

2. Identification and Evaluation of Potential Improvements

The first section of this Chapter summarizes guidance from prior plans and relevant policies and standards that will affect planning and design of improvements for the Pacific Coast Bike Route (PCBR) and California Coastal Trail (CCT). The second section presents potential improvements identified for sections of Route 1. It shows improvement design types in typical sections with a range of cross slopes and other characteristics. The Chapter also lists evaluation criteria and discusses how the criteria were applied to the project sections. Finally, the Chapter closes with the evaluation process that was used to consider the project section options. **Appendix A. Relevant Documents and References** reviews pertinent plan, policy, standards, and guidelines documents in more detail.

2.1. Guidance for Design Concepts

PCBR and CCT improvements in many of the highly-constrained and sensitive portions of State Route 1 could entail significant grading, retaining walls, and other major changes. The design concepts developed for this Study are generalized, and reflect typical responses to a wide range of conditions that occur along the route. Any of the potential improvements will require careful site-specific studies, planning, design, and environmental review to resolve.

Policies and Standards for Highway Shoulders

The design of bike route improvements that would widen State Route 1 shoulders and design of a potential parallel Coastal Trail or other pedestrian facility in the right-of-way raise important policy issues for Caltrans, Mendocino County, and the California Coastal Commission (CCC). These issues become particularly important for the design of bridge structures. The agencies' policies are in conflict in some respects, and resolving the specific acceptable design requires inter-agency discussions. Consensus on a preferred design is often only feasible to resolve on a project-specific basis.

CCC policy, which is reflected in Policy 3.6-20 of the Mendocino County Local Coastal Plan (LCP), is that "Paved 4 foot shoulders should be provided by Caltrans along the entire length of State Route 1 wherever construction is feasible without unacceptable environmental effects." The County of Mendocino's State Route 1 Corridor Study Update (2008) has similar recommendations, and also recommends maximizing available shoulder space on the west side of State Route 1, especially on uphill grades. Bicycle pull-outs and provision of 4 to 10-foot wide shoulder areas with all planned bridge replacement projects are also recommended.



The design of bike route improvements that would widen State Route 1 shoulders raises important policy issues.

The Caltrans Highway Design Manual (HDM) states that the standard minimum shoulder width for all state highways is 8 feet of paved shoulder (Table 302.1 Mandatory Standards for Paved Shoulder Widths on Highways)¹.

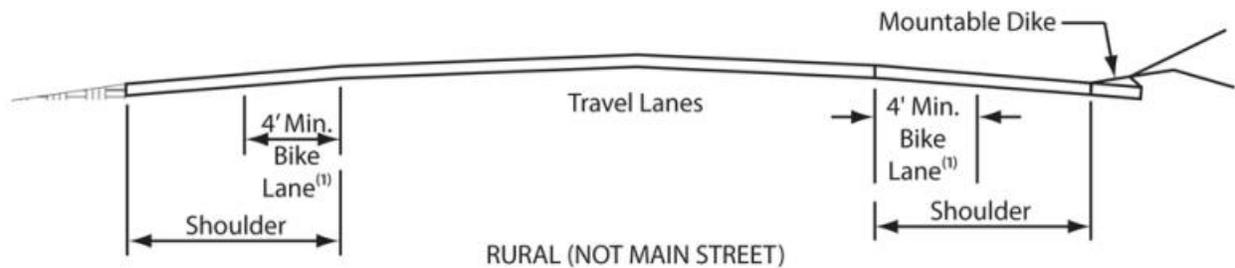


Figure 2-1. Caltrans Standards for Class II Bike Lanes on Rural Highways (Figure 301.2A)

The Route Concept Report for State Route 1, which is Caltrans’ “general plan” for improving the highway, states that the traveled way and usable shoulder must meet minimum width requirements that range from 24 to 32 feet, depending on traffic volumes (Section 2). However, the Report goes on to state that these standards may not be possible due to costs to widen narrow sections in rugged terrain, existing issues with vertical and horizontal alignment, and environmental impacts. It also cites the Mendocino Council of Governments’ Regional Transportation Plan Needs Section statement that, “Improvement of State Route 1 to provide four foot shoulders for bicycle traffic is an unresolved issue in Mendocino County.” However, this will still require an exception from standards from Headquarters for any specific project, which must be justified case-by-case.

Caltrans Design Information Bulletin 79-03, in Table 2, includes standards for shoulder width on conventional two lane highways based on traffic volumes (Average Daily Traffic, in vehicles, or ADT). On a bridge, the standards call for 4 foot shoulders where there is up to 1000 ADT and 8 foot shoulders when the ADT is above 1000. On highways, the threshold between the 4 foot shoulder standard and 8 foot shoulders is 3000 ADT.

A 4-foot paved shoulder may also be narrower than standards for bike facilities. Section 301.2 Class II Bikeway (Bike Lane) Lane Width in the HDM defines the minimum width for designated bike lanes as 4 feet (see Figure 2-1), but requires a 10-foot minimum shoulder width adjacent to abutment walls, retaining walls in cut locations, and noise barriers (Table 302.1, Footnote 8).

A Class III bike route is generally the existing condition along Route 1 in the project area. Class III bikeways are facilities where bicyclists share the roadway with motor vehicles, and may use paved shoulders of varying widths depending on what is available. In this scenario the shoulders could be widened to 4 feet or less, but the route would not be designated as Class II bike lanes; it would remain, technically, a Class III facility.

Standards and practices for design of the CCT in Mendocino County are maintained by the Mendocino Land Trust, which is principally responsible for CCT implementation in the County. Guidance is provided by the Strategic Plan for the California Coastal Trail in Mendocino County (2010).

¹ The exception is a 4-foot minimum shoulder on a slow-moving vehicle lane, such as a climbing or passing lane section only. California HDM Section 301.2(1) specifies that where bike lanes are present, shoulders must be a minimum of 4 feet wide, except adjacent to on-street parking (minimum 5 feet) or where posted speeds are greater than 40 mph (6 feet required).

2.2. Caltrans Active Projects

Caltrans, in partnership with federal, regional and local transportation agencies, has several bicycle and shoulder improvement projects in progress at various stages of development. Brief descriptions of Caltrans Active Projects are listed in the below sections. Within each phase of development, projects are listed from South to North, according to Caltrans postmile designations. Active projects are also illustrated in Figure 2-2. Additional information can be found on the Caltrans District 1 web page: <http://www.dot.ca.gov/dist1/dlprojects>.

Listing a project as an “active project” may be potentially misleading. Caltrans projects are funded and developed in phases with some risk associated with the transition to the next phase or step in the development process. From a conceptual planning origin, the first step in the development process is to create a project scope, which defines the project limits and improvements to be made. The scope includes the timeline and budget for the project as well. The scoping document is the basis for Caltrans’ request to fund project development, including design and environmental compliance. Construction funds are reserved when the project is funded for development; however, funds are not allocated until the environmental document has been approved and all of the regulatory permits have been obtained. As budget projections and revenues fluctuate, it may be necessary to revise project schedules and priorities. New projects are typically not initiated without an expectation that funds will be available.

The Pacific Coast Bike Route / California Coastal Trail Engineered Feasibility Study identifies conceptual improvements at a planning level. In order to implement the recommended improvements contained in this plan, a project will need to request funding under one of the existing funding sources for which it is eligible. Funding is typically made available on an annual or biennial basis and projects initiated in one funding cycle are advanced and prioritized in the order that they have been adopted into the work program. If funding does not allow for a project to advance to the next stage of development, either the project will wait until funding becomes available or other sources of funding may be pursued for implementation.

2.2.1. Planning

Planning level projects have been identified in a plan, but have not received funding for project-level studies. The PCBR/CCT Engineered Feasibility Study is not a Project Study Report. The segments recommended for improvement have been determined to be deficient for bicycle and pedestrian travel in a high-priority segment of the Route. These areas are described as independent segments and are ready for advancing to the first stage of formal project development.

Point Arena ADA

This project has been identified as a need, but not initiated formally for project development. Due to budget constraints this project is not expected to be ready for construction until 2017 or later.

PCBR/CCT EFS Recommended Improvement Segments

These projects will wait for further development until a funding source has been identified and will follow behind the two projects already funded for PSR preparation.

2.2.2. Advance Planning

After a project has been initiated, funding must be secured to prepare a Project Study Report (PSR). A PSR is a scoping document that Caltrans presents to the California Transportation Commission as the basis for requesting project funding. The PSR includes an engineering evaluation of sufficient detail to provide estimates of the work involved to deliver the project; including design, right of way estimates and environmental compliance. The scope of work also includes cost estimates and a schedule for completing design, environmental compliance and construction.

Caltrans has secured funding to study two segments on State Route 1 in Mendocino County for bicycle and pedestrian improvements: Downtown Gualala and Fort Bragg to Tenmile River. These studies assumed that funding would be available under the Transportation Enhancement (TE) program, which was the primary source of funding for bicycle and pedestrian improvements under the federal transportation funding bill, SAFETEA-LU.² After these projects were awarded Advance Planning funds, the federal government approved a new federal transportation funding bill, MAP-21,³ which changed the way transportation funds will be distributed. Under SAFETEA-LU, funds were set aside for the TE program for the exclusive use of TE-eligible projects. Under MAP-21, funds for bicycle and pedestrian improvements will remain eligible for funding, but these funds are no longer guaranteed and must compete with other critical programs such as bridge replacement and highway safety projects. In all likelihood, the PSRs for Downtown Gualala and Fort Bragg to Tenmile River will be completed but have to wait for future funding for design and construction. As long as these two projects do not advance, it is unlikely that any of the planning-level projects will advance to the PSR stage.

Downtown Gualala

The Project Study Report (PSR) is funded and underway and is expected to be completed by June 30, 2013. The PSR will be prepared for the development of two travel lanes, a left turn lane, bike lanes and raised sidewalks on both sides of State Route 1 through downtown Gualala. The project, as initiated, includes the installation of 8 crosswalks, raised pedestrian median refuges in 6 of the crosswalks and landscaping between Sundstrom and Center Streets on the east side of State Route 1.

