SAFETY IMPROVEMENT DESIGN

Oregon

Department of Transportation
Interoffice Memo
Roadway Engineering Section

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File Code:

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TO: Designers, Roadway Unit Managers, Manual Holders

FROM: Tom Lauer, PE
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SUBJECT: Superelevation, Superelevation Runoff, and Horizontal Curvature

Improvements to superelevation, superelevation runoff, and horizontal curvature can be as cost effective as lane and shoulder width improvements. Recommendations are outlined below.

Investigate superelevation and horizontal curvature using the following methodology:

1. Analyze 10 year if available, 5 year minimum crash history for possible connection to superelevation, superelevation runoff, and horizontal curvature deficiencies on all horizontal curves.

2. Analyze existing horizontal curvature from available data sources, which may include right-of-way maps, "as constructed" plans, and the Transviewer computer program. Identify those curves in which the design speed is more than 15m/hr (25 km/hr) below the running speed of approaching vehicles and the current year ADT is 2000 or greater. (Careful evaluation of the appropriate value to be used for the approach speed of vehicles must be made, taking into account transitioning from tangent alignments to more mountainous curving alignments. The appropriate approach speed for an individual curve is directly dependent on the rest of the alignment approaching the curve potentially generating an approach speed far less than the 85th percentile for the overall project.). Be cautious in using older right-of-way maps, as they may not replicate the existing roadway curvatures.

3. The roadway engineer-in-charge and/or the roadway designer shall drive each curve at the design speed and document comfort level. Note the level of difficulty in maintaining the vehicle in the center of the travel lane and what additional level of physical effort is needed to steer the vehicle. Remember that the design speed may be variable depending on the geometry of the curve and may be posted with speed advisory signs. Also drive the curve in both directions as the superelevation rates and feel may be different between lanes. At the discretion of the engineer, a ball bank indicator or smart level may be used at this step to obtain objective data.

4. Discuss specific problem areas with District staff directly responsible for maintaining the section of highway.

5. Request digital terrain models for those curves and associated runoffs that are determined suspect from using the above criteria. Compare the runoff gradients for conformance with AASHTO publication "A Policy On Geometric Design of Highways and Streets" (page 170 of the 2001 edition).

6. Apply the following correction analysis if needed for superelevation, superelevation runoff, and horizontal curvature.

Superelevation and Superelevation Runoff

Using the DTM information make corrections to the superelevations and superelevation runoffs to meet desirable AASHTO Standards. Remember that within a corridor geometric consistency in meeting driver expectations is important in selecting the appropriate values.

Horizontal Curvature

Calculate the benefit/cost ratio for the reconstruction of horizontal curvature using the Countermeasure Analysis Tool (CAT). When the benefit/cost ratio exceeds 1.0 consideration shall be given for reconstructing the curve.

7. Prepare exception letters for nonstandard superelevation, superelevation runoff, and horizontal curvature for all suspect curves that cannot be corrected using step 6 above.

When curve reconstruction is not justified, appropriate low cost mitigation measures such as those listed in Tables 7-6 and 8-9 of the 2003 Highway Design Manual should be applied.

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