INTERSTATE OPERATIONS STUDY & PLAN FOR FUTURE IMPROVEMENTS

EXECUTIVE SUMMARY | JULY 2023

METROCOG

FARGO-MOORHEAD METROPOLITAN COUNCIL OF GOVERNMENTS

Introduction

Fargo Moorhead Metro COG and its partner agencies have conducted the Interstate Operations Study and Plan for Future Improvements as a high-level study to identify prioritized improvements to improve safety, traffic operations, and mobility for the Interstate system within the Fargo-Moorhead Metro Area. The project study area is shown in the figure on the right and is defined by the following limits:

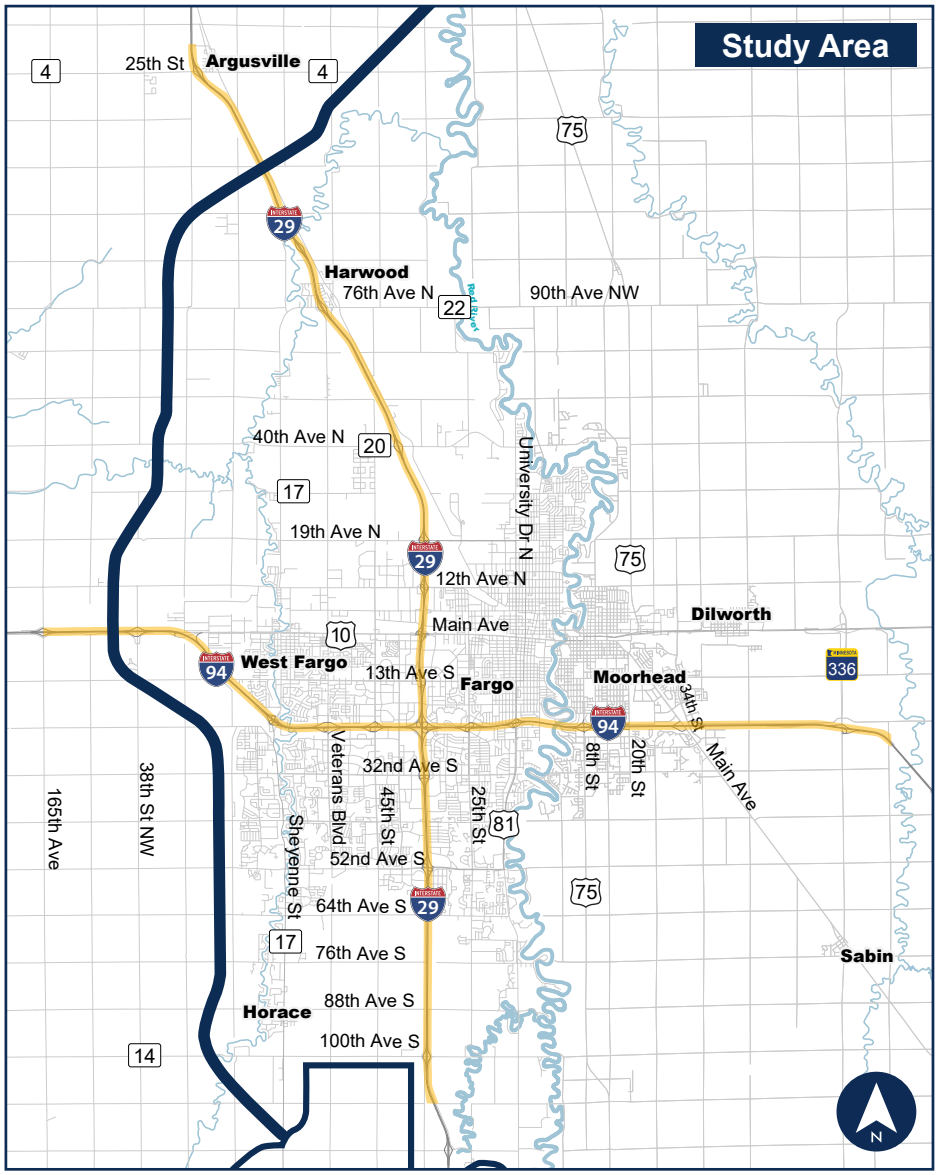
INTERSTATE 94

- **West Limit:** 165th Avenue / Cass County 15
- **East Limit:** Minnesota 336

INTERSTATE 29

- **North Limit:** Cass County 4 (Argusville)
- **South Limit:** 100th Avenue S / Cass County 14