Fort Bragg to Tenmile River

The PSR is to be completed by June 30, 2013. A Project Study Report (PSR) will be prepared for the widening of existing shoulders to 4 feet. The project is located on State Route 1, from the Pudding Creek Bridge (Postmile 62.10) north of Fort Bragg to a point 8.3 miles north near the intersection of State Route 1 with Ocean Meadows Circle (Postmile 70.40).

2.2.3. Project Approval and Environmental Document

The Project Approval and Environmental Document (PA&ED) is the concurrent process of designing the project and evaluating the environmental impacts of a project. The project can be approved and advanced for construction funding when the design plans meet the purpose and need for the project, the design plans are in compliance with State design standards, the CEQA/NEPA document has been approved, and all permits have

² SAFETEA-LU: Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

³ MAP-21: Moving Ahead for Progress in the 21st Century

been obtained from regulatory agencies. Once the PA&ED phase is complete and all permits have been received, the California Transportation Commission releases funds to construct the project.

Pacific Coast Bike Route Improvements, Phase III

The Pacific Coast Bike Route, Phase III project will add short sections of paved shoulder for bicycle travel on the southbound lane (western shoulder) of Route 1 between the community of Manchester and the community of Irish Beach (Postmiles 21.04 to 24.63). Pavement will be added to existing disturbed ground, where feasible, within the existing road prism. This project will not add shoulders throughout the entire project limits but will result in improvements at spot locations or in short segments where environmental impacts will be negligible. This project is in construction currently and will be completed in the summer of 2016.

Navarro Grade Guard Rail Safety Project

The Navarro Grade Metal-Beam Guard-Rail project will add or widen shoulders to four feet for the purpose of traffic safety but will have an added benefit for bicyclists. This project is expected to start construction in the summer of 2014.

Salmon Creek Bridge Replacement Project

Caltrans proposes to replace the Salmon Creek Bridge on Route 1 in Mendocino County. The current bridge, built in 1950, has a concrete deck over steel beams. The bridge is functionally obsolete because it is narrow and does not meet current standards for shoulders and guardrails. Maintenance costs are high because the steel beams must be repainted regularly. Salmon Creek Bridge is expected to begin construction in 2016. Additional information can be found on the Caltrans District 1 web page; the web address is provided below:

<http://www.dot.ca.gov/dist1/dlprojects/salmon/>.

Albion River Bridge Replacement Project

This project will evaluate improvements to the Albion River Bridge on Route 1 in Mendocino County near the town of Albion. This project is needed because the bridge is narrow, it does not meet current standards for shoulders and guardrails, and maintenance costs are high. Construction could begin as early as fall of 2016, although it could get delayed until summer of 2017. Additional information can be found on the Caltrans District 1 web page; the web address is provided below:

<http://www.dot.ca.gov/dist1/dlprojects/albion/>.

Mendocino Four Bridges Project

Caltrans proposes to widen the shoulders and install new bridge rails at Pudding Creek Bridge, Russian Gulch Bridge, Jack Peters Creek Bridge, and Little River Bridge. Pudding Creek Bridge, Jack Peters Creek Bridge and Little Rivers are expected to begin in construction in summer of 2017, while Russian Gulch Bridge is anticipated to start construction in summer of 2018, due to a more extensive environmental documentation process. Additional information can be found on the Caltrans District 1 web page; the web address is provided below:

<http://www.dot.ca.gov/dist1/dlprojects/men4bridges/>.

Seaside Creek Storm Damage Project

The California Department of Transportation (Caltrans) proposes to make storm-damage repairs to State Route 1 in Mendocino County. The project is located on Mendocino Route 1, from Postmile 70.2 to 70.8, between the City of Fort Bragg and the community of Westport. The project will realign a portion of the roadway and rebuild the structure section with four to eight-foot shoulders, construct a 700-hundred-foot-long soldier pile tie-back wall, replace the metal-beam guard-rail, and install a vehicle barrier with a bicycle rail. Space for parallel parking will be provided on a derelict portion of the former roadway alignment with a protected pedestrian pathway to access the beach. This project is anticipated to begin construction in spring of 2014.

2.2.4. Construction

Point Arena Safe Routes to School

The Point Arena Safe Routes to School project will improve sidewalk and crosswalk locations at two intersections on Route 1 in the City of Point Arena. Pedestrian improvements will be made along Lake Street, terminating at the intersections with Route 1 at Postmiles 15.2 and 15.8. This project has been scheduled to begin construction in summer, 2013.

Pacific Coast Bike Route Improvements, Phase II

The Pacific Coast Bike Route, Phase II project will add short sections of paved shoulder for bicycle travel on the southbound lane (western shoulder) of Route 1 between the City of Point Arena and the community of Manchester (Postmiles 14.9 to 21.7). Pavement will be added to existing disturbed ground, where feasible, within the existing road prism. This project will not add shoulders throughout the entire project limits but will result in improvements at spot locations or in short segments where environmental impacts will be negligible. This project is in construction currently and will be completed in the summer of 2013.

Greenwood Creek Bridge

Caltrans is currently replacing the existing Greenwood Creek Bridge with a new two-lane bridge with two 12-foot lanes, 6-foot shoulders, and a 5-foot pedestrian walkway on the west (southbound) side. The existing Greenwood Creek Bridge is located on Route 1 in Mendocino County, approximately half a mile south of the town of Elk. Additional information can be found on the Caltrans District 1 web page; the web address is provided below:

<http://www.dot.ca.gov/dist1/dl/projects/greenwood/>.

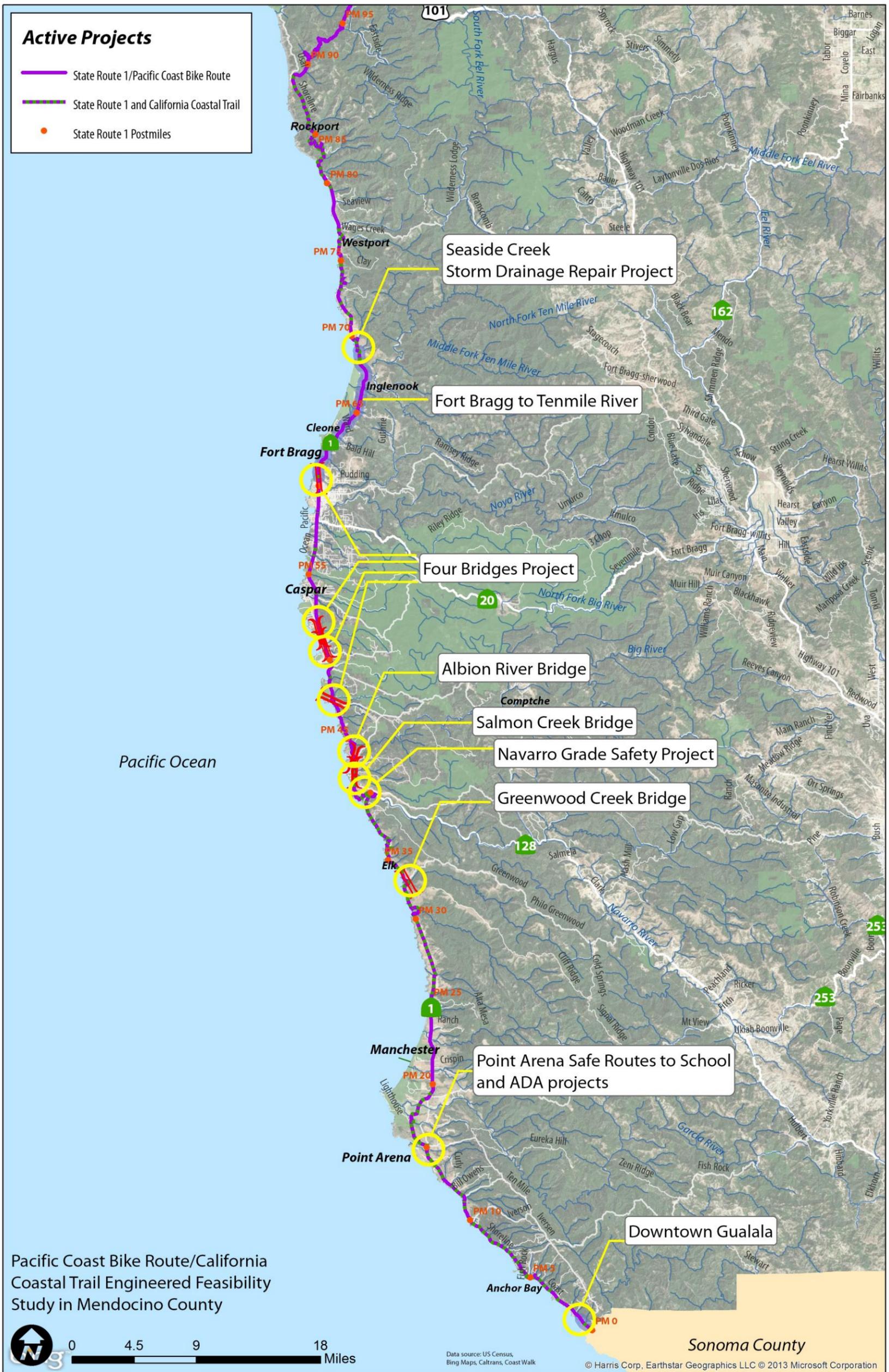


Figure 2-2. Caltrans Active Projects



Figure 2-3. Downtown Gualala Active Project

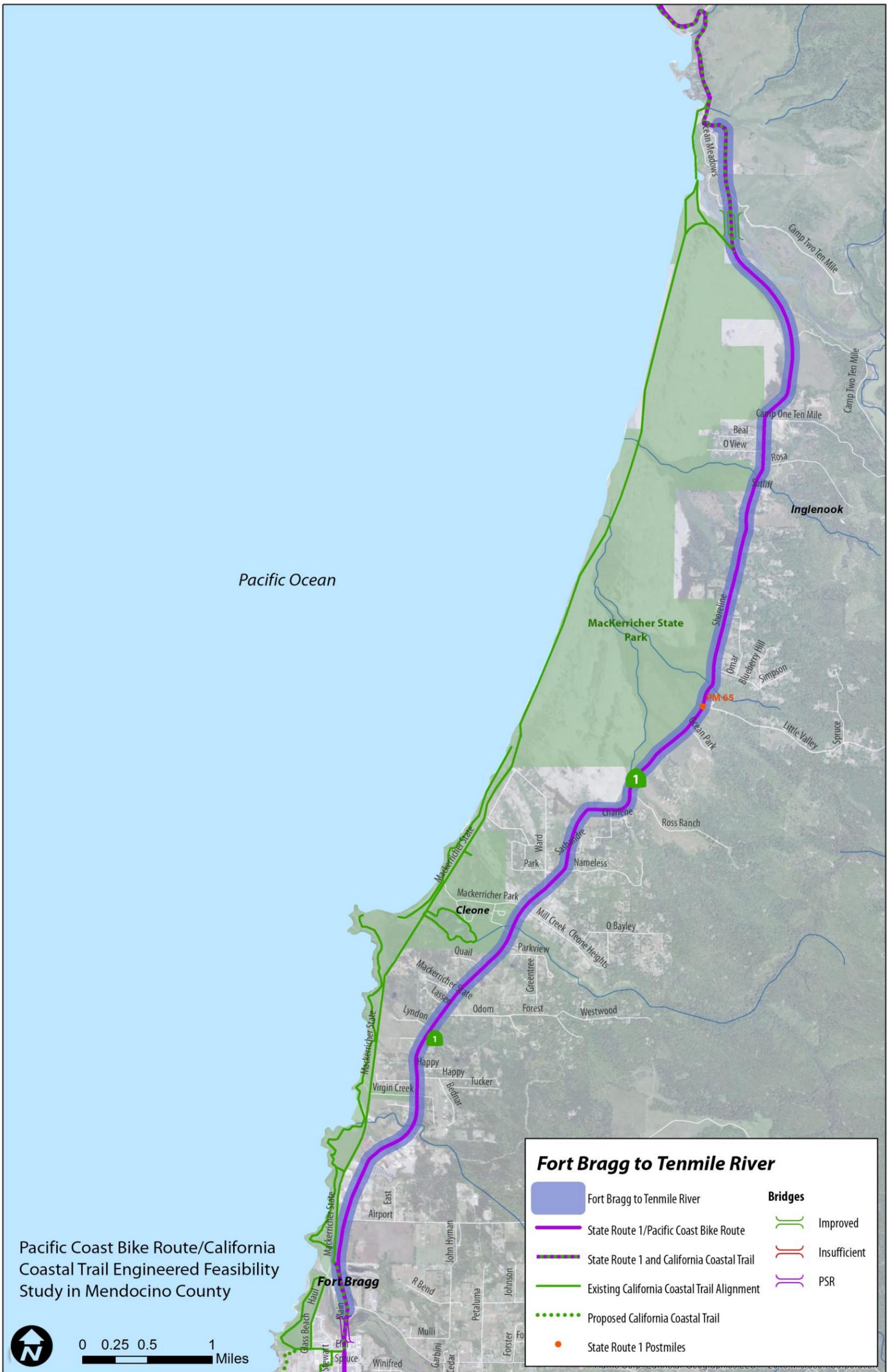


Figure 2-4. Fort Bragg to Tenmile River Active Project

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2.3. Relevant Plans and Projects

Several active projects that include PCBR and CCT improvements are in various stages of planning, design, and implementation. This includes area-specific community plans and Caltrans projects with plans and cost estimates for bicycle and pedestrian improvements along Route 1 that supersede the current study in level of detail. These projects are summarized below and the community plans are reviewed in more detail in Appendix A.

Gualala Bicycle and Pedestrian Improvements

Improvement concepts and plans are contained in three documents:

- Gualala Community Action Plan (2007)
- Gualala Downtown Design Plan (Phase II) (2009)
- Downtown Gualala Refined Streetscape Design Plan (2012)

The recent Downtown Gualala Refined Streetscape Design Plan presents recommendations for improvements to State Highway from the vicinity of Pacific Woods Road to Old State Highway. The improvements consist of widening the roadway to provide a center turn lane and installation of 8-foot wide pedestrian walkways and 5-foot wide bicycle lanes on both sides of the street to accommodate a range of users (see **Figure 2-5**). An option preferred by the community would provide a shared lane (sharrow) on the west side and a 5-foot wide bicycle lane on the east (uphill) side. The “Interim Constrained” Plan recommends allowing an 8-foot strip of parallel parking on the west side of State Route 1, which will eventually be replaced with an 8-foot pedestrian walkway in front of Surf Market. This interim recommendation allows the property and business owners to use the existing on-street parking until all improvements can be fully funded and implemented. The Plan estimates probable costs for Phase I as being \$1,646,460, which includes repaving, curb and gutter, pedestrian walkways, crosswalks, ADA ramps, median islands, landscaping, signs, and striping.

The Gualala Downtown Design Plan (Phase II) (2009) states that north of Ocean Drive (known as Uptown Gualala), the pedestrian walkway will only be provided on the west side of State Route 1. The preferred path surfacing is a compacted stabilized soil mixture such as “Granitecrete,” in keeping with the casual coastal character.

The Gualala Community Action Plan (2007) recommends a gateway sign located within a median located just south of Old Stage Road/Old State Highway.

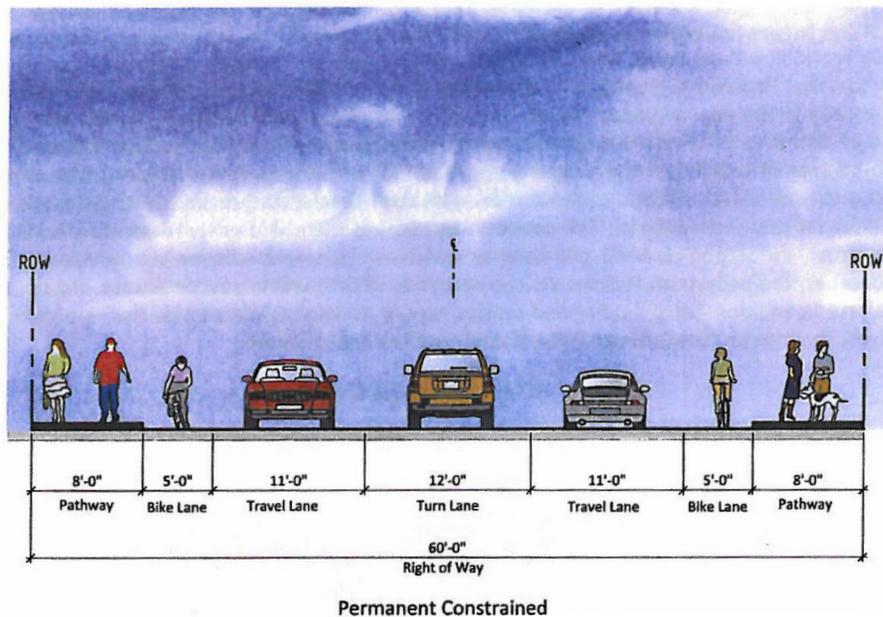


Figure 2-5. Recommended Refined Street Section, Downtown Gualala

Source: Downtown Gualala Refined Streetscape Design Plan (2012)

Point Arena Bicycle and Pedestrian Improvements

The Point Arena Community Action Plan (2010) provides a Downtown Streetscape Plan and guidance for circulation and parking. Sidewalks generally exist along both sides of State Route 1/Main Street from Iverson Avenue to the State Route 1/School Street intersection. A sidewalk exists on the north side of State Route 1/School Street from the State Route 1/Main Street intersection and to Lake Street. Within Point Arena, State Route 1 is designated as a Class III bike route.

The Plan recommends bulb-outs, bus bulbs, marked crosswalks, and refuge islands to slow vehicle traffic and improve pedestrian safety. The proposed roadway section includes an 8-foot parking lane and 11-foot travel lanes, which will require a Caltrans exemption. This configuration will provide for sidewalk expansion by 2 or 3 feet on the west side of the street between the WestAmerica Bank Building and the new Centennial Park Plaza, and 2 to 3 feet on the east side of the street, between Mill Street and Fogeaters Market. The proposed cross-section also includes a 5-foot northbound Class II bike lane for the uphill direction between Riverside/Eureka Hill Road and Iverson Avenue, and a Class III shared southbound lane for bicyclists, with a Class III facility before and after the climbing section. Figure 2-6 shows the Plan's recommendation for trail and access route improvements.

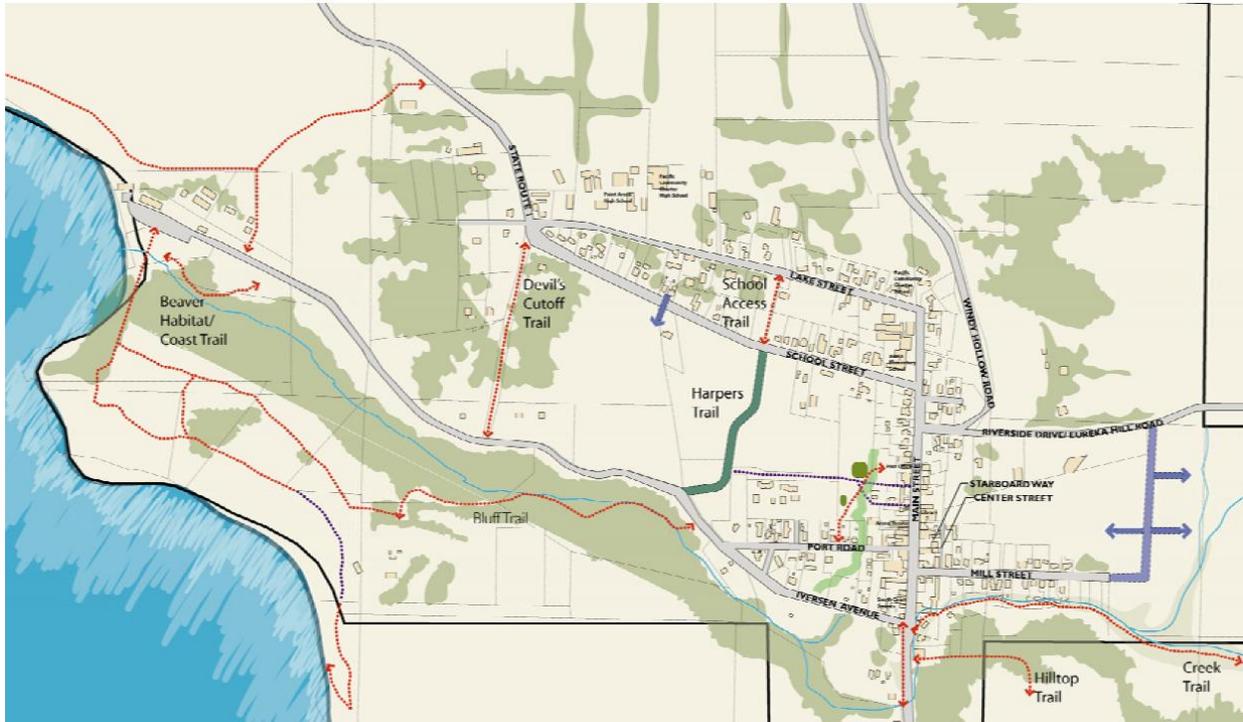


Figure 2-6. Point Arena Proposed Trail and Access Route Improvements

Source: The Point Arena Community Action Plan (2010)

