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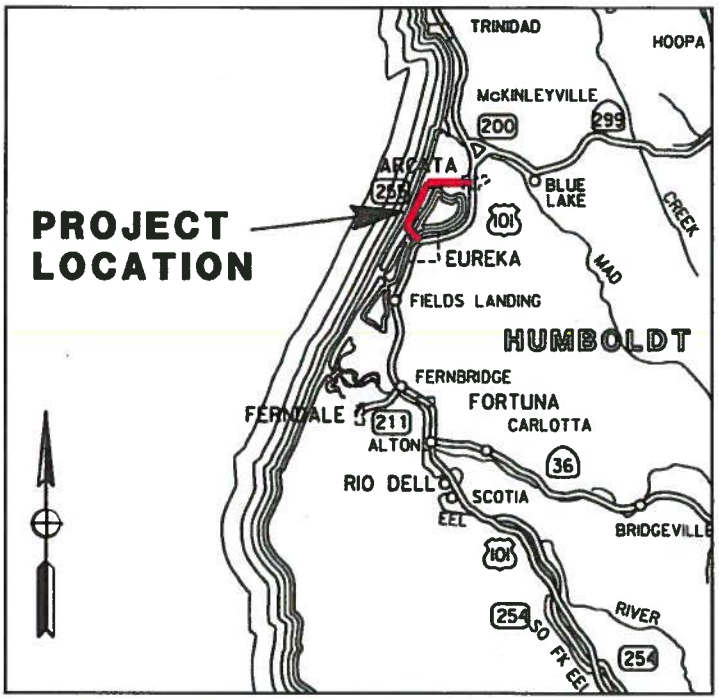
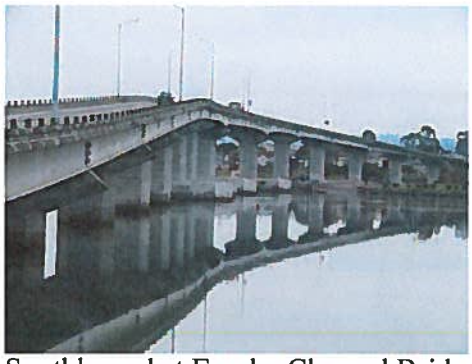
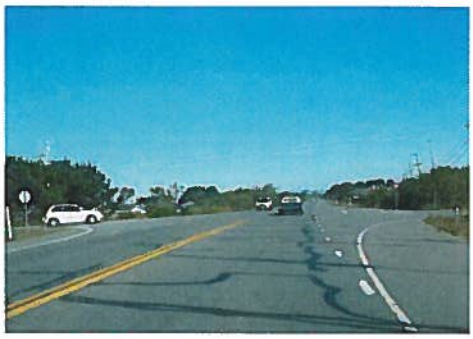
STATE ROUTE 255
ENGINEERED FEASIBILITY STUDY
NON-MOTORIZED TRAFFIC IMPROVEMENTS AND MANILA TRANSPORTATION ENHANCEMENTS



IN HUMBOLDT COUNTY, FROM THE JUNCTION OF ROUTES 255 & 101 IN EUREKA TO JUST WEST OF THE INTERSECTION WITH K STREET IN ARCATA



Southbound at Eureka Channel Bridge



Northbound at Dean/Pacific Intersection

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Feb 15, 2013
Date

State Route 255
Engineered Feasibility Study Report

State Route 255
Engineered Feasibility Study Report

Attachments

A. Location Map
B. Initial Manila Transportation Enhancements
C. Future Manila Transportation Enhancements
D. Segment 1 Non-motorized Traffic Improvements
E. Segment 2 Non-motorized Traffic Improvements
F. Segment 3 Non-motorized Traffic Improvements
G. Segment 4 Non-motorized Traffic Improvements
H. Cost Estimates
I. Public Comments
J. Preliminary Environmental Analysis Report
K. References
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M. Advance Planning Study
N. Score Sheets
O. Non-motorized Traffic Improvements Fact Sheets
P. Initial Manila Transportation Enhancements Fact Sheets
Q. Future Manila Transportation Enhancements Fact Sheets
R. Collision Data

I. Executive Summary

The State Route 255 (SR 255) Engineered Feasibility Study Report evaluates potential improvements for bicycle and pedestrian facilities along the entire route from Eureka to Arcata focusing on gaps in the existing facility and opportunities to provide connections to planned non-motorized traffic improvements of other agencies. In this document, bicycle and pedestrian treatments are referred to as "non-motorized traffic improvements" and are discussed in detail in Section VI.

The study also reviewed transportation enhancements within the community of Manila. These types of improvements are discussed in Section VII and have two objectives: to address multi-modal connections within the community and to increase a driver's sense of arrival when their vehicle enters the community. The purpose of heightening a driver's awareness of the community is to influence driving behavior. Ideally, these improvements would lead to reduced speeds and increased accessibility.

The purpose of this document is to investigate multiple design concepts independently, relate them to the context of the corridor to ensure that they are appropriate, and to identify improvements that complement each other. These design concepts will consider potential funding sources as well as engineering, environmental, and other constraints anticipated with implementing them. With this information having been previously considered, planners and transportation agency partners will be able to quickly assess which course of action will serve the community and system most efficiently. After completion, this document will also be used to assist Caltrans and other agencies in applying for funding as sources become available. In this way, this report can be used as a reference document to initiate programming for non-motorized and traffic calming improvements.

In considering the feasibility of the proposed improvements, the existing condition of SR 255 was evaluated for environmental, engineering, and right-of-way constraints that would impact the viability of a feature. All of the proposed improvements were evaluated and where applicable, a scoring system was used to compare improvements that were similar in nature, such as intersection treatments.

Many of the improvements studied were originally proposed by the community in the Manila Community Transportation Plan (2005) and, as Caltrans participated in the development of that plan, these improvements had conceptual level support. With this study, these improvements have been further evaluated for appropriateness and as the conditions identified herein are met, projects to install these improvements may be considered as funding becomes available.

The features studied for this report will require lead time before construction. For those features that can be installed in the shorter term, the length of this lead time will primarily depend on when funding becomes available. Some of the short term or initial projects such as the radar feedback signs and optical speed bars have already been installed. Other concepts require a longer lead and are referred to as future projects as theses improvements will require certain conditions to be met prior to seeking funding or initializing the project development process. The following tables summarize the transportation enhancement improvements studied for the Manila community's section of the highway.

Summary of Manila Transportation Enhancements

Traffic Calming and Community Connectivity Improvement Options

Initial Improvements

Improvement	Location(s)	Summary Statement	Cost Range (in thousands)
Gateway Monuments	PM 3.6 & 4.1	Aesthetic signage informing drivers they have entered a community.	$240 - $350
Landscaping	PM 3.6/4.1	A roadside treatment that can help enhance a driver's sense of arrival by adding elements to the field of vision.	$150 - $230
Painted Medians & Islands	PM 3.6/3.9	Areas within roadway that can be used by pedestrians for refuge. Are also a feature added to convey a sense of arrival to drivers.	$730 - $1,100
Optical Speed Bar	PM 3.55/3.65 & 4.16/4.26	A field of converging, painted bars along a traveled way that effect drivers perception of speed.	$70 - $100
Radar Feedback Signs	PM 3.35 & 4.68	Electronic signs that measure and then relay speed of oncoming vehicles as a means to alerting drivers of their speed.	$420 - $630
Colorized Shoulders	PM 3.54/4.16	An aesthetic treatment to the shoulders that reinforces the separation between the traveled way and the shoulders. Also ads to a driver's sense of arrival.	$510 - $760
Safety Lighting	PM 3.6 & 3.94	A safety enhancement that increases the nighttime visibility of intersections and roadside areas.	$440 - $660
Pavement Marking (lane narrowing)	PM 3.6/4.1	Narrowing the traveled way provides additional shoulder area for bicyclists and pedestrians	$130 - $200

Future Improvements

Improvement	Location(s)	Summary Statement	Cost Range (in thousands)
Curbed Medians and Islands	PM 3.64/3.94	Raised curbs would replace painted islands after prevailing speeds reduced.	$340 - $510
Roundabouts (Manila)	PM 3.64 and/or 3.94	An intersection treatment with proven track record of decreasing severity and frequency of collisons.	$3.7 - $5.6 (millions)
Traffic Signals (Manila)	PM 3.64 and/or 3.94	An intersection treatment that can increase accessibility for pedestrians, bicyclists and traffic entering highway.	$2.4 - $3.6 (millions)
All Way Stops (Manila)	PM 3.64 and/or 3.94	Another form of intersection treatment with the capability to increase access to the highway.	$280 - $410
Traffic Signal or Roundabout (Samoa)	PM 2.0	An improvement proposed by the developers of the Town of Samoa as mitigation for that project's impacts to traffic.	Cost borne by developer of Samoa
High-intensity Activated crossWalK (HAWK)	PM 3.7/3.9	An on-demand crosswalk signal that improves cross highway traffic safety.	$400 - $600
Standard Crosswalk	PM 3.64 and/or 3.94	An improvement that defines the area and location where cross highway traffic crosses.	$56 - $84

II. Background

SR 255 is an 8.8 mile corridor in Humboldt County which begins at the US 101 intersection in the City of Eureka and traverses the Samoa Peninsula, through the community of Manila, to the US 101 interchange in Arcata.

SR 255 has been used since the early 19th century to service industry and a military base on the Samoa Peninsula. Until the 1960's, the peninsula was only accessible to vehicles by road or railroad via the Arcata Bottoms. Pedestrians from Eureka used a ferry boat to cross Humboldt Bay.

The route from Arcata to the southern tip of the peninsula was originally maintained by Humboldt County. IN 1970, Caltrans took responsibility for the portion from Arcata to the junction of where the Samoa Bridge meets the peninsula. Humboldt County continues to maintain the portion south of this junction. The Humboldt Bay Bridges, built by Caltrans, were completed in 1971 and were the final segment constructed of what we now call State Route 255.

Land use on the peninsula in the late 1960's and early 1970's was dominated by the timber industry, and development in the area focused on supporting the industry. Residents numbered around 1,100 and were split between the company town of Samoa and the community of Manila to the north. The two lumber mills located on the south end of the peninsula drew 1,060 workers to the location on a daily basis. Only 150 of these workers resided on the peninsula while the rest commuted by vehicle or ferry.

Traffic studies conducted on the west side of the Arcata city limits resulted in an Average Daily Traffic (ADT) of 2,950 prior to the construction of the Samoa Bridges and jumped to 3,550 after the bridges were opened for public use in 1971. Truck traffic accounted for roughly 20% of the ADT. These numbers rose as the timber industry continued to thrive and new mills and factories were built.

By 1980, the timber and pulp industries were operating in full force on the Samoa Peninsula. Along with industrial traffic, the area saw an increase in tourists and recreationalists visiting the beach via the Samoa bridges. By this time, ADT on SR 255 at the intersection with US 101 in Eureka, had risen to 5,800 with truck traffic being 12.2% of that and at the US 101 intersection in Arcata the ADT had risen to 14,300 with a truck volume of 4.9%. The mid section of SR 255 saw an ADT of 6,000 at the Young Lane intersection.

The timber and pulp industry subsided over the last two decades, and eventually the once thriving mills closed their doors. Accordingly, traffic volumes along the corridor were reduced as workers no longer commuted to the peninsula. However, traffic volumes at the north and south ends of SR 255 continued to grow along with the communities of Eureka and Arcata resulting in an ADT of 7,700 at the US 101 intersection in Eureka and 16,300 at the US 101 intersection in Arcata in the year 2000; conversely, traffic through the mid section dropped to 4,300 at the Young Lane intersection.

