Project Prioritization for Urban and Rural Projects

SRF

2018 TEAM CONFERENCE

March 7, 2018

Challenge

Limited funding for transportation improvements requires strategic selection of projects to ensure resource allocation is optimized.

GOVERNING

THE STATES AND LOCALITIES

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INFRASTRUCTURE & ENVIRONMENT

Trump Infrastructure Plan Wants to Stop 'Overreliance' on Federal Money

The president's long-awaited infrastructure plan pushes state and local governments to spend more but offers them a smoother path to getting federal regulatory approval.

BY DANIEL C. VOCK | FEBRUARY 11, 2018

www.governing.com

THE HILL

Turning an infrastructure plan into a reality

BY RICK CAPKA, OPINION CONTRIBUTOR — 02/15/18 05:00 PM EST
THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

10 COMMENTS

13 SHARES

SHARE TWEET PLUS ONE

Just In...

VA watchdog preparing report on Shulkin misuse of security detail: report
ADMINISTRATION — 18M 35S AGO

Asset manager tells clients how to remove gun stocks from stock portfolios: report
BLOG BRIEFING ROOM

Solution

Develop project prioritization and implementation planning criteria to inform transportation investment decision-makers.

Project Prioritization

Approach

- ✓ Identify Goals & Performance Measures
- ✓ Conduct Data Collection
- ✓ Develop Evaluation & Prioritization Criteria
- ✓ Conduct Scenario Planning & Evaluation
- ✓ Prepare Recommendations & Implementation Plan

Strategies

- ✓ Quantitative Measures
- ✓ Qualitative Measures
- ✓ Benefit-Cost or Monetization
- ✓ BIG Data & Travel Time Reliability
- ✓ Stakeholder Input

Examples

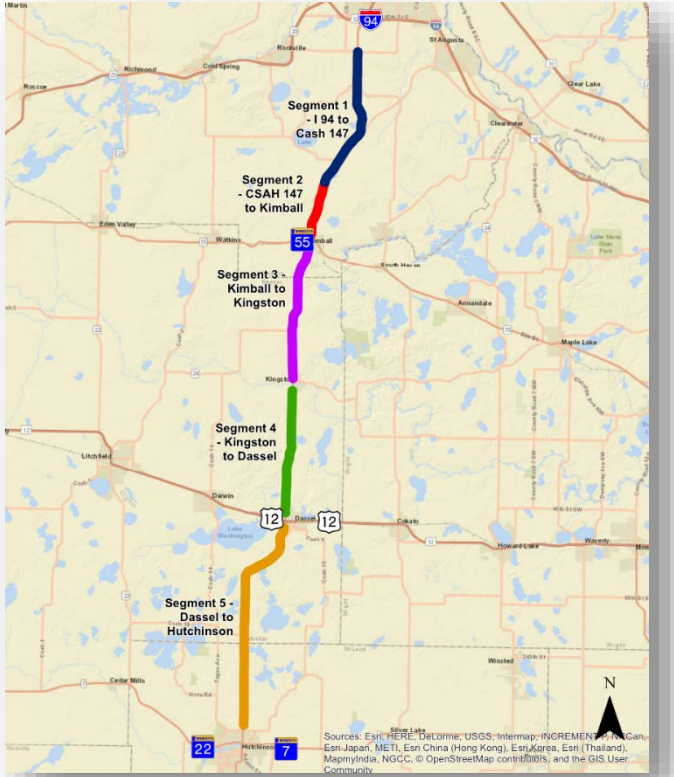
Rural and urban case studies demonstrating project prioritization.

TH 15 Passing Lane Assessment

Hutchinson, Minnesota

Recommend and prioritize locations for passing lanes along TH 15 based on:

- ✓ Need for improved safety and mobility
- ✓ Minimal ROW needs
- ✓ Low risk for drainage/wetland and environmental impacts
- ✓ Low risk for other project delivery issues



Data Collection

Traffic Characteristics:

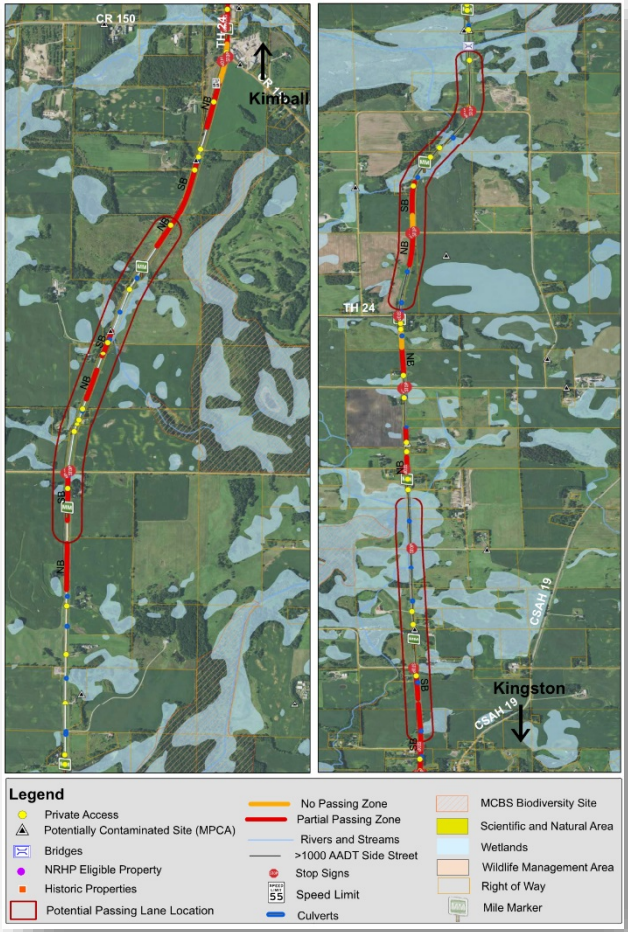
- 2017 daily traffic = 4,600 AADT
- 2045 daily traffic projection = 7,000
- Existing heavy trucks = 9%

Existing No Passing Zones:

- Northbound = 25%
- Southbound = 21%

Passing Lanes Considered:

- 3-lane passing lane heading south from Kimball
- 3-lane passing lane heading north from Kingston
- 4-lane passing lane (north of TH 24)



TH 15 Passing Lane Assessment

Prioritization Approach

1. Ranked based on mobility, safety, and economic criteria (i.e. Benefit-Cost).
2. Considered regional traffic and spacing of passing lanes.
3. Potential risks identified.