Fort Bragg Bicycle and Pedestrian Improvements

The Fort Bragg South Main Street Access and Beautification Plan (2011) includes an approximately 1.8 mile stretch of South Main Street/State Route 1 between Oak Street and downtown Fort Bragg to the north and the Hare Creek Bridge at the City's southern limit. Despite a lack of pedestrian facilities, residents and tourists can be found walking along the roadway shoulder, in travel lanes, and along well-worn, informal pedestrian pathways that exist along some sections of the highway. While bicyclists in the southern portion of Fort Bragg utilize the shoulder for travel, the shoulders narrow considerably closer to downtown, creating potential conflicts with parked cars and vehicles entering and exiting driveways.

The Plan recommends creating a safer pedestrian and bicyclist environment along State Route 1 by reducing lane widths to 11 feet, reducing design speeds, and expanding the 25 mph zone. Pedestrian improvements include continuous 5-foot minimum sidewalks, with 10- to 15-foot sidewalks in retail or commercial areas, bulb-outs, high-visibility crosswalks, and median islands. The Plan developed alternative ways of accommodating bike lanes through road diet treatments (see Figure 2-7). The Plan estimates that the recommended improvements would cost \$5.73 million for the "Baseline" Design Alternative, and \$13.72 million for the addition of a landscaped central median.

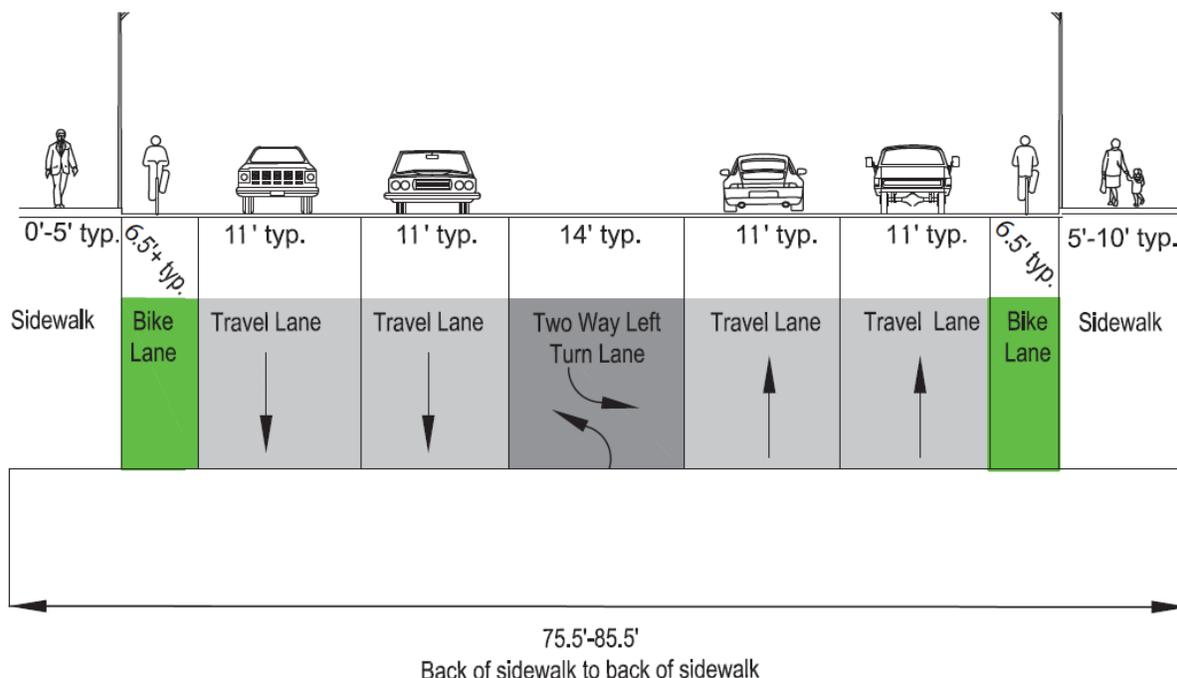


Figure 2-7. Proposed State Route 1 Cross-Section through Fort Bragg, Oak Street to Maple Street

Source: Fort Bragg South Main Street Access and Beautification Plan (2011)

Fort Bragg Coastal General Plan (2008)

The Coastal General Plan’s Circulation Element states that one of its main objectives is to “encourage public transportation, bicycle, and pedestrian movement, and other alternatives to the single-occupant vehicle” (p. 5-1). The community aims to accommodate these other modes in the context of future growth and development. The study recognizes that forecasted growth will cause an increase in trips. If an automobile-only approach is followed, established LOS standards would require extensive street widening on Main Street through the heart of the commercial district. This could have a great impact on businesses there due to the loss of on-street parking. Therefore, the plan recommends that the City of Fort Bragg improve public transportation, expand bicycle routes, provide safe sidewalks throughout the community, and adopt land use designations which reduce the need to drive. In addition to reducing the costs of constructing and maintaining roads and parking facilities, according to the plan, alternative transportation improvements will benefit individuals who lack access to a personal vehicle and those who prefer other modes of transport to conserve energy and reduce pollution.

The plan recommends several policies to encourage use of alternative modes. Policy C-2.4 establishes standards for public streets, including traffic calming measures; sidewalks with a buffer between the street and walking path; bulb-outs; continuation of the grid street system; and safe standards for radius returns. Policies C-2.8 and C-2.9 require the continuation of streets and bicycle and pedestrian paths through new developments wherever possible. Policy C-3.1 reduces vehicle through-traffic on local streets. Policy C-4.1 encourages traffic engineers and planners to prioritize pedestrian safety and sense of place when considering

roadway improvements on Main Street. Finally, Policy C-10.1 establishes a comprehensive and safe network of bikeways connecting all parts of Fort Bragg, while also providing funds for rights-of-way acquisition needed to complete the system.

Fort Bragg Bicycle Master Plan (2009)

The City's Bicycle Master Plan outlines the community's goals and policies for increasing the mode share of bicycles. The plan summarizes all existing and planned bicycle facilities, and recommends new bikeways, bicycle parking facilities, and education/safety program. The plan also proposes standards for bikeway design, parking and signage (Chapter 5). It is acknowledged that Fort Bragg has very favorable conditions for year-round cycling. Further, the regular street grid facilitates easy cross-town connections, and many of the streets are sufficiently wide to accommodate bike lanes. However, the plan points out many constraints to cycling in the City.

- Main Street (STATE ROUTE 1) in Fort Bragg carries a relatively high volume of traffic.
- Narrow highway bridges at Hare Creek and Pudding Creek are significant obstacles to bicycle travel.
- Uneven street surfaces are caused by railroad tracks, utility covers, rough pavement, and debris.

During the Mill Site Specific Plan process, planners identified support for a Class I bikeway running along the entire length of the site's waterfront. This would become the new Pacific Coast Bike Route through the City. The City also plans to install a multi-use trail along the western edge of Glass Beach Drive that will join the existing Old Haul Road/Pudding Creek Trestle multi-use trail with the proposed bike path on the Mill Site. Lastly, the plan highlights focused efforts in South Fort Bragg to create a bikeway across and in the vicinity of the Noyo Bridge; install bicycle-instigated signals at the Main Street intersections with Ocean View Drive and Highway 20; and stripe Class II bike lanes that connect Pomo Bluffs Park and the College of the Redwoods to State Route 1 via Ocean View Drive and the frontage road.

Westport Area Integrated Multi-Use Coastal Trail Plan (2011)

The goal of the Westport Area Integrated Multi-Use Coastal Trail Plan (Westport Area Plan) is to plan a continuous, non-motorized, context-sensitive transportation route along the unincorporated northern Mendocino coast between Usal Road and the Ten Mile bridge on the west side of State Route 1 (State Route 1). The Westport Area Plan describes and illustrates existing conditions along the study area corridor (see Westport Area Plan Figures 2 through 6), including locations with narrow existing right-of-way or easements (see Figure 7) and the State Route 1 elevation profile (see Figure 8). Figure 13 presents Westport Village walking destinations.

The plan defines a preferred alignment and typical design cross sections for the 21-mile coastal trail section. The plan recommends a trail that will follow State Route 1 for much of its length, separating from the roadway only where adjacent public or nonprofit lands or easements already exist, or where landowners have expressed a willingness to negotiate an easement. A total of 15.53 miles of Shoulder non-motorized shared use path (SUP) and 5.59 miles of Separated SUP are recommended. The locations of those proposed trail segments are summarized in Table 12. Recommended facility improvements are presented in Figures 14 through 28. Figures 15 through 17 illustrate cross sections of different SUP configurations. Other improvements (e.g., parking and access improvements, bike racks, picnic tables, restrooms, water fountains, and signage) are recommended in Section 4.3 to support increased non-motorized use of the study corridor.

The study corridor was divided into 17 segments. The three highest priorities identified in this plan are Sections 2c, 3, and 4a surrounding the most densely settled portion of the study corridor in and around the village of Westport. Those sections were stressed by the local community because they will serve the greatest number of people, provide critical transportation connections between the village and outlying resident and visiting populations, and address safety concerns.

2.4. Basic Improvement Concepts

Except for bridge structures, slopes adjacent to the highway are the most significant single condition/constraint that would determine improvement requirements and feasibility. Another key factor is the width of existing shoulders; paved or unpaved, and thus proximity of the adjacent slopes.

Although the slopes adjacent to the highway vary widely along the project area, they tend to reflect whether the terrain is coastal terrace (relatively flat) or coastal hills (steep). For this reason, and to average the range of slopes for cost estimation purposes, the slopes along the highway were classified into three types:

- Type A – “Minor” slopes, from flat to below 25% or 4 feet horizontal to 1 foot vertical. For estimating purposes these were assumed to average 10% slope.
- Type B – “Moderate” slopes, from 25%, or 4 feet horizontal to 1 foot vertical, to 50% or 2:1. For estimating purposes these were assumed to average 40% slope.
- Type C – “Severe” slopes, from 50% or 2:1 to 1:2 (1 foot horizontal to 2 feet vertical). For estimating purposes these were assumed to average 100% slope, or 1:1.

Two different design concepts were developed to respond to policy objectives and the basic physical constraints for widening:

- Where topographic constraints are minor or moderate (slope conditions A and B), the PCBR improvement goal was assumed to be 4 foot paved shoulders for bikes plus a 4 foot unpaved shoulder for a total minimum shoulder of 8 feet. Where the CCT occurs – typically on the west/SB side, the goal was assumed to be an additional 8 feet of space, plus an additional 1 foot of space for a crash barrier and fence between the shoulder and the CCT. The CCT could be paved or unpaved depending on the setting and use.

Where existing paved shoulders are wider than 4 feet they would remain, but if they are less than 8 feet, it is assumed that widening would occur to create the additional unpaved shoulder – which could be either native soil or base rock depending on the firmness of the material or agreements about the appropriate design (the cost estimates assume base rock to be conservative).

This design concept does not necessarily comply with HDM standards for shoulders or with County LCP or CCC policy regarding highway shoulders, and would be subject to review on a project-specific basis.

- Where topographic constraints are significant (slope condition C), the goal was assumed to be 4 foot paved shoulders for bikes, plus where applicable an additional 4 feet for the CCT, plus an additional 1 foot of space for a crash barrier and fence between the shoulder and the CCT. The CCT could be paved or unpaved depending on the setting and use.

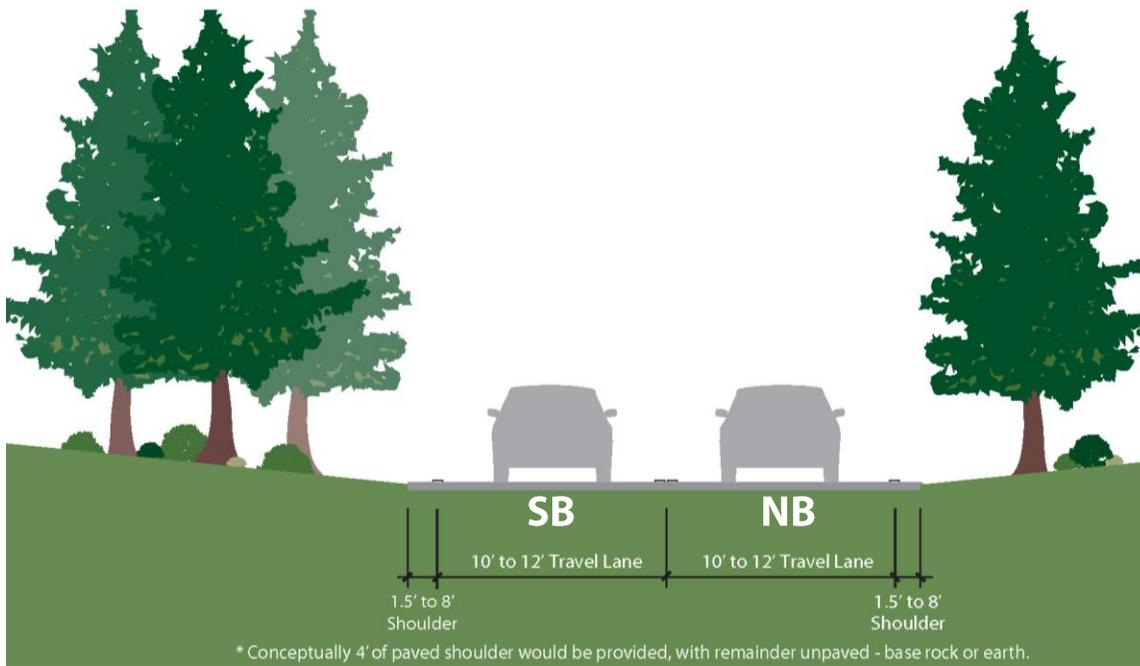
2.5. Improvement Design Illustrations

A series of illustrative cross-sections are presented in **Figure 2-8** to show a range of typical conditions and how improvements could be provided, consistent with the above basic improvement concepts. The illustrations show a series of three cross-sections (existing, with PCBR improvements, and with PCBR improvements plus CCT), for each of the three slope classes (A, Minor; B, Moderate; and C, Severe). There are two sets of cross sections for each of the B and C slope conditions: one with slopes down to the highway on both sides, and one with cross-slope such that the shoulder slopes down from the highway on the SB or west side. The latter is the most typical slope configuration along the route, but there is much variation, and all the illustrated conditions occur.

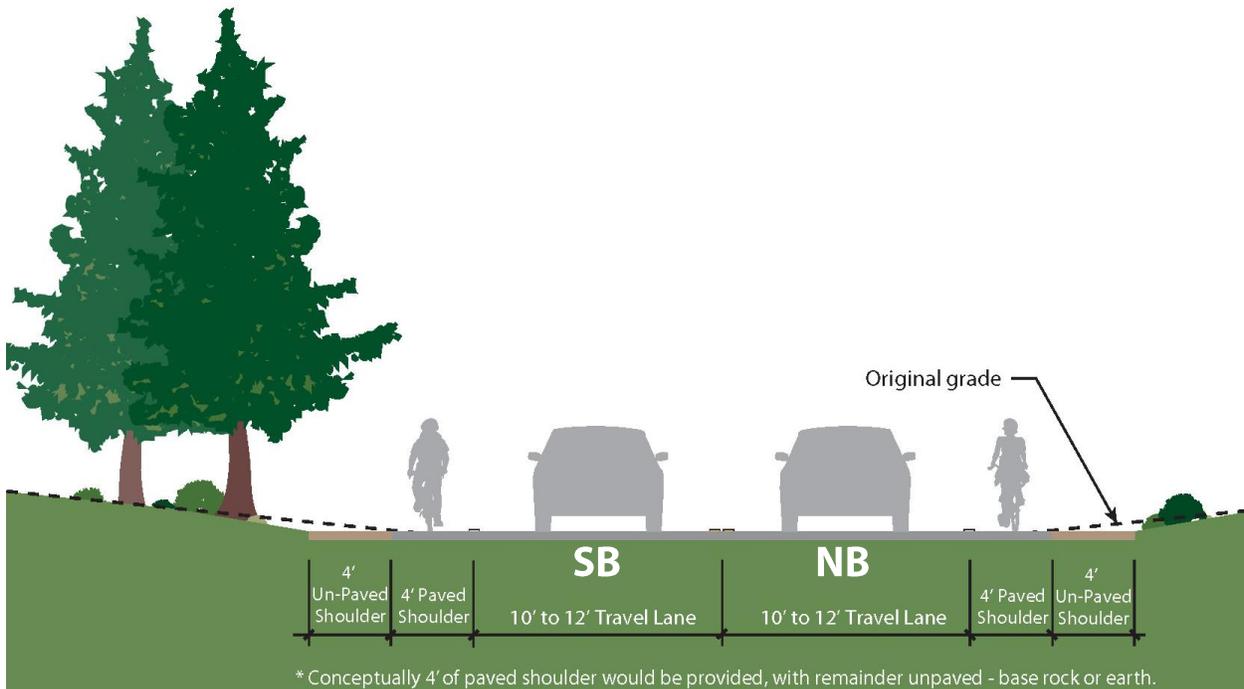
An example of an existing narrow bridge and examples of two levels of widened bridges are also provided.

These cross-sections were translated into specific assumed improvement designs, with associated quantities and costs for grading, retaining walls, paving and related improvements, as detailed in **Appendix C, Cost Estimate Methodology**. These per-type estimates were important building blocks for overall estimates of cost for Potential Improvement Segments.

