MnDOT TSMO Program Planning Support
Scope of Work

Background
The Minnesota Department of Transportation has a rich history of innovation in managing, operating and maintaining its transportation system. MnDOT’s family of plans supports its vision, mission and core values. Advances in intelligent transportation systems (ITS), weather-related and maintenance technologies, and systems integration set MnDOT ahead of many state DOTs around the country.

In 2016, MnDOT made a commitment to transportation systems management and operations (TSMO) by establishing a new section in the Operations Division, focused on advancing TSMO within the DOT.

Current plans
Policy direction is laid out in the Minnesota GO 50-year Vision for Transportation and the Statewide Multimodal Transportation Plan (SMTP). There are eight system plans and various supporting plans. Several of these plans are discussed below to provide context for how a TSMO Program Plan will support and integrate with current planning and program delivery.

*MnDOT Vision*
Minnesota’s multimodal transportation system maximizes the health of people, the environment and our economy.

*Mission*
Plan, build, operate and maintain a safe, accessible, efficient and reliable multimodal transportation system that connects people to destinations and markets throughout the state, regionally and around the world.

*Core Values*
- Safety
- Excellence
- Service
- Integrity
- Accountability
- Diversity and Inclusion

*Minnesota GO 50-year Vision for Transportation*
MnDOT launched the Minnesota GO visioning process to better align the transportation system with what Minnesotans expect for their quality of life, economy and natural environment. The effort was based on an understanding that transportation is a means to other ends, not an end in itself. It also recognized that infrastructure is only one of many elements necessary to achieving a high quality of life, a competitive economy and a healthy environment.

The 50-year vision for transportation requires consistency and collaboration across jurisdictions and sectors. Although MnDOT initiated the effort to develop the vision, it is a vision for all forms of transportation. Ownership of the vision is a shared responsibility.
**MnDOT Statewide Multimodal Transportation Plan**

The MnDOT Statewide Multimodal Transportation Plan (SMTP) is Minnesota’s highest level policy plan for transportation. It is a 20-year plan based on the Minnesota GO Vision. It includes all types of transportation and all transportation partners, looking beyond roadways to the entire transportation system.

The plan looks at objectives, performance measures and strategies to develop policy direction for each of the modal and system plans in MnDOT’s Family of Plans. The objectives in the SMTP are:

- Open decision-making
- Transportation safety
- Critical connections
- System stewardship
- Healthy communities

Performance measures are used to track progress toward each objective and strategies for achieving the objectives are provided.

**Minnesota State Highway Investment Plan**

The 20-Year Minnesota State Highway Investment Plan (MnSHIP) directs capital investment for Minnesota’s state highway system. The plan describes how MnDOT will use capital investments to repair, replace and improve the state highway system. Investments are categorized into 14 categories such as pavement condition, Twin Cities mobility, greater Minnesota mobility, regional and community improvement priorities, and transportation safety. MnDOT tracks capital investments by these categories. A single MnDOT project can include investment from several different categories. While MnSHIP does not address how MnDOT funds the operation of the system or day-to-day management of the system, operations and management decisions can influence the timing of capital investments.

**Minnesota Statewide Freight System Plan**

The Minnesota Statewide Freight System plan recommends a series of actions to preserve and strengthen the condition and performance of Minnesota’s freight transportation system. Five key actions needed to advance freight performance include: integrating freight into transportation planning and project developments; developing freight system investment plan; using a performance-based approach to make strategic investments on the principal freight network, using advanced technologies to provide better information and operate the system cost-effectively; and advocating for freight projects and dedicated freight funding.

**MnDOT Statewide ITS Plan**

MnDOT’s family of statewide transportation plans ensures there is a comprehensive approach to all areas of transportation. As the plans become more focused and detailed, the need for a Statewide Intelligent Transportation System (SITSP) Plan was acknowledged. ITS technology is rapidly evolving and the
industry is continuously attempting to keep up; therefore, well thought out guidance with steps towards a statewide approach will greatly benefit the state transportation system and residents.

The purpose of the MnDOT Statewide ITS Plan (SITSP) is to identify immediate, short-term, and mid-term ITS needs to meet the goals and objectives identified in MnDOT’s 50 year vision. MnDOT’s ITS will support Minnesota’s multimodal transportation system that maximizes the health of people, the environment and the economy by providing effective systems and operations which utilize innovation and cost effective technologies. One of the most recent plans developed by MnDOT, the Intelligent Transportation Systems Plan was completed in July 2015.

The plan used a SWOT analysis (strengths, weaknesses, opportunities and threats) and developed and evaluated three statewide ITS investment scenarios. The plan looks at:

- Performance measures and indicators
- Current ITS environment and history
- Statewide architecture
- Planning and funding embedded in multiple processes
- Summary of devices
- Three investment scenarios: 1) fiscal constraint, 2) asset management, 3) optimization
  - The plan considered the outcomes of each scenario in terms of what current facilities would be expanded, what ITS devises would be decommissioned, and associated changes to communications, operations and staffing. It also looked at the implications for advancing TSMO
  - Funding and resource needs, and formal agreements were identified for each scenario

It looks at policy issues, next steps for statewide ITS and future systems and possibilities.

The MnDOT SITSP provides a valuable resource for understanding current operational challenges, opportunities and priorities as a component of a larger TSMO initiative.

