zero deaths | zero serious injuries
on Montana roadways

Intersections and Innovations

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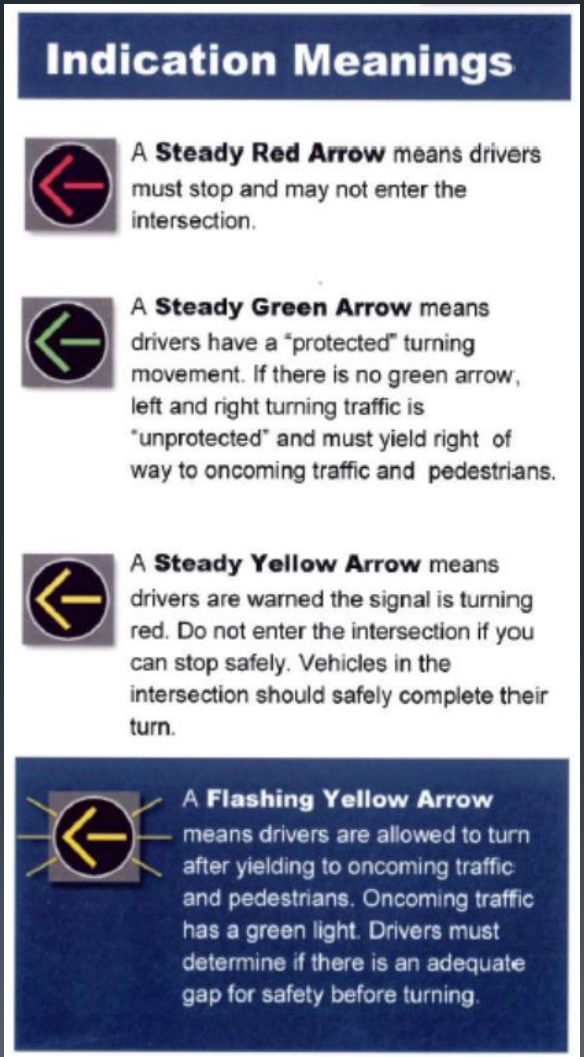
April 24, 2017

Agenda

- Flashing Yellow Arrow (FYA)
- Roundabouts
- Enhanced Crossing Treatments (Pedestrians)
- Cable Median Barriers
- Centerline Rumble Strips
- Intersection Conflict Warning Systems
- Traffic Signal Timing Parameters

Flashing Yellow Arrow (FYA)

Flashing Yellow Arrow (FYA)



Roundabouts

Purpose & Design

WHY ROUNDABOUTS?

A well-designed, strategically placed roundabout has several benefits:

Safety

Slower speeds and less conflict points reduces the frequency and severity of accidents.

Operation

Delays are reduced due to the smooth flow of vehicle traffic rather than the stop-and-go traffic of normal intersections.

Aesthetics

The central island is often landscaped to help beautify the intersection.

DESIGN

There are no traffic signals or stop signs in a roundabout. To keep traffic flowing, most roundabouts have the following design feafures:

Yield at Entry

Traffic entering the roundabout yields the right-of-way to vehicles already in the roundabout.

One-Way Travel

Vehicles in a roundabout travel in one direction only (counterclockwise).

