



# CONNECT THE COASTSIDE

## Evaluation of Transportation Alternatives to Address Buildout Deficiencies

For the  
County of San Mateo  
Planning and Building Department

Prepared By:



April 9, 2015

In Association With:  
Dyett & Bhatia  
Flint Strategies  
Nelson\Nygaard



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### Draft Report 2

Prepared for  
San Mateo County

By



1970 Broadway, Suite 740  
Oakland, CA 94612  
(510) 763-2061

In association with Dyett & Bhatia, Nelson Nygaard, and Flint Strategies

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# INTRODUCTION

In 2012, the California Coastal Commission certified a package of amendments known as the Midcoast Update to San Mateo County's Local Coastal Program (LCP). Policy 2.53 of the Updated LCP requires San Mateo County to prepare a Comprehensive Transportation Management Plan (CTMP). **Connect the Coastside** is the project that will produce the CTMP. The CTMP requirement of the Local Coastal Program responds to the impact that growth in the region has had on roadway capacity, which is viewed by many as insufficient to support the current and future needs of the community and visitors.

This report presents several alternatives that were developed to address some or all of the deficiencies identified in the *Buildout Analysis and Traffic Projections Report* and evaluate the improvements identified in each alternative based on how well they address the identified deficiencies, as well as their feasibility and cost-effectiveness. In the initial stages of **Connect the Coastside**, over 110 specific ideas to mitigate the potential impacts of future growth in the Midcoast and Half Moon Bay study area were generated by the Technical Advisory Committee (TAC), the Midcoast and Half Moon Bay community, and prior studies for improving multi-modal transportation (e.g. vehicle, bicycle, pedestrian, transit).

A series of three alternatives have been identified based on the expected cost associated with the projects and the potential environmental and political impact of the potential projects. This memorandum presents a Low Cost/Low Potential Impact alternative, a Medium Cost/Medium Potential Impact alternative and a High Cost/High Potential Impact alternative. Each of the three alternatives is designed to be multi-modal with potential projects to address needs for pedestrians, bicyclists, transit users and automobile users.

The end result of this study will be a Comprehensive Transportation Management Plan with a preferred alternative to be adopted and implemented by the Board of Supervisors for the Midcoast communities of San Mateo County. The CTMP will also serve as an advisory plan for the City of Half Moon Bay.

# SUMMARY OF DEFICIENCIES IDENTIFIED FOR BUILDOUT CONDITIONS

The *Buildout Analysis and Traffic Projections Report* provided a detailed analysis of existing transportation issues and deficiencies on the Midcoast and in Half Moon Bay. Deficiencies were identified for the Midcoast, Half Moon Bay and State Route (SR) 92 east of Half Moon Bay by comparing existing conditions to the policies and level of service (LOS) standards defined in the current Local Coastal Program<sup>1</sup> (LCP) and the Half Moon Bay General Plan and Circulation Update<sup>2</sup>. The deficiencies identified for each area are documented in the Task 2 *Buildout Analysis and Traffic Projections Report* and summarized separately below.

## MIDCOAST

Under Buildout conditions, the projected increase in traffic along Highway 1 within the Midcoast communities will result in the majority of unsignalized intersections to experience high delay for vehicles trying to enter Highway 1. The majority of unsignalized intersections within the Midcoast, from residential neighborhoods, will operate worse than the intersection LOS standard defined in the LCP. Additionally, under Buildout conditions, the entirety of Highway 1 within the Midcoast will not meet the roadway segment LOS standard as defined in the LCP, based on the volume of traffic the roadway is designed to handle.

The layout of neighborhoods in many of the Midcoast communities inhibits mobility and results in circuitous routes between nearby destinations. Additionally, beach access for pedestrians crossing Highway 1 is limited by infrequent crossing opportunities, heavy traffic volumes, high vehicle speeds, and unimproved pedestrian facilities. There are no stop controls or treatments at uncontrolled locations to help pedestrians and cyclists safely cross Highway 1.

Transit service operates at low frequencies and limited coverage. Additionally, existing bus stops lack amenities and shelter for users waiting for buses.

There is generally sufficient parking supply during the weekdays; however during weekends and special events demand for parking can exceed the available capacity. The Martini Creek and Montara State Beach lots north of Montara and the Fitzgerald Marine Reserve lot in Moss Beach were observed to be at or above capacity during some peak periods. It was also noted that public parking locations are not always easily identified or signed.

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<sup>1</sup> County of San Mateo Local Coastal Program Policies, 2013, County of San Mateo, Planning and Building Department.

<sup>2</sup> Half Moon Bay Circulation Element, 2013, City of Half Moon Bay.

## HALF MOON BAY AND SR 92 EAST OF HALF MOON BAY

Based on the increase in traffic along Highway 1 under projected Buildout conditions, the majority of the unsignalized intersections within the City of Half Moon Bay are expected to experience high delay and to operate worse than the intersection LOS standard defined in the Half Moon Bay Circulation Element. Highway 1 within the City of Half Moon Bay has several sections with four lanes which will operate within the roadway segment LOS standard. However, two-lane sections between Mirada Road and Grandview Boulevard, between Kelly Avenue and Seymour Street, and between Redondo Beach Road and Fairway Drive, will not meet the roadway segment LOS standard as defined in the LCP, based on the volume of traffic the roadway is designed to handle. All study intersections along SR 92 and the two-lane portion of SR 92 east of Main Street will not meet the LOS standards under projected Buildout conditions.

A lack of consistent pedestrian and bicycle trails and crossings results in decreased mobility and accessibility within and between communities within the City of Half Moon Bay. Additionally, pedestrian access along the Highway 1 and SR 92 corridor is limited by infrequent crossing opportunities, heavy traffic volumes, high vehicle speeds, and unimproved pedestrian facilities. There are no stop controls or treatments at uncontrolled locations to help pedestrians and cyclists safely cross the highways.

Transit service operates at low frequencies and limited coverage. Additionally, existing bus stops lack amenities and shelter for users waiting for buses.

The majority of beach access parking lots were observed to operate at over 100% capacity during peak periods.

## IDENTIFICATION OF ALTERNATIVES

Improvements included in each alternative are selected from a list of potential improvements compiled from TAC and community-suggested improvements, proposed projects identified in recent, relevant reports, as well as improvements suggested by the DKS team to address identified deficiencies. To address the needs for the Buildout projections, the projects are considered for implementation over the next 30 years to respond to planned growth in the study area. The complete list of potential improvements was analyzed to determine which improvements were feasible and addressed deficiencies identified in the *Buildout Analysis and Traffic Projections Report*.

Improvements are grouped into three alternatives for evaluation. Each alternative is based on cost, expected impact to existing infrastructure, environment and surrounding communities, as well as the overall effect on residents of the Midcoast Communities and City of Half Moon Bay. The three alternatives described in this section are as follows:

- Alternative 1 – Low Cost/Low Impact
- Alternative 2 – Medium Cost/Medium Impact
- Alternative 3 – High Cost/High Impact

Alternatives are defined by proposed improvements and modifications to the following categories:

- Roadway and intersections/access points
- Bicycle and Pedestrian facilities
- Transit and
- Parking

## ALTERNATIVE 1 – LOW COST/LOW IMPACT IMPROVEMENTS

Alternative 1 mainly focuses on improvements that can be made within the existing right of way and without significant cost or environmental impact. These projects address deficiencies that can be improved with signage and striping changes as well as improvements already planned such as the expansion of the multi-modal “Parallel Trail”. **Projects currently being planned and evaluated are bolded.**

### Roadway and Intersection Improvements

- **Addition of left-turn bay and acceleration lane at Gray Whale Cove parking lot**
- Signage to restrict turning movements to consolidate traffic at key intersections within Midcoast and Half Moon Bay
- Stop signs added to unsigned intersections along Highway 1



- Defined curb and paved shoulder for the following segments along Highway 1 to provide a consistent cross section for vehicle and pedestrian safety:
  - Half Moon Bay Segment - Terrace Avenue to Seymour Street
  - El Granada Segment - Capistrano Road to Coronado Street
  - Moss Beach Segment - California Avenue to Cypress Avenue
  - Montara Segment - 7th Street and 9th Street

## Bicycle and Pedestrian Facility Improvements

- Striped crossing with beacons to alert traffic at the following high demand and bus stop locations as seen in **Figure 1**:
  - **Gray Whale Cove**
  - Montara State Beach
  - **2<sup>nd</sup> Street**
  - **7<sup>th</sup> Street**
  - **Moss Beach Lighthouse (16<sup>th</sup> Street)**
  - **Virginia Street**
  - **California Street**
  - **Cypress Avenue**
  - HMB Airport
  - North Capistrano Road
  - Surfer's Beach Parking area, north of Coronado Street
  - Medio Avenue
  - **Mirada Road**
  - Kehoe Avenue
  - Terrace Avenue/Grand Boulevard
  - Quarry Road (along SR 92)
  - Pilarcitos Creek Road (along SR 92)
  - SR 35 (along SR 92)
- Sidewalks in the following locations to provide a more continuous walking path for pedestrians:
  - Along Highway 1 in Montara, Moss Beach, Miramar, and developed areas of Half Moon Bay
  - Along Coronado Street and Avenue Alhambra in El Granada
- Sharrows on Main Street in Montara, Carlos Street in Moss Beach, and Main Street in Half Moon Bay
- Traffic signal updates throughout Half Moon Bay including:
  - Pedestrian count-down indicators on all signalized crosswalks
  - Crosswalk signal crossing adjustments to accommodate slower walking speeds

- Bicycle signal detection device
- Pedestrian refuge spaces on wide road crossings

## Transit Improvements

- Improvements to bus stops including overhead shelters, bike racks, trash receptacles, passenger seating, pedestrian lighting, and electronic bus arrival signs. Currently bus stops consist only of a sign to denote the location. The following bus stops serve the study area:
  - 11 bus stops in Montara along Highway 1, Main Street, 6<sup>th</sup>/Harte Street, and Sunshine Valley Road serving Samtrans Route 17
  - 12 bus stops in Moss Beach along Highway 1, Sunshine Valley Road, Etheldore Street, Airport Street, and Prospect Way serving Samtrans Route 17
  - 13 bus stops in El Granada along Airport Street, Capistrano Road, Ave Alhambra/Plaza Alhambra, and Highway 1 serving Samtrans Route 17
  - 33 bus stops in Half Moon Bay along highway 1, Main Street, Kelly Street, and SR-92 serving Samtrans Route 17 and Route 294
  - 8 bus stops east of Half Moon Bay along SR-92 serving Samtrans Route 294
- More frequent weekend service for the existing SamTrans fixed routes serving the study area:
  - Increase weekend frequency on Route 17 from 120 minutes to 60 minutes
  - Increase weekend frequency on Route 294 from 120 minutes to 60 minutes.