	I-94	Segment 1 < 10 miles >		CSAH 147	Segment 2 < 3 miles > Kimball		Segment 3 < 8 miles >	Kingston	Segment 4 < 8 miles >	Dassel	Segment 5 < 13 miles >	Hutchinson
	4-Lane (North of CSAH 142)	4-Lane (South of CSAH 142)	3-Lane Northbound (South of CSAH 147)	3-Lane Southbound	4-Lane	3-Lane Northbound	3-Lane Southbound	3-Lane Northbound	3-Lane Southbound	4-Lane	3-Lane Northbound
Background Data												
2017 Traffic (AADT)	6,600		6,800	4,600			3,900		4,800			
2045 Daily Traffic Projection	10,000		10,300	7,000			5,900		7,300			
Existing % of Heavy Trucks	8%		8%	9%			8%		10%			
Existing % of No Passing Zones	12% NB - 10% SB		21% NB - 34% SB	25% NB - 21% SB			30% NB - 28% SB		16% NB - 17% SB			
Segment Crash Rate (2006-2015)	0.33		0.39	0.34			0.42		0.29			
Segment Severity Rate (2006-2015)	0.54		0.71	0.57			0.66		0.43			
Benefit-Cost Anlaysis												
Benefit-Cost Ratio for Southbound Passing Lanes	2.27			0.89	1.24		1.05		0.67	0.89		
Rank	1			4	2		3		6	5		
Benefit-Cost Ratio for Northbound Passing Lanes	2.27		4.32		1.24	1.28		1.35		0.89	0.53	
Rank	2		1		5	4		3		6	7	
Southbound Passing Lanes (Sensitivity)	1.53			0.54	1.04		0.67		0.67	0.89		
Rank	1			6	2		4		4	3		
Northbound Passing Lanes (Sensitivity)	1.53		1.73		1.04	0.94		0.97		0.89	0.53	
Rank	2		1		3	5		4		6	7	
Potential Impacts/Risks												
Number of Access points in Passing Lane	4	6	8	8	5	5	3	3	2	6	4	
Number of Impacted Bridges	0	0	0	0	0	0	0	0	0	0	0	
Number of Impacted Culverts	10	14	11	6	4	5	6	8	5	3	2	
Number of Impacted Potentially Contaminated Sites (MPCA)	1	2	2	1	0	1	0	0	0	0	1	
Potential Wetland Impacts (Acres)	0.13	0	0	0	0.7	0	0	0.3	0.2	0.09	0	
Risk of Impact to MCBS Biodiversity Sites	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	
Risk of Impact to Scientific and Natural Areas	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	
Risk of Impact to Wildlife Areas	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	

Segment Prioritization

Priority #1 – Segments 1/2

- 3-lane passing lane heading north from Kimball
- 3-lane passing lane heading south from I-94

Priority #2 – Segment 3

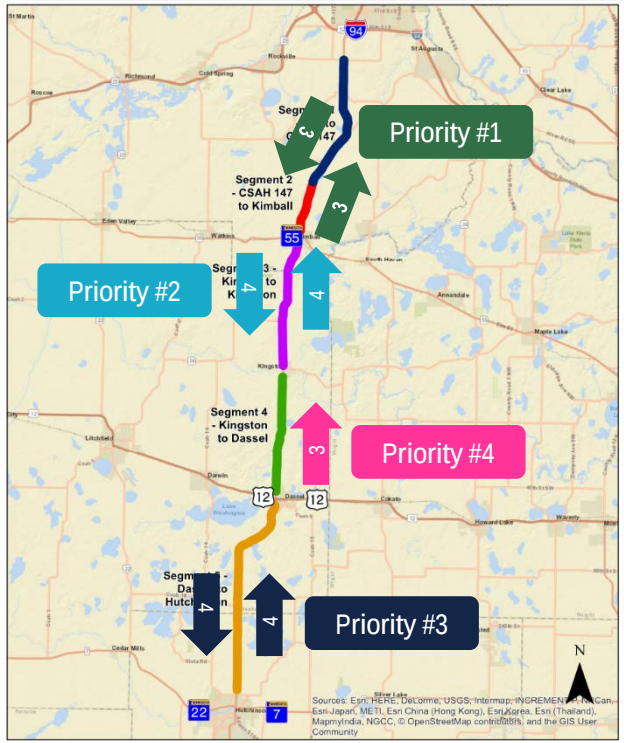
- 4-lane passing lane (north of TH 24)

Priority #3 – Segment 5

- 4-lane passing lane mid-segment

Priority #4 – Segment 4

- 3-lane passing lane heading north from Dassel

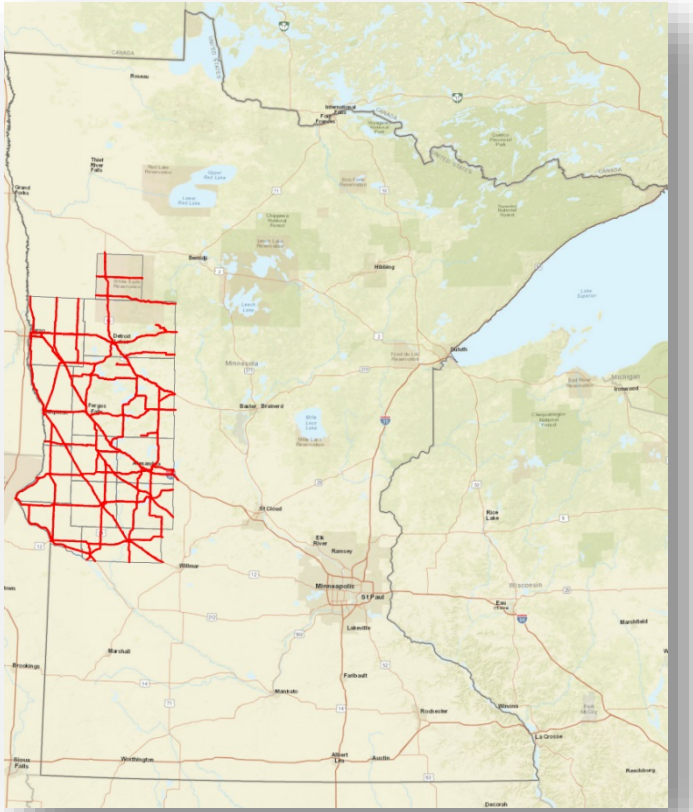


D4 Shoulder Widening Prioritization

Detroit Lakes, Minnesota

Prioritize locations for widening shoulders of roadway segments that are not currently built to MnDOT Standards.

Includes all two-lane two-way State roadways within District 4 with shoulder widths less than six feet.



