



# OR 211 ROAD SAFETY AUDIT REPORT › MP 14.0-24.0

NOVEMBER 2022



## ACKNOWLEDGMENTS

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# 1.0 › BACKGROUND

In October of 2021, the Oregon Department of Transportation (ODOT) designated the section of OR 211 (Woodburn-Estacada Highway 161) from Molalla (MP 14.0) to South Moon Ridge Road (MP 22.0) as a Safety Corridor. Establishing a Safety Corridor allocates resources to address short-term safety concerns on a segment of state highway that has a fatal and serious injury crash rate higher than the statewide average for similar types of roadways.

**Based on 2015-2019 crash data, the segment of OR 211 between MP 14.0 and MP 22.0 has a fatal and serious injury crash rate that is 167 percent of the statewide average. Additionally, 69 percent of fatal and serious injury crashes involved aggravating factors and risky behaviors such as speeding and impairment.**

In order to successfully implement a Safety Corridor, an assessment of safety concerns and crash risks on the corridor is required. An effective method for evaluating corridor safety performance is a Road Safety Audit (RSA) which relies on a multi-disciplinary team to identify a comprehensive set of crash risks and potential solutions. Conducting an RSA meets many of the implementation goals identified in the

“Oregon Safety Corridor Program Guidelines,” as well as the Federal Highway Administration’s Safe System Approach, which ODOT has adopted as part of their statewide Transportation Safety Action Plan (TSAP).

The Safe System approach aims to eliminate fatal and serious injuries for all users by applying the six principles and five elements shown below:



This report documents the RSA process, findings, and recommendations for the OR 211 corridor between MP 14.0 and MP 24.0.<sup>1</sup>

<sup>1</sup> The RSA study corridor was expanded two miles further east than the Safety Corridor designation

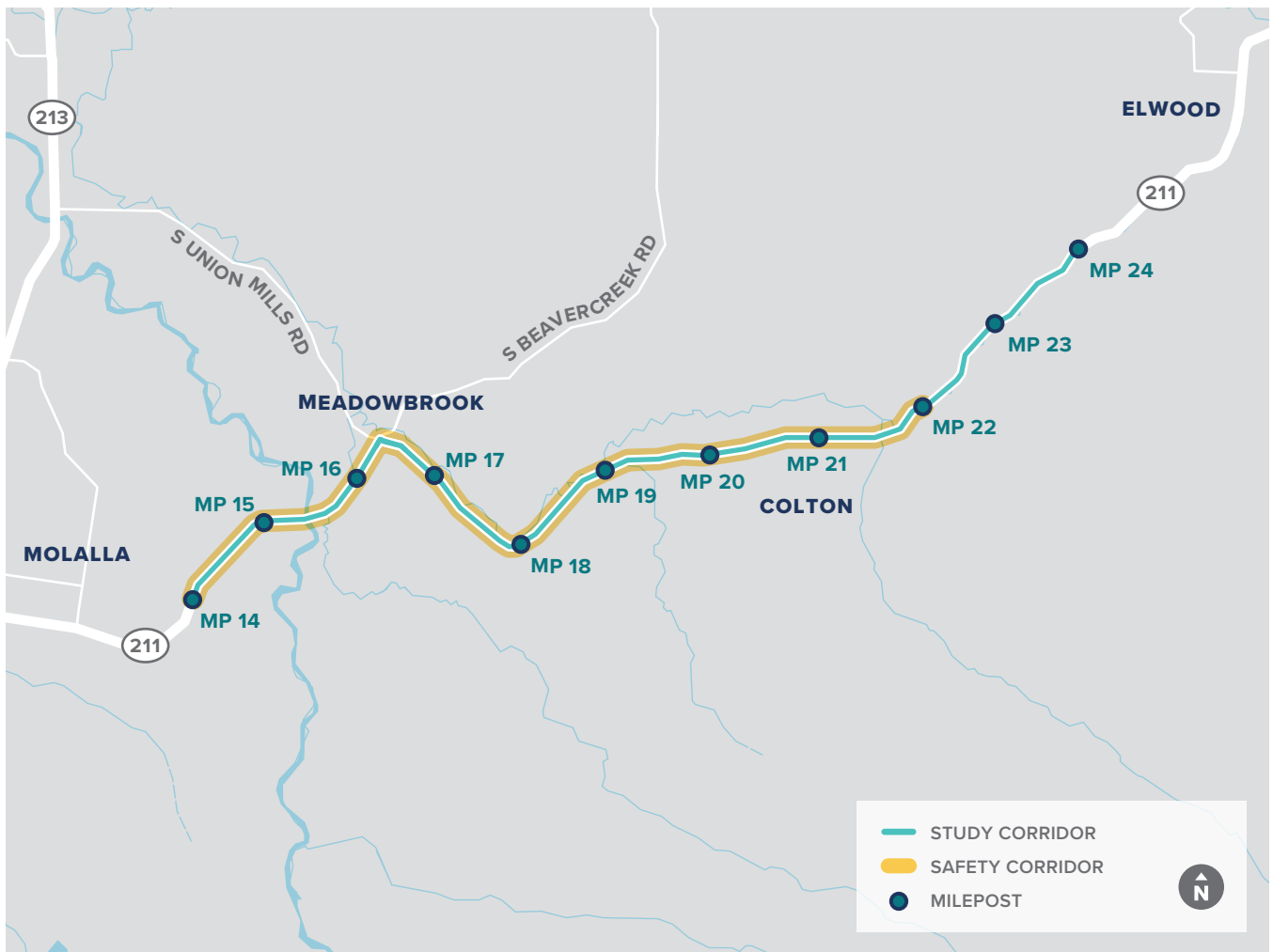


FIGURE 1: STUDY CORRIDOR

## 1.1 › WHAT IS A ROAD SAFETY AUDIT (RSA)?

An RSA is a formal safety performance examination of a roadway that is conducted by a multidisciplinary team. The selected team assesses the existing crash history of the defined study corridor and suggests potential safety improvement options to reduce the number and severity of crashes. An RSA is a way to proactively address safety concerns and identify short-, mid-, and long-term improvements by applying safety evaluation techniques and engineering practices. The Federal Highway Administration (FHWA) has identified RSAs as a proven safety countermeasure.<sup>2</sup>

The suggested safety improvements discussed may be impacted by funding sources, engineering evaluation, environmental and/or right of way concerns. Multiple agencies may need to work together to identify funding sources for potential improvements.

Figure 2 shows the eight major steps for conducting an RSA consistent with FHWA RSA Guidelines.<sup>3</sup>