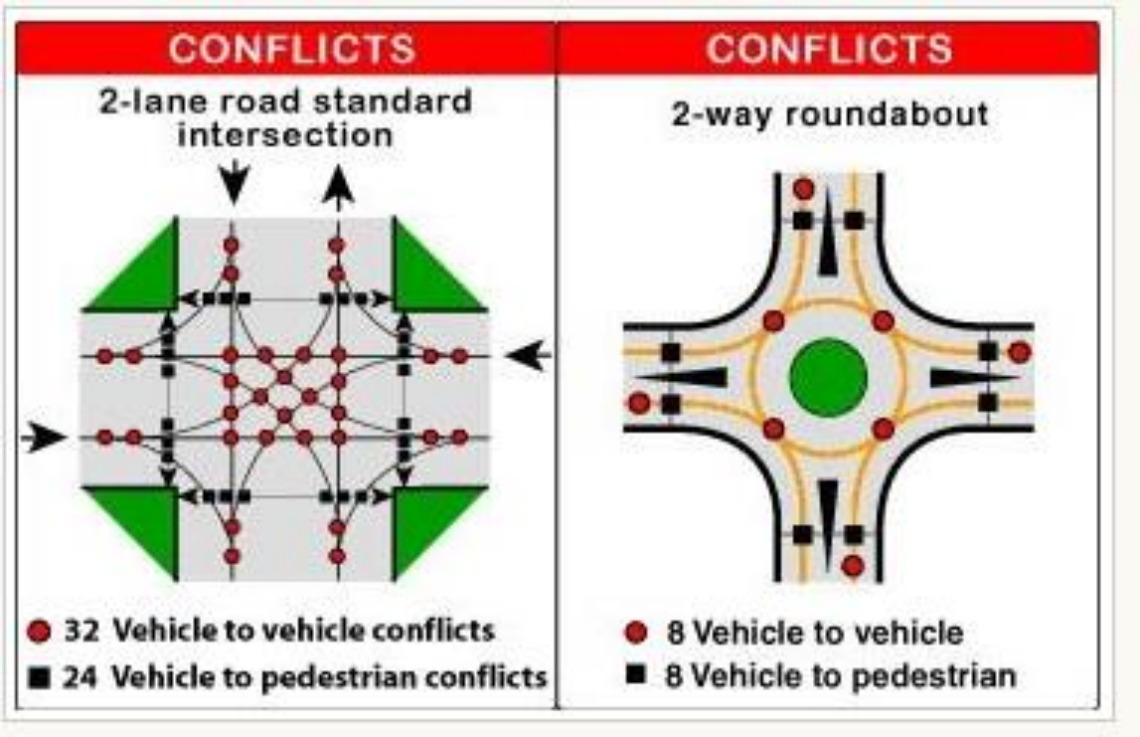
Central Island

A raised, painted, or landscaped central island.