Statewide Regional ITS Architecture Update
MnDOT is currently updating the Minnesota Statewide Regional ITS Architecture to be in conformance with the latest version of the National ITS Architecture and software. The update will be comprehensive due to the recent updates in other MnDOT plans and the desire to align and build linkages between them. The architecture will identify the current ITS capabilities and gaps in services. Most of the service packages (e.g. ATIS, ATMS, CVO, MCM) in the architecture align with TSMO projects, services and activities and should help to inform the TSMO implementation plan process. Stakeholder outreach and workshops will occur this fall 2017/winter 2018, with a draft of the architecture completed by July 2018. These two parallel planning efforts are complementary and will need to be coordinated.
Highway Systems Operations Plan (HSOP)
The MnDOT Highway Systems Operations Plan (HSOP) 2012-2015 identifies the numerous challenges of maintaining and operating a 12,000-mile transportation system at a time when resources are limited and infrastructure is aging. It balances many competing activities, which include clearing snow and ice, patching roadways, inspecting bridges, maintaining roadway lighting, operating and maintaining signals and ITS devices. These various activities enhance safety and mobility for system users. It also documents policy, strategies, performance targets and investment priorities for maintenance and operations-related activities.

The HSOP looks at maintenance and preservation connections to the Statewide Multimodal Transportation Plan, the State Highway Investment plan as well as other modal plans such as Freight and Pedestrians. It looks to guide management and non-capital highway investments short-term and work toward long-term operations and maintenance vision, with focus on maintenance investments. Major themes in the plan are:

- Safety
- Good stewards of the environment
- Seek innovation
- Infrastructure asset management
- Understanding system and cost trends

The HSOP is a snapshot of current maintenance and operations activities using performance based assessment. The findings and recommendations address:

- Aging infrastructure
- Increasing costs
- Growing number of infrastructure assets
- Impacts of the capital budget/total project cost
- Mandates
- Decreasing staff levels
- Use of technology and innovations
- Performance measures
- Training
- Preventative maintenance
- The process for updating HSOP

MnDOT Transportation Asset Management Plan
Another MnDOT plan that relates to TSMO is the Transportation Asset Management Plan (TAMP). MnDOT was one of the states chosen by FHWA to develop a pilot TAMP in response to MAP-21. The asset types included in this first plan are pavements, bridges, culverts, deep storm water tunnels, overhead sign and high-mast light tower structures. The plan looks at:
• Asset management planning and programming framework
• Performance measures and targets
• Inventory and condition
• Risk management analysis
• Life-cycle cost considerations
• Performance gaps
• Financial plan and investment strategies
• Implementation and future developments
• Priorities and responsible offices

The TAMP II is currently under development. This plan will include signals, lighting and all ITS devices assets statewide. This will provide foundational information for TSMO Program planning and development.

5-year Strategic Operating Plan and Business Plans
MnDOT has just completed the development of a 5-year Strategic Operating Plan to address:

• A stronger tie between strategic and operational/tactical planning
• Greater integration of performance and risk management into MnDOT decision-making at all levels
• A transparent process by which MnDOT identifies and prioritizes spending proposals in advance of funding becoming available
• Consistency and coordination across the agency

The plan has four strategic operating goals; Customer Trust, Operational Excellence, Workforce Excellence, Effective Financial & Information Management. See Exhibit B.

MnDOT is also developing district and office business plans that will roll-up to an agency business plan. The plans will evaluate progress toward achievement of MnDOT’s mission and the Minnesota GO Vision. The business plans will guide the organization’s goals and how districts and offices plan to achieve them. This initial business planning effort (FY 18-19) asked each office and district to report on 2-3 processes. Subsequent iterations of this planning effort are expected to be more comprehensive. Outcomes of this planning process will prove extremely helpful to TSMO program planning when considering the business and process aspects of the program.

CV Projects
MnDOT’s ITS research and development section is currently working on a number of Connected and Autonomous Vehicle projects that should be considered in the TSMO plan development. The two principal projects include the Autonomous Bus Project and the Connected Corridor Project, both of which will be implemented over the next three years. The Autonomous Bus Project will help prepare transportation owners and policy makers for the future automated technologies by demonstrating a driverless shuttle bus in a winter environment. The Connected Corridor Project will build four vehicle-to-
infrastructure systems integrated into the traffic signal network on TH 55 in the west metro area. And finally, MnDOT is leading a new task force looking at connected and autonomous policy and regulatory issues.

**Other TSMO activities**
MnDOT staff continually looks for opportunities to advance operations and management. A number of projects, strategies and initiatives fall under the TSMO umbrella and should be considered with TSMO program development. The following is a listing showing the breadth of current TSMO activities

- **Innovation & Emerging Technologies**
  - Integrated Mobile Observations (IMO)
  - Connected Corridor Project (USDOT ATCMTD 2017 proposal)
    - New ATC 5.2b specifications being developed
    - SPaT Challenge (In-Vehicle Signal Status, Ped/Bike Warning/ Early Phase Change Alert)
    - Basic Safety Message usage (Improved Flow Data, Optimized Signal Timing)
    - Maintenance Vehicle Warning system – Automated Message posting
    - Back Offices, using MnFAST backbone on corridor

- **Research Projects – U of MN**
  - Freeway Queue Warning and BSM Emulation
  - Snowplow “Gang” plowing
  - I – 94 St. Paul Work Zone
  - Duluth Work zone worker safety - DSRC
  - In-Vehicle Messaging

- **Freeway Operations and Active Traffic Management**
  - RTMC – metro freeway ops, signal ops, maintenance dispatch and State Patrol dispatch
  - 400 miles of freeway management system (ramp meters, DMSs, cameras, detection)
  - Statewide – state patrol responsible for traveler information, maintenance and emergency management dispatching
  - Traffic Incident Management (TIM)
  - ATM – adaptive ramp metering & dynamic lane use control and shoulder lanes.
  - Dynamic pricing and HOT lanes

