Traffic Tech Talk

Planning for Operations: TSMO-TIP

Todd Szymkowski, PE, PTOE, PMP

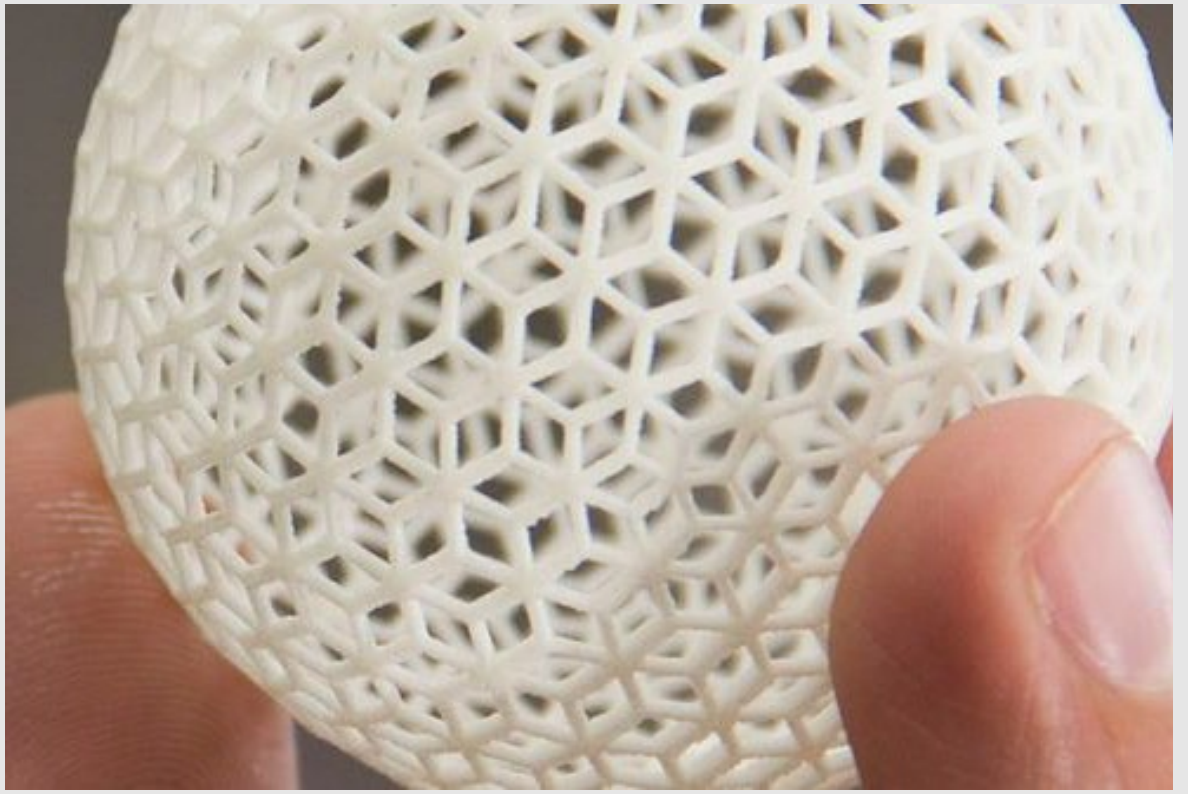
Bureau of Traffic Operations

- TSMO-TIP and its origins
- TSMO TIP Objectives
- TSMO-TIP Processes, Application, and Tools
- Future TSMO-TIP improvements
- Other State DOT Activities
- Key TSMO-TIP Resources

What is TSMO-TIP?

1. Process
2. Application
3. Two Tools
   - Needs Analysis Tool
   - Benefits Analysis Tool

- Preliminary Step in constructing ITS on State Network
- Aligned with the Signals and ITS Standalone Program (SISP)



Signals and ITS Standalone Program (SISP)

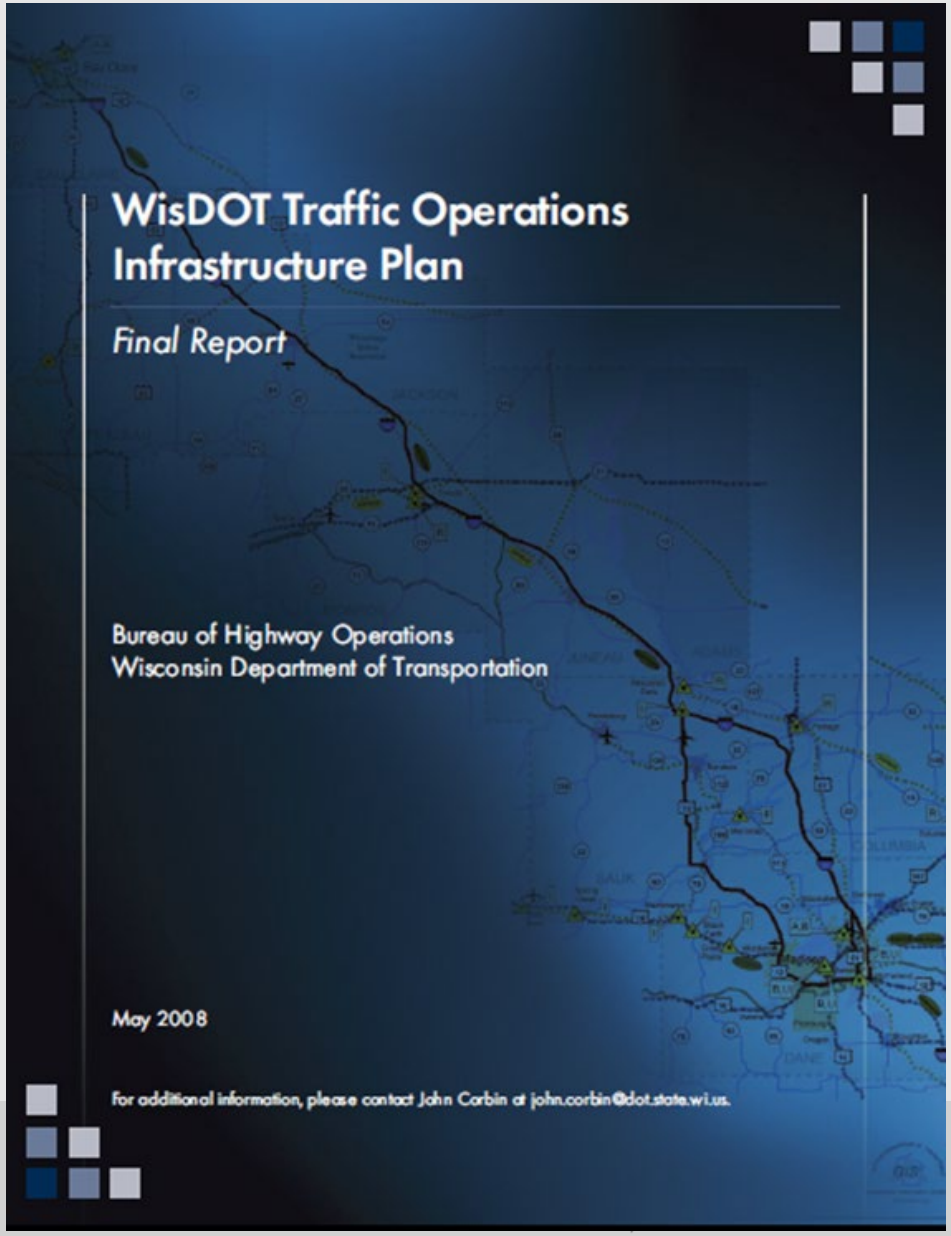
- $10M set aside for standalone projects with greater than 50% cost associated with traffic signal or ITS hardware and construction
- All state (including Interstate) and connecting highways (90/10 split) eligible
- Spring and Fall Solicitations

