District 4 Shoulder Widening Study

• Evaluation Criteria:
  • Safety
  • Mobility
  • Multimodal Accommodations
  • System Preservation
  • Environmental Impacts
  • Constructability
  • Functionality

3/8/2018
Evaluation Criteria – Safety

Existing Crash Rate

• Existing crash rates and critical crash rates were calculated

• Segments with rates above the critical rate received the highest score

Future Year Predicted Crash Rate

• Predicted future year crash rates were calculated

• Segments with largest reduction in future year predicted crash rates received the highest score
District Safety Plan

• Identified high priority segments from MnDOT’s District 4 Safety Plan

• Segments were identified as high priority if at least three risk factors were present

• **High Priority Segments** with the largest number of risk factors scored the highest
Shoulder Design

- Segments with shoulders that do not meet current design standards received the highest score
Evaluation Criteria – Mobility

Future Year AADT

- Future year 2045 traffic volume projections were developed
- Segments with the highest projected traffic volumes received the highest score

Future Year Corridor Operations

- Future year Level of Service (LOS) results were calculated for each segment
- Segments with the worst future year LOS received the highest score
Evaluation Criteria – Multimodal Accommodations

Bicycle Corridors

- MnDOT District Bicycle Plan Sustainability Analysis routes were identified
- Segments were rated in the plan as good, fair, or poor based on user comfort
- Segments identified as poor received the highest score
Heavy Commercial Route

• Heavy commercial percentages were calculated

• Shoulders provide an area for emergency parking and improve lateral separation for vehicles

• Segments with the highest percentage of heavy commercial vehicles received the highest score
Agricultural or Recreational Route

- District 4 staff identified corridors with heavy agricultural or recreational use
- Segments identified as heavy agricultural or recreational use received the highest score
Unique Travel Corridors

- Includes unique travel corridors (i.e. Amish users, corridors within American Indian Reservations, high pedestrian corridors, etc.) that would benefit from wider paved shoulders

- To prioritize unique corridors, these segments received the highest score
Evaluation Criteria – System Preservation

Transportation Plan Consistency

• Segments in the MnDOT District 4 10-Year Capital Highway Investment Plan (CHIP) were identified

• Programmed or planned segments have already been identified as a high priority

• Programmed or planned segments received the highest score
Evaluation Criteria – System Preservation

Maintenance Issues

• District 4 staff identified maintenance issues:
  • Steep slopes
  • Narrow shoulders
  • Loose shoulder material
  • Shoulders prone to erosion

• Shoulders improve lateral support and drainage for pavement

• Segments with identified maintenance issues received the highest score
Environmental Impacts

• Environmental data was mapped:
  • Wetland data
  • Potentially contaminated sites
  • Biodiversity significant sites
  • Wildlife Management Areas (WMA)

• Environmentally sensitive areas that are within 100 feet of the roadway centerline were assumed to be potentially impacted

• To minimize risk, segments with the lowest number of environmentally sensitive areas received the highest score
Evaluation Criteria – Constructability

**Obstacles and Obstructions**

- Bridges, culverts, and buildings were mapped
- The density of bridges, culverts, and buildings within 75 feet of the roadway centerline were calculated for each study segment
- Segments with the **lowest density of obstacles and obstructions** are assumed to have the least risk and received the **highest score**

**Right of Way**

- Locations where **right of way acquisition is not expected** received the **highest score**
Shoulder Design

- Segments with shoulders that **meet current design standards** received the **highest score**

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**Table 4-4.01C (English)**

<table>
<thead>
<tr>
<th>Shoulder Type</th>
<th>Design Speed (mph)</th>
<th>Width (ft)</th>
<th>Surface Type</th>
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<tbody>
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<tr>
<td></td>
<td>50-149</td>
<td>3.0</td>
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</tr>
<tr>
<td>RURAL</td>
<td>150-299</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;300</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
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<td>PRINCIPAL</td>
<td>ALL NA NA</td>
<td>Bituminous Concrete, Aggregate or Combination</td>
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<tr>
<td></td>
<td>MINOR</td>
<td>ALL NA NA</td>
<td></td>
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<tr>
<td></td>
<td>WITHOUT PARKING</td>
<td>LOW 3.0</td>
<td>6.0 PAVED</td>
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<td>WITH PARKING</td>
<td>HIGH 4.0</td>
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<td></td>
<td>URBAN CROSS SECTION</td>
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<tr>
<td></td>
<td>HIGH</td>
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</tbody>
</table>

*6.0 ft per AASHTO guidelines for minimum width.

Surfaced: minimum of 1.5 ft paved with bituminous or concrete pavement.
Access Density

• Access density was obtained from MnDOT’s District 4 Safety Plan

• Segments with the highest access density received the highest score

Gaps in Existing Shoulder

• Segments with existing gaps in shoulder width were identified

• To address gaps in the system, segments with an existing gap in shoulder width received the highest score
• BCA provides an indication of the economic desirability of a project

• Primary factors include:
  • Crash reduction costs
  • Travel time savings costs
  • Initial construction costs
  • Remaining capital value

• Decision makers must weigh the results against other considerations, effects, and impacts of the project
Prioritization of Corridors

Figure 1

Ranking based on Project Need
- Tier 1 (1 - 20)
- Tier 2 (21 - 40)
- Tier 3 (41 - 60)

Ranking based on Project Delivery
- Tier A (1 - 30)
- Tier B (31 - 60)
- Tier C (61 - 104)

Project Benefit-Cost Ratio
- X.X Benefit Cost Ratio

Legend:
- Tier 1 (1 - 20)
- Tier 4 (61 - 80)
- Tier 5 (81 - 104)

Miles

Map of prioritized corridors with color-coding for different tiers and project delivery rankings.
District 8 Shoulder Widening Process

• Goals:
  • Improved Safety
  • Corridor Consistency
  • Improved Multimodal Connections (non-motorized, freight, agricultural equipment, transit, etc.)
  • Improve Maintenance Operations/Issues
  • Efficient Timing (optimal time to add shoulders is with a reclamation project)
  • Minimize Environmental Impacts
  • Others?
• What other goals should be considered for District 8’s shoulder widening prioritization?

• Go to www.menti.com to vote

• Use the code 58700
D8 Data Collected for Prioritization Criteria

- Crash Data (plus run off road crashes and segment crashes)
- Traffic Volumes (AADT & HCAADT)
- Pavement Condition (RQI)
- Existing Edge or Center Line Rumbles
- Existing Shoulder Width & Type
- Shoulder Consistency along Corridor
- Estimated Inslope Steepness
- Other Roadway Geometric Changes or Infrastructure Work Needed
- District Bike Plan Route
Data Yet to Collect

• Future Predicted Crashes
• Future Level of Service
• Identify Heavy Agricultural or Recreational Use Routes
• Identify Unique Travel Corridors
• Identify Maintenance Issues
• Identify Environmental Impacts
• Other Data to Collect?
D8 Shoulder Widening Prioritization Process Questions

• What other data should D8 include in the shoulder widening prioritization process?

• What topic areas are most important regarding shoulder widening prioritization?

• www.menti.com code 58700
Thank you!

Lindsey Bruer

lindsey.bruer@state.mn.us

320-214-6333