The study area includes Interstate mainline segment, system ramps, service ramps, rest areas, and ramp terminal intersections along I-29 and I-94.



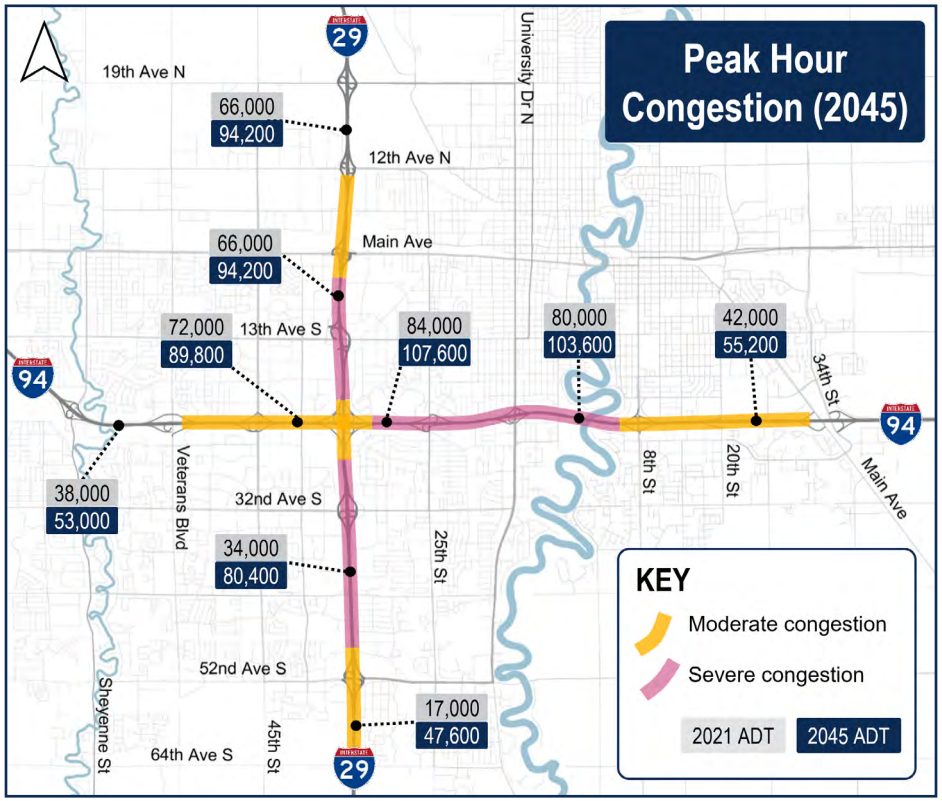
Study Objectives

The objectives and anticipated outcomes for this study include:

- Present a clear menu of recommended improvements aimed at addressing identified deficiencies in operations, safety, reliability, etc.
- Recommend project priorities and staging based on expected increases in traffic volumes combined with planned system preservation projects
- Provide operational and analytical data to assist with later project development phases
- Determine the potential use of a perimeter route around the metro area and identify how such a route affects volumes on the interstate system

