Hatch Mott MacDonald
Delivering Solutions

STATE HIGHWAY 1 & DOLAN ROAD FEASIBILITY STUDY

MONTEREY COUNTY, CALIFORNIA

Final Report

Prepared For

Monterey County Resource Management Agency
Department of Public Works
Salinas, California

Initial Submittal: November 13, 2013
Revised Submittal: June 26, 2014

"This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Hatch Mott MacDonald being obtained. Hatch Mott MacDonald accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purposes agrees, and will by such use or reliance be taken to confirm his agreement, to indemnify Hatch Mott MacDonald for all loss or damage resulting therefrom. Hatch Mott MacDonald accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

To the extent that this report is based on information supplied by other parties, Hatch Mott MacDonald accepts no liability for any loss or damage suffered by the client, whether contractual or tortious, stemming from any conclusions based on data supplied by parties other than Hatch Mott MacDonald and use by Hatch Mott MacDonald in preparing this report."

TABLE OF CONTENTS

EXECUTIVE SUMMARY VI

1 INTRODUCTION 1

2 EXISTING CONDITIONS 3

2.1 Study Area 3
2.2 Moss Landing Community Plan 6
2.3 SR 1 & 183 Corridor System Management Plan 8
2.4 Existing Traffic Network 9
2.5 Existing Transit Systems 9
2.6 Existing and Proposed Bikeway and Pedestrian Facilities 10
2.7 Existing Utilities 11
2.8 Existing Foliage 11
2.9 Geotechnical Report 11
2.10 Environmental Constraints Assessment 12
2.11 Existing Collision Data 16
2.12 Existing Travel Speeds 19
2.13 Existing Conditions Intersection Operations 20

3 IMPROVEMENT ALTERNATIVE ANALYSIS 22

3.1 Improvement Alternatives 22
3.2 Operations of Improvement Alternatives 25
3.3 Improvement Alternative Evaluations 26
3.4 Improvement Alternatives Recommended for Rejection 31
3.5 Improvement Alternatives Recommended for Further Study 33

4 IMPROVEMENT ALTERNATIVE FEASIBILITY STUDY 34

4.1 Improvement Alternative Categories 34
4.2 Improvement Alternative Construction Cost Estimates 38
4.3 Initial Study Results 39
4.4 Feasibility Assessment 43

5 RECOMMENDED IMPROVEMENT ALTERNATIVES FOR FURTHER STUDY 45

5.1 Improvement Alternatives Recommended for Further Study 45
5.2 Next Steps 45

6 REFERENCES 46

6.1 List of References 46
6.2 List of Contacts 46

LIST OF EXHIBITS

1. Location of Study Area

2. Adjacent Land Uses within Study Area

3. Moss Landing Harbor

4. Moss Landing Power Plant

5. Moss Landing Power Plant Emergency Gate

6. Moss Landing Commercial Park

7. Unused Oil Storage and Pumping Systems at Moss Landing Commercial Park

8. Narrow Northbound SR 1 Shoulder

9. Existing Overhead Utilities along SR 1

10. Existing Foliage North of Dolan Road

11. Existing Foliage South of Dolan Road

12. Summary of Overall Findings from Geotechnical Evaluation

13. Summary of Overall Findings from Environmental Constraints Assessment

14. Collision History – State Route 1/Dolan Road

15. Collision Diagram – State Route 1/Dolan Road

16. Existing Travel Speeds on State Route 1

17. Existing Volumes and Levels of Service

18. Level of Service Comparison Table

19. Design Criteria Matrix Template

20. Design Criteria Matrix Evaluation Categories

21A. Completed Design Criteria Matrix (by Improvement Alternative Number)
21B. Completed Design Criteria Matrix (by Improvement Ranking)

LIST OF EXHIBITS
(Continued)

22. State Route 1/Dolan Roundabout Lane Requirements

23. Summary of Signal Warrant Evaluations – State Route 1/Dolan Road

24. Vehicle Queue Length Comparison Table

25. Comparison of Signalized Improvement Alternatives

26. Improvement Alternative Cost Estimates

27. Summary of Overall Findings from Initial Study

28. Improvement Alternative Feasibility Table

LIST OF APPENDICES

A. *State Highway 1 & Dolan Road Feasibility Study, Monterey County, California – Geotechnical Letter Report*

B. *Environmental Constraints Report – State Route 1 – Dolan Road Improvements*

C. Collision History Data

D. Travel Time Data

E. Existing Traffic Counts

F. Level of Service Calculations

G. Year 2035 Traffic Volumes

H. Roundabout Conceptual Footprint

I. Improvement Alternative Conceptual Designs

J. Signal Warrants

K. Vehicle Queuing Calculations

L. Improvement Alternative Construction Cost Estimates

M. *Initial Study – State Route 1 – Dolan Road Improvements*

EXECUTIVE SUMMARY

The State Highway 1 & Dolan Road Feasibility Study evaluates potential safety and operational improvements at the State Route 1 / Dolan Road intersection in Moss Landing, California. This feasibility study was commissioned by the Monterey County Resource Management Agency – Department of Public Works to review the potential improvement options, including their benefits, physical and environmental challenges, and any related issues that may hinder or prevent their ultimate implementation.

The intent of the Feasibility Study is to analyze shorter-term safety and operational improvements and cost effective solutions. The Study does not preclude or analyze in detail the need for longer-term improvements along the Highway 1 corridor between Castroville to Moss Landing and as such should be analyzed in a corridor study. Longer-term solutions should incorporate a corridor study to include the other intersections of Highway 1 in the Moss Landing area. These long term solutions include but are not limited to a roundabout, consolidating intersections and driveways and connection of Dolan Road and Moss Landing Road via a new overpass.

This feasibility study is just the first step in a process to implement safety and capacity improvements at the State Route 1 / Dolan Road intersection. Its aim is to identify the preferred feasible improvements for further evaluation. As the intersection is under the jurisdiction of Caltrans, further analysis and design work will need to be prepared prior to implementation, including a formal Project Study Report.

The project approach and analysis contained herein has been structured akin to the recently adopted Caltrans Traffic Operations Policy Directive 13-02, "Intersection Control Evaluation (ICE)," which governs analysis of potential intersection traffic control improvements. Although Caltrans District 5 has yet to announce its guidelines for implementation of that new policy, the analysis contained within this report was established with the goal of being consistent with said future guidelines.

Existing Conditions:

Study Area:

The State Route 1 (SR 1) / Dolan Road intersection is located in Moss Landing, California. Major uses in the Moss Landing Area are the Moss Landing Harbor, the Monterey Bay Aquarium Research Institute (MBAR), the Moss Landing Marine Laboratories (MLML), the Moss Landing Power Plant, and the Moss Landing Commercial Park (a.k.a. Moss Landing Business Park). Of those uses, the Moss Landing Harbor fronts the study intersection to the west, the Moss Landing Power Plant is located at the northeast corner of the intersection, and the Moss Landing Commercial Park is located at the southeast corner of the intersection.

Current and Past Studies of the Area:

The draft Moss Landing Community Plan update, which governs the study area, contains the

following policies and recommendations regarding State Route 1:

1. Installation of roundabouts at key intersections with State Route 1 (e.g. Dolan Road and Moss Landing Road);

2. Minimize new direct access points to State Route 1;

3. Preparation of a Project Study Report for the State Route 1 corridor through Moss Landing area, with potential improvements to include the consolidation of the State Route 1 intersections with Dolan Road and Moss Landing Road (North).

The *State Routes 1 & 183 Corridor System Management Plan* (CSMP) by Caltrans District 5 notes that, between 2006 and 2009, SR 1 at Dolan Road had a collision rate of more than three times the statewide average for similar intersections. The document also includes the following general recommendations that could be applied as improvements within the study area:

1. Add auxiliary lanes, intersection improvements and other system refinements, in order to reduce delay preserve and enhance existing services, while noting that operational improvements alone do not solve corridor capacity needs.

2. Redesign and modernize the intersections to reduce delay and maximize throughput on State Route 1 and parallel routes. These upgrades may include improving the parallel local road network, adding turn-movement storage, deceleration and/or acceleration lanes to the intersection, and converting at-grade intersections into grade-separated interchanges.

3. Increase the capacity, operational efficiency and connection on the parallel road network to reduce local traffic demand on SR 1.

<u>Existing Transportation Network:</u>

The **SR 1/Dolan Road intersection** is a "T" intersection, with SR 1 in a north-south alignment and Dolan Road in a roughly east-west alignment. Traffic on Dolan Road is stop controlled, while SR 1 traffic is free-flow through the intersection. Left and right turn lanes are present on both SR 1 and Dolan Road at the intersection. A median acceleration lane is also present along southbound SR 1 for use by traffic turning left from Dolan Road. Note that a Moss Landing Power Plant gated driveway forms a fourth approach to the intersection.

Monterey-Salinas Transit (MST) operates three fixed-route lines through Moss Landing – Lines 27, 28 and 78, which together serve Marina, Watsonville, Castroville, Salinas, Santa Cruz and the Presidio of Monterey. All three lines stop at bus stops located alongside each direction of SR 1 south of Dolan Road.

No bicycle lanes are formally marked in the study area, although the paved shoulders of both SR 1 and Dolan Road are used by bicyclists as bicycle lanes. Although these shoulders are

generally adequate for use by bicyclists, the shoulder along northbound SR 1 narrows to only four feet in advance of its intersection with Dolan Road.

Formal bicycle lanes are proposed along Dolan Road between SR 1 and Castroville Boulevard. Design is underway on a new joint-use pedestrian and bike path (the "Monterey Bay Sanctuary Scenic Trail – Moss Landing Segment") to be located alongside SR 1 and Moss Landing Road between the northern and southern ends of Moss Landing Harbor.

No sidewalks, crosswalks, or other pedestrian facilities are present in the vicinity of the SR 1/Dolan Road intersection. No new pedestrian improvements are proposed in the area other than the aforementioned Monterey Bay Sanctuary Scenic Trail.

A number of aboveground and underground utilities are present near the SR 1/Dolan Road intersection, including utility poles fronting both sides of SR 1 and the southern frontage of Dolan Road, telephone vaults are located along the frontages of both SR 1 and Dolan Road near the southeastern corner of their intersection, and various manholes accessing underground potable water pipelines located along the western side of the intersection.

The foliage present near the SR 1/Dolan intersection is composed of trees and bushes. Both eucalyptus and Monterey cypress trees front SR 1, with clusters of both tree types located along both sides of the highway. Various small trees and bushes are scattered along the eastern frontage of SR 1 against the security fence for the Moss Landing Commercial Park.

Geotechnical Report:

A geotechnical report was prepared, documenting past geotechnical investigations in the site vicinity, a field visit, testing of field samples, and preliminary pavement design sections. The report concluded that roadway widening in this area was feasible from a geotechnical pavement engineering standpoint; however, a thicker pavement section was recommended for any widening south of Dolan Road. Further investigation of subgrade soils requiring this thicker section was also recommended. The full geotechnical report can be found within **Appendix A**.

Environmental Constraints Assessment:

An environmental constraints assessment was prepared, identifying the potential existing environmental constraints adjacent to the SR 1/Dolan Road intersection and in the surrounding area. The assessment identified various potential issues that could limit – to varying degrees – the ability to implement potential roadway improvement options, as well as a few methods by which the effects of these issues can be minimized if not fully abated. These issues included removal of adjacent trees, the potential presence of endangered plants, nearby archeological sites, potentially historic buildings at the Moss Landing Commercial Park, potentially hazardous soil and water contamination at the Moss Landing Power Plant and Moss Landing Commercial Park, the proximity of the proposed Monterey Bay Sanctuary Trail to the intersection, and the potential relocations of overhead and above ground utilities. The full environmental constraints assessment can be found within **Appendix B**.

Collision Data:

Collision data between 2007 and 2011 was evaluated by collision type and location. A total of 61 collisions occurred within this period, 54 of which occurred within 500 feet of the SR 1/Dolan intersection. The two most prevalent types were rear-end and "failure to yield" collisions. Speeding was considered a primary collision factor in ten of these collisions. Thirty-seven people were injured in the 54 intersection collisions, while no fatalities were reported. The overall collision rate for the intersection is 0.839 collisions per million entering vehicles, nearly three times the statewide average for similar intersections.

Travel Speeds:

Travel speeds along SR 1 were collected via travel time runs conducted in April 2013. Speeds through the study intersection and the immediate vicinity were found to be within 5 MPH of the posted speed limit.

Intersection Operations:

Level of service calculations were performed at the study intersection using intersection volumes collected in March 2011 as part of the Moss Landing Community Plan environmental analysis. The SR 1/Dolan Road intersection currently operates at an acceptable LOS A during both the AM and PM peak hours. However, side street operations on Dolan Road are at LOS E (AM) and LOS F (PM).

Improvement Alternative Analysis:

A total of 12 improvement alternatives were developed to improve safety and operations at the SR 1/Dolan Road intersection. These alternatives vary from simple striping and signing improvements to more complicated roadway widening projects. The improvement alternatives are:

1. No Build
2. Flashing Beacons, Signs, Channelizers & Striping
3. Improve Sight Distance
4. Add Northbound SR 1 Right Turn Acceleration Lane
5. Prohibit Turning Movements
6. Widen Shoulder Widths to Caltrans Standards
7. Widen Lane Widths to Caltrans Standards
8. Full Signal
    a. Single Through Lane
    b. Two Through Lanes
9. Half Signal
    a. Single Through Lane
    b. Two Northbound Through Lanes
10. Roundabout
    a. Single-Lane

b. Two Lane
11. Widen SR 1 to Two Lanes in Each Direction
12. Relocate SR 1/Dolan Intersection to the South

Note: Two other improvement alternatives are also included within this analysis but are not fully evaluated. They are both long-term improvements that are more extensive improvements that those previously mentioned. The long-term improvements are:

13. Consolidate Intersections and Driveways
14. Connect Dolan and Moss Landing Roads via New Overpass

An operational analysis was performed of each of the first twelve alternatives, using the 2010 Highway Capacity Manual methodologies, as part of the overall initial evaluation of each improvement alternative.