- **Road Weather Technology**
  - 99 MnDOT RWIS sites and 99 additional aviation sites (AWOS/ASOS)
  - MDSS forecasts with pavement condition predictions and treatment recommendations
  - AVL mapping fleet activities, data collection
  - Salt solution program
  - Data and in-vehicle images displayed in 511

- **Signal Operations**
  - 700 signals with 200 on fiber connection in Metro
  - 600 signals Greater MN with 40 on fiber connection
  - Greater MN have some very old controllers in place
  - Metro new central system (MaxView) with capacity to host all districts and city/county
Retime major corridors every 3 years, minor corridors every 5 years
• Metro is upgrading all timing to new pedestrian crossing times & clearance times
• New TAMS system August 2016

• 511 Traveler Information
  o High and Low Bandwidth Sites
  o Truckers’ Page
  o 3G Mobile Site
  o iPhone and Android Apps, 511 landline
  o Dynamic Message Boards, Portable CMSs, KBEM Radio
  o CARS provides estimated delay time calculated by Google Speeds
  o Performance measures – market research on credibility, utilization
  o Partnerships with 10 other CARS states, MSP, other MnDOT offices

• FIRST – Freeway Incident Response Team
  o Defined mission, related to MnDOT mission, vision, goals
  o Annual budget with multiple funding sources
  o FIRST routes prioritized by corridor congestion and incident frequency
  o Performance measures – utilization, response time, clearance time, number and type of incidents
  o Skill and training requirements

• Work Zones
  o Work zone safety and mobility policy sets MnDOT direction
  o TMP required – some simple and some very comprehensive
  o Leadership from Statewide Multi Agency/Industry committee
  o Intelligent Work zone Toolbox
  o Need to consider user impacts early and plan mitigation
  o More coordination with other jurisdictions needed

• Performance Measurement/Management
  o Freeway Annual Congestion Report
  o Live congestion map –live html stream
  o Performance Measurement System (iPeMS) – in use since 2012
  o Arterial detection & signal performance (Utah DOT/Purdue & MaxView)
  o Annual Transportation Performance Report

**Development of TSMO planning framework**

Although MnDOT has many of the components of a TSMO program in place, there is no statewide TSMO vision, mission or specific organizational structure to support TSMO. In 2015, MnDOT participated in an FHWA Capability Maturity Model (CMM) workshop to evaluate the current state of the TSMO practice in Minnesota. The results were consistent with other states around the country showing a maturity of level of 2-3 in most dimensions. Level 2 is Managed, Level 3 is integrated, and Level 4 is optimized. This shows opportunities for enhancing, integrating and formalizing many of the dimensions of a fully matured TSMO program. One of the components of Level 4, Optimized, is a formal TSMO program.
In early 2016, MnDOT formed a TSMO Leadership Team and a TSMO Working Group to set a path forward for TSMO. Over the past few months these two groups have considered practices in other states, reviewed upcoming guidance from FHWA on how to develop a formal TSMO program, Developing and Sustaining a Transportation Systems Management & Operations (TSMO) Mission for Your Organization: A Primer on TSMO Program Planning (available soon from FHWA), and looked at the unique challenges and opportunities to integrating TSMO in MnDOT. MnDOT is a highly decentralized organization with five divisions and eight districts. Many of the current activities for traffic operations focus on the metro area due to congestion. The other seven districts have unique challenges and areas of emphasis to address those challenges and often look to the Regional Transportation Management Center (RTMC), Metro Traffic Office or to the Office of Traffic, Safety and Technology (Central Office) for support and guidance on various aspects of TSMO. At the same time, the districts appreciate their independence in addressing issues in a more local fashion when the resources and capabilities exist within the district.

The relatively new TSMO Manager position reports to the Assistant Director of the Division of Operations. Currently, the TSMO Manager is the only staff formally assigned to the TSMO program. One of the planning challenges is to determine the best allocation of staff and determine workforce capabilities needed to advance a formal TSMO program.

Approach

Transportation systems management and operations is focused on actively managing the transportation network to optimize safety, mobility and reliability. An effective TSMO program is structured as a core function of the department, formalizing strategies and activities into a cohesive and comprehensive program. TSMO program planning should address strategic, business and implementation elements to align TSMO goals and objectives with MnDOT’s strategic vision and mission, and to deliver projects and services in way that integrates TSMO with other MnDOT projects and activities.

An integrated TSMO program provides opportunities to improve system performance by preserving and optimizing capacity, enhancing public safety, improving system reliability and enabling seamless connections between modes of transportation. This requires organizational and process changes to optimize performance, including collaboration across MnDOT functional areas (e.g. district planning, maintenance, traffic, and RTMC) and with partner agencies (e.g. State Patrol, local agencies, fire/rescue).

MnDOT’s history of performance-based planning and management should be reflected in all aspects of TSMO program planning, at the strategic, business and implementation levels of the program. Linking all three areas of program planning to MnDOT’s vision, mission and goals and integrating performance management to direct program outcomes will enhance organizational commitment to TSMO.

TSMO has evolved over recent years to provide a structured approach to optimizing system performance. FHWA recently developed guidance on TSMO program planning that focuses on three main areas – strategic, business and implementation planning. This three tiered approach supports a sustainable approach to TSMO programs by aligning the strategic elements with the DOT’s overall mission and vision; provides the organizational structure, policies, resources and business processes needed to
integrate and mainstream TSMO; and implements specific services, projects and activities to deliver the DOT’s strategic intention for TSMO. These three aspects of TSMO program planning work together to create a robust and responsive program that is sustainable as a core function of the DOT.

