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Caltrans Design Modifications

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June 22, 2007

Phil Dow
Executive Director
Mendocino Council of Governments
367 N. State Street, Suite 206
Ukiah, CA 95482

Re: Laytonville Traffic Calming and Downtown Revitalization Project – Requested Caltrans Design Modifications

Dear Phil:

This letter is a follow-up to the Laytonville Traffic Calming and Downtown Revitalization Charrette that took place in Laytonville from May 19-24. As you know, Laytonville community members voiced strong support for reducing traffic speeds and improving bicycle and pedestrian circulation during the Charrette.

Fehr & Peers and the Project Team met with Caltrans on May 21, in part to discuss the Highway 101 Improvement Project (Contract No. 01-429304) currently under design. The preliminary design plans for this project contain several important bicycle and pedestrian features, including sidewalks with pedestrian-scale lighting, street trees, multiple crosswalk locations, 11-foot travel lane widths, and a 1.5 meter (5-foot) shoulder.

As part of our meeting, several additional items relating to Caltrans' current design were discussed. Specifically, the Project Team suggested several modifications to the design to further enhance bicycle and pedestrian conditions and reinforce the identity of Downtown Laytonville. They were:

- Use of colored shoulder treatments on US-101 in Downtown Laytonville
- Modifications to the corner curb radius or addition of a pedestrian refuge island at the west leg of the Branscomb Road / US-101 intersection

As agreed to at the meeting, Fehr & Peers has investigated the use of colored bicycle lane treatments in California and elsewhere and summarized this information below. We have also included additional description of the proposed modifications to the west leg of the Branscomb Road / US-101 intersection.

Colored shoulders on a State Highway in Florida (source: pedbikeimages.org / Dan Burden)

Colored Shoulder Treatments

Fehr & Peers conducted research on colored shoulders and bicycle lanes as a potential traffic calming and bicyclist safety tool. Colored (or pigmented) shoulders have been used as a traffic calming and bicyclist safety tool for decades in Europe but have also been implemented in cities in the United States.

332 Pine Street, 4th Floor, San Francisco, CA 94104 (415) 348-0300 Fax (415) 773-1790
www.fehrandpeers.com

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Colored shoulders have been installed in Chino Hills, California and along state-highway facilities in Florida. Colored bicycle lanes in high-risk areas have been installed in Petaluma and Sunnyvale in California as well as in Portland, New York, Chicago, and several other U.S. cities.

Past studies indicate the key advantages to colorization treatments:

- Narrows feel of the street and may help reduce traffic speeds
- Improvement in bicycle safety at high conflict areas - treatment has been shown to significantly improve safety in Europe and North America
- Reduction in motorists encroaching on shoulders or bicycle lanes
- Improvement in visibility and warning bicyclists and motorists of high-conflict areas

Studies on effectiveness indicate that vehicles are more likely to stay out of colored shoulder areas than unmarked or lined shoulders, decreasing the likelihood of bicycle-automobile conflicts. Studies have also shown that more motorists will yield to cyclists when colored shoulders are present.[1]

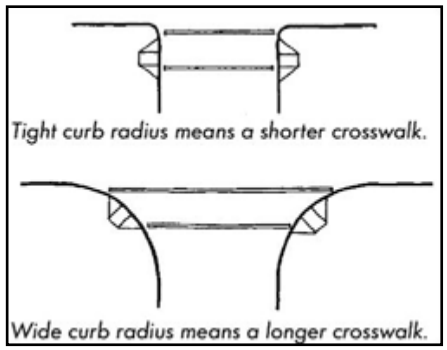
Table 1 in Appendix A describes three treatment types that are generally appropriate for colored shoulders: tennis paint, dyed asphalt, and thermoplastic coating.

Fehr & Peers recommends that dyed asphalt be used for traffic shoulders due to its ease of implementation (when completed with roadway resurfacing), high durability, and low maintenance requirements. While tennis paint is not highly durable, it could be implemented if Caltrans desires to conduct a pilot study on the effectiveness of colored shoulders prior to permanent installation. Thermoplastic/epoxy coatings are more durable than tennis paint, but would have a higher installation cost due to the length of roadway where colored treatments would be used.