Figure 2-8: Typical Conditions and Improvement Cross-Sections



Type A – Minor Slope - Existing



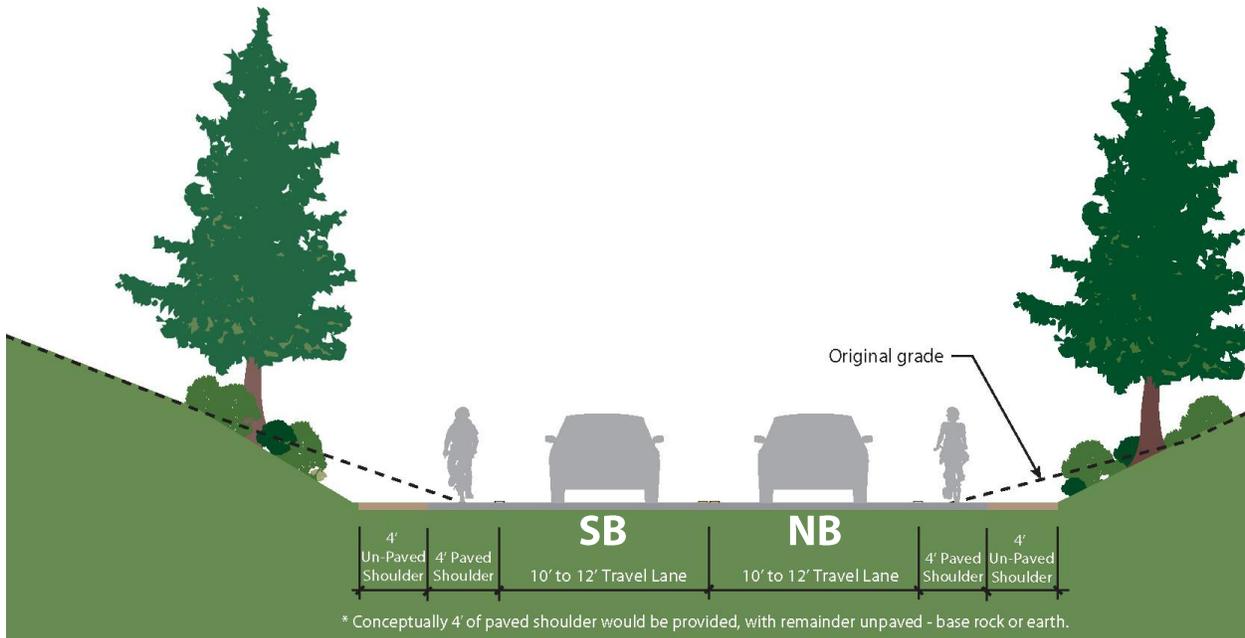
Type A – Minor Slope – Proposed PCBR



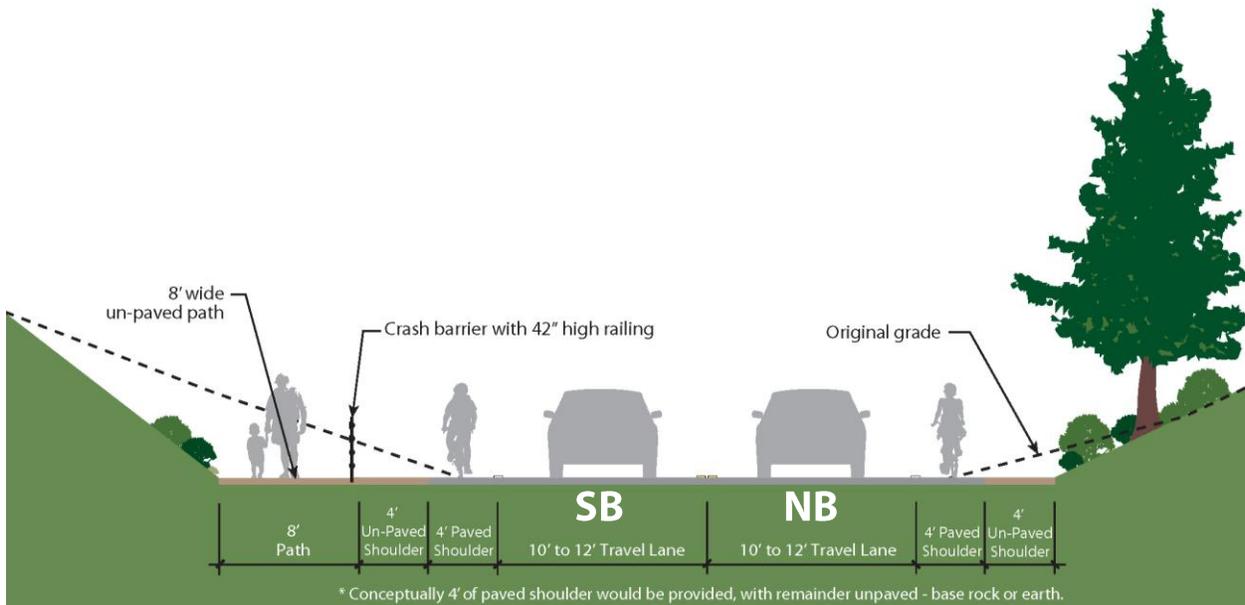
Type A – Minor Slope – Proposed PCBR and CCT



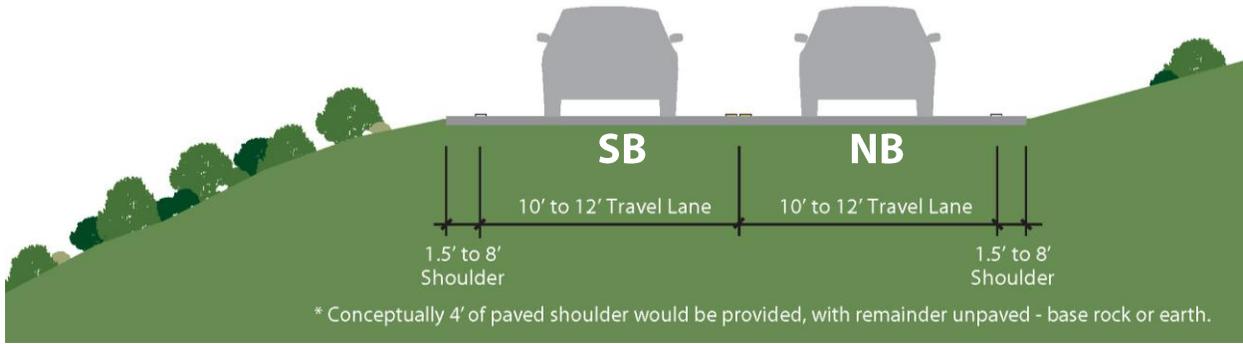
Type B - Moderate Slope - Existing



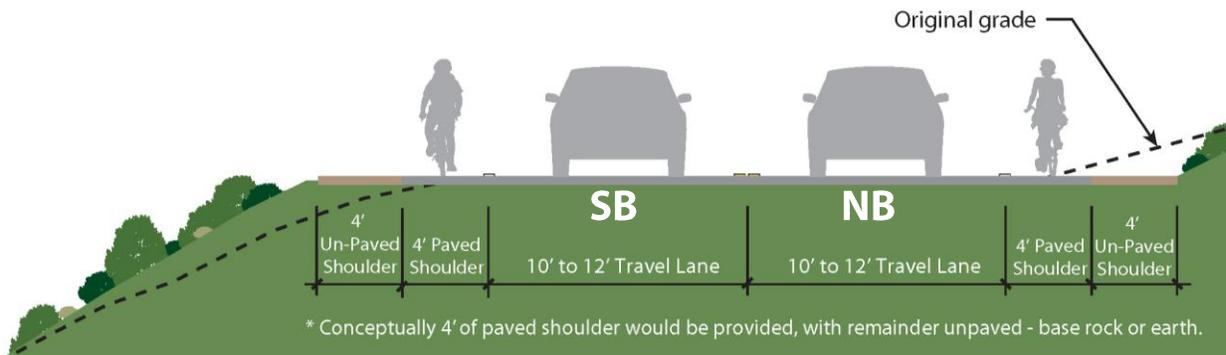
Type B - Moderate Slope – Proposed PCBR



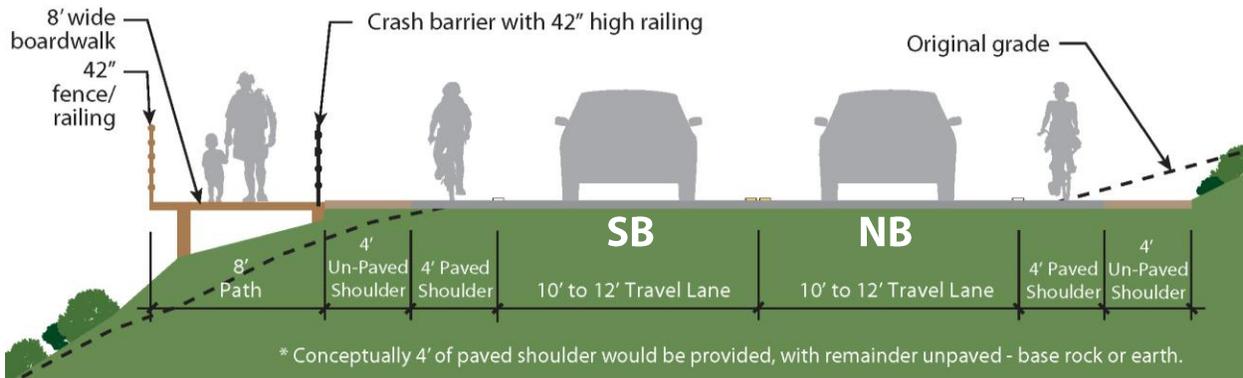
Type B - Moderate Slope – Proposed PCBR and CCT



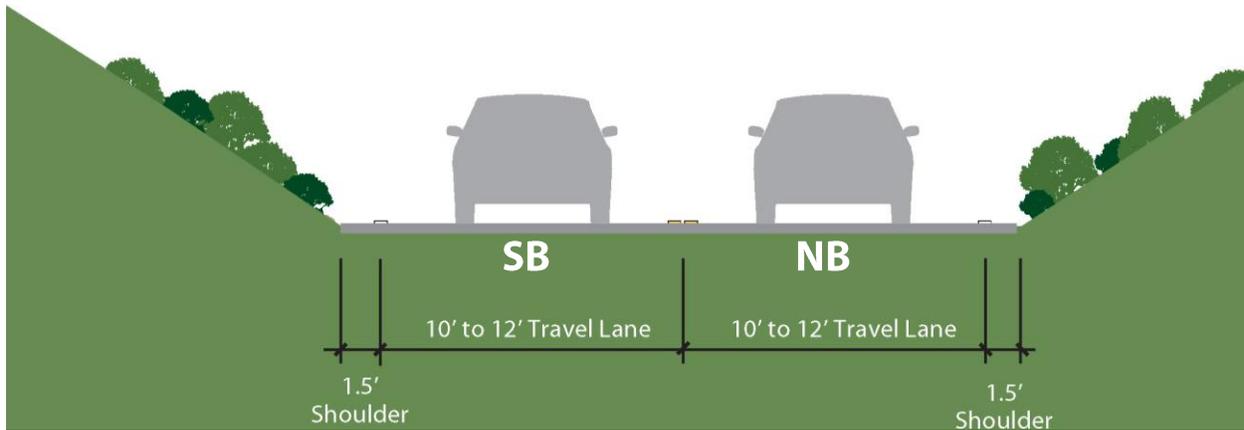
Type B - Moderate Cross Slope – Existing