A design criteria matrix (**Exhibit 19**) was used to evaluate the improvement alternatives. The individual criteria used in this evaluation included reduction in vehicle delay; improvement of vehicle, pedestrian and bicycle safety; minimization of environmental impacts, right-of-way acquisition, project costs, and project duration; ability to construct in phases or increments; and potential acceptability to Caltrans. Each criterion had a point range, with a perfect total score of 100 points. Each improvement alternative was individually rated, then ranked from highest score to lowest score.

After evaluation, eight of the original fourteen improvement alternatives were rejected from further consideration. The remaining six improvement alternatives were found to have major safety and/or capacity benefits and were further evaluated; those improvement alternatives are:

2. Flashing Beacons, Signs, Channelizers and Striping
3. Improved Sight Distance
4. Add Northbound SR 1 Right Turn Acceleration Lane

8a. Full Signal, One Through Lane
9a. Half Signal, Single Northbound Through Lane
9b. Half Signal, Two Northbound Through Lanes

Improvement Alternative Feasibility Study:

Prior to performing the further analysis, Improvement Alternatives 2, 3 and 4 were combined together into a unified alternative named Improvement Alternative 2-3-4. The other three improvement alternatives remained unchanged.

Unsignalized Improvement Alternative:

Improvement Alternative 2-3-4 is the only improvement alternative that retains the existing side-street stop control. A conceptual design of this improvement is included within **Appendix I**. The improvements include new flashing beacons, signs and street lighting; refreshing of existing pavement striping; trimming of roadside foliage; and a new northbound SR 1 acceleration lane.

Signalized Improvement Alternatives:

Signal warrants were evaluated at the SR 1/Dolan Road intersection under both Existing and Year 2035 Conditions. Of the six signal warrants evaluated, three warrants were found to be met, including the four-hour (Warrant 2) and peak hour (Warrant 3). Based upon these results, a traffic signal is considered warranted.

There are three improvement alternatives that include traffic signals. Conceptual designs of these improvements are included within **Appendix I**.

Improvement Alternative 8a is a standard traffic signal, with all intersection movements (including to and from the gated Moss Landing Power Plant equipment driveway) controlled by the signal. No additional pavement is required with this improvement alternative.

Improvement Alternative 9a is a half signal, whereby one of the through movements on the major street (southbound SR 1, in this case) has a continuous green signal, regardless of the operations of the other signal phases. This improvement alternative does not signalize the power plant driveway, instead leaving it as stop controlled and limiting access to right turns in and out only. No additional pavement is required with this improvement alternative.

Improvement Alternative 9b is also a half signal and treats the power plant driveway in a similar fashion. Unlike the other half-signal alternative, Improvement Alternative 9b adds a second northbound SR 1 through lane at the intersection. This is achieved via a conversion of the existing northbound right turn lane into a shared through-right lane and the addition of a second northbound through lane leaving the intersection. (SR 1 narrows back to a single northbound through lane before reaching the bridge over Elkhorn Slough.) As such, this improvement alternative does require additional pavement north of Dolan Road.

Improvement Alternative Cost Estimates:

Programming estimates have been developed for each of the four improvement alternatives. The estimates range between $700,000 to $1,300,000, depending upon the improvement alternative. Note the programming estimates include construction and all soft costs (design, environmental, right-of-way, utilities construction management and permitting). Programming estimates are plus or minus 35 percent accurate.

Initial Study Results:

An Initial Study was prepared, assessing the potential environmental impacts of Improvement Alternatives 2-3-4, 8a, 9a, and 9b. This Initial Study concluded that a mitigated negative declaration can be declared for all four improvement alternatives. All of the identified potentially significant impacts can be reduced to less-than-significant status through the implementation of various mitigation measures both prior to and during construction. The full Initial Study, including each detailed mitigation measure, is located within **Appendix M**.

Feasibility Assessment:

Accounting for all of the design and environmental analysis, all four improvements (Improvement Alternatives 2-3-4, 8a, 9a, and 9b) appear to be feasible to construct. While there are a number of required mitigation measures that must be followed prior to and during construction, none would preclude the construction of any of the improvement alternatives. However, these mitigation measures will likely increase the construction time and cost.

Improvement Alternatives Recommended for Further Study:

All four of the improvement alternatives discussed in Section 4 – Improvement Alternatives 2-3-4, 8a, 9a, and 9b – appear to be feasible to construct and are not environmentally precluded from construction. It is therefore recommended that all four improvements be considered for future implementation. Further analysis and design is recommended prior to selection of a single improvement alternative for implementation.

Next Steps

The likely next step would be a formal Project Study Report (PSR), which would be the gateway to state approval and funding. A likely PSR component would be the new Intersection Control Evaluation (ICE) process implemented by Caltrans in August 2013, which is a process to analyze potential intersection and interchange improvement alternatives on a Caltrans facility. This includes improvements such as stop signs, traffic signals, roundabouts and improvements deviating from Caltrans design standards. Implementation of the ICE process is left to each individual Caltrans district.

The County of Monterey should also consider long-term improvements, such as intersection consolidation and grade separation improvements (i.e. Improvement Alternatives 13 and 14). These improvements will require considerably more analysis, design, and stakeholder collaboration than was performed as part of this report. These improvements will also be more expensive and will take longer to build; however, they will be more consistent with the stated long-term goals of Caltrans and the Moss Landing Community Plan for the SR 1 corridor through Moss Landing. Note that it is possible that such an improvement may be incorporated into an ICE analysis of the SR 1/Dolan Road intersection.

1 INTRODUCTION

The State Route 1 / Dolan Road intersection in Moss Landing, California is an important component of both the local and regional transportation system in Monterey County. Traffic safety and operations at this intersection have been concerns for both the County of Monterey and the California Department of Transportation (Caltrans) for many years. To begin the process towards implementing roadway improvements at this intersection, the Monterey County Resource Management Agency – Public Works Department has commissioned Hatch Mott MacDonald to prepare this feasibility study to review the potential improvement options, including their benefits, physical and environmental challenges, and any related issues that may hinder or prevent their ultimate implementation. **Exhibit 1** shows the location of the study intersection.

This feasibility study is just the first step in a process to implement safety and capacity improvements at the State Route 1 / Dolan Road intersection. Its aim is to identify the preferred feasible improvements for further evaluation. As the intersection is under the jurisdiction of Caltrans, further analysis and design work will need to be prepared prior to implementation, including a formal Project Study Report.

This report and its contained analysis have been prepared in collaboration with the County of Monterey Department of Public Works staff, principally Ms. Patricia A. Lopez who served as project manager for the County. Considerable interaction between HMM and County staff was an integral component of this project, keeping County staff informed of the results and ensuring that the final report meets County needs. All of the environmental analysis has been prepared by EMC Planning Group under contract with HMM. Finally, HMM has performed all of the transportation and geotechnical analysis, prepared this report and managed the overall analysis and report preparation.

The project approach and analysis contained herein has been structured akin to the recently adopted Caltrans Traffic Operations Policy Directive 13-02, "Intersection Control Evaluation (ICE)," which governs analysis of potential intersection traffic control improvements. Although Caltrans District 5 has yet to announce its guidelines for implementation of that new policy, the analysis contained within this report was established with the goal of being consistent with said future guidelines.

The contents of this report have been split into two pieces – Existing Conditions and Improvement Alternative Analysis.

- Existing Conditions summarizes the existing area, known environmental issues and constraints, intersection and roadway operations, and collision history.

- Improvement Alternative Analysis summarizes the improvement alternatives evaluated in this analysis, the evaluation criteria used in the analysis, the preferred alternatives selected for further analysis, and the results of said further analysis (including conceptual design and more specific environmental analysis).


N.T.S
JENSEN RD
1
CABRILLO HWY
SPRINGFIELD RD.
STRUVE RD
ELKHORN SLOUGH
JETTY RD
STUDY INTERSECTION
MONTEREY BAY
MOSS LANDING
DOLAN RD
1
CABRILLO HWY
MOLERA RD
CASTROVILLE BLVD
Hatch Mott MacDonald
EXHIBIT 1
LOCATION OF STUDY AREA

2 EXISTING CONDITIONS

This chapter presents a description of the surrounding area, current and past studies of the study area, existing road network, existing traffic volumes, known environmental issues, area collision history, and existing traffic operations within the study area.

2.1 Study Area

The State Route 1 / Dolan Road intersection (SR 1/Dolan) is located in Moss Landing, California, a small unincorporated community in northern Monterey County of approximately 200 people[1]. The community is located at nearly the midpoint of Monterey Bay, where Elkhorn Slough empties into the bay. Currently, the primary commercial and industrial uses in the area are related to the Monterey Bay – the harbor and educational research. In addition, a regional electrical power plant and a commercial park front the study intersection. Each use is described on the following pages. See **Exhibit 2** for the location of these uses relative to the SR 1/Dolan intersection.

[1]Moss Landing population taken from 2010 US Census web page, (http://www.census.gov/2010census). Accessed August 6, 2013.


N.T.S
CABRILLO HWY
JETTY RD
ELKHORN SLOUGH
MOSS LANDING HARBOR
STUDY INTERSECTION
MONTEREY BAY
MOSS LANDING
MOSS LANDING POWER PLANT
SAND HOLDT RD
DOLAN RD
MONTEREY BAY AQUARIUM RESEARCH INSTITUTE
MOSS LANDING COMMERCIAL PARK
1
MOSS LANDING RD
MOSS LANDING MARINE LABORATORIES
POTRERO RD
Hatch Mott MacDonald
EXHIBIT 2
AREA LAND USES

2.1.1 Moss Landing Harbor

Exhibit 3 – Moss Landing Harbor

Moss Landing Harbor (**Exhibit 3**) is centered around Elkhorn Slough and its opening into the Monterey Bay. The harbor is home to hundreds of individual slips for recreational boaters and commercial vessels, as well as restaurants, commercial retail and other harbor-related uses. Its southern half sits along the western side of the State Route 1 / Dolan Road intersection. Access to the south harbor is via Moss Landing Road, which connects to SR 1 approximately 1,600 feet south of the SR 1/Dolan intersection. Access to the north harbor is via driveways directly off of State Route 1, north of Elkhorn Slough.

2.1.2 Educational Research

Two non-profit and educational organizations call Moss Landing home – the Monterey Bay Aquarium Research Institute (MBARI) and the Moss Landing Marine Laboratories (MLML). Both organizations perform research about the Monterey Bay ecosystem and its inhabitants. MBARI, the research arm of the Monterey Bay Aquarium, is located on a spit of partially developed land separating the Moss Landing Harbor from the Monterey Bay. Moss Landing Marine Laboratories is operated by the California State University system, and is located approximately a third of a mile to the south of the harbor. Both are accessible from State Highway 1 via Moss Landing Road.

2.1.3 Moss Landing Power Plant

Exhibit 4 – Moss Landing Power Plant

The Moss Landing Power Plant (**Exhibit 4**) is located at the northeastern corner of the SR 1/Dolan intersection. Originally built in the 1950s to burn oil, today the plant uses natural gas to generate electrical power for the greater Monterey Bay Area and Northern California. Primary access to the plant is via Dolan Road, although there is a little-used driveway off of State Route 1 approximately 600 feet north of Dolan Road. A gated emergency access to plant equipment

adjacent to Moss Landing Harbor is located immediately opposite the SR 1/Dolan intersection, forming a fourth leg to the intersection (**Exhibit 5**).

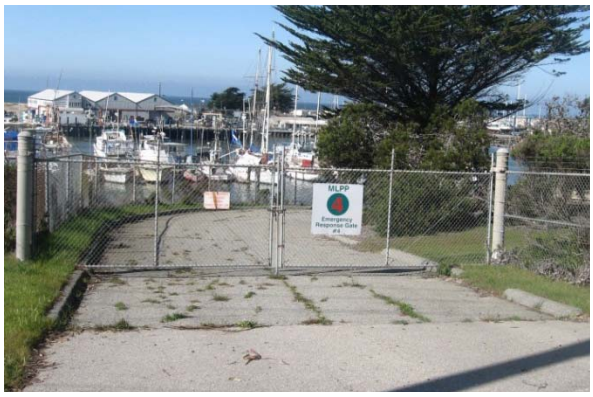


Exhibit 5 – Moss Landing Power Plant Emergency Gate

2.1.4 Moss Landing Commercial Park

The Moss Landing Commercial Park (also known as the Moss Landing Business Park – **Exhibit 6**) is an underutilized business park located at the southeastern corner of the SR 1/Dolan intersection. Although a few industrial businesses do populate the facility, the majority of the site's buildings are currently vacant. A citizens group has proposed to construct a water desalinization plant within a portion of the site; as of this writing, no date has yet been set for its construction.

Exhibit 6 – Moss Landing Commercial Park

The business park was previously used for various industrial uses. The site was originally developed to produce refractory bricks for use in large industrial furnaces. In the 1950s, storage tanks for oil and gasoline were added; many of the original fuel tanks remain on the project site (**Exhibit 7**). In addition, piping is still present between those tanks and a fuel loading/unloading dock located within the southern Moss Landing Harbor. One of these pipelines is encased in redwood, while the other is made of metal. Access to this dock is via a dirt road off of State Route 1 south of Dolan Road.

Primary access to the Moss Landing Commercial Park is via Dolan Road, although gated driveways do exist off of State Route 1 south of Dolan Road.

2.2 Moss Landing Community Plan

As of this writing, the Monterey County Resource Management Agency – Planning Department is preparing a Draft Environmental Impact Report evaluating the environmental impacts of the Draft Moss Landing Community Plan. The Community Plan itself will be an amendment to the Monterey County General Plan and the North County Land Use Plan governing the Moss Landing area. It has been prepared to provide a comprehensive planning framework to improve and enhance the Moss Landing community. Components of the Community Plan include land use, transportation, public services, conservation and open space, public access, and specific projects. The level of proposed growth is limited and is focused upon marine research, commercial fishing, visitor-serving and industrial uses that enhance the existing area and provide future economic opportunities to the area.

Exhibit 7 – Unused Oil Storage and Pumping Systems at Moss Landing Commercial Park:
Top: Existing Oil Tank
Middle: Existing Piping along SR 1
Bottom: Existing Oil Loading Dock within Moss Landing Harbor

With respect to the study area, the draft Moss Landing Community Plan includes the following policies and recommendations regarding State Route 1:

1. Installation of roundabouts at key intersections with State Route 1 (e.g. Dolan Road and Moss Landing Road);

2. Minimize new direct access points to State Route 1;

3. Preparation of a Project Study Report for the State Route 1 corridor through Moss Landing area, with potential improvements to include the consolidation of the State Route 1 intersections with Dolan Road and Moss Landing Road (North).

2.3 SR 1 & 183 Corridor System Management Plan

The *State Routes 1 & 183 Corridor System Management Plan* (CSMP), released in October 2011 by Caltrans District 5, is a document meant to guide future improvements along the State Routes 1 and 183 corridors and prioritize funding strategies and mechanisms. The CSMP objectives are to reduce travel time and delay for all travel modes, reduce traffic congestion, improve connectivity between different transportation modes and facilities, and expand mobility options across both corridors.

The State Route 1 corridor through Moss Landing is included within the CSMP as part of Segment 2. The CSMP notes that, for the period between 2006 and 2009, the SR 1/Dolan Road intersection had a collision rate of more than 3 times the state average for similar intersections (i.e. rate of 0.66 collisions per million vehicle miles, compared to the then-statewide average of 0.20 collisions per million vehicle miles).

The CSMP does not include any specific recommendations for improvements to State Route 1 within the study area or to the SR 1/Dolan Road intersection in particular. However, the following general recommendations could be applied as improvements within the study area:

1. Add auxiliary lanes, intersection improvements and other system refinements, in order to reduce delay preserve and enhance existing services, while noting that operational improvements alone do not solve corridor capacity needs.

2. Redesign and modernize the intersections to reduce delay and maximize throughput on State Route 1 and parallel routes. These upgrades may include improving the parallel local road network, adding turn-movement storage, deceleration and/or acceleration lanes to the intersection, and converting at-grade intersections into grade-separated interchanges.

3. Increase the capacity, operational efficiency and connection on the parallel road network to reduce local traffic demand on SR 1.

2.4 Existing Traffic Network

The primary regional access to Moss Landing is provided by State Route 1 (SR 1). Other streets relevant to this study are Dolan Road and Moss Landing Road. **Exhibit 1** depicts the study area. A brief description of these streets follows, with the state highway and study corridor first, followed by the remaining roadways in alphabetical order.

State Route 1 is a state highway within Monterey County, extending north-south throughout the coastal region of the county through Moss Landing, Marina, Seaside, Monterey, and Carmel. The highway continues northward into Santa Cruz County en route to San Francisco and southward into San Luis Obispo County en route to Los Angeles. In the greater Moss Landing area, SR 1 is a two-lane highway with turn lanes at intersections and major driveways. Caltrans has designated SR 1 through Moss Landing as a "Terminal Route," meaning that the largest truck allowed on California state highways (i.e. the STAA standard truck) is allowed to travel the highway. The speed limit on SR 1 is 50 miles per hour (MPH) through the southern portion of Moss Landing (i.e. between Moss Landing Road (South) and Jetty Road), including at Dolan Road.

Dolan Road is a two-lane east-west roadway within northern Monterey County. It connects SR 1 with Castroville Boulevard, providing part of the link between US 101 in Prunedale and SR 1 in Moss Landing. The speed limit on Dolan Road is 55 MPH.

Moss Landing Road is a two-lane, largely rural roadway providing direct access to central Moss Landing, the Moss Landing Harbor and the beachfront. It forms a loop that connects to SR 1 at each end. Through its connection to Sandholdt Road, Moss Landing Road provides access to various businesses and organizations located between the harbor and the Monterey Bay. The speed limit on Moss Landing Road is 25 MPH.

The **SR 1/Dolan intersection** is a "T" intersection, with SR 1 in a north-south alignment and Dolan Road in a roughly east-west alignment. Traffic on Dolan Road is stop controlled, while SR 1 traffic is free-flow through the intersection. Left and right turn lanes are present on both SR 1 and Dolan Road at the intersection. A median acceleration lane is also present along southbound SR 1 for use by traffic turning left from Dolan Road. Note that the Moss Landing Power Plant gated driveway is located directly opposite this intersection, effectively forming a fourth approach to the intersection.

2.5 Existing Transit Systems

Monterey-Salinas Transit (MST) operates three fixed-route lines through Moss Landing – Lines 27, 28 and 78. Line 27 connects Marina and Watsonville via Castroville every two hours on weekdays only. Line 28 connects Salinas and Watsonville via Castroville a minimum of once every hour on weekdays and weekends. Line 78 is an express line connecting Santa Cruz and the Presidio of Monterey, operating three round trips per day on weekdays and four round trips per day on weekends All three lines stop at bus stops located alongside each direction of SR 1 south of Dolan Road.

2.6 Existing and Proposed Bikeway and Pedestrian Facilities

2.6.1 Bikeways

No bicycle lanes are formally marked in the study area, although the paved shoulders of both SR 1 and Dolan Road are used by bicyclists as bicycle lanes. Although these shoulders are generally adequate for use by bicyclists, the shoulder along northbound SR 1 narrows to only four feet in advance of its intersection with Dolan Road (**Exhibit 8**).

Exhibit 8 – Narrow Northbound SR 1 Shoulder near Intersection

The SR 1 corridor is also part of the Pacific Coast Route, which is a system of state and local roadways facilitating bicycle travel that extend along the coastlines of Washington, Oregon and California.

Few bicyclists were observed along the SR 1 corridor during field observations in February 2013. Most bicyclists appeared to be bicycling purely for recreation rather than commuting.

According to the *2008 Monterey County General Bikeways Plan*, formal bicycle lanes are proposed along Dolan Road between SR 1 and Castroville Boulevard. In addition, the County of Monterey is currently designing a new joint-use pedestrian and bike path adjacent to SR 1 within Moss Landing. Named the "Monterey Bay Sanctuary Scenic Trail – Moss Landing Segment," the path would compose a small portion of the planned bicycle and pedestrian trail that will eventually connect Santa Cruz and Monterey. The path would connect the northern and southern ends of Moss Landing Harbor alongside the western frontage of SR 1 and the northern frontage of Moss Landing Road.

2.6.2 Pedestrian Facilities

No sidewalks, crosswalks, or other pedestrian facilities are present in the vicinity of the SR 1/Dolan Road intersection. No pedestrian activity was observed during field observations in February 2013. No new pedestrian improvements are proposed in the area other than the aforementioned Monterey Bay Sanctuary Scenic Trail.

2.7 Existing Utilities

A number of aboveground and underground utilities are present near the SR 1/Dolan Road intersection. Utility poles carrying electrical lines front both sides of SR 1, especially to the south of the intersection. Utility poles are also present along the southern frontage of Dolan Road. Telephone vaults are located along the frontages of both SR 1 and Dolan Road near the southeastern corner of their intersection. Underground potable water pipelines are accessible via various manholes located along the western side of the intersection (**Exhibit 9**).

Exhibit 9 – Existing Overhead Utilities along SR 1

2.8 Existing Foliage

The foliage present near the SR 1/Dolan Road intersection is generally of two types – trees and bushes. Both eucalyptus and Monterey cypress trees front SR 1, with both tree types located along both sides of the highway north of Dolan Road (**Exhibit 10**). While the trees east of SR 1 form a cohesive canopy against the eastern frontage of the roadway, the trees west of SR 1 have more variation in height and are in two distinct clusters – one just north of Dolan Road and one a couple of hundred feet to south of Dolan Road (closer to Moss Landing Road).

Exhibit 10 – Existing Foliage North of Dolan Road

Various small trees and bushes are scattered along the eastern frontage of SR 1 against the security fence for the Moss Landing Commercial Park (**Exhibit 11**). Most of these plants are located within the Caltrans right-of-way, although some are located within the Moss Landing Commercial Park.

Exhibit 11 – Existing Foliage South of Dolan Road

2.9 Geotechnical Report

Hatch Mott MacDonald has prepared a geotechnical review of existing subsurface conditions in the vicinity of the SR 1/Dolan Road intersection and the immediate surrounding area. This review, *State Highway 1 & Dolan Road Feasibility Study, Monterey County, California – Geotechnical Letter Report*, is summarized below and

within **Exhibit 12**; **Appendix A** contains the full geotechnical review report and appendices.

Note: This geotechnical review has been prepared in support of intersection-level improvements only, primarily pavement widening. Also, no hazardous materials review was performed as part of this review; see Sections 2.10 Environmental Constraints Assessment and 4.3 Initial Study Results for more information about potentially hazardous materials within the study area.

The geotechnical review included a review of past geotechnical investigations in the site vicinity (specifically in 2000 and 2010), a field visit, testing of field samples, and preliminary pavement design sections. **Exhibit 12** summarizes the overall findings from the geotechnical review, alongside the potential limiting impact of each finding upon future intersection improvements.

Exhibit 12 – Summary of Overall Findings from Geotechnical Review

Finding	Limiting of Improvement Options?
1 Widening of road is feasible from a geotechnical pavement engineering standpoint	No
2 A thicker pavement section is recommended south of Dolan Road, unless subgrade soils are replaced	Possibly – would require additional construction time and budget
3 Further investigation is recommended of subgrade soils with low R-values (i.e. soils requiring thicker pavement sections) such as south of Dolan Road.	Unlikely, but would require additional construction time and budget
4 Construction shall conform to Caltrans standard specifications, latest edition	No
5 If full-depth hot asphalt mix (HMA), or HMA with asphalt treated permeable base (TPB) are used for design, use working table for placing construction equipment to meet construction requirement and subtract its Gravel Equivalent from the surface layer for design.	No

2.10 Environmental Constraints Assessment

An environmental constraints assessment has been prepared by EMC Planning Group of the potential existing environmental constrains adjacent to the SR 1/Dolan Road intersection and the immediately surrounding area. This assessment – *Environmental Constraints Report – State Route 1 / Dolan Road* – is summarized within **Exhibit 13**, alongside the potential limiting impact of each finding upon future intersection improvements. The full environmental assessment is contained within **Appendix B**.

The environmental constraints assessment identified a number of issues that may limit – to varying degrees – the ability to implement roadway improvements to the intersection. Further evaluation of these issues will be necessary to determine the extent to which the issues could directly affect specific improvement alternatives. The assessment also

identifies a few methods by which the effects of these issues can be minimized if not fully abated. These methods should be considered during the design and construction phases of the project.

Exhibit 13 – Summary of Overall Findings from Environmental Constraints Assessment

Finding		Limiting of Improvement Options?
A	*Biological Resources*	
1	Groves of planted Monterey cypress and gum (i.e. eucalyptus) trees are present within the study area. Removal of any of these trees with diameters of 36 inches or larger at breast height will require a coastal development permit. Removal of any other type of tree with diameters of 24 inches or larger will also require a coastal development permit.	Possibly, if improvement involves removal of existing trees.
2	No sensitive habitats are located within the study area – only low-quality habitats are present.	No
3	A pre-construction survey of nesting birds should occur if construction will involve site disturbance occurring between February 1st and September 15th of any year.	Unlikely, but could limit construction times during the year
4	Construction noise could cause temporary disruption to marine animals in the harbor; however, this disruption would be a less than significant impact.	No
5	The Congdon's tarplant, a special-status plant, has been previously recorded as occurring very close to the study area. The construction area should be surveyed in the plant's bloom period (typically September) to verify if the plant is indeed within the construction area.	Likely, if found to be within construction area.
B	*Archaeological Resources*	
1	Two known archaeological sites are located near the study intersection:	
	a State Route 1 at Elkhorn Slough (CA-MNT-229)	Possibly, if near construction area
	b State Route 1 south of Moss Landing Road (CA-MNT-235)	Possibly, if near construction area
2	Further study of potential archaeological resources in the area is recommended, especially as the exact location of site CA-MNT-235 could not be verified in the field.	Possibly, if near construction area
C	*Historical Resources*	
1	No officially designated historic places are located in or adjacent to the study area	No

	Finding	Limiting of Improvement Options?
2	Some buildings on the Moss Landing Commercial Park property are over 45 years old, and as such could potentially be deemed historic	Possibly, if construction area would encroach upon said buildings
3	A historic evaluation should be conducted if any of the buildings on the Moss Landing Commercial Park property or the redwood pipeline should be removed or altered.	Possibly, if construction area would encroach upon said buildings
D	*Hazardous Materials*	
1	The Moss Landing Power Plant is an active cleanup site, due to past groundwater contamination from historical storage of fuel oil. Monitoring wells are located both on and off of the Power Plant property, including some near State Route 1.	Possibly, if construction area is adjacent to Moss Landing Power Plant
2	Both soil and groundwater contamination (chromium) is also present at the Moss Landing Commercial Park site, but the extent of contamination is unknown.	Possibly, if construction area is adjacent to or includes Moss Landing Commercial Park property
3	The groundwater and soil toxicity is not likely to constrain any transportation improvements, but some construction worker safety precautions may be necessary.	No, if proper safety precautions are followed.
4	The precise locations of the groundwater monitoring wells should be verified to ensure that any proposed transportation improvements won't affect them.	Possibly, if construction area is located near any monitoring wells.
E	*Hydrology*	
1	Groundwater is approximately 26 feet below the surface of the SR 1/Dolan intersection.	No – construction should not require reaching groundwater depth.
2	The intersection and surrounding area has no significant flood potential.	No
3	Construction activities would have an elevated effect upon water quality, due to proximity to the Moss Landing Harbor.	No, if standard design and construction practices are followed
4	Standard design and construction practices should adequately address any hydrological issues.	No
F	*Transportation*	
1	The proposed Monterey Bay Sanctuary Scenic Trail may constrain the construction of any improvements to the west of SR 1.	Possibly, if construction includes any roadway widening west of existing paved shoulder

Finding	Limiting of Improvement Options?
2 The design of any transportation improvements should not preclude the continued use of existing bus stops along SR 1. This is not likely a significant constraint.	No
G Utilities	
1 Overhead power lines:	
a No high voltage lines are present near the SR 1/Dolan Road intersection.	No
b Additional roadway widening along SR 1 and/or Dolan Road may require relocation of existing overhead power lines.	Possibly, if construction requires relocation of existing overhead utility lines or poles.
2 Two sets of underground water intake pipelines cross SR 1:	
a Moss Landing Power Plant – travels between Moss Landing Harbor and the power plant approximately 250 feet north of Dolan Road.	Unlikely – construction should not require reaching pipeline depth.
b Moss Landing Commercial Park – travels between Moss Landing Harbor and the commercial park approximately in line with the southern right-of-way line for Dolan Road. After crossing underneath SR 1, travels above ground parallel to SR 1 en route to tanks located approximately opposite the SR 1/Moss Landing Road intersection.	Possibly, if construction includes acquisition of additional right-of-way east of SR 1 and south of Dolan Road.
i The aboveground portion of the Moss Landing Commercial Park pipelines constitute a significant constraint upon any roadway widening to the east of the existing SR 1 right-of-way.	Likely, if construction includes acquisition of additional right-of-way east of SR 1 and south of Dolan Road.
3 Potable water pipelines run along Dolan Road en route to storage tanks above Moss Landing Road.	Unlikely, but should be verified prior to construction.
4 Sewer pipelines are assumed to travel underneath SR 1 en route to areas north of Elkhorn Slough (but not verified).	Unlikely, but should be verified prior to construction.
5 Regional natural gas pipelines service the Moss Landing Power Plant to the east; however, these pipelines are not located near the SR 1/Dolan intersection. Local natural gas pipelines are presumed to exist in the study area.	Unlikely, but should be verified prior to construction.

2.11 Existing Collision Data

Collision data at the SR 1/Dolan Road intersection was obtained from the California Highway Patrol through the County of Monterey Department of Public Works staff. **Exhibit 14** summarizes the obtained collision data by collision type and location, while **Exhibit 15** depicts a collision diagram for the intersection. The obtained collision data spans for the five most-recent years available – from January 1, 2007 to December 31, 2011 (see **Appendix C**).

Exhibit 14 – Collision History Summary – State Route 1/Dolan Road

Type	Total	Frequency (per year)	Injuries (Total)	Fatalities (Total)
Rear End				
SR 1	8	1.6	7	0
Dolan Road	16	3.2	5	0
Yield/Right-of-Way Violations				
Broadside				
SR 1	6	1.2	2	0
Dolan Road	12	2.4	11	0
Head-On				
SR 1	1	0.2	0	0
Dolan Road	1	0.2	0	0
Sideswipe				
SR 1	1	0.2	0	0
Dolan Road	2	0.4	1	0
Speeding as PCF[3]				
SR 1	7	1.4	7	0
Dolan Road	3	0.6	3	0
Collisions between Dolan Rd. left and right turning vehicles	3	0.6	1	0
Collisions with Wrong-Way Driver				
SR 1	4	0.8	0	0
Dolan Road	0	0	0	0

Notes:

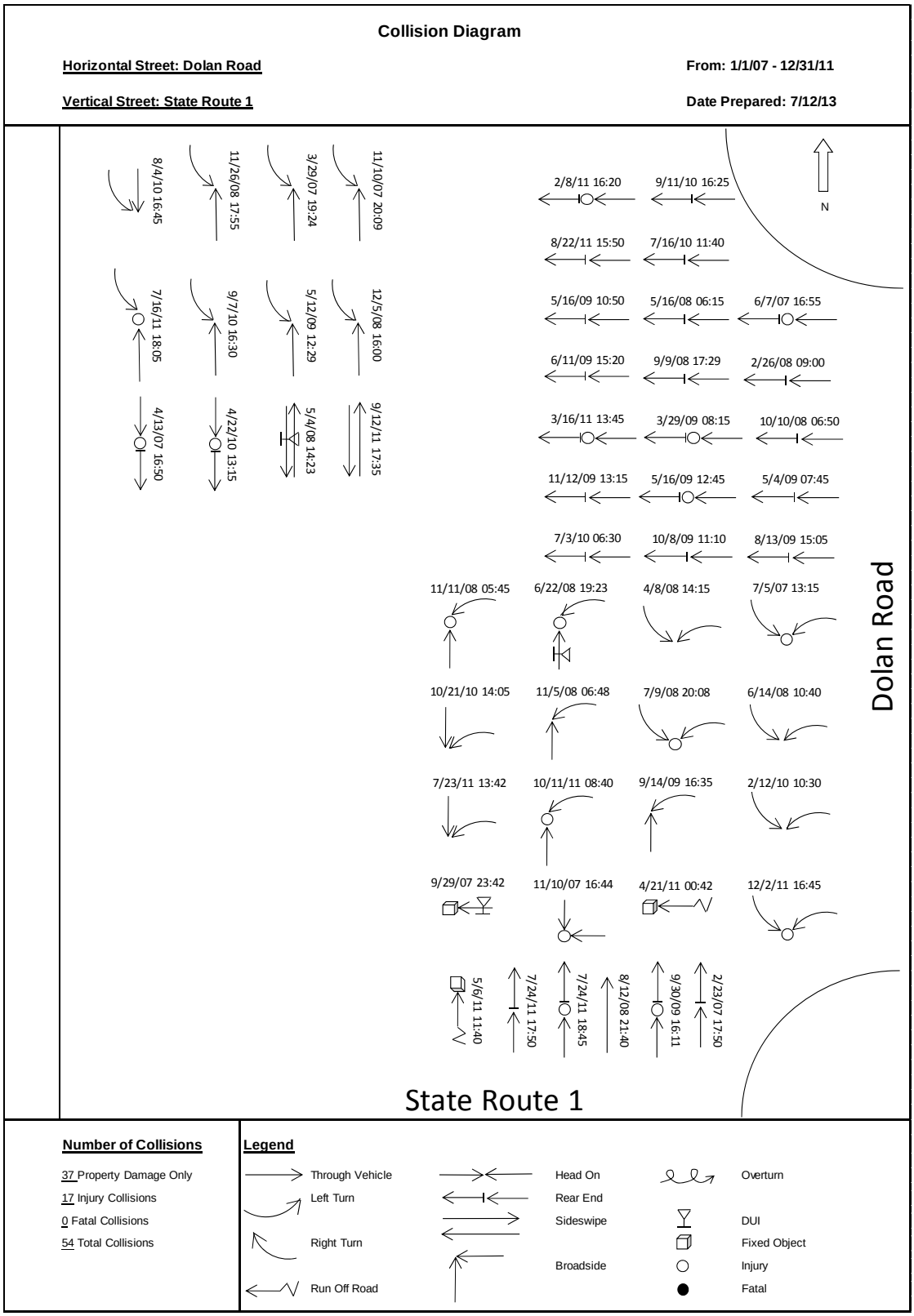
1. Include collisions that occurred at or near the SR 1/Dolan intersection.
2. Some individual collisions are repeated under multiple categories.
3. PCF = Primary Collision Factor, as determined by the investigating officer.
4. State Average Collision Rate taken from *2009 Collision Data on California State Highways*, California Department of Transportation, 2009.

A total of 61 collisions have occurred within this period, 54 of which occurred within 500 feet of the intersection. The two most prevalent collision types at the SR 1/Dolan Road intersection were rear-end collisions (8 on SR 1, 16 on Dolan Road, 24 total) and collisions where drivers failed to yield right-of-way (8 on SR 1, 15 on Dolan Road, 23 total). All of the "failure to yield" collisions involved vehicles turning left from SR 1 and/or Dolan Road. Speeding was considered a primary collision factor in ten of all intersection collisions during this period. Collisions were not concentrated in any one month, time of day, or weather condition. Lack of intersection lighting was only cited in one collision. Driving Under the Influence (DUI) was only cited in three of the collisions.

Thirty-seven people were injured in the 54 intersection collisions. Injuries were most prevalent in the rear-end collisions and those collisions where speeding was a primary collision factor. No fatalities were reported during this period.

The overall collision rate at the SR 1/Dolan Road intersection is 0.839 collisions per million entering vehicles (collisions/MEV). This is nearly three times the state average of 0.300 collisions/MEV for similar intersections.

Exhibit 15 – Collision Diagram – State Route 1/Dolan Road



Note: Diagram contains collisions between 1/1/2007 and 12/31/2011 that were within 500 feet of the intersection.

2.12 Existing Travel Speeds

Existing travel speeds along the SR 1 corridor through Moss Landing during the AM and PM peak hours were obtained through weekday travel time runs conducted in April 2013. **Exhibit 16** summarizes the average speeds incurred along the corridor in each direction. Travel speeds were found to be within 5 MPH of the posted speed limit along the majority of the corridor, including at Dolan Road. The areas with the slowest travel speeds were at each end of the corridor, namely north of Struve Road (north) and near Merritt Street (State Route 183). The travel time data is included within **Appendix D**.

Exhibit 16 – Existing Travel Speeds on State Route 1

AM (6:30 AM - 8:30 AM)

Northbound:

Location	Travel Speed	Speed Limit
Merritt to Molera	**47.8 mph**	55 mph
Molera to Moss Landing (S)	53.6 mph	55 mph
Moss Landing (S) to Dwy #2	54.0 mph	50 mph
Dwy #2 to Moss Landing (N)	54.2 mph	50 mph
Moss Landing (N) to Dolan	51.4 mph	50 mph
Dolan to Dwy #1	49.6 mph	50 mph
Dwy #1 to Elkhorn Slough	54.4 mph	50 mph
Elkhorn Slough to Jetty	55.2 mph	50 mph
Jetty to Struve (S)	54.7 mph	55 mph
Struve (S) to Struve (N)	57.4 mph	55 mph
Struve (N) to Springfield	51.2 mph	55 mph
Springfield to Jensen	54.2 mph	55 mph

Southbound:

Location	Travel Speed	Speed Limit
Jensen to Springfield	51.6 mph	55 mph
Springfield to Struve (N)	51.0 mph	55 mph
Struve (N) to Struve (S)	53.0 mph	55 mph
Struve (S) to Jetty	50.2 mph	55 mph
Jetty to Elkhorn Slough	47.3 mph	50 mph
Elkhorn Slough to Dwy #1	46.4 mph	50 mph
Dwy #1 to Dolan	49.6 mph	50 mph
Dolan to Moss Landing (N)	49.4 mph	50 mph
Moss Landing (N) to Dwy #2	49.8 mph	50 mph
Dwy #2 to Moss Landing (S)	50.2 mph	50 mph
Moss Landing (S) to Molera	53.1 mph	55 mph
Molera to Merritt	**46.6 mph**	55 mph

PM (3:30 - 5:30 PM)

Northbound:

Location	Travel Speed	Speed Limit
Merritt to Molera	**42.2 mph**	55 mph
Molera to Moss Landing (S)	**44.2 mph**	55 mph
Moss Landing (S) to Dwy #2	48.6 mph	50 mph
Dwy #2 to Moss Landing (N)	48.0 mph	50 mph
Moss Landing (N) to Dolan	46.6 mph	50 mph
Dolan to Dwy #1	46.8 mph	50 mph
Dwy #1 to Elkhorn Slough	48.4 mph	50 mph
Elkhorn Slough to Jetty	49.0 mph	50 mph
Jetty to Struve (S)	50.6 mph	55 mph
Struve (S) to Struve (N)	51.4 mph	55 mph
Struve (N) to Springfield	**38.0 mph**	55 mph
Springfield to Jensen	**41.1 mph**	55 mph

Southbound:

Location	Travel Speed	Speed Limit
Jensen to Springfield	54.0 mph	55 mph
Springfield to Struve (N)	51.5 mph	55 mph
Struve (N) to Struve (S)	50.8 mph	55 mph
Struve (S) to Jetty	50.5 mph	55 mph
Jetty to Elkhorn Slough	46.2 mph	50 mph
Elkhorn Slough to Dwy #1	46.2 mph	50 mph
Dwy #1 to Dolan	47.4 mph	50 mph
Dolan to Moss Landing (N)	49.8 mph	50 mph
Moss Landing (N) to Dwy #2	48.4 mph	50 mph
Dwy #2 to Moss Landing (S)	51.2 mph	50 mph
Moss Landing (S) to Molera	**47.0 mph**	55 mph
Molera to Merritt	**33.0 mph**	55 mph

Notes:

1. Dwy #1 is the Moss Landing Power Plant driveway north of Dolan Road. Dwy #2 is the southernmost driveway into the commercial area at SR 1 and Moss Landing Road (N).
2. Travel speeds in **bold** indicate speeds more than 5.0 mph below speed limit.

