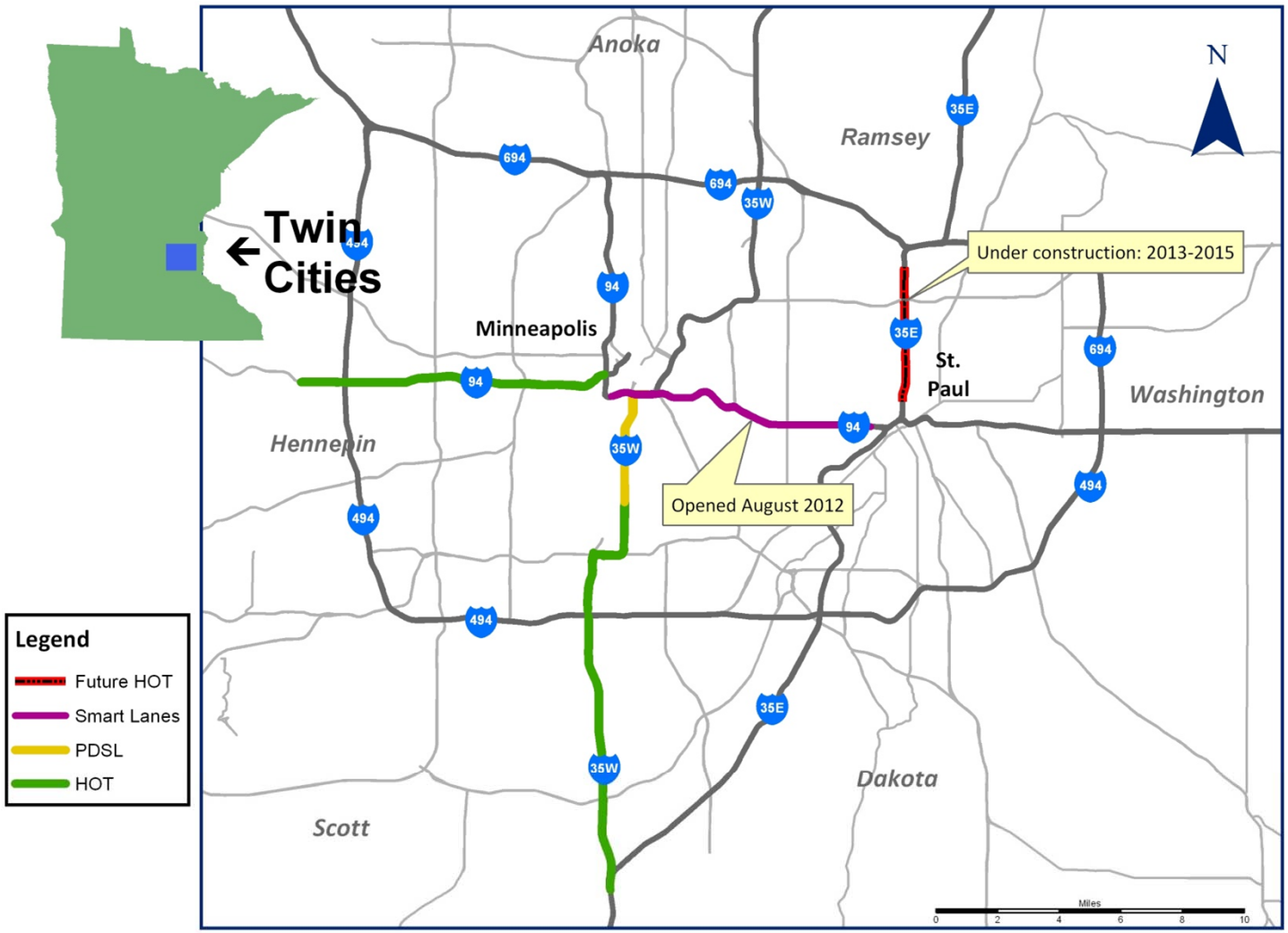
Missouri Operations Summit
MoDOT and FHWA
September 25-26, 2012

Paul Czech

Minnesota Department of Transportation


Twin Cities
Anoka
Ramsey
Minneapolis
St. Paul
Washington
Hennepin
Dakota
Scott
N
Under construction: 2013-2015
Opened August 2012
Legend
Future HOT
Smart Lanes
PDSL
HOT
Miles
0
2
4
6
8
10

TWINS

2010 Census

	Missouri	Minnesota
State Population	6.0M	5.3M
Land Area (Sq. Mi.)	69K	80K
Person's/Sq. Mi.	87	67
City Population	Kansas City 460K	Minneapolis 385K
	St. Louis 320K	St. Paul 285K
	MSA (Combined) 4.8M	MSA 3.3M

St. Louis Beltway

Kansas City Beltway

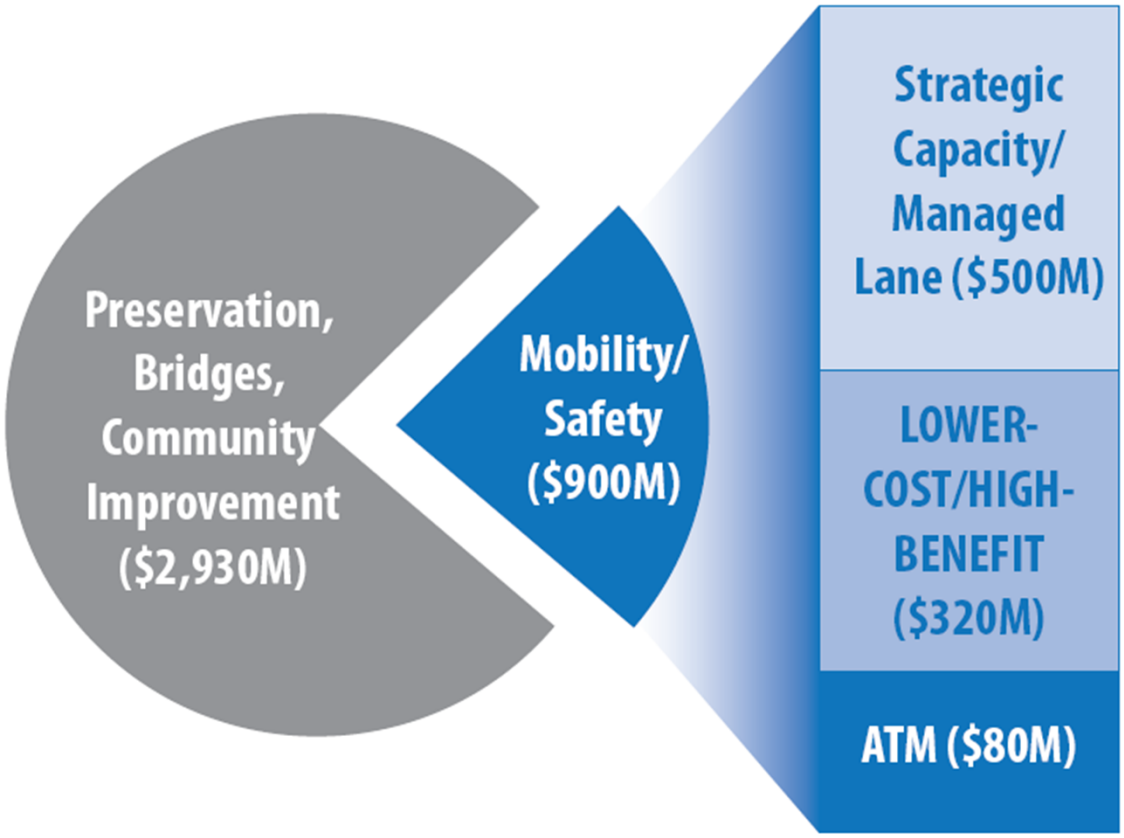
Twin Cities Beltway

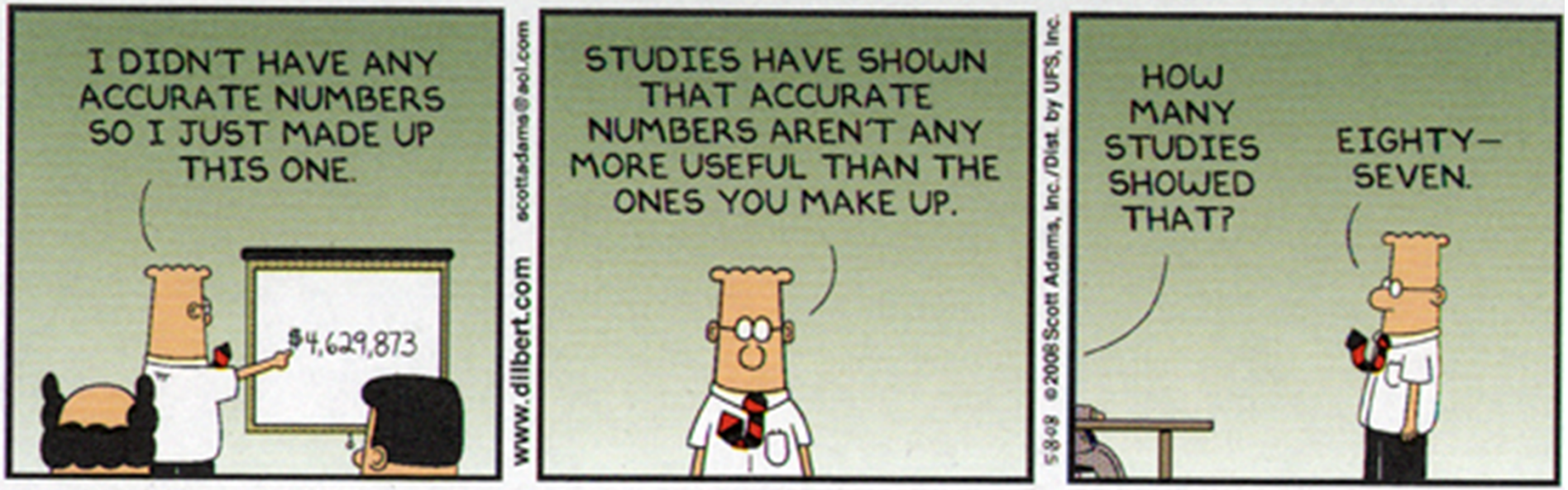
Metro District Long Range 20-Year Investment Plan

The Role of Planning and Operations

- Provides the link between the policies and strategies established in the Statewide Transportation Policy Plan
- Guide for future multi-modal capital *and operational* investments in the state trunk highway system within the Twin Cities metro area.
- Prepared in conjunction with the Metropolitan Council's Transportation Policy Plan

Metro District Highway Investment Plan
State Road Construction 2015-2030




I DIDN'T HAVE ANY ACCURATE NUMBERS SO I JUST MADE UP THIS ONE.
$4,629,873
www.dilbert.com scottadams@aol.com
STUDIES HAVE SHOWN THAT ACCURATE NUMBERS AREN'T ANY MORE USEFUL THAN THE ONES YOU MAKE UP.
5-8-08 ©2008 Scott Adams, Inc./Dist. by UFS, Inc.
HOW MANY STUDIES SHOWED THAT?
EIGHTY-SEVEN.

