Sonoma Mountain Road to Lafferty Park

Safety Analysis & Recommendations

Prepared for Friends of Lafferty Park by
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Background

Since 1996, the City of Petaluma has been pursuing the creation of an open space park on their Lafferty Ranch property. Concern over the safety of the three-mile stretch of Sonoma Mountain Road leading to the Lafferty gate has arguably been the biggest single obstacle raised by opponents of the park. This report recommends a middle ground between taking no action to improve road safety and complete reconfiguration of the roadway to meet the AASHTO standard.

Methodology

The roadway was divided into 30 segments of a length of 0.1 mile each, numbered 1 to 30, starting from the Lafferty gate. The roadway, shoulder, lines of sight, signage, and other factors were assessed to determine recommendations that are presented in the following pages. The recommendations are discussed in table below (Specific Recommendations), and are summarized and presented graphically on topographic map segments of the road in Appendix A. The ID numbers of the table refer to the thirty 0.1-mile long segments (for instance, "6b" refers to the 0.6-0.7 mile segment, second recommendation).

Comments and Conclusions

So far, two strategies for minimizing the risk of accidents have been presented. The AASHTO strategy, ostensibly supported by the park opponents, is based on creating a roadway that can accommodate higher vehicle speeds by providing broader travel lanes, wider shoulders, and flatter horizontal and vertical curves. The Traffic Calming strategy, presented here, while addressing areas where vehicles are at the most significant risk of leaving the roadway, emphasizes maintenance of curves, narrower roadways, and uneven pavement, with adequate signage, to keep traffic speed at a safe level.

Given the prohibitive financial and environmental costs of the AASHTO strategy, I think it prudent for the County and State agencies involved in the creation of Lafferty Park and the Petaluma-Sonoma Trail to pursue the Traffic Calming strategy in a form similar to the one presented in this report.

The U.S. Department of Transportation has recently begun to recognize the need and desirability to design highways that incorporate community values, and now gives designers increased flexibility in deviating from the rigid AASHTO guidelines in order to incorporate such community values. The basic geometric design criteria are set forth in *A Policy on Geometric Design of Highways and Streets* (Green Book), published by the American Association of State Highway and Transportation Officials (AASHTO). The U.S. Department of Transportation gives the following rationale for the newly increased design flexibility with respect to the Green Book:
"If highway designers are not aware of opportunities to use their creative abilities, the standards or conservative use of the Green Book criteria and related State standards, along with a lack of full consideration of community values, can cause a road to be out of context

with its surroundings. It may also preclude designers from avoiding impacts on important natural and human resources." (Source: U.S. Department of Transportation, Federal Highway Administration, *Flexibility in Highway Design*. Publication No. FHWA-PD-97-062. Washington, DC, page vi).

The recommendations contained in this report are consistent with *Flexibility in Highway Design*. They lead not only to design and maintenance of a road in its rural setting, but are also fiscally responsible. The modest but effective safety recommendations suggested in this report amount to about $100,000. This is a very low cost for increasing our community's access to the natural beauty of Sonoma County.

Sonoma Mountain Road, rebuilt according to AASHTO standards, would not only be prohibitively expensive, financially and environmentally, but would also increase vehicle speeds, thereby inadvertently offsetting the safety improvements intended by a road retrofit according to AASHTO standards.

This report pursues a Traffic Calming strategy to address safety, environmental, and cultural concerns. Specific recommendations are outlined on the following pages.