Caltrans' plans indicate the roadway will be resurfaced as part of the project. Using a colored asphalt dye for the roadway shoulders will add a negligible overall cost to the project if implemented as part of roadway resurfacing. Because dyed asphalt is highly durable and low-maintenance, there will be minor ongoing maintenance costs after installation.[2]

Modifications to the US-101 / Branscomb Road Intersection

The current Caltrans design plans for the US-101 / Branscomb Road intersection indicate a 15 -meter (approximately 50-foot) curb radius at the northwest and southwest quadrants to the intersection to accommodate the high proportion of trucks turning on Branscomb Road. While an adequate curb radius is important in an area where there are high numbers of turning trucks, it can also have substantial negative consequences for pedestrian safety. A large curb radius allows motor vehicles to turn at



[1] See "An Evaluation of Red Shoulders as a Bicycle and Pedestrian Facility" and "Evaluation of Blue Bike-Lane Treatment in Portland, Oregon" (University of North Carolina, 1998 and 2000); and "Evaluation of the Blue Bike Lane Treatment used in Bicycle-Motor Vehicle Conflicts Areas in Portland, Oregon" (Federal Highway Administration, 2000)

[2] Ongoing maintenance costs would primarily be due to the need to match the color for pavement repairs.

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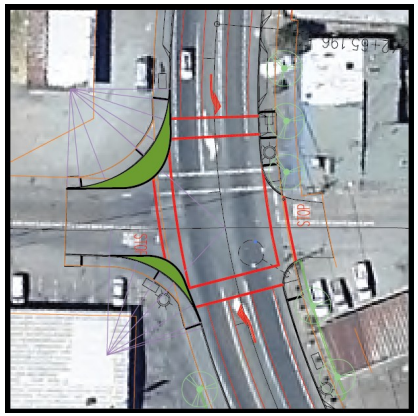
high speeds, and it significantly increases the pedestrian crossing distance at the west leg of the intersection (see example figure at right). This is particularly important in areas of relatively high pedestrian activity such as the Branscomb Road / US-101 intersection.

Because of the need to promote pedestrian safety at the US-101/Branscomb Road while still accommodating the high number of trucks that use Branscomb Road, two solutions are proposed. Fehr & Peers recommends Option 1 be implemented.

Option 1: Reduce the corner curb radii to 25-35 feet (25 feet preferred)

A corner curb radius will reduce pedestrian crossing distances yet still provide adequate turning space for most trucks. Many trucks using this intersection are able to successfully navigate the smaller intersection footprint that exists today without encroaching onto the opposing traffic lane. In fact, the small concrete barrier at the northwest corner of the intersection is roughly equivalent to where the edge of the curb would be located with a 25-foot corner radius. All trucks observed making a right turn from southbound US-101 to westbound Branscomb Road successfully maneuvered around this obstacle without encroaching into the opposing travel lane.



Option 1: Reduced Corner Radii

Because most trucks use this intersection without difficulty today, Fehr & Peers recommends as small a radius as possible be included as part of the intersection design (see figure at right). This option would have the added benefit of decreasing overall project cost by lessening right-of-way that needs to be acquired in the vicinity of the intersection.

Option 2: Add a pedestrian refuge at the west leg of the intersection

If Caltrans maintains that a 15-meter radius is absolutely necessary at this intersection, we recommend Option 2 be included in the design instead. This would provide pedestrians a refuge or waiting area when crossing the west crosswalk and would maintain additional space for large trucks maneuvering through the intersection.

A pedestrian refuge island should be 5-6 feet in width and should have an end "cap" at the intersection for additional pedestrian protection (see figure at right).