In 2002, a parallel route, US 101 along the east side of Humboldt Bay, was designated a *Safety Corridor* and the maximum speed limit was reduced to 50 miles per hour (MPH). There was a measurable shift of traffic volumes from the principal arterial (US 101) to the parallel route (SR 255) as local drivers opted to bypass the S*afety Corridor*. This initially resulted in 29% increase in traffic volumes. Currently, traffic volumes are about 15% above those prior to implementation of the Safety Corridor.

One ancillary effect of the reduction in industrial production on the Samoa Peninsula is a change in character of the residential communities. The population of residents throughout the area (Fairhaven, Samoa, and Manila) has more or less stayed the same from roughly 1,000 in the early 1900s to 1,100 in 1962 and 1,042 in 2012 as estimated by the California State Department of Finance. Although the overall population has not changed, the residents have expressed a desire to develop their communities and in 2002 the Manila Community Services District sponsored the first phase of the Manila Community Transportation Plan. This plan was funded by Caltrans with HCAOG participation as co-applicant. Caltrans was also involved in the plan development process through participation in the technical advisory group and as the grant administrator. A discussion of information from the documents prepared by various agencies and organizations that is relevant to this study is provided in Attachment K.

III. Purpose and Need Statement

The purpose of this study is to evaluate the feasibility of, and a strategy for, pursuing potential improvements for non-motorized and traffic calming improvements within the existing state right-of-way along the SR 255 corridor. As part of that analysis, the potential environmental impacts, engineering feasibility and construction costs of the improvements have been evaluated.

This study will be used as a Caltrans' planning tool to propose improvements that will address the public's concerns regarding changes in traffic volumes/speeds and pedestrian/bicyclists safety and overall mobility throughout the SR 255 corridor.

IV. System Planning

The Route Concept Report for SR 255 calls for maintaining the existing mix of 2 and 4-lane conventional highway and expressway along this facility. Capacity increasing improvements are not necessary to achieve the route concept over the 20-year period. With any rehabilitation project along the route, consideration should be given to widening the shoulders of Segment 3 where the width of these shoulders is not currently standard. Improvements analyzed in this report reflect current System Planning guidance which calls for development of Context Sensitive Solutions and development of "Complete Streets" concepts.

V. Existing Conditions

The existing highway along the study limits varies substantially between Eureka and Arcata. These variations include changes in the geometrics of the cross sections, land use of the frontage properties and type of access control. For the purposes of identifying these varying conditions, this report divides the corridor into 4 segments as shown below in Figure 1. Table 1 provides greater detail on the features and existing conditions of these segments. Although the alignment of SR 255 is in an east/west direction for some portions, this document refers to the overall north/south direction of the route for consistency.

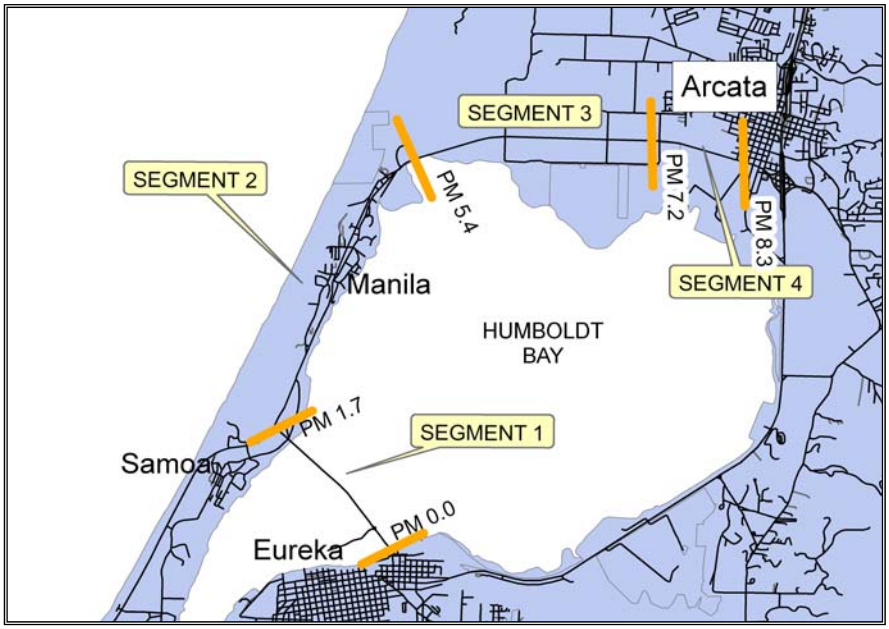


FIGURE 1

Table 1

Route 255 SEGMENT	PM RANGE	DESCRIPTION	EXISTING FACILITY
1	0.0/1.7	Route 101 to Eureka Urban Limits	2-lane expressway
2	1.7/5.4	Eureka Urban Limits to 0.2 miles North of Mad River Slough Bridge.	2-lane conventional/expressway
3	5.4/7.2	0.2 miles North of Mad River Slough Bridge to Arcata Urban Limits	2-lane conventional
4	7.2/8.3	Arcata Urban Limits to just West of Intersection with K Street	4-lane conventional

Segment 1 (PM 0.0-1.7)

Beginning within the City of Eureka, Segment 1 is a 1.7 mile long expressway and is predominantly on three bridges that either pass over portions of the Humboldt Bay, a spur of the Northwest Pacific Railroad (NWP) or local roads. These bridges are collectively referred to as the Humboldt Bay Bridges. The first bridge along this segment passes over the Eureka Channel and is 1,817' long. The second bridge passes over the Middle Channel and is 1,081' long. The third bridge passing over the Samoa Channel is 2,506' long.

The majority of the bridges in this segment are constructed of concrete piers and girders. One undercrossing in Segment 1 is formed by a steel plate elliptical super-span and provides access to the marina on Woodley Island. An earthquake retrofit on these structures was finished in 2007. A typical view of these bridges is provided as Figure 2.

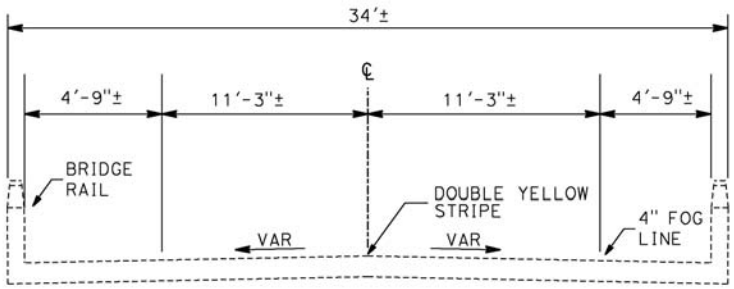
The bridge decks throughout Segment 1 are surfaced with concrete and were recently (2008) re-striped to provide slightly wider shoulders and narrower traveled lanes, which are now less than the 12' standard (see Figure 3). The railing along the structures is 3' high and is comprised of a concrete parapet with an elliptical shaped, tubular rail bolted to the parapet. Conduit for the seismic sensor system is bolted to the outside of the parapet. The typical cross section through this segment is provided graphically in Figure 4. Between structures, the roadway widens to provide both directions of travel with 12' lanes and 8' paved shoulders. Passing is permitted along some stretches between structures and parking on the shoulder is prohibited except for emergencies.

Eureka Channel Bridge from Woodley Island, Segment 1 (PM 0.5)

Figure 2

Northbound on Eureka Channel Bridge, Segment 1 (PM 0.3)

Figure 3



STRUCTURE TYPICAL SECTION
SEGMENT 1
(PM 0.0 - 1.7)

Figure 4

There is a 30 mph speed zone for both directions between post mile 0.00 and 0.40. At PM 0.11, the prevailing speed is 34 mph for both directions. The remainder of the segment is posted at 55 mph which is the maximum speed for a two-lane, undivided highway. A speed study was conducted at four locations along Segment 1 on May 31, 2007 and June 7, 2011. The prevailing speeds obtained with this study are tabulated below.

Segment 1, Speed Survey Results

Post Mile 0.67	57 mph
Post Mile 1.00	61 mph
Post Mile 1.37	60 mph
Post Mile 1.84	52 mph

The right-of-way width varies considerably through this section of the highway. Within the urban area in Eureka, the right-of-way width is 40'. Between Eureka and the peninsula the right-of-way width varies between 120' and 400'. Most of the right-of-way along this segment is over the surface waters of Humboldt Bay and therefore, the right-of-way limits are not defined by land use changes or delimited with fencing.

Pedestrian access along portions of this segment is restricted by signage which specifically prohibits this form of non-motorized traffic. These signs are located at the southbound approach to the Samoa Bridge and at the northbound onramp from Woodley Island to the Eureka Channel Bridge. The District could consider removal of these signs after improvements to the structures. The 2012 District System Management Plan (DSMP) allows for bicyclists on all State highways in District 1, including freeways.

Segment 2 (PM 1.7-5.4)

Segment 2 comprises 3.7 miles of the highway and passes through the unincorporated community of Manila (Attachment E). The Route Concept Report (2001) describes the terrain over this segment as "level" and the grade as "rolling".

This segment's functional classification is an expressway and has partial access controlled right-of-way. There are approximately five private points of entry onto the state highway. One of these access points serves multiple residences. A second provides access to the Friends of the Dunes Nature Center and the remaining three serve the Sierra Pacific Lumber Company. There are six county road access locations along Segment 2.

Northbound along Segment 2 (Approximately at PM 3.2)

Figure 5

For most of this segment, a spur of the Northwest Pacific Railroad (NWP) runs nearly parallel to the east side of the highway right-of-way. At one point before reaching the Mad River Slough Bridge (PM 5.4), the railroad crosses the highway at grade. Crossing signals have been partially removed at this crossing. Except for occasional use of the spur for rail mounted excursion tours and maintenance equipment, the railroad has not been in operation since the main line was damaged by severe winter storms of 1998.

The width of the right-of-way varies, but averages 140' wide and bisects the community of Manila. The right-of-way and access rights were originally purchased by the county with the intention of the highway eventually becoming a 4-lane facility.

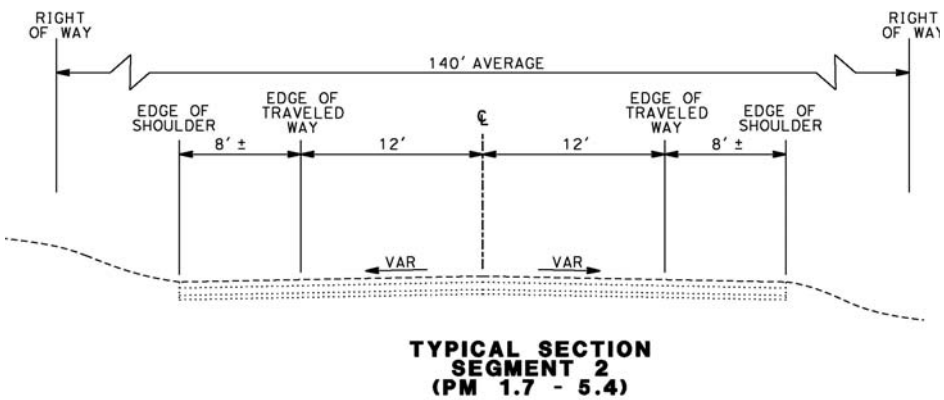


Figure 6

Typically, the roadbed of this highway is approximately 40' wide along this segment. Exceptions to this occur at locations where turn lanes are provided at highway intersections with local streets or private access points. A picture of a typical cross section of the highway is provided as Figure 5 and the dimensions of a typical section are provided in Figure 6.