2010 Update: Genesis for the New Investment Strategy

- Several studies/plans influenced the 20-Year Highway Investment Plan update
  - Principal Arterial Study
  - Metro Highway System Investment Study (MHSIS)
  - Congestion Management and Safety Plan (CMSP)
  - MnPASS (a.k.a. HOT lanes) System Study Part II

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Principal Arterial Study
2007

Comparison of Approaches

- Long-range transportation plans (TPP/TSP)*
- Lower cost/high benefit
- Priced system
- “Fix” congestion

***TPP/TSP = Met Council and Mn/DOT 20-Year Transportation Plans**

Key findings:
Principal Arterial Study

- Can't build (buy) our way out of congestion
- Typical investments are designed for a 20-year "complete" fix
- Focus on lower-cost/high-benefit projects to help mitigate congestion and safety issues
- Pursue alternatives to mitigate congestion

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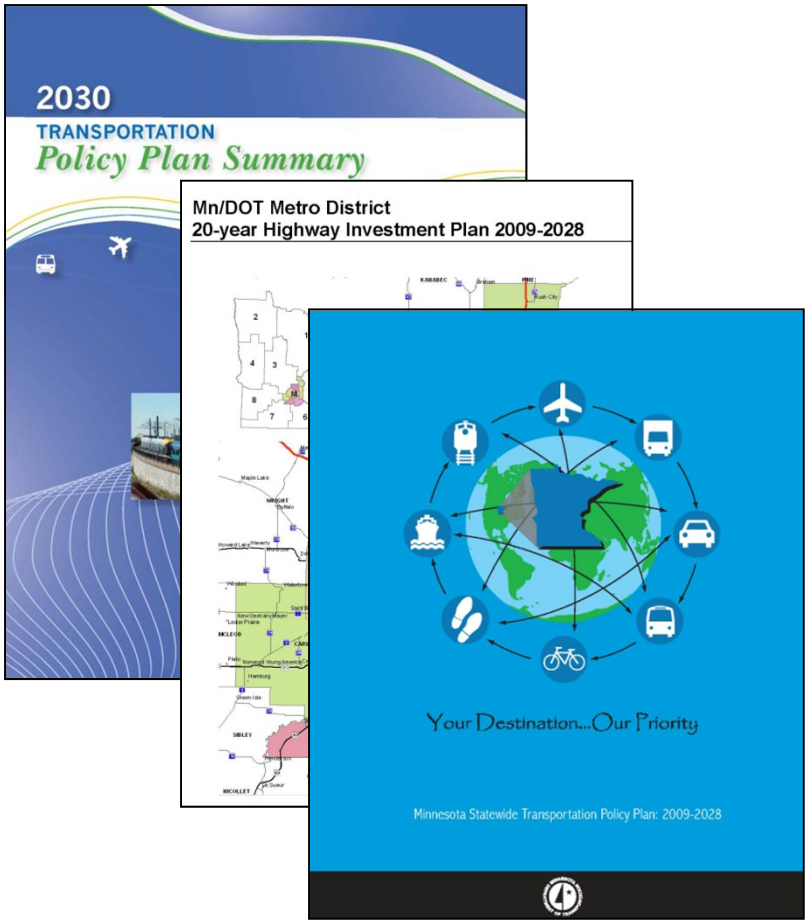
Metro Highway System Investment Study

Metropolitan Council

MINNESOTA DEPARTMENT OF TRANSPORTATION

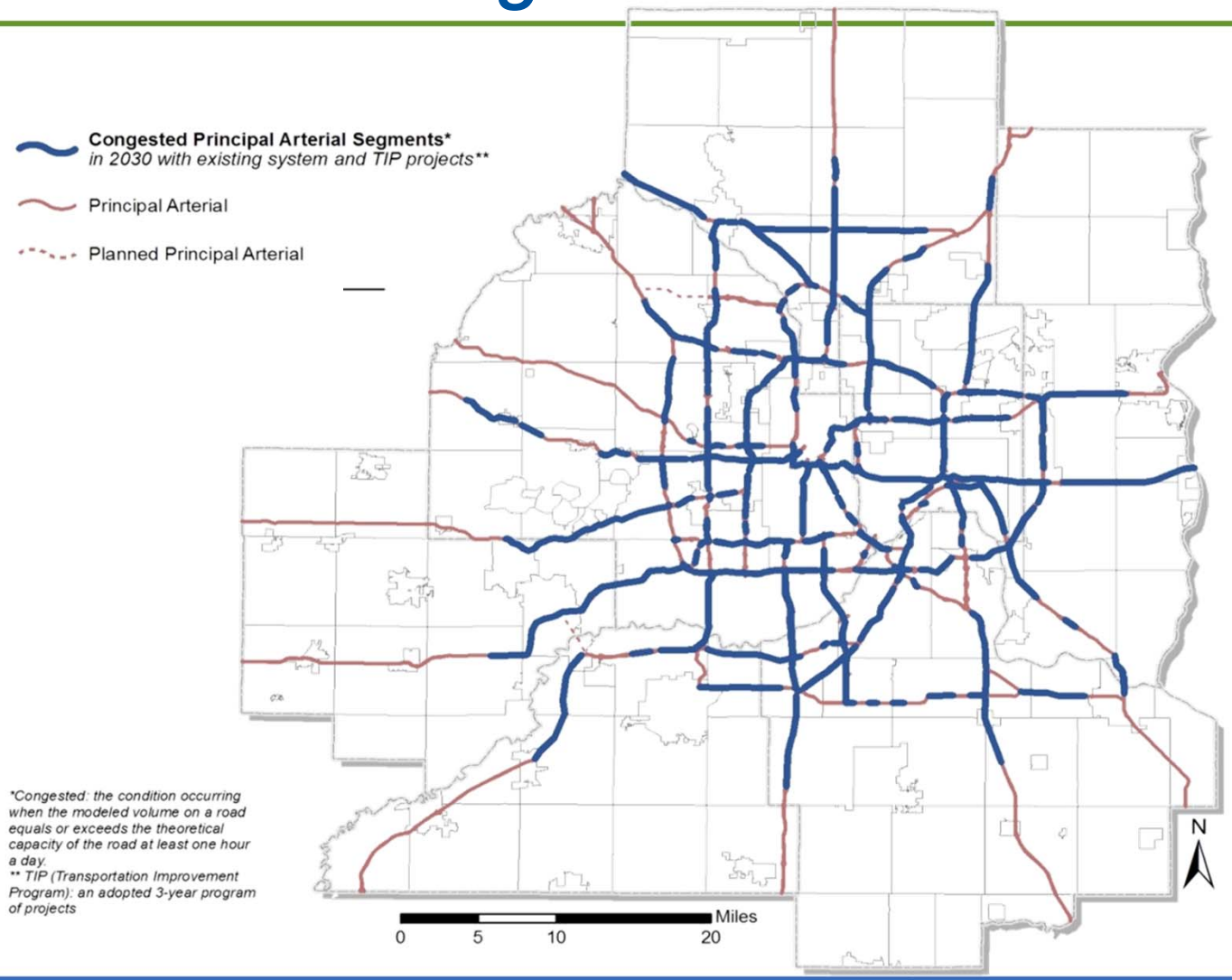
A joint effort of the Metropolitan Council and Minnesota Department of Transportation

Policy direction



- Metropolitan Council Transportation Policy Plan
- Mn/DOT Metro District Highway Investment Plan
- Mn/DOT Statewide Transportation Plan

Year 2030 Congestion



Funding constraints

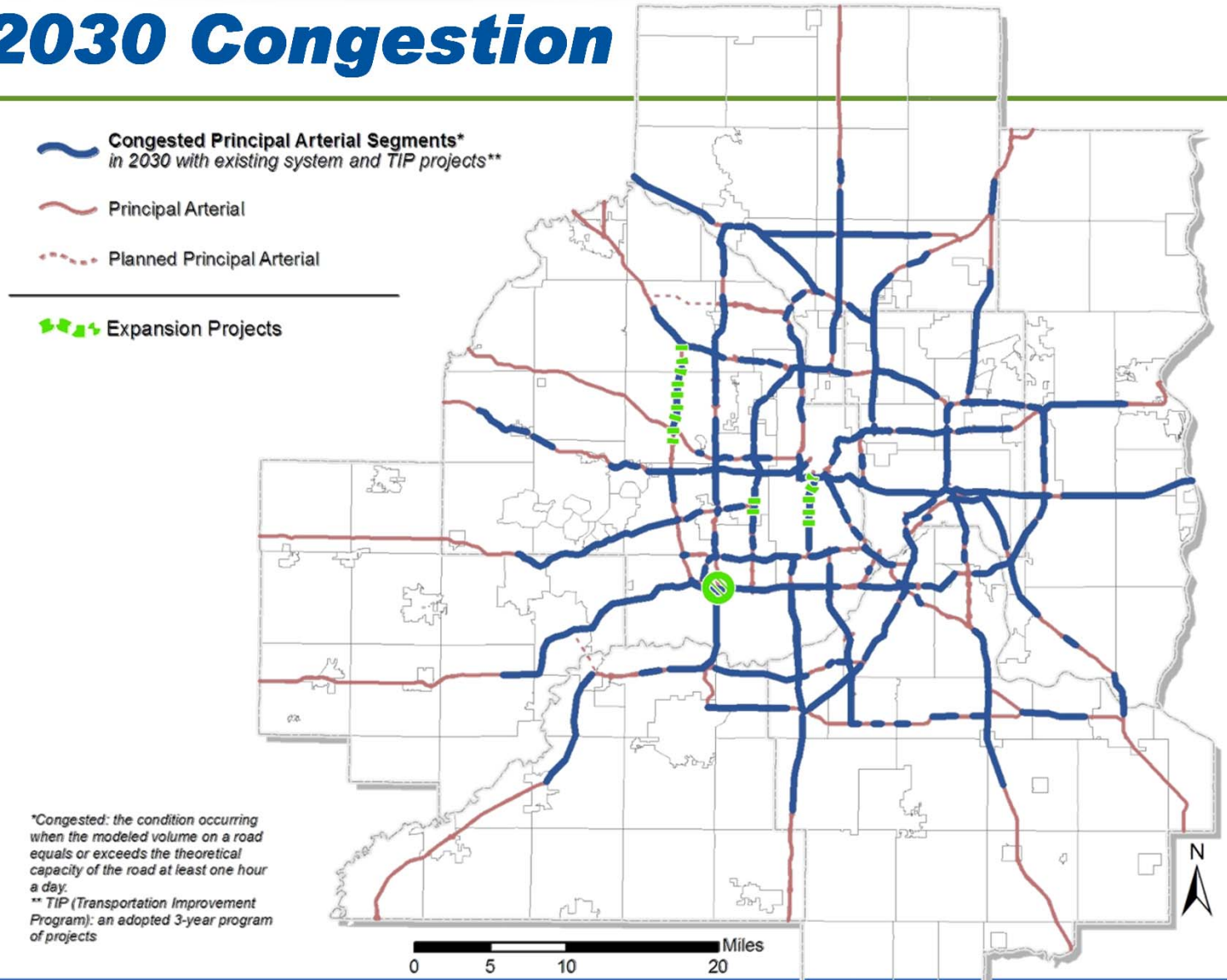
- Adding capacity to fully eliminate congestion would cost more than $40 billion over next 20 years

- If used alone, state gas tax would need more than $2 per gallon increase

Constrained budgets

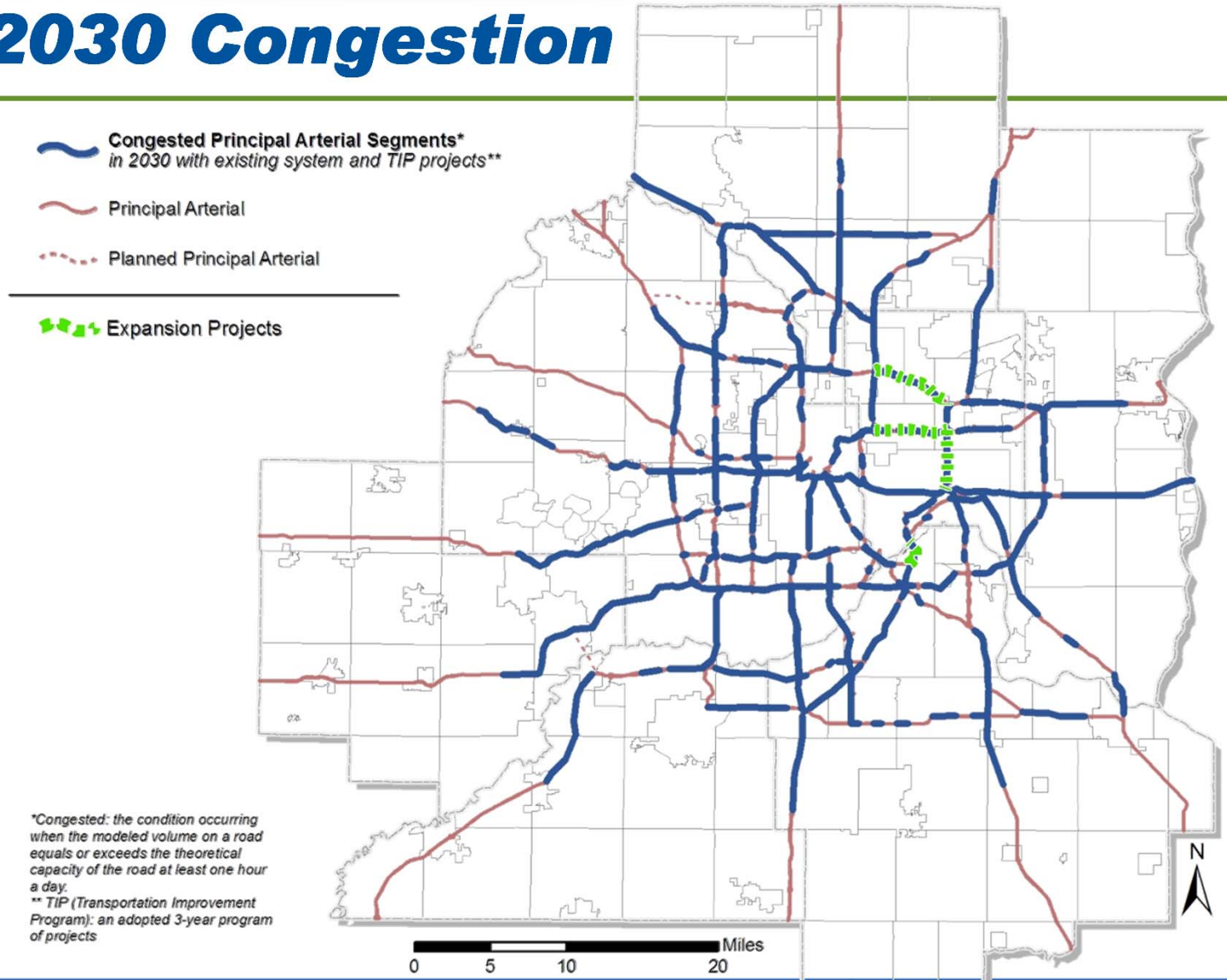
- Traditionally transportation plans have called for major expansion to mitigate congestion
- Many projects carried over from plan to plan
- 2009 plans left major expansion projects unfunded, estimated at $3 billion