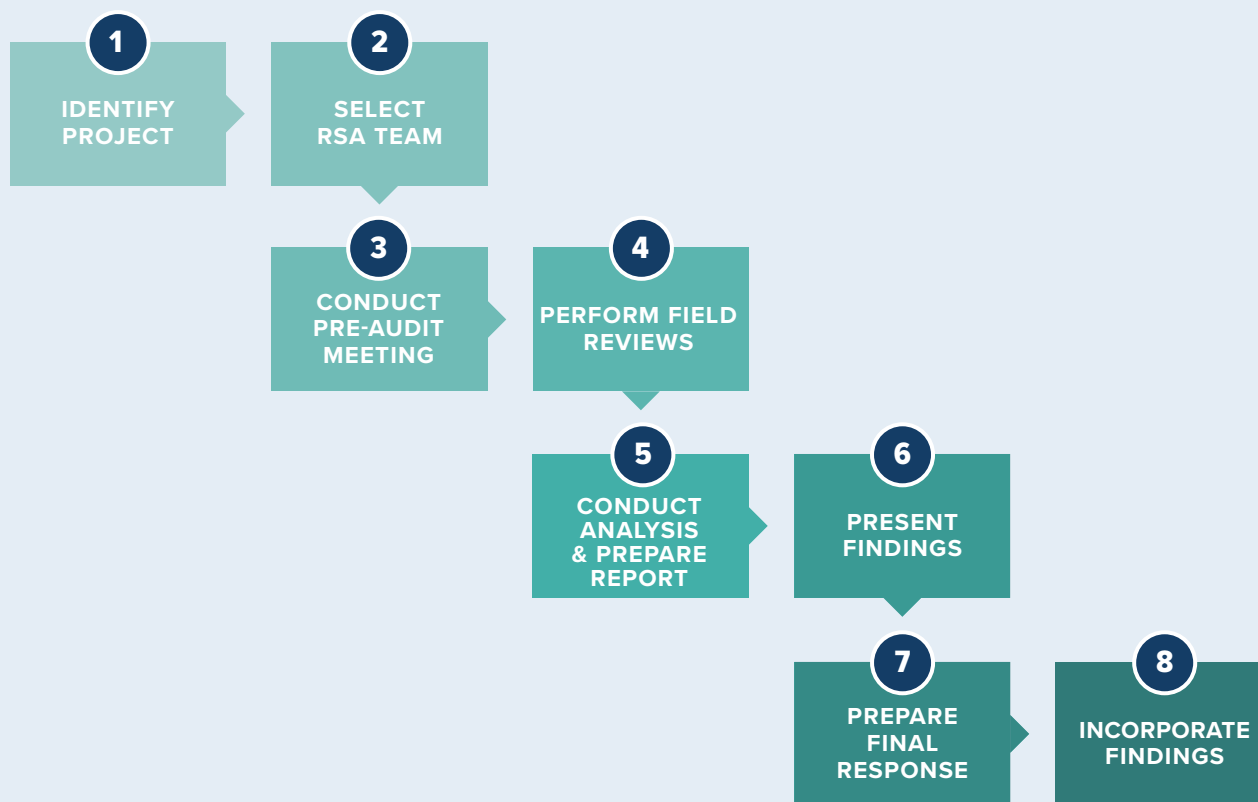


FIGURE 2: RSA PROCESS

2 <https://safety.fhwa.dot.gov/provencountermeasures/>

3 FHWA Road Safety Audit Guidelines, Federal Highway Administration, 2006.

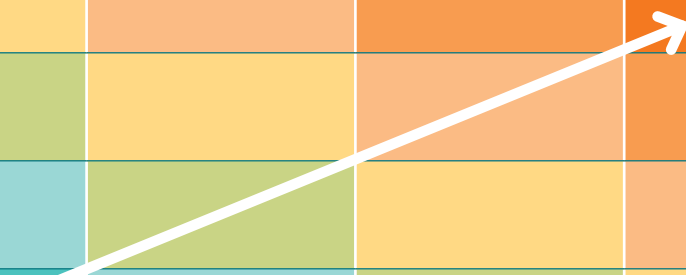
While a thorough analysis of reported crash history is a key component of an RSA, an equally important element is to identify underlying crash risk, even where few or no crashes have been reported. The likelihood of a crash occurring, and the potential resulting injury severity are used to prioritize crash risks.

- Potential crash frequency is qualitatively estimated by expected exposure (i.e., how many road users will likely be exposed to the identified safety risk) and probability (i.e., how likely is it that a collision will result from the identified safety risk).
- Potential crash severity is qualitatively estimated based on such factors as anticipated speeds (prevailing speed of traffic versus posted regulatory speed), expected collision types, and the likelihood that road users will be exposed.

These two risk elements (frequency and severity) may be combined to obtain a qualitative risk assessment based on the matrix shown in Table 1.

TABLE 1: CRASH RISK PRIORITIZATION MATRIX

RISK FREQUENCY CATEGORY	POTENTIAL CRASH SEVERITY: NEGLIGIBLE	POTENTIAL CRASH SEVERITY: LOW	POTENTIAL CRASH SEVERITY: MEDIUM	POTENTIAL CRASH SEVERITY: HIGH
FREQUENT				HIGH PRIORITY
OCCASIONAL				
INFREQUENT				
RARE	LOW PRIORITY			





## 1.2 › CORRIDOR CHARACTERISTICS

The study corridor is along OR 211 from Mile Post (MP) 14.0-24.0 in Clackamas County. OR 211 is a two-lane district highway that is classified by ODOT as a Rural Minor Arterial connecting the communities of Molalla and Estacada. In general, the segment is characterized by a posted speed of 55 mph, approximately 11-12 foot wide travel lanes, narrow shoulders (ranging from 1-4 feet wide), horizontal curves, roadside drainage ditches, and numerous access points (local roads and driveways). There are centerline rumble strips but no shoulder rumble strips, and there is no roadway lighting except for one overhead light at the crosswalk in Colton. Additional details about specific sections of the corridor are summarized below.



**MP 14.0 (eastern Molalla city limit) to MP 20.5 (just west of Colton):** This segment has very narrow shoulders (less than two feet wide), with the exception of the 0.7-mile section between Macksburg Road and Wright Road, which has 6-8 feet wide paved shoulders. The posted speed is 55 mph. The adjacent land use is primarily farmland and single-family homes, as well as the Country Christian School and a gas station near the Beaver Creek Road & Union Mills Road intersection. The clear zone adjacent to the roadway is limited, with trees and utility poles less than 10 feet from the edgeline in some cases. There are multiple local road intersections (all unsignalized), including Vaughn Road, Macksburg Road, Wright Road, and Beaver Creek Road/Union Mills Road.



**MP 20.5 to MP 21.5 (Colton):** The study corridor travels through the community of Colton, where the access density increases and there is one major intersection at Wall Street which provides a marked pedestrian crossing with rectangular rapid flashing beacons (RRFB). The only other pedestrian facilities include approximately 190-feet of sidewalk in front of the Colton Market near Wall Street. Colton High School is located just south of OR 211 on Wall Street. Within Colton, the posted speed limit is reduced to 35 mph, with a 20 mph school speed zone when children are present. The shoulder width ranges from less than two feet to six feet, and there is no street lighting aside from the Wall Street intersection. The Colton Fire station is located approximately 700 feet east of Wall Street.



**MP 21.5 to MP 24.0 (east of Colton):** East of Colton, the highway becomes more rural in nature with fewer driveways and local road intersections and dense vegetation adjacent to the roadway. The posted speed is 55 mph. There is an increase in horizontal and vertical curvature in this section, as well as an increased density of roadside objects (mostly trees). The segment generally has little or no shoulder with pavement drop-offs and guardrail present in some locations.

## 1.3 › PAST SAFETY PROJECTS AND INVESTIGATIONS

The following list summarizes the past safety-related projects that have been completed on OR 211 in the study area (year noted refers to the general timeline work was completed).

- **2015 › MP 22.0–33.0:** Install centerline rumble strips from Schieffer Road to Estacada (48V-064)
- **2021 › MP 14.0–32.0:** Install curve warning and advisory speed signs at various locations on OR 43, OR 141, OR 211, OR 213, OR 219, OR 281, OR 282, and US 30 as part of ODOT's Region 1 Curve Warning Safety Project (53V-053)
- **2021 › MP 14.0–22.0:** Install centerline rumble strips from Mathias Road in Molalla to Schieffer Road in Colton (53V-121)
- **2021 › MP 14.0–22.0:** ODOT officially designates this segment a Safety Corridor on October 27
- **2022 › MP 17.0–27.0:** Re-install centerline rumble strips that were previously paved over (Maintenance project)

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## 1.4 › WHO WAS ON THE RSA TEAM?

The RSA team was comprised of two sub-teams. A diverse team of 25 stakeholders participated in pre-audit and post-audit workshops in which safety concerns along the corridor were thoroughly discussed and documented. Due to the characteristics of the corridor and limited locations to safely pull off the roadway, a smaller team of 10 people was selected to conduct the actual field audit.

### RSA STAKEHOLDER AGENCIES

- ODOT Headquarters and Region 1 (representing safety, operations, and maintenance)
- Clackamas County
- City of Molalla
- Molalla Police Department
- Molalla Fire Department
- Colton Fire Department
- Oregon State Police
- Molalla River School District
- Colton School District
- DKS Associates

A full list of participants is included in the Appendix.



## 1.5 › WHEN WAS THE RSA CONDUCTED?

The RSA team met in July and August of 2022.



**JULY 20, 2022**

In-Person and Virtual Hybrid Pre-Audit Workshop (*Discussion of project background, crash data, and safety concerns*)



**JULY 27, 2022**

Field Audit

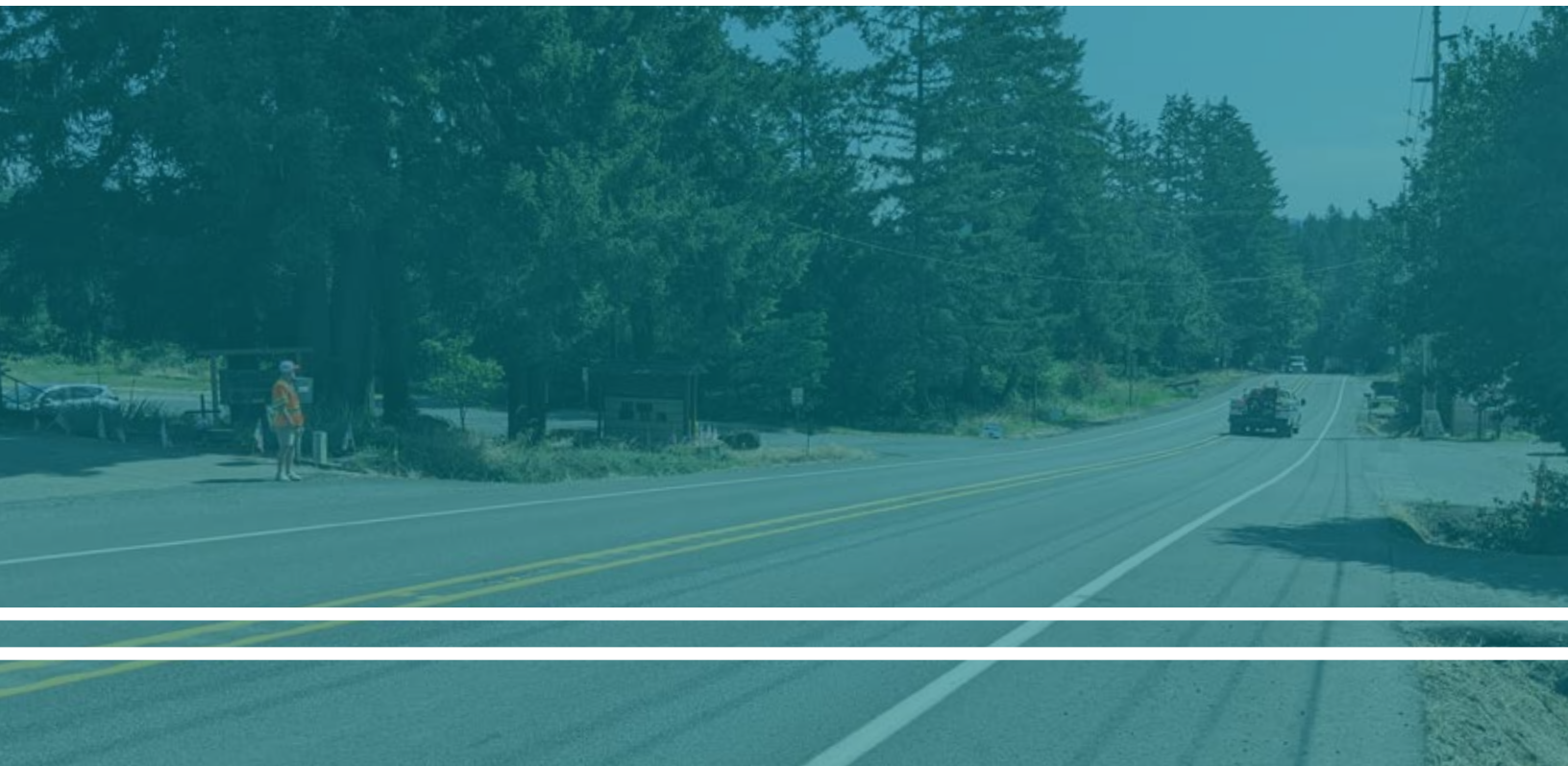


**AUGUST 12, 2022**

Virtual Post-Audit Workshop (*Summary of field audit observations and discussion of potential treatments*)



The presentation slides from the RSA workshop is provided in the Appendix.



## 2.0 ›

# SUMMARY OF CORRIDOR CRASH DATA

Crash data for the most recent five-year period available, from 2016 to 2020, was obtained from the Oregon Department of Transportation. Notable trends in reported crashes are summarized below, including crash severity, crash types, and primary contributing factors.

### 2.1 › CRASH FREQUENCY AND SEVERITY

As shown in Table 2, a total of 156 crashes occurred on the study corridor between 2016 and 2020, of which seven resulted in a fatality and five resulted in a severe injury. An additional 39 crashes resulted in minor injuries, 48 resulted in possible injuries, and 57 resulted in property damage only (PDO).

TABLE 2: CRASH FREQUENCY BY YEAR AND SEVERITY

YEAR	CRASH SEVERITY					TOTAL
	FATAL	SEVERE INJURY	MINOR INJURY	POSSIBLE INJURY	PDO	
2016	2	1	10	6	14	33
2017	0	1	5	10	14	30
2018	1	0	9	14	11	35
2019	4	2	7	14	10	37
2020	0	1	8	4	8	21
TOTAL	7	5	39	48	57	156



As shown in Figure 3, several locations along the corridor experienced multiple crashes between 2016 and 2020, with the highest frequency of crashes occurring at the intersection of OR 211/Beavercreek Road/Union Mills Road. Other high-crash locations include the intersections at Macksburg Road, Dhooghe Road, Oswalt Road, and Wall Street as well as the horizontal curves near Short Fellows Road and Schieffer Road.

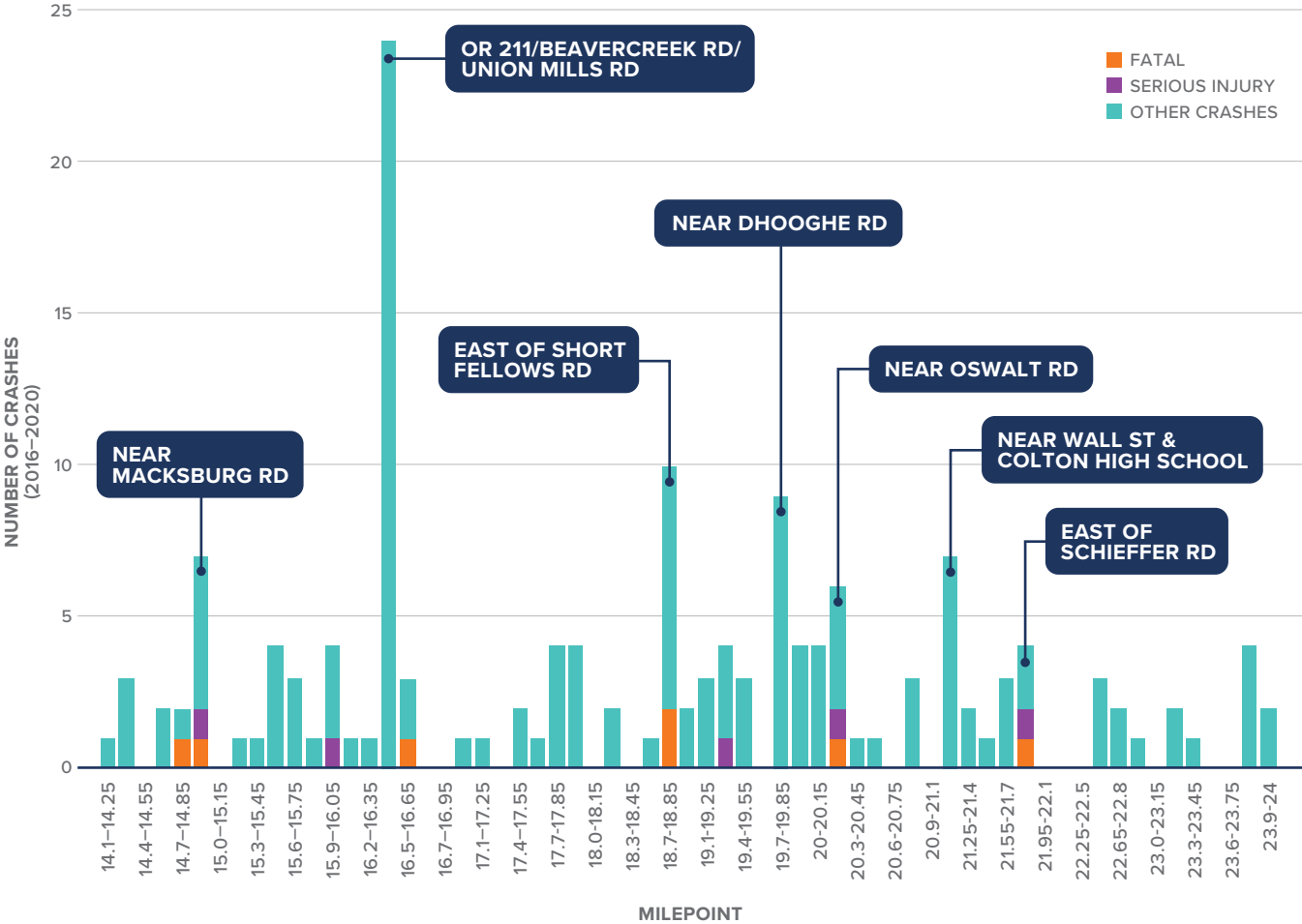


FIGURE 3: CRASH FREQUENCY BY MILEPOINT

## 2.2 › CRASH TYPES

The proportion of different crash types reported on the OR 211 corridor are summarized in Table 3. As shown, the most common type of crashes along the corridor is fixed object crashes followed by angle or turning related crashes and rear end crashes. However, when considering fatal and severe crashes, fixed object and head-on were the most common crash types.

TABLE 3: CORRIDOR CRASH TYPES AND SEVERITY

TOP CRASH TYPES	ALL SEVERITY		FATAL AND SERIOUS INJURY	
	COUNT	PERCENTAGE	COUNT	PERCENTAGE
<b>FIXED OBJECT</b>	59	38%	4	33%
<b>ANGLE OR TURNING</b>	35	22%	2	17%
<b>REAR END</b>	33	21%	1	8%
<b>SIDESWIPE</b>	13	8%	2	17%
<b>HEAD-ON</b>	5	3%	3	25%
<b>OTHER</b>	11	7%	—	—

Regarding fixed object crashes, the most common types of objects struck were:

- **Ditches** › 51 percent
- **Utility poles** › 12 percent
- **Fences** › 8 percent
- **Trees** › 5 percent

Approximately 67 percent of crashes involving a driver leaving their lane or roadway resulting in a fatality or serious injury (this includes fixed object, sideswipe, and head-on crashes).

Although there is very little pedestrian travel along the corridor, there were two pedestrian-involved crashes during the study period. One crash occurred in 2018, and one crash occurred in 2019. Both occurred at night and resulted in minor injuries.

There were no reported bike-involved crashes during the study period.



## 2.3 › CONTRIBUTING FACTORS

Each crash record indicates the primary factor that contributed to the crash, as determined by either the responding officer or ODOT Crash Analysis & Reporting Unit. In each crash report, anywhere from one to three contributing factors are listed. However, the following statistics only examine the primary factor reported in the crash level database. For the OR 211 corridor, the most commonly reported primary contributing factors are inattention (13 percent), failure to yield (12 percent), driving too fast for conditions (11 percent), and other improper driving (10 percent). Approximately 10 percent of reported crashes involved impairment (alcohol or drugs).

### WEATHER

Approximately 76 percent of all crashes occurred during clear or cloudy conditions, with 13 percent occurring during rain, three percent occurring during fog, and 3 percent occurring during snow. Road surfaces may be wet or slick even if there is not active precipitation. Approximately 21 percent of all crashes occurred on a wet road surface and another 5 percent occurred on a snowy or icy road surface.

### LIGHTING

Approximately 35 percent of all crashes occurred in dark (no street lights), dawn, or dusk conditions. There is no roadway segment lighting and intersection lighting is present only at Wall Street, which may contribute to limited visibility at night.

### TEMPORAL TRENDS

Trends related to the time crashes occurred along the corridor are presented in Figures 4, 5, and 6. As shown, noticeably more crashes occur in the afternoon and evening hours than in the morning hours. Peak hours for crash frequency correlate with travel times for school release (and after-school activities) and commuting from work.

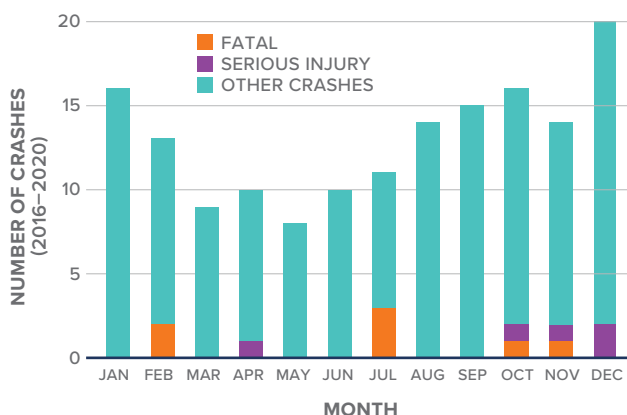


FIGURE 4: CRASH FREQUENCY BY MONTH

Crash frequency varies across the days of the week and there is no clear pattern related to weekday versus weekend crash frequencies, except that there were notably fewer crashes on Mondays and Fridays than other days of the week.

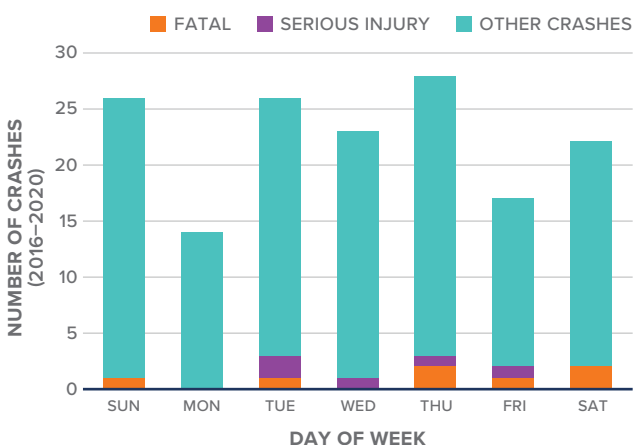


FIGURE 5: CRASH FREQUENCY BY DAY OF WEEK

Across the year, there is a notably higher number of crashes occurring during winter months than summer months. This is likely influenced by several factors, including an increase in inclement weather and a decrease in the number of daylight hours in the winter months.

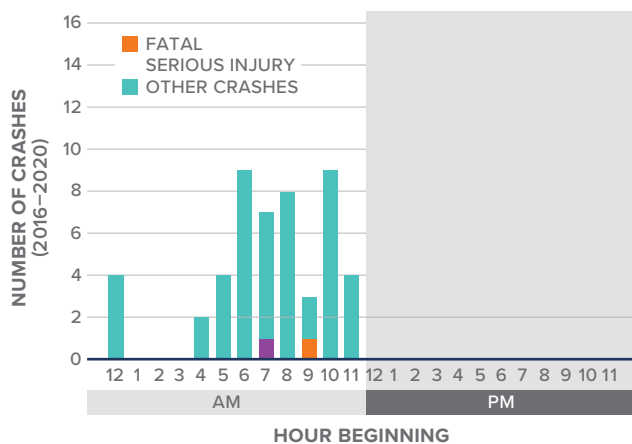


FIGURE 6: CRASH FREQUENCY BY TIME OF DAY

## DIRECTIONALITY

On corridors that are oriented primarily east-west, sunrise and sunset glare may interfere with a driver's vision during certain times of the year. Approximately 60 percent of all crashes on the corridor involved a westbound striking vehicle, while 40 percent involved an eastbound striking vehicle. When looking only at crashes occurring during possible sunset times (5:00-8:00 p.m.), directionality is even more pronounced with 70 percent involving westbound vehicles and 30 percent involving eastbound vehicles. The higher proportion of crashes involving westbound striking vehicles suggests that sunset glare may be a contributing factor to crashes along the corridor.





# 3.0 ›

## SYSTEMIC SAFETY NEEDS AND POTENTIAL SOLUTIONS

Through field review observations and an evaluation of the crash history, the project team identified several crash risks that are present at more than one location within the corridor and would be best addressed by systemic (corridor-wide) application of strategic safety countermeasures.

ODOT should consider implementing the systemic safety solutions outlined in Table 4 to address corridor-wide safety needs, many of which could be implemented as part of maintenance activities or other planned projects. The focus of this effort should be meeting current engineering standards rather than exceeding those standards, especially for low-cost safety countermeasures, in areas identified as having crash concerns. Additional location-specific safety solutions are described in the next section.

In addition to the engineering solutions described in Table 4, multiple stakeholders identified a need for driver education campaigns focusing on aggressive driving, impaired driving, and how to safely interact with first responders on two-lane highways.

TABLE 4: OR 211 SYSTEMIC SAFETY NEEDS AND POTENTIAL SOLUTIONS

IDENTIFIED SAFETY NEED	POTENTIAL SAFETY SOLUTIONS	APPLICATION LOCATION
High frequency and severity of crashes at two-way stop-controlled intersections.	<ul style="list-style-type: none"><li>• Install oversized stop signs, double stop signs, double arrow signs at top of “T” intersections, and/or advance signing.</li><li>• Install “Stop Ahead” pavement markings and double-wide stop bars.</li><li>• Add retroreflective tape to warning and regulatory sign posts.</li><li>• Maintain vegetation to ensure visibility of regulatory and warning signs.</li></ul>	All stop-controlled intersections, with priority on higher volume intersections include Macksburg Road, Dhooghe Road, Oswalt Road, Wall Street, and Schieffer Road

IDENTIFIED SAFETY NEED	POTENTIAL SAFETY SOLUTIONS	APPLICATION LOCATION
High frequency and severity of crashes on horizontal curves.	<ul style="list-style-type: none"> <li>Evaluate horizontal curves for chevron signs and advisory speeds.</li> <li>Install post-mounted delineators.</li> <li>Install supplemental curve warning signs and chevrons.</li> <li>Install speed feedback signs in advance of curves with advisory speed.</li> <li>Widen shoulders and install safety edge treatment to make roadside more recoverable.</li> <li>Install edgeline rumble strips.</li> <li>Install or upgrade raised or recessed pavement markers on edgelines and centerlines.</li> </ul>	All horizontal curves with advisory speed reductions and/or curve-related crashes, including curves near Macksburg Road, Paveletz Road, Short Fellows Road, and Schieffer Road
High frequency and severity of lane departure and fixed object crashes.	<ul style="list-style-type: none"> <li>Protect ditches with guardrail.</li> <li>Install post-mounted delineators.</li> <li>Increase clear zone width by managing vegetation and relocating fixed objects such as utility poles.</li> <li>Widen shoulders and install safety edge treatment to make roadside more recoverable.</li> <li>Install or upgrade raised or recessed pavement markers on edgelines and centerlines.</li> </ul>	Entire corridor where feasible, with focus on horizontal curves and segments from Short Fellows Road to Winslow Road and from Dhooghe Road to Oswalt Road



# 4.0 › HIGH CRASH LOCATION NEEDS AND POTENTIAL SOLUTIONS

The following sections describe the RSA findings, safety needs, and recommended solutions for specific high-crash locations, or focus areas, along the corridor, as identified in Figure 7.



