

Final Sonoma State Route 1 Repair Guidelines



California Department of Transportation
District 04

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Note to the Project Development Team

FROM HELENA 'LENKA' CULIK CARO:

I am pleased to present the Sonoma State Route 1 Repair Guidelines. Consistent with Caltrans' Strategic Management Plan, these guidelines will help promote stewardship and sustainability of our transportation resources by streamlining projects through a shared vision with our partners. The shared vision promotes sustainability by reducing environmental impacts through design flexibility.

The objective of these repair guidelines is to provide guidance that integrates and balances safety, mobility, and maintenance goals with environmental values. This document provides a framework to enable more timely repairs that are not only functional but are also consistent with the landscape, uses, and regulatory and land management policies associated with Highway 1. This allows the Project Development Team to have a shared understanding of practices and features best suited for the Highway 1 corridor. With a corridor-centric approach, all those who work on repair projects on Highway 1 in Sonoma County share a common vision rather than approaching each project with separate design considerations. This vision not only bridges Caltrans functional units, it also supports and connects the requirements of the California Coastal Act, Sonoma County Local Coastal Plan, California State Park Services and is supported by Caltrans' policy of Context Sensitive Solutions and the Highway Design Manual flexibility guidance.

These guidelines, as put into practice, will help promote the organizational excellence goals of Caltrans and help the Project Development Team to produce a quality project. Thank you for your hard work, public service and dedication.



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List of Abbreviated Terms

AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily traffic
Caltrans	California Department of Transportation
CCC	California Coastal Commission
CCT	California Coastal Trail
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
Coastal Act	California Coastal Act
Conservancy	California Coastal Conservancy
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DIB	Design Information Bulletin
DSDD	Design Standard Decision Document
EO	emergency opening
FWS	U.S. Fish and Wildlife Service
Guidelines	State Route 1 Repair Guidelines
HDM	<i>Highway Design Manual</i>
Highway 1	California State Route 1
KPRA	kingpin-to-rear-axle

List of Abbreviated Terms

LCP	Local Coastal Program
Master Plan	Sonoma County Transportation Authority Countywide Bicycle and Pedestrian Master Plan
MGS	Midwest Guardrail system
mph	mile(s) per hour
NEPA	National Environmental Policy Act
PDT	Project Development Team
PRC	Public Resources Code
State Parks	California Department of Parks and Recreation
USACE	U.S. Army Corp of Engineers

Glossary

Complete Streets: A transportation facility that is planned, designed, operated, and maintained to provide safe mobility for all users, including pedestrians, bicyclists, motorists, and transit users, appropriate to the function and context of the facility.

Design Vehicle: For Highway 1 in Sonoma County, the design vehicle is a California Legal Kingpin-to-Rear-Axle Distance (KPRA) Advisory Route, with a KPRA of 30 feet.¹ See also *Highway Design Manual Topic 404.4(2)(b)*.

Design Standard Decision Document (DSDD): A DSDD is required on a project if any element on a project does not meet current standards. The DSDD must justify a design exception and must be approved prior to the nonstandard feature being constructed.

Roadside: A general term denoting the area adjoining the outer edge of the roadbed to the right-of-way line.

Roadway: That portion a highway between the outside lines of the sidewalks, or curbs and gutters, or side ditches, including the appertaining structures and all slopes, ditches, channels, waterways, and other features necessary for proper drainage and protection.

Scenic Highway: A state or county highway—in total or in part—that is recognized for its scenic value, is protected by a locally adopted corridor protection program, and has been officially designated by Caltrans.

Shoulder: The portion of the roadway contiguous with the traveled way for the accommodation of stopped vehicles, for emergency use, for errant vehicle recovery, and for lateral support of base and surface courses. The shoulder may accommodate bicyclists and pedestrians, and in towns, it may accommodate parking.

Travel Lane: The portion of the roadway for the movement of vehicles and bicycles, exclusive of shoulders.

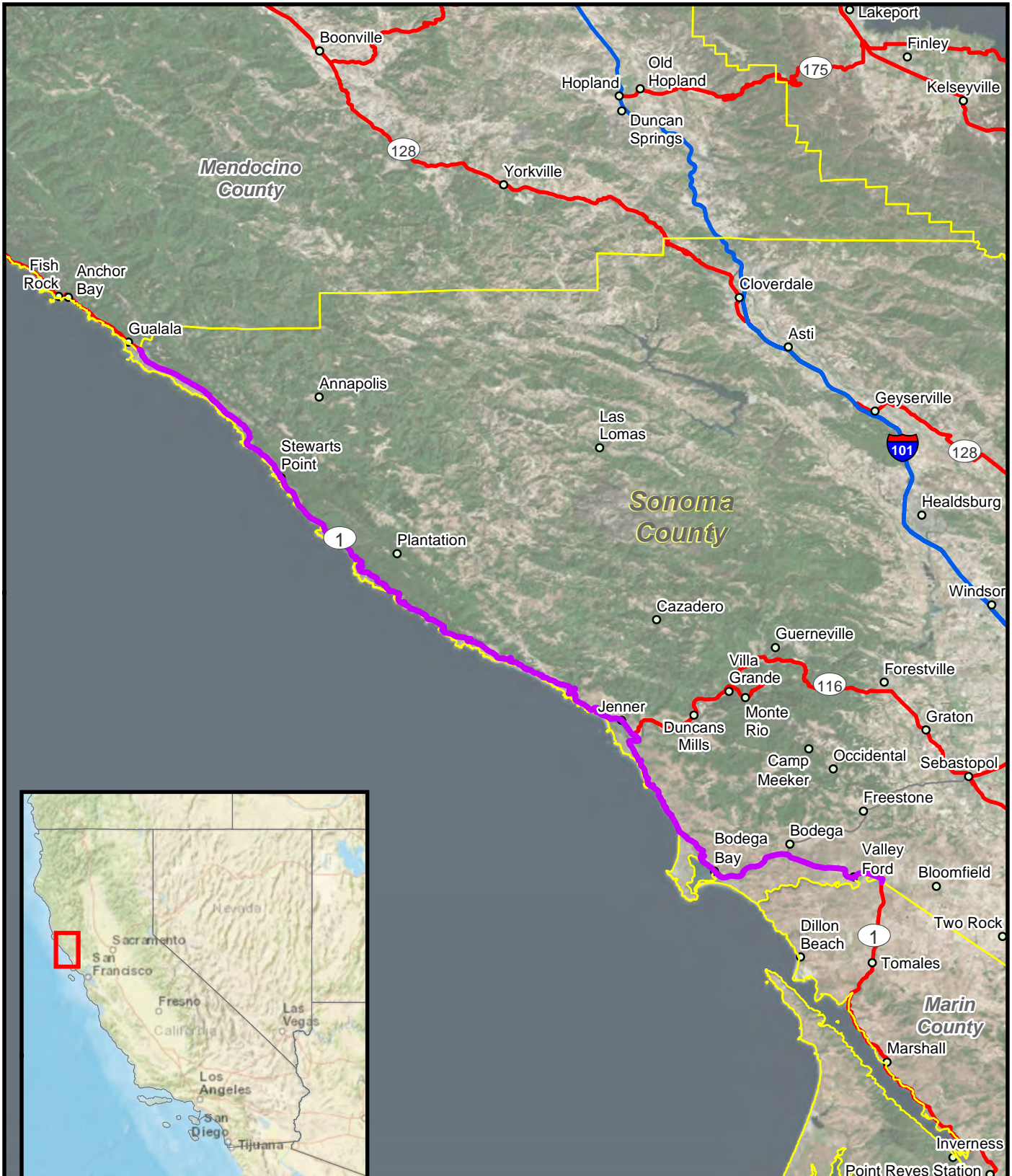
¹ See <http://www.dot.ca.gov/trafficops/trucks/docs/truckmap-d04.pdf>.

Chapter 1 Purpose

The purpose of these *Sonoma State Route 1 Repair Guidelines* (Guidelines) is to provide California Department of Transportation (Caltrans) staff and stakeholders with a consistent vision and direction when working on or reviewing damage repair (permanent restoration) projects along that portion of California State Route 1 (Highway 1) traversing Sonoma County (Figure 1-1). While this damage is predominantly related to storm events, the recommendations apply to any major event that damages the roadway. The Guidelines allow Caltrans District 4 and its partner agencies to respond with timely and consistent efforts to repair projects in a manner that minimizes alterations, acknowledges the special sensitivity of this segment of Highway 1, supports the existing aesthetics, and protects natural resources while meeting the needs of all user groups.

Dialogue with the California Department of Parks and Recreation (State Parks), Sonoma County, and the California Coastal Commission (CCC) helped identify the great need for shared damage repair guidance. No Highway 1 corridor-wide recommendations previously existed as references for Caltrans staff and partnering agencies when considering potential treatments for damage repair.

To respond to these concerns, Caltrans convened an interdisciplinary working group with these partners to create recommendations that maintain sensitivity to the Highway 1 corridor's social, historic, scenic, and environmental values while also protecting the safety of users. The objective is to provide guidance that Caltrans and its partnering agencies can reference to promote efficient, appropriate repairs to this highly valued highway. The Guidelines reflect compromises made by all partners to find consensus, and to provide more suitable design guidance to Project Development Teams (PDTs) working on repair projects along this corridor.



- Legend**
- U.S. Highway
 - State Route
 - Local
 - State Route 1 Sonoma County
 - County Boundary

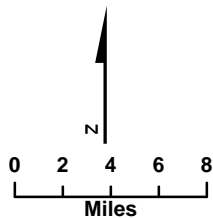


FIGURE 1-1
STATE ROUTE 1 IN SONOMA COUNTY
 Sonoma State Route 1 Repair Guidelines

Chapter 2 How to Use these Guidelines

These Guidelines have been developed to provide consistency and clarification in design development for Caltrans roadway damage repair projects within Sonoma County along Highway 1. Damage repair projects are typically spot improvement projects no more than 0.5 mile in length. They may or may not involve structures, such as bridges or retaining walls. Although these Guidelines were created in response to the ongoing need for repair projects, they contain context and stakeholder information that would benefit all projects being considered in the scenic coastal environment.

These Guidelines are intended to instruct users on how to align the design of repair projects with the existing transportation needs of Highway 1 while preserving and enhancing the resources and aesthetics of the project location. Applying these approaches should also streamline the process for meeting the requirements for local, state, and federal approvals of projects in the corridor. This chapter provides a brief description of each remaining chapter in the Guidelines, along with the target audience for each chapter.

Chapter 3 – Environmental and Permitting Conditions

Chapter 3 outlines the issues and key players involved in the project development process. Staff involved in developing projects along Highway 1 in Sonoma County should thoroughly understand this section. The District Landscape Architecture Office and Environmental Division will be able to answer any additional questions regarding individual project issues and solutions.

Chapter 4 – Process

Chapter 4 covers the fundamentals of the project development process for damage repair projects. Staff involved in developing projects along Highway 1 in Sonoma County should thoroughly understand this section. The District Maintenance Office and District Design Liaison will be able to provide additional details.

Chapter 5 – Design Guidelines

Chapter 5 contains specific recommendations regarding the design of the permanent restoration portion of a damage repair project and is the essence of this document. Recommendations can be specific or general in nature, and the designer should use judgment when applying these recommendations and keep the context of the Highway 1 facility in mind. All staff involved in the design of a damage repair project

along Highway 1 should review this section in its entirety. Note that the design guidelines in this section do not replace the *Highway Design Manual* (HDM) (Caltrans 2016), and any deviations from the standards contained in the HDM will require an approved Design Standard Decision Document (DSDD). The design guidelines, however, are intended to provide ancillary information for these DSDDs. On January 30, 2015, the design exception approval process was delegated to the District for this type of highway.

It is important to understand the project location, natural context, landscape setting, vehicle and bicycle volumes and speeds, stakeholder needs, and other key site conditions when designing projects. To support Caltrans' Context-Sensitive Solutions policy as part of these design recommendations, the Highway 1 corridor is segmented according to landscape units. Each landscape unit represents an area with similar visual character based on vegetation, topography, and other visual elements. Fifteen designated Highway 1 segments are located in Sonoma County. Appendix A, *Landscape Units and Existing Conditions*, describes each unit. Staff should use these recommendations in tandem with Table 5-1, *Design Recommendations*, presented in Chapter 5.

Chapter 3 Environmental and Permitting Considerations

3.1 The Uniqueness of Highway 1

Throughout most of Sonoma County, Highway 1 is a two-lane rural highway that meanders along the Pacific coastline. Highway 1 traverses several State Parks, including Fort Ross State Historic Park, Kruse Rhododendron State Natural Reserve, Salt Point State Park, and Sonoma Coast State Park. Highway 1 connects, and has become a well-known feature of, the scenic coastline and pastoral inland areas that dominate this region. This scenic quality is protected by the California Coastal Act (Coastal Act), Sonoma County's Local Coastal Program (LCP) (Sonoma County, 2001), and State Parks land management policies. Highway 1 is currently eligible for scenic highway status.

Residents in the area greatly value the unrushed and rural lifestyle of their communities. For many coastal residents along the route, Highway 1 is the only transportation connection to the rest of California and constitutes their economic lifeline and access to emergency services. The stunning natural beauty of the landscape has also made this section of Highway 1 a popular destination corridor for outdoor enthusiasts of all types. The Highway 1 corridor serves both as a basic means of transportation and a source of multimodal recreation; therefore, roadway design must comprehensively consider and account for a variety of user needs and values.

The geographic context and proximity to the Pacific Ocean means Highway 1 is subject to serious damage from winter storms and earthquakes. Depending on the extent of roadway damage, effects can range from mere traveling inconveniences to full roadway closures. The Loma Prieta earthquake on October 17, 1989, caused significant damage along Highway 1 in Sonoma County.

Sonoma County lies in the Coast Range geomorphic province. The Coast Range comprises northwest-trending folded and faulted mountains and intermountain valleys that roughly parallel the San Andreas fault zone. The range extends from the Pacific Ocean on the west to the edge of the Great Valley to the east. The topography through which most of Highway 1 traverses Sonoma County is dominated by the Pacific Ocean and the San Andreas fault.

The geology of Highway 1 through Sonoma County comprises four distinct terrains underlain by four different rock units (from south to north): Tertiary Wilson Grove Formation, Quaternary marine terraces, Cretaceous Franciscan Complex Mélange, and Cretaceous granitic rocks (Salinian block).

The Tertiary Wilson Grove Formation underlies Highway 1 in the southern part of Sonoma County from the Marin County line to roughly Bodega Bay. This formation comprises marine sedimentary rocks (e.g., sandstones, siltstones, and conglomerates) overlying the Franciscan Complex. This section of Highway 1 traverses gently rolling topography and is generally not prone to extensive instability.

North of Bodega Bay, the San Andreas fault heads offshore, and Highway 1 hugs a slightly elevated coastline underlain by Quaternary marine terraces. These very young, poorly lithified sedimentary rocks were deposited over Franciscan Complex rocks when sea levels were slightly higher. They form the bluffs just above the beach from Bodega Bay to Jenner. Strong wave action is the primary erosional feature, over steepening the bluffs and creating local instabilities.

Franciscan Mélange underlies Highway 1 from Jenner to about Fort Ross. This unit consists of sedimentary rocks that include greywacke sandstone, siltstone, shale, limestone, and chert, along with volcanic and metamorphic blocks in a sheared matrix of argillite. Franciscan rocks can be weak—especially where argillite is present—and weather quickly to clayey soil. The Franciscan Complex is known for extensive deep-seated earth flows and landslides and is considered highly susceptible to erosion due to heavy rainfall and wave action generated from winter storms. This unit is found exclusively on the east side of the San Andreas fault. This stretch of coast is steep and often requires structural solutions to repair unstable slopes.

