

TSM&O Traffic Infrastructure Process

Stakeholder Summit

Bureau of Traffic Operations
August 17, 2015



Summit Agenda

- Welcome and Introductions
- Objectives and Purpose of the Meeting

Agenda

- I. Introductions (10 min)
- II. Background (30 min)
- III. TSM&O-TIP (60 min)
Break (15 min)
- IV. 2016 TSM&O Deployments (60 min)
- V. Next Steps (5 min)



Summit Objectives

- ▶ Ensure internal and external stakeholders are aware of the current status of TSM&O traffic infrastructure and related systems
- ▶ Solicit feedback on the data-driven needs assessment methodology, the data inputs, and the relative weights
- ▶ Provide information to stakeholders about where highway network operational needs are greatest
- ▶ Collect recommendations on what new technologies, systems, or data sources the Department should be pursuing and evaluating, as well as existing components that should be considered for retirement



II. Background



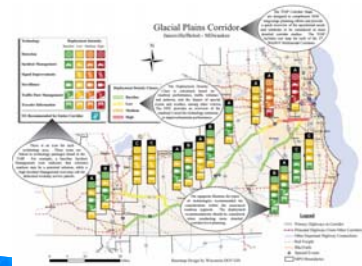
What was the Traffic Operations Infrastructure Plan (TOIP)?

- ▶ Structured around Connections 2030 framework
- ▶ 37 corridors targeted for specific improvements
- ▶ Technology Areas
 - Detection
 - Incident management
 - Traffic signal systems
 - Surveillance
 - Ramp and highway traffic flow management
 - Communications
 - Traveler warning and information
- ▶ Used MetaManager data



TOIP Development

- ▶ Initial methodology and report completed May 2008
 - Scoring method
 - High level cost estimates
 - Deployment density classes
 - "Signpost" guidance
 - FHWA & FTA Transportation Planning Excellence Award



TOIP Development

- Implementation plan completed in 2009
 - Tied to six-year improvement plan
 - Followed on by economic analyses for every region
 - Tracking tool developed



TOIP Development

- 2010: bi-annual updates began
 - Complete re-run of methodology
 - Revised rankings
 - Tracking tool updates
- 2011: Communication Systems Layer (CSL)
 - Fiber and related communication infrastructure needs overlay
 - Brought together an initial spatial inventory
- 2012: integration with ITS/ITSNet inventory
- From 2009 through today, ITS deployments continue



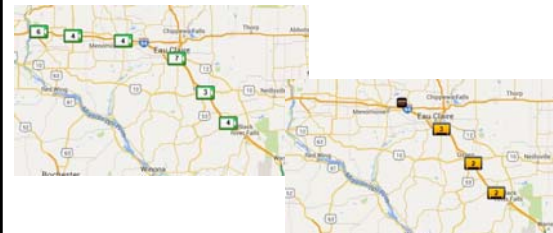
TOIP Current Deployment Status

- Roughly 90-95% deployed



TOIP Current Deployment Status

- Northwest Region Examples



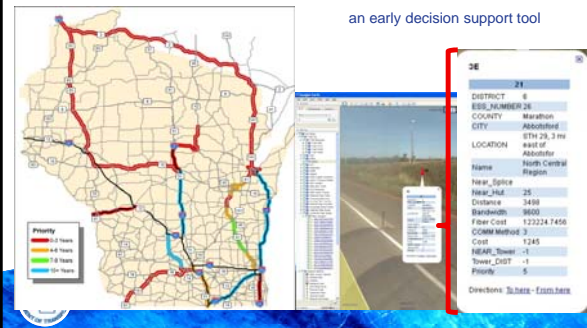
Key TOIP Project/Program Management (PPM) Outcomes

- Develop draft methodology and associated tools
 - Potential operational improvements
 - New technologies
 - Improved GIS analysis, planning, and prioritization
- Focus on ITS deployments
- Inclusive, with regular review
 - Communications Systems Layer (CSL)
 - Traffic signal systems
 - Traffic data, including private sources
 - Supporting IT systems