## Parking Improvements

- Formalized parallel parking for Montara State Beach, with a physical separation from Highway 1.
- **Paving and striping at the upper Gray Whale Cove parking lot<sup>3</sup>**
- Improved wayfinding signage

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<sup>3</sup> To be evaluated by the Green Valley Trail and Congestion Management Projects



**Figure 1 - Existing and Future Coastal Trail and Parallel Trail Facilities**

## ALTERNATIVE 2 – MEDIUM COST/MEDIUM IMPACT IMPROVEMENTS

Alternative 2 includes all strategies introduced in Alternative 1, in addition to those described in this section. Alternative 2 addresses intersection LOS at intersections that do not meet the standard under Buildout by reducing the number of locations where traffic can have unrestricted access to Highway 1. This is done through the addition of raised medians physically restricting left turns off of and on to Highway 1 or by blocking access to Highway 1 completely. These improvements require a moderate amount of capital investment with some potential environmental impact. Alternative 2 also considers supplementary bike lanes along Airport Street and Capistrano Road, which are currently being evaluated as part of Plan Princeton, as well as demand-focused improvements to transit service (e.g. shuttles and park-and-ride lots) and additional parking in high demand locations for observed overflow during weekend periods of high recreational demand.

### Roadway and Intersection Improvements

- All Alternative 1 roadway improvements
- Signalization of the following intersections meeting signal warrants:
  - Highway 1 and California Avenue in Moss Beach
  - Highway 1 and Cypress Avenue in Moss Beach
  - Highway 1 and Kehoe Avenue in Half Moon Bay
  - **Highway 1 and Main Street (S) in Half Moon Bay** (Already included in Buildout analysis as an intersection planned to be signalized by the City of Half Moon Bay)
  - **Highway 1 and Grand Boulevard/Terrace Avenue in Half Moon Bay** (Already included in Buildout analysis as an intersection planned to be signalized by the City of Half Moon Bay)
- Restricting access to Highway 1 from residential neighborhoods through the following measures:
  - **Addition of a median between 7<sup>th</sup> Street and 9<sup>th</sup> Street in Montara**
  - Restricting access to Highway 1 between St. Etheldore/Vallemar Street and Vermont Avenue east of Highway 1 in Moss Beach
- **Addition of a median with northbound left-turn bay at the Lighthouse in Montara (16<sup>th</sup> Street)**
- **Addition of left-turn bay and acceleration lane at 8<sup>th</sup> Street in Montara**
- Consolidation of access to Highway 1 at the following locations:

- Nurseryman’s Exchange driveways between Mirada Road and Young Avenue
- Realign Frenchman’s Creek Road to consolidate intersections at Frenchman’s Creek Road and Venice Boulevard
- **Grand Avenue and Terrace Avenue** (Already included in Buildout analysis as a planned improvement by the City of Half Moon Bay)
- An expansion of the defined curb and paved shoulder included in Alternative 1 to include the following segments along Highway 1:
  - Half Moon Bay Segment – Seymour Street to Redondo Beach Road & Terrace Avenue to Frenchman’s Creek Road
  - El Granada Segment - Coronado Street to Medio Avenue & Capistrano Road to Coral Reef Avenue
  - Moss Beach Segment - Cypress Avenue to Etheldore Street
  - Montara Segment - between 1st Street and 7th Street

## Bicycle and Pedestrian Facility Improvements

- All Alternative 1 bicycle and pedestrian facility improvements
- “Parallel Trail” adjacent to Highway 1 and Coastal Trail adjacent to the coastline along the entire study area, will provide pedestrians and cyclists with a direct connection to communities and locales along Highway 1. As envisioned, this facility would be composed of Class I, Class II and Class III bike facilities. These facilities will be part of the proposed North Coast Bikeway in the County’s Comprehensive Bicycle and Pedestrian Plan (CBPP), connecting Daly City, Pacifica, and Half Moon Bay. **Figure 17** shows the proposed location of the Parallel Trail and Coastal Trail.
  - Proposed Parallel trail alignment would be a 6.23 mile segment along Highway 1 between 2<sup>nd</sup> Street in Montara and the existing bicycle facilities at Ruisseau Francais Avenue in Half Moon Bay and a 1.58 mile segment along Highway 1 between the existing bicycle facilities at Wavecrest Road and the southern border of Half Moon Bay.
  - Proposed Coastal trail alignment would be a 1.82 mile segment along Highway 1 between the Devil’s Slide Trail and 2<sup>nd</sup> Street in Montara, a 0.25 mile segment along Cypress Avenue between Highway 1 and Airport Street in Moss Beach, and the paving of an existing 1.69 mile dirt path along the coast in south Half Moon Bay.
- **Class II bike lane along Capistrano Road which is currently being evaluated for Plan Princeton**

- **Class II bike lane along Airport Street which is currently being evaluated for Plan Princeton**

## Transit Improvements

- All Alternative 1 transit improvements
- Shuttle bus service on summer and fall weekends during peak recreational times and special events with the following characteristics:
  - June – October program
  - Special event weekend service, outside of peak summer period; up to 4 weekends of service, or 8 days total a year
  - Operational hours from sunrise to sunset
  - Provides connections from either Hillsdale or Hayward Park Caltrain Station to three locations in the study area (the exact communities would be dependent on the event).
  - Frequency of 30 minutes
- The establishment of a park-and-ride shuttle and usage of the following existing parking lots as weekend park-and-ride locations to improve access to transit particularly for those potential riders who do not live within walking distance of bus service and to also provide a location for people to meet and carpool:
  - Pillar Point Harbor, Princeton
  - Church of Jesus Christ of Latter Day Saints, Moss Beach
  - Calvary Chapel or Our Lady of the Pillar churches in Half Moon Bay
- School bus service for Cabrillo Unified School District. Based on feedback received from the Technical Advisory Committee, the school district would need a total of 10 buses to provide adequate service. Also, a facility for storing the vehicles and maintenance would be needed.

## Parking Improvements

- All Alternative 1 parking improvements
- Additional parking facilities or parking improvements for recreational users at the following locations:
  - Parking lot for Rancho Corral de Tierra access east of highway, which could also be available for overflow beach parking

## ALTERNATIVE 3 – HIGH COST/HIGH IMPACT IMPROVEMENTS

Alternative 3 encompasses Alternatives 1 and 2, as well as those strategies described in the ensuing section. As roadway segment LOS is defined by capacity utilization, the primary ways to improve roadway segment LOS is to increase capacity or divert traffic to a parallel route. Alternative 3 builds on the improvements provided in Alternative 1 and Alternative 2 by increasing capacity through the proposed addition of travel lanes in the Midcoast and by proposing an alternate route within Half Moon Bay through the addition of a frontage road east of Highway 1. Highway 1 would undergo a complete realignment in El Granada, to address sea level rise and erosion concerns, which would also include a large addition of parking capacity. Several roundabouts are proposed for intersections acting as community gateways or as required analysis when considering signalization of an intersection. While the existing terrain would make it difficult to provide additional travel lanes along SR 92, capacity can be improved by the addition of occasional passing/climbing lanes to reduce bottlenecks caused by truck traffic along SR 92. Alternative 3 also introduces pedestrian over/under crossings at high demand locations to allow for pedestrian traffic across Highway 1 without interfering with traffic flow, as well as Class II Bike lanes along SR 92 to allow for safe bicycle commuting between San Mateo and Half Moon Bay. Transit service would be improved with permanent local routes. These improvements require a large amount of capital investment, potentially require acquisition of right of way and will result in a significant impact to Midcoast communities and Half Moon Bay.

### Roadway and Intersection Improvements

- All Alternative 1 and Alternative 2 roadway improvements with the exception of replacing proposed signalization of intersections with roundabouts
- Roundabouts at the following intersections:
  - Highway 1 and 9<sup>th</sup> Street in Montara
  - Highway 1 and Etheldore Street (N) in Moss Beach
  - Highway 1 and Cypress Avenue in Moss Beach
  - Highway 1 and Capistrano Road (S) in El Granada
  - Highway 1 and Coronado Street in El Granada
  - Highway 1 and Mirada Road in Miramar
  - Highway 1 and Kehoe Avenue in Half Moon Bay
  - Highway 1 and Main Street (N) in Half Moon Bay
  - Highway 1 and SR 92 in Half Moon Bay
  - Main Street and SR 92 in Half Moon Bay
  - Highway 1 and Higgins Canyon Road/Main Street (S) in Half Moon Bay

- SR 92 and SR 35 east of Half Moon Bay
- Traffic calming implementation along Main Street in Montara and along Carlos Street in Moss Beach. This could include basic measures (speed display units) or speed control devices (chicanes and speed humps).
- Increasing road capacity to two lanes in each direction between 9<sup>th</sup> Street in Montara and St. Etheldore Street/Vallemar Street in Moss Beach, and between Cypress Avenue in Moss Beach and Capistrano Road (S) in El Granada.
- Highway 1 realignment in El Granada to address sea level rise and erosion concerns
- Construction of a Frontage Road along east side of Highway 1 connecting Main Street with Frenchman's Creek Road
- Left turn lanes at the following major businesses along SR 92 in Half Moon Bay:
  - Berta's Farm
  - Lemos Farm
  - Half Moon Bay Nursery
- Passing/Climbing lanes on the eastbound portion of SR-92 between the Landfill Road and Pilarcitos Quarry Road to allow cars to pass the high volume of trucks on this roadway segment as well as provide a passing lane to go around right-turning cars.
- An expansion of the defined curb and paved shoulder included in Alternatives 1 and 2 to include the following segments along Highway 1:
  - Half Moon Bay Segment - Redondo Beach Road to Miramontes Point Road & Frenchman's Creek Road to Mirada Road
  - El Granada Segment - Medio Avenue to Mirada Road
  - Moss Beach Segment - Carlos Street to California Avenue
  - Montara Segment - between 9th Street and 14th Street

## Bicycle and Pedestrian Facility Improvements

- All Alternative 1 and Alternative 2 bicycle and pedestrian facility improvements
- Instead of providing striped crossings with beacons to alert traffic at the following high demand and bus stop locations, provide pedestrian over/under crossings:
  - Gray Whale Cove
  - Montara Sanitary District building
  - Surfer's Beach Parking area, north of Coronado Street
  - Kehoe Avenue



- Provide a Class II bicycle route along State Route 92 from Main Street in Half Moon Bay to SR-35.

## Transit Improvements

- All Alternative 1 and Alternative 2 transit improvements
- Provide an additional SamTrans route serving Half Moon Bay, El Granada, Princeton, Moss Beach, Montara, and Pacifica:
  - Montara-Moss Beach-Devil's Slide Trail route
  - El Granada-Miramar-North Half Moon Bay (to SR 92)

These routes would have local stops, reducing access distance for users, and allow access to high demand locations as well as connections to regional routes

- SamTrans service that provides connections to regional transit providers during the morning and evening peak periods with limited stops in order to decrease the travel time:
  - Peak period express bus service between Half Moon Bay and Daly City BART Station with frequency of 30 minutes during the morning and evening peak hour and stops in Half Moon Bay, El Granada, Montara, and Pacifica
  - Increase weekday peak period frequency on Route 294 between Half Moon Bay and San Mateo-Hillsdale Caltrain Station from 60 minutes to 30 minutes.
  - Expand the weekday coverage of Route 294 to provide connections to El Granada and Princeton.

## Parking Improvements

- All Alternative 1 and Alternative 2 parking improvements
- Diagonal parking for Moss Beach along Carlos Street
- Diagonal parking for El Granada separated from Highway 1 realignment

## EVALUATION OF ALTERNATIVES

Evaluation of alternatives will primarily determine the effectiveness of the proposed improvements to address deficiencies identified in the *Buildout Analysis and Traffic Projections Report*. In order to judge the cost effectiveness of the proposed improvements, cost estimates and feasibility/design concerns have been evaluated for each alternative. Additionally the following metrics will be used for each type of proposed improvement:

- Roadway and Intersection Improvements
  - Roadway Segment LOS
  - Intersection LOS
  - Effect on vehicle and pedestrian safety
- Pedestrian, Bicycle, Transit, and Parking Improvements
  - Filling gaps in existing bicycle or pedestrian networks or transit connections
  - Improved pedestrian and bicycle safety
  - Improved access to communities, neighborhoods or popular destinations
  - Improved access to the shoreline
  - Precedent for a project that has already been recommended in a previous study

Because there are no formal, locally established standards for non-vehicle modes, each improvement was given a score according to the scoring system given in **Table 1**. These scores all represent a relative improvement to existing conditions. A baseline score for each area can be produced with further study to allow for a comparison of relative improvement in addition to this current absolute improvement. Further explanation of these evaluation metrics is available in Appendix B.

**Table I - Pedestrian, Bicycle, Transit, and Parking Evaluation Metrics**

<b>Metric</b>	<b>Description</b>	<b>Point Value</b>
<b>Connectivity</b>	Measures the extent to which a project fills a gap in existing bicycle or pedestrian networks or transit connections.	<b>0 to 3</b> (low to high connectivity)
<b>Access</b>	Measures the extent to which a project provides new facilities or service to currently underserved communities or existing destinations.	<b>0 to 3</b> (low to high access)
<b>Safety</b>	Bonus priority for safety improvements.	<b>0 or 1</b>
<b>Shoreline</b>	Bonus priority for enhanced public shoreline access.	<b>0 or 1</b>
<b>Precedent</b>	Bonus for a project recommended in one or more previous studies	<b>0 or 1</b>
<b>Capital Cost</b>	Measures the extent of the estimated capital cost for a project.	<b>0 to 3</b> (high to low capital cost)
<b>Annual Cost</b>	Measures the extent of the estimated annual operating and maintenance costs of a project.	<b>0 to 3</b> (high to low annual cost)

## **ALTERNATIVE 1 – LOW COST/LOW IMPACT IMPROVEMENTS**

Alternative 1 mainly focuses on improvements that can be made within the existing right of way and without significant cost or environmental impact. These projects address deficiencies that can be improved with signage and striping changes as well as improvements already planned and being evaluated.

### **Roadway and Intersection Improvements**

Alternative 1 includes very few roadway and intersection improvements as few of the deficiencies are able to be addressed simply with signage and striping.

#### ***Ability to Address Deficiencies***

None of the proposed improvements in Alternative 1 address any of the roadway capacity deficiencies, however, the addition of a left-turn bay and acceleration lane at Gray Whale Cove parking lot, the addition of stop signs to unsigned intersections along Highway 1 and having a defined curb and paved shoulder along Highway 1 will all improve safety both for vehicle and pedestrian travel along Highway 1.

Using signs to restrict left-turn movements at the following key locations will improve the LOS as shown in **Table 2** for the affected locations; however, without any physical impediment to left turns there will be the possibility of violations to avoid increased delays at the intersections where left turns are consolidated.

**Table 2 - Alternative 1 Buildout Conditions Peak Hour Intersection Level of Service**

Intersection Number	LOS Standard <sup>1</sup>	Street Names	Control Type	AM Peak Hour	PM Peak Hour	Midday Peak Hour
				LOS <sup>2</sup>	LOS <sup>2</sup>	LOS <sup>2</sup>
2	D	Hwy 1 / 7th St	TWSC	F (F)	F (F)	F (F)
3	D	Hwy 1 / 8th St	TWSC	C (F)	C (F)	B (F)
5	D	Hwy 1 / Vallemar St	TWSC	F (D)	F (F)	F (E)
6	D	Hwy 1 / California Ave	TWSC	F (F)	F (F)	F (F)
7	D	Hwy 1 / Virginia Ave	TWSC	E (F)	F (F)	F (F)
8	D	Hwy 1 / Vermont Ave (WB)	TWSC	F (F)	F (F)	F (F)

<sup>1</sup> Standard is given for an individual approach (stop controlled)

<sup>2</sup> Project LOS (Buildout No Project LOS)

Alternative 1 does not address any of the remaining study intersection LOS or roadway segment deficiencies. With the improvements included in Alternative 1, the following intersections do not meet the LOS standard during the listed peak hours:

**Midcoast**

- Highway 1 and 2nd Street (AM, PM, Midday)
- Highway 1 and Vallemar Street (PM, Midday)
- Highway 1 and California Avenue (AM, PM, Midday)
- Highway 1 and Virginia Avenue (AM, PM, Midday)
- Highway 1 and Vermont Avenue (AM, PM, Midday)
- Highway 1 and Cypress Avenue (AM, PM, Midday)
- Highway 1 and St. Etheldore Street (AM, PM)
- Highway 1 and Coral Reef Avenue (AM, PM, Midday)
- Highway 1 and Magellan Avenue (AM, PM, Midday)
- Highway 1 and Medio Avenue (AM, PM, Midday)
- Highway 1 and Miramar Drive (AM, PM, Midday)

**Half Moon Bay**

- Highway 1 and Mirada Road (AM, PM, Midday)
- Highway 1 and Roosevelt Boulevard (AM, PM, Midday)
- Highway 1 and Young Avenue (AM, PM, Midday)
- Highway 1 and Ruisseau Francais Avenue (Midday)

- Highway 1 and Frenchman’s Creek Road (AM, PM, Midday)
- Highway 1 and Venice Boulevard (AM, PM, Midday)
- Highway 1 and Spindrift Way (AM, PM, Midday)
- Highway 1 and Kehoe Avenue (AM, PM, Midday)
- Highway 1 and Grandview Boulevard (AM, PM, Midday)
- Highway 1 and Belleview Boulevard (AM)
- Highway 1 and Main Street (north) (PM, Midday)
- Highway 1 and Kelly Avenue (Midday)
- Highway 1 and Filbert Street (AM, PM, Midday)
- Highway 1 and Seymour Street (AM, PM, Midday)
- Main Street and Lewis Foster Drive (PM)

### **SR-92**

- SR 92 and Muddy Road/Ox Mountain Landfill Road (PM, Midday)
- SR 92 and Skyline Boulevard (AM, PM, Midday)
- SR 92 and SR 35 (PM, Midday)

With the improvements included in Alternative 1, the following roadway segments do not meet the LOS standard during the listed peak hours:

### **Midcoast**

Highway 1 between Coronado Street and Miramar Drive operates below the CMP standard at LOS F. While the remainder of the roadway segments within the Study Area operate better than the LOS E standard given in the CMP, Highway 1 along the entire Midcoast region between 1<sup>st</sup> Street and Miramar Drive does not meet the LCP LOS D standard during the listed peak hours.

### **Half Moon Bay**

The following roadways segments within the Study Area operate below the LOS standard given in the CMP:

- Highway 1 between Miramar Drive and Roosevelt Boulevard (Midday)
- Highway 1 between Roosevelt Boulevard and Young Avenue (PM, Midday)
- Highway 1 from Young Avenue to Ruisseau Francais Avenue (Midday)
- Highway 1 from Ruisseau Francais Avenue to Venice Boulevard (PM, Midday)
- Highway 1 from Venice Boulevard to Frontage Road (Midday)
- Highway 1 between Frontage Road to Spindrift Way (PM, Midday)
- Highway 1 from Spindrift Way to Kehoe Avenue (Midday)
- Highway 1 from Kehoe Avenue to Grandview Boulevard (AM, PM, Midday)

### **SR-92**

- SR 92 from Skyline Boulevard to SR 35 (PM, Midday)

Additionally, several roadway segments fall below the stricter standard provided by the LCP. The following roadway segments do not meet the LCP LOS D standard during the listed peak hours:

- Highway 1 between Miramar Drive and Grandview Boulevard (AM, PM, MIDDAY)
- Highway 1 between Kelly Avenue and Seymour Street (AM, PM)
- Highway 1 between Redondo Beach Road and Fairway Drive (AM, PM)

**SR-92**

- SR 92 from Main Street to Skyline Boulevard (AM, PM)
- SR 92 from Skyline Boulevard to SR 35 (AM, PM, MIDDAY)
- SR 92 between SR 35 and I-280 (AM, PM)

**Cost Estimates**

Cost estimates for the Alternative 1 proposed improvements have been calculated based on standard unit costs and are listed in **Table 3**. Cost estimates include contract items as well as mobilization, construction engineering, permits, design, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 3 - Cost Estimates for Alternative 1 Roadway and Intersection Improvements**

#	Improvement	Cost Estimate
1	Gray Whale Cove Turn and Acceleration Lanes <sup>1</sup>	\$ 960,000
2	Turn Restriction Signage	\$ 40,000
3	SR-1 Side-Street Stop Signs	\$ 18,000
4	SR-1 Paved Shoulder and Curb	\$ 2,302,000
	<b>Total:</b>	<b>\$ 3,320,000</b>

<sup>1</sup> Draft PPS for Congestion Management and Safety Improvements, 2014

**Feasibility and Design Concerns**

There are no feasibility concerns that were identified for any of the Alternative 1 proposed roadway and intersection improvements.