Year 2030 Congestion



*Congested: the condition occurring when the modeled volume on a road equals or exceeds the theoretical capacity of the road at least one hour a day.
** TIP (Transportation Improvement Program): an adopted 3-year program of projects

Year 2030 Congestion



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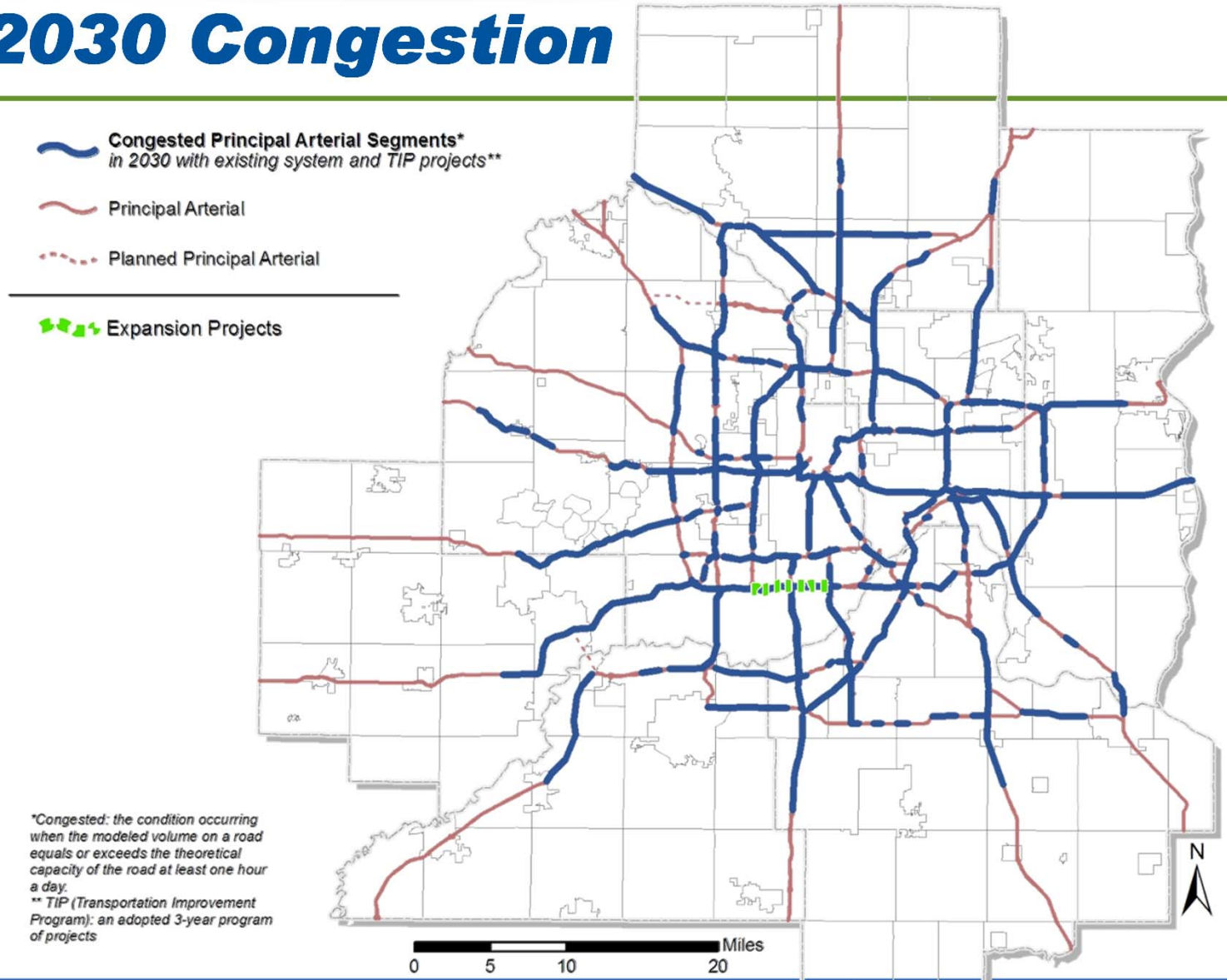


*Congested: the condition occurring when the modeled volume on a road equals or exceeds the theoretical capacity of the road at least one hour a day.
** TIP (Transportation Improvement Program): an adopted 3-year program of projects

Maximizing efficiency

"Our goal is to effectively use every inch of pavement so that we have the most efficient transportation system possible."

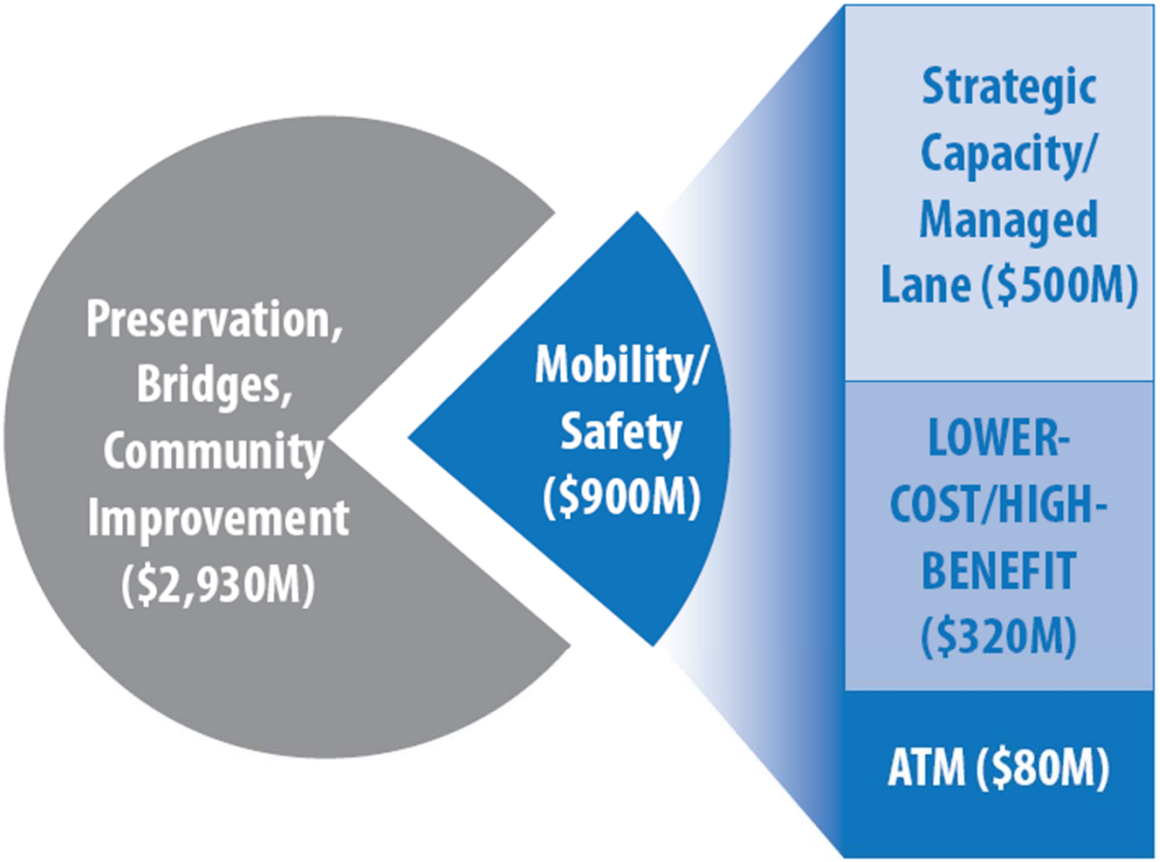
Victor Mendez, Federal Highway Administrator

September 2009

System-wide management

- Active Traffic Management (ATM) applications
- Lower-cost/high-benefit capacity and safety improvements
- New managed lanes

Metro District Highway Investment Plan
State Road Construction 2015-2030



Mobility Investment Scenarios: 2015-2030

Anticipated Funds (in millions)	Vision Scenario (in millions)	Eliminate Congestion
$80 for ATM $320 for lower-cost/high-benefit $500 for managed lanes and strategic capacity enhancements	$500 to 1,000 for more ATM $1,000 to 1,500 for more lower-cost/high benefit $1,000 to 1,500 for additional managed lanes/strategic capacity enhancements	More than $40 Billion
Total: **$900 Million**	**Total:** **$3.0 to $4.0 Billion** (This estimate does not include any new principal arterial highways in developing areas)	

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Congestion Management and Safety Plan, Phase III

Minnesota Department of Transportation

and

SRF Consulting Group, Inc.

