Rural Two Lane Case Study

SR 78 near Red Lodge
Montana DOT

Learning Outcomes:

Apply the HSM to Montana Department of Transportation Projects

► Rural Two-Lane Intersection
► Rural Two-Lane Roadway Segments
Case Study Project: SR 78 near Red Lodge

3 Curve Realignments

SR 78 and US 212 Intersection
US 212 Approach to SR 52 Intersection

- Looking South
- Looking South
- Looking North
- Looking North

SR 78 Approach to US 212 Intersection

- Looking East
- Looking East
- Villard St. Approach Looking South
- Villard Street Approach Looking North
SR 78 and US 212 Intersection

Proposed Roundabout Alternative
Using Excel Spreadsheets for Intersection Crash Frequency Prediction

Demonstration of Excel Spreadsheets

Group Exercise for HSM Crash Prediction

Alternatives Discussion

Intersection Data 2010 [2033]:

SR 78 and US 212 (3ST)
- AADT SR78 = (AADT<sub>minor</sub>) = 3,750 [5,000]
- AADT 212 (AADT<sub>major</sub>) = 7,125 [9,500]
- Skew = 15°

SR 78 and Villard St. (4ST)
- AADT SR78 = (AADT<sub>major</sub>) = 3,750 [5,000]
- AADT Villard St. = (AADT<sub>minor</sub>) = 1,125 [1,500]
- Skew = 15°

Assume: 1) Existing intersection configuration for 2033
2) SADT (Summer Peak) = 1.2 × AADT
Intersection Alternatives:

1. Left-turn lane on US 212 NB at SR 78
2. Right-turn lane on US 212 SB at SR 78
3. Left-turn lane on SR 78 EB at Villard St.
4. 2 Left turn lanes on SR 78 at Villard St.
5. Eliminate intersection skew (both)
6. Replace both intersections with a single modern roundabout (proposed)
7. Other alternatives?

HSM Crash Prediction Outcomes:

SR 78 and US 212 (3ST)
- \(N_{predicted-2010} = \) (existing) [with alt. changes]
- \(N_{predicted-2033} = \) (existing) [with alt. changes]

SR 78 and Villard St. (4ST)
- \(N_{predicted-2010} = \) (existing) [with alt. changes]
- \(N_{predicted-2033} = \) (existing) [with alt. changes]

SR 78 and US 212 (Roundabout)
- \(N_{predicted-2010} = \)
- \(N_{predicted-2033} = \)
HSM Case Study

March 2012
Delaware

SR 78 Curve at Sta 114+00 (MP 2.1)

Looking North
Looking North
Looking North
Looking East

SR 78 Curve at Sta. 165+00 (MP 3.2)

Looking West
Looking West
Looking West
Looking South
Using Excel Spreadsheets for Roadway Segments Crash Frequency Prediction

Demonstration of Excel Spreadsheets

Group Exercise for HSM Crash Prediction

Alternatives Discussion
SR 78 Roadway Segments Data [Proposed]:

SR 78 Station 85+00 to 205+00 [2.273 miles]
► AADT 2010 [2033] = 2,000 [4,000]
► Lane width = 12 ft [12 ft]
► Shoulder width = 1 ft gravel [2 or 4 ft paved]
► Existing Radii (ft) 1 = 604; 2 = 574; 3 = 574
  [1 = 1,700; 2 = 960; 3 = 960 (w/spirals)]
► Grades = ≤ 5% [≤ 4%]
► Driveway Density = 10 per mile
► RHR = 3 [2]
► No lighting or centerline rumble strips

SR 78 Section Crash Data, 2001 - 2010

Fatal = 0; Injury = 8 (11); PDO = 15; Total = 23
All SVROR; 16 on curves; 7 on tangents; Dir. = split
Weighted AADT = 1,629; Length = 2.273 mi
MVMT = 5.946; Crash Rate = 3.9; Severity = 35%
3 Semi-truck; 4 Motorcycle; 15 Car/Pickup/SUV
6 Nighttime; 17 Daylight/Dusk
6 Alcohol; 8 Ice/Snow; 1 Wet/Rain; 14 Dry (10 Dry + Daylight/Dusk + Curve)
18 Overturn; 5 Ditch/Fence/Rock
14 Male; 9 Female; 1 ≥ Age 65; 3 < Age 21
Roadway Alternatives:

1. 11 ft lane width (12 ft in curves)
2. 6 ft paved shoulder width
3. Minimum Radii = 1,200 ft (60 mph)
4. RHR = 1
5. Centerline and edgeline rumble strips
6. Highway lighting
7. Other alternatives?

HSM Crash Prediction Outcomes:

SR 78 (Station 85+00 to 205+00)

\[ N_{predicted-2010} = \]
- Existing
- Proposed
- With alternative changes

\[ N_{predicted-2033} = \]
- Existing
- Proposed
- With alternative changes
Learning Outcomes:

Apply the HSM to Montana Department of Transportation Projects
► Rural Two-Lane Intersection
► Rural Two-Lane Roadway Segments

Questions and Discussion