The following design considerations were identified:

- Adequate vehicle storage length for the proposed southbound left-turn bay at the Gray Whale parking lot should be included for the expected demand in order to minimize the potential for queue spillback.
- Given the topography of the land adjacent to Highway 1, some locations may prove expensive to provide paved shoulders and curb.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## Bicycle and Pedestrian Facility Improvements

### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix B**.

**Table 4 - Alternative 1 Bicycle and Pedestrian Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
1	Pedestrian Crossings	1	1	1	1	1	5
2	Sidewalks	1	1	1	0	1	4
3	Traffic signal updates	1	0	1	0	0	2
4	Community Street Sharrows	1	2	1	0	1	5

### *Cost Estimates*

Cost estimates for the Alternative 1 proposed improvements have been calculated based on standard unit costs and are listed in **Table 3**. Cost estimates include contract items as well as mobilization, construction engineering, permits, design, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 5 - Cost Estimates for Alternative I Bicycle and Pedestrian Improvements**

#	Improvement	Cost Estimate
1	Striped Pedestrian Crossing with Beacons	\$ 2,550,000
2A	SR-1 Sidewalk (Phase A)	\$ 1,475,000
3	Traffic Signal Updates	\$ 1,624,000
4A	Sharrows on Main Street	\$ 44,000
4B	Sharrows on Carlos Street	\$ 43,000
	<b>Total:</b>	<b>\$ 5,736,000</b>

### *Feasibility Concerns*

There are no feasibility concerns that were identified for any of the Alternative 1 proposed bicycle and pedestrian improvements.

The following design considerations were identified:

- The beach access crosswalk at the Gray Whale Cove parking lot should be placed at a location that would accommodate the southbound storage lane.
- The Parallel Trail would be expected to have an uneven profile and may carry a high engineering cost. Additionally it may encumber significant environmental impacts that could require mitigation.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

### **Transit Improvements**

#### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix B**.

**Table 6 - Alternative I Transit Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
5	Bus Stop Amenities	0	0	1	0	0	1
6	Increased Weekend Samtrans service	2	2	0	0	0	4



## Cost Estimates

Cost estimates for the Alternative 1 proposed improvements have been calculated based on standard unit costs and are listed in **Table 7**. Cost estimates include contract items as well as mobilization, construction engineering, permits, design, and contingency. A full breakdown of costs is included in **Appendix A**. Cost estimates for increased transit service is based on current operating costs of weekend SamTrans Route 17 and 294.

**Table 7 - Cost Estimates for Alternative I Transit Improvements**

#	Improvement	Cost Estimate
1	Bus Stop Amenities	\$ 156,000 /stop
2	Increased Weekend Samtrans service	\$ 525,000

## Feasibility Concerns

There are no feasibility or design concerns that were identified for any of the Alternative 1 proposed transit improvements. There are 77 active bus stops located throughout the study area. A demand study would need to be performed in order to identify which bus stops have enough demand to warrant improvement.

A full listing of improvements with feasibility and design considerations is included in **Appendix A**.

## Parking Improvements

### Ability to Address Deficiencies

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix C**.

**Table 8 - Alternative I Parking Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
7	Montara State Beach Parking	1	1	0	1	1	4
8	Gray Whale Cove Parking Lot	1	1	0	1	1	4
9	Improved Wayfinding	1	1	0	1	0	3

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
	Signs						

## Cost Estimates

Cost estimates for the Alternative 1 proposed improvements have been calculated based on standard unit costs and are listed in **Table 9**. Cost estimates include contract items as well as mobilization, construction engineering, permits, design, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 9 - Cost Estimates for Alternative 1 Parking Improvements**

#	Improvement	Cost Estimate
1	Montara State Beach Parking Lot Improvements	\$ 557,000
2	Gray Whale Cove Parking Lot Improvements	\$ 1,052,000
3	Wayfinding Signage	\$ 303,000
	<b>Total:</b>	<b>\$ 1,912,000</b>

## Feasibility Concerns

There are no feasibility concerns that were identified for any of the Alternative 1 proposed parking improvements.

The following design considerations were identified:

- The proposed parking lot for Montara State Beach should include a left-turn bay for northbound traffic.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## ALTERNATIVE 2 – MEDIUM COST/MEDIUM IMPACT IMPROVEMENTS

Alternative 2 addresses intersection LOS at intersections that do not meet the LCP standard at Buildout by reducing the number of locations where traffic can have unrestricted access to Highway 1. This is done through the addition of raised medians physically restricting left turns off of and on to Highway 1 or by blocking access to Highway 1 completely. Alternative 2 also considers supplementary bike lanes along Airport Street and Capistrano Road, which are currently being evaluated as part of Plan Princeton, as well as demand-focused improvements to transit service (e.g. shuttles and park-and-ride lots) and additional parking in high demand locations. These improvements require a moderate amount of capital investment and minimal environmental impact.

## Roadway and Intersection Improvements

### *Ability to Address Deficiencies*

In addition to the proposed improvements in Alternative 1, Alternative 22 will include physical medians to restrict turning movements at 8<sup>th</sup> Street in Montara and at California Avenue and Virginia Avenue in Moss Beach. Signalization will improve the ability for minor street traffic to enter Highway 1 at the high volume intersections of Highway 1/California Avenue and Highway 1/Cypress Avenue in Moss Beach and Highway 1/Kehoe Avenue in Half Moon Bay.

These proposed improvements will result in the following changes to the intersection LOS as shown in **Table 10** for the affected locations. While the restricted westbound access diverts and consolidates traffic at Vallemar and Vermont, the eastbound traffic still experiences high delay and a resulting LOS F because of the high volumes along Highway 1. Additionally, the diverted traffic results in a worsening of LOS at Highway 1/Vallemar Street

Alternative 2 does not address any of the remaining study intersection LOS or roadway segment deficiencies.

**Table 10 - Alternative 2 Buildout Conditions Peak Hour Intersection Level of Service**

Intersection Number	LOS Standard <sup>1</sup>	Street Names	Control Type	AM Peak Hour	PM Peak Hour	Midday Peak Hour
				LOS <sup>2</sup>	LOS <sup>2</sup>	LOS <sup>2</sup>
2	D	Hwy 1 / 7th St	TWSC	F (F)	F (F)	F (F)
3	D	Hwy 1 / 8th St	TWSC	C (F)	C (F)	B (F)
5	D	Hwy 1 / Vallemar St	TWSC	F (D)	F (F)	F (E)
6	D	Hwy 1 / California Ave	Signal	A (F)	A (F)	B (F)
7	D	Hwy 1 / Virginia Ave	TWSC	E (F)	F (F)	F (F)
8	D	Hwy 1 / Vermont Ave (WB)	TWSC	F (F)	F (F)	F (F)
9	D	SR 1 / Cypress Avenue	Signal	B (F)	C (F)	B (F)
27	E	Hwy 1 / Kehoe Ave	Signal	E (F)	D (F)	B (F)

<sup>1</sup> Standard is given for an individual approach (stop controlled)

<sup>2</sup> Project LOS (Buildout No Project LOS)

With the improvements included in Alternative 2, the following intersections do not meet the LOS standard during the listed peak hours:

#### **Midcoast**

- Highway 1 and 2nd Street (AM, PM, Midday)

- Highway 1 and Vallemar Street (AM, PM, Midday)
- Highway 1 and Virginia Avenue (AM, PM, Midday)
- Highway 1 and Vermont Avenue (AM, PM, Midday)
- Highway 1 and St. Etheldore Street (AM, PM)
- Highway 1 and Coral Reef Avenue (AM, PM, Midday)
- Highway 1 and Magellan Avenue (AM, PM, Midday)
- Highway 1 and Medio Avenue (AM, PM, Midday)
- Highway 1 and Miramar Drive (AM, PM, Midday)

### **Half Moon Bay**

- Highway 1 and Mirada Road (AM, PM, Midday)
- Highway 1 and Roosevelt Boulevard (AM, PM, Midday)
- Highway 1 and Young Avenue (AM, PM, Midday)
- Highway 1 and Ruisseau Francais Avenue (Midday)
- Highway 1 and Frenchman’s Creek Road (AM, PM, Midday)
- Highway 1 and Venice Boulevard (AM, PM, Midday)
- Highway 1 and Spindrift Way (AM, PM, Midday)
- Highway 1 and Kehoe Avenue (AM)
- Highway 1 and Grandview Boulevard (AM, PM, Midday)
- Highway 1 and Belleview Boulevard (AM)
- Highway 1 and Main Street (north) (PM, Midday)
- Highway 1 and Kelly Avenue (Midday)
- Highway 1 and Filbert Street (AM, PM, Midday)
- Highway 1 and Seymour Street (AM, PM, Midday)
- Main Street and Lewis Foster Drive (PM)

### **SR-92**

- SR 92 and Muddy Road/Ox Mountain Landfill Road (PM, Midday)
- SR 92 and Skyline Boulevard (AM, PM, Midday)
- SR 92 and SR 35 (PM, Midday)

With the improvements included in Alternative 1, the following roadway segments do not meet the LOS standard during the listed peak hours:

### **Midcoast**

Highway 1 between Coronado Street and Miramar Drive operates below the CMP standard at LOS F. While the remainder of the roadway segments within the Study Area operate better than the LOS E standard given in the CMP, Highway 1 along the entire Midcoast region between 1<sup>st</sup> Street and Miramar Drive does not meet the LCP LOS D standard during the listed peak hours.