Missouri Operations Summit, September 25-26, 2012

CMSP Intent

To identify a list of lower-cost/high-benefit projects that seek to maximize mobility and reduce crash risk at key congestion and safety problem locations

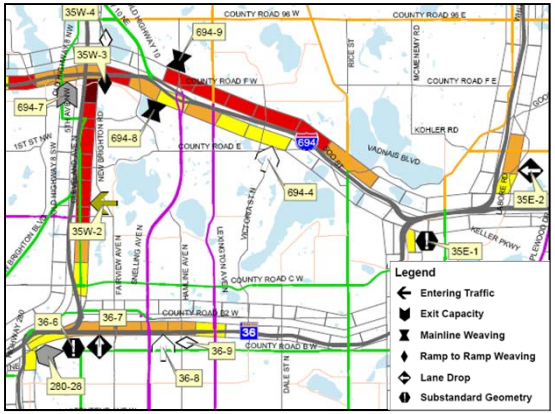
CMSP Background

<u>Phase I</u> (2007)

- Implemented 19 Lower-Cost/High-Benefit projects

<u>Phase II</u> (2009)

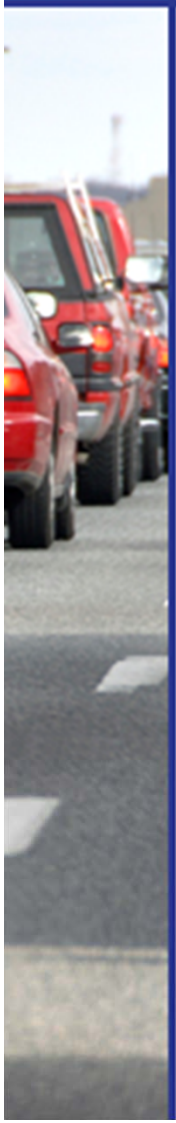
- System Problem Statement
- Congestion Management Strategies, Tools, and Application Framework
- Project-Specific Before and After Studies
- Congestion Management Case Studies
- Flexible Design and Managed Corridor Workshops



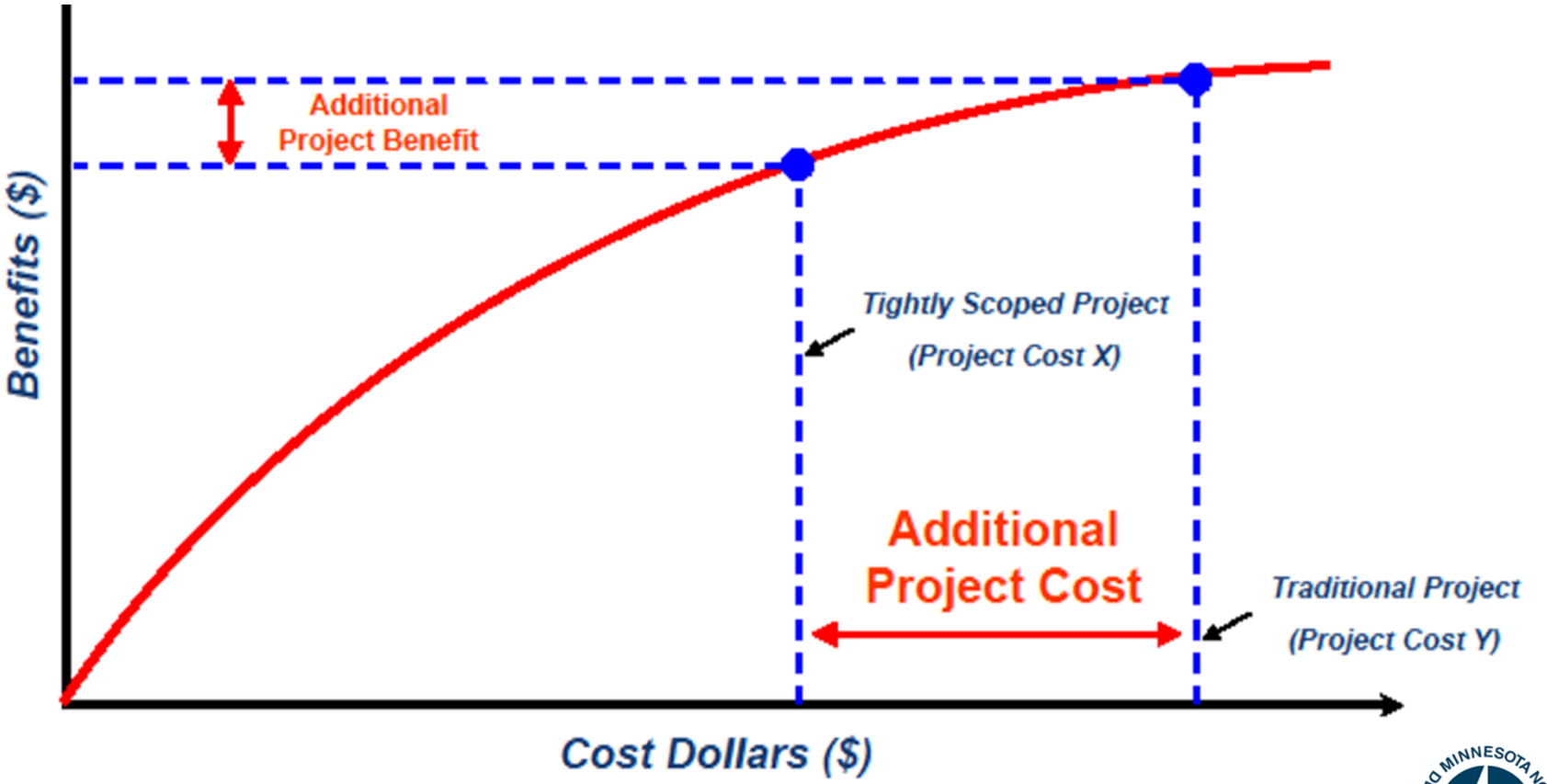
<u>Phase III</u> (current)

- Develop and prioritize list of CMSP opportunities, potential solutions, and programming framework

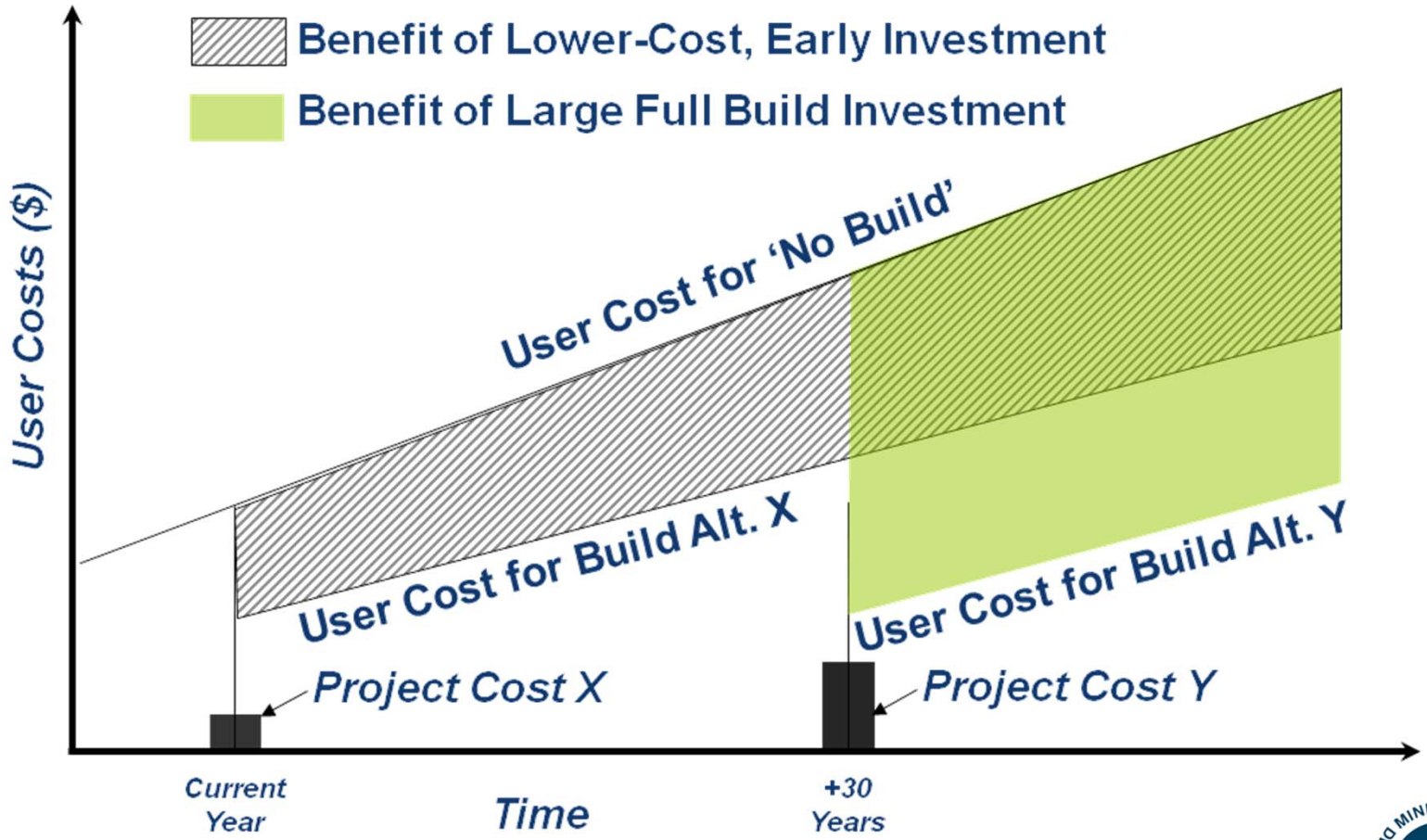
Right-sizing Projects



Every project has a point of diminishing returns



The Time Value of Resources



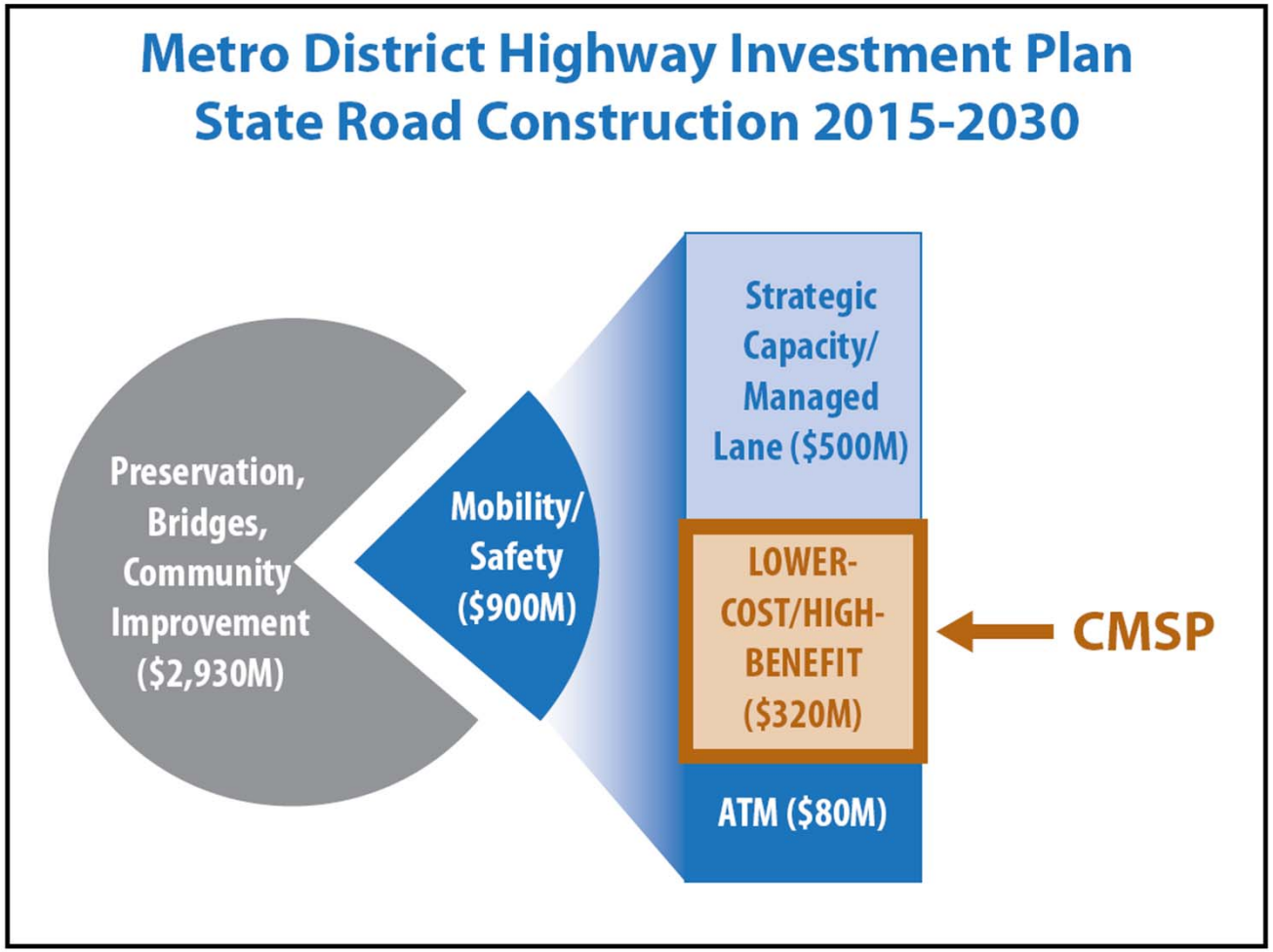
Lower-Cost/High-Benefit Example

I-394 WB Additional Lane

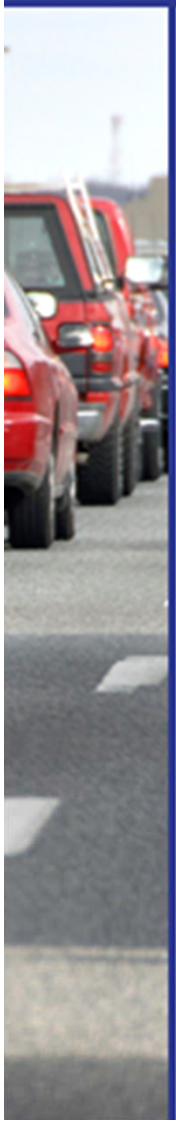
- **Project Details**
  - WB aux lane connected between TH100 C-D road entrance and TH169 C-D road exit
  - Two-lane exit provided to TH169 C-D road
  - Constructed in 2005
- **Benefits**
  - Provides lane continuity through Louisiana Ave interchange
  - Relieves peak congestion issues

