



## Dharma Cloud Foundation

PO Box 1066  
Mendocino, CA 95460

November 7, 2005

California Coastal Commission  
Att: Larry Simon  
45 Fremont Avenue, Suite 2000  
San Francisco, CA 94105-2219

Re.: Federal Consistency Review for the replacement of the Ten Mile Bridge,  
Mendocino County, CC-74-05

Dear Commissioners:

The proposal by Caltrans to construct the replacement for the Ten Mile Bridge with 1) 8' shoulders, 2) no sidewalk 3) and the ST-20 railing should be amended.

Item 20 c. **CC-74-05**

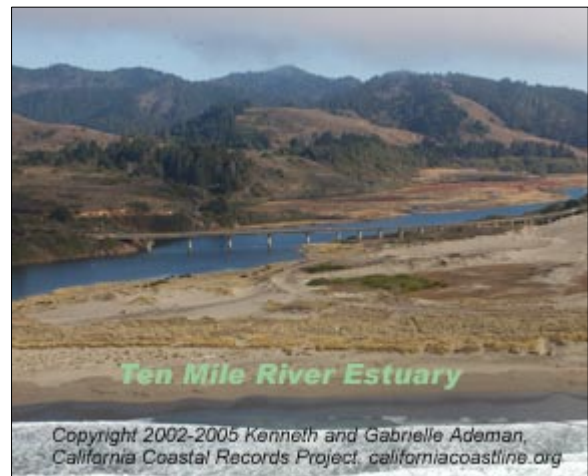
November 16, 2005:

Ten Mile Bridge

## Recommendations

The Commission should:

1. Require that the shoulder width be narrowed from 8' to 4';
2. Require that a sidewalk be installed on the bridge;
3. Require that pedestrians be protected from the traffic by placing the ST-10 railing used on the Noyo Bridge on the traffic side of the sidewalk;
4. Require use of a newly designed pedestrian railing incorporating curved and arched elements found in the historic bridges of Hwy 1, as officially recommended by the Commission to Caltrans in 2001.



## Why the Staff Report recommendation should be amended

Ten Mile Bridge is set in one of the most spectacular, unspoiled, undeveloped and rural areas along Highway 1. If any bridge deserves to be designed to harmonize with the landscape and the historic character of the highway, it is Ten Mile Bridge. An urban-expressway bridge with 8' shoulders and an unsightly industrial-style railing fails is out of scale and out of character.

At the September 15, 2005 Commission meeting in Eureka, a majority of the Commissioners expressed strong support for a separated sidewalk and 4' shoulders for the Greenwood Bridge in the village of Elk. This support reflected the Commissioner's understanding of Highway 1's scenic beauty, rural character, and

role in the Coastal Trail. Caltrans agreed to work with staff to revise its design to reflect the Commission's expression.

Remarkably, the staff report recommends accepting 8' shoulders and no sidewalk for the Ten Mile Bridge. When I spoke to Peter Douglas several weeks after the Eureka meeting, he told me that he had agreed with Caltrans to accept 8' shoulders on Ten Mile Bridge. He was persuaded because of safety considerations on a bridge of this length. When I voiced my concern about the precedent this would set for future bridges, he said that Caltrans had agreed that it would not take Ten Mile as a precedent.

But, if a bridge in such an outstanding setting is not accorded special design consideration, what bridge will qualify? Regardless of what Caltrans promises, the facts will speak loudly in the future if the Commission fails to protect the scenic values of Ten Mile River.

I have the highest respect for Mr. Douglas. In this case, though, he accepted Caltrans arguments that do not stand up to analysis. The difficulty of justifying 8' shoulders and no sidewalk is apparent in the lengthy, tortured, arguments on pages 17-22 of the staff report. Rationalizations, compromises, and promises pile one upon the other. The end result is still a bridge design that fails to meet the Commission's mandate to protect coastal values.

The Commission has strong grounds for insisting that the design incorporate 4' shoulders, a protected sidewalk, and a newly designed pedestrian railing with arches.