**MACKSBURG ROAD**



**BEAVERCREEK/UNION MILLS INTERSECTION**



**DHOOGHE ROAD AND OSWALT ROAD**



**COLTON**

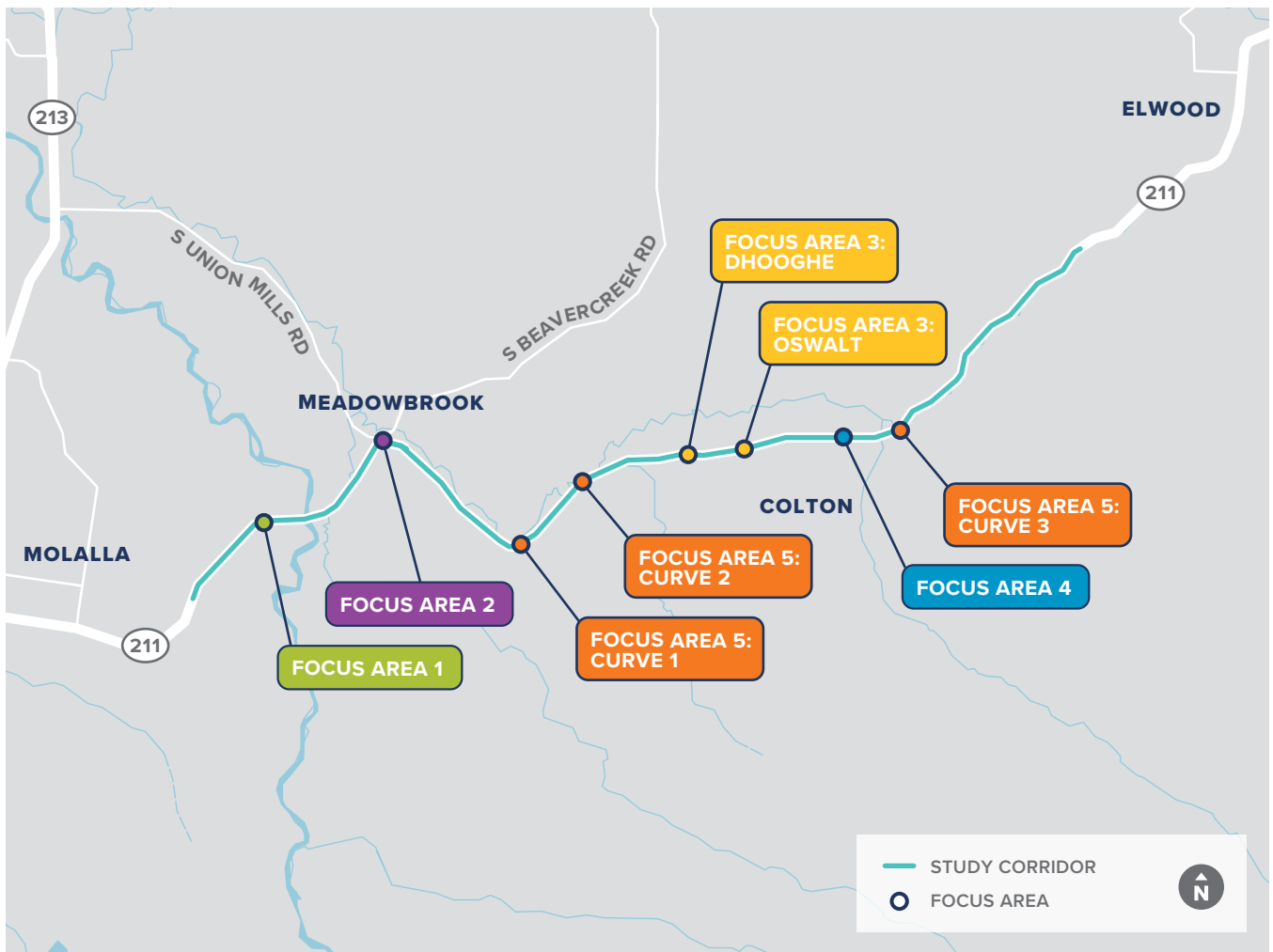


FIGURE 7: FOCUS AREA LOCATIONS

## POTENTIAL SOLUTIONS

The suggested potential safety improvements discussed may be impacted by funding sources, engineering evaluation, environmental and/or right of way concerns. Multiple agencies may need to work together to identify funding sources for potential improvements.



## 4.1 › FOCUS AREA 1: MACKSBURG ROAD (MP 14.98)

The intersection of OR 211 and Macksburg Road is located at MP 14.98. This is a three-legged intersection, and Macksburg Road is the stop-controlled minor road. There are 4-foot paved shoulders in both directions along OR 211 in this area.

### CRASH PATTERNS

There were seven reported collisions during the study period at this intersection, including four fixed-object road departure (ditch) collisions. Three occurred in dark conditions and four occurred during the day, with five in clear weather and two in rainy weather. Two crashes resulted in a fatality or serious injury. One was a sideswipe resulting from improper passing, and one was a turning movement crash in which the driver on Macksburg Road failed to stop at the stop sign. Members of the RSA team familiar with the intersection indicated that many collisions at this intersection occur as a result of southbound drivers on Macksburg Road failing to stop at the stop sign and hitting vehicles traveling on OR 211.

### RSA OBSERVATIONS

During the Field Review, it was noted that the Macksburg Road approach lies on the outside of a horizontal curve, offering excellent sight distance in both directions. There is also a residential driveway across from Macksburg Road inside the horizontal curve that is hidden by trees and shrubs. Participants witnessed vehicles traveling at high speeds around the curve.

Participants of the Field Review felt that drivers on the curve might benefit from chevron curve warning signs.

#### CRASH FREQUENCY RISK:

Medium



#### CRASH SEVERITY RISK:

High



#### POTENTIAL SOLUTIONS

To address the identified crash risks and associated reported crash patterns in this focus area, the following solutions should be considered for implementation.



#### Short-Term Solutions (0–3 Years)

- Add chevron signs and post delineators along curve
- Install systemic stop-controlled intersection visibility upgrades
- Install combined horizontal curve/intersection warning sign or advance intersection warning sign

## 4.2 › FOCUS AREA 2: BEAVERCREEK/UNION MILLS INTERSECTION (MP 16.43)

This focus area, located at MP 16.43, is characterized by a four-way intersection with unique traffic control. The intersection is all-way stop controlled except for a channelized right turn on the northbound approach continuing east. OR 211 makes a turn at this intersection, traveling on the south and east approaches. There is a gas station at the northeast corner with three driveway accesses: two on the westbound approach and one on the southbound approach. There is a school with two driveways approximately 800 feet and 1000 feet east of the intersection.

### CRASH PATTERNS

From 2016 to 2020, there were 19 total crashes at this intersection. The majority of collisions in this area were angle, turning, and rear end collisions. Contributing factors include failure to yield, disregarding the stop sign, inattention, and failure to avoid another vehicle. Four crashes occurred in the vicinity of the gas station's easternmost driveway. There were no fatal or serious injury crashes at this location during the study period.

### RSA OBSERVATIONS

During the Field Review, participants noted the large percentage of heavy logging trucks, tailgating behavior, rolling stops, and high speeds in the NB-to-EB free right-turn lane. It was also noted that there are no pedestrian facilities. An ODOT guide sign on the northwest corner facing the east approach is obstructed by the gas station signs, the stop sign on that approach, and a tree.