Since restriping in 2007, vehicle passing is prohibited along this segment. Parking is restricted to emergency situations. The posted speed limit for north and south bound vehicles is 55 mph.

Each year since the inception of the Eureka-Arcata Safety Corridor in May of 2002, Caltrans has presented monitoring data and discussion on the performance of the Safety Corridor. Included in these reports is data on the impacts the Safety Corridor has had on nearby routes such as SR 255 and Old Arcata Road. The most recent report titled Eureka-Arcata Safety Corridor, Ninth/Tenth Year Report, September 20, 2012 indicates that the Safety Corridor initially increased the traffic volume over baseline years (1/1/1996 through 12-31/2000) by 29% at the traffic collection station located near the intersection of SR 255 and Old Navy Base Road (PM 2.0). Since that time though, traffic volumes have gradually decreased and are now approximately 9% higher than baseline. The recent report indicates the 85th percentile of the prevailing speed is at 58 mph and the total annual average number of collisions has increased 48% since the baseline was established

As part of this study, a comparison of collision data sets was made for the first and second 4-year periods after the Safety Corridor. Between the data range 5/19/2002 through 5/18/2006 and 5/19/2006 through 5/18/2010, the collision data suggests a declining trend for both the segment and most of the intersections in Segment 2 (see Attachment R). Highlighted in the tables of Attachment R are locations that experienced an increase in rates over these two data sets. The declining trend reflects a change between the first and second halves after the Safety Corridor. The above mentioned 48% increase reflects an overall change after the Safety Corridor. Data included in the tables does not reflect the recent collisions such as the incident which involved a fatality in late 2011.

A Traffic Safety Evaluation for a 5-year time period (October 1, 2003 through September 30, 2008) was performed as part of the review of existing highway conditions in Manila. This evaluation was conducted for both of the primary intersections in Manila (Dean/Pacific and Lupin) and provides an assessment of the types, quantities, and causes of the collisions. This data is presented in Attachment R as well.

Traffic volume counts are used in evaluating whether signals meet traffic warrants (minimum thresholds), quantifying collision rates and other types of traffic engineering analysis. For the Dean/Pacific and Lupin Avenue intersections, traffic volume data was collected by Caltrans in April 2009 and in 2005 for use in the Manila Community Transportation Plan (2005). These volumes are included in Attachment L. The two data sets are used to assess intersection improvements in this study.

In April 2009, Caltrans also collected data on pedestrians in order to assess the needs and concentrations of the non-motorized users. The counts were also used to determine whether a location met the prerequisite criteria for improvements such as crosswalks. These warrants are detailed in the California Manual on Uniform Traffic Control Devices (California MUTCD). The Caltrans pedestrian survey is included in Attachment L.

Another source of pedestrian and bike data was obtained through a Caltrans program called the Non-Motorized Digital Data Collection Pilot Project which temporarily mounts cameras to record non-motorized traffic passing through intersections during daylight hours. One of these systems was installed at the intersection of SR 255 and Lupin Avenue in August 2010. This data is included in Attachment L and is used later in this report.

Segment 3 (PM 5.4-7.2)

Segment 3 is comprised of 1.8 miles of highway and extends approximately from Mad River Slough Bridge (PM 5.4) to about a ¼ mile east of the highway's intersection with Pacheco Road (Attachment F). The Route Concept Report (2001) describes both the terrain and the grade line over this segment as "level".

This segment is classified as a 2-lane conventional highway and, although this segment is without access control, the only two active access breaks along this segment are at locations where the highway intersects with two county roads; Jackson Ranch (PM 5.98) and Pacheco Lane (PM 6.99). There are remnants of former points of private access, but these gravel drives and cattle gates appear to be idle on the south side of the highway. Along the north side, the railroad property prevents direct access to the highway. County road crossings with the railroad are uncontrolled (lack crossbucks, crossing arms, crossing signals, etc). A typical picture of the Segment 3 roadway is provided in Figure 7.

Northbound along Segment 3 (PM 7.0)

Figure 7

The width of the right-of-way varies, but the majority of the segment has a right-of-way width of 50'. The exception to this occurs at intersections or crossings over water bodies where the right-of-way widens slightly. Toward the north end of this segment, the route begins to transition to a 4-lane highway and the right-of-way width expands to 95'. A spur of the former NWP railroad runs parallel to the highway and along the southbound limits of the right-of-way. There appears to be wetlands on both sides of the road.

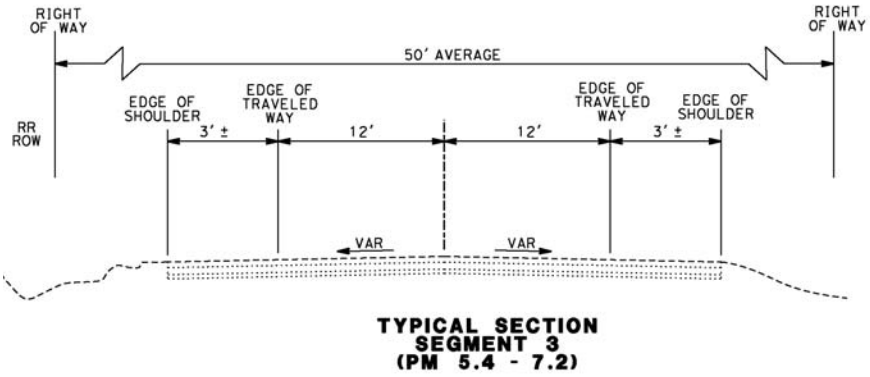


Figure 8

The roadbed of this highway is approximately 32' wide. Exceptions to this occur at intersection locations where there are dedicated turning lanes and where the highway crosses Mad River Slough. Dimensions of this segment's typical section are provided as Figure 8. Passing movements are permitted along some stretches of the 2-lane highway and parking is only permitted for emergency situations. The posted speed limit is 55 mph for both travel directions.

Segment 4 (PM 7.2-8.3)

Segment 4 begins about 1600' south of the highway's intersection with V Street and extends to post mile 8.8, making the full length of the segment 1.6 miles The limit of this study is at post mile 8.3, which is just south of the K Street intersection. The City of Arcata's Gateway Project begins just south of this point creating some overlap between the two efforts.

The Route Concept Report describes both the terrain and the grade line over this segment as "level". This segment is classified as a 4-lane conventional highway and has multiple access points along the portion that lies north of K Street where there are numerous commercial and retail properties. South of K Street, the majority of properties are undeveloped and except for local street intersections, there are limited breaks in access.

The right-of-way width varies in Segment 4. South of the railroad crossing at post mile 8.2, the right-of-way is about 140' wide and begins to taper down in random steps to approximately 80' east of the railroad. Where the right-of-way is narrowest, improvements associated with the development of the frontage properties has occurred in close proximity to the right-of-way line. In some instances, separation between the traveled way and existing utilities is as little as five feet.

The first small stretch of Segment 4 (PM 7.2/7.4) is a 2-lane, undivided highway with shoulder widths of about 3'. Further north, the configuration widens to a 4-lane, divided highway between PM 7.5 and 8.16 with opposing lanes being separated by a grassy median. These lanes are 12' wide and the inside lanes are separated from the medians with 2' shoulders. Left turn lanes are provided at intersections and breaks in the medians are provided where vehicle crossings are needed. An image of the divided highway with a grassed median is provided as Figure 9 and a typical roadway section west of K Street is provided in Figure 10. The posted speed limit west of PM 8.16 is 55 mph. East of this mark the speed limit is 35 mph.

Northbound along Segment 4 (PM 7.7)

Figure 9

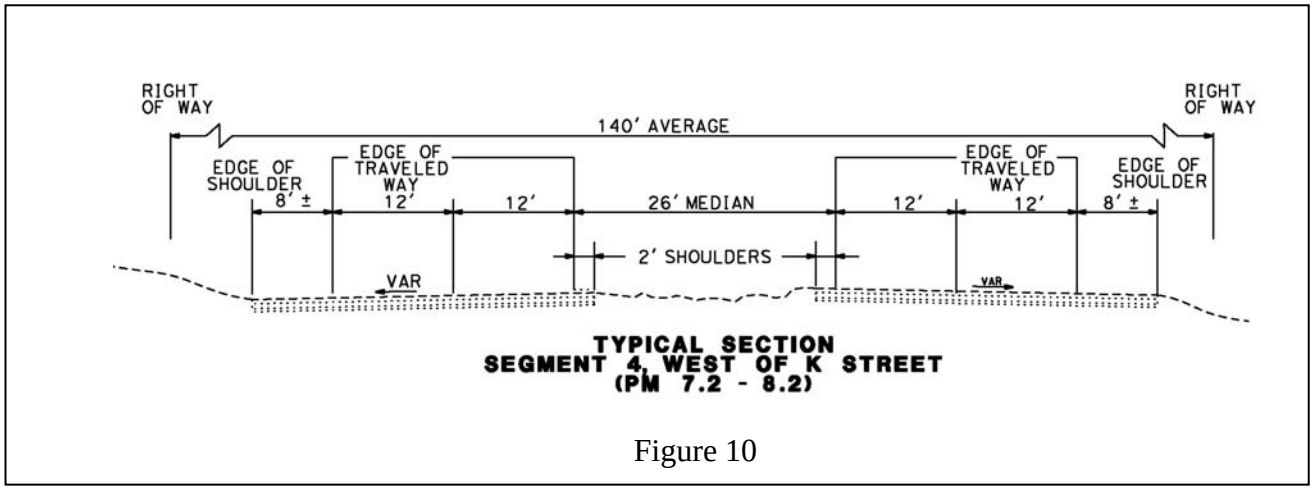


Figure 10

The City of Arcata's Samoa Boulevard Gateway Project begins at about PM 8.16. This project has changed the cross section of the route through Arcata's business district by reducing the roadway from a 4-lane facility to a 2-lane facility with bike lanes. The improvements extend to about 1,200' east of the SR 255 & 101 interchange and include installation of sidewalks, crosswalks, art zones, landscaping and directional signs. Figure 11 provides a view of the roadway after this project's construction.

Northbound along Segment 4 (PM 8.5)

Figure 11, with Gateway Improvements

A spur of the NWP railroad is located on the north side of the highway and crosses the roadway at PM 8.2 where the railroad alignment curves to the south to rejoin the mainline. When the railroad was operating, traffic was controlled at this crossing with four automatic gate arms, crossbuck regulatory signs, audible devices and flashing beacons. Except for the gate arm posts and foundations, most of these traffic control devices have been removed as the railroad is not operational. With their removal, signage was installed to communicate that the tracks are out of service. Metal beam guardrail is installed at the northbound approach to the crossing, but not on the southbound approach. This guardrail installation begins at the

edge of the paved shoulder and tapers inward toward the edge of the traveled way which leaves no shoulder for bicycles. The purpose of the guardrail installation is to protect the crossing signal. Images of this crossing from both approaches are provided as Figure 12.

Southbound along Segment 4 (PM 8.3)

Northbound along Segment 4 (PM 8.29)

Figure 12

VI. Non-motorized Traffic Improvements

Overview

All four of the SR 255 segments were individually evaluated for non-motorized improvements. Within the limits of the community of Manila, the focus was on facility crossings and intercommunity connections. These types of improvements are discussed in the next section. Outside of Manila, improvements to the system were evaluated for their benefit to users accessing the route as a throughway or as a means to connecting with other systems contiguous to the highway right-of-way.