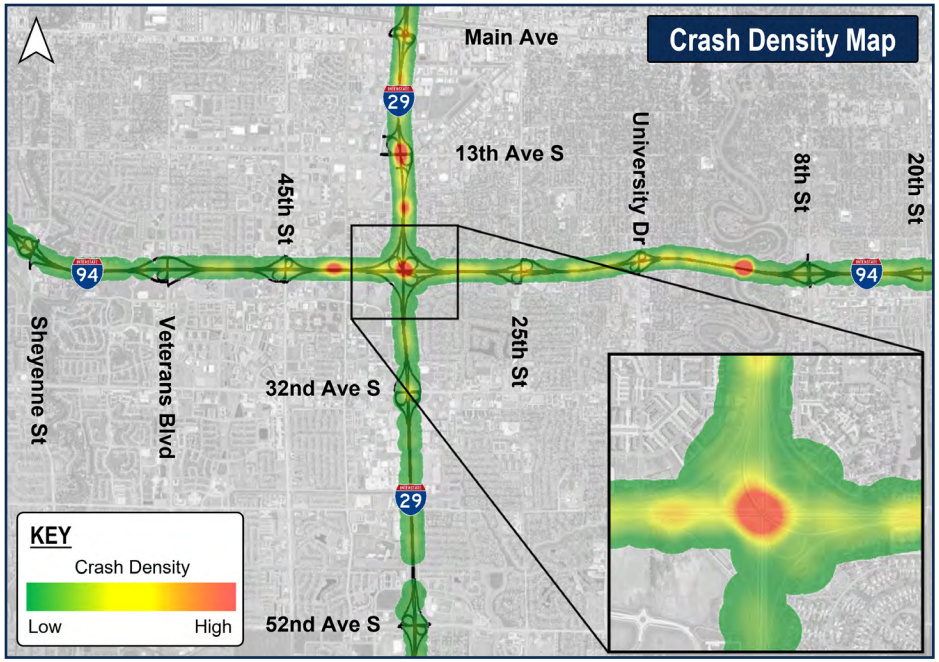
Traffic Operations

Planning-level peak hour capacities were developed for all Interstate segments within the study area. Capacities were compared to peak hour 2045 forecasts to determine areas of moderate and severe congestion, shown in the figure below.



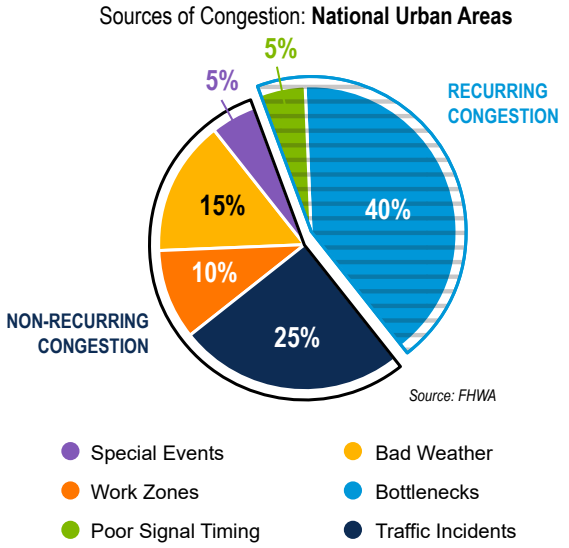
Safety

A safety dashboard was developed to select, sort, and filter crashed by time of day, day of week, month of year, type, and location. The study team also developed a crash density map to identify areas of high crash frequency to investigate.



Recurring vs Non-Recurring Congestion

The Fargo-Moorhead metro area experiences many different kinds of congestion, from bottlenecks to traffic incidents and weather events. FHWA national estimates are shown in the pie chart. Due to the fluctuations in normal traffic and long winter season, the study team estimates the percent recurring congestion in the metro area is **20%–30%**.



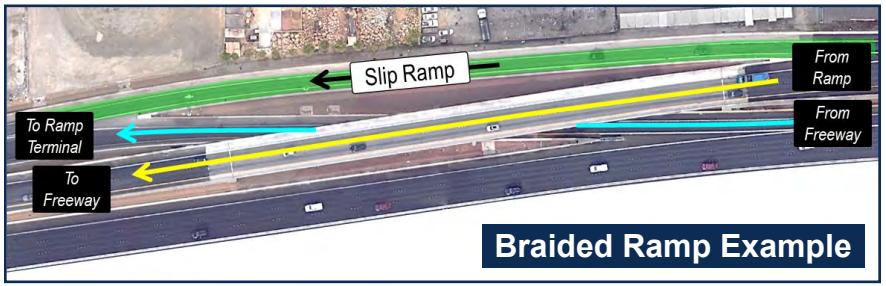
Strategy Development & Analytics

Mainline Geometric Strategies

The study team assessed operational and safety deficiencies along I-29 and I-94 to develop geometric improvement strategies. The study team reviewed the following mainline geometric improvements:

- Traditional Interstate Widening
- Auxiliary Lanes
- Collector-Distributor Roads
- Braided Ramps

As shown in the implementation plan, the study team recommended a combination of traditional widening, auxiliary lanes, and braided ramps at select locations. Braided ramps (shown below) separate the entering and exiting traffic at successive interchanges by shifting one of the movements onto a bridge, eliminating weaving traffic.



Interchange Strategies

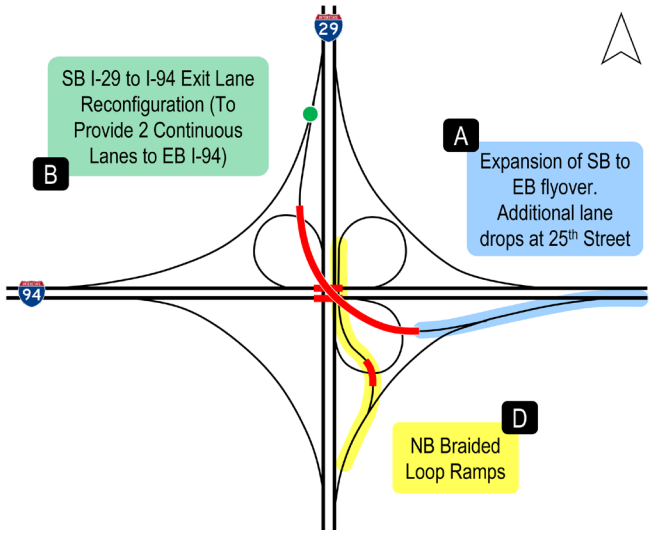
SERVICE INTERCHANGES

The study team assessed operational and safety deficiencies at service and system interchanges within the IOS study area. Each interchange is discussed in detail in the final report. The following strategies were considered:

- Interchange Reconfigurations
- New Interchanges
- Lane Modifications / Ramp Widening
- Signal Timing Improvements
- Bicycle / Pedestrian Enhancements

SYSTEM INTERCHANGE

Traffic volumes around the I-29 / I-94 system interchange are expected to grow significantly by 2045. The study team considered the following strategies at the system interchange to serve future demand.



A. SB I-29 to EB I-94 Expansion (Construction in 2023)

B. SB I-29 to I-94 Exit Lane Reconfiguration

C. NB I-29 to WB I-94 Flyover

D. Braided Loop Ramps

E. Collector-Distributor Roads

F. Dynamic Lane Assignment

Strategies A, B, and D were carried into the implementation plan. Some of these strategies were removed since they would reduce the effective weaving lengths for adjacent Interstate segments. Other strategies, like Dynamic Lane Assignment, should be considered as volumes continue to increase at the system interchange.

TSMO / ITS Improvements

Transportation Systems Management and Operations is an approach to manage and optimize the current transportation systems to improve safety, reduce congestion, and enhance mobility. TSMO typically involves the integration of various transportation technologies, strategies, and services to improve the performance of the transportation system.