MnDOT is committed to developing a comprehensive TSMO program that includes strategic, business and implementation elements. The approach laid out in this scope of work looks at developing a TSMO strategic plan to provide an overall direction and strategic outcomes for the program. A decision framework is needed to translate the strategic elements into an implementation plan with specific projects, services and activities. MnDOT would like these elements in place within a 12 month period (by December 1, 2018 assuming a December 1, 2017 contract execution date) to provide a clear direction and the first steps for the program. It is also essential to address other business and organizational aspects of TSMO to support departmental integration and create sustainability of TSMO as a core function. MnDOT would like these elements in place within 18 month period (by June 1, 2019 assuming a December 1 2017 contract execution date). The development of a business plan for the TSMO will provide the framework for a mainstreamed TSMO program.

MnDOT formed a TMSO Leadership Team and TSMO Working Group to support the development of the TSMO program. The Leadership Team is made up of executive, division and district level leaders within the department and serves as a decision-making body for the TMSO program. The Working Group represents operations, maintenance and planning functions and currently provides support and oversight to TSMO program development. Sue Porter, MnDOT’s TMSO Program Manager, will serve as the lead on this project. Additionally, the other District Engineers will need to be engaged in the planning process as appropriate.

**TSMO Leadership Team**

Sue Mulvihill        Chief Engineer
Jody Martinson Operations Division Director
Amr Jabr             Asst. Division Director
Jeff Vlaminck District Engineer – D6 Rochester
Duane Hill           District Engineer – D1 Duluth
Steve Lund           State Maintenance Engineer
Jay Hietpas          State Traffic Engineer
Bryan Dodds          Metro Ops & Maintenance Director
Brian Kary           RTMC Manager
Steve Misgen         Metro Traffic Manager
Ray Starr            ITS R&D
Mark Nelson          Statewide Planning and Data Analysis Manager
Sue Porter           TSMO Lead
Jim McCarthy         FHWA
Jon Tompkins         Freight and Commercial Vehicle Operations Office

**District Engineers (Not on the Leadership Team)**

Craig Collison District Engineer – D2 Bemidji
Dan Anderson         District Engineer – D3 St. Cloud/Brainerd
Coordination within MnDOT (divisions, offices and districts) and with partner agencies (State Patrol, Metropolitan Council, cities and counties, etc.) is essential in developing a plan that is supported throughout MnDOT and by its partners. The statewide transportation system includes state and local facilities, transit services, and non-motorized facilities. It serves a wide array of users including commuters, freight haulers, recreational users, businesses, shoppers, school students, and interstate travelers.

**Task 1. Strategic planning**

Strategic planning sets the direction for TSMO and provides a common understanding of how TSMO will support MnDOT’s vision and mission. It addresses the “why” – why TSMO is important. Strategic planning looks at current challenges and opportunities, defines MnDOT’s TSMO vision and mission, and identifies high level goals and objects for TSMO.

MnDOT’s TSMO program planning and plans must reflect the Minnesota GO 50-Year Vision for Transportation and the mission, goals and objectives defined by MnDOT’s Statewide Multimodal Transportation Plan. It must articulate the role of TSMO as a core business function and part of delivering MnDOT’s mission.

In addition to the Minnesota Go 50-year Vision and the Statewide Multimodal Transportation Plan, it is important to look at TSMO in relation to the other MnDOT plans outlined in the Background section. MnDOT’s TSMO strategic plan must expand the thinking on systems management and operations while it aligns with the strategic intent of other current activities within the department. It must look at how the current focus areas and programs can be supported and integrated into MnDOT’s TSMO program.

**Approach**

MnDOT’s TSMO strategic direction must communicate the value of TSMO to the agency and the public, set the direction for TSMO, and provide clear, measurable objectives for TSMO services and activities.

**Key elements**

The following key elements should be addressed and documented in the strategic planning process:
Business case

The business case is the cornerstone for mainstreaming and integrating TSMO within the agency. It must consider the specific challenges faced by MnDOT in delivering its vision and mission, including both current challenges and anticipated trends that may affect transportation demand and system performance in the future. It must also consider current and future opportunities, including new technologies and partnerships that would support MnDOT’s mission. Finally, it must look at national and statewide trends in travel, economics, demographics and land use to consider the role TSMO can play in meeting current and future challenges.

Vision and mission

The vision for TSMO and the mission of MnDOT’s TSMO program will articulate a high level, strategic direction for TSMO. The vision will include the intended outcomes for the TSMO program and the mission will consider the role of the TSMO program in delivering MnDOT’s vision.

Strategic goals

Strategic goals look at the desired outcomes of the TSMO program in terms of system-wide performance. The strategic goals must reflect the focus areas included in the business case and set priorities for the transportation system and system investments.

Strategic objectives

Strategic objectives must be specific, measurable, and realistic. Performance measures must be developed to track progress; these will provide a link between MnDOT’s strategic vision for TSMO and ongoing performance management to move the agency toward its intended outcomes.

Developing the TSMO strategic direction must be done in a collaborative and inclusive process that brings together representatives from MnDOT’s Central Office and Districts. The TSMO Leadership Team and TSMO Working Group will participate in developing the strategic elements of the TSMO Program. They will also help identify any additional groups that must be included in the planning process.

Task 1.1 Review MnDOT Strategic Direction

The TSMO strategic planning elements must build upon and enhance MnDOT’s strategic vision and mission and incorporate current goals and objectives across the various TSMO-related plans and activities. This includes, but is not limited to:

- Minnesota GO 50-Year Vision
- MnDOT Statewide Multimodal Transportation Plan
- MnDOT Highway Systems Operations Plan
- MnDOT Statewide ITS Plan
- MnDOT Transportation Asset Management Plan (TAMP)
- MnDOT Highway Systems Operations Plan (HSOP)
The consultant must be familiar with the strategic elements of these plans and understand how the TSMO program strategic planning supports and expands on these plans.