The San Andreas fault crosses Highway 1 again just south of Fort Ross. Cretaceous granitic rocks, found exclusively on the west side of the San Andreas fault, are capped by a thin sequence of Quaternary marine terrace rocks. The granitic rocks are of varying compositions (e.g., granites, granodiorites) and crop out locally as intact blocks. This section of Highway 1 from Fort Ross to the Mendocino County line traverses gently rolling terrain, and instabilities are often localized and shallow.

Highway 1 in Sonoma County is located near, and often within, the seismically active San Andreas strike-slip fault complex. This fault system forms the boundary between the North American and Pacific Plates and often comprises one or more distinctive strands, any or all of which can rupture during a seismic event. Movement along these

faults, characterized as strike-slip, allow the plates to grind past each other. The entire length of Highway 1 in Sonoma County is expected to experience strong ground motion and possible surface rupture at specific locations during a large seismic event on the San Andreas Fault. Several major earthquakes have occurred in the San Francisco Bay Area since 1800. Protecting against impacts to the geological, biological, visual, cultural, and archeological resources along Highway 1 can constrain and often delay its maintenance and repair. Historically, repair and maintenance projects have been challenging and usually take longer than similar projects in inland portions of the Caltrans system.

In addition to its unique natural features, Highway 1 is distinguished by its political boundaries. Most of Highway 1 falls within the California coastal zone, where specific policies govern development in an effort to protect the access, qualities, and resources of the California coast.

3.2 Guiding Authorities

3.2.1 State Parks Policies

State Parks has extensive policies that direct the management and use of their lands. These policies span natural resource protection, transportation, recreational uses, and protection of their viewsheds. These policies affect activities in and adjacent to State Parks lands. Highway 1 traverses parks at various locations in Sonoma County, as indicated in the Landscape Units Map in Appendix A. A selection of State Parks policies is presented in the following subsections and should be considered when projects occur adjacent to or may affect these lands.

State Parks policies relating to Highway 1 include the following:

- ***Department Operations Manual, State Parks (0304.2.3) (State Parks 2010).***
The purpose of State Parks shall be to preserve outstanding natural, scenic, and cultural values; indigenous aquatic and terrestrial fauna and flora; and the most significant and representative examples of ecological regions.
- ***Department Operations Manual, Scenic Values and Viewshed (0312.2) (State Parks, 2010).*** The principal objective in the management of scenic areas is preservation of the quality of the visual environment. More specific objectives in scenic resource management should include the following:
 - Identify and protect scenic resources and qualities

- Avoid or minimize modifications to scenic resources
- Remove intrusive human-made elements that are not significant cultural resources, including intrusive light and noise
- Where modifications of scenic resources are necessary, design attractive structures, subordinate to the character of their surroundings and that appear to belong to their setting, in sympathy with the sense of place
- Locate structures in the background as much as possible, isolated from primary views
- Use visually harmonious materials, colors, textures, and scale that blend into and are subordinate to their landscapes' background
- Unify structures on the site with a consistent style of architecture and materials

Protection of scenic resources goes beyond State Parks boundaries. Development outside of the park boundary that is out of scale with its surroundings, with contrasting colors or reflective surfaces, or poorly sited, can impact views from within the park.

3.2.2 Coastal Zone Management Act

The U.S. Congress passed the Coastal Zone Management Act (CZMA) of 1972 to preserve, protect, develop, and (where possible) restore or enhance the resources of the nation's coastal zone. Additionally, Congress intended to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and aesthetic values, as well as the needs for compatible economic development.

For all of the California Coast, except the San Francisco Bay, the CCC is responsible for implementing the CZMA. The CCC is responsible for reviewing proposed federal and federally authorized activities to assess their consistency with the approved state coastal management program.

The CCC's federal consistency authority applies to activities that are undertaken, funded, or permitted by federal agencies or if they occur on federal lands. Such activities, whether or not they occur inside of the coastal zone, are subject to the federal consistency CZMA provisions if they have the potential to affect resources in

the coastal zone. During such reviews, the CCC determines whether the proposed activities are consistent with the policies of the Coastal Act and may refer to certified LCP policies as guidance for determining such consistency.

3.2.3 California Coastal Act

The resource protection policies and planning processes underpinning the Coastal Act were established by voter initiative in 1972 (Proposition 20) and later adopted by the California Legislature through the Coastal Act of 1976 (Public Resources Code sections 30000-30900). The law is administered by the CCC and is the backbone of the State's federally approved coastal management program. The CCC issues coastal development permits; reviews federal activities affecting the coastal zone; reviews LCPs; educates the public; and works with local governments and other agencies to protect a number of coastal resources, including public beach access, wetlands, sensitive habitats, agricultural lands, water quality, scenic vistas, and coastal tourism. The CCC's jurisdiction extends to all areas within the coastal zone, which includes approximately 1.5 million acres of coastal land extending from Oregon to Mexico. The coastal zone's western boundary begins 3 miles at sea and extends inland to varying degrees that range from a few blocks up to 5 miles. Highway 1 in Sonoma County falls within the coastal zone.² Projects within the coastal zone that include activities not specifically excluded by the Coastal Act are subject to regulatory review by the CCC or, where the CCC has certified a LCP, by the local government implementing that program. A large proportion of Caltrans' projects that are subject to local government review for necessary Coastal Development Permits are also appealable to the CCC.

Several Coastal Act policies apply specifically to Highway 1, including, but not limited to the following:

- **Public Resources Code (PRC) Section 30251:** “The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas.”

² See <https://databasin.org/maps/new#datasets=ece6ae2d026b43959cfa11cceb2c07ac>.

- **PRC Section 30254:** “it is the intent of the (California) Legislature that State Highway 1 in rural areas of the coastal zone remain a scenic two-lane highway.”
- **PRC Section 30240:** “Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.”
- **PRC Section 30610:** “no coastal development permit shall be required pursuant to this chapter for...(d) Repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities; provided, however, that if the commission determines that certain extraordinary methods of repair and maintenance involve a risk of substantial adverse environmental impact, it shall, by regulation, require that a permit be obtained pursuant to this chapter.”

The permit exclusion described above (PRC 30610) applies to a number of activities covered in the CCC’s regulations. Local governments can also request that these exclusions be included in their LCPs, as certified by the CCC.

So long as there is no risk of causing substantial adverse impacts on public access, environmentally sensitive habitat areas, wetlands, or public views to the ocean and there is no expansion of the roadway facility, no permit is required for repair and maintenance of existing public roads. This includes landscaping; signalization; lighting; signing; resurfacing; installing or expanding retaining walls, safety barriers, and railings; and other comparable development within the existing right-of-way.³ Designers are encouraged to contact the District’s Coastal Liaison in the Environmental Division to determine the applicability of the exclusion.

Maintenance activities are generally those necessary to preserve the highway facility as it was constructed, including constructing temporary detours; removing slides and slip outs; restoring and repairing drainage appurtenances; installing slope protection devices; installing minor drainage facilities for preservation of the roadway or adjacent properties; restoring, repairing, and modifying bridges and other highway structures for public safety; and restoring pavement and base to original condition by

³ 14 California Code of Regulations 13252(a) & Repair, Maintenance and Utility Hook-up Exclusions from Permit Requirements - <http://www.coastal.ca.gov/legal/rmu-exclusions.pdf>

replacement, resurfacing, or pavement grooving. A permit is required for excavation or disposal of fill outside of the roadway prism.

The following Caltrans maintenance and alteration programs (or their equivalent conducted by local road departments) “that do not result in an addition to or enlargement or expansion of the existing public road facility itself” do not require a permit except as noted:

- Flexible Roadbed Program
- Rigid Roadbed Program
- Roadside Maintenance Program
- Roadway Litter and Debris Program
- Vegetation Control Program
- Pavement Delineation Program
- Sign Program
- Electrical Program
- Traffic Safety Devices Program
- Public Service Facility Program (except that a permit is required for construction of new facilities)
- Landscape Program
- Bridge and Pump Maintenance Program
- Tubes, Tunnel, and Ferry Maintenance Program
- Bridge Painting Program
- Miscellaneous safety projects, provided there is not expansion in the roadway or number of traffic lanes
- Major damage maintenance, repair, and restoration

- Comparable minor alterations

Appendix B, Coastal Act Repair Maintenance Exclusions, provides a full description of the activities listed previously.

3.2.4 Local Coastal Programs

LCPs are the local governments' planning guidelines for coastal development and, once approved by the CCC, provide cities and counties with the authority to issue Coastal Development Permits, with a defined appeal authority resting with the CCC. The CCC retains the primary permit jurisdiction for tidelands, submerged lands, and public trust lands. An LCP must be consistent with Coastal Act policies and allows local governments to specify further actions and policies for their own regional setting. Sonoma County's LCP includes a Land Use Plan—which prescribes land use classifications, types, and densities of allowable development, goals, and policies surrounding development—and an Implementation Plan, primarily zoning ordinances, that provides for the Land Use Plan's implementation. Sonoma County reviews projects and issues Coastal Development Permits, based on its LCP, in areas within the coastal zone occurring outside of the CCC's primary jurisdiction.

Sonoma County adopted its LCP in 1981 and updated it in 1989 to be consistent with its revised General Plan. Other than this focused update, the County has not conducted large-scale revisions. Several of the policies in the Sonoma County LCP directly address projects on Highway 1 and bicycle accommodations. The following are notable LCP policies relevant to this corridor:

- **Road Improvements:** “Providing turning lanes at intersections and parking areas is the most effective approach to improving the capacity of Highway 1, while maintaining it as a two-lane scenic highway...Other minor highway safety and capacity improvements proposed for Highway 1 are selective widening and road alignments; parking management, development and enforcement programs; and other types of road improvements such as roadway striping and marking, bicycle lanes and pedestrian ways...Road construction projects should include sufficient shoulder width to accommodate bicycles and pedestrians where off-road facilities are not feasible” (Sonoma County LCP, VII-33, p. 157).
- **Bikeways, Pedestrian Walks, and Transit:** “...Separated or Class I bike paths are the most desirable option...Where separate paths are not feasible, bicycle lanes adjacent to the travel lane or Class II bike paths are preferable to the existing narrow shoulder. With this option, however, parking restrictions and

enforcement may be needed to keep parked vehicles out of roadside bike lanes” (Sonoma County LCP, VII-39, p. 163).

- **Recommendations for Bikeways – Pedestrian Walks – Transit:** “Where off-road facilities are not feasible, provide adequate shoulder width to accommodate bicyclists and pedestrians on Highway 1 through Sonoma County.”

“Where engineering problems or gradient differences prevent standard four foot shoulders, a minimum of two foot shoulders on both sides of travel lanes is acceptable for bicyclists.”

3.2.5 California Coastal Trail

The California Coastal Trail (CCT) is a product of multiple regulations and state and federal policies, including the following:

- The Coastal Act, which calls for protecting and providing maximum public access to the shoreline, including such measures as a statewide coastal trail system (PRC Section 30220-30224).
- Section 31408 of the State Coastal Conservancy Act of 1976 (PRC Section 31000 et al.), which calls for the California Coastal Conservancy (Conservancy) to have a principal role in the implementation of a coastal trail.
- State and federal designation of the CCT as California’s Millennium Legacy Trail in 1999.
- Senate Bill 908, passed into law in 2001, which requires the completion of the CCT.
- Assembly Bill 1396, passed into law in 2007, directing the Conservancy to coordinate development of the CCT with Caltrans, State Parks, and the CCC. Under this bill, Caltrans is responsible for notifying the Conservancy quarterly, as well as other specified agencies, regarding excess property suitable for the CCT. In addition, the law requires that provisions for the CCT be included in regional transportation plans and that, to the extent feasible, state agencies with property interests or regulatory authority along the coast cooperate in planning and making lands available for the completion of the trail, including constructing trail links, placing signs, and management.

The CCT is envisioned to be a continuous, interconnected, braided public trail system along the California coastline. The CCT may take the form of an informal footpath, shared sidewalk, bicycle path, or, where no other alternative exists, may connect along the shoulder of the roadway, on either an interim or a permanent basis.

While primarily for pedestrians, the CCT is intended to accommodate a variety of users, including bicyclists, wheelchair users, equestrians, and other complementary forms of non-motorized transportation.

Caltrans designers are encouraged to contact Sonoma County Regional Parks and State Parks to evaluate the potential for collaboration on coastal trail development for projects along SR 1 in Sonoma County.

3.2.6 Sonoma County Transportation Authority Countywide Bicycle and Pedestrian Master Plan, 2014 Update

The Sonoma County Transportation Authority Countywide Bicycle and Pedestrian Master Plan (Master Plan) (Sonoma County Transportation Authority 2014) designates Highway 1 in Sonoma County as part of the regional bicycle network with proposed Class II bicycle lanes from the Marin County line to Meyer's Grade Road and from Kruse Ranch Road to the Mendocino County line and a proposed Class III bicycle route from Meyer's Grade Road to Kruse Ranch Road. The Master Plan also calls for the development of the Bodega Bay Trail as a Class I path parallel to Highway 1 in Bodega Bay. Proposed bicycle network maps and list of projects can be found in the Master Plan appendices.

3.2.7 Additional Permitting, Concurrences, and Authorizations

In addition to the policies and restrictions unique to the coastal zone, Highway 1 repairs in Sonoma County are subject to regulations that apply to all project activities in California in general. Depending on the scope of the damage, the location, and the necessary response, Caltrans may be required to obtain permits, concurrences, or authorizations from the following: California Department of Fish and Wildlife (CDFW), the California Regional Water Quality Control Board, State Parks, the U.S. Army Corps of Engineers (USACE), the U.S. Fish and Wildlife Service (FWS), the State Lands Commission, the Gulf of Farallones National Marine Sanctuary, or the National Oceanic and Atmospheric Administration. Each of these agencies examines Caltrans' efforts through a different lens and policy, adding another layer of complexity to the regulatory matrix that applies to any Highway 1 repair project.

For a comprehensive list and description of these requirements, refer to the State Environmental Reference site.⁴ An overview of those requirements that are frequently triggered in repair projects along this corridor follows.

For damage repair projects adjacent to State Parks lands, or other areas of exceptional scenic quality, including the coastal zone, Caltrans should consult with the affected land manager as early in the planning process as possible, before project scoping and at approximately the 30-, 60-, and 90-percent design reviews; this will ensure that all feasible measures to avoid and minimize harm are incorporated, public lands resources are considered in the project development process, and resources are adequately protected. In addition, designers are encouraged to engage with resource agencies, such as State Parks, throughout the project development process to keep the lines of communication open and to learn of potential concerns or conflicts as well as opportunities. This collaboration and coordination will need to be managed to keep the project on schedule and to minimize potential impacts to sensitive biological and cultural resources.

3.2.7.1 NATIONAL ENVIRONMENTAL POLICY ACT (1969)

The National Environmental Policy Act (NEPA) applies when the project is entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies. When Caltrans road projects are federally funded, Caltrans must complete a NEPA evaluation of the effects of the project on the human environment (comprising economic, social, and environmental impacts). NEPA compliance also requires compliance with all federal laws under the NEPA “umbrella,” including the National Historic Preservation Act, the federal Endangered Species Act, and Section 4(f).

3.2.7.2 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) maintains a quality environment for the people of California by giving the people responsibility for engaging in the environmental review process. CEQA applies to governmental action, which may involve (1) activities directly undertaken by a governmental agency, (2) activities financed in whole or in part by a governmental agency, or (3) private activities that require approval from a governmental agency. Any California agency with discretionary approval (the “lead agency”) over such an action that has the potential to affect the physical environment (a “project”) must complete a CEQA determination that is subject to public scrutiny before granting approval.

⁴ See <http://www.dot.ca.gov/ser/voll/voll.htm>.

Caltrans will prepare an environmental document that describes the project and assesses its impacts. Depending on the extent of the impacts, additional mitigation work may be required. For details on the process, refer to the State Environmental Reference site.⁵

3.2.7.3 CLEAN WATER ACT OF 1977 AND 1987

The purpose of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of waters through prevention and elimination of pollution. It applies to any discharge of a pollutant into waters of the U.S.