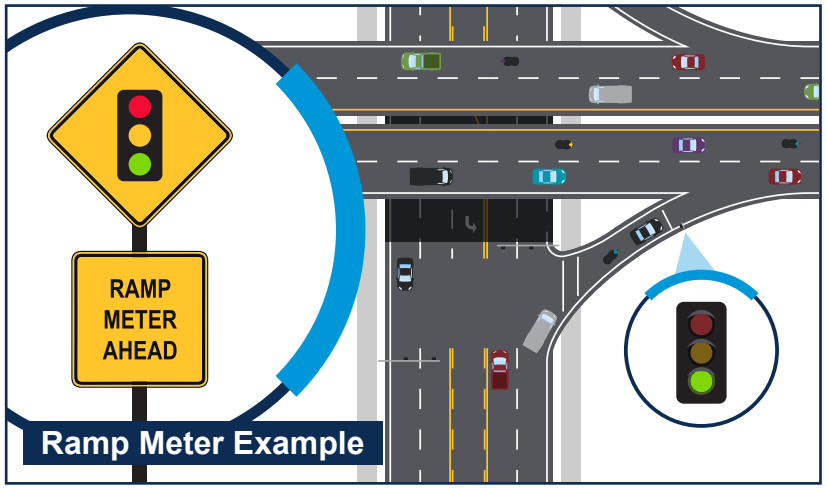
The study team reviewed the following TSMO Strategies to determine their effectiveness within the metro area.

TSMO/ITS IMPROVEMENTS

- Ramp Metering*
- Queue Detection System*
- Hard Shoulder Running
- Anti-Icing Systems
- Variable Speed Limits
- Traveler Information
- Bottleneck Removal
- Network Surveillance
- CAV Infrastructure
- Work Zone Management*
- Traffic Management Center*
- Roadway Service Patrol*
- Traffic Incident Management*

*The study team advanced TSMO strategies that were applicable to the metro area.

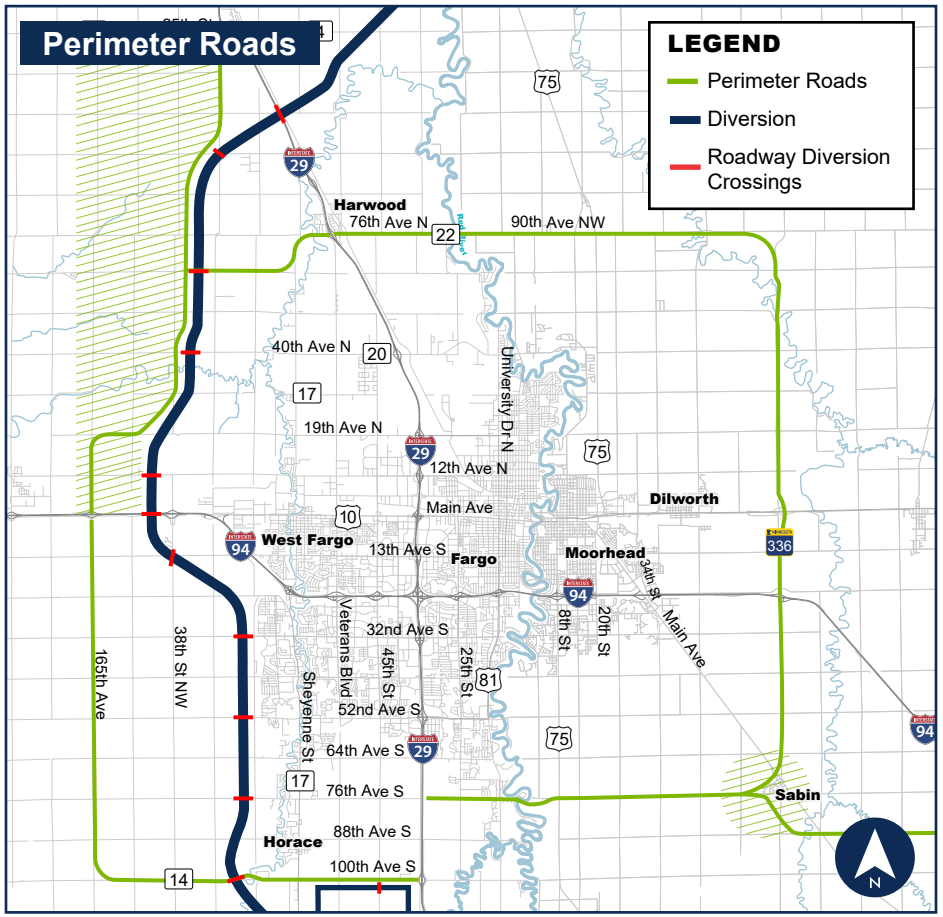
Specifically, the study team investigated safety and reliability of Ramp Metering throughout the core of the metro area. Through a review of the CMF Clearinghouse and case study research, ramp metering may reduce the number of total crashes up to 40% in areas of the Interstate where metering occurs.



