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MEMORANDUM

Date:	December 9, 2011	Project #: 10323.04
To:	Nancy Kraushaar & John Lewis, City of Oregon City	
From:	Hermanus J. Steyn, Pr.Eng., P.E. and Erin M. Ferguson, P.E.	
Project:	Safety Assessment	
Subject:	Holcomb Boulevard	

The City of Oregon City retained Kittelson & Associates, Inc. (KAI) to conduct a safety assessment of the 13700 block of Holcomb Boulevard. Figure 1 illustrates the study area. The purpose of the assessment is to identify potential improvements to address safety issues. This memorandum summarizes the conditions, field observations, and potential improvements identified for the site.

Motivation for the Assessment

The 13700 block of Holcomb Boulevard contains a 15-mph design curve that is hidden from the view of westbound motorists because of a downhill grade beyond a vertical crest curve (see Exhibit 1). There are two advanced signs warning westbound drivers of the curve. The combination of the 15-mph design curve on a downhill grade makes it difficult for some drivers to stay in the travel lane. Historically, the curve has become known among local media, residents and emergency responders as a site of serious crashes. The most recent reported incident occurred at night when a driver apparently under the influence of alcohol lost control of their vehicle, dislodged the guardrail on the outer part of the curve, struck a utility pole and was killed. Requests for additional crash data were forward to the County and the police, but KAI was unsuccessful in obtaining additional information. The City would like to reduce crashes at the location and hired KAI to identify potential engineering countermeasures.

Exhibit 1 – Westbound View on Holcomb Boulevard

STUDY VICINITY MAP
OREGON CITY, OR

FIGURE 1

Existing Conditions

Holcomb Boulevard is located in the northeastern portion of Oregon City. It provides a connection to Highway 213 via Redland Road for single family houses and housing developments. Traffic volume information from the City indicates the two-lane road carries approximately 8,000 vehicles per day near where it intersects Redland Road with volumes tapering off in the east near Barlow Road to approximately 3,000 vehicles per day. These daily volumes fall within a reasonable range for a two-lane road. Peaking characteristics indicate the highest hourly volumes occur during commuting hours, which is consistent with the surrounding residential land use. The posted speed on Holcomb Boulevard in the study area is 40 mph. Speed data from the City indicates the 85th percentile speed on Holcomb Boulevard east of Front Avenue (approximately 1,700 feet upstream of the curve) is 43 mph indicating the large majority of motorists tend to travel close to or at the posted speed when approaching the curve. Existing conditions observed in the field are discussed below.

Field Observations

KAI conducted a site visit on the morning of Thursday, October 13, 2011. While in the field, they were met by a City staff member to discuss site conditions. Below are observations and photos from the site visit.

Exhibit 2 – Advanced Warning Signs

Approaching the curve from the east, there are two advanced warning signs posted on Holcomb Boulevard prior to the curve. The furthest advanced sign is located approximately 350 feet prior to the curve and the second is located just prior to where the roadway begins to curve north and downhill (see Exhibit 2). The curve itself is delineated with chevron warning signs visible for westbound (i.e., downhill) and eastbound (i.e., uphill) motorists; guardrail also follows the outside edge of the curve (see Exhibit 3).

Exhibit 3 – Guardrail along Curve

A street light is present in the curve and prior to the curve near the first advanced warning sign.

Motorists observed during the site visit did need to brake (as shown in Exhibits 3 and 4) and slow

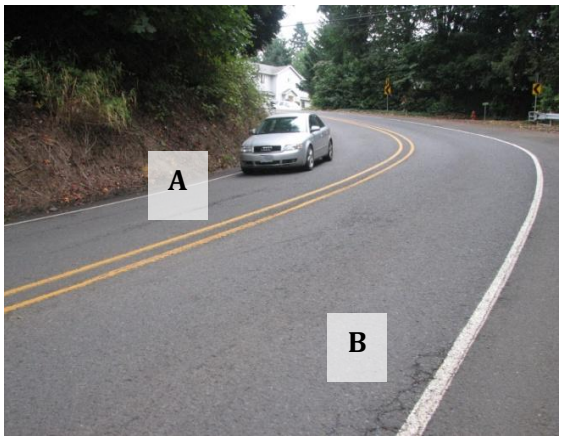
their speeds to negotiate the curve successfully. Some motorists traveling downhill were observed traveling over the inside edge lane line entering the curve and then shifted towards the centerline while exiting the horizontal curve (see Exhibit 4). Some motorists traveling uphill were observed traveling over the outside edge line onto the paved shoulder.