Ideally for non-motorized through-way travelers, a separated, multimodal paved pathway would be constructed along the entirety of the route. This, however, is difficult to achieve as there are significant right-of-way, environmental, engineering, cost, maintenance requirements, and policy constraints that make such a continuous facility less viable. Because of these constraints, the facility was reviewed segment by segment for opportunities to provide improvements that would benefit the community of Manila and interregional users of the system whilst having the least impacts. This facility review considered points of connection to facilities being planned by other agencies.

As an aid to comparing the different options within each segment against each other, a scoring system was developed. Specifics on the scoring system are included in Attachment N and Attachment O contains full analysis of the non-motorized traffic improvement features which were evaluated.

Improvement Installation Strategy

This study's approach to installing non-motorized improvements along the route is based on a strategy that identifies facility gaps and/or deficiencies that make the route difficult for non-motorized users accessing the facility for either crossing or traveling between Eureka and Arcata. After identifying these locations, the strategy is to prioritize improvements to the locations which have highest critical need. In the end, the goal of this strategy is to create a facility that meets the needs of all motorized and non-motorized users.

Also considered in the improvement installation strategy are features which could be installed to improve connectivity within Manila. These types of improvements would aid residents accessing neighborhoods within the community. An example of such an improvement is a trail along the roadside that would connect the Lupin Avenue residents with the Pacific/Dean Avenue residents. Other similar trails are considered beyond these two intersections, but these two intersections have been identified as the primary intersections in Manila and therefore have a higher benefit potential.

Environmental Impact Assessment

Preliminary Environmental Analysis Report (PEAR) are prepared to assesses the environmental impacts of a project under the current federal (National Environmental Policy Act, NEPA) and state (California Environmental Quality Act, CEQA) regulations. The PEAR also details anticipated environmental permits, mitigation costs, and staff time required to complete the process, all of which have a bearing on the cost and time to develop a project. The PEAR is included as Attachment J and findings of the PEAR are incorporated into the cost estimates (Attachment H), scoring system (Attachment N), fact sheets (Attachment O, P & Q), and used to establish an order of improvement installation sequence.

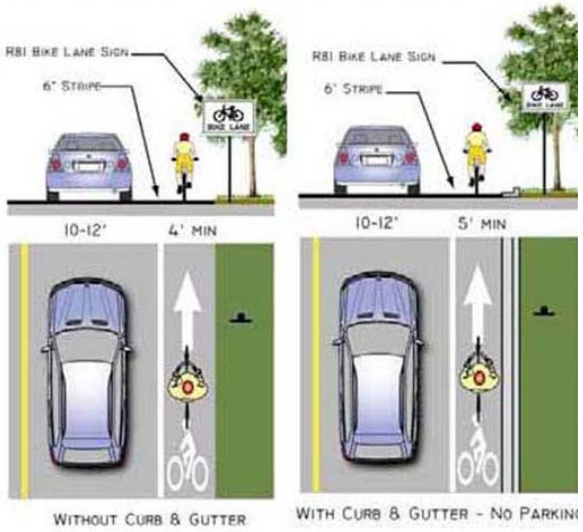
For non-motorized traffic improvements, the PEAR only evaluated the most viable of the proposed improvements within a segment. For instance, in Segment 1, there were seven different types of improvements considered and of these seven, the improvement with the highest potential was used as a basis for assessing the environmental impacts and regulatory needs for the segment. This approach was used for Segment 2 as well. In Segment 3 and 4, the PEAR combined the environmental assessment for these two segments because of similarities between the existing roadway conditions and proposed improvements within each segment.

Non-motorized Traffic Improvement Types and Design Standard Guidance

Because the Highway Design Manual (HDM) establishes the definition of bike paths, lanes and routes (Class I, II and III bikeways, respectively), the HDM was used as the primary reference for guidance on the design and policy criteria for the non-motorized traffic improvements evaluated in this study. Use of this manual across the state provides a means of maintaining consistency on the highways and ensures that facilities meet user expectations. In some situations, designating a route as either one of these bikeway types is inappropriate due to traffic volumes and/or speeds or because of a lack of bikeway continuity. In these cases, providing a facility with features such as standard shoulders is preferred over designation as a particular bikeway class. Below, are brief descriptions of these three bikeway classes within the HDM.

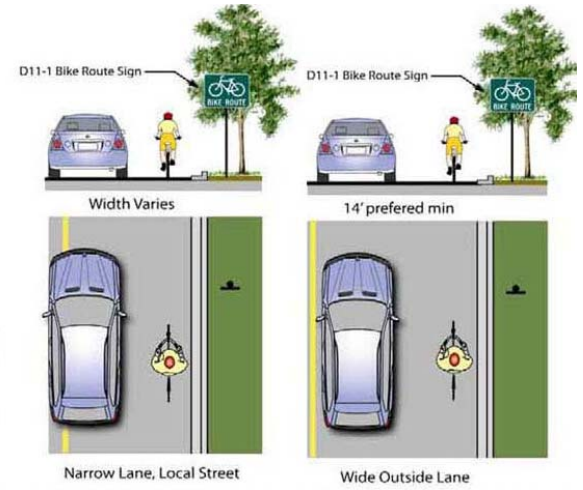
Class I Bikeway (Bike Path)

Class I Bikeway: Provides a separated right-of-way for the exclusive use of bicycles and pedestrians with cross flow by motorists minimized. Sidewalks are not considered Class I facilities and motorized vehicles are usually prohibited on bike paths. Bikeways should be used to serve corridors not served by streets and highways or where a wide right-of-way exists.



Class II Bikeway (Bike Lane)

Class II Bikeway: Provides a striped lane for one-way bike travel on a street or highway. Bike lanes are intended to delineate the right-of-way assigned to bicyclists and motorists and to provide for more predictable movements by each. These lanes are demarcated with pavement markings and include bike lane signs along the roadside. In practice, Class II bike lanes are typically not installed along rural, high-speed, highways.



Class III Bikeway (Bike Route)

Class III Bikeway: Provides for shared use with bicycle and motor vehicle traffic. Class III bikeways are intended to offer continuity to bikeway systems on through routes not served by Class I or II bikeways or are provided to connect discontinuous segments of bikeways. These facilities are identified by signs which indicate a designated bike route. Class III bikeways do not require pavement marking. The minimum Class III bikeway widths are represented as the minimum standard widths of traveled ways and shoulders in the latest HDM.

Summary

Below, is a table that summarizes the most viable of the non-motorized traffic improvements that were studied. Included in the table are brief summary descriptions and costs for each of these features. This list comprises the improvements which have a greater potential for safety improvement, user benefit, and shorter project development period. The table identifies variations of either Class I features, or a Class II or III features for each segment. The primary goal of the Class II or III feature options is to provide standard shoulder widths for these types of bikeways Brief descriptions of these improvements follow the table and complete analysis of all features, including those which are not viable, can be found in the non-motorized improvement feature fact sheets contained within Attachment O.

Summary Table of Viable Non-motorized Transportation Improvements

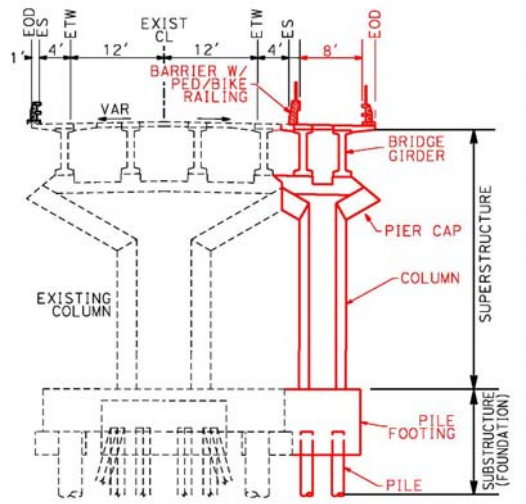
		Improvement Evaluated	Summary Description	Cost Range (millions)
SEGMENT 1	FEATURE 1.1	Class I, Deck Widening With New Foundations	Improvements located on only 1 side of structure. Feasibility hinges on approval of having non-standard, vehicular shoulder widths.	$30 - $44
	FEATURE 1.2	Class II or III, Deck Widening With New Foundations	Widening on 1 side of structure to create standard width vehicular shoulders which would become bike ways for both NB and SB. Existing centerline would be offset to balance width gained.	$28 - $41
	FEATURE 1.3	Class I, Deck Widening with Pier Cap Extension	Adds a separated bike lane on 1 side of structure with shift of centerline. Would require approval of non-standard, vehicular shoulder and travel lane widths. Involves widening on both sides of structure.	$21 - $31
	FEATURE 1.4	Class II or III Deck Widening with Pier Cap Extension	Improvement of shoulders to standard widths on both sides of structure.	$17 - $25
SEGMENT 2	FEATURE 2.1	Class I, Off-Roadway Path (PM 3.6/4.7)	Off roadway path located along southbound roadside. Maintenance agreement will be required.	$1.6 - $2.5
	FEATURE 2.2	Class I, Off-Roadway Path (PM 2.9/3.6)	Off roadway path located along southbound roadside. Maintenance agreement will be required.	$1.2 - $1.8
	FEATURE 2.4	Class II or III Bikeway (PM 1.7/5.4)	Minor roadway construction work anticipated at railroad crossings as the existing shoulders meet minimum shoulder widths.	$160 - $240 (in thousands)
SEGMENT 3	FEATURE 3.1	Class II or III, Widened Shoulders	Shoulders widened on both sides of roadway. Wetland impacts and utility relocation costs.	$4.0 - $6.0
SEGMENT 4	FEATURE 4.2	Class I, Off Roadway by Lane Reduction	Elimination of one of the four lanes to provide room for a Class I bikeway. Feature would require point of connection to similar facility to be viable.	$1.8 - $2.8
	FEATURE 4.3	Class II or III, Shoulder Widening (PM 7.2/7.4)	Over a very short stretch of the segment the shoulders would be widened on both sides of roadway to match Feature 3.1.	$600 - $900 (in thousands)

Segment 1 (PM 0.0/1.7)

To make improvements for non-motorized users along Segment 1, this study investigated several deck widening strategies for the three existing bridges. In all, seven different design concepts were analyzed. Some of the viable concepts would result in a separated Class I bikeway while others would provide additional shoulder width for a Class II or III bikeway. In either case, significant structural improvements would be required and varying degrees of environmental impacts would be involved. After conducting the engineering and environmental analysis, three of the seven concepts were determined to be non-viable. The remaining four concepts, which would provide either Class I, II or III bikeways, would be accomplished by supporting the widened decks with new foundations or by extending the pier caps. Detailed discussion on all of the concepts can be found within Attachment O and a summary description of the more viable concepts is included below.

Feature 1.1, Class I, (PM 0.0/1.7)

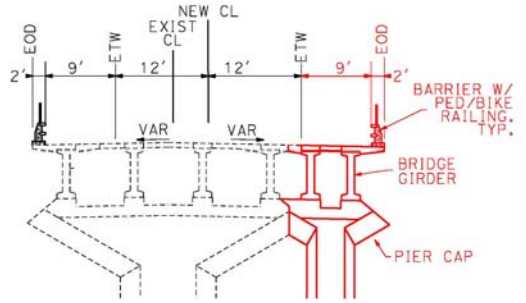
The concept of this feature is a proposal to widen the existing bridge decks to provide a separated path along either the northbound or southbound edge of traveled way. The separated path would allow for two-way bike and pedestrian traffic and would be 8' wide with bike railings on each side of the path to prevent bike departures. The barrier separating vehicular traffic from the non-motorized path would prevent vehicles from entering the path as well. The existing shoulder widths and the vehicular traveled ways would remain at their current widths, which would require approval of a design exception for being less than standard. Construction of this alternative would require new piles and column supports. This design would benefit non-motorized users as it would fill a gap in the route connectivity between Eureka and Arcata and would address a long standing desire to provide a safe alternative to the 101 Corridor.