Ramp Meter Example

Off-System Improvements – Perimeter Roads

A significant component to a resilient and reliable Interstate system is the non-Interstate system. The study team identified perimeter road alignments and other off-system improvements to act as a relief valve during Interstate slowdowns due to an incident, weather event, peak congestion, or construction.



Metro COG and Cass County are advancing the west perimeter roads though a follow-on study. At a minimum, Right-of-Way should be preserved along perimeter roads and access-control policies should be developed to limit closely spaced accesses on perimeter roads.

Agency & Stakeholder Coordination

Input received from one-on-one, study review committee, focus group, and DOT management team meetings were an integral part of the strategy and implementation plan development.

Study Review Committee Meetings

The study review committee, represented by the following agencies, met during 6 key milestones to gather information and gain feedback.

Focus Groups

Focus groups were established to help inform the study and provide input at key milestones. The following groups met at 3 key study milestones. The first responders focus groups helped recommend and justify Safety and TSMO improvements throughout I-29 & I-94.

- First responders
- Local officials
- Freight industry / MATBUS

DOT Management Meetings

The study team presented the implementation plan to the North Dakota and Minnesota DOT management teams during the development of the final recommendations for the study. Feedback from the management team meetings were incorporated into the implementation plan.

Implementation Plan

The study team used the following guidelines to develop the implementation plan

COMBINING SYSTEM PRESERVATION & EXPANSION PROJECTS

The plan should consider combining system preservation projects with expansion projects where it makes sense. This could be achieved by delaying or by advancing either type of project within any given Interstate segment.