Phase III

Metro District Highway Investment Plan



CMSP Phase III Process



Problem Location Identification

- Phase I project locations
- Phase II System Problem Statement
- Local Agency/Transit Operations Works Sessions

Primary Screening

- Locations categorized by facility type
- Screening tool using traffic volumes/crash cost

Secondary Screening

- Design Charrettes to develop project concepts
- Screening based on problem, cost and effectiveness
- Final recommendation of Tier 1, 2, 3 projects

CMSP Phase III Filtering Process

Problem Location Identification

- Phase I project locations
- Phase II System Problem Statement
- Local Agency/Transit Operations Works Sessions

6+Lane Freeway	119	4-Lane Freeway	103
Expressway	124	2-Lane Arterial	101

Total of 447 Locations

CMSP Phase III Filtering Process

Problem Location Identification

- Phase I project locations
- Phase II System Problem Statement
- Local Agency/Transit Operations Works Sessions

Total of 447 Locations

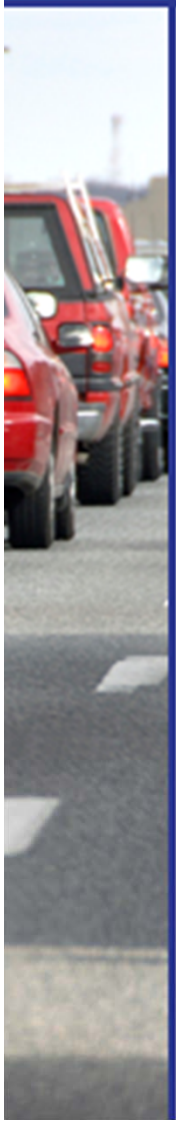
Primary Screening

- Locations categorized by facility type
- Screening tool using traffic volumes/crash cost

6+Lane Freeway	23	4-Lane Freeway	22
Expressway	18	2-Lane Arterial	18

Total of 81 Locations

CMSP Phase III Filtering Process



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Primary Screening

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- Screening tool using traffic volumes/crash cost

Total of 81 Locations

Secondary Screening

- Design Charrettes to develop project concepts
- Screening based on problem, cost and effectiveness
- Final recommendation of Tier 1, 2, 3 projects

Final 53 projects ranked in three tiers

SRF Consulting Group, Inc

MINNESOTA DEPARTMENT OF TRANSPORTATION

Secondary Screening

Quantified Attributes		
Problem Magnitude	**Project Cost**	**Effectiveness**
Sum of Existing Delay and Crash Costs	Planning-Level Construction Cost Estimate	Percent of Existing Delay and Crash Costs Solved by Proposed Solution

Scoring performed by computing the <u>Return Period</u>: the Length of Time for Delay and Crash Savings to Equal Project Cost

$$Return\ Period = \frac{Project\ Cost}{Problem\ Magnitude * Effectiveness}$$

Secondary Screening

- **Return period scores range from 1 month to 235 years**
- **49 out of 60 solutions have return periods shorter than 10 years**
- **Solutions have been categorized into 3 tiers***
  - Tier 1: Return period less than 2 years
  - Tier 2: Return period between 2 years and 6 years
  - Tier 3: Return period between 7 years and 11 years

*A small number of solutions are not recommended due to return periods over 18 years

CMSP – Next Steps

- **Finalize CMSP Project Opportunity List**
  - CMSP Project Management Team Meeting
  - Metro Program Committee
- **Publish Final Report**
- **Outreach**
  - FHWA Informational Meeting
  - Local stakeholders

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  - MnPASS (a.k.a. HOT lanes) System Study Part II

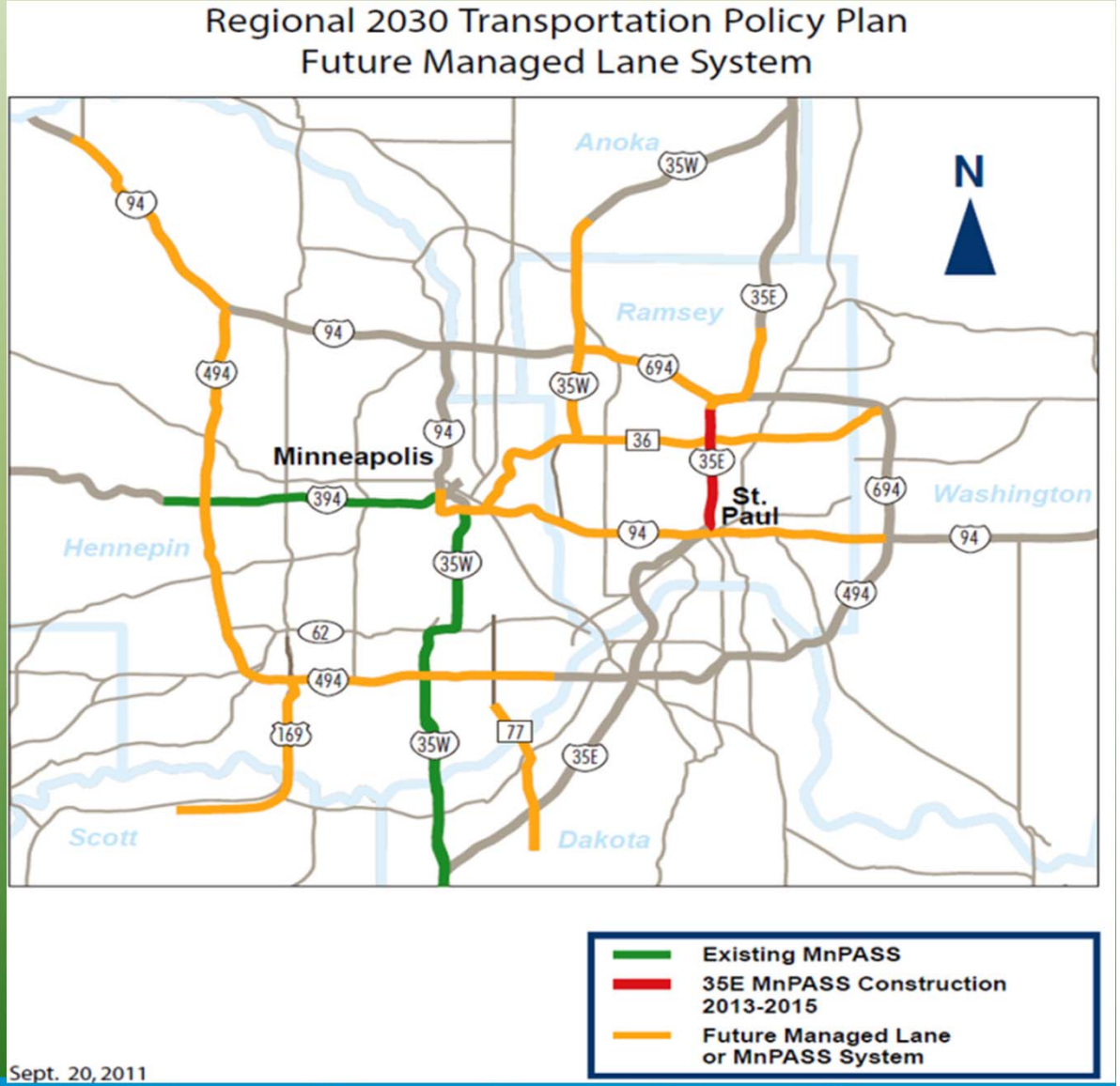
MnPASS System Study Phase 2

Prepared for the Minnesota Department of Transportation by Cambridge Systematics, Inc. with SRF Consulting

Your Destination...Our Priority

MnPASS System

- Opened 11 miles HOT lane on I-394 in 2005
- Opened 16 mile HOT lane on I-35W in 2009/2010
- Proposed 4 mile HOT lane on I-35E in 2015

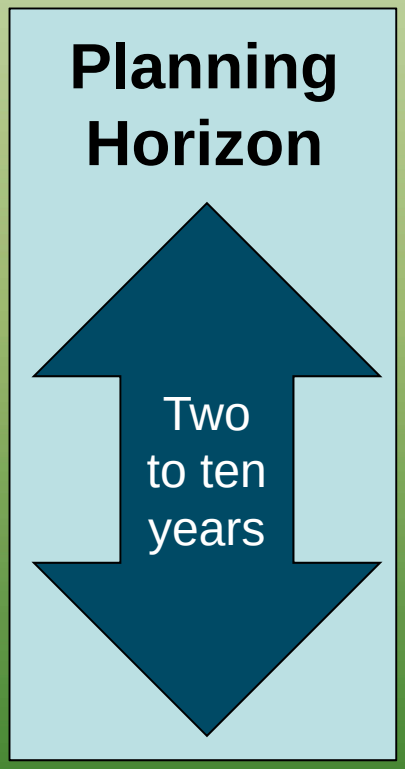


Phase - 1 (2005)

- Evaluated impacts of overlaying MnPASS onto the Twin City Highway System
- Identified a potential MnPASS system
  - Studied cost, operational, revenue and system implications
  - Did not evaluate benefits of priced versus non-priced capacity expansion

Phase-2 (2010)

- Developed prioritized list of MnPASS corridors that could be implemented in the near term (2-10 years)
  - Criteria to identify viable MnPASS projects
  - Traffic and revenue analysis
  - Conceptual engineering analysis
  - Identified technological, policy, financial, and institutional issues and barriers



Performance/Financial Evaluation Approach

- Measures consistent with Met Council and Mn/DOT Long-Range Transportation Policy and Investment Plans
- Financial analysis which included a B/C analysis consistent with the Metropolitan Highway System Investment Study

Selected Performance Measures

Travel Time Reliability

Throughput

Travel Time Reduction/ Average Trip Time

Change in Congested VMT

Transit Suitability:

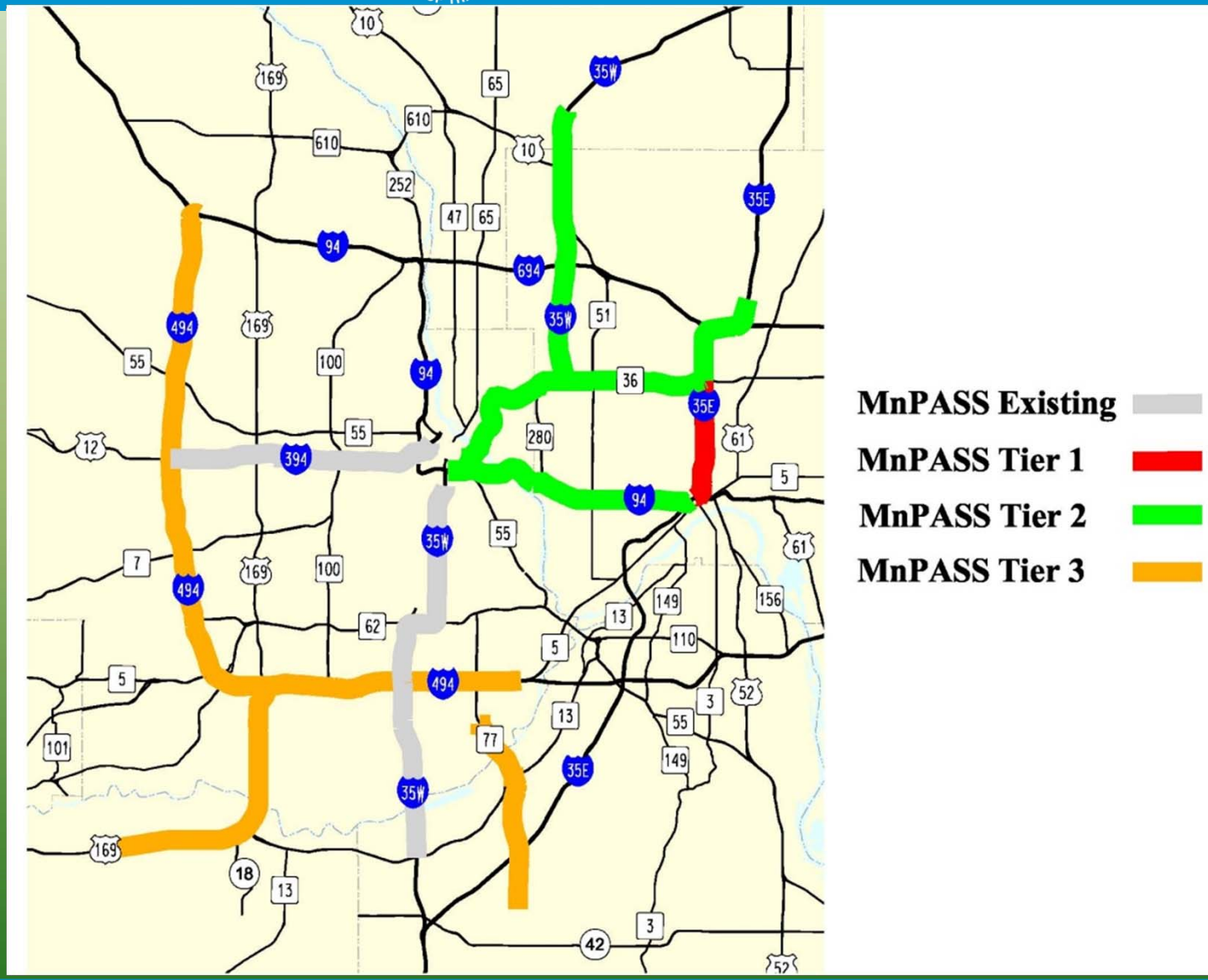
Daily bus volumes

Peak bus volumes

Existing bus-only shoulder lanes

Future plans

MnPASS II System Vision



The Next Opportunity

- Construct a MnPASS lane in each direction through the I-35 "Cayuga" project area
  - From downtown St. Paul to Northern suburbs
  - Open after follow up project is completed north to Little Canada Road and connection made into downtown St. Paul

See Cayuga Project materials at:
http://www.dot.state.mn.us/metro/projects/cayuga/index.html

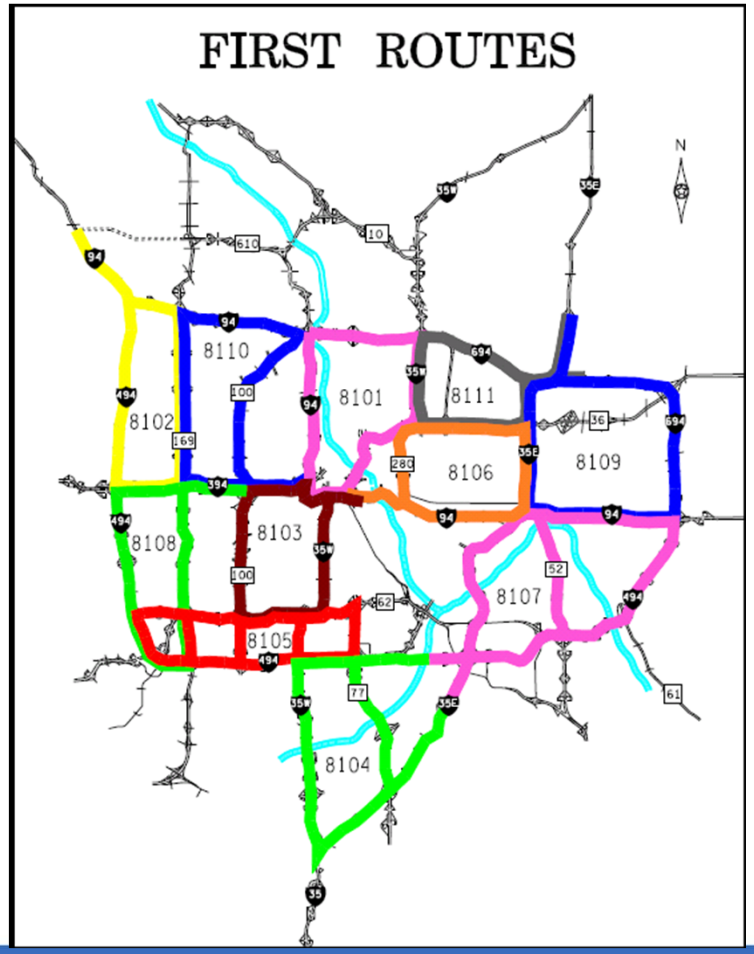
Active Traffic Management

The next step in congestion management

What is Active Traffic Management?

- Technology used to constantly adapt to changing highway conditions
  - Overhead gantries
  - Queue warning
  - Variable speed limits
  - Junction control
  - Travel time signs
  - Etc…

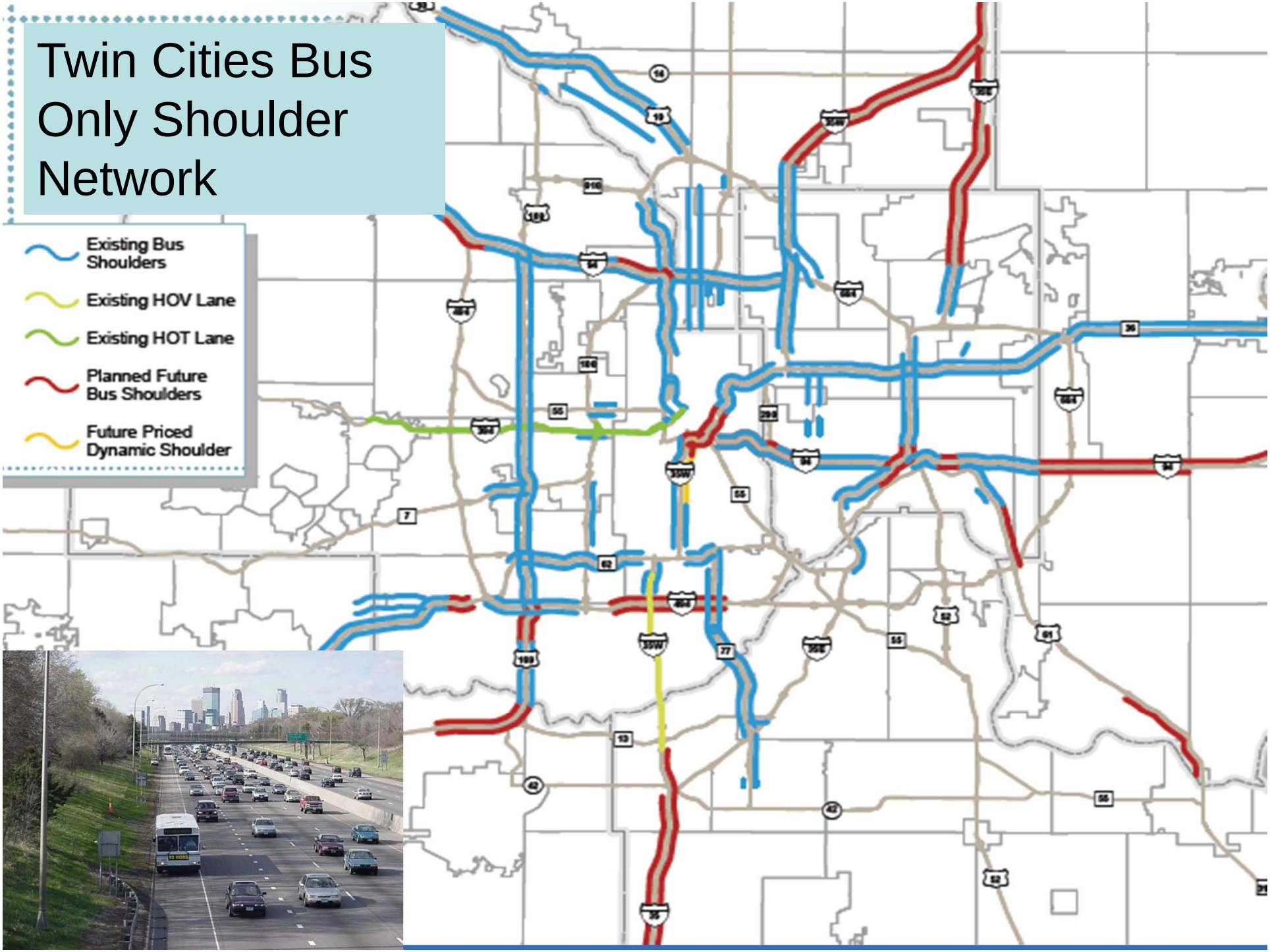
Freeway Incident Response and Safety Team (FIRST)



Freeway Operations

- Cameras, loop detectors, and ramp meters
  - Most expansive system in the nation
  - First ramp meter placed into operation in 1969
  - Today, there are more than 400 ramp meters in operation

Twin Cities Bus Only Shoulder Network



Overhead gantries

- Display changing speed limits and real-time traffic information for drivers over each lane

Included in overhead gantries

- Queue warning
- Variable speed limits or speed harmonization

SPEED
LIMIT
65
35
35
1950

Junction Control

- Uses changeable traffic signs and electronic pavement markings to direct drivers to use specific lanes based on varying traffic demand

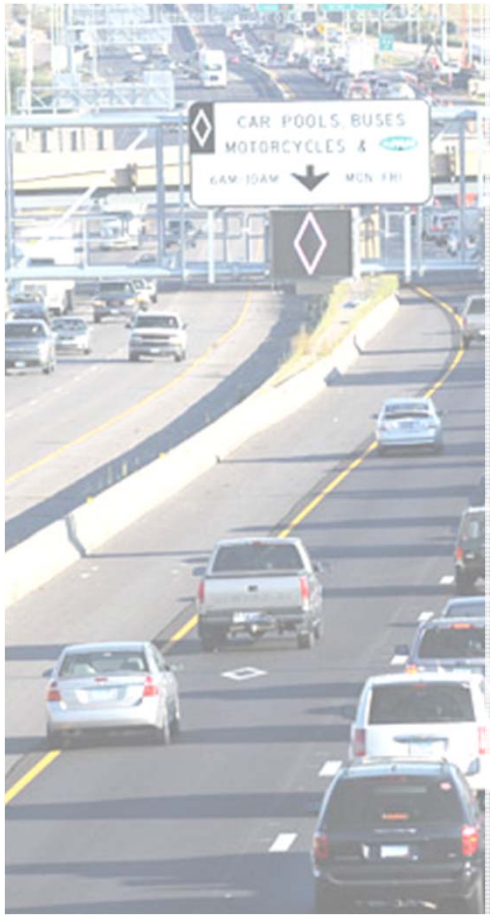
Dynamic rerouting

- Uses overhead signs, lights and changeable lane markings to alert drivers that they need to change their route based on current traffic conditions