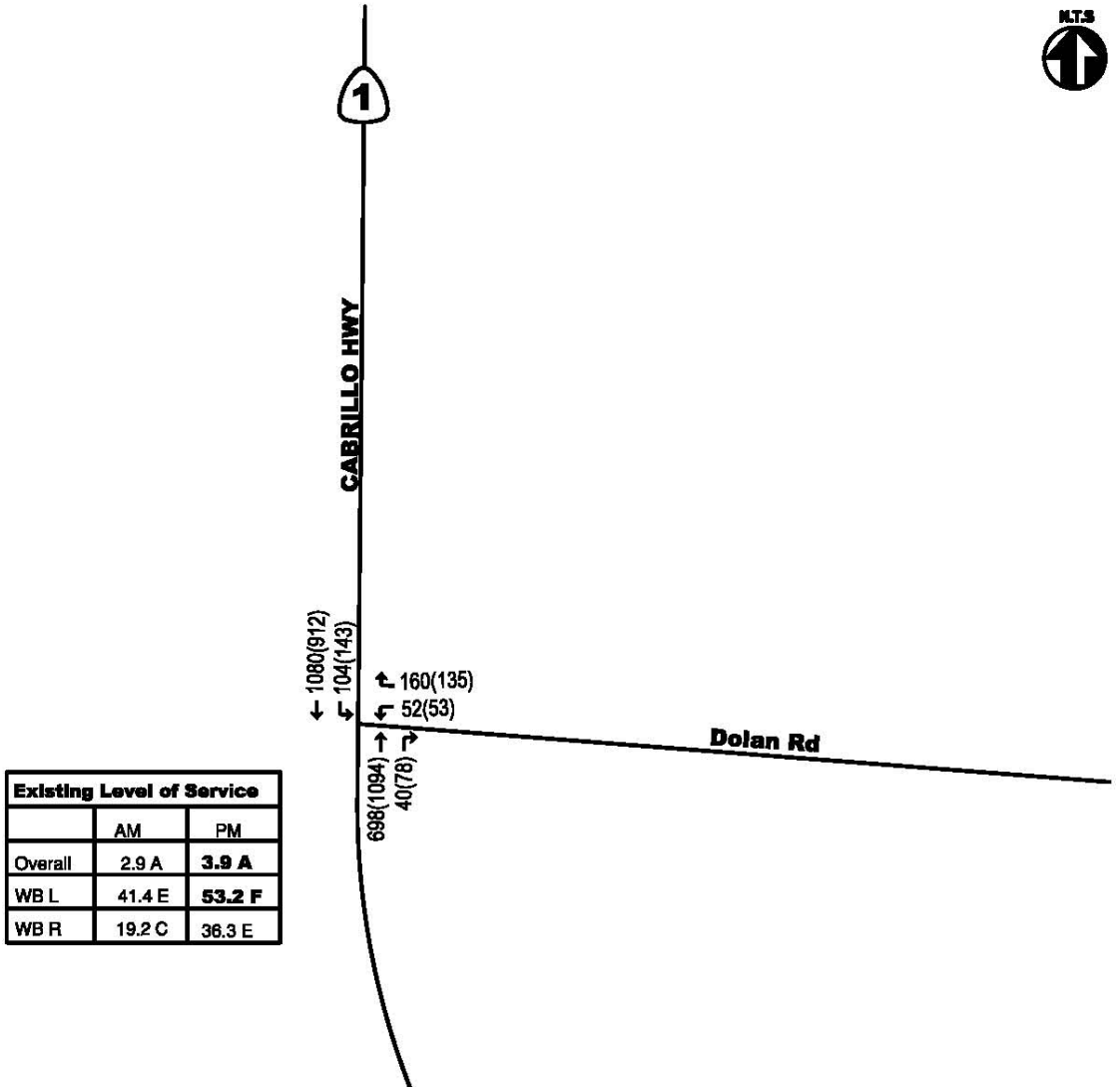
2.13 Existing Conditions Intersection Operations

Exhibit 17 depicts the existing AM and PM peak hour traffic volumes at the SR 1/Dolan Road intersection. These volumes were collected in March 2011 and were provided by the consultant team assisting the County of Monterey in the preparation of the environmental analysis for the Moss Landing Community Plan update (see **Appendix E**).

Exhibit 17 also summarizes the existing levels of service at the SR 1/Dolan Road intersection. Intersection operations were evaluated using technical procedures documented in the *2010 Highway Capacity Manual* (HCM). The SR 1/Dolan Road intersection is under the jurisdiction of the California Department of Transportation ("Caltrans"), which has established a Level of Service (LOS) standard of the transition between LOS C and LOS D.

The SR 1/Dolan Road intersection currently operates at an overall LOS A during both the AM and PM peak hours. However, side-street operations on Dolan Road are currently at LOS E (AM) and LOS F (PM). Level of service calculations are within **Appendix F**.

Exhibit 17 – Existing Volumes and Levels of Service



Existing Level of Service		
	AM	PM
Overall	2.9 A	**3.9 A**
WB L	41.4 E	**53.2 F**
WB R	19.2 C	36.3 E

Legend:
XX (YY) = AM Peak Hour (PM Peak Hour)
WB L = Westbound Dolan Rd. Left Turn
WB R = Westbound Dolan Rd. Right Turn

3 IMPROVEMENT ALTERNATIVE ANALYSIS

An analysis has been performed to identify potential safety and capacity improvements at the SR 1/Dolan Road intersection and evaluate their feasibility to be implemented. The following section summarizes the analysis process undertaken and corresponding results.

3.1 Improvement Alternatives

A total of 12 improvement alternatives were developed to improve safety and operations at the SR 1/Dolan Road intersection. These alternatives vary from simple striping and signing improvements to more complicated roadway widening projects. The improvement alternatives are:

1. No Build
2. Flashing Beacons, Signs, Channelizers & Striping
3. Improve Sight Distance
4. Add Northbound SR 1 Right Turn Acceleration Lane
5. Prohibit Turning Movements
6. Widen Shoulder Widths to Caltrans Standards
7. Widen Lane Widths to Caltrans Standards
8. Full Signal
   a. Single Through Lane
   b. Two Through Lanes
9. Half Signal
   a. Single Through Lane
   b. Two Northbound Through Lanes
10. Roundabout
    a. Single-Lane
    b. Two Lane
11. Widen SR 1 to Two Lanes in Each Direction
12. Relocate SR 1/Dolan Road Intersection to the South

Each improvement alternative is described below, along with the reasons why it was selected for evaluation.

1. <u>No Build</u>
   No Build represents the existing intersection geometry and traffic control, with no changes. This improvement alternative represents a benchmark against which all of the other improvement alternatives can be compared.

2. <u>Flashing Beacons, Signs, Channelizers & Striping</u>
   This improvement alternative would implement additional signs, pavement striping, channelizers and flashing beacons, both at an in advance of the SR 1/Dolan Road intersection. These would be simple, inexpensive safety improvements that could be implemented quickly if funding was secured.

3. Improve Sight Distance
   This improvement alternative would improve sight distance of vehicles, signs, and the overall intersection by trimming foliage and removing or relocating obstructions within the driver sight lines at the intersection. Improving sight distance would improve safety by indicating the presence of the upcoming intersection and by providing additional stopping distance for conflicting traffic entering the intersection.

4. Add Northbound SR 1 Right Turn Acceleration Lane
   This improvement alternative would add a new northbound acceleration lane along SR 1 directly in front of the Moss Landing Power Plant, for use by vehicles turning right from Dolan Road onto northbound SR 1. A new acceleration lane would allow vehicles turning onto northbound SR 1 to accelerate up to or near through traffic speeds prior to merging onto the highway.

5. Prohibit Turning Movements
   With this improvement alternative, one or more turning movements would be prohibited at this intersection. The most likely movement that could be prohibited would be the westbound Dolan Road left turn movement onto southbound SR 1. Prohibition of this movement would eliminate some traffic conflicts at the intersection, but would require some vehicles to detour considerably out of their way in order to continue to reach their intended destinations.

6. Widen Shoulder Widths to Caltrans Standards
   This improvement alternative would widen the existing paved shoulders along SR 1 to meet current Caltrans standards. This improvement would primary focus upon the northbound SR 1 shoulder just south of Dolan Road, which narrows to approximately four feet in width in advance of the intersection. Widening the shoulder would provide additional refuge space for vehicles during emergencies as well as a larger buffer for bicyclists from through traffic on SR 1.

7. Widen Lane Widths to Caltrans Standards
   This improvement alternative would widen all lanes along SR 1 at the intersection to meet current Caltrans standards. Currently, all travel lanes on SR 1 are within a half-foot or less of the Caltrans standard width of 12 feet. This improvement would add the additional pavement necessary to achieve full standard width for all lanes

8. Full Signal
   a. Single Through Lane
   b. Two Through Lanes

   These improvement alternatives would construct a new traffic signal at the SR 1/Dolan Road intersection. Improvement Alternative 8a would keep the single through lane in each direction of SR 1, while Alternative 8b would add a second through lane in each direction of SR 1 through the intersection. Changing the intersection control to a traffic signal would minimize the number of "failure to yield" collisions, but could increase the number of rear-end collisions on SR 1. The addition of second through lanes would also minimize vehicle queue lengths on SR 1.

9. Half Signal
    a. Single Through Lane
    b. Two Northbound Through Lanes

    A variation to Improvement Alternatives 8a and 8b, these improvement alternatives would construct a half signal, whereby only northbound SR 1, westbound Dolan Road, and the southbound SR 1 left turn movement would be controlled by the signal. Southbound SR 1 through traffic would continue to operate free-flow through the intersection, and would be shown a continuous green light. Existing examples of half signals in Monterey County include SR 156 at Castroville Boulevard and SR 156 at Prunedale North Road. As with the full signal, changing the intersection control to a half signal would minimize the number of "failure to yield" collisions, but could increase the number of rear-end collisions on SR 1. The addition of a second northbound through lane would also minimize vehicle queue lengths on SR 1. The primary benefit of a half-signal over a standard signal is that the southbound SR 1 movement would never stop, thereby reducing overall delay at the intersection compared to a standard traffic signal. The downside of a half-signal is that pedestrians and bicyclists cannot cross all of SR 1 at a controlled crossing.

10. Roundabout
    a. Single-Lane
    b. Two Lane

    These improvement alternatives would convert the existing SR 1/Dolan intersection into a roundabout. Improvement Alternative 10a would construct a roundabout with a single circulating lane, while Alternative 10b would have two circulating lanes. As noted previously, a roundabout is the suggested improvement at this intersection within the draft Moss Landing Community Plan. Roundabouts slow traffic and reduce conflict points, thereby minimizing the severity and frequency of collisions.

11. Widen SR 1 to Two Lanes in Each Direction

    Similar to Improvement Alternative 8b, this improvement would add a second through lane in each direction of SR 1 through the SR 1/Dolan intersection. However, unlike Alternative 8b, the intersection would not be signalized. Instead, it would remain as free-flow on SR 1 and stop control on Dolan Road. Widening SR 1 to two lanes in each direction would reduce vehicle platoon size along SR 1.

12. Relocate SR 1/Dolan Road Intersection to the South

    This improvement alternative would relocate the SR 1/Dolan Road intersection further to the south of the existing intersection. This would be accomplished through the realignment of Dolan Road into the northern edge of the Moss Landing Commercial Park. Such a relocation would improve sight distance and allow for the existing westbound Dolan Road right turn lane to be lengthened.

Note: Two other improvement alternatives are also included within this analysis but are not fully evaluated. They are both long-term improvements that are more extensive improvements that those previously mentioned. The long-term improvements are:

13. Consolidate Intersections and Driveways
    This improvement alternative would consolidate the existing intersections and driveways along this section of SR 1 in two ways. First, all of the existing driveways along SR 1 into the Moss Landing Commercial Park would be closed. Second, Dolan Road would be realigned to travel through the Moss Landing Commercial Park, intersecting SR 1 as a fourth approach to the existing SR 1/Moss Landing Road (North) intersection. In this configuration, Dolan Road would also serve as the primary entrance into the Moss Landing Commercial Park from SR 1. The consolidation would improve operations by reducing the number of conflict points along SR 1 in this area. It is also consistent with multiple policies and recommendations identified within the Draft Moss Landing Community Plan. Note that this improvement alternative would require considerable coordination with the ownership of the Moss Landing Commercial Park, hence its exclusion from full analysis in this report.

14. Connect Dolan and Moss Landing Roads via New Overpass
    This improvement alternative, consistent with the aforementioned *State Routes 1 & 183 Corridor System Management Plan* and previously recommended within the *Moss Landing Economic Development Strategy* report published in 2010, would create a new roadway connecting Dolan Road and Moss Landing Road (North). This roadway would loop around the outside of the Moss Landing Commercial Park, crossing SR 1 south of Moss Landing Road on a grade-separated bridge. This improvement alternative would substantially improve vehicle, pedestrian and bicycle safety by allowing all three modes of travel to cross the highway without conflicting with SR 1 traffic. This improvement would likely cost multiple millions of dollars to construct and will require extensive future analysis in order to assess its full feasibility, hence its exclusion from full analysis in this report.

3.2 Operations of Improvement Alternatives

As part of their evaluation, operational analyses have been prepared of each of the improvement alternatives described above (with the lone exceptions of the two long-term improvements, i.e. #13 and #14). **Exhibit 18** summarizes the AM and PM peak hour operations of each improvement alternative, both under existing and Year 2035 conditions[2]. (See **Appendix F** for the level of service calculations.) Note that traffic operations is but one of the categories used to compare the improvement alternatives. The following section identifies all of the categories used to evaluate each improvement alternative.

[2]Year 2035 Conditions include projected traffic growth from the Moss Landing Community Plan. See **Appendix G** for the Year 2035 volumes analyzed here.

