D1 ADVANCE PLANNING

Project Location

On Route 101 in Del Norte County, 10 miles south of Crescent City from PM 12 - 15.5
EA 01-987101

Last Chance Grade Engineered Feasibility Study

LAST CHANCE GRADE

Last Chance Grade Engineered Feasibility Study

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Acronyms

ASBS	Area of Special Biological Significance
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
Del Norte LTC	Del Norte Local Transportation Commission
EFH	Essential Fish Habitat
EFS	Engineered Feasibility Study
ER	Emergency Relief
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FHWA	Federal Highways Administration
GDRC	Green Diamond Resource Company
HDM	Highway Design Manual
LCG	Last Chance Grade
MSA	Magnuson Stevens Fishers Conservation and Management Act
MOU	Memorandum of Understanding
NLCG	North Last Chance Grade Slide
NMFS	National Marine Fisheries Service
Old-growth	Old-growth coastal redwood
PM	Post Mile
PSR	Project Study Report
SLCG	South Last Chance Grade Slide
SLR	Sea Level Rise
SONCC	Southern Oregon/Northern California Coast
VA	Value Analysis

1. EXECUTIVE SUMMARY

The Last Chance Grade Feasibility Study examines a variety of alternatives to minimize or avoid the risk of roadway failure and reduce ongoing maintenance costs of US 101 at Last Chance Grade in Del Norte County. Since its construction in 1937, Last Chance Grade has been prone to geologic instability and land movement. In 1972, a significant storm washed out a portion of the roadway, resulting in two fatalities. Faced with road failures and increasing maintenance costs, Caltrans began studying alternatives to remedy this segment in 1987 and continued these studies through 2003, generating six reports and thirty alternatives overall. The alternatives ranged from roadway stabilization of the existing alignment, to roadway bypasses of state and national parks land. All previously studied alternatives were considered during this Feasibility Study; however, none were recommended as originally envisioned because additional information is now understood about the challenges related to right-of-way acquisition, excessive grades, and significant roadway excavation.

Due to numerous sensitive natural and cultural landscapes within the project area, Caltrans partnered with agencies and Tribal governments with land management responsibilities in the Last Chance Grade area to develop feasible solutions that fully integrate environmental and cultural landscape considerations (referred to in this report as "the Partners."). The Partners are California Department of Parks and Recreation, National Park Service, Yurok Tribe, Tolowa Dee-ni' Nation, and Elk Valley Rancheria, California. The Partners met regularly during the Feasibility Study process and worked to develop a Memorandum of Understanding, which establishes a set of shared goals to accomplish within the study.

Alternatives for this study were developed using design criteria based on constructability, adherence to design standards, and impacts to the environment and sensitive resources. Using the design criteria, a set of fourteen alternatives were studied. These alternatives range from a one mile long tunnel retreating behind the Last Chance Grade slide, to a 15.5 mile bypass east of the existing US 101 alignment.

The need for public participation in this study is recognized as essential to the project's success. The Partners worked to develop a more inclusive community engagement approach for public input. Three workshops held in Crescent City, Eureka, and Klamath attracted a diverse audience. The workshops described the history of Last Chance Grade and issues that drive the effort behind the Feasibility Study. The workshops also provided an overview of the proposed alternatives. Participants were then able to voice their thoughts and concerns of the project alternatives in small groups. Input received during the workshops included the following concerns: impacts of a roadway failure and the need to expedite the project; the safety and reliability of the existing and new segments; the project funding and cost; the environmental impacts; and the partnering and outreach process. A "Frequently Asked Questions" section is available on the project website http://www.lastchancegrade.com and within Appendix B. The website will be online for the life of the project and will provide a high level of transparency.

To determine the feasibility of the proposed alternatives, Caltrans relied on input from technical experts from the Partners and from within Caltrans. The Partners and Caltrans technical experts worked to produce a preliminary analysis of the alternatives that describes the potential environmental impacts associated with each alternative. In addition, the Office of State Planning Economic Analysis Branch provided an economic analysis of a long-term closure at Last Chance Grade. The economic analysis concluded that combining the travel cost impacts, annual economic impacts, and applying annual cost to a potential construction schedule of an alternative demonstrates consideration of the feasibility of expending as much as $1 billion to rectify the Last Chance Grade segment.

As a result of the analysis of project alternatives, impacts were identified and classified by the Partners and Caltrans staff. These identified impacts were then used to screen alternatives, and exclude alternatives that do not provide a unique advantage over the other alternatives being proposed. The screening and

basis for alternative exclusion concluded that seven alternatives: Maintain Existing Alignment, A1, A2, C3, C4, C5, and F are recommended for further study within a Project Study Report.

The next steps with the completion of this Feasibility Study includes the development of a Project Study Report to further refine and study recommended alternatives and develop the cost, scope, and schedule of the project. Following the Project Study Report, Caltrans will seek funding to initiate project development. No funding has formally been requested at this time; however, Caltrans, FHWA, state, and federal elected officials are actively seeking to identify potential funding sources. This project presents many some of the challenges associated with alternatives that include a short bypass that impacts old-growth coastal redwoods, a longer bypass with a greater cost and project footprint, or maintaining the existing alignment.

2. BACKGROUND

2.1 HISTORY OF LAST CHANCE GRADE

Figure 1 Last Chance Grade Construction in 1934

Last Chance Grade (LCG) is a segment of US Highway 101 in southern Del Norte County, between Wilson Creek and Crescent City (Postmile [PM] 12-15.5). This segment of US 101 was originally constructed in 1894 as a county road and then designated as State Route 1 in 1923. Between 1933 and 1937, the California Division of Highways realigned the route to the current alignment and the route was designated as US 101. It was noted before construction began that the roadway through Last Chance slide was "expensive to maintain because of the extremely unstable formation." During construction of the current alignment, many slipouts and slides occurred, delaying construction. The Division of Highways considered an alignment to the east of the ridge, but it was dropped due to cost and impacts to state park resources.

Last Chance Grade has a history of geologic instability, including landslides and slipouts, which presents a long-term issue with roadway stability and maintenance costs. Surveys conducted by Caltrans have shown the landslides have moved the roadway over 50 feet horizontally off the 1937 alignment.

Since the 1970s, the number of projects and their associated cost have increased due to roadway movement. Between 1981 and 2012, a total of $36.2 million was spent on maintenance and repair projects, with $29.3 million spent between 1997 and 2012. The trend of increased maintenance and emergency projects and capital expenditures is expected to continue.

In recent years, Caltrans has received many public appeals to "make Last Chance Grade safe and reliable." Sixteen North Coast agencies, Tribes, and businesses, along with Congressman Jared Huffman and State Senator Jim Nielson have all sent letters to Caltrans asking for a safe alternative to Last Chance Grade. In addition, State Senator Mike McGuire supports a permanent solution to Last Chance Grade.

2.2 GEOLOGY OF LAST CHANCE GRADE

Last Chance Grade is located in a geologically active area, and landslides occur between one and three times a decade. A California Geologic Survey report prepared in 2000 identified over 200 landslides along the US 101 corridor between Wilson Creek and Crescent City. The landslides identified tend to be "large, deep seated slides that affect large areas" (Wills 2001).

The roadway traverses two large landslides: the Last Chance Grade Landslide (PM 14.85-15.34) and the Wilson Creek Wall Landslide (PM 14.39-14.85). The Last Chance Grade Landslide and Wilson Creek Wall Landslides are within the Franciscan Complex Broken Formation. The Broken Formation consists mainly of thickly bedded sandstone with siltstone and shale interbeds. The massive and hard sandstone blocks, bounded by weak sheared zones, leads to steep slopes and slides of large intact blocks of rock (Wills, 2001). South of Wilson Creek Wall Landslide the roadway traverses a large active earthflow. Shallow debris slides also exist west of the roadway.

The Last Chance Grade Landslide is composed of two major landslides, the Northern Last Chance Grade Landslide (NLCG; PM 15.2–15.34), and the Southern Last Chance Grade slide (SLCG; PM 14.85–15.2). The NLCG Landslide is between 125-160 feet deep and is approximately 700 feet wide, and a faster moving relatively shallow (approximately 40 feet thick) landslide exists within the limits of the NLCG Landslide. The SLCG slide is between 125–260 feet deep and approximately 1500 feet wide.

The NLCG slide is moving at a rate two times faster than the SLCG slide. Recent monitoring between July 2012 and April 2015 shows a vertical movement of the roadway of 2.59 feet, and a horizontal movement of 3.26 feet in the main slide area. Specific measurements in Table 1 and Figure 2 provide a graphical representation of the slide movement. This movement is reflected in cracks on retaining walls at the NLCG and SLCG slide interface (See Figure 3). Also contributing to the slides is the toe of the Wilson Creek Bluffs, which is undergoing mass wasting and erosion by tidal influences.

Table 1 Slide Movement July 2012 through April 2015 (PM 15.18-15.22)

Measurement Date	Vertical Movement* (in feet)		Horizontal Movement* (in feet)	
	Monitoring Period	Cumulative	Monitoring Period	Cumulative
7/2/2012	0.00	0.00	0.00	0.00
8/2/2012	0.03	0.03	0.08	0.08
2/27/2013	0.62	0.65	0.47	0.55
9/18/2013	0.25	0.90	0.21	0.76
3/27/2014	0.21	1.11	0.14	0.90
9/23/2014	0.21	1.32	0.20	1.10
1/14/2015	0.17	1.49	0.74	1.84
4/16/2015	1.10	2.59	1.43	3.26

* Horizontal movement is westwards, vertical movement is downwards

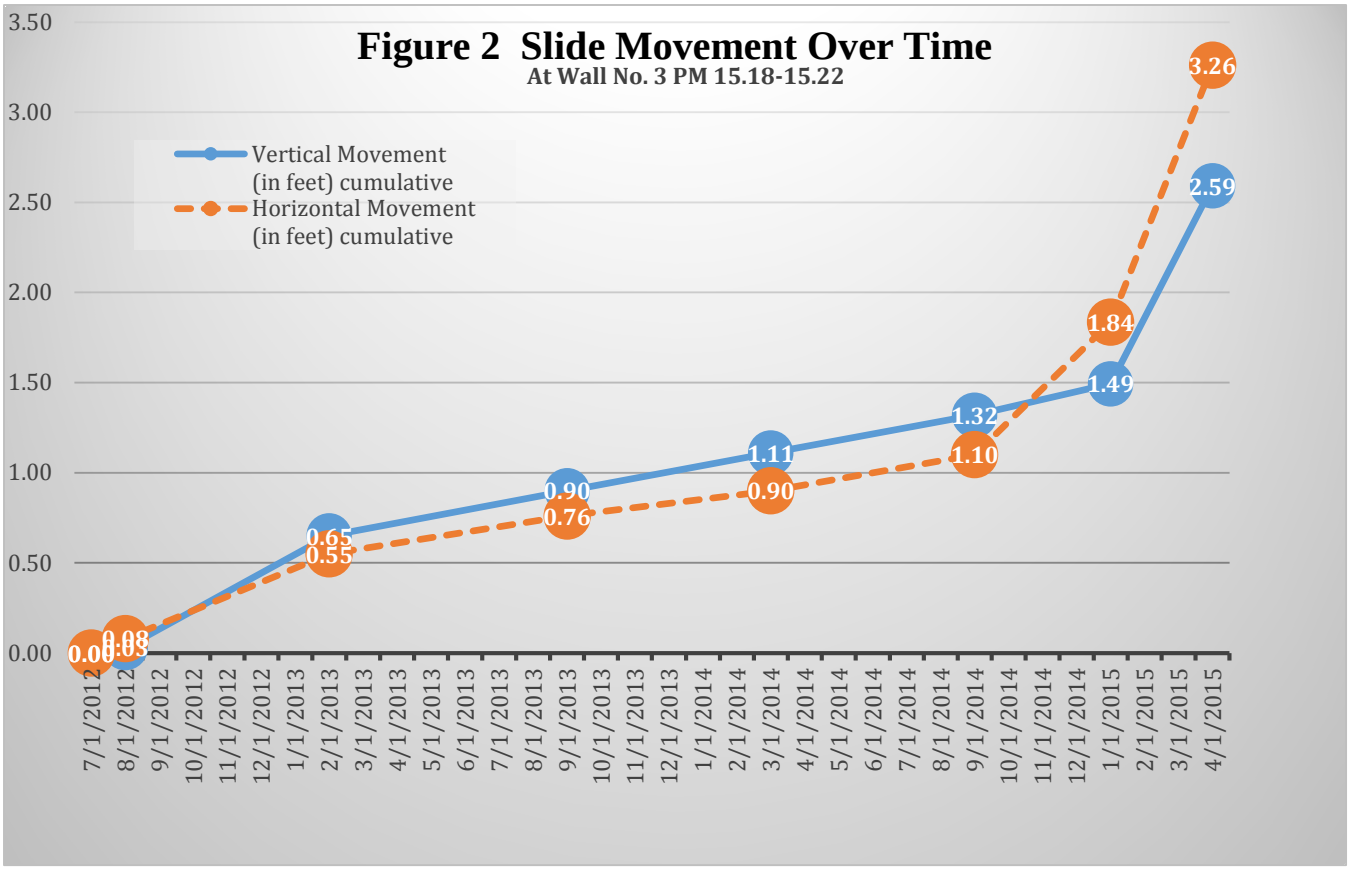


Figure 2 is a graphical representation of slide movement over time. Monitoring began in July of 2012 when sensors and a survey network were installed during the construction of a retaining wall. Movement is measured in feet; vertical movement is downwards, and horizontal movement is westwards.

Figure 3 Cracking on Retaining Wall at NLCG and SLCG Slide Interface Near PM 15.2

Figure 4 2012 Storm Damage Near PM 15.0

The geologic instability in the area is often exacerbated by storm events. In 1972, during a period of intense rainfall—18 inches in 48 hours—two motorists lost their lives when a landslide washed out the roadway. More recently, two federally declared storm events in 2011 and 2012 required emergency projects to maintain the highway alignment for use. The 2011 storm event created three slipouts along the roadway, closing the southbound shoulder and requiring resurfacing of the roadway and the extension of an existing retaining wall. The 2012 storm event created one new slipout and accelerated an existing slipout from the prior year. This storm required an emergency soil nail wall to prevent further loss of the roadway. For more information on storm damage emergency relief projects, see Section 7.1.

The large mass and unstable properties of the slides, combined with the erosion of the bluffs, make maintaining the roadway alignment difficult, and "mitigation of this slide extremely difficult, if not impossible" (Wills 2000).

2.3 PREVIOUS STUDIES AND ALTERNATIVES

2.3.1 Previous Studies

The Last Chance Grade segment has been studied by Caltrans in the past to identify options available to reduce the cost of maintenance and reduce the number of road closures due to landslides. In 1987, Caltrans completed the *Wilson Creek Bluffs Bypass Project Study Report* (PSR) that identified four alternatives for evaluation. The transportation concept, or vision, for the future of US 101 at the time the PSR was prepared, consisted of a freeway/expressway with four 12-foot lanes with 10-foot shoulders and a 14-foot paved median for a total roadway width of 82 feet. The alternatives proposed did not include an alternative that would avoid all impacts to parklands. All the alternatives were determined to be infeasible due to excessive capital costs and environmental impacts.

The *1993 US Route 101 in Del Norte-A Corridor Study* evaluated four alternatives at a larger scale focusing on two sections of highway between Wilson Creek (PM 12.5) and Cushing Creek (PM 22.5). The study concluded it was infeasible to bypass all federal and state park land, and also concluded the transportation concept for US 101 should be scaled down for this section of highway to a two-lane facility. The study references an alignment that the California Department of Parks and Recreation proposed in July 26, 1962, endorsed by Save the Redwoods League, which would cost $325 million and remove an estimated 600 redwood trees greater than 36" diameter at breast height (Corridor Study 1993).

The 1993 *Wilson Creek Bluffs Bypass Project Report* evaluated seven different iterations of one alternative from the 1987 *Wilson Creek Bluffs Bypass* and one minimum impact alternative for future study. The Wilson Creek Bluffs Bypass project was terminated before completion due to the following: a moratorium on project development activities for right-of-way only projects; impacts to old-growth coastal redwood forest (old-growth redwood) and rare/endangered species; and the cost of alternatives unlikely to get funding. The Del Norte Local Transportation Commission (Del Norte LTC) agreed on this termination with a 4-1 vote.

In 1995, another PSR was initiated to address the concerns of Caltrans, Del Norte LTC, and the public about a catastrophic slide at Last Chance Grade. Four varying alternatives were proposed: a tunnel, a minor realignment with slope stressing and solider pile tieback wall(s), and a major retreat requiring significant excavation. After the report, Caltrans worked with the Department of Conservation Geological Survey to produce the report *Landslides in the Highway 101 Corridor between Wilson Creek and Crescent City, Del Norte, California* (2000) authored by C.J. Wills. The report would be used by Caltrans to produce a Preliminary Geotechnical Report (May 2001) for the alternatives proposed in the 1995 PSR. The two reports provided extensive mapping that significantly increased the known limits of the landslide area. Alternative 3 was described as the most feasible alternative from a geotechnical perspective, addressing issues with the deep-seated slide; however, the impacts to park resources were deemed unacceptable. Alternative 1, a short tunnel option, was determined to be infeasible and a diagram provided in the report shows a long tunnel would be more feasible based on geotechnical information.

In 2002, Caltrans completed the *Value Analysis State Route 101 Roadway Stabilization*. The focus of the Value Analysis (VA) was on the segment between Postmile 15.0 to 15.6. The scope of the study was limited to the existing highway corridor, with a special focus on minimizing impact to state and national parks and minimizing impacts to old-growth redwoods. The main alternatives considered include Alternative 1, 2A, 2B, and 3 from the 1995 PSR. The VA Team accepted Alternative 2, but they reduced the length of the retaining walls to limit right-of-way acquisition, environmental impacts, and cost. The Value Analysis also recorded some additional alternatives that did not meet the purpose of the study. The Alternative C.1 is a 1230-foot single diameter bore tunnel along the alignment first proposed in the 2001 Geotechnical Report. Alternative C.2 also along this same alignment but with two smaller diameter bored tunnels approximately 5,200 feet long. Alternative D is a solider pile wall with slope stressing and Alternative E used slope stressing with substantial impacts to old-growth redwoods. In response to the 2001 Geotechnical Report and 2002 VA, a supplemental PSR was prepared in 2003 to explore alternatives with new information. The PSR proposed five alternatives, ranging from a minor realignment and stabilization, to a tunnel and major realignment behind the slide plane.

From the 2003 supplemental PSR, five retaining walls were constructed in 2010 at Last Chance Grade to maintain the roadway alignment: four tie back soldier pile walls on the west side of the roadway, and one soldier pile wall on the east side of the roadway. This option was chosen as the most cost effective option by the 2002 VA study, with concurrence from the project development team and stakeholders.

2.3.2 Previous Alternatives

Previous alternatives generally fall into two categories: bypass and alignment stabilization. The six studies described in section 2.3.1 produced 30 alternatives on 16 different alignments. Bypass alternatives varied in length and alignment, from minor realignments and tunnels behind the slide plane, to major bypasses of the State and National Parks. Table 2 on the following page summarizes the previous alternatives studied. A detailed description of all previous alternatives is presented in Appendix A.

Table 2 Previous Alternatives Evaluated	
Supporting Document	**Alternatives**
1987 PSR	Four bypass alternatives on two different alignments and one no build alternative
1993 Project Report	Seven bypass alternatives on seven varying alignments, and one minimum impact alternative with stabilization of the current alignment
1993 Corridor Study	Three bypass alternatives on three different alignments, and one alternative to improve the existing roadway
1995 PSR	Two bypass alternatives on one alignment, two minor realignments with roadway stabilization, and one retreat behind the slide plane through a large cut
2002 VA	One alternative to construct retaining walls throughout the project limits (PM 15.0–15.6), one alternative to construct retaining walls at key points, and an alternative to augment the present maintenance program (no build)
2003 Supplemental PSR	One realignment with a tunnel, two minor realignments with roadway stabilization, one major realignment with a large cut behind the slide plane, and one alternative to construct five retaining walls and widen the roadway for 12-foot lanes and 4-foot shoulders

Other alternatives included a viaduct, buttress, and seawall. A viaduct is not suitable at the slide location due to the slide moving as an intact mass that would impose excessive lateral loads on the supports. The viaduct supports would have to be anchored to solid material and the depth of the slide creates conditions that will not facilitate an engineered solution. A buttress was determined to be difficult to engineer and prohibitively expensive due to the rugged terrain. It is also difficult to determine whether a buttress would slow slide movement due to the large mass of the slide and precipitation triggering movement. A seawall was determined to be prohibitively expensive and would have severe environmental impacts. The mountainous terrain makes it difficult to reconnect the seawall to the existing alignment requiring a facility several miles long, and thus contributing to the excessive cost. All previous alternatives were reviewed during the preparation of this Feasibility Study; however, none were retained as originally conceived because of the development of more advanced technology, a greater value placed on minimized impacts to parks and old-growth redwoods, and a better understanding of geotechnical issues and grades between 8-11%. In addition, while the potential for a 4-lane facility was previously studied, a 2-lane facility is the current preferred transportation concept. A 4-lane facility would not qualify for a major funding source as the Federal Highways Administration Emergency Relief program has a “replace-in-kind” requirement.

3. PURPOSE AND NEED

3.1 PURPOSE

The purpose of this Feasibility Study is to develop and study sustainable alternatives for a permanent solution to the instability and potential roadway failure at Last Chance Grade. The study considers alternatives that provide a more reliable connection, reduce maintenance costs, and protect the economy, natural resources, and cultural landscapes.

3.2 NEED

Landslides and road failures at Last Chance Grade have been an ongoing problem for decades. A geologic study in 2000 conducted for Caltrans by the California Geological Survey mapped over 200 historical and active landslides (both deep-seated and shallow) within the corridor between Wilson Creek and Crescent City. Over the years, Caltrans has conducted a considerable number of construction projects and

maintenance activities in the Last Chance Grade area. Since 1980, landslide mitigation projects – including roadbed overlays, slip-out and washout repairs, retaining walls, drainage improvements, and maintenance – have cost over $36 million. A long-term sustainable solution at Last Chance Grade is needed because of the following reasons:

- Economic ramifications of a long-term failure;
- Risk of delay/detour to traveling public
- Increasing maintenance costs, and
- A potential increase in frequency and severity of large storm events caused by climate change.

4. PARTNERSHIP

Caltrans partnered with agencies and Tribal governments with a vested interest and land management responsibilities near US 101 at Last Chance Grade to study and develop feasible solutions fully integrating environmental and cultural resource considerations. The partnership consists of Caltrans, California Department of Parks and Recreation, National Park Service, Yurok Tribe, Elk Valley Rancheria, California, and the Tolowa Dee-ni' Nation (collectively "the Partners.")

Through a memorandum of understanding (MOU), the Partners have all agreed to:

- Work cooperatively and in unity;
- To communicate openly and in an atmosphere of confidence and trust;
- Work as a team to discuss alternatives, work through barriers, resolve conflicts and communicate openly to arrive at consensus on a solution to the problem of the instability of U.S. Route 101 at Last Chance Grade; and
- Make reasonable best efforts to meet the values and goals set by the Partners.

The values established by the Partners through the MOU are:

- Connectivity of northwest California
- Continuity of emergency response
- Crisis preparedness
- Energy Conservation
- Environmental Justice
- Mobility
- Preservation of local economy
- Preservation of unique ecosystem as an International Biosphere and World Heritage Site
- Protection of environmental resources (visual, cultural, and natural)
- Reduction in greenhouse gas emission
- Redwood National and State Parks visitor access and experience
- Safety of travelers
  Sustainability

The goals set forth through the MOU and shared by the Partners are:

- Obtain a comprehensive economic study that defines:
  - An economic baseline,
  - Economic impacts, and
  - An economic impact monitoring plan
- Develop a clear and concise engineered Feasibility Study that:

    - Is consistent with Partner Policies
    - Reviews full range of potential alternatives, including any potential impacts to cultural resources;
    - Provides detailed comparison of selected viable alternatives;
    - Identifies buildable project(s);
    - Include implementation strategy; and
    - Explores innovative technologies and construction methods
- Establish communication guidelines; and
- Obtain Partner consensus on development of alternatives to address the instability of Route 101 at Last Chance Grade.

The Partners worked together extensively during the development of the alternatives to be evaluated. Each partner was able to give input on each alternative, as well as any recommendations or favored alternatives.

During the Partnership process, different organizations were approached to decide whether they should be a partner or key stakeholder. Due to the time commitment, early stage of process, and potential contribution, Green Diamond Resource Company, Save the Redwoods League, Federal Highway Administration, and Del Norte Local Transportation Commission are currently identified as key stakeholders and not partners. Other key stakeholders include the following:

- California Bicycle Advisory Committee
- California Bicycle Coalition
- California Coastal Commission
- California Department of Forestry and Fire Protection
- California Fish and Wildlife
- California Highway Patrol
- California Walks
- Center of Biological Diversity
- City of Crescent City
- City of Eureka
- County Coastal
- Crescent City/Del Norte County Chamber of Commerce
- Del Norte County
- Del Norte County Board of Supervisors
- Del Norte County Community Development Department
- Del Norte Local Transportation Commission
- Environmental Protection Information Center
- Friends of Del Norte
- Green Diamond Resource Company
- Humboldt County Association of Governments
- Humboldt County Board of Supervisors
- Klamath Chamber of Commerce
- Local Fire Departments
- Local Paramedics and Emergency Responders
- National Oceanic and Atmospheric Administration
- North Coast Regional Water Quality Control Board
- Rails-to-Trails Conservancy
- Redwood Coast Transit
- Save the Redwoods League
- US Army Corps of Engineers
- US Department of Agriculture Forest Service
- US Federal Highways Administration
- US Fish and Wildlife

5. ALTERNATIVES DESIGN CRITERIA

The project team developed a set of preliminary criteria to aid in identifying alternatives for study. The criteria were developed based on constructability, highway design standards, and potential impacts to the environment and other resources. Alternatives were developed using vertical grades not to exceed 7%, a design speed of 55 mph, and a minimum horizontal curve radius of 1100 feet. All alternatives will have a roadway cross-section consisting of 2-lanes, with 12 ft. lanes and 8 ft. shoulders (10 feet in tunnels.) There is an attempt to limit proposed structures, such as bridges, to a maximum height of 200 feet. Structures taller than 200 ft. require additional engineering and maintenance considerations. There is also an effort to limit road cut or fill slopes to 200 feet with a slope of 1.5:1 for constructability, excess disposal, and environmental considerations. Reducing the road cut and fill volumes by using a steeper slope will help to reduce the overall footprint of the roadway compared to a standard slope of 2:1 to 4:1. These preliminary criteria were used to eliminate alignments that would prove to be too difficult to build and maintain.

Figure 5 Typical Cross Section of Alternatives

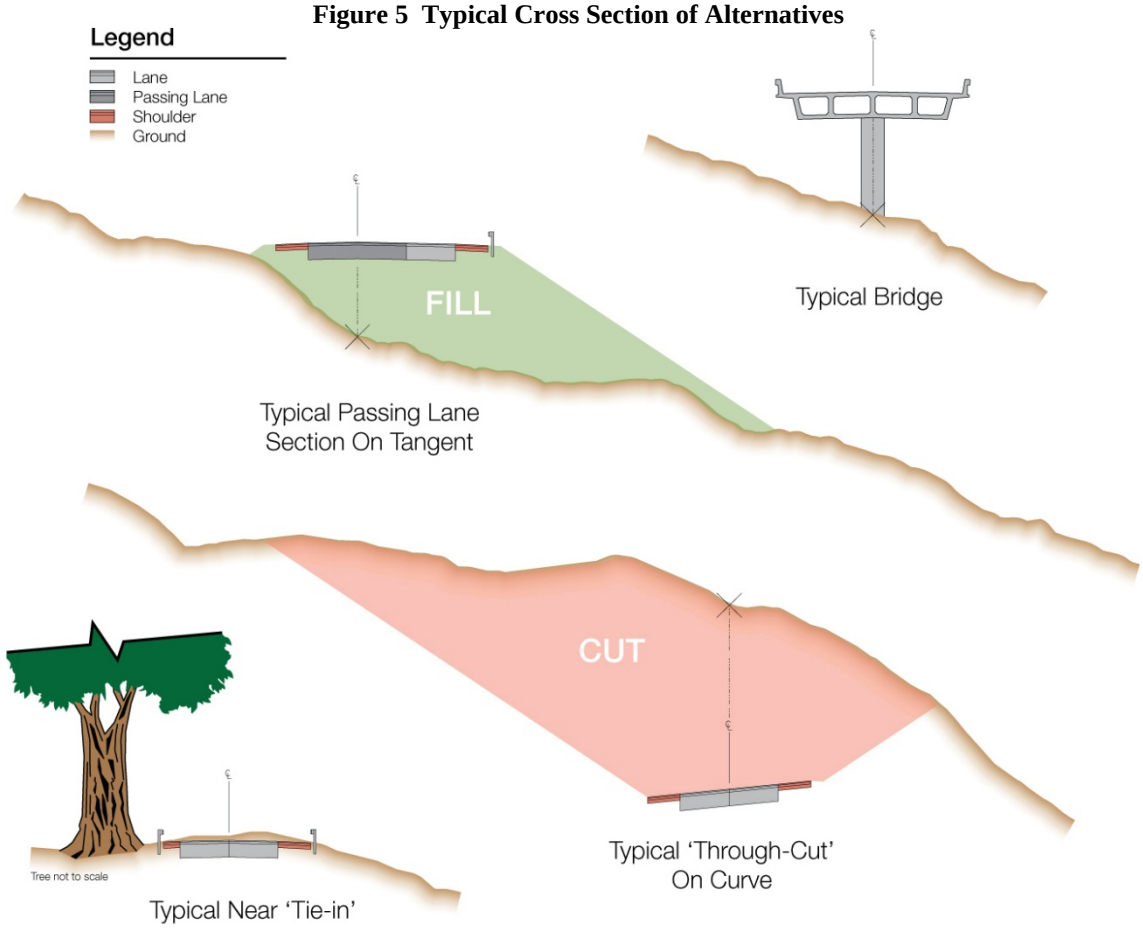


Figure 5 shows the typical cross section of some of the proposed alternatives representing different locations along each alternative. The upper right diagram shows a typical bridge, or viaduct, being proposed for Alternatives A2 and B2 and the reduced footprint and associated environmental impacts compared to using road cut and fill. The fill diagram (upper left) shows how the width of the roadway increases when adding a passing lane and thus increasing the overall footprint of the roadway. The cut diagram (lower right) shows how the cut slope ratio (1.5:1) can increase/decrease the overall footprint of a roadway. The lower left diagram shows how reducing shoulder width on tie-in segments can eliminate the need to take large trees, such as old-growth redwood.

6. COMMUNITY INVOLVEMENT

6.1 INTRODUCTION

Caltrans and the Partners recognized the need for more extensive public participation for the creation of this Feasibility Study than is typical with other Caltrans studies due to the complexity of the issue. Caltrans and the Partners worked to develop a public participation approach suitable to the size and scope of the project.

6.2 WEBSITE

As with other major projects in District 1, Last Chance Grade has a webpage dedicated to project updates. This webpage gives a brief history of Last Chance Grade—including links to previous studies and evaluations—as well as current and future projects. The webpage is regularly updated to include new information relating to the Feasibility Study and public participation, including presentations, and partnership meeting summaries. A "Frequently Asked Questions" section is available on the project website and available in Appendix B. The webpage is the easiest and most convenient way for public to obtain information on Last Chance Grade. The project website is http://www.lastchancegrade.com.

6.3 DEL NORTE LOCAL TRANSPORTATION COMMISSION UPDATES

Del Norte County LTC and Caltrans have worked closely during the Feasibility Study. Caltrans regularly updates the Del Norte LTC during board meetings on the progress of the Feasibility Study. Del Norte LTC tasked Caltrans to evaluate the economic impact of a US 101 closure in the event of a slide failure at Last Chance Grade– thus the Last Chance Grade Economic Impact Study was completed in January of 2015.

6.4 PUBLIC WORKSHOPS

Caltrans and the Partners determined that the most effective way to garner public input was to hold a series of public workshops. These workshops were used to present the alternatives studied to the public and stakeholders and to solicit comment and input. Workshops were held in Crescent City, Eureka, and Klamath. The format and materials were the same for each workshop.

The workshop began with a brief Open House period, where attendees signed in, received workshop materials, and were able to browse display boards and speak with Partner representatives. The handouts included:

- Workshop information, agenda, location map, Feasibility Study process, a preliminary alternatives map;
- An alternatives summary matrix including cost and impacts; and
- A comment card.

The display boards included:

- A location map of the project in relation to Del Norte and Humboldt Counties, local roads, rivers, watersheds and the state and national parks;
- A environmental resources map;
- A geological survey map showing all known landslides on the Last Chance Grade corridor; and
- A preliminary alternatives map showing all 14 alternatives to be studied, their position in relation to the existing alignment and Redwood National and State Parks, and topography.

The workshop began with a presentation by the Caltrans project manager and environmental coordinator. The presentation included:

- A history of Last Chance Grade, including details of various emergency events and consequent repair projects, as well as public concern and requests for action;
- Cost history from 1981-present;
- Completed studies and reports;
- Data on roadway movement from instability;
- The geology of Last Chance Grade, including major landslides;
- A summary of the issues and challenges involved;
- Information on the Last Chance Grade project process and details of the 14 alternatives studied, including design considerations and comparisons of factors such as added travel time, construction impacts, estimated costs and habitat impacts; and
- Information regarding the Last Chance Grade Economic Impact Study

Following the presentation, the project manager led a question and answer session. Subsequently, attendees broke into small group discussions and a final report out by groups concluded the workshop.

The small group discussions included a varied audience and resulted in a diverse array of comments. Approximately 150 people through the region attended the meetings, including:

- Local And Regional Transportation Agencies
- Native American Tribal Governments
- Emergency Service Providers
- Medical Service Providers
- National And State Park Resource Agencies
- Tourism Organizations
- County And Municipal Governments
- Environmental Organizations
- Local And Civic Cultural Organizations
- Regional And Local Planning Staff
- Bicycle And Pedestrian Advocacy Groups
- Local Educators, Schools And Colleges
- Local And Regional Chambers Of Commerce
- Political Organizations
- Local News Media
- Area Residents

Several key findings of the workshops emerged from public and stakeholder input:

- Impacts of road failure and the need to expedite;
- Safety and reliability;
- Project funding and cost;
- Environmental, cultural, and recreational impacts;
- Partnering and outreach process; and
- Considerations and preferences regarding alternatives

Impacts of Road Failure and the Need to Expedite: Attendees frequently commented that road failure is "not a matter of 'if,' but 'when.'" Many participants noted the current road is in need of repair, and maintenance projects are only "band-aids" and the situation has been around "for too long." Participants described the impacts of a complete road failure; how it would isolate Del Norte County from California, and heavily affect Humboldt, Shasta, and the southern Oregon Counties. Others agreed that a bypass could take years to complete; an emergency declaration may be able to "cut red tape," but alternatives must be feasible and not likely to be stopped by litigation based on environmental impacts.

Safety and Reliability: Some participants prioritized safety and reliability as more important than the cost or impacts of the project. Others wanted the project materials to include more information on collision and fatality rates on the segment, with greater emphasis on these impacts in the analysis. A Cascadia Subduction event was noted as a possible hazard the new highway should be designed to withstand. Others questioned the choice to consider exclusively a 2-lane facility and wanted a 4-lane facility to be considered.

Project Funding and Cost: Participants expressed their concerns regarding project funding and the cost of constructing and maintaining the selected alternative. They urged those costs to be taken into account, and expressed that it is important to consider which alternatives are more likely to be funded. Participants also suggested the Partners begin seeking funding sources concurrently with the Feasibility Study process. Many suggested considering some non-traditional sources such as establishing an Enhanced Infrastructure Finance District.

Environmental and Cultural Impacts: Concerns about impacts to natural resources were frequently mentioned during the workshops. Many participants strongly urged the selection of an alternative with the least environmental impact, while acknowledging that this must be weighed against the long-term stability of the solution. Many felt strongly about the protection of old-growth redwoods, while others suggested removal of old-growth redwoods for "human safety is not an issue." Fisheries and aquatic habitat was another issue many participants brought up, suggesting starting the roadway further south to avoid Wilson Creek. Some participants cited impacts to cultural landscape as an important issue, noting that cultural impacts are hard to mitigate and suggested focusing on responding to impacts that are more manageable.

Partnering and Outreach Process: Participants commented on the Last Chance Grade Partnering Process, and suggested that it be expanded to include additional partners including representatives from the cities, counties, and area organizations. Participants asked whether Partners had identified their preferred alternatives.

Comments on the alternatives varied. Some participants expressed they thought there was too much focus on protection of the environment at the expense of public safety, the economy, and protection from natural hazards. Participants also expressed concern that there are too many alternatives, and the options should be reduced to a fewer number. There was also a request that the "no build" alternative or an alternative that focuses on improvements to the current alignment be described more prominently and further studied. Others questioned the use of a tunnel in a seismically active and unstable area.

A complete summary of the public workshops can be found in Appendix C.

6.5 ADDITIONAL OUTREACH

The need for additional outreach during the Feasibility Study was determined by the Partners to be necessary to inform the public about the study. There were numerous questions brought up at during the public participation workshops that could not be answered during the public meetings due to time constraints and the depth of material. Frequently Asked Questions in Appendix B help to address some of these issues. In addition, Congressman Jared Huffman initiated a stakeholder group to help meet the need for additional outreach.

6.6 CONGRESSMAN JARED HUFFMAN STAKEHOLDER GROUP

Congressman Jared Huffman has organized a stakeholder group separate from the Caltrans organized Partnership to address the issues at Last Chance Grade. Caltrans will be participating in the stakeholder group meetings, expected to continue through 2016, and will incorporate the group's input into the project.

7. EXISTING PROJECTS

Several projects have already been completed within the Last Chance Grade study limits to maintain the highway alignment. Since 1997, there have been 14 construction projects totaling $28 million, and $4 million spent on maintenance repairs. Projects have predominately been related to maintenance repairs as a result of storm activities or excessive movement of the slide, in addition to regular maintenance. Table 3 lists previous projects on Last Chance Grade.

Table 3 Previous Last Chance Grade Projects

Project Description	Project Location (Postmile)	Year of Project
Storm Damage Repair	4.6-36	1957
Storm Damage Repair	15.3	1972
Storm Damage Repair	14.41-14.52	1985
Construction Of A Tieback Retaining Wall	14.41-14.52	1987
Repair Of Tieback Wall	14.5	1997
Slipout And Washout Repair	15.2-22.8	1998
Construction Of Last Chance Grade Retaining Wall	15.5	1999
Construction Of Wilson Creek Retaining Wall	14.6	2000
Seal Cracks In Roadway	9.4-15.6	1999
Placement Of Open Grade Asphalt Concrete	15-15.4	2000
Drainage Revision	12.7-12.9	2002
Reconstruction Of The Roadway And Placement Of Open Grade Friction Course	14.4-14.8	2009
Construction Of Retaining Walls	15-15.4	2010
Three Slipout Repairs	15 and 15.27	2012
Emergency Soil Nail Wall	15.27	2012
Rubberized Hot Mix Asphalt	12.7-15.5	2012
Construction Of Soldier Pile Wall	15.3	2013

7.1 STORM DAMAGE EMERGENCY RELIEF PROJECTS

Following a series of storms in March of 2011, Governor Jerry Brown declared a State of Emergency for 19 Counties, including Del Norte and US 101. This proclamation ordered Caltrans to request immediate assistance through the Federal Highway Administration's (FHWA) emergency relief (ER) program. On April 18, 2011, Caltrans formally requested ER funds through a Notice of Intent and FHWA acknowledged the request on May 2, 2011, providing guidelines for ER project development. Two ER emergency opening projects were identified on Last Chance Grade, two slipout repairs near PM 15.15, and the extension of an existing soil nail wall at PM 15.27. Another storm in March of 2012 required an ER emergency opening project at Last Chance Grade at PM 15.27. This project entailed maintaining and stabilizing the roadway until an existing retaining wall could be repaired and a new wall installed. Documentation relating to ER projects at Last Chance Grade, including declarations and damage assessment forms can be found in Appendix D.

In addition to the previously completed projects, two permanent restoration projects are scheduled for construction under the ER program:

- Soil Nail Wail in 2016 (PM15.1): required due to a failure of a portion of the roadway shoulder, and loss of embankment fill below the roadway.

- Soldier Pile Tieback Wall in 2017 (PM15.0): required in the same location as an existing soil nail wall to regain roadway shoulder.

8. ALTERNATIVES STUDIED

Fourteen alternatives were developed and studied for the Feasibility Study. As explained in Section 5, all alternatives will be built as a two-lane highway with intermittent truck-climbing/passing lanes. Each lane is 12 feet wide, with 8-foot shoulders (10 feet in tunnels). At the widest point (two-lanes and a truck-climbing lane), the roadway is expected to be approximately 52 feet wide, and the total roadbed 58 feet wide. For alternatives in old-growth redwood forests, shoulders will be as narrow as four feet, and viaducts will be used to reduce impacts to old-growth redwoods.

Table 4 on page 18 provides a summary of the alternatives and their respective costs and impacts, and Figure 6 on page 21 shows the alternative alignments and tie-in segments.

8.1 ALTERNATIVE- MAINTAIN EXISTING ALIGNMENT

This alternative will have no planned construction, and US 101 will continue on its existing alignment. Regular maintenance and operations will continue with this alternative, with emergency restoration projects as needed to address changing conditions. Current annual maintenance costs of $2 million with a projected cost of approximately $26 million by 2034 (District 1 Climate Change Vulnerability Assessment and Pilot Studies). Engineering solutions such as retaining walls have not been able to provide long-term stability, but will continue to be necessary to provide an adequate highway facility. As the landslide moves slowly, the road will require costly repairs and maintenance with potential environmental impacts including old-growth redwood impacts associated with minor retreats to keep the roadway open. A future slide might occur that is deep and large enough that it could result in a major failure of the roadway and complete closure of the roadway indefinitely. A major failure would have economic impacts and require a significant detour that is outlined in 9.2.3 Economic Impact Study. Some potential options closest to the existing alignment include a retreat upslope that could require taking more than 100 old-growth trees. There are some estimates in the 1993 Project Report (Appendix A).

8.2 ALTERNATIVE A

8.2.1 Alternative A1 (Rudisill Road to LCG Tunnel)

This alternative utilizes the existing alignment of US 101 until Rudisill Road (PM 13.4), where it veers east, gaining elevation before connecting with Segment 1, a tunnel under Del Norte Coast Redwoods State Park. The approximately 2,000 ft. tunnel then daylights before reconnecting with the existing US 101 alignment at Postmile 15.7.

8.2.2 Alternative A2 (Rudisill Road to Damnation Trailhead)

This alternative utilizes the existing alignment of US 101 until Rudisill Road (PM 13.4), where it veers east, gaining elevation before connecting with Segment 2 in the Del Norte Coast Redwoods State Park boundary along a viaduct that reduces impacts to sensitive environmental resources and old-growth redwoods. A2 connects with the existing alignment at Postmile 15.8.

8.3 ALTERNATIVE B

8.3.1 Alternative B1 (Wilson Creek Bridge to LCG Tunnel)

This alternative starts at Wilson Creek Bridge (PM 12.57) and quickly turns east, gaining elevation along Wilson Creek. It heads north into tie-in Segment 1, a tunnel under Del Norte Coast Redwoods State Park. The approximately 2,000 ft. tunnel then daylights before reconnecting with the existing US 101 alignment at Postmile 15.7.

8.3.2 Alternative B2 (Wilson Creek Bridge to Damnation Trailhead)

This alternative starts at Wilson Creek Bridge (PM 12.57) and quickly turns east, gaining elevation along Wilson Creek. It heads north before connecting with Segment 2 in Del Norte Coast Redwoods State Park on a viaduct reducing impacts to sensitive environmental resources and old-growth redwoods. Alternative B2 connects with the existing alignment at Postmile 15.8.

8.4 ALTERNATIVE C

8.4.1 Alternative C3 (Rudisill Road to South of Mill Creek Access)

This alternative utilizes the existing alignment of US 101 until Rudisill Road (PM 13.4), gaining elevation along the Del Norte Coast Redwoods State Park before entering the Mill Creek watershed and tie-in Segment 3, connecting back with US 101 at Postmile 19.7.

8.4.2 Alternative C4 (Rudisill Road to North of Mill Creek Access)

This alternative utilizes the existing alignment of US 101 until Rudisill Road (PM 13.4), gaining elevation along the Del Norte Coast Redwoods State Park before entering the Mill Creek watershed and tie-in Segment 4, connecting back with US 101 at Postmile 20.7.

8.4.3 Alternative C5 (Rudisill Road to Hamilton Road)

This alternative utilizes the existing alignment of US 101 until Rudisill Road (PM 13.4), gaining elevation along the Del Norte Coast Redwoods State Park before entering the Mill Creek watershed and tie-in Segment 5, connecting back with US 101 at Postmile 22.9.

8.5 ALTERNATIVE D

8.5.1 Alternative D3 (Wilson Creek Bridge to South of Mill Creek Access)

This alternative starts at Wilson Creek Bridge (PM 12.57) and quickly turns east, gaining elevation along Wilson Creek and the Del Norte Coast Redwoods State Park before entering the Mill Creek watershed and tie-in Segment 3, reconnecting with the existing US 101 alignment at Postmile 19.7.

8.5.2 Alternative D4 (Wilson Creek Bridge to North of Mill Creek Access)

This alternative starts at Wilson Creek Bridge (PM 12.57) and quickly turns east, gaining elevation along Wilson Creek and the Del Norte Coast Redwoods State Park before entering the Mill Creek watershed and tie-in Segment 4, reconnecting with the existing US 101 alignment at Postmile 20.7.

8.5.3 Alternative D5 (Wilson Creek Bridge to Hamilton Road)

This alternative starts at Wilson Creek Bridge (PM 12.57) and quickly turns east, gaining elevation along Wilson Creek and the Del Norte Coast Redwoods State Park before entering the Mill Creek watershed and tie-in Segment 5, reconnecting with the existing US 101 alignment at Postmile 22.9.

8.6 ALTERNATIVE E

8.6.1 Alternative E3 (Wilson Creek Road to South of Mill Creek Access)

This alternative starts south of Wilson Creek Bridge (PM 12.48) and veers east along Wilson Creek. E3 gains elevation following Wilson Creek before entering the Mill Creek watershed and tie-in Segment 3, reconnecting with the existing US 101 alignment at Postmile 19.7.

8.6.2 Alternative E4 (Wilson Creek Road to North of Mill Creek Access)

This alternative starts south at Wilson Creek Bridge (PM 12.48) and veers east along Wilson Creek. E3 gains elevation following Wilson Creek before entering the Mill Creek watershed and tie-in Segment 4, turning west and reconnecting with the existing US 101 alignment at Postmile 20.7.

8.6.3 Alternative E5 (Wilson Creek Road to Hamilton Road)

This alternative starts south at Wilson Creek Bridge (PM 12.48) and veers east along Wilson Creek. E5 gains elevation following Wilson Creek before entering the Mill Creek watershed and tie-in Segment 5, turning west and reconnecting with the existing US 101 alignment at Postmile 22.9.

8.7 ALTERNATIVE F (FULL TUNNEL)

Alternative F is a tunnel bypass of the Last Chance Grade slide. The alternative leaves the alignment near Postmile 14.2, and heads into an approximately1-mile long tunnel before daylighting into the existing alignment near Postmile 15.7.

Table 4 Preliminary Alternatives Comparison Table

Alternative	Travel Time Added (minutes)	New Construction								Watershed Crossings		Construction Year Cost (millions)		Existing Habitat Type	
		Construction Length (miles)	Structures			Length in Parks (miles)	Construction Footprint (acres)	Construction Schedule (years)	Cut (cubic yards)	Fill (cubic yards)						
			Culverts > 36"	Tunnel	Bridges						Wilson Creek	Mill Creek	Min	Max	Type	Acres
A1 Rudisill Road to LCG Tunnel (Includes 2,000 ft. tunnel)	1.0	3.4	9	Yes	2	1.0	77	3	4,740,000	664,000	1	0	$520	$710	Coastal scrub/grassland/spruce	7
															Riparian	1
															Clear cut	13
															Young Redwood Forest	54
															Mature Redwood Forest	0
															Old-growth Redwood Forest	1
A2 Rudisill Road to Damnation Trailhead	0.8	3.5	10	No	3	0.9	80	2	4,990,000	716,000	2	0	$320	$380	Coastal scrub/grassland/spruce	7
															Riparian	1
															Clear cut	13
															Young Redwood Forest	56
															Mature Redwood Forest	0
															Old-growth Redwood Forest	3
B1 Wilson Creek Bridge to LCG Hill Tunnel (Includes 2,000 ft. tunnel)	0.4	3.7	9	Yes	3	1.0	89	3	7,670,000	Negligible	3	0	$550	$730	Coastal scrub/grassland/spruce	12
															Riparian	1
															Clear cut	10
															Young Redwood Forest	65
															Mature Redwood Forest	0
															Old-growth Redwood Forest	1
B2 Wilson Creek Bridge to Damnation Trailhead	0.2	3.7	10	No	4	0.8	92	2	7,920,000	52,000	4	0	$340	$400	Coastal scrub/grassland/spruce	12
															Riparian	1
															Clear cut	10
															Young Redwood Forest	67
															Mature Redwood Forest	0
															Old-growth Redwood Forest	3
C3 Rudisill Road to South of Mill Creek Access	1.7	8.2	14	No	9	3.5	250	3	21,870,000	Negligible	4	3	$750	$870	Coastal scrub/grassland/spruce	7
															Riparian	1
															Clear cut	13
															Young Redwood Forest	205
															Mature Redwood Forest	23
															Old-growth Redwood Forest	0
C4 Rudisill Road to North of Mill Creek Access	1.5	9.0	14	No	11	4.3	270	4	23,410,000	Negligible	4	4	$820	$950	Coastal scrub/grassland/spruce	7
															Riparian	1
															Clear cut	13
															Young Redwood Forest	205
															Mature Redwood Forest	43
															Old-growth Redwood Forest	0

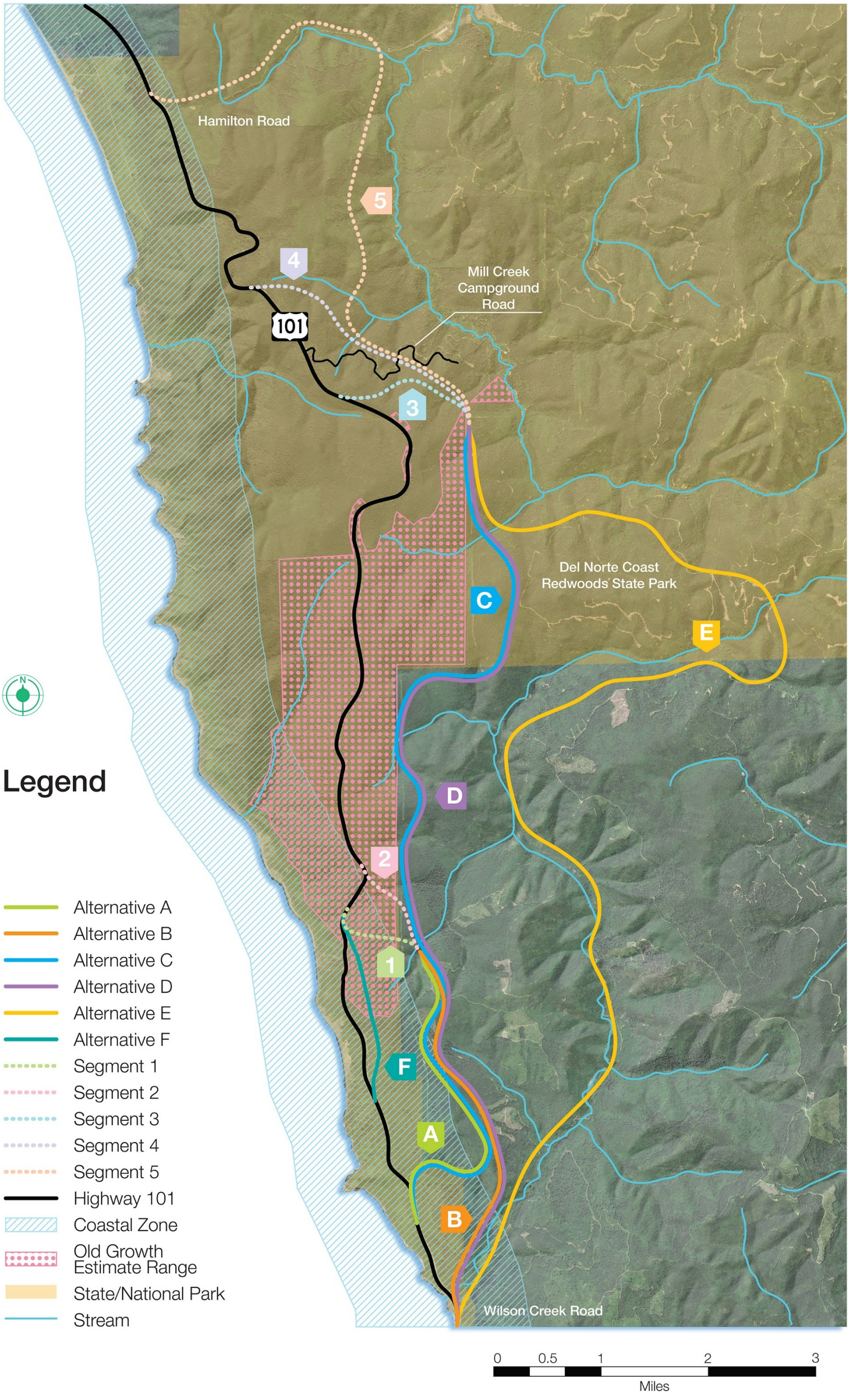
Table 4 Preliminary Alternatives Comparison Table

Alternative	Travel Time Added (minutes)	New Construction								Watershed Crossings		Construction Year Cost (millions)		Existing Habitat Type	
		Construction Length (miles)	Structures			Length in Parks (miles)	Construction Footprint (acres)	Construction Schedule (years)	Cut (cubic yards)	Fill (cubic yards)						
			Culverts > 36"	Tunnel	Bridges						Wilson Creek	Mill Creek	Min	Max	Type	Acres
C5 Rudisill Road to Hamilton Road	2.6	12.2	21	No	16	7.5	332	4	24,160,000	865,000	4	6	$1,200	$1,300	Coastal scrub/grassland/spruce	7
															Riparian	1
															Clear cut	13
															Young Redwood Forest	217
															Mature Redwood Forest	93
															Old-growth Redwood Forest	0
D3 Wilson Creek Bridge to South of Mill Creek Access	1.2	8.4	14	No	10	3.4	262	3	24,810,000	Negligible	6	3	$770	$900	Coastal scrub/grassland/spruce	12
															Riparian	1
															Clear cut	10
															Young Redwood Forest	216
															Mature Redwood Forest	23
															Old-growth Redwood Forest	0
D4 Wilson Creek Bridge to North of Mill Creek Access	1.0	9.3	14	No	12	4.2	282	4	26,340,000	Negligible	6	4	$840	$980	Coastal scrub/grassland/spruce	12
															Riparian	1
															Clear cut	10
															Young Redwood Forest	216
															Mature Redwood Forest	43
															Old-growth Redwood Forest	0
D5 Wilson Creek Bridge to Hamilton Road	2.0	12.5	21	No	17	7.5	344	4	27,100,000	201,000	6	6	$1,130	$1,320	Coastal scrub/grassland/spruce	12
															Riparian	1
															Clear cut	10
															Young Redwood Forest	228
															Mature Redwood Forest	93
															Old-growth Redwood Forest	0
E3 Wilson Creek Road to South of Mill Creek Access	4.1	11.4	33	No	10	4.8	299	4	24,860,000	564,000	7	5	$1,020	$1,200	Coastal scrub/grassland/spruce	0
															Riparian	22
															Clear cut	0
															Young Redwood Forest	254
															Mature Redwood Forest	23
															Old-growth Redwood Forest	0
E4 Wilson Creek Road to North of Mill Creek Access	3.9	12.2	33	No	12	5.6	319	4	26,400,000	564,000	7	6	$1,100	$1,280	Coastal scrub/grassland/spruce	0
															Riparian	22
															Clear cut	0
															Young Redwood Forest	254
															Mature Redwood Forest	43
															Old-growth Redwood Forest	0

Table 4 Preliminary Alternatives Comparison Table

Alternative	Travel Time Added (minutes)	New Construction								Watershed Crossings		Construction Year Cost (millions)		Existing Habitat Type	
		Construction Length (miles)	Structures			Length in Parks (miles)	Construction Footprint (acres)	Construction Schedule (years)	Cut (cubic yards)	Fill (cubic yards)					
			Culverts > 36"	Tunnel	Bridges						Wilson Creek	Mill Creek	Min	Max	Type	Acres
E5 Wilson Creek Road to Hamilton Road	5.0	15.5	40	No	17	8.8	381	4	27,150,000	765,000	7	8	$1,390	$1,620	Coastal scrub/grassland/spruce	0
															Riparian	22
															Clear cut	2
															Young Redwood Forest	264
															Mature Redwood Forest	93
															Old-growth Redwood Forest	0
F Full Tunnel Parallel to E (5400 ft.)	1.0	1.3	—	Yes	—	—	4	6.5	—	—	—	—	$690	$1,060	Coastal scrub/grassland/spruce	2
															Riparian	0
															Clear cut	0
															Young Redwood Forest	0
															Mature Redwood Forest	1
															Old-growth Redwood Forest	1
Alternative Maintain Existing Alignment	Unknown and unquantifiable															

Figure 6 Map of Alternatives Studied



Preliminary Alternatives:
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

9. ALTERNATIVE REVIEW

Caltrans sought review of the alternatives to evaluate possible impacts. This evaluation requires review and input from internal and external sources as it relates to traffic operations, traffic safety, environmental impacts, right-of-way, geotechnical design, and cultural landscape impacts.

9.1 ENVIRONMENTAL RESOURCES

Vegetation: The alternatives studied traverse mostly forested areas consisting of primarily redwood forest, but also some coastal alder/spruce, and some riparian forest. Multiple age groups make up the redwood forest: recently cut forest (<5 years), young forest (<50 years), mature forest (50-200 years), and old-growth redwood forest (>200 years). Within Redwood National and State Parks, the forest contains various age groups with an emphasis on old-growth and mature redwood forest. On the private lands east of the Park, the forest is typically much younger, ranging from recently cut to young forest.

Old-growth redwoods are a rare Natural Community of Special Concern. They provide habitat for some endangered or threatened species such as the marbled murrelet, northern spotted owl, and pacific fisher. The trees are some of the oldest and largest on the planet, reaching over 2000 years old, with heights greater than 360 feet, and diameters larger than 20 feet. Because less than 5% of the original old-growth redwood forest remains, it is a very limited resource, which is not renewable due to the time it takes to achieve those characteristics. Redwood National and State Parks are recognized as a World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization.

Most of the area is within the Redwood Forest Alliance and multiple associations are present within the alternatives. Some of these areas will qualify as a High Priority or Natural Community of Special Concern based on guidance by the California Department of Fish and Wildlife. In particular, the stands of old-growth redwood within the Park are a Natural Community of Special Concern. Other vegetation types may be identified when more extensive surveys of the alternatives are conducted.

Waters and Wetlands: While this study did not conduct wetland delineations, there are likely wetlands and other waters of U.S. and State jurisdiction within the project limits. There are likely seeps and other wetlands along the hillsides within the footprints of the alternatives. Some of the alternatives will traverse creeks and drainages, which will require bridges or culverts. Wetlands and other waters are under the jurisdiction of the United States Army Corp of Engineers, the North Coast Regional Water Quality Control Board, the Coastal Commission (where resources exist in the Coastal Zone) and the California Department of Fish and Wildlife. These are not likely to be extensive enough to be a major factor in overall planning, but may require some mitigation under the Clean Water Act.

The extensive floodplain along Wilson Creek and Alternative E is possibly coastal wetlands for the first mile, and wetlands and other waters for the next three miles. Alternatives B, D and E likely impact coastal wetlands. Wilson Creek flows into the Redwood National Park Area of Special Biological Significance (ASBS) in the Pacific Ocean, under regulation by the State Water Resources Control Board. New discharges within this area will be subject to the ASBS compliance requirements within the Caltrans National Pollutant Discharge Elimination System permit (NPDES No. CAS000003).

Special Status Species: The California Natural Diversity Database shows numerous special status species within the vicinity of the project, and many of these could be present within the footprint of the project. Protocol botanical surveys would be conducted in the planning phase for the project. Table 5 includes species listed under the state and federal endangered species acts which could be found near the project.

Table 5 Special Status Species		
Species	**Federal Status**	**State Status**
Western Lily (*Lilium occidentale*)	Endangered	Endangered
Northern Spotted Owl (*Strix occidentalis*)	Endangered	
Marbled Murrelet (*Brachyramphus marmoratus*)	Endangered	Endangered
Pacific Fisher (*Pekania pennanti*)	Candidate Proposed Threatened	Candidate Proposed Threatened
Bald Eagle (*Haliaeetus leucocephalus*)		Endangered
Western Snowy Plover (*Charadrius nivosus nivosus*)	Threatened	
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)	Threatened	Endangered
Willow Flycatcher (*Empidonax trailii*)		Endangered
Townsend's Big-eared Bat (*Corynorhinus townsendii*)		Candidate Threatened
Coho Salmon (*Oncorhynchus kisutch*) Southern Oregon/Northern California Coast Ecologically Significant Unit	Threatened	Threatened

Western Lily (*Lilium occidentale*) Federal Endangered, State Endangered: Western lily is a federal endangered and state endangered perennial flowering plant, which grows at the edges of bogs or forest openings. It can be found in coastal prairie and scrub habitats within the coastal fog zone. It is possibly present in the coastal zone within the vicinity of Alternatives A, C, and tie-in Segment 5.

Northern Spotted Owl (*Strix occidentalis*) Federal Endangered, State Candidate: Northern spotted owl use mature and old-growth redwood forest types for nesting, foraging and roosting. There are eight historic activity centers near the proposed alternatives that may be affected by the project. Many of these may no longer be active, however there are likely to be a few pairs within the area. The removal of forest habitat within the footprint of the alignments will reduce the habitat available for nesting, roosting, foraging, and dispersal of spotted owls. Alternatives C, D, and E would remove large amounts of nesting, roosting and foraging habitat relative to other alternatives.

Marbled Murrelet (*Brachyramphus marmoratus*) Federal Endangered, State Endangered:

Marbled murrelets nest in old-growth redwood forests and are likely present within the Park areas of the alternatives. The USFWS has designated Critical Habitat for the murrelet roughly along the Park boundaries. Alternatives A2 and B2 remove approximately three acres of old-growth redwoods that is marbled murrelet nesting habitat. All of the other alternatives have the potential of removing a few old-growth redwood trees, which could be nesting habitat, but at a much smaller scale than A2 and B2. The project will require formal Section 7 consultation with US Fish and Wildlife, and may result in an adverse effect to murrelets. The critical habitat removal along Alternatives A2 and B2 may result in a jeopardy determination under the Endangered Species Act. Tie-in Segments 3, 4 and 5 re-enter the Park near Mill Creek Campground within the Designated Critical Habitat, but this mature redwood forest may not contain suitable nesting trees.

Pacific Fisher (*Martes pennanti*) Federal Candidate Proposed Threatened, State Candidate: Pacific fisher use mature forest habitats and are assumed present within the project area. Removal of mature and old forest stands would decrease the amount of habitat available to fisher within the project area. Additionally, the new roadway could be a migration barrier to fisher and other terrestrial animals causing reduced gene flow and isolating populations.

Bald Eagle (*Haliaeetus leucocephalus*) State Threatened: Bald eagles are present within the area, foraging in the river and ocean, and nesting in the tops of large trees. Nesting eagles could be disturbed by the construction activities and nest trees could be removed if within the project footprint.

Western Snowy Plover (*Charadrius nivosus nivosus*) Federal Threatened: Western snowy plover nest on ocean beaches along the north coast of California and have been detected at Gold Bluffs Beach to the south of the project area. There is a small amount of nesting habitat along the Wilson Creek beach, but most of this beach is susceptible to inundation during high tide, and thus would not be nesting habitat. Work around the Wilson Creek Bridge could disturb plovers from this area. Given the small amount of marginal habitat and disturbance from people using the beach access, the impact to plovers here would be negligible.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) Federal Threatened, State Endangered: Western Yellow-billed Cuckoo nest in mature riparian forest. The riparian forest along Wilson Creek could provide nesting habitat, and Alternative E would remove some of this habitat.

Willow Flycatcher (*Empidonax trailii*) State Endangered: Willow flycatcher use riparian forest, similar to what exists along Wilson Creek. Alternative E, and possibly tie-in Segment 5 on Hamilton Road, could support nesting or migrating willow flycatcher. Removal of this habitat would affect willow flycatchers.

Townsend's Big-eared Bat (*Corynorhinus townsendii*) State Candidate Threatened: Townsend's big-eared bat is a candidate for threatened status under the California Endangered Species Act. This bat uses many habitat types, and while normally associated with roosting in caves, they have been found in the basal hollows of large trees. They could be roosting in the basal hollows of large redwoods within the alignments. The removal of forest habitat within the footprint of the alignments will reduce the habitat available for roosting of Townsend's big-eared bats.

Fisheries Resources: Caltrans has a responsibility under Section 7(a) 2 of the Endangered Species Act (ESA) to consult with the National Marine Fisheries Service (NMFS) if a proposed project may affect listed species or their designated critical habitats. In addition, Caltrans must determine if there are potential effects to essential fish habitat (EFH) designated under the Magnuson Stevens Fisheries Conservation and Management Act (MSA) and include conservation measures and determination to NMFS. Furthermore, pursuant to section 2080 of the California Fish and Game Code, Caltrans is required to consult with the California Department of Fish and Wildlife if a proposed action may affect the State listed threatened Southern Oregon/Northern California Coast (SONCC) Coho Evolutionarily Significant Unit (ESU).

Alternatives proposed for the project include new alignments through the Wilson Creek and Mill Creek (tributary to Smith River) watersheds. Federal and State listed species and critical habitat in the Mill Creek watershed include SONCC Coho salmon and EFH for the SONCC Coho and for Chinook. The Mill Creek and Wilson Creek watersheds are both noted as having high intrinsic potential for the SONCC Coho population.

Mill Creek is under almost entirely public land since the acquisition of 25,000 acres in 2002. It is noted as having high productivity and favorable rearing and spawning conditions for Coho, but is far below its carrying capacity. The fisheries and habitat within Mill Creek play an important role in the productivity of the Smith River and the Smith River is at the core of the SONCC Coho population. Construction and

operation of a new highway facility within these watersheds may have impacts on salmonid and Essential Fish Habitat.

Wilson Creek land holdings are primarily under Green Diamond Resource Company (GDRC). GDRC has a Habitat Conservation Plan in accordance with section 10(a)(1)(B) of the ESA which includes provisions designed to conserve Coho and minimize and mitigate potential adverse effects of any take of aquatic species that may occur incidental to GDRC's activities. A high priority recovery action in Wilson Creek is to reduce the road-stream hydrologic connection. Wilson Creek is considered important to the recovery of the SONCC Coho population because of its potential to provide connectivity between other populations within the SONCC ESU.

Wildlife Habitat and Connectivity: Many species of forest wildlife will regularly travel through the project areas. Wildlife populations are often patchy and require movement of individuals between patches for genetic diversity and for robustness against demographic stochasticity. Linear transportation corridors can isolate populations, causing genetic bottlenecks and loss of populations. Many of the stream crossings will be bridges, which do provide for wildlife passage underneath through the riparian corridor. Both fish and terrestrial wildlife can pass through natural habitat under a bridge without being exposed to increased predation or vehicle mortality. Because of the length and size of the alternatives, wildlife overpass crossings may need to be incorporated into the design.

Cultural Resources: Caltrans is working closely with our project Partners to ensure that applicable state and federal laws are followed, specifically the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act as codified in 36 CFR 800. The LCG Partners are committed to identifying any historic properties, historic resources, or tribal cultural resources in the vicinity of the proposed alternatives early in the environmental process to avoid and minimize potential effects. As defined under Section 106, the term **"**historic properties" means any site, district, structure, building or object listed in or determined eligible for listing in the National Register of Historic Places (National Register), the regulations of which are found at 36 CFR 60. Such sources may include archeological sites or features, historic sites, cultural landscapes, or traditional cultural properties that meet the criteria for inclusion in the National Register.

California state law identifies "historical resources" as properties that meet the criteria for listing in the National Register or the California Register of Historical Resources (California Register), as well as properties that are designated as historic under local ordinances and properties that have been identified as significant in a local survey that meets the state Office of Historic Preservation standards. A "tribal cultural resource", as defined in Assembly Bill 52, may be a site, cultural landscape, feature, sacred place, place, or object determined eligible for the California Register or a local register, or any resource that meets California Register criteria as determined by the CEQA lead agency "in its discretion and supported by substantial evidence," in consideration of the significance of the tribal cultural resource to a California Native American tribe.

The consideration of cultural landscape is important for the analysis of the proposed alternatives. A cultural landscape, as defined by National Park Service, is "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." Following extensive conversations between the Partners, specialists, federally recognized Tribes, and the concerned public, the LCG Partners have identified the Wilson Creek area as a potentially important cultural landscape.

At present, the majority of the proposed alternatives have not been adequately inventoried for cultural resources. Background research and records search data from the regional information center indicate the possibility of encountering cultural resources on any of the proposed alternatives is moderate to high. In

addition to conducting the extensive studies necessary to document and assess potential impacts to cultural resources in the project area, the LCG partnership will consult with all project stakeholders to ensure the input of all interested parties is considered throughout the life of the project. These stakeholders include the project partners, federally recognized Tribes, and the general public.

Visual Resources: There are potential visual impacts associated with the various alignments. The large cut-slopes throughout the alignments may have negative impacts on the visual landscape. There are scenic views of the ocean and coastline from the current alignment that will be lost when the alignment is moved inland.

Coastal Zone Resources: Portions of the alignments are within the Coastal Zone, under the jurisdiction of the California Coastal Commission, and all alignments would require a Coastal Development Permit. All alternatives begin in the Coastal Zone and a portion of A and C swing back into the Coastal Zone. The beginning of all alternatives, the entirety of alternative F, and tie in segments 1 and 5 are within the Coastal Zone. There are likely to be coastal wetlands within these areas, which will require special treatment.

Sea Level Rise and Climate Change: Sea level rise (SLR) and climate change are both important factors to Last Chance Grade slides. SLR can affect the slide area by increasing the rate of erosion of the Wilson Creek Bluff toe. Two forecast models, the Committee on Sea Level Rise in California, Oregon, and Washington, and the United State Army Corps of Engineers forecast a maximum change in sea level of between 13.38 inches and 18.89 inches in 2050. Climate change also has the potential to increase the frequency and severity of storm events in northern California (Committee on Seal Level Rise in California, Oregon, and Washington, 2012). Storms have adversely affected the Last Chance Grade slide in the past, and an increase in storms will potentially increase the movement of the slides. All alternatives will improve the resiliency of the highway to sea level rise and increased precipitation. The High Prairie Creek Bypass was another alternative considered early in the process and is based on Alternative 1 proposed in the 1993 Corridor Study. This alternative was determined to meet the criteria of being technically feasible from an engineering perspective and the most effective at dealing with projected sea level rise; however, this alterative was eliminated from further consideration because of its associated environmental impacts. The proposed route is longer than Alternative E5, and it would add additional length of new highway increasing travel time for vehicles. The route was determined to be cost prohibitive and would have impacts greater than Alternative E5 to environmental resources. The alternative would also be opposed by tourist and timber operations in the project area.

9.2 CALTRANS FUNCTIONAL UNIT INPUT

9.2.1 Traffic Operations

A length and climbing lane analysis was prepared by Caltrans District 1 Traffic Operations to determine where climbing lanes are needed.

The purpose of a truck climbing lane is to improve capacity, Level of Service, and safety by providing separation between large trucks traveling at a lower speed and traffic traveling at a higher free flow speed.

The need for a truck climbing lane is a result of these proposed alignments going through mountainous terrain with steep grades (6.75% maximum grade), high truck percentages (13% in 2012), and increased traffic volumes (assumed 5% greater by 2034).

Highway Design Manual (HDM) Section 204.5 specifies that a truck-climbing lane should be considered when the running speed of trucks decrease 10 mph or more than the running speed of the remaining traffic. HDM figure 204.5 was used to determine speed reduction with respect to length of grade (ft.) and percent upgrade. At locations where a 10 mph speed reduction is identified, a truck-climbing lane is proposed

and its minimum length is determined. Due to potential increased environmental impacts related to truck climbing lanes, some areas may be reduced or eliminated. Truck climbing lane locations will be finalized as the project is developed further. The complete truck climbing lane analysis is located in Appendix E.

9.2.2 Geotechnical

Caltrans performed a geotechnical review of the alternatives to determine whether they are feasible. The Office of Geotechnical Design North reviewed the alternatives using existing Caltrans reports, California Geological Survey Special Report 184, a landslide map provided by Green Diamond Resource Company and plan maps/profiles/typical cross sections of the proposed alignments.

The geotechnical review of the proposed alignments for all alternatives is inconclusive based on available geotechnical data. Geotechnical subsurface drilling and field investigations along the tunnel alignments will be required to determine if tunnels are feasible. The southern tunnel portal of Alternative F and the portion of each tunnel located within the earthflow impacts will have to be mitigated and may be determined to be infeasible with more information. In addition, the northern portion of the two tunnels and portals would need to be located outside the limits of the northern Last Chance Grade Landslide. Whether or not landslide mitigation will be required for a given alignment will depend mainly on the stability of the existing slopes, the magnitude of the proposed cuts and fills, and the groundwater conditions. The entire preliminary geotechnical evaluation is presented in Appendix F.

9.2.3 Economic Impact Study

The Del Norte LTC requested Caltrans prepare an economic study of a US 101 closure at Last Chance Grade. The Economic Analysis Branch of the Office of State Planning produced the *Last Chance Grade Economic Impact of US-101 Closure* to document quantitatively the economic losses to Del Norte County, and the State of California. This was done by analyzing the impacts to passenger and truck traffic and economic impact to Del Norte County through business interviews.

The impact study concluded that a failure at Last Chance Grade would require a 320-mile detour, costing an estimated $1.34 million per day and $450 million per year in travel time and cost. The added travel costs and loss in business activity resulting from a closure of US 101 would cost Del Norte County approximately $300–$400 million in annual output and as many as 3,000–4,000 jobs. The loss of jobs would cost the region $100–$130 million in income annually. Combining the travel cost impacts, annual economic impacts, and applying annual cost to a potential construction schedule of an alternative demonstrates consideration of the feasibility of expending as much as $1 billion (in 2015 dollars) to rectify the Last Chance Grade segment. The complete economic impact study is located in Appendix G.

9.3 OTHER CONSIDERATIONS

9.3.1 Excavation and Disposal

All alternatives require a significant amount of excavation. Between 4.7 and 27 million cubic yards of excavation will be necessary, posing a substantial issue with disposal. Cost and disposal options will need to be evaluated in future phases.

9.3.2 Fate of Existing Alignment

Depending on the alternative ultimately selected for construction, a portion of the Last Chance Grade segment will remain. This leaves the remaining alignment open for a variety of options, including preservation as a park access point, conversion to a non-motorized path, or removal for habitat rehabilitation. The determination of the existing alignment will need to be evaluated in a separate planning effort with State and National Parks and the community.

9.3.3 Green Diamond Resources Company

All alternatives, except for F, will travel through GDRC property. Currently the land is used for timber harvesting, and construction of a highway including right-of-way will necessitate acquisition of property from GDRC. This will require negotiations with Green Diamond Resource Company to find a suitable solution for all parties.

10. RESULTS

The Feasibility Study is not intended to formulate a recommendation for a preferred alternative; however, alternatives were compared against each other based on many factors including, but not limited to: cost, natural resource and cultural landscape impacts, time of construction and quantity of excavation. The intent of reducing the number of alternatives is to study only the alternatives most likely to move forward. Technical experts within each of the Partner organization evaluated each alternative. By including the Partners and their technical expertise, the team was able to minimize and/or avoid impacts. By evaluating the preliminary feasibility of an alternative for this study, a basis for alternative exclusion was developed to remove alternatives from further study.

10.1 BASIS FOR ALTERNATIVE EXCLUSION

The criteria used for alternative exclusion includes geotechnical, environmental, engineering, and planning as a baseline used to evaluate alternatives. An essential question answered in this process is whether an alternative provides a unique advantage over other alternatives being proposed. For this Feasibility Study, the primary impacts to avoid are natural resources and cultural landscape. As discussed previously, Last Chance Grade exists in a unique, sensitive environment. The alternatives eliminated from further consideration section outlines some of the challenges with past alternatives studied prior to this Feasibility Study. Old-growth redwoods are of particular concern due to their scarcity. Cultural landscape in the study area are also of particular concern. Impacts to both old-growth redwood forests and cultural landscapes are very difficult and costly to mitigate, and are considered carefully by the Partners. Impacts to fisheries in the Wilson and Mill Creek watersheds are also of concern. Alternatives that both travel through the watershed with stream crossings and have larger construction footprints will potentially lead to increased impacts. Wildlife connectivity impacts increase with the length and width of new highway, and alternatives with longer lengths were considered less favorable. Both watershed and wildlife connectivity impacts can be mitigated, and are not valued as highly as old-growth redwood forests and cultural landscapes.

The alternatives proposed in this Feasibility Study are considered feasible based upon the preliminary information available during the evaluation process; however, Alternatives B1, B2, D3, D4, D5, E3, E4, and E5 are not recommended for further study. Reducing the number of alternatives studied will allow project teams moving forward to focus their studies and analysis and develop better data, which can be used to evaluate further potential solutions at Last Chance Grade. These alternatives when compared to other similar alternatives provide no unique advantage to necessitate further study.

10.1.1 Exclusion of Alternatives B1 and B2 from Further Study

The A and B Alternatives share segments 1 and 2 and are the easiest options to compare. When comparing Alternatives B1 and B2 with A1 and A2, B1 and B2 impact about 15% more habitat area and cultural landscape because of a larger construction footprint. Alternatives B1 and B2 are projected to cost around $20 million more than Alternatives A1 and A2. The two B alternatives will require an additional 3 million cubic yards of soil to be moved compared to the two A alternatives. These additional impacts, without any added value, eliminate the need to continue to study Alternatives B1 and B2.

10.1.2 Exclusion of Alternatives D3, D4, and D5 from Further Study

The C and D alternatives are very similar with the exception of the starting point of each set of alternatives. Comparing Alternatives C3, C4, and C5 with D3, D4, and D5; the D alternatives have a greater potential impact on habitat area and cultural landscape because of the larger construction footprint. All three options are more expensive by $20 to $30 million compared to the C alternatives. Since Alternatives D3, D4, and D5 do not present unique value and do not provide equal benefit to C3, C4, and C5, they are eliminated from further study.

10.1.3 Exclusion of Alternatives E3, E4, and E5 from Further Study

The E alternatives are easiest to compare to the C and D alternatives. The E alternatives are the only alternatives to start south of Wilson creek. Alternatives E3, E4, and E5 have the largest construction footprint that would impact over 300 acres of existing habitat and cultural landscape with a cost between 1 and 1.3 billion dollars. The E Alternatives provide no advantage over the D Alternatives, which are less favorable to the C alternatives. The E Alternatives appear to avoid more landslides, but there is concern that this area east of Last Chance Grade has received less focus in previous geologic studies. The E alternatives add additional five or more minutes of travel time to the route between Crescent City and Klamath and have the greatest potential barrier to wildlife connectivity and watershed integrity. The increased travel time and construction footprint will have the second largest increase to greenhouse gas emissions of all alternatives considered.

Cost, construction, and added length are also important in determining the feasibility of alternatives. As stewards of the State Highway System, Caltrans must make sure the public receives a cost effective highway within a reasonable construction period, and that these impacts are considered appropriately.

11. RECOMMENDED ALTERNATIVES

Using all of the available resources and input from Partners, stakeholders, and the public alike, Caltrans has recommended the following alternatives to be retained for further study in a Project Study Report:

Alternative - Maintain Existing Roadway: This alternative is retained to be used as a baseline to compare other alternatives. This alternative would have unknown and unquantifiable impacts to cultural landscapes or natural resources, and will not avoid long-term issues with the Last Chance Grade slide. This alternative has the potential to have the greatest impact to environmental resources. A major landslide could initiate the fastest solution to getting the road open for drivers. Some potential options closest to the existing alignment include a retreat upslope that could require taking more than 100 old-growth trees. There are some estimates in the 1993 Project Report (Appendix A).

Alternative A1: This alternative is recommended for further study. Alternative A1 is one of the shortest and least expensive options, and has a smaller potential impact on cultural landscapes and natural resources relative to other alternatives. By leaving the highway north of Wilson Creek, A1 avoids both watershed impacts and cultural landscape impacts. However, A1 does have the potential to remove up to one acre of old-growth redwood forest.

Alternative A2: This alternative is recommended for further study. Alternative A2 is the least expensive option and among the shortest, however it has greater potential impacts to old-growth forest relative to other alternatives. This alternative has the potential to remove up to three acres of old-growth redwood forest.

Alternative C3: This alternative is recommended for further study. This alternative has the potential for the least impact to old-growth redwood forest and State and National Park land. However, C3 does have an increased length and an increase in potential impacts to both Wilson and Mill Creek watersheds. This alternative is also among the more costly routes.

Alternative C4: This alternative is recommended for further study. This alternative is among the least impactful to old-growth redwood forests and state and national park land; however, it is one of the longer and more costly recommended alternatives. Increased length also increases the potential impacts to Wilson and Mill Creek watersheds.

Alternative C5: This alternative is recommended for further study. This alternative is among the least impactful to old-growth redwood forests; however, it is the longest and most costly recommended alternative. Increased length also increases the potential impacts to Wilson and Mill Creek watersheds.

Alternative F: This alternative is recommended for further study. This alternative is the shortest alternative, utilizing a tunnel under the state and national parks. This does have the potential to remove up to one acre of old-growth redwood forest. Soil stability at the tunnel portals may be an issue in construction and maintenance and will require further evaluation. This alternative is recommended as an option to minimize environmental impacts, but will require extensive geotechnical investigation.

12. FUNDING POSSIBILITIES

A sequence of planning activities must be completed before funding can be secured. The current Feasibility Study is the first necessary step in the process. The Feasibility Study process helps determine if the project is physically and economically feasible to construct. Once a Feasibility Study determines that a project is feasible, Caltrans begins the project initiation process. This process will develop a more detailed scope, schedule, and cost for each of the recommended alternatives. Ultimately, this will provide Caltrans with a dollar amount to be used to formally request funding.

The large cost of this project precludes it from being funded through standard state funding sources. Similar to the Confusion Hill Bypass, a special allocation of funding from either the state or federal government will most likely be the source of funding for the Last Chance Grade project. A special allocation is a request for funding that is outside of normal funding allotments. Funding through special allocation will be discussed in further detail during the project initiation phase, described in Section 13 below.

It is important to note that while funding has not yet been formally requested, Caltrans, state, and federal legislators are actively seeking to identify potential funding sources and agency partners willing to commit resources to this effort.

13. PROJECT DEVELOPMENT

Following this Feasibility Study, a PSR will be prepared to perform a more detailed analysis of the alternatives recommended for further study as they related to the cost, scope, and schedule of developing a project. In this phase, alternatives and alignments will be refined with more precise cost estimates along with more detailed technical analysis of proposed structures and right-of-way. The PSR is scheduled to be completed in July of 2016, and a more formal search for funding sources will start at that time. Caltrans is required by federal and state laws, the National Environmental Policy Act and CEQA, to study alternatives and determine the potential environmental impacts before making a decision on which alternative to select. This process will involve other federal and state agencies, public hearings, a draft Environmental Impact Report and Environmental Impact Statement, public comment, and eventually a decision on which alternative best meets the needs of the project while having the least amount of impact. This environmental review of the project will likely take approximately eight years.

The alternative alignments propose a difficult choice between a short bypass with impacts to old-growth redwoods, and a much longer bypass with greater cost, a larger footprint, and its own ecological impacts. During the Project Study Report process, Caltrans will continue to work with the Partners and community stakeholders to develop a solution to Last Chance Grade.

Appendix A

Summary of Previous Studies and Alternatives

1. SUMMARY OF PREVIOUS STUDIES AND ALTERNATIVES

Caltrans has studied the Last Chance Grade in the past to identify and evaluate available options to reduce the cost of maintenance and road closures due to landslides.

1.1 1987 PROJECT STUDY REPORT

A 1987 Project Study Report (PSR) identified five alternatives, including a no-build alternative. At the time, the route concept called for a 4-lane facility with a design speed of 65-70 miles per hour (mph). The alternatives identifies are:

A. Complete 4-lane expressway bypass of the Redwood State and National Parks from Wilson Creek (PM 12.5) to Post Mile 16.3. Four 12-foot lanes with 10-foot shoulders and a 4-foot median;
B. Two-lane conventional highway bypass with alternating truck climbing lanes on same alignment as Alternative A;
C. No-build. Continue using existing alignment with roadway stabilization maintenance;
D. 4-lane expressway bypass further east of existing alignment; and
E. 2-lane conventional highway bypass on same alignment as Alternative D

1.2 1993 PROJECT REPORT

A Project Report was started to further evaluate eight alternatives. All alternatives were designed as a 4-lane facility with a 14-foot median, 10-foot shoulders, and a design speed of 60 miles per hour unless otherwise noted. The alternatives were as follows:

Alt. R Complete 4-lane expressway bypass of the Redwood State and National Parks from Wilson Creek (PM 12.5) to Post Mile 16.3. Four 12-foot lanes with 10-foot shoulders and a 4-foot median (Same as the 1987 PSR Alternative A)
Alt. S Similar to Alternative R, but with an alignment with an even burden of right-of-way between the Simpson Redwood Company and the State and National Parks
Alt. T Alternative alignment of S
Alt. U Alternative version of S and T that minimizes the impacts to the State and National Parks
Alt. V Total Bypass of Last Chance Grade and State and National Parks
Alt. W Realignment 200 feet east of existing alignment
Alt. X Minimal Impact Alternative—stabilization of the highway using viaducts, retaining walls, and spot treatments to the hillside
Alt Y Combination of S, T and U

Ultimately, this project report was terminated in 1993 before completion due to funding concerns and a moratorium on right-of-way only projects. Out of the termination an understanding that Caltrans will work to "restore and improve the existing highway in a way that a permanent and reliable highway can be assured in the future."

1.3 US 101 IN DEL NORTE COUNTY CORRIDOR STUDY

In 1993, Caltrans prepared a Corridor Study report for US 101 in Del Norte County. The Corridor Study was completed for all of US 101 in Del Norte County, with emphasis on the Last Chance Grade segment and the Cushing Creek segment (Post Miles 20.3-22.3.) This Corridor Study considered three bypass alternatives. The alternatives evaluated are listed below:

Alt. 1 Complete 17 mile, 4-lane expressway bypass of the Redwood State and National Parks from Post Mile 9.3 to Post Mile 23.0. Four 12-foot lanes with 10-foot shoulders and a 4-foot median
Alt. 1A Alternative 1 alignment with a 3-lane facility

Alt. 2 Two-lane conventional highway bypass of the Last Chance Grade segment from Post Mile 12.5 to Post Mile 16.3

Alt. 3 Four-lane facility constructed in the existing alignment at the Last Chance Grade segment, and a 3-lane facility at the Cushing Creek Segment

The Corridor Study concluded that Alternatives 1, 1A, and 2 were infeasible due to the cost, construction time, and impacts to the environment. Alternative 3 was the only alternative that was considered potentially feasible based on cost and property impacts. The Corridor Study also concluded that the existing route concept for US 101 in this segment should be scaled down to a 55mph 2-lane facility to reflect environmental constraints relating to the State and National Parks.

1.4 1995 PROJECT STUDY REPORT

In 1995, a PSR was prepared as a result of joint concerns between Caltrans, the Del Norte Local Transportation Commission, and the public about a catastrophic slide. The PSR studied three alternatives and a no-build option immediately adjacent to the existing roadway alignment. The alternatives identified in the 1995 PSR are:

Alt. 1 Realignment to the east of the roadway utilizing a 1230-foot long tunnel behind the assumed slide plan

Alt. 2A Slight easterly realignment with stabilization through a soldier tieback wall below the roadway and slope stressing above the roadway

Alt. 2B Slight easterly realignment with stabilization through a soldier tieback wall below the roadway and a soldier tieback wall above the roadway

Alt. 3 Major realignment of the roadway to the east through a large cut behind the assumed slide plane

Alt. 4 No-Build

Two other alternatives, a viaduct and a buttress along the existing alignment, were studied, but deemed to be infeasible due to the geologic instability.

A geotechnical report for the Last Chance Grade segment was prepared in 2001 in response to the California Geological Survey report prepared to document and map existing landslides along the Last Chance Grade corridor. The geotechnical report was prepared to determine the geotechnical feasibility of the alternatives from the 1995 PSR. Alternatives 1, 2A, and 2B were determined by the geotechnical design branch to be infeasible due to the size and mass of the slide plane. Only Alternative 3 was recommended as feasible with respect to geotechnical aspects, but had unacceptable impacts to park land.

1.5 2002 VALUE ANALYSIS

The Value Analysis (VA) Study looks at options other than the alternatives of the 1995 PSR but the scope of these options would be limited to the existing highway corridor with special focus on minimizing state and federal park right-of-way takes and reducing impacts to old growth trees. The alternatives identified in the 2002 Value Analysis are:

Alt. 1.0 Construct retaining walls throughout the project limits (PM15.0-15.6)

Alt. 2.0 Construct retaining walls to address specific instability

Alt. 3.0 Augment the Present Maintenance Program with a Contingency Plan to Accelerate Road Damage Repairs on the Existing Alignment (No build)

The VA concluded that Alternative 2.0 was the best alternative of the three.

The Value Analysis also recorded some additional alternatives that were didn't meet the purpose of the study. The Alternative C.1 is a single diameter bore along the alignment first proposed in the 2001 Geotechnical Report. Alternative C.2 also along this same alignment but with two smaller diameter bored tunnels about 5,200 feet long. Alternative D is a solider pile wall with slope stressing and Alternative E uses slope stressing, both with substantial impacts to old growth trees.

1.6 2003 SUPPLEMENTAL PROJECT STUDY REPORT

This supplemental PSR addresses the findings of the 2001 geotechnical report and the 2002 VA, while presenting a new alternative. The alternatives, with the exception of Alternative 4, are the same from the 1995 PSR:

Alt. 1 Realignment to the east of the roadway utilizing a 1230-foot long tunnel behind the assumed slide plan

Alt. 2A Slight easterly realignment with stabilization through a soldier tieback wall below the roadway and slope stressing above the roadway

Alt. 2B Slight easterly realignment with stabilization through a soldier tieback wall below the roadway and a soldier tieback wall above the roadway

Alt. 3 Major realignment of the roadway to the east through a large cut behind the assumed slide plane

Alt. 4 Five retaining walls and widen the roadway to allow for 12-foot lanes and 4-foot shoulders, and an 8-foot shoulder for the southbound lanes at two locations

The supplemental PSR recommended Alternative 4 as the most preferable, however noted that this alternative will locally correct the roadway failure, but not address the deep seated landslide.

All previous alternatives were reviewed during the preparation of this feasibility study. However, none were retained for further study due to challenges including: right-of-way needed for a 4-lane facility, grades between 8-11%, excessively large volume of excavation and disposal for cuts and fills, unacceptable impacts to Park resources and old growth redwoods, and geotechnical issues.

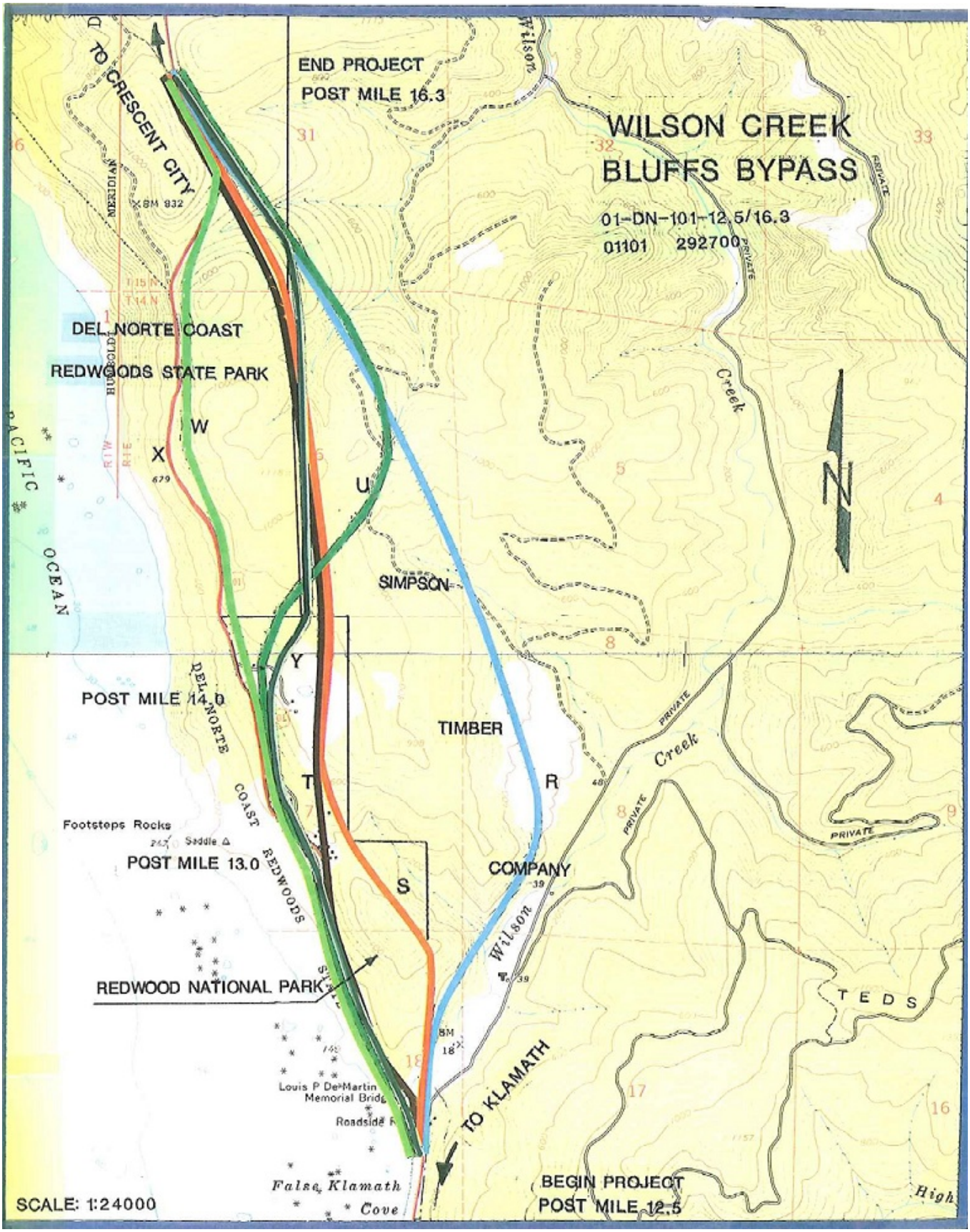


Figure 1 1993 Project Report Alternatives

Table 1 Previous Alternatives

Source	Alternative Number	Description	Total Cost	ROW Cost	Construction /Roadway	Structures Cost	Year of Cost Estimate	Excavation (100,000 yds^3)	# of Lanes	Lane Width	Median Width	Shoulder Width	ROW Acreage Required	Old Growth Trees
1987 PSR	A	This alignment crosses Wilson Creek 200 feet east of the existing structure. The route stays east following the ridgeline of the hills and connects with the existing route beyond the bluffs. This alternative has a 75 MPH horizontal alignment with a 50 MPH vertical alignment (7% maximum grade).	$43,500,000	$1,441,000	—	$5,000,000	1987	—	4	12	4	10	—	—
1987 PSR	B	This alternative alignment is the same as Alternative A except the roadway is a two-lane facility with alternating truck passing lanes the entire length of the project.	$40,000,000	$1,441,000	—	$2,000,000	1987	—	3	12	0	10	—	—
1987 PSR	C	This alternate is the "no-build" alternate.	$3,000,000		—	—	1987	—	—	—	—	—	—	—
1987 PSR	D	This alternative is similar to Alternative A except the horizontal alignment shifts slightly further east. The alternative has a 70 MPH horizontal design speed and a 65 MPH vertical alignment.	$36,500,000	$1,466,000	—	$3,000,000	1987	—	4	12	4	10	—	—
1993 PR	R	1987 PSR Alt A: bypass coastal bluffs along Wilson Creek Drainage then north through Simpson Redwood Company Property	$71,000,000	—	—	—	1993	71	4	12	14	10	—	125
1993 PR	S	Alternative R Alignment with park land impacts	$69,000,000	—	—	—	1993	73	4	12	14	10	—	542
1993 PR	T	Alternative R Alignment with park land impacts	$74,000,000	—	—	—	1993	79	4	12	14	10	—	543
1993 PR	U	Version of "S" and "T" that have less impacts to parks	$72,000,000	—	—	—	1993	74	4	12	14	10	—	125
1993 PR	V	A total bypass concept that avoids parks but does include Wilson Creek Bluffs Bypass and Cushing Creek Bypass. Alternative dropped from PR but added to Corridor Study as Alt 1.	—	—	—	—	1993	—	4	12	14	10	—	—
1993 PR	W	Realignment of roadway 200' to the east from existing alignment.	$26,000,000	—	—	—	1993	17	4	12	14	10	—	438
1993 PR	X	Minimal Impact Alternative- stabilize the highway using viaducts, retaining walls, and spot treatments into the hillside to the east.	—	—	—	—	1993	—	2	12	0	8	—	—
1993 PR	Y	A combination of "S" "T" and "U"	$52,000,000	—	—	—	1993	47	4	12	14	10	—	125
DN 101 CS	1	4-Lane 17 mile total bypass of state and national park land. Same as Alternative V	$580,000,000	$29,000,000	$550,000,000	—	1993	450	4	12	14	10	1097	—
DN 101 CS	1A	Same as Alternative 1, with a 3-lane Facility	$470,000,000			—	1993	—	3	12	—	—	—	—
DN 101 CS	2	8 miles of new construction (cost estimate includes 22 million cost for Cushing Creek project)	$305,000,000	$23,000,000	$282,000,000	—	—	220	4	12	14	8	679	—
DN 101 CS	3	4-lane facility constructed at Wilson Creek Bluffs, and a 3-lane facility at Cushing Creek	$102,000,000	$11,000,000	$9,100,000	—	1993	—	4	12	14	10	289	—
1995 PSR	1	Realign highway in Tunnel behind Slide Plane	$35,200,000	$528,000	$35,148,079	—	1995	1.4	2	—	—	—	2.32	40
1995 PSR	2A	Minor Roadway Realignment and stabilize with a solider pile tieback wall and slope stressing	$25,000,000	$1,283,000	$24,948,110	—	1995	6	2	—	—	—	7.13	80
1995 PSR	2B	Same as 2A except with an additional soldier pile tieback wall in place of slope stressing to minimize impacts to State Park property	$31,700,000	$384,000	$31,631,243	—	1995	0.47	2	—	—	—	1.08	40
1995 PSR	3	Major Retreat behind slide plane	$42,700,000	$4,654,000	$42,655,366	—	1995	37		—	—	—	25.4	275
1995 PSR	4	No Build	$0	$0	$0	—	—	0	—	—	—	—	0	0
2002 VA	1	Construct Retaining Walls Throughout the Project Limits	$36,186,000	$384,000	$4,637,260	$27,775,000	2001	—	2	—	—	—	—	—
2002 VA	2	Construct Retaining Walls that Only Address Specific Terrain Instability	$5,936,000	$0	$605,033	$4,790,000	2001	—	2	—	—	—	—	—
2002 VA	3	Augment the Present Maintenance Program with a Contingency Plan to Accelerate Road Damage Repairs on the Existing Alignment	$236,250	$0	$0	$236,250	2001	—	2	—	—	—	—	—
2002 VA	A	1995 PSR Alt 2B Same as 2A except with an additional soldier pile tieback wall in place of slope stressing to minimize impacts to State Park property	$72,897,000	$6,236,360	$56,439,258	$4,372,500	2001	3793	2	—	—	—	2540	275

Source	Alternative Number	Description	Total Cost	ROW Cost	Construction /Roadway	Structures Cost	Year of Cost Estimate	Excavation (100,000 yds^3)	# of Lanes	Lane Width	Median Width	Shoulder Width	ROW Acreage Required	Old Growth Trees
2002 VA	B.1	The Hamilton Road Bypass. A route through previously harvested timberlands (avoid old-growth redwoods), some of which are now within park boundaries. This route would be substantially longer, and it would join existing alignments at PM 12.5 at Wilson Creek and PM 22.5 at Hamilton Road (Alt E, 1987 PSR)	$90,000,000	$1,000,000	$72,000,000	$17,000,000	2001	—	2	12	—	8	—	—
2002 VA	B.2	Simpson Bypass with Tunnel. A longer tunnel than proposed under 1995 PSR Alt 1, but still passes through part of old landslide mass.	$137,000,000	$1,000,000	$72,000,000	$64,000,000	2001	—	—	—	—	—	—	—
2002 VA	C.1	One Large Diameter Bored Two-Lane Tunnel	$177,931,000	$777,000	$3,281,351	$116,627,500	2001	—	—	—	—	—	—	—
2002 VA	C.2	Two Smaller Diameter Bored One-Way Tunnels	$169,532,750	$777,000	$6,345,307	$108,702,500	2001	—	—	—	—	—	—	—
2002 VA	D	Realignment of Roadway between PM 15.0-15.6	$39,870,513	$1,283,400	$14,233,000	$15,656,000	2001	—	—	—	—	—	—	—
2002 VA	E	Slope Stressing Upslope and Downslope of the Roadway	$125,000,000	$0	$0	$0	2001	—	—	—	—	—	—	—
2003 PSR Supplemental	4	Five retaining walls and widen the existing roadway for 2-12' lanes and 8' shoulders	$8,120,000	$7,300	$2,000,000	$6,110,000	2003	—	2	12	—	—	—	—

Appendix B

Frequently Asked Questions

Last Chance Grade Frequently Asked Questions (FAQs)

Project Background

1. What is the Last Chance Grade project?

The “Last Chance Grade” (LCG) is a 4-mile segment of US Highway 101 just north of Wilson Creek, between Klamath and Crescent City. Landslides and road failures have been an ongoing problem for decades and substantial funds have been invested in repairs. The road is currently safe to use, but a long term solution is needed to ensure continued safe and reliable transportation on US 101.

Since 1981, Caltrans has invested more than $36 million to respond to a number of events that have occurred along the roadway. Geotechnical studies indicate continued movement of the roadway, signaling that regular investments will be required to keep the roadway safe and open.

While Caltrans has numerous safety procedures in place, there is no viable alternative route in the event of a complete failure of the roadway due to a landslide. Without a detour available, complete failure would isolate Del Norte County from the County’s smaller communities to the south and the remainder of the North Coast of California. Residents could be cut-off from medical care, schools and other important services and the economic impacts would be devastating.

2. Can the current road alignment be maintained over the long-term?

Current maintenance of the alignment will require continued activities similar to what is now occurring, with construction of temporary walls to control surface movement and maintain the structural integrity of the roadway. This approach has severe limitations; there is an active landslide area along Last Chance Grade where a future slide might occur that is deep and large enough that it could result in a major failure of the roadway and the complete closure of the roadway indefinitely. A slide of this scale could occur next year or in a hundred years; it is not technically possible to estimate when something like this might occur. We just do not know, and thus we are left balancing risks.

3. Will the road be closed during project construction?

For most of the proposed alternatives, the project will be constructed off the roadway and will have minimal impact on traffic flow. There will be short-term closures necessary at locations where the new alignment reconnects with the existing highway. These closures will likely be scheduled during periods of low traffic with anticipated short durations of several hours.

4. Has Caltrans ever closed the road completely during repairs?

No, Caltrans does not have a record of any full roadway closure along Last Chance Grade lasting longer than a day.

Who is Involved?

5. Who are the Last Chance Grade Partners?

Caltrans initiated the Last Chance Grade Partners (the Partners) to create an active, working relationship with the agencies and groups that have management responsibilities for lands and resources that could be directly impacted by any realignment of the route. The Partners include: Caltrans District 1, the National Park Service, California Department of Parks and Recreation, the Yurok Tribe, Elk Valley Rancheria, and Smith River Rancheria. Each of the Partners have biological, archaeological, cultural, geological and other specialists whose expertise is critical to understanding the full nature of the sensitive areas that surround Last Chance Grade.

In addition to participating in monthly or bi-monthly meetings, the Partners expend a substantial amount of effort to collect and analyze information and share results on key issues. The Partners recognize that a substantive level of effort to work collaboratively on identifying solutions will be critical to resolving issues and identifying a viable alternative to improve Last Chance Grade. A memorandum of understanding signed by the Partnership confirms this commitment.

6. Can the City of Crescent City and Del Norte County be included as partners?

Crescent City and Del Norte County are important Last Chance Grade Stakeholders and their support and input is greatly valued. They have expressed to Caltrans and the Del Norte County Local Transportation Commission support for a project at Last Chance Grade, but they have not requested to be Partners to date.

7. What is the Last Chance Grade Stakeholder Group?

Congressman Jared Huffman created and introduced the Last Chance Stakeholder Group process on March 30, 2015. The effort is being facilitated by Joy Keller-Weidman, who has been funded through the Congressman's office via the contributions of the Del Norte County Transportation Commission, the Save the Redwoods League, and the Crescent City Chamber of Commerce, and Caltrans. Congressman Huffman's Last Chance Grade Stakeholder Group is made up from representatives from each of the following groups, agencies and organizations:

- Del Norte County
- Humboldt County
- Curry County
- Del Norte Local Transportation Commission
- Yurok Tribe
- Elk Valley Rancheria
- Smith River Rancheria
- Redwood National and State Parks
- California State Parks
- Caltrans
- California Highway Patrol
- Crescent City
- Humboldt County Association of Governments
- Environmental Protection Information Center (EPIC)

- Friends of Del Norte
- Save the Redwoods League
- Green Diamond Resource Co.
- Crescent City-Del Norte Chamber of Commerce
- Last Chance Grade Advisory Committee
- C. Renner Petroleum
- Rumiano Cheese

Questions about the Last Chance Grade Stakeholder Group can be directed to Congressman Huffman's office (http://huffman.house.gov/contact)

Alternative Plans

8. Why can't Caltrans select an alternative and build a bypass now?

Caltrans is required by federal and state laws the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) to study alternatives, and determine the potential environmental impacts before making a decision on which alternative to choose. The environmental review of the project will likely take approximately eight years.

The alternative alignments propose a difficult choice between a short bypass with impacts to old growth redwoods, and a longer bypass with greater cost, larger foot print and its own ecological impacts. We anticipate a diverse range of public viewpoints on which alternative would be best, and the potential of legal challenges depending on which alternative is selected. Part of the current feasibility study process is to make the public aware of this difficult decision which needs to be made with the hope that the public, project Partners, and Caltrans can work together at selecting an alternative which best meets transportation needs while minimizing environmental impacts.

9. Why is funding being sought only after the selection of alternatives for study?

An important first step is for Caltrans to complete the Feasibility Study which determines if a project is physically and economically feasible to construct. Once the study determines that a project is feasible, Caltrans begins the project initiation process. Through this process, Caltrans will develop a more detailed scope, schedule and costs for the alternatives –ultimately providing Caltrans with a dollar amount with which to be able to formally request funding.

It is important to note that while funding has not yet been formally requested, Caltrans and area legislators are actively seeking to identify potential funding sources and agency partners willing to commit resources to this effort.

10. Can Caltrans secure funding for the more costly alternatives?

The current list of project alternatives range in cost from $320 million to $1.6 billion. The Last Chance Grade Economic Study was prepared to determine if there was economic justification to support moving forward with a project in these cost ranges. The Study concluded that a project cost as much as $1 billion was economically justified based upon the estimated economic impacts to the local economy if the road was closed at Last

Chance Grade. Cost is an important consideration and will be one of the criteria used when evaluating and determining the final project. Caltrans and area legislators are actively seeking to identify potential sources and agency partners may be willing to commit resources to the project.

11. Is there a "no action" alternative?

Yes, there is a "No Build" Alternative that is called *Maintain Existing Alignment*, which is included in the list of alternatives that are being considered as part of the Feasibility Study. The Last Chance Grade Feasibility Study includes a summary of this alternative and it estimates the annual maintenance costs, impacts to the traveling public, and the potential environmental resource impacts required to keep the roadway open.

12. Why do the alternatives only include two lanes?

Caltrans is proposing to construct a two-lane facility to minimize impacts through sensitive environmental resources, such forest habitats, fisheries and old growth redwood trees. A four-lane facility would require a much larger footprint and greatly expand the impacts on these sensitive resources, making it even more challenging and costly to mitigate impacts. Caltrans is considering passing lanes for some portions of the roadway. In addition, while the potential for a 4-lane facility was previously studied, a 2-lane facility is the current preferred transportation concept. A 4-lane facility would not qualify for a major funding source as the Federal Highways Administration Emergency Relief program has a "replace-in-kind" requirement.

13. Will bicycles be accommodated?

Caltrans is planning construction of full 8-foot shoulders for the majority of this new alignment. This will greatly improve bicycle access through the area.

Safety and Other Concerns

14. Is traveling Last Chance Grade safe?

Yes. Caltrans actively monitors the roadway conditions to ensure the safety of all users and plans are in place to respond to an event that may occur. The highway has sufficient safety barriers including metal beam guard rail and K-Rail and signage to protect and inform drivers. The roadway has been realigned both horizontally and vertically due to the slippage and roadway settling. Walls have been built on both the west and east side of the roadway in an attempt to maintain the road grade. Caltrans is also now constructing a Near-Real-Time Monitoring System at Last Chance Grade to install a notification system in the event of a significant drop in the roadway. This system will alert Caltrans as soon as the drop occurs so that the roadway can be closed to the traveling public.

15. What plans are in place to provide emergency access should there be a significant event on the roadway?

Caltrans has several plans in place and their response will depend on the size of the event. For example, maintenance staff may take action to initiate a road or lane closure. A larger event might require additional actions such as bridging a gap or moving earth to make room for a road. These short term fixes help buy time to develop a more permanent solution.

Caltrans has worked closely with Green Diamond, Tribes, Del Norte Transportation Commission, and Del Norte County Board of Supervisors to look at alternative emergency access in the event of a road closure. Unfortunately, the only alternative route available is a 27- mile old logging road that requires driving more than 2.5 hours on steep grades using four-wheel drive. This alternative route is not maintained and not a viable option for the traveling public.

16. Why have steep 1.5:1 slopes been identified for design criteria within this area?

The various alignments / profiles were developed with the roadbed's entire width resting within cut sections (fully embedded) over their majority. This was done to avoid over-steep side-hill fill slopes on the down-hill side of the roadway. The combined result of the steep terrain (varying from about 27% to 80%), the maximum grade limit, and the fully embedded roadway are cut slopes that are often very high, as well as significant 'through-cut' side-hill sections.

In steeper areas and deeper cuts, a more preferable slope of 2:1 (50 %) would not intersect ('catch') the existing ground surface until the mountain top is reached, or would result in enormous cuts. If any of the current alternatives proceed to design development, proposed design slopes might vary between 2:1 and 1.5:1 depending on location and the results of future geologic and soils investigation. Retaining walls may also be required in areas now unidentified, to a considerable degree. For purposes of study and comparison, and to maintain 'feasibility' until further data indicates otherwise, uniform cut slopes of 1.5:1 were used throughout.

17. What is the highest elevation of the area – i.e., is snow a concern?

The elevation of the alignments identified will be at similar elevation as the existing roadway. Snow has occurred at Last Chance Grade on occasion and it has not presented a problem for Caltrans Field Maintenance Staff. Caltrans Field Maintenance crews perform Storm Patrol during every storm. As standard practice, these crews clear slide debris, plow snow and unclog culverts as needed to keep our roadways open during storm events.

18. Can the landslide complex be bridged, stabilized or can viaducts be placed along the existing alignment?

The active landslide complex cannot be bridged or stabilized along the existing alignment due to its size and scope. The active landslide complex is located between PM 14.4 to PM 15.3 (just under a mile in length.)

The massive scale of the landslide complex presents significant challenges to traditional engineered structures such as bridges, viaducts and earth retaining structures. Caltrans engineering staff explored many landslide mitigation options during the Value Analysis completed in 2002. The analysis determined it was not feasible to build permanent bridges, walls or viaducts capable of stopping or securing the landslide in the vicinity of Last Chance Grade. There is no physical structure capable of handling loads imposed by the landslide uphill from the roadway. A suspension bridge across the slide complex would be over a mile long, which is twice the distance of the new self-anchored suspension span of the Bay Bridge project that cost 6.5 billion dollars. This option would also likely be infeasible due to the geologic instability in the contiguous area.

19. Why would Caltrans propose a tunnel in an area known for its geological instability?

The tunnel alternative was included in the feasibility study because it affords a route that may minimize environmental impacts. The tunnel alignment would be located outside the limits of the Last Chance Grade Landslide complex. The feasibility of this alternative could only be determined through extensive geotechnical exploration, monitoring and analysis. The Devil's Slide project on Route 1 in San Mateo County is an example of a tunnel that was constructed to bypass a large coastal landslide. Several of the options involve tunnels and the results of the geotechnical studies are needed to determine if these alternatives are viable.

20. When will Caltrans have the geotechnical studies concluded?

The geotechnical studies that will need to be conducted represent a significant undertaking that requires significant resources and includes activities such as subsurface exploration that require environmental clearance. The funding for these studies will not be available until funding for the overall project is found. Assuming project funding were found without delay, the studies could commence in August 2016. Depending on the alternatives selected, the preliminary geotechnical recommendations could be available within two to four years with final recommendations within eight to twelve years.

21. If the road is bypassed, what is going to happen to the old road?

The selected alternative will determine the length of the old road that will be bypassed and relinquished. During the environmental planning phase a concurrent planning effort will address the needs of the community and environment with respect to the bypassed highway. There are many possible relinquishment options that will be evaluated as part of the planning effort. Some of these options are likely to include: relinquishment of the road to the California Department of Parks and Recreation as a park access road, modification of the road to a coastal trail or bicycle path, construction of a vista point, and/or complete removal with re-contouring and planting of native forest vegetation. There are many options that have been identified as opportunities for the public to enjoy the current slide area's magnificent views of the Pacific Ocean and Del Norte coastline. Caltrans would also consider any ideas for the bypassed roadway that the public has to offer.

22. Is Caltrans aware that the U.S. Postal Service plans to relocate their main area center to Medford, Oregon, making postal delivery more dependent on the road remaining open through this area?

Caltrans is aware that the USPS plans to relocate some operations to Medford, OR. Maintaining this route is a priority for many users, including the USPS.

The Environment

23. How did we determine "old growth", "mature" and "young" redwood forest habitat types?

A wildlife biologist from one of the Partner agencies used these three categories to provide a rough estimate of the forest habitat types within the area. "Old growth" refers to virgin stands of redwoods likely 500 to 2000 years old. "Mature" forest stands are generally second growth forests approximately 50 to 150 years old. "Young" stands are third and possibly fourth growth stands generally less than 50 years old. There will be some stands

that do not fit within these rough classifications, and these age classes and related acreage estimates will be refined during the environmental studies as the project moves forward.

24. Can we reduce the project footprint and related impacts by slowing the speed of the road to 40-50 mph?

In general, slower moving traffic allows for smaller curves and provides more flexibility to conform the roadway to the terrain and minimize the size of the cut and fill work. However, one of the biggest challenges at Last Chance Grade is that the alignment needs to gain an 800' to 1,000' in elevation in a relatively short distance in an area surrounded by natural barriers. Hillsides in this area have natural slopes varying from 27% to 80%. To maintain a steady maximum grade of 6% to 7%, the alignment must take a 'side hill' course until achieving a high point. Switch-backs cannot be used to reverse direction on a mid-grade ascent, no matter the radius, given the road width, grade requirements, and the steep terrain. Therefore slower speeds (smaller radius curves) are difficult and don't provide significant reduction in the project's footprint.

25. What are the watershed impacts associated with the alternatives?

Potential watershed impacts associated with the proposed project will begin to be evaluated for each alternative during the NEPA/CEQA review process and continue throughout the design, permitting, and construction phases. The proposed alternatives are located within two separate watersheds within the Smith River Hydrologic Unit. The Wilson and Nickel Creek hydrologic areas (i.e., sub-watersheds) are located within the Point St. George-Frontal Pacific Ocean watershed, and the Mill Creek area is located within the Smith River-Frontal Ocean watershed. Both of these watersheds discharge accumulated surface water to the Redwood National and State Parks which has been designated by the California State Water Resources Control Board (SWRCB) as an Area of Special Biological Significance (ASBS).

Potential watershed impacts associated with alternatives F, A1, A2, B1 and B2 would be limited to the Wilson Creek sub-watershed area located within the Point St. George-Frontal Pacific Ocean watershed. The other alternative alignments would have the potential to impact water quality within both the Point St. George-Frontal Pacific Ocean and Smith River-Frontal Ocean watersheds. During the NEPA/CEQA review phase of the project an initial water quality assessment report (WQAR) will be prepared by Caltrans environmental engineers. This WQAR will discuss the regulatory framework of the project, provide data on surface and groundwater resources within the project area, identify potential impacts/benefits associated with the proposed project, and recommend specific avoidance and/or minimization measures for potentially adverse impacts to water quality.

Several aspects of the proposed bypass alternative alignments will need to be fully evaluated for potential watershed impacts. Design features that are of specific concern to water quality include, but are not limited to, surface water runoff from impervious surfaces and roadway drainage outfalls and their proximity to sensitive receiving water bodies (e.g., ASBS, 303(d) listed water bodies, etc.). These types of potential impacts are evaluated under the regulatory framework established by Section 402(p) the Federal Clean Water Act and California Water Code Section 13376 which establish Waste Discharge Requirements (WDRs) for point source discharges from the Caltrans right-of-way (i.e., existing and new facilities and roadways). Performance standards for these non-

stormwater and stormwater discharges are included in Caltrans NPDES Permit No. CAS000003 adopted by the State Water Resources Control Board (July, 2012).

Potential watershed impacts associated with construction of the proposed project alternatives will also need to be evaluated. Construction activities which disturb more than one acre of soil are regulated under the Construction General Permit No. CAS000002. The construction scenario of each alternative will need to balance short-term and long-term impacts to sensitive waterways that could potentially affect ESA listed species and other beneficial uses. The project alternative ultimately selected would avoid and minimize potential impacts to waterways to the maximum extent practicable by utilizing the best available data and technology in consultation with applicable Federal and State resource agencies to promote the conservation of all beneficial uses associated with water quality.

Staying Informed

26. How can I stay informed about what's happening with the planning process?

The project website is the best available resource for getting information about the Feasibility Study and any information about a future project. A new, dedicated project website (www.Lastchancegrade.org) will be used as a tool to provide complete information and support a transparent planning process.

Appendix C

Last Chance Grade EFS Summary of January 2015 Community Workshops

Last Chance Grade Feasibility Study
Summary of January 2015 Community Workshops

Prepared by:

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800 Hearst Avenue
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April 2015

Last Chance Grade Feasibility Study

LAST CHANCE GRADE

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Last Chance Grade Feasibility Study
Summary of January 2015 Community Workshops

I. INTRODUCTION

The "Last Chance Grade" (LCG) is a 3-mile segment of US Highway 101 in Del Norte County, California located between Klamath and Crescent City. Last Chance Grade is an area of highway prone to geological activity. Landslides and road failures have been an ongoing problem for decades and substantial funds have been invested in repairs. The road is currently safe to use, but a long term solution is needed to ensure continued safe and reliable transportation on US 101.

Caltrans, the California Department of Parks and Recreation, the National Park Service, the Yurok Tribe, the Smith River Rancheria, and the Elk Valley Rancheria are collaborative partners in the development of the Last Chance Grade Feasibility Study, which is currently underway. The study is an investigation that considers a full range of needs, options, ideas, opportunities, and constraints. Once completed, the feasibility study will be used as a reference document identifying potential improvement projects, enabling the Partners to respond to and compete for various project funding sources as they become available. The Partners meet on a monthly basis and will continue to meet for the duration of the study.

During January 2015, the LCG Partners hosted three community workshops presenting possible alternatives for future study, and provided opportunities for stakeholders and the public to submit input regarding the alternatives.

II. SUMMARY OF KEY FINDINGS

A number of key themes emerged from input provided by stakeholders and the public, as summarized below.

Impacts of Road Failure and Urgent Need to Expedite

The majority of participants expressed their concern that road failure at LCG is both inevitable and possibly imminent. They noted that fixes to the current alignment are only "band-aids" and that a permanent solution must be expedited. They emphasized that the alternatives chosen for future study must be those most likely to move forward. They also expressed frustration at delays caused by construction and lane closures. They stated that, regardless of what alternative is pursued, the road needs to be kept open during project construction.

Many participants detailed the impacts of road failure at LCG, describing the cost of losing road access as greater than that of any alternative. Total disconnection would cut off access to vital community and emergency services, impact the integrity of alternative routes, and have a profound negative effect on business and tourism. These impacts were described as extending well beyond Del Norte County to the entire state,

and even the rest of the county and the world, given the scope of tourism driven by the area's natural resources.

Safety and Reliability

The majority of participants emphasized the crucial importance of a safe, reliable road at Last Chance Grade. Many noted that the current experience of driving the road made them feel nervous and uncertain and worried about their own and others' safety. They emphasized that human safety is equally or more important than any other impacts and that it should be given weight in decision making. They expressed their concern regarding the geological instability of the area and that geotechnical study is necessary to identify a lasting solution that will survive major events and will not have the effect of worsening landslides.

Participants also addressed other aspects of road safety including safe speeds and the need for safety features such as median barriers on curves, turnouts, pullouts with rest areas, wider shoulders, and possibly bicycle lanes. A few participants stated that they would like to see a four-lane road through the area to ease congestion and make passage easier for trucks and other large vehicles using the road for goods movement and services.

Project Funding and Costs

Participants expressed various concerns regarding project funding and the cost of constructing and maintaining the selected alternative. They urged that cost be taken into account and that the Partners consider which alternatives are most likely to get funded – possibly those that are less expensive without high annual maintenance costs. They suggested early identification of funding sources, identifying and leveraging the Partner's own resources, and "thinking out of the box." A number of specific funding options were suggested including a toll road, an Enhanced Infrastructure Finance District (EIFD) and selling any redwoods that need to be cut down to benefit the project.

Environmental, Cultural and Recreational Impacts

Impacts to natural resources such as old growth redwoods; creeks, fisheries and fish habitat; and wildlife habitat were another frequently mentioned concern. Many participants strongly urged the selection of an alternative with the least environmental impact, possibly one of the shorter alternatives. However, participants also allowed that this must be weighed against long-term viability and safety.

Concerns were also stated regarding impacts to cultural resources, which are hard to mitigate. Participants also sought more information regarding these resources and possible impacts. Finally, participants expressed concerns about the effect of environmental impacts on scenic views and tourism, which is largely driven by interest in the area's beauty and natural features.

Partnering and Outreach Process

Participants commented on the LCG partnering and outreach processes. They suggested that the Partnership be expanded to make it less subject to political influence and suggested various stakeholder groups that should be more involved. They stressed the importance of engaging interest groups early in the process and of continued information to and gathering of input from the community. They also expressed their appreciation of the process and partnering efforts so far.

Participants asked about the Partners' preferred alternatives and level of agreement. They expressed concern that there is too much focus on protecting the environment at the expense of public safety and health and the economy and urged that knowledge gained from previous bypass projects in the area be utilized.

Considerations and Criteria for Selection of a Preferred Alternative

Participants made general comments on considerations and criteria for selecting alternatives and also commented on their specific alternative preferences.

In terms of general considerations, participants expressed that the number of alternatives for further study must be narrowed down. Some noted that the community will agree on any route which will continue to work over the long term but that this must be balanced with environmental concerns. Others urged the Partners not to discount viable alternatives due to cost, impacts or other considerations noted, given the impact of total road failure. Other considerations included maintaining access to current roads and trails and ensuring that the new road is easy to travel as possible.

In terms of specific preferred alternatives, there was slightly greater support for the shorter alternatives, particularly the "A" and "B" options, due to their lower environmental impacts, lesser cost and shorter construction time. The "D" and "E" alternatives were not as well supported due to the perception of greater impacts on both environmental and cultural resources. Participants stated positions both strongly in favor of and against Alternative F1, which proposes a tunnel built in the current alignment. Supporters expressed that it would have less impact, avoiding old growth redwoods and creeks. They called out examples of other lengthy tunnels that have worked, including some in seismically active areas. Those who objected to the idea of a tunnel or tunnels expressed that it did not seem safe, would entail higher maintenance costs, would not be long enough to avoid the danger zone and would lose the view which is important to tourism. Some participants also urged the consideration of a "no action" alternative or an alternative that focuses on improvements to support the current alignment.

Finally, participants suggested a number of alternatives not on the list, including an ocean bridge or causeway; coastal trail alignment; a four-lane bypass similar to Drury Parkway; Rudisill, Hunter Creek or Mill Creek Roads as alternative routes; ferries or shuttle buses; and a "no-build" alternative maintaining/improving the current alignment.

III. METHODOLOGY

In January 2015, the Partners hosted three community workshops and provided an opportunity to submit comments via written or email correspondence in order to receive input on a range of possible alternatives that would provide a long-term solution for Last Chance Grade.

The alternatives were developed based on a review of previously proposed planning studies and discussions with the Partners to identify additional alternatives. Fourteen alternatives were identified and shared with the public.

Outreach Methods

Participation opportunities were promoted and advertised through a variety of methods including:

- Postcard mailing and e-mail announcements to existing stakeholder lists and to stakeholder groups including:
  - County, state and city elected officials
  - Local public agencies including transportation, community development and community services agencies
  - Natural resources agencies including State and National Parks, State and National Fish and Wildlife, regional and national coastal and water commissions, and USDA Forest Service
  - Native American Tribes
  - Local and regional public transportation providers
  - Bicycle and pedestrian advocacy groups
  - Safety groups including CHP, CalFire and local fire departments, paramedics and emergency responders
  - Hospitals and clinics
  - Special interest organizations including environmental organizations
  - Chambers of Commerce
  - Local businesses
  - Schools and universities
- Posting on dedicated Caltrans webpage at www.dot.ca.gov/dist1/d1projects/last_chance_grade
- Press releases and media coverage including local and regional online and print newspapers, radio and TV. Local news coverage received included articles in the *Del Norte Triplicate* and *Eureka Times-Standard*.

For more information, see Appendix A, “Outreach Materials.”

Community Workshops

From January 26th through 28th, three public workshops were conducted by the Last Chance Grade Partners, with assistance provided by MIG, Inc., a planning, design and

communications firm headquartered in Berkeley, California. MIG is Caltrans' On-Call contractor whose participation is made available through funding and resources provided through the statewide Public Participation and Engagement Contract.

The workshops were held in the three main communities located along the route: Crescent City, Klamath and Eureka. All workshops were held at ADA-accessible locations.

The following workshops were held:

Location	Address	Date and Time
Crescent City	Del Norte County Fairgrounds Arts & Crafts Building 421 Highway 101 North Crescent City, CA	Monday, January 26, 2015 5:30-7:30 p.m.
Eureka	Wharfinger Building Great Room Eureka Public Marina, #1 Marina Way Eureka, CA	Tuesday, January 27, 2015 5:30-7:30 p.m.
Klamath	Yurok Tribal Office Klamath Community Room 190 Klamath Boulevard Klamath, CA	Wednesday, January 28, 2015 5:30-7:30 p.m.

Staff Facilitation Training

To build capacity within the LCG Partners to facilitate group discussions both during the workshops and throughout the length of the project, MIG conducted a staff facilitation training on Monday, January 26 at the Del Norte County Fairgrounds prior to the first workshop. Approximately 30 LCG Partner staff members participated in the training. Many of these participants assisted with facilitation and note taking activities for the small group discussions conducted during the workshops.

Workshop Format

All three workshops followed the same interactive format which allowed participants to learn about the history of Last Chance Grade and proposed alternatives, ask questions of LCG Partner staff, and comment on their preferences for the alternatives.

Open House and Workshop Materials

Each workshop began with a brief Open House period. After attendees signed in, they were able to view maps and displays which provided information about the project and the alternatives currently under consideration. The maps and displays included the following:

- Location Map showing the location of the project area in relation to Del Norte and Humboldt Counties, local roads, rivers, watersheds and National and State Parks
- Preliminary Alternatives Map showing the 14 alternatives currently being studied; their position in relation to the existing Last Chance Grade alignment, Highway 101, and State and National Parks; and the topology of the region
- Cultural and Environmental Resources Map showing the general location of environmental resources including old growth redwoods, coastal zones and streams as well as areas of cultural significance.
- Geological Survey Map showing landslides that have been mapped by USGC study of the Highway 101 corridor along Last Chance Grade, color-coded by type

Attendees were also provided with the following handouts:

- Agenda packet with workshop information, Agenda, Location Map, Feasibility Study Process and Preliminary Alternatives Map
- Alternatives Summary Matrix consisting of short descriptors lengths, additional travel time, footprint, timelines, costs and acreage of habitat impacts
- Comment Card that could be filled out during the workshops or mailed to Caltrans at a later date

There was also a table with a display of materials related to emergency preparedness provided by the Partners. Last Chance Grade Partner staff members were available to answer questions.

Presentation

After a fifteen-minute Open House period where participants could view information displays, Caltrans staff made a PowerPoint presentation. Talitha Hodgson, Last Chance Project Manager, detailed the history and geology of Last Chance Grade, and Jason Meyer, Associate Environmental Planner described the preliminary alternatives.

The presentation included:

- A history of Last Chance Grade, including details of various emergency events and consequent repair projects undertaken as well as public concern and requests for action, cost history from 1981 to present, completed documents and data on road movement due to seismic activity;
- A summary of the geology of Last Chance Grade including major landslides;
- An overview of the difficulties involved in developing alternatives;
- A review of the project timeline;
- A synopsis of the fourteen preliminary alternatives; and
- The conclusions of the Last Chance Grade Economic Impact Study.

The presentation was followed by a brief question-and-answer session.

For reproductions of the workshop displays and handouts and the full presentation, please see Appendix B, "Workshop Materials."

Small Group Discussion and Report

Following the presentation, attendees were asked to split into small groups according to the number that appeared on the name badges received at sign-in. Each group had a facilitator and a note-taker. Facilitators led their groups through a discussion of the following three subjects:

1. What's your experience like traveling through Last Chance Grade?
2. Talk about your general reaction to the alternatives that were discussed. What issues and concerns came to mind while you were listening to the presentation? What criteria do you think should be emphasized as these are evaluated for further study?
3. Are there any alternatives that haven't been considered and should be?

At the end of the discussion period, each group identified a reporter, who shared the highlights of their group's discussion with the reconvened larger group.

Next Steps and Closing Comments

The presenters concluded each workshop with comments regarding the next steps in the process, and provided contacts for more information.

IV. COMMUNITY WORKSHOP PARTICIPATION AND RESULTS

Community Workshop Participation

Approximately 150 people from throughout the region attended the community workshops. They represented a wide variety of organizations and interests, including:

- Local and regional transportation agencies
- Law enforcement agencies
- County and municipal governments
- Fire departments and Community Service Districts
- Regional and local planning staff
- Native American tribal governments
- Emergency and medical services providers
- Environmental organizations
- Bicycle and pedestrian advocacy groups
- National and State Parks and natural resources agencies
- Statewide, regional and local transportation providers
- Tourism organizations
- Local civic and cultural organizations

- Local educators, schools and colleges
- Political organizations
- Local and regional Chambers of Commerce
- Local business interests and labor unions
- Local news media
- Area residents

Community Workshop Results

Presentation Questions

Questions asked by participants during the question-and-answer period following the presentation included:

- Why are the City of Crescent City and Del Norte County not included in the Partnership? Can other partners be added?
- Why is funding being sought only after the selection of alternatives for study? Can't those processes occur in parallel?
- Why only two lanes? Can this become a four-lane road?
- Can bicycle lanes be added?
- What is the highest elevation of the area – i.e., is snow a concern?
- Will the road be closed during project construction?
- Has the road ever been closed completely during repairs?
- Is there a "no action" alternative?
- Can the current road alignment be maintained (and improved)?
- Is Caltrans aware that the U.S. Postal Service plans to relocate their main area center to Medford, Oregon, making postal delivery more dependent on the road remaining open through this area?

Answers to these questions will be posted on the Last Chance Grade website under the heading "Frequently Asked Questions."

Small Group Discussion Comments

Comments made by participants during the small group discussions are summarized below. For a full transcription of flipchart notes made during small group discussions, please see Appendix C, "Small Group Discussion Notes."

Experience of Driving Last Chance Grade

Many participants travel LCG for both business and personal reasons with frequencies ranging from multiple times a month to daily. Several business owners also noted that their clients drive LCG or that they rely on shipping goods through this section so they are economically dependent on the road remaining passable. Participants also travel the road for recreational purposes. Some of the recreational users bike this section in

addition to travelling by car and noted that the narrowness of the road and shoulders make it particularly dangerous for bikes. This is a particular issue in summer when there are cyclists on the road.

The response to the experience of driving LCG most frequently mentioned by participants was that it made them feel nervous or uncertain. There are noticeable changes in the road and participants feel unsure of road conditions. Several noted that the sense of inevitable and possibly imminent road failure has them "holding their breath" when traveling this section. As one participant who travels to Eureka every other day for medical reasons put it, "I set out every time thinking, is this the day?" Others mentioned that their spouse or families worry about them when they need to drive LCG. Participants also expressed their frustration at delays caused by construction and lane closures, which impact businesses and make people late for appointments.

Participants did mention one enjoyable aspect of travelling LCG; it is extremely scenic. Several voiced a preference for selecting an alternative that would preserve this aspect of the road if possible. However, it was also noted that the scenic aspect also causes a safety issue when travelers, particularly bicyclists, pause to enjoy the views.

Issues and Concerns Regarding Last Chance Grade and Alternatives

Participants noted a number of issues and concerns regarding Last Chance Grade and the various alternatives shared at the workshop.

The majority of participants expressed two main concerns: first, the inevitability of road failure at LCG and its substantial impacts, making it necessary to expedite a permanent solution; and second, the safety and reliability of that solution.

Inevitability, Impacts of Road Failure; Need to Expedite Solution

One of the most frequent comments made by participants was that road failure at LCG is inevitable and possibly imminent—"a matter not of *if*, but of *when*." Many participants agreed that the current road is in need of repair, but expressed that fixes to the current alignment are only "band-aids" and the situation has been going on for too long. Many expressed that a permanent solution must be expedited. Participants asked, "What can be done to move forward sooner rather than later?"

Many participants detailed the impacts of road failure at LCG, describing the cost of losing road access as greater than that of any alternative. Total disconnection would be devastating, cutting off access to vital services such as hospitals, medical care, schools and airports, and would also impact the integrity of alternative routes such as Highway 199. Participants described impacts that go beyond simply isolating Del Norte County; it would also affect Humboldt and Shasta Counties and Southern Oregon. Impacts to business and tourism, on which the area relies, would also be profound. The region's natural resources are internationally recognized and it was noted that tourists come not only from the San Francisco Bay Area, but also from all over the country and the world.

Participants asked questions regarding what a short-term response to road failure might be. They also queried what circumstances short of complete failure would lead to an emergency declaration. It was noted that an emergency declaration functions to cut red tape and make it possible to move forward faster. However, it was also pointed out that the alternative advanced must be feasible and not likely to be stopped by a lawsuit based on environmental grounds.

Finally, participants noted that regardless of what alternative is pursued the current road needs to be kept open during project construction.

Safety and Reliability

Several participants noted that safety and reliability are more important than the cost or other impacts of any solution. Several participants requested that Caltrans modify its presentation to include information on the number of fatalities and accidents that have occurred along this section. They wanted the human impacts to be noted more prominently in the LCG information and for these impacts to be given more weight in decision making.

Participants also asked questions including whether there is a permanent solution and whether remediation projects carried out to date have improved safety and slowed the impact of the slides. It was noted that the median barrier added on the curve near Cushing Creek—the former site of several head-on collisions—has improved safety considerably.

Many participants expressed their concern regarding the geological instability of the area causing relatively rapid movement of the roadway. They noted that given the area's location in the Cascadia Subduction Zone as well as the likelihood of a major event, it is crucial to do the geotechnical study to identify alternatives that will survive such an event and will meet all compliance standards. Participants also wondered about whether any of the alternatives would have the effect of worsening landslides.

Road Width and Turnouts/Pullouts

Some participants in all three workshops asked whether it was possible to create a four-lane road through this section. It was suggested that this would ease congestion and make passage easier for large trucks that must use the road for goods movement and services. Some noted that if a four-lane road is not possible, the two-lane road must have wider shoulders wherever possible. They would also like to see turnouts and pullouts provided, including some with rest areas, which would allow truckers to take a break and tourists to safely pause to enjoy the scenery.

Project Funding and Costs

Participants expressed their concerns regarding project funding and the cost of constructing and maintaining the selected alternative. They urged that costs be taken into account and expressed that it is important to consider which alternatives are most

likely to get funded. Some noted that funding agencies are more likely to favor less expensive alternatives and those without high annual maintenance costs.

Participants also suggested that the Partners initiate identification of funding sources earlier in the process, referring to the community's experience with the Highway 199/197 project. They asked questions about funding, including:

- What funding is available?
- Where does it come from—private, federal, and/or state sources?
- What resources do the Partners have?

Participants recommended leveraging the Partner's own resources and also "thinking out of the box."

Some participants suggested specific funding options including making the alternative a toll road, an Enhanced Infrastructure Finance District (EIFD), and using the money from selling any redwoods that need to be cut down in the process. As an alternative to the latter, they suggested donating the funds raised or the wood itself to the tribes.

Environmental and Cultural Impacts

Participants expressed their concerns regarding potential impacts of the various alternatives. These related both to impacts on environmental resources such as old growth redwoods, fisheries and wildlife habitats and to impacts on areas of cultural significance.

Impacts to natural resources were a frequently mentioned concern. Many participants strongly urged the selection of an alternative with the least possible environmental impact while allowing that this must be weighed against the long-term stability of the solution. Some suggested that the shorter alternatives were better because they had fewer environmental impacts.

Many felt strongly that it is crucial to protect old growth redwoods. Others suggested that sometimes it's necessary to remove trees and that three acres of old growth are not an issue versus human safety. It was suggested that if the selected alternative impacts some trees, the impact can be mitigated by protecting the trees in the former alignment.

Many participants also felt strongly about avoiding impacts to fisheries and salmon habitats. Wilson Creek was seen as particularly vulnerable; it was suggested that starting farther south, perhaps at Minor or Hunter Creek, might be an option.

Some participants also stated their concerns about impacts to cultural resources, which were not detailed in the handout. They noted that impacts on cultural resources are hard to mitigate, and recommended focusing impacts on those resources that can be more easily mitigated.

Finally, participants also expressed concerns about the effect of environmental impacts on the scenic views and on tourism. People come to the area to see the redwoods, the salmon, and the scenery. However, it was suggested that the alternatives might open up new view opportunities, particularly on the other side of the mountain.

Partnering and Outreach Process

Participants also made comments on the LCG partnering and outreach processes. They suggested the Partnership be expanded so it was less likely to be subject to political influence. Participants suggested various other stakeholder groups that should be more involved, including the Yurok Tribe, local municipalities and counties, the Harbor Districts, Community Service Districts, the Local Transportation District, Tourism and Visitor Bureaus, Chambers of Commerce and the Golden Gate Bridge District. They stressed the importance of engaging interest groups early in the process and of continued community input. They also noted that LCG is not the only vulnerable spot on Highway 101 and that this affects a much larger area. Some participants expressed their appreciation for the efforts to coordinate decisions with the local tribes.

Participants asked whether the Partners have preferred alternatives and whether they all share the same preferences. Some expressed that the Partners should go with whatever alternative the State and National Parks were most in agreement with. Others expressed concern that there is too much focus on protecting the environment at the expense of public safety and health, the economy and protection from natural hazards. The Partners were also urged to utilize knowledge gained from previous bypass projects in the area.

Comments on Alternatives

Finally, discussion participants commented on the alternatives presented. They made comments on general considerations and criteria regarding the choice of alternatives for further study. They also called out the specific alternatives they most favored. Participants' opinions varied widely. There was no overall consensus on one desired alternative.

General Criteria and Considerations Regarding Alternatives

Participants expressed that there were too many alternatives proposed and that the choices must be narrowed down. They suggested a number of general considerations to be taken into account in choosing alternatives for further study. Some participants noted that the community will agree on any route which will work continually over the long term, but cautioned that this must be balanced with environmental concerns. However, given the impact of total road failure, others urged the Partners not to discount viable alternatives due to cost, impacts on resources or other considerations noted on the Alternatives Summary Matrix. They expressed that added travel time is not great and is not a big factor, especially compared to reliability.

Participants noted that it's important to consider maintaining access to Highway 101 and trails as well as the location of existing power lines. They urged that any new road be as easy to travel as possible, offering a "smooth ride" and avoiding extreme curves or uphill climbs—pointing out that it's difficult to encourage economic growth if the road is hard to traverse.

Some participants also urged that a "no action" alternative or an alternative that focuses on improvements that would support the current alignment should be added to the list.

Specified Preferences

Participant opinion was split in terms of whether they preferred the shorter or longer alternatives. Many preferred the shorter routes as most direct, least expensive and most efficient to construct. They did not like the greater impacts of the longer routes. However, some expressed that the longer routes may be more economical and durable in the long run.

Many of the discussion participants specified their preferred alternatives out of those presented. Overall there was slightly greater support for the shorter alternatives (A1, A2, B1 and B2), due to their lower environmental impacts, especially with regards to impacts on fisheries and aquatic habitat, lower cost, shorter construction time and perceived greater stability. There was also some support for alternatives C3 and C5. The "D" and "E" alternatives were seen as having greater impacts on both environmental and cultural resources and were not well supported.

Preferences Regarding Tunnels

Participants stated positions both in favor of and against the inclusion of a tunnel, particularly alternative F1, which proposes a tunnel built in the current alignment.

Those in favor of a tunnel expressed that it would have less impact and avoid old growth redwoods. They called out examples of other lengthy tunnels including the BART Transbay Tunnel, the English Channel Tunnel and the Mont Blanc Vehicular Tunnel between Switzerland and Italy. They noted that tunnels have been built in seismically active zones before, so it is not automatically a bad idea, if it can be proven to be safe. The suggestion was also made to build a series of shorter tunnels with viaducts in between be built.

Objections raised by those who were against the inclusion of a tunnel included:

- That it did not seem safe, particularly if the area is seismically active;
- That having a tunnel in a seismic zone would entail high maintenance costs;
- That Alternative F1 would be too short to entirely avoid the danger zone; and
- That there would be no view, which is important since tourists come to the area to see the scenery and redwoods.

Bicycle and Recreational Use

Some participants expressed concerns about impacts on bicycle or pedestrian travel through the area. They would like to see better bicycle facilities provided. They also questioned what would happen to the old alignment if a bypass is built. It was suggested that, if safe, it be used as a low-speed, possibly seasonal tourist destination for biking and hiking.

Alternatives Not on List

Participants suggested a number of additional alternatives to be considered. These included:

- A toll bridge, promontory bridge or causeway over the ocean which would create a significant tourist attraction. However, several other participants expressed that this was not very feasible given that it is open and unprotected ocean.
- An alignment on the coastal trail
- Rudisill Creek as an alternative
- Another four-lane bypass like Drury Parkway. Participants noted that that this area is also an important watershed, and questioned how this project got passed and whether the topography is similar to LCG.
- Ferries or buses to shuttle large numbers of people
- A "no-build" alternative that would maintain and improve the current alignment
- No action, with regular maintenance improvements.

Comment Cards and Correspondence

Eighteen comment cards and four written letters were received from stakeholders and workshop participants. For a full transcription, please see Appendix D, "Comment Cards," and Appendix E, "Correspondence."

Comment Cards

The majority of those submitting comment cards also attended the workshops and participated in the small group discussions. Therefore, many of the comment cards received gave additional details regarding suggestions and opinions already expressed.

Safety and Stability

Some commenters reiterated the importance of safety and their fears regarding the danger of injury or loss of life, especially for daily or frequent travelers including schoolchildren. They also urged that solution be expedited and an alternative opened as soon as possible, noting that if a bridge in San Francisco were subject to this kind of threat it would be closed immediately and asking why this was not being treated as a similar emergency. They called out the lack of geological stability and the rapid growth of cracks in the road and cliffs, and suggested that the best geotechnical firm available be retained to study the feasibility and safety of all alternatives, especially those involving tunnels.

In regards to tunnels, commenters repeated both the pro- and anti-tunnel arguments stated during the discussions. Those in favor noted the lower impact on redwoods, less added travel time and length, and expressed that it seems a better route in the long run despite the longer construction schedule. They also urged that the tunnel might be safer if built in the sea floor like the English "Chunnel." Those against the idea of tunnel commented that a tunnel would not be geologically sound—the coastline is too unstable, with the Cascadia Subduction Zone overdue for a large earthquake. They also expressed that it would be too expensive.

Project Funding and Costs

In regards to project funding and costs, commenters urged that the Partners identify more funding options and keep fiscal responsibility in mind while moving forward, suggested the establishment of an Enhanced Infrastructure Finance District or of a public-private partnership, and suggested that any redwood cut be sold to defray project costs or donated to the tribes for traditional uses.

Concerns Regarding Impacts

Several commenters stated their concern regarding environmental and cultural impacts, particularly to old growth redwoods, fisheries and creeks. They noted that impacts affect Oregon residents and travelers as well as Northern California locals. They also enquired where the cultural resources that might be impacted are specifically located and urged that more information on old growth redwoods be provided to help the public better understand their significance and scarcity.

Outreach Process

Comments made several suggestions regarding the ongoing outreach process, including:

- Before defining alternatives for further study, conduct interviews with those who are in a position to stop or halt construction due to concern over impacts, and provide an assessment and follow-up plan
- In summarizing input, weight responses by frequency; and
- Keep information coming to the public.

Comments also reiterated concerns that the process not be limited by political influence or overdue concern with environmental and other impacts versus human safety and the area's economic health. Several commenters expressed their gratitude and appreciation for the work done thus far.

Considerations and Preferences Regarding Alternatives

Commenters expressed both general considerations and preferences for specific alternatives. These included:

- Choose the alternative that is least likely to experience delays;
- Balance the "triple bottom line" of people, environment and cost;

- Choose the most scenic alternative; make the new road four lanes, or at least choose an option that allows for later expansion;
- Provide pullouts and rest areas for trucks and RVs;
- Map out and take into account existing road/trail access and power lines; and
- Preserve the existing alignment for bicycle/pedestrian use or a seasonal, low-speed road.

Several commenters also specified the alternatives that they most favored. These included A2, B2, C3, C4 and D3. These were seen as having the lowest cost and least environmental impact while consideration good road terrain and travel time. C5, D5 and E5 were also supported as having the least impact on parkland and habitats, and it was recommended that this longer alternative be designed for four lanes which would raise the cost but increase safety and promote commerce. Another commenter reiterated the additional alternative of building an ocean causeway.

Correspondence

The Partners also received nine written letters via postal mail or email. These letters echoed several of the same themes covered in small group discussions and on the comment cards. Correspondents included representatives of regional environmental organizations and an area hospital, as well as local residents, some with significant experience regarding the issues at Last Chance Grade.

Several correspondents expressed the need for further and more detailed study of the feasibility and impacts of various alternatives. They suggested that there may be feasible alignments and alternatives in addition to those currently proposed including those that maintain or remain close to the current alignment. They called for complete transparency in the process with details of the studies such as criteria used to be shared with stakeholders and the public as study proceeds. They urged that the Partners work closely with all stakeholders, particularly environmental organizations concerned with habitat impacts so that the project may proceed without undue delay.

Several correspondents emphasized their concerns regarding the protection of environmental resources, particularly old growth redwoods. They noted that portions of the land identified as alternative routes are under deed restriction to public park purposes, as well as being designated as a World Heritage Site and Globally Significant Ecoregion. They suggested that mitigation should be implemented for any impacts that are truly unavoidable. They also supported engineering assumptions for the alternatives that are appropriate to the conditions including keeping the highway design as a 2-lane road limited to speeds of 55 mph or possibly even less.

Several correspondents commented on their preferences for specific alternatives. Some supported the shorter alternatives, particularly B2 and A2, noting that they offer the best chance of a fairly quick resolution due to their lower cost and lesser impact. Some also supported alternatives involving tunnels and/or viaducts. They offered several suggestions regarding these options, including building the tunnel underground

(drilling down to stable bedrock if possible) and studying other potential tunnel/viaduct alignments.

One correspondent also emphasized the crucial importance of a reliable north/south route between Crescent City/Curry County and Eureka to serve medical needs, including emergency hospital transfers and importing medical supplies and expertise.

Conclusion

In conclusion, the level of interest for community members is very high. Participants, particularly those who drive the route regularly, emphasize the need for a permanent solution to be expedited. There are a broad range of issues and concerns for Caltrans and the Last Chance Grade Partners to respond to. The workshops did not yield any overall consensus on the best alternative.

APPENDIX A: OUTREACH MATERIALS

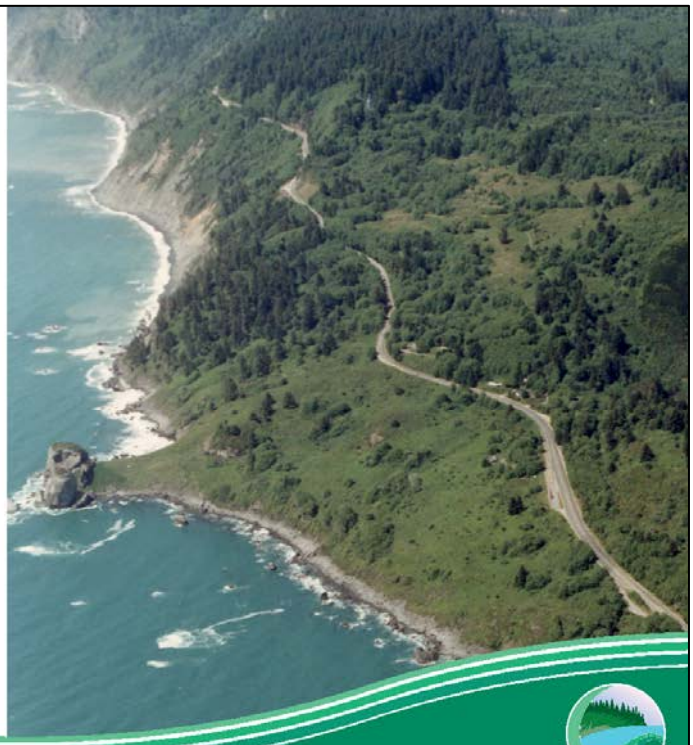
I. Postcard Mailing

LAST CHANCE GRADE COMMUNITY WORKSHOPS

The "Last Chance Grade" (LCG) is a 4-mile segment of US Highway 101 just north of Wilson Creek, between Klamath and Crescent City. Landslides and road failures have been an ongoing problem for decades and substantial funds have been invested in repairs. The road is currently safe to use, but a long term solution is needed to ensure continued safe and reliable transportation on US 101.

Working in partnership, Caltrans, state and federal park agencies and local tribal governments are seeking public input and ideas on a range of possible alternatives.

Come to a workshop to learn more and share your ideas.



LAST CHANCE GRADE

JOIN US AT A COMMUNITY WORKSHOP!

CRESCENT CITY
Monday, January 26, 2015
5:30–7:30 p.m.
Del Norte County Fairgrounds
Arts & Crafts Building
421 Highway 101 North

EUREKA
Tuesday, January 27, 2015
5:30–7:30 p.m.
Wharfinger Building, Great Room
Eureka Public Marina
#1 Marina Way

KLAMATH
Wednesday, January 28, 2015
5:30–7:30 p.m.
Yurok Tribal Office
Klamath Community Room
190 Klamath Boulevard

All locations are ADA-accessible.

CONTACT

For project updates and general information:

www.dot.ca.gov/dist1/d1projects/last_chance_grade/

Or contact the Last Chance Grade Project Team at:
lastchancegrade@dot.ca.gov
(707) 445-6464, TTY 711

LAST CHANCE GRADE

II. Email Blast Sent to Stakeholders

LAST CHANCE GRADE COMMUNITY WORKSHOPS

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Or contact the Last Chance Grade Project team:
lastchancegrade@dot.ca.gov, (707) 445-6464, TTY 711

III. Official Press Release

Today's Date: January 20, 2015
District: 1 - Eureka

FOR IMMEDIATE RELEASE

CALTRANS SEEKING PUBLIC INPUT ON PROPOSED REALIGNMENT AT LAST CHANCE GRADE

EUREKA - Caltrans will be holding three public workshops for its study of the realignment of U.S. Highway 101 in Del Norte County at Last Chance Grade (approximately 12 miles south of Crescent City). The workshops will provide an opportunity for the public to offer feedback to Caltrans regarding the feasibility study, which examines sustainable alternatives for a permanent solution to instability and potential roadway failure at Last Chance Grade. At the workshop, Caltrans will introduce prospective alternatives to the public and work with attendees to develop a list of criteria that can be used to further refine proposed feasible alternatives in order to better develop a project that is responsive to the needs of the community as well as the transportation needs of California.

Last Chance Grade is a geologically active stretch of U.S. Highway 101 that is constantly being affected by coastal uplift and erosion. Geologists have identified approximately 200 active slide areas in the vicinity of Last Chance Grade. This activity has caused the roadway to move several feet closer to the ocean. To date, several temporary projects have been constructed to slow the roadway's movement towards the ocean – however, study partners are in agreement that a more permanent solution is needed to ensure the reliability of U.S. Highway 101 and to protect the safety of motorists traveling between Crescent City and Eureka. Caltrans engineers have studied more than a dozen potential highway realignments that could address the geological issues that the highway currently faces.

Public workshops will be held in the following ADA-accessible locations:

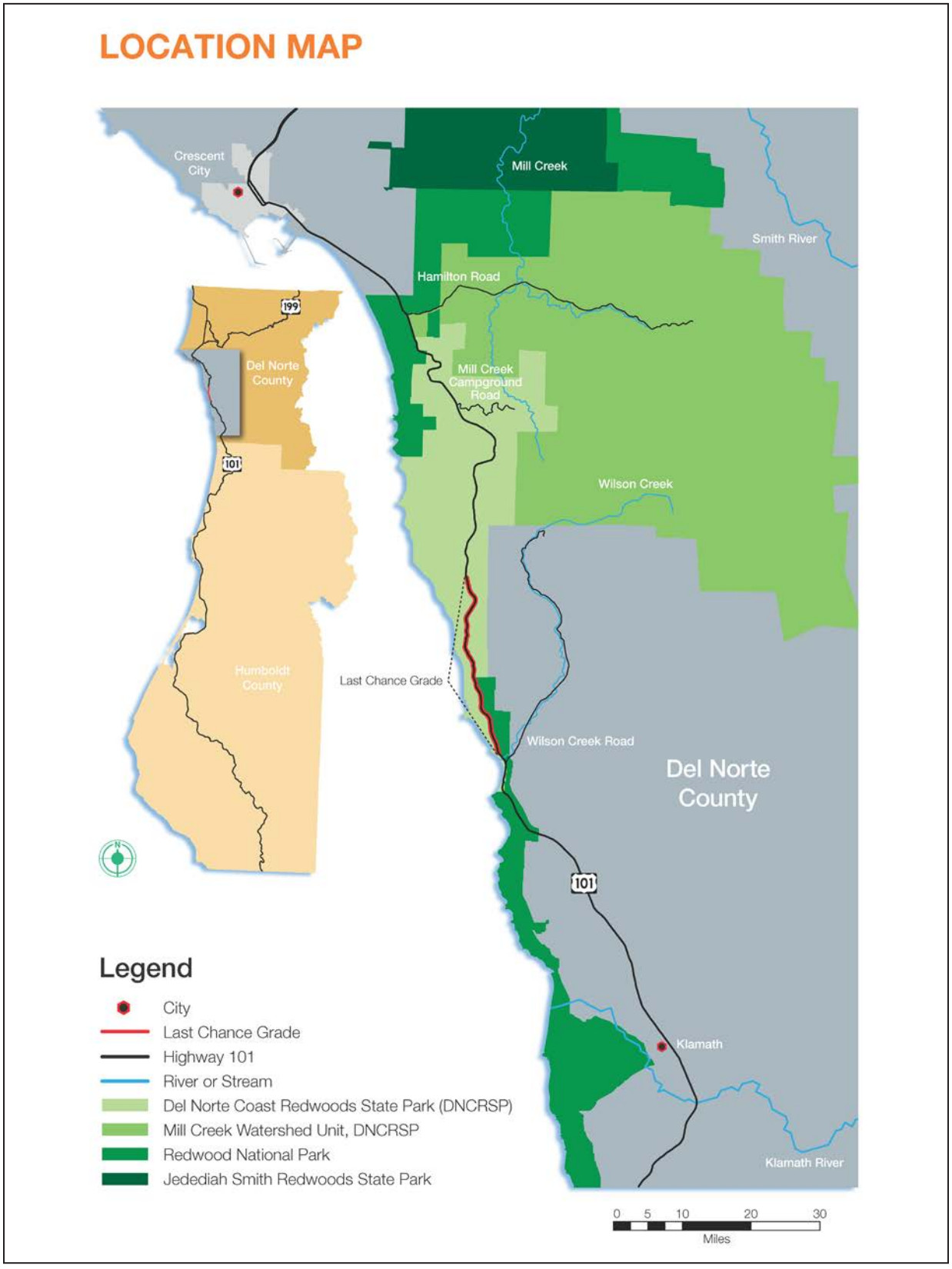
Crescent City - Monday, January 26, 2015
5:30 p.m. - 7:30 p.m.
Del Norte County Fairgrounds
Arts & Crafts Building
421 Highway 101 North

Eureka - Tuesday, January 27, 2015
5:30 p.m. - 7:30 p.m.
Wharfinger Building
Great Room
Eureka Public Marina, #1 Marina Way

Klamath - Wednesday, January 28, 2015
5:30 p.m. - 7:30 p.m.
Yurok Tribal Office
Klamath Community Room
190 Klamath Boulevard

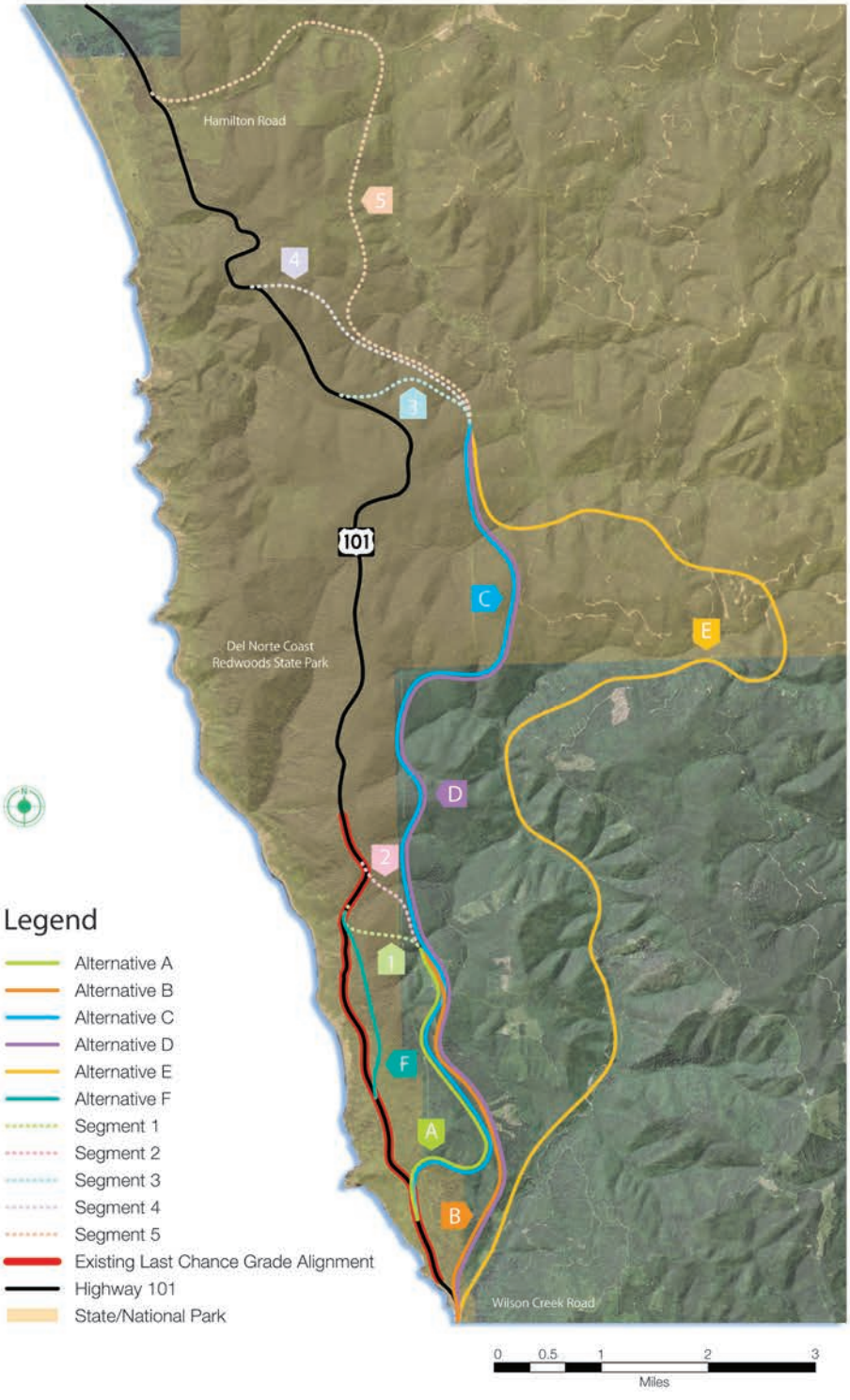
APPENDIX B: WORKSHOP MATERIALS

I. Display Banners

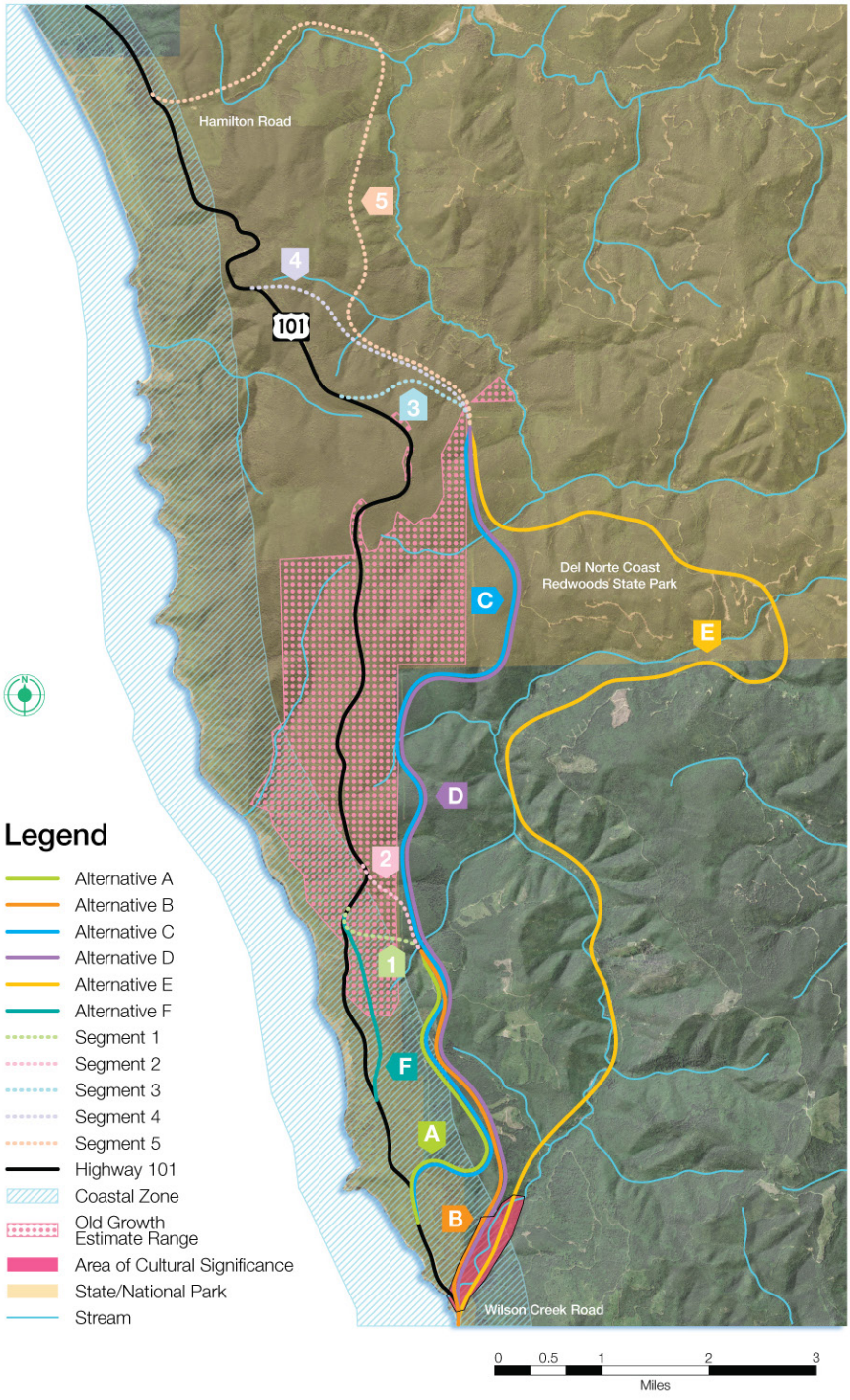


PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

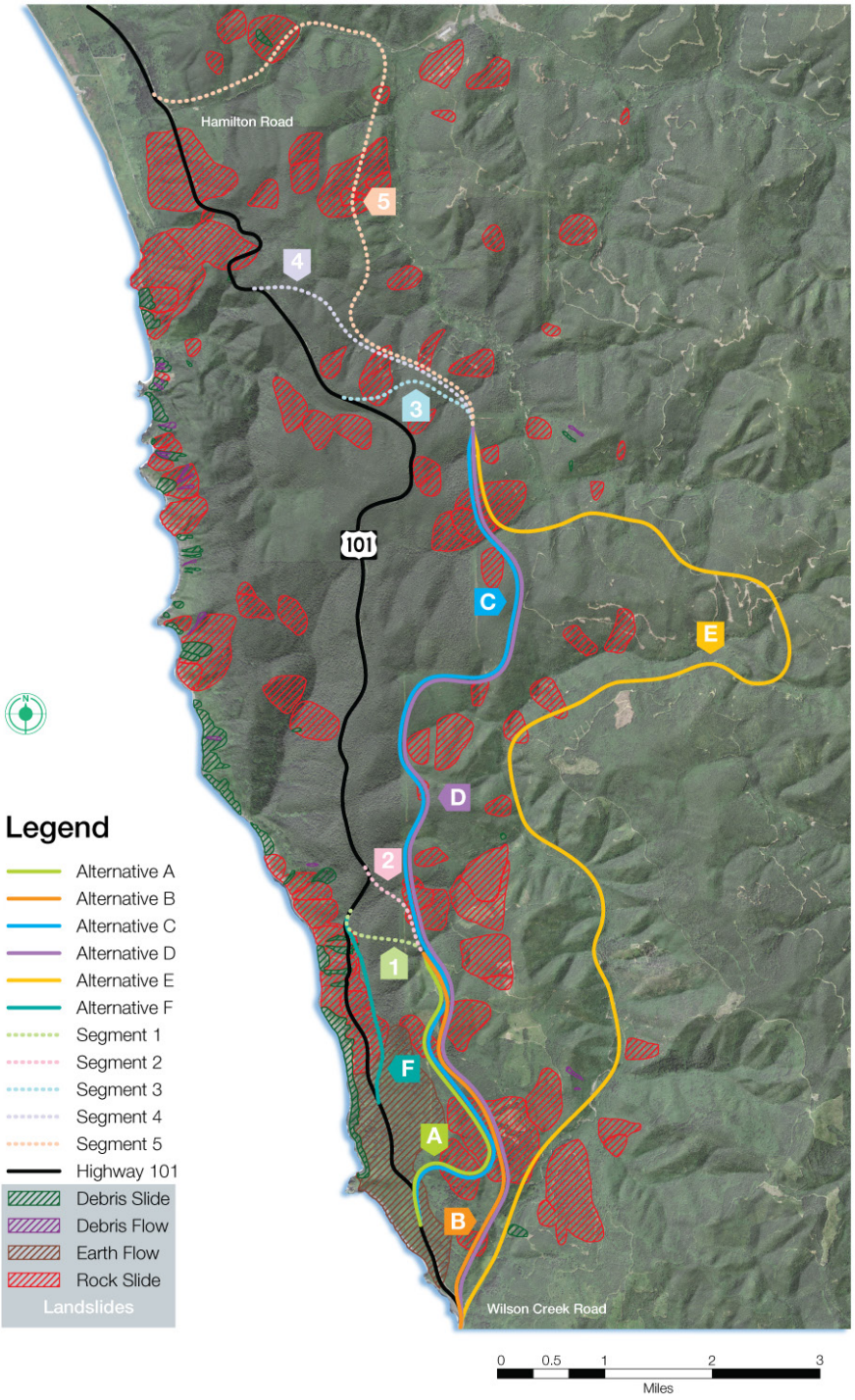


CULTURAL AND ENVIRONMENTAL RESOURCES



Preliminary Alternatives:
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

GEOLOGICAL SURVEY



Preliminary Alternatives:
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

II. Display Boards

LAST CHANCE GRADE FEASIBILITY STUDY

Purpose

The purpose is to study the sustainable alternatives for a permanent solution to instability and potential roadway failure at Last Chance Grade. The study will consider alternatives that reduce maintenance costs, provide a more reliable connection, and protect economic, environmental, and cultural resources.

Need

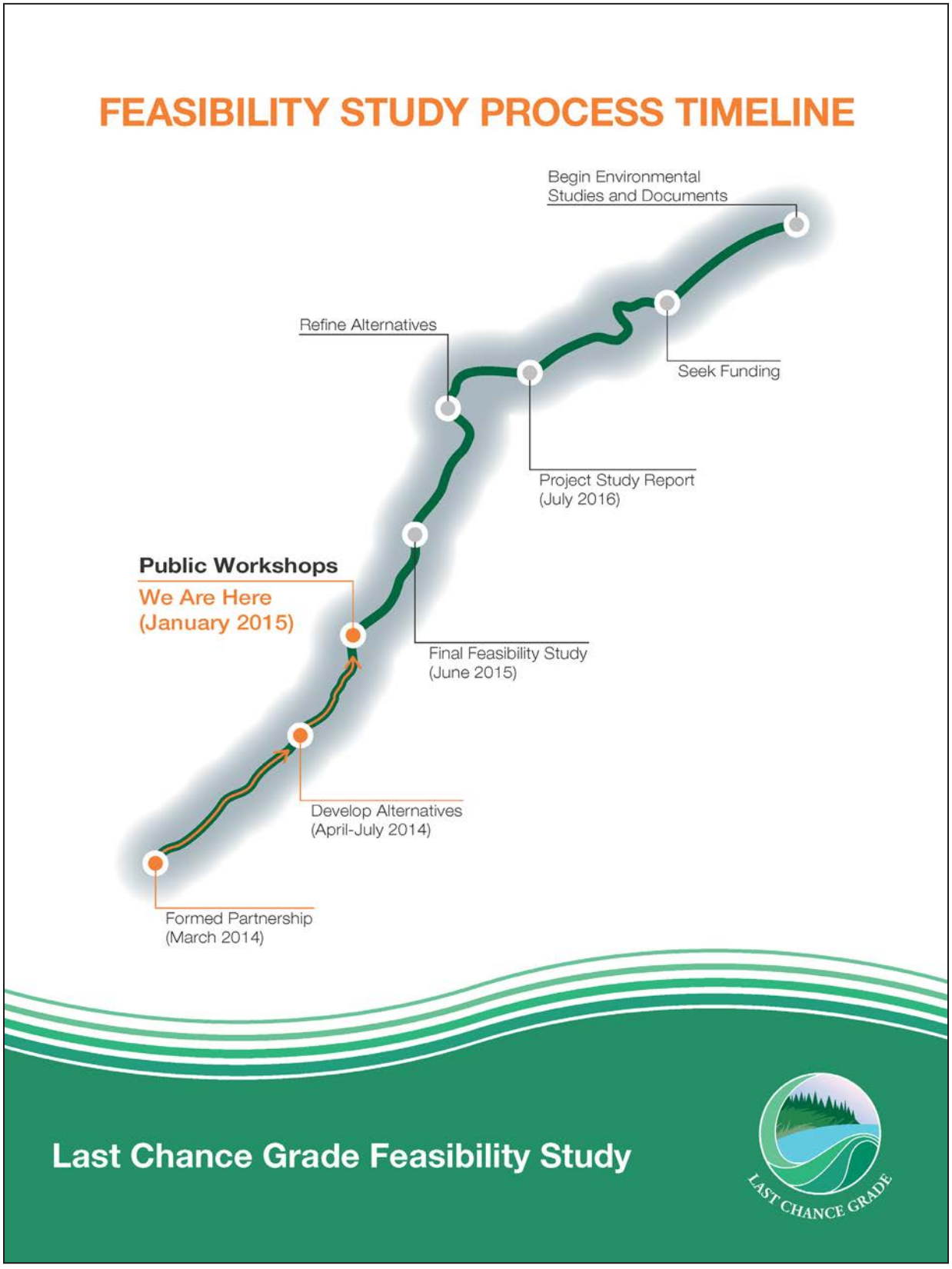
Landslides and road failures at Last Chance Grade have been an ongoing problem for decades. A geologic study in 2000 conducted for Caltrans by the California Geological Survey mapped over 200 historical and active landslides (both deep-seated and shallow) within the corridor between Wilson Creek and Crescent City. Over the years, Caltrans has conducted a considerable number of construction projects and maintenance activities in the Last Chance Grade area. Since 1980, landslide mitigation projects – including roadbed overlays, slip-out and washout repairs, retaining walls, drainage improvements, and maintenance – have cost over $36 million. There is a need for a long-term solution to this historic instability at Last Chance Grade.

Description

This study will investigate and assess a range of alternatives to address the segment of US Highway 101 at Last Chance Grade impacted by landslides and increasing instability. A Partnership was formed with the National Park Service, California Department of Parks and Recreation, the Yurok Tribe, Elk Valley Rancheria, and Smith River Rancheria to study and develop feasible solutions that ensure that environmental and cultural resources considerations are fully integrated into the study.

Last Chance Grade Feasibility Study

LAST CHANCE GRADE


FEASIBILITY STUDY PROCESS TIMELINE
Begin Environmental Studies and Documents
Refine Alternatives
Seek Funding
Project Study Report (July 2016)
Public Workshops
We Are Here (January 2015)
Final Feasibility Study (June 2015)
Develop Alternatives (April-July 2014)
Formed Partnership (March 2014)
Last Chance Grade Feasibility Study
LAST CHANCE GRADE

TYPES OF LANDSLIDES

Debris slides occur in coarse-grained soil that is likely to include surface deposits, rock fragments and vegetation on very steep slopes. Initially they may move as one intact slab of earth and vegetation, but break up quickly into rock and soil flows. Debris slides usually occur in areas where the base of a slope is undercut by erosion. Debris slides are often triggered by periods of intense rainfall or by undercutting and erosion of the base of the slope, and can be renewed into a new slide when the scar is impacted by similar disturbance processes.

Debris flows are similar to debris slides except that the mass of coarse-grained material flows down slope as a slurry. These often begin as a shallow slide from high pore water pressures following periods of intense rain, at a time scale much shorter than those that affect deeper slides.

Earth flows are composed of fine grained soil and weathered bedrock, and movement occurs on many discontinuous shear surfaces. These are more common on less steep slopes, but can be found where landslide toes are being eroded. The movement of earth flows is generally slow, but can accelerate under certain circumstances. Earth flows can be affected by changes along the entire slope or a disturbance to any part of the slope, including changes to the water table.

Rock slides occur on relatively steep slopes, often moving and sliding on one or several shear surfaces called slide planes. These slides are sensitive to a rise in the water table that may occur in years with high rainfall, decreasing the stability of the overall slope. These are often slow slides.

Last Chance Grade Feasibility Study

LAST CHANCE GRADE

III. Agenda Packet

Last Chance Grade Feasibility Study

COMMUNITY WORKSHOP

CRESCENT CITY
January 26, 2015
5:30-7:30 p.m.
Del Norte County Fairgrounds
Arts & Crafts Building
421 Highway 101 North

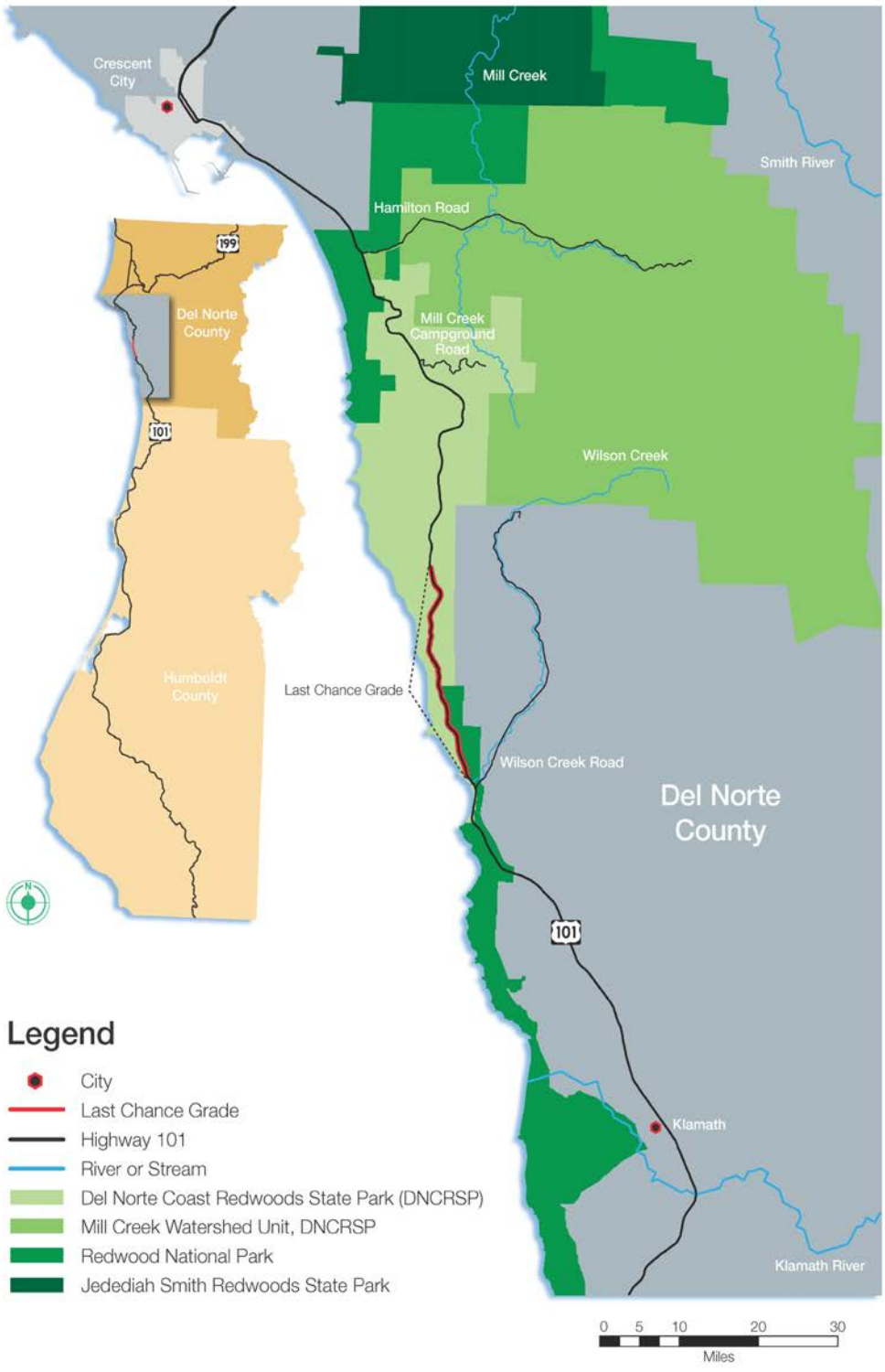
EUREKA
January 27, 2015
5:30-7:30 p.m.
Wharfinger Building
Great Room
Eureka Public Marina
#1 Marina Way

KLAMATH
January 28, 2015
5:30-7:30 p.m.
Yurok Tribal Office
Klamath Community Room
190 Klamath Boulevard

AGENDA

5:30 p.m.	Sign-in and Open House
5:45 p.m.	Presentation
6:15 p.m.	Small Group Discussion
7:00 p.m.	Small Group Reports
7:25 p.m.	Next Steps and Closing Comments
7:30 p.m.	Adjourn

LOCATION MAP



FEASIBILITY STUDY PROCESS

Purpose

The purpose is to study the sustainable alternatives for a permanent solution to instability and potential roadway failure at Last Chance Grade. The study will consider alternatives that reduce maintenance costs, provide a more reliable connection, and protect economic, environmental, and cultural resources.

Need

Landslides and road failures at Last Chance Grade have been an ongoing problem for decades. A geologic study in 2000 conducted for Caltrans by the California Geological Survey mapped over 200 historical and active landslides (both deep-seated and shallow) within the corridor between Wilson Creek and Crescent City. Over the years, Caltrans has conducted a considerable number of construction projects and maintenance activities in the Last Chance Grade area. Since 1980, landslide mitigation projects – including roadbed overlays, slip-out and washout repairs, retaining walls, drainage improvements, and maintenance – have cost over $36 million. There is a need for a long-term solution to this historic instability at Last Chance Grade.

Description

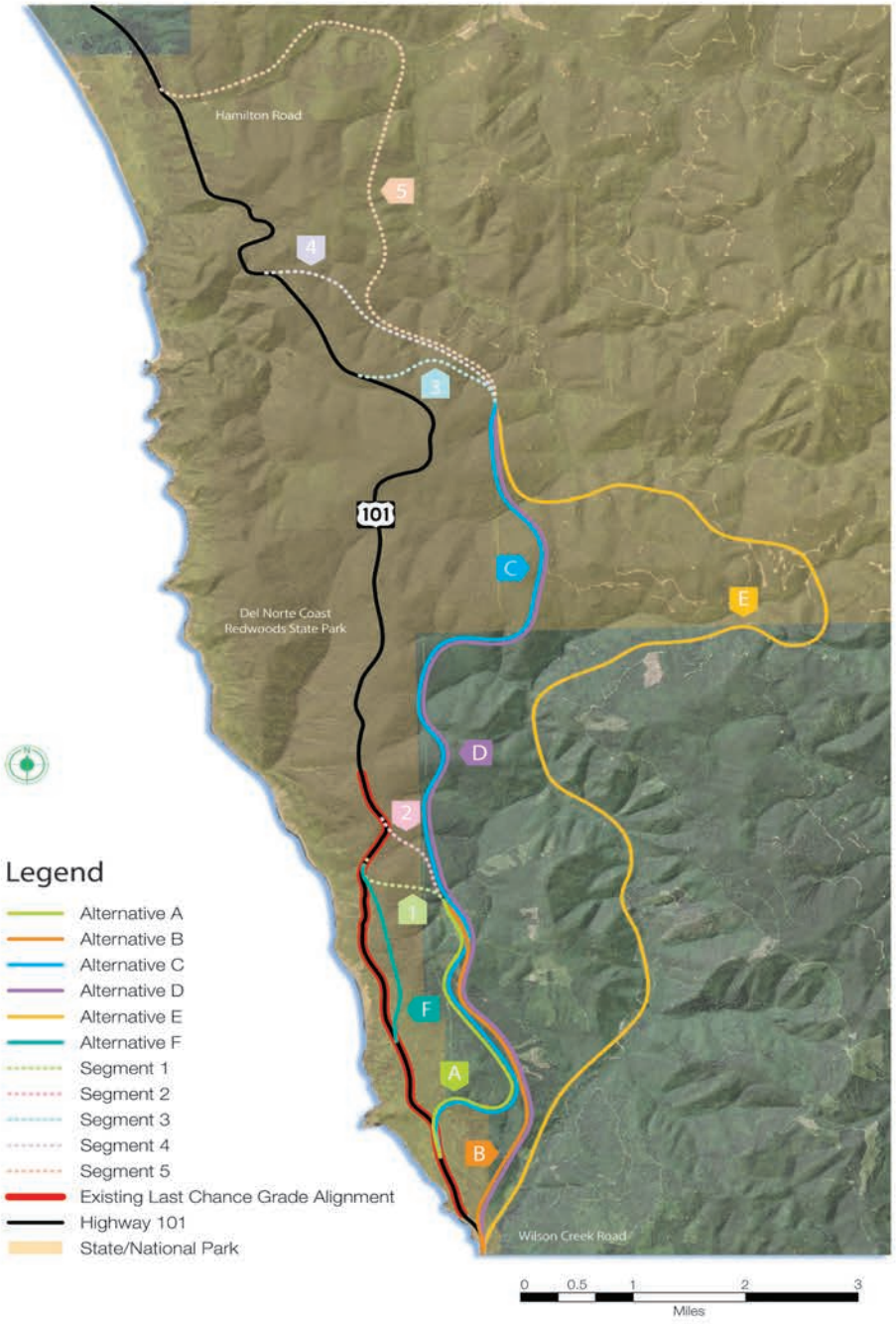
This study will investigate and assess a range of alternatives to address the segment of US Highway 101 at Last Chance Grade impacted by landslides and increasing instability. A Partnership was formed with the National Park Service, California Department of Parks and Recreation, the Yurok Tribe, Elk Valley Rancheria, and Smith River Rancheria to study and develop feasible solutions that ensure that environmental and cultural resources considerations are fully integrated into the study.

Engineering Assumptions for Alternatives Design Criteria

- 7% maximum grade
- Route Concept
  - 2 Lane conventional highway with truck passing lanes
  - 12 ft. lanes, 8 ft. shoulder
- Design Speed—55 MPH
- Turning Radius—1,100 ft. minimum
- Structures limited to maximum 200 ft. height
- Cut/fill 200 ft. maximum height
- Cut slopes 1.5/1 ratio
- Protect sensitive cultural, environmental and scenic resources

PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1



IV. Alternatives Summary Matrix

LAST CHANCE GRADE FEASIBILITY STUDY PRELIMINARY ALTERNATIVE ESTIMATED SUMMARY COMPARISON									
Alternative	**Travel Time (Wilson Creek Road to Hamilton Road)**		**New Construction**			**Cost (in Millions)**		**Existing Habitat Type**	
	Total Length (Existing: 10.1 mi)	**Added Time**	**Construction Length**	**Construction Footprint**	**Construction Schedule**	**Min**	**Max**	**Type**	**Acres**
A1 Rudisill Road to LCG Tunnel (Includes 2,010 ft. tunnel)	11.1 mi	1.2 min	3.3 mi	76 acres	3 years	$340M	$460M	Coastal scrub/grassland/spruce	7 acres
								Riparian	1 acre
								Clear cut	13 acres
								Young Redwood Forest	54 acres
								Mature Redwood Forest	0 acres
								Old Growth Redwood Forest	1 acre
A2 Rudisill Road to Damnation Trailhead	10.9 mi	0.9 min	3.3 mi	80 acres	2 years	$210M	$250M	Coastal scrub/grassland/spruce	7 acres
								Riparian	1 acre
								Clear cut	13 acres
								Young Redwood Forest	56 acres
								Mature Redwood Forest	0 acres
								Old Growth Redwood Forest	3 acres
B1 Wilson Creek Bridge to LCG Hill Tunnel (Includes 2,010 ft. tunnel)	10.6 mi	0.5 min	3.6 mi	89 acres	2 years	$360M	$480M	Coastal scrub/grassland/spruce	12 acres
								Riparian	1 acre
								Clear cut	10 acres
								Young Redwood Forest	65 acres
								Mature Redwood Forest	0 acres
								Old Growth Redwood Forest	1 acre
B2 Wilson Creek Bridge to Damnation Trailhead	10.3 mi	0.2 min	3.6 mi	93 acres	2 years	$220M	$260M	Coastal scrub/grassland/spruce	12 acres
								Riparian	1 acre
								Clear cut	10 acres
								Young Redwood Forest	67 acres
								Mature Redwood Forest	0 acres
								Old Growth Redwood Forest	3 acres
C3 Rudisill Road to South of Mill Creek Access	11.9 mi	2.1 min	8.1 mi	249 acres	3 years	$490M	$570M	Coastal scrub/grassland/spruce	7 acres
								Riparian	1 acre
								Clear cut	13 acres
								Young Redwood Forest	205 acres
								Mature Redwood Forest	23 acres
								Old Growth Redwood Forest	0 acres
C4 Rudisill Road to North of Mill Creek Access	11.7 mi	1.8 min	8.9 mi	269 acres	4 years	$540M	$630M	Coastal scrub/grassland/spruce	7 acres
								Riparian	1 acre
								Clear cut	13 acres
								Young Redwood Forest	205 acres
								Mature Redwood Forest	43 acres
								Old Growth Redwood Forest	0 acres
C5 Rudisill Road to Hamilton Road	12.7 mi	3.1 min	11.9 mi	331 acres	4 years	$730M	$850M	Coastal scrub/grassland/spruce	7 acres
								Riparian	1 acre
								Clear cut	13 acres
								Young Redwood Forest	217 acres
								Mature Redwood Forest	93 acres
								Old Growth Redwood Forest	0 acres

LAST CHANCE GRADE FEASIBILITY STUDY PRELIMINARY ALTERNATIVE ESTIMATED SUMMARY COMPARISON									
Alternative	**Travel Time (Wilson Creek Road to Hamilton Road)**		**New Construction**			**Cost (in Millions)**		**Existing Habitat Type**	
	Total Length (Existing: 10.1 mi)	**Added Time**	**Construction Length**	**Construction Footprint**	**Construction Schedule**	**Min**	**Max**	**Type**	**Acres**
D3 Wilson Creek Bridge to South of Mill Creek Access	11.3 mi	1.4 min	8.3 mi	262 acres	3 years	$510M	$590M	Coastal scrub/grassland/spruce	12 acres
								Riparian	1 acre
								Clear cut	10 acres
								Young Redwood Forest	216 acres
								Mature Redwood Forest	23 acres
								Old Growth Redwood Forest	0 acres
D4 Wilson Creek Bridge to North of Mill Creek Access	11.1 mi	1.1 min	9.1 mi	282 acres	4 years	$560M	$650M	Coastal scrub/grassland/spruce	12 acres
								Riparian	1 acre
								Clear cut	10 acres
								Young Redwood Forest	216 acres
								Mature Redwood Forest	43 acres
								Old Growth Redwood Forest	0 acres
D5 Wilson Creek Bridge to Hamilton Road	12.1 mi	2.4 min	12.2 mi	344 acres	4 years	$750M	$870M	Coastal scrub/grassland/spruce	12 acres
								Riparian	1 acre
								Clear cut	10 acres
								Young Redwood Forest	228 acres
								Mature Redwood Forest	93 acres
								Old Growth Redwood Forest	0 acres
E3 Wilson Creek Road to South of Mill Creek Access	14.3 mi	4.9 min	11.3 mi	299 acres	4 years	$680M	$790M	Coastal scrub/grassland/spruce	0 acres
								Riparian	22 acres
								Clear cut	0 acres
								Young Redwood Forest	254 acres
								Mature Redwood Forest	23 acres
								Old Growth Redwood Forest	0 acres
E4 Wilson Creek Road to North of Mill Creek Access	14.1 mi	4.7 min	12.0 mi	319 acres	4 years	$730M	$850M	Coastal scrub/grassland/spruce	0 acres
								Riparian	22 acres
								Clear cut	0 acres
								Young Redwood Forest	254 acres
								Mature Redwood Forest	43 acres
								Old Growth Redwood Forest	0 acres
E5 Wilson Creek Road to Hamilton Road	15.1 mi	5.9 min	15.1 mi	381 acres	4 years	$920M	$1,070M	Coastal scrub/grassland/spruce	0 acres
								Riparian	22 acres
								Clear cut	2 acres
								Young Redwood Forest	264 acres
								Mature Redwood Forest	93 acres
								Old Growth Redwood Forest	0 acres
F1 Full Tunnel Parallel to E (5,422 ft.)	10.0 mi	0.2 min	1.3 mi	4 acres	6.5 years	$450M	$700M	Coastal scrub/grassland/spruce	2 acres
								Riparian	0 acres
								Clear cut	0 acres
								Young Redwood Forest	0 acres
								Mature Redwood Forest	1 acre
								Old Growth Redwood Forest	1 acre

V. Comment Card

COMMENT CARD

Please share your comments regarding the alternatives to improve road stability and safety at Last Chance Grade.

Optional:

Name: _____ Affiliation: _____

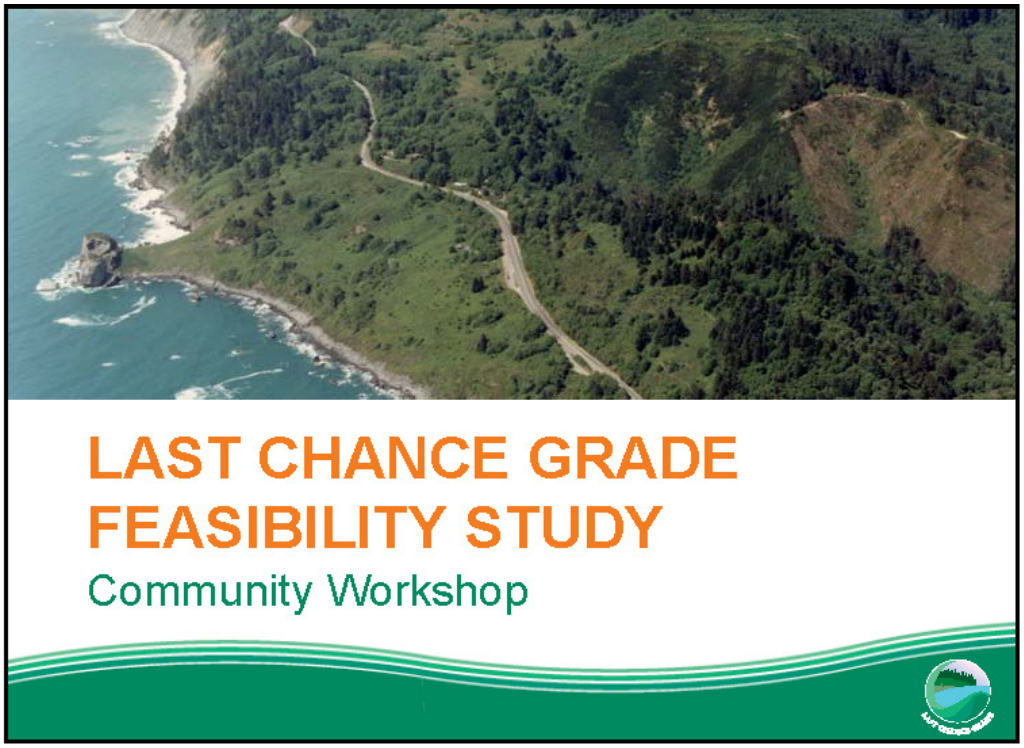
Contact Info: (Mailing address or email):

_____

Thank you for your participation! Please turn this card in at the end of the meeting. You may also return it by mail or email **no later than February 18, 2015.** Please mail to: Caltrans District 1, c/o Talitha Hodgson, 1656 Union Street, Eureka, CA 95501, or email to: lastchancegrade@dot.ca.gov.

Last Chance Grade Feasibility Study

VI. Presentation



AGENDA

5:30 p.m.	Sign-in and Open House
5:45 p.m.	Presentation
6:15 p.m.	Small Group Discussion
7:00 p.m.	Small Group Reports
7:25 p.m.	Next Steps and Closing Comments
7:30 p.m.	Adjourn

LAST CHANCE GRADE FEASIBILITY STUDY

Presentation Overview

- What's been going on at Last Chance Grade?
  - History and Geology
  - Partnering
- What are we doing about it?
  - Feasibility Study and Preliminary Alternatives
  - Timelines
- What do we need from you?
  - Public Input/Small Group Discussion

LAST CHANCE GRADE FEASIBILITY STUDY

HISTORY

TIMELINE

- 1894 County Road
- 1923 State Route 1
- 1933 and 1937 realigned to current Route 101
- Landslides 1-3 times per decade
- 1970's $ increasing
- 1980's initiated 4 decades of studies
- 2009 Safety Project
- 2011 Federally Declared Storm Event
- 2012 Federally Declared Storm Event

LAST CHANCE GRADE FEASIBILITY STUDY

POST MILE 15.1 – MARCH 2011 STORM EVENT

- Spring 2011 Caltrans Closed SB Shoulder
- 10/11 FHWA Emergency Relief Funds
- Upcoming Project: Soil Nail Wall 16/17

LAST CHANCE GRADE FEASIBILITY STUDY

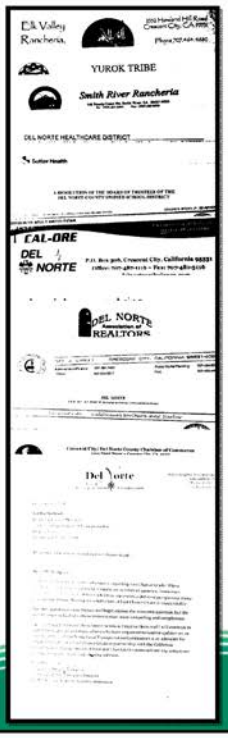
March 2012 ER Storm Event:

- Failure accelerated at PM 15.3 and new slipout at PM 15.0
- 2 EO Project and 1 PR Project
- PM 15.3 EO Wall Project at 15.3 - $4.8 million

POST MILE 15.0 – MARCH 2012 STORM EVENT

- Emergency Soil Nail Project Completed Spring 2012
- 11/12 FHWA Emergency Relief Funds
- Upcoming Project 16/17: Soldier Pile Wall

LAST CHANCE GRADE FEASIBILITY STUDY



PUBLIC APPEALS:
"Make LCG Safe & Reliable"

Caltrans Receives:

- 16 Letters from North Coast Agencies, Tribes and Businesses
- Congressman Jared Huffman
- Senator Jim Nielson
- DNLTC Requests Economic Impact Study
- Citizen's Advisory Group Formation

LAST CHANCE GRADE COST HISTORY
(1981 to Present)

Date	Description	Costs
1981-1996	Corridor Study Yearly Cost Summary	$4,084,000
1981-1996	Field Maintenance Cost	$3,980,000
1997	Wilson Creek Retaining Wall	$100,000
1998	Slipout Repair	$207,802
1998	Washout Repair	$270,740
1999	Last Chance Grade Retaining Wall	$877,446
1999-2000	Wilson Creek Retaining Wall, Drainage	$2,901,165
2000	OGAC	$63,281
2001-2002	Drainage Revisions	$95,718
2009	Reconstruct Roadway and Place OGFC	$13,038,070
2010	Construct Retaining Walls	$13,764,187
2012	Repair Slipouts	$7,157,907
2012	Rubberized HMA Overlay	$1,222,421
TOTAL		$36,192,000

LAST CHANCE GRADE FEASIBILITY STUDY

COMPLETED STUDIES AND REPORTS

1987 – Wilson Creek Project Study Report
1992 – Preliminary Geotechnical Report
1993 – Value Analysis
1993 – US Route 101 in Del Norte County: A Corridor Study
1995 – Last Chance Grade Project Study Report
2000 – USGS Landslide Study – Special Report 184
2001 – Preliminary Geotechnical Report
2002 – Value Analysis
2003 – Supplemental Project Scope Summary Report
2007 – Supplemental Project Scope Summary Report

LAST CHANCE GRADE FEASIBILITY STUDY

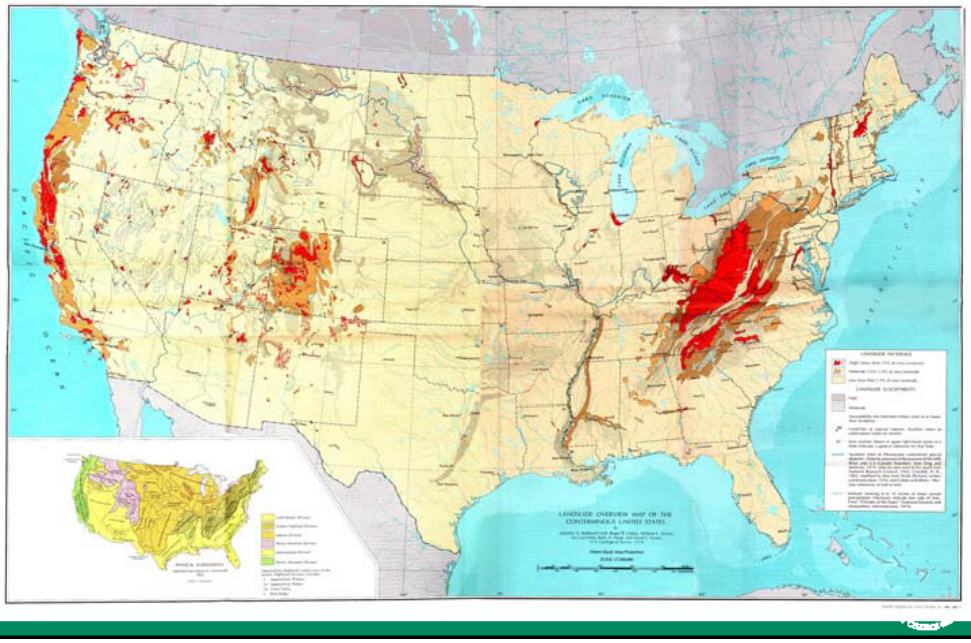
ROAD MOVEMENT

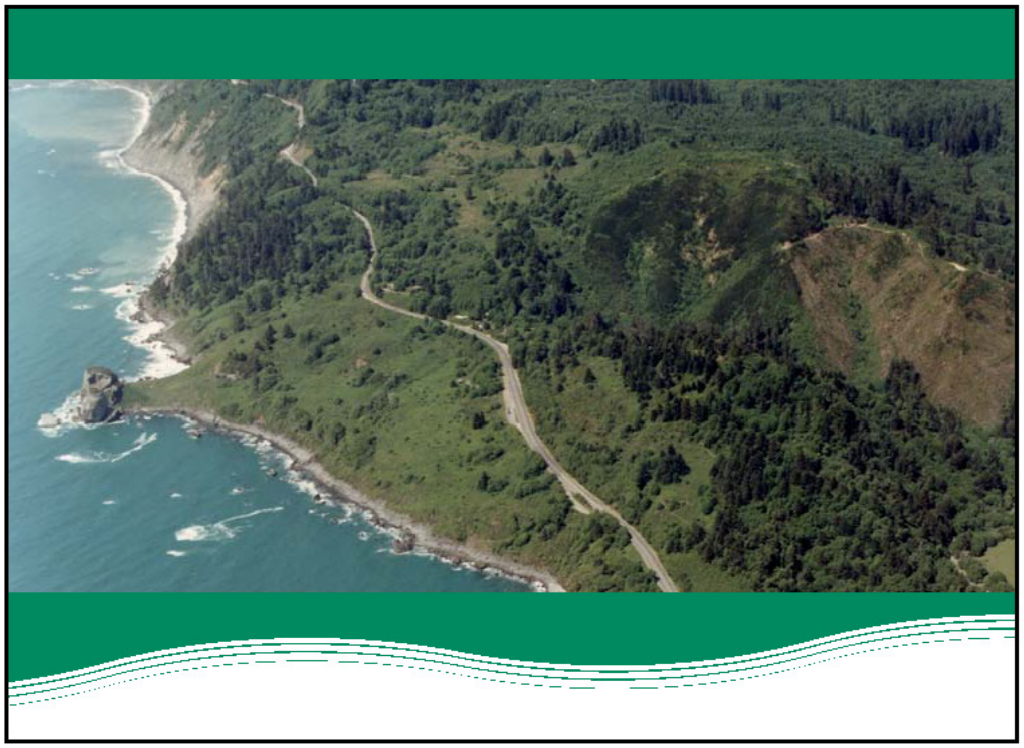
Surface Monitoring Data July 2012 – September 2013

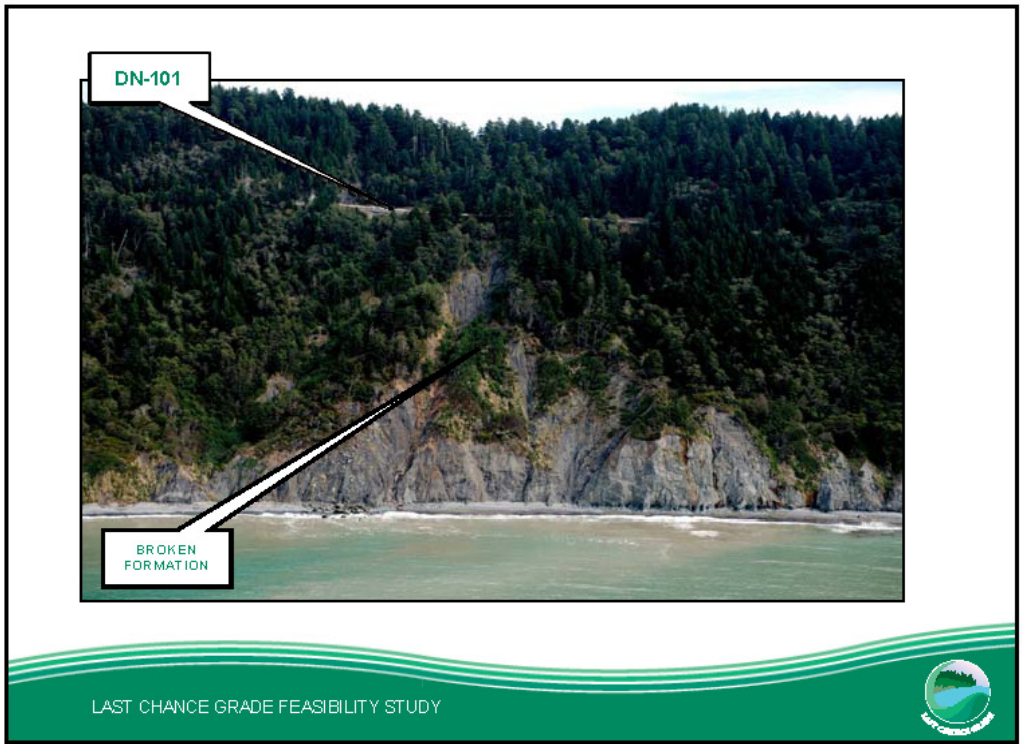
- The Northern LCG slide movement : Vertical ~ 8" Horizontal ~ 11"
- The Southern LCG Slide Vertical ~ 3" Horizontal ~ 4"

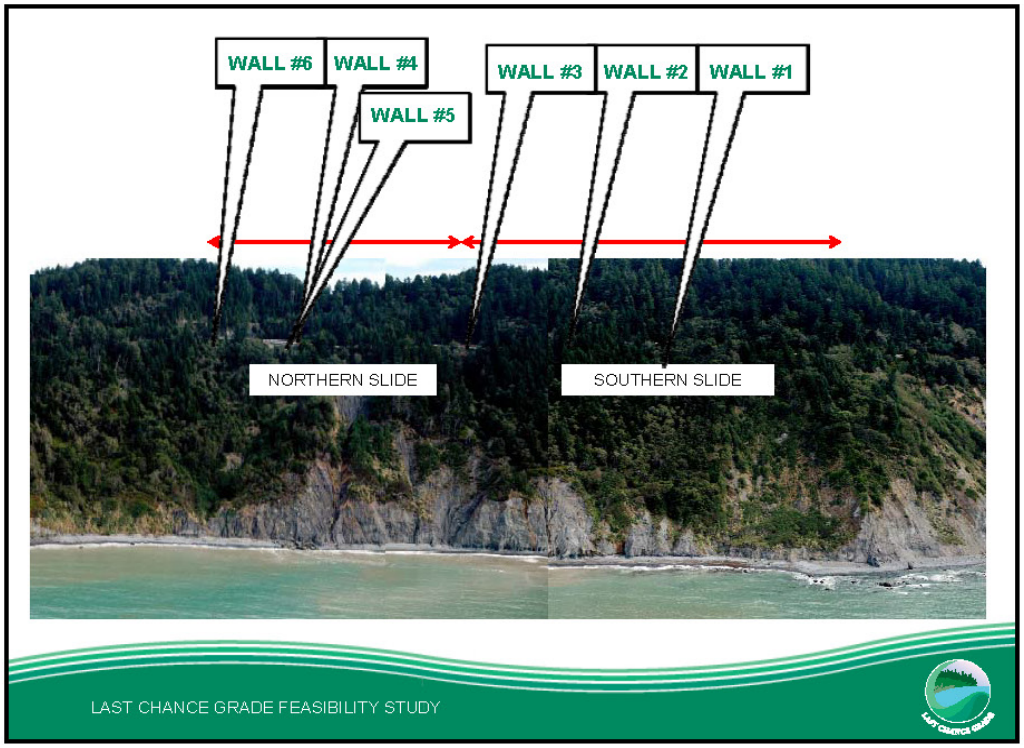
GEOLOGY

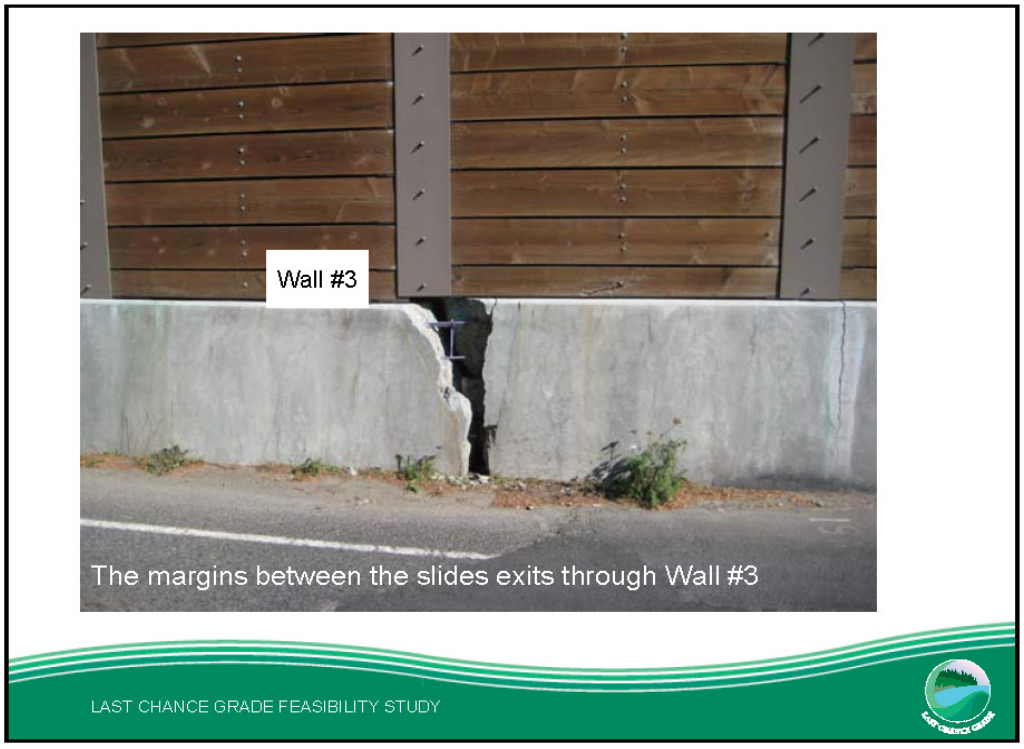
US LANDSLIDE OVERVIEW MAP






DN-101
BROKEN FORMATION
LAST CHANCE GRADE FEASIBILITY STUDY


WALL #6
WALL #4
WALL #5
WALL #3
WALL #2
WALL #1
NORTHERN SLIDE
SOUTHERN SLIDE
LAST CHANCE GRADE FEASIBILITY STUDY


Wall #3
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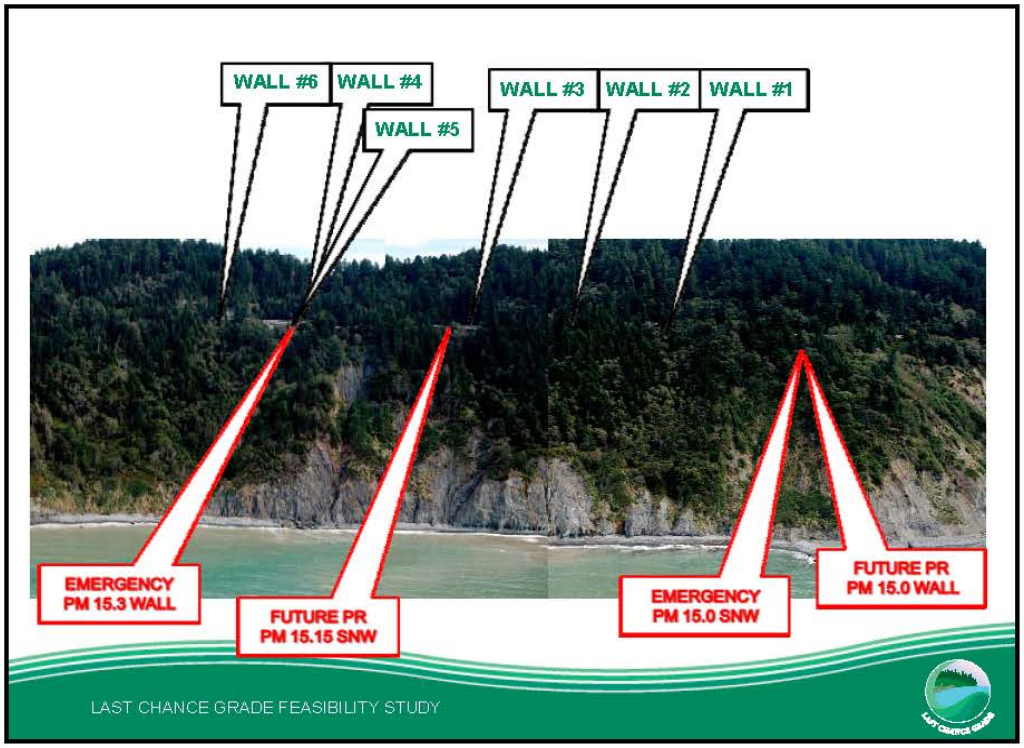
LAST CHANCE GRADE FEASIBILITY STUDY


WALL #6
WALL #4
WALL #5
WALL #3
WALL #2
WALL #1
EMERGENCY PM 15.3 WALL
FUTURE PR PM 15.15 SNW
EMERGENCY PM 15.0 SNW
FUTURE PR PM 15.0 WALL
LAST CHANCE GRADE FEASIBILITY STUDY


Mill Creek
Del Norte County
Last Chance Grade is also…
• Adjacent to an Internationally Unique Biosphere and World Heritage Site
• In an Area of Cultural Importance
• Vital to Community Connectivity and the County Economy

IN SUMMARY…

- Project/Closure History
- Geology
- Increasing Costs and Storm Event Frequency
- Public Concern
- Potential Community and Economic Impacts
- Environmental and Cultural Sensitivity

… COMPLEX PROBLEM

LAST CHANCE GRADE FEASIBILITY STUDY

LAST CHANCE GRADE PARTNERS

- Caltrans District 1
- California Department of Parks and Recreation
- National Park Service
- Yurok Tribe
- Smith River Rancheria
- Elk Valley Rancheria

LAST CHANCE GRADE FEASIBILITY STUDY

LAST CHANCE GRADE FEASIBILITY STUDY

LOCATION MAP

PURPOSE

- Study sustainable alternatives for a permanent solution to instability and potential roadway failure
- Consider alternatives that:
  - Reduce maintenance costs
  - Provide a more reliable connection
  - Protect economic, environmental, and cultural resources

NEED

- Landslides and road failures are an ongoing problem for decades
- 2000 CA Geological Survey study mapped 200+ historical and active landslides between Wilson Creek and Crescent City
- Caltrans has conducted many construction projects and maintenance activities in the area
- Cost of landslide mitigation projects since 1980—over $36 million
- Need for a long-term solution

DESCRIPTION

- Will investigate and assess a range of alternatives to address segment of Hwy 101 impacted by landslides and increasing instability
- Partnership formed to study and develop feasible solutions fully integrating environmental and cultural resources considerations

LAST CHANCE GRADE FEASIBILITY STUDY

FEASIBILITY STUDY PROCESS TIMELINE

LAST CHANCE GRADE FEASIBILITY STUDY

ALTERNATIVES

FACTORS CONSIDERED

- Overall length
- Added length and travel time
- Construction length, footprint and schedule
- Roadway excavation and fill required for grading
- Structures included (bridges, culverts, tunnels)
- Cost
- Protection of cultural, environmental and scenic resources
- Old-Growth Redwood Trees
- Length within State/National Parks
- Watershed crossings

LAST CHANCE GRADE FEASIBILITY STUDY

DESIGN CONSIDERATIONS

- 7% maximum grade
- Route Concept
  - 2 Lane conventional highway with truck passing lanes
  - 12 ft. lanes, 8 ft. shoulder
- Design Speed—55 MPH
- Turning Radius—1,100 ft. minimum
- Structures limited to maximum 200 ft. height
- Cut/fill 200 ft. maximum height
- Cut slopes 1.5/1 ratio
- Protect sensitive cultural, environmental and scenic resources

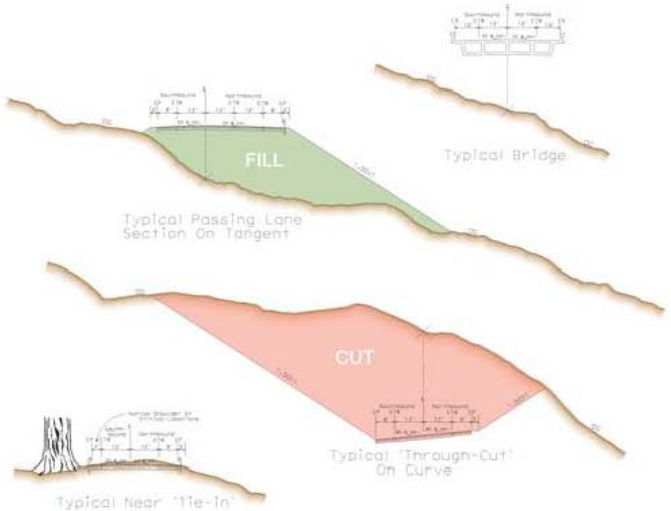
LAST CHANCE GRADE FEASIBILITY STUDY

GEOLOGICAL SURVEY

GEOLOGICAL SURVEY

Note: Landslides shown were derived from USGC study of the 101 corridor along Last Chance Grade. Landslides have not been fully mapped along Alternative E.

ROADWAY CROSS SECTION



LAST CHANCE GRADE FEASIBILITY STUDY

PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

PRELIMINARY ALTERNATIVES FOR STUDY

ALTERNATIVE A1

Rudisill Road to LCG Tunnel

(Includes 2,010 ft. tunnel)

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 11.1 mi
- Added Time: 1.2 min

New Construction

- Length: 1.0 mi
- Footprint: 76 acres
- Schedule: 3 years

Cost (in Millions)

- Minimum: $340M
- Maximum: $460M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 7 acres
- Riparian: 1 acre
- Clear cut: 13 acres
- Young Redwood Forest: 54 acres
- Mature Redwood Forest: 0 acres
- Old Growth Redwood Forest: 1 acre

ALTERNATIVE A2

Rudisill Road to Damnation Trailhead

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 10.9 mi
- Added Time: 0.9 min

New Construction

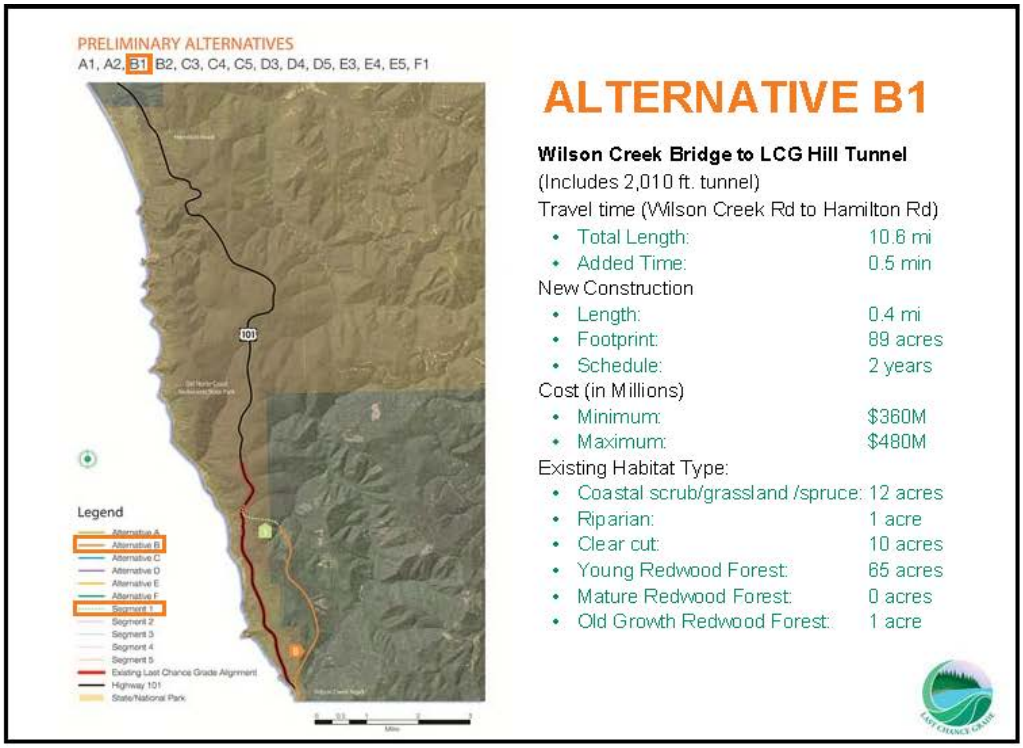
- Length: 0.8 mi
- Footprint: 80 acres
- Schedule: 2 years

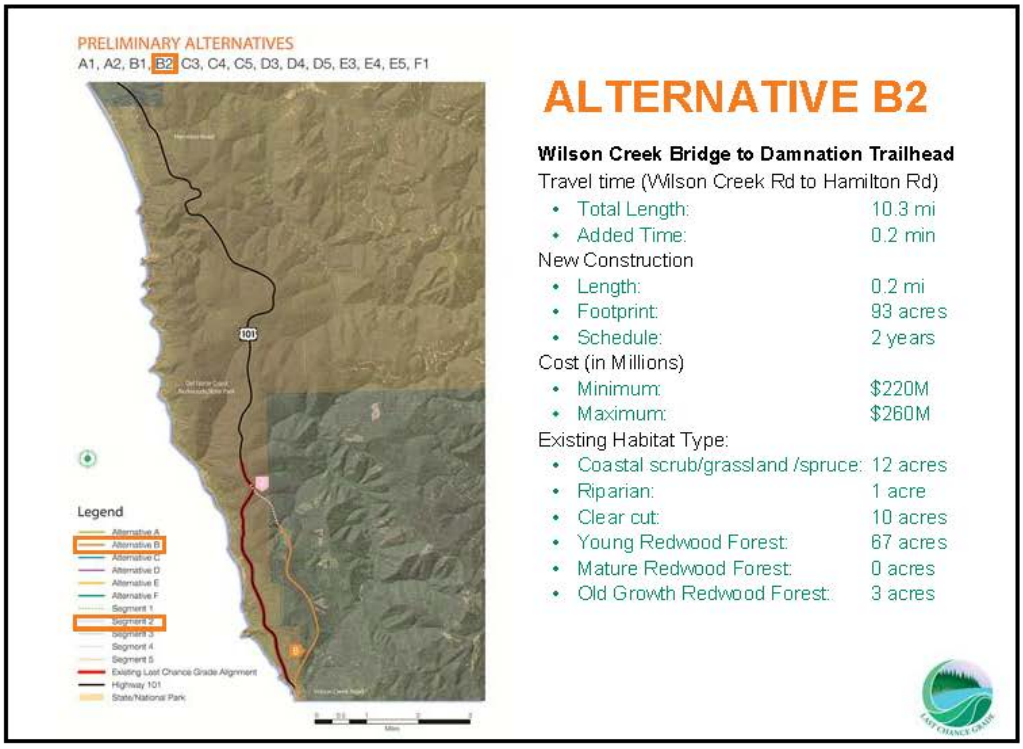
Cost (in Millions)

- Minimum: $210M
- Maximum: $250M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 7 acres
- Riparian: 1 acre
- Clear cut: 13 acres
- Young Redwood Forest: 56 acres
- Mature Redwood Forest: 0 acres
- Old Growth Redwood Forest: 3 acres


PRELIMINARY ALTERNATIVES
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1
Legend
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Existing Last Chance Grade Alignment
Highway 101
State/National Park
ALTERNATIVE B1
Wilson Creek Bridge to LCG Hill Tunnel
(Includes 2,010 ft. tunnel)
Travel time (Wilson Creek Rd to Hamilton Rd)
• Total Length: 10.6 mi
• Added Time: 0.5 min
New Construction
• Length: 0.4 mi
• Footprint: 89 acres
• Schedule: 2 years
Cost (in Millions)
• Minimum: $360M
• Maximum: $480M
Existing Habitat Type:
• Coastal scrub/grassland /spruce: 12 acres
• Riparian: 1 acre
• Clear cut: 10 acres
• Young Redwood Forest: 65 acres
• Mature Redwood Forest: 0 acres
• Old Growth Redwood Forest: 1 acre


PRELIMINARY ALTERNATIVES
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1
Legend
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Existing Last Chance Grade Alignment
Highway 101
State/National Park
ALTERNATIVE B2
Wilson Creek Bridge to Damnation Trailhead
Travel time (Wilson Creek Rd to Hamilton Rd)
• Total Length: 10.3 mi
• Added Time: 0.2 min
New Construction
• Length: 0.2 mi
• Footprint: 93 acres
• Schedule: 2 years
Cost (in Millions)
• Minimum: $220M
• Maximum: $260M
Existing Habitat Type:
• Coastal scrub/grassland /spruce: 12 acres
• Riparian: 1 acre
• Clear cut: 10 acres
• Young Redwood Forest: 67 acres
• Mature Redwood Forest: 0 acres
• Old Growth Redwood Forest: 3 acres

PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

ALTERNATIVE C3

Rudisill Road to South of Mill Creek Access

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 11.9 mi
- Added Time: 2.1 min

New Construction

- Length: 1.7 mi
- Footprint: 249 acres
- Schedule: 3 years

Cost (in Millions)

- Minimum: $490M
- Maximum: $570M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 7 acres
- Riparian: 1 acre
- Clear cut: 13 acres
- Young Redwood Forest: 205 acres
- Mature Redwood Forest: 23 acres
- Old Growth Redwood Forest: 0 acres

PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1

ALTERNATIVE C4

Rudisill Road to North of Mill Creek Access

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 11.7 mi
- Added Time: 1.8 min

New Construction

- Length: 1.5 mi
- Footprint: 269 acres
- Schedule: 4 years

Cost (in Millions)

- Minimum: $540M
- Maximum: $630M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 7 acres
- Riparian: 1 acre
- Clear cut: 13 acres
- Young Redwood Forest: 205 acres
- Mature Redwood Forest: 43 acres
- Old Growth Redwood Forest: 0 acres

PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, **C5**, D3, D4, D5, E3, E4, E5, F1

ALTERNATIVE C5

Rudisill Road to Hamilton Road

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 12.7 mi
- Added Time: 3.1 min

New Construction

- Length: 2.6 mi
- Footprint: 331 acres
- Schedule: 4 years

Cost (in Millions)

- Minimum: $730M
- Maximum: $850M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 7 acres
- Riparian: 1 acre
- Clear cut: 13 acres
- Young Redwood Forest: 217 acres
- Mature Redwood Forest: 93 acres
- Old Growth Redwood Forest: 0 acres

PRELIMINARY ALTERNATIVES

A1, A2, B1, B2, C3, C4, C5, **D3**, D4, D5, E3, E4, E5, F1

ALTERNATIVE D3

Wilson Creek Bridge to South of Mill Creek Access

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 11.3 mi
- Added Time: 1.4 min

New Construction

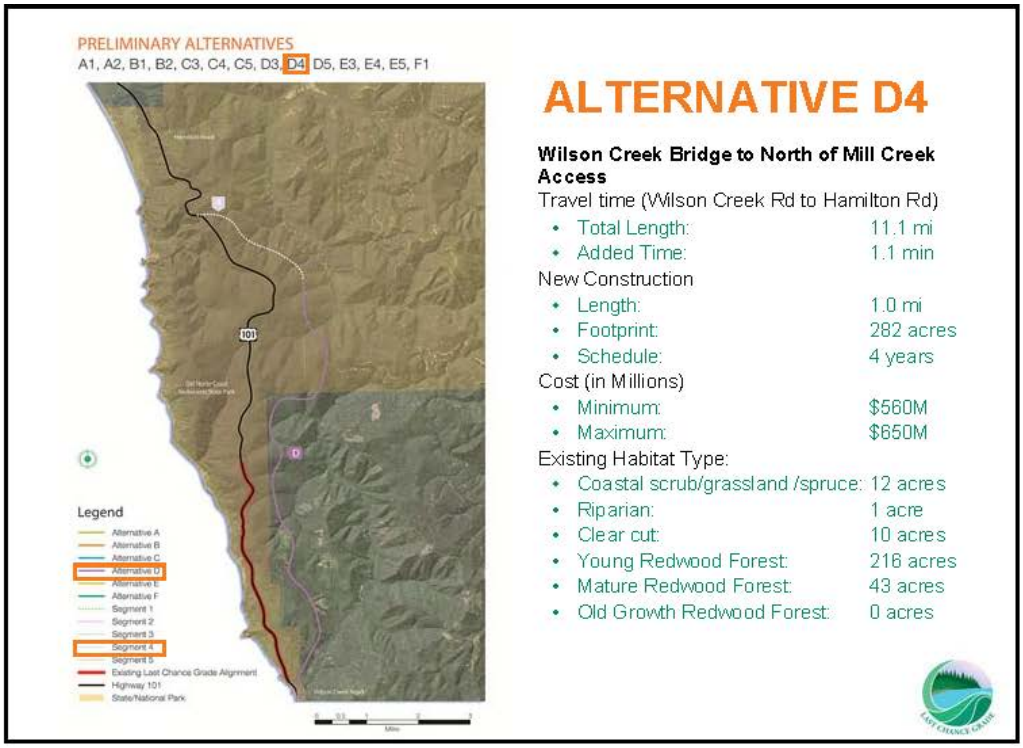
- Length: 1.2 mi
- Footprint: 262 acres
- Schedule: 3 years

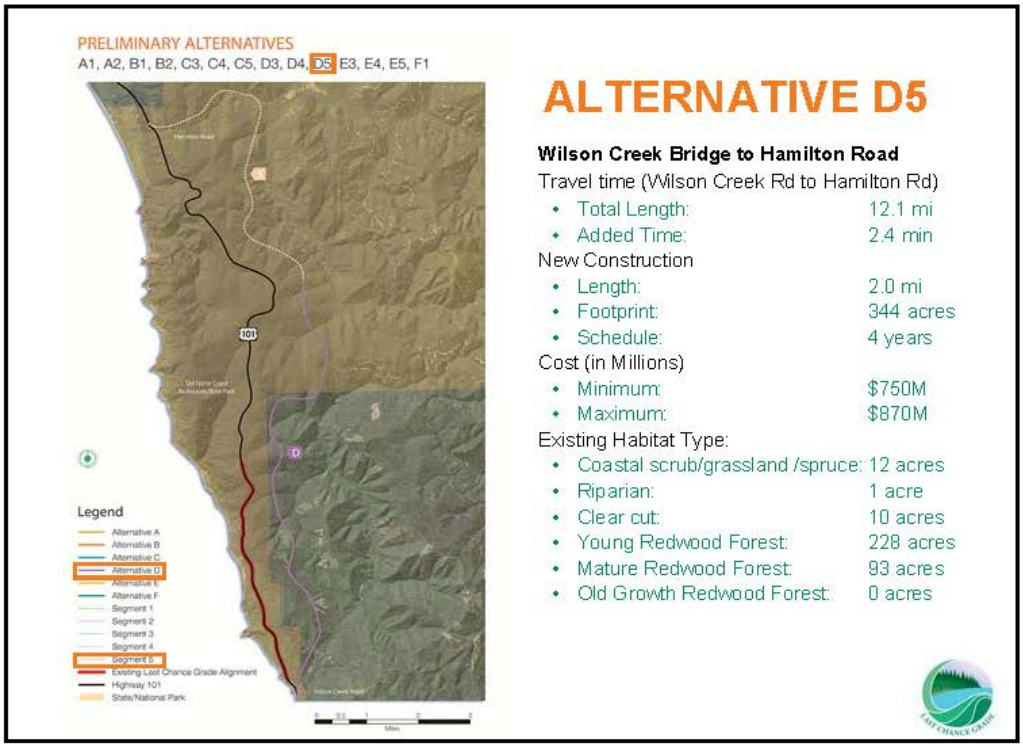
Cost (in Millions)

- Minimum: $510M
- Maximum: $590M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 12 acres
- Riparian: 1 acre
- Clear cut: 10 acres
- Young Redwood Forest: 216 acres
- Mature Redwood Forest: 23 acres
- Old Growth Redwood Forest: 0 acres


PRELIMINARY ALTERNATIVES
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1
ALTERNATIVE D4
Wilson Creek Bridge to North of Mill Creek Access
Travel time (Wilson Creek Rd to Hamilton Rd)
• Total Length: 11.1 mi
• Added Time: 1.1 min
New Construction
• Length: 1.0 mi
• Footprint: 282 acres
• Schedule: 4 years
Cost (in Millions)
• Minimum: $560M
• Maximum: $650M
Existing Habitat Type:
• Coastal scrub/grassland /spruce: 12 acres
• Riparian: 1 acre
• Clear cut: 10 acres
• Young Redwood Forest: 216 acres
• Mature Redwood Forest: 43 acres
• Old Growth Redwood Forest: 0 acres
Legend
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Existing Last Chance Grade Alignment
Highway 101
State/National Park


PRELIMINARY ALTERNATIVES
A1, A2, B1, B2, C3, C4, C5, D3, D4, D5, E3, E4, E5, F1
ALTERNATIVE D5
Wilson Creek Bridge to Hamilton Road
Travel time (Wilson Creek Rd to Hamilton Rd)
• Total Length: 12.1 mi
• Added Time: 2.4 min
New Construction
• Length: 2.0 mi
• Footprint: 344 acres
• Schedule: 4 years
Cost (in Millions)
• Minimum: $750M
• Maximum: $870M
Existing Habitat Type:
• Coastal scrub/grassland /spruce: 12 acres
• Riparian: 1 acre
• Clear cut: 10 acres
• Young Redwood Forest: 228 acres
• Mature Redwood Forest: 93 acres
• Old Growth Redwood Forest: 0 acres
Legend
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Existing Last Chance Grade Alignment
Highway 101
State/National Park

ALTERNATIVE E3

Wilson Creek Road to South of Mill Creek Access

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 14.3 mi
- Added Time: 4.9 min

New Construction

- Length: 4.1 mi
- Footprint: 299 acres
- Schedule: 4 years

Cost (in Millions)

- Minimum: $680M
- Maximum: $790M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 0 acres
- Riparian: 22 acres
- Clear cut: 0 acres
- Young Redwood Forest: 254 acres
- Mature Redwood Forest: 23 acres
- Old Growth Redwood Forest: 0 acres

ALTERNATIVE E4

Wilson Creek Road to North of Mill Creek Access

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 14.1 mi
- Added Time: 4.7 min

New Construction

- Length: 3.9 mi
- Footprint: 319 acres
- Schedule: 4 years

Cost (in Millions)

- Minimum: $730M
- Maximum: $850M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 0 acres
- Riparian: 22 acres
- Clear cut: 0 acres
- Young Redwood Forest: 254 acres
- Mature Redwood Forest: 43 acres
- Old Growth Redwood Forest: 0 acres

ALTERNATIVE E5

Wilson Creek Road to Hamilton Road

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 15.1 mi
- Added Time: 5.9 min

New Construction

- Length: 5.0 mi
- Footprint: 381 acres
- Schedule: 4 years

Cost (in Millions)

- Minimum: $920M
- Maximum: $1,070M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 0 acres
- Riparian: 22 acres
- Clear cut: 2 acres
- Young Redwood Forest: 264 acres
- Mature Redwood Forest: 93 acres
- Old Growth Redwood Forest: 0 acres

ALTERNATIVE F1

LCG Tunnel - Full Tunnel Parallel to E

(5,422 foot tunnel)

Travel time (Wilson Creek Rd to Hamilton Rd)

- Total Length: 10.0 mi
- Added Time: 0.2 min

New Construction

- Length: 1.3 mi
- Footprint: 4 acres
- Schedule: 6.5 years

Cost (in Millions)

- Minimum: $450M
- Maximum: $700M

Existing Habitat Type:

- Coastal scrub/grassland /spruce: 2 acres
- Riparian: 0 acres
- Clear cut: 0 acres
- Young Redwood Forest: 0 acres
- Mature Redwood Forest: 1 acre
- Old Growth Redwood Forest: 1 acre

Economic Impact Study

- ↑ $1.3 mil /day ($450 mil/yr) travel delay & vehicle operating costs
- ↓ $300 to $400 mil Output to Del Norte Economy
- ↓ 3,000 to 4,000 jobs and $100 to $130 mil/yr wages

= **Good Investment**

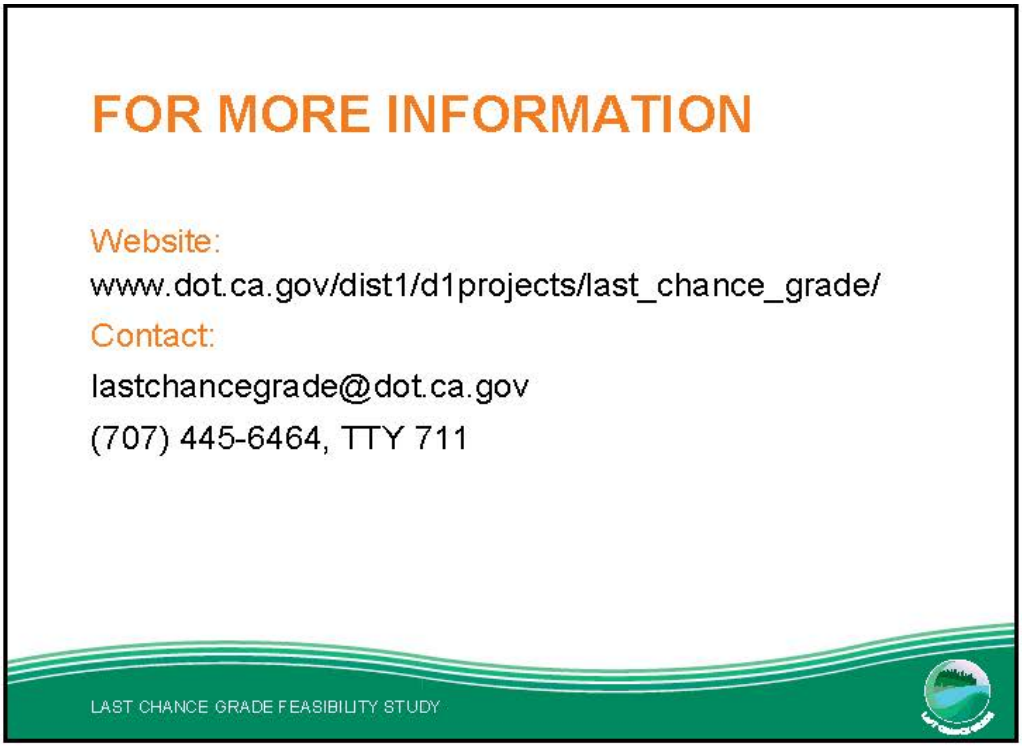
SMALL GROUP DISCUSSION

CONCLUSION AND NEXT STEPS

NEXT STEPS

- Final Feasibility Study
- Begin Project Study Report (July 2015)
- Refine Alternatives
- Complete Project Study Report (July 2016)
- Seek Funding
- Begin Environmental Studies and Documents

LAST CHANCE GRADE FEASIBILITY STUDY


FOR MORE INFORMATION
Website:
www.dot.ca.gov/dist1/d1projects/last_chance_grade/
Contact:
lastchancegrade@dot.ca.gov
(707) 445-6464, TTY 711
LAST CHANCE GRADE FEASIBILITY STUDY

APPENDIX C: SMALL GROUP DISCUSSION NOTES

CRESCENT CITY

Group 1

Question 1 (your experience)

- Passable
- Delays maintenance
- Nervous traveling through ✓
- Urgent matter
- Visually beautiful ✓✓
- Cyclists in summer

Question 2 (reactions to Alternatives)

- Loss of view
- Design speed (lower)
- Turn outs for trucks
- Bicycle facilities
- Effect on local tourism/economy
- Narrow down list of alternatives
- Engaging interest groups early in process
- Use of old railroad for potential recreational use would be eliminated in tie-ins 4 and 5
- Mitigation for loss of environmental resources
- New view opportunities

Parking Lot

- Concern: loss of view
- Lower speed (designed)
- Turn outs/trucks
- Commerce
- Bike lanes/space

Group Report Notes – Group 1

- Question 1:
  - Be passable – is, but problems
  - Delays for maintenance
  - Nervous traveling through
  - Urgent matter – all the way down to Mendocino coming aboard
  - Visually beautiful
  - Cyclists in summer
- Question 2 reaction:
  - Loss of view
  - Design speed (lower)
  - Turnouts for trucks
  - Bike facilities

- Effect on tourism and economy
- Narrow down list of alternatives
- Engage interest groups early
- Admire Caltrans and parks for efforts to coordinate with tribes
- Old railroad right-of-way
- Mitigation
- New view opportunities other side of mountain

Group 2

Question 1 (your experience)

- Hold your breath
- Time delay/cost during repairs (Lane closures; >15 minutes)
- I won't travel it

Question 2 (reactions to Alternatives)

- Time frame
- Planning process oriented around politics (i.e. partners have only had input) and less focus on public safety/health and economy. Too much environmental focus. Hazards: earthquake, tsunami
- Total disconnection devastating
  - Hospital
  - LCG
  - Airport
  - Integrity of Highway 199
- Public safety should be #1 criterion
- Environmental criteria also important: salmon, landslides
- Humans are not named as important factor
- No tunnel
- Alternative "F" is a joke. Too short – does no good.

Question 3 (Preferred Alternatives)

- Preferred: B2 best…stable and safe (from experience)
  - Length, cost and time
  - Preserves scenic qualities
- No build – don't do.

General

- Should be more partners
  - Crescent City
  - Del Norte County
  - Harbor District
  - All four CSD's
  - Local Transportation District

Group Report Notes – Group 2

- Hold your breath
- Time delays, cost

- Alternatives:
  - Time frame
  - Planning process – oriented around politics
  - Limited partners
  - Less focus on safety
  - Too much environmental focus
  - Hazards – tsunami, earthquake
- B2 is preferred alternative – assuming stable and safe – cost, time, preserves scenery

Group 3

Question 1 (your experience)

- Multiple trips ✓
- Safety – Cushing Creek (head on collision) ✓
  - Distance between lanes

Question 2 (reactions to Alternatives)

- Timely completion
- Cost
- Environmental stoppage i.e. 199/Richardson's Grove
- Two lane concept
- Funding

Question 3 (Preferred Alternatives)

- Partners preference
- Turnouts
- pullouts

Parking Lot

- Two lane concept
- Funding what's available

Group Report Notes – Group 3

- Reporter knows road well – res. engineer
- Experiences:
  - Many travel every day
  - Concerns re safety
  - There were previously head on collisions where barrier put in – barrier good
  - Nervous because width of roadway is so narrow – trucks around corners
- Issues/concerns:
  - Timing – will it be done?
  - Cost
  - Del Norte funding – unlikely
  - Environmental stoppage – lawsuits
  - 2-lane concept – want four lane – or different 2 lane
  - Funding? Possible? Where?

- Q3:
  - What are partners' preferences – all on boards?
  - Do they have preferred alternatives?
  - Turnouts – passing
  - Pullouts – actually have rest stops, maintenance

Group 4 (note: questions not clearly marked on page)
- Safety project effectiveness: has the projects slowed the slide
- Safety concerns
- Old growth locations
- Stability in the Cascadia Zone ✓
- Tunnel stability and feasibility
- Time concerns
- Geotechnical feasibility priority
- Litigation concerns: will lawsuits stop project
- Isolation in an emergency situation ✓
  - Emergency services impacts
- Travel time vs. road stability ✓
  - Travel time nearly negligible
- Construction length
- Tunnel missing scenery, safety
- Tourism impacts
- Expedite timeline

Group 4 Summary:
- Safety/reliability
- Cascadia subduction event
- Impacts to ecosystem/tourism
  - Salmon
  - Old growth
- Expedite the project!
  - How do we get results sooner?

Group Report Notes – Group 4
- Group reporter from Save the Redwoods; diverse group including police, landowners, etc.
- Four points:
  1. Safety/reliability – even though interested in tunnel – but dangerous?
  2. landowners – Cascadia subduction aone – several-100-year event – which alternative will survive that? Geotech and feasibility important. Tunnel: under English Channel, BART, etc. – not automatically a bad idea but better be safe
  3. impacts to tourism and ecosystem. People come here for redwoods, wild salmon but they are coming – protect for long-term
  4. expedite – what can be done to move forward sooner than later?

Group 5

Question 1 (your experience)

- Daily commuter for 3 years to Eureka; since – several times a month
  - Headache/scares his wife
  - Safety
- Local Transportation Commission
  - Hears safety concerns regularly
  - Impact to travel time as result of damage

Question 2 (reactions to Alternatives)

- Improvements in timely fashion (schedule) ✓
- Mile long tunnel (Alt. F) is concern
- Too many alternatives impact Wilson Creek fisheries
- Shortest/most direct route
- Cost
- F1 less environmental impact
  - Shortest, less _____, forest, fisheries

Question 3 (Preferred Alternatives)

- Cost
- Safety (A)
- Environmental impact (B)
- Travel time
- Schedule
- A1 - improved geotechnical alignment
- B1 – fisheries/aquatic habitat
- Likes/dislikes about alternatives
- Consider alignment on coastal trail

Group Report Notes – Group 5

- Concerns:
  - Travel time
  - Safety
  - Schedule – how long will it take
  - Geotech align
  - Feasibility? Tunnel or around forest
  - Environmental impact – forest, fisheries
- Much like other groups

Group 6

- Keep road open, even during construction (#2)
- Experience – drive through
- Safety a big concern (#1)
- One lane a hassle
- Travel time an issue

- Two lane vs. multiple lanes
- PCRSP bypass is 4-lane and no more traffic than LCG
- Not if, when it will fail – how to deal with it
- New alternative – toll bridge over ocean, especially if costs are already high
- Do parks agree with an alternative? Do that one
- Community will agree on any route that works continually, but environmental concerns will come out first – need to balance
- Who will choose? Ultimately the partners
- U.S. Highway – will funding be federal?
  - Address funding process
- Provide for future expansion from two- to four-lane
  - Route concept of two lane keeps some traffic off because it's a winding road
  - Multi-users (traffic types) need to be considered
  - Population growth will increase traffic
- 18-20 mile tunnel between Switzerland and Italy
- Alternative most inland has least chance of being affected by Cascadia event
- Shortest route with least impact on redwoods (#3)
- Need to look at accident rate and severity
- Community learned from 199/197 project – start looking at all funding sources now
- Funding agencies don't want to look at high annual maintenance costs
- Get something under construction now in advance of failure
- At what point would LCG be an emergency (without complete failure? like Confusion Hill) (#4)
- An emergency declaration cuts red tape

Summary

- Safety a big concern
- Keep road open during construction
- Shortest route with least impact to redwoods
- At what point of failure would LCG be considered an emergency, without complete failure, i.e. Confusion Hill

<u>Group Report Notes – Group 6</u>

- Group reporter: diverse group
- Resounding message – act now, be proactive – not IF but WHEN
- Safety is big concern
- Keep open during construction
- Shortest distance, least impact on old growth
- What point of failure is considered an emergency without complete failure?
- Consider a promontory bridge – charge toll – tourist attraction
- It's a regional project – major route
- Will impact many counties
- Do now, pick least impact, think out of box

Group 7

Question 1 (your experience)

- Safety ✓✓
- Reliability
- Imminent failure
- Tunnels
- Timeline – public agency
- Waste money
- Movement of roadway
- Continuous issue band-aid
- Economic hardship to local business
- Scary to travel
- Noticeable change on road

Question 2 (reactions to Alternatives)

- Rudisill Creek as alternative
- Three acres of Old Growth Redwood not an issue to save money
- Don't like longer routes
- Some loss of Old Growth Redwood okay if D6 is protected in former alignment
- Practicable and safety prime focus
- Toll road to collect funds
- Feasibility
  - What's practical to get through compliance hoops
  - Geotechnical feasibility
- No tunnels
- Stay out of important fish watersheds

Important Criteria

- Costs
- Safety
- Implement in short timeline – expedite project
- Lessen impact to fish

Group Report Notes – Group 7

- Group reporter Mary Wilson, involved with tourism industry
- Concern re safety of road now
  - Klamath resident – sets out on road thinking, is this the day?
  - Travels every other day to Eureka for medical reasons – scary
- Economic impacts
  - Concern – thankful economic study was done. Not sure it includes all impacts – e.g. many Del Norte real estate sales are to people from further south
- Rudisill Creek as alternate road – not concerned with 3 acres of old growth vs. human safety
- Wanted cheaper alternative – more likely to get funded
- Have to take trees out sometimes
- Concern re fisheries

- Toll road
- Concern re feasibility – enviro lawsuits
- Didn't like tunnel – people come here to see redwoods
- Cost / safety / quickly / cheaper / no fish impact
- A2 is #1 choice
- C3 is #2 choice

Group 8

Flipchart Notes

- Ferries and buses
- Golden Gate Bridge District
- EIFD (Enhance Infrastructure Finance District)
- Which option is a nicer road to travel on? Smooth curves, scenic, uphill climbs
- Habitat modification setting precedent with regards to Richardson's Grove. Clear cutting redwoods
- All areas of the economy affected including potential clients
- Con - removing old growth redwoods
- Maintaining access to 101 and trails
- Existing power lines utilization

Question 2

- Building a road over the ocean (causeway)

Detailed Notes (from group notetaker)

Question 1: What is your experience with LCG?

Answer: Three group members were business owners and each of them either drive or have clients drive the grade 2-3 times per week. One group member says it's an emotional drive for her because she has a close friend whose parents died as a result of LCG failing.

Question 2: What do you think about the alternatives? (Features)

Answers: 1) The biggest concern was cost. The group feared that if the alternatives were too expensive then there is no way the project will ever get funded/built.

2) There was a big concern for a "smooth" ride. It seems that people do not want another windy road because it's hard to encourage economic growth when the roads are so hard to traverse.

3) Continued community input was important to the group. There is lots of concern about who makes the decisions that affect their community.

Question 3: Alternative Suggestions

Answers: 1) Ferries that could shuttle people to Crescent City without having to drive LCG

2) An ocean causeway that could bypass the hill completely.

3) No major suggestions to change existing alternatives but the group did not like the long/expensive alternatives. The short cost/construction time alternatives were the most accepted.

Group Report Notes – Group 8

- Concerned about economic impacts – lots of business owners, client using road, shipping goods
- Overall safety – concerned re. traveling often
- Consider ferries and buses for transporting larger numbers
- Golden Gate Bridge district potential partners – have vested interests
- EIFD – enhanced infrastructure finance district – both north to Curry County and south to SF
- More pleasant option for road – smooth, no bad uphill
- Impacts to Old Growth – keep minimal
- If alternate route bypassed parks and redwoods – what is intention – existing route, powerlines? Map out to determine best route
- Causeway

EUREKA

Group 1

Question 1 (your experience)

- Occasional delay
- Vital
- Nervous/dangerous
- Intimidated tourists
- Guardrail locations

Question 2 (reactions to Alternatives)

- Least expensive ✓
- Least impact to environment, timberlands and parkland ✓
- Driving time not a big factor
- Environmental impacts more important than cost
- Maintenance costs of alternatives
- Dependability of alternatives

Question 3 (Preferred Alternatives)

- Not letting cost/resources discount viable alternatives due to impact of total failure

Group Report Notes – Group 1

Q1: Agreed that it's vital; cost of losing LCG greater than that of any alternative
Q2: Minimize resource impacts – overall footprint. Dependability of alternatives – take into account ongoing costs, reliability
Q3: When considering impacts – don't discount any alternative due to info on chart

Group 2

Question 1 (your experience)

- Reliability
- Significant link
  - Livability
  - Isolation of Eureka
- Scenic

Question 2 (reactions to Alternatives)

- Old Growth
  - Shorter less impact
- Salmon habitat

Question 3 (Preferred Alternatives)

- Stabilize current alignment
  - Wave zone at base of slope
- Shorter tunnels
  - Avoid old growth (B2 connector)
  - Viaduct

Parking Lot

- Group members' occupations

    - State Senator's office
    - Retired
    - Former Caltrans
    - EPIC
- Wilson Road ownership
- Difference from previous tunnels

Group Report Notes – Group 2

- Q1:
    - Agreed with first group
    - Reliability not good now for all sorts of use
    - Significant link for general regional transportation – loss isolates Del Norte County but also Eureka/Humboldt County. Limited to 3 access roads – more isolated than Crescent City if LCG goes down
    - Scenic now
- Q2:
    - Environmental impacts significant – concern re. old growth
    - Shorter alternatives have greater tree impact and impact on habitat
- Q3 – alternatives to consider:
    - Stabilize current alignment – more study
    - Eliminate natural bluff
    - Another option – shorter tunnels that avoid old growth habitat, viaducts inbetween

Group 3

Question 1 (your experience)

- Drop 3" in 8 *hours*
- Driven for 42 years. Wants 4 lanes for safety (bikes, recreational use). Spectacular views.
- Use recreationally. Not safe now, especially for bikes. Nice scenically. Needs 8' shoulders.
- Business uses. Concerns: Funding to post-build due to geology.

Question 2 (reactions to Alternatives)

- "Permanent" – will any really work long-term? ✓✓
- Future study: costs for loss of eco resources (ecological services) – short/long-term, indirect/direct and mitigation for loss of public lands
- Like tunnel – less impact
- Needs to be 4 lanes
- Wilson Creek option: damaging to the creek
- Passing lanes necessary

Question 3 (Preferred Alternatives)

- Haven't been considered
- Focus impacts on the resources that can be easily mitigated – natural and cultural ✓✓✓

- Takes costs into account
- Scenic beauty
- Take business interests into account: wide enough for larger trucks

Question 4(?)

- Maintain current conditions – what is the "no action" alternative?
- What happens to the old highway after build?

Group Report Notes – Group 3

- Q1:
  - One person has drive for 42 years – favored four lanes for safety, esp. bikes
  - Spectacular views
  - Wider shoulders, especially for bikes to enjoy views
- Q2:
  - Is permanent solution really permanent?
  - Further study needed – mitigation for cost of ecological services – what eco resources do for environment – also loss of public lands
  - Liked tunnel – least impact
  - Concern re Wilson Creek due to impact
- Q3:
  - More focus on scenery
  - Business concerns – wider for trucks
  - Impacts on cultural resources are hard to mitigate
  - Is there a "No Action" alternative?
  - What will happen to old highway after bypass?

Group 4

Question 1 (your experience)

- Diane
  - Concerned about safety
- Mike
  - Frequent traveler
  - Concerned about safety
  - His company's on the _____ *[sentence not finished in notes]*
- Monty
  - From Southern Oregon
  - Two times/month
  - Concerned about what the condition of road is
  - Would like to avoid entire area – cost effective
- Deena
  - LCG can be scary
  - Frequent traveler

Question 2 criteria

- Diane
  - Avoid old growth redwoods
- Mike
  - Avoid or minimize impacts
- Monty
  - Economic impact
  - Ex. ICC part is in Del Norte – direct impact to Humboldt _____ *(illegible)*
  - Stability
- Deena
  - Environmental impacts

Question 3 Additional Alternatives

- Monty
  - Concerned about geotech investigations
  - Wants most reliable route
  - Short term reactions to failure
- Deena
  - Litigation (time and cost)

Which one?

- C5 ✓✓✓
- Concerns about impacts on bicycle/pedestrian traffic ✓
- Shoulder width ✓

Key Points

- Group is concerned about impacts on N.R.
- Cost is not a big factor
- Reliability and safety of alternative is very important
- Route C5 seemed best

Group Report Notes – Group 4

- Concerned with impact to natural resources weighing with long term stability
- Many in group drive it lots
- Impact of litigation – don't move too quickly
- C5 – everyone liked – less impact – stable
- Considerations for bike travel
- Cost major factor – long-term stable & safe more important than cost

KLAMATH

Group 1

Question 1 (your experience)

- Need of repair. Bumpy.
- Failure of current road inevitable ✓✓
- Anxious / nervous / unsafe / dangerous ✓✓✓
- Delays (impacting businesses) ✓
- Beautiful, scenic ✓✓
- Costly to maintain, Band-Aid
- Not knowing current condition of road

Question 2 (reactions to Alternatives)

- Too many alternatives ✓
- Least environment impact
- Cost effective
- Shortest route
- No Build alternative?
- Tunnels in seismic zone – high maintenance cost ✓
- LCG not the only vulnerable spot
- More detail needed on environmental impact (old growth and species)
- Impact to tourism/local business
- Any alternative is better than the existing alignment
- Funding?

Question 3 (Your preferred alternatives or suggestions)

- Maintain "old" route as tourist destination (ex.: bike/ped)
- Use money from any cut redwoods (if any) to help offset costs

Parking Lot

- Maintain "old" route for bike/ped
- Use money from cutting down trees to offset cost or donating to Yurok Tribe

Group Report Notes – Group 1

- Q1 – 3 main points:
  - Roads need repair – bumpy
  - Anxious driving; nervous, dangerous
  - Cost to maintain and "Band-Aids"
- Q2:
  - General consensus – least environmental impact
  - Cost-effective – tax dollars
  - Safer route
  - Any alternative better than present situation
- Q3:
  - Go with new route – old route intact as bike/hike route
  - Use money from cut redwoods to help fund

Group 2

Question 1 (your experience)

- Stability?
  - Uneasy feeling when crossing
- Scenic ✓
- Delay
- Road sharing, width of roadway
  - Cyclist / car / tourism (stopping to enjoy scene)
- Multiple trips a day

Question 2 (reactions to Alternatives)

- Liked the tunnel
  - Least impact to redwoods
- Cultural impact?
  - Not listed in handout
- More economical in the long run to take the longer alternatives?
  - Durability
  - Longevity
- Get moving
- Funding?
  - Private?
  - Federal?
  - State?
- Stakeholders
  - Tourism – Visitor Bureau, Chamber of Commerce

Question 3 (Preferred Alternatives)

- Turnouts and pullouts
  - Pullouts including rest stops
- Four lane alternatives
  - Paired with longer alternatives
  - More outreach for four-lane vs. two
    - Local business

Parking Lot

- Old road?
  - Seasonal use after project?
  - Low speed tourism?
- Turnouts
- Pullout
- Four-lane
  - Longer alternative at 65 mph?
- Will Caltrans utilize knowledge from Redwoods Bypass?

Group Report Notes – Group 2

- Q1:
  - Stability – uneasy feeling – crossing

    - Width of lanes
    - Delays – late for appointments
    - Road-sharing with bikes, congestion
    - It's so beautiful – scenic quality not overlooked
- Q2:
    - Possible discussion on tunnel – less environmental/cultural impacts
    - Longer route – more tourism, more jobs created by building it, longer-term solution
    - Need to get moving
    - Funding? Some out-of-box ideas
        - All partners' resources – leveraging all
    - Economy of area big factor – include all stakeholders
- Q3:
    - Pullouts for scenic views
    - Four lanes – take polls on four vs. two

Group 3

Question 1 (your experience)

- Why just LCG? Why not a larger project area?
- This impacts South Oregon, Humboldt and Shasta – more stakeholders

Question 2 (reactions to Alternatives)

- Avoid Wilson Creek
- Start project south of Wilson Creek – Minor Creek maybe
- Not very enthusiastic for tunnel
- A1 and A2 are preferred
    - Low impact
    - Cost effective
- Costs?
    - Not a factor
    - US 101 economically important
    - Tourism is vital to the area

Question 3 (Additional alternatives?)

- Another large 4-lane bypass like Drury Parkway
- Water transportation not very feasible

Summary

- More Yurok involvement, especially with cultural impacts
- Tribal involvement with the economic opportunity
- Avoidance of Wilson Creek
    - B, D & E are not preferred (culturally sensitive)
- Option of starting further south – Hunter Creek or Minor Creek

Group Report Notes – Group 3

- Q1:
  - Why only LCG? Whole section from Klamath to Crescent City is falling apart – project is entire area
  - Impacts in Oregon, Humboldt, Shasta
  - Primary tourism area for Japanese and Chinese
- Q2:
  - Tribal view – avoid Wilson Creek – A, B
  - Look at south of Wilson Creek for start – Minor or Hunter Creek
  - Not as enthusiastic for tunnel – being inside not safe if area moving
  - Costs
  - 101 affects economy and tourism
- Q3:
  - Four-lane bypass like Drury Parkway – how did that get passed? – topography the same? – watershed also
  - Ocean is not feasible
  - Yurok Tribe needs to be more involved because of tourism, cultural, economic impacts – avoid Wilson Creek
  - B, D, E not preferred
  - Options start further back

APPENDIX D: COMMENT CARDS

CRESCENT CITY

Several alternatives seem feasible all involve tradeoffs. What are the most important? I'm not sure. It seems to me that the most important issues to consider are those that would prevent the bypass alternative route from being built. I would recommend an in-depth series of interviews with key stakeholders that are in a position to generate enough power to stop the construction of the road. These groups include city counselors, county supervisors, environmental groups, business people that have a financial stake in the road and our area (including Del Norte/Curry/Humboldt Chambers of Commerce, and groups with stakes in cultural resources). A local and perhaps regional stakeholder assessment and engagement follow up plan seems to be essential to the successful completion of this project. It should be done before alternatives are defined!

****

1. PUBLIC SAFETY ISSUE; this is urgent (loss of lives).

2. NO tunnels. This coastline is unstable; it is seismically active. The Cascadia Subduction Zone is long overdue for a large quake. Tunnels are not feasible; too expensive and not geologically sound.

3. Open an alternative route as soon as possible.
- The hillside south of LCG has a large crack that is growing. I do not feel safe traveling on Hwy 101 in this area (Wilson Creek to Crescent City) especially on Last Chance Grade (one small quake and it's down the hillside).
- Alternative routes: A2; B2; C3; C4; and D3 are good options (least cost with the least environmental harm) with consideration of good road terrain and travel time.
- If a bridge in SF was at risk of failure, it would be closed immediately. Why is this road failure not an emergency to California?

****

If this is only 2 lanes, the option that allows later expansion to four or at least 3 lanes should be chosen.
A tunnel laid on the sea floor like the English "chunnel" might be cost effective.

****

Preserve the fisheries of Wilson and Mill Creeks.

****

Most beautiful
Least likely to experience traffic delay
Layer mapping
- existing access
- power lines etc.

TBL: Triple Bottom Line
3 People Planet Profit
3 Public Private Partnership

EIFD
Enhanced Infrastructure Finance District

****

Crescent City borders Oregon. There are impacts that may affect Oregon residents and travelers. Also, could open up more funding options?

****

Let's talk out of the box!
A promontory bridge 1-2.5 miles around the breach, out into the ocean slightly arcing north-easterly around the breach. Could be a toll road. 9th Wonder of the World – tourists would flock to this new work of engineering.

****

Please retain and use a very good (the best!) geotechnical firm to study and evaluate the feasibility and potential safety of the alternatives…especially those involving tunnels. The tunnels appear attractive but there is genuine concern re their reliability and safety.

Old growth redwoods: you might consider providing background info/description to help the general public understand the significance and scarcity of this resource.

Thank you for your excellent work preparing for this workshop! Well done!

****

1. 4 lanes now
2. Where are the cultural lands?
3. Get it done – stop studying forever.
4. Safe, available
5. Pull offs for RVs, rest area
6. Costs so we can get it done

****

Please be sure to weight the answers. Example: if every person sights SAFETY, it needs to be weighted appropriately – not mentioned once and onto next thing on list.

****

My wife drives to Klamath every day to teach at Margaret Keating School. They frequently travel north on field trips. A catastrophic failure would not only inconvenience us all; it could possibly kill my wife and the entire 5 & 6 grade class. Please don't gamble with their lives.

Also; as a tax payer, I would like to see something that resembles fiscal responsibility in your choice of routes. For crying out loud, people work hard for that money.

****

Caltrans and your planning team have gotten this situation tied up in knots, and you have it fundamentally wrong. The tail is now wagging the dog. Your solution is the same as others who yearn to save trees rather than human lives. On a daily basis they plot to discourage the regional economic potential of Del Norte County and surrounding counties, which in effect condemns what otherwise could be a promising future for this precious place. How happy do you think you will be when the steps you are taking with this project lead inevitably toward either (a) doing nothing to bypass a doomed section of highway that is clearly headed for the Pacific Ocean or (b) costing the residents of California so much money that our already egregious taxes will climb much farther as ballot issue and delay the project for decades. In Charlie Fielder's signature approach to keeping his job, you blatantly pander to the powerful few who indeed have no legal right to affect decisions here. I would remind you that duly elected leaders exist in Del Norte County, from 5-person Boards in the four Special Districts that constitutionally govern their associated townships (see California Government Code), the Harbor Commission, the incorporated City of Crescent City, and the County government. All of us are elected by our respective constituencies to uphold the right of Del Norte County's representative population to participate equally in any decision-making process that affects human life, the economy, education, welfare systems, and health services. The national park and state park have no constitutional jurisdiction in the context of those same terms, and the tribes only have a legal right per capita, yet you admitted this evening that these interests exclusively comprise your planning process, vice those of us who are sworn to govern this precious place in a manner beneficial to humans. And, let us not forget the rights of the constitutional stake holders in Coos, Jefferson, and other Oregon county governments situated above and to the east of Del Norte County. You blatantly have ignored legal and constitutional rights in this process, and you are truly getting the basic premise wrong when you put the lives of not more than 3 acres of Redwoods in front of human life in general and the regional future of somewhere around 300,000 people, not to mention the lives and enterprises of those who visit here or who depend upon human and commercial connections within the affected counties. Shame on you for how irresponsibly you have managed this potentially catastrophic situation. One indeed might simplify the gravity of this planning process by observing that four major outcomes will most assuredly determine what becomes of Del Norte County over the relatively short term, meaning in priority order (a) the proposed U.S. Highway 101 Bypass, (b) access to adequate hospital services, (c) the Crescent City Airport's commercial capability, and (d) the integrity of U.S. Highway 199. Earthquakes, tsunamis, and wildfires represent only three of the potentially crippling 8 disasters discussed in Del Norte County's Hazard Mitigation Plan that was approved a few years ago by FEMA and Cal/OES. We know a Cascadia event is on our horizon with 40% likelihood before 2050 and more probably within a few short years, given the now locked tectonic plate ridge that is building pressure every second. An earthquake greater than 5.5 on the Richter Scale would in fact damage U.S. Highways 101 and 199, causing them to be closed to all traffic until repairs can be made. We possess conclusive engineering studies predicting such. A 9-level earthquake would drop every

bridge in the county. Those of us in elected governance positions are aware of said planning factors. Why do you not grant us at least equal voice with those who have nothing at risk? The bottom line is that your entire focus is political. In that vein your actions put aside legality to a degree, and you are not even close to behaving in a manner that is consistent with the fundamental tenants of constitutional governance. I say again, shame on you. You are doing this region a catastrophic disservice.

You have the opportunity to correct these planning deficiencies. If you take no action within two months from today, you will see these comments in newspapers throughout the affected region.

EUREKA

Regret I can't stay further tonight.

This is going very well, and I am interested to learn what comes forth during the rest of tonight's meeting. Also at the other workshop sites. Keep information coming.

****

D3 appears to be the cheapest way to bypass the whole area, and avoid all the area's maintenance.

****

Option E appears to put Wilson Creek at risk of accidental pollution, forever.

KLAMATH

For safety and commerce, I recommend four lane highway.

I also think the existing highway could possibly be saved for tourists.

The existing highway could be only open at certain times of the year.

The existing highway could be maintained as a lower speed road.

Alternate E5 has the least impact. If E5 was designed into four lanes the cost would go up, but the benefits would be gained back through safety and commerce.

****

Cut redwoods should be donated to the tribes for canoes and other traditional uses.

****

1) No matter what alternative is used the abandoned road be turned into a bicycle/hike only area
2) Sell old redwood to offset cost.

****

I picked F1 Full Tunnel Parallel to E because there is less redwood forest acreage cut, less minutes to added time and construction length. It looks like it will take longer to complete but in the long run a better route. I like the tunnel on Highway 199. It's fun to drive through.

UNSPECIFIED (Received via mail)

The Coastal Trail follows the Highway of the thirties from the Crescent City Overlook and crosses the present Hwy. 101 a few hundred yards South of the Damnation Creek trailhead. There it crosses the highway and proceeds inland over much gentler terrain than the Last Chance Grade, following a route that would be easier and less expensive than most of the suggested alternatives to build a highway on. Alternative B2 appears to approximately follow this route. It may be the chosen route because of the low cost. If it is, the experience of following the Coastal Trail will be much less a wilderness experience.

The existing 101 has some great scenery and would be easier to maintain without the heavy traffic and if it only has to be a few feet wide. Why not keep it for hikers and perhaps cyclists who go slow enough to appreciate the views? The separation of pedestrians and cyclists from motorized traffic is a problem to planning any route.

****

Thanks very much for the public meetings and opportunity to comment on the Alternatives proposed for seeking "a permanent solution to instability and potential roadway failure" at LCG. It was very good to hear that agencies and public alike seem to care most about protecting natural and cultural values – especially old-growth redwoods – during the difficult and expensive upgrade. (What a welcome change from the Del Norte Redwoods State Park Cushing Creek project of 20 years ago, when it was proposed initially that over 200 old-growth redwoods be cut.)

It would be excellent to take this opportunity to reroute Hwy 101 from most all of DNRSP, from Wilson Creek to Hamilton Road – much as was done, finally, in the case of Prairie Creek Redwoods State Park. Three Alternatives would seem best for this purpose: C5, D5, and E5.

This highway upgrade presents a rare opportunity to enhance DNRSP and its redwood forest ecosystem. Removing a 2(to 3)-lane major highway – with its attendant unhealthy pollution, noise, nighttime light, traffic – would be a major benefit to creatures (especially the endangered marbled murrelet and northern spotted owl). And removing and replanting the old roadway will be beneficial to the flora and fauna of the entire ecosystem.

We must always remember that all but about 4 percent of the magnificent ancient redwood forest remains. Removing Hwy 101 from the middle of this park will help greatly to protect that last 4 percent.

APPENDIX E: CORRESPONDENCE

Gregory J. Duncan, M.D.
Orthopedic Surgery & Upper Extremity Surgery

Talitha Hodgson
CalTrans Project Manager
Last Chance Grade

February 8, 2015

Tamera Leighton , Executive Director
Del Norte Local Transportation Commission

Dear Ms. Hodgson and Ms. Leighton:

I am writing with information in support of a prompt and permanent solution to the unstable section of Highway 101 known as Last Chance Grade.

I have practiced orthopedic surgery in Del Norte County for the past 23 years, and appreciate the importance of a reliable north south route between Crescent City and Eureka with respect to the medical needs of Del Norte and Curry county residents and visitors.

Emergency transfers out of Sutter Crescent City have steadily risen over the past 10 years. In 2005, 285 patients required emergency hospital to hospital transfers from Crescent City. In the first three quarters of 2014, the number of transfers had risen to 510.

An increasing number of patient transfers are now performed by ground ambulance to hospitals in Humboldt County. In addition, Sutter Coast Hospital relies on blood products and pathology expertise from Humboldt County. If Last Chance Grade becomes impassible, the loss will have a significant impact on hospital operations.

I appreciate your efforts toward a long term solution to Last Chance Grade. I know you are aware that Highway 101 between Humboldt and Del Norte Counties is a vital economic link, but in addition, this roadway plays an important role in our community's medical needs.

Please contact me with any questions.

Sincerely,

Gregory J. Duncan, M.D.
Chief of Surgery
Sutter Coast Hospital

Cc: Kurt Stremburg

From: John Mertes – via email
February 15, 2015

Old Growth Redwood Forests are a revered symbol of California and the Natural World. Only about 5% of the Old Growth remains making what old growth remain very valuable. Any proposal to cut old growth will be vehemently opposed and must have extraordinary justification. Thu the top criteria for any of the alternatives is minimizing taking of old growth. Any such taking must be mitigated.

Work with and negotiate agreement with environmental organizations such as The Sierra Club, Save the Redwoods League, Environmental Protection Information Center (EPIC), Northcoast Environmental Center, and Friends of Del Norte from now on so that they agree with the project. Otherwise you will likely experience costly lawsuits and delays.

Possible alternatives I didn't see discussed -
Excavate the land slide material down to stable rock and then replace the removed material with stable fill or alternatively replace with viaducts.

Also while there have been fatalities in the Last Chance Grade area due to land slides; there have also been numerous other fatalities on US101 elsewhere between Crescent City and Wilson Creek.

****

February 16, 2015

Talitha Hodgson
Caltrans District 1
1656 Union Street
Eureka, CA 95501

Subject: Last Chance Grade Feasibility Study

Thank you for the opportunity to comment on this worthwhile project. As you are aware, I was involved in the development of the last major project to construct the "maintenance walls" on the existing alignment. The project studies for that project were generally limited to the existing corridor. There was also a limited review of possible bypass alignments in response to Parks' suggestion to bypass the slide area.

The most significant issue of a bypass involves the reconnection to the existing alignment at the northerly end. Unless the bypass is extended far to the north, there will be some impact to old growth redwood forest within park lands. This additional northerly extension, however, results in more overall impact, not only from the construction of the roadway, but also from significant volumes of excavated material requiring disposal sites. It would be desirable to reconnect as far to the south as

possible to lessen these impacts, and preserve the opportunity for the public to experience travel through the redwood forest north of Last Chance Grade.

The alternatives incorporating a tunnel certainly reduce impact. It may be possible to further reduce impact to old growth forest by also considering viaduct to make the needed reconnection. The A1 and B1 Alternatives include a tunnel, but may not be feasible due to geotechnical instability and substandard alignment. A possible modification may be to route the tunnel with a more northerly orientation, and then construct viaduct across the ravine to connect to the existing alignment. The tunnel may be in more stable material, and the alignment would be improved. Consideration of potential tree fall in an old growth forest may preclude viaduct, however, and would require review by Structures.

There may be other alignments between Last Chance slide and the Park corner that might be feasible if the tunnel and/or viaduct strategy were utilized. A brief review of topographic mapping indicates a few additional opportunities may be available. I would encourage a more detailed study to identify if other alignments may accomplish this goal.

Once again, thank you for the opportunity to comment on this project. I am available if you would like to discuss this in more detail.

Respectfully yours,
Dennis P. McBride

****

From: Lucy H. Allen – via email
Berkeley Law Public Interest Fellow
Environmental Protection Information Center
February 17, 2015

Thank you for the opportunity to provide input at this preliminary stage of this potential project. EPIC's concerns center first and foremost around impacts to old growth redwood forest, and also to mature and other redwood forests, and salmonid habitat. EPIC is also concerned about public transparency throughout the planning process. We understand the community need for connectivity, but all viable options for avoiding impacts to our natural resources must be thoroughly studied, and these studies must be made available to the public, before the project proceeds.

Specifically, studies regarding the feasibility of using the existing right of way for the project – through more permanent stabilization efforts than are currently taking place, use of a viaduct, or other measures – must be conducted and made available to the public. EPIC does not consider this to be a "no action" alternative. Instead, we would like to see the feasibility of taking action within or near the existing roadway. If a study

concludes that this is infeasible, Caltrans should select an alternative that avoids impacts to old growth redwoods to the greatest extent possible.

For impacts that are truly unavoidable, Caltrans should implement mitigation that enhances old growth redwood and salmon habitat values.

EPIC supports keeping the project as a 2-lane, 55mph road.

Save The Redwoods
LEAGUE

February 18, 2015

Caltrans District 1
c/o Talitha Hodgson
1656 Union Street
Eureka, CA 95501

Dear Ms. Hodgson,

We appreciate this opportunity to offer comments on the preliminary alternatives under consideration for the **Last Chance Grade Engineered Feasibility Study**. We share the community's interest and urgency to secure safe passage for travelers along this Highway 101 corridor of Del Norte County and protection for the world-class natural and cultural resources of Redwood National and State Parks (RNSP). As Caltrans conducts its Feasibility Study, we urge the agency to follow a highly transparent process that engages diverse stakeholders, to allow partners like us to understand and to have input into the criteria and data being used for planning and decision-making.

Last Chance Grade is surrounded by the largest remaining old-growth coast redwood forest on Earth, an irreplaceable resource that Save the Redwoods League has worked to protect for more than 90 years. Since 1923, the League has protected more than 26,000 acres of coast redwood forest through 136 land transactions that helped assemble RNSP, prevent destruction of the world's tallest forest, and conserve habitat for nine species listed as Threatened or Endangered under the Endangered Species Act. Please note in particular that portions of the land identified as alternative routes include land conveyed by Save the Redwoods League to the State of California. Those conveyances (deeds) restrict use of the land to public park purposes as part of the California State Park System. It's also notable that RNSP is designated a World Heritage Site by the International Union for Conservation of Nature (IUCN) and a Globally Significant Ecoregion by the World Wildlife Fund (WWF). Both of these distinguished designations call for continued protection of this globally significant and imperiled resource.

With the limited information publically available today on the project, it is not yet clear whether the preliminary alternatives for Last Chance Grade represent the full range of options to maximize protection of sensitive cultural, environmental and scenic resources. Further, it is not clear how these alternatives will be compared and evaluated through the Feasibility Study. We encourage Caltrans to share more information with stakeholders so that we can provide input and help find a best alternative. Specifically, we request to know how habitat types are being defined (e.g. what is mature redwood forest?), what data sources are being used to assess potentially affected resources (e.g. forest age/structure and wildlife corridors) and most importantly, what criteria are being used to compare and select alternatives for further study.

We look forward to actively participating as a key stakeholder in the project. We are prepared to apply our deep ecological knowledge of the coast redwood forest to help identify the best possible alternative for Last Chance Grade.

Sincerely,

Emily Burns, PhD

WALK AMONG GIANTS℠ | 111 Sutter Street 11th Floor San Francisco CA 94104 p 415 362 2352 f 415 362 7017 | SaveTheRedwoods.org

Friends of Del Norte

Committed to our environment since 1973

A nonprofit, membership based conservation group
advocating sound environmental policies for our region.
PO Box 229, Gasquet, CA 95543

February 18, 2015

ATT: Caltrans District1, c/o Talitha Hodgson, 1656 Union Street, Eureka, CA 95501

E-mail: lastchancegrade@dot.ca.gov

REGARDING: Last Chance Grade Feasibility Study, Scoping Comments - 5 pages

Thank you for the opportunity to comment. We have reviewed the most current Highway Design Manual (design manual) prepared for the California Department of Transportation in 2014, for this purpose as stated:

"**Purpose:** This manual was prepared for the California Department of Transportation (Department) by the Division of Design for use on the California State highway system. This manual establishes uniform policies and procedures to carry out the State highway design functions of the Department."
http://www.dot.ca.gov/hq/oppd/hdm/pdf/english/HDM_Complete_22Sep2014.pdf

In summary, the engineering assumptions for Alternatives are ill advised, according to the design manual, and are inappropriate and insensitive to our environmental concerns. The route twists through our Coastal Ranges, geologically considered an unstable mountain range. The appropriate highway design speed should be reduced to 40-50 miles per hour, for safety reasons, as well as scenic and recreational considerations according to the design manual.

The assumed engineering design for steep cut-slopes of 1.5:1 and up to 200 feet, is inappropriate for our rainy climate, with steep topography, erodible soils and unstable stratigraphy and geologic formations. This steep cut-slope standard is also insensitive to aesthetic impacts within a UNESCO World Heritage Park. According to the design manual these steep cut slopes are likely to result in soil slips, and unsightly scars of excavation and embankment should be held to a minimum. Please reduce cut-slopes to the maximum extent feasible, and consider retaining walls when practical to reduce slope length and steepness, as recommended by the design manual. It is illogical to propose methods which are recognized as unstable to correct the very landslide prone problems that led to this highway replacement necessity in the first place.

We of course want the alternative route with the least impacts to Old Growth Redwoods, as well as consideration of fragmentation of the Redwood Park landscape. According to the latest methodologies, safe passage for wildlife across, under or over the new highway must also be considered. In other words, safe wildlife corridors should be included in the plan, and existing wildlife corridors should be avoided. The inline tunnel alternative F1 seems to fit this bill the best. However, a more detailed analysis is needed to compare impacts.

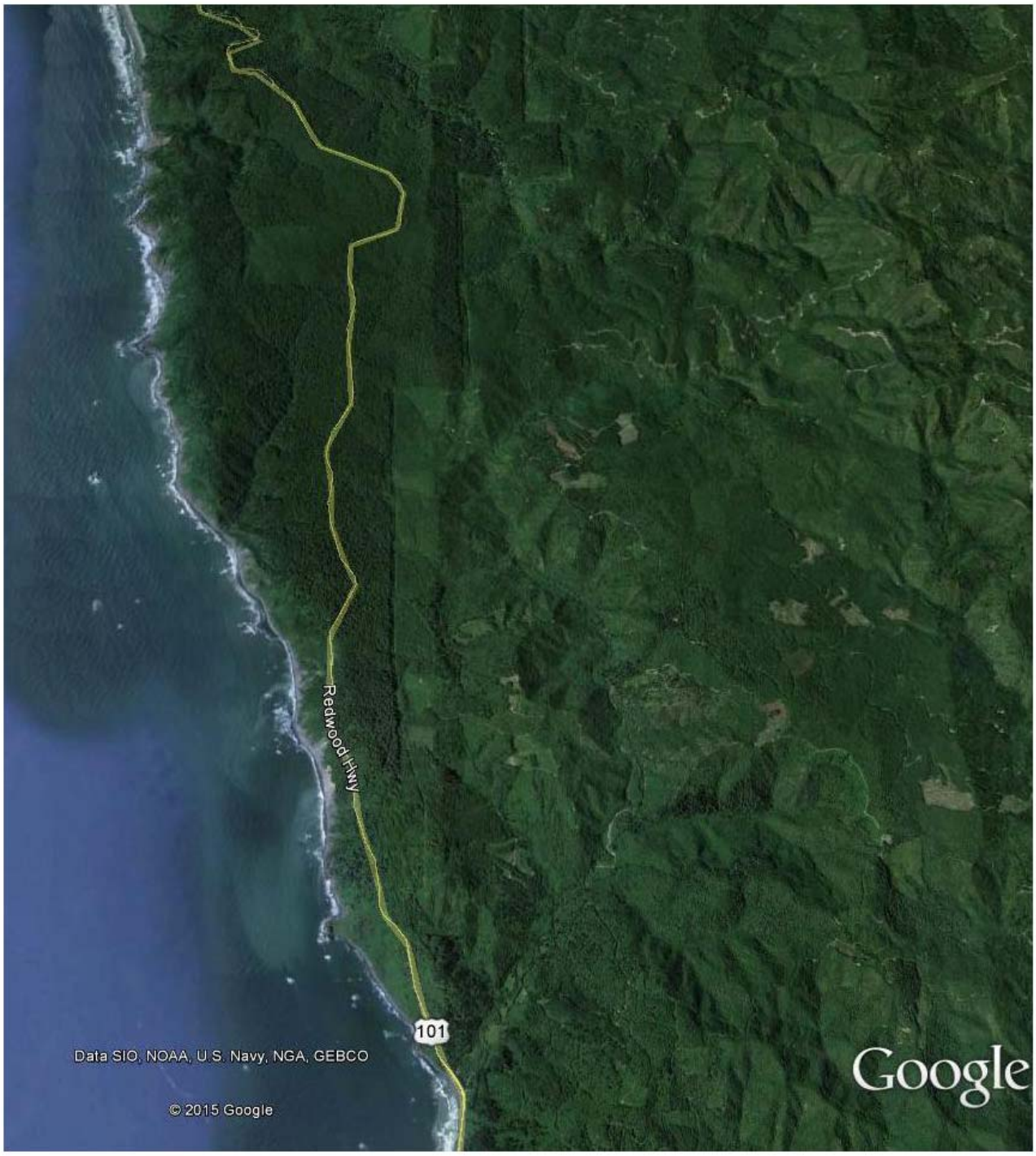


Figure 1) Hwy design speed should be 40-50 miles. Any deviation requires mandatory safety approval, and is inconsistent with design manual recommendations for safety considerations and scenic/recreational considerations.

Figure 1) above shows the twisted route through our Coastal Ranges, geologically considered to be a mountain range. According to the design manual, the Hwy design speed should be 40-50 miles per hour. Any deviation requires mandatory safety approval. Please reduce the design speed accordingly. The hwy design speed recommended in the design manual for a conventional rural highway through mountainous terrain is 40 to 50 miles per hour. The topography of our steep jagged, windy coastal range is characteristic of mountainous terrain. It is certainly not "flat or rolling." Therefore, at maximum, the design speed should be 50 miles per hour. It is prudent to lower the design speed because the very windy roadway that will be needed to traverse such mountains shall necessitate many slower speed areas, and driving at a consistent speed is the goal set by the design manual for safety reasons. Slowing down greatly for turns, and speeding up to a fast highway speed should be avoided. The scenic and recreational attributes of the area also warrant a lower design speed.

As stated in the design manual:

"It is preferable that the design speed for any section of highway be a constant value. However, during the detailed design phase of a project, situations may arise in which engineering, economic, environmental, or other considerations make it impractical to provide the minimum elements for other design standards (e.g., curve radius, stopping sight distance, etc.) established by the design speed. See Topic 82 for documenting localized exceptions to features preventing the standard design speed.

The cost to correct such restrictions may not be justified. Technically, this will result in a reduction in the effective design speed at the location in question. **Such technical reductions in design speed shall be discussed with and documented as required by the Design Coordinator."**

"A highway in level or rolling terrain justifies a higher design speed than one in mountainous terrain. As discussed under Topic 109, scenic values are also a consideration in the selection of a design speed.
Further we are providing this Table extracted from the design manual:

CONVENTIONAL HIGHWAYS (2)

Rural	
Flat terrain	55-70
Rolling terrain	50-60
Mountainous terrain	40-50
Main Streets – Cities, Towns, and Community Centers	30-40

101.2 Highway Design Speed Standards

Table 101.2 shows appropriate ranges of design speeds that shall be used for the various types of facilities, place types, and conditions listed. For additional guidance, see Index 101.1(2).

Therefore, **proposed cut slopes are excessive and inconsistent with design principals for highway stability and aesthetic consideration and water quality considerations.**

A cut slope of up to 200 feet is excessive and inconsistent with recommendations of the design manual regarding aesthetics and in consideration of water quality impacts. The beauty of our Coastal temperate rainforest and redwood forest will be significantly degraded by such large cut slopes, and will result in ugly scars and excessive clearing. This highway traverses a UNESCO world heritage site, Redwood National and State Parks, that is a travel destination for tourists from around the globe. The use of retaining walls should be employed to avoid cut slopes, both for aesthetics

and water quality sedimentation and erosion issues in our rainy temperate rainforest environment. A reduction of design speed will also help to reduce cut slope requirements, and reduce repair costs.

Therefore, please reduce the maximum cut slopes and slope ratio to the greatest extent feasible.

According to the **Design Manual 109.3:**
"Throughout planning and design consider the following:

(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.

(c) Existing vegetation (e.g., trees, specimen plants, diminishing native species or historical plantings) 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.

(b) Design slopes as flat as is reasonable with slope rounding, landforming/geomorphic grading, contouring, or stepping to minimize erosion and to promote plant growth. **Consider retaining walls when practical to reduce slope length and steepness.** Include standard special provisions or approved special provisions which will require the contractor to remove or excavate, stockpile, and apply topsoil and/or duff on the final slope to promote plant growth. For information on landforming/geomorphic grading see: http://www.dot.ca.gov/hq/LandArch/webinars/index.htm and work with district landscape architecture."

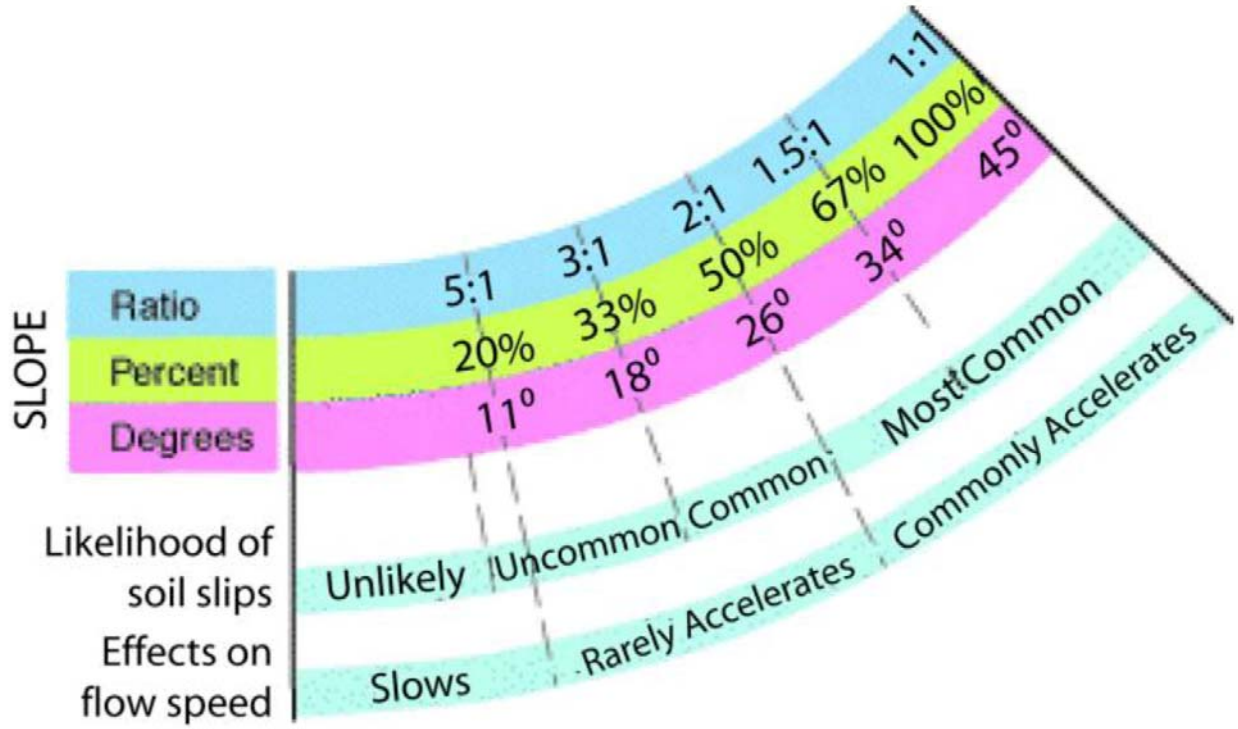


Figure 819.7E Soil Slips vs. Slope Angle, Highway design manual, 810-39 March 7, 2014

As you can see from your own design manual, the selection of 1.5 cut slopes is inappropriate and excessive for our Coastal Mountain ranges that receive high rainfall and consist of landslide prone geologic formations and erodible soils. The choice of such a steep cut-slope will result in excessive degradation of water quality in coastal streams that are habitat for many sensitive species of salamander and frogs. Such an inappropriate proposed steep 1.5 cut-slope will result in the "likelihood of soil slips," which is a major cost factor in road failure and creates the need for constant repairs in our rainy climate with very fractured geologically unstable coastal formations. Please reduce the cut. The long term costs and environmental consequences of hacking away 1.5 steep slopes of up to 200 feet are unacceptable design plans.

Conservation of Materials and Energy

It is our understanding that you do not intend to recycle and reuse the existing flexible roadbed. This is inconsistent with the design manual that requires consideration of recycling of existing flexible pavement. What reason is there not to reuse some of this pavement, where negative impacts of pollution to watercourses from removal are not a factor?

From the **Design Manual:**

"110.11

Paving materials such as cement, asphalt, and rock products are becoming more scarce and expensive, and the production processes for these materials consume considerable energy. Increasing evidence of the limitation of nonrenewable resources and increasing worldwide consumption of most of these resources require optimal utilization and careful consideration of alternates such as the substitution of more plentiful or renewable resources and the recycling of existing materials.

(2) Flexible Pavement. **Recycling of existing flexible pavement must be considered, in all cases, as an alternative to placing 100 percent new flexible pavement."**

We of course want the alternative route with the least impacts to Old Growth Redwoods, as well as consideration of fragmentation of the Redwood Park landscape and of corridors used by its wildlife. Wildlife did not have a large conflict with the existing Last Chance Grade location because it was on the cliff edge; the new location will create major exposure for wildlife roaming their territories or seeking to migrate to new territories. The inline, parallel tunnel alternativeF1 seems to fit this bill the best. However, a more detailed analysis is needed to compare such impacts.

Thank you,

Eileen Cooper

Eileen Cooper, vice president Friends of Del Norte, on behalf of the Organization and Board

To: CalTrans, 1120 N St, Sacramento, CA 94273
From: Phoebe Lenhart, Crescent City, CA
Date: Jan. 19, 2015
Re: Proposed alternatives for US HWY 101 between Eureka and Crescent City

Regarding the preliminary alternative routes presented by CalTrans to the public, it is appealing and practical to provide an alternative that is direct and safe. The Alternatives A and B are not satisfactory options for those conditions. The Alternatives C, D, and E are ridiculous routes due to their length, curves and destruction to the environment. Frankly, it is a concern that you are offering them at all. That leaves alternative F which I would like to suggest be built UNDERGROUND. Japan is on the western edge of the "Ring of Fire" and has successfully built numerous tunnels. The technology exists to construct tunnels that are earthquake proof. I would like CalTrans to evaluate a tunnel for this segment of US HWY 101 following Alternative F.

Hi Talitha,

Congrats on your successful workshop Monday at the Del Norte Fairgrounds. I was impressed by the comprehensive study on various alternative routes, the distances, costs and impacts on the landscape. As you know I have been a part of Last Chance since the late 50's. I worked as a seasonal river guide on the Klamath River with Ed Huges that worked in 1930-31 on 101 and met the surveyor who surveyed the coast route and also the Wilson Creek drainage route. I share this with Caltrans and National and State Parks in the middle 2000s as a member of the Board of Supervisors and Chair of "El Tico" for 1-1/2 years.

Supervisor Roger Gitlin asked Kurt Stremburg and I to be co-chairs of the Bypass Last Chance Grade Committee. In the two years that Kurt and I have worked together, I think that you are now aware of the support we have received from politicos, tribes, Chamber of Commerces and travel bureaus and private enterprise.

Talitha, our consensus, as result of our trip with Andy and Ruth Anne of Green Diamond Resources to the north side of their N-200 logging road mirrors your B-2 proposal. A-2 is also a good route through Rudisill Road. As you know the lowest cost, shortest distance, least impact on the environment has the greatest chance of a fairly quick resolution of this problem.

I know that State and National Parks are a big player. We have already met with Jeff Bomke and Steve Prokopp. I also know that the Federal Highway Administration is huge. I spent four years while on the Board, working with Gary Strike and Tim Marshall out of Denver, Colorado on the two phases of the South Fork Road Project. Jerry Cochran and I along with County Roads met for a year with the Denver team here and Tidwater Construction completed a two year project of eliminating one ways and West Coast Construction of Coos Bay did the Steven and Hurdy Gurdy Bridges.

Gary Strike is now the Director of the six western states. Chuck Law out of Medford was the lead inspector on both jobs. Talitha thanks to you and Region 1 for your efforts. Hope I can be of further help.

Chuck Blackburn – Retired Board of Supervisors, Del Norte County

Appendix D

Emergency Relief Documentation

FOR IMMEDIATE RELEASE:
Friday, April 15, 2011

Contact: Governor's Press Office
(916) 445-4571
California Emergency Management Agency (CalEMA)
(916) 607-7657

Governor Brown Declares State of Emergency in 19 Counties Following Severe March Storms

SACRAMENTO – Governor Edmund G. Brown Jr. today issued an emergency proclamation for Alameda, Amador, Butte, Contra Costa, Del Norte, Humboldt, Madera, Mariposa, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, Sierra, Stanislaus, Sutter, Trinity, Tuolumne, and Ventura Counties following a series of storms last month that swept across California, bringing heavy rain, high winds and flooding.

The full text of the emergency proclamation is below:

PROCLAMATION OF A STATE OF EMERGENCY

WHEREAS between March 15 and 27, 2011, a series of severe rainstorms swept across California, bringing high winds and excessive precipitation and flooding; and

WHEREAS these severe storms harmed people and property by damaging public and private facilities, forcing the evacuation of residents, and requiring the opening of emergency shelters; and

WHEREAS these storms caused roads and highways to close as a result of mudflows, debris, floods, and erosion, and also caused a levee to crack; and

WHEREAS these conditions require continuing emergency response, including significant repair and reconstruction work and debris removal; and

WHEREAS the damage caused by this series of storms has impacted numerous California counties, including Alameda, Amador, Butte, Contra Costa, Del Norte, Humboldt, Madera, Mariposa, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, Sierra, Stanislaus, Sutter, Trinity, Tuolumne, and Ventura; and

WHEREAS the circumstances of these storms, by reason of their magnitude, are or are likely to be beyond the control of the services, personnel, equipment, and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property exist due to the storm conditions in the counties of Alameda, Amador, Butte, Contra Costa, Del Norte, Humboldt, Madera, Mariposa, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, Sierra, Stanislaus, Sutter, Trinity, Tuolumne, and Ventura;

NOW, THEREFORE, I, EDMUND G. BROWN JR., Governor of the State of California, in accordance with the authority vested in me by the state Constitution and statutes, including the California Emergency Services Act, and in particular, section 8625 of the California Government Code, HEREBY PROCLAIM A STATE OF EMERGENCY to exist within the counties of Alameda, Amador, Butte, Contra Costa, Del Norte, Humboldt, Madera, Mariposa, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, Sierra, Stanislaus, Sutter, Trinity, Tuolumne, and Ventura.

IT IS HEREBY ORDERED THAT:

1. The California Department of Transportation shall formally request immediate assistance through the Federal Highway Administration's Emergency Relief Program, 23 U.S.C. section 125, in order to obtain federal assistance for critical highway repairs or reconstruction in the affected counties.

2. All agencies of the state government shall use and employ state personnel, equipment and facilities for the performance of any and all activities consistent with the direction of the California Emergency Management Agency and the State Emergency Plan.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 15th day of April 2011.

_____
EDMUND G. BROWN JR.
Governor of California

ATTEST:

_____
DEBRA BOWEN
Secretary of State

# # #

Governor Jerry Brown
State Capitol Building
Sacramento, CA 95814

DEPARTMENT OF TRANSPORTATION
DIVISION OF BUDGETS
Federal Resources Office
P.O. Box 942873, MS-23
SACRAMENTO, CA 94273-0001
PHONE (916) 654-3043
FAX (916) 653-2004
TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

April 18, 2011

Mr. Bob Tally.
Acting Division Administrator
Federal Highway Administration, California Division
650 Capitol Mall, Suite 4-100
Sacramento, CA 95814

Attention: Mr. Scott McHenry
Senior Transportation Engineer

Dear Mr. Tally:

NOTICE OF INTENT

Under the provisions of Section 125, Title 23 of the United States Code, this is a Notice of Intent by the California Department of Transportation (Caltrans) to request Emergency Relief (ER) funds to assist in the cost of repairing damages on the Federal-aid highways in California caused by winter storm damage that commenced on March 15, 2011 in the following counties: Alameda, Amador, Butte, Contra Costa, Del Norte, Humboldt, Madera, Mariposa, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, Sierra, Stanislaus, Sutter, Trinity, Tuolumne, and Ventura. A series of severe storms swept across California, that brought heavy rain, high winds, and flooding.

Enclosed is a copy a Governor's Proclamation declaring a State of Emergency in California for 19 counties, dated April 15, 2011. Preliminary damage estimate is in the range of $125 million and subject to change.

In a separate letter, we will be submitting the Damage Survey Summary Report for this storm, to provide the Division Administrator with a basis to make a finding that the disaster is eligible for ER funding.

If you, or your staff, have any questions, please contact Gerald Kracher, Major Damage Restoration Engineer, at (916) 654-3523, or myself at (916) 654-3043.

Sincerely,

FARDAD FALAFARSA
Chief
Federal Resources Office

Enclosure

c: Gerald Kracher, Division of Maintenance, Caltrans
Teresa McWilliam, Division of Local Assistance
Randy Steen, Federal Resources Office
Susan Clarke, Federal Resources Office
FRO file

U.S. Department of Transportation
Federal Highway Administration

California Division

650 Capitol Mall, Suite 4-100
Sacramento, CA 95814
(916) 498-5001

May 2, 2011

In Reply Refer To:
HDA-CA

Ms. Cindy McKim
Director
California Department of Transportation
P.O. Box 942873
Sacramento, CA 94273-0001

Attention: Federal Resources Office, Room 3500
For Mr. Fardad Falakfarsa, Chief

Dear Ms. McKim:

SUBJECT: Emergency Relief (ER) (CA11-3) Notice Of Intent Acknowledgement

This letter is to acknowledge receipt of your Notice of Intent, dated April 18, 2011, which requested Emergency Relief (ER) funds, authorized under Sections 120 and 125 of Title 23, U.S. Code, to assist in the cost of repair to damages incurred on Federal-aid highways resulting from storms commencing on March 15, 2011. We further acknowledge a Governor Proclamation covering the following 19 counties: Alameda, Amador, Butte, Contra Costa, Del Norte, Humboldt, Madera, Mariposa, Mendocino, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, Sierra, Stanislaus, Sutter, Trinity, Tuolumne, and Ventura.

You should proceed with any necessary emergency repairs to restore essential travel, to begin preliminary engineering comprising surveys, design, and preparation of construction plans, to perform the permanent restoration work required as an associated part of the emergency operations, and to use State forces, emergency contracts, and negotiated equipment rental contracts as necessary to perform the work. A photo record documenting damages incurred by the mud and debris flow, flooding and slope and embankment erosion will be required for federal reimbursement on a site-by-site eligibility basis.

The eligibility of such work for ER funds will be contingent upon a favorable finding by our office. Our decision will be based upon review of the Damage Survey Summary Report, complete with a preliminary listing of projects by location to be completed. Compilation of other pertinent information, such as photographs, news articles, and notes from site reviews will be useful to our determination. The Federal ER disaster number to be associated with this incident, encompassing all damage within all counties designated under both Governor Proclamations will be CA11-3.

All Emergency Opening activities accomplished within 180 days from the day of Event (March 15, 2011), may be reimbursed at 100 percent Federal share. Permanent Restoration (PR) work, other than that performed as an incidental part of the Emergency Opening (EO), shall not be performed prior to program approval and Federal project authorization supported by an approved Damage Assessment Form.

All sites shall be individually identified and submitted for eligibility determination for Federal ER reimbursement. Recordkeeping should be adequate to permit audit of costs on a site-by-site basis for Force Account and Contractor performed work. We will be meeting with Caltrans' Storm Damage Coordinators in developing a list of projects that will require the Federal Highway Administration (FHWA) field reviews. Through working with your staff in determining preliminary eligibility of projects, we should be able to develop a full schedule of FHWA site reviews to be conducted by engineers from our office by the end of June.

For replace in kind type damage sites on facilities under the jurisdiction of local agencies will continue to be reviewed by Caltrans' representatives with delegated authority in accord with the October 19, 1998, ER Program Delegation. Should you have any questions relative to this event or the Emergency Relief Program, please contact Scott McHenry at (916) 498-5854 or scott.mchenry@dot.gov.

Sincerely,

Karen A Bobo

For
Robert F. Tally, Jr.
Acting Division Administrator

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 0 0 1 - 0
Sheet # 1 of 4 Federal Project # EO ER - _____ ( )
Disaster No. CA 1 1 - 3 PR ER - _____ ( )

Applicant: CALTRANS	County: DEL NORTE	Incident Date (mm/dd/yyyy): 03/24/2011 Inspection:
Location of Damage: Per Site ☑ or ☐ Per Mile		Federal-aid Highway? Y for yes, if no, ineligible for ER funds: Y
Name of Road/Bridge: Route 101		
PM Begin: 15.15 PM Length: 1,000.00 (in feet)		Map No: 1A
PM End:		Functional Classification Type: Principal Arterial
Road/Bridge Data: Bridge No: n/a Type:		Route #: 101
Traveled Way: Width: 2-12' lanes Type: PCC ☐ AC ☑ Gravel ☐		Forest Hwy? Y/N ☐ Interstate? Y/N: Y
Shoulder: Width: var 4-12' Type: PCC ☐ AC ☑ Gravel ☐		Existing ADT: 4,600
Description of Damage: Two Slipouts - Roadway Failure		

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s):_____ EA(s):_____		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s):		PE	
			CE	
			Construction	
	NOTE: Environmental documentation for EO is required. It is generally started after work has begun.		R/W	
		Subtotal Emergency Opening		$0
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF	Two Slipouts requiring reconstruct roadway and embankment utilizing gravity structure, anchored wire mesh and/or soil nails. Likely requires environmental mitigation.	PE	784,000
	☑ Contract ☐ FA		CE	392,000
	PR EAs		Construction	1,960,000
	NOTE:PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION		R/W	10,000
	NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures	**Subtotal Permanent Restoration**		$3,146,000

Eligible	Signature	Date		
☐ Yes ☐ No	Local Agency (if applicable):		PE Total	$784,000
☒ Yes ☐ No	Caltrans: Tabitha Hodgson	7/13/2011	CE Total	$392,000
☒ Yes ☐ No	FHWA*: Cesar Perez	7/13/11	R/W Total	$10,000
			Construction Total	$1,960,000
		TOTAL ESTIMATE		**$3,146,000**

Agency sig. Name (print):
CT signature Name (print): TABITHA HODGSON
FHWA Sig. Name (print): CESAR PEREZ
DAF Prepared by (print): TABITHA HODGSON

Original: Caltrans District **Copies**: FHWA, Division of Local Assistance(local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
*Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. **Reminder: This DAF must be accompanied by photos of the damage.**

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF # CEP - CT01 - 0 0 1 - 0

Sheet # 2 of 4

Applicant CALTRANS

Agency EO Calc ☐ EO contract ☐ PR Calc ☑

Quantity*	Unit*	Labor, Materials, and Equipment	Unit Price	Cost
1	EA	CONSTRUCTION SITE MANAGEMENT	40,000.00	40,000.00
1	EA	PREPARE SWPPP	7,000.00	7,000.00
1	EA	CONSTRUCTION AREA SIGNS	120,000.00	120,000.00
1	EA	TEMPORARY CONSTRUCTION BMPS	60,000.00	60,000.00
1	EA	TRAFFIC CONTROL SYSTEM	150,000.00	150,000.00
2	EA	PORTABLE CHANGEABLE MESSAGE SIGN SYS.	10,000.00	20,000.00
90	WD	TIME-RELATED OVERHEAD	800.00	72,000.00
1	EA	CLEARING AND GRUBBING	10,000.00	10,000.00
600	CY	ROADWAY EXCAVATION	40.00	24,000.00
400	SQYD	EROSION CONTROL (TYPE D)	20.00	8,000.00
110	CY	CLASS 2 AGGREGATE BASE	90.00	9,900.00
120	TON	HOT MIX ASPHALT (TYPE B)	180.00	21,600.00
40	TON	HOT MIX ASPHALT (OPEN-GRADED)	180.00	7,200.00
6400	SQFT	GRAVITY WALL OR SOIL NAILS	150.00	960,000.00
1	EA	PROGRESS SCHEDULE (CPM)	8,000.00	8,000.00
200	LF	THERMOPLASTIC STRIPE	5.00	1,000.00
160	LF	METAL BEAM GUARD RAIL	50.00	8,000.00
1		MISCELLANEOUS MINOR ITEMS	76,300.00	76,300.00
1		MOBILIZATION	157,000.00	157,000.00
1		ENVIRONMENTAL MITIGATION	200,000.00	200,000.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
			Total	1,960,000.00

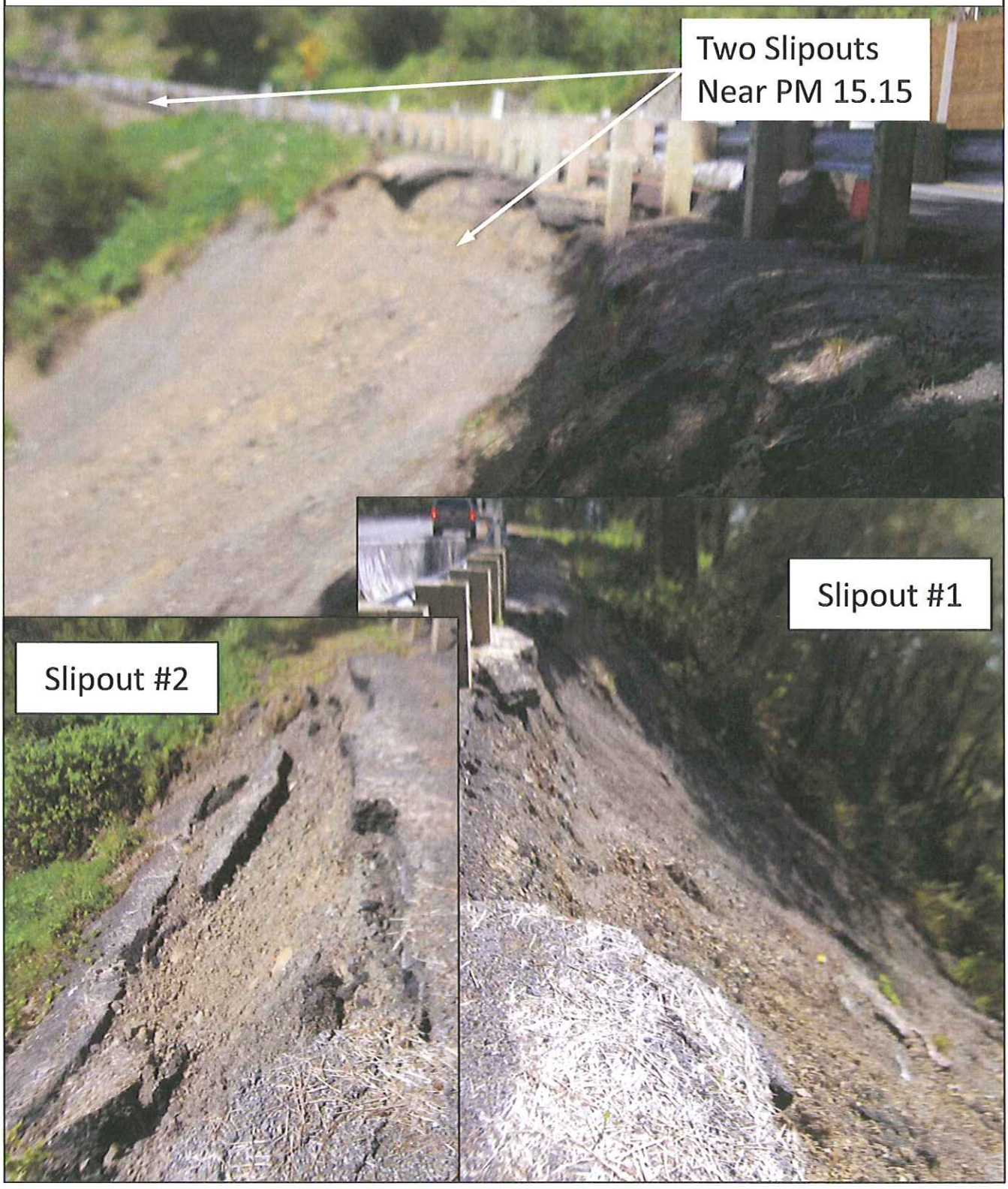
*Lump Sum will generally only be accepted for non biddable items, such as Mobilization.

Justifications/comments: Non-typical Scope, PE/CE Cost, Engineering estimates etc.

U.S. Department of Transportation
Federal Highway Administration
California Division – Title 23
Damage Assessment Form (DAF)

DAF # CEP - CT01 - 0 0 1 - 0
Sheet # 3 of 4
Applicant
CALTRANS

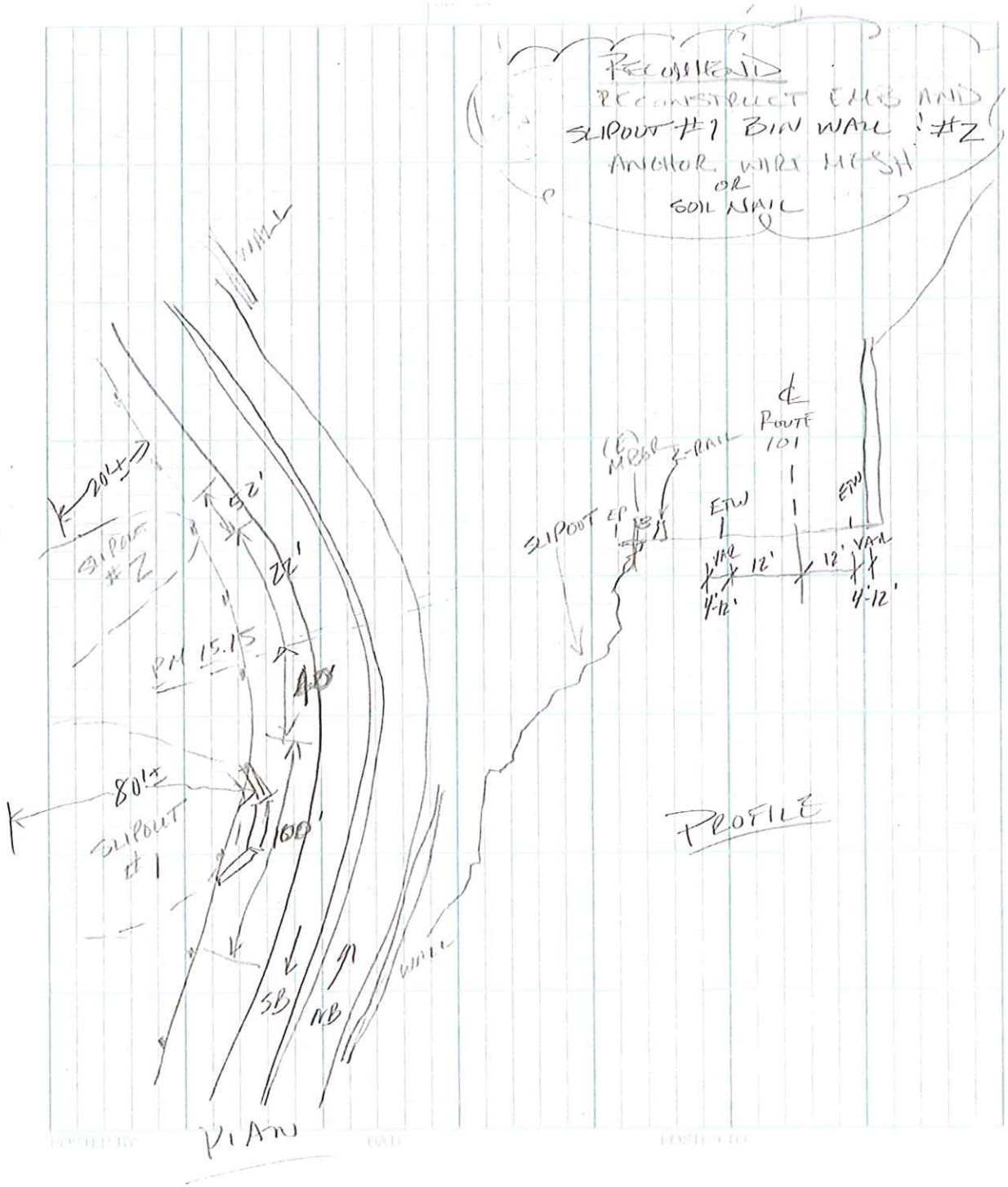
Photos, Sketches and/or Narrative



U.S. Department of Transportation
Federal Highway Administration
California Division – Title 23
Damage Assessment Form (DAF)

DAF # CEP - CT01 - 0 0 1 - 0
Sheet # 4 of 4
Applicant
CALTRANS

Photos, Sketches and/or Narrative



U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 002 - 0
Sheet # 1 of 4 Federal Project # EO ER - _____ ( )
Disaster No. CA 11 - 3 PR ER - _____ ( )

Applicant: CALTRANS	County: DEL NORTE	Incident Date (mm/dd/yyyy): 03/25/2011	Inspection:
Location of Damage:	Per Site ✓ or ☐ Per Mile	Federal-aid Highway? Y for yes, if no, ineligible for ER funds: Y	
Name of Road/Bridge: Route 101			
PM Begin: 15.27	PM Length: 500.00 (in feet)	Map No: 1A	
PM End:		Functional Classification Type: Principal Arterial	
Road/Bridge Data: Bridge No: n/a	Type:	Route #: 101	
Traveled Way: Width: 2-12' lanes	Type: PCC ☐ AC ☐ Gravel ✓	Forest Hwy? Y/N ☐	Interstate? Y/N: N
Shoulder: Width: var 2-4'	Type: PCC ☐ AC ☐ Gravel ✓	Existing ADT: 4,600	
Description of Damage: Slipout/Sink			

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s): EA(s):		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s):		PE	
			CE	
			Construction	
NOTE: Environmental documentation for EO is required. It is generally started after work has begun.			R/W	
		Subtotal Emergency Opening		$0
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF ✓ Contract ☐ FA PR EAs 01-0B270	Work includes extending existing soldier pile wall by at least 100', roadway reconstruction and re-establish drainage. Likely requires environmental mitigation.	PE	972,000
			CE	486,000
			Construction	2,430,000
NOTE:PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION			R/W	10,000
NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures		Subtotal Permanent Restoration		$3,898,000

Eligible	Signature	Date		
☐ Yes ☐ No	Local Agency (if applicable): N/A		PE Total	$972,000
☒ Yes ☐ No	Caltrans: Tabatha Hodgson	7/28/2011	CE Total	$486,000
☒ Yes ☐ No	FHWA*: Cesar Perez	8/2/11	R/W Total	$10,000
			Construction Total	$2,430,000
		TOTAL ESTIMATE		$3,898,000

Agency sig. Name (print): N/A
CT signature Name (print): TABITHA HODGSON

FHWA Sig. Name (print): CESAR PEREZ
DAF Prepared by (print): T. HODGSON

Original: Caltrans District Copies: FHWA, Division of Local Assistance(local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
*Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. Reminder: This DAF must be accompanied by photos of the damage.

U.S. Department of Transportation Federal Highway Administration- California Division- Title 23 Damage Assessment Form (DAF)	DAF # CEP - CT01 - 0 0 2 - 0 Sheet # 2 of 4 Applicant CALTRANS Agency EO Calc ☐ EO contract ☐ PR Calc ☑

Quantity*	Unit*	Labor, Materials, and Equipment	Unit Price	Cost
1	EA	PROGRESS SCHEDULE (CPM)	8,000.00	8,000.00
120	WD	TIME-RELATED OVERHEAD	800.00	96,000.00
1	EA	CONSTRUCTION SITE MANAGEMENT	40,000.00	40,000.00
1	EA	PREPARE SWPPP	7,000.00	7,000.00
1	EA	TRAFFIC CONTROL SYSTEM	150,000.00	150,000.00
1	EA	TEMPORARY CONSTRUCTION BMPS	60,000.00	60,000.00
1	EA	CONSTRUCTION AREA SIGNS	120,000.00	120,000.00
2	EA	PORTABLE CHANGEABLE MESSAGE SIGNS	10,000.00	20,000.00
1	EA	CLEARING AND GRUBBING	10,000.00	10,000.00
600	CY	ROADWAY EXCAVATION	60.00	36,000.00
600	CY	STRUCTURE BACKFILL (SOLDIER PILE WALL)	120.00	72,000.00
400	TON	EROSION CONTROL (TYPE D)	20.00	8,000.00
90	TON	CLASS 2 AGGREGATE BASE	90.00	8,100.00
400	LF	HOT MIX ASPHALT (OPEN-GRADED)	180.00	72,000.00
140	EA	HOT MIX ASPHALT (OPEN-GRADED)	180.00	25,200.00
3000	SQFT	SOLDIER PILE WALL	400.00	1,200,000.00
200	LF	METAL BEAM GUARD RAILING	50.00	10,000.00
800	LF	THERMOPLASTIC TRAFFIC STRIPE	5.00	4,000.00
1		MISCELLANEOUS MINOR ITEMS	96,700.00	96,700.00
1		MOBILIZATION	187,000.00	187,000.00
1		ENVIRONMENTAL MITIGATION	200,000.00	200,000.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
			Total	2,430,000.00

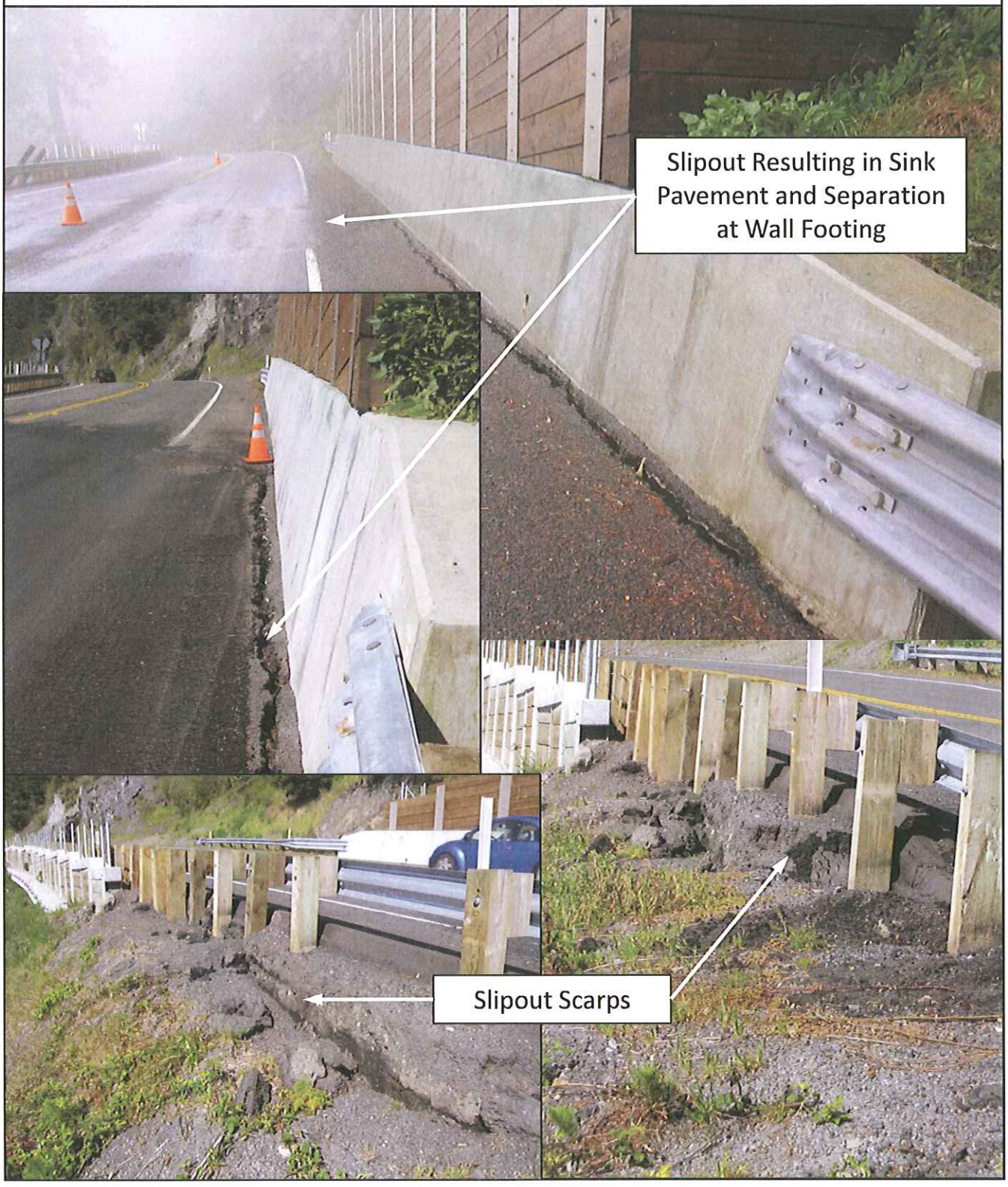
*Lump Sum will generally only be accepted for non biddable items, such as Mobilization.

Justifications/comments: Non-typical Scope, PE/CE Cost, Engineering estimates etc.

U.S. Department of Transportation
Federal Highway Administration
California Division – Title 23
Damage Assessment Form (DAF)

DAF # CEP - CT01 - 002 - 0
Sheet # 3 of 4
Applicant
CALTRANS

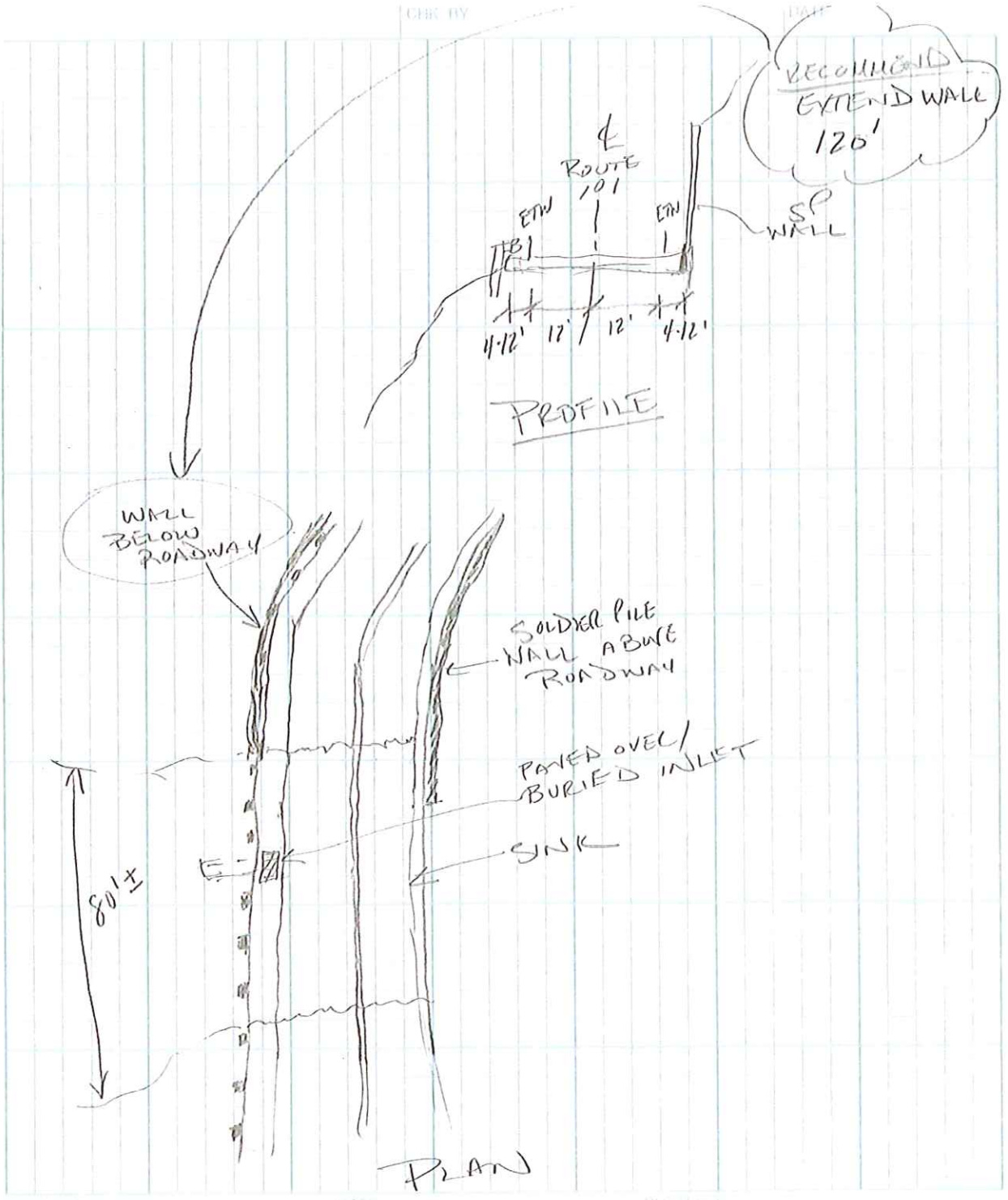
Photos, Sketches and/or Narrative



U.S. Department of Transportation
Federal Highway Administration
California Division – Title 23
Damage Assessment Form (DAF)

DAF # CEP - CT01 - 002 - 0
Sheet # 4 of 4
Applicant
CALTRANS

Photos, Sketches and/or Narrative



State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: Talitha Hodgson
Major Damage Coordinator

Date: July 18, 2011
File: 01-DN-101-PM 15.27

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL DESIGN - NORTH
BRANCH B - EUREKA

Subject: March Storm Damage Recommendation Located on DN 101 at PM 15.27

Site reviews of the slipout located on Route 101 in Del Norte County at PM 15.27 revealed that the slope failure occurred at the southern termination of an existing soldier pile tie-back wall. The slipout scarp created a more than one foot drop in the roadway and resulted in the roadway pulling away from a second uphill retaining wall. The slipout is still moving requiring regular pavement leveling to maintain the roadway.

Observations of the over-steepened slopes above and below the roadway indicates the only viable solution to restore and secure the roadway is to extend the existing soldier pile wall 100 feet south. Other methods of stabilizing the roadway are not feasible due to the steep terrain and magnitude of the slide.

If you have any questions or require further assistance, please call me at (707) 441-2024.

Report by: Kathy Gallagher

Reviewed by: Charlie Narwold

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 0 1 2 - 0
Sheet # 1 of 4 Federal Project # EO ER - _____ ( )
Disaster No. CA 1 2 - 3 PR ER - _____ ( )

Applicant	County	Incident Date (mm/dd/yyyy)	Inspection
CALTRANS	Del Norte	03/31/2012	

Location of Damage: Per Site ☑ or ☐ Per Mile

Federal-aid Highway? Y for yes, if no, ineligible for ER funds: Y

Name of Road/Bridge: Route 101

PM Begin: 15.27 PM Length: 100.00 (in feet)

PM End:

Map No: 1A43

Functional Classification Type: Primary Arterial

Road/Bridge Data: Bridge No: n/a Type:

Route #: 101

Traveled Way: Width 2-12' lanes Type: PCC ☐ AC ☐ Gravel ☑

Forest Hwy? Y/N: N Interstate? Y/N: Y

Shoulder: Width var 2' - 4' Type: PCC ☐ AC ☐ Gravel ☑

Existing ADT: 16,500

Description of Damage: Slipout

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s): EA(s):		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s): 01-0C3804	Provide Traffic Control, Maintain and Stabilize Road until ELB is initiated to repair damaged retaining walls and extend the down-slope retaining walls.	PE	20,000
			CE	200,000
			Construction	400,000
	NOTE: Environmental documentation for EO is required. It is generally started after work has begun.		R/W	10,000
		Subtotal Emergency Opening		$630,000
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF ☐ Contract ☐ FA PR EAs		PE	
			CE	
			Construction	
	NOTE:PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION		R/W	
	NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures	**Subtotal Permanent Restoration**		$0

Eligible	Signature	Date		
☐ Yes ☐ No	Local Agency (if applicable):		PE Total	$20,000
☑ Yes ☐ No	Caltrans:	8/14/12	CE Total	$200,000
☑ Yes ☐ No	FHWA*: Cesar E Perez	8/14/12	R/W Total	$10,000
			Construction Total	$400,000
		TOTAL ESTIMATE		**$630,000**

Agency sig. Name (print): N/A
CT signature Name (print): Jim Barnes
FHWA Sig. Name (print): Cesar Perez
DAF Prepared by (print): Jim Barnes

Original: Caltrans District **Copies**: FHWA, Division of Local Assistance(local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
*Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. **Reminder: This DAF must be accompanied by photos of the damage.**

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 013 - 0
Sheet # 1 of 5 Federal Project # EO ER - ( )
Disaster No. CA 12 - 3 PR ER - ( )

Applicant	County	Incident Date (mm/dd/yyyy)	Inspection
CALTRANS	Del Norte	03/31/2012	

Location of Damage: Per Site [✓] or [ ] Per Mile

Federal-aid Highway? Y for yes, if no, ineligible for ER funds [Y]

Name of Road/Bridge: Route 101

PM Begin: 15.27 PM Length: 300.00 (in feet)

PM End:

Map No 1A43

Functional Classification Type: Primary Arterial

Road/Bridge Data: Bridge No n/a Type:

Route # 101

Traveled Way: Width 2-12' lanes Type: PCC [ ] AC [✓] Gravel [ ]

Forest Hwy? Y/N [N] Interstate? Y/N [Y]

Shoulder: Width var 1-4' Type: PCC [ ] AC [✓] Gravel [ ]

Existing ADT: 16,500

Description of Damage: Slipout

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s): EA(s):		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s): 01-0C3904	Provide Traffic Control, Repair Damaged Walls, Extend Downslope Wall, Restore Surface Drainage, Meet Permitting Commitments, and Place Erosion Control.	PE	200,000
			CE	1,800,000
			Construction	4,800,000
	NOTE: Environmental documentation for EO is required. It is generally started after work has begun.		R/W	50,000
		Subtotal Emergency Opening		$6,850,000
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF		PE	
	[ ] Contract [ ] FA		CE	
	PR EAs		Construction	
	NOTE:PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION		R/W	
	NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures	**Subtotal Permanent Restoration**		$0

Eligible	Signature	Date		
[ ] Yes [ ] No	Local Agency (if applicable):		PE Total	$200,000
[✓] Yes [ ] No	Caltrans: Scott Lee	9/28/12	CE Total	$1,800,000
[✓] Yes [ ] No	FHWA: Cesar E Perez	9/28/12	R/W Total	$50,000
			Construction Total	$4,800,000
		TOTAL ESTIMATE		**$6,850,000**

Agency sig. Name (print): N/A
CT signature Name (print): Scott Lee
FHWA Sig. Name (print): Cesar Perez
DAF Prepared by (print): Jim Barnes

Original: Caltrans District Copies: FHWA, Division of Local Assistance(local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
*Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. **Reminder: This DAF must be accompanied by photos of the damage.**

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 0 0 3 - 0
Sheet # 1 of 5 Federal Project # EO ER - ( )
Disaster No. CA 1 2 - 3 PR ER - ( )

Applicant	County	Incident Date (mm/dd/yyyy)	Inspection
CALTRANS	Del Norte	03/30/2012	

Location of Damage: Per Site ☑ or ☐ Per Mile
Name of Road/Bridge: Route 101
PM Begin: 15.0 PM Length: 350.00 (in feet)
PM End:

Federal-aid Highway?
Y for yes, if no, ineligible for ER funds: Y
Map No: 1A43
Functional Classification Type: Principal Arterial
Route #: 101

Road/Bridge Data: Bridge No n/a Type: n/a

Traveled Way: Width 24' Type: PCC ☐ AC ☑ Gravel ☐
Shoulder: Width var 2-3' Type: PCC ☐ AC ☑ Gravel ☐

Forest Hwy? Y/N: N Interstate? Y/N: Y
Existing ADT: 16,500

Description of Damage: Slipout

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s): EA(s):		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s): 01-0C2404	Provide Traffic Control, Construct Temporary Soil Nail Wall, Dewater, Reconstruct MBGR and Place Erosion Control	PE	20,000
			CE	310,000
			Construction	920,000
	NOTE: Environmental documentation for EO is required. It is generally started after work has begun.		R/W	10,000
		Subtotal Emergency Opening		$1,260,000
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF ☑ Contract ☐ FA PR EAs 01-0C241	Construct Soldier Pile Tie-Back Wall to regain shoulder, reconstruct roadway and traffic control.	PE	1,000,000
			CE	500,000
			Construction	2,500,000
	NOTE:PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION		R/W	200,000
	NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures	**Subtotal Permanent Restoration**		$4,200,000

Eligible	Signature	Date		
☐ Yes ☐ No	Local Agency (if applicable):		PE Total	$1,020,000
☑ Yes ☐ No	Caltrans: Scott A. Lee	9/28/12	CE Total	$810,000
☑ Yes ☐ No	FHWA*: Cesar E Perez	9/28/12	R/W Total	$210,000
			Construction Total	$3,420,000
		TOTAL ESTIMATE		**$5,460,000**

Agency sig. Name (print): N/A
CT signature Name (print): Scott Lee
FHWA Sig. Name (print): Cesar Perez
DAF Prepared by (print): Tallitha Hodgson

Original: Caltrans District **Copies**: FHWA, Division of Local Assistance(local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
*Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. **Reminder: This DAF must be accompanied by photos of the damage.**

FHWA CA Form (CA Rev 12/10)

Appendix E

Last Chance Grade EFS Length and Climbing Lane Analysis

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: JEFFREY PIMENTEL
Project Engineer
District 1 Advance Planning

Date: September 18, 2014

File: 01-DN-101-12.5/16.3
Last Chance Grade EFS
EA 01-987101
EFIS 01 1400 0066

From: TROY ARSENEAU, Chief
District 1 Office of Traffic Operations

Subject: **LAST CHANCE GRADE EFS: LENGTH AND CLIMBING LANE ANALYSIS**

INTRODUCTION

A need for a long-term solution to roadway failures at Last Chance Grade has been determined. Last Chance Grade is located on US 101 in Del Norte County from Wilson Creek Road (PM 12.50) to 3.8 miles north of Wilson Creek Rd (PM 16.30). Through different combinations of 9 proposed alignments, 13 alternatives were identified.