Example Projects

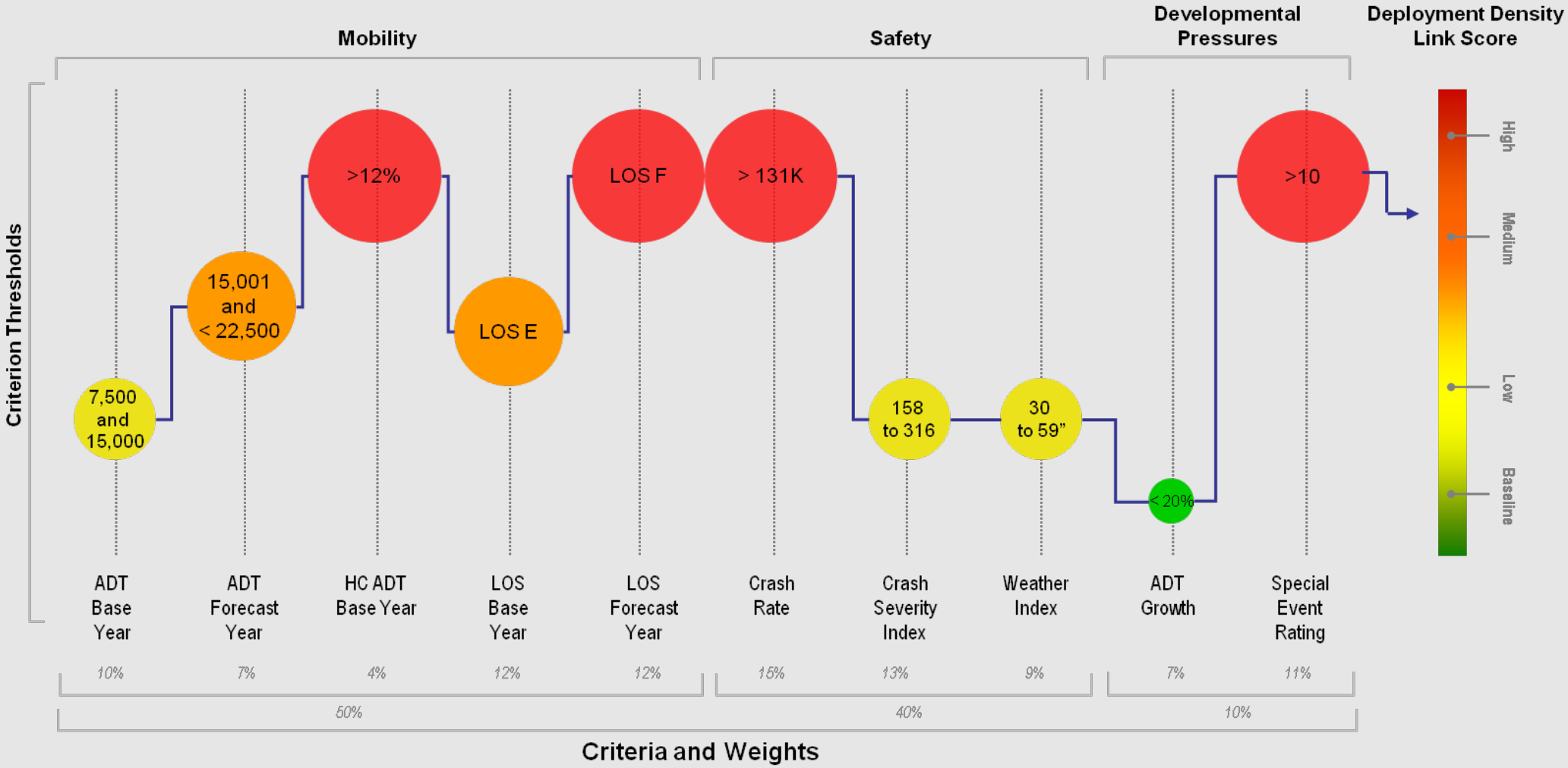
- New Signals/ Rehabs / Retrofit / Retiming
- ITS Devices / Rehabs
- Field Devices Communications
- Systems Software/Firmware
- Signal and ITS Life Cycle Replacement
- Performance Measures Applications
- R&D Projects
- CAV Deployments and Applications
- Studies, Plans, and Evaluations
- Traffic Ops. Data Subscriptions

Origins of TSMO-TIP

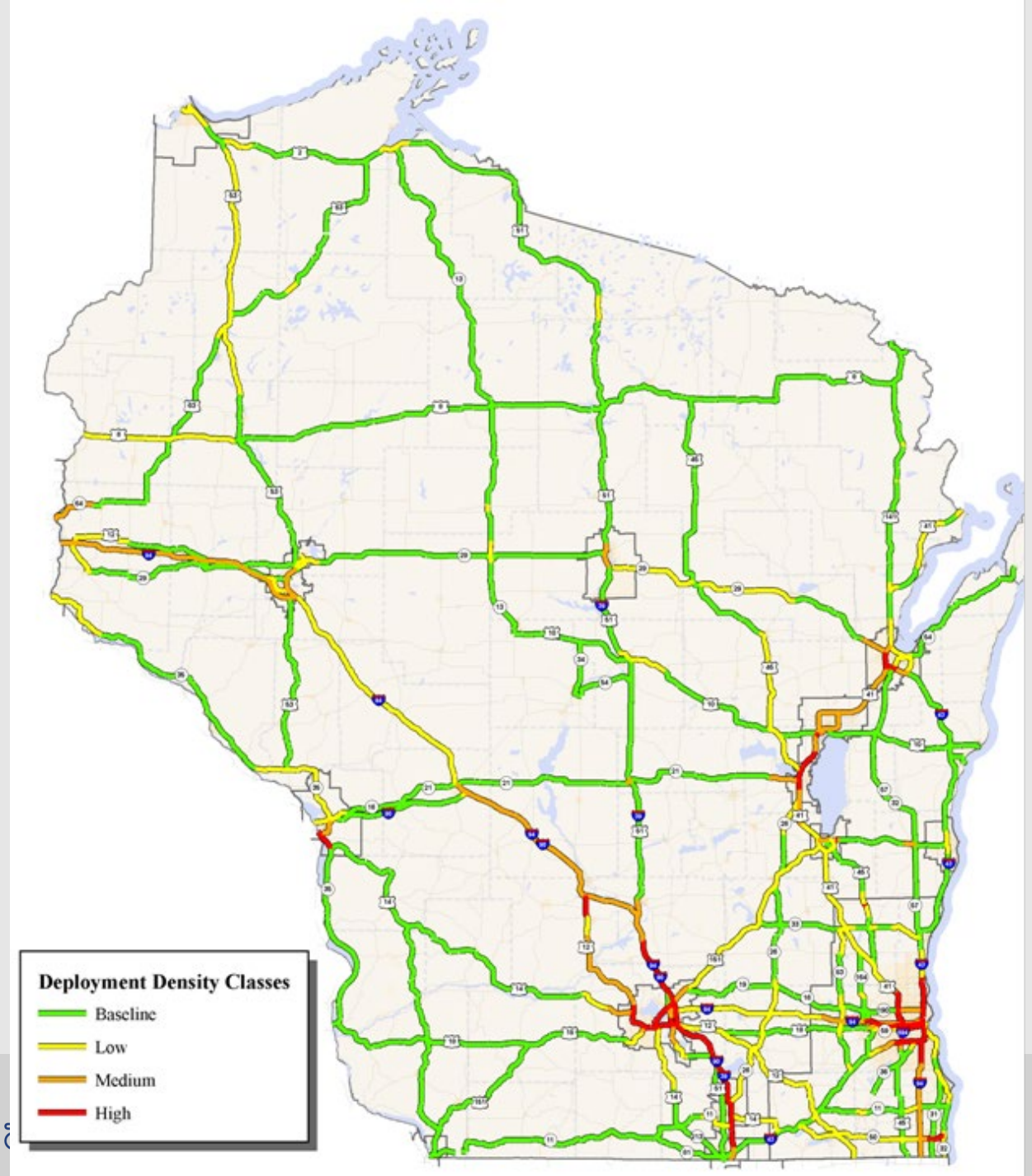
- Evaluate operational/ITS projects in same manner as traditional highway projects – “pavement equivalences”
- Notion of “ITS Everywhere” unreasonable
- Integrate operations into the WisDOT planning process
- Methodology based on operational needs:
  - Ramp Control and Surveillance
  - Traveler Warning and Information Systems
  - Traffic Signal Systems
  - Enabling Communications Network
- **Recipient of FHWA and FTA 2008 Transportation Planning Excellence Awards**



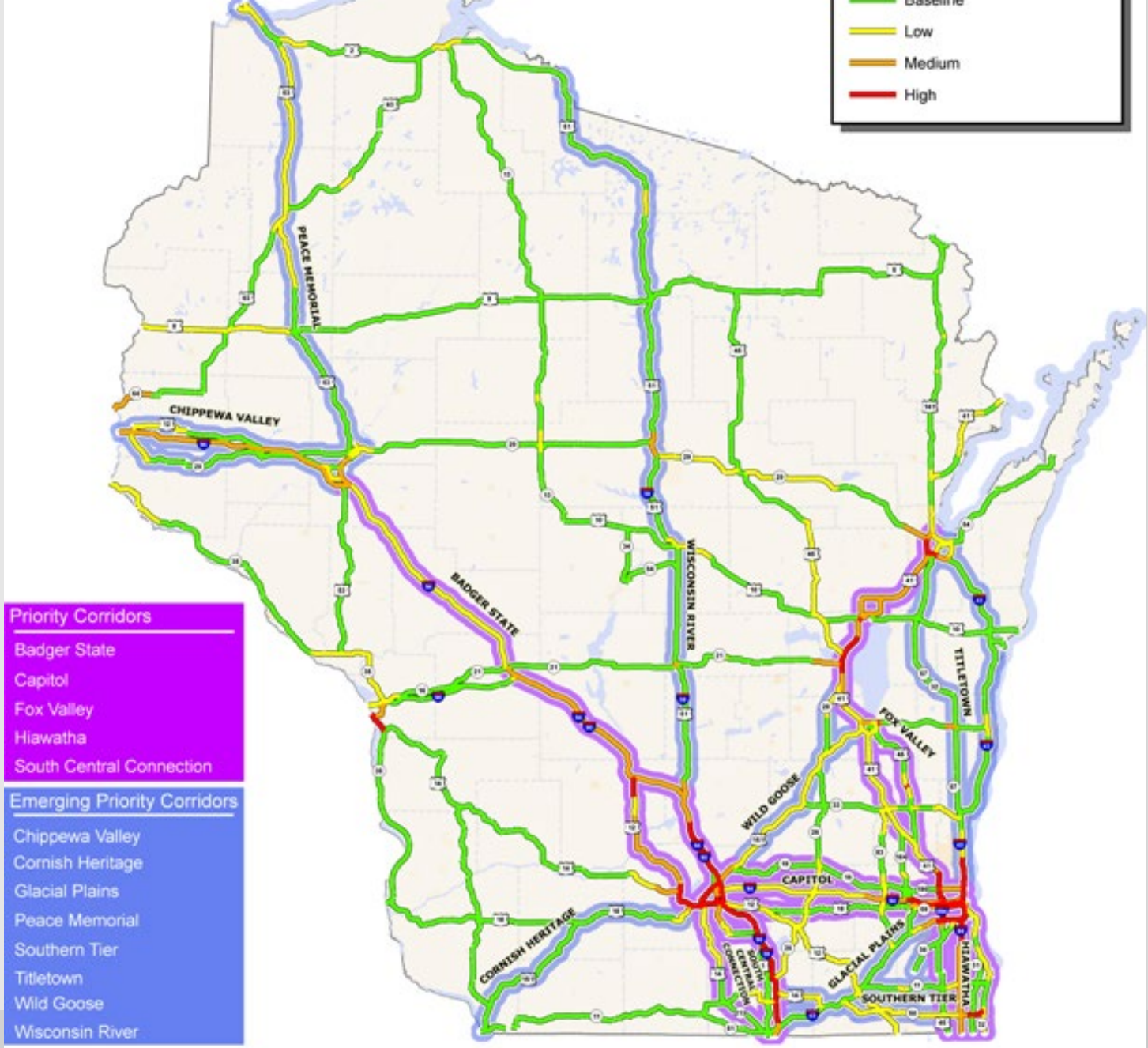
Sample Results



Statewide Deployment Density

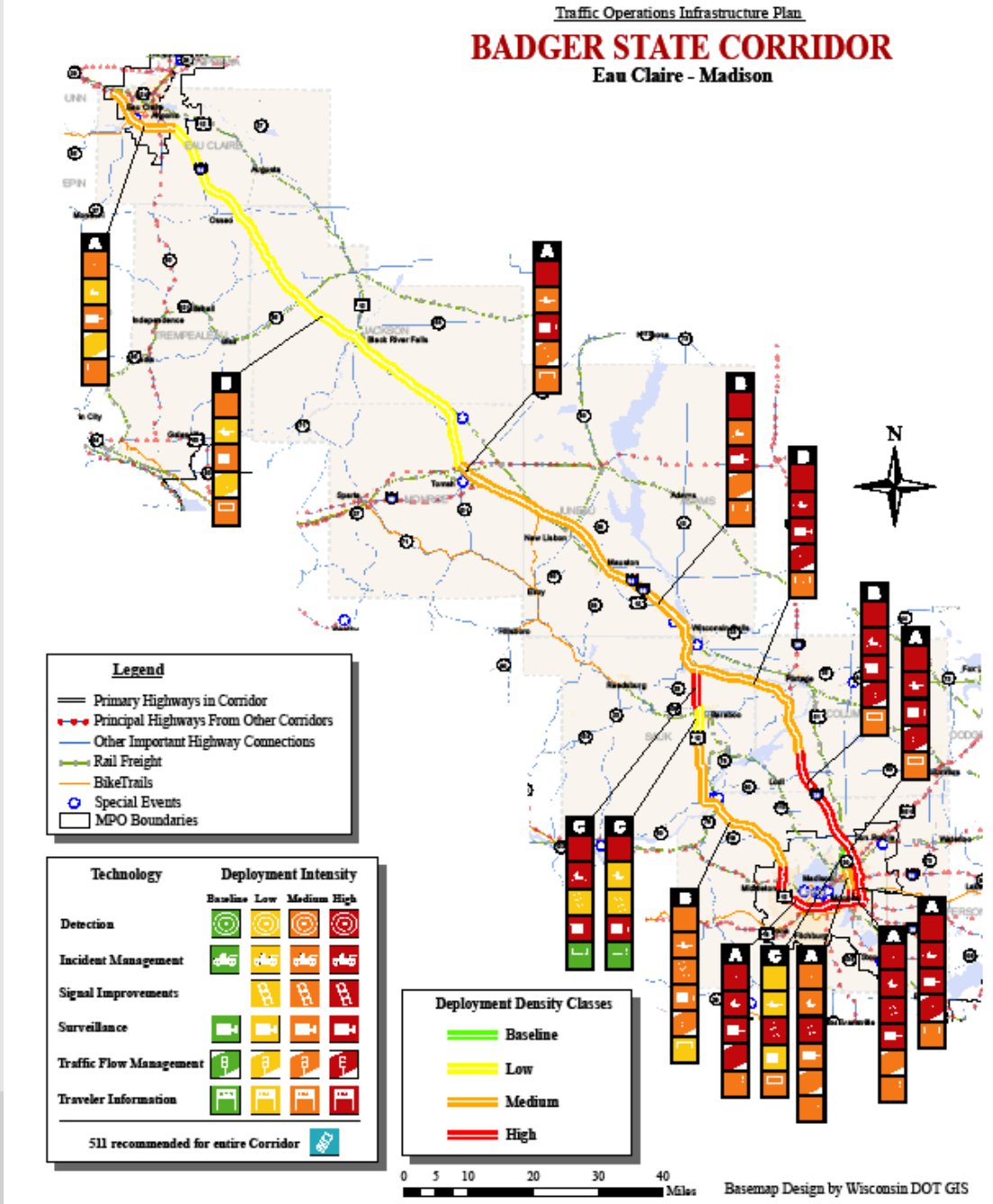


Priority and Emerging Priority Corridors



Corridor Maps

- Match Long-Range Plan Corridors
- Deployment Density Class
- Operations Intensity



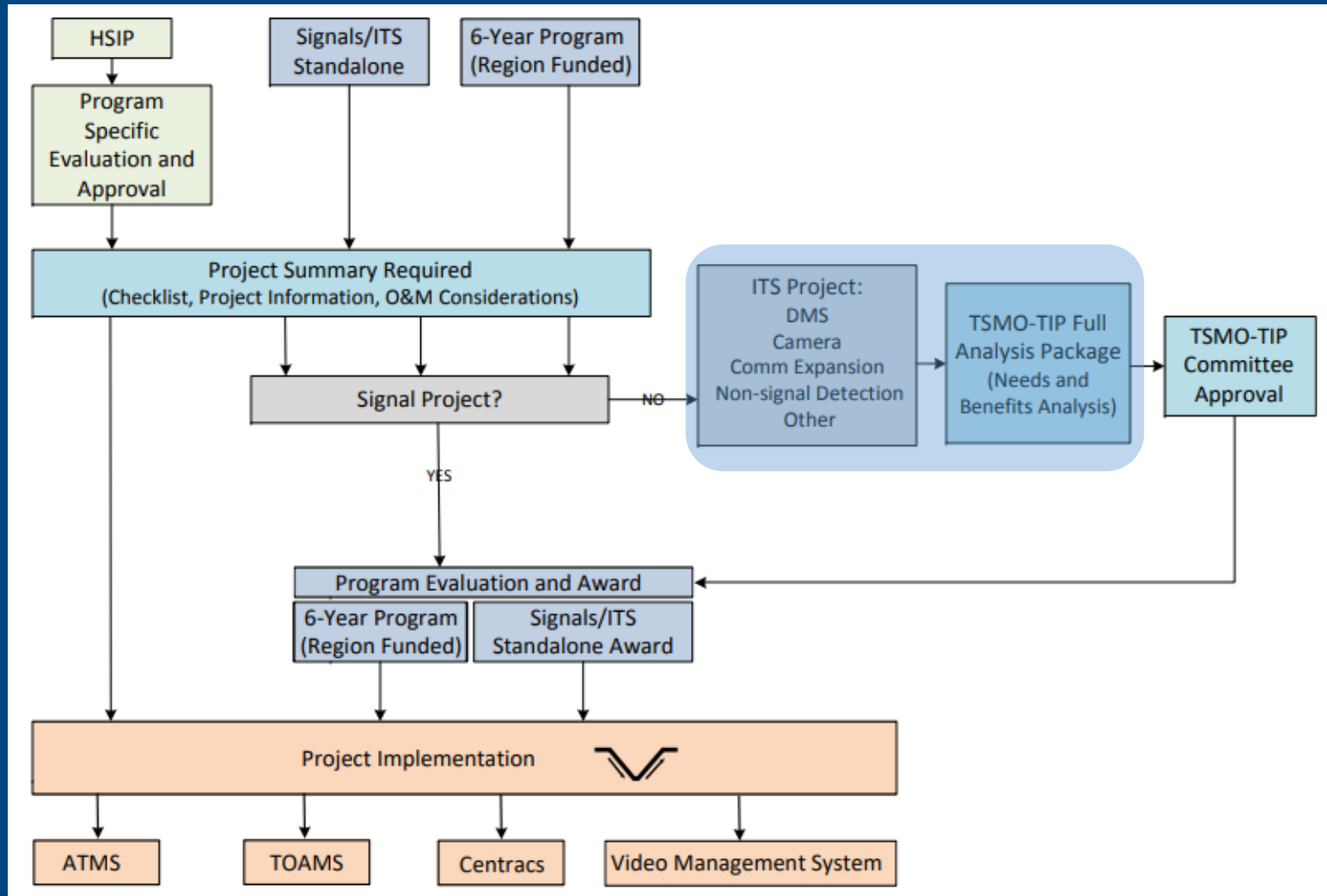
TSMO-TIP Objectives

Sustain a traffic infrastructure deployment process focused on:

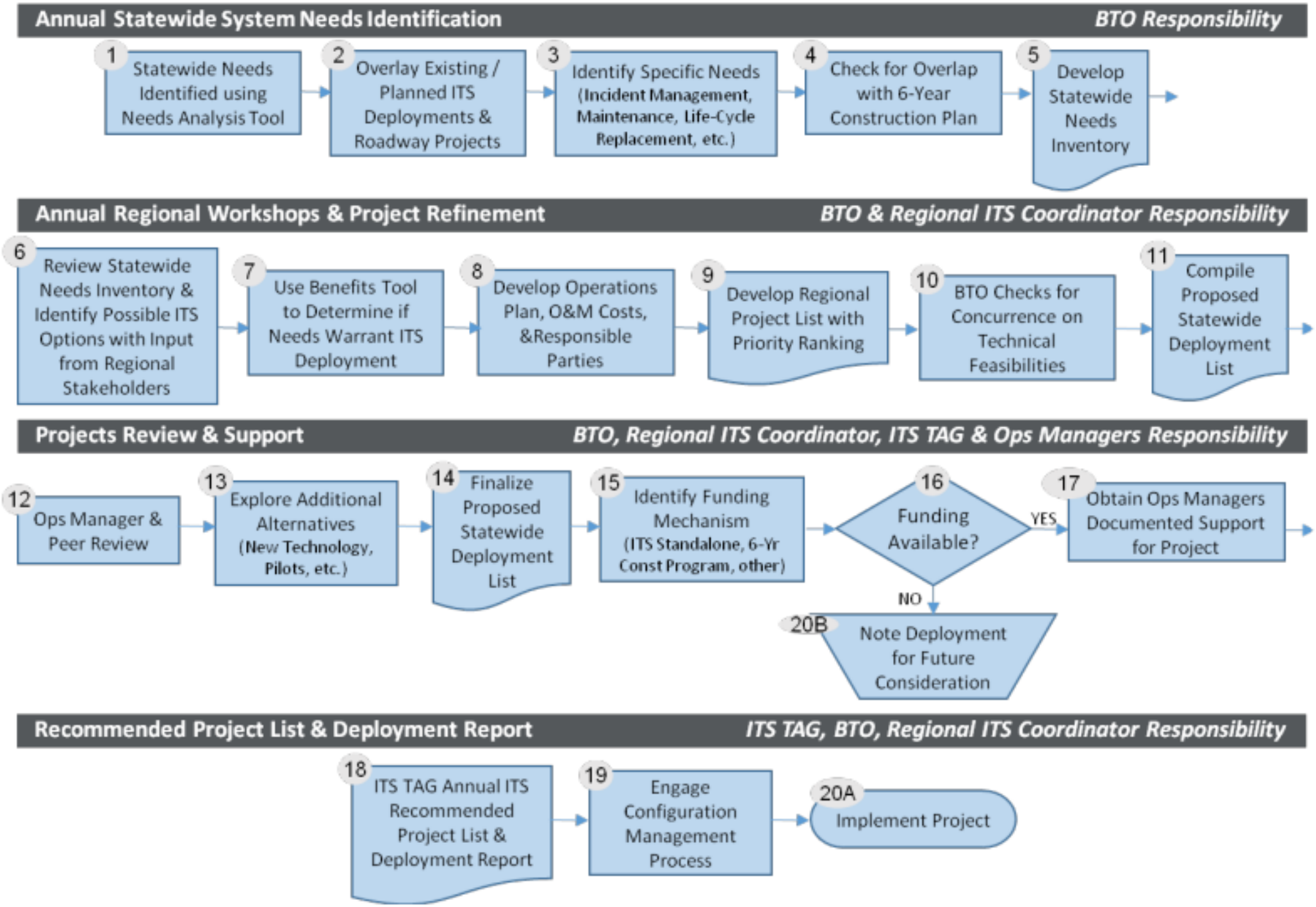
- Continuous performance improvement
- Current and short-term needs
- Decision making support
- Process documentation
- Support federal requirements