Communications Network

- TOIP Communication Systems Layer (CSL)

an early decision support tool



AIM Plan – Need

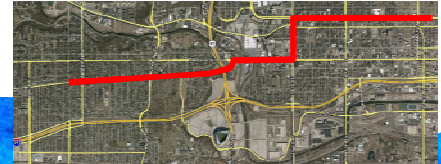


- ▶ Increasing use of ITS for traffic mitigation
- ▶ Traditional traffic mitigation measures
 - Lane capacity improvements
 - Intersection improvements
- ▶ No statewide plan exists that provides guidance on recommending ITS on non-freeway corridors



AIM Plan – Project Purpose

- ▶ Identify corridors that may benefit from ITS planning efforts
 - Corridors with mobility issues
 - Poor performance
 - Local agency partnership
 - Project opportunities for improvement
 - Particularly those near MAJORS projects



AIM Plan – Project Purpose

- ▶ Provide tool to evaluate arterials for ITS planning
 - Data-driven methodology
 - Range of technologies
 - Statewide compatibility
 - Unique, need driven analyses

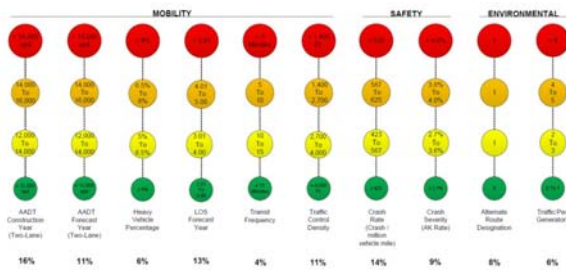


AIM Plan – Evaluation Criteria

- ▶ Construction year ADT
- ▶ Forecast year ADT
- ▶ Heavy vehicle ADT
- ▶ Forecast year LOS
- ▶ Traffic & pedestrian generators
- ▶ Alternate route designation
- ▶ Traffic control density
- ▶ Transit frequency
- ▶ Crash rate
- ▶ Crash severity



AIM Plan – Criteria Development

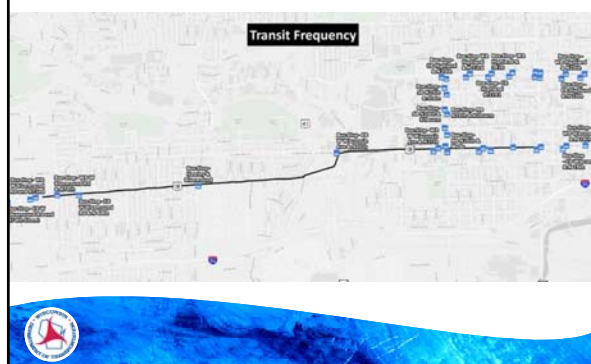


AIM Plan – Data Collection

- ▶ Data sources used for AIM
 - MetaManager
 - WisDOT traffic data maps
 - WisDOT crash database
 - MAJORS traffic analysis
 - Aerial imagery of corridors
 - Local agency discussions

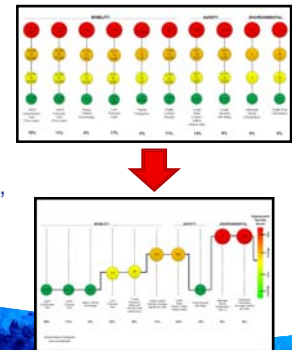


AIM Plan – Conditions Mapping



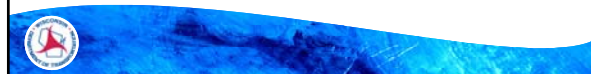
AIM Plan – Scoring Method

- ▶ Threshold scores for a particular criteria summed across all MM segments
- ▶ Threshold scores normalized, weighted, and summed to generate corridor score

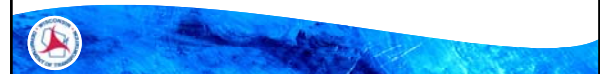


AIM Plan – Additional Steps

- Develop ITS deployment spectrum
 - Develop cost estimate for corridors
 - Establish performance measures
 - Local agency partnerships
- ▶ AIM Plans remain under the TSM&O-TIP umbrella but drills down into arterial needs with additional data



III. TSM&O-TIP



Defining TSM&O – MAP-21

MAP-21 revised the federal definition of TSM&O to the following (23 U.S.C. § 101(a)(39)):

(A) In general. -- The term 'transportation systems management and operations' means integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system.