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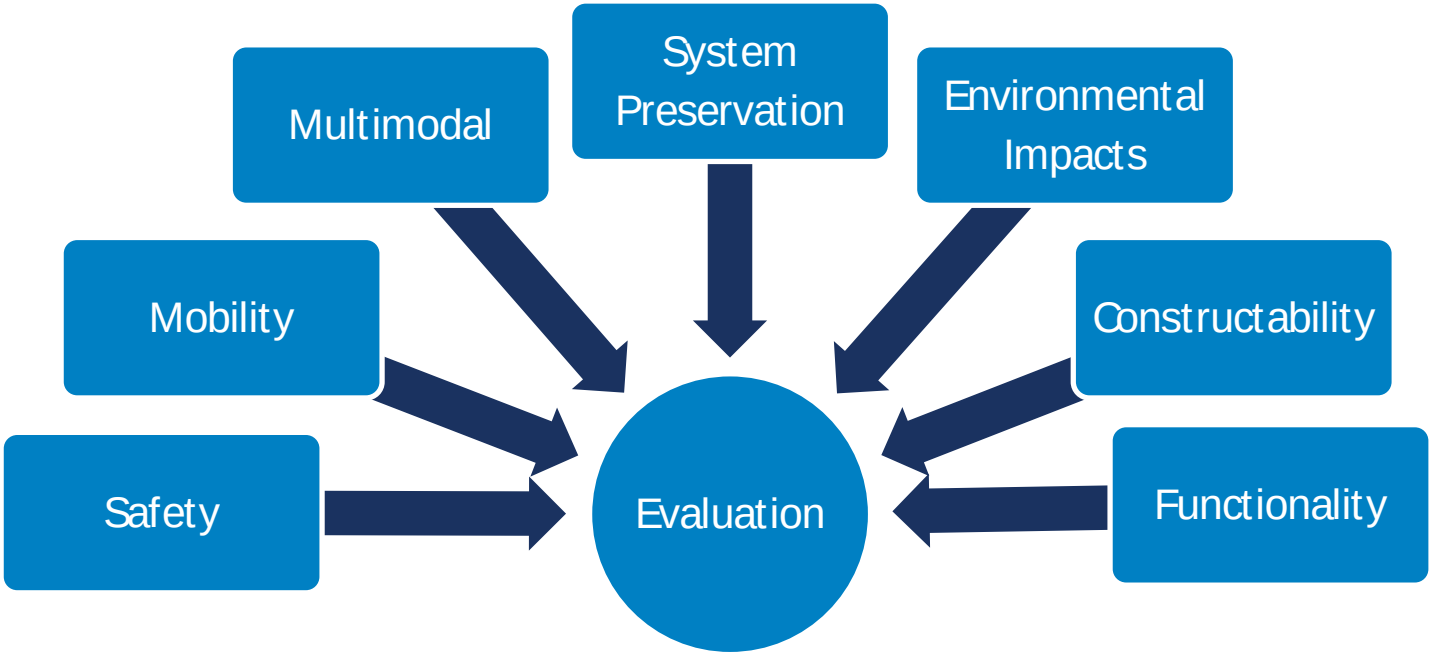
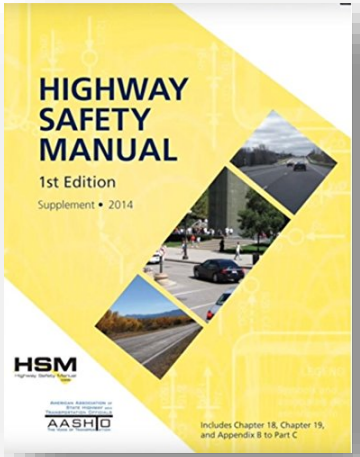
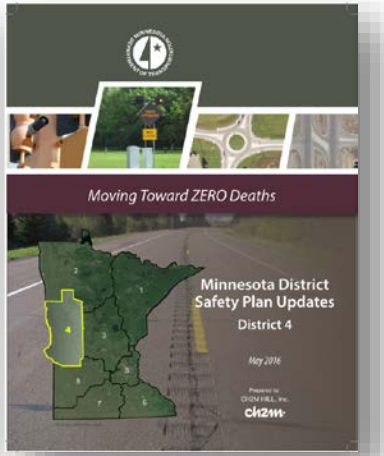
Evaluation Criteria



Evaluation Criteria – Safety





Crash Rates

- Existing crash rates and critical crash rates were calculated.
- 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.
- High Priority Segments with the largest number of risk factors scored the highest

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.

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.

Heavy Commercial Route

- Heavy commercial percentages were calculated. Shoulders provide an area for emergency parking and improve lateral separation for vehicles.

Agricultural or Recreational Route

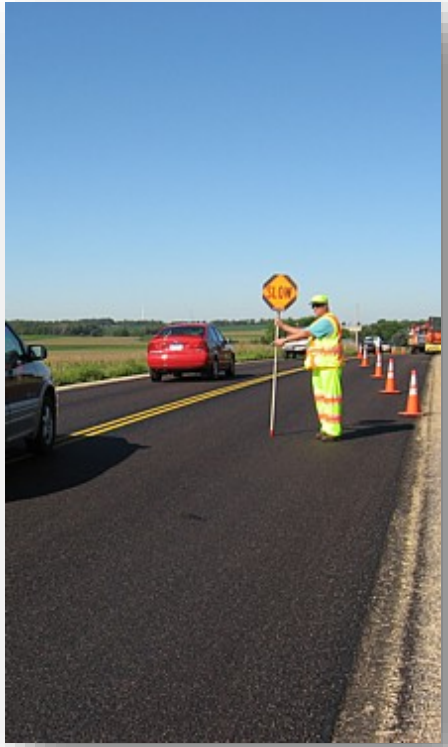
- District 4 staff identified corridors with heavy agricultural or recreational use.

D4 Shoulder Widening Prioritization

Evaluation Criteria – System Preservation

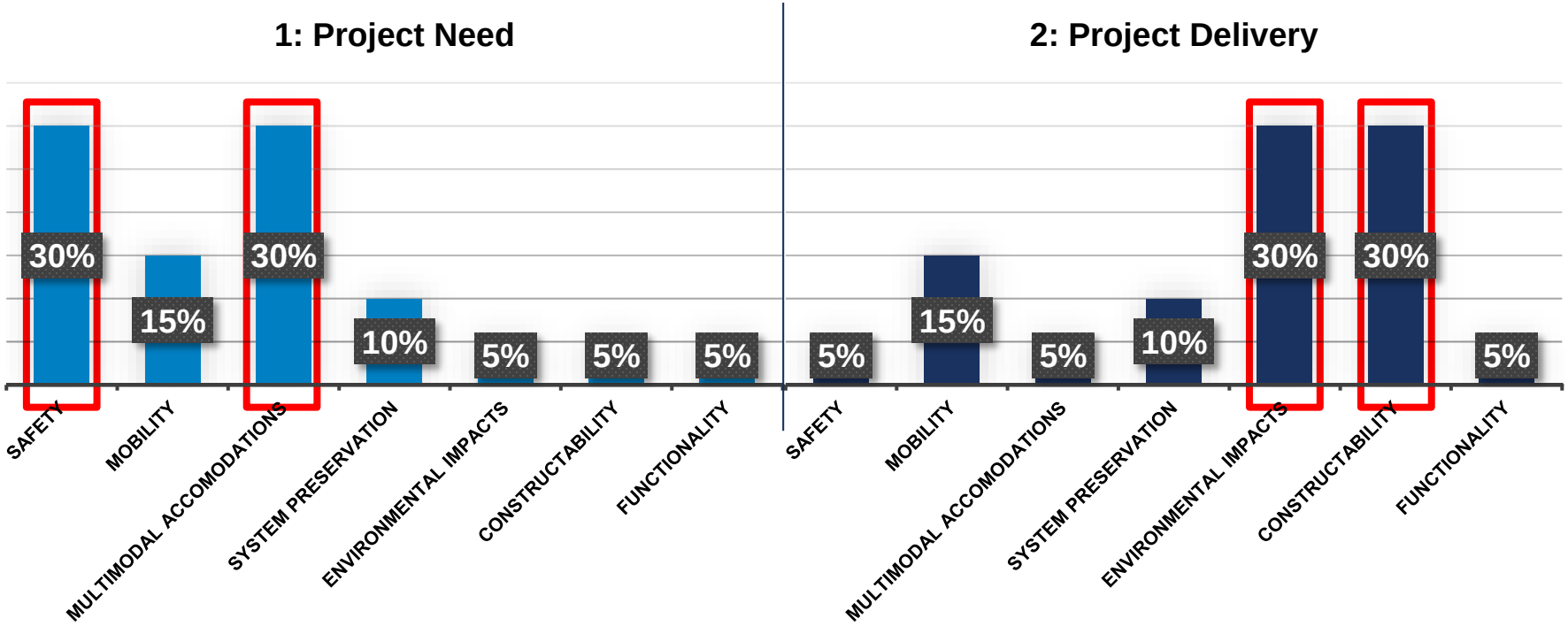
Maintenance Issues

- District 4 staff identified maintenance issues:
  - Steep slopes
  - Narrow shoulders
  - Loose shoulder material
  - Shoulders prone to erosion
- Segments with identified **maintenance issues** received the **highest score.**