TSMO-TIP Processes

- Process tied to SISP
- Assists to justify ITS/TSMO Investments
- Combines Network Screening w/ Needs and Benefits Analysis

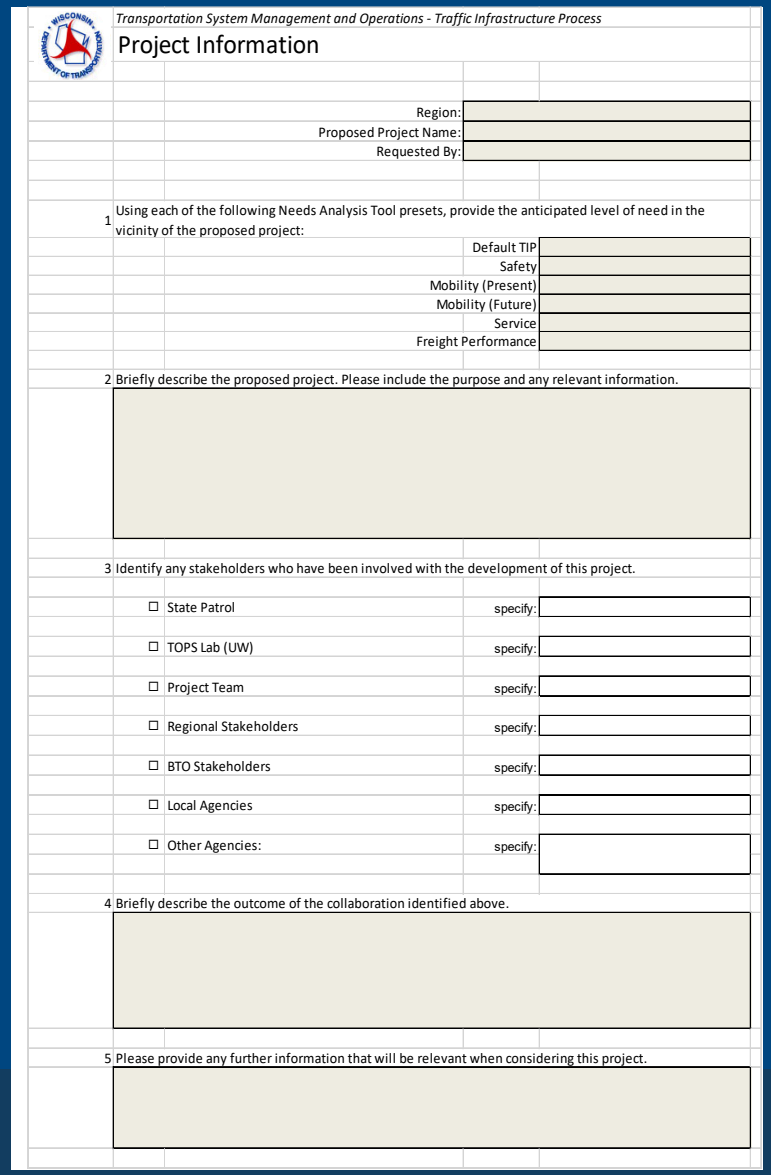


TSMO TIP Process



Application

- Project Information
- Documentation Checklist
- Project Information Sheet
- Project Needs Maps
- Project Needs Reports
- Project Benefit Analysis
- Project O&M Considerations
- Any supporting information



Transcription of the image:

Transportation System Management and Operations - Traffic Infrastructure Process

Project Information

Region:
Proposed Project Name:
Requested By:

1 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP
Safety
Mobility (Present)
Mobility (Future)
Service
Freight Performance

2 Briefly describe the proposed project. Please include the purpose and any relevant information.

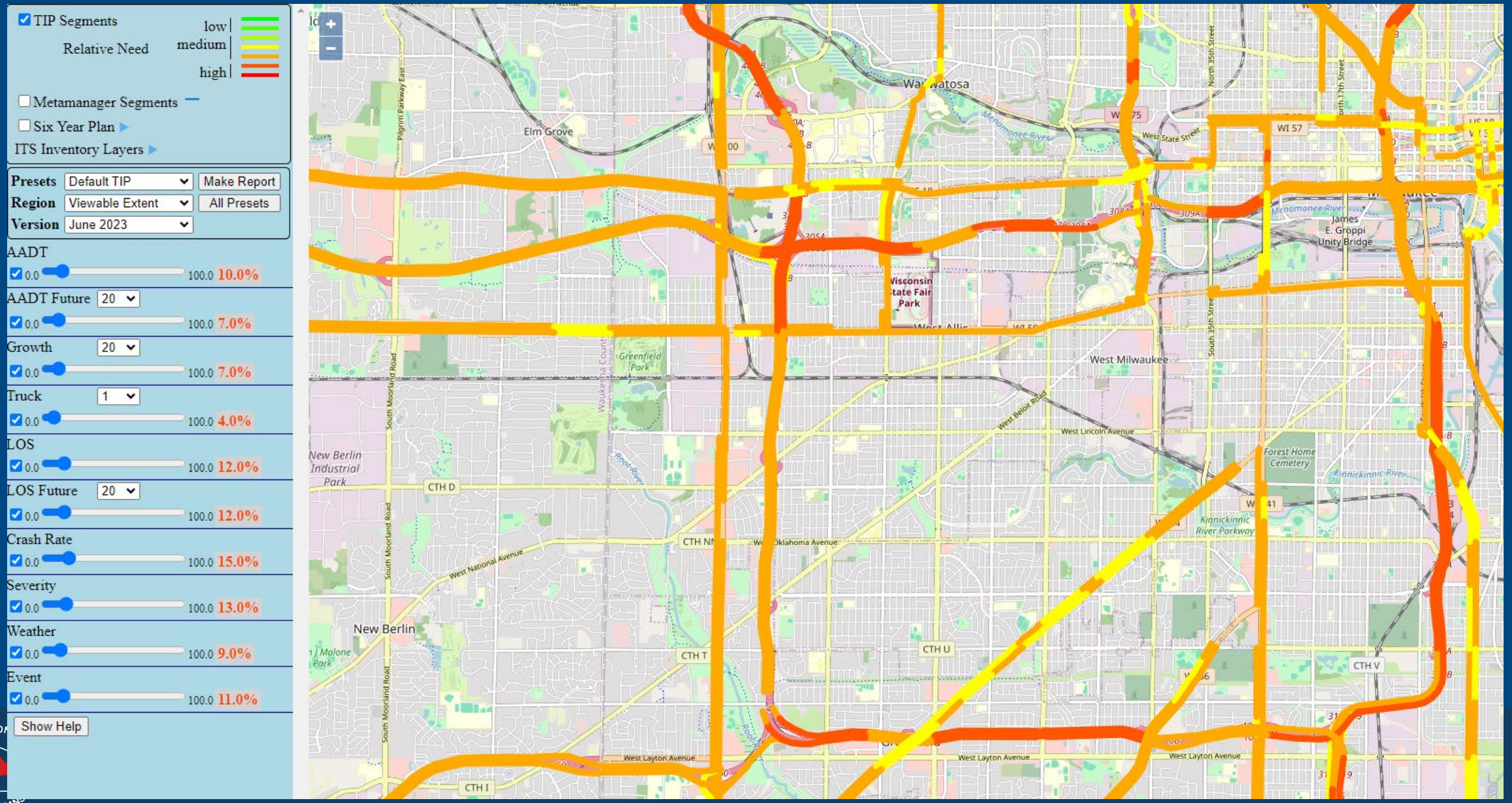
3 Identify any stakeholders who have been involved with the development of this project.