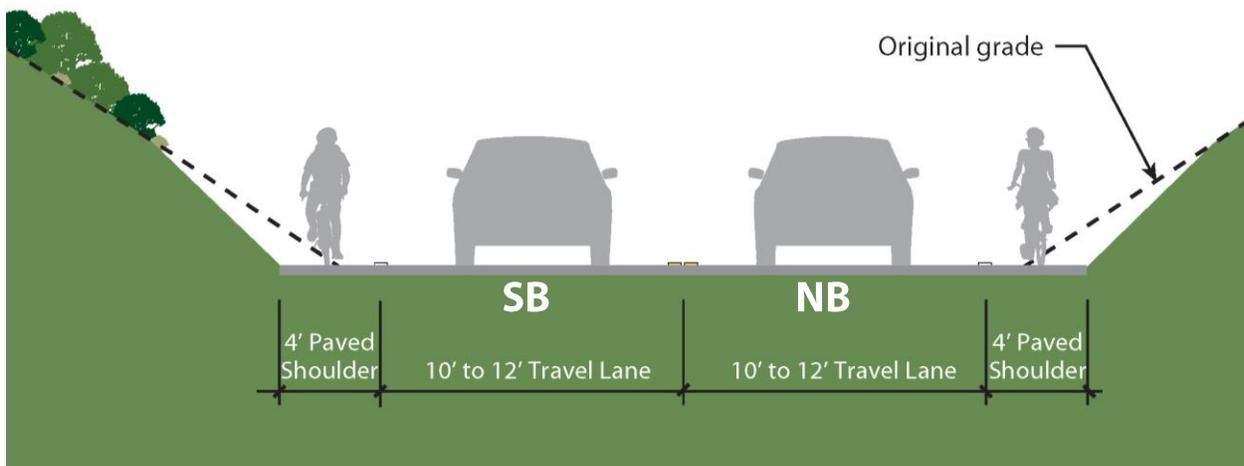
Type B - Moderate Cross Slope – Proposed PCBR



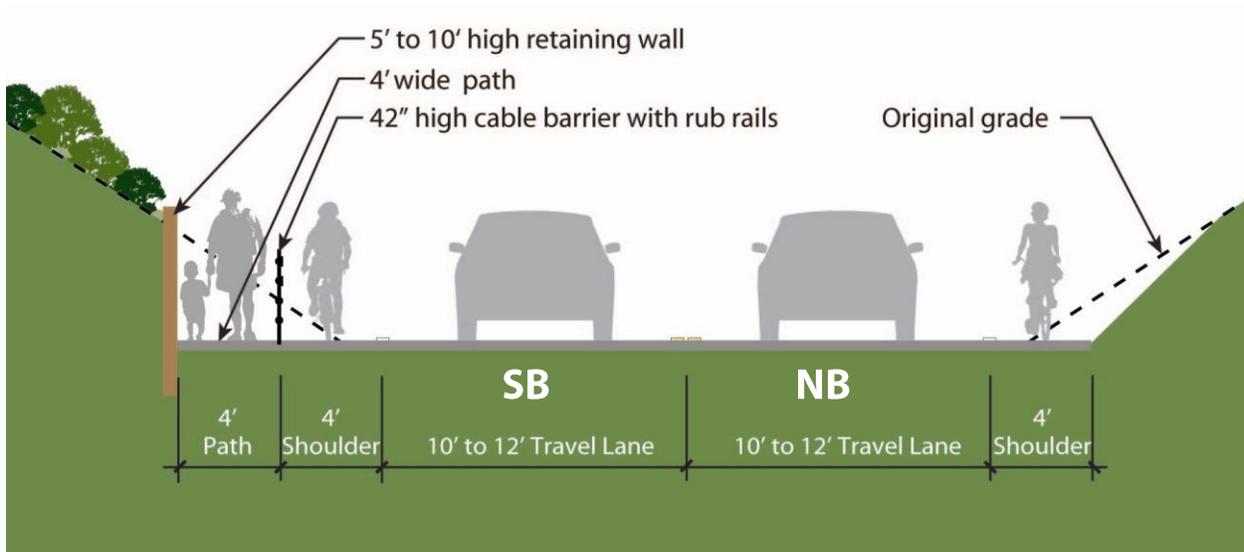
Type B - Moderate Cross Slope – Proposed PCBR and CCT



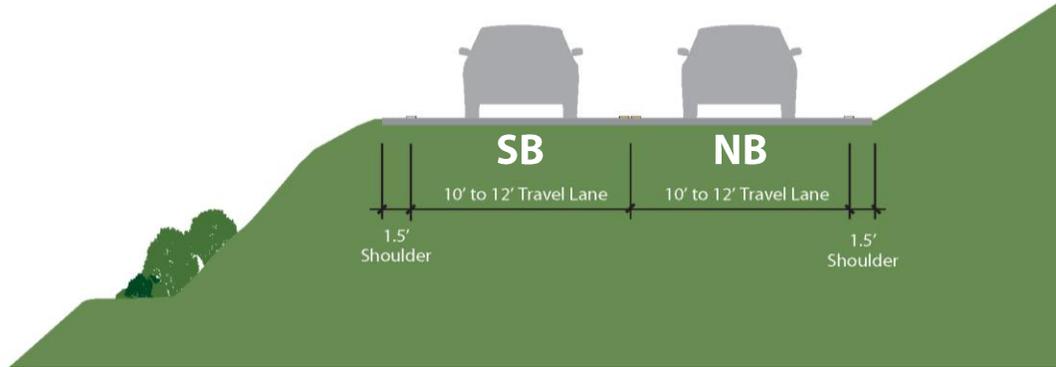
Type C - Severe Slope - Existing



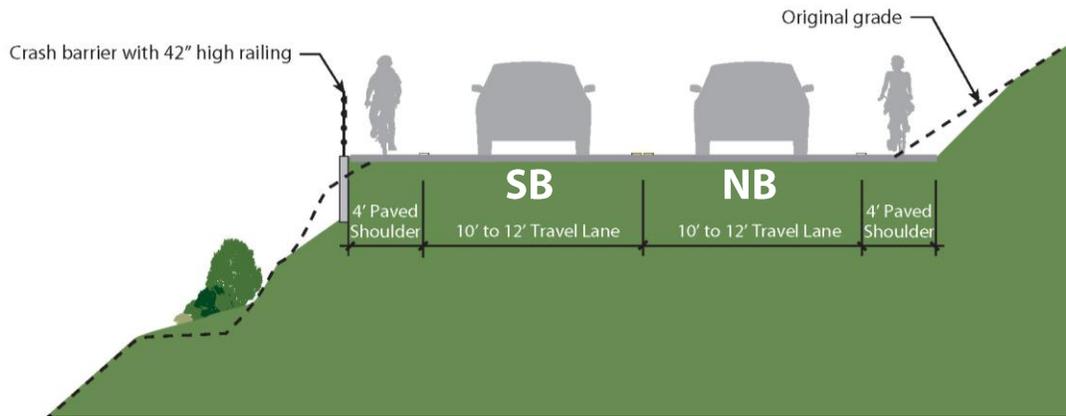
Type C - Severe Slope – Proposed PCBR



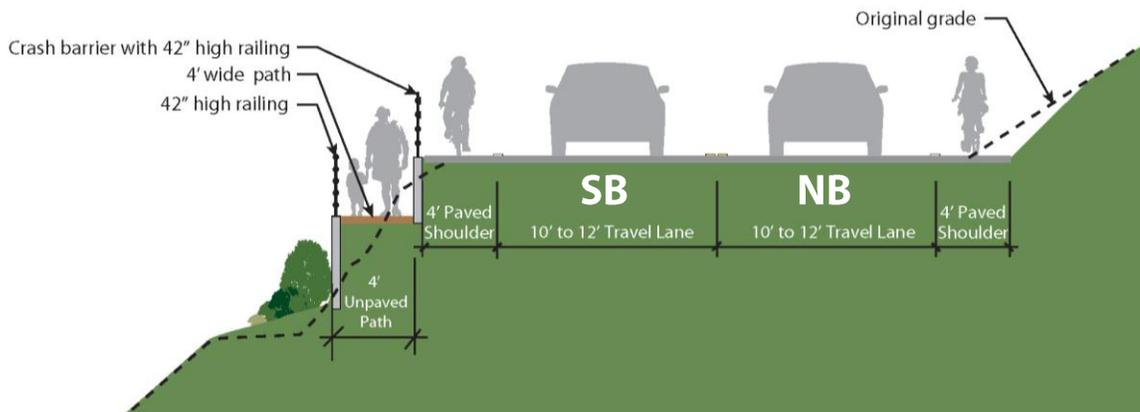
Type C – Severe Slope – Proposed PCBR and CCT