OPERATIONAL & SAFETY CONSIDERATIONS

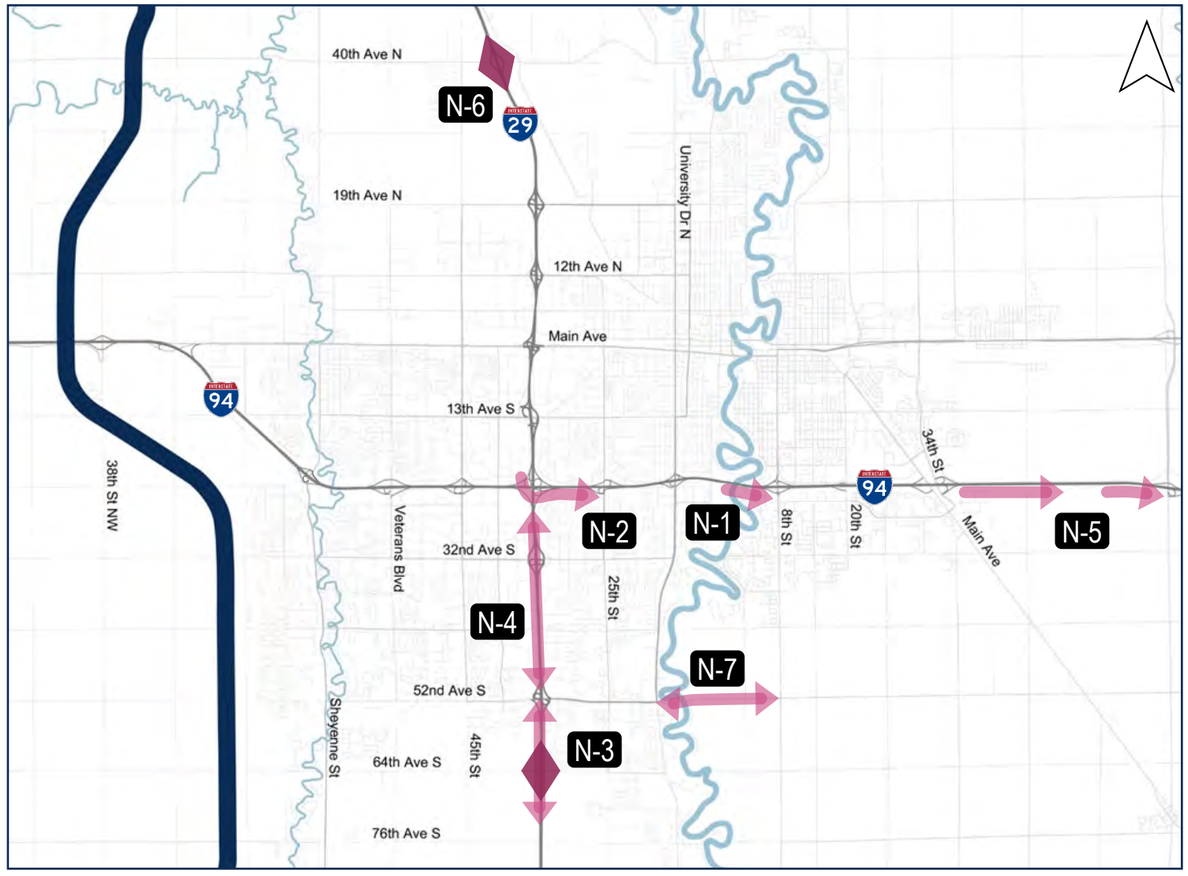
The plan should consider the severity of operational and safety needs and the impact of delaying the recommended improvement strategies.

LIMITING DISRUPTIONS TO THE TRAVELING PUBLIC

The plan should consider the impacts of project construction on the users of the system (for example, should there be a minimum number of years between major projects within a specific section of Interstate). Additionally, off-system or TSMO improvements that would improve operations during construction should be considered.

INPUT FROM STAKEHOLDERS

The plan should consider a balance of state DOT and local agency needs. The impact of development growth opened up by the diversion may shift local agency needs at various service interchanges. The timeline of these improvements were determined with SRC members.



System Preservation Projects

Six major system preservation projects are anticipated within the study area over the next 20 years. Minor rehabilitation (concrete pavement repair, bridge deck overlays, etc) were not included in the implementation plan.

NEAR TERM

- S-1. Full Reconstruction: 2023

MID TERM

- S-2. Full Reconstruction: 2031-2034
- S-3. Full Reconstruction: 2031-2034
- S-4. Bridge Replacement: 2031-2034
- S-5. Full Reconstruction: 2031-2034
- S-6. Full Reconstruction: 2034-2037

Near Term Projects

- N-1. I-94 EB Exit to 8th Street
- N-2. Flyover Expansion to 25th Street
- N-3. New Interchange at 64th Ave S (may include C-D Roads)
- N-4. I-29 Expansion
- N-5. I-94 Aux Lane (Near of Weigh Station)
- N-6. 40th Ave N Interchange Reconfiguration
- N-7. 52nd Ave S / 60th Ave S Widening