### **Half Moon Bay**

The following roadways segments within the Study Area operate below the LOS standard given in the CMP:

- Highway 1 between Miramar Drive and Roosevelt Boulevard (Midday)
- Highway 1 between Roosevelt Boulevard and Young Avenue (PM, Midday)
- Highway 1 from Young Avenue to Ruisseau Francais Avenue (Midday)
- Highway 1 from Ruisseau Francais Avenue to Venice Boulevard (PM, Midday)
- Highway 1 from Venice Boulevard to Frontage Road (Midday)
- Highway 1 between Frontage Road to Spindrifft Way (PM, Midday)
- Highway 1 from Spindrifft Way to Kehoe Avenue (Midday)
- Highway 1 from Kehoe Avenue to Grandview Boulevard (AM, PM, Midday)

### SR-92

- SR 92 from Skyline Boulevard to SR 35 (PM, Midday)

Additionally, several roadway segments fall below the stricter standard provided by the LCP. The following roadway segments do not meet the LCP LOS D standard during the listed peak hours:

- Highway 1 between Miramar Drive and Grandview Boulevard (AM, PM, Midday)
- Highway 1 between Kelly Avenue and Seymour Street (AM, PM)
- Highway 1 between Redondo Beach Road and Fairway Drive (AM, PM)

### SR-92

- SR 92 from Main Street to Skyline Boulevard (AM, PM)
- SR 92 from Skyline Boulevard to SR 35 (AM, PM, Midday)
- SR 92 between SR 35 and I-280 (AM, PM)

## Cost Estimates

Cost estimates for Alternative 2 proposed improvements have been calculated based on standard unit costs and are listed in **Table 11**. Cost estimates include contract items as well as mobilization, construction engineering, design, permits, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 11 - Cost Estimates for Alternative 2 Roadway and Intersection Improvements**

#	Improvement	Cost Estimate
	<i>Carried over<sup>1</sup> Alternative 1 options</i>	\$ 2,760,000
4B	Hwy 1 Paved Shoulder and Curb (Phase B)	\$ 2,841,000
5	California Avenue Signal	\$ 767,000
6	Cypress Avenue Signal	\$ 640,000
7	Kehoe Avenue Signal	\$ 640,000
8	Main Street (S) Signal	\$ 530,000

9	Hwy 1 Median and Left Turn Bay in Montara	\$ 225,000
10	Hwy 1 Access Restrictions in Moss Beach	\$ 268,000
11	Montara Lighthouse Median and Left Turn Bay	\$ 170,000
12A	Nurserymen's Exchange Access Consolidation (Minimal Alternative) <sup>2</sup>	\$ 1,521,000
12B	Nurserymen's Exchange Access Consolidation (Expanded Alternative)	\$ 2,851,000
13	Frenchman's Creek Road Realignment and Access Consolidation	\$ 1,182,000
14	Terrace Avenue/Grand Boulevard Access Consolidation and Signalization	\$ 1,270,000
	<b>Total (assuming Project 12A):</b>	<b>\$ 12,814,000</b>
	<b>Total (assuming Project 12B):</b>	<b>\$ 14,144,000</b>

<sup>1</sup> Does not include Turn Restriction Signage as it has been replaced with median and access restriction projects

<sup>2</sup> The minimal alternative includes a frontage road between Young Avenue and Roosevelt Boulevard while the expanded alternative would continue the frontage road south to cover the driveway directly south of Young Avenue and north to Mirada Road.

### *Feasibility Concerns*

There are no feasibility concerns that were identified for any of the Alternative 2 proposed roadway and intersection improvements.

The following design considerations were identified:

- All design considerations noted for Alternative 1
- Signalization of the Highway 1/California Avenue intersection may require careful design considerations because of the Wienke Way leg that makes it a five legged intersection. Additionally, striping enhancements may be necessary to create safe pedestrian crossing opportunities.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## **Bicycle and Pedestrian Facility Improvements**

### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix B**.

**Table 12 - Alternative 2 Bicycle and Pedestrian Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
10	Parallel Trail	3	3	1	1	1	9

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
11	Coastal Trail	2	2	1	1	1	7
12	Class II Bike Lanes on Airport Street and Capistrano Road	2	1	1	0	1	5

### *Cost Estimates*

Cost estimates for Alternative 2 proposed improvements have been calculated based on standard unit costs and are listed in **Table 13**. Cost estimates include contract items as well as mobilization, construction engineering, design, permits, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 13 - Cost Estimates for Alternative 2 Bicycle and Pedestrian Improvements**

#	Improvement	Cost Estimate
	<i>Carried over Alternative 1 options</i>	\$ 5,736,000
2B	Hwy 1 Sidewalk (Phase B)	\$ 1,806,000
5	Coronado Street and Ave Alhambra Sidewalk	\$ 749,000
6	Parallel Trail adjacent to Highway 1 for the entire study area <sup>1</sup>	\$ 11,037,000
7	Coastal Trail throughout the entire study area <sup>1</sup>	\$ 5,251,000
9	Main Street Class III Bike Route	\$ 85,000
10	Capistrano Road Bicycle Facilities	\$ 866,000
11	Airport Street Class II Bike Lanes	\$ 4,238,000
	<b>Total (assuming Project 12B):</b>	<b>\$ 29,768,000</b>

<sup>1</sup>Cost estimates for these projects are based on per mile Class 1 paved bike trail cost estimates established in the 2002 Mid-Coast Recreational Needs Assessment (pg 62), and adjusted for 2014 dollars

### *Feasibility Concerns*

There are no feasibility concerns that were identified for any of the Alternative 2 proposed bicycle and pedestrian improvements.

The following design considerations were identified:

- All design considerations noted for Alternative 1
- Lane width should be narrowed along the proposed Class II bike lanes on Capistrano Road and Airport Street in order to enhance the traffic calming effect.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

### **Transit Improvements**

#### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix C**.



**Table 14 - Alternative 2 Transit Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
13	Special Event Shuttle Service	3	2	0	1	0	6
14	Park-and-Ride Lots	2	2	0	0	0	4
15	School Buses	2	2	0	0	0	4

### *Cost Estimates*

Cost estimates for shuttle and school bus service are considered out of the scope for this project and are not included in this document as they would require acquisition or lease of vehicles from a private company as well as ongoing operation, maintenance, and storage costs. The proposed park-and-ride lots have a minimal cost estimate as they involve the use of existing lots and negotiation of cost with private lot owners.

### *Feasibility Concerns*

There are no feasibility or design concerns that were identified for any of the Alternative 2 proposed transit improvements.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

### **Parking Improvements**

#### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix C**.

**Table 15 - Alternative 2 Parking Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
17	Parking lot for Rancho Corral de Tierra	1	1	0	1	1	4

### *Cost Estimates*

Cost estimates for Alternative 2 proposed improvements have been calculated based on standard unit costs and are listed in **Table 16**. Cost estimates include contract items as well as mobilization, construction engineering, design, permits, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 16 - Cost Estimates for Alternative 2 Parking Improvements**

#	Improvement	Cost Estimate
	<i>Carried over Alternative 1 options</i>	\$ 1,912,000
4	Rancho Corral de Tierra Parking Lot	\$ 2,346,000
	<b>Total:</b>	<b>\$ 4,258,000</b>

### *Feasibility Concerns*

There are no feasibility concerns that were identified for any of the Alternative 2 proposed parking improvements.

The following design considerations were identified:

- All design considerations noted for Alternative 1
- The designated crosswalk for the proposed Rancho Corral de Tierra access parking lot should have high visibility for Highway 1 traffic. The installation of Rectangular Rapid Flashing Beacon should be considered as an effective measure to alert motorists of the presence of pedestrians and bicyclists.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## ALTERNATIVE 3 – HIGH COST/HIGH IMPACT IMPROVEMENTS

Alternative 3 builds on the improvements provided in Alternative 1 and Alternative 2 by increasing capacity through the proposed addition of travel lanes in portions of the Midcoast and by proposing an alternate route within Half Moon Bay through the addition of a frontage road east of Highway 1. Highway 1 would undergo a complete realignment in El Granada to address sea level rise and erosion concerns, which would also include a large addition of parking capacity along the coast, south of Highway 1. While the existing terrain would make it difficult to provide additional travel lanes along SR 92, capacity can be improved by the addition of occasional passing/climbing lanes to reduce bottlenecks caused by truck traffic along SR 92. Alternative 3 also introduces pedestrian over/under crossings at high demand locations to allow for pedestrian traffic across Highway 1 without interfering with traffic flow as well as Class II Bike lanes along SR 92 to allow for safe bicycle commuting between San Mateo and Half Moon Bay. Transit service would be improved with permanent local routes. These improvements require a large amount of capital and operating investment, potentially require acquisition of right of way and will result in a significant impact to Midcoast communities and Half Moon Bay.

### Roadway and Intersection Improvements

#### *Ability to Address Deficiencies*

Increasing the road capacity to two lanes in each direction between 9<sup>th</sup> Street in Montara and St. Etheldore Street/Vallemar Street in Moss Beach and between Cypress Avenue in Moss Beach and Capistrano Road (S) in El Granada results in an improvement to Road Segment LOS for those segments from LOS E to LOS A/B under Buildout conditions as shown in **Table 17**. Outside of these segments it is not suggested to add additional capacity as it may encourage faster speeds through higher density areas with higher occurrences of pedestrian crossings. The unaffected segments still operate worse than the standard.

**Table 17 - Alternative 3 Buildout Conditions Peak Hour Roadway Segment Level of Service**

Segment Number	Location	AM Peak Hour	PM Peak Hour	Midday Peak Hour
		LOS <sup>1</sup>	LOS <sup>1</sup>	LOS <sup>1</sup>
4	Hwy 1 from 9th St to Carlos St	A (E)	A (E)	B (E)
	Hwy 1 from Carlos St to 9th St	A (E)	A (E)	A (E)
8	Hwy 1 from Cypress Ave to St. Etheldore St	A (E)	A (E)	B (E)
	Hwy 1 from St. Etheldore St to Cypress Ave	A (E)	A (E)	A (E)
9	Hwy 1 from St. Etheldore St to Capistrano Rd N	A (E)	B (E)	A (E)
	Hwy 1 from Capistrano Rd N to St. Etheldore St	A (E)	A (E)	A (E)
10	Hwy 1 from Capistrano Rd N to Coral Reef Ave	A (E)	B (E)	A (E)
	Hwy 1 from Coral Reef Ave to Capistrano Rd N	A (E)	A (E)	A (E)

<sup>1</sup> Project LOS (Buildout No Project LOS)

The addition of roundabouts at the following locations results in the LOS changes detailed in **Table 18** for the affected locations. The number of roundabout lanes was analyzed based on the number of lanes for the major approach and the amount of traffic expected to use the roundabout. An aerial view showing the minimum paving diameter is shown for each proposed roundabout in **Appendix C**.