Exhibit 18 – Level of Service Comparison Table

Alternative	Traffic Control Type		Existing Conditions (Year 2011)				Year 2035 Conditions			
			AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. No Build	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
2. Flashing Beacons, Signs, Channelizers & Striping	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
3. Improve Sight Distance (trim foliage, remove obstructions, etc.)	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
4. Add NB SR 1 Right Turn Acceleration Lane	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
5. Prohibit Turning Movements (WB Left)	One-Way Stop Control	Overall:	2.0	A	2.9	A	2.6	A	6.3	A
		WB L:[4]	-	-	-	-	-	-	-	-
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
		Diversion Delay:[5]	**360.0**	**F**	**360.0**	**F**	**360.0**	**F**	**360.0**	**F**
6. Widen Shoulder Widths to Caltrans Standards	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
7. Widen Lane Widths to Caltrans Standards	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**
8. Full Signal										
a. Single Through Lanes	Full Signal	Overall:	13.7	B	19.8	B	20.8	C	53.2	D
b. Two Through Lanes	Full Signal	Overall:	8.3	A	9.2	A	9.0	A	10.6	B
9. Half Signal (SB does not stop)[6]										
a. Single NB Thru Lane	Half Signal	Overall:	13.9	B	33.9	C	17.3	B	**91.3**	**F**
b. Two NB Thru Lanes	Half Signal	Overall:	10.7	B	12.1	B	11.6	B	14.7	B
10. Roundabout										
a. Single-Lane	Roundabout	Overall:	**94.5**	**F**	**134.9**	**F**	**179.3**	**F**	**257.3**	**F**
b. Two-Lane	Roundabout	Overall:	11.2	B	13.1	B	13.2	B	20.0	C
11. Widen SR 1 to Two Through Lanes in Each Direction	One-Way Stop Control	Overall:	2.1	A	2.6	A	2.5	A	3.7	A
		WB L:	26.7	D	41.1	E	39.4	E	**79.6**	**F**
		WB R:	12.8	B	15.9	C	14.8	B	20.8	C
12. Relocate SR 1/Dolan Intersection to the South	One-Way Stop Control	Overall:	3.0	A	4.0	A	4.4	A	8.8	A
		WB L:	41.8	E	**54.5**	**F**	**81.2**	**F**	**124.6**	**F**
		WB R:	19.2	C	36.3	E	28.9	D	**100.0**	**F**

Notes:
1. NB, SB, WB = Northbound, Southbound, Westbound
2. L, R = Left Turn, Right Turn
3. SR 1 = State Route 1
4. With prohibition of westbound Dolan Road left turn movement, left turn delay is non-existant. However, such a prohibition would add an additional "diversion" delay to rerouted traffic; see Note 5, below.
5. "Diversion Delay" refers to additional delays from vehicle rerouting created by movement prohibition, assuming 100% of the prohibited vehicles, are proceeding to Moss Landing Road.
6. Incorporates zero delay from the freeflow southbound through movements that are not controlled by the half-signal.
7. Delays and levels of service in **bold** indicate deficient operations.

3.3 Improvement Alternative Evaluations

Initial evaluations of the improvement alternatives were performed using a design criteria matrix, which ranks each project in a number of categories. **Exhibit 19** depicts the design criteria matrix used in this analysis.

Exhibit 19 – Design Criteria Matrix Template

Project Goal: Identify cost-effective solution(s) that improve safety and operations

	Options	Total Points	Evaluation Criteria									Notes
			Reduces Vehicle Delays	Improves Vehicle Safety	Improves Pedestrian and Bicyclist Safety	Minimizes Environmental Impacts	Minimizes Right-of-Way Acquisitions	Minimizes Project Costs	Minimizes Project Duration	Constructible in Phases/ Increments	Likely Acceptable to Caltrans	
		(0-100)	(0-10)	(0-15)	(0-10)	(0-10)	(0-10)	(0-20)	(0-10)	(0-5)	(0-10)	
1	No Build											
2	Flashing Beacons, Signs, Channelizers & Striping											
3	Improve Sight Distance (relocate utilities, trim foliage, remove obstructions, etc.)											
4	Add NB SR 1 Right Turn Acceleration Lane											
5	Prohibit Turning Movements (WB Dolan Left Turn)											
6	Widen Shoulder Widths to Caltrans Standards											
7	Widen Lane Widths to Caltrans Standards											
8	Full Signal											
	a. One Through Lane											
	b. Two Through Lanes											
9	Half Signal (SB does not stop)											
	a. Single NB Thru Lane											
	b. Two NB Thru Lanes											
10	Roundabout											
	a. Single-Lane											
	b. Two-Lane											
11	Widen SR 1 to Two Lanes in Each Direction											
12	Relocate SR 1/Dolan Intersection to the South											
13	Consolidate Intersections and Driveways (including SR 1/ Dolan and SR 1/Moss Landing)											
14	Connect Dolan and Moss Landing Roads via New Overpass											

Notes:
1. NB, SB, EB, WB = Northbound, Southbound, Eastbound and Westbound).
2. Higher scores reflect more feasible and beneficial improvements.

A number of different categories were used to evaluate each improvement alternative. Those categories, including their scoring range, are identified within **Exhibit 20**.

Exhibit 20 – Design Criteria Matrix Evaluation Categories

Design Criteria Matrix Category	Point Range
Reduces Vehicle Delays	0-10 points
Improves Vehicle Safety	0-15 points
Improves Pedestrian and Bicyclist Safety	0-10 points
Minimizes Environmental Impacts	0-10 points
Minimizes Right-of-Way Acquisition	0-10 points
Minimizes Project Costs	0-20 points
Minimizes Project Duration	0-10 points
Constructible in Phases/Increments	0-5 points
Likely Acceptable to Caltrans	0-10 points
Total:	**100 points**

Each improvement alternative was ranked in each category based upon its relative potential to meet that category's goal, with 0 ("zero") representing no potential and 10 ("ten") representing full achievement. The maximum score possible is 100 points, with a median score (the "No Build" alternative) of 65 points.

Exhibits 21A and 21B contain the completed design criteria matrix, including the score and relative ranking of each improvement alternative. **Exhibit 21A** organizes the improvement alternatives by improvement alternative number, while **Exhibit 21B** organizes the improvement alternatives by their relative ranking. The rankings were then used to help either reject improvement alternatives from further consideration or select them for further analysis. The following sections identify which improvements fall under either category.

Exhibit 21A – Completed Design Criteria Matrix (by Improvement Alternative Number)

Project Goal: Identify cost-effective solution(s) that improve safety and operations

	Options	Relative Ranking	Total Points	Evaluation Criteria									Notes
				Reduces Vehicle Delays	Improves Vehicle Safety	Improves Pedestrian and Bicyclist Safety	Minimizes Environmental Impacts	Minimizes Right-of-Way Acquisitions	Minimizes Project Costs	Minimizes Project Duration	Constructible in Phases/ Increments	Likely Acceptable to Caltrans	
			(0-100)	(0-10)	(0-15)	(0-10)	(0-10)	(0-10)	(0-20)	(0-10)	(0-5)	(0-10)	
1	No Build	- 2 -	65	0	0	0	10	10	20	10	5	10	No improvements
2	Flashing Beacons, Signs, Channelizers & Striping	- 1 -	74	0	10	3	10	10	17	9	5	10	Improves driver awareness
3	Improve Sight Distance (relocate utilities, trim foliage, remove obstructions, etc.)	- 4 (T) -	57	1	10	3	8	10	5	5	5	10	Improves driver, bicyclist and pedestrian visibility
4	Add NB SR 1 Right Turn Acceleration Lane	- 3 -	62	1	10	5	7	9	15	7	0	8	Improves sight distance; Minimal effect upon capacity
5	Prohibit Turning Movements (WB Dolan Left Turn)	- 7 (T) -	53	0	0	0	7	10	17	9	0	10	Minor effect upon capacity; Traffic diversions minimize safety benefits
6	Widen Shoulder Widths to Caltrans Standards	- 9 -	46	0	7	5	9	5	10	0	0	10	No effect upon capacity
7	Widen Lane Widths to Caltrans Standards	- 13 (T) -	39	0	7	5	7	5	5	0	0	10	No effect upon capacity
8	Full Signal												
	a. One Through Lane	- 6 -	56	5	10	8	9	9	10	5	0	0	Longer SR 1 queues
	b. Two Through Lanes	- 11 -	41	8	10	8	4	5	3	0	3	0	Minor SR 1 queues
9	Half Signal (SB does not stop)												
	a. Single NB Thru Lane	- 4 (T) -	57	6	8	7	9	9	13	5	0	0	Longer NB SR 1 queues
	b. Two NB Thru Lanes	- 10 -	45	9	8	7	6	7	5	0	3	0	Minor NB SR 1 queues
10	Roundabout												Requires shifting
	a. Single-Lane	- 15 -	32	0	9	5	5	5	3	5	0	0	intersection to the
	b. Two-Lane	- 16 -	31	9	9	5	4	4	0	0	0	0	south
11	Widen SR 1 to Two Lanes in Each Direction	- 17 -	28	5	7	0	4	0	0	0	2	10	Unclear if Coastal Commission will allow
12	Relocate SR 1/Dolan Intersection to the South	- 13 (T) -	39	1	10	5	5	5	5	0	0	8	Prevents WB right turn blockage by left turn queue
13	Consolidate Intersections and Driveways (including SR 1/ Dolan and SR 1/Moss Landing)	- 12 -	40	3	10	5	4	0	3	2	5	8	Long-Term Improvement
14	Connect Dolan and Moss Landing Roads via New Overpass	- 7 (T) -	53	10	13	10	4	2	2	2	0	10	Long-Term Improvement

Notes:
1. NB, SB, EB, WB = Northbound, Southbound, Eastbound and Westbound).
2. Higher scores reflect more feasible and beneficial improvements.
3. (T) = Tie -- multiple improvement options rate at the same score.

Exhibit 21B – Completed Design Criteria Matrix (by Improvement Ranking)

Project Goal: Identify cost-effective solution(s) that improve safety and operations

	Options	Relative Ranking	Total Points	Evaluation Criteria									Notes
				Reduces Vehicle Delays	Improves Vehicle Safety	Improves Pedestrian and Bicyclist Safety	Minimizes Environmental Impacts	Minimizes Right-of-Way Acquisitions	Minimizes Project Costs	Minimizes Project Duration	Constructible in Phases/ Increments	Likely Acceptable to Caltrans	
			(0-100)	(0-10)	(0-15)	(0-10)	(0-10)	(0-10)	(0-20)	(0-10)	(0-5)	(0-10)	
2	Flashing Beacons, Signs, Channelizers & Striping	- 1 -	74	0	10	3	10	10	17	9	5	10	Improves driver awareness
1	No Build	- 2 -	65	0	0	0	10	10	20	10	5	10	No improvements
4	Add NB SR 1 Right Turn Acceleration Lane	- 3 -	62	1	10	5	7	9	15	7	0	8	Improves sight distance; Minimal effect upon capacity
3	Improve Sight Distance (relocate utilities, trim foliage, remove obstructions, etc.)	- 4 (T) -	57	1	10	3	8	10	5	5	5	10	Improves driver, bicyclist and pedestrian visibility
9	Half Signal (SB does not stop) a. Single NB Thru Lane	- 4 (T) -	57	6	8	7	9	9	13	5	0	0	Longer NB SR 1 queues
8	Full Signal a. One Through Lane	- 6 -	56	5	10	8	9	9	10	5	0	0	Longer SR 1 queues
5	Prohibit Turning Movements (WB Dolan Left Turn)	- 7 (T) -	53	0	0	0	7	10	17	9	0	10	Minor effect upon capacity; Traffic diversions minimize safety benefits
14	Connect Dolan and Moss Landing Roads via New Overpass	- 7 (T) -	53	10	13	10	4	2	2	2	0	10	Long-Term Improvement
6	Widen Shoulder Widths to Caltrans Standards	- 9 -	46	0	7	5	9	5	10	0	0	10	No effect upon capacity
9	Half Signal (SB does not stop) b. Two NB Thru Lanes	- 10 -	45	9	8	7	6	7	5	0	3	0	Minor NB SR 1 queues
8	Full Signal b. Two Through Lanes	- 11 -	41	8	10	8	4	5	3	0	3	0	Minor SR 1 queues
13	Consolidate Intersections and Driveways (including SR 1/ Dolan and SR 1/Moss Landing)	- 12 -	40	3	10	5	4	0	3	2	5	8	Long-Term Improvement
7	Widen Lane Widths to Caltrans Standards	- 13 (T) -	39	0	7	5	7	5	5	0	0	10	No effect upon capacity
12	Relocate SR 1/Dolan Intersection to the South	- 13 (T) -	39	1	10	5	5	5	5	0	0	8	Prevents WB right turn blockage by left turn queue
10	Roundabout a. Single-Lane	- 15 -	32	0	9	5	5	5	3	5	0	0	Requires shifting intersection to the south
	b. Two-Lane	- 16 -	31	9	9	5	4	4	0	0	0	0	
11	Widen SR 1 to Two Lanes in Each Direction	- 17 -	28	5	7	0	4	0	0	0	2	10	Unclear if Coastal Commission will allow

Notes:
1. NB, SB, EB, WB = Northbound, Southbound, Eastbound and Westbound).
2. Higher scores reflect more feasible and beneficial improvements.
3. (T) = Tie -- multiple improvement options rate at the same score.

3.4 Improvement Alternatives Recommended for Rejection

Many of the improvement recommendations were rejected for further consideration. The reasons behind each rejection are discussed below.

1. No Build:

Despite ranking second of all improvement alternatives, the No Build improvement alternative was rejected as its lack of any improvements does not further the stated goals of improving safety and operations at the intersection.

5. Prohibit Turning Movements:

This improvement alternative was not analyzed further in part because the remedy – prohibition of the westbound Dolan Road left turn movement – was viewed as being too draconian of an improvement for traffic bound for Moss Landing. The movement prohibition would lead to potential traffic diversions of approximately 6 additional minutes beyond the current duration of a trip to reach Moss Landing Road (North) from Dolan Road. In addition, the prohibition could lead to some vehicles attempting U-turns further north on SR 1, which would introduce additional safety issues to the corridor.