(B) Inclusions. -- The term 'transportation systems management and operations' includes --

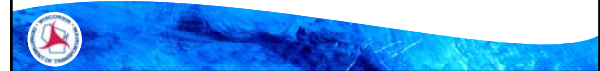
(i) actions such as traffic detection and surveillance, corridor management, freeway management, arterial management, active transportation and demand management, work zone management, emergency management, traveler information services, congestion pricing, parking management, automated enforcement, traffic control, commercial vehicle operations, freight management, and coordination of highway, rail, transit, bicycle, and pedestrian operations; and

(ii) coordination of the implementation of regional transportation system management and operations investments (such as traffic incident management, traveler information services, emergency management, roadway weather management, intelligent transportation systems, communication networks, and information sharing systems) requiring agreements, integration, and interoperability to achieve targeted system performance, reliability, safety, and customer service levels.



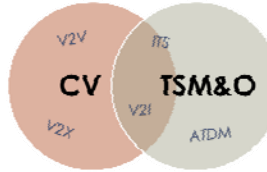
Defining TSM&O – Continued

- FHWA states, "Transportation Systems Management and Operations (TSM&O) is an integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to preserve capacity and improve the security, safety and reliability of the transportation system."
- The WisDOT TSM&O State of the State Report further adds: "Plans to retire system components that no longer provide sufficient benefit to warrant continuation or are technologically obsolete."



TSM&O ≠ ITS

- ITS is part of TSM&O, specifically the technology applications and supporting communications to improve safety and efficiency
- Contrast that with connected vehicle (CV) applications, which overlap with TSM&O



- With the TOIP retired, the TSM&O traffic infrastructure process takes a broader and more flexible approach



Example TSM&O Traffic Infrastructure Strategies

- Work Zone Management
- Traffic Incident Management
- Service Patrols
- Special Event Management
- Road Weather Management
- Transit Management
- Traffic Signal Coordination
- Surveillance and Monitoring
- Traveler Information
- Ramp Management
- Managed Lanes
- Active Traffic Management
- Integrated Corridor Management
- Truck Parking



TSM&O-TIP Objectives

- Develop a high level process and associated spatial analytical tool for WisDOT TSM&O traffic infrastructure
- Continuous performance improvement
- Prioritize investments where potential benefit is greatest
 - Decision-making support
- Support federal requirements:
 - Systems engineering and ITS architecture
 - Real time system management information program
 - MAP-21 performance management



TSM&O Stakeholders

- Division of Transportation System Development (DTSD)
 - Bureau of Traffic Operations (BTO)
 - Systems Operations Section
 - Traffic Engineering Section
 - Bureau of Highway Maintenance (BHM)
 - Regional operations managers
 - Regional traffic staff
 - Bureau of Project Development (BPD)
- Division of Transportation Investment Management (DTIM)
 - Bureau of State Highway Programs (BSHP)
 - Bureau of Planning and Economic Development (BPED)
- Wisconsin State Patrol (WSP)
- Wisconsin TOPS Lab
- Federal Highway Administration (FHWA)
- Select Counties
 - Milwaukee and Dane County Sheriffs
- Select Municipalities
 - City of Milwaukee
 - City of Madison Traffic
- Select Planning Organizations
 - Southeast Wisconsin Regional Planning Commission (SEWRPC)
 - Madison Area Transportation Planning Board (MATPB)