The following three locations show consistent improvement of LOS with the implementation of a roundabout over the no-project alternative:

- Highway 1 & Coronado Street
- Highway 1 & Kehoe Avenue
- SR-92 & SR-35

Additionally, the following locations show mixed improvement of LOS with the implementation of a roundabout over the no-project alternative:

- Highway 1 & Main Street
- Main Street & SR-92

This inconsistency of improvement is due to an increase of traffic turning during certain peak hours being more than the capacity of the roundabout. While traffic signals can be timed differently to account for peak hour volumes, the capacity of a roundabout cannot be adjusted.

**Table 18 - Alternative 3 Buildout Conditions Peak Hour Intersection Level of Service**

Intersection Number	LOS Standard <sup>1</sup>	Roundabout Lanes	Street Names	AM Peak Hour	PM Peak Hour	Midday Peak Hour
				LOS <sup>2</sup>	LOS <sup>2</sup>	LOS <sup>2</sup>
N/A	D	Single	Hwy 1 / 9 <sup>th</sup> Street <sup>1</sup>	N/A	N/A	N/A
5	D	Single	Hwy 1 / Vallemar (N)	D (D)	<b>F (F)</b>	<b>F (E)</b>
9	D	Single	Hwy 1 / Cypress Avenue	<b>F (F)</b>	<b>F (F)</b>	<b>F (F)</b>
11	D	Double	Hwy 1 / Capistrano Road (S)	C (C)	D (C)	E (D)
14	D	Double	Hwy 1 / Coronado Street	D (D)	C (C)	C (E)
19	E	Single	Hwy 1 / Mirada Road	<b>F (F)</b>	<b>F (F)</b>	<b>F (F)</b>
27	E	Double	Hwy 1 / Kehoe Avenue	C (F)	B (F)	C (F)
32	E	Double	Hwy 1 / Main Street (N)	<b>F (D)</b>	<b>E (F)</b>	<b>F (F)</b>
33	E	Double	Hwy 1 / SR 92	<b>F (C)</b>	<b>F (D)</b>	<b>F (F)</b>
42	F	Double	Main Street / SR 92	B (D)	D (C)	D (F)
38	E	Double	Hwy 1 / Higgins Canyon Road/Main Street (S)	A (A)	B (A)	C (A)
48	D	Double	SR 92 / SR 35	C (D)	<b>E (F)</b>	<b>F (F)</b>

<sup>1</sup> Not a study intersection

<sup>2</sup> Project LOS (Buildout No Project LOS)

With the improvements included in Alternative 3, the following intersections do not meet the LOS standard during the listed peak hours:

**Midcoast**

- Highway 1 and 2nd Street (AM, PM, Midday)
- Highway 1 and Vallemar Street (PM, Midday)
- Highway 1 and California Avenue (AM, PM, Midday)
- Highway 1 and Virginia Avenue (AM, PM, Midday)
- Highway 1 and Vermont Avenue (AM, PM, Midday)
- Highway 1 and Cypress Avenue (AM, PM, Midday)
- Highway 1 and Capistrano Road (S) (PM)
- Highway 1 and St. Etheldore Street (AM, PM)
- Highway 1 and Coral Reef Avenue (AM, PM, Midday)

- Highway 1 and Magellan Avenue (AM, PM, Midday)
- Highway 1 and Medio Avenue (AM, PM, Midday)
- Highway 1 and Miramar Drive (AM, PM, Midday)

### **Half Moon Bay**

- Highway 1 and Mirada Road (AM, PM, Midday)
- Highway 1 and Roosevelt Boulevard (AM, PM, Midday)
- Highway 1 and Young Avenue (AM, PM, Midday)
- Highway 1 and Ruisseau Francais Avenue (Midday)
- Highway 1 and Frenchman’s Creek Road (AM, PM, Midday)
- Highway 1 and Venice Boulevard (AM, PM, Midday)
- Highway 1 and Spindrifft Way (AM, PM, Midday)
- Highway 1 and Grandview Boulevard (AM, PM, Midday)
- Highway 1 and Bellevue Boulevard (AM)
- Highway 1 and Main Street (N) (AM, PM, Midday)
- Highway 1 and SR-92 (AM, PM, Midday)
- Highway 1 and Kelly Avenue (Midday)
- Highway 1 and Filbert Street (AM, PM, Midday)
- Highway 1 and Seymour Street (AM, PM, Midday)
- Main Street and Lewis Foster Drive (PM)

### **SR-92**

- SR 92 and Muddy Road/Ox Mountain Landfill Road (PM, Midday)
- SR 92 and Skyline Boulevard (AM, PM, Midday)
- SR 92 and SR 35 (PM, Midday)

With the improvements included in Alternative 1, the following roadway segments do not meet the LOS standard during the listed peak hours:

### **Midcoast**

Highway 1 between Coronado Street and Miramar Drive operates below the CMP standard at LOS F. While the remainder of the roadway segments within the Study Area operate better than the LOS E standard given in the CMP, Highway 1 along the entire Midcoast region between 1<sup>st</sup> Street and Miramar Drive does not meet the LCP LOS D standard during the listed peak hours expect for the segments proposed to be widened:

- Highway 1 between 9<sup>th</sup> Street and Carlos Street
- Highway 1 between Cypress Ave and Coral Reef Road

### **Half Moon Bay**

The following roadways segments within the Study Area operate below the LOS standard given in the CMP:

- Highway 1 between Miramar Drive and Roosevelt Boulevard (Midday)
- Highway 1 between Roosevelt Boulevard and Young Avenue (PM, Midday)

- Highway 1 from Young Avenue to Ruisseau Francais Avenue (Midday)
- Highway 1 from Ruisseau Francais Avenue to Venice Boulevard (PM, Midday)
- Highway 1 from Venice Boulevard to Frontage Road (Midday)
- Highway 1 between Frontage Road to Spindrift Way (PM, Midday)
- Highway 1 from Spindrift Way to Kehoe Avenue (Midday)
- Highway 1 from Kehoe Avenue to Grandview Boulevard (AM, PM, Midday)

### **SR-92**

- SR 92 from Skyline Boulevard to SR 35 (PM, Midday)

Additionally, several roadway segments fall below the stricter standard provided by the LCP. The following roadway segments do not meet the LCP LOS D standard during the listed peak hours:

- Highway 1 between Miramar Drive and Grandview Boulevard (AM, PM, Midday)
- Highway 1 between Kelly Avenue and Seymour Street (AM, PM)
- Highway 1 between Redondo Beach Road and Fairway Drive (AM, PM)

### **SR-92**

- SR 92 from Main Street to Skyline Boulevard (AM, PM)
- SR 92 from Skyline Boulevard to SR 35 (AM, PM, Midday)

## ***Cost Estimates***

Cost estimates for Alternative 3 proposed improvements have been calculated based on standard unit costs and are listed in **Table 19**. Cost estimates include contract items as well as mobilization, construction engineering, designs, permits, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 19 - Cost estimates for Alternative 3 Roadway and Intersection Improvements**

#	Improvement	Cost Estimate <sup>3</sup>
	<i>Carried over<sup>1</sup> Alternative 1 and 2 options with Project 12A</i>	\$ 8,967,000
	<i>Carried over<sup>1</sup> Alternative 1 and 2 options with Project 12B</i>	\$ 10,297,000
4B	Hwy 1 Paved Shoulder and Curb (Phase C)	\$ 2,441,000
15	9th Street Roundabout	\$ 1,171,000
16	Etheldore Street Roundabout	\$ 1,492,000
17	Cypress Avenue Roundabout	\$ 1,205,000
18	Capistrano Road Roundabout	\$ 1,446,000
19	Coronado Street Roundabout	\$ 1,154,000
20	Mirada Road Roundabout	\$ 1,234,000
21	Kehoe Avenue Roundabout	\$ 1,240,000
22	Main Street (N) Roundabout	\$ 1,630,000
23	Hwy 1/SR-92 Roundabout	\$ 1,630,000
24	SR-92/Main Street Roundabout	\$ 1,630,000
25	Higgins Canyon Road Roundabout	\$ 1,313,000
26	SR-92/SR-35 Roundabout	\$ 1,177,000
27	Main Street Traffic Calming	\$ 522,000
28	Carlos Street Traffic Calming	\$ 306,000
29	Highway 1 Realignment (Center Alignment)	\$ 14,474,000
30	Hwy 1 East Side Frontage Road in Half Moon Bay <sup>2</sup>	infeasible
31	SR-92 Left Turn Lanes	\$ 418,000
32	SR-92 Passing/Climbing Lanes	\$ 1,519,000
33	Hwy 1 Widening to 4 Lanes	\$ 12,614,000
	<b>Total (assuming Project 12A):</b>	<b>\$ 57,583,000</b>
	<b>Total (assuming Project 12B):</b>	<b>\$ 58,913,000</b>

<sup>1</sup> Does not include signalization projects as they have been replaced by roundabouts

<sup>2</sup> Cost estimates are not included for the frontage road as a large part of this project cost would include right-of-way acquisition, and any cost estimate based on materials and design would greatly underestimate the cost

<sup>3</sup>Cost estimates do not include any right-of-way acquisition



## *Feasibility Concerns*

There are no design feasibility concerns that were identified for any of the Alternative 3 roadway and intersection improvements. There are no legal restrictions to increasing capacity along Highway 1 within the study area as it is not classified as a rural area. Some of the high impact improvements may carry with them some opposition from local residents. Capacity improvements often result in some resistance based on concerns over induced demand as well as resulting right-of-way acquisition issues. Roundabouts also sometimes carry with them resistance due to how they slow traffic along previously non-controlled locations, potentially resulting in increased travel time and congestion during periods of high demand or simply unfamiliarity with how they operate.

The creation of a frontage road parallel to Highway 1 would also result in a large amount of required right-of-way acquisition, including the removal of several existing houses. This was deemed to be politically infeasible. Other alternative parallel routes with Highway 1 have been discussed in the past including the Foothill Boulevard alignment and a parallel route partially aligned with Golden Gate Avenue and existing north-south connections, however these have previously been ruled out based on upcoming projects and environmental impacts.

