



ODOT Region 2 Tech Center  
455 Airport Rd. S. E. Bldg. A  
Salem, OR 97301  
Fax: (503) 986-2873  
Phone: (503) 986-2990

**DATE:** March 22, 2013  
*Angela Kargel*  
**FROM:** Angela Kargel, P.E., PTOE  
Region 2 Traffic Manager  
**SUBJECT:** Response to Road Safety Audit  
US20, Independence Highway Intersection MP 6.41  
US20, Granger Avenue Intersection MP 5.63

An interdisciplinary team consisting of ODOT, Benton County, DKS and Associates staff, and a local citizen conducted a Road Safety Audit (RSA) at these two intersections on March 19 and 20 of 2012 with the final report published in April. The RSA intersections are both top Safety Priority Index System (SPIS) sites for ODOT. The RSA was instigated by ODOT Region 2 Traffic through their annual SPIS review. DKS and Associates were hired to conduct the RSA and produce the final report.

This response will be ordered for the six core issues at the intersections as determined by the RSA and address the suggestions presented. The six issues in order of priority are Left Turn Crashes, Driver Behavior, Vehicles Queuing on Railroad Tracks, Lack of Bicycle and Pedestrian Facilities, Railroad Grades and Markings, and Narrow Shoulders.

#### **Left Turn Crashes**

*Convert median/left turn lane to continuous left turn lane to allow refuge zone for left turning vehicles:* ODOT will pursue this change in the upcoming striping season. We will also explore options such as experimental 2-stage left striping at the Independence Highway intersection.

*Add painted buffer between right turn and through lanes:* ODOT will perform measurements to determine if there is width to accommodate this. If there is, ODOT will pursue this change in the upcoming striping season. If there is not, ODOT will consider adding pavement width and restriping as part of a larger safety project incorporating additional improvements (such as restricting turn movements and adding turnaround as described below).

*Construct a median acceleration lane for left turns onto US20 at Granger:* "Inside acceleration lanes" work safely if the added lane is sufficiently long enough for turning vehicles to get completely up to speed before being required to merge into traffic. Our previous experience in Region 2 is at locations where an additional through lane begins at the intersection. Because building an additional lane for a quarter mile or more is expensive and impactful, ODOT prefers to try the restriping to allow 2-stage left first as it may be just as effective and significantly less expensive. We will consider this option if the restriping plan does not improve operations or safety.

*ITS solutions (changeable message boards triggered by specific conditions) to warn US20 traffic of oncoming side-street traffic at Granger and Independence:* A recent FHWA study<sup>1</sup> reports that an ITS system to warn mainline traffic of vehicles on the stopped approach that may enter the intersection has good potential to reduce crashes, though there is insufficient data to prove or validate its effectiveness. The study intersection criteria suggest that both our intersections may see improvements with this application. ODOT will pursue an experimental application of this type of ITS system at one of our intersections, in combination with or independent of other solutions in this report, as funding becomes available. ODOT "quick fix" funding may be applicable here.

*Restrict turn movements to right in – right out and provide turn around point(s) west of Independence and/or Granger:* This option would cause some significant out of direction travel, particularly for Independence Highway intersection users, but with eliminating the left out conflict could produce significant improvements to crashes. Considering the significant cost (around \$1 million to add a left turn refuge and turnaround), this option will be pursued if other lower cost options are unsuccessful and as funding becomes available.

*Install a signal or roundabout at Granger, or a signal at Independence and construct frontage road between intersections:* While analysis of a multi-lane roundabout shows it would function reasonably and likely reduce crashes, geometric constraints of the area, including the proximity of the railroad tracks, would require a significant right of way purchase and road rebuild. Combined with frontage road construction, it is unlikely that a high cost project like this would achieve a positive benefit/cost ratio or availability of a sum of project funding (likely \$8 million or more). The proximity of the railroad may be a fatal flaw for this proposal.

Signals at high speed locations tend to result in increases in rear end crashes and high incidences of run-the-red-light angle crashes as well as increasing overall user delay. Installing a signal on a rural high speed highway also violates the Oregon Highway Plan. A detailed analysis of the Granger and Independence intersections showed that while a signal warrant could be met in several of the configurations (either intersection signalized, or one combined intersection signalized), resulting queues on the highway would be a quarter of a mile at peak times on day of opening, extending as traffic volumes increase on the highway over time. Because of all these reasons, Region 2 Traffic does not support signalizing either intersection and will not pursue that option.

### **Driver Behavior**

*Targeted enforcement of rolling stops and distracted driving, provide overtime enforcement funding:* ODOT supports this recommendation and will pass it on to our law enforcement partners in the area. ODOT will also watch for opportunities to support OT enforcement as program criteria and funding allow.

*ITS solution to warn motorists on Independence and Granger about oncoming US20 traffic:* The FHWA report<sup>1</sup> cited previously contends that this type of system does not appear to be effective in reducing crashes. ODOT does not support this experimental application.

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<sup>1</sup> Federal Highway Administration. "Stop-Controlled Intersection Safety: Through Route Activated Warning Systems," Report No. FHWA-SA-015, February 2011.

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*Construct median acceleration Lane for left turns onto US20:* See response under Left Turn Crashes.

*Restrict turn movements to right in – right out and provide turn around point west of Granger:* See response under Left Turn Crashes.

*Install a signal or roundabout at Granger, or a signal at Independence and construct frontage road between intersections:* See response under Left Turn Crashes.

### **Vehicles Queuing on Tracks**

*Install Sign “XX Feet Between Tracks and Highway” on Granger and Independence:* ODOT will work with Benton County to have these signs installed.

*Install left and right turn lanes for Granger and Independence approaches:* Because it is unlikely that additional width for turn lanes will prevent vehicles from stopping on tracks, and because of the significance of widening rail crossings, this option will not be pursued.

*Widen shoulder on US20 west of each intersection for train refuge:* ODOT supports this but it will not likely compete for Safety money based on benefit/cost. Shoulder widening in these locations will be considered during future paving projects.

*Active warning sign that illuminates when vehicles stop on tracks:* Current technology would result in operational inaccuracies as well as heavy maintenance for a system such as this. It would also not likely produce improved safety results, possibly encouraging motorists to pull out on the highway without a traffic gap just to get off the tracks. ODOT does not support this application.

*Install Traffic Signal at either or both intersections:* See response under Left Turn Crashes.

### **Lack of Bicycle or Pedestrian Facilities**

*Construct separated path parallel to US20:* Will consider for priority when bicycle/pedestrian funding is available.

### **Railroad Grades and Markings**

*Restripe Granger railroad crossing stop bar to one foot from crossing arm:* ODOT will review crossing order and work with Benton County as appropriate to make any needed change.

*Raise highway grade at both intersections to meet standard approach grade at the railroad crossings:* A project of this magnitude will not meet benefit/cost analysis for a safety project. ODOT will consider as rail crossing improvement funding becomes available, compared against other regional needs and considering appropriate risk factors. If another project at either of these intersections is moved forward to address other safety issues, some grade improvements will be considered.

### **Narrow Shoulder Width**

*Widen shoulder on the south side of the highway near Independence Highway intersection:* As this is not thought to be a contributing factor to crashes, this will not be pursued as an independent safety project, but will be considered during future paving projects or projects developed to address the other safety issues.