D4 Shoulder Widening Prioritization

Prioritization Scenario Evaluation



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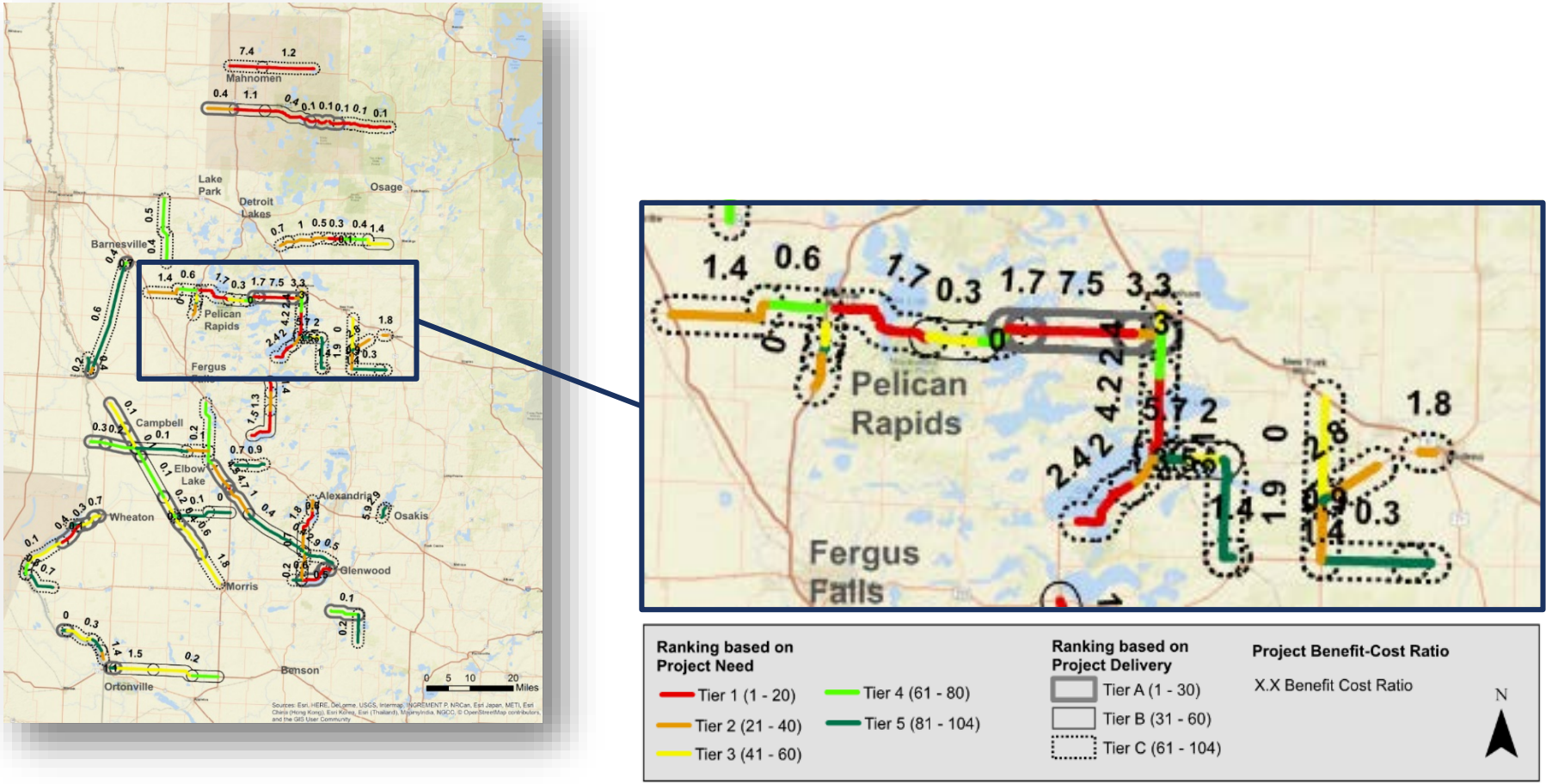
3: Benefit-Cost Analysis

D4 Shoulder Widening Prioritization



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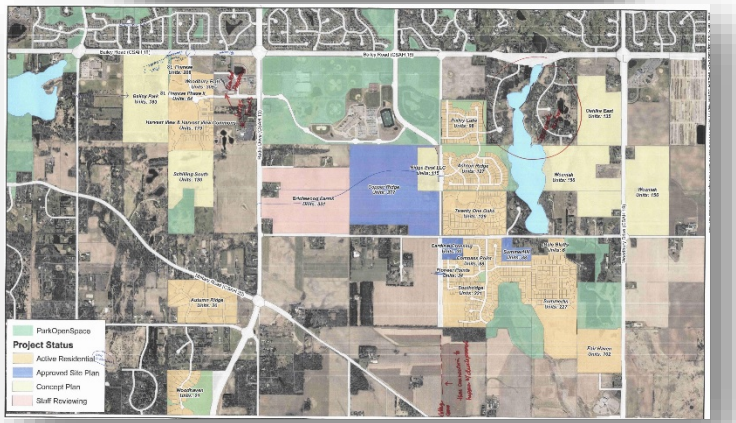
D4 Shoulder Widening Prioritization

Bailey Road Corridor Management

Wash. Co., Minnesota

Develop a vision for an east-west arterial roadway design.

Develop implementation plan to address existing issues and accommodate future development needs.