Feature 1.1
Class I,
Deck Widening with New Foundations

Feature 1.2, Class II or III, (PM 0.0/1.7)

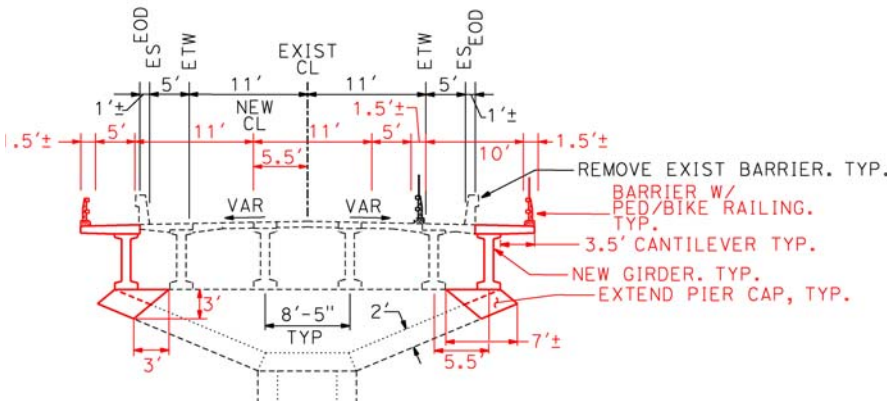
This concept proposes widening one side of the existing bridge decks to provide additional shoulder width along both the northbound or southbound edges of traveled way. These wider shoulders would then be used to provide standard shoulder widths of either a Class II or III bikeway. With the widening, the shoulders on each side would be increased to approximately 9'. The existing traveled ways could be widened to standard width. The centerline would be shifted towards the widened deck side and the crown of the deck could be reestablished at the new centerline with polymeric concrete. The existing barriers on each side would be replaced with standard barriers which would include bike railing. The structural improvement to the bridge itself would be identical to Feature 1.1.



Feature 1.2
Class II or III,
Deck Widening With New Foundations

Feature 1.3, Class I, (PM 0.0/1.7)

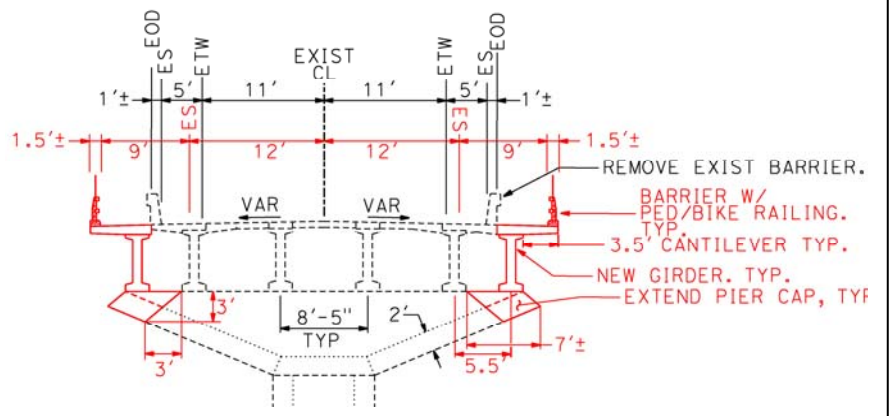
This feature proposes widening the existing bridge decks to provide a separated path along either the northbound or southbound edge of traveled way for two-way bike and pedestrian traffic. The path would be 10' wide and would have bike railings on each side to prevent bike departures. The barrier separating vehicular traffic from the non-motorized path would prevent vehicles from entering the path. The existing shoulder widths and traveled ways would remain at their current width as shown, which would require approval of a design exception. Construction of this alternative would require extending the pier caps on each side as shown in graphic to the right.



Feature 1.3
Class I, Deck Widening with Pier Cap Extensions

Feature 1.4, Class II or III, (PM 0.0/1.7)

This concept proposes widening both sides of the existing bridge decks to provide wider shoulders in both northbound and southbound directions of travel. These wider shoulders would then be used to provide standard shoulder widths of either a Class II or III bikeway. With the widening, the shoulders on each side would be increased from their existing 5' widths to approximately 9'. The traveled lanes could be increased to the standard 12'. The outside bridge railings would be replaced with standard bridge rails and would also include bike railing. To accomplish deck widening, the existing pier caps would be extended and new girders would be constructed to support the deck as shown in the figure to the right. The centerline would remain in place.



Feature 1.4
Class II or III, Deck Widening with Pier Cap Extensions

Segment 2 (PM 1.7/5.4)

Within Segment 2, one focus of the study is to provide improvements that benefit non-motorized users of the route that are passing through the Manila community. An example of through-users would be those using the route as part of the proposed California Coastal Trail (Humboldt County California Coast Trail Implementation Strategy, 2010) which intersects the route at Jackson Road (PM 6.02) and then coincides with the route's alignment until the route terminates in Eureka (PM 0.0). A second consideration is for improvements that would benefit non-motorized traffic crossing the route, especially in Manila. These types of improvements are addressed later in the next section of this report.

The ideal improvement for through-travelers in Manila would be to provide a detached, Class I bikeway along the route. However, this is difficult to accomplish as there are significant environmental impacts (wetlands, visual, archaeological, sensitive species, etc.) and engineering constraints (topographic, crossing safety, site distance clearance, maintenance commitments, policy restrictions, etc.) that make such a facility less viable along the entirety of Segment 2. As such, two short Class I trails were evaluated. These two trails would primarily benefit the Manila Community as they are located between the main intersections and would provide neighborhood-to-neighborhood access. Also considered was an attached Class I bikeway which would provide a means of avoiding or lessening environmentally sensitive areas. Lastly, Class II or III bikeways were evaluated for the entire segment. Detailed analysis of these four facilities is included in Attachment O and a summary of the most viable of the four is presented below.

Feature 2.1, Class I, Off-Roadway Path (PM 3.6/4.7)

Feature 2.1 is a detached Class I path that would meander along the roadside (Attachment D). Non-motorized traffic using this path would primarily include bicyclists and pedestrians, but could also include other types of non-motorized users. The path would be constructed of an asphalt surface and would provide gravel shoulders. Two-way, non-motorized traffic would be allowed and vehicular traffic would be prevented by placement of bollards at the path's intersections with cross roads. This separated path was analyzed between post miles 3.6 and 4.7 as this stretch has a wide right-of-way which affords the space to meander along the western roadside. Placement of the improvement here would provide the community of Manila with a means of connecting the west Lupin Avenue and west Peninsula Drive neighborhoods.

Feature 2.1 (PM 3.6/4.7)
Class I, Off-Roadway Path

Feature 2.2, Class I, Off-Roadway Path (PM 2.9/3.6)

Feature 2.2 is similar to Feature 2.1 as this improvement would be a meandering path along the roadside. As shown in Attachment D, this feature was analyzed between the intersection of the route with Peninsula Drive (PM 2.9) and Dean/Pacific (PM 3.6). The purpose of the installation would be to provide a non-motorized traffic connection between the central Manila area and the southernmost connection of Peninsula Drive. Because the existing right-of-way is access controlled, no access openings would be

provided with this feature and as a result, properties along the frontage of the highway would not be able to access the path directly from their parcels.

Feature 2.4, Class II or III Bikeway (PM 1.7/5.4)

Feature 2.4 is a consideration for the installation of a Class II or III bikeway along both the northbound and southbound shoulders of the highway. The primary scope of work with installing such a feature would include ensuring shoulder areas met standard widths and the railroad crossing near Sierra Pacific Lumber Mill (PM 5.2) was traversable.

Segment 3 (PM 5.4/7.2)

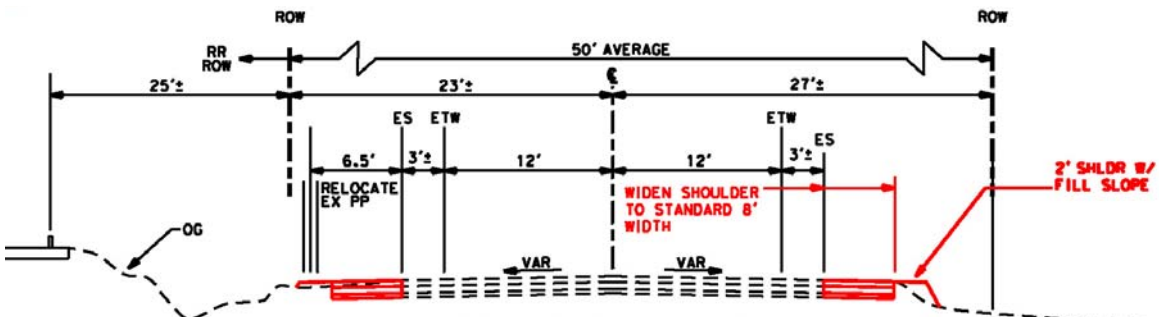
Within Segment 3, improvement strategies were evaluated for non-motorized users passing through the segment such as those accessing the proposed California Coast Trail. Ideally, a detached Class I bikeway along the route would be preferred for these users. However, the focus of the study is on improvements within the right-of-way and within Segment 3 the right-of-way is prohibitively narrow for such an improvement. If at a later time consideration was given to acquire right-of-way for a bikeway, the installation of such a path would be constrained by the adjacent railroad on one side and wetlands on the other.

With the right-of-way being prohibitively narrow for a **detached** Class I bikeway, consideration for installing an **attached** Class I bikeway, similar to that which was discussed for Segment 2, was evaluated for Segment 3. As was the case within Segment 2, installing an attached Class I would require a design exception for placement of barrier in the clear recovery zone and would introduce issues with site distances at intersections. Consequently, installation of an attached bikeway is not viable.

The third alternative evaluated was widening the shoulders of the facility to standard width for either a Class II or III bikeway. This feature is generally described below and all three alternatives are described in greater detail in Attachment O.

Feature 3.1, Class II or III, Widened Shoulders (PM 5.4/7.2)

Feature 3.1 calls for widening the existing 2’ to 4’ shoulders along both northbound and southbound lanes of Segment 3 to a standard 8’ shoulder width. This additional width would meet the standard with of either a Class II or III bikeway. In either case, widening the shoulders would address one of the primary deficiencies along the route. Some utility poles will require relocation due to their close proximity to the highway. Costs for relocating these utilities, including right-of-way costs, would be the responsibility of the affected utility companies. A typical section of the proposed improvement is highlighted below and a plan view of the feature is shown on Attachment F.



Feature 3.1
Class II or III, Widened Shoulders

Segment 4 (PM 7.2/8.3)

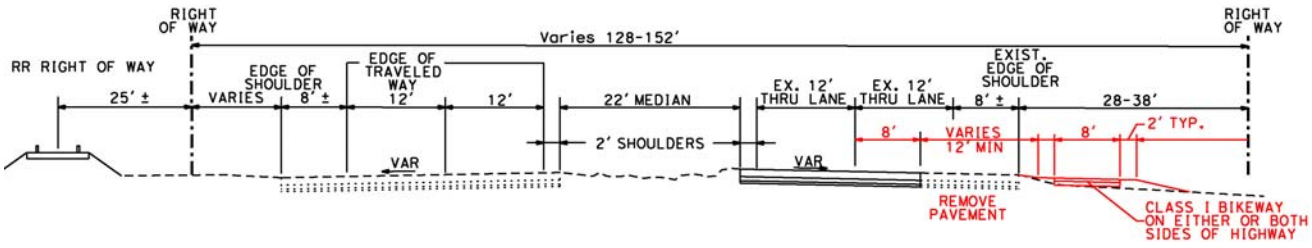
The focus of the improvement features considered within Segment 4 are for non-motorized traffic users passing through the segment. Selection of improvements that would complement those which were installed with the City of Arcata's Gateway Project was also taken into account as that project involves non-motorized traffic improvements (Attachment G2).