**Task 1.2 Review State of the TSMO Practice**
The consultant must be familiar with current TSMO program planning practices and guidance at the national level to bring current and emerging practices into the MnDOT TSMO program planning process. This includes understanding and building on guidance found in the following:

- AASHTO and FHWA Capability Maturity Model (CMM) guidance
- NCHRP 20-07/345 Program Planning and Development for Transportation System Management and Operations (TSM&O) in State Departments of Transportation
- FHWA’s Developing and Sustaining a Transportation Systems Management and Operations Mission for Your Organization: A Primer on TSMO Program Planning
- NCHRP 20-07/365 Transportation Systems Management and Operations Program Planning – Experiences from the SHRP 2 Implementation Assistance Program

These planning frameworks should provide an understanding of the key questions and considerations to be addressed in the strategic planning workshop.

**Task 1.3 Strategic Workshop**
The consultant will plan and facilitate a workshop to define the vision, mission, goals, objectives and focus areas for MnDOT TSMO Program. The workshop should include the TSMO Leadership Team, District Engineers, and representatives from State Patrol, Guidestar, local governments, transit agencies, FHWA, MPOs, RDOs and emergency responders.

The consultant will be responsible for developing the agenda, materials, and exercises for the workshop, in consultation with the MnDOT Project Manager. The workshop should focus on defining TSMO and the TSMO strategic vision, mission, goals and objectives for Minnesota. Defining TSMO will include defining what is included under the TSMO umbrella for MnDOT.

If breakout sessions are used, focus areas should be predetermined and approved by the MnDOT Project Manager. The consultant will provide all materials, facilitate and document the workshop.

The consultant should provide examples of successful strategic workshops in TSMO that they have designed and facilitated.

**Task 1.4 Develop Strategic TSMO Document**
The consultant will develop a strategic TSMO planning document based on review of current MnDOT plans and findings from the strategic workshop. Additional information and data may be needed to support findings and recommendations. An important element of the strategic planning document will be the business case for TSMO in MnDOT. This should discuss what TSMO includes and why TSMO is important to MnDOT and to the traveling public and communities in terms of economic benefits, traveler safety and convenience, system optimization. It should also highlight current and future transportation challenges facing Minnesota and provide information on how TSMO can provide a cost effective
approach to these challenges. The business case should consider national and state trends, emerging technology and opportunities to integrate these through MnDOT’s TSMO program.

The strategic vision and mission for MnDOT’s TSMO program should articulate the desired future state and describe MnDOT’s role in delivering this vision. The vision and mission must align with Minnesota GO 50-Year Vision and the Statewide Transportation Multimodal Plan while setting high-level TSMO outcomes. Part of this planning effort may include core values or principles for how the transportation system should be managed and operated.

TSMO goals and strategic objectives define the desired results and measurable outcomes. The goals identify the areas of importance to the TSMO program and the objectives provide specificity in measuring and managing the realization of those goals. TSMO goals and objectives should not be limited to MnDOT statewide planning goals but if additional goals are identified they should be consistent with the statewide planning goals. The strategic TSMO program document should tie the goals to departmental goals and consider additional goals needed to support the TSMO vision and mission.

MnDOT would also like to explore strategic focus areas to determine if priority functions or regions should be identified for the TSMO program. This may include priority functions (e.g. traveler information, incident management, road weather management, ITS) or it may be geographic (e.g. metro, greater Minnesota, freeway, arterial) to help focus resource investments. This should be considered in the strategic planning workshop and addressed in the strategic TSMO document as appropriate.

**Considerations**
The following set of questions should be considered in developing the strategic planning workshop and the strategic TSMO program document:

- What issues and trends are affecting MnDOT’s system performance?
- What opportunities does TSMO offer in addressing transportation challenges?
- Who are the transportation system users and what is important to them?
- What is important to MnDOT and State leadership?
- How does TSMO advance MnDOT’s vision and mission?
- What goals and objectives will support MnDOT’s vision and mission?
- How does MnDOT measure system performance?
- What are the most important functions in optimizing system performance in MnDOT?
- Where do we think the greatest return on investment is?
- Are these priorities different in different areas of the state?
- How will these priorities change in the future?

**Deliverables**
- Documented approach to the strategic workshop that includes list of participants, agenda, materials and presentations
- Summary document of TSMO strategic planning workshop
- Draft strategic TMSO planning document
Task 2. Tactical decision-making
Based on the strategic direction developed in Task 1, the consultant will develop a decision-making process for identifying and evaluating potential projects, services, activities and other investments to support the TSMO program mission, goals and objectives. This process will provide the basis for developing the TSMO program’s initial implementation plan and will become a critical component of the TSMO program’s business plan.

Approach
The consultant will work with the TSMO Working Group to identify current investment decision-making practices and identify key considerations for investment planning and funding requests. The consultant will document current practices, identify areas for further definition or refinement, make recommendations on process revisions or additional processes needed, and document proposed decision processes to support development of implementation and investment plans and funding requests. TAMP II should be looked at to better understand the current gap in asset management.

Task 2.1 Define processes for developing implementation plan
The consultant will identify the types of decisions needed to develop an implementation or tactical plan, including prioritization of projects and services. The consultant will work with the TSMO Working Group to review current decision processes and develop and document the process to be used in developing a tactical TSMO implementation plan.