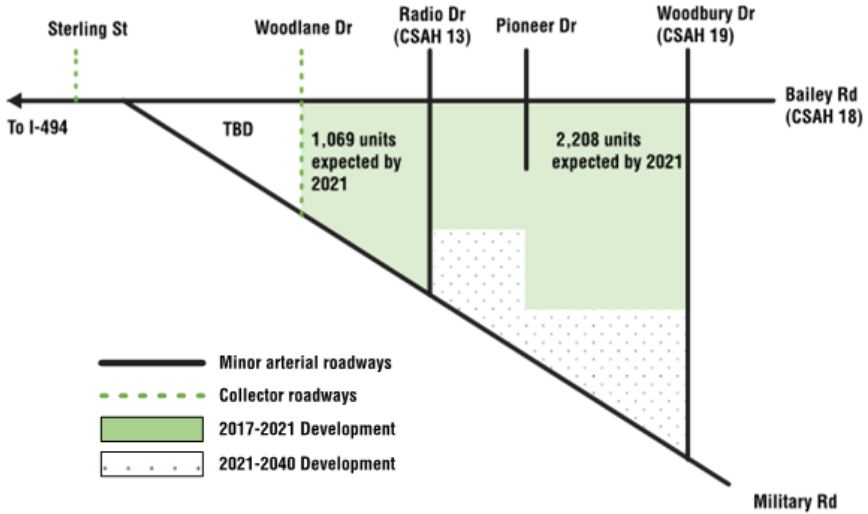


Bailey Road Corridor

About the Bailey Road Corridor

- Primary connection to I-494 and US 10/61
- Access to businesses, schools, churches, healthcare, and residential properties
- Used by pedestrians and bicyclists
- Delays, access issues, and safety concerns with existing traffic
- More than 3000 new housing units anticipated by 2021 will directly increase traffic (see map)

Map of Planned Development of Housing Units Near Bailey Road



Corridor Priorities

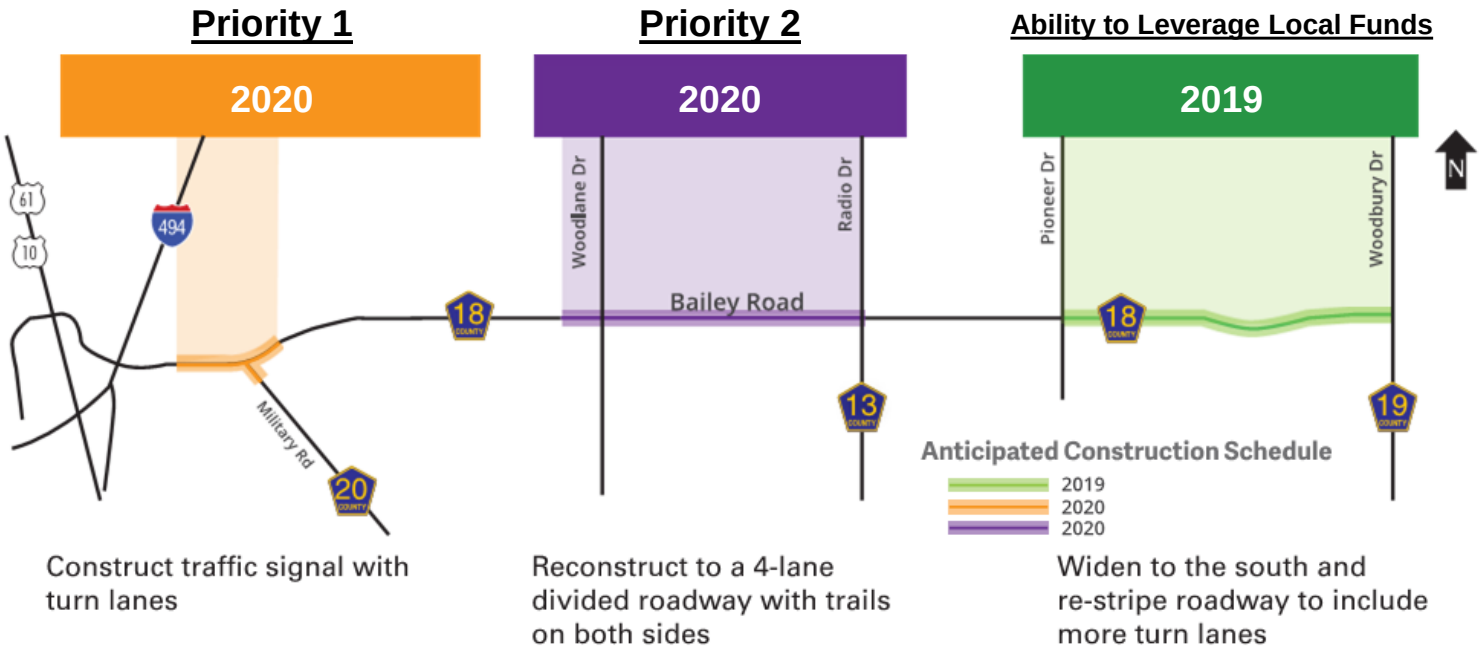
COMMON THEMES NOTED DURING NEIGHBORHOOD MEETINGS HELD IN JUNE 2017

		NEIGHBORHOOD GROUP			
Current Need:	**Details:**	**Group 1**	**Group 2**	**Group 3**	**Group 4**
Lack of sidewalks/trails	Difficult to get around on foot or bike with lack of sidewalks/trails	✓		✓	✓
Difficulty making left turns	Challenging to find gaps in traffic to make left turns onto Bailey, but also making lefts from Bailey; some cars passing illegally on shoulder	✓	✓	✓	✓
Traffic congestion/delays	Some drivers experience delays and traffic backups	✓		✓	
Military/Bailey intersection needs attention	Stop signs cause significant backups during rush hour; poor lines of sight	✓	✓	✓	✓
Speeding	Some people are driving in excess of speed limit	✓			✓
Posted speed	Some concerned that posted speed is too high, while others like the mobility it provides		✓	✓	✓
Traffic noise	Large trucks generate loud noises and cause vibrations	✓	✓	✓	✓
Future Concern:	**Details:**	**Group 1**	**Group 2**	**Group 3**	**Group 4**
Pedestrian crossings	Need more opportunity to cross Bailey Road safely	✓	✓	✓	✓
Impacts of wider roadway	Addition of lanes and trails may have impacts to private property	✓	✓	✓	
Development/growth	Continued growth and development will continue to strain Bailey Road and limit mobility if nothing is done			✓	✓
Speed	Wider roadway may generate higher traffic speed		✓	✓	✓
Increased traffic noise	Noise may increase with more traffic	✓	✓		✓

Prioritization Process

Objectives	Evaluation Criteria	Measures	Prioritization
Safety	Crash History	Crash Rate or Correctable Crashes	20%
	Predicted Crashes based on Highway Safety Manual	Number of Crashes or Crash Modification Factor	
Mobility	Future Traffic Growth	Growth Percentage from existing to 2040 AADT	20%
	2025 No Build Corridor Operations	LOS	
	Improvement to Side-Street Delay	Reduction in Number of Intersections with Side-Street LOS E/F in AM or PM peak hours	
Capacity	Reserve Capacity in 2025	No Build Volume/Capacity	20%
Multimodal Accommodations	Pedestrian Network Connectivity	Reduction in Number of Gaps in Pedestrian Network	20%
	Additional Pedestrian Crossings	Number of Additional Crossings of Bailey Rd	
	Improved Pedestrian Crossings	Delay of Pedestrians at Crossings	
		Safety of Pedestrian Crossings	
Development	Timing of Development	Year of Construction	20%
	Intensity of Development	Number of Units	