Specific Recommendations

ID #	Situation	Recommendation	Notes
1a	Horse fence on Pfendler property has been hit by uphill cars failing to complete turn	Repair fence (30 ft), install retroreflective delineators or paint fence white	To make the curved road alignment more obvious
1b	During reduced visibility (weather) the sharp curve may not be sufficiently visible	Install a rumble strip (50 ft; northeast of the 15 MPH sign) for uphill traffic	To alert drivers of the approaching curve
1c	The existing 15 MPH sign is not firmly secured in the ground	Secure base of existing 15 MPH sign	
2a	Embankment	Add 25 ft of guardrail on the northwest side, for downhill traffic	To prevent vehicles from driving off the roadway
4a	Roadway narrows	Install a "Road Narrows" sign	
6a	Sharp curve	Install on east side a "Single Head Arrow" sign (W57, right) facing downhill traffic	
6b	As 6a	Install a "Single Head Arrow" sign (W57, left) facing uphill traffic	
8a	Visibility of road alignment needs enhancement	Install retroreflective delineators	To emphasize road alignment
10a	Vertical curve	Paint fence posts tips with white retroreflective paint	To illuminate vertical curve at night
12a	Drivers needing to check on their vehicles, etc.	Install a turnout on downhill side (just behind culvert)	To accommodate malfunctioning vehicles, etc.
13a	Drivers needing to check on their vehicles, etc.	Install a turnout on uphill side (slightly downhill from the turnout at 12a)	To accommodate malfunctioning vehicles, etc.
13b	Crest of vertical curve	Paint fence posts tips with white retroreflective paint	To enhance visibility of roadway alignment
14a	Road narrows north of existing guardrail at retaining wall	Install a "Road Narrows" sign, a white edgeline, retroreflective delineators, and a 25 ft guardrail in front of oak tree	To keep vehicles from veering off the road into oak tree
15a	Road narrows, and no shoulder on southwest bound (downhill) side	Install a "Road Narrows" sign and a "No Shoulder" sign on downhill side	
15b	3 ft deep ditch at edge of pavement	Install 120 ft of guardrail with retroreflective delineators	To keep vehicles from veering off the road into ditch
15c	Steep embankment	Install 150 ft of guardrail with retroreflective delineators from dirt driveway to phone pole, above steep embankment	To keep vehicles from veering off the road into steep embankment
15d	Road narrows approaching steep embankment on northeast bound side	Install a "Road Narrows" sign on uphill side	
16a	Retroreflective delineators	Replace retroflective delineators	

	in need of replacement	along curve	
17a	Tree branches blocking existing 20 MPH sign	Remove small tree branches that are blocking existing 20 MPH sign	
17b	Sight line across curve needs improvement	Keep vegetation low and, if acceptable with property owner, shave grade down several feet	To improve sight line across curve
21a	Road embankment is slumping	Install 330 ft of guardrail with retroreflective delineators on eastside of roadway	To keep vehicles from veering off the road into embankment
21b	Curve and steep bank	Install a curve warning sign	
24a	Patchwork bumpy road surface	Retain patchwork bumpy road surface (do not resurface)	To control speeding
25a	Opportunity for a turnout and advance signing	Install a "Turnout 300 ft" sign 300 ft in advance of existing wide section	
25b	As 25a	Install a "Turnout 300 ft" sign 300 ft in advance of existing wide section	
28a	Patchwork bumpy road surface	Retain patchwork bumpy road surface (do not resurface)	To control speeding
29a	Winding road ahead, requiring a maximum speed limit of 35 MPH and lower where posted on advisory speed plates	Install a "Winding Road" (W-14) sign supplemented by a "Next 3 Miles" plate; install a 35 MPH speed limit sign	To advise motorists unfamiliar with the road of the winding roadway and to set an overall speed limit consistent with road characteristics

About the Report Author

Joern Kroll earned the following degrees (all from the University of California, Berkeley):

Master of City and Regional Planning (1986)
Master of Transportation Engineering (1987)
Ph.D, Architecture, with a dissertation on streets and highways as public architecture (2001)

Since 1987, I have been working in transportation planning and traffic engineering, mostly for the City and County of San Francisco. I have presented several papers at local, national, and international transportation conferences.

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ATTACHMENT A
Segment #1
0 to .7 miles from Lafferty Gate

Key: **Recommendations** are in tan boxes with red borders. **Existing signs** are in yellow boxes. Boxes are placed on the side of the road whose traffic they will affect (if a sign faces downhill traffic but is on uphill side of road, the box will be on the downhill side, but the pointer tip will be on the uphill side, e.g. see the left arrow here).

Road elements (hill crests, culverts) are in white ovals.

Distance from the top, in miles, shown in blue squares.

Laffert y Park

1a: Repair fence (30 ft), install retroreflective delineators or paint

<_ 20

0.1

<_ 15

One Lane Road

1c: Secure base of existing 15 MPH sign

2a: Add 25' guard rail on NW side, for down hill traffic

Rough Road

0.2

Road Narrows

0.3

N

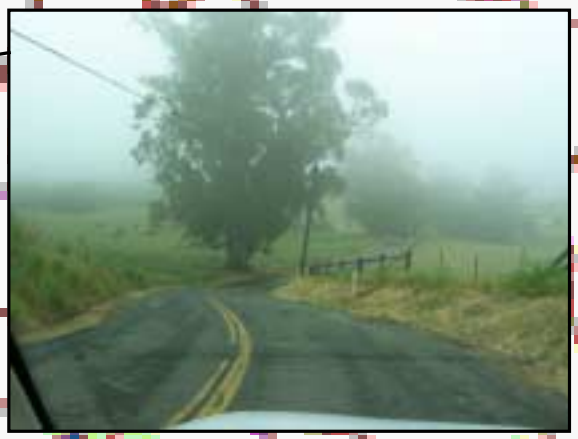
150' narrow road section, no yellow center