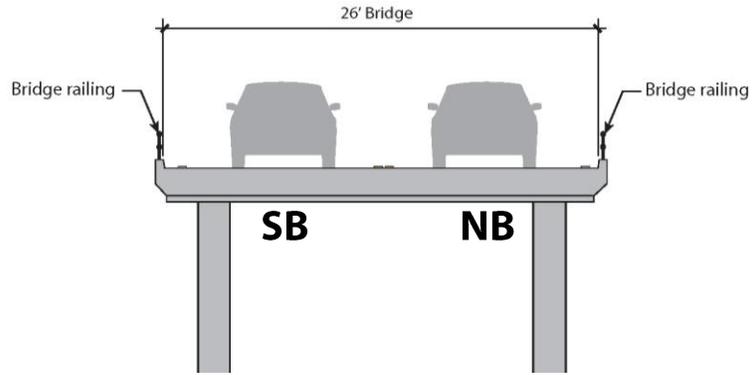
Type C – Severe Cross Slope – Existing



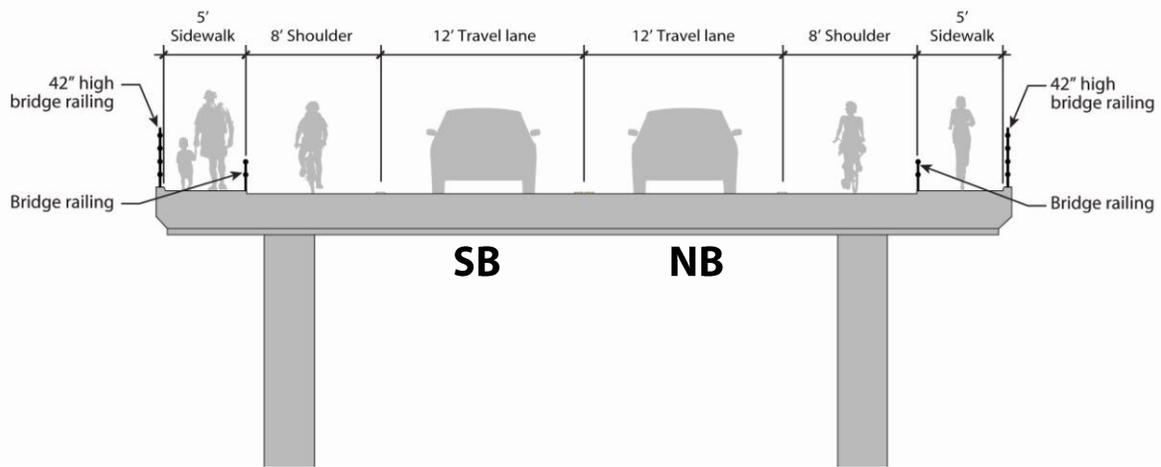
Type C – Severe Cross Slope – Proposed PCBR



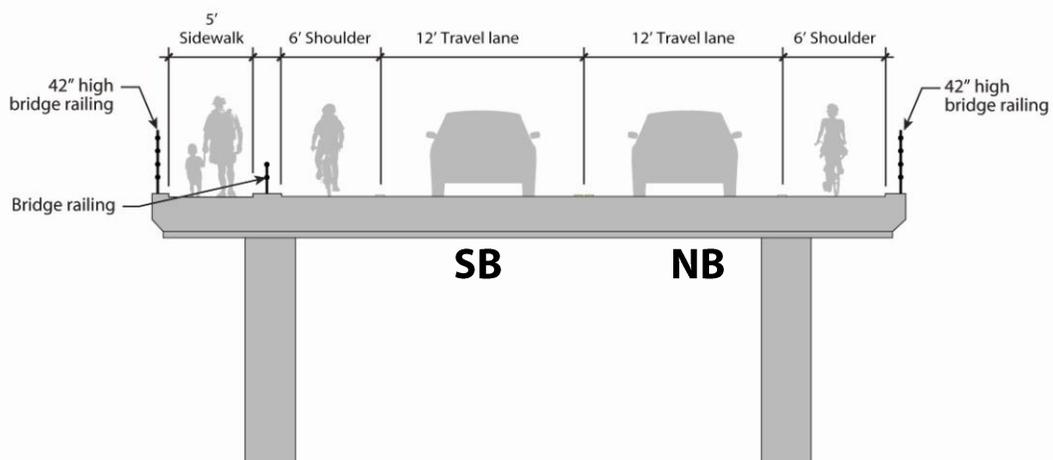
Type C – Severe Cross Slope -- Proposed PCBR and CCT



Non-Compliant Bridge – Existing



Caltrans Highway Design Manual Standards



Approved Greenwood Creek Cross Section

2.6. Evaluation Criteria

The potential improvement areas were identified and “scored” based on the following eight criteria, which were adapted from the eight criteria reviewed by the TAG and public through the first phase of the project. Some criteria were combined and a criterion for constructability/cost was added, but the basic concepts are the same as the original set and the criteria are listed in the general order of importance to workshop attendees.

2.6.1. Bike and Pedestrian Facilities Conditions

Definition: Physical conditions that tend to be less safe, such as steep hills, horizontal curves (especially with limited line-of-sight), areas with higher posted speed limits, and areas with high traffic volumes; input from public and stakeholders about unsafe locations.

Available data: Physical conditions data from GIS maps; traffic and speed limit data from Caltrans; public and stakeholder input.

Evaluated by: Adding traffic volume and speed limit conditions to GIS database; view on map or cross-reference from post mile table.

2.6.2. Safety Concerns

Definition: Documented bike and pedestrian accidents.

Available data: Collision data involving bicyclists and pedestrians; from Caltrans or the Statewide Integrated Traffic Records System (SWITRS).

Evaluated by: Mapping or correlating post mile tables of this data with other GIS data and reviewing on map.

2.6.3. High Bicycle and Pedestrian Use

Definition: Commuter routes and other frequently used routes.

Available data: Prior and recent bike and pedestrian count data from Caltrans; input from public and stakeholders about high use locations.

Evaluated by: add count locations and results to GIS; view on map or cross-reference from post mile table.

2.6.4. Provides a Regional Connection

Definition: Routes between communities; access to destinations (e.g. parks, schools that are otherwise isolated).

Available data: GIS shapefiles; public domain data regarding communities, parks, and preserves.

Evaluated by: Viewing features on maps.

2.6.5. Gap Closure Opportunities

Definition: Relatively small segments without bike and pedestrian facilities located between nearby built facilities or connections to destinations. There is no or minimal shoulder or other alternative route to the highway for bicyclists and pedestrians (particularly narrow bridges). “Alternative route” is defined as a parallel public road that does not add significant climbing or distance compared to following the highway.

Feasibility of alternative routes and locations where CCT crosses from west to east side of highway or back requires resolution of safe highway crossing – good sight distance or ability to cross under a bridge.

Available data: GIS shapefiles; improved and planned bridges; existing shoulder widths (¼ mi. data – 0; 2'; 4'; 4-8'; 8'+); public road GIS data for alternative routes.

Evaluated by: Viewing features on maps; identifying, highlighting and briefly describing alternative routes and associated crossing conditions.

2.6.6. California Coastal Trail (CCT) Intersect

Definition: CCT alignment is planned within the State Route 1 right-of-way (constraints dictate that there is no other alternative).

Available data: CCT alignment GIS shapefiles from Mendocino Land Trust.

Evaluated by: Viewing CCT alignment on maps and correlating with other conditions.

2.6.7. Biological and Cultural Resources Impact

Definition: Avoiding or minimizing impact or conflict with sensitive resources and associated potential implementation costs or “fatal flaws”.

Available data: Environmental constraints in field data spreadsheet and maps with ¼ mile segment scores for biological resources constraints; Caltrans-supplied table of general presence or absence of cultural resources on ¼ mile segment basis.

Evaluated by: review of “red/yellow/green” maps reflecting significance of biological constraints and reference to ¼ mile segment table of cultural resource constraints.

2.6.8. Constructability/Cost

Definition: Existing physical conditions that present opportunities and constraints for wider shoulders and parallel trail, and the approximate estimated cost of the improvements.

Other factors and options that could impact cost and feasibility include adjacency to other planned state highway improvements (they could potentially be combined), and doing shoulder widening only on the southbound (most popular PCBR bicyclist direction) or on uphill side.

Available data: *Conditions and constraints* in the field data spreadsheet and maps with ¼ mile segment scores for physical constraints/constructability; planning-level cost estimates based on above data and Google Earth and Streetview inventory; Caltrans project data.

Evaluated by: Review of “red/yellow/green” maps reflecting significance of constraints; comparing estimated cost overall and per mile for potential improvements; identifying currently planned project.

2.7. Other Potential Improvements

While the study focused on addressing gaps, potential improvements were suggested by the public that are enhancements – such as signs and rumble strips on segments with shoulders that are already 8 feet. These have been included as a separate list.

2.8. Evaluating and Summarizing Potential Improvements

The goal was to provide an easily understood summary of how the Potential Improvement Segments were selected and how they rank relative to the criteria. An approximate “score” for each criterion for each potential improvement segment is provided by using shading as illustrated in Table 2-1. In all cases darker indicates that the improvement is more desirable or feasible.

Table 2-1. Scoring Levels

Symbol	Associated Scoring Level
	High - strong presence/score
	Moderate presence/score
	Low - Limited presence/score
	Not present

The basis for assigning these relative scores is summarized in Table 2-2. The scores for different criteria are not weighted relative to each other – the projects were considered for their overall feasibility and desirability.

Table 2-2. Basis for Establishing Scores

Criterion	Basis for Higher Score
Bike and Pedestrian Facilities Conditions	Higher traffic volumes; speed limits; hills; curves; public comment
Safety Concerns	Higher # of bike or pedestrian accidents
High Bicycle and Pedestrian Use	High use counts by Caltrans; public comments
Provides a Regional Connection	Community and development areas, parks, preserves and destinations mapped or visible in GIS data/Google Earth; public comments
Gap Closure Opportunities	Lack of shoulders; narrow bridges; no feasible alternative route; relatively small segments without bike and pedestrian facilities located between nearby built facilities or connections to destinations (note that “improved” goal differs depending on terrain)
California Coastal Trail (CCT) Intersect	Depends on extent of planned CCT in segment without an alternative route
Biological and Cultural Resources	Low biological data score per ¼ mile and no present cultural resources
Constructability/Cost	Low average constraint score per ¼ mi; low construction cost per mile; adjacent to currently planned project

Segments were scored and described using the form shown in Figure 2-9.

Segment: _____ - PM __ to __		
Description:		
Length:		
Slopes: (type)		
Shoulders: (existing and proposed)		
Coastal Trail: (y or n; type and loc)		
Bridges: (reconstruction or parallel?)		
Score	Criterion	Considerations
	Safety Concerns	
	High Bicycle and Pedestrian Use	
	Provides a Regional Connection	
	Gap Closure Opportunities	
	California Coastal Trail (CCT) Intersect	
	Biological and Cultural Resources Impact	
	Constructability/Cost	

Figure 2-9. Potential Improvement Segment Summary Form