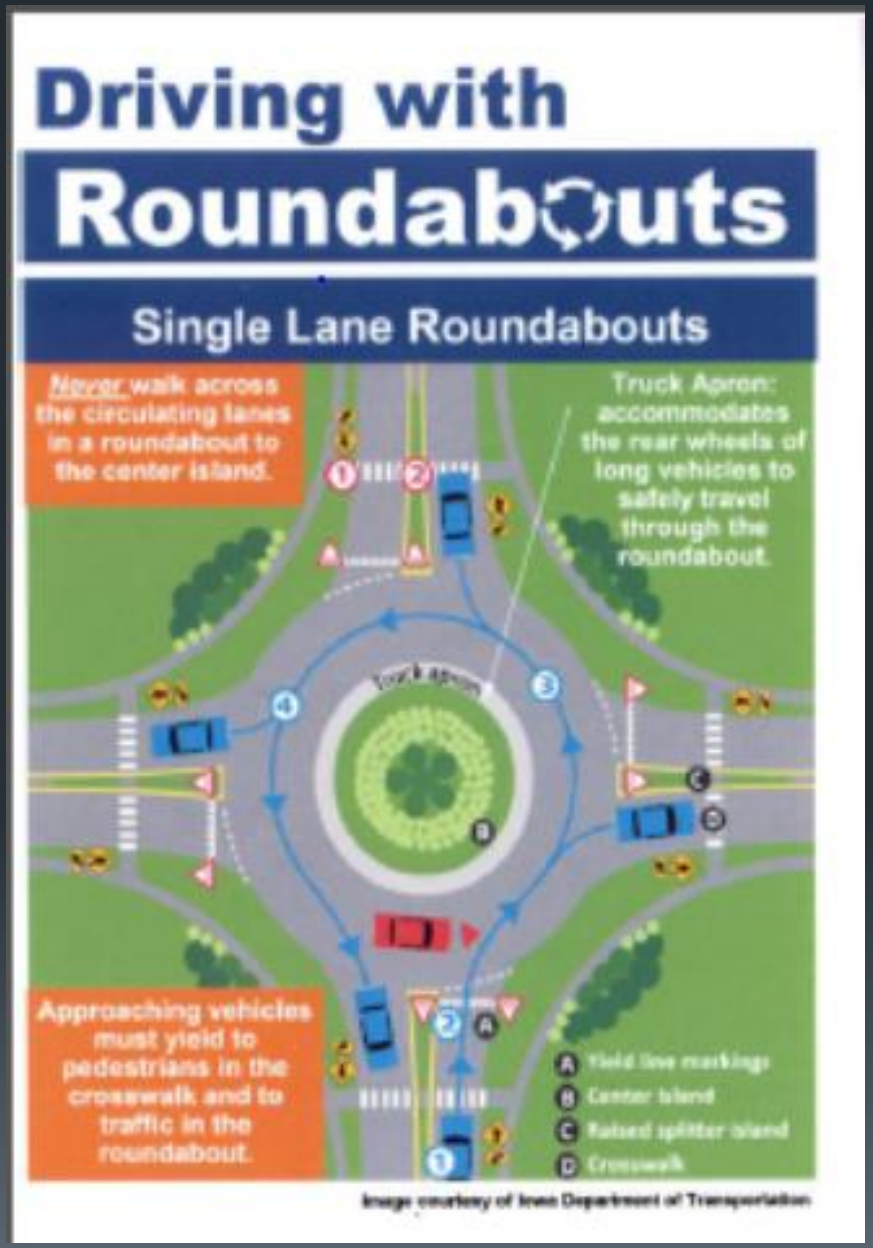
Slower Speeds

Geometric features physically limit vehicle speeds to 25 mph or less.

Roundabouts



Roundabouts



Roundabouts

1. **SLOW DOWN** when approaching a roundabout, and be prepared to stop.

2. **LOOK TO THE LEFT** as traffic flows in a counter-clockwise direction. Yield to ***ALL*** vehicles already in the roundabout. They have the right of way-***no matter which lane they are traveling in.***

3. **STAY IN YOUR LANE** when entering a roundabout. Merge into the traffic flow when it is safe.

4. **TRAVEL AROUND THE CIRCLE** in a counterclock-wise direction until you reach your desired street. Use your right-turn signal to exit the roundabout.

Other Vehicles

Large Vehicles need more space when navigating roundabouts, and smaller vehicles should drop back to allow the larger vehicle to complete travel through the roundabout.

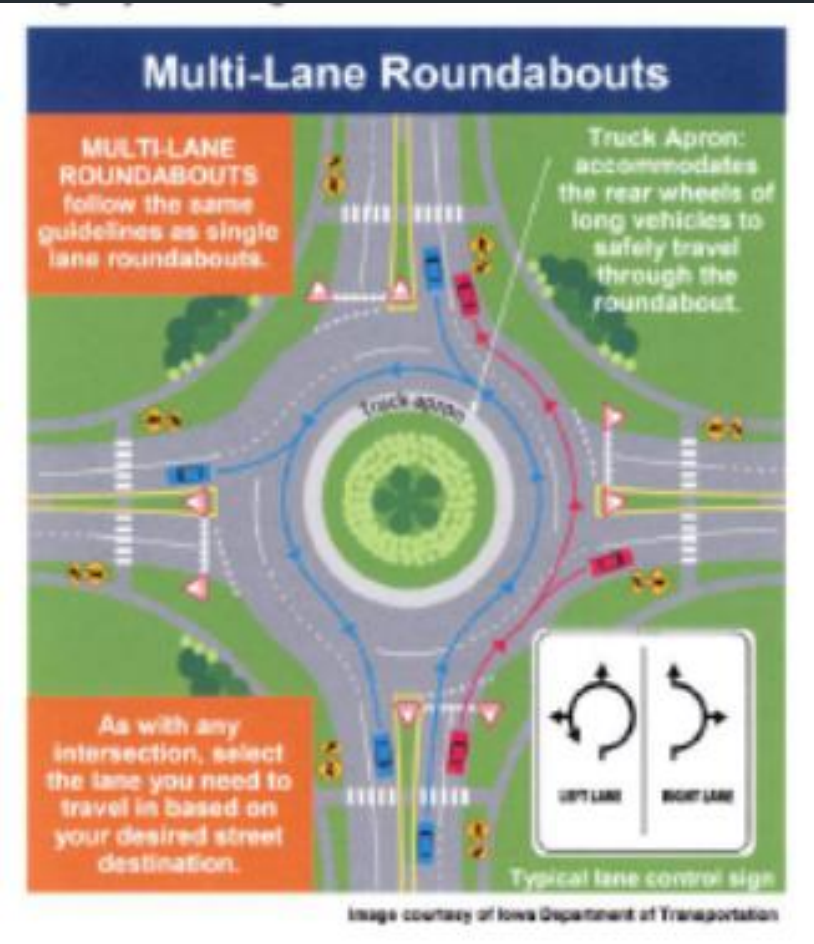
If an Emergency Vehicle approaches, exit the roundabout immediately and then pull over. ***Do not stop in the roundabout.***