Corridor Vision & Implementation Plan

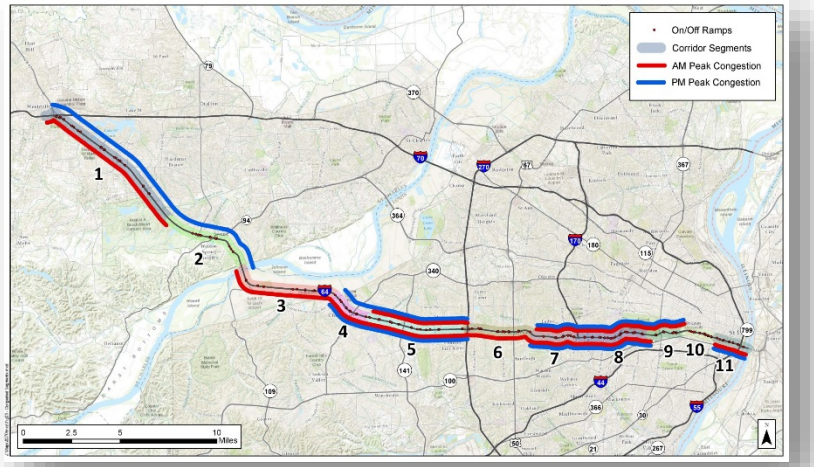


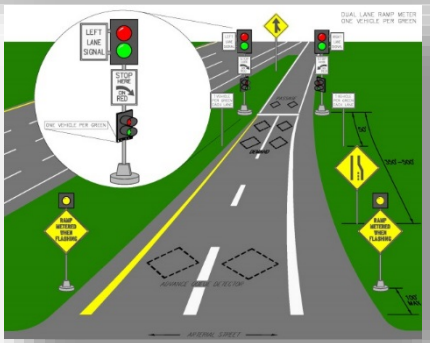
I-64 Ramp Metering Feasibility Study

St. Louis, Missouri

Prioritize locations for the potential installation of ramp metering.

Strategically select locations where benefit is realized without major impacts.





Why Ramp Metering?

1. Capacity improvement opportunities limited to non-existent in certain sections of I-64.
2. History has shown increasing capacity not always the best answer for congestion problems.
3. Ramp Metering systems have a long track record of being a cost-effective success nationwide.

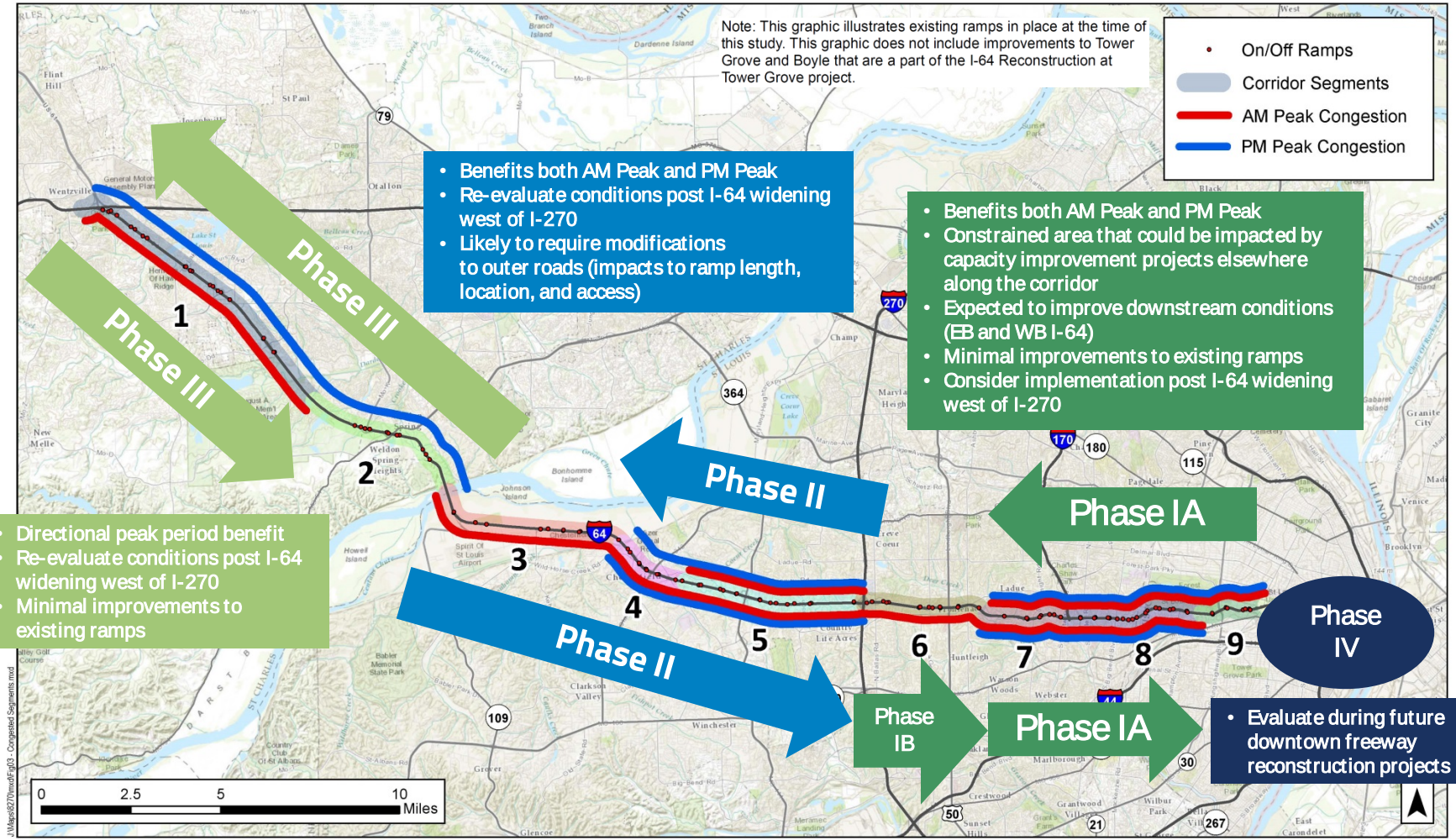
Prioritization Criteria

1. **The severity of congestion and or crash hazard caused by the bottlenecks or interchange merging's. The key element here is this should match driver's perception that a significant problem exists.**
2. The degree that a particular metering strategy can resolve the issue from a high-level perspective.
3. **The effect, if any, on downstream corridor segments.**
4. **The ability to coordinate the improvement recommended with existing infrastructure and future maintenance/ construction activities.**
5. The ability of parallel routes to accommodate any potential traffic diversions.
6. The recommendation is consistent with MoDOT's policies, goals and objectives.

Screening Process

1. **The severity of congestion and or crash hazard caused by the bottlenecks or interchange merging's. The key element here is this should match driver's perception that a significant problem exists.**
2. The degree that a particular metering strategy can resolve the issue from a high-level perspective.
3. The effect, if any, on downstream corridor segments.
4. The ability to coordinate the improvement recommended with existing infrastructure and future maintenance/construction activities.
5. The ability of parallel routes to accommodate any potential traffic diversions.
6. The recommendation is consistent with MoDOT's policies, goals and objectives.