The key elements of the process will include:

- Stakeholders (internal and external) – Who should be involved in the decision process?
- Data needs – What data are needed to evaluate cost effectiveness; what data are available?
- Evaluation/prioritization steps linked to strategic planning and emphasis areas – How will the strategic TMSO goals and objectives be used to evaluate potential projects and services?
- Anticipated benefits – What are the anticipated benefits of the proposed project or service?
- Estimated costs – What are the anticipated costs of the proposed project or service?
- Feasibility – What is the feasibility of implementation of the project or service in the proposed timeframe; what challenges or limitations must be overcome for it to be feasible?
- Schedule/timeframe – What is the proposed timeframe for the implementation plan and for each of the proposed projects and services?
- Staffing needs – What are the staffing and capabilities needs; are they currently available?
- Intra and Inter-agency coordination – What coordination is needed between MnDOT divisions and districts; what coordination is required with outside agencies at the state and local level?

The decision process must outline the steps of the process and address each of the key elements above.
Deliverables

- Summary of current investment decision processes in MnDOT
- Draft tactical decision process
- Final tactical decision process
- PowerPoint overview of tactical decision process

Task 3. Implementation planning
Based on the approved tactical decision making process, the consultant will work with the TSMO Working Group to determine implementation priorities, identify potential projects and services for evaluation, and develop a 5-year implementation plan based on the tactical decision process. A

Task 3.1 List of potential projects, services and activities based on strategic goals and objectives
The consultant will work with TSMO Working Group to develop a list of potential projects, services and activities to advance the TSMO strategic goals and objectives. This will include outreach to the Districts and TSMO Leadership Team and external partners (e.g. State Patrol, Metropolitan Council, user groups, local agencies) to identify specific problems and opportunities that could be addressed through TSMO investments. The Statewide ITS system architecture should be considered in this process.

Task 3.2 Application of tactical decision-making process
The consultant will evaluate the potential projects and services and present the findings to the TSMO Leadership Team. The consultant will facilitate a working session with the TSMO Leadership Team to review, revise and prioritize the potential projects for inclusion in a 5-year implementation plan.

Task 3.3 Prioritized list of projects, services and activities
The consultant will develop a prioritized list of TSMO projects, services and activities as the basis for a 5-year implementation plan. Each project, service and activity will be documented with the following elements:

- Description and scope
  a. Current practice
  b. Proposed action
- Benefits
- Budget
- Schedule
- Responsible parties
- Staffing needs
- Potential obstacles to implementation
- Performance monitoring

Considerations
The following set of questions should be considered in developing the 5-year implementation plan:

- What services, activities and projects provide the greatest return on investment in meeting MnDOT’s TSMO goals, objectives and priorities?
• Is there guidance/standards that TSMO program should strive to meet to achieve vision (e.g. communication of systems, CMS spacing, camera coverage).
• What current services and activities can be leveraged or enhanced to advance TSMO?
• Are there gaps that need to be addressed to meet MnDOT’s TSMO goals and objectives?
• What funding sources and mechanisms are available for TSMO implementation?
• What projects or services would engage outside partners to leverage and enhance TSMO?

Deliverables
• Initial list of projects and services for consideration
• Application of TSMO tactical decision process to potential projects with complete documentation
• Facilitation of TSMO Leadership Group meeting to review evaluation documentation
• Development of a draft 5-year implementation plan
• Development of a final 5-year implementation plan
• PowerPoint overview of final 5-year implementation plan

Task 4. Business planning
TSMO program business planning is essential to the integration and mainstreaming of TSMO within MnDOT. It provides the structure, processes and resource commitments to support and sustain TSMO as a core business function in the department and to support new and evolving system management initiatives and technologies.

An increased focus on advancing TSMO through business processes has grown out of the TSMO capability maturity model and subsequent SHRP2 initiatives. SHRP2 has focused on advancing TSMO and fostering more reliable travel times through business and organizational solutions. Examples of SHRP2 Organizing for Reliability Tools can be found at https://www.fhwa.dot.gov/goshrp2/Solutions/Available/L06_L01_L31_L34/Organizing_for_Reliability_Tools.

Task 4.1 Business plan development
MnDOT created a new TSMO position in the Operations Division in 2016. The TSMO business plan will help define and structure TSMO activities in the department in terms of integration, resources, business processes, and communication. This plan will document the organizational and business mechanisms needed to deliver the strategic vision, mission, goals and objectives. It will provide a framework for advancing TSMO in MnDOT. It will address the day-to-day aspects of TSMO as well as institutional and organizational changes needed to integrate TSMO as a core business function in MnDOT.

The consultant will work with the TSMO Leadership Team, TSMO Working Group and MnDOT Project Manager to develop a TSMO business plan that addresses each of the following elements:

1. Programmatic objectives
2. Organizational structure and integration
3. Resources
a. Staffing and workforce needs  
b. Resource/asset management  
c. Data needs and management  
d. Financial  
e. Research and development

4. Business processes  
a. Performance management  
b. Decision support systems  
c. Policies and administrative processes  
d. Budgeting and accounting  
e. Contracting and procurement processes

5. Communication and collaboration  
a. Internal to MnDOT (CO and districts)  
b. External partners  
c. Outreach and communication with users

Programmatic objectives

Strategic goals and objectives are focused on higher level outcomes of TSMO associated with the transportation system and its users. Programmatic objectives focus on how well MnDOT is delivering the TSMO program, business process and procedures. The programmatic objectives are intended as measures of how well the TSMO program is managed and how effectively it is working in the organization. These measures are used to evaluate the cost effectiveness of procedural changes or business processes, determine additional staffing needs and capabilities, evaluate customer service, support resource requests, etc. They help gauge how well the program is being managed rather than how well the system is being managed. Programmatic objectives are useful in connecting business functions to strategic goals and objectives.

The consultant will work with MnDOT to consider:

- What are the best indicators of program effectiveness within the organization?  
- What data are available and/or needed to assess program effectiveness?

Organizational structure and integration

Clearly defined leadership and organizational structure will support the integration of TSMO within MnDOT. The organizational structure includes the interaction between division and offices, between central office and the districts, between districts/central office and with outside partner agencies. It defines the roles and responsibilities for TSMO and lead units for various aspects of program delivery.