☐ State Patrol specify:
☐ TOPS Lab (UW) specify:
☐ Project Team specify:
☐ Regional Stakeholders specify:
☐ BTO Stakeholders specify:
☐ Local Agencies specify:
☐ Other Agencies: specify:

4 Briefly describe the outcome of the collaboration identified above.

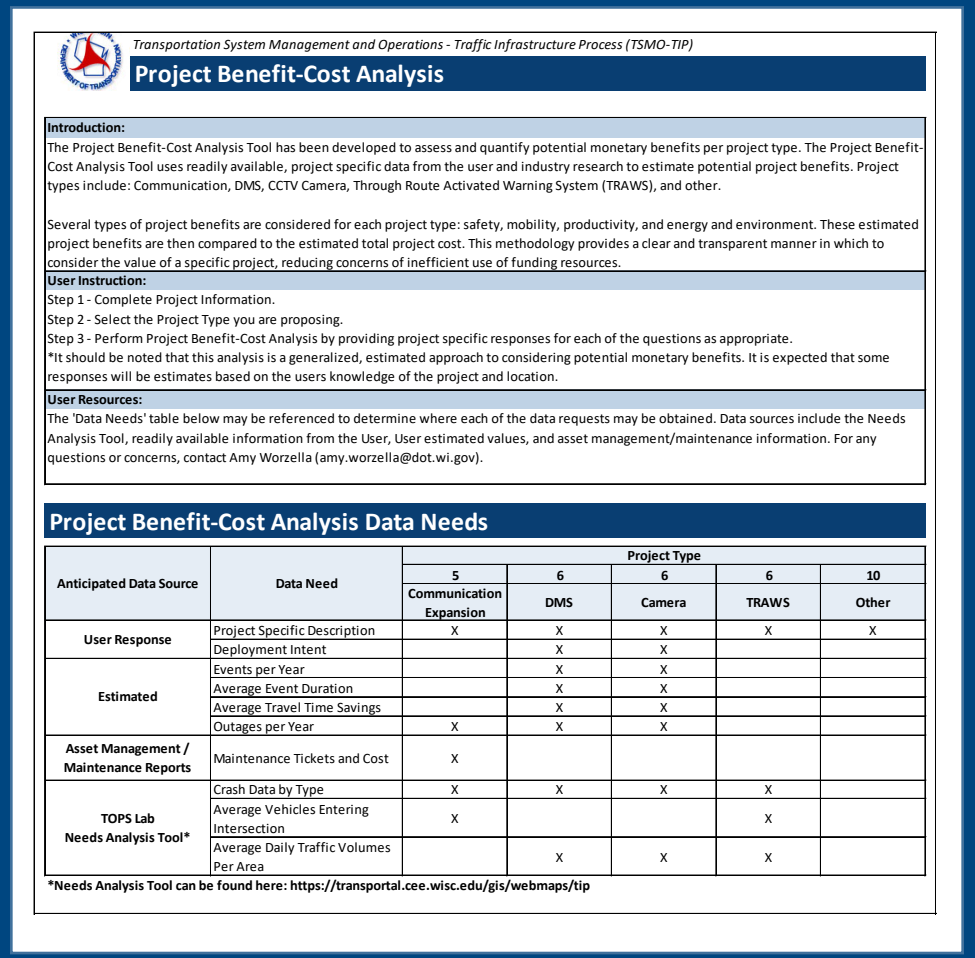
5 Please provide any further information that will be relevant when considering this project.

TSMO-TIP Needs Analysis Tool



Benefits Analysis Tool

- Project Type
  - DMS
  - CCTV
  - Communications
  - Through Route Activated Warning System (TRAWS)
  - Other
- Generates
  - 20-Year Monetized Benefits and Costs
  - Benefit-Cost Ratio
  - Return on Investment



Transportation System Management and Operations - Traffic Infrastructure Process (TSMO-TIP)

Project Benefit-Cost Analysis

Introduction:

The Project Benefit-Cost Analysis Tool has been developed to assess and quantify potential monetary benefits per project type. The Project Benefit-Cost Analysis Tool uses readily available, project specific data from the user and industry research to estimate potential project benefits. Project types include: Communication, DMS, CCTV Camera, Through Route Activated Warning System (TRAWS), and other.

Several types of project benefits are considered for each project type: safety, mobility, productivity, and energy and environment. These estimated project benefits are then compared to the estimated total project cost. This methodology provides a clear and transparent manner in which to consider the value of a specific project, reducing concerns of inefficient use of funding resources.

User Instruction:

Step 1 - Complete Project Information.
Step 2 - Select the Project Type you are proposing.
Step 3 - Perform Project Benefit-Cost Analysis by providing project specific responses for each of the questions as appropriate.
*It should be noted that this analysis is a generalized, estimated approach to considering potential monetary benefits. It is expected that some responses will be estimates based on the users knowledge of the project and location.

User Resources:

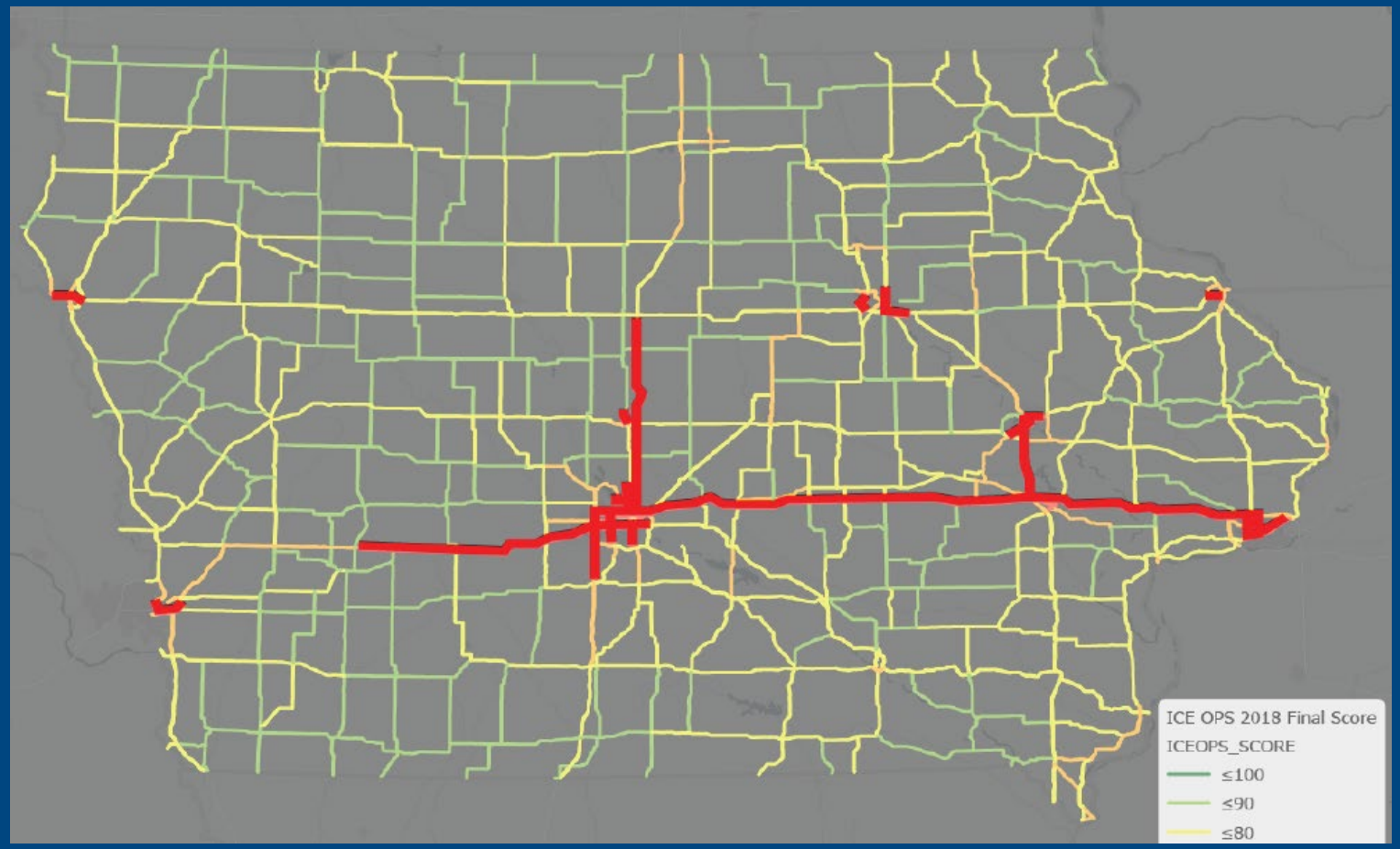
The 'Data Needs' table below may be referenced to determine where each of the data requests may be obtained. Data sources include the Needs Analysis Tool, readily available information from the User, User estimated values, and asset management/maintenance information. For any questions or concerns, contact Amy Worzella (amy.worzella@dot.wi.gov).

