

NCDOT TSMO Statewide Strategic Plan

Service Layer Plans

July 31, 2023

Final

Introduction

The service layer plans serve as a roadmap of activities for the next one to five years for each of the TSMO Program functions.

Each service layer plan contains a description, the current level of maturity, objectives organized around the program's goals, and action items. The service layer plans do not prioritize activities, and it is important to note that priorities can change over time in response to new opportunities or urgent needs.



Traffic Incident Management (TIM)

Service Layer Plan

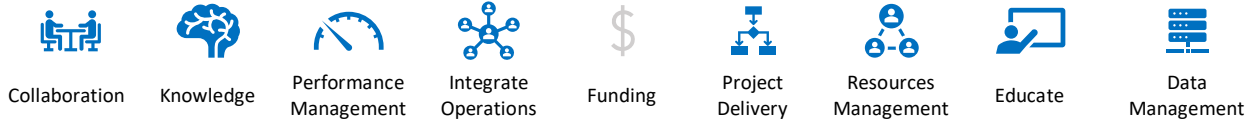
Traffic Incident Management (TIM) is the coordination of multiple TSMO strategies to manage incidents and special events safely and efficiently. TIM involves high levels of collaboration between responding agencies. A mature TIM program includes rapid detection and verification of an incident location and severity, quick response to the scene, safe management at the scene, and quickly clearing the incident to reopen the lanes.





Objectives

1. *Mature TIM knowledge internally, including an incident management manual and standard goals by positions*
2. *Expand the IMAP Program training to include quick clearance and traffic management practices*
3. *Enable data driven decisions for IMAP operations, including a Performance Management Program*
4. *Establish TIM focused performance measures*
5. *Increase the integration of TIM strategies in projects and programs*
6. *Mature towing industry with performance measures, training, and incentive-based heavy towing program*





Action Items

1. *Mature TIM knowledge internally, including an incident management manual and standard goals by positions*

- 1.1 Mature the role of the **RITS Engineer** and **IMEs**
 - 1.1.1 Establish a RITS Engineer in the Eastern Region
 - 1.1.2 Establish an IME in the Eastern Region
 - 1.1.3 Establish a consistent understanding of the roles and responsibilities relative to TIM
 - 1.1.4 Clarify the delineation of roles between RITS Engineer and the IME
 - 1.1.5 Integrate an alignment with SHP levels to foster relationship building
 - 1.1.6 Integrate accountability relative to their performance and expectations
 - 1.1.7 Establish and educate them on tools that have an impact on those goals
- 1.2 Mature the role of the **Regional TIM Coordinators**
 - 1.2.1 Transition all Regional TIM Coordinators to prioritize regional focus
 - Indoctrinate to be confident NCDOT spokesperson
 - Leverage the breadth of skills to support cross-training and resource sharing
 - Document a clear definition of their role
 - 1.2.2 Foster the relationship with the TIM Program Management
- 1.3 Establish consistent **Team Meetings** in ALL regions and at the Statewide level ([Incident Management Manual](#))
 - 1.3.1 Establish frequency by region
 - 1.3.2 Recruit the right participants to the meetings
 - Communication Centers / PSAPs
 - Emergency Management
 - 1.3.3 Leverage the TIM Self Assessments to drive the focus and direction for the region
 - 1.3.4 Strengthen the impact of After-Action Reviews and Open Roads Meetings
 - Establish culture of consistency in after action reviews (within a week)
 - Provide more education on how to prepare and facilitate
 - Allow Regional TIM Coordinators to model the behavior expected
 - Partner with other agencies to take the lead as the meeting chair
 - 1.3.5 Provide additional guidance on the structure for building the teams
 - Include guidance on how to connect back to statewide
 - Investigate best practices from other states
 - 1.3.6 Use lessons learned to guide multi-agency training needs
 - 1.3.7 Establish formal agreements and MOUs to support sustainability
 - Identify a list of partner agencies and beneficial agreements
 - Define goals and timelines for getting agreements and MOUs in place
- 1.4 Establish a collaborative platform for Internal/External **Education and Outreach**
 - 1.4.1 Host presentations, white papers, training materials, videos, etc.
 - 1.4.2 Allow partners to share examples of how they are using the tools