Exhibit 4 – Motorists Drifting onto Centerline Exiting Horizontal Curve

The location of the guardrail along the outside edge is set back at the edge of the dirt/gravel shoulder (see Exhibit 5). This location facilitates a potential improvement discussed in the following section. While in the field, KAI also observed opportunities to improve the roadway pavement conditions (see Exhibit 6). The current pavement conditions are not anticipated to have contributed to the crashes at this location. Repaving the roadway would help preserve the structural integrity of the roadway and prevent further rutting and/or cracking.

Exhibit 5 – Guardrail Location

A



B

Exhibit 6 – Pavement Conditions

Considerations for Potential Improvements

The potential improvements outlined below range from lower to higher cost countermeasures. The primary focus of the improvements is to help slow westbound vehicle speeds approaching the curve, delineate the roadway alignment and provide motorists the space they need to negotiate the curve.

Maintain Vegetation Around Advance Warning Signs

The vegetation near the first advanced warning sign could be improved to provide better visibility of the sign on the westbound approach (see Exhibit 2 above).

Install Centerline and Edge Line Pavement Markers

Reflective pavement markers help illuminate the roadway alignment in low light conditions improving visibility of the road to motorists. Raised pavement markers tend to be more visible than recessed pavement markers. In addition, driving over the pavement markers would also alert the driver of leaving the travel lane.

Adjust Warning Signs on the Westbound Approach

The current advanced warning signs along the westbound approach to the curve consist of:

- MUTCD Sign W1-3 displaying a 15 mph advisory speed located approximately 350 feet in advance of the curve.
- MUTCD Sign W1-2aR displaying a 15 mph advisory speed located just prior to where the roadway curves north and downward.

We suggest the City consider replacing:

- MUTCD Sign W1-3 with MUTCD Sign W1-1R and an advisory speed plaque W13-1P with a 15 mph advisory speed (see Exhibit 7 for an example of sign type).
- Replacing sign W1-2aR with W1-1aR and adding the sign W1-1aL after the curve to alert drivers to curve prior to the signal at Redland Road. The 15 mph advisory speed should be maintained.

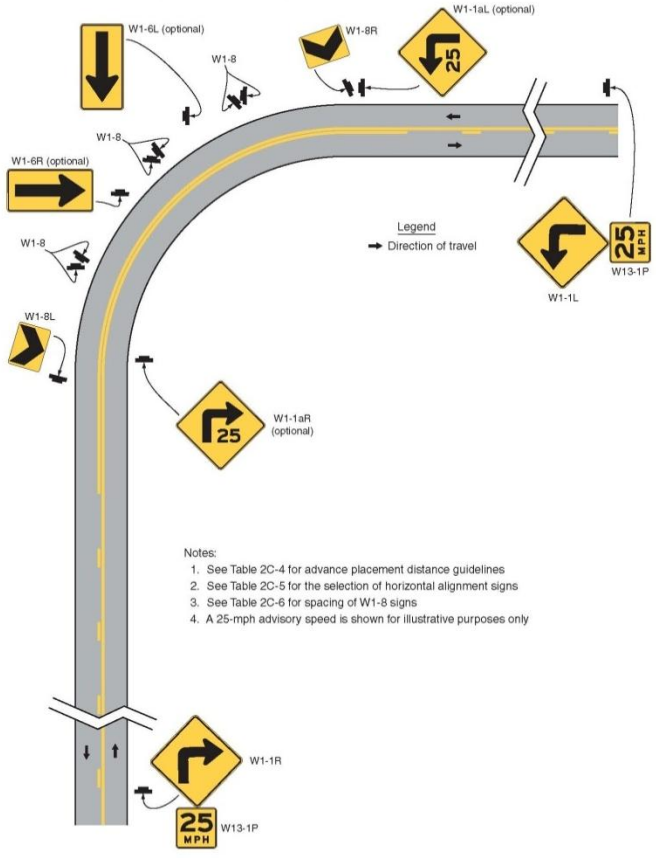


Exhibit 7 – MUTCD Figure 2C-2

The purpose of adjusting the signs is to reinforce the approaching 90-degree curve for westbound motorists. If motorists are able to slow appropriately to navigate that curve, they will be able to navigate the following curve as well.

Install a Speed Feedback Sign

Speed feedback signs (see Exhibit 8) inform drivers of their speed and have been found to help reduce motorists' speeds. Installing a speed feedback sign on approach to the curve near the first advanced warning sign approximately 350 feet in advance of the curve would tell motorists how their current speeds compare to the posted 15-mph advisory speed.

Exhibit 8 – Speed Feedback Sign

Adjust Roadway Alignment through the Curve

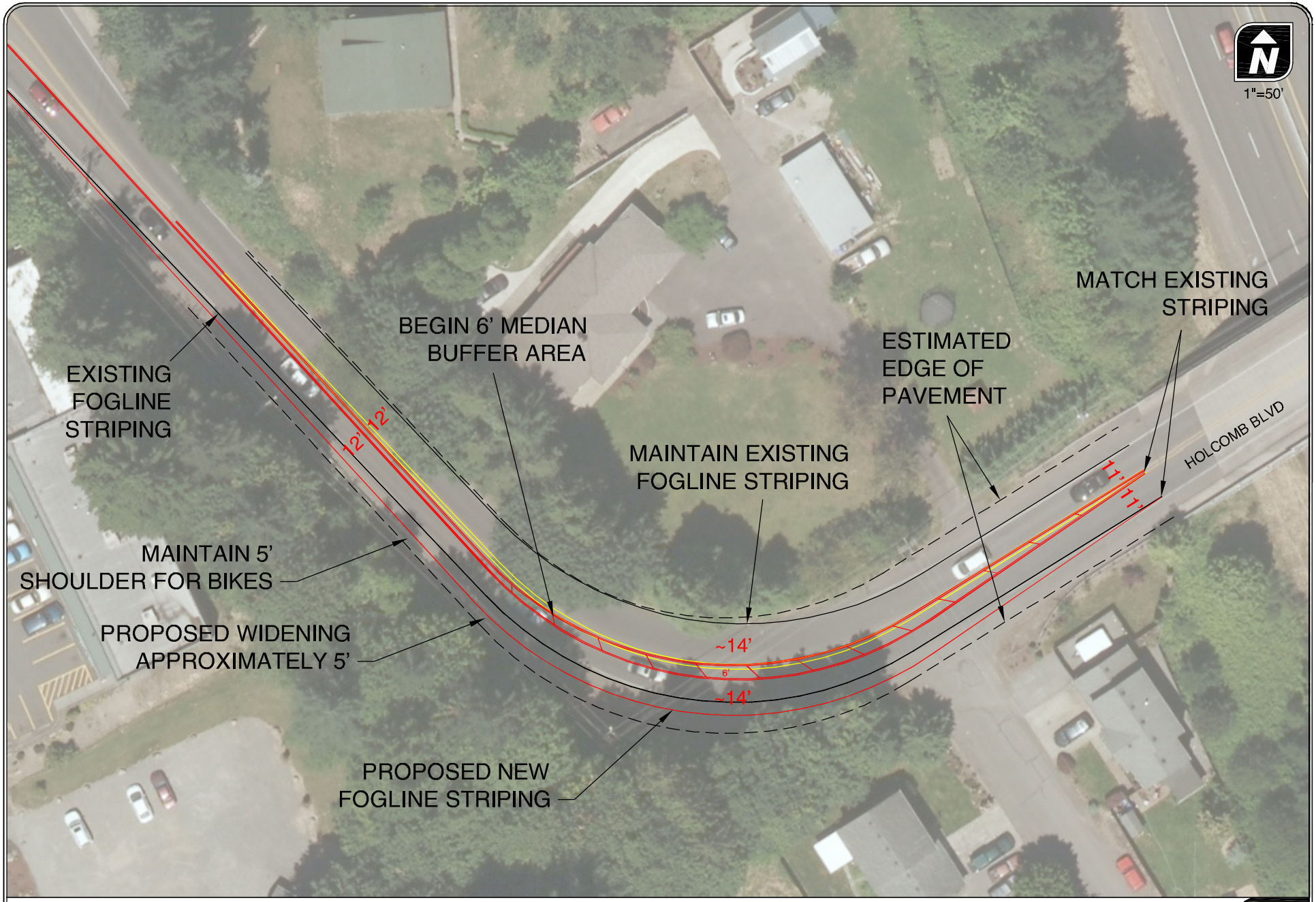
Adjust the roadway alignment through the curve to provide a buffered space to separate eastbound (i.e., uphill) and westbound (i.e., downhill) motorists. The current paved roadway plus the gravel shoulder width provides sufficient space to realign the eastbound approach (i.e., uphill approach) to place motorists closer to the existing guardrail, which creates additional space between the opposing travel lanes. The westbound (i.e., downhill) approach can also be adjusted to soften the horizontal curve and provide a center median buffer area. Figure 2 illustrates the design concept.

Recommendations

We suggest the City consider their available maintenance budget to implement the low-cost countermeasures, such as

- Clearing the vegetation around the advanced warning sign
- Installing raised pavement markers
- Considering adjusting the warning signs

In the longer term, we suggest the City consider installing the speed feedback sign, as well as adjusting the roadway alignment through the curve to provide additional space for motorists to negotiate the curve. This adjustment could be undertaken when the City resurfaces Holcomb Boulevard to improve the pavement conditions.



HOLCOMB BOULEVARD STRIPING CONCEPT
OREGON CITY, OR

FIGURE 2