Bicycles and Pedestrians

Pedestrians must cross at designated crosswalks.

Bicyclists are encouraged to walk their bikes and use pedestrian crosswalks for safety. If you are comforta-ble riding in traffic, ride on the roadway while obeying the same traffic rules as motorized vehicles. Clearly signal your turning intentions.

Roundabouts



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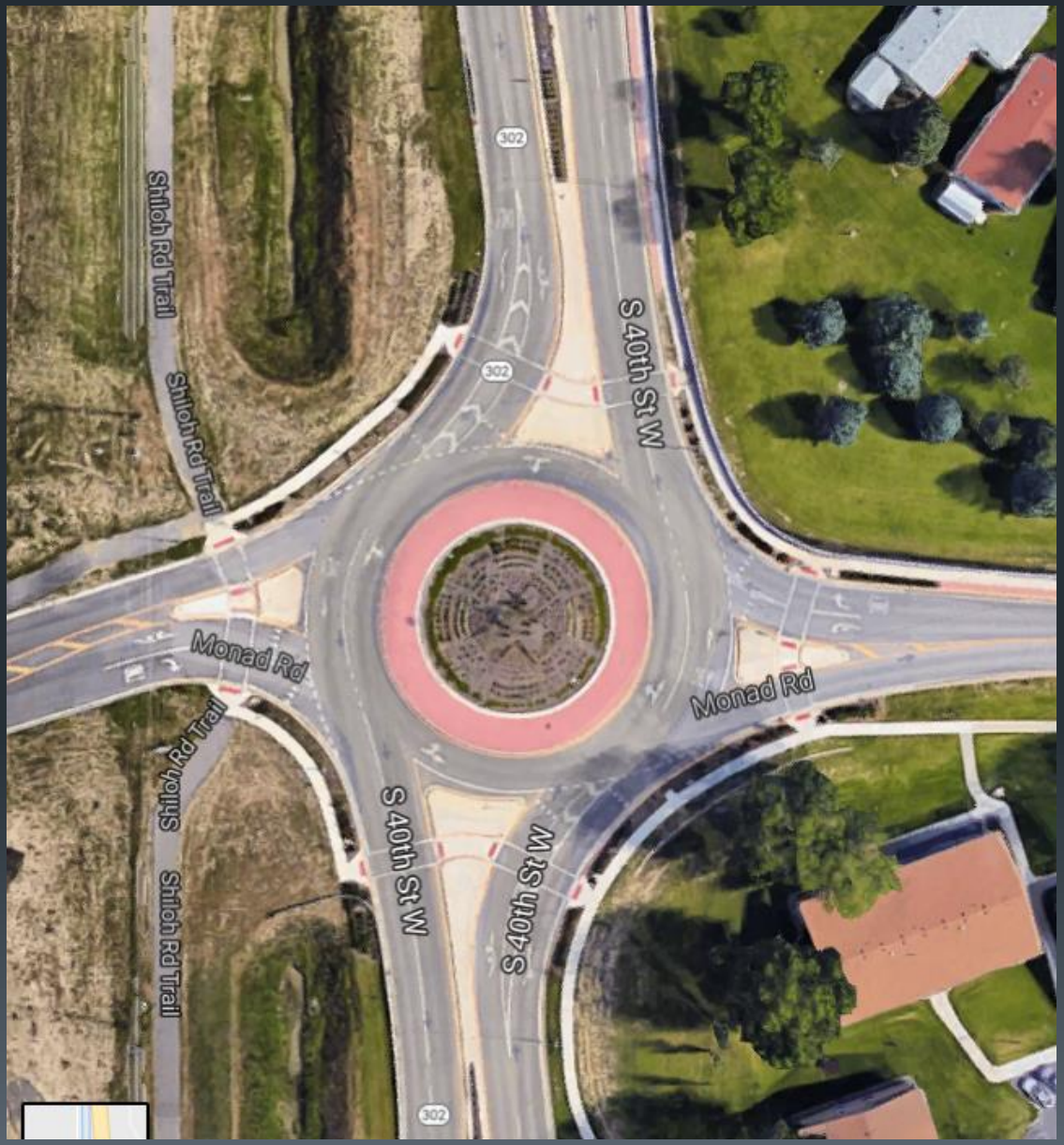