Currently, TSMO resides with a manager under the Assistant Operations Division Director. The TSMO Program Manager has no direct reports and is charged with facilitating TSMO activities across the department. The consultant will work with MnDOT to determine the best structure to support and integrate TSMO in the department. TSMO is treated differently in DOTs across the country, from a division level function to an individual in traffic operations. In some states, there is a TSMO lead who
facilitates a committee of representatives from various, related units and partner organizations. The ultimate structure of MnDOT’s TSMO program and the connections across the agency must support the strategic mission, goals and objectives and effectively integrate TSMO as a core business function.

The consultant will work with MnDOT to consider:

- How does TSMO fit into the organizational structure of MnDOT?
- Who has primary responsibility for the TSMO program?
- Does the structure support the advancement of TSMO?
- How is TSMO integrated within central office, between central office and the districts, and between the districts?
- How should TSMO be integrated into existing planning and programming processes?
- What organizational changes are needed to create a sustainable and robust TSMO program?

The consultant will provide a summary of these considerations with recommendations to the TSMO Leadership Team and document decisions made by the Leadership Team.

Resources

MnDOT’s TSMO business planning should address the full range of resources needed to deliver the TSMO strategic vision and mission. These resources include:

- Staffing and workforce needs
- Resource/asset management
- Data needs and management
- Financial
- Research and development

**Staffing and workforce needs**

Currently there is one staff person formally assigned to TSMO in MnDOT. Additional employees work in associated areas such as traffic operations, ITS research and development, maintenance, district traffic engineering, and planning. An important part of the business planning process is to identify staffing needs within MnDOT and specifically within the TSMO program to support the proposed organizational structure and TSMO integration within the department. This includes numbers and types of employees as well as skill sets needed, such as system integrators and data analysts.

The consultant will work with MnDOT to consider:

- What skills and capabilities are needed to deliver the TSMO mission and identified implementation plan?
- Is there sufficient staffing in place?
- What new or additional skills and capabilities are needed to support the 5-year implementation plan?
• What additional skills and capabilities are needed to advance new and priority service areas?
• What training is needed to support TSMO?

Resource/asset management
TSMO includes traditional and non-traditional assets and technology, such as traffic control devices, communications infrastructure, public information and outreach technology, and other ITS devices. Resource and asset management also requires maintenance, updates and replacement which should be accounted for in the business planning process.

The consultant will work with MnDOT to consider:

• How is TSMO asset management addressed in MnDOT’s TAMP and what additional asset management strategies should be put in place to support TSMO?
• How does resource/asset management impact TSMO staffing needs?
• What additional resources and assets are needed to support the 5-year implementation plan?

Data needs and management
Effective TSMO requires data management and data analytics to take advantage of new and expanding big data sources for real time application and planning. MnDOT recently acquired StreetLight Analytics for planning purposes and is looking at additional data sources for operations. Understanding the benefits and limitations of various data sources and analytics is important to their successful use; in-house capabilities for data management and analytics is also critical.

The consultant will work with MnDOT to consider:

• What data are needed to support TSMO and TSMO performance management?
• What is the decision process needed to select data and data analytic purchases?
• What additional skills are needed to support TSMO data management?

Financial
To develop an integrated TSMO program, sustainable funding and clear processes to compete with other MnDOT programs and initiatives is essential. Funding should be identified for the 5-year implementation plan identified in Task 3 and ongoing funding needs for staffing, projects, services and activities should be documented in the business plan.

The consultant will work with MnDOT to consider:

• How is TSMO funding currently addressed in the MnDOT 5-year planning process?
• What are the current sources of funding for TSMO?
• What are the future funding levels needed to support TSMO?
• What additional sources of funding might be available for TSMO including federal funds?
• Who are MnDOT’s partners for potential funding requests or leveraging funds?
Business processes

Business processes support and sustain a TSMO program. They include day-to-day business management as well as policies and procedures used to make business decisions and complete contracting and procurement activities. Business processes for TSMO include:

- Performance management
- Decision support systems
- Policies and administrative processes
- Budgeting and accounting
- Contracting and procurement processes

Each of these is needed to support an ongoing, formal TSMO program. The consultant should work with MnDOT to define and document each of these in the business plan.

Performance management

MnDOT uses performance-based management techniques throughout its planning initiatives. MnDOT began using performance measures to inform management and investment decisions in the mid-1990s. MnDOT’s Plan Development Guidelines require inclusion of performance measures in all major plans. The Statewide Multimodal Transportation Plan includes performance measures for each objective, the 2015 MnDOT Statewide ITS Plan includes performance measures and indicators, and the Transportation Asset Management Plan defines asset management performance measures and targets.

Beyond simply measuring performance, performance management uses performance data as an input for management decisions. Performance management occurs in real-time and in program planning to make informed investment and management decisions. The consultant will work with MnDOT to develop and document performance measures for each of the TSMO strategic objectives and associated business rules and actions needed to enhance or redirect performance outcomes.

The consultant will work with MnDOT to consider:

- What measures should be used to monitor and assess each strategic objective?
- What data are currently available to support performance measures?
- What additional data are needed?
- What actions should be taken in response to performance trends?

Decision support systems

Current and emerging data sources provide input into management decision making as well as automated, computer-based operational decision support. Decision support systems (DSS) support business decisions and operations, including freeway operations, incident detection, winter maintenance, and smart signals. DSS provides a formal structure to critical investment decisions and real-time operations. The consultant will work with MnDOT to identify areas where DSS is currently being used and explore areas
where additional DSS should be implemented to formalize decision making in TSMO. Appropriate DSS will be developed and documented as part of the TSMO business plan.