0.4

4a: Install "Road Narrows" sign

S

0.5



0.6

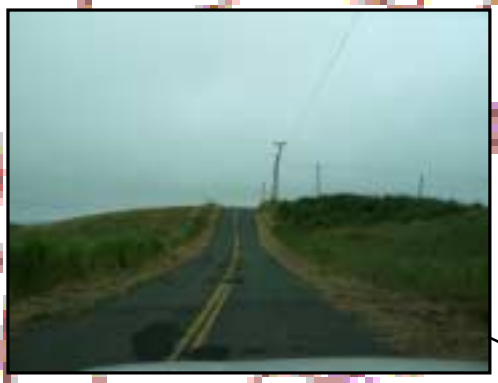
6a: Install on east side a "Single Head Arrow" sign (W57, right) facing

0.7

6b: Install a "Single Head Arrow" sign (W57, left) facing uphill traffic

0.8

Segment #2
0.7 to 1.4 miles from Lafferty Gate



See Segment 1

0.8

Crest of

Troug

0.9

8a: Install retroreflective delineators

Crest of

SONOMA

2.5

1.0

1.1

10a: Paint fence posts tips with white retroreflective paint to illuminate vertical

Culvert

1.2

12a: Install a turnout on downhill side (just behind culvert)

600

1.3

13a: Install turnout on uphill side (slightly downhill from SW

Crest of

13b: Paint fence posts tips with white retroreflective

1.4

1.5

14a: Install a "Road Narrows" sign, a white edgeline, retroreflective delineators, and a 25 ft guardrail in front of oak tree to keep NE bound cars from veering off road into oak.

Guardrail at retaining

See Segment 3

Segment #3
1.4 to 2.1 miles from Lafferty Gate

See Segment 2

15a: Install a "Road Narrows" sign and a "No Shoulder" sign on downhill side

1.5

15b: Install 120 ft of guardrail with retroreflective delineators

15d: Install a "Road Narrows" sign on uphill side

1.6

16a: Replace retroflective delineators along

17a: Remove small tree branches that are blocking existing 20 MPH sign

<_ 20

1.7

⇓

_> MPH

17b: Keep vegetation low and, if acceptable with property owner, shave grade down several feet

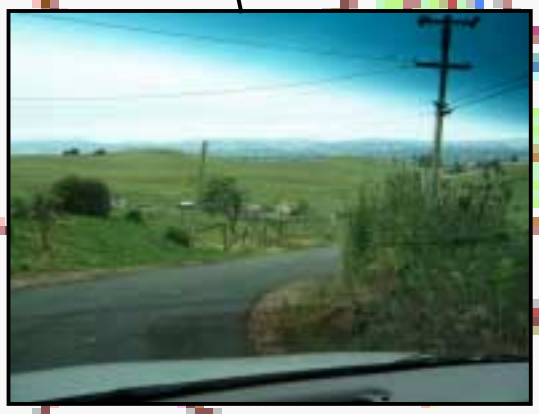
1.8

♣

◊

<_ 15

1.9



M 286

2.0

Road is

21a: Install 330' guardrail and reflective roadside markers on E side of roadway

2.1

21b: Install a curve warning sign

See Segment 4

Segment #4
2.0 to 3.0 miles from Lafferty Gate

See Segment 3

2.1

2.2

2.3

2.4

25a: Install a "Turnout 300 ft" sign 300 ft in advance of existing wide se tion

2.5

24a: Retain patchwork bumpy road surface (do not resurface) to control speeding

2.6

25b: Install a "Turnout 300 ft" sign 300 ft in advance of existing wide se tion

2.7

28a: Retain patchwork bumpy road surface (do not resurface) to control speeding

2.8

2.9

(Stop Ahead)

29a: Install a "Winding Road" (W-14) sign supplemented by a "Next 3 Miles" plate; install a 35 MPH speed limit sign

Road Narrow s

3.0

Not a Through Road