Additionally, the gas station accesses consist of wide driveways with no curbs or striping. Field review participants witnessed several drivers performing unsafe maneuvers in and out of the accesses, such as entering the driveway on the left side of exiting vehicles instead of using the correct (right-most) side of the driveway.

On the southbound approach, there is a horizontal and vertical curve that limits visibility approaching the intersection.

Field review participants noted Country Christian School, which is near the intersection, does not have a school speed zone. A previous ODOT evaluation in 2015 indicates this school does not meet warrants for a school speed zone or marked crossing. The segment is instead signed as a "School Zone" on both approaches to the school campus to alert drivers of possible school children near the road.

#### CRASH FREQUENCY RISK:

High



#### CRASH SEVERITY RISK:

Low



#### POTENTIAL SOLUTIONS

To address the identified crash risks and associated reported crash patterns in this focus area, the following solutions should be considered for implementation.



#### Short-Term Solutions (0–3 Years)

- Install overhead lighting
- Reposition YIELD sign to make less visible to northbound right-turning vehicles
- Relocate guide sign and/or gas station sign to improve visibility of guide sign
- Relocate or enlarge stop sign
- Remove tree to improve visibility of signing on the east approach
- Install systemic stop-controlled intersection visibility upgrades



#### Mid-Term Solutions (3–5 Years)

- Upgrade intersection to an all-way stop and remove free right turn slip lane (*two roadway concept designs are shown on the following page*)
- Install transverse rumble strips on northbound and southbound approaches, per ODOT standards



#### Long-Term Solutions (5+ Years)

- Manage access at gas station by consolidating access points or restricting width of access points
- Install a roundabout if confirmed through Intersection Control Evaluation (ICE)

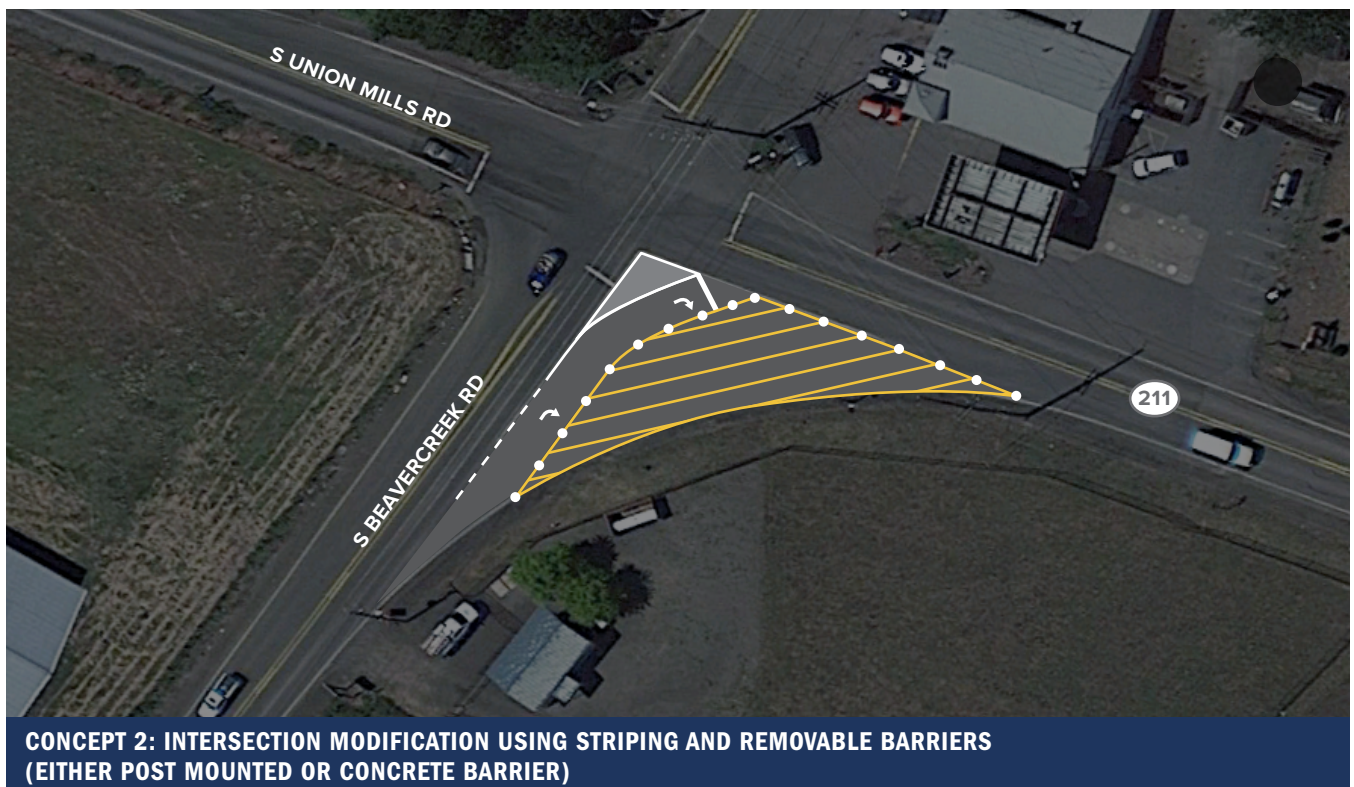
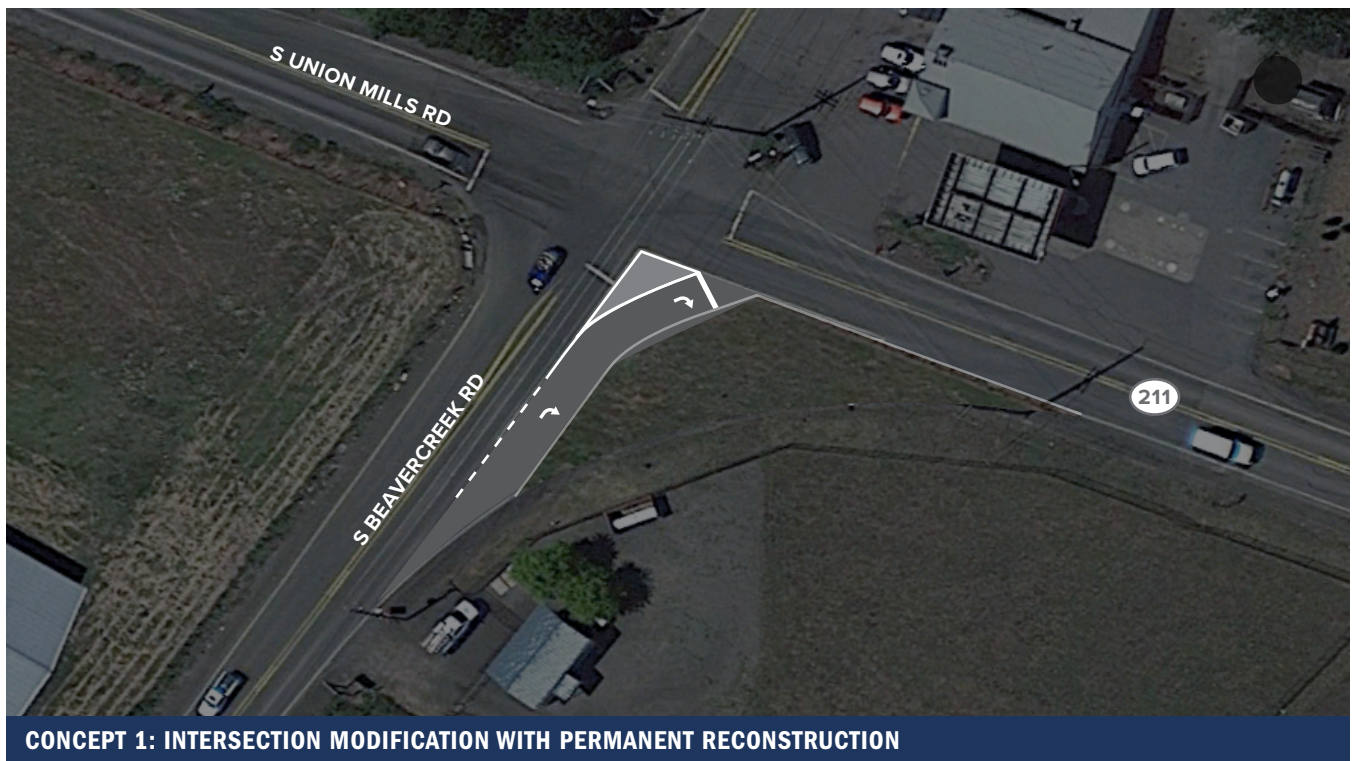


FIGURE 8: ROADWAY CONCEPTS FOR THE OR 211/BEAVERCREEK/UNION MILLS INTERSECTION



## 4.3 › FOCUS AREA 3: DHOOGHE ROAD (MP 19.79) AND OSWALT ROAD (MP 20.28)

The minor street stop-controlled intersections at Dhooghe Road and Oswalt Road are located at MPs 19.79 and 20.28, respectively. Dhooghe Road extends south approximately two miles to Graves Quarry, and thus experiences heavy truck traffic. Dhooghe Road also provides access to many private driveways. Similarly, Oswalt Road provides access to private driveways, but extends south for less than a mile before turning east and connecting to Wall Street. Both intersections have steep downgrades approaching OR 211 from the south, and both had similar crash patterns in the reported crash data as well as noted by first responders on the RSA team. As such, safety deficiencies and solutions for these locations were considered in tandem.

### CRASH PATTERNS

Over the five-year study period, there were nine total crashes at Dhooghe Road. Five were fixed object crashes (two of which involved a ditch), two were rear end crashes, one was a head-on crash, and one was an angle crash. 80 percent of the fixed object crashes involved vehicles heading west. Both rear end crashes involved vehicles heading east. None of the nine crashes resulted in a fatality or serious injury.

At Oswalt Road, there were three total crashes, two of which resulted in a fatal or serious injury. The fatal crash was an angle crash with “inattention” listed as the contributing factor. The serious injury crash was a fixed object (ditch) crash with “inattention” listed as the contributing factor.

### RSA OBSERVATIONS

Field review participants noted absent (or obscured) advance warning for the stop-control on both Dhooghe Road and Oswalt Road. There are also drainage ditches, culverts, and pavement drop-offs in the corners of the intersections that create hazards for vehicles turning right onto or off of the highway.

To the south, Dhooghe Road leads to a rock quarry approximately 2.2 miles from OR 211, generating significant truck traffic. The northbound approach to OR 211 on both Dhooghe Road and Oswalt Road have a long, steep downhill grade that restricts visibility of the upcoming intersection.



FIGURE 9: NORTHBOUND APPROACH TO OR 211 ON DHOOGHE ROAD

**CRASH FREQUENCY RISK:****Medium****CRASH SEVERITY RISK:****High**

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**POTENTIAL SOLUTIONS**

To address the identified crash risks and associated reported crash patterns in this focus area, the following solutions should be considered for implementation.

**Short-Term Solutions (0–3 Years)**

- Trim vegetation around existing signs
- Install systemic stop-controlled intersection visibility upgrades

**Long-Term Solutions (5+ Years)**

- Modify adjacent drainage ditches and culverts to reduce hazards
- Widen corner radii and/or shoulder of the intersection

## 4.4 › FOCUS AREA 4: COLTON (MP 20.5-21.5)

The community of Colton is a focus area, including the intersection at Wall Street and the fire station on the east side of town. OR 211 has a 35 mph speed zone, a 20 mph school speed zone, and a vertical curve leading to the Wall Street intersection that has a pedestrian crosswalk with an RRFB on the west leg. Wall Street leads to Colton High School to the south. Colton Fire District Station 336 is located east of the intersection in the sag of a vertical curve.

### CRASH PATTERNS

In the five-year study period, a total of 14 crashes occurred in the community of Colton between MP 20.5 and MP 21.5, all of which resulted in minor injuries or property damage only. Five were rear-end, three involved a fixed object, two involved turning vehicles, two were coded as “other”, one involved a pedestrian, and one was an angle crash. The most common contributing factors to crashes in Colton include inattention, following too closely, failure to yield, and failure to avoid another vehicle.

A total of three crashes occurred in the vicinity of the Wall Street intersection, including one angle crash and two rear-end crashes. All three crashes involved at least one eastbound vehicle, which is the direction of travel for which sight distance is most restricted.

Additionally, two crashes occurred in the vicinity of Colton Fire District Station 336. One of the crashes involved a vehicle entering the Colton Café parking lot on the opposite side of the road. The other crash was a rear-end between two westbound vehicles and involved “an officer or flagger,” though it is unclear from the crash record if it was directly related to fire station activity.

### RSA OBSERVATIONS

The field review took place during the summer, and participants did not witness any pedestrian crossing at the Wall Street intersection. However, local residents indicated that the intersection sees heavy pedestrian demand to and from Colton High School during the school year. It was noted that there are no pedestrian facilities on either side of OR 211 approaching the intersection, with the exception of about 190 feet of sidewalk on the north side of OR 211 adjacent to the Colton Market.

The southbound approach had two stop signs, one of which was obstructed by overgrown vegetation, shown in Figure 10.



FIGURE 10: OVERGROWN VEGETATION AT OR 211 AND WALL STREET, LOOKING SOUTH

First responders indicated that vehicles travel at high speeds over the vertical curve at the Wall Street intersection, resulting in near misses when fire trucks leave the fire station. To mitigate this, first responders have adopted an alternate route via an adjacent driveway further east of the vertical curve to gain more sight distance and allow for safer entry onto OR 211.

There is a 35 mph speed zone starting approximately 1,200 feet west of Wall Street that extends past the fire station and ends 1,250 feet east of Wall Street. The posted speed transitions directly from 55 mph to 35 mph. The sudden reduction in posted speed may contribute to higher vehicle speeds through Colton. There is also a school speed zone starting 280 feet west of Wall Street and ending 180 feet east of Wall Street, which requires drivers to slow down to 20 mph when children are present.

### CRASH FREQUENCY RISK:

Medium



### CRASH SEVERITY RISK:

Medium



### POTENTIAL SOLUTIONS

To address the identified crash risks and associated reported crash patterns in this focus area, the following solutions should be considered for implementation.



### Short-Term Solutions (0–3 Years)

- Implement a speed zone transition by adding a 45 mph speed zone between the 55 mph and 35 mph zones
- Install speed feedback signs
- Install supplemental lighting on the north side of OR 211 at Wall Street
- Install flashing beacons on existing pedestrian warning signs on approaches to Wall Street
- Update school speed zone signs to current MUTCD standards
- Trim vegetation to maintain visibility of signs
- Conduct ICE to evaluate feasibility of converting Wall Street intersection to an all-way stop



### Mid-Term Solutions (3–5 Years)

- Install activated flashing beacons on existing or new warning signs near the Colton Fire Station to warn through traffic of entering firetrucks and emergency vehicles (Figure 11). Consider installing a full emergency signal if volumes increase and ODOT warrants are met.



### Long-Term Solutions (5+ Years)

- Add sidewalk on OR 211 to facilitate safe pedestrian travel

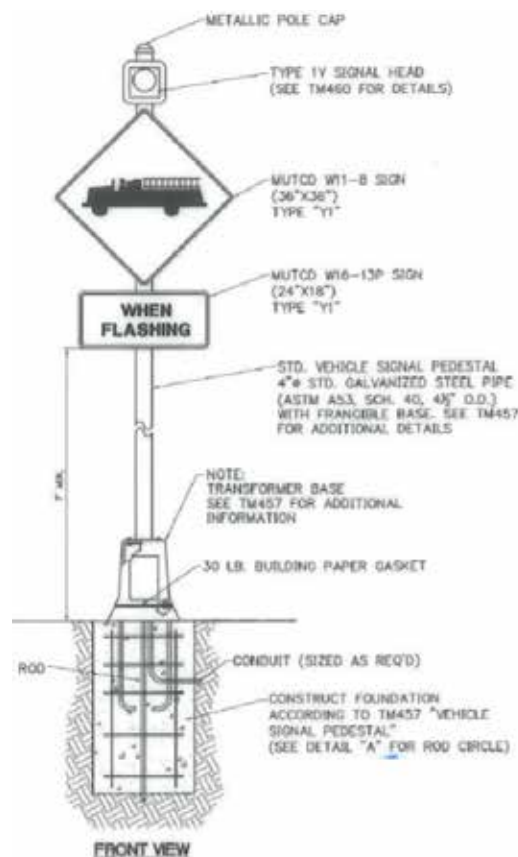


FIGURE 11: ODOT STANDARD DRAWING FOR EMERGENCY VEHICLE ACTUATED WARNING BEACONS (TRAFFIC SIGNAL DESIGN MANUAL, CHAPTER 12.4.8)



## 4.5 › FOCUS AREA 5: HORIZONTAL CURVES (VARIOUS MILEPOINTS)

Changes in roadway alignment introduce increased crash risk as they require additional attention for a driver to safely navigate the roadway. Although there are numerous horizontal curves along the study corridor, the following curves have a notable frequency or severity of crashes that suggests increased crash risk that warrants additional treatment.