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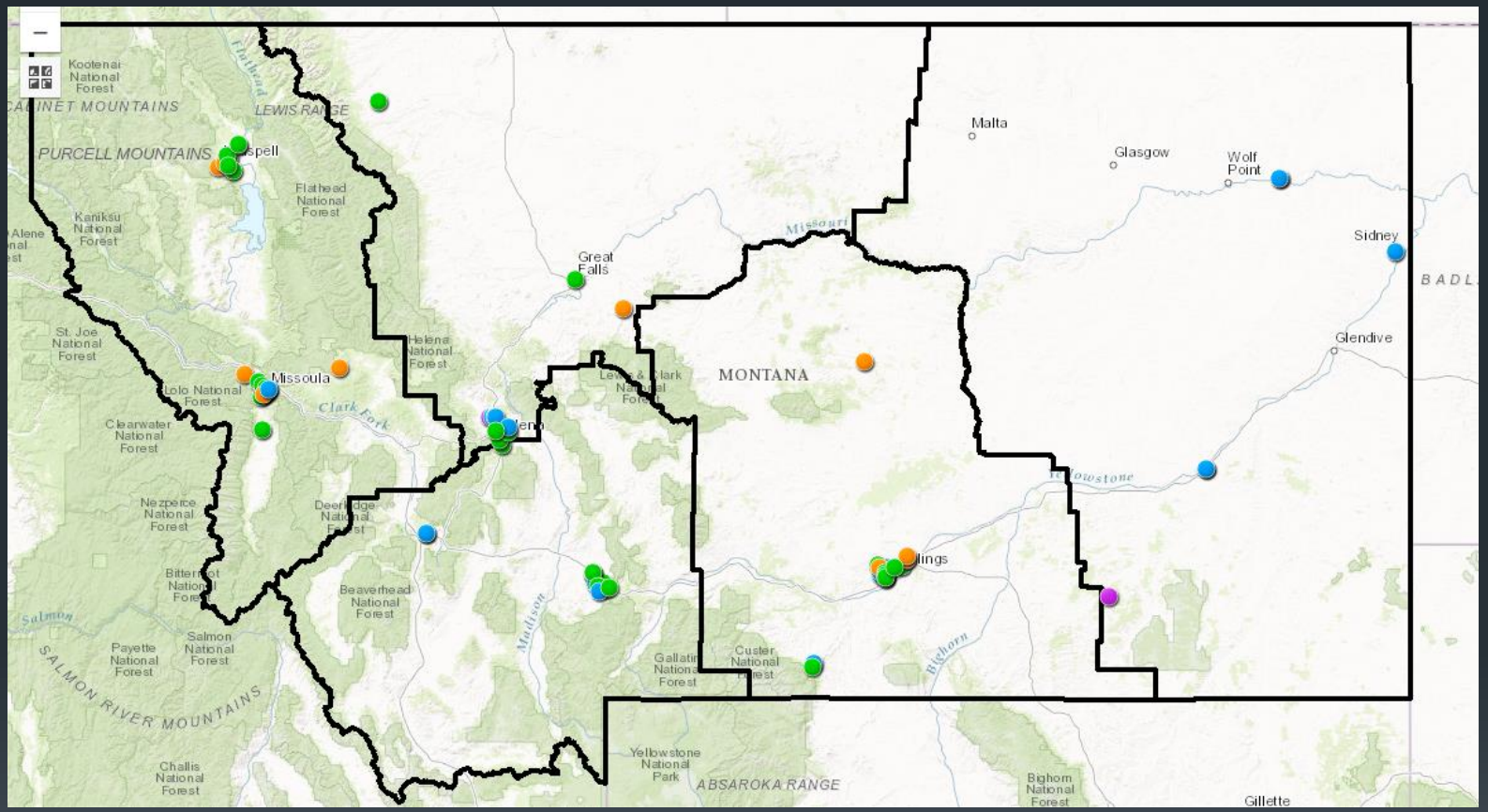