TSMO IMPROVEMENTS

- TIM Group
- TMC
- DMS / CCTV

Mid-Term Projects

- M-1. I-94 Expansion to 6 Lanes
- M-2. I-94 Expansion to 8 Lanes
- M-3. I-94 Mobility Improvements
- M-4. 20th Street Reconfiguration
- M-5. I-29 Braided Ramps between 13th Ave S & I-94
  - 13th Ave S Reconfiguration
- M-6. I-94 & Main Ave Improvements
  - Including 13th Ave S I-94 Overpass
- M-7. NW Perimeter Road

TSMO IMPROVEMENTS

- Ramp metering (Ring 1)
- Service patrol
- Smart Work Zones

Long-Term Projects

- L-1. I-29 Aux Lanes
- L-2. Braided NB Loop
- L-3. New Interchange at 76th Ave S (includes C-D Roads)
- L-4. 100th Ave S Improvements
- L-5. Perimeter Road(s)

TSMO IMPROVEMENTS

- Ramp metering (Ring 2)

TYPE	ID	PROJECT	NEAR TERM								MID TERM										LONG TERM									
			23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Interstate	N-1	I-94 EB Exit to 8th Street																												
Interstate	N-2	Flyover Expansion to 25th Street																												
Interstate / Interchange	N-3	New Interchange at 64th Ave S (May Include C-D Roads)																												
Interstate	N-4	I-29 Expansion (Between I-94 & 52nd Ave S)																												
Interstate	N-5	I-94 EB Aux Lanes (Between 34th Street, Weigh Station, & MN 336)																												
Interchange	N-6	40th Ave N Interchange Reconfiguration																												
Off-System	N-7	52nd Ave S / 60th Ave S Widening (Between University & US 75)																												
TSMO	N-8	Re-Start TIM Group																									No Years Identified			
TSMO	N-9	Development of TMC																												
TSMO	N-10	DMS / CCTV Expansion																									No Years Identified			
Interstate	M-1	I-94 Expansion to 6 Basic Lanes (Between Sheyenne & I-29)																												
Interstate	M-2	I-94 Expansion to 8 Basic Lanes (Between I-29 & 8th Street)																												
Interstate	M-3	I-94 Mobility Improvements (Between 8th Street & MN 336)																												
Interchange	M-4	20th Street Reconfiguration																												
Interstate / Interchange	M-5	I-29 Braided Ramps between 13th Ave S & I-94																												
Interchange	M-6	I-94 & Main Ave Improvements (Including 13th Ave S I-94 Overpass)																												
Off-System	M-7	NW Perimeter Road																												
TSMO	M-8	Ramp Metering (Ring 1)																												
TSMO	M-9	Service Patrol																												
TSMO	M-10	Smart Work Zones																									No Years Identified			
Interstate	L-1	I-29 Aux Lanes (Between 12th Ave N & Main Ave)																									No Years Identified			
Interstate	L-2	Braided NB Loop Ramp (At I-29 / I-94 System Interchange)																									No Years Identified			
Interchange	L-3	New Interchange at 76th Ave S (May Include C-D Roads)																									No Years Identified			
Interchange	L-4	100th Ave S Improvements																									No Years Identified			
Off-System	L-5	Perimeter Road(s)																									No Years Identified			
TSMO	L-6	Ramp Metering (Ring 2)																												
System Preservation	S-1	I-94 Construction (Between 38th Street NW to 13th Ave S)																												
System Preservation	S-2	I-94 Reconstruction (Between Sheyenne & I-29)																												
System Preservation	S-3	I-94 Reconstruction (Between I-29 & Red River)																												
System Preservation	S-4	I-94 Red River Bridge Replacement																												
System Preservation	S-5	I-94 Reconstruction (Between Red River & MN 336)																												
System Preservation	S-6	I-29 Reconstruction (Between 40th Ave S & 124th Ave S)																												

Legend

- Near Term
- Mid Term
- Long Term
- System Preservation
- Mainline / Off-System
- Interchange
- TSMO