The following design considerations were identified:

- All design considerations noted for Alternative 1 and Alternative 2
- While the installation of a roundabout is technically feasible at the Highway 1/9th Street intersection, the intersection's close proximity to the Main Street/9th Street intersection (approximately 130 feet) presents traffic operational challenges that can be addressed with careful design considerations.
- The installation of a roundabout at the Highway 1/Etheldore Street intersection will require integration with the Etheldore Street/Carlos Street intersection. The concept presented in the Highway 1 Safety and Mobility Improvement Study provides good guidance for how the roundabout should be designed.
- The Highway 1/Main Street (S) intersection will require an innovative roundabout design because of the close proximity to the Higgins Canyon Road/Main Street intersection.
- Any left-turn pockets for businesses along SR-92 should have adequate storage lengths to minimize their impact on traffic operation along SR-92.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**. An aerial view of the proposed roundabout location with required paving footprints is included in **Appendix D**.

## **Bicycle and Pedestrian Facility Improvements**

### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix C**.

**Table 20 - Alternative 3 Bicycle and Pedestrian Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
18	Pedestrian over/under crossings	2	1	1	1	0	5
19	Class II Bicycle Route along SR 92	3	3	1	0	1	8

### *Cost Estimates*

Cost estimates for Alternative 3 proposed improvements have been calculated based on standard unit costs and are listed in **Table 21**. Cost estimates include contract items as well as mobilization, construction engineering, designs, permits, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 21 - Cost Estimates for Alternative 3 Bicycle and Pedestrian Improvements**

#	Improvement	Cost Estimate
	<i>Carried over Alternative 1 and 2 options</i>	\$ 29,768,000
2C	SR-1 Sidewalk (Phase C)	\$ 1,564,000
13	Gray Whale Cove Pedestrian Overcrossing	\$ 4,486,000
14	Montara Sanitary District Pedestrian Overcrossing	\$ 5,849,000
15	Surfer's Beach Pedestrian Overcrossing	\$ 7,221,000
16	Kehoe Avenue Overcrossing	\$ 6,408,000
17	SR-92 Bike Lanes	\$ 20,959,000
	<b>Total:</b>	<b>\$ 76,255,000</b>

### *Feasibility Concerns*

There are no feasibility concerns that were identified for any of the Alternative 3 proposed bicycle and pedestrian improvements other than those noted for Alternative 2; however the design of pedestrian under-crossings may be affected by the water table for locations close to the coast and while pedestrian over-crossings may provide a way for pedestrians and bicyclists to cross Highway 1 without causing any conflicts or speed reduction to highway 1 traffic, the required vertical

clearance and ramp for handicap accessibility can potentially result in a large footprint of land needed for the structure.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## Transit Improvements

### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix C**.

**Table 22 - Alternative 3 Transit Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
20	New SamTrans service	3	3	0	0	0	6
21	Transit to BART and San Mateo	3	3	0	0	0	6

### *Cost Estimates*

Cost estimates for increased transit service are based on current operating costs of weekday SamTrans Route 17 and 294 service.

#	Improvement	Cost Estimate
	<i>Carried over Alternative 1 and 2 options</i>	\$ 12,537,000
21	Increased SamTrans service to regional transit providers	\$ 2,124,000
	<b>Total:</b>	<b>\$ 14,661,000</b>

### *Feasibility Concerns*

There are no feasibility or design concerns that were identified for any of the Alternative 3 proposed transit improvements.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## Parking Improvements

### *Ability to Address Deficiencies*

The proposed improvements were given the following scores for the evaluation metrics. A full listing of scores is provided in **Appendix C**.

**Table 23 - Alternative 3 Parking Evaluation Scores**

#	Project	Connectivity (0 to 3)	Access (0 to 3)	Safety (0 or 1)	Shoreline (0 or 1)	Precedent (0 or 1)	Impact Subtotal
21	Carlos Street Parking	1	2	1	1	1	6
22	El Granada recreational parking	1	2	1	1	1	6

### *Cost Estimates*

Cost estimates for Alternative 3 proposed improvements have been calculated based on standard unit costs and are listed in **Table 24**. Cost estimates include contract items as well as mobilization, construction engineering, designs, permits, and contingency. A full breakdown of costs is included in **Appendix A**.

**Table 24 - Cost estimates for Alternative 3 Parking Improvements**

#	Improvement	Cost Estimate
	Carried over Alternative 1 and 2 options	\$ 4,258,000
5	Carlos Street On-Street Parking	\$ 34,000
6	El Granada Diagonal Parking	\$ 54,000
	<b>Total:</b>	<b>\$ 4,346,000</b>

### *Feasibility Concerns*

There are no feasibility or design concerns that were identified for any of the Alternative 3 proposed parking improvements other than those noted for Alternative 2.

A full listing of improvements with feasibility and design considerations is included in **Appendix B**.

## CONCLUSION

The following three alternatives were developed from a list of proposed improvements. The alternatives were designed to assess what level of improvement would be needed to address deficiencies in the Buildout condition. The three alternatives were based on cost; expected impact to existing infrastructure, the environment and the surrounding communities; and the overall effect on residents of the Midcoast Communities and City of Half Moon Bay. The three alternatives described in this section are as follows:

- Alternative 1 – Low Cost/Low Impact
- Alternative 2 – Medium Cost/Medium Impact
- Alternative 3 – High Cost/High Impact

The improvements for each alternative were evaluated based on the following criteria:

- Roadway and Intersection Improvements
  - Meeting roadway segment LOS standards
  - Meeting intersection LOS standards
  - Improving vehicle and pedestrian safety
- Pedestrian, Bicycle, Transit, and Parking Improvements
  - Filling gaps in existing bicycle or pedestrian networks or transit connections
  - Improving pedestrian and bicycle safety
  - Improving access to communities, neighborhoods or popular destinations
  - Improving access to the shoreline
  - Support for a project in a previous study

While the determination of alternatives based on cost and impact provides a clear methodology for aggregation and evaluation of improvements, the ultimate result of this study is a hybrid alternative which includes suggested improvements from all three alternatives.

## Hybrid Alternative with Suggested Improvements

### *Roadway and Intersection Improvements*

The following projects are suggested to improve safety or circulation in a cost-effective way:

- Addition of a left-turn bay and an acceleration lane at Gray Whale Cove parking lot will improve circulation and prevent turning vehicles from restricting flow along Highway 1 in a cost-effective way **(Alt 1)**
- Addition of a median with northbound left-turn bay at 16<sup>th</sup> Street will improve circulation in Montara and provide a crossing refuge for pedestrians **(Alt 2)**

- The use of signage to restrict turning movements and to consolidate traffic at key intersections within the Midcoast area and Half Moon Bay will not address any intersection LOS deficiency, but it will reduce the number of vehicle conflicts along Highway 1 and potentially improve safety for pedestrians in Montara and Moss Beach. The proposed construction of medians and blocking access is a more expensive solution without any added benefit. **(Alt 1)**
- The implementation of traffic calming improvements such as speed display units and speed humps along Main Street in Montara and along Carlos Street in Moss Beach is a cost-effective way to slow traffic and improve safety for bicyclists and pedestrians. **(Alt 3)**
- Stop signs added to unsigned intersections along Highway 1 and a defined curb and paved shoulder for the following segments along Highway 1 will provide a consistent cross section for vehicle and pedestrian safety based on areas of highest pedestrian and bicycle activity along Highway 1:
  - Montara Segment – 1st Street and 14th Street **(Alt 1, 2, 3)**
  - Moss Beach Segment – Carlos Street to Etheldore Street (S) **(Alt 1, 2, 3)**
  - El Granada Segment – Coral Reef Avenue to Medio Road **(Alt 1, 2)**
  - Half Moon Bay Segment – Frenchman's Creek Road to Redondo Beach Road **(Alt 1, 2)**
- Consolidation of access to Highway 1 at the following locations will reduce the number of vehicle conflicts along Highway 1 and improve circulation **(Alt 2)**:
  - Nurseryman's Exchange driveways between Mirada Road and Young Avenue
  - Grand Avenue and Terrace Avenue (Already included in Buildout analysis as a planned improvement by the City of Half Moon Bay)
- Left-turn lanes at major businesses along SR 92 in Half Moon Bay would be a cost-effective solution to address a circulation issue commonly identified by the community. The main impediment would be acquisition of the required right-of-way at the desired locations. The following locations are suggested **(Alt 3)**:
  - Berta's Farm
  - Lemos Farm
  - Half Moon Bay Nursery

The following projects are suggested to improve intersection and roadway deficiencies:

- Signalization of the following intersections will address the LOS deficiencies and show no improvement with implementation of a roundabout **(Alt 2)**:
  - Highway 1 and California Avenue in Moss Beach (LOS F to LOS B)

- Highway 1 and Cypress Avenue in Moss Beach (LOS F to LOS C)
- Highway 1 and Main Street (S) in Half Moon Bay (Already included in Buildout analysis as an intersection planned to be signalized by the City of Half Moon Bay) (LOS E to LOS A)<sup>4</sup>
- Highway 1 and Grand Boulevard/Terrace Avenue in Half Moon Bay (Already included in Buildout analysis as an intersection planned to be signalized by the City of Half Moon Bay) (LOS F to LOS B)<sup>4</sup>
- Roundabouts at the following intersections address LOS deficiencies **(Alt 3)**:
  - Highway 1 and Coronado Street in El Granada (LOS E to LOS D)
  - Highway 1 and Kehoe Avenue in Half Moon Bay (LOS F to LOS C)
  - SR 92 and SR 35 east of Half Moon Bay (Midday peak remains LOS F, however AM and PM peak improve from LOS F to LOS E)

The remainder of the roundabouts analyzed resulted in a worsening of LOS for the intersection.

- Increasing road capacity to two lanes in each direction between 9<sup>th</sup> Street in Montara and St. Etheldore Street/Vallemar Street in Moss Beach, and between Cypress Avenue in Moss Beach and Capistrano Road (S) in El Granada will address the roadway segment deficiency (LOS E to LOS A/B), however the largest impediment to this will be the large cost and obtaining public support. **(Alt 3)**
- The addition of passing/climbing lanes on the eastbound portion of SR-92 between the Landfill Road and Pilarcitos Quarry Road will allow cars to pass the high volume of trucks on this roadway segment and provide a passing lane to go around right-turning cars. The cost estimate does not however include any right-of-way acquisition or any large scale earthwork which may be identified with a full design. **(Alt 3)**

Many of the intersection and roadway LOS deficiencies are not addressed with the proposed improvements. This was the result of very high forecasted buildout volumes along Highway 1 and SR 92 and fairly strict LOS standards that in many cases are not met under current conditions. This results in LOS deficiencies in locations that either could not be mitigated through the use of signalization or roundabouts or in locations where capacity improvements are considered undesirable from a multimodal or political standpoint. While large-scale capacity improvements and signalization would further address the LOS deficiencies, it is instead suggested that the intersection and roadway level of service standards for the Midcoast area be relaxed to take into account the current deficiencies and the multimodal needs of the community. Alternatively, land-use alternatives that would significantly reduce the Buildout

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<sup>4</sup> From Buildout Analysis and Traffic Projections Report



land use could partially address the forecasted deficiencies. A summary of the cost of the proposed hybrid alternative roadway and intersection improvements is included in **Table 25**.