http://www.mdt.mt.gov/visionzero/roads/roundabouts/locations.shtml

Enhanced Crossing Treatments

- High Visibility Crosswalk

Enhanced Crossing Treatments

- Raised Pedestrian Crossing

Enhanced Crossing Treatments

- Bulb-Out/Curb Extensions

Enhanced Crossing Treatments

- Crossing Island (Pedestrian Refuge)

Enhanced Crossing Treatments

- Rectangular Flashing Beacon

Enhanced Crossing Treatments

- Pedestrian Hybrid Beacon

Pedestrian hybrid beacon in Belgrade, MT

Enhanced Crossing Treatments

- Pedestrian Hybrid Beacon

AS A PEDESTRIAN..

See This?	Do This!
	Push the Button to Cross
	Wait
	Continue to Wait
	Start Crossing
 (counting down)	Continue Crossing
	Push the Button to Cross

AS A DRIVER..

See This?	Do This!
	Proceed with Caution
 (flashing)	Slow Down (Pedestrians have activated the push button)
	Prepare to Stop
	STOP! (Pedestrians in Crosswalk)
 (alternately flashing)	STOP! (Proceed with Caution if Clear)
	Proceed with Caution

Enhanced Crossing Treatments

- Pedestrian Signal

Enhanced Crossing Treatments

- Grade Separated Crossing

Cable Median Barriers

Centerline Rumble Strips

Installation aimed to prevent fatal and severe injury crashes on rural highways.

Centerline Rumble Strips

BENEFITS OF CENTERLINE RUMBLE STRIPS

- Provide immediate / direct feedback to drivers or motorcyclists unintentionally crossing the centerline of two-lane highways, giving distracted or drowsy drivers time to correct course.
- Act as a guideline to vehicles and snowplows in winter whiteout conditions and other low-visibility conditions.
- Effective in lowering the number of highway fatalities and serious injuries in other states where implemented — reducing total roadway departure crashes as much as 42 percent and fatal and severe injury crashes as much as 73 percent.
- Are a low-cost safety measure. Compared to $1 million per mile of total highway reconstruction cost, centerline rumble strips cost $5,000 per mile to install.

Centerline Rumble Strips

DRIVING WITH CENTERLINE RUMBLE STRIPS

Montana drivers should be aware of the following when driving on two-lane highways installed with centerline rumble strips:

- Passing is allowed in passing zones. Centerline rumble strips are installed in both passing and non-passing zones. They are not meant to deter safe passing by car, truck or motorcycle.
- Don't hug the shoulder. This makes bicyclists nervous. Be sure to give bicyclists plenty of shoulder room.
- Centerline rumble strips may seem louder when you drive over them compared to shoulder strips. This is because the vehicle and driver's body is right over the strip.

Centerline Rumble Strips

THE MONTANA IMPLEMENTATION

MDT is targeting specific stretches of highway for the centerline rumble strip implementation. Installation is happening on two-lane highways that meet these criteria:

- Have been the site of at least one fatal or serious injury roadway departure crash over a five-year period. In particular, MDT is prioritizing highways that have been sites of these types of roadway departure crashes: head-on, side-swipe from the opposite direction and left-side off-the-road crashes.
- The posted speed limit is above 45 mph.
- Rural areas, outside more densely populated suburban areas where rumble strip noise could be an annoyance.