The consultant will work with MnDOT to consider:

- How can MnDOT’s performance management system be used to support investment decisions?
- What data are available to support real-time operations decisions?
- What data are needed to support real-time operations decisions?

_Policies and administrative processes_
Administrative processes include day-to-day work processes as well as policies that guide decisions, operations and internal and external relationships. The consultant will work with MnDOT to identify administrative processes that would impact TSMO decisions and deployment, as well as policies that need revision or development to support the timeframes and challenges associated with TSMO initiatives. These may include policies associated with traveler information, review and approval of TSMO deployments, or interactions with partner agencies. The consultant will work with MnDOT to identify policy and process areas that need to be more clearly documented and areas where revisions are needed to enhance program effectiveness.

_Budgeting and accounting_
MnDOT’s TSMO program does not have a stand-alone budget; rather, it facilitates funding requests and works with other offices and districts to determine TSMO-related funding priorities. The consultant will work with MnDOT to determine the best budgeting and accounting approach for the TSMO program, and if a separate budgeting process is needed. The consultant will also develop and document an accounting process to support tracking of TSMO investments.

_Contracting and procurement processes_
New and emerging technologies and TSMO services often fall outside the traditional contracting and procurement processes developed for more traditional infrastructure construction and maintenance. As new opportunities for partnerships with technology developers emerge, MnDOT should be positioned to respond effectively to potential partnerships and pilot applications. The consultant will work with MnDOT to determine how such opportunities are considered today in terms of contracting and procurement and identify potential changes to be more responsive in a changing business environment. The consultant will document potential limitations or obstacles to new business models and recommendations for policy and process changes to make MnDOT more responsive to future business and investment opportunities.

_Communication and collaboration_
An important aspect of formalizing TSMO as a core business function within MnDOT is to understand and document how it is integrated with other functional areas through communication and collaboration. It is important to consider how the TSMO program collaborates with each of the following:

- MnDOT (CO and districts)
• External partners
• System users

Internal to MnDOT (CO and districts)
MnDOT is made up of a central office and eight districts. Each district has some level autonomy in how it manages the system and the central office provides policy, technical and financial support to the districts. The consultant will work with MnDOT to document the current practices and identify those areas where additional communication and collaboration is needed to advance the TSMO vision and mission. This may vary by district and should be used to determine and document changes in how the central office collaborates with each district in terms of TSMO support.

Additionally, the TSMO program must collaborate across the divisions and offices in the central office in order to integrate TSMO into planning, programming, project development and design, operations and maintenance. In its current configuration as a one-person office, it is essential that formal communication and collaboration mechanisms be explored and documented as part of the organizational structure.

External partners
External TSMO partners include State Patrol, local governments, regional planning organizations, emergency responders, transit and other transportation service providers. The consultant will work with MnDOT to determine the partner agencies, challenges and opportunities that currently exist with external partners and the agreements or forums necessary to build and enhance multiagency collaboration. MnDOT will consider external partners, how they may value their role in TSMO and how MnDOT should collaborate with them.

The consultant will provide recommendations on how to structure collaboration with MnDOT’s external partners and specific actions to facilitate and enhance interagency relationships to support TSMO.

Outreach and communication with users
System users are MnDOT’s ultimate customer. An effective TSMO program must understand and address user expectations and provide timely information to support system use. Users include commuters, shippers, service providers, recreation users, and regional and interstate travelers. The consultant will work with MnDOT to identify what mechanisms are in place to solicit and address user needs and expectations and evaluate current public information and public relations initiatives. This is important to TSMO integration and to build support for investment in TSMO projects, services and activities.

Other considerations
In developing a TSMO business plan, it is important to consider emerging trends and develop a framework for evaluating and responding to disruptive technologies. One example is connected and automated vehicles (CAV). Although not an immediate risk to current business practices, MnDOT should consider potential implications and timing of needed responses. The consultant will work with MnDOT to consider how to organize for CAV growth to respond effectively to changes required.

Deliverables
• Draft recommendations for each of the business planning areas identified above
• Draft TSMO business plan
• Final TSMO business plan
• PowerPoint overview of final TSMO business plan

**Task 5. Project management**
The consultant will provide a project management plan and project schedule within one month after the start of contract. The project management plan should provide detailed information on the consultant’s approach, staffing, schedule and budget. Project management throughout the project will include weekly phone calls with MnDOT Project Manager and monthly meetings (or potentially bi-weekly during certain tasks) with the TSMO Working Group. In addition, the consultant’s schedule should include meetings with the TSMO Leadership Team at key points throughout the process and those specifically noted in Tasks 1-4, and the dates of each deliverable outlined in Tasks 1-4.

**Deliverables:**
- Project management plan and schedule with an assumed contract execution date of December 1, 2017.
- Tasks 1 will be delivered within 4 months from start of contract
- Task 2 will be delivered within 6 months from start of contract
- Task 3 will be delivered within 11 months from start of contract
- Task 4 will be delivered within 18 months from start of contract

**Consultant requirements and capabilities**
TSMO program planning requires a diverse set of skills and experience in strategic planning, business planning, tactical planning and organizational change management. To support MnDOT’s effort to fully integrate TSMO into the agency, the successful proposal must demonstrate expertise and experience in each of these areas. Specific experience in each of these areas in developing TSMO programs is most important. Consultant proposals should demonstrate successful experience and provide specific examples. Experience in the application of strategic, implementation and business planning, and change management in similar areas is also pertinent. MnDOT expects the successful proposal to bring a thorough understand of each of these areas to the project, noting past successes and specific staff experience. The successful proposal will also detail the proposed approach and include any insights and recommendations that would enhance the scope outlined above.