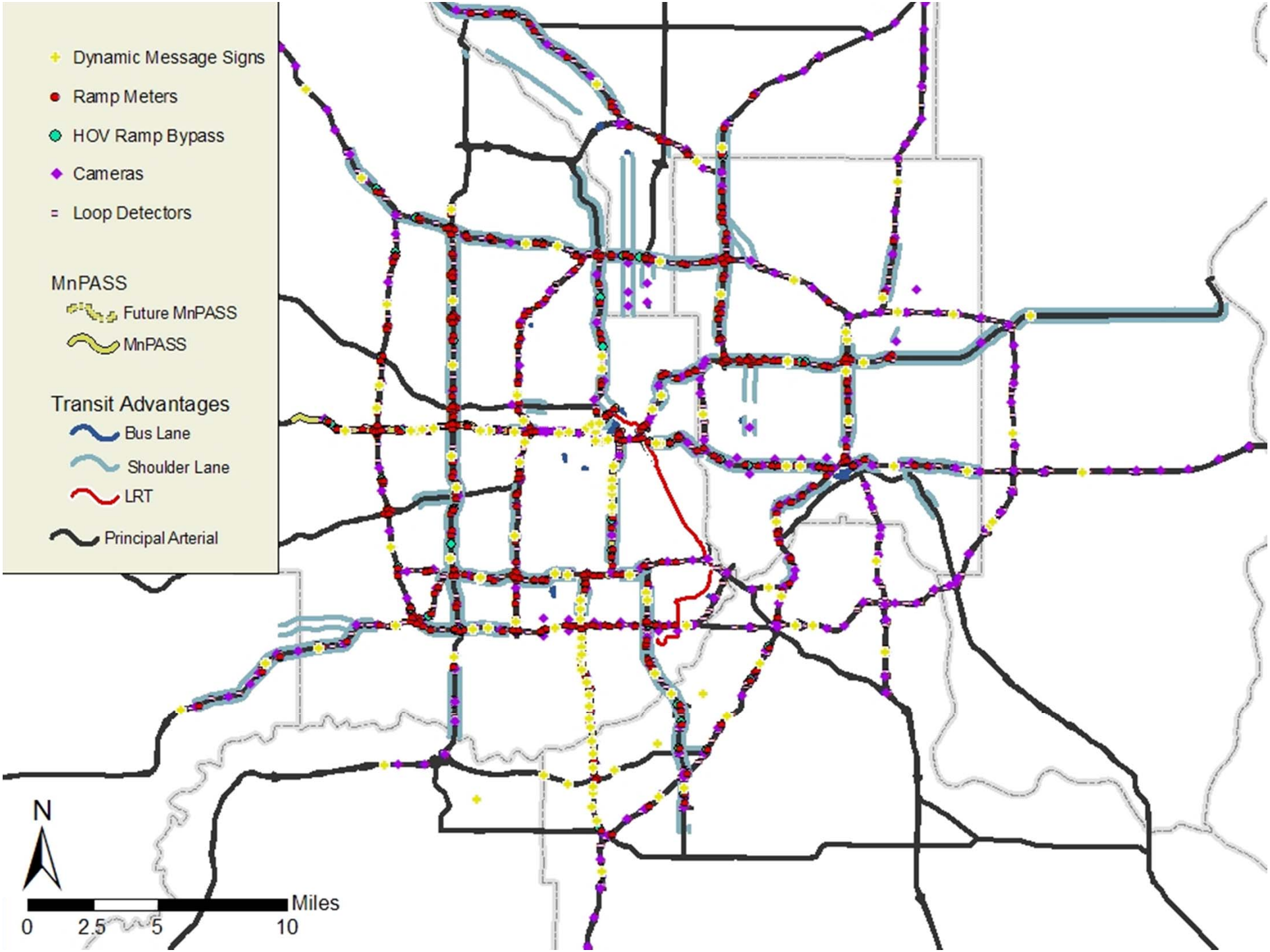
Travel time signs

- Signs display estimated travel time and other traffic conditions so drivers can take more control over their commutes and make on the road route decisions

Managed lane system



- Move more people, more reliably
- Facilitate increased capacity within existing rights of way
- Provide greater speed/reliability for transit
- Encourage greater transit use
- Provide congestion-free managed lanes for those who choose to pay or ride transit


Dynamic Message Signs
Ramp Meters
HOV Ramp Bypass
Cameras
Loop Detectors
MnPASS
Future MnPASS
MnPASS
Transit Advantages
Bus Lane
Shoulder Lane
LRT
Principal Arterial
N
Miles
0
2.5
5
10

Minnesota's Intelligent Work Zone (IWZ) Toolbox

Guideline for
Intelligent Work Zone System Selection

What is a IWZ System?

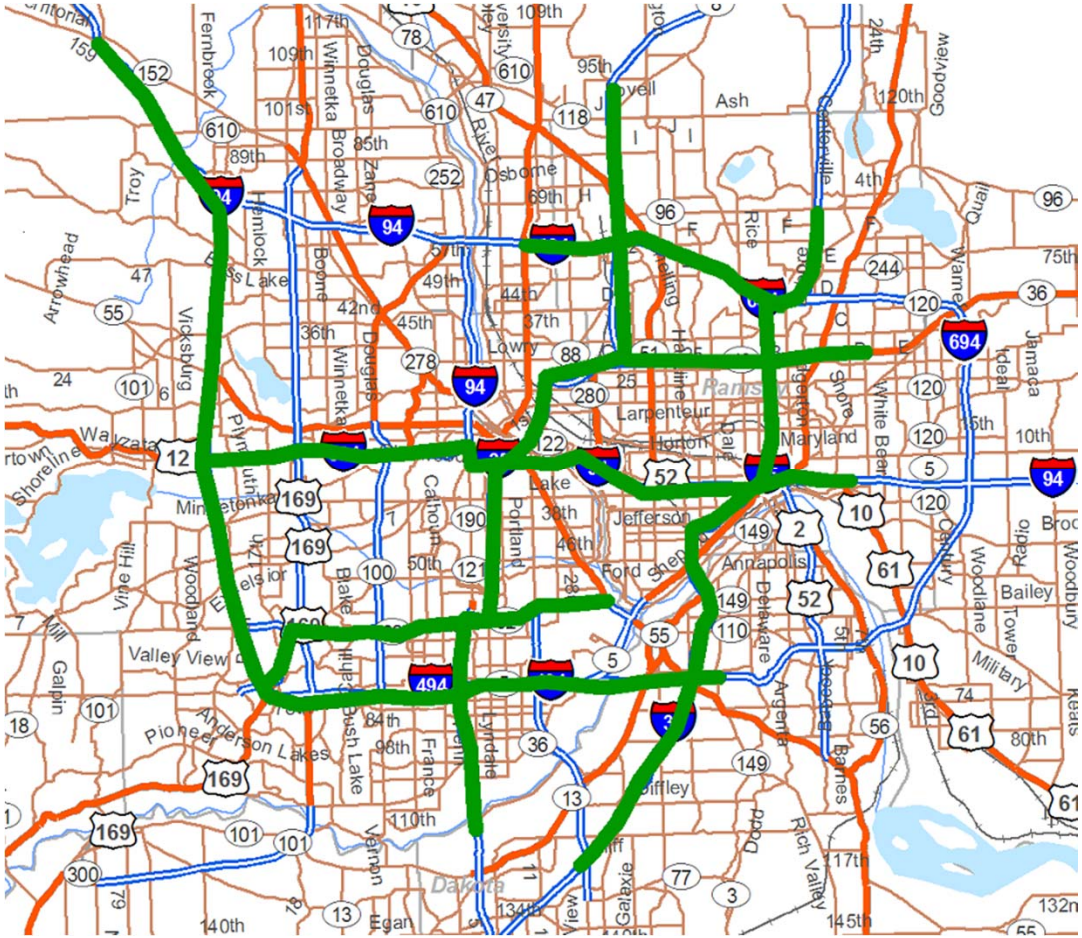
Definition

A system of devices that provides motorists, and/or workers, "**real-time**" information for improved mobility and safety through a work zone.

Additional IWZ Information?

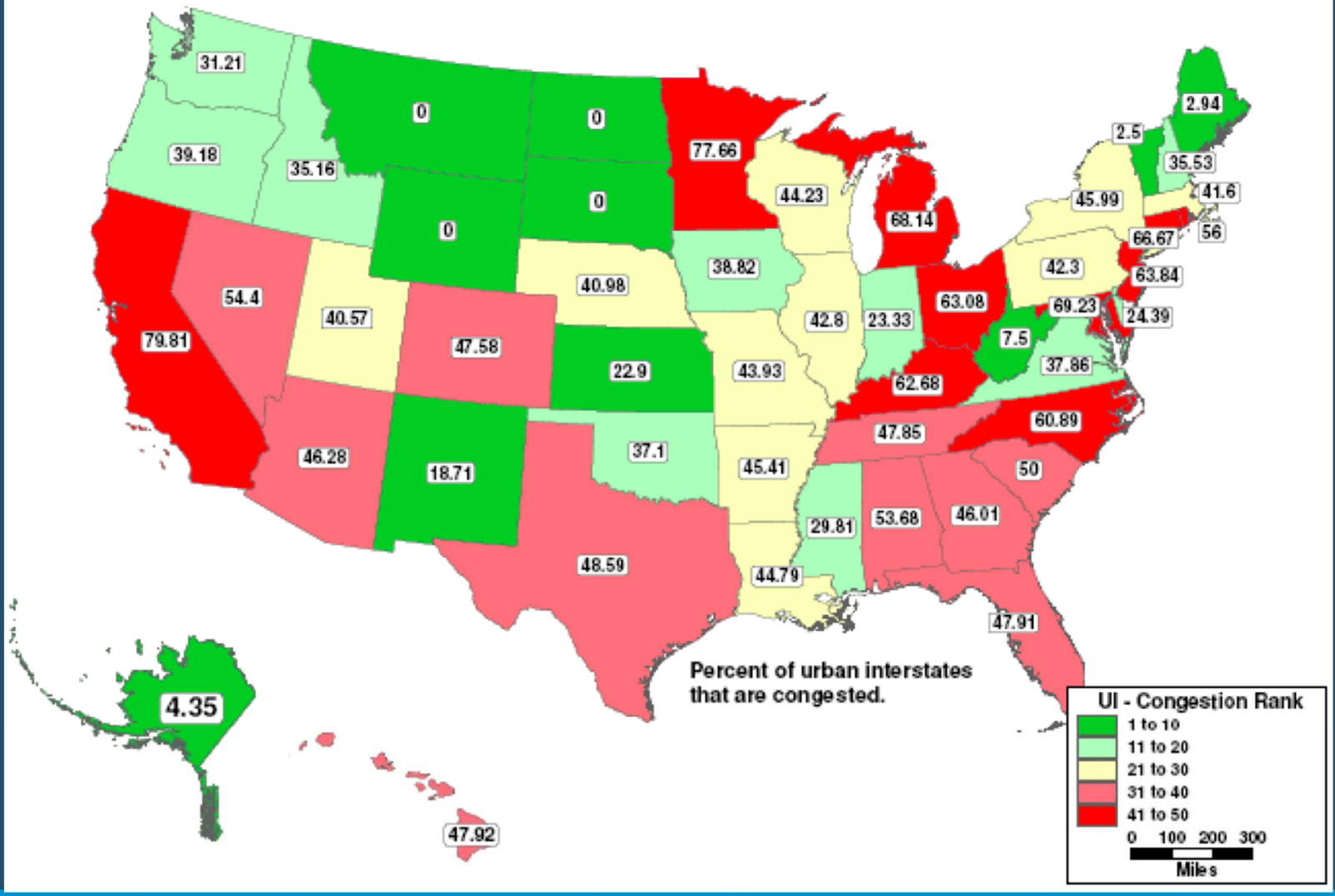
http://www.dot.state.mn.us/traffic eng/workzone/iwz/MN-IWZToolbox.pdf