The core question is whether current highway design standards absolutely mandate 8' shoulders for new bridges on rural Highway 1. The clear answer is **they do not.**

A subsidiary question is whether an 8' shoulder and no sidewalk, as compared to 4' shoulders and a protected sidewalk, would result in a significant safety benefit. The clear answer is **they would not.**

The above answers are based on my extensive review of Caltrans design standards, Caltrans exceptions to standards, national policy on flexibility in design standards, and accident data and analysis (see below).

Given the scenic, environmental, and human benefits of narrowing the shoulders and providing a protected sidewalk, and the lack of any valid justification for wider shoulders, the Commission should require that the design be amended.

## **Eight-Foot Shoulders Are Not Required**

The proposed 8' shoulders are a cookie-cutter standard, but all levels of transportation planning endorse the need for flexibility in highway design to accommodate community wishes, scenic values, and environmental considerations. Caltrans endorses flexibility and provides for it by allowing exceptions on a case by case basis. It has granted exceptions for situations similar to those existing for rural bridges on scenic stretches of Highway 1.

## Design Flexibility Is Standard Practice

1. Caltrans' *Highway Design Standards*, its engineering "Bible," specifies 8' shoulders for all replacement bridges on 2-lane roads projected to have more than a very low level of traffic. Highway 1 at Ten Mile exceeds that traffic level. But, Caltrans can make an exception to this standard.
2. Caltrans' has complete freedom to make exceptions to *any* standard. The exception needs to be justified. Preservation of environmental and scenic values are common grounds for design exceptions.
3. Caltrans' planning document for Highway 1 in Mendocino County explicitly states that applying Caltrans design standards "may not be prudent" for among other reasons:
  - **Environmental impacts could be significant. Widening could impact biological, historic or archeological resources. Further, the scenic character of the highway could be damaged.**
  - **Widening Route 1 to beyond 9.6 meters (32'), in rural areas would be inconsistent with the Coastal Act and the Local Coastal Plan.**

Both of these reasons apply to 8' shoulders on Ten Mile Bridge. Wide shoulders damage the "scenic character of the highway," and they would widen the bridge beyond 32', making it "inconsistent with the Coastal Act and the Local Coastal Plan."

4. Caltrans does make exceptions to design standards for Highway 1 projects, for the reasons stated above. In particular, the standards of DIB 79-02 (which apply to resurfacing, restoration, and rehabilitation projects) require at least 4' and sometimes 8' shoulders be included in all projects. Further, these standards state:

Shoulders are important to accommodate bicycle traffic, and pedestrian traffic where sidewalks are not present. The minimum usable shoulder for bicycles and pedestrians is 1.2 m [4'], but wider shoulders are more appropriate.

Most of Highway 1 in Mendocino County does not meet the required minimum 4' shoulders. In many areas, shoulders are basically non-existent. The lack of shoulders adequate for bicyclists is a known, serious safety failure.

Despite the mandated standard and the heavy bicycle traffic, Caltrans does not include 4' shoulders as part of all resurfacing projects. It grants a design exception for these projects.

5. Caltrans has made significant design exceptions for other projects. Two examples:
  - Caltrans allowed 4' shoulders on bridges where the standard is 8'. Highway 150 in Santa Barbara County had two bridges replaced recently.

The bridges were designed originally with 8' shoulders, but after Santa Barbara agencies opposed the width, arguing that the wider shoulders were out of scale for a scenic rural road, Caltrans narrowed the shoulder width on these bridges to 4'.

- Caltrans allowed significantly narrower shoulders than the standard. A history of a project on Route 89 along Emerald Bay, Lake Tahoe, notes:

The only design exception required was for allowance of the 0.6m wide (2ft) shoulders. FHWA and AASHTO generally consider a 1.2m wide (4ft) shoulder as the minimum acceptable width for a two lane major collector/minor arterial roadway, such as this portion of State Route 89.

The traffic level (ADT) on this road where 2' shoulders were allowed is **five times** the 2004 traffic level at Ten Mile Bridge.

This project was in an extremely scenic and environmentally sensitive area, and Caltrans recognized that these values justified the design exception.

6. Caltrans has modified its own standards in response to public concerns. When the Commission was considering the Noyo Bridge railing, Caltrans design standards required less than 4" spacing between rails less than 32" from the surface. In response to public desires for more visually transparent railings, Caltrans has changed the required spacing to less than 6".
7. In passing the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, Congress emphasized, in addition to safety, the importance of transportation design that is sensitive to its surrounding environment, especially in historic and scenic areas. In 1995, Congress reemphasized and strengthened this direction through the NHS Act, which states, in section 304:

A design for new construction, reconstruction, resurfacing... restoration, or rehabilitation of a highway on the National Highway System ... may take into account...[in addition to safety, durability and economy of maintenance]...

  - the constructed and natural environment of the area;
  - the environmental, scenic, aesthetic, historic, community, and preservation impacts of the activity; and
  - access for other modes of transportation.
8. The Federal Highway Association has acted on this congressional directive by promoting flexible design to preserve community, scenic and environmental values.
9. AASHTO, the American Association of State Highway and Transportation Officials, which sets standards considered a minimum by Caltrans, also now explicitly recognizes this need.

With respect to bridge design, the AASHTO publication, *A Guide for Achieving Flexibility in Highway Design* (2004), states:

**The replacement or retention of bridges having historic or aesthetic value or the design of bridges on very low-volume roads may justify traveled way widths less than the indicated minimum AASHTO Green Book values.**  
 [Emphasis added.]

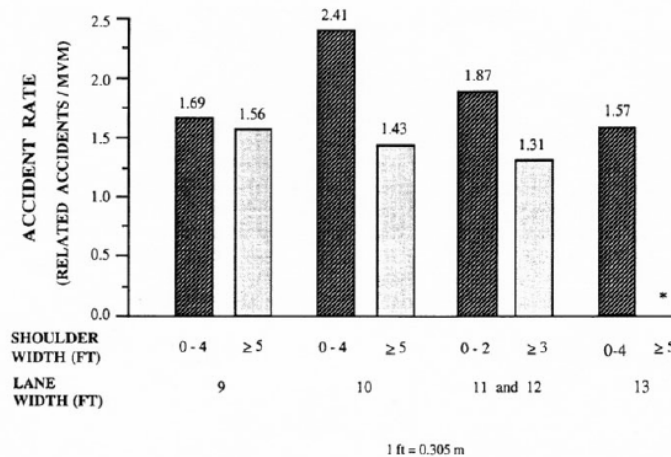
In summary, national and state highway policy recognizes the need to make exceptions to cookie-cutter standards, especially in a historic, scenic, and environmentally sensitive location such as Ten Mile River.

**Accident Data Do Not Support a Safety Argument for 8' Shoulders**

The Caltrans project report provides accident data for Ten Mile Bridge. During the five years cited, there were two accidents with injuries, no fatalities, and one with property damage only. **The accident rate per mile on Ten Mile Bridge with the current 1' shoulders is only 58% of the state average for all highways.** The bridge is already relatively safe.

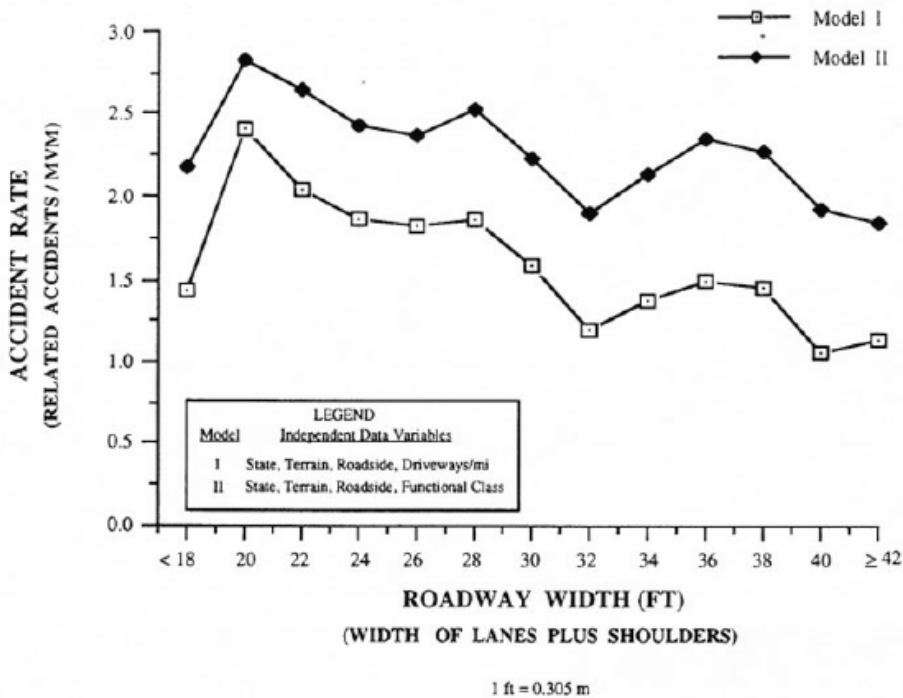
**Widening the shoulders from 1' to 4' would provide a significant additional safety margin, but increasing from 4' to 8' would not significantly reduce accident rates.** The figure below is from a study of accidents on low-volume roads, such as Highway 1 at Ten Mile River<sup>1</sup>. It shows that moving from a 1' shoulder to greater than 3' reduces the expected accident rate by 30%.

**Figure 1** Rates of related accidents by roadway width from Models I and II



**Figure 2** Rates of related accidents by lane and shoulder width from the data base for low-volume roads (the asterisk indicates inadequate sample size).

Figure 1 of this study shows that moving from 3-4' to 8' shoulders (32' to 40' total roadway width) does not result in a statistically significant reduction in accident rates.<sup>2</sup>



**To summarize, the best available evidence shows that increasing shoulder width from 4' to 8' would have no significant safety benefit.**

**The Safety Benefit of 4' Shoulders**

The proposed amendments to the bridge design couple reduced shoulder width to the addition of a protected sidewalk. Although there are no quantified statistics, pedestrians certainly will be safer in a protected sidewalk than walking on a traffic shoulder next to high-speed traffic.

**The Safe-Pullout Argument**

Caltrans argues that 8' shoulders are required to create a safe pullout area for disabled vehicles. This is a non-problem. There will be less than an accident a year, and in most cases 4' shoulders will allow non-involved vehicles to get around the accident. The other

**The Maintenance Argument**

Caltrans argues that 8' shoulders are needed to provide room for maintenance vehicles without requiring one-way traffic control. This is not correct. A safe 8' working lane could be created with concrete barriers. Pylons could then mark two

12' lanes. Note also that much maintenance could be done from with a protected 4' shoulder and sidewalk, leaving 28' for two-way traffic.

### **The Visual Impact of 8' Approach Shoulders**

The 8' shoulders would not exist just on the bridge but require transition zones of 8' and 8' to 4' shoulders off the bridge. The Commission Staff recognized their negative impact:

While Caltrans continued to argue for the proposed [bridge approach] shoulder widths and lengths based on design guidelines, the Commission staff argued that the supposed public access benefits that would arise from the introduction of paved shoulders in excess of four feet in width into a stretch of Hwy.1 where existing shoulder widths rarely reach four feet (and in most areas are significantly less than four feet) would be inconsequential, but that potential visual resource impacts from these shoulders could be significant.



In negotiations, Caltrans agreed [note well] to make an exception to its design standards and to shorten the transition

zones. Although shorter than initially proposed, there will be hundreds of feet of transition zone varying from 8' to 4'. The required wide transition shoulders are another negative visual impact that would be avoided by 4' bridge shoulders.

### **Conclusion**

**Given the scenic, environmental, and human benefits of narrower shoulders and a protected sidewalk, and the lack of any valid justification for wider shoulders, the Commission should require that the design be amended.**

### **The Desirability of a Protected Sidewalk**

Narrowing the shoulders would allow a protected sidewalk without widening the bridge width.

#### **Why a sidewalk?**

The lack of sidewalks goes against the commission's support for the California coastal trail. This bridge will be part of coastal trail and should provide for safe pedestrian use.

The Ten Mile Bridge is at the edge of a State Park that contains rare, large coastal dunes. There is now informal access and the Parks Department plans to develop formal access.

The dunes and the park will bring people to the area who will use the bridge because of it will provide magnificent views of the ocean, river, and surrounding valley.

There is a community at the north side of Ten Mile River that would use the bridge for access to the dunes park area.

Lack of a sidewalk endangers pedestrians.

### **Why Caltrans' Pedestrian Data Is Meaningless**

In arguing against the need for a pedestrian sidewalk, Caltrans cited a 1-day survey that found no pedestrians used the existing Ten Mile Bridge. **No pedestrians use the existing bridge because they don't want to risk injury and death!** There are only 1' shoulders and a 9-inch curb. Only out of desperation, certainly not for pleasure, would anyone walk on the existing bridge. The cited statistic is meaningless in terms of evaluating the need for a sidewalk.

Build a bridge with a protected sidewalk and a nearby parking area, and pedestrians will use it.

### **Why a two-rail system with the ST-10?**

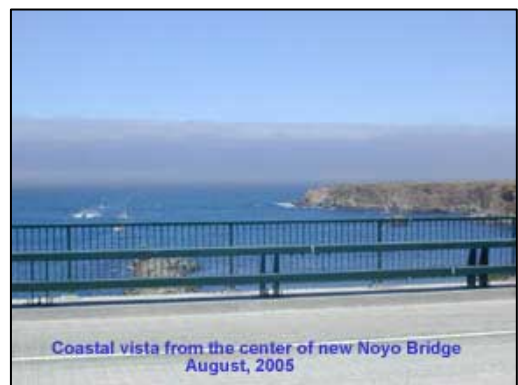
1. National safety standards (the "AASHTO" standards) subscribed to by California say that pedestrians on bridges shall be protected from vehicles when the highway is designed for high speeds (50 MPH or greater). This protection requires a traffic barrier on the traffic side of the sidewalk.

Whatever the posted speed limit, the actual speeds on the Ten Mile Bridge will certainly exceed 50 MPH.

Eight-foot shoulders will increase passing on the bridge, as now occurs on sections of Highway 1 with wide shoulders. Motorists already pass on the bridge because it is one of the few places in the area where there is adequate sight distance for passing. Passing vehicles put pedestrians in unprotected shoulders at increased risk.

Because the bridge will be occupied by pedestrians, the proposed use of a combination vehicle-pedestrian-bicycle rail, the ST-20, on the Ten Mile Bridge is contrary to AASHTO standards. The AASHTO standards limit use of a combination vehicle-pedestrian rail placed on the outer edge of a bridge, "to roads designated for 45 MPH or less."<sup>3</sup> Another ASHTO document says, "For speeds of 50 MPH or greater, pedestrians should be protected by a separation traffic barrier."<sup>4</sup>

2. The AASHTO standards for pedestrian protection can be met by using the two-rail system so successfully employed on the new Noyo Bridge. The inner rail is an ST-10, which has a low height and good visual transparency.





3. The use of an inner rail, together with a 4' shoulder to be used by bicycles, will allow the outer rail to be a pedestrian railing. This will greatly improve scenic viewing and bridge aesthetics.

### **Why a newly designed railing?**

1. A new pedestrian railing needs to be designed for coastal bridges. **The ST-20 railing proposed by Caltrans fails to embody the recommendations the Commission made to Caltrans in June, 2001.<sup>5</sup> The ST-20 railing need not and should not be used on any bridges in the coastal zone.**



The 2001 recommendations of the commission were based on the work and advice of the commission's "Railing Subcommittee," established in December 1999. The subcommittee met numerous times with Caltrans and received advice from the public. Two of the key commission recommendations were:

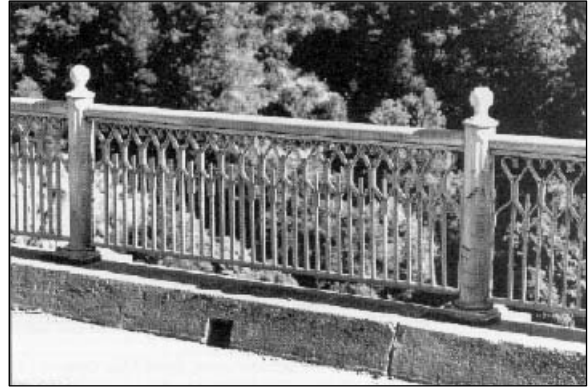
- **Curved and arched elements should be explored, in order to make the rail design as graceful and attractive as possible.**
- **Because of the loss of many historic and attractive bridges throughout California, a new rail design should seek to incorporate elements of historic bridges where consistent with modern safety standards.<sup>6</sup>**

A pedestrian railing could easily incorporate curved arches that would reflect the arches that were incorporated into railings of the historic arched, concrete bridges of Highway 1. They would provide a link to the historic past. They would provide a feeling of tradition, as well as aesthetic beauty. Examples of such railings are shown below.