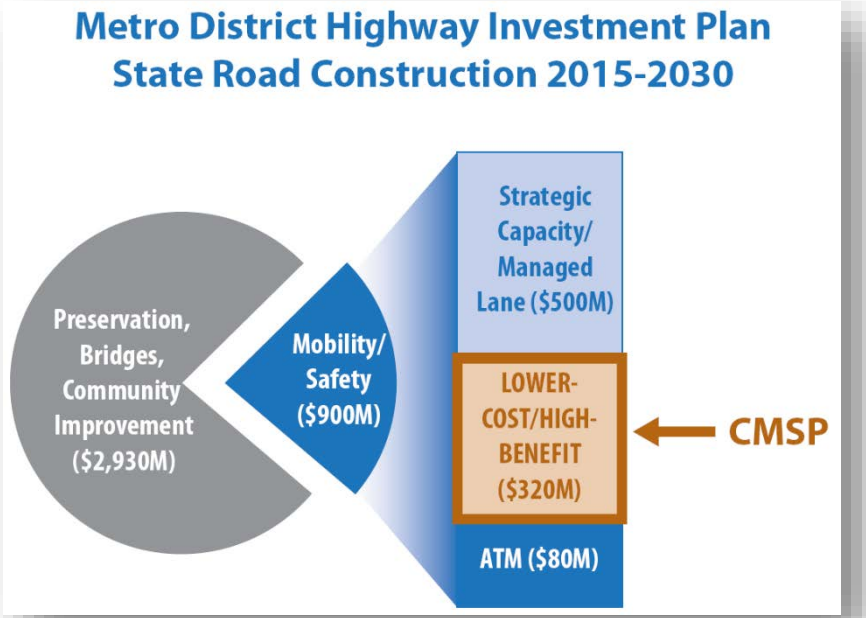
Corridor Component	Screening Criteria
Mainline Congestion	Do two or more lanes operate at volumes over 1,900 vph with speeds less than or equal to 45 mph for 15-minutes a day for 100 work days per year? or
Corridor Speeds Density/ LOS	Does the freeway segment operate with a speed less than 45 mph for 15-minutes a day during a typical traffic day? or Does the freeway segment operate with a density greater than or equal to 28 vpmpl for 15-minutes a day during a typical traffic day?
Right Lane + Ramp Congestion	Does the right-lane volume plus the ramp volume exceed 1,900 vph with densities of 35-40 pcphpl for 15-minutes a day for 100 work days per year?
Ramp Volume	Do ramp volumes fall within 300 to 900 vph (practical limits for ramp metering) for single-lane ramps? Or, do ramp volumes fall within 300 to 1,800 vph for dual-lane ramps?
Total Volume	Is the ramp volume plus mainline volume greater than 1,500 vphpl? or Is the ramp volume plus mainline volume greater than the following? • Two mainline lanes in one direction – 2,650 vph • Three mainline lanes in one direction – 4,250 vph • Four mainline lanes in one direction – 5,850 vph • Five mainline lanes in one direction – 7,450 vph • Six mainline lanes in one direction – 9,050 vph
Crashes Crash History	Is there a higher than average number of crashes associated with the traffic flows indicated above? More specifically, high instances of side-swipe, rear-end, and run-off-road crashes?
Metering Effectiveness	Will a ramp meter or a system of ramp meters contribute to the maintenance of a specific Level of Service (LOS)?
Ramp Spacing	Is there a high number and density of on-ramps (interchange spacing <1 mile or an interchange complex) that impact merging and weaving?


Note: This graphic illustrates existing ramps in place at the time of this study. This graphic does not include improvements to Tower Grove and Boyle that are a part of the I-64 Reconstruction at Tower Grove project.
On/Off Ramps
Corridor Segments
AM Peak Congestion
PM Peak Congestion
Phase III
Phase III
Benefits both AM Peak and PM Peak
Re-evaluate conditions post I-64 widening west of I-270
Likely to require modifications to outer roads (impacts to ramp length, location, and access)
Benefits both AM Peak and PM Peak
Constrained area that could be impacted by capacity improvement projects elsewhere along the corridor
Expected to improve downstream conditions (EB and WB I-64)
Minimal improvements to existing ramps
Consider implementation post I-64 widening west of I-270
Phase II
Phase IA
Directional peak period benefit
Re-evaluate conditions post I-64 widening west of I-270
Minimal improvements to existing ramps
Phase II
Phase IB
Phase IA
Phase IV
Evaluate during future downtown freeway reconstruction projects
1
2
3
4
5
6
7
8
9
0 2.5 5 10 Miles

Congestion Management Safety Plan 4

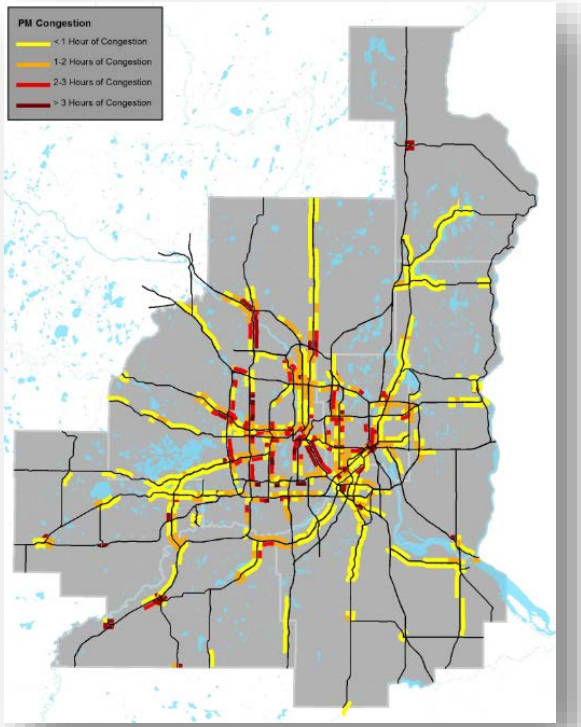
Twin Cities, Minnesota

Strategically develop lower-cost/high-benefit solutions targeting high-priority problem locations.



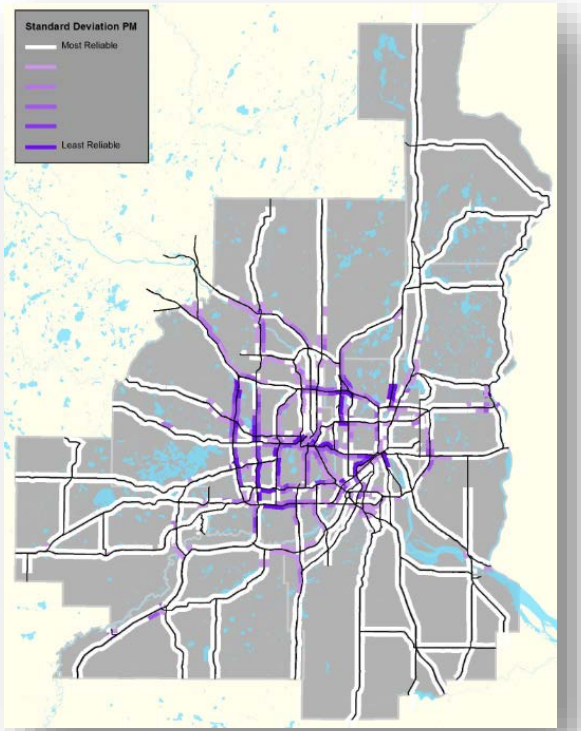
Performance Measures – Recurring Congestion

- Loop detector and INRIX speed data
- Data obtained from MnDOT 2015 Congestion Report
- Segments mapped to MnDOT highway line layer
- Analyze data in coordination with other measures