TSM&O Capability Maturity Model

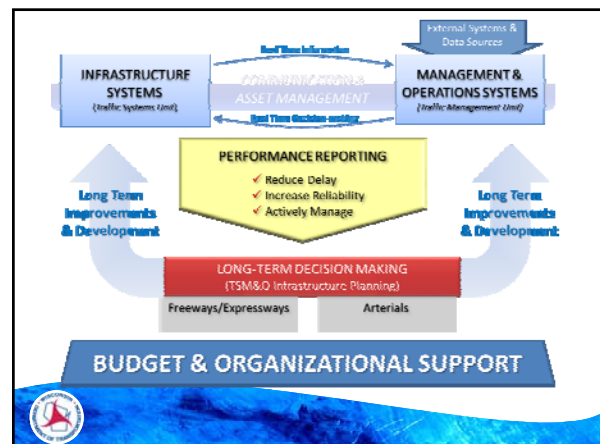
Six Dimensions

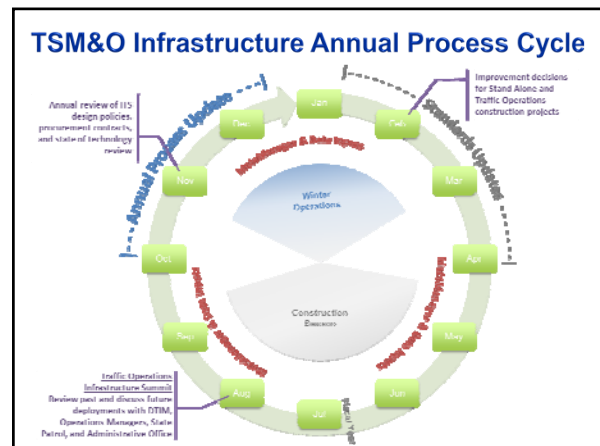
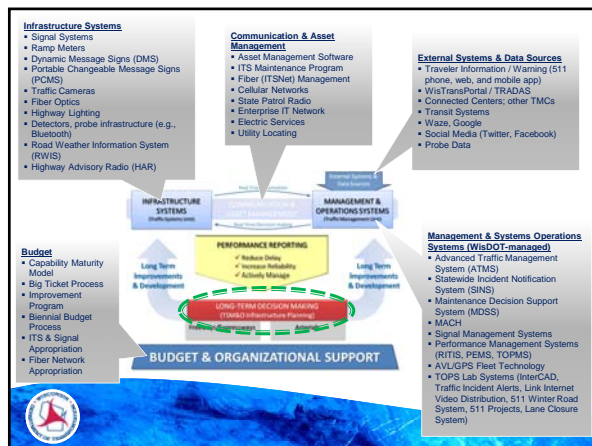
- Business Processes
- Systems & Technology**
- Performance Measurement
- Culture
- Organization / Workforce
- Collaboration

Relevant Examples

- Develop this new traffic infrastructure process
- Peer review and working group
- Annual cycle with updates and linkages to other WisDOT business processes
- Truck parking, ITS architecture, regional coordination, etc.

WisDOT recently received a federal grant to advance these





Process Cycle Case Study Example

A WisDOT region requests a new device – e.g., DMS, detector, etc. – and these are some questions to consider:

- Is it effective?
- Does WisDOT have capability to operate and maintain?
- Is it optimally placed?
 - How does it meet priority needs?
- Is the technology the best option?
 - Are there other options to consider?
- How does it fit with ITS architecture and WisDOT policy documents?