Centerline Rumble Strips

CENTERLINE RUMBLE STRIP INSTALLATION SCHEDULE:

Butte District: 2015

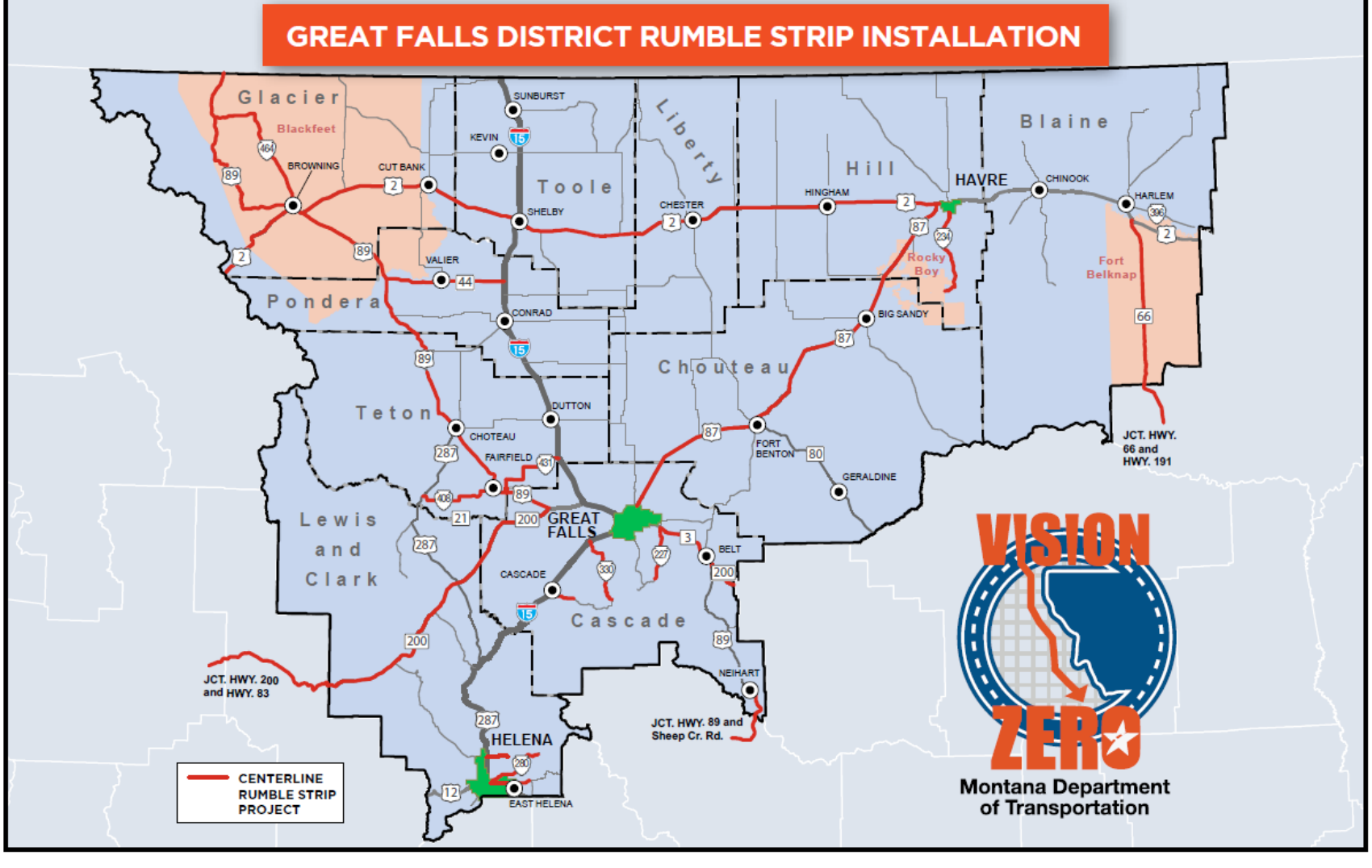
Billings District: 2016

Great Falls District: 2017

Glendive District: 2018

Missoula District: 2019

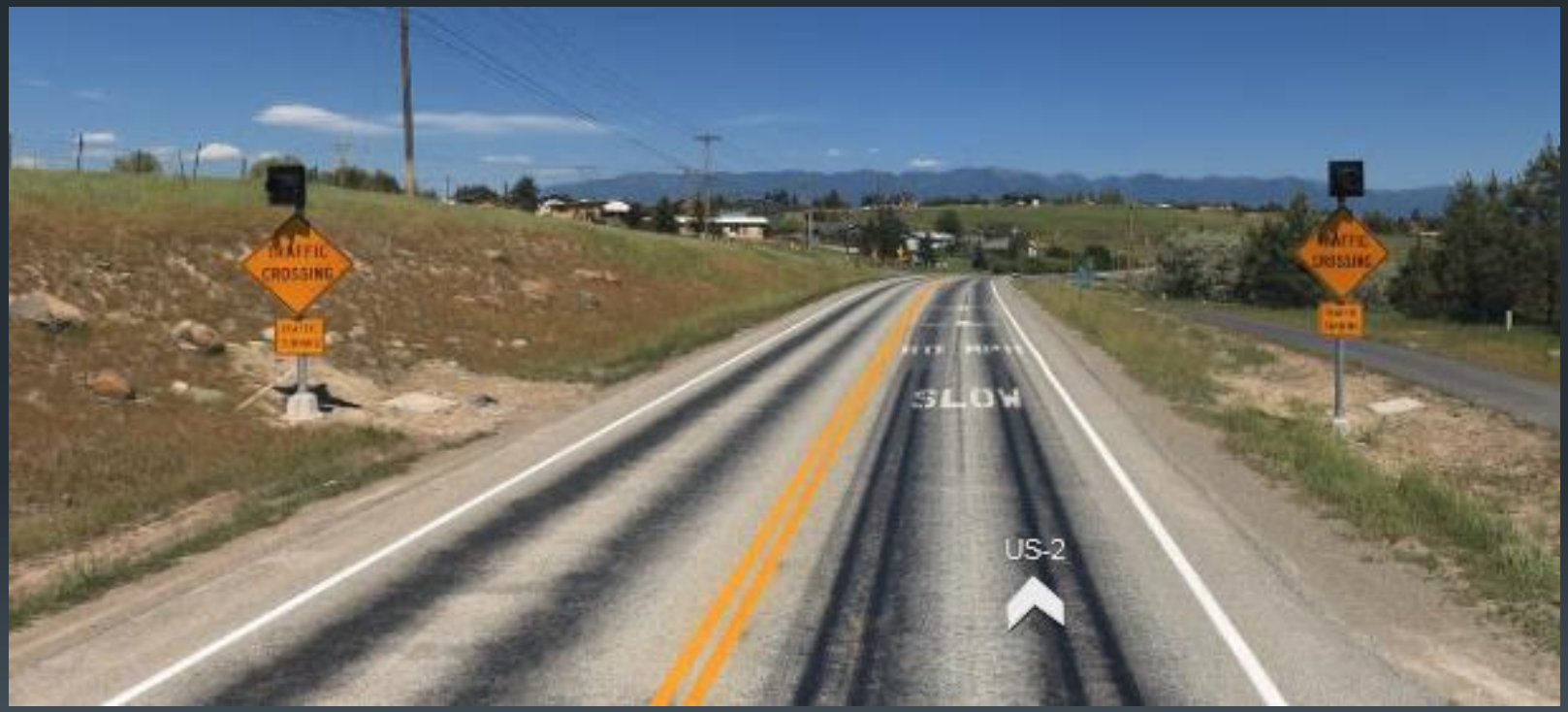
Centerline Rumble Strips



Centerline Rumble Strips

- http://www.mdt.mt.gov/visionzero/rumblestrips/

Intersection Conflict Warning System



Intersection Conflict Warning System

Traffic Signal Timing Parameters

- Yellow Change Interval
  - Yellow times range from a minimum of 3 seconds to a maximum of 5 seconds.
- Red Clearance Interval
  - For through movements, red clearance times should be at least 1 second with a maximum value of 3 seconds.
- Pedestrian Interval
  - Walk Time
  - Flashing Don’t Walk

Traffic Signal Timing Parameters

- Green Times
  - Main Line
  - Side Streets
- Left Turn Phasing
  - Permissive
  - Permissive/Protective
  - Protective
- Coordination/Corridor Timing
  - Proper traffic signal timing promotes safe and efficient traffic flow. A well timed traffic signal system can reduce fuel consumption and emissions, eliminate unnecessary stops and delays, and increase safety.

Questions and Discussion

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