Section 401: Section 401 of the CWA requires a water quality certification from the State Board or Regional Board when a project (1) requires a federal license or permit (a Section 404 permit is the most common federal permit for Caltrans projects) and (2) will result in a discharge to waters of the U.S. Section 401 water quality certification apply to the construction and subsequent operation of a facility.

Section 402: This section of the CWA establishes a permitting system for the discharge of any pollutant (except dredge or fill material) into waters of the U.S. A National Pollutant Discharge Elimination System permit is required for all point discharges of pollutants to surface waters. A point source is a discernible, confined, and discrete conveyance, such as a pipe, ditch, or channel. Permits (National Pollutant Discharge Elimination System permit) for all other discharges are obtained from U.S. Environmental Protection Agency or appropriate State agency, which in most cases is the appropriate Regional Water Quality Control Board (Section 402).

Section 404: Section 404 of the CWA establishes a permit program administered by USACE, regulating the discharge of dredged or fill material into waters of the U.S. (including wetlands). Section 404 guidelines allow the discharge of dredged or fill material into the aquatic system only if no practicable alternatives would have less adverse impacts. This coordination is conducted through consultation with USACE.

3.2.7.4 ENDANGERED SPECIES ACT OF 1973

This act and subsequent amendments provides guidance for the conservation of endangered and threatened species and the ecosystems upon which they depend.

Section 7: This section requires federal agencies to ensure that the actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification

⁵ See <http://www.dot.ca.gov/ser/voll/voll.htm>.

of critical habitat for these species. FWS and National Marine Fisheries Service share responsibilities for administering the Act. Section 7 allows for incidental take of a listed species for activities funded or carried out by federal agencies if the take is incidental to, and not the purpose of, an otherwise lawful activity.

Section 9: This section lists those actions that are prohibited under the Endangered Species Act. The take of a species listed in accordance with the act is prohibited. Two processes (Section 7 and Section 10) allow a take when it is incidental to an otherwise legal activity.

Section 10: This section provides a means whereby a nonfederal action with a potential take of a listed species could be allowed under an incidental take permit.

3.2.7.5 CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) establishes the policy of the state to conserve, protect, restore, and enhance threatened or endangered species and their habitats. CESA mandates that state agencies should not approve projects that would jeopardize the continued existence of threatened or endangered species if reasonable and prudent alternatives are available that would avoid jeopardy.

No state agency consultation procedures are provided under CESA; however, projects that might result in a take of a state-listed species require a permit from CDFW. For projects that affect both a state- and federal-listed species, compliance with the federal Endangered Species Act may satisfy CESA if CDFW determines that the federal incidental take authorization is consistent with CESA. For projects that will result in a take of a state-only listed species, Caltrans must apply for an incidental take permit under Fish and Game Code § 2081(b).

3.2.7.6 FISH PASSAGE AND WILDLIFE ACCOMMODATIONS

With the passage of California Senate Bill 857 in 2005, Caltrans must provide for the unimpeded passage for anadromous fish (fish that are born in freshwater, migrate to the ocean to mature and return to freshwater to spawn). Damage repair projects that include existing stream or river crossings must incorporate into the design the remediation of conditions that impede fish passage. Designers and PDTs should work with the Caltrans District Fish Passage Coordinator to review fish barrier locations. Resource information is available online.⁶ Design guidance can be found in the Caltrans (2007a) publication *Fish Passage Design for Road Crossings*.

⁶ See <http://www.calfish.org/>.

Repair projects will include, where appropriate, safe crossings for terrestrial and aquatic wildlife and other accommodations to promote biodiversity and avoid or mitigate harm to individual animals, the fragmentation of plant and animal habitats, and the disruption of natural systems.

3.2.7.1 SECTION 4(F)

Section 4(f) of the Department of Transportation Act of 1966, codified in federal law at United States Code, Title 49, §303, declares that “[i]t is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.”

Section 4(f) specifies that “[t]he Secretary [of Transportation] may approve a transportation program or project...requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if –

- there is no prudent and feasible alternative to using that land; and
- the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.”

Section 4(f) further requires consultation with the Department of the Interior and, as appropriate, the involved offices of the Departments of Agriculture and Housing and Urban Development in developing transportation projects and programs that use lands protected by Section 4(f).

In general, a Section 4(f) “use” occurs with a Department of Transportation-approved project or program when the following criteria are met: 1) Section 4(f) land is permanently incorporated into a transportation facility; 2) a temporary occupancy of Section 4(f) land is adverse in terms of the Section 4(f) preservationist purposes as determined by specified criteria (Code of Federal Regulations Title 23, §771.135[p][7]); and 3) Section 4(f) land is not incorporated into the transportation project, but the project’s proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are

substantially impaired (constructive use) (Code of Federal Regulations Title 23, §§771.135[p][1] and [2]).

3.2.7.2 CALIFORNIA STATE CONCURRENT RESOLUTION 17 – RELATIVE TO OAK WOODLANDS (1989)

This resolution requires that state agencies undertake in the performance of their duties to preserve and protect native oak trees to the greatest degree feasible or provide for replacement plantings where Blue, Engleman, Valley, or Coast live oak trees are removed.

3.2.7.3 THREE FEET FOR SAFETY ACT

On September 16, 2014, Assembly Bill (AB) 1371, known as the Three Feet for Safety Act, went into effect in California. This Act is designed to reduce car-bicycle crashes by reminding drivers to give bicyclists more safe space when passing. The California Vehicle Code was amended, requiring drivers to give people riding a bicycle at least 3 feet of clearance when passing in the same direction. If the street width doesn't allow for that, the driver is required to slow down to a "reasonable and prudent" speed, and may pass "only when doing so would not endanger the safety of the operator of the bicycle, taking into account the size and speed of the motor vehicle and bicycle, traffic conditions, weather, visibility, and surface and width of the highway."

This policy confirms the need to provide adequate roadway width, where feasible and where the speed differential between bicyclists and motorist is expected to be significant, such that motorists can safely pass bicyclists.

3.2.8 Caltrans Standards and Directives

Additionally, many internal Caltrans standards and guidance will apply to these projects. An overview of these follows.

3.2.8.1 DESIGN STANDARDS

Caltrans designs roadways in accordance with the HDM. For example, the HDM calls for new construction to have a 40-foot-wide roadway section (width), consisting of two 12-foot-wide lanes (one in each direction) with 8-foot-wide paved shoulders on conventional highways. A design exception is required for any project intending to install a section that is less than 40 feet wide. However, there are many good reasons to seek out a narrower roadway section. These include avoiding impacts to archaeological resources, sensitive or listed biological resources, and visual resources, as well as topographical and right-of-way constraints, conflicts with context

sensitivity and regulatory policy, and excessive costs. In addition to the HDM’s standards, many more have been developed to provide mobility and safety for all users. For additional standards, see Caltrans Design Information Bulletin (DIB) No. 79-03 (Caltrans 2007b). This bulletin, currently in its third edition and contains standards for most damage repair projects.

3.2.8.2 CONTEXT-SENSITIVE SOLUTIONS

In November 2001, Caltrans adopted a policy, Director’s Policy 22 (Caltrans 2001), stating that all approaches toward planning, designing, constructing, maintaining, and operating the Caltrans system should look for “Context-Sensitive Solutions.” This means that transportation decision making should be inclusive, considering and integrating aesthetic, historic, and environmental values into the process of project delivery. The policy recognizes that highways are more than just the paved roadway—they are corridors that support communities’ economic, aesthetic, cultural, and social needs. The Context-Sensitive Solutions policy asks staff to reach resolutions through a collaborative interdisciplinary approach involving all stakeholders. Staff should coordinate within State Parks staff for projects bordering a state park. See the map and Existing Conditions table in Appendix A for state parks adjacent to Highway 1 in Sonoma County. The County of Sonoma and the CCC should be included for projects in, or affecting the resources of, the coastal zone.

3.2.8.3 COMPLETE STREETS POLICY

In 2008, Caltrans strengthened its policy on Complete Streets in Deputy Directive 64 (Caltrans 2008), which requires that Caltrans provide for the needs of travelers of all ages and abilities. Several revisions were made to the HDM in 2012 to incorporate features of Complete Streets.

3.2.8.4 MAIN STREET: FLEXIBILITY IN DESIGN AND OPERATIONS

The *Main Street, California A Guide for Improving Community and Transportation Vitality* booklet (Caltrans 2013a) is a planning reference and compilation of options that can enhance established traffic engineering and design practices in the implementation of Deputy Directive 64. Although the ideas and practices in this report do not supersede existing Caltrans’ manuals, the suggestions support existing multimodal policies and standards, offering stakeholder engagement and traffic-calming practices for projects focused on main streets in communities.

3.2.8.5 CLIMATE CHANGE POLICY

On June 22, 2012, Caltrans issued Director’s Policy 30 on Climate Change (Caltrans 2012). Director’s Policy 30 directs the coordination of climate change mitigation and

adaptation across all Caltrans programs, to include design and construction of transportation infrastructure, support of climate change-related research, ensuring that adequate resources are allocated toward project-level climate change-related studies, and further development, coordination, and implementation of Caltrans Climate Change policy.

Chapter 4 Process

4.1 Process for Major Damage Repairs

Caltrans District 4 Maintenance is responsible for providing documentation to secure funding for major damage repairs. This documentation requires input from a wide range of functional units, including the following:

- Geotechnical Design
- Design (Roadway)
- Landscape Architecture
- Environmental
- Structures
- Materials
- Hydraulics
- Right-of-Way
- Traffic
- Construction

A Caltrans Director's Order is necessary to perform emergency damage repairs. A Director's Order is a formal document, signed by the Director or delegated Deputy Director, that grants authority to a district to accelerate project award and set aside the standard project advertising, bidding, and award processes. Director's Orders are critical to Caltrans' ability to respond effectively and quickly to emergencies on the state highway system.

The typical approach for most major damage sites is a standard two-step process consisting of two projects. The first project is an emergency opening (EO) project, such as debris removal, asphalt concrete pavement leveling, or setting up traffic control to restore essential transportation functions. The second project is a permanent restoration project for the full repairs.

EO projects are repairs made during and immediately following major damage to restore essential traffic, minimize the extent of damage, and protect the remaining facilities. Permanent restorations are repairs performed after emergency repairs have been completed to restore the highway to its pre-disaster operating condition. These Guidelines apply to permanent restoration repair projects.

There are instances when EO and permanent restoration projects are performed concurrently. If this is the case, the Guidelines would also apply to the project. EO-only efforts are directed by the Division of Maintenance and should use these guidelines as a reference for best practices.

4.1.1 Project Development for Storm Damage Projects

Most permanent restoration projects and replacement projects use the normal design-bid-build process, following the guidelines in the *Project Development Procedures Manual* (see Reference Section) for a normal bid with plans, specifications, and an engineer's estimate. A Damage Assessment Form can serve as the project initiation and project approval document for some straightforward projects. For more complex projects, a Project Initiation Report and a Project Report are required (the Damage Assessment Form is an attachment to these documents). The District Maintenance Engineer will coordinate with Design and Headquarters programming to make this determination.

All projects must comply with state and federal regulations intended to protect the public and environment from damage or impacts. Response to events that have been declared a disaster by the state or federal government, or in which a state of emergency has been declared, may have some or all of these regulations suspended for a short period of time. It is during this time that EO projects typically are executed.

The following is an overview of the permanent restoration project development process:

- 1) Perform a field assessment.
- 2) Conduct a preliminary consultation with staff of agencies with permitting authority over the project. As part of this consultation, participants will determine what additional review may be desirable before and during Caltrans' 30-, 60-, and 90-percent design review processes.
- 3) Ensure that design is based on the HDM, the parameters of this document, and other constraints identified by field assessment, including the following:
 - a. Forming a PDT—The project will be refined based on functional group guidance. Base any design exceptions on site context and impacts and document them in a Design Standard Decision Document (DSDD). Fulfilling

the policy objectives listed in Chapter 3, and their underlying mandates, should be a high priority in guiding the design process.

- b. Maintaining current roadway geometry, where feasible, while providing for safe multimodal travel should guide design rather than achieving a greater design speed. See section 5.1.1, Design Speed.
 - c. Considering how the various design parameters of Chapter 5 can be synthesized to best fulfill policy objectives and inform the overall design.⁷
- 4) Ensure environmental compliance, including developing and preparing the NEPA and CEQA documents as needed and incorporating alternative design analysis and other information needed for any required coastal development permits, Section 4(f) coordination, or other agency approvals. This task requires continued coordination with relevant permitting agencies and other relevant resource agencies. This includes Sonoma County Regional Parks and State Parks for potential coastal trail improvements. Additional or revised design exceptions may need to be prepared as part of this planning process. Depending on the level of environmental document, it may require public involvement activities.
 - 5) Secure environmental permits,⁸ which may involve appearing before an approval authority and participating in a public involvement process.
 - 6) Finalize project design, satisfy permit conditions, and obtain right-of-way clearances.
 - 7) Send project construction plans out to bid.
 - 8) Administer the construction contract consistent with issued permit; any proposed changes must be reviewed by appropriate functional units for consistency with standards, these guidelines, and permits. Proposed changes that are inconsistent with issued regulatory waivers or permits must receive appropriate regulatory clearances prior to being implemented.

⁷ For example, relative to roadway geometrics and lane/shoulder widths, while 12-foot lanes might provide safe truck turning, one or both shoulders could be narrower where appropriate to minimize overall roadway/structure width, or vice versa (designing a narrower travel lane and increasing the width of the shoulder[s]).

⁸ A coastal permit may be required, as discussed in Chapter 3. Depending on the scope and location of the damage and the necessary repair response, Caltrans may also be required to obtain permits, concurrences, or authorizations from the following: CDFW, the California Regional Water Quality Control Board, State Parks, USACE, FWS, State Lands Commission, or the National Oceanic and Atmospheric Administration. Each of these agencies examines Caltrans' efforts through a different lens of policy requirements, adding another layer of complexity to the regulatory matrix that applies to any Highway 1 repair project.

- 9) Perform post-construction activities, such as revegetation monitoring and reporting and implementing mitigation commitments until required performance standards are met. It is noted that programmatic and advanced mitigation planning is being developed and should be considered as a potential fit for project needs.

For additional information on Major Damage or Director's Order Projects refer to the Division of Maintenance Website.⁹

4.1.2 Federal Funding

EO and permanent restoration projects are eligible for federal funding reimbursement when there is a declared disaster. Projects are eligible for reimbursement for two federal fiscal years after the triggering event. The funding source is first-come/first-served. Projects developed quickly are more likely to receive federal transportation dollars. Projects that are not able to meet the time constraints of the federal program are likely to be funded from the State Highway Operations and Protection Program account under the Major Damage Restoration category. The greater percentage of federal dollars captured to fund the Major Damage Restoration category frees up the State Highway Operations and Protection Program state-only funding for other programming categories, such as the Stormwater Mitigation Program or the Roadside Protection and Restoration Program.

⁹ See <http://onramp.dot.ca.gov/hq/maint/orway/ha23>.

Chapter 5 Design Guidelines

The design guidelines herein apply to permanent restoration projects on Highway 1 in Sonoma County. The intent is to improve consistency in design and aesthetic considerations for these projects. Projects should minimize change from current conditions, stay within the existing right-of-way, and be visually compatible with the surrounding environment to protect the rural character of Highway 1 while maintaining safety and functionality of all design elements. Projects should also meet the needs of all roadway users in a multimodal context. Chapter 80 of the HDM calls for a balanced solution to transportation problems. The HDM Topic 109, Scenic Values in Planning and Design (see Appendix C), states that the location of the highway, its alignment and profile, the roadway cross section, and other features should all be in harmony with the setting. These guidelines provide additional factors to be considered in achieving that goal. In particular, they provide greater specificity to assist in achieving successful context sensitive designs through appropriate HDM exceptions. All staff involved in the design of a damage repair project on Sonoma Highway 1 should review this chapter.

Consultation with Sonoma County and the CCC is encouraged for projects requiring coastal development permits, as is early notification to other applicable permitting agencies. Projects within, adjacent to, or visible from State Parks lands, especially public viewing areas, should include early coordination with State Parks to obtain their input and recommendations. This consultation should include all design elements. The project development team should meet early with the Environmental generalist for coordination with partners.

5.1 Overview of Recommendations

Per DIB 79-03, major repair projects can restore the highway to the condition that existed prior to the damage; however, consideration of appropriate highway improvements is part of the project development process. Restoration projects that necessitate physical changes to the roadside environment involving a structure—such as retaining walls, bridges, or viaducts—shall, in accordance with the HDM, strive to maintain the existing character of roadway and minimize the roadway geometric features to achieve appropriate, context-sensitive design standards consistent with resource preservation. These design features include width, horizontal and vertical alignment, superelevation, and stopping sight distance. The exact features that constitute final design should be based on a sound engineering analysis that considers

the context of the specific project location and the avoidance of adverse impacts. Projects that are considered replacement facilities are expected to bring the roadway geometric features to minimum design standards. However, as indicated in HDM Topics 81 and 109, designers are required to consider potential impacts on sensitive resources and scenic values. Projects with the potential to result in adverse impacts to coastal resources should be reevaluated to consider nonstandard design options to avoid or reduce such impacts. Note that there is value in staying within the existing right-of-way and road bench width, retaining an existing curvature that has a more natural fit to the landscape, and in limiting driving speeds, as these are important to the user's experience and part of the character of the roadway. Careful attention should also be given to designing projects to be consistent with the Sonoma County LCP and Coastal Act policies for all projects along Highway 1. Similarly, projects in or adjacent to State Parks lands, or that may affect the scenic qualities of State Parks lands, should be consistent with park plans and management policies.

To achieve these objectives, designers may have to accept current nonstandard features or even deviate from design standards. For example, it may not be possible to accommodate very large trucks. Most of Highway 1 in Sonoma County is designated a California Legal Kingpin-to-Rear-Axle (KPRA) Advisory Route with a KPRA distance of 30 feet. Repair projects are not intended to increase this KPRA number. Maintaining the current roadway curvature and features should accommodate the KPRA-30 vehicle even though curve radii, superelevations, or widths may not be standard. Accommodating longer KPRA vehicles by designing to standard may be possible, but it should not be at the expense of the scenic environment.

Projects that would typically be required to bring the Highway 1 facility up to current design standards shall have an approved Design Standard Decision Document (DSDD) when they need to deviate from HDM standards. These Guidelines can be cited as ancillary documentation in these DSDDs; however, the approval for these DSDDs is reliant on impacts to specific resources on a project-by-project basis.

For repair projects, the PDT should be aware that there are usually many interested stakeholders who need to be involved in the project development process, consistent with the Context-Sensitive Solutions policy.

The PDT also should note that there are many good reasons to seek out a narrower roadway section. These include avoiding impacts to archaeological resources, sensitive or listed biological resources, and visual resources, as well as topographical

and right-of-way constraints, conflicts with context sensitivity and regulatory policy, and excessive costs. Projects are to be designed to accommodate all roadway users. Surrounding land uses, existing and planned pedestrian and bicycle facilities, bicycle and pedestrian plans, and input from stakeholders and agency partners all need to be considered when determining multimodal needs. If there is an identified need to accommodate pedestrian travel on a replacement facility, planning and development for the facility needs to be coordinated with input from various stakeholders and agency partners. Section 5.3 includes considerations for pedestrian and bicycle accommodations.

Table 5-1 summarizes Highway 1 design recommendations. These recommendations are further discussed in the subsequent sections. DSDDs are expected to document the application of most of the recommendations.

Table 5-1 Design Recommendations



Design Element	Recommendation	Comments
<p>Roadway Geometrics</p> 	<p>The character of the existing horizontal and vertical alignment should be generally maintained. Curve flattening should be made only when there is an accident history at the location. Design speed should be commensurate: 25 to 40 miles per hour (mph) is acceptable in rural mountainous, rolling, or flat areas and 25 mph or less is acceptable in developed areas.</p>	<p>Where alterations may be warranted, primarily because of a demonstrated crash history, any new alignment should avoid and mitigate resource impacts, be carefully fitted and blended in with the existing topography, and designed to meet the needs of all roadway users. Repair projects should consider alternatives that provide for staying within the existing roadway bench and right-of-way. Avoid encroaching into State Parks lands.</p>
<p>Lane Width</p> 	<p>Meeting the safety and mobility needs of all roadway users while preserving the existing, scenic two-lane character of Highway 1 is the primary goal; less than 12-foot lane widths may be considered.</p>	<p>HDM Index 301.1 calls for a 12-foot-wide lane. Narrower than 12-foot lanes should be considered if negative project impacts can be reduced, the design vehicle can be accommodated, the character of the roadway can be preserved, sight distance is adequate, and the needs of all roadway users are met. Lane width in towns can be 11 feet. See Section 5.2.6.</p>

Table 5-1 Design Recommendations




Design Element	Recommendation	Comments
<p>Shoulder Width – Rural Locations</p> 	<p>Considerations include avoiding negative project impacts that would be significant under applicable resource protection policies and accommodating cyclists according to project-specific topography and context. Recommendation is for 4-foot shoulders unless justified otherwise.</p>	<p>– DIB 79-03 requires either a 4-foot shoulder or 8-foot shoulder depending on the average daily traffic (ADT) of the roadway segment; 4-foot shoulders promote the rural character of the roadway, provide space for multimodal users, and reduce visual impacts caused by the full geometric cross section. Evaluate whether resource constraints would allow 6-foot shoulders for areas identified as Class II facilities in the Sonoma Countywide Bicycle and Pedestrian Master Plan (see Section 5.3.1).</p>
<p>Shoulder Width – Towns</p> 	<p>A 5-foot shoulder width should be used where no parking exists; 13-foot shoulder width should be used where parking exists.</p>	<p>The 5- or 13-foot shoulder width can be provided in towns to accommodate bicyclists. Pedestrians should be accommodated on sidewalks or paths. Seek out stakeholder involvement when working in towns to ensure consistency with Sonoma County LCP and town plans.</p>
<p>Shoulder Width – Bridges</p> 	<p>A 4-foot shoulder should be the minimum considered on structures when an alternative bicycle path is available. A 6-foot shoulder width is preferred adjacent to bridge rails and retaining walls and when required by geometric conditions.</p>	<p>Using a 6-foot shoulder allows bicyclists the full use of the shoulder for riding; 4-foot-wide shoulders tend to push bicyclists closer to or over the edge line into the travel way. If there is an identified need to provide connections/access for pedestrian travel on a bridge replacement, such as a gap on a parallel trail, a sidewalk may be considered in addition to shoulders and in coordination with stakeholders and agency partners.</p>

Table 5-1 Design Recommendations




Design Element	Recommendation	Comments
<p>Parking, Pullouts, Unpaved Shoulders, and Turnouts</p> 	<p>No net loss of parking, pullouts, or turnouts. Non-pavement treatments should be used where feasible. Other roadway uses or development of the area beyond the shoulder should be minimized and fit in with the natural environment.</p>	<p>Any pullouts removed should be replaced so as to provide equivalent or better service. Any opportunities to add parking, pullouts, or turnouts should be considered, especially where there is an identified need (such as coastal access points) and where consistent with the Sonoma County LCP.</p>
<p>Bridge Barriers and Railing</p> 	<p>Bridge railings should be see-through type, to allow maximum views and consider all multimodal users. Ensure that the railing height and rail opening widths meet current minimum design standards for both bicyclists and pedestrians where appropriate.</p>	<p>See-through types of railings are used to allow viewers visual access to the unique scenic qualities of the crossing. Bicycle and pedestrian railings added to a bridge rail can be highly visible and special attention should be given to the aesthetics of these railings.</p>
<p>Railing</p> 	<p>Midwest guardrail (MGS) is the preferred railing type where railing is required. Wood posts and matte finish on railing should be used where feasible. White Barrier Markers on top of the MGS should be used in lieu of Delineators (Type F White).</p>	<p>MGS is a consistent and familiar feature along the Highway 1 corridor. It provides transparency, context sensitivity, and is cost effective. Continuity in railing type is important to avoid visual intrusion caused by dissimilar roadside features.</p>

Table 5-1 Design Recommendations




Design Element	Recommendation	Comments
<p>End Treatments</p> 	<p>Where practical, see-through concrete barriers and railings should be terminated with a buried end-section. If not feasible, an in-line end-section should be used.</p>	<p>Buried end-sections and in-line end-sections, as opposed to flared end sections minimize visual impacts. Design solutions that avoid the need for crash cushions that would cause visual intrusion are encouraged.</p>
<p>Vegetation Control Under MGS</p> 	<p>No vegetation control treatment is required under MGS.</p>	<p>Typical soil coverage for erosion control will be needed.</p>
<p>Non-safety Fencing</p> 	<p>Where fencing is required, it should be wire or timber with timber posts. Other fence types should be installed where they are more typical and appropriate for the adjacent land use.</p>	<p>Wire and timber are common features along Highway 1 and in rural and agricultural settings. Chain-link fence should be avoided. Before replacing a stand-alone fence, consider its purpose and need and alternatives. In general, do not add non-safety fencing unless it serves to promote, and is consistent with policies of, the Sonoma County LCP.</p>

Table 5-1 Design Recommendations




Design Element	Recommendation	Comments
<p>Slope Stabilization</p> 	<p>Nonstructural options should be considered first, then, where not feasible, other options that can be revegetated with native plants are preferred. Ensure that any pedestrian needs/uses are factored into the final design.</p>	<p>Nonstructural options are less visually disruptive than retaining walls. Solutions that can be vegetated with locally appropriate native palette of plants to blend in with the surrounding environment are preferred. See Section 5.6. It is important to evaluate the impact on existing and planned pedestrian access (e.g. public trail or pathway).</p>
<p>Retaining Wall – Timber Lagging Walls</p> 	<p>Timber lagging is typically used for retaining walls required below the roadway.</p>	<p>Timber lagging is visually appropriate for both rural and marine settings. Coat the exposed concrete and metal features to blend into the setting and reduce glare. Dark-brown paint (Federal Standard 595 Color #30051) should be used. Stain should also be dark brown. Wall aesthetic uniformity is important to minimize cumulative visual impacts caused by inconsistency.</p>
<p>Buried Walls</p> 	<p>Retaining walls should be buried, if feasible, and the resulting slope revegetated with appropriate native plants.</p>	<p>Resulting slope should be evaluated to determine whether guardrail is required per Chapter 7 of the <i>Traffic Manual</i>. If guardrail is not required at the time of the project, adequate unpaved area should be provided between the edge of pavement and the retaining wall to accommodate future installation of guardrail if warranted. Communicate with Traffic Safety for these issues. Any choice between uphill or downhill retaining wall structures should favor that with the least environmental and scenic impact.</p>

Table 5-1 Design Recommendations






Design Element	Recommendation	Comments
<p>Fall Protection Cable Railing</p> 	<p>Mobile fall protection should be considered and used whenever feasible.</p>	<p>A design exception will need to be processed.</p>
<p>Retaining Wall – Carved and Stained Rock Walls</p> 	<p>Soil nail walls with shotcrete are typically used for walls above the roadway. Stain and carve shotcrete to mimic local natural rock outcroppings. Eliminate paved ditch and maintenance railing wherever feasible. Stain all appurtenances to match the wall.</p>	<p>Carved rock walls blend into the natural environment. Staining of the concrete and metal features blend them into the setting and reduce glare. Wall aesthetic uniformity is important to minimize cumulative visual impacts. Attention to aesthetic detail on these walls goes beyond color and texture. Vertical alignment should be adjusted to resemble natural rock formations. The wall face should have a batter to mimic a natural slope aspect. See Section 5.6.2.</p>
<p>Post-construction Grading</p> 	<p>The graded bench in front of the wall should be evaluated for post-construction long-term uses. The priority is to bury the wall to reduce visual impacts. Slope rounding techniques should be used to help blend the disturbed areas into the natural landforms.</p>	<p>This area should be discussed with local partners to determine if the location may be in future plans for the California Coastal Trail and if it makes sense to leave the bench to facilitate long term plans.</p>

Table 5-1 Design Recommendations

Design Element	Recommendation	Comments
<p>Drainage Features</p> 	<p>Drainage pipes should be hidden from view where feasible. Pipes that cannot be hidden should be colored with earth-tone coating to conceal them. Concrete drainage features should be colored to match adjacent earth tones. Drainage rock used as dissipaters should be colored earth tone to reduce visual impacts. Inlets should be sited outside of where bicyclists are most likely to ride, if feasible, and shall use bicycle-proof grates.</p>	<p>Drainage features should be camouflaged to the extent feasible. Drainage features can be highly reflective and visually intrusive if left uncovered or uncolored. Where appropriate, drainage ditches should be designed in conjunction with the shoulder to reduce the amount of pavement and widening needed.</p>
<p>Rumble Strips</p> 	<p>Rumble strips, if warranted, should only be placed in the centerline to reduce vehicle crossovers.</p>	<p>Shoulder and edge line rumble strips can create control issues for bicyclists.</p>

5.2 Roadway

5.2.1 Design Speeds

The HDM defines design speed as “a speed selected to establish specific minimum geometric design elements for a particular section of highway.” These design elements include vertical and horizontal alignment and sight distance. Although Table 101.2 in the HDM defines the standard design speed for conventional highways in rural, flat terrain as 55 to 70 miles per hour (mph), in rolling terrain as 50 to 60 mph, and in mountainous terrain as 40 to 50 mph, several additional factors must be considered in the final selection of an appropriate design speed.

Many factors influence the choice of design speed, including the terrain, environmental impacts, type and anticipated volume of traffic, functional classification of the highway, and whether the area is rural or urban. Scenic values are also a consideration in the selection of a design speed.

In addition, the selected design speed should be consistent with the speeds that are likely to be expected on a given highway facility. Drivers adjust their speed based on their perception of the physical limitations of the highway and its traffic. Where a reason for limiting speed is obvious to approaching drivers, they are more apt to accept a lower design speed than where there is no apparent reason for it.

As outlined in Topic 81 of the HDM, it is not always feasible or appropriate—either from a physical or an environmental standpoint—to bring the roadway up to HDM standards; therefore, technical reductions in design speeds are required. For Highway 1 in Sonoma County, the design speeds listed in HDM Table 101.2 are often significantly above the posted speed limits or above what a driver will achieve or expect to achieve and therefore need to be lowered. Designers should aim to retain the natural curvature of Highway 1 as this will protect the character of the highway, calm traffic, enhance the recreational experience, and minimize impacts to adjacent coastal resources. Design improvements along Highway 1 that will protect the existing character and sensitive resources should be considered through all practical means, including lower design speeds.

As noted, HDM design speeds can be adjusted to be lower, especially where there are tight curves. A design speed of 25 to 40 mph may be acceptable in rural mountainous, rolling, or flat areas, and 25 mph (or less) is generally acceptable in developed town areas. The chosen design speeds for a project should generally reflect current safe and appropriate speeds for the existing highway geometry.

5.2.2 Posted Speeds

Posted speed limits, or speed zones, are set based on the 85th percentile speed of free-flowing traffic. This posted speed may be reduced where an engineering study indicates the need for a reduction in speed based on collision records, roadside development, and other conditions not readily apparent to the driver. The District Traffic Safety Engineer should be consulted for assistance with this procedure. Reference the *California Manual for Setting Speed Limits* (Caltrans 2014a) for the setting process and other details.

Advisory speeds are used to advise motorists of changes in conditions, including roadway horizontal alignment and sight distance. These are determined based on site conditions and are below the posted speed limit.

Appendix A shows speed zones along Highway 1 but does not include advisory speeds. There are several different speed zones, dependent on the roadway conditions

and location. While the predominant posted speed may be 55 mph, the advisory speed or speed zone is lower where the sight distance is restricted by steep grades or tight horizontal curves. In these areas, design exceptions are often required due to the limited right-of-way and restrictive existing conditions. Some segments may not have been subject to a speed study and are therefore shown as being the default 55 mph. As part of a repair project, especially on a curved section of Highway 1, performing a speed study and posting or adjusting an advisory speed sign, should be considered.

5.2.3 Landscape Segments and Speeds

Sonoma County can be categorized into segments based on similar landscape unit types, which are listed below. Appendix A describes the landscape units in greater detail, as well as the existing posted and advisory speeds for each segment. This appendix also highlights the areas adjacent to State Parks lands.

Towns: Several sections of Highway 1 in Sonoma County pass through small rural towns with driveways that serve commercial and residential areas. These sections have a higher percentage of bicycle and pedestrian traffic. These sections typically have posted speeds of 25 to 35 mph and relatively level grades (less than four percent).

In these sections, lower design speeds may be appropriate to provide for the needs of both non-motorized and motorized modes of transportation. Wider pavement sections with appropriate striping should be considered to accommodate bicyclists and pedestrians, with a minimum of 5-foot-wide shoulders where parking is not present and 13-foot-wide shoulders where parking is allowed.

Coastal Bluff, Marine Terrace, Coastal Canyon, Estuary, and Bay Front: These landscape units typically are characterized by winding roadways with steep hillsides along Highway 1. Speed zones and advisory speeds in these sections vary, with some areas 35 mph or less, because the roadway geometrics require motorists to travel more slowly to navigate the existing curves and grades. Right-of-way typically is limited in these sections.

Forested: There are sections along Highway 1 with eucalyptus, cypress, oak, and pine groves. The roadway in these sections is typically winding with rolling grades up to 7 percent or more. Speed zones are typically 35 to 55 mph, with existing advisory speed locations due to the existing horizontal and vertical curve alignment. Travel lane and shoulder width requirements may change or reduce in size while still

accommodating the needs of the traveling public in these sections. Right-of-way may be limited in these areas.

Agricultural/Pasture: Typically, the agricultural sections have level grades, with grasslands and open farmlands. Speed zones for these sections are typically 30 to 55 mph, with some advisory speed locations at horizontal curves with limited sight distance. Sonoma County LCP policies on maintaining economic, environmental, and social value of agricultural lands should be taken into account when designing highway projects. A narrower cross section may or may not be appropriate in these areas, but all potential resource impacts should be evaluated to assist in that determination.

5.2.4 Horizontal and Vertical Alignment

Along with user expectations, the existing horizontal and vertical alignments of Highway 1 are key factors defining its distinctive character. This character is defined in the context of Highway 1 segments noted previously. Meeting the expectations of all roadway users is a basic design concept to strive for in all cases; therefore, comprehensive improvements that significantly alter the character of Highway 1 from that in the adjacent environment, and thus, change the users' expectations and recreational experience, are not normally justified, warranted, or desirable. Minor adjustments to the roadway alignment, which could, for example, remove a broken back curve or provide the necessary superelevation transitions between reversing curves, can often be included on a case-by-case basis. In general, however, realignment of curves should only be considered when there is a demonstrated crash history. Impacts to coastal resources and bicyclists should also be a part of this consideration. The decision to include or not include any roadway improvement needs to factor in the existing alignment and other basic geometric features such as width, sight distance, or the presence/absence of a turn lane; the context of the facility; the crash history of the area; the possible need for traffic calming features; and the crash potential, both before and after the proposed improvements. In cases where overriding issues call for a realignment, the alignment should be carefully fitted and blended in with the topography in such a manner as to not only address safety concerns, but also to fit the character of Highway 1 in light of the surrounding landscape and sensitive resources.

5.2.5 Sight Distance, Superelevation, and Horizontal and Vertical Curves

Commensurate with the chosen design speed, the alignment should provide stopping sight distance. This basic design standard should be strived for in all circumstances.

An alignment that provides a high degree of drivability is attained when the horizontal alignment and superelevation are consistent with the design speed, and there is sufficient tangent length to attain the superelevation runoff shown in Topic 202 of the HDM. For low-speed facilities, the superelevation rates shown in Table 202.2 can be reduced without sacrificing safety or drivability. The American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy of Geometric Design of Highways and Streets* (AASHTO 2011) provides guidance on superelevation and speed and may provide additional insights for achieving acceptable project design.

The guidelines for vertical curves in Topic 204.4 of the HDM provide for highway geometry commensurate with the design speed. In addition, vertical curves that restrict sight distance below standard should be considered for upgrading.

Consideration of whether to modify curvature based on a demonstrated crash history should also include an evaluation of whether there is any indication that the existing roadway geometry or other factors actually contributed to the cause of the crashes. The results of this evaluation must factor into any decision about whether the roadway alignment actually needs to be changed. Lower design speeds should be evaluated as a means to calm traffic and as an alternate to changing a current alignment. Beyond this, any further consideration of any roadway adjustment should only be made to the extent that it is necessary for the design vehicle to stay within the lane, and keeping in balance the potential benefits with the potential adverse impacts given the context of the facility.

5.2.6 Travel Lanes and Shoulders

The HDM standard roadway section for a new two-lane undivided roadway is two 12-foot-wide lanes and two 8-foot-wide shoulders. However, for resurfacing, restoration, and rehabilitation projects (also known as 3R), geometric standards for paved shoulder widths per DIB 79-03 vary depending on traffic volumes and the width of existing shoulders. As the average daily traffic (ADT) for Highway 1 varies from 1,250 to 17,400 vehicles, per DIB 79-03, all segments of Highway 1 in Sonoma County require either 4-foot-wide (ADT of 1,001 to 3,000) or 8-foot-wide (ADT

more than 3,001) shoulders. However, site-specific conditions may warrant further modification of these widths through design exceptions.

Due to the highly scenic and sensitive environment as well as the existing narrow (often 22-foot-wide) roadbed, a 40-foot roadway may not be sensitive to Highway 1 through Sonoma County. For the majority of Sonoma Highway 1, travel lane widths should be 12 feet with a recommendation of 4-foot shoulders or 6-foot shoulders in high truck traffic areas (see Traffic Census Program website, Truck Traffic counts; <http://www.dot.ca.gov/trafficops/census/>) and where Class II bicycle lanes are proposed in the Sonoma Countywide Bicycle and Pedestrian Master Plan from the Marin County line to Meyer's Grade Road and from Kruse Ranch Road to the Mendocino County line (see Section 5.3.1).

Encroaching onto or impacts to sensitive resources within or adjacent to State Parks lands may warrant narrowing the roadway cross section. Discussions should include the State Parks land manager and factor in design vehicle requirements, safety concerns, non-motorized users and other site relevant items. Additional adjustments to lane widths may be needed in tight curves, to address site distance constraints, or by narrowing the roadway width to avoid significant impacts.

Consideration of wider shoulders (greater than 4 feet) may be preferred where vertical elements such as Midwest Guardrail (MGS) or bridge rail are proposed for extended lengths as these elements limit the ability for bicyclists to use the full shoulder width. Wider shoulders may be necessary if there is a history of vehicles stopping for scenic purposes. Narrower shoulders (less than 4 feet) may be acceptable in some downhill sections where bicycle traffic can reasonably use the full lane width, or where wider shoulders would individually or cumulatively adversely affect sensitive or scenic resources, or to avoid development outside of the right-of-way without compromising the safety and mobility needs of bicyclists.

Highway 1 also serves as the main street for many towns. Often, a wider roadway section may be the most appropriate and user-friendly solution when they include parallel parking, bike lanes, and sidewalks. These sections have a higher percentage of bicycle and pedestrian traffic and should be given special consideration. In these sections, a 5-foot-wide shoulder without parking and 13-foot-wide shoulder with parking is recommended to accommodate bicycles. A separate pedestrian way should be provided. Perpendicular and diagonal parking are highly discouraged. Given the various conditions currently existing in towns (e.g., presence of curbs, parallel

parking, no parking, informal off-road parking, sidewalks, etc.), a site-specific solution should be derived based on coordination with local officials and in conformance with the Sonoma County LCP and applicable town plan. Also see DIB 82-06 (Caltrans 2017) for Americans with Disabilities Act requirements and accommodations.

The location of shoulder-width reductions or tapers back to the existing shoulder width should consider the visibility of bicyclists to motorized traffic. Shoulders on flat or ascending grades should have width reductions where sight distance is not significantly restricted by crest vertical or horizontal curves. This allows bicyclists to transition from the shoulder to the lane in full view of motorized traffic. This provision is less of a concern in downgrades where bicyclists are expected to use the full lane width.

5.3 Bicycle and Pedestrian Facilities

Bicyclists and pedestrians are frequent users of Highway 1, but off-road separated facilities or standard bicycle lanes are not feasible within the existing right-of-way for stretches of Highway 1. All options for accommodating cyclists and pedestrians should be considered in a context-sensitive manner, with an eye toward including cycling improvements where the needs and opportunities are the greatest, especially considering the Three Feet for Safety Act, while at the same time not detracting from the rural scenic characteristics of Highway 1 or causing other negative impacts to sensitive resources within the State Parks lands or the coastal zone. Bicyclist-appropriate railings, at the minimum allowable height, should be considered on barriers, walls, and bridges.

In some locations, it may be appropriate to increase the paved shoulder width, such as where limited line of sight is present, uphill segments where bicyclists ride at relatively slower speeds than motorists, or where vertical elements such as MGS or bridge rail are proposed for extended lengths as these elements limit the ability of bicyclists to use the full width of the shoulder. Shoulders wider or narrower than 4 feet in a rural environment should also consider the actual or expected volume of bicycle and pedestrian traffic, taking into account site-specific topography and particular user needs from a corridor perspective.

Pedestrians and bicyclists should be accommodated in all projects. Dedicated pedestrian facilities should be incorporated into projects on a case-by-case basis where there is an identified need and in coordination with local stakeholders.

5.3.1 Sonoma Countywide Bicycle and Pedestrian Master Plan

Sonoma County Transportation Authority updated the Bicycle and Pedestrian Master Plan (Master Plan) in 2014. The Master Plan proposes Class II bicycle lanes from the Marin County line to Meyer's Grade Road (north of Jenner) and from Kruse Ranch Road (near Salt Point State Park) to the Mendocino County line. The segment between Meyer's Grade Road and Kruse Ranch Road is proposed as a Class III bicycle route. Caltrans projects should accommodate the Master Plan by incorporating 6-foot-wide shoulders in Highway 1 repair projects where Class II bicycle lanes are proposed and 4-foot wide shoulders where a Class III bike route is proposed in the Master Plan (Sonoma County Transportation Authority 2014).

5.3.2 Bicycle and Pedestrian Crossings

Repair projects should consider the need for safe crossings, such as where a trail crosses Highway 1. Where a need is identified to channelize pedestrians to cross the highway at a defined location, the Office of Traffic Safety evaluates the need to mark an uncontrolled crossing on a case-by-case basis. At uncontrolled crossings, elements such as signage, high-visibility crosswalks, or other traffic control devices should be considered and incorporated into the project design as appropriate.

5.3.3 California Coastal Trail

Caltrans is supportive of the CCT, and designers should consider the alignment of the CCT when designing damage repair solutions. Repair projects should be designed such that they address any trail considerations that may fall within a project limit and to not preclude future development of the trail. Information on the alignment of the CCT is available on CCC's web site.¹⁰ Contributing to links in the CCT within a project's limits is a potential strategy for mitigating unavoidable project impacts to public coastal access and should be considered for feasibility.

5.3.4 Parking, Pullouts, and Turnouts

Vehicles frequently park or pull off the travel way and onto the shoulders of Highway 1 and may become pedestrians to observe the scenic vistas or access the coast. It is important to consider surface treatment, safety, and the potential to block bicycle and/or pedestrian access when considering accommodating parking or pullouts on the shoulder. Consider sight distance and other safety issues when creating new parking and pullout locations. Any new pullouts or parking areas should be consistent with the Sonoma County LCP. Consultation with State Parks is

¹⁰ See <http://www.coastal.ca.gov/access/ctrail-access.html>.

necessary regarding the addition, retention, or removal of any parking, pullout, or turnouts when within its jurisdiction.

Bicycle pullouts may also be considered on uphill locations or at the top of an ascending grade when 4-foot or wider shoulders are not present to allow bicyclists to rest or let other users pass safely. Scoping of bicycle pullout locations should be considered on a case-by-case basis, based on engineering judgment so as not to encourage risky behavior. Additional treatments should be considered, with stakeholder and agency partner input, where pullouts are intended as bicycle refuge, to encourage safe passing of cyclists at ingress/egress points and to discourage vehicular parking if not in proximity to a trailhead or other public access points.

Existing pullouts should be preserved when feasible. If projects warrant the removal of an existing pullout, it should be replaced in an appropriate location so there is no net reduction in the number of pullouts.

5.4 Bridges

Bridge width, the design of the bridge, and selection of the barrier and railing type for the structure should be such that they complement the existing surroundings. Stakeholder involvement should be part of any bridge replacement project. Bridge recommendations are not included in these Guidelines and should be developed as part of project-specific development process.

BRIDGE BARRIERS AND RAILING

Each bridge is unique and, as such, the bridge type and associated railing should be determined on a case-by-case basis. Bridge type, in addition to structural requirements, should also consider pedestrian and bicycle access, view opportunities from the structure, and bridge visibility from the surrounding area. The railing type should consider the safety of motorists, bicyclists, and pedestrians, while also being visually compatible with the surrounding landscape. Guidance is provided in *Bridge Rails and Barriers: A Reference Guide for Transportation Projects in the Coastal Zone* (see Reference Section) or the most current Caltrans guidance. The next section addresses barriers and railing options, along with some benefits and disadvantages to consider when selecting a railing.

5.5 Guardrail, Railing, End Treatment, and Fences

Roadside safety devices, such as guardrail and metal or concrete railing, are common features along the Highway 1 corridor. Following is a brief description of railing considerations along the Highway 1 corridor.

Fencing is also a common feature within the Highway 1 corridor along many of the agricultural and recreational areas. Depending on the location, fencing may be privately or publicly installed and maintained.

5.5.1 Railing

Caltrans is committed to using railings that minimize visual impacts along the coast. There are several types of Caltrans standard railings that can be considered for use along Highway 1. Caltrans is in the process of approving MASH tested barriers for use on the state highway system. Designers should refer to the *Bridge Rails and Barriers: A Reference Guide for Transportation Projects in the Coastal Zone* (see Reference Section), as a reference for the types of barriers that are acceptable.

Designers should carefully consider the safety of all users and the compatibility with the surrounding environment when selecting a railing type. Designers should ensure that the railing height and rail opening widths meet current standards for both bicyclists and pedestrians where appropriate. Consult the District Landscape Architect to ensure visual compatibility with the corridor.

Midwest Guardrail: MGS with wooden posts is the predominant railing type currently seen along Highway 1 in Sonoma County. It is considered the best railing option for several reasons, including compatibility with existing roadway features, good transparency, context sensitivity, cost effectiveness, its current inclusion in the Standard Plans, and the fact that Maintenance has the materials for repair readily available. Where site conditions allow, wood posts should be used. No under guardrail treatment is required. The guardrail should have a matte finish applied to the final coating to reduce glare. White Barrier Markers on top of the MGS should be used in lieu of Delineators (Type F White). Other approved guardrails may be considered for aesthetic reasons or unavoidable project limitations. Consult the District Landscape Architect to ensure visual compatibility with the corridor.

5.5.2 End Treatments

End treatments for railing and concrete barriers are also important elements. The designer should select the appropriate approved end treatments for the railing and

concrete barriers based on several factors, including the design speed and geometrics of the roadway, maintenance considerations, availability of replacement parts, safety for all users, and consistency along the Highway 1 corridor. Where feasible, railings and barriers should be terminated with end sections buried in an adjacent slope or an earthen berm. The height of berms used for buried end sections must be sufficient for standard installations. If burying end sections is not feasible, inline end treatments should be considered. Large flared end terminals and alternative end treatments such as barrels or crash cushions should be avoided, as they cause visual impacts.

5.5.3 Fencing

Right-of-way fencing is an uncommon feature on Highway 1, but may be found along many of the agricultural and recreational areas. The vast majority of fencing along the highway is privately owned. Caltrans will construct private fencing only as a right-of-way consideration to mitigate damages (i.e., to replace existing fencing damaged or altered by a Caltrans construction project).

Fencing may be state owned. If so, consider its purpose and whether it needs to be replaced or if there are alternative means for meeting that purpose. Avoid non-safety fencing unless it serves to promote and is consistent with policies of the Sonoma County LCP. The fencing type should be consistent throughout the Highway 1 corridor and should be functional. Chain-link fencing should be avoided, unless required for specific security purposes and only if options that are more compatible are not available. Depending on location and context, desirable fence types include the following:

- Wire (barbed or smooth) on timber or steel posts
- Stretched cable on timber posts
- Timber post and rail (single or multiple rails)
- Timber post and split rail (applicable to forested settings)
- Timber post and pickets
- Hybrid designs combining a variety of the above elements other types of fences typical to the specific location (e.g., picket fences in towns or corral fencing in ranch areas) that are consistent with Sonoma County LCP provisions or town

plans (see Design Guidelines, No. 25 Coastal Zone Design Guidelines, Fences, page 178, Sonoma County LCP, 2001¹¹).

Newly installed steel fencing should be colored to better blend in with the surrounding environmental setting and rural character.

Fencing should not create a visual barrier to the scenic landscape nor should it create a barrier to wildlife. Consult with the adjacent public land manager to determine appropriate treatment.

The previously listed points are applicable whether the fence is private or a Caltrans fence. See Topic 701 of the HDM for an in-depth discussion of the various types of fences Caltrans constructs.

5.6 Slope Stabilization

Due to the extreme terrain and frequent landslides along the Highway 1 corridor, structural and nonstructural slope stabilization systems are often necessary. Nonstructural options should be used over structural systems where feasible. The location and type selection of slope stabilization should consider and minimize impacts to existing and planned public access.

5.6.1 Nonstructural Slope Stability Recommendations

Nonstructural slope stability solutions are generally more cost effective and less visually disruptive than structural solutions. Nonstructural systems that can be revegetated are encouraged because these systems have the potential to blend more fully into the surrounding landscape when mature. Slope stabilization products such as rock bolts and metal mesh can be colored to blend into the environment. Contact Landscape Architecture to determine if the metal features of the rock stabilization products need to be colored to blend into the environment. The most appropriate nonstructural solution for a specific site should be determined by the geotechnical engineer and geologist. Refer to section 5.8 for a discussion on landscape and erosion control. Some examples of nonstructural solutions include, but are not limited to, the following:

- Slope reconstruction
- Rock slope protection
- Geosynthetic stabilized embankments

¹¹ <https://sonomacounty.ca.gov/PRMD/Long-Range-Plans/Local-Coastal-Plan/Current/>

- Embankment confinement systems
- Rock drapery or anchored mesh
- Rock bolting

5.6.2 Retaining Walls

A wide variety of retaining wall options are available to engineers in the event that a structural wall is the most appropriate alternative to stabilizing a slope. In general, retaining walls can be categorized into two broad categories—cut-slope walls (which are typically found in the upslope section of the roadway) and fill walls (which are typically found in the downslope section of the roadway). The geotechnical engineer, the structural engineer, and the geologist will determine the most appropriate retaining wall type, height, and length for a specific site. Safe maintenance access must be considered in the design and layout of retaining walls.

From a visual standpoint, the final appearance of the wall surface, wall height, length, and top elevation have a visual impact and should be consistent with the surrounding context. The District Landscape Architect should be consulted.

TIMBER LAGGING WALLS

The primary preference for the appearance of retaining walls consists of a timber lagging aesthetic treatment.

The H-piles and timber lagging should be painted a dark brown with a matte finish. The walers (if necessary for tieback anchors) should be stained a dark brown to match. Federal Standard 595 Color #30051, dark brown, is the preferred color choice.

Burying the walls is recommended to minimize visual impacts.

Where concrete barriers are incorporated into the retaining walls and the wall is exposed, the barrier should be stained to match the color of the wall.

In some locations, another treatment may be preferred. Consult with the District Landscape Architect to determine appropriate treatment.

CARVED AND STAINED ROCK WALLS

The secondary aesthetic preference consists of a carved rock aesthetic treatment that is stained to match the surrounding rock formations. This treatment is similar to the finish found on most soil nail walls along the coast, although this appearance can be achieved on other wall types as well. In some locations, stained concrete may be preferred over carved and stained rock walls.

Where concrete barriers are incorporated into the retaining walls, the barrier should be stained to match the color of the wall.

Walls should be discussed with the District Landscape Architect to ensure that the aesthetic treatment selected is acceptable from a visual standpoint.

FALL PROTECTION

Fall protection is required at the top of all retaining walls greater than 30 inches in height. Due to the visual impacts, the use of standard cable railing should be avoided. Consult with Maintenance on the need to access the top of a wall and, if so, would mobile fall protection (i.e. safety cable attached to a Maintenance vehicle) or a safety cable provide the required fall protection. If so, do not install cable railing. If fall protection is required on an uphill wall, cable railing should be colored to blend in with the environment. Chain-link railing should be avoided as fall protection in favor of one of the previously listed solutions.

For cases where new safety cable or railing would be visible from the roadway and would negatively affect the scenic character of Highway 1 must be installed, existing safety cables, railings or roadside appurtenances within the project limits should be evaluated for removal to keep visual clutter to a minimum.

SLEEPER SLABS

Sleeper slabs, if used for the installation of barrier railings at retaining walls, should be treated to match the remainder of the roadway. The sleeper slabs may be lowered and overlaid with a thin layer of asphalt concrete pavement or may be colored to blend in with the surrounding roadway surface.

DRAINAGE DITCHES BEHIND WALLS

Concrete drainage ditches that are located behind retaining walls should be stained or treated to blend into the surrounding landscape.

5.7 Roadside Features

5.7.1 Drainage

The safety, functionality, and aesthetics of drainage systems should be carefully reviewed and considered. This section discusses the aesthetic treatments that should be considered when installing drainage systems. Slope protection or concrete should be treated to blend with the surrounding landscape. Design drainage to avoid erosion and sedimentation, or contributing to destabilization of slopes. Existing drainage features will be evaluated at storm damage repair sites. Where feasible, incorporate

improvements into the new roadway facility to avoid further erosion and sedimentation

5.7.2 Headwalls and Wingwalls

Typically, aesthetic treatments are not required but due to the highly scenic nature of Highway 1, aesthetic treatments should be considered to ensure that headwalls and wingwalls blend into the existing landscape. Such treatments may include stained or integrally colored concrete to match the surrounding landscape.

5.7.3 Pipes and, Inlets

To the greatest extent possible, these drainage facilities should be buried or hidden from view. Exposed pipes and end sections extending from walls or hillsides, including galvanized pipes, should be treated to blend in to the adjacent landscape. The preferred color is Federal Standard 595 Color #30051, dark brown, with a matte finish to reduce glare.

Drainage inlets should be sited outside of where bicyclists are most likely to ride; inlets placed within the roadway must use bicycle-proof grates.

5.7.4 Outfalls

New pipes and culverts should discharge at established drainage outfalls.

Drainage outfalls that can be revegetated are preferred and should be used when site conditions allow. Revegetation considerations are discussed in the Landscaping and Revegetation section below.

5.7.5 Ditches

The ditches should be designed to blend into the surrounding landscape. Concrete and metal facilities should be treated to match the surrounding terrain. Where appropriate, drainage ditches should be designed in conjunction with the shoulder to reduce the amount of pavement and widening needed, following the guidelines in Chapter 830 of the HDM.

5.8 Landscaping and Revegetation

5.8.1 Revegetation and Erosion Control

Native plant communities contribute to the scenic nature of Highway 1. The objective for revegetation for all areas disturbed by roadside repairs, including construction access and staging areas, is to reestablish native vegetation that integrates and matches adjacent intact native plant communities without introducing nonnative

species into weed-free native communities. Designers should specify seed and plant material from local sources whenever feasible. Consult with the Project Biologist and Erosion Control Specialist for recommendations on appropriate plant material. Designers should look for opportunities to cover features such as rock slope protection and drainage pipes with weed-free soil and locally appropriate plant material to achieve revegetation objectives. Because inadvertent application of soil that contains high-priority weed species propagules can create a large maintenance issue, it is essential that all soil sources be examined by an individual familiar with high-priority weed species prior to application to avoid accidental introduction.

Where the project is adjacent to or on State Parks lands, Caltrans will enter into a planting agreement with State Parks. Contact the District Landscape Architect and project generalist to initiate the process early in project development. The agreement shall cover work on areas disturbed within the State right-of-way and on State Parks lands. The scope of work for revegetation, weed management, and erosion control plans will generally include (1) collection of local seed and propagation of local plant material, (2) planting installation and plant establishment on State right-of-ways and State Parks land for up to 5 years, and (3) exotic weed management. Consult Caltrans Erosion Control Unit for project-specific best management practices and erosion control plans and special provisions.

For projects located in areas outside of State Parks, the PDT team is encouraged to look for partnership opportunities for plant establishment and long-term weed abatement.

5.8.2 Invasive and Exotic Vegetation Control

The first line of defense—and the most cost-effective long-term strategy against invasive weeds—is preventing them from becoming established. Prevention and exclusion of noxious weed species are the most practical and economical means of weed management. This is accomplished by ensuring that seed or reproductive plant parts of new weed species are prevented from being intentionally or unintentionally introduced to an area. Best management practices for invasive exotic weed prevention are already incorporated into standard special provisions and include preventative measures, such as equipment washing and seed testing.

Outbreaks of invasive weeds should be controlled during the plant establishment period if applicable. Nonstandard special provisions requiring the contractor to

perform more aggressive management practices may be needed to control invasive weeds during the plant establishment period.

When working within or adjacent to State Parks lands, the PDT should make early contact with the agency to develop vegetation control plans that are in concert with resource management programs that may involve a multi-year process of seed gathering and propagation. Partnering with these agencies to perform plant establishment and/or long-term maintenance activities is also recommended. Control of exotic vegetation should be covered in the agreement discussed in Revegetation and Erosion Control above.

5.8.3 Signage

Signage guidelines should follow the fundamental principle that “less is more” with regard to Highway 1. Only signs that are necessary for the safety of the traveling public and those that convey essential information to the traveler, including way finding and directional signs, should be installed. The design and placement of signage should be in accordance with the latest edition of the *California Manual of Uniform Traffic Control Devices* (Caltrans 2014b). Signs should be combined onto existing posts where feasible. Signs for the California Coastal Trail should be provided where applicable.

5.8.4 Delineators

The use of Type E delineators can impair the scenic value of the highway. Consider eliminating or not using these where possible. In areas with MGS present, use white Concrete Barrier Markers mounted on top of the posts in lieu of the Type E delineator. Use 6-inch wide high visibility stripe instead of delineators where MGS is absent.

5.9 Miscellaneous

5.9.1 Fish Passage and Wildlife Accommodations

Repair projects will include, where appropriate, safe crossings for terrestrial and aquatic wildlife and other accommodations to promote biodiversity and avoid or mitigate harm to individual animals, the fragmentation of plant and animal habitats, and the disruption of natural systems. Repair projects should consider wildlife crossings and guidance provided in the *Wildlife Crossings Guidance Manual* (Caltrans 2009). For more details on fish passage, see Section 3.2.7.6. Designers should contact the District Biologist.

5.9.2 Construction/Maintenance Access Roads

Construction access roads shall be chosen to disturb the least amount of area and be as unobtrusive as possible. Construction access roads or benches that are built to facilitate construction activities should be re-graded using slope rounding techniques and revegetated to match the existing terrain once construction is complete (see also Section 5.8). If the construction roads are needed for future maintenance access, they should be minimized in width and length and seeded with erosion control. Local partners should be consulted to determine if the maintenance access road has potential for incorporation into the California Coastal Trail.

5.9.3 Scenic Highway Status

The HDM defines a scenic highway as a “state or county highway, in total or in part, that is recognized for its scenic value, protected by a locally adopted corridor protection program, and has been officially designated by Caltrans.” Highway 1 within Sonoma County is currently eligible for scenic highway status and, if status is awarded, specific requirements will be triggered, including special signage along Highway 1.

Minimize repair project impacts, individually and cumulatively, to the characteristics that make these segments eligible for Scenic Highway status.

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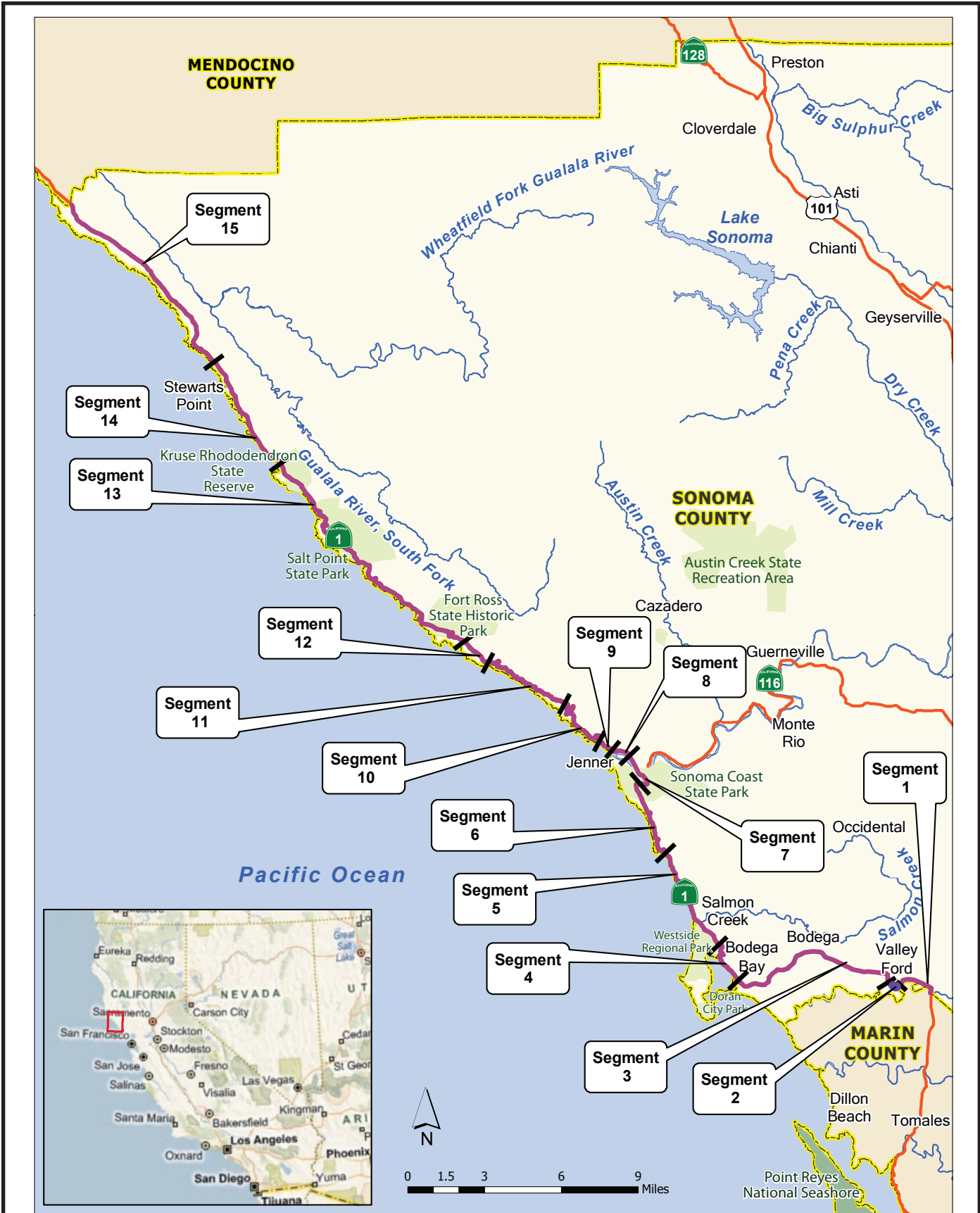
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Appendix A Landscape Units and Existing Conditions



Source: Caltrans

LEGEND

- Federal Parks
- State Parks
- Highway 1 Landscape Units

**LOCATION MAP
SONOMA COUNTY LANDSCAPE UNITS**

Structures - Sonoma County

City	Segment	Landscape Character and Road use	Segment Location (PM)	2014 Traffic Volumes (AADT)	Location (PM)	Bridge Number	Year Built	Name	Bridge Type	Railing	Sufficiency Rating	Work Recommendation	BIR Date	Existing				RRR Standard		Speed Zone (Posted)
														Clear Width	Lane Width	Shldr Width	Ped Facility	Lane Width	Shldr Width	
	1	AP	0.00-1.75	4400	0.3	20-186	1960	Pogolimi Creek	2X box Culvert	None	69.2	install str mrkrs	10/30/08	30	12	3		12	8	35
Valley Ford	2	T	1.75-2.05	4400																
	3	AP	2.05-9.40	6400 6300	9.16	20-189	1956	Cheney Gulch	2X box Culvert	MBGR	71.2	trim heavy brush	10/30/08	32	12	4		12	8	45
Bodega Bay	4	T	9.40-11.50	4700																
	5	CB	11.50-16.00	4000	12.49	20-191	1983	Salmon Creek	RC slab	Type 25 Mod	87.9	patch spalls, methacrylate deck rem loose conc, clean exposed rebar, patc soffit	10/30/08	40	12	8	Y	12	8	55 **
					15.3	20-198	1956	Scotty Creek	4X box culvert	None	70.7		10/30/08	20	10	0		12	8	55 **
	6	MT	16.00-19.50	3125																
	7	E	19.50-21.15	2800	19.72	20-195	1984	Russian River	RC Bridge	Type 25 Mod	87.8	rplc type b compression joint seal	10/30/08	36	12	6	Y	12	8	55 **
Jenner	8	T	21.15-22.00	2800																
	9	CB	22.00-22.60	1900																
	10	MT	22.60-26.30	1900	24.5	20-070	1940	Russian Gulch	RC deck slab	timber	68.1	rem veg and debris in chnl	10/30/08	26	12	1		12	8	55 **
	11	CB	26.30-30.60	1900																
	12	MT	30.60-31.95	1900																
Stillwater Cove (37)/ Salt Point (38.1)/ Stewarts Point (39.64)	13	CB/MT/F	31.95-44.80	1900																
	14	MT/F	44.80-49.76	1600																
Sea Ranch Lodge (50.5)/ Pebble Beach (52.2)/	15	MT/F	49.76-58.58	2850																
		AP= Agricultural/Pasture F= Forested BF= Bay Front E= Estuary CB= Coastal Bluff MT= Marine Terrace CC= Coastal Canyon T= Town																		

Roadway - Sonoma County

City	Segment	Landscape Character and Road use	Existing Highway	Segment Location (PM)	2014 Traffic Volumes (AADT)	Existing		RRR Standard (DIB 79-03 Table 2)		Speed Zone (Posted)
						Lane Width	Shldr Width	Lane Width	Shldr width	
	1	AP	predominantly level roadway with mainly flat grassy farmlands	0.00-1.75	4400	11	1	12	8	35
Valley Ford	2	T	mostly level roadway with a series of small homes and businesses with driveways; limited parallel and angled parking	1.75-2.05	4400	11	8-10	12	8	30, 35
	3	AP	Mostly level with some rolling terrain; steep hillsides on both sides of highway	2.05-9.40	6300	11	1-4	12	8	45
Bodega Bay	4	T	Level and rolling terrain with a mix of residential, commercial, and recreational uses through the town limits; roadway passes through a winding conyon as it leaves town	9.40-11.50	4700	11	1-8	12	8	25, 35
	5	CB	Rolling terrain with few sharp curves with limited sight distance; surrounding landscape is mostly open hillsides on the east with the ocean to the west	11.50-16.00	4000	10	0-1	12	8	55 **
	6	MT	Mostly rolling with some level terrain;	16.00-19.50	3125	11	0-1	12	8	55 **
	7	E	Mostly level with steep grassy hillsides on the east and Russian River to the west	19.50-21.15	2800	11	0-1	12	4	55 **
Jenner	8	T	Level roadway through town limits mix of commercial and residential with driveways and steep hillsides; there is limited parallel parking in town	21.15-22.00	2800	10	4-8	12	4	25
	9	CB	Rolling terrain with few sharp curves; mostly steep slopes on both sides of highway	22.00-22.60	1900	10	0-1	12	4	55
	10	MT	Mostly mountainous with some rolling terrain and few sharp curves; there are steep slopes that alternate on both sides of highway; in this segment, there are several retaining walls (steel piles with timber lagging) with 4-foot shoulders	22.60-26.30	1900	10	0-1	12	4	55 **
	11	CB	Rolling terrain with sharp curves and steep grassy and rocky hillsides on both sides	26.30-30.60	1900	10	0-1	12	4	55 **
	12	MT	Roadway terrain is rolling with some straight alignment and some sharp cuves; there are grassy hillsides on both sides	30.60-31.95	1900	11	0-1	12	4	25
Fort Ross (32.7)/ Stillwater Cove (37)/ Salt Point (38.1)/ Stewarts Point (39.64)	13	CB/MT/F	Rolling terrain with some straight alignment and few sharp curves; heavily forested; few residential and lodging	31.95-44.80	1900	11	0-1	12	4	55 **
	14	MT/F	Rolling with some straight alignment; native forest on both sides	44.80-49.76	1600	11	0-1	12	4	55 **
Sea Ranch Lodge (50.5)/ Pebble Beach (52.2)/ Stengel Beach	15	MT/F	Rolling with mostly straight alignment; grassy pasturelands and mature tree conopies on both sides; occasional rock outcropp	49.76-58.58	2850	11	0-1	12	4	55 **
		CB= Coastal Bluff								
		MT= Marine Terrace								
		CC= Coastal Canyon								
		T= Town								
		AP= Agricultural/Pasture								
		F= Forested								
		BF= Bay Front								
		E= Estuary								

Appendix B Coastal Act Repair Maintenance Exclusions

REPAIR, MAINTENANCE AND UTILITY HOOK-UP EXCLUSIONS FROM PERMIT REQUIREMENTS

(Adopted by the California Coastal Commission on September 5, 1978)

NOTE: This guideline applies only to exclusions established in subsections (d) and (f) of section [30610](#). For other exceptions to the permit requirements, see [Section 13250](#) of the Commission Regulations (additions to existing single-family houses), Sections [13200 through 13210](#) (vested rights), Sections [13211-13213](#) (permits granted under the 1972 Coastal Act), Sections [13215-13235](#) (urban land), Sections [13240-13249](#) (categories of development), Sections [13136-13144](#) (emergency permits) and Sections [13145-13154.5](#) (administrative permits).

I. General Provisions.

Section 30610 of the Coastal Act states in part:

...no coastal development permit shall be required pursuant to this chapter for...

(d) Repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities; provided, however, that if the commission determines that certain extraordinary methods of repair and maintenance involve a risk of substantial adverse environmental impact, it shall, by regulation, require that a permit be obtained pursuant to this chapter.

...

(f) The installation, testing, and placement in service or the replacement of any necessary utility connection between an existing service facility and any development approved pursuant to this division; provided, however, that the commission may, where necessary, require reasonable conditions to mitigate any adverse impacts on coastal resources, including scenic resources.**

This guideline is intended to detail the types of development activities the Commission considers repair, maintenance or utility hook-ups related to the on-going work of various types of public and private agencies. Such lists obviously cannot be exhaustive and the exclusions also apply to activities comparable to those listed. Where a proposed activity is not included in this guideline, the Regional Commission Executive Director, after consultation with the State Commission Executive Director, if necessary, will determine whether a permit is required.

The standards for these exclusions are stated in [Section 30610](#) of the Coastal Act: they do not relate to the environmental impact of the proposed activity. The repair and maintenance exclusion is intended to allow continuation of existing developments and activities which began before the effective date of the Coastal Act. The utility hook-up exclusion exempts utilities from obtaining permits for work to serve developments because Commission review of such work is included in the review of the development itself.

**Minor changes have been made to the legal citations to the Coastal Act contained in this document to correspond to the current version of the cited Section.

II. Description of Activities Excluded.

The following construction activities comparable to those listed do not require a coastal development permit except as specified below:

A. Roads. No permit is required for repair and maintenance of existing public roads including landscaping, signalization, lighting, signing, resurfacing, installation or expansion of retaining walls, safety barriers and railings and other comparable development within the existing right-of-way as specified below. Maintenance activities are generally those necessary to preserve the highway facility as it was constructed, including: construction of temporary detours, removal of slides and slip cuts, restoration and repair of drainage appurtenances, slope protection devices, installation of minor drainage facilities for preservation of the roadway or adjacent properties, restoration, repair and modifying for public safety bridges and other highway structures, restoring pavement and base to original condition by replacement, resurfacing, or pavement grooving. A permit is required for excavation or disposal of fill outside of the roadway prism. The following maintenance and alteration programs of the State Department of Transportation, or their equivalent conducted by local road departments, which do not result in an addition to or enlargement or expansion of the existing public road facility itself, do not require a permit except as noted: (1) [Flexible Roadbed Program](#); (2) [Rigid Roadbed Program](#); (3) [Roadside Maintenance Program](#); (4) [Roadway Litter and Debris Program](#); (5) [Vegetation Control Program](#); (6) [Pavement Delineation Program](#); (7) [Sign Program](#); (8) [Electrical Program](#); (9) [Traffic Safety Devices Program](#); (10) [Public Service Facility Program](#) except that a permit is required for construction of new facilities; (11) [Landscape Program](#); (12) [Bridge and Pump Maintenance Program](#); (13) [Tubes, Tunnel and Ferry Maintenance Program](#); (14) [Bridge Painting Program](#); (15) [Miscellaneous safety projects](#), provided there is not expansion in the roadway or number of traffic lanes; (16) [Major damage maintenance, repair and restoration](#); (17) [Comparable Minor Alterations](#).

(NOTE: See [Appendix I](#) for more detailed description of activities included in these programs.)

B. Public Utilities.

1. Natural Gas, Chilled Water and Steam Facilities.

a. Service Connections. Install, test and place in service the necessary piping and related components to provide natural gas, chilled water and/or steam service to development either exempted or approved under the Coastal Act, including:

(1) Extend underground gas, chilled water and/or steam mains, except in marshes, streams or rivers, from terminus of existing main piping to proper location in front of customer's property. Break and remove pavement as necessary, open trench or bore, for installation of main piping, install mains and appurtenances, pressure test for leakage, back-fill open cuts, purge air from piping and introduce gas, chilled water and/or steam into newly installed piping. Restore pavement as necessary. Provide for cathodic protection as necessary.

(2) Extend underground gas, chilled water and/or steam service piping from the main locations, except, in marshes, streams or rivers, to the meter location on the customer's property. Construction activities are similar to those in Item (1) above.

(3) Construct and install the meter set assembly, generally above ground, on the customer's property, including installation of associated valves, pressure regulator, meter and necessary piping to connect the gas, chilled water and/or steam service to the customer's piping system.

(4) When necessary, install gas, chilled water and/or steam pressure regulation equipment and related components, to control pressure where the source of the supply is at a higher pressure than the pressure in the district distribution main system. Construction includes necessary excavation, installation of piping, valves, regulators, below ground vaults and related components.

(5) Install necessary cathodic protection facilities for main and service extensions to new and existing customers.

b. Distribution and Transmission Facilities.

(1) Operate, inspect and maintain distribution and transmission mains, services, meter set assemblies and district regulator stations. Conduct leakage surveys, repair leaks, handle emergency or hazardous incidents, maintain supply pressure, inspect and adjust pressure regulators, operate valves, locate and mark facilities to help prevent damage to them and to provide for public safety.

(2) Install, replace, alter, relocate or remove piping and cathodic protection facilities as necessary due to corrosion, interference with other underground or surface construction, franchise requirements, mechanical damage, reinforcement to existing distribution systems to provide for increased usage (provided such usage is to provide service to development either exempted or approved under the Coastal Act). Isolation of piping segments or systems to provide emergency control and the restoration of service to a customer.

c. Production and Storage Facilities. Perform necessary maintenance, replacement, repair, relocation, abandonment and removal work to gas storage facilities, chilled water and/or steam plant facilities, mechanical equipment including prime movers and pumping equipment, chilled water and/or steam production facilities, gas and oil processing facilities, pollution control facilities, cooling towers, electric equipment, controls, gas injection and withdrawal wells, and other miscellaneous plant and pipeline structures. Installation of any required new safety devices and pollution control facilities within existing structures or equipment or where land coverage, height, or bulk of existing structures will not be increased.

d. Miscellaneous. Perform necessary maintenance, repair, replacement, relocation, abandonment and removal work to pipeline roads, rights-of-way, fences and gates, sprinkler systems, landscaping, odorizing stations, telemetry equipment, lighting facilities, mechanical and electrical equipment, cathodic protection facilities and environmental control equipment.

e. Grading and Clearing. Maintenance activities shall not extend to the construction of any new roads to the site of the work. A permit is required for grading an undisturbed area of greater than 500 sq. ft., removal of trees exceeding 12 inches dbh or clearing more than 500

sq. ft. of brush or other vegetation unless the Executive Director of the Regional Commission determines the activity does not involve the removal of major vegetation.

2. **Electric Utilities.**

a. Generation Stations, Substations, Fuel Handling, Transportation and Storage Facilities and Equivalent Facilities. A coastal permit is not required for repairs, maintenance, and minor alterations which do not increase the capacity of the facility or work required to supply increased demand of existing customer's facilities in order to maintain the existing standard of service. A coastal permit is not required for installation of any required new safety devices and pollution control facilities within existing structures of equipment or where land coverage, height or bulk of existing structures will not be increased.

b. Transmission and Distribution and Communication Facilities. A coastal permit is not required to maintain, replace, or modify existing overhead facilities, including the addition of equipment and wires to existing poles or other structures, right-of-way maintenance, and minor pole and equipment relocations. A coastal permit is not required to install, test and place in service power line extension facilities and supply points specifically required to provide service to development permitted or exempted under the Coastal Act, or work required to supply increased demand of existing customers' facilities in order to maintain the existing standard of service.

A coastal permit is not required to install, test, place in service, maintain, replace, modify or relocate underground facilities or to convert existing overhead facilities to underground facilities provided that work is limited to public road or railroad rights-of-way or public utility easements (P.U.E.).

c. Services. Electrical service and metering facilities may be installed and placed in service to any development permitted or exempted under the Coastal Act. A coastal permit is not required to maintain, replace, or relocate service or metering facilities for developments permitted or exempted under the Coastal Act.

d. Grading, Clearing and Removal of Vegetation. Excluded activities shall not extend to the construction of any new road to the site of the work. In cases involving removal of trees exceeding 12 inches dbh, grading of any undisturbed area of greater than 500 sq. ft. or clearing of more than 500 sq. ft. of brush or other vegetation, the utility shall consult with the Executive Director of the Regional Commission to determine whether the project involves removal of major vegetation such that a permit is required. A coastal permit is not required for removal of minor vegetation for maintenance purposes (tree trimming, etc.) for safety clearances.

e. Definitions.

(1) **Line Extension.** All facilities for permanent service excluding transformers, services and meters, required to extend electric service from the utility's existing permanent facilities to one or more supply points.

(2) **Service.** A single set of conductors and related facilities required to deliver electric energy from a supply point to the customer's facilities.

(3) **Supply Point.** Any transformer, pole, manhole, pull box or other such facilities at which the utility connects one or more sets of service conductors to the utility's permanent electric facilities.

3. **Telephone.** No permit or conditions are required for the activities of a telephone company that come within the following areas:

a. Repair and maintenance of existing damaged or faulty poles, wires, cables, terminals, load cases, guys and conduits, including the necessary related facilities, to restore service or prevent service outages.

b. Placement of existing telephone facilities underground, provided such undergrounding shall be limited to public road or railroad rights-of-way or public utility easements (P.U.E.) and provided there is no removal of major vegetation and the site is restored as close as reasonably possible to its original condition.

c. Placement of additional aerial facilities on existing poles.

d. Removal of existing poles and facilities thereon, where new, replacing facilities have been placed underground.

e. Performance of work in connection with or placement of facilities to expand service to existing customers or to serve new customers, including placement of underground service connections or aerial service connections from existing poles with any necessary clearance poles.

f. Removal of minor vegetation for maintenance purposes (tree trimming, etc.).

g. Maintenance activities shall not extend to the construction of any new roads to the site of the work. A permit is required for grading an undisturbed area of greater than 500 sq. ft., removal of trees exceeding 12 inches dbh or clearing more than 500 sq. ft. of brush or other vegetation unless the Executive Director of the Regional Commission determines the activity does not involve the removal of major vegetation.

4. **Others, including Water, Sewer, Flood Control, City and County Public Works, Cable TV.** No permit is required for repair or maintenance of existing facilities that do not alter the service capacity, installation of new or increased service to development permitted or exempted under the Coastal Act, placement of additional facilities on existing poles, or placement of existing facilities underground, provided such undergrounding shall be limited to public road or railroad rights-of-way or public utility easements (P.U.E.) and provided there is no removal of major vegetation and the site is restored as close as reasonably possible to its original condition. A permit is required for installation of service to vacant parcels or installation of capacity beyond that needed to serve developments permitted or exempted under the Coastal Act.

Maintenance activities shall not extend to the construction of any new roads to the site of the work. A permit is required for grading an undisturbed area of greater than 500 sq. ft., removal

of trees exceeding 12 inches dbh or clearing more than 500 sq. ft. of brush or other vegetation unless the Executive Director of the Regional Commission determines the activity does not involve the removal of major vegetation. No permit is required for removal of minor vegetation (e.g., tree trimming) where it interferes with service pipes or lines.

C. Parks. No permit is required for routine maintenance of existing public parks including repair or modification of existing public facilities where the level or type of public use or the size of structures will not be altered.

D. Industrial Facilities. No permit is required for routine repair, maintenance and minor alterations to existing facilities, necessary for on-going production that do not expand the area or operation of the existing plant. No permit is required for minor modifications of existing structures required by governmental safety and environmental regulations, where necessary to maintain existing production capacity, where located within existing structures, and where height or bulk of existing structures will not be altered.

E. Other Structures. For routine repair and maintenance of existing structures or facilities not specifically enumerated above, no permit is required provided that the level or type of use or size of the structure is not altered. (NOTE: See Section [13250](#) of the Commission Regulations for exclusions or additions to existing single-family houses.)

F. Dredging and Beach Alteration. (NOTE: Maintenance dredging of navigation channels is exempted by Section 30610 (b). Other dredging and sand movement projects, where part of an established program may be exempt from the permit requirements of the Coastal Act by reason of vested rights, where such rights have been reviewed and acknowledged by the Regional Commission. Contact the Regional Commission office for information and application forms.)

APPENDIX I

Detailed description of activities included in road maintenance programs for which no coastal development permit is required.

1. **Flexible Roadbed Program.** This program covers the restoration and repair of both surface and base within the previously paved portion of the roadway. This includes previously paved asphalt concrete shoulders two feet or greater in width where the shoulder is designated by traffic marking, pavement delineation or traffic use. Paved shoulders less than two feet in width will be considered as included in the traveled way lanes.
2. **Roadbed, Rigid.** The Rigid Roadbed Program covers the restoration and repair of both surface and base within that paved portion of the roadway used for the movement of vehicles. This includes asphaltic concrete or oiled shoulders two feet or greater in width. Paved shoulders less than two feet in width will be considered as included in the traveled way lanes. This program does not include roadbed widening projects.
3. **Roadside Maintenance Program.** This program includes the repair, replacement, and cleaning of ditches, culverts, underdrains, horizontal drains and miscellaneous headwalls and debris racks. Also included are fence repairs, roadside section restoration (e.g., drift removal, bench cleaning, slide removal, and fill slope replacement). In addition, repairs or replacement of retaining walls, installation of slope protection devices, minor drainage facilities, sidewalks and curbs, bins, cattle guards and other such structures where there is no increase in size (or adding to what exists) is included in this program. This program shall not include seawalls or other shoreline protective works, activities subject to review under Section 1601 of the Fish and Game Code, or excavation or disposal of fill outside of the roadway prism.
4. **Roadway Litter and Debris Program.** This program includes all work concerning roadbed and roadside cleanup operations to insure that the highway presents a neat, clean and attractive appearance.
5. **Vegetation Control Program.** Vegetation control refers to the maintenance treatment of all vegetative material growing native within the highway rights-of-way. Included is cutting and trimming by hand and mechanical means.
6. **Pavement Delineation Program.** The pavement delineation program involves all work necessary to place and maintain distinctive roadway markings on the traveled way. This includes layout, removal of old stripe, painting of new or existing stripe including striping for bike lanes, installation and/or removal of raised pavement markers including cleaning of such markers and the use of thermoplastic, tape or raised bars for pavement markings. Changing of striping for more lanes is not included in this program.
7. **Sign Program.** The sign program includes all work performed on existing signs for the purpose of warning, regulating or guiding traffic including bicycle traffic using bike lanes. The work consists of manufacture, assembly and installation of new signs to replace existing signs and the repair, cleaning and painting of signs.

8. **Electrical Program.** This program includes all work performed on in-place highway electrical facilities used to control traffic with signal systems, provide safety and sign lighting, illuminate maintenance building and grounds, generate standby power, operate bridges, pumps and automatic watering systems. Certain navigational lighting installed on bridges and bridge fenders or piling are included in this program.
9. **Traffic Safety Devices Program.** Work performed under this program includes replacement of guide posts, markers, skid resistant grooves, and also replacement, cleaning and/or painting of guard rails. The repair of median barrier cable chain link fence and portland cement concrete walls; the repair and maintenance of energy dissipators such as water type bumpers, sand traps or other devices installed for the purpose of absorbing vehicle energy are included in this program.
10. **Public Service Facility Program.** Public Service Facilities consist of roadside rests, vista points, map stops, historical monuments, roadside fountain areas and vehicle inspection stops. Work to be performed under this program consists of a wide variety of custodial maintenance in connection with existing restrooms, fountains and picnic areas.
11. **Landscape Program.** This program refers to the treatment, maintenance and replacement of all vegetative material planted within the State Highway right-of-way. Work includes watering, fertilizing, plant replacement, weed control by hand and mechanical means and tree trimming.
12. **Bridge and Pump Maintenance Program.** The Bridge and Pump Maintenance Program includes work performed on all structures which provide for passage of highway traffic over, through or under obstacles and/or qualify for bridge numbers as assigned by the Division of Structures.
13. **Tubes, Tunnel and Ferry Maintenance Program.** The Tubes, Tunnel and Ferry Maintenance Program includes maintenance and repair of tunnels, tubes, ferries and docks or slips. Tunnel or tube maintenance includes washing, cleaning, tile repair and the maintenance of electro-mechanical equipment. Tunnel structural repairs will be performed under this program when covered by approved Division of Structures reports of work needed.
14. **Bridge Painting Program.** This program involves bridge maintenance painting performed in conformance with the requirements of air pollution control and water quality control agencies having jurisdiction.
15. **Miscellaneous Safety Projects.** Elimination of hazards within the operating areas or the operating right-of-way or projects modifying existing features such as curbs, dikes, headwalls, slopes, ditches, drop inlets, signals and lighting, etc., within the right-of-way to improve roadside safety.
16. **Major Damage Maintenance, Repair and Restoration.** Provides temporary road openings and related maintenance and returns highway facilities to serviceable states as rapidly as possible following major damage from storms; earthquakes; tidal waves; ship, train or vehicle collisions; gasoline truck fires; aircraft crashes, and all other kinds of physical violence. (NOTE: These items may be developments rather than repair or maintenance activities, but would be subject to the emergency permit provisions of the Coastal Act. Inquiries should be

directed to the Regional Commission staff if at all possible prior to commencement of construction.)

17. **Miscellaneous Alterations.**

- a. Installation, modification or removal of regulatory, warning or informational signs, according to the standards of the State Department of Transportation Uniform Sign Chart.
- b. Traffic channelization - improvements to local service and safety by delineation of traffic routes through the use of curbs, dikes, striping, etc., including turn pockets, where construction is performed by State Department of Transportation Maintenance Department or equivalent activities by local road departments.
- c. Maintenance of existing bicycle facilities.
- d. Modification of traffic control systems and devices including addition of new elements such as signs, signals, controllers, and lighting.
- e. Devices such as glare screen, median barrier, fencing, guard-rail safety barriers, energy attenuators, guide posts, markers, safety cable, ladders, lighting, hoists, paving grooving.
- f. Alteration or widening of existing grade separation structure where the primary function and utility remains unaltered.
- g. Minor operational improvements such as median and side ditch drainage facilities, where not subject to review under Section 1601 of the Fish and Game Code or involving excavation or disposal of fill outside of the roadway prism.
- h. Modification, upgrading, alteration, relocation, or removal of railroad grade crossings, railroad grade crossing protection, and the construction of bus and truck stop lanes at railroad grade crossings.

Appendix C Highway Design
Manual Topics

Appendix C Highway Design Manual Topics

Topic 81 – Project Development Overview

Index 81.1 – Philosophy

The project development process seeks to provide a degree of mobility to users of the transportation system that is in balance with other values. In the development of transportation projects, social, economic, and environmental effects must be considered fully along with technical issues so that final decisions are made in the best overall public interest. Attention should be given to such considerations as the following:

- (a) Need to provide transportation for all users (motorists, bicyclists, transit riders, and pedestrians) of the facility and transportation modes.
- (b) Attainment of community goals and objectives
- (c) Needs of low mobility and disadvantaged groups
- (d) Costs of eliminating or minimizing adverse effects on natural resources, environmental values, public services, aesthetic values, and community and individual integrity
- (e) Planning based on realistic financial estimates
- (f) The cost, ease, and safety of maintaining whatever is built

Proper consideration of these items requires that a facility be viewed from the perspectives of the user, the nearby community, and larger statewide interests. For the user, efficient travel and safety are paramount concerns. At the same time, the community often is more concerned about local aesthetic, social, and economic impacts. The general population, however, tends to be interested in how successfully a project functions as part of the overall transportation system and how large a share of available capital resources it consumes. Therefore, individual projects must be selected for construction based on overall system benefits as well as community goals, plans, and values.

Decisions must also emphasize different transportation modes working together effectively.

The goal is to provide a safe, sustainable, integrated and efficient transportation system in a manner that is compatible with, or which enhances, adjacent community values and plans.

More information on flexibility in design and developing projects that enhance livability is available online.¹²

Topic 109 – Scenic Values in Planning and Design

109.1 Basic Precepts

For any highway, having a pleasing appearance is an important consideration. Scenic values must be considered along with safety, utility, economy, and all the other factors considered in planning and design. This is particularly true of the many portions of the State Highway System situated in areas of natural beauty. The location of the highway, its alignment and profile, the cross section design, and other features should be in harmony with the setting.

109.2 Design Speed

The design speed should be carefully chosen, as it is the key element that establishes standards for the horizontal alignment and profile of the highway. These requirements in turn directly influence how well the highway blends into the landscape. Scenic values, particularly in areas of natural scenic beauty must play a part along with the other factors set forth under Index 101.1 in selecting a design speed.

109.3 Aesthetic Factors

Throughout planning and design, consider the following:

- (a) The location of the highway should be such that the new construction will preserve the natural environment and will lead to and unfold scenic positions. In some cases, additional minor grading not required for roadbed alignment may expose an attractive view or hide an unsightly one.
- (b) The general alignment and profile of the highway should fit the character of the area traversed so that unsightly scars of excavation and embankment will be held to a minimum. Curvilinear horizontal alignment should be coordinated with vertical curvature to achieve a pleasing appearance.

¹² Available at <http://www.dot.ca.gov/hq/oppd/design/2014-4-2-Flexibility-in-Design.pdf> and http://www.dot.ca.gov/hq/projdev/pdq/2015_PDO_Winter.pdf.

- (c) Existing vegetation (e.g., trees, specimen plants and diminishing native species) should be preserved and protected to the maximum extent feasible during the planning, design, and construction of transportation projects. Whenever specimen or mature trees are present, especially in forested areas, a tree survey should be made to provide accurate data on the variety, condition, location, size, and ground elevations of trees affected.
- (d) Appropriate replacement planting should be provided when existing planting is removed. When native or specimen trees are removed, replacement planting should reflect the visual importance of the plantings lost. Where the visual impact of tree removal is substantial, replacement with large transplants or specimen size trees may be appropriate. If not, an appropriate quantity of smaller replacements may be required to ensure eventual survival of an adequate number of plants.

Provisions for watering and establishment of replacement planting should also be considered. The District Landscape Architect should be consulted early in the planning and design process so that appropriate conservation and revegetation measures are incorporated.

- (e) Existing vegetation such as trees or large brush may be selectively thinned or removed to open up scenic vistas or provide a natural looking boundary between forest and cleared areas. Vegetation removal for aesthetic purposes should be undertaken only with the concurrence of the District Landscape Architect.
- (f) Vista points should be provided when views and scenery of outstanding merit occur and feasible sites can be found (see Topic 904 for site selection criteria).
- (g) Whenever feasible, wide medians and independent roadways should be provided on multilane facilities as these features add scenic interest and relieve the monotony of parallel roadways.
- (h) Bridges, tunnels, and walls merit consideration in lieu of prominent excavation and embankment slopes when costs of such alternates are not excessive.
- (i) Slopes should be flattened and rounded whenever practical and vegetation provided so that lines of construction are softened.
- (j) Structures should be located and designed to give the most pleasing appearance.

- (k) Scars from material sites should be avoided. Planting compatible with the surroundings should be undertaken to revegetate such scars when they are unavoidable.
- (l) Drainage appurtenances should be so located that erosion, sumps, and debris collection areas are hidden from view or eliminated when site conditions permit.
- (m) Interchange areas should be graded as flat as reasonable with slope rounding and contouring to provide graceful, natural looking appearance. The appearance can be further enhanced by planting a vegetative cover appropriate to the locality, being careful to maintain driver visibility.
- (n) In locations where graffiti has been excessive, concepts such as limiting accessibility, planting, and surface treatments should be considered to deter graffiti.
- (o) Roadsides should be designed to deter weed growth along the traveled way, and to provide for mechanical litter collection.