	Larger disturbed soil area = higher potential to encounter	Medium disturbed soil area = medium potential to encounter	None
Biological Resources	All alternatives would have to include construction avoidance and minimization measures. Smallest disturbed soil area = lower potential to disturb protected habitat or take endangered species	Largest disturbed soil area = higher potential to disturb protected habitat or take endangered species Likely to encroach on a wetland near 1st Street, Montara.	Relatively small disturbed soil area, similar to Alternative 1 but includes more widening at Montara and Moss Beach. Could encroach on a wetland near 1st Street, Montara.	Section 7 consultation Section 1600 consultation Alternative 2: Section 404 permit

4.11 COST ESTIMATES

A summary of the estimated construction costs (escalated to construction year mid-point) of the proposed alternatives is presented in Table 4-10.

Table 4-10: Cost Estimates (Capital Costs)

Location	Alternative 1 (1A/1B)	Alternative 2	Alternative 3
Mirada Road	\$380,000	\$4,130,000	-
Moss Beach*	(\$680,000/\$580,000)	\$7,410,000	\$2,950,000
16th Street	\$380,000	\$3,330,000	-
1st Street–9th Street	\$520,000	\$7,250,000	\$4,110,000
Gray Whale Cove	\$960,000	\$1,060,000	-

Detailed cost estimates for each location are provided in Attachment C.

*Moss Beach location includes proposed improvements at Cypress Avenue.

4.12 SCHEDULE

Table 4-11 shows the anticipated project milestone schedule for each alternative. This schedule is subject to change based on environmental impacts, cost, and funding availability.

Table 4-11: Project Milestone Schedule:

Project Milestones	Alternative 1	Alternative 2	Alternative 3
Highway 1 Study Phase I	2009	2009	2009
Highway 1 Study Phase I	2012	2012	2012
Congestion & Safety Improvement Project Feasibility Study	2015	2015	2015
Caltrans Project Initiation Document	2016	2016	2016
Environmental Document	2016	2017	2017
Final Design	2017	2018	2018
Construction	2018	2020	2019

Note: Shown in Year of Completion (timeframes indicated after 2015 are estimates)

Projects requiring pavement widening (primarily alternative 2, less in alternative 3), require additional studies which explains the difference in the milestone schedules outlined above.

5. PUBLIC OUTREACH

Public input continues to be an important factor for this project. As part of this study, the SMCTA and San Mateo County held two public meetings/workshops: on **Wednesday, June 18, 2014**, and **Thursday, July 31, 2014**. The first draft of the Preliminary Planning Study was circulated prior to a third public meeting which was held on **Wednesday March 11, 2015**. The meeting gave the public another opportunity to provide input on the study and help prioritize the improvements. The public comment period was left open for a month following the third public meeting. Comments were received primarily through the San Mateo County's MindMixer Site, and many were also received via email.

Most of the comments received at the first two public meetings/workshops fell into six main categories: medians for pedestrian refuge, acceleration lanes, lighting concerns, traffic concerns, speed issues, and schedule concerns.

The third public meeting, on March 11, 2015, and subsequent comment period, provided the project team with additional community input on the six main categories however more specifically at the locations of Montara and Moss Beach Town Centers. The general consensus heard was the range of alternatives was too broad. Alternative 3 was developed after the 3rd public meeting to address the public's concerns and helped to narrow down the range of alternatives to address a middle ground of proposed improvements. Alternative 3 provides a combination of features of Alternative 1 and Alternative 2 such as raised medians while minimizing resulting widening and earth retention structure work. Comments from the public have been incorporated into the project alternatives and a detailed output of gathered comments has been included in Attachment G. A fourth public meeting is scheduled for **June 23th, 2015** to discuss the revised alternatives in preparation of the Final Report.

Public participation will continue through the future phases of the project.

6. RECOMMENDATIONS

This draft report presents the implications of the alternatives, such as capital cost, environmental impacts, and anticipated implementation schedules, for public review and comment. As the public acceptance of the alternatives is a key factor for the project moving forward, recommendations will be provided following the circulation of and public comment period for this report.

Recommendations for the alternatives will be described in the Final Report and will include proposed Caltrans project delivery process for the project(s), including Project Initiation Document (PID), Project Approval and Environmental Document (PA/ED), and whether the project(s) may qualify for a Permit Engineering Evaluation Report (PEER).

General recommendations and action items for future studies include:

- Conduct traffic and pedestrian counts throughout the project limits.
- Determine the optimal locations for the pedestrian crossings based on pedestrian counts. It is recommended that pedestrian counts take place on the weekend when the highest recreational pedestrian volumes are present.
- Determine locations where consolidating left-turn movements would be warranted to improve traffic flow and safety through town centers.
- Continue coordination with other pedestrian trail projects within the corridor to provide optimal pedestrian connectivity.

7. PROJECT REVIEWS

The project improvements were reviewed by the SMCTA, County of San Mateo, Caltrans, the public, and the Midcoast Community Council.

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LIST OF ATTACHMENTS

List of Attachments

Attachment A: Project Location and Vicinity Map

Attachment B: Alternative Exhibits

Attachment C: Cost Estimates

Attachment D: PEAR Checklist(s)

Attachment E: Caltrans Speed Survey

Attachment F: Traffic Methodology Memorandum

Attachment G: Public Comments

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