LENGTH DIFFERENCES

To determine the difference in length for each alternative a study area was developed. The study area was defined as Wilson Creek Rd (PM 12.57) to Hamilton Rd (PM 22.70). The existing length was calculated and the increased length for each alternative was determined (Table 1).

Table 1 lists the length increase for each alternative compared to the existing route and the number and total length of proposed truck climbing lanes for each alternative.

#	Alternative	Length (mi)	Δ Length (mi)	Proposed Truck Climbing Lanes	
				#	Total Length (mi)
-	Existing	10.13	-	-	-
1	A-1	11.13	1.00	4	2.7
2	A-2	10.90	0.77	4	3.0
3	A-CD-3	11.87	1.74	10	6.1
4	A-CD-4	11.66	1.53	12	6.8
5	A-CD-4-5	12.72	2.59	13	9.7
6	B-1	10.56	0.43	3	2.8
7	B-2	10.32	0.19	3	3.1
8	B-CD-3	11.30	1.17	9	6.3
9	B-CD-4	11.09	0.96	11	6.9
10	B-CD-4-5	12.15	2.02	12	9.8
11	E-3	14.28	4.15	6	7.2
12	E-4	14.06	3.93	7	7.6
13	E-4-5	15.13	5.00	8	10.6

CLIMBING LANE NEEDS

The purpose of a truck climbing lane is to improve capacity, Level of Service (LOS), and safety

by providing separation between large trucks traveling at a lower speed and traffic traveling at a higher free flow speed.

The need for a truck climbing lane is a result of these proposed alignments going through mountainous terrain with steep grades (6.75% maximum grade), high truck percentages (13%, 2012) and increased traffic volumes (assumed 5% greater by 2034).

Highway Design Manual (HDM) Section 204.5 specifies that a truck climbing lane should be considered where the running speed of trucks fall 10 mph or greater than the running speed of the remaining traffic. HDM Figure 204.5 was used to determine speed reduction with respect to length of grade (ft) and percent upgrade (Attachment 1). At locations where a 10 mph speed reduction was identified, a truck climbing lane was proposed and its minimum length was determined (Attachment 2). The number and cumulative length of proposed truck climbing lanes for each proposed alternative was also determined (Table 1). Assumptions include a posted speed limit of 55 mph for any proposed alternative, an assumed typical heavy truck of 200 lb/hp and a low LOS ($\leq$ LOS D) on the grade.

RECOMMENDATION

Due to the steep grades proposed in each of the 13 alternatives, District 1 Office of Traffic Operations recommends that the proposed truck climbing lanes be included in each alternative. These proposed truck climbing lanes will reduce congestion, provide a higher LOS and improve safety by providing separation of high and low speed vehicles.

ATTACHMENTS

1. Proposed Truck Climbing Lane Locations and Lengths
2. Highway Design Manual (HDM) Figure 204.5: Critical Lengths of Grade for Design

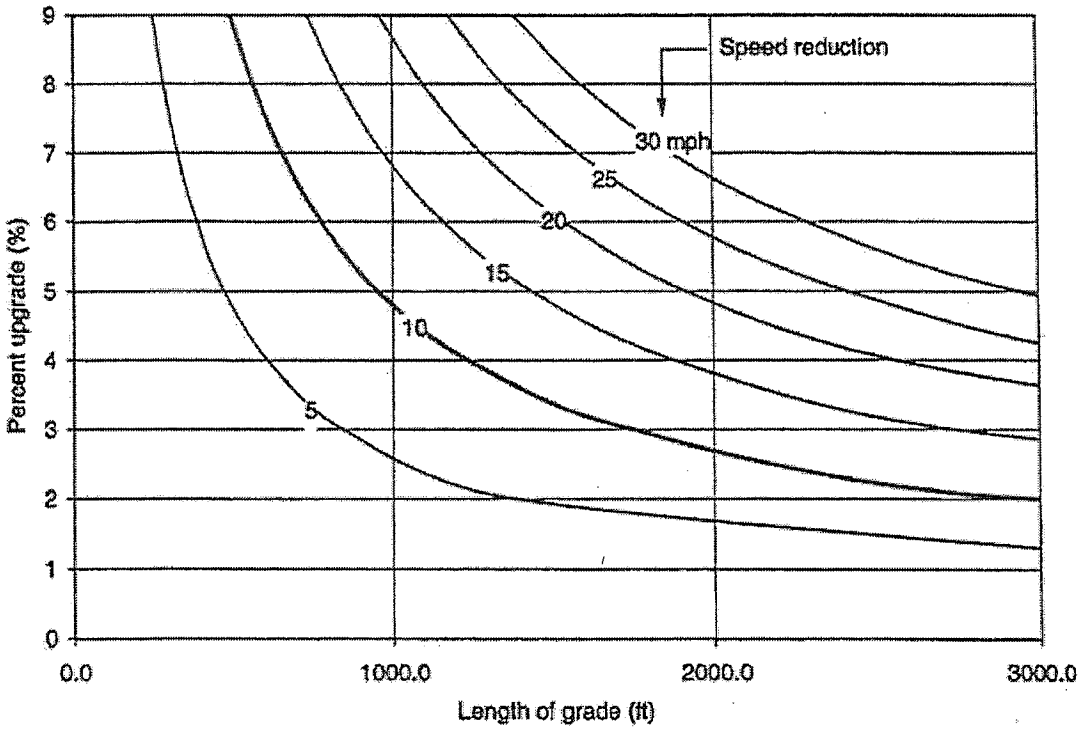
c: THodgson
RMartinelli
KTucker

JNL/jnl

Attachment 1: Highway Design Manual Figure 204.5: Critical Lengths of Grade for Design

Figure 204.5

Critical Lengths of Grade for Design



Attachment 2: Proposed Truck Climbing Lane Locations and Lengths

Alt	Proposed Truck Climbing Lane Location #	Direction	Alignment	Beg STA	End STA	Length (mi)
A-1	1	NB	A	0	37	0.7
	2	NB	A	50	117	1.3
	3	NB	1	22	36	0.3
	4	SB	1	0	16	0.4
			A	117	123	
A-2	1	NB	A	0	37	0.7
	2	NB	A	50	117	1.3
	3	NB	2	15	46	0.6
	4	SB	2	0	15	0.4
			A	117	123	
A-CD-3	1	NB	A	0	37	0.7
	2	NB	A	50	117	1.3
	3	NB	CD	37	70	0.6
	4	NB	CD	114	145	0.6
	5	NB	CD	208	218	0.2
	6	NB	3	18	58	0.8
	7	SB	CD	218	232	0.3
	8	SB	CD	174	199	0.5
	9	SB	CD	70	94	0.5
	10	SB	CD	0	37	0.8
			A	117	123	
A-CD-4	1	NB	A	0	37	0.7
	2	NB	A	50	117	1.3
	3	NB	CD	37	70	0.6
	4	NB	CD	114	145	0.6
	5	NB	CD	208	218	0.2
	6	NB	4	58	98	0.8
	7	SB	4	25	42	0.3
	8	SB	4	0	16	0.3
	9	SB	CD	218	232	0.3
	10	SB	CD	174	199	0.5
	11	SB	CD	70	94	0.5
	12	SB	CD	0	37	0.8
			A	117	123	
A-CD-4-5	1	NB	A	0	37	0.7
	2	NB	A	50	117	1.3
	3	NB	CD	37	70	0.6
	4	NB	CD	114	145	0.6
	5	NB	CD	208	218	0.2
	6	NB	5	125	210	1.6
	7	SB	5	33	118	1.6
	8	SB	5	0	17	0.8
			4	25	50	
	9	SB	4	0	16	0.3
	10	SB	CD	218	232	0.3
	11	SB	CD	174	199	0.5
	12	SB	CD	70	94	0.5
	13	SB	CD	0	37	0.8
			A	117	123	

Alt	Proposed Truck Climbing Lane Location #	Direction	Alignment	Beg STA	End STA	Length (mi)
B-1	1	NB	B	18	134	2.2
	2	NB	1	22	36	0.3
	3	SB	1	0	16	0.3
B-2	1	NB	B	18	134	2.2
	2	NB	2	15	46	0.6
	3	SB	2	0	15	0.3
B-CD-3	1	NB	B	18	134	2.2
	2	NB	CD	37	70	0.6
	3	NB	CD	114	145	0.6
	4	NB	CD	208	218	0.2
	5	NB	3	18	58	0.8
	6	SB	CD	218	232	0.3
	7	SB	CD	174	199	0.5
	8	SB	CD	70	94	0.5
	9	SB	CD	0	37	0.7
B-CD-4	1	NB	B	18	134	2.2
	2	NB	CD	37	70	0.6
	3	NB	CD	114	145	0.6
	4	NB	CD	208	218	0.2
	5	NB	4	58	98	0.8
	6	SB	4	25	42	0.3
	7	SB	4	0	16	0.3
	8	SB	CD	218	232	0.3
	9	SB	CD	174	199	0.5
	10	SB	CD	70	94	0.5
	11	SB	CD	0	37	0.7
B-CD-4-5	1	NB	B	18	134	2.2
	2	NB	CD	37	70	0.6
	3	NB	CD	114	145	0.6
	4	NB	CD	208	218	0.2
	5	NB	5	125	210	1.6
	6	SB	5	33	118	1.6
	7	SB	5	0	17	0.8
			4	25	50	
	8	SB	4	0	16	0.3
	9	SB	CD	218	232	0.3
	10	SB	CD	174	199	0.5
	11	SB	CD	70	94	0.5
	12	SB	CD	0	37	0.7

Alt	Proposed Truck Climbing Lane Location #	Direction	Alignment	Beg STA	End STA	Length (mi)
E-3	1	NB	E	170	370	3.8
	2	NB	E	396	424	0.5
	3	NB	E	519	536	0.3
	4	NB	3	18	58	0.8
	5	SB	3	0	9	0.2
			E	536	539	
	6	SB	E	424	506	1.6
E-4	1	NB	E	170	370	3.8
	2	NB	E	396	424	0.5
	3	NB	E	519	536	0.3
	4	NB	4	58	98	0.8
	5	SB	4	25	42	0.3
	6	SB	4	0	16	0.4
			E	536	539	
	7	SB	E	424	506	1.6
E-4-5	1	NB	E	170	370	3.8
	2	NB	E	396	424	0.5
	3	NB	E	519	536	0.3
	4	NB	5	125	210	1.6
	5	SB	5	33	118	1.6
	6	SB	5	0	17	0.8
			4	25	50	
	7	SB	4	0	16	0.4
			E	536	539	
	8	SB	E	424	506	1.6

Appendix F

Last Chance EFS Preliminary Geotechnical Evaluation

M e m o r a n d u m

Serious drought.
Help Save Water!

To: Talitha Hodgson
Project Manager

Date: April 27, 2015

File: 01-DN-101-PM 12.5/16.3
EFIS ID: 0114000066
Last Chance Grade EFS

Attn: Jeffrey Pimentel, Project Engineer
Advance Planning

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN NORTH

Subject: Preliminary Geotechnical Evaluation of Proposed Realignments

Introduction

This memorandum summarizes the results of a preliminary geotechnical evaluation of the currently proposed realignments of Highway 101 that bypass Last Chance Grade in Den Norte County, California. This memorandum supersedes the memorandum titled Preliminary Geotechnical Evaluation of Proposed Realignments dated February 25, 2015. The proposed realignments are shown on Figures 1 and 2. The information contained in this memorandum is based on a review of existing Caltrans reports, California Geological Survey Special Report 184 (Wills, 2000), the landslide map provided by Green Diamond Resource Company and plan maps, profiles and typical cross sections of the proposed realignments. No field investigation was conducted in preparation of this Memorandum.

This preliminary evaluation focused on identifying existing geologic conditions that could significantly impact the design and performance of the proposed realignments. The intent of this evaluation is to determine if any of the proposed realignments are not feasible based on existing geologic data. A summary of geological conditions identified along the proposed realignments that are considered significant in terms of determining their feasibility is provided in the observations section below.

Geology in the vicinity of the proposed realignments

California Geological Survey Special Report 184, Landslides in the Highway 101 Corridor between Wilson Creek and Crescent City, Del Norte County, California (2000) includes a geologic map and a landslide map that encompasses the proposed realignments. The maps are based on a compilation of previous mapping, interpretation of aerial photographs and field mapping.

The geologic map indicates bedrock beneath the proposed alignments is either Franciscan Complex Broken Formation or Melange. The Broken formation typically consists of hard sandstone blocks separated by weak beds of shale and shear zones. Landslides within the Broken formation tend to be deep seated. The Northern and Southern Last Chance Grade Landslides along the existing Highway 101 alignment are located within the Broken Formation. The Melange typically consists of highly sheared shale and argillite. Landslides in the Melange are typically earthflows. The existing Highway 101 alignment immediately north of Wilson Creek is located within an active earthflow.

The landslides identified in the landslide map are classified and mapped based on their geomorphology. Detailed geotechnical data required to evaluate the probability of movement of the landslides were not collected as part of the investigation.

Observations

With the exception of the existing active landslides along the coast, almost all the landslides that the proposed realignments traverse are mapped as probable or questionable, dormant-mature, deep (>50 feet) rockslides (Wills, 2000).

Alternatives A and C between Station 0 and Station 16 are located within an active earthflow and will traverse what is mapped as a probable dormant landslide between approximately Station 26 and Station 42 (Figure 1). The portion of the realignments within the active earthflow will be prone to deformation similar to what is occurring along the existing Highway 101 alignment immediately north of Wilson Creek which requires frequent maintenance. A typical cross section through the probable dormant landslide at approximately Station 37 indicates a 1.5(H):1(V) cutslope would have a vertical height of approximately 200 feet.

Alternative A-1 is a proposed tunnel alignment. The proposed tunnel is approximately 2000 feet in length. Tunnel designs require collecting geotechnical data along the proposed alignment. Horizontal and inclined borings potentially up to 1000 feet in length could be drilled from the ends of the proposed tunnel outside the limits of the continuous old growth Redwood.

Alternative B traverses what is mapped as large probable dormant landslide between approximately Station 56 and Station 87. Portions of Alternatives A, B and C also traverse the landslide (Figure 1). Review of typical sections at approximately Station 52 and Station 70 along Alternatives A and C indicate a 1.5(H):1(V) cutslope would have a vertical height of approximately 400 feet.

Alternative F is a proposed tunnel alignment. Preliminary cross sections indicate the tunnel would be inboard of the inferred failure surface of the Northern and Southern Last Chance Grade Landslide but the southern portal and a portion of the tunnel would be within the limits of an active earthflow.

Conclusions

The only proposed realignment that does not seem feasible based on a review of available geotechnical data is Alternative F. The southern portal and the portion of the tunnel located within the earthflow would not be feasible unless the potential impacts of the earthflow could be mitigated. In addition, the northern portion of the tunnel and portal would need to be located outside the limits of the northern Last Chance Grade Landslide. It may be possible but an extensive geotechnical investigation would be required to determine if this alternative is feasible.

Several of the proposed realignments require large cuts. The proposed cuts may be feasible from a geotechnical standpoint but may not be practical due to the large excavation volumes. The total excavation volumes for Alternatives A and B are 3 million and 6 million cubic yards respectively. Alternatives C and D and Alternative E are 17 million and 23 million cubic yards respectively. Whether or not landslide mitigation will be required for a given realignment will depend on the stability of the existing slopes and the magnitude of the proposed cuts and fills.

With the exception of Alternative F, there is not sufficient data to determine the feasibility of the proposed realignments based on geotechnical considerations alone. A field investigation that includes subsurface drilling will aid in determining the feasibility of the proposed realignments.

If you have any questions or require additional assistance, please contact me at (707) 445-6036.

CHARLIE NARWOLD
Senior Engineering Geologist
Office of Geotechnical Design North
Branch B

References

Wills, C. J., “California Geological Survey Special Report 184, Landslides in the Highway 101 Corridor between Wilson Creek and Crescent City, Del Norte County, California,” 2000.

List of Figures

Figure 1 - Geologic Map of Northern Portion of Proposed Realignments.

Figure 2 - Geologic Map of Southern Portion of Proposed Realignments.

C: Project File

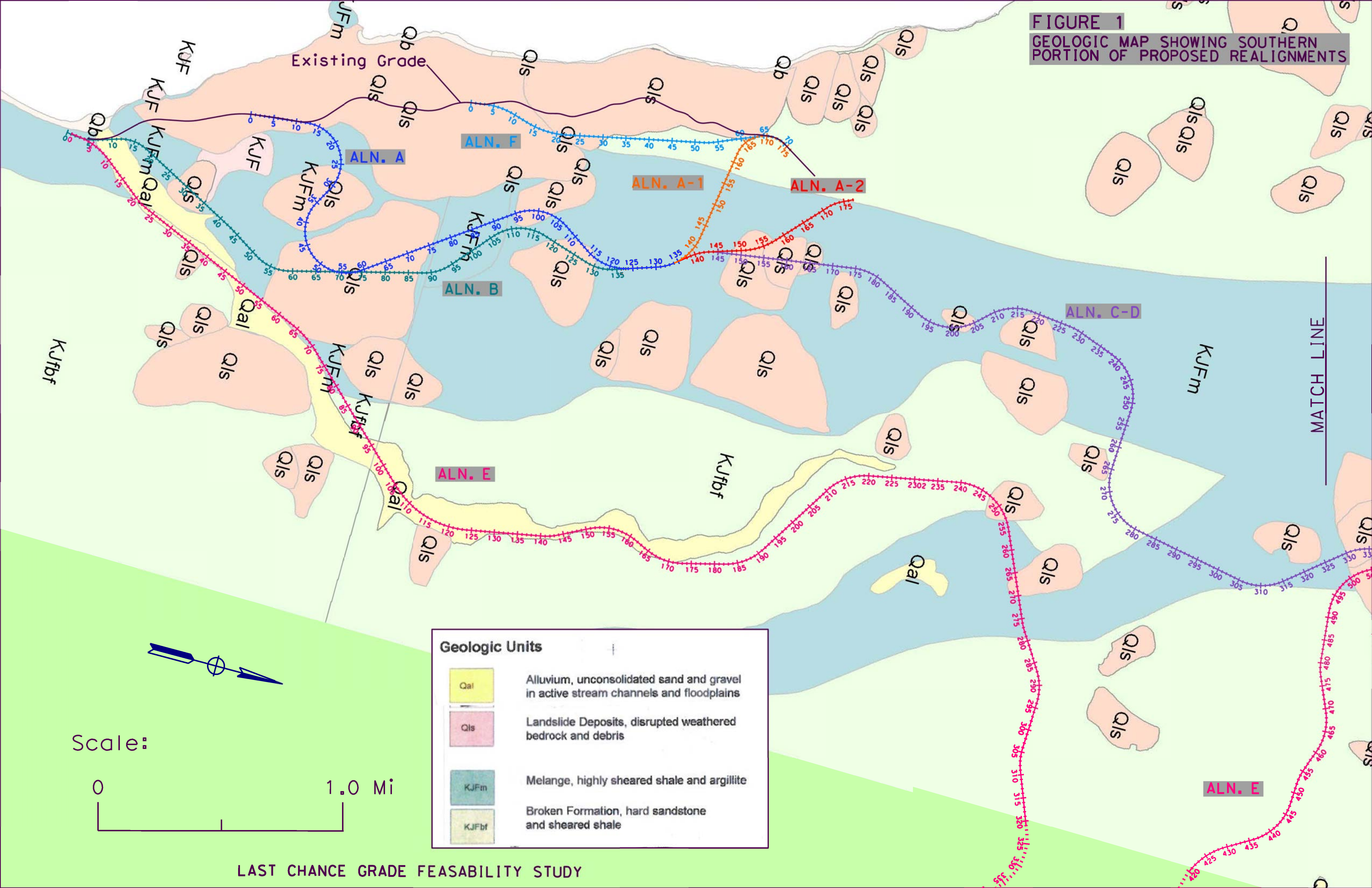


FIGURE 1
GEOLOGIC MAP SHOWING SOUTHERN PORTION OF PROPOSED REALIGNMENTS
Existing Grade
ALN. A
ALN. F
ALN. A-1
ALN. A-2
ALN. B
ALN. C-D
ALN. E
MATCH LINE
KJF
KJFm
KJfbf
Qb
Qal
Qls
Geologic Units
Qal
Alluvium, unconsolidated sand and gravel in active stream channels and floodplains
Qls
Landslide Deposits, disrupted weathered bedrock and debris
KJFm
Melange, highly sheared shale and argillite
KJFbf
Broken Formation, hard sandstone and sheared shale
Scale:
0
1.0 Mi
LAST CHANCE GRADE FEASABILITY STUDY

FIGURE 2

GEOLOGIC MAP SHOWING NORTHERN PORTION OF PROPOSED REALIGNMENTS

ALN. C-D

ALN. 3

ALN. 4

ALN. 5

ALN. E

MATCH LINE

KJFm

KJfbf

Qls

Qal

W. Branch Mill Cr.

Scale:

0 1.0 Mi

Appendix G

Last Chance Grade Economic Impact of US-101 Closure

Last Chance Grade

Economic Impact of US-101 Closure

California Department of Transportation

District 1

Prepared by

Economic Analysis Branch

Office of State Planning

Division of Transportation Planning

California Department of Transportation

January 16, 2015

EXECUTIVE SUMMARY

United States Highway (US)-101 is the primary route that provides direct access to Del Norte County for commercial trucking year round, as well as for recreational traffic especially during tourist season. There has been a recurring problem of slides and slip outs around Last Chance Grade on US-101 in Del Norte County over the past several decades, resulting in frequent travel delays due to lane closures and high maintenance costs at this location. Were a major slide to occur that closes both lanes, traffic between Del Norte and Humboldt Counties would be re-routed around Last Chance Grade via the US-199/I-5/SR-299 corridor, for an additional distance of **320 miles.** Such detour would cost the traveling public (trucking industry and passenger vehicles) an estimated **$1,340,000** per day **($450 million per year**) in travel delay and added vehicle operating costs.

The added travel costs and loss in business activity resulting from a closure of US-101 would cost the Del Norte County approximately **$300 to $400 million in annual output** and as many as **3,000 to 4,000 jobs**. The loss of jobs would cost the region **$100 to $130 million** in income **annually**. Tourist dependent industries such as Leisure & Hospitality and Retail would be impacted the most severely along with other industries dependent on transportation. Closure of US-101 at Last Chance Grade would affect intraregional and interregional travel and have broader impacts beyond tourism and goods movement. US-101 is the primary route for travel within Del Norte County and regional travel into Humboldt County providing residents with access to schooling, medical services and other essentials. Although this study is intended to focus on the economic impacts to Del Norte County, it is recognized that surrounding regions with business links would also experience adverse affects, particularly Humboldt County.

Preliminary cost estimates of building a permanent bypass around Last Chance Grade on US-101 is in the range of **$250 million to $1.070 billion**. Combining travel cost impacts of **$450 million** with the annual economic impacts of **$300 to $400 million**, and applying the annual cost of the term of construction, demonstrates consideration of the feasibility of expending as much as **$1 billion** to rectify the Last Chance Grade complex.

There has been a recurring problem of slides and slipouts around Last Chance Grade on US-101 in Del Norte County over many decades. According to District 1 engineers, the hillside at Last Chance Grade is unstable, and the entire hillside slide plane is moving. The slides to date have been relatively small within the larger hillside slide plane. Unstable soil and large block movement result in frequent road closures and high maintenance costs at this location. A 2000 geological study conducted by the California Geological Survey mapped over 200 active slides within the corridor area. Major slide activity is likely to occur more frequently over time, with movements both above and below the roadway. These incidents are likely to cause major damage, close Route 101 for months, and require millions of dollars to keep this segment of the highway open. This paper presents a brief analysis of the traffic and economic impacts of a major landslide at Last Chance Grade, which would close US-101 for an extended period of time, and an economic evaluation of the proposed realignment project in that location.

BACKGROUND

US-101 in Del Norte County is a rural principal arterial that is considered the "lifeline of the California's North Coast". It is a part of the National Highway System (NHS), the Interregional Road System (IRRS), and both a "high emphasis" and "focus route" facility for priority improvements in the 2013 Interregional Transportation Strategic Plan (ITSP). This route is the primary route that provides direct access for commercial trucking year round, as well as recreational traffic especially during the summer months (tourist season). Maintaining US-101 open and in good condition between Humboldt County and the Oregon Border is very critical to the economic well being of Del Norte County and the north coast region.

Currently, there are no Surface Transportation Assistance Act (STAA) restrictions between Humboldt County and Del Norte County on US-101. If Last Chance Grade were to fail, and a detour would be implemented, STAA trucks would not be able to travel from Del Norte County to Humboldt County and vice versa. Until STAA restrictions on SR-299 or US-199 are lifted, STAA trucks would not be able to access Humboldt County from Del Norte County in the event of a Last Chance Grade failure.

Road closures from post mile (PM) 12.5 to 16.3 due to slides and slipouts are responsible for a continual maintenance problem. When slipouts occur, the highway can sometimes be kept open only to one-way traffic, causing long delays to the traveling public and truckers. When a major slide occurs that closes both lanes, traffic traveling north and south would be diverted around Last Chance Grade via US-199/Interstate (I)-5/State Route (SR)-299 corridor, for an additional distance of 320 miles. Tourist traveling in this region would bypass the region entirely were US-101 to be closed to thru traffic.

Since 1997, it is estimated that project and repair costs for the Last Chance Grade slide complex have been $29.3 million dollars. Frequent repairs are necessary to repair slipouts, re-construct shoulders and secure existing retaining walls. A Feasibility Study is underway that will examine prior studies of the area, available data, and the information gathered by earlier projects for the development and exploration of alternatives to the existing process of rebuilding and repairing the roadway. Although definitive cost estimates have not been developed, building a bypass around the Last Chance Grade is thought to range between $240 million and $1.07 billion.

TRAFFIC IMPACT

A major slide along US-101 at Last Chance Grade would close the highway to through traffic between Del Norte and Humboldt Counties. Due to the remote nature of the region a detour route within close proximity is not viable, adding hundreds of miles to travel into and out of the region. Construction of a new route around the slide area is estimated to take between two and three years to complete. A sketch-level analysis was performed to estimate the traffic impacts in the event US-101 is closed due to a major slide at Last Chance Grade. The alternative route for travel between Crescent City, Del Norte County to Eureka/Arcata, Humboldt County is US-199 to I-5 to SR-299. Table 1, Daily Vehicle Miles Traveled, shows the current volume of travel on US-101 and the miles traveled between SR-199 and SR-299 compared with travel on the above described detour.

Table 1: Daily Vehicle Miles Traveled

	AADT	VMT Via US-101	VMT Via 199/I-5/299	Added VMT
All Vehicles	5,050	360,000	1,800,000	1,400,000
Trucks	556	44,000	222,000	176,000

TRUCK TRAFFIC

Trucks traveling on US-101 along the impacted area consist of interregional trips between Crescent City and Eureka/Arcata and those heading for other destinations. US-101 is the most direct route into and out of Del Norte County and Crescent City. It also is the main corridor within the county connecting the towns of Smith River and Klamath, Crescent City and many other points of interest reliant on goods shipments. This route is considered a primary route for transporting commercial goods to coastal towns north into Oregon from Sacramento and the San Francisco Bay Area. In this analysis all trucks are assumed to use the detour route. The narrow and winding nature of the detour make it difficult for trucks to traverse US-199 and SR-299, thus reducing the speed traveled. Travel is also impacted by few opportunities for passing, restricting faster moving trucks and passenger vehicles. There are some sections of SR-299 with steep grades and posted signs advising 20 MPH. Recent upgrades at Buckhorn Grade have improved the average speed in this section. Still, adding approximately 5,000 vehicles to SR-299 will have a measurable impact on the operational level of service, increasing delays for recreational traffic and goods movement on that route.

The number of extra miles required to travel the detour from around the Last Chance Grade slide area via US-199 to I-5 to SR-299 is approximately 320 miles. Based on an estimated speed of 45 MPH, the detour route would take an estimated 7 hours of additional travel time per vehicle to complete. It is estimated that the detour will cause 3,900 additional daily truck hours of travel. Based on Caltrans'

California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C), the truck delay costs are $113,000 per day. The additional 176,000 miles of truck travel adds $200,000 per day to truck operating costs. Total added cost for trucks is estimated to be $313,000 per day.

PASSENGER VEHICLES

For passenger vehicles (excluding 5+ axle trucks) the analysis applied similar assumptions as truck travel. US-101 is a vital link connecting Del Norte and Humboldt Counties. This route carries workers between regions and provides a link for Del Norte County residents to expanded commerce and services located in neighboring Humboldt County. Additionally, US-101 is the primary route providing access to tourist attractions located in the north coast region, particularly during the summer season. Finally, this is the primary route for intra-regional travel for locals to destinations within Del Norte County.

Based on the above scenario, in case of a closure along US-101, there will be an additional 26,000 daily vehicle hours of delay which will cost motorists about $327,000. The additional 1,400,000 miles of travel per day would also costs motorists about $700,000 in added vehicle operating costs. Therefore, the total additional user costs for travelers to the Del Norte County area would be slightly more than $1,000,000 per day so long as US-101 is closed.

The added cost to all travelers using the detour around the slide area at Last Chance Grade would be approximately $1,300,000 per day. It should be noted that these user costs are based on the current average level of traffic. Daily user costs would be expected to increase as traffic volume increases over time and the cost of driving increases.

Table 2, Summary Daily Travel Impacts and Costs, summarizes the daily impacts from the closure of US-101 to all travelers. Over the year, total travel costs would amount to approximately $450 million, assuming 250 days of travel for trucks and 365 days of travel for passenger vehicles. As stated above,

repair of US-101 after a major slide could take two to three years. It is anticipated that significant changes in travel would occur, therefore, it is not within the scope of this analysis to determine long-term financial impacts from a catastrophic failure at Last Chance Grade.

Table 2: Summary Daily Travel Impacts and Costs

	Daily Cost	Vehicle Operating Cost	Total Cost
5+ Axle Trucks	$113,000	$200,000	$313,000
All Other Vehicles	$327,000	$700,000	$1,027,000
Summary Total:			$1,340,000

ECONOMIC IMPACT

The closure of US-101 at Last Chance Grade is likely to have immediate and substantial economic impacts to the community of Crescent City and to the County of Del Norte. US-101 provides the only major access through Crescent City and Del Norte County, representing the primary route for moving goods and services into and out of the region. The increase in distance and time necessary to travel alternative routes into and out of the region will significantly add to the costs of travel for both business and regional travelers. The closure of US-101 would also re-direct tourists traveling along the North Coast of California to alternative routes that completely bypass Del Norte County and Crescent City. The potential economic impacts from these effects were analyzed using data outputs from the sketch-level traffic impact analysis.

The economic impact analysis was conducted using the Transportation Economic Development Impact System (TREDIS) model developed by Development Research Group, Inc. and designed to assess economic impacts due to changes in travel amount, type and quality. The main focus of this analysis was to evaluate the impacts economic output in Del Norte County and Crescent City from increased transportation costs and, to a limited degree, the loss of tourism/destination travelers from the closure of US-101. The basis of the analysis is the change in travel as the result of the closure. Travel flow data

was provided by Caltrans, District 1 and was synthesized through Caltrans' Cal-B/C Tool in order to obtain inputs for the TREDIS model. A scenario was developed to simulate travel patterns resulting from the closure of US-101 that were compared with the current, uninterrupted flows of traffic. To get a further understanding of the regions reliance on US-101, Caltrans conducted interviews with local business representatives and elected officials and sent a survey questionnaire to nearly 300 additional business owners/representatives who were not personally contacted. Information received from interviewees and survey respondents provided an understanding of the real and perceived impacts on individual businesses and the community. The information was incorporated into the model input assumptions and used to validate the model outcomes.

Because of the sketch-level detail of the data, the level of precision of the economic analysis is limited. The data used in the analysis were generated from annual average daily travel (AADT) counts taken of travelers along US-101, as recorded by Caltrans. Estimates of the number of travelers making the trip(s) between Crescent City and the Humboldt County line were developed from AADT counts taken from various points along the highway. This travel is thought to represent the interregional and destination travelers (i.e., tourist, recreational, etc.) and would be most impacted by a closure. Interregional travelers include Del Norte County residents traveling to Humboldt for goods and services and freight trucks transporting goods into, out of, and through Del Norte County and Crescent City. The distribution of trips by type, were estimated for both the pre-slide and post-slide scenario evaluation. The results of the economic analysis are meant to provide a scale of the potential impacts on the economy of Crescent City and Del Norte County from the disruption of travel due to a slide along US-101 at Last Chance Grade.

THE ECONOMY

The Del Norte County economy, like the State, reflects a shift from a resource extraction and manufacturing based economy to a service based economy, lead by the government, education and health services, and the retail sectors. The region continues to support the fisheries and agricultural industries but the primary component of the regional economy relies on tourism, drawn by the natural

features of the north coast and further supporting the retail and services sector industries. In 2013, approximately 9,800 Del Norte County residents reported being employed, while nearly 8,000 jobs were reported by employers located in the County, accounting for an estimated $300 million in total wages. Table 3, Del Norte County Employment and Unemployment, describes the labor market for the county and employment by industry sector.

Table 3: Del Norte County Employment & Unemployment

Civilian Labor Force[(1)]	**11,100**
Civilian Employment	**9,820**
Civilian Unemployment	**1,280**
Civilian Unemployment Rate	**11.6%**
Total, All Industries[(2)]	**7,990**
Total Farm	320
Total Nonfarm	7,670
Total Private	4,060
Goods Producing	250
Mining, Logging and Construction	170
Manufacturing	80
Service Providing	**7,420**
Private Service Providing	3,810
Trade, Transportation & Utilities	1,060
Information	80
Financial Activities	190
Professional & Business Services	190
Educational & Health Services	1,390
Leisure & Hospitality	780
Other Services	130
Government	**3,610**
Federal Government	150
State & Local Government	3,470
State Government	1,540
Local Government	1,930

(1) Civilian labor force data are by place of residence; include self-employed individuals, unpaid family workers, household domestic workers, & workers on strike. Data may not add due to rounding. The unemployment rate is calculated using unrounded data.

(2) Industry employment is by place of work; excludes self-employed individuals, unpaid family workers, household domestic workers, & workers on strike. Data may not add due to rounding.

Source: California Employment Development Department - Labor Market Information Division

The Del Norte County economy was estimated at $790 million in market value of goods and services produced in 2012. Total taxable sales, including retail sales, contributed $226 million to the regional economy. Approximately half of taxable sales, $111 million, were generated from tourism and recreation related expenditures. Agriculture production generated $40.2 million in 2012. The major commodities produced included nursery, flowers and foliage, livestock and livestock products. Timber accounted for $1.3 million in production. Fish harvesting contributed $34.3 million to the economy. Dungeness crab accounted for just over $30 million of output in the fisheries industry. Real estate services are estimated to generate $40 - 50 million in sales annually supporting ancillary industries within and outside the region. Manufacturing and construction's input to the economy continue to decline as a contribution to economic output in the region.

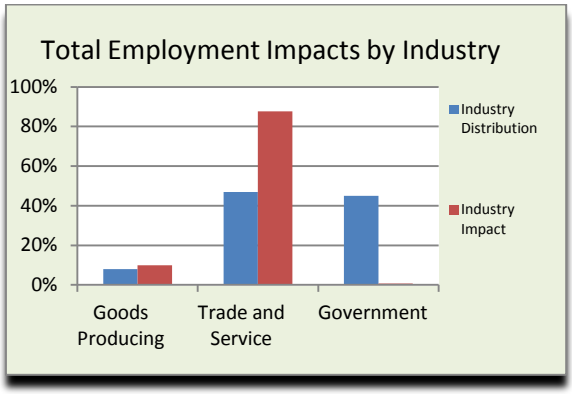
The region is home to four federally recognized Native American Tribes operating numerous business enterprises in Crescent City and throughout the region, including three casinos. These operations provide local retail and entertainment needs but are also dependent on tourism and pass through travelers for sales. Proceeds from these operations support the tribes' communities with job opportunities and other services.

Del Norte County has a strong business connection to Curry County, Oregon, to the north and Humboldt County to the south. A failure of US-101 at Last Chance Grade would disrupt the flow of goods, such as fuel, dairy products and timber, to Crescent City and the northern half of Del Norte County from Humboldt County. Other disruptions would occur for emergency response and transport services. Residents of Del Norte County travel to Humboldt County for medical services that are not available locally. The economic impacts will occur beyond Del Norte County as these services are either delayed or not sought due to the additional cost of travel. To the north of Del Norte County, communities located in southern Oregon rely on the business generated from tourist traveling the Pacific Coast Region of California, Oregon and Washington.

MODEL OUTCOMES

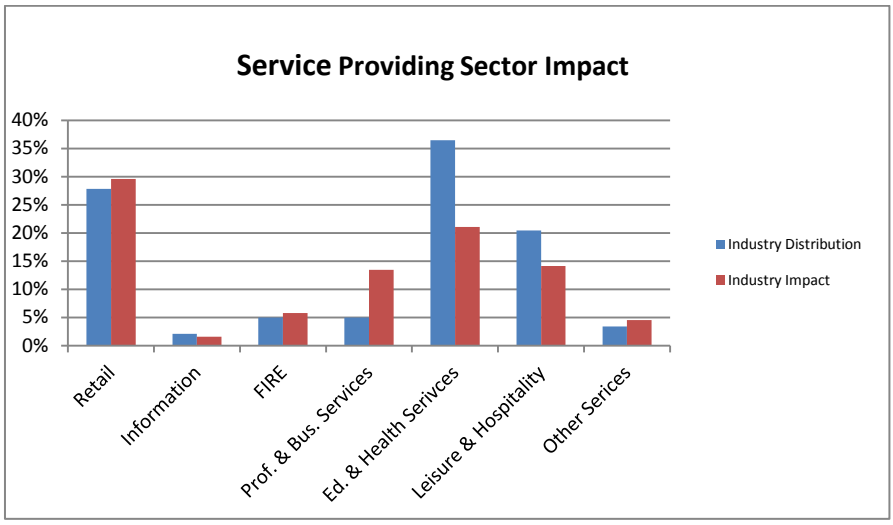
The complete closure of US-101 at Last Chance Grade could result in $300 to $400 million in reduced annual output according to the TREDIS results. Additionally, as many as 3,400 to 4,200 jobs could be lost and $100 to $130 million in wages annually. The Trade and Service Sector industries are impacted the most severely, accounting for nearly 90 percent of job losses, according to the results. Goods Producing industries and Government make up the remaining 10 percent. Table 4, Employment Impacts by Industry, shows the distributions of jobs by Sector and the impacts from closure of US-101 between Goods Producing, Trade and Service and the Government Sectors.

Table 4: Total Employment Impacts by Industry



Within the Trade and Service Sector, TREDIS model results indicate Retail and Leisure & Hospitality experience the greatest impact in losses as a percentage of existing jobs, at just below 50 percent. The results also show significant impacts to Education & Health Service and Business Service/Finance, Insurance & Real Estate Sectors, particularly in medical related fields and real estate. Table 5, Service Providing Sector Impact, describes the impacts to jobs as a percent of jobs across the Service Providing Sector.

Table 5: Service Providing Sector Impact



The distribution of job and income impact in the Retail and Leisure & Hospitality industries is provided in Table 6, Retail and Leisure & Hospitality Sector Impacts. The loss of Retail jobs reach across the entire Sector, though industries serving tourist related travel are especially at risk.

Table 6: Retail and Leisure & Hospitality Sector Impacts

Sector	Industry	Jobs Lost	Income Lost ($mil.)
Retail Services	Food and beverage	200	5.632
	Gasoline stations	73	3.506
	General merchandise	167	5.022
	Miscellaneous	112	1.607
Leisure & Hospitality	Arts, Entertainment, and Recreation	29	0.303
	Lodging	58	1.002
	Restaurants & Drinking Establishments	422	6.967

ASSESSMENT

As explained above, the TREDIS Transportation Economic Model is only able to provide a generalized assessment of the economic impacts to the region from the closure of US-101. However, the TREDIS results are important in that they show similar impacts regarded by the business representatives interviewed and responding to the survey, for this analysis. Business representatives and government officials expressed concerns that closure of US-101 would have catastrophic impacts to the regional economy. The TREDIS results indicate that the region would experience significant impacts approaching those feared in the community. Below is a brief summary of the interview and survey results with comparisons to the TREDIS results.

The survey results provide a consistent concern among the business community regarding the impacts from the closure of US-101. Survey respondents were primarily from the Retail and Service industries dependent on tourism. Other industries represented in the survey included Agriculture, Manufacturing Utilities, Real Estate and Government. Tribal representatives were also interviewed in person or responded to the survey. In all, **40** interviews were conducted and/or surveys received as part of the Last Chance Grade economic analysis study.

The general consensus from interview and survey respondents was for an immediate economic impact from a closure of US-101 in the event of a major slide at Last Chance Grade. Respondents representing industries catering to tourism and general retail and service related goods foresee an immediate impact on their level of business, resulting in lay-offs with potential closure of businesses in some instances. Respondents indicated a long-term closure of the US-101, 6 to 12 months, would result in closure of their businesses, and significant impact on the community. Agriculture, Manufacturing and Utilities industry respondents, particularly with business links to Humboldt County, expressed concerns regarding additional costs associated with the transportation of materials between Humboldt and Del Norte Counties. Significant increases in transportation costs are anticipated from the additional travel expected from detouring around the Last Chance Grade area on US-101. Real Estate and Finance industry respondents expressed concerns related to impacts on property values and sales, including

long-term recovery once US-101 is opened to through traffic. The impacts on property values and sales would also result in job losses, not only in Del Norte County but also in Humboldt County and in Oregon as these regions are closely interlinked. Many respondents expressed concern that economic growth would continue to be adversely impacted until such time as a permanent fix US -101 at Last Chance Grade is completed.

The survey results highlight the reliance Del Norte County has on tourism, and the link US-101 provides for facilitating these activities in and out of the region. For respondents who identified themselves as dependent on tourism, 50 to 100 percent of sales are generated from tourist expenditures. The tourist season was generally identified as the period between May and September when a majority of sales occurred. Coincidently, respondents reliant on tourism anticipate an immediate impact on business resulting in layoffs and business failure, were the closure to last beyond six months or a year. Additionally, respondents in the Retail industry with less reliance on tourism, still anticipate affects as layoffs ripple through the region impacting their sales.

Respondents in Manufacturing, Agriculture and utilities (fuels) industries expressed their reliance on US-101 for transporting raw and finished goods between Del Norte and Humboldt Counties, and beyond. Business obligations preclude many respondents from altering their relationship with sources in Humboldt County for raw and finished materials meaning these trips would still be required resulting in significant increases in transportation costs. Respondents noted that besides the increase in direct cost associated with the additional mileage and travel time between Del Norte and Humboldt Counties, additional costs include the need to add a second driver to make a trip or pay lodging costs to allow single drivers ample rest periods. Respondents indicated that increased transportation costs would impact profit margins adversely.

Responses from the survey also indicated a strong reliance on US-101 of coastal cities in Southern Oregon. US-101 also acts as a primary route of access for transporting goods to cities located along this route and tourist traveling along the west coast between San Francisco to Portland, or Seattle. The closure of US-101 at Last Chance Grade would also divert traffic away from cities located in Southern

Oregon. Tourist making this trip would opt for more direct routes to connect with the coast at locations located north toward Central Oregon. Though the scope of this analysis does not include impacts to Oregon cities, respondents are sensitive to the impacts on their neighbors to the north and the boomerang affects on the Del Norte County economy.

There are a number of situations created by the closure of US-101 that are not captured in the analysis but will still impose costs and hardship to residents in the County. Services such as schools, health and welfare, and emergency response will be severely disrupted. Many of the children living in towns and communities south of the Last Chance Grade are bused in to Crescent City to attend school. Since no practicable alternate routes exist, special arrangements would need to be made to ensure the requisite number of school days are attended. This may require temporary locations be established or that the children are bused to schools located in Humboldt County. Either alternative described above will likely impact the budget, and jobs, of the school district(s). Similarly, access to social and medical services would be impacted in the same way by a closure of the highway. Emergency response, be it medical, fire or police, would require coordination between multiple jurisdictions to ensure critical response is available and timely. This too, is likely to impact the budgets of the various jurisdictions involved. Each of these situations will require swift and effective coordination with limited resources and time to react.

The analysis does not consider the revenue impacts to local government entities. Del Norte County would stand to lose a substantial amount of revenues from sales and use taxes, personal income taxes and business taxes and fees. As the only incorporate city in the County, Crescent City would be impacted in similar ways as Del Norte County. The loss of tax revenues would impact the level of services each of the above entities would be able to provide. However, in the given situation, demand for government services would likely increase for those directly impacted by the closure.

CONCLUSION

Based on the analysis it can be demonstrated that closure of US-101 at Last Chance Grade would impose significant costs on travelers of this route. The additional miles of travel required to travel around the slide area at Last Chance Grade would add an additional $1.3 million in travel costs per day, and as much as $450 million over a one year period. According to the results of the TREDIS Model, these additional costs translate into $300 to $400 million in reduced output to the Del Norte County economy, approximately 3,000 to 4,000 lost jobs, and lost wages of $100 to $130 million over a one year period. Impacts of this magnitude would be severe to an economy the size of Del Norte County. Businesses dependent on tourism and on the transportation of goods on US-101 would be at particular risk of failure. Secondary affects could adversely impact additional businesses not otherwise dependent on tourism, and/or goods movement along US-101. Even those businesses that are able to absorb the additional cost associated with higher transport and secondary affects will be at risk should the closure of US-101 extend for a long length of time.

This study did not include an analysis of the economic impacts to Humboldt County that would occur from closure of US-101. However, Humboldt County businesses provide goods and services to businesses in Del Norte County that would be impacted from a closure.

Despite the limitations of the analysis addressed earlier, the results merit consideration for assessing the financial viability for taking action to remediate the risk associated with a major slide along US-101 at Last Chance Grade. Table 7, Economic and Highway Realignment Cost Impacts, compares the modeled economic impacts with the estimated project costs of building a new alignment around Last Chance Grade. The cost estimates for the project were provided by Caltrans, District 1 staff and reflect the total cost to design and construct the new highway. The table shows the total economic impacts carried out over three years, the amount of time to complete the project, against three project cost scenarios. In all three scenarios, **the potential economic impacts exceed project costs**. The exception is when the high cost project scenario is completed in one year, which is unlikely with a project this complex.

Table 7: Economic and Highway Realignment Cost Impacts

	Project Costs (million)	**Total Financial and Economic Impacts-Year 1*** ($750-$850 mil)	**Total Financial and Economic Impacts-Year 2*** ($1,500-$1,600 mil)	**Total Financial and Economic Impacts-Year 3*** ($2,250-$2,350 mi)
Alternative #1	$250	$500-$600	$1,250-$1,350	$2,000-$3,000
Alternative #2	$500	$250-$350	$1,000-$1,100	$1,750-$1,850
Alternative #3	$1,070	($320-$420)	$430-$530	$1,180-$1,280

*Based on $450 million annual cost to travelers and $300-$400 million impact on economic output to Del Norte County.

Appendix H

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