- 1.5 Establish a **Sustainable Training Program**
 - 1.5.1 Document roles with SHR2 Training
 - Set goals for train the trainer
 - Focus on multi-agency training exercises
 - Formalize Multi-Discipline Training for emergency responders
 - 1.5.2 Document the IMAP Training Program (current and future)
([https://nconnect.sharepoint.com/sites/trafficsystemsoperationsprojects/References/TIM/IMAP/Responder Field Guide or Supervisor Training Guide](https://nconnect.sharepoint.com/sites/trafficsystemsoperationsprojects/References/TIM/IMAP/Responder%20Field%20Guide%20or%20Supervisor%20Training%20Guide))
 - Create a shareable calendar so Regions can access the training schedule and plan
 - Implement In-Service Training Courses
 - Continuous development through a data driven approach to content development and delivery
 - Participant performance tracking
 - 1.5.3 Document training needs and strategies for NCDOT Staff
 - RITS Engineer
 - IME
 - CME
 - 1.5.4 Operations Academy
 - Document the list of graduates from NC
 - Prioritize the list of potential attendees
 - Include Regional TIM Coordinators in the list
 - 1.5.5 National Operations Center of Excellence (NOCOe)
 - Present at least twice in the TIM Talk Webinars
 - Consistently participate in the TIM Talk webinars
 - Provide feedback on takeaways and applicable lessons learned
 - 1.5.6 Transportation Operations Manual
 - Identify Champions that can help promote and share the content
 - 1.5.7 Identify new and untapped training opportunities for all levels of staff
 - Leverage Peer2Peer exchanges
 - Actively engage in the SSP PFS
 - Position NCDOT for newly identified training opportunities
 - 1.5.8 Strategically engage in professional organizations and conferences (local, regional, and national)
 - ITS Carolinas (Annual Meeting, Lunch and Learns, Operations Academy)
 - ITS Summit (Prepare for 2026 meeting)
 - Safety Conferences
 - First Responders
 - 1.5.9 Hire a training manager
 - 1.5.10 Develop a formal IMAP Manual review process
- 1.6 Complete the IM Manual including adoption from the Division Engineers and the Chief.
 - 1.6.1 Complete Volume 1
 - 1.6.2 Complete Volume 2
 - 1.6.3 Develop a TIM Operations Manual
 - Define Standard Guidance
 - Maintain Standard Operating Procedures (SOPs)
 - 1.6.4 Implement a document management plan to maintain all TIM documentation.



2. *Expand the IMAP Program training to include quick clearance and traffic management practices*

2.1 **Stabilize IMAP** coverage

- 2.1.1 Hire and train staff to support baseline coverage for routes and hours of operation
- 2.1.2 Expand to strategic locations supported by appropriate staffing levels
- 2.1.3 Convert existing response route to patrol
- 2.1.4 Identify strategic expansions for geographic, seasonal, or weekend coverage

2.2 **Optimize** the IMAP Program

- 2.2.1 Mature the staffing strategy
 - Reevaluate responder positions categories
 - Assess the organizational structure of staff supporting the IMAP Program
 - Investigate challenges filling the positions (entry level, limited experience, etc.)
 - Assess the value of contracting IMAP services by region
 - Identify the staffing demands needed to effectively manage the growing IMAP staff

3. *Enable data driven decisions for IMAP operations, including a Performance Management Program*

3.1 Establish clear and manageable tool for **maintaining IMAP data**

- 3.1.1 Accuracy is important to validate sponsorship level
- 3.1.2 Quarterly assessment of Regional IMAP operations
 - Confirm staffing levels
 - Confirm designated routes and hours of operations
 - Confirm fleet status

3.2 Increase agility in the application of IMAP resources to meet more **dynamic demands** (Emergency Response, seasonal)

- 3.2.1 Establish the capacity to move resources around in response to needs
 - Leverage possible imbalances in staffing levels
 - One region could be overstaffed while another is “right-staffed”
 - Use overall staffing levels to balance during long term absences
 - Document a clear process for resource sharing
 - Involve regions in the process development to ensure buy-in
 - Identify mitigation for deficits created in other area regions
- 3.2.2 Establish the capacity to better support surge staffing
 - Identify a pool of resources that could be available
 - Train those resources to supplement in high demand times
 - Leverage the surge staff to minimize or eliminate the dependency on other regions
 - Investigate how other agencies (SHP) address surge staffing for seasonal demand on the coast during the summer

3.3 **Benefit/Cost Analysis (BCA)** for IMAP investments

- 3.3.1 Define a method to demonstrate the value of IMAP in a consumable method
- 3.3.2 Confirm the role of the data analysis in making program level decision
- 3.3.3 Replicate the process applied for the tow contract BCA
- 3.3.4 Host an access-controlled dashboard to communicate the benefits



- Use the talents of a Tableau expert to support dashboard evolution
 - Determine strategies to increase the efficiency of accessing the data
 - Identify how to leverage existing data to demonstrate the benefits
 - Number of stops
 - Average response time
- 3.4 Implement a strategy for the **lifecycle management** of IMAP vehicle
- 3.4.1 Mature how the statewide fleet is managed
- Effectively distribute the new fleet vehicles
 - Move all IMAP vehicles into a standalone cost center
 - Balance the fleet age and condition across the state
 - Document guidelines for maintaining the statewide fleet
- 3.4.2 Define the next generation IMAP vehicles

4. Establish TIM focused performance measures

- 4.1 Define metrics for NCDOT Staff
- 4.1.1 VIP goