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May 5, 2006

California Coastal Commission
Att.: Melanie Faust
710 E Street, Suite 200
Eureka, California 95501

Items F 5a, F 6a - 1-06-PWP
Item F 8c - 1-06-022
June 13, 2006
Ten Mile Bridge Replacement Project

Dear Commissioners:

The proposal by Caltrans to construct the replacement for the Ten Mile Bridge with 6-foot' shoulders and one 5-foot protected sidewalk should be amended.

Recommendations

The Commission should:

1) Accept the condition recommended by the staff to require Caltrans to return to the Commission within one year for approval of revised plans for guard rails and barriers.
2) Accept the Caltrans proposal to place only one, rather than two, protected sidewalks on the bridge.
3) Require that the sidewalk be 4 feet in width, with 5-foot wide passing spaces every 200 feet, as required by the American Disabilities Act.
4) Require that the width of the traffic lanes plus shoulders be no greater than 32 feet. This would allow two 12-foot lanes and 4-foot shoulders or, preferably, two 11-foot lanes and 5-foot shoulders.
5) Request Caltrans to lobby for national acceptance of the recommendation of the AASHTO Nonmotorized Transportation Technical Committee that bicycle railing height be lowered from 54" to 42", the same height as pedestrian railings.

The combination of recommendations 3) and 4) will allow the bridge to 5 feet narrower than the proposed design. This modified design will significantly reduce the bridge's impacts on the environment, in keeping with the mandates of the Coastal Act and the California Environmental Quality Act. Safety will not be significantly affected.

Note: Comments specific to Public Works Plan 1-06-PWP begins on page 8.

Discussion

Ten Mile Bridge is in one of the most spectacular, unspoiled, undeveloped and rural areas along Highway 1.

The existing Ten Mile Bridge is low and narrow, minimally intruding in its setting.

The replacement bridge needs to be wider to accommodate walkers on the coastal trail and to provide shoulders adequate for bicyclists and vehicle safety. The Coastal Act and the California Environmental Quality Act require that the replacement bridge be as visually unobtrusive as possible consistent with meeting these needs.

The Commission has required Caltrans to provide strong justification for any features that increase the width or visual intrusiveness of the replacement bridge.

Caltrans has justified its revised design, first, with safety arguments, but Caltrans' has misrepresented the underlying studies and data. The studies and data don't support Caltrans' assertion that 1) historical accident rates at Ten Mile Bridge are meaningfully higher than state averages, or that 2) six-foot as compared to four-foot shoulders will substantially reduce expected accidents.

Secondly, Caltrans has asserted that the American Disabilities Act (ADA) requires it to build a five-foot sidewalk. This is erroneous.

A bridge 5 feet narrower than Caltrans' proposed design can be built without affecting safety significantly or conflicting with ADA requirements. The Commission should condition its approval on acceptance by Caltrans of the narrower bridge.

Following sections discuss in detail ADA requirements and Caltrans' analysis of accident rates and the safety effects of wider shoulders.

Requirements of the American Disability Act

Caltrans has proposed a 5' wide sidewalk for Ten Mile Bridge, asserting that "the ADA requirement [is] for a five foot (not four foot) sidewalk."[1] This is erroneous.

The current ADA requirement for Pedestrian Access Routes, including sidewalks, is a clear width of 3 feet; and when distances are greater than 200 feet, passing spaces five feet long and 5 feet wide must be provided every 200 feet.[2]

A proposed revision to the right-of-way rules (in process and not now law) increases the clear width for pedestrian access routes to four feet.[3] It keeps the same requirement of a passing space every 200 feet.

A four-foot wide sidewalk, with turnouts every 200 feet, will meet current and in-progress rules under the American Disabilities act.

These turnouts could be cantilevered, so that they would not add to the basic width of the bridge.

The turnouts could be increased in size to add an attractive aesthetic feature for pedestrians. For example, standard turnouts could 3-feet deep and 10-feet long, with

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[1] *Ten-Mile River Bridge Seismic Retrofit/Replacement, State Route 1, Initial Study with Proposed Mitigated Negative Declaration,* Caltrans, March 2006 (hereafter, *Ten-Mile Initial Study*), p. 4.
[2] Sections 403.5.1 and 403.5.3, *ADA and ABA Accessibility Guidelines for Buildings and Facilities*, Published in the Federal Register July 23, 2004 and amended August 5, 2005.
[3] Section R301.3.1, *Revised Draft Guidelines for Accessible Public Rights-of-Way,* ADA Access Board, November 23, 2005

curved rather than rectangular shapes. Perhaps a larger turnout with a resting bench could be provided at the center of the bridge to provide an architectural focal point for the bridge.

The four-foot sidewalk will save one foot of width and correspondingly reduce the required size of the bridge foundation.

Shoulder Width and Accident Rates

I documented in earlier testimony to the Coastal Commission that four-foot shoulders would provide a high level of safety on Ten Mile Bridge and that increasing shoulder width from four to eight feet would not significantly reduce accident rates.[4] The lack of significant safety effect from increasing shoulder width beyond 4 feet was from an analysis of accidents on low-volume rural roads, appropriate to Highway 1 at Ten Mile River[5].

Caltrans has submitted to the Commission that increasing shoulder width from four to six feet would reduce collision rates by approximately 44%[6]. This assertion, critically important to the case for 6-foot shoulders, does not stand up under examination.

In a memo, Tami Grove, Commission staff person, states that the basis for this estimate is a research paper on bridge accident rates by Daniel Turner published in 1984.[7] The table of accident reduction factors cited by Caltrans is included with Ms. Grove's memo. The original research paper from which the Caltrans-cited accident-reduction table is supposedly derived has no table remotely like the cited table.

Because comparing Mr. Turner's and Caltrans' tables is technical and detailed, I have made this comparison in Appendix 1. What can be said without going into technical detail is that Mr. Turner never examined the effect of increasing shoulder width on bridge accident rates. Mr. Turner's analysis only examined the effect on bridge accident rates of differences between the width of the approach highway and that of the bridge. Bridges with a width less than that of the approach roadways were found to have elevated accident rates, as one might expect.

For approach highways wider than 30', the widest roads he considered, all accident rates were extremely small, less than 0.2 accidents per million vehicles in all but one relative bridge-width category. Further, there was no pattern in the accident rates with relative bridge width (the widest width actually had the highest accident rate). Mr. Turner notes, though, that results for highways wider than 30' had very few observations and weren't statistically reliable.

All proposed designs for the Ten Mile bridge are wider than 30'; thus there is nothing in Mr. Turner's analysis that legitimately supports Caltrans' assertion that going from four to six foot shoulders would reduce accident rates by 44%.

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[4] Vince Taylor, comments on CC-74-05, to Larry Simon, California Coastal Commission, pp. 5-6, November 7, 2005.

[5] 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

[6] *Ten Mile River Bridge Seismic Retrofit/Replacement, Initial Study with Proposed Mitigated Negative Declaration,* Caltrans, March 2006, p.3.

[7] Tami Grove to Melanie Faust and Bob Merrill, *Subject: Responding to some of the issues raised re: Ten Mile Bridge,* May 22, 2006, included as Exhibit 4A of the commission staff report on permit 1-06-22, June 1, 2006. The cited article is: Daniel Turner, *Prediction of Bridge Accident Rates*, Journal of Transportation Engineering, Vol. 110, No. 1, January 1984.

Mr. Turner refers in his article to a study of bridge accidents in Colorado that does bear on the issue of the added safety from increasing shoulder width. This study further substantiates the conclusion of other research I cited previously that found no significant decrease in accident rates from shoulders wider than four feet.[8]

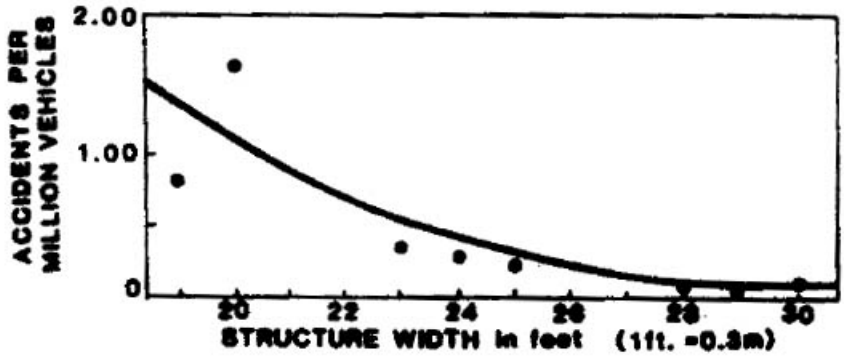

FIG. 3.—Colorado Absolute Width Curve

Figure 3 from this study shows that accident rates are extremely small for bridges equal to or greater than 28' wide, and further, that there is no meaningful decline in accident rates for bridge widths beyond 28'. With 4' shoulders, the new Ten Mile bridge would have a traveled way of 32', well into the flat portion of the curve; thus further increases in width would not reduce predicted accident rates.

Historical Accident Rates at Ten Mile Bridge

In its November permit application, Caltrans estimated that the accident rate for the existing Ten Mile Bridge was ***58 percent*** of the comparable statewide rate. This finding further reinforced the conclusion that safety considerations didn't justify wider shoulders.

More recently, Caltrans has prepared another historical accident analysis for Ten Mile Bridge. The revised analysis reports that the accident rate at Ten Mile Bridge is ***186 percent*** of the comparable state average.

How much weight should the commission attach to the more recent estimate? **Not much.**

Does the new estimate provide any support for shoulders wider than 4 feet. **No.**

The important fact is that historical accident rates apply to the existing bridge, not any of the proposed designs. The traveled way on the new bridge will be at 32' with four-foot shoulders, six feet wider than the existing width. As noted previously, according to the Colorado study, the accident rate on the new bridge will be low and will not decline significantly with further increases in width. This finding is also supported by the study of rural highways cited in my November comments on the Ten Mile permit application.

[8] *A study of Motor Vehicle Traffic Accidents at Bridges on the Colorado State Highway System,* Traffic Engineering Section, Colorado Division of Highways, Denver, Colorado, June, 1973.

The historical analysis itself needs to be viewed skeptically.[9] That accidents have occurred is indisputable, but rate of accidents is very sensitive to the time period chosen, and the comparison to supposed statewide averages is not valid. The supposed "statewide average" is not for comparable bridges but is mechanically derived from highway-segment accident rates.

Past accidents at Ten Mile have not been sufficient to cause it to be identified as an accident "hot spot," according to Ralph Martinelli, the Chief of District 1 Traffic Safety Office.

As will be seen in the following section, accidents at Ten Mile were almost non-existent prior to a 2001 widening of the traffic lanes and narrowing of the shoulders.

The Safety Tradeoff of Lane and Shoulder Widths

I recommend that the traveled way (lanes plus shoulders) of the new bridge be 32'. This would conform the bridge to the Mendocino County LCP and give a very low expected accident rate.

An important variable is how the traveled way is divided between traffic lane and shoulder width. The Caltrans "standard" would be for 12' lanes and 4' shoulders. There is a strong argument for 11' lanes and 5' shoulders.

A narrower (11-foot) lane and a wider (5-foot) shoulder would both 1) provide greater safety for bicyclists, and 2) reduce expected vehicle accident rates.

The present bridge has only 1-foot shoulders; thus even four-foot shoulders would be a vast improvement for bicyclists. The *AASHTO Guide for the Development of Bicycle Facilities* generally recommends a minimum of four-foot shoulders, but it recommends (not requires) a minimum of five-foot shoulders next to a guardrail.[10]

The available data argue that not only would bicyclists be safer with the wider shoulder, but drivers would be at least marginally safer. An analysis of the effects of various factors on the safety of rural two-lane highways estimates that safety benefit of widening the shoulder from four to five feet would slightly more than offset the safety loss from narrowing the lane from 12' to 11'.[11] Another analysis of accident rates on rural road found that vehicle accidents are best correlated with overall width of lanes plus shoulders; thus 5' shoulders plus 11' lanes would provide extra cyclist safety without detracting from vehicle safety.[12]

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[9] Appendix 2 lists and discusses the factors that account for Caltrans' greater that 3-fold increase in estimated relative accident rates between the initial and second estimate.

[10] *Guide for the Development of Bicycle Facilities*, American Association of State Transportation Organizations, 1999.

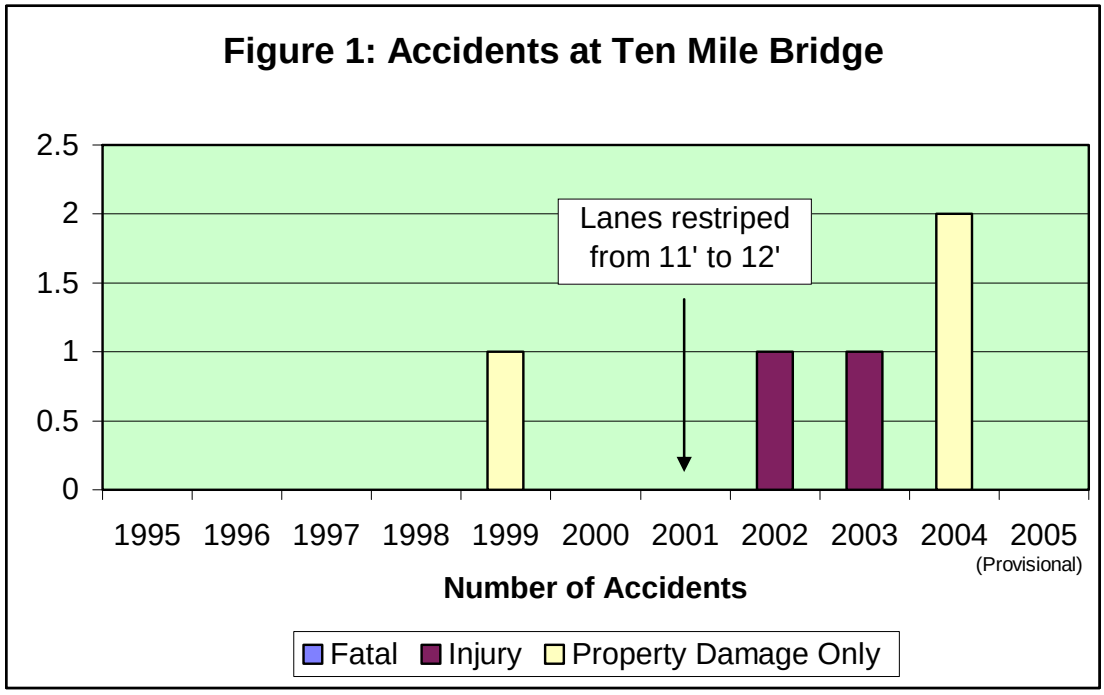
[11] D. W. Harwood, et. al., *Prediction of the Expected Safety Performance of Rural Two-Lane Highways*, Midwest Research Institute, Kansas City, Mo, Report No. FHWA-RD-99-207, May 1997-September 200. Figure 3 shows a 6% safety benefit from moving from 4-foot to 5-foot shoulders. Figure 2 shows a 5% safety loss from reducing lane width from 12 to 11 feet. These changes would apply to the expected very low accident rate at the New Ten Mile Bridge and would not make a significant difference in the overall expected accident rate.

[12] 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

Ten Mile Experience with Restriping to Widen Lanes

More compelling is the accident experience at Ten Mile Bridge before and after a lane restriping done in 2001. In this year, the traffic lanes were widened from 11' to 12' and the shoulders narrowed from 2' to 1'.

Figure 1 shows the accidents reported from 1995 through 2005 on Ten Mile Bridge.[13] Strikingly, there was only one accident in 6 years prior to the restriping, whereas there were four accidents in four years following the restriping – a six-fold increase in accident rates. The difference is great enough to suggest that the wider lanes encouraged higher speeds, that in turn resulted in more accidents.[14]



The implication of the accident experience is that the bridge was safer for drivers when more of the width was devoted to shoulder space. On the new bridge, the shoulders will be much wider than on the old, but to the extent that the narrower lane slows down drivers, having an 11' instead of a 12' lane will enhance safety.

Although the Commission may not want to make it a condition of approval that shoulders be five feet wide and lanes eleven feet wide, I urge the Commission to strongly recommend this configuration to Caltrans.

Meeting the Need for a More Scenically Compatible Railing

The ST-20 is not an acceptable design for use in a highly scenic area. I support the staff recommendation to defer selection of railings for the bridge for a year.

The Commission should also urge Caltrans to work toward national adoption of the 42" bicycle railing height recently recommended by a national standards committee. In 2005, a technical working committee of the national standards organization evaluated studies on appropriate bridge railing heights for bicyclists. The committee concluded, "… [T]he

[13] Roberta Tanger, California Highway Patrol, Information Services Unit, June 13, 2006.
[14] The restriping also halved the already inadequate 2-foot shoulder available to bicyclists. It indicates how little weight Caltrans gives to bicyclist safety on Highway 1.

consensus was to recommend that since there was no compelling argument for taller railings, the 42 inch height would be the value recommended to the Geometric Design Committee which had been authorized by the Bridge Committee to make the final decision."[15]

At 42" bicycle railings would be the same height as pedestrian railings, 12" lower than the present standard. The lower height would increase greatly the opportunity to develop visually pleasing and transparent combination traffic and bicycle barriers.

Summary and Conclusions

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 should be required to fulfill its obligation to balance engineering considerations with concern for scenic and environmental values.

The Commission should:

1) Accept the condition recommended by the staff to require Caltrans to return to the Commission within one year for approval of revised plans for guard rails and barriers.
2) Accept the Caltrans proposal to place only one, rather than two, protected sidewalks on the bridge.
3) Require that the sidewalk be 4 feet in width, with 5-foot wide passing spaces every 200 feet, as required by the American Disabilities Act.
4) Require that the width of the traffic lanes plus shoulders be no greater than 32 feet. This would allow two 12-foot lanes and 4-foot shoulders or, preferably, two 11-foot lanes and 5-foot shoulders.
5) Request Caltrans to lobby for national acceptance of the recommendation of the AASHTO Nonmotorized Transportation Technical Committee that bicycle railing height be lowered from 54" to 42", the same height as pedestrian railings.

The following section contains comments directed specifically to the application for Commission concurrence with Caltrans proposed Public Works Plan for Ten Mile Bridge.

[15] Minutes of July 12, 2005 Meeting of AASHTO Technical Committee on Nonmotorized Transportation in Woods Hole, MA. http://cms.transportation.org/sites/design/docs/TCNMT%20Minutes%202005.pdf.

Public Works Plan – Agenda Items F 5a and 6a

Following are additional comments specific to the Public Works Plan submitted by Caltrans for Commission approval. The previous discussion and recommendations are relevant in their entirety to the Public Works Plan.

As proposed, the project does not comply with the California Environmental Quality Act (CEQA) nor the Mendocino County certified local costal program (LCP) and should not be certified by the Commission.

The Mendocino County LCP limits Highway 1 to 32' in width. Caltrans' planning document for Mendocino County recognizes that:

- Widening Route 1 to beyond 9.6 meters (32'), in rural areas would be inconsistent with the Coastal Act and the Local Coastal Plan.[1]

The staff finds that the project conforms to the requirements of CEQA (p. 13, 1-06-PWP). This finding is in error. The design does not meet the stated CEQA requirement that "… there are no … alternatives that would substantially lessen any significant adverse impacts of the Plan on the environment. As described previously, the bridge could be five-feet narrower than the proposed design without significantly affecting safety. The narrower bridge would significantly reduce the impacts of the project on the environment.

Acceptance of the Public Works Plan should be conditioned on my Recommendations 3) and 4).

General

The proposed project as described does not justify a Mitigated Negative Declaration according to CEQA guidelines.

The proposed project will affect visual resources, water quality, and noise receptors.

The proposed project will also affect endangered, threatened, and listed species. The statement on page iii, "The impacts to threatened and endangered species will be mitigated in accordance with the Biological Opinions rendered by" various agencies does not constitute adequate CEQA justification for a negative declaration. Without a description of the setting and specific details of the mitigations, the public and decisionmakers cannot judge whether or not the mitigations will eliminate effects of the project.

Visual Resources

1. The proposed bridge design does not meet the requirements of the Local Coastal Plan of Mendocino County (LCP) for "highly scenic" areas. The LCP designates "Ten Mile River estuary (including its wooded slopes, wetlands, dunes and ocean vistas visible from Highway 1)" as a highly scenic area.

   The LCP specifies that "Any development permitted in these areas shall provide for the protection of ocean and coastal views from public areas including highways …" The proposed use of the ST-20 railing on the estuary side of the bridge will significantly degrade views of the estuary and its surroundings.

[1] *Route Concept Report Route 1 Corridor*, Caltrans District 1, September 2003. In support of the 32' limit, this quotation cites: *Mendocino County General Plan*, Coastal Element, adopted August 17, 1983, p.107, section 3.8-6.

2. The LCP specifies that within highly scenic areas "new development shall be subordinate to the character of its setting." To meet this requirement, the bridge should be as narrow as possible, consistent with safety considerations. The bridge could be five feet narrower without significantly affecting safety.

Failure to Consider the Environmentally Superior Alternative

A basic failing under CEQA is the failure of the Initial Study to evaluate the alternative that would best protect the coastal resources:

> Four-Foot Sidewalk on West Side of Bridge and Four-foot Shoulders, with Newly Developed Railing on East Side of Bridge. I term this "C-Superior-Alternative", abbreviated C-SA

Narrower Bridge Would Remove Less Wetland and Fish Habitat: Four foot shoulders and a four foot sidewalk in C-SA would narrow the bridge by five feet compared to the design C-SW proposed by Caltrans, a reduction of 12%. Such a significant reduction in width might allow reducing the required size of the piers.

If so, C-SA would reduce the number of piles necessary to construct the new bridge. This would result in a net decrease in permanently removed wetland and fish habitat.[2]

A Narrower Bridge Would Allow Saved Funds to Be Used to Increase Safety on Highway 1: The narrower bridge would cost less to construct. Any possible decreases in safety associated with the narrower bridge could be more than offset by using the savings to put four-foot shoulders on especially dangerous stretches of Highway 1 that now have little or no shoulders.

Caltrans needs to consider safety not just on the bridge itself but within the setting in which it resides. It should provide decisionmakers with an estimate of how many miles of four-foot shoulders could be installed if it narrowed the bridge by reducing the width of the traveled way by four feet, as Alternative C-SA would do.

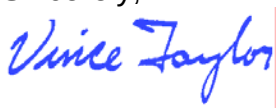
Conclusion

The Initial Study does not consider alternative designs that could maintain safety while reducing the overall impact on scenic resources. It, therefore, fails to meet CEQA requirements.

Prior to concurring with the Plan, the Commission should:

1) Require a single sidewalk 4 feet in width, with 5-foot wide passing spaces every 200 feet, as required by the American Disabilities Act.
2) Require that the width of the traffic lanes plus shoulders be no greater than 32 feet.

Sincerely,



Vince Taylor, Ph.D.
Executive Director

[2] *Ten Mile Initial Study,* op. cit., p.6.

Appendix 1
Tables of Accident Statistics Compared

Caltrans has provided information to the Commission that widening bridge shoulders to 6 feet from 4 feet would reduce accidents by 44%. The table from which this estimate is derived is included in Exhibit 4A of the commission staff report on permit 1-06-22, June 1, 2006. The table is reproduced below.

Summary of accident reduction factors associated with widening shoulders on bridges. [1, 2, 3]

Bridge Shoulder Width Before Widening, in feet		Bridge Shoulder Width, in feet, after Widening Each Side [Total of Both Sides in Brackets]						
Each Side	Total of Both Sides	2 [4]	3 [6]	4 [8]	5 [10]	6 [12]	7 [14]	8 [16]
0	0	23	42	57	69	78	83	85
1	2	--	25	45	60	72	78	80
2	4	--	--	27	47	62	71	74
3	6	--	--	--	28	48	60	64
4	8	--	--	--	--	44	44	50

[1] Adapted from Table 25 in *Accident Mitigation Guide for Congested Rural Two-Lane Highways*, National Cooperative Highway Research Program (NCHRP) Report 440, National Academy Press, 2000. (The original table uses both metric and English units; metric units were deleted to simplify the table.)

[2] Assume that the width of lanes on the bridge remains constant.

[3] The reduction factors are the percent reductions in total accident rate expected due to widening shoulders on bridges. For example, widening from 2-ft shoulders on each side to 6-ft shoulders on each side would reduce the total bridge accident rate by 62%.

According to Commission staff, Tami Grove, the above table is based on a 1984 article on predicting bridge accident rates.[1] Table 2, the only table of accident rates in this article is reproduced on the next page.

It is immediately obvious that the two tables consider different variables. The first table contains changes in accident probabilities associated with changes in shoulder width. The second table contains accident probabilities associated with different combinations of 1) approach highway width and 2) bridge width. There is no valid way to translate the second table into the first table. Bridge width and shoulder width are not independent variables in the second table.