Project Benefit-Cost Analysis Data Needs

Anticipated Data Source	Data Need	Project Type				
		5	6	6	6	10
		Communication Expansion	DMS	Camera	TRAWS	Other
User Response	Project Specific Description	X	X	X	X	X
	Deployment Intent		X	X		
Estimated	Events per Year		X	X		
	Average Event Duration		X	X		
	Average Travel Time Savings		X	X		
	Outages per Year	X	X	X		
Asset Management / Maintenance Reports	Maintenance Tickets and Cost	X				
TOPS Lab Needs Analysis Tool*	Crash Data by Type	X	X	X	X	
	Average Vehicles Entering Intersection	X			X	
	Average Daily Traffic Volumes Per Area		X	X	X	

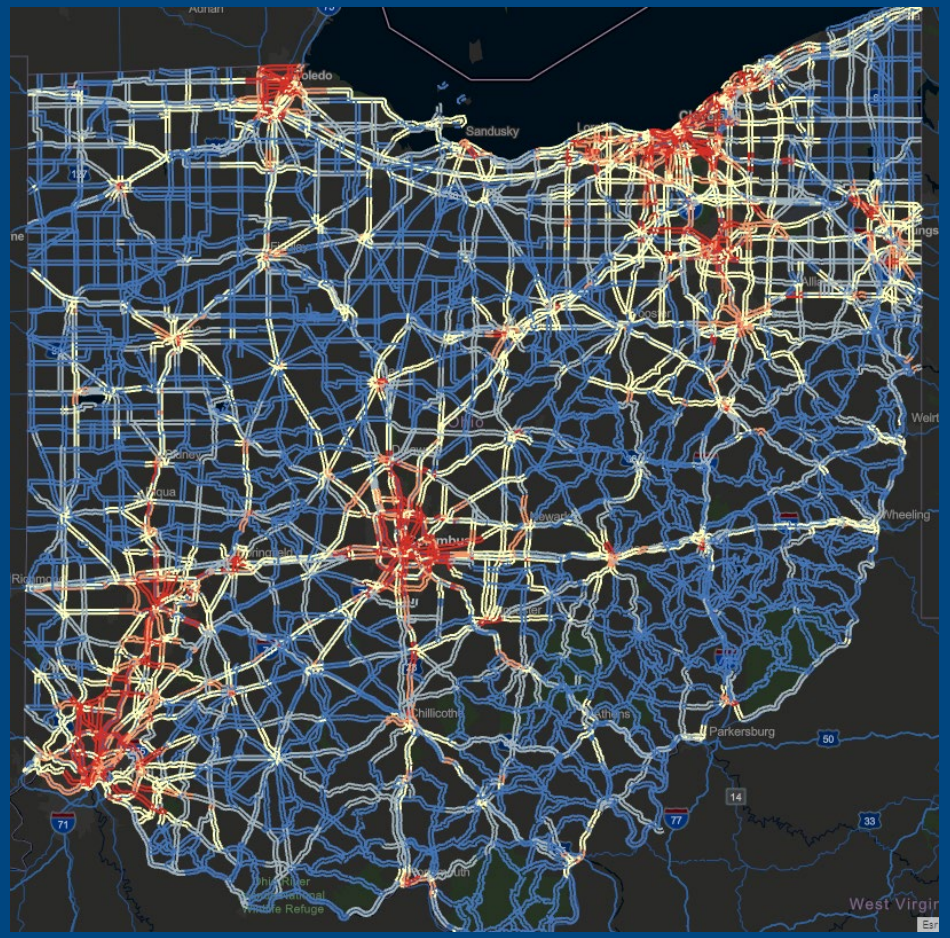
*Needs Analysis Tool can be found here: https://transportal.cee.wisc.edu/gis/webmaps/tip

Other States - Iowa DOT ICE-OPS



Criteria	Weight
AADT	20%
Annual Bottleneck Duration	15%
Incident Density	15%
Crash Rate	15%
Buffer Time Index	10%
Event Center Proximity	5%
Flood Event Density	5%
Winter Weather Sensitive Mileage	5%
Freight Network Mileage	5%
ICE Infrastructure Score	5%
	100%

Other States - Ohio DOT TOAST



Criteria	Weight
Bottlenecks	30%
Travel Time and Speed (TTP and TTI)	30%
TSMO Safety	15%
Traffic Incident Management (clearance and secondary crashes)	15%
Traffic Volumes	10%
	100%

Link to tool

Future TSMO-TIP Improvements

- July – Complete Update of Benefits Analysis Tool with real WisDOT Maintenance Costs
- July/August – Update Needs Assessment Tool Data & Generate New Needs Report
- Update TEOPS to reflect current practices
- Future - Looking at leveraging new data sets and developing additional treatments

Future TSMO-TIP Improvements

	Importance					
Metric	Not at all	A little	Somewhat	Very	Extremely	Average
Non-recurring delay	14%	14%	14%	43%	14%	2.29
Secondary crashes	14%	29%	0%	29%	29%	2.29
Roadway clearance times	0%	0%	71%	29%	0%	2.29
Duration of impact from weather-related events	0%	0%	100%	0%	0%	2.00
Freight bottlenecks	29%	0%	29%	29%	14%	2.00
Hard braking	29%	0%	43%	29%	0%	1.71
Wiper activation	57%	29%	14%	0%	0%	0.57

	Importance					
Treatment	Not at all	A little	Somewhat	Very	Extremely	Average
Queue warning	0%	0%	14%	86%	0%	2.86
Dynamic lane use	0%	0%	43%	43%	14%	2.71
Wrong-way driver treatments	0%	14%	14%	57%	14%	2.71
Integrated corridor management	14%	0%	57%	29%	0%	2.00
Ramp metering	0%	29%	57%	14%	0%	1.86
Wildlife crossing treatments	43%	43%	14%	0%	0%	0.71

Key Resource Information

- TEOPS, Chapter 17, Section 6 (2019): https://wisconsindot.gov/dtsdManuals/traffic-ops/manuals-and-standards/teops/17-06.pdf
- Needs Analysis Tool: https://transportal.cee.wisc.edu/gis/webmaps/tip
- Current Needs Report: https://files.topslab.wisc.edu/tsmo/tsmo-tip/FY22_StatewideNeedsInventory_draft.pdf
- Historical TSMO-TIP Info / Benefits Tool: https://topslab.wisc.edu/research/tsmo/tip/