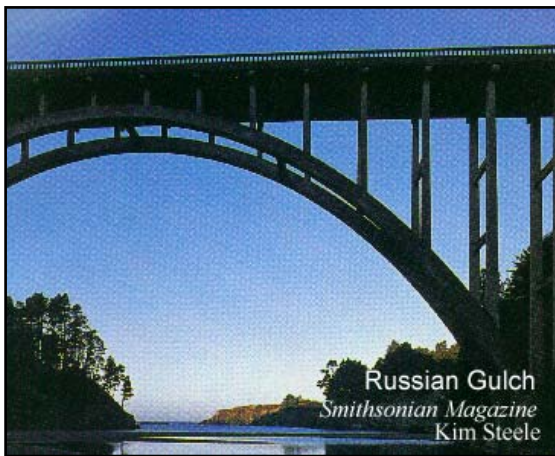


These railing are on bridges in France and are of cast iron. Alternative materials could be used, although cast iron would be structurally adequate for pedestrian railings.

California has also used elaborate metal bridge railings in the past. The photo to the right is a railing on historic Highway 70 in the Sierras.



The original Hw 1 bridges have arched designs and arches in the railings, as seen in Russian Gulch Bridge. The Ten Mile Bridge has the historic concrete arched railings.



## **Conclusion**

The Ten Mile Bridge needs to be designed to preserve the small-scale rural character of Highway 1 and to fit harmoniously with the exceptional scenic values of Ten Mile Estuary.

Despite any assurances by Caltrans, Ten Mile Bridge designs will set a precedent for future bridges to be constructed by Caltrans on Hwy 1.

The staff recommendation to accept the Caltrans' design is not supportable. Caltrans can be required to fulfill its obligation to balance engineering considerations with concern for scenic and environmental values.

The Commission should require that Caltrans' bridge design reflect previously expressed commission concerns and recommendations.

The commission should:

- Require that the shoulders be reduced from 8' to 4'.
- Require a sidewalk to protect pedestrians and further development of the coastal trail.
- Require use of a two-rail system to protect pedestrians and to provide for optimal railing aesthetics and motorist views.
- Require use of a newly designed scenic pedestrian rail acceptable to the commission. The two-rail system with an outer pedestrian rail will provide wide latitude for designing a rail incorporating curves, arches, and historical elements.

Sincerely,

Vince Taylor, Ph.D.  
Executive Director

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<sup>1</sup> Charles V Zegeer, Richard Stewart, Forrest Council, And Timothy R. Neuman, *Accident Relationships of Roadway Width on Low-Volume Roads*, Transportation Research Record 1445, approximately 1994. Web reference: [http://www.sonic.net/~woodhull/trans/Zegeer\\_etal.pdf](http://www.sonic.net/~woodhull/trans/Zegeer_etal.pdf)

<sup>2</sup> Even if moving from 4' to 8' shoulders reduced accident rates by another 10%, which seems doubtful, the effect would be almost unnoticeable. Caltrans data show one injury accident every 2.5 years. Four-foot shoulders would, reduce this to 3.5 years. A further 10% reduction in accident rate would avoid one injury accident in 35 years.

<sup>3</sup> *AASHTO LRFD Bridge Design Specifications*, Chapter 13, Section C13.7.1.1, p. 13-6, American Association of State Highway and Transportation Officials, 1998

<sup>4</sup> *A Policy on Geometric Design of Highways and Streets*, AASTO (1990), cited in *ibid*, p. 13-6.

<sup>5</sup> Letter to Caltrans Director Jeff Morales from Sara Wan, Commission Chair, June 29, 2001.

<sup>6</sup> *Ibid*.