Option 2: Refuge Island

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Conclusion

The preliminary Caltrans design plans for the Laytonville project contain several good bicycle and pedestrian features, including sidewalks with pedestrian-friendly amenities and bicycling accommodations. While these features are beneficial for bicyclist and pedestrian access and circulation, Fehr & Peers recommends the following modifications also be incorporated into the current design to further improve walking and bicycling conditions and reinforce the identity of Downtown Laytonville:

- Add colored shoulder treatment to US-101 within the project limits (Ramsey Road to 0.3 km north of Branscomb Road). Due to its durability and low cost, the recommended colored shoulder treatment is a dyed asphalt application.

- Modify the US-101 / Branscomb Road intersection to better accommodate pedestrian crossings by reducing corner curb radii as small as possible (25-feet, or 8-meters, is preferred) or installing a 6-foot wide pedestrian refuge island in the middle of the west crosswalk.

Please do not hesitate to call should you have any questions.

Sincerely,

FEHR & PEERS

Matt Haynes, P.E., AICP
Senior Transportation Engineer

CC: Allison Purnell, Local Government Commission
Bruce Brubaker, Design, Community & Environment

SF07-0324

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APPENDIX A

TYPES OF COLORED SHOULDER TREATMENTS

Treatment Type	Tennis Paint	Dyed Asphalt	Thermoplastic/Epoxy Coating
Description of application	Tennis paint painted on top of existing asphalt to produce a colored shoulder.	Dye mixed in with asphalt and applied as shoulder. Requires repaving of existing shoulder.	Thermoplastic or epoxy coating bonded to new or existing asphalt.
Cost	**Low** - 5-10 cents/linear foot	**Low** - Costs are low if treatment is installed in conjunction with road repaving (higher if implemented as stand alone project)	**Moderate** - Approximately $2.66/square foot
Durability	**Low** - Portland study found that in some areas paint wore off in 2-3 months - Other studies predict lifespan to be under 1 year	**High** - Lasts as long as streets but dye may begin to wear	**Moderate to high** - Short-term evaluations indicate that this application has good longevity, but there have been no long-term studies to date - As a lane marking, has an expected life-span of 2-4 years

Maintenance	**High** - Treatment needs to be reapplied every few months	**Low** - Dye may wear off, but should last the duration of any road	**Low to Medium** - Should last long, however the Portland (Hunter) study stated that one of the 8 lanes was in "fair" condition after a year. If applied incorrectly, may require some maintenance.
Potential Vendors	- Tennis Universal (http://www.tennisuniversal.com/) - Accurate Tennis - Most tennis-related vendors	- Asphacolor Architectural Asphalt (800-258-7679) - Most asphalt vendors	- Flint Trading (Premark®) (336-475-6600) - Ride-A-Way (http://www.streetprint.com/ride-a-way/) - Malley Slurry Seal Co. (Macro®-Color™ Colored Slurry Surfacing) (http://www.slurry.com/cont_Macrocolor.shtml)
Places of Application	Germany, Lake County (FL), Portland (OR)	Netherlands, Denmark, Lake County (FL)	Switzerland, Germany, Portland (OR), Chino Hills (CA), Petaluma (CA), Sunnyvale (CA)
Advantages	- Inexpensive. - Good to use for a pilot project to test the effectiveness of colored bike lanes in an area.	- Durable and effective. - Good to use when undergoing capital improvement project that already involves road repaving.	- Skid resistant. - Very vibrant. - Does not require any change to the actual road pavement.
Disadvantages	- Not a good long-term treatment. - Paint wears off quickly.	- Colors are not very vibrant so contrast is less noticeable and dark at night. - Can be expensive and labor-intensive if not applied with road repaving.	- Limited evaluations on long-term durability.
Research Studies	- "An Evaluation of Red Shoulders as a Bicycle and Pedestrian Facility" (Hunter) - "Evaluation of Blue Bike-Lane Treatment in Portland, Oregon" (Hunter) - Evaluation of the Blue Bike Lane Treatment used in Bicycle-Motor Vehicle Conflicts Areas in Portland, Oregon (Federal Highway Administration, 2000) - *Pavement Marking Summary* (Madison/Dane Counties, Wisconsin) - *Innovative Bicycle Treatments* (Nabti, Ridgway)		

Source: Fehr & Peers, 2007