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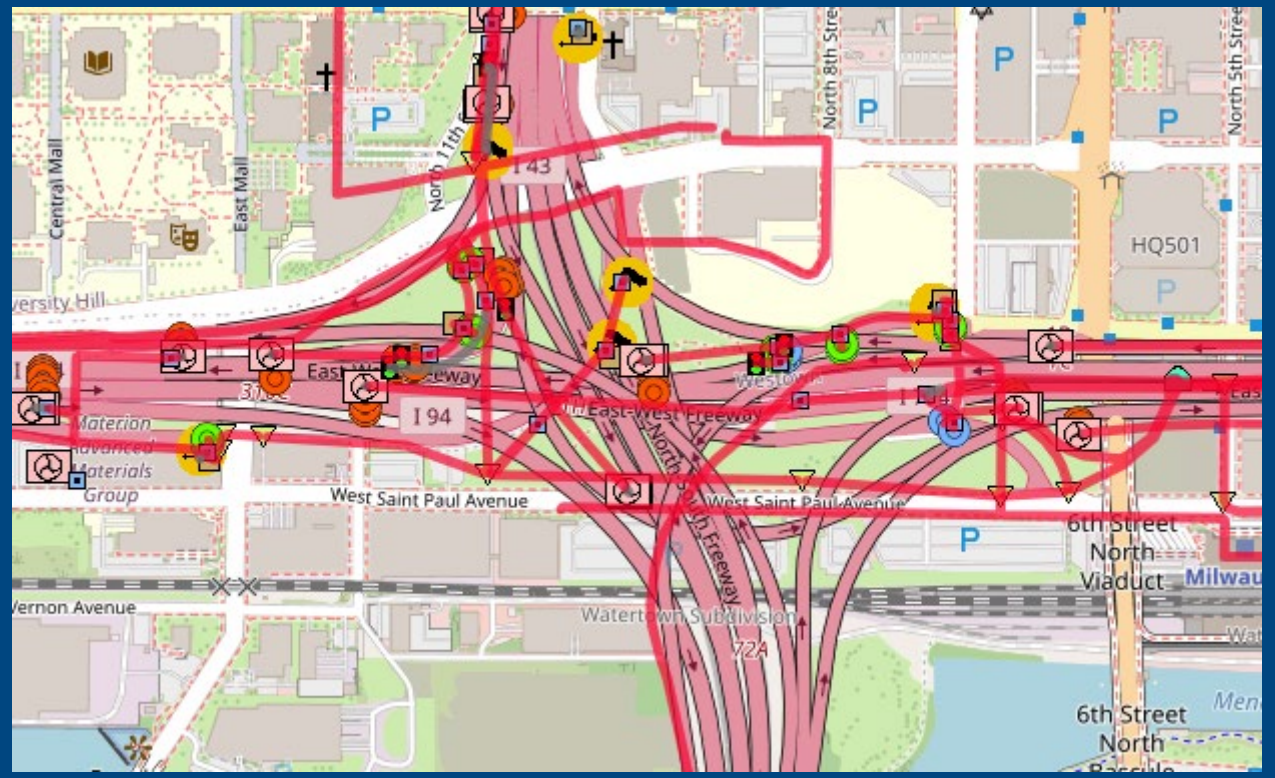
Traffic Tech Talk
ITS Device Placement

Dean Beekman, P.E.
Statewide ITS Engineer

June 26th, 2024

ITS Design Elements

- Traffic cameras (CCTV's)
- Dynamic message signs (DMS)
- Ramp Meters (RM)
- System Detector Stations (SDS)
- Fiber Optic Infrastructure



ITS Device Placement Coordination

- Regional ITS coordinators
- Control Room Operators
- Law Enforcement
- Regional Project Development Staff
- Consultant Partners
- Site visit/field conditions
- Local utilities

Traffic Cameras (CCTV)

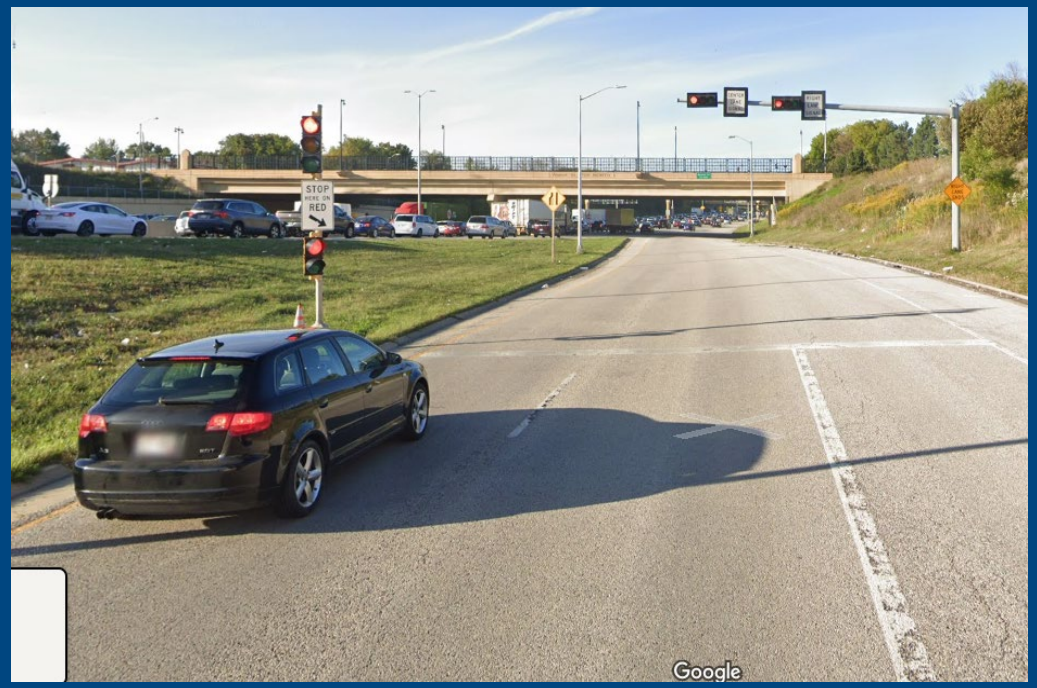
- View, view, view!
- Highest elevation
- Power availability
- Typically at interchanges
- Full coverage in urban areas
- Proximity to fiber communications
- Be aware of obstructions – trees, bridges, sign bridges, curves, and noise walls.

Dynamic Message Signs (DMS)

- Location, location, location!
- Provide motorist information
- Alternate route options
- Proximity to other static signing
- Sight distance
- Power
- High incidents/heavy tourist traffic/weather conditions
- Proximity to fiber for communications, but can always use a cell modem

Ramp Meter (RM)

- Corridor decision
- Entrance ramps only (no system ramps)
- Volume/Capacity (V/C) > 0.7
- Projected ML and Ramp volumes
- Ramp storage ~ 7% of PHV determines stop bar placement
- Geometrics/number of lanes
- Full RM vs underground vs loops for future use.



System Detector Stations (SDS)

- Capture volumes/speeds for mainline and ramps for travel times and planning efforts
- Interchanges – Capture all ramp movements in urban areas (use during construction closures)
- Microwave detectors can be refocused
- Determine spacing (urban vs rural)
- AC Power or Solar
- Communications (fiber, wireless radios, or cell modems)

Fiber Optic Infrastructure

- Connect field devices to our central software.
- Determine layout – Trees, ditches, retaining walls, noise walls, structures, rivers, and RR crossings.
- Determine number of conduits and fiber count.
- Connections to local field cabinets
- Vault spacing ~ 1500-1700’

ITS Infrastructure

- https://transportal.cee.wisc.edu/gis/webmaps/itsmap
- https://511wi.gov/