Along Segment 4, three types of bike improvements were evaluated in this study. The first type of improvement is a detached Class I off-roadway path which would be installed along the roadside. The second is also an off-roadway Class I bikeway, but the space for the facility would be created by eliminating one of the four lanes from the roadway section. Lastly, Segment 4 was examined for opportunities to improve the existing facility to a Class II or III bikeway. These three alternatives are detailed in Attachment O and the most viable of the three is summarized below.

Feature 4.2, Class I, Off Roadway by Lane Reduction (PM 7.47/8.16)

Feature 4.2 is a consideration for installing a Class I bikeway along the northbound section of the highway. The northbound side is preferred for this feature because this side is reduced from two lanes to one as the outside lane is eliminated with the City of Arcata's Gateway project's bike lane. With Feature 4.2, the space for the Class I bikeway would be afforded by eliminating the outside lane all together and using the area for a shoulder and a landscaped strip which would provide the clear recovery area separation. The improvement would involve removal of a portion of the existing pavement and placement of fill to support the path.

Essential to this proposal is a need for the path to connect to a similar facility. That is, such a path would need to provide continuity in the system and not strand non-motorized traffic in between logical points of connection or force users to unnecessarily cross the highway. One such connection would be to the City of Arcata's north/south bike path project.



Feature 4.2
Class I, Off-Roadway by Lane Reduction

Feature 4.3, Class II or III, Shoulder Widening (PM 7.2/7.4)

Feature 4.3 only applies to a short portion where the existing shoulders are less than the standard width. The proposed widened shoulders of Feature 4.3 would be used to establish a Class II or III bike lane and is a continuation of Feature 3.1. As such, all discussion found within the section addressing Feature 3.1 applies here. Beyond these post mile limits, the existing shoulder widths meet standard dimensions.

VII. Manila Transportation Enhancements

Overview

Manila transportation enhancements include improvements that can increase mobility for non-motorized users, but also include improvements that intend to affect a driver's behavior in such a way that a driver becomes more aware of the conditions and ideally, reduce their speed as a result. These types of features are often referred to as traffic calming improvements. All of the transportation enhancement improvements are located within the community of Manila. The one exception is the proposed treatment at the three-way intersection at PM 2.0 (west of the Samoa Bridges), where a roundabout or signal is proposed as part of the traffic mitigation measures described in the Samoa Town Master Plan. Neither of the measures at PM 2.0 would be installed until the intersection meets signal warrants.

Improvement Installation Strategy

Some types of traffic calming improvements can be constructed in Manila without meeting certain criteria such as traffic signal warrants, vehicular speed thresholds, or having documented collision histories as justification for their construction. Other improvements such as raised medians or curbs require a reduction in the prevailing speed prior to their approval because installation of these types of features on a high speed facility could increase risk to users and liability for the State. For these reasons, a strategy has been developed to introduce the traffic calming improvements sequentially.

The first level or initial improvements consists of visual improvements that alert drivers to a change in their surrounding conditions and convey to them a sense of arrival. These traffic calming improvements have demonstrated moderate reductions in the prevailing speeds. With the successful reduction of the speeds through implementation of initial traffic calming features, additional improvements can be introduced. Examples of future improvements include raised curb medians, narrowed lanes and crosswalks. These types of improvements require drivers to be more engaged with the facility and have the potential to further reduce the prevailing speeds whilst also improving accessibility. Consideration was given to assuring that initial improvements did not conflict with future improvements thereby, avoiding removal of the initial improvements. Selecting initial and future improvements that complement each other was also considered. For example, planning the landscaping treatments so these improvements won't conflict with improvements installed afterwards such as a Class I bikeway. There are some cases where replacement or removal of an initially installed improvement is the strategy. One example is the plan to install painted medians and islands and then in the future, replace these with curbed medians and islands after the prevailing speeds are reduced.

Some improvements need to be installed later because they require that other improvements be in place beforehand. For example, curbed medians in Manila are proposed as a future improvement because their installation would require a reduction in the existing speeds as a condition of their approval. Similarly, some of the improvements have been classified as future installations because current conditions either do not meet warrants or existing policy does not allow such an improvement.

Design Guidance References for Transportation Enhancements

In evaluating the feasibility of the proposed improvements, the Caltrans Highway Design Manual (HDM) was used as a primary reference to establish design criteria. Within this manual, design standards are established to maintain consistency and ensure that highway facilities meet driver expectations. These standards are categorized in order of importance in development of a safe highway system, and are referred to as Mandatory, Advisory, and Permissive Standards. Also included are considerations for the Federal Highway Administration's Controlling Criteria and other standards from the California Manual on Uniform Traffic Control Devices (CALIFORNIA MUTCD) and the Caltrans Traffic Manual. The

HDM defines a mandatory design standard as those considered most essential to achievement of overall design objectives. Advisory standards allow greater flexibility to accommodate design constraints or be compatible with local conditions on resurfacing or rehabilitation projects. Permissive standards are standards other than mandatory or advisory. Exceptions to Mandatory and Advisory standards are allowed, but only if approved through a process defined in the Department's Project Development Procedures Manual. For the improvements being considered with this study, discussion on the design exception requirements and their likelihood of approval are contained within the feasibility criteria section of each considered features' fact sheets (Attachment O, P & Q).

Environmental Impact Assessment

A Preliminary Environmental Analysis Report (PEAR) was prepared for the study and a summary of that document was provided earlier in Section VI of this report. As was the case with the non-motorized traffic improvements, the PEAR addresses the three "worst case scenario" options, in terms of potential environmental impacts within Segment 2. These were: a) roundabouts, b) Class I separated bike paths, and c) a combination of multiple minor enhancements such as gateway monuments, landscaping, and striping. These three were chosen because, from an environmental impact perspective, they represent the most substantial of the intersection treatments, non-motorized traffic improvements, and initial improvement groupings, respectively.

Summary

A table of recommended long and short term improvements for the Manila section of the highway was presented earlier in the Executive Summary. In addition to these improvements, other features were also considered, but are not being recommended because these were determined to be non-viable. These non-recommended improvements are tabulated below. Following this table, there are three sections that provide greater detail on the nature and purpose of the proposed improvements; detailed analysis of the features can be found in the fact sheets (Attachments P & Q). Layout maps showing the improvement locations are included as Attachments B & C.

Improvements Considered (Not Recommended)

Improvement	Location(s)	Summary Statement	Cost Range
Pedestrian Grade Separation	PM 3.75/3.94	A structure to provide non-motorized traffic a means of crossing the highway by either traversing over or under the traveled way. Not recommended due to high costs, significant visual impacts to the coastal zone and low volume of non-motorized traffic.	$2.9 - $4.4 (millions)
Bus Turnouts	PM 3.79	Turnouts along highway would provide centrally located stops and would eliminate the need for buses to enter local streets of Manila. Not recommended due to survey results indicating a lack of support from public and transit agency does not have plans to add stops on highway.	$1.0 - $1.4 (millions)

Initial Construction Improvement Features

(To encourage speed reduction in Manila)

The initial construction improvement features between post mile 3.35 and 4.68 have been selected to allow drivers to experience a series of changes as they approach and pass through Manila. The purpose of which is to influence a driver's perception of their surroundings, so they're aware they have entered the community of Manila and a reduction of their speed is needed. These improvements are composed of

features that are intended to calm traffic by indirectly affecting traffic flow. With successful reduction of the prevailing speeds, improvements that require direct driver engagement such as roundabouts and curbed medians can be implemented in the future.

Descriptions of each of the proposed initial improvements follow. Also included are the proposed post mile locations and range of costs for these features. Full details on feature's costs, impacts, feasibility, pros, and cons are included as Attachment P and proposed locations of all initial improvements are shown within the layouts of Attachment B.

Radar Feedback Signs, Segment 2 (PM 3.35 & 4.68)

Radar feedback signs are used to raise awareness of vehicle speed. This is accomplished by flashing a driver's measured speed on a changeable message screen posted below the speed limit sign. These types of installations have been used effectively on many State Highways. Caltrans recently completed a project that installed two of these devices along the SR 255 corridor.

Radar Feedback Sign

Gateway Monuments, Segment 2 (PM 3.6 & 4.1)

Gateway monuments are used to help communicate a sense of arrival to drivers and, as part of an improvement array, can contribute to a reduction of prevailing speeds. These features have been installed statewide under Caltrans' Gateway Monument Program and typically have features or themes that highlight a region's characteristics or a local artist's work. Installation of these features is recommended at both north and south entrances to the community. Gateway monument installations are usually done under cover of encroachment permit and maintained by local jurisdictions.

Gateway Monument

Landscaping, Segment 2 (PM 3.6 through 4.1)

Placement and selection of landscaping materials can also affect a driver's perception of their speed and can contribute to the array of features used to calm traffic and enhance visual cues to a driver. Along Segment 2, landscaping is proposed primarily along the southbound roadside between and at the approaches to the Dean/Pacific and Lupin/Victor intersections. The main issue and constraint with a roadside landscaping installation is locating the plant materials a safe distance from the highway and costs to maintain. Usually done with encroachment permit.

Roadside Landscaping

Painted Medians and Islands, Segment 2, (PM 3.64 - 3.94)

Medians are the portion of a divided highway separating the traveled ways from opposing traffic. Islands are areas between traffic lanes for control of vehicle movements or for pedestrian refuge. Either of these features can be formed with raised curbs or may be painted on the pavement surface. Painted medians are proposed rather than raised curbs because the prevailing speeds are too high to permit raised curb installation. The roadbed will require widening to maintain the existing lane and shoulder widths while providing a median. The primary issues and constraints with median and island installations include the environmental impacts associated with widening the paved roadway to accommodate medians.

Painted Medians

Optical Speed Bars, Segment 2, (PM 3.55-3.65 & PM 4.16-4.26)

Optical speed bars are pavement markings in a converging pattern that give drivers the perception that their vehicle is accelerating and causes the driver to reduce their speed. This is accomplished by having the distance between each bar become shorter than the previous. The net effect is a sense that one is accelerating.

Both a northbound and a southbound field of markings are proposed at the approaches to Manila. Costs for these pavement marking installations are minimal and was included in the 2012 overlay project. Before and after installation speed surveys will be performed to measure these features effectiveness.

Optical Speed Bars

Colorized Shoulders, Segment 2 (PM 3.54 through 4.16)

The colorizing of shoulders along a roadway may be done for aesthetics, bike lane marking, parking area demarcation or traffic calming. In this application, colorized shoulders are being considered as part of a traffic calming array.

Colorized shoulders are proposed along both the northbound and southbound approaches in Manila and in between the main intersections. A specific color would be determined with the inception of an actual project. The primary issues and constraints of a colorized shoulder installation are related to maintenance costs (cleaning and reinstalling).

Colorized Shoulders

Safety Lighting, Segment 2 (PM 3.64 and 3.94)

Safety lights or street lights are installed at intersections or other locations where illumination of roadway features is desired. The purpose of illuminating these areas include reduction of nighttime collisions or criminal activities and to provide greater visibility.