Stakeholder Input

Refer to Handout

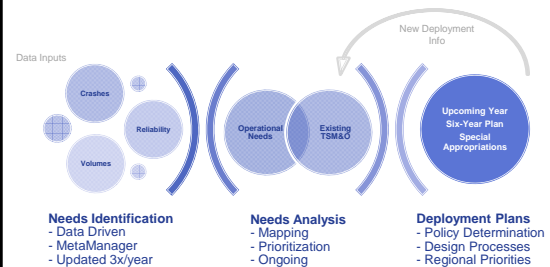
- What do you need out of the process to support your efforts?
- What is an example of a traffic infrastructure project you have or are pursuing within TSM&O?
- What is a performance measure that you already use or want to use to define a successful project?
- With a less prescriptive infrastructure process in place, what TSM&O infrastructure projects would you focus on or prioritize?
- What is one recommendation you have for a new technology, system, or data source the Department should be pursuing, evaluating, and adopting?

Stakeholder Input (continued)

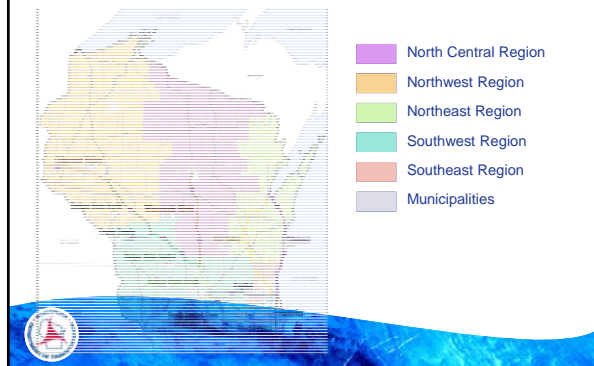
- What is a technology, system, or specific device that you would like to see retired?
- How would you utilize the needs assessment tools to help select or prioritize your projects? In your opinion, what inputs are most important?
- What gaps do you see between current TSM&O infrastructure deployments and operational needs?
- What do you believe is the correct group (existing or new) for approving TSM&O infrastructure investments (e.g., ITS TAG, Ops Managers, BTO management, etc.)?
- What other recommendations or feedback do you have?

please write down some thoughts and leave this sheet behind when you leave

TSM&O-TIP Process Overview

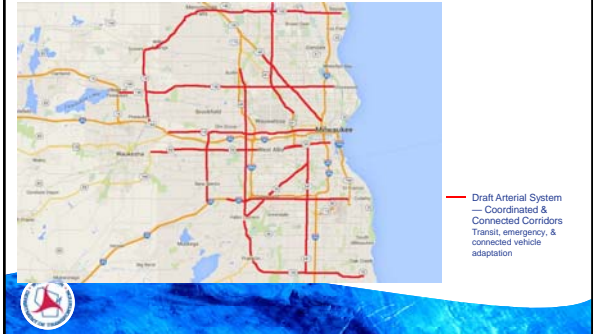


Statewide TSM&O Deployment MAPSS Corridors



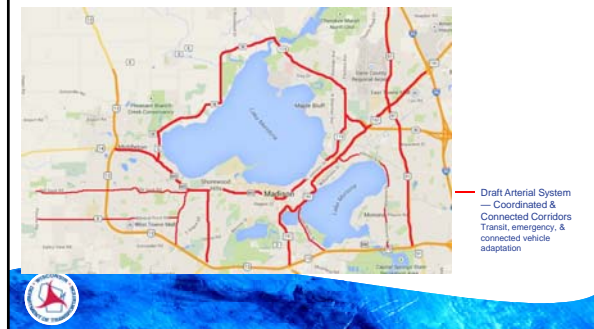
Draft Arterial System

Example: Milwaukee & Waukesha Counties



Draft Arterial System

Example: Dane County



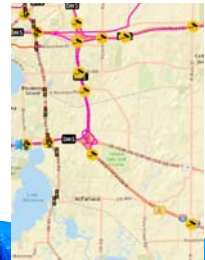
Process Tools

- Performance driven spatial analytics
- Data driven: identify gaps between need and current TSM&O infrastructure deployment

Network Inputs:

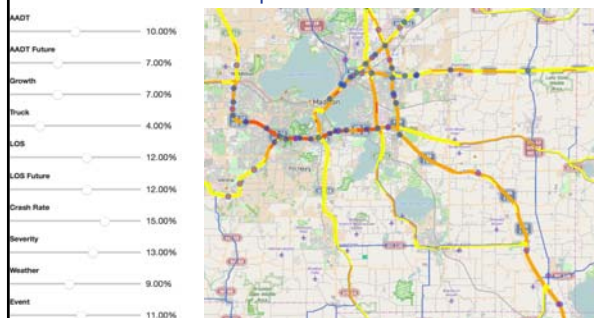
- AADT (present and future)
- Growth
- Trucks
- LOS (present and future)
- Crash Rate
- Crash Severity
- Weather Impact
- Special Events
- Reliability

Existing Field Coverage:



Process Tools

- Statistical and analytical model
- Interface is in development



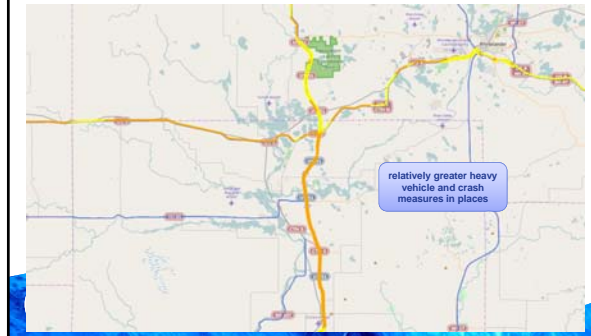
Process Tools – Examples

Northwest Region



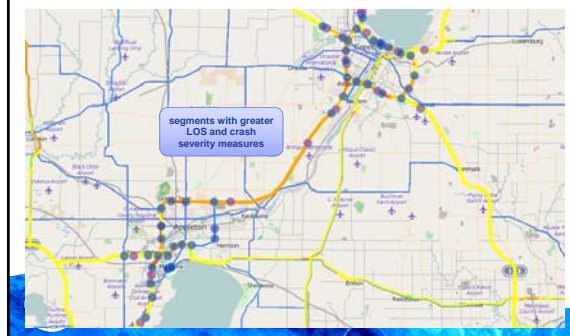
Process Tools – Examples

North Central Region



Process Tools – Examples

Northeast Region



Process Tools – Examples

Southwest Region

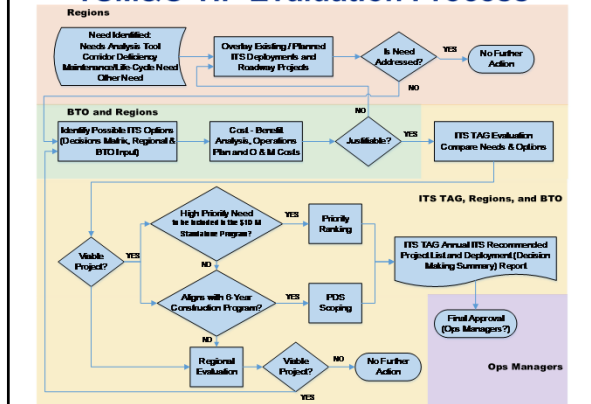


Process Tools – Examples

Southeast Region



TSM&O TIP Evaluation Process



TSM&O Evaluations

- ▶ Summary information for current technologies and infrastructure strategies
 - VSL state of the practice example
- ▶ Evaluation framework for new or emerging technologies or infrastructure strategies
 - Efficacy
 - Cost effectiveness and benefit-cost analysis
 - Life cycle costs
- ▶ Retiring or phasing out old or ineffective equipment or systems
 - HAR example



TSM&O Decision Matrices

Technology Matrix

Traditional Infrastructure Based

	Loop	Microwave – G4	Microwave – Wavetronics
Initial Cost	\$17,000 per site ¹	\$18 to \$21k per site ¹	\$20 to \$23k per site ¹
Annual Operations & Maintenance Cost	\$500 per site ¹	\$400 per site ¹	\$400 per site ¹
Total Cost for 10 Years (including initial, O&M and replacement cost)	\$45,000 per site	\$43,000 per site	\$47,000 per site
Data Content	Traffic volume, speed, lane occupancy and vehicle classification	Traffic volume and speed is measured directly	Traffic volume and speed is measured directly
Data Quality	High capture rate with little lag time	High capture rate with little lag time	High capture rate with little lag time
Data Collection	Continuous data collection of all vehicles (based on equipment reliability and position)	Continuous data collection of all vehicles (based on equipment reliability and position)	Continuous data collection of all vehicles (based on equipment reliability and position)