Potential corridors for additional Active Traffic Management Strategies

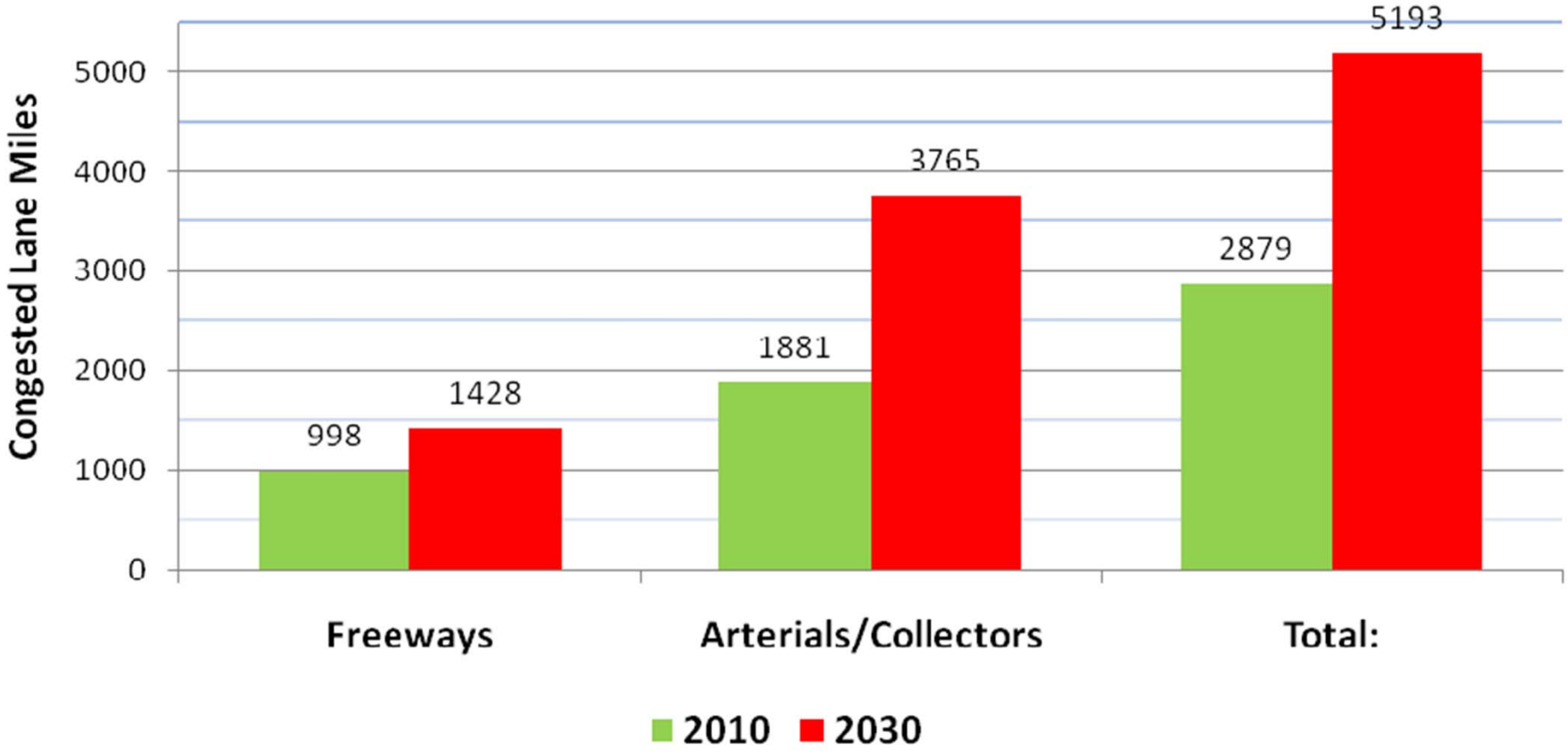


Performance Measures for Mobility

Figure 7: Percent of Urban Interstates Congested, 2008



Metro District
Congested Lane Miles



Metro District
Congested Vehicle Miles Traveled

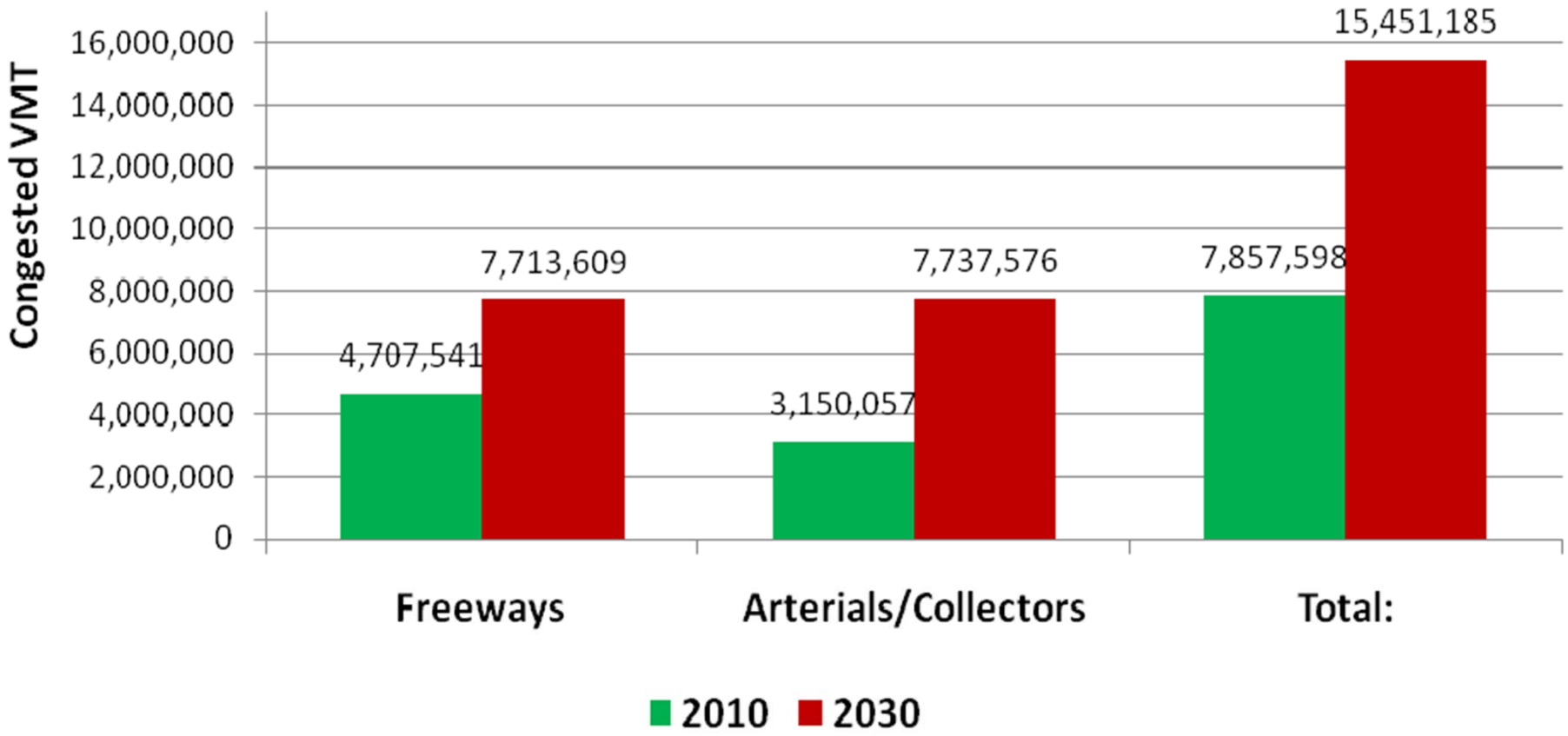


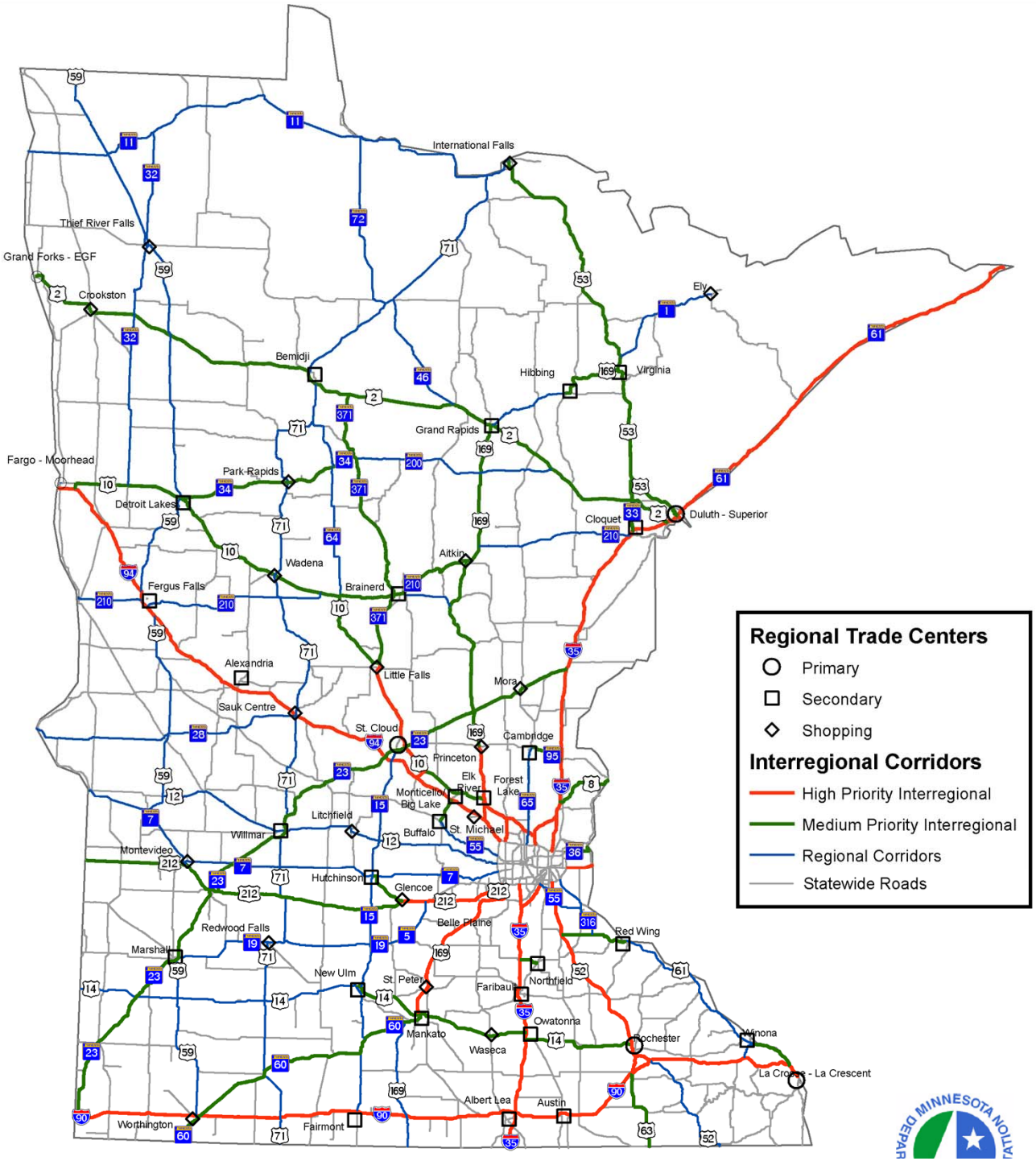
Table 12: 2009 Urban Mobility Ranking

Urban Area	Travel Time Index	Rank
Chicago, Illinois	1.43	2
San Diego, California	1.37	5
Denver-Aurora, Colorado	1.31	14
Las Vegas, Nevada	1.30	17
Austin, Texas	1.29	20
Minneapolis-Saint Paul	**1.24**	**28**
Indianapolis, Indiana	1.21	34
St. Louis, Missouri	1.13	52
Pittsburgh, Pennsylvania	1.09	70
Kansas City, Missouri/Kansas	1.07	80

Strategies and Objectives for Mobility Performance Measures

Objective	Strategy to reach objective	Measure of progress toward objective
Minimize Freeway Delay	ATM Lower cost high benefit Strategic capacity enhancements	% of freeway system congested during peak periods
Minimize Non-freeway Delay	ATM Lower cost high benefit Strategic capacity enhancements	% of non-freeway system congested during peak periods
Maintain a travel time index that is better than the average of peer cities	ATM Lower cost high benefit Strategic capacity enhancements	Comparison of relative ranking to other peer cities
Increase person throughput	Primarily new managed lanes	Changes in person throughput
Increase travel time reliability for those willing to ride transit or pay to use managed lanes	ATM New managed lanes	% or miles of new managed lanes such as High Occupancy Vehicles (HOV), Bus Rapid Transit (BRT) and High Occupancy Toll (HOT)

INTERREGIONAL



CORRIDORS

IRC's

Greater Minnesota IRCs:
Targets for average corridor travel speed

- **60 MPH for high-priority IRCs**
- **55 MPH for medium-priority IRCs**
- **For corridors containing both high- and medium-priority segments, the length-weighted average speed target is used.**

Greater Minnesota IRC Mobility Performance

- **Currently, 98% of the Greater Minnesota IRC system performs within 2 MPH of speed target* or faster.**
- **System performance target: 95% of the system within 2 MPH of speed target or faster.**
- **System performance is forecast to remain at 98% through 2019.**

*Speed targets apply to *average* corridor travel speed

Good Planning Results From Engaging:

- Freeway operations
- Traffic operations
- Maintenance operations

Questions?

Paul Czech – Mn/DOT Metro District
paul.czech@state.mn.us
651-234-7785