6. Widen Shoulder Widths to Caltrans Standards:

This improvement alternative ranked relatively low (9th out of 17), in part because it would require acquisition of additional right-of-way and potentially relocation of various utilities. For these reasons, this improvement was not analyzed.

7. Widen Lane Widths to Caltrans Standards:

This improvement alternative had a low ranking (tied for 13th out of 17 improvements), due in part to its relatively high cost of implementation compared to the relative amount of benefit, and the fact that its physical length of improvement has a higher than average potential for environmental impacts, longer construction times, and inability to construct the improvement in phases or increments. For these reasons, this improvement was not analyzed.

8b. Full Signal, Two Through Lanes:

This improvement alternative was not analyzed further for the same reasons as Improvement Alternative #7. In addition, it is highly likely that this improvement would require acquisition of additional right-of-way to be implemented, especially north of Dolan Road.

10. Roundabout (Single-Lane and Two-Lane):

These two improvement alternatives – which scored 15th and 16th out of 17 improvements) were not analyzed further due to interrelated reasons. Guidelines within *NCHRP Report 672: Roundabouts: An Informational Guide, 2nd Edition,* published by the National Cooperative Highway Research Program (NCHRP) in 2010, were reviewed to initially identify if a single-lane or two-lane roundabout would be more appropriate at the SR 1/Dolan Road intersection. The guidelines suggest that a one-lane roundabout should operate acceptably if the sum of the

circulating traffic and entering traffic at each entry into the roundabout is less than 1,000 vehicles per hour. Traffic sums of between 1,000 and 1,300 vehicles per hour should operate marginally in a one-lane roundabout, while traffic sums over 1,300 vehicles per hour should require a two-lane roundabout. As shown within **Exhibit 22**, during the PM peak hour for Existing conditions, two of the traffic sums are between 1,000 and 1,300 vehicles per hour, while one traffic sum is over 1,300 vehicles per hour. Under Year 2035 conditions, all of the PM peak hour traffic sums and one of the AM peak hour sums are over 1,300 vehicles per hour. These results were confirmed by the operational analysis, which found that PM peak hour operations of the single-lane roundabout (both for Existing and Year 2035 conditions) would be deficient for traffic entering from Dolan Road. For these reasons, the single-lane roundabout was not analyzed further.

Exhibit 22 – State Route 1/Dolan Road Roundabout Lane Requirements

Roundabout Entry Point	Volumes at Roundabout Entry Points (sum of entering and conflicting volumes)				Number of Lanes Required
	Existing Conditions		Year 2035		
	AM	PM	AM	PM	
South Entry	842	1315	1025	1595	Two Lanes Required
East Entry	910	1282	1100	1550	Two Lanes Required
North Entry	1236	1108	1495	1340	Two Lanes Required

The two-lane roundabout would operate acceptably within Caltrans standards. However, the overall size of the two-lane roundabout would need to be on the larger side of a typical two-lane roundabout; this for two reasons. First, due to SR 1's designation as a "Terminal Route;" the larger trucks would require a larger roundabout diameter in order to minimize lane offtracking. Second, the roundabout design uses a roundabout design speed of 30 mph, which dictates a larger internal radius than for slower design speeds. With a design speed of 30 mph, all entering vehicles will need to reduce speeds by at least 20 mph prior to entering the roundabout; use of a lower design speed would require further speed reduction. Constructing said roundabout as a system – such as in conjunction with the two other roundabouts proposed within the draft Moss Landing Community Plan (at Moss Landing Road (South) and Moss Landing Road (North)) – would better allow for a slower design speed more typical of a modern roundabout, as they will act in tandem to moderate vehicle travel speeds. Using lower design speed at an isolated roundabout at the intersection of two high-speed roadways is generally not advisable without further physical improvements on the roadway approaches to encourage vehicle deceleration prior to entering the roundabout.

A preliminary "conceptual footprint" design of the two-lane roundabout found that it would likely not fit within the space available. (See **Appendix H** for the "conceptual footprint" design of the two-lane roundabout.) If it were constructed, the center of the two-lane roundabout would have to be relocated further south of the existing intersection to avoid encroachment onto the Moss Landing Power Plant property,

requiring a southerly relocation of Dolan Road. These relocations, however, would in turn encroach upon the existing buildings and pipelines present at the Moss Landing Commercial Park, possibly requiring their relocation or removal; such relocations or removals would be complicated by their potential historical significance. Second, the western edge of the roundabout would encroach upon the edge of the Moss Landing Harbor, potentially requiring a retaining wall at the edge of the harbor and also displacing the planned Monterey Bay Sanctuary Scenic Trail from its planned alignment. Further detailed design of the two-lane roundabout may result in a minimizing of many of these impacts, but not all of them are expected to be eliminated. For those reasons, the two-lane roundabout was not analyzed further.

11. Widen SR 1 to Two Lanes in each Direction:
This improvement alternative, which scored the lowest of all of the improvements, is not being considered any further for the same reasons that Improvement Alternative 8b was rejected. In addition, the current position of the California Coastal Commission is that widening of SR 1 to four lanes through this area may violate the California Coastal Act; this position may make this improvement infeasible at this time.

12. Relocate SR 1/Dolan Road Intersection to the South:
This improvement alternative was not analyzed for some of the same reasons as Improvement Alternative #10b, namely that the relocation of the intersection would encroach upon existing buildings and pipelines at the Moss Landing Commercial Park.

3.5 Improvement Alternatives Recommended for Further Study

The following improvement alternatives are recommended for further study:

2. Flashing Beacons, Signs, Channelizers and Striping
3. Improve Sight Distance
4. Add Northbound SR 1 Right Turn Acceleration Lane
8a. Full Signal, One Through Lane
9a. Half Signal, Single Northbound Through Lane
9b. Half Signal, Two Northbound Through Lanes

These six improvement alternatives were found to have major safety and/or operational benefits. Further evaluation, conceptual design, and environmental analysis of these improvement alternatives are summarized in Section 4 of this report.

4 IMPROVEMENT ALTERNATIVE FEASIBILITY STUDY

This section summarizes the further operational evaluation, conceptual design, and environmental analysis performed on the improvement alternatives recommended for further study in the previous section.

4.1 Improvement Alternative Categories

The six improvement alternatives recommended for further study have been grouped into two categories – unsignalized and signalized. Each category is described below.

4.1.1 Unsignalized Improvement Alternative

The three unsignalized improvement alternatives are not mutually exclusive of each other, and thus have been consolidated into a single conceptual design depicted within **Appendix I**. This consolidated improvement alternative, hereby referred to as Improvement Alternative 2-3-4, includes new flashing beacons, signs and street lighting; refreshing of existing pavement striping; trimming of roadside foliage to improve both intersection sight distance and views of existing signs; and the addition of a new northbound SR 1 acceleration lane. The yellow flashing beacons would be mounted above new Side Road (W2-2) signs on SR 1 and a replaced Stop Ahead (W3-1) sign on Dolan Road approaching the intersection, in order to further emphasize the presence of the intersection and potential conflicting traffic. New street lights would be added at the southeast and northeast corners of the intersection, in order to improve intersection lighting at night and on foggy days, as well as to again emphasize the presence of the intersection and potentially conflicting traffic. The striping improvements would include refreshing of the existing "STOP AHEAD" and "STOP" legends on Dolan Road and the through pavement arrows on northbound and southbound SR 1 approaching the intersection. The foliage trimming would occur around existing signs and within trees immediately adjacent to the intersection.

Finally, the new acceleration lane would be designed to allow vehicles turning right from Dolan Road onto northbound SR 1 to accelerate up to the existing signed speed limit of 50 MPH prior to merging with through traffic. This is opposed to the current intersection layout which requires right-turning traffic to merge directly with through traffic immediately after stopping at the stop sign. This improvement would require additional pavement along the northbound frontage of SR 1 directly in front of the Moss Landing Power Plant; said widening would end prior to the existing bridge over Elkhorn Slough.

Note: It is highly recommended that the new flashing beacons be powered by solar panels and batteries. This will eliminate the need to obtain direct electrical service for the beacons and can provide flexibility in their location. The battery will allow the beacons to function at night and on foggy days with more limited sun exposure. The use of LED beacons will also reduce overall power requirements for the improvement.

4.1.2 Signalized Improvement Alternatives

The three signalized improvement alternatives have been further evaluated as a unit but conceptually designed as individual improvements. This is because the signalized improvement alternatives are each mutually exclusive; while they share many aspects with each other, they cannot be combined as individual units.

The following sub-sections discuss both the additional evaluations (signal warrants and vehicle queuing) and the individual designs of each alternative.

Signal Warrant Evaluation:

Signal warrants were evaluated at the SR 1/Dolan Road intersection for both Existing and Year 2035 conditions. **Exhibit 23** summarizes the warrant results for each evaluated condition, while **Appendix J** contains each evaluated warrant. Three of the six evaluated warrants were found to be met for Existing conditions, including the four-hour (Warrant 2) and peak hour (Warrant 3) warrants. The peak hour warrant was also found to be met under Year 2035 conditions. Based upon these results, a traffic signal at the SR 1/ Dolan Road intersection is considered warranted.

Exhibit 23 – Signal Warrant Evaluations – State Route 1/Dolan Road

Warrant	Warrant Status			Notes
	Met	Not Met	N/A	
1. Eight-Hour Vehicular Volume			✓	Sufficient data not available to evaluate warrant
1A. Minimum Vehicular Volume			✓	
1B. Interruption of Continuous Traffic			✓	
1C. Combination of A and B			✓	
2. Four-Hour Vehicular Volume	✓			Side Street has high right turn volume
3. Peak Hour Vehicle Volume	✓			Side Street has high right turn volume
Existing (Year 2011)	✓			
Year 2035	✓			
4. Pedestrian Volume		✓		No pedestrian crossings at intersection
Part A (Four-Hour)		✓		
Part B (One-Hour)		✓		No pedestrian crossings at intersection
5. School Crossing		✓		School children do not cross at intersection
6. Coordinated Signal System			✓	Approaches do not have downstream signals
7. Crash Experience		✓		Collision rates meet warrant, but other parts not met
8. Roadway Network	✓			Intersection of two regionally important roadways
9. Intersection Near a Grade Crossing			✓	Warrant does not apply

Signal Queuing Evaluation:

Exhibit 24 summarizes the estimated 95th percentile vehicle queue lengths for through traffic on State Route 1 for each of the three signalized improvement alternatives. The vehicle queue calculations can be found within **Appendix K**. These queues represent a simple method to compare the relative impact of the improvement alternative upon the through traffic operations of State Route 1.

Ninety-fifth percentile vehicle queue lengths would be longest for Improvement Alternative 8a (Full Signal, One Through Lane) and shortest for Improvement Alternative 9b (Half Signal, Two Northbound Through Lanes). Queue lengths would be longest on northbound SR 1 and shorter on southbound SR 1, especially in the PM peak hour. None of these queues would extend far enough to block traffic at adjacent intersections; however, as traffic would slow as it approaches the end of these queues, it is possible that such slowing under Improvement Alternative 8a could affect operations at the State Route 1/Moss Landing Road intersection, which is located approximately 1,500 feet south of the Dolan Road intersection, under Year 2035 conditions during the PM peak hour.

Exhibit 24 – Vehicle Queue Length Comparison Table

Improvement Alternative	State Route 1 Through Vehicle Queues (feet)							
	Existing Conditions (Year 2011)				Year 2035 Conditions			
	AM		*PM*		*AM*		*PM*	
	NB	SB	NB	SB	NB	SB	NB	SB
8a. Full Signal, One Through Lane	298	292	877#	162	418	1022#	1198#	311
9a. Half Signal, One Northbound Through Lane	309	0	727#	0	414	0	964#	0
9b. Half Signal, Two Northbound Through Lane	135	0	217	0	174	0	281	0

Notes:
1. Queues represent 95th percentile queues.
2. # = 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

Results from the queuing report show the length of the northbound right turn lane on State Route 1 at Dolan Road is adequate for both Existing and Year 2035 Conditions.

Queues on the northbound right turn lane are minimal under both Existing and Year 2035 Conditions, less than 15 feet.

Given the conceptual intersection geometrics, the southbound left turn lane is approximately 506 feet, with a 120 feet bay taper, which totals 626 feet. This provides a storage length of 251 feet on the turn lane. This storage length is adequate to accommodate the existing queues and year 2035 queues.

Signalized Improvement Alternative Conceptual Designs:

Appendix I contains the conceptual designs of the three signalized improvement alternatives. Various attributes, benefits and deficiencies for each improvement alternative identified through the conceptual design process are summarized within **Exhibit 25**.

Exhibit 25 – Signal Improvement Alternatives Comparison

Improvement Alternative	Additional Right-of-Way Needed?	Handling of Moss Landing Power Plant Emergency Driveway	Additional Pavement Added?
Alternative 8a – Full Signal, One Through Lane	No	Controlled by signal	No
Alternative 9a – Half Signal, Single Northbound Through Lane	No	Not controlled by signal; Restricted to right turns in and right turns out only	No
Alternative 9b – Half Signal, Two Northbound Through Lanes	No	Not controlled by signal; Restricted to right turns in and right turns out only	Yes – New second northbound through lane north of Dolan Road and widened northbound shoulder south of Dolan Road

Notes:

1. Alternative 8a, Full Signal, One Through Lane – The alternative treats the Moss Landing Power Plant emergency equipment area driveway as if it is an active driveway, complete with protected left turn phasing into the driveway and a shared east-west permitted phase with westbound Dolan Road traffic. Although not absolutely necessary, this treatment of the emergency driveway will minimize any impacts to overall intersection operations when maintenance vehicles need to access the gated equipment accessible from the driveway.

2. Alternative 9b, Half Signal, Two Northbound Through Lanes:
   a. New Second Northbound Through Lane North of Dolan Road – As this new lane is a merge lane and not an acceleration lane, it does not need to be as long as the previously described acceleration lane under Alternative "2-3-4."

   b. Widening of Northbound SR 1 Shoulder South of Dolan Road – This widening would add approximately four feet to the existing shoulder south of Dolan Road, in order to meet the Caltrans shoulder standard width of 8 feet. This widening is incorporated into this improvement alternative because the second northbound SR 1 through lane would now also carry higher-speed through traffic in addition to slower right-turning traffic. Note that while this improvement would not change the distance between the traveled way and existing aboveground utilities fronting the highway, it would narrow the distance between the edge of pavement and said utilities by four feet.

The preparation of the improvement alternative conceptual designs did not uncover any design issues that would preclude their construction. Discussions of potential environmental issues associated with the designs are described within Section 4.2 Initial Study Results.

4.2 Improvement Alternative Construction Cost Estimates

Exhibit 26 summarizes the preliminary construction cost estimates for each of the four improvement alternatives described above – Alternatives 2-3-4, 8a, 9a, and 9b. The detailed programming construction estimates are contained within **Appendix L**. The construction programming estimates range between approximately $220,000 to $391,000, depending upon the improvement alternative. Note that this does not include soft costs (design, environmental, right-of-way, utilities construction management and permitting).

Exhibit 26 – Summary of Improvement Alternative Construction Cost Estimates

Improvement Alternative	Preliminary Construction Cost Estimate	Soft Cost (Design, Env, ROW, Utilities, Permitting	Total Programming Project Cost
Alternative 2-3-4 – Flashing Beacons, Striping, etc.; Sight Distance Improvements; Northbound Acceleration Lane	$220,128	$479,872	$700,00
Alternative 8a – Full Signal,One Through Lane	$249,336	$850,664	$1,110,000

Improvement Alternative	Preliminary Construction Cost Estimate	Soft Cost (Design, Env, ROW, Utilities, Permitting	Total Programming Project Cost
Alternative 9a – Half Signal, Single Northbound Through Lane	$227,184	$872,816	$1,110,000
Alternative 9b – Half Signal, Two Northbound Through Lanes	$391,068	$908,932	$1,300,000

Note: Programming estimates are plus or minus 35% accurate.

4.3 Initial Study Results

An Initial Study has been prepared by EMC Planning Group, assessing the potential environmental impacts of the four improvement alternatives previously describes within this section (i.e. Improvement Alternatives 2-3-4, 8a, 9a, and 9b). This report – *Initial Study – State Route 1 – Dolan Road Improvements* – concluded that a mitigated negative declaration can be declared for all four improvement alternatives. All of the identified potentially significant impacts can be reduced to less-than-significant status through the implementation of various mitigation measures, both prior and during construction. **Exhibit 27** summarizes the overall findings under each evaluated environmental factor, specifically if any mitigation measures are deemed necessary and, if so, provides a summary of that measure and its potential effect upon implementation of the improvement alternatives. The full Initial Study, including each detailed mitigation measure, is located within **Appendix M**.

Exhibit 27 – Summary of Overall Findings from Initial Study

Finding	Mitigation Measure	Limiting of Improvement Options?
1 Aesthetics		
b Removal of existing trees along SR 1 could result in a significant visual impact.	Implement Mitigation Measure BIO-2 (see below)	Unlikely, but would add additional construction costs and time. Only applicable to Improvement Alternatives 2-3-4 and 9b.

Finding			Mitigation Measure	Limiting of Improvement Options?
1	Aesthetics (continued)			
c	Removal of and replacement of existing trees along SR 1 could have a potentially significant impact upon visual character of project area.		Implement Mitigation Measure BIO-2 (see below)	Unlikely, but would increase additional construction costs and time. Only applicable to Improvement Alternatives 2-3-4 and 9b.
2	*Agriculture and Forest Resources*			
	No Impacts			
3	*Air Quality*			
	All impacts would be Less Than Significant			
4	*Biological Resources*			
a	i	Construction noise and removal of trees during breeding season could disturb nesting birds or their young, which is considered a significant adverse environmental impact.	BIO-1 – Tree removal and noise-generating activities should occur outside of nesting bird season (February 1 to September 15). If removal of construction occurs during nesting season, a pre-construction survey for nesting birds should be performed. If nesting birds are found within 250 feet of construction, a construction-free buffer zone should be established.	Unlikely, but could limit construction times during the year and/or increase construction costs. Only applicable to Improvement Alternatives 2-3-4 and 9b.
	ii	The special-status plant species Congdon's tarplant has been recorded as occurring near the project area.	BIO-2 – The presence/absence of Congdon's tarplant shall be determined on bare soils within the project area during the summer and fall months (typically August and September) prior to construction-related activities.	

Finding		Mitigation Measure	Limiting of Improvement Options?
4	*Biological Resources* (continued)		
		BIO-3 – If found, appropriate avoidance or mitigation shall be developed in coordination with appropriate regulatory agencies, including identification of off-site mitigation area for habitat restoration, seed and topsoil transfer, and establishment of a five-year maintenance and monitoring program	Unlikely, but would increase construction time and costs. Only applicable to Improvement Alternatives 2-3-4 and 9b.
e	Potential removal of three "landmark" trees (as defined in *North County Coastal Implementation Plan*)	BIO-4 – A Monterey County costal development permit shall be required for removal of any landmark trees. A Forester's Assessment and Recommendation for removal will be necessary. The quantity, size, and species of replacement trees shall be coordinated with Monterey County Resource Management Agency – Planning Department and Caltrans District Landscape Architect. All removed landmark trees must be replaced at a minimum ratio of 1:1.	Unlikely, but would increase construction time and costs. Only applicable to Improvement Alternatives 2-3-4 and 9b.
5	*Cultural Resources*		
b	A known archaeological site is located near the northern end of the study area	CR-1 – Prior to development of road improvements north of Dolan Road, steps shall be taken to protect potential cultural resources, including backhoe testing and construction monitoring by a qualified archaeologist.	Unlikely, but would increase construction time and costs. Only applicable to Improvement Alternatives 2-3-4 and 9b.
d	Construction activity could potentially disturb human remains	Implement Mitigation Measure CR-1	Unlikely, but would increase construction time and costs. Only applicable to Improvement Alternatives 2-3-4 and 9b.

Finding		Mitigation Measure	Limiting of Improvement Options?
6	*Geology and Soils*		
	All impacts would be Less Than Significant		
7	*Greenhouse Gas Emissions*		
	All impacts would be Less Than Significant		
8	*Hazards and Hazardous Materials*		
d	Construction could involve excavation of soils contaminated by past groundwater contamination at the Moss Landing Power Plant		
		HAZ-1 – Prior to construction of improvements, the project sponsor shall coordinate with Department of Toxic Substances Control to develop appropriate hazardous materials protocols for soil excavation.	Unlikely, but would increase construction time and costs.
9	*Hydrology and Water Quality*		
b	Ongoing irrigation of new landscaping would represent an inappropriate optional use of water within an over-drafted basin.		
		HY-1 – Re-vegetation of highway margins shall incorporate native plantings that will successfully establish after five years of irrigation. Any installed irrigation systems shall be removed after five years.	Unlikely, although will affect the types of landscape materials that can be used, potentially increasing construction time and costs.
10	*Land Use and Planning*		
	No Impacts		
11	*Mineral Resources*		
	No Impacts		
12	*Noise*		
	All impacts would be Less Than Significant		
13	*Population and Housing*		
	No Impacts		

Finding		Mitigation Measure	Limiting of Improvement Options?
14	*Public Services*		
	No Impacts		
15	*Recreation*		
	No Impacts		
16	*Transportation/Traffic*		
	All impacts would be Less Than Significant		
17	*Utilities and Service Systems*		
b	Water would be drawn from an over-drafted aquifer		
18	Mandatory Findings of Significance	Implement Mitigation Measure HY-1	Unlikely, though will limit usable types of landscape materials, potentially increasing construction time and costs.
a	Proposed project could have impacts upon endangered plants, specifically Congdon's tarplant		

4.4 Feasibility Assessment

Exhibit 28 summarizes the feasibility of constructing the four improvement alternatives evaluated within this section of the report. Accounting for all of the design and environmental analysis, all four improvements appear to be feasible to construct. While there are a number of required mitigation measures that must be followed prior to and during construction, none would preclude the construction of any of the improvement alternatives. However, these mitigation measures will likely increase the construction time and cost.

Exhibit 28 – Improvement Alterative Feasibility Table

Improvement Alternative		Constructability and Environmental Issues	Feasible to Construct? (Yes/No)[2]	Notes
2-3-4	Flashing Beacons, Signs, Channelizers & Striping; Improve Sight Distance (relocate utilities, trim foliage, remove obstructions, etc.); Add WB Dolan Right Turn Acceleration Lane	Construction period may be restricted by nesting birds, Tree removal requires replantings and County permits; Verification of presence of endangered plant, Measures to preserve potential cultural resources; Methods to handle contaminated soil; Use of native plantings with minimal water usage; Adjacent power plant may request buffer or other security enhancements	**Yes**	Improves driver awareness; Improves driver, bicyclist and pedestrian visibility; Improves sight distance; Minimal effect upon capacity
8	Full Signal a. One Through Lane	Minimal striping, grading and foundations;Methods to handle contaminated soil; Use of native plantings with minimal water usage	**Yes**	Longer SR 1 queues
9	Half Signal (SB does not stop) a. Single NB Thru Lane	Minimal striping, grading and foundations; Methods to handle contaminated soil; Use of native plantings with minimal water usage	**Yes**	Longer NB SR 1 queues
	b. Two NB Thru Lanes	Construction period may be restricted by nesting birds, Tree removal requires replantings and County permits; Verification of presence of endangered plant, Measures to preserve potential cultural resources; Methods to handle contaminated soil; Use of native plantings with minimal water usage; Adjacent power plant may request buffer or other security enhancements	**Yes**	Minor NB SR 1 queues

5 RECOMMENDED IMPROVEMENT ALTERNATIVES FOR FURTHER STUDY

This section identifies the improvements recommended for further study, as well as the likely next steps in the design and analysis process prior to approval and construction.

5.1 Improvement Alternatives Recommended for Further Study

All four of the improvement alternatives discussed in Section 4 – Improvement Alternatives 2-3-4, 8a, 9a, and 9b – appear to be feasible to construct and are not environmentally precluded from construction. It is therefore recommended that all four improvements be considered for future implementation. Further analysis and design is recommended prior to selection of a single improvement alternative for implementation.

5.2 Next Steps

The likely next step in the analysis and design process would be the preparation of a formal Project Study Report (PSR), the completion of which would be the gateway to state approval and funding for the ultimately selected improvement. As previously mentioned within the Introduction, a likely component of a future PSR is the new Intersection Control Evaluation (ICE) process recently implemented by a Caltrans directive in August 2013. ICE is an evaluation process meant to analyze potential intersection and interchange improvement alternatives on a Caltrans facility. This includes common improvements such as stop signs and traffic signals, as well as more unique and innovative improvement options like roundabouts or improvements deviating from Caltrans design standards. Responsibility for implementation of the ICE process is left to each individual Caltrans district; therefore all future discussions regarding the ICE process for this project would be with Caltrans District 5 staff. The analysis contained within this report was structured in the spirit of these future guidelines.

The County of Monterey should also consider a long-term solution to safety and circulation issues in the study area, such as the intersection consolidation and grade separation improvements identified in Improvement Alternatives 13 and 14. These improvements will require considerably more analysis, design, and stakeholder collaboration than was performed as part of this report. These improvements will also be more expensive and will take longer to build; however, they will be more consistent with the stated long-term goals of Caltrans and the Moss Landing Community Plan for the SR 1 corridor through Moss Landing. Note that it is possible that such an improvement may be incorporated into an ICE analysis of the SR 1/Dolan intersection.

6 REFERENCES

6.1 List of References

1. California Department of Transportation, *Traffic Operations Policy Directive 13-02 – Intersection Control Evaluation (ICE)*, Issued August 23, 2013, Effective August 30, 2013.
2. 2010 US Census, http://www.census.gov/2010census, accessed August 6, 2013.
3. Moss Landing History, www.mosslanding.com, accessed March 6, 2013.
4. Monterey County Resource Management Agency, *Draft Moss Landing Community Plan*, May 2012.
5. California Department of Transportation (Caltrans), *State Routes 1 & 183 Corridor System Management Plan*, October 2011.
6. Monterey-Salinas Transit web page, www.mst.org, accessed August 5, 2013.
7. County of Monterey Department of Public Works, *2008 Monterey County General Bikeways Plan*, Approved October 7, 2008.
8. California Department of Transportation, *2009 Collision Data on California State Highways*, 2009.
9. Applied Development Economics, *Moss Landing Economic Development Strategy*, February 25, 2010
10. Kimley-Horn and Associates, *Regional Impact Fee – Nexus Study Update*, March 26, 2008.
11. National Cooperative Highway Research Program, *NCHRP Report 672: Roundabouts: An Informational Guide, 2nd Edition*, 2010.

6.2 List of Contacts

1. Paul H. Greenway P.E., Assistant Director of Public Works, RMA – Department of Public Works, Salinas, California.
2. Patricia A. Lopez, Project Manager, RMA – Department of Public Works, Salinas, California.
3. Ogarita Carranza, Management Analyst II, RMA – Department of Public Works, Salinas, California
4. Jonathan Pascua, P.E., RMA – Department of Public Works, Salinas, California.
5. Richard James, EMC Planning Group, Monterey, California.
6. Martin Carver, Management Specialist RMA – Planning Department, Salinas, California.
7. Franziska Church, Fehr & Peers, San Jose, California.