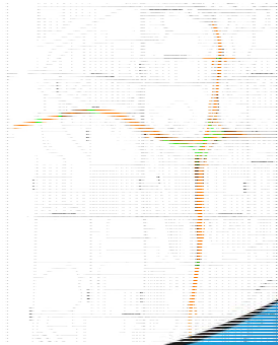
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Zoo Interchange Project Proposed DMS



2016-2017 Construction Zoo Interchange Phase 2

- Lane closure I-94 eastbound
- W-N closed for 10 months
- N-E closed for 6 months



Zoo North Leg Construction

- Construction will follow Phase 2
- Lane restrictions on I-41/US 45
- North Avenue Ramps closed for over a year
- North Avenue closed for the summer



Decision Making Process

1. Do the signs fill a need for the TMP and ICMS?
2. Do the signs capitalize on existing investment (travel time and communication infrastructure, ICMS investments)?
3. Do the proposed signs provide a significant improvement over the existing signs?



TMP Strategies

Strategy must...	DMS
Provide lasting benefit to commuter safety and mobility	Yes – signs continue to provide a benefit after construction
Be proven successful and provide positive benefit cost ration	Yes – studies indicate signs have a benefit cost of about 15 under normal conditions, much higher during construction
Align with WisDOT's TMP policy goals and eligible TMP Strategies	Yes



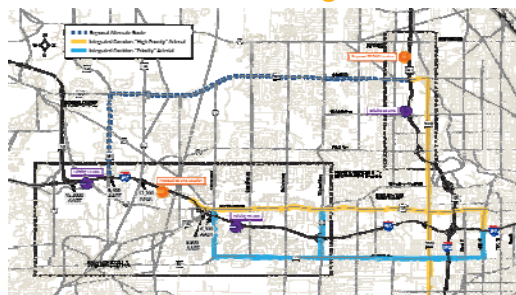
Integrated Corridor Management System

Goals

- **Optimize corridor operations versus individual networks**
- Maximize available capacity through the corridor
- Improve travel time reliability and predictability
- **Manage congestion**
- **Provide traveler information to improve decision making**



Proposed and Existing Sign Locations



Proposed Signs

- Full color, high resolution sign provides more flexibility with signage and more visibility to motorists
- Capitol Drive and Barker Road provide improved alternate route options
- Eastbound sign reaches about 35,000 more vehicles daily



DMS Benefit - Cost

- Long-term B/C calculations are based on 15% of peak hour motorists saving 5 minutes of delay
 - Results in B/C of 15 to 1
 - Based on TOIP economic analysis



DMS Benefit - Cost

- Construction B/C calculations are based on 50% of peak hour motorists saving 7 minutes
 - Results in B/C of 67 to 1
 - Based on microsimulation study



IV. 2016 Deployments



2016 TSM&O Deployments

- Municipal and County Proposed Deployments
- Proposed 2016 Deployments
 - 6-year construction schedule
 - \$10M standalone
- Evaluating 2016 Deployments with TSM&O-TIP