Justification for State funding of the installation of a safety light on a State Highway is specified in the State Traffic Manual. Based on the criteria, the Manila intersections do not meet the warrants. However, local agencies may install and maintain such lighting if the costs are funded through a source other than the State. Identifying a local agency to sponsor a safety lighting installation is the primary constraint with this feature.

Safety Lighting

Pavement Marking (lane narrowing), Segment 2 (PM 3.6 through 4.1)

Pavement markings are used to demarcate the extent of the traveled way and to separate traffic flows (bicycles, cars, pedestrians, opposing traffic, etc). In some locations on both local roadways and state highways, these markings are located in such a way that they demarcate a narrower lane width. The purpose of which is to either increase shoulder areas or reduce a drivers perception of available traveled way so the driver feels constrained and is inclined to reduce their speed. As a traffic calming tool, lane narrowing has had mixed results.

Pavement Marking (lane narrowing)

Future Construction Improvement Features

(To be considered after speeds have been reduced or other criteria met)

Future improvements are either classified as intersection traffic control treatments or features unrelated to intersection treatments. Unlike the initial improvement features which are part of a complimentary array, selection of one the future intersection improvements will eliminate the need for others as these improvements are mutually exclusive. For example, installing a signal would preclude any other intersection treatment installation at the same specific location. Because of this, the intersection treatments could be compared against each other for value/benefits, costs, environmental impacts, and operational benefits. For the purpose of comparing these similar treatments, a relative assessment method was developed with this study (Attachment N).

Locations of various future improvement features are shown graphically within Attachment C and excluding the 3-way intersection improvements at post mile 2.0, all of the future improvements are located within post mile range 3.6 to 4.1. Except for the intersection treatments or crosswalks, the future improvements fit into the traffic calming array described earlier and extend from post mile 3.35 to 4.68. Placement of the features is expected to further calm traffic through Manila. They were not included as initial improvements because existing speeds, collision history, policy and/or warrants do not presently allow for their installation. The specific details on these constraints are addressed in the fact sheets found in Attachment Q. Basic information such as costs, location, and an improvement description are provided in the subsections below.

Traffic Signal or Roundabout (Samoa), Segment 2 (PM 2.0)

The descriptions below for traffic signals and roundabouts apply to the proposal to install either of these features at the three-way intersection of SR 255 and New Navy Road. Installation of either a roundabout or a signal at this intersection has been included as a long term item because this improvement would only be needed when the former company town of Samoa is redeveloped. Costs for project development and construction were not calculated because these costs would be the responsibility of the developer. Details on the need and conditions of this installation are included in the discussion summary of the 2007 Samoa Town Master Environmental Impact Report (see Attachment K).

Curbed Medians and Islands, Segment 2 (PM 3.64 through 3.94)

The purpose of the earlier described painted medians and islands apply to curbed medians and islands. Due to high prevailing speeds, painted medians are proposed as initial improvements and after a reduction in the prevailing speeds through initial improvement efforts, painted medians may be replaced with raised curbs.

Curbed Medians & Islands

RANGE OF INTERSECTION TREATMENTS

Roundabouts (Manila), Segment 2 (PM 3.64 and/or 3.94)

Modern roundabouts are one-way circular intersections with specific control features that distinguish them from their predecessor the traffic circle. Compared to other intersection improvements, roundabouts have demonstrated a positive effect on reducing the severity of collisions and add less of a system delay.

Roundabouts were considered at the two primary intersections within Manila. However, because neither of these locations currently meet signal warrants, they are considered to be an improvement that could be pursued when the existing conditions change or policy changes.

Roundabout

Traffic Signals (Manila), Segment 2 (PM 3.64 and/or 3.94)

Traffic signals are control devices which are installed to aid pedestrians, bicyclists, and motor vehicles through intersections. When properly used, they are valuable devices for reducing the frequency and severity of certain types of collisions.

In Manila, traffic signals were considered at the two primary intersections. However, because neither of these locations currently meet signal warrants, they are considered to be an improvement that could be pursued when the existing conditions change or policy changes

Traffic Signal

All Way Stops (Manila), Segment 2 (PM 3.64 and/or 3.94)

All way stops or 4-way stops are traffic control devices and can reduce the frequency and severity of certain types of collisions. The California MUTCD delegates the authority to erect a stop sign facing highway traffic to the District Director and based on engineering judgment.

In Manila, all way stops were evaluated for the two primary intersections. However, because neither of these locations currently meet signal warrants, they are considered to be an improvement that could be pursued when the existing conditions change or policy changes

All Way Stop

HAWK Crosswalk, Segment 2 (PM 3.7/3.9)

The High-intensity Activated crossWalK (HAWK) or Pedestrian Hybrid Beacon is similar to a traffic signal, but the HAWK signal head arrangement consists of three lamps-two red on top and one yellow below. These devices have been added to the MUTCD as an alternative to providing a pedestrian crossing at a location that does not meet signal warrants or at a location that meets signal warrants, but a decision is made to not install a traffic signal. These devices have warrant requirements based on vehicular and pedestrian traffic volumes.

HAWK Crosswalk

In Manila, the HAWK crosswalk is proposed either at or between the two primary intersections. A HAWK signal in Manila is considered a future improvement because non-motorized improvements such as sidewalks or paths should be in place prior to a HAWK installation. HAWKs are also considered to be a future improvement because this section of SR 255 does not currently meet the HAWK warrants of the California MUTCD.

Standard Crosswalk, Segment 2 (PM 3.64 and/or 3.94)


Standard Piano Key Crosswalk

Crosswalk markings define and delineate paths for pedestrians to cross roadways. Although mid-block crosswalk are not encouraged, crosswalks also help alert drivers of pedestrian crossing areas when the crossing is not located at an intersection controlled by a traffic control device such as stop signs, signals, or yield signs.

For the Manila segment of SR 255, either or both of the primary intersections are the locations where crosswalks could be located with the appropriate condition. Midblock crossing could also be considered. Standard crosswalks are considered as a future improvement due to current vehicular speeds and pedestrian volumes.

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Improvements Considered (Not Recommended)

Bus Turnout, Segment 2 (PM 3.79)

Typically, bus turnouts are located in urban settings where it is desirable to have buses pull out of the travel way so through traffic is not impeded during loading and unloading of passengers. Turnouts should be installed with other supporting infrastructure such as sidewalks or paths so that reasonable access to the turnouts is provided.

Bus Turnout

The ideal location for bus turnouts in Manila would be midway between the two primary intersections. Constructing turnouts here provides for good sight distance and reduces conflicts with traffic movements at the intersections. Also, locating turnouts here would centralize the feature to midway between the two main non-motorized crossings of the highway

The lack of non-motorized access such as sidewalks, crossings or separated paths along the highway is the primary issue or constraint with installing bus turnouts. The transit agency does not currently have plans to stop on SR 255 as their main stops are located on the local streets within the community of Manila.

Pedestrian Grade Separation Crossings, Segment 2 (PM 3.75/3.94)

Overcrossings and undercrossings provide a means for pedestrians and bicyclists to safely cross a roadway without interfering with the flow of vehicular traffic or waiting for gaps between traffic. Overcrossings are structures that provide grade separation between vehicular traffic and non-motorized traffic by routing the non-motorized traffic over the roadway on a bridge structure. Undercrossings similarly separate modes of traffic, but route non-motorized traffic under the roadway through structures such as large reinforced concrete boxes. In either case, these structures are designed to meet the requirements of the Americans with Disability Act (ADA) and the criteria within the HDM.

In Manila, both an overcrossing and an undercrossing have been considered. The location of either type should preferably be where the majority of non-motorized traffic crosses the highway. Currently, this occurs at the Lupin/Victor intersection, but because of the amount of ramp needed to clear the road the actual structure may need to be located between the two primary intersections. The primary constraints with either of these structures are high costs, low volume of non-motorized traffic, and engineering/environmental limitations.

Undercrossing

VIII. Other Facility Considerations

Lowering of Posted Speeds

Frequently, the question of lowering the speed limit for the section of SR 255 passing through Manila is asked. Sometimes this question is based on the belief this could be done if the route classification was changed or if the highway was relinquished to the county. The answers to these two approaches are discussed after this subsection, while the focus of this subsection is to explain how speed limits are set.

The setting of speed limits can be controversial and requires a rational and defensible determination to maintain public confidence. Speed limits are normally set near the 85th-percentile speed that statistically represents one standard deviation above the average speed and establishes the upper limit of what is considered reasonable and prudent. As with most laws, speed limits need to depend on the voluntary compliance of the greater majority of motorists. Speed limits cannot be set arbitrarily low, as this would create violators of the majority of drivers and would not command the respect of the public.

The requirements for establishing speed limits are outlined within the California Vehicle Code (CVC) and the California Manual of Uniform Traffic Control Devices (California MUTCD). Legislators are responsible for the language in the CVC, while the Department of Transportation and the California Traffic Control Devices Committee are responsible for the standards and specifications found in the California MUTCD.

Section 22349 of the CVC provides for maximum speed limits of 65 mph on State highways (except for 70 mph for freeways), and 55 mph on two-lane, undivided highways with not more than one through lane of travel in each direction.

The Basic Speed Law, used by all fifty states as a basis for speed regulation, states that "No person shall drive a vehicle upon a highway at a speed greater than is reasonable or prudent having due regard for weather, visibility, the traffic on, and the surface and width of, the highway, and in no event at a speed which endangers the safety of persons or property." The principle of the Basic Speed Law is that drivers will adjust their speeds as conditions warrant.

Speed zones (other than the above statutory maximum speed limits) shall only be established on the basis of an engineering and traffic survey (E&TS) that has been performed in accordance with traffic engineering practices. The engineering study shall include an analysis of the current speed distribution of free-flowing vehicles.

The process for setting reduced speed zones for both State and local agencies is governed by law, and guidance is provided in the California MUTCD, which states in part: "CVC Section 627 defines the term *Engineering and traffic survey* and lists its requirements. Standard: An engineering and traffic survey (E&TS) shall include, among other requirements deemed necessary by the Department, consideration of the following:

A. Prevailing speeds as determined by traffic engineering measurements

B. Collision records

C. Highway, traffic, and roadside conditions not readily apparent to the driver.

When a reduced speed limit is to be posted, it shall be established at the nearest 5 mph increment of the 85th-percentile speed of free-flowing traffic, except as shown in the two Options below:

Option 1. The posted speed may be reduced by 5 mph from the nearest 5 mph increment of the 85th-percentile speed, in compliance with CVC Sections 627 and 22358.5.

Option 2. For cases in which the nearest 5 mph increment of the 85th-percentile speed would require a rounding up, then the speed limit may be rounded down to the nearest 5 mph increment below the 85th-percentile speed, if no further reduction is used. Refer to CVC Section 21400(f).

Stated as a standard: "If the speed limit to be posted has had the 5 mph reduction applied, then an E&TS shall document in writing the conditions and justification for the lower speed limit and be approved by a registered Civil or Traffic Engineer. The reasons shall be in compliance with CVC Sections 627 and 22358.5."

Section 22354.5 of the CVC sets out the requirements to consult with the California Highway Patrol and also to consider the input from local agencies. It states the following: "Speed Limit Change: Consultation and Consideration requirements:

(a) Whenever the Department of Transportation determines, upon the basis of an engineering and traffic survey, to increase or decrease the existing speed limit on a particular portion of a state highway pursuant to Section 22354, it shall, prior to increasing or decreasing that speed limit, consult with, and take into consideration the recommendations of, the Department of the California Highway Patrol.