- **MP 17.8–18.1 near Paveletz Road**  
(no advisory speed)
- **MP 18.7–18.9 near Short Fellows Road**  
(45 mph advisory speed)
- **MP 21.6–21.8 near Schieffer Road**  
(40 mph advisory speed)
- **MP 21.9–22.0 east of Schieffer Road**  
(40 mph advisory speed)

It should be noted that these curves were not specifically investigated during the field audit as there were not suitable locations for the RSA team to safely pull over or walk along the roadway. As such, the assessment of risk is primarily dependent upon observed crash patterns and available imagery (aerial and street-view).

### **PAVELETZ ROAD (MP 17.8-18.1)**

- Horizontal curve, no advisory speed, with public road intersection within the curve
- Seven total crashes, five injury and two PDO
- Four fixed object crashes, three rear-end crashes
- Rear-end crashes likely related to Paveletz Road intersection and/or residential driveways
- Fixed objects included ditches and utility poles

### **SHORT FELLOWS ROAD (MP 18.7-18.9)**

- Horizontal curve, 45 mph advisory speed, with public road intersection just west of curve
- 10 total crashes, two fatal, two minor injury, two possible injury, four PDO
- Eight fixed object crashes, one turning crash, one head-on crash
- Majority of crashes attributed to “other improper driving” and over half of the fixed objects were a ditch
- Impairment (either drugs or alcohol) was involved in both fatal crashes and two injury crashes

### SCHIEFFER ROAD (MP 21.6-21.8)

- Horizontal curve, 40 mph advisory speed, with public road intersection within the curve
- Four total crashes, one minor injury, two possible injury, one PDO
- Two fixed object crashes, one rear end crash, one overturning crash
- Two crashes attributed to speed, one to fatigue, and one to load shift

### EAST OF SCHIEFFER ROAD (MP 21.9-22.0)

- Horizontal curve, 40 mph advisory speed
- Two total crashes, one fatal, one serious injury
- Both fixed object crashes, one involving a ditch and one a tree
- Both attributed to speed, and the fatal crash involved impairment

#### CRASH FREQUENCY RISK:

High



#### CRASH SEVERITY RISK:

Medium



#### Short-Term Solutions (0–3 Years)

- Install flashing beacons on curve warning signs
- Install speed feedback signs in advance of curves with advisory speeds
- Install retroreflective tape on curve warning sign posts
- Install post mounted delineators
- Install intersection warning signs or change curve warning signs to combined horizontal alignment/intersection warning signs for Paveletz Road and Schieffer Road



#### Mid-Term Solutions (3–5 Years)

- Examine feasibility of strategies to increase clear zones on curves such as managing vegetation, relocating utility poles, or widening shoulders



#### Long-Term Solutions (5+ Years)

- Realign highway to minimize horizontal alignment changes
- Widen shoulders and install safety edge treatment to make roadside more recoverable



# 5.0 ›



## SUMMARY OF SUGGESTED IMPROVEMENTS

The OR 211 Road Safety Audit evaluated the safety performance and crash risks along the rural two-lane highway between mile points 14.0 and 24.0. Based on findings from an analysis of crash data, input from stakeholders, and a multidisciplinary field review, a range of potential safety solutions were identified for each of the five focus areas, as well as a toolbox of low-cost systemic treatments that can be applied corridor-wide. Detailed information on each of the recommended treatments is included in the Appendix.







Table 5 provides a preliminary prioritization of the short-term and mid-term treatments that may be used to guide implementation. Prioritization was determined using the risk assessment of each location (potential crash frequency and potential crash severity), the potential crash risk reduction of the treatments, and feasibility of implementing the solutions. (low-cost, short-term projects received higher priority than high-cost, long-term projects).

TABLE 5: PRELIMINARY PRIORITIZATION FOR IMPLEMENTATION

LOCATION	CRASH FREQUENCY RISK	CRASH SEVERITY RISK	POTENTIAL COUNTERMEASURES
Curve east of Short Fellows Road	High	Medium	 <ul style="list-style-type: none"> <li>• Install flashing beacons on curve warning signs</li> <li>• Install speed feedback signs in advance of curves with advisory speeds</li> <li>• Install retroreflective tape on curve warning sign posts</li> <li>• Install post mounted delineators</li> </ul>
Curve east of Schieffer Road	High	Medium	 <ul style="list-style-type: none"> <li>• Install flashing beacons on curve warning signs</li> <li>• Install speed feedback signs in advance of curves with advisory speeds</li> <li>• Install retroreflective tape on curve warning sign posts</li> <li>• Install post mounted delineators</li> </ul>

LOCATION	CRASH FREQUENCY RISK	CRASH SEVERITY RISK	POTENTIAL COUNTERMEASURES
Curve at Schieffer Road	High	Medium	 <ul style="list-style-type: none"> <li>• Install flashing beacons on curve warning signs</li> <li>• Install speed feedback signs in advance of curves with advisory speeds</li> <li>• Install retroreflective tape on curve warning sign posts</li> <li>• Install post mounted delineators</li> <li>• Install combined horizontal curve/intersection warning sign or advanced intersection warning sign</li> </ul>
Curve at Paveletz Road	High	Medium	 <ul style="list-style-type: none"> <li>• Install flashing beacons on curve warning signs</li> <li>• Install retroreflective tape on curve warning sign posts</li> <li>• Install post mounted delineators</li> <li>• Install combined horizontal curve/intersection warning sign or advanced intersection warning sign</li> </ul>
Curve east of Short Fellows Road	High	Medium	 <ul style="list-style-type: none"> <li>• Examine feasibility of strategies to increase clear zones on curves such as managing vegetation, relocating utility poles, or widening shoulders</li> </ul>
Curve east of Schieffer Rd	High	Medium	 <ul style="list-style-type: none"> <li>• Examine feasibility of strategies to increase clear zones on curves such as managing vegetation, relocating utility poles, or widening shoulders</li> </ul>
Curve at Schieffer Rd	High	Medium	 <ul style="list-style-type: none"> <li>• Examine feasibility of strategies to increase clear zones on curves such as managing vegetation, relocating utility poles, or widening shoulders</li> </ul>
Curve at Paveletz Rd	High	Medium	 <ul style="list-style-type: none"> <li>• Examine feasibility of strategies to increase clear zones on curves such as managing vegetation, relocating utility poles, or widening shoulders</li> </ul>
Macksburg Road Intersection	Medium	High	 <ul style="list-style-type: none"> <li>• Add chevron signs and post delineators along curve</li> <li>• Install systemic stop-controlled intersection visibility upgrades</li> <li>• Install combined horizontal curve/intersection warning sign or advance intersection warning sign</li> </ul>
Dhooghe Road Intersection	Medium	High	 <ul style="list-style-type: none"> <li>• Trim vegetation around existing signs</li> <li>• Install systemic stop-controlled intersection visibility upgrades</li> </ul>



LOCATION	CRASH FREQUENCY RISK	CRASH SEVERITY RISK	POTENTIAL COUNTERMEASURES
Oswalt Road Intersection	Medium	High	 <ul style="list-style-type: none"> <li>Trim vegetation around existing signs</li> <li>Install systemic stop-controlled intersection visibility upgrades</li> </ul>
Wall Street Intersection	Medium	Medium	 <ul style="list-style-type: none"> <li>Install supplemental lighting on the north side of OR 211 at Wall Street</li> <li>Install flashing beacons on existing pedestrian warning signs on approaches to Wall Street</li> <li>Trim vegetation to maintain visibility of signs</li> <li>Conduct ICE to evaluate feasibility of converting to an all-way stop</li> </ul>
Community of Colton	Low	Medium	 <ul style="list-style-type: none"> <li>Implement a speed zone transition by adding a 45 mph speed zone between the 55 mph and 35 mph zones</li> <li>Install speed feedback signs</li> <li>Update school speed zone signs to current MUTCD standards</li> </ul>
Colton Fire Station	Low	Medium	 <ul style="list-style-type: none"> <li>Install activated flashing beacon system</li> </ul>
Beavercreek Road/Union Mills Road Intersection	High	Low	 <ul style="list-style-type: none"> <li>Install overhead lighting</li> <li>Reposition YIELD sign to make less visible to northbound right-turning vehicles</li> <li>Relocate guide sign and/or gas station sign to improve visibility of guide sign</li> <li>Relocate or enlarge stop sign</li> <li>Remove tree to improve visibility of signing on the east approach</li> <li>Install systemic stop-controlled intersection visibility upgrades</li> </ul>
Beavercreek Road/Union Mills Road Intersection	High	Low	 <ul style="list-style-type: none"> <li>Upgrade intersection to a true all-way stop and remove free right turn slip lane</li> <li>Install transverse rumble strips on northbound and southbound approaches in conjunction with traffic control change</li> <li>Install advance warning of traffic control change</li> </ul>