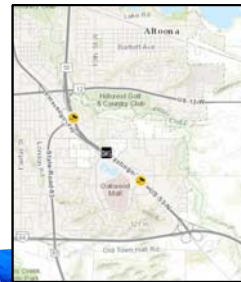


Proposed 2016 Camera Deployments

Region	Device ID	Location	Project
NE	CCTV-05-0042	US 41 @ Oneida St	* USH 41 Expansion Project, 1133-09-71
NE	CCTV-05-0047	US 41 @ I-43	* USH 41 Expansion Project, 1133-10-77
NE	CCTV-05-0048	US 41 @ East Deerfield Drive	* USH 41 Expansion Project, 1133-10-77
NW	CCTV-27-0036	I-94 @ County O	1023-00-80
NW	TBD	US 53 @ Golf Rd.	\$10M Appropriation
NW	TBD	US 53 @ STH 93	\$10M Appropriation
NW	TBD	US 53 @ Melby Rd.	\$10M Appropriation
NW	TBD	US 53 @ STH 124	\$10M Appropriation
NW	TBD	US 53 @ STH 29	\$10M Appropriation
NW	TBD	US 53 @ STH 29 (2nd camera)	\$10M Appropriation
NW	TBD	US 53 @ Bus 29/CTH X	\$10M Appropriation
SE	CCTV-30-0133	I-94 @ Hwy E	1030-23-72
SE	CCTV	I-894 @ Hale Interchange	\$10M Appropriation
SE	CCTV	I-894 @ 51st St.	\$10M Appropriation
SE	CCTV	I-43 @ Locust	\$10M Appropriation
SE	CCTV	I-794 @ Howard Ave.	\$10M Appropriation
SE	CCTV	I-43 @ Calhoun Rd.	\$10M Appropriation
SE	CCTV	I-94 @ 35th St.	\$10M Appropriation
SW	CCTV-13-0128	US 151 @ WIS 19	1111-02-78
SW	CCTV-13-0129	US 151 @ CTH N	1111-02-78

Proposed 2016 TSM&O Deployments

Northwest Region
Eau Claire / Chippewa Falls (US 53)



Proposed 2016 DMS Deployments

Region	Device ID	Location	Project
NW	DMS-55-0009	WIS 35/64 WB @ Anderson Boy Scout Camp Rd	8110-02-75
NW	TBD	US 53 NB (Between Golf Rd. & STH 93)	\$10M Appropriation
NW	TBD	US 53 NB South of STH 29	\$10M Appropriation
NW	TBD	US 53 SB North of STH 29	\$10M Appropriation



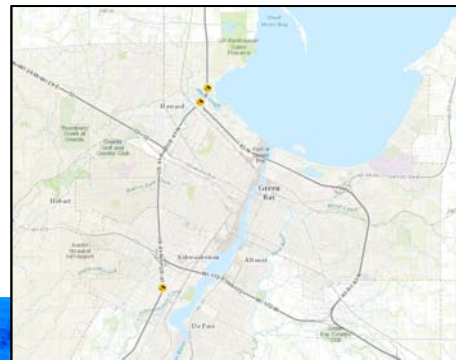
Proposed 2016 TSM&O Deployments

Northwest Region
Saint Croix County / Jackson County



Proposed 2016 TSM&O Deployments

Northeast Region



Proposed 2016 TSM&O Deployments

Southwest Region

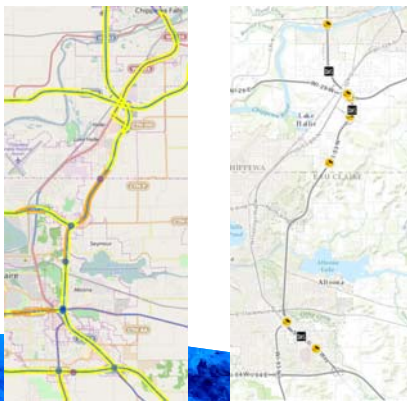


Proposed 2016 TSM&O Deployments

Southeast Region



Needs Tool and 2016 Planned Deployments



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Next Steps

- ▶ Continue improving tools (Needs, CBA, future Asset Management Software for Inventory, O&M, and Life Cycle)
- ▶ Use Process to Evaluate Old Technology (HAR)
- ▶ Meet with Regions to do a Process Workshop
- ▶ Annual Schedule tie in with Evaluation Process
- ▶ Questions?
- ▶ Thank you



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