(b) The city council or board of supervisors of a city or county through which any portion of a state highway subject to subdivision (a) extends may conduct a public hearing on the proposed increase or decrease at a convenient location as near as possible to that portion of state highway. The Department of Transportation shall take into consideration the results of the public hearing in determining whether to increase or decrease the speed limit."

A posted speed limit lower than a rate justified through an E&TS would establish what is defined as a speed trap in the CVC. Where a speed trap exists, enforcement of the artificially low limit by use of radar or other electronic devices can be challenged in court and the violation is likely to be overturned.

The CVC prohibits "speed traps" in Section 40801, and defines them in Section 40802, which states in part: "…A 'speed trap' is either of the following: (A) A particular section of a highway measured as to distance and with boundaries marked, designated, or otherwise determined in order that the speed of a vehicle may be calculated by securing the time it takes the vehicle to travel the known distance. (B) (i) A particular section of a highway or state highway with a prima facie speed limit that is provided by this code or by local ordinance…if that prima facie speed limit is not justified by an engineering and traffic survey conducted within one of the following time periods, prior to the date of the alleged violation, and enforcement of the speed limit involves the use of radar or any other electronic device that measures the speed of moving objects: (I) Except as specified in subclause (II), seven years. (II) If an engineering and traffic survey was conducted more than seven years prior to the date of the alleged violation, and a registered engineer evaluates the section of the highway and determines that no significant changes in roadway or traffic conditions have occurred, including, but not limited to, changes in adjoining property or land use, roadway width, or traffic volume, 10 years."

Research indicates that artificially lowering the posted speed limits has almost no impact on driver behavior and therefore, do not reduce prevailing traffic speeds. As an alternative, a technique of adding traffic calming features to a facility is commonly used and studies have shown this approach has had better success. Because these measures have yielded more effective results in reducing traffic speeds, these techniques are recommended in the previously detailed initial improvement section of this study.

Conversion of Expressway to Conventional Highway

The Highway Design Manual (HDM) defines an expressway as "*an arterial highway with at least partial control of access, which may or may not be divided or have grade separations at intersections.*" The HDM defines a conventional highway as "*a highway without control of access which may or may not be divided. Grade separations at intersections or access control may be used when justified at spot locations."* The main difference between the two is that expressways have partial access control and conventional highways have no access control.

Segment 2 is classified as an expressway because controlled access right-of-way was obtained in the mid 1960's for the construction of the highway as a county route. After completion of the construction of the Samoa Bridges in 1971, the state route was extended to include the portion from PM 2.0 to 8.3 and was formally adopted as part of the State Highway System. While Segment 2 of SR 255 is designated as an expressway, the route mostly serves local traffic as an intra-regional route rather than an inter-regional route serving traffic passing through the area.

The CA MUTCD and the CVC make no distinction between an expressway or a conventional highway with regard to the conditions required to lower the speed limit. Therefore, changing the designation from expressway to conventional highway will not change the requirements for setting speeds.

Relinquishment of Highway

Route relinquishment is the act of turning over the property rights, liability and maintenance responsibilities of a portion of a state highway. There are three types of relinquishments: relinquishment by legislative enactment, relinquishment by superseding with a new state highway, and relinquishment of collateral facilities. Of these three types, relinquishment by legislative enactment would be applicable to the SR 255 as this route could be viewed as one that no longer serves inter-regional or statewide transportation needs. The other two types of relinquishments apply to different situations where a route is being realigned or where a

temporary improvement is no longer needed as part of the SHS such as a frontage road that was used as a detour. The process of route relinquishment is detailed in the Streets and Highways Code and in the department's Project Development Procedures Manual.

There is a belief by some that route relinquishment would allow greater flexibility in the types of improvements that can be installed along the facility. While local agencies may tend to be less constrained by State policies and standards such as some aspects of roadside non-motorized traffic improvements, local agencies would still be required to use the same design guidance as the State for roadway features.

With regard to posted speed limits, the California Vehicle Code (CVC) allows for greater flexibility in establishing speed limits on local roads. For instance, the Section 627 of the CVC allows local jurisdictions to consider residential density and/or bicycle and pedestrian safety as additional factors in establishing a speed limit through an E&TS. Even if SR 255 was relinquished, the characteristics of the route would not change and it is unlikely this section of the CVC could be applied.

The first step in the legislative relinquishment process requires either a local agency request or Department determination that a route does not serve regional or statewide transportation needs. Caltrans has met with the County and the County has indicated they would potentially accept the route providing that maintenance funding was continued in perpetuity.

IX. Community Involvement

Public outreach efforts for this project began in the spring of 2009 with a series of meetings between Caltrans staff, community leaders, and members of both private and public groups. The purpose of these meetings was to inform these agencies and stakeholders of the study and provide the groups with an opportunity to provide feedback on the study.

The first public meeting was held at the Community Center in Manila on January 27, 2010 and was attended by approximately 50 people. The meeting introduced the public to the study and the concepts being considered and provided attendees an opportunity to ask questions and recommend additional concepts.

A second public meeting was held at the Manila Community Center on February 15, 2012. This meeting provided community members an opportunity to engage staff, review the findings of the study and make comments on the scope of the study.

A compilation of all comments from these meetings is included as Attachment I.

X. Funding

Because of the broad nature of improvement options proposed in this report, there are several funding programs that may be used to finance these improvements. These funding sources come from federal and state government programs as well as development mitigation fees or local and regional government programs.

In general, the majority of state and federal governmental programs fall into two categories: programmed transportation funds and competitive grant programs. The bulk of the programmed transportation funds favor vehicular improvements and the competitive source programs primarily support community enhancement and non-motorized traffic improvements. In most cases, both of these programs require a varying contribution level from local funding sources. Typically, the fair share amount for local projects is between 0% and 15%. Programmed transportation fund sources also tend to allow for project development while competitive source funding programs usually require a higher level of preliminary project development funding.

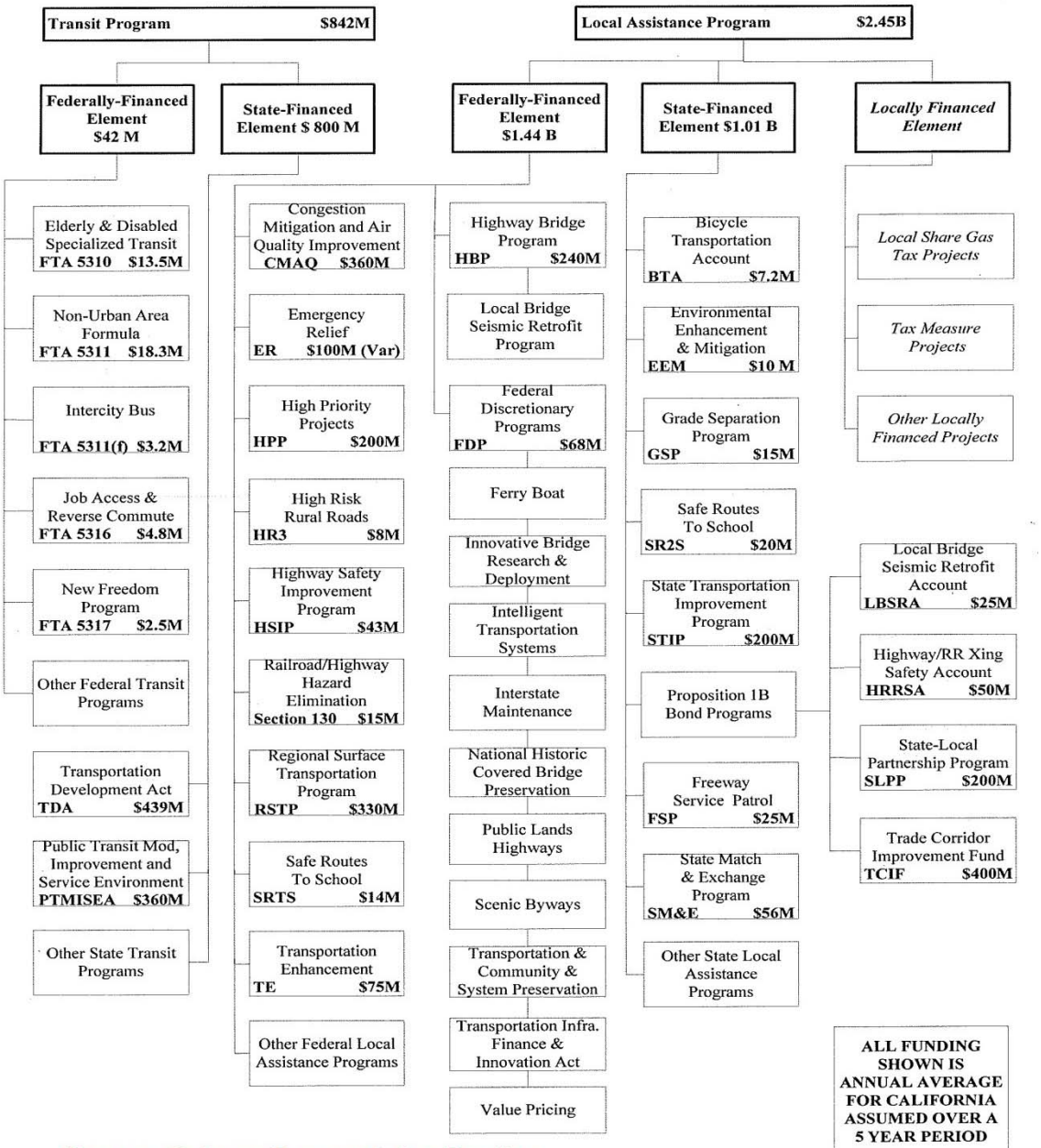
The Samoa Town Master Plan and Master Environmental Impact Report (Attachment K) have identified two traffic related impacts that require mitigation. The first impact as a result of the redevelopment of Samoa is the increased vehicular traffic through Manila and the corresponding effects on this community. The second is the impact the redevelopment of Samoa would have on the highway at the T-intersection located at PM 2.0. The Master Environmental Impact Report recommended $180,000 in mitigation costs for the impacts to the Manila community. According to that report, these impact fees would be used toward a signal or roundabout improvement at PM 2.0 described in the Manila Communities Transportation Plan. This money would be due after Phase II of the Samoa Plan. According to the Master Environmental Impact Report, these improvements would be required as a result of the Samoa Plan and consequently would be fully funded by the developer. The report also stated these improvements would be required 7-10 years into the plan.

Bus turnouts may be funded through federal mass transit grant sources.

The following table, which is in transition as several of the federal programs are either closed or are being phased out, provides a matrix that highlights possible funding sources available for development and construction of these improvements.

TRANSPORTATION FUNDING OPPORTUNITIES GUIDEBOOK **EXHIBIT 5**

State and Federal Programs Available for Local Transportation Projects



Source: Caltrans Transportation Funding Opportunities Guidebook (August 25, 2008)

XI. Attachments

A. Location Map
B. Initial Manila Transportation Enhancements
C. Future Manila Transportation Enhancements
D. Segment 1 Non-motorized Traffic Improvements
E. Segment 2 Non-motorized Traffic Improvements
F. Segment 3 Non-motorized Traffic Improvements
G. Segment 4 Non-motorized Traffic Improvements
H. Cost Estimates
I. Public Comments
J. Preliminary Environmental Analysis Report
K. References
L. Traffic Counts
M. Advance Planning Study
N. Score Sheets
O. Non-motorized Traffic Improvements Fact Sheets
P. Initial Manila Transportation Enhancements Fact Sheets
Q. Future Manila Transportation Enhancements Fact Sheets
R. Collision Data