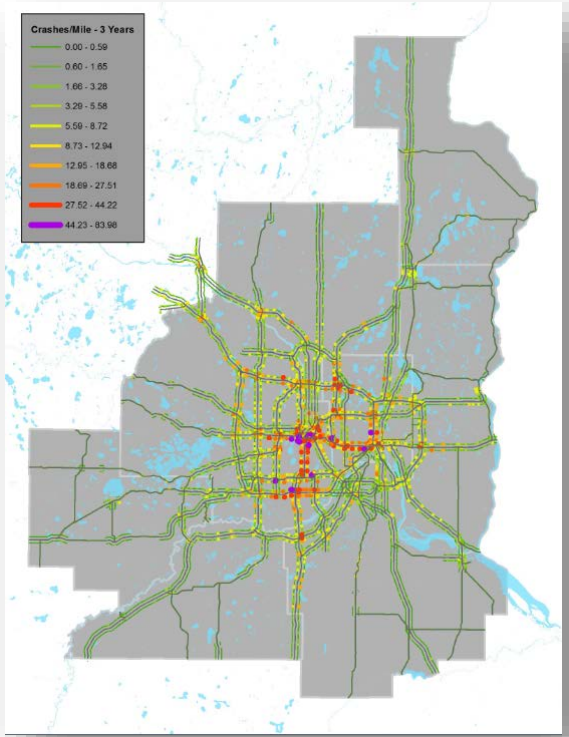
Performance Measures – Travel Time Reliability

- One year of travel time data (full year 2015)
- Includes all conditions
  - Weather
  - Crashes
  - Road Work
- Standard deviation of travel time distribution



Performance Measures – Crash Density

- 3 years of crash records (Jul 2012- Jun 2015)
- Individual crashes assigned by highway milepost and direction
- Densities show high crash concentrations

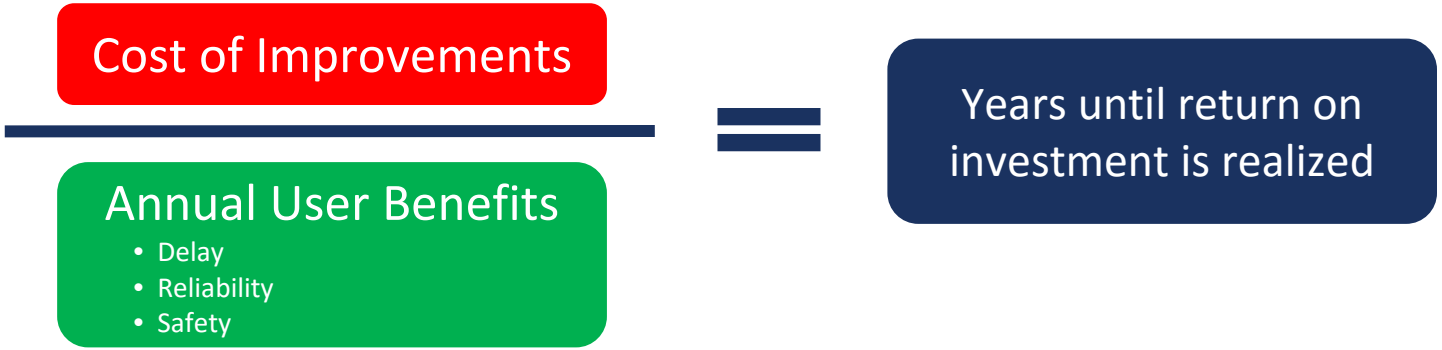


Monetization of Performance Measures

Congestion Cost	Reliability Cost	Crash Cost
• Vehicle speeds • Traffic volume • Influence distance • Congestion duration • **Value of time**	• Travel time standard deviation • Traffic volume • Influence distance • **Value of reliability**	• Number of crashes by severity • **Crash cost by severity**

Prioritization Criteria

Methodology: **Project Return Period**

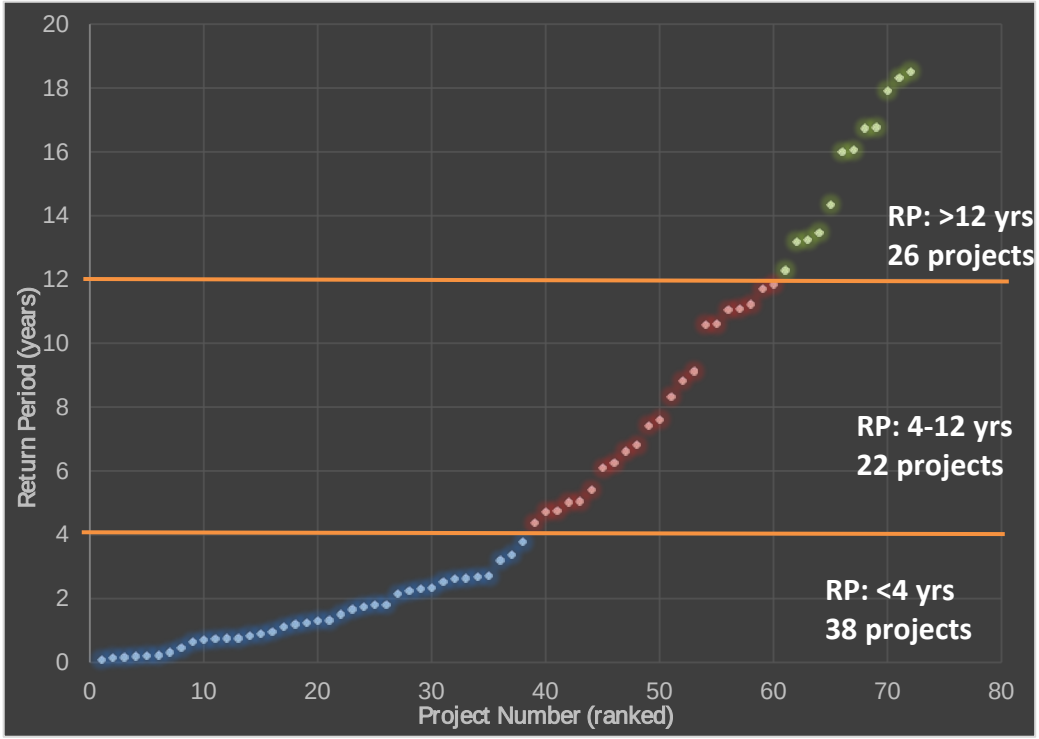


CMSP Opportunities

Return period – years until return in investment is realized (user cost savings equates to project cost).

Recommended spot mobility locations:

- 50 locations with desirable return period
- Locations carried forward to Transportation Policy Plan



Key Takeaways

Lessons learned.

What you should remember…

- Prioritization of projects allows for efficient use of transportation investment dollars.
- Tailor approach/methodology to scope of project/need.
- Leverage existing data sources to the extent possible.
- Leverage planned and programmed projects to the extent possible.
- Understand local priorities.
- Reach out to ALL stakeholders (i.e. other agency departments, public, businesses).
- Include scenario planning and evaluation to build consensus.
- Use best practices and innovation with evaluation measures.
- Be open minded and flexible!

Thank You!

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