For the Ten Mile Bridge, the closest that one can come in the second table to inferring anything about accident probabilities is in the last column to the right, "Approach Roadway over 30'." Descending this column one moves to wider bridges (though shoulder width is not specified separately from the total traveled width). Accident probabilities are very low in all cells, and there is no consistent pattern of decreasing accident probabilities as one

[1] Daniel Turner, *Prediction of Bridge Accident Rates*, Journal of Transportation Engineering, Vol. 110, No. 1, January 1984

TABLE 2.—Probability of Bridge Accident per Million Vehicular Passages

Bridge relative width, in feet (meters) (1)	Approach Roadway Width, in Feet (Meters)							
	18.0–18.0 (4.9–5.5) (2)	18.1–20.0 (5.6–6.1) (3)	20.1–22.0 (6.2–6.7) (4)	22.1–24.0 (6.8–7.3) (5)	24.1–26.0 (7.4–7.9) (6)	26.1–28.0 (8.0–8.5) (7)	28.1–30.0 (8.6–9.1) (8)	Over 30.0 (9.1) (9)
Over 6.0 narrower (1.8)	1.200	0.767	0.436	0.135	0.060	0.030	0.200	0.163
4.1–6.0 narrower (1.3–1.8)	1.200	1.171	0.757	0.686	0.604	0.533	0.472	0.150
2.1–4.0 narrower (0.7–1.2)	1.194	0.476	0.490	0.503	0.500	0.400	0.300	0.140
0.1–2.0 narrower (0.0–0.6)	0.611	0.649	0.553	0.695	0.479	0.500	0.400	0.130
0.0–2.0 wider (0.0–0.6)	0.344	0.496	0.330	0.529	0.319	0.497	0.677	0.120
2.1–4.0 wider (0.7–1.2)	0.641	0.319	0.319	0.308	0.477	0.448	0.420	0.105
4.1–6.0 wider (1.3–1.8)	0.217	0.200	0.193	0.256	0.224	0.176	0.128	0.080
6.1–8.0 wider (1.9–2.4)	0.254	0.170	0.234	0.061	0.162	0.113	0.064	0.056
8.1–10.0 wider (2.5–3.1)	0.165	0.000	0.170	0.145	0.333	0.331	0.200	0.120
10.1–14.0 wider (3.2–4.3)	0.140	0.123	0.120	0.083	0.148	0.171	0.068	0.176
Over 14.0 wider (4.3)	0.113	0.110	0.066	0.090	0.098	0.102	0.299	0.248

moves down. Indeed, the last cell (the widest bridge) has the highest accident probability. This is undoubtedly a statistical anomaly due to few observations.

Appendix 2
Factors Explaining the Increase in Estimated Accident Rates at Ten Mile Bridge.

In its November permit application, Caltrans estimated that the accident rate for the existing Ten Mile Bridge was ***58 percent*** of the comparable statewide rate.

More recently, Caltrans has prepared another historical accident analysis for Ten Mile Bridge. The revised analysis reports that the accident rate at Ten Mile Bridge is ***186 percent*** of the comparable state average.

Listed below are the factors that account for the 3-fold increase in estimated historical relative accident rates Ten Mile Bridge between the first and second estimates made by Caltrans. [19]

A variety of factors explain the more recent, higher accident rate relative to statewide averages.

What accounts for this greater than 3-fold increase in the estimated relative accident rates at Ten Mile Bridge?

1) The second study used a different, later five-year period. The later period had 4 accidents compared to 3 in the earlier period, an increase of 33%.
2) The first study used an average annual daily traffic rate (AADT) of 2700 vehicles per day. According to Caltrans, this was an error. The correct value, they assert is 1600 vehicles per day. This change increases accidents per vehicle going over the bridge by 69%.
3) Caltrans changed from looking at accidents over a *segment of road* to considering Ten Mile Bridge as a point or "spot." The same "accident classification category" was used in both studies, but the state-wide accident rate used in the first estimate was reduced by 50% in the second estimate. This is the standard procedure used to convert from a *segment statewide accident rate* to a *spot statewide accident rate.* This procedure doubles the Ten Mile accident rate relative to the statewide rate.

Combining all of the above factors increases the accident rate relative to statewide rates by a factor of 4.5. This is even greater than 3.2 times that Caltrans second estimate of relative accident rates exceeds its first estimate.

What stands out is the use of a measure of statewide average accident rate in the second estimate that is twice the former rate. This rate is developed from the old rate by dividing it in half. Neither rate is for bridges comparable to Ten Mile; thus the relative accident rate is meaningless.

Also, accident rates were much lower from 1995 to 2001 than afterward. Using a ten-year average would reduce the estimated accident rate by about one-half.

[19] Information presented here was provided by Ralph Martinelli, Chief, District 1 Traffic Safety Office, June 17, 2006