**Table 25 - Cost of Hybrid Alternative Roadway and Intersection Improvements**

#	Improvement	Cost Estimate
1	Gray Whale Cove Turn and Acceleration Lanes	\$ 440,000
2	Turn Restriction Signage	\$ 40,000
3	SR-1 Side-Street Stop Signs	\$ 18,000
4A	SR-1 Paved Shoulder and Curb (Phase A)	\$ 2,302,000
4B	SR-1 Paved Shoulder and Curb (Phase B)	\$ 2,841,000
4C	SR-1 Paved Shoulder and Curb (Phase C)	\$ 820,000
5	California Avenue Signal	\$ 767,000
6	Cypress Avenue Signal	\$ 640,000
8	Main Street (S) Signal	\$ 530,000
11	Montara Lighthouse Median and Left Turn Bay	\$ 170,000
12	Nurserymen's Exchange Access Consolidation (Expanded Alternative)	\$ 2,851,000
14	Terrace Avenue/Grand Boulevard Access Consolidation and Signalization	\$ 1,270,000
19	Coronado Street Roundabout	\$ 1,154,000
21	Kehoe Avenue Roundabout	\$ 1,240,000
26	SR-92/SR-35 Roundabout	\$ 1,177,000
27	Main Street Traffic Calming	\$ 522,000
28	Carlos Street Traffic Calming	\$ 306,000
31	SR-92 Left Turn Lanes	\$ 418,000
32	SR-92 Passing/Climbing Lanes	\$ 1,519,000
33	SR-1 Widening to 4 Lanes	\$ 12,614,000
	<b>Hybrid Roadway and Intersection Total</b>	<b>\$ 31,639,000</b>

### ***Bicycle and Pedestrian Facility Improvements***

The following bicycle and pedestrian improvements were found to be cost-effective solutions to providing a safer and more connected environment to the Midcoast area and Half Moon Bay.

- The “Parallel Trail” adjacent to Highway 1 and Coastal Trail adjacent to the coastline (including Airport Street) provides a safe and cost-effective alternative route for pedestrians and recreational bicycles away from the heavier traffic on Highway 1 **(Alt 2)**
- Sharrows on Main Street in Montara, Carlos Street in Moss Beach, and Main Street in Half Moon Bay provide a safe and cost-effective alternative route for commuting bicycles away from the heavier traffic on Highway 1 **(Alt 1)**.
- A Class II bike lane along Capistrano Road would improve bicycle connectivity along Highway 1 **(Alt 2)**
- Striped crossing with beacons were found to be very cost-effective at improving connectivity, access, and safety. The following locations were identified as high priority locations **(Alt 1)**:
  - Gray Whale Cove
  - Montara State Beach
  - 2<sup>nd</sup> Street
  - 7<sup>th</sup> Street
  - Moss Beach Lighthouse (16<sup>th</sup> Street)
  - Virginia Street
  - California Street
  - Cypress Avenue
  - HMB Airport
  - North Capistrano Road
  - Surfer’s Beach Parking area, north of Coronado Street
  - Medio Avenue
  - Mirada Road
  - Kehoe Avenue
  - Terrace Avenue/Grand Boulevard
  - Quarry Road (along SR 92)
  - Pilarcitos Creek Road (along SR 92)
  - SR 35 (along SR 92)

The following improvements were identified solutions to providing a safer and more connected environment to the Midcoast area and Half Moon Bay, but they carried a larger price tag. They are suggested if the funding is available.

- A Class II bicycle lane along SR-92 would greatly improve connectivity for bicyclists between San Mateo and Half Moon Bay, however the large cost would make it necessary to perform a demand study to determine if the potential volume of bicyclists who would use the route would make it worth the cost **(Alt 3)**.
- Traffic signal updates throughout Half Moon Bay would improve safety for pedestrians in the downtown areas. Potential improvements include **(Alt 1)**:
  - Pedestrian count-down indicators on all signalized crosswalks
  - Crosswalk signal crossing adjustments to accommodate slower walking speeds

- Bicycle signal detection device
- Pedestrian refuge spaces on wide road crossings
- A Class II bike lane along Airport Street would provide another alternate route for bicyclists, however given the cost, a demand study to determine if the potential volume of bicyclists would help determine the need for an additional bicycle route **(Alt 2)**
- Sidewalks in the following locations would provide a more continuous walking path for pedestrians **(Alt 1, 2, 3)**:
  - Along Highway 1 in Montara, Moss Beach, Miramar, and developed areas of Half Moon Bay
  - Along Coronado Street and Avenue Alhambra in El Granada

Though they minimize the conflict and impact with vehicle along Highway 1, the very high cost of over- or under-crossings as well as the large footprint is prohibitive as compared to the much cheaper solution of striped pedestrian crossings. A summary of the cost of the proposed hybrid alternative roadway and intersection improvements is included in **Table 26**.

**Table 26 - Cost of Hybrid Alternative Bicycle and Pedestrian Improvements**

Project #	Project Name	Cost
<b>Hybrid Bicycle and Pedestrian Facility Recommended Improvements</b>		
1	Striped Pedestrian Crossing with Beacons	\$ 2,550,000
3	Sharrows on Main Street	\$ 44,000
4	Sharrows on Carlos Street	\$ 43,000
6	Parallel Trail adjacent to Highway 1 for the entire study area	\$ 11,037,000
7	Coastal Trail throughout the entire study area	\$ 5,251,000
10	Main Street Class III Bike Route	\$ 85,000
11	Capistrano Road Bicycle Facilities	\$ 866,000
	<b>Hybrid Bicycle and Pedestrian Recommended Total:</b>	<b>\$ 19,876,000</b>
<b>Hybrid Bicycle and Pedestrian Facility Recommended Improvements with Additional Funding</b>		
2A	SR-1 Sidewalk (Phase A)	\$ 1,475,000
2B	SR-1 Sidewalk (Phase B)	\$ 1,806,000
2C	SR-1 Sidewalk (Phase C)	\$ 1,564,000
5	Coronado Street and Ave Alhambra Sidewalk	\$ 749,000
9	Traffic Signal Updates	\$ 1,624,000
12	Airport Street Class II Bike Lanes	\$ 4,238,000
17	SR-92 Bike Lanes	\$ 20,959,000

	<b>Hybrid Bicycle and Pedestrian with Additional Funding Total:</b>	<b>\$ 52,291,000</b>
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## Transit Improvements

The majority of the transit improvements will depend on discussions and negotiations with SamTrans or private bus companies as well as required acquisition and ongoing costs. A more comprehensive recommendation will require a demand study to determine need and want for the variety of services listed here.

Transit services that were evaluated to have the highest cost effectiveness were:

- Shuttle bus service on summer and fall weekends during special events. **(Alt 1)**
- More frequent weekend service for the existing SamTrans fixed routes serving the study area. **(Alt 2)**
- The establishment of a park-and-ride shuttle and usage of existing parking lots. **(Alt 2)**

Transit services that were evaluated to have less cost effectiveness were:

- SamTrans service that provides connections to regional transit providers during the morning and evening peak periods with limited stops though increased weekday frequency of Samtrans Route 294 and 17. **(Alt 3)**
- School bus service for Cabrillo Unified School District including a facility for storing the vehicles and maintenance. **(Alt 2)**

Given the high cost but necessity of improvements to bus stops, the specific locations chosen for improvements should be based on a travel demand study with public involvement to determine which transit stops have the highest demand or highest potential for future demand. **(Alt 1)** For this hybrid alternative, a conservative estimate of about half the stops (40 stops) have been included as being improved.

A summary of the cost of the proposed hybrid alternative roadway and intersection improvements is included in **Table 27**. This cost estimate does not include the cost of school bus service for Cabrillo Unified School District.

**Table 27 - Cost of Hybrid Alternative Transit Improvements**

#	Improvement	Cost Estimate
<b>Hybrid Transit Facility Recommended Improvements</b>		
2	Increased Weekend Samtrans service	\$ 525,000
	<b>Hybrid Parking Recommended Total</b>	<b>\$ 525,000</b>
<b>Hybrid Transit Recommended Improvements with Additional Funding</b>		
1	Bus Stop Amenities	\$ 6,240,000

21	Increased SamTrans service to regional transit providers	\$ 2,124,000
<b>Hybrid Transit with Additional Funding Total</b>		<b>\$ 8,889,000</b>

## Parking Improvements

The lack of capacity for the large amount of weekend recreational parking demand results in a spillover of demand into community parking. There is a need for additional parking in the Midcoast and Half Moon Bay. The following proposed improvements present low cost solutions.

- Formalized parallel parking for Montara State Beach, with a physical separation from Highway 1. **(Alt 2)**
- Diagonal parking for Moss Beach along Carlos Street and diagonal parking for El Granada are both part of larger improvements, however it is suggested that given the parking need, that they be constructed independent of the approval of the larger projects in Moss Beach and El Granada. **(Alt 3)**
- Improved wayfinding signage **(Alt 1)**

The following locations would also benefit from increased parking; however the higher cost may make their approval dependent on available funding:

- Paving and striping at the upper Gray Whale Cove parking lot **(Alt 1)**
- Parking lot for Rancho Corral de Tierra access and beach overflow located east of Highway 1 **(Alt 2)**

**Table 28 - Cost of Hybrid Alternative Parking Improvements**

Project #	Project Name	Cost
<b>Hybrid Parking Recommended Improvements</b>		
1	Montara State Beach Parking Lot Improvements	\$ 557,000
3	Wayfinding	\$ 303,000
5	Carlos Street On-Street Parking	\$ 34,000
6	El Granada Diagonal Parking	\$ 54,000
<b>Hybrid Parking Recommended Total</b>		<b>\$ 948,000</b>
<b>Hybrid Parking Recommended Improvements with Additional Funding</b>		
2	Upper Gray Whale Cove Parking Lot Improvements	\$ 1,052,000
4	Rancho Corral de Tierra Parking Lot	\$ 2,346,000
<b>Hybrid Parking with Additional Funding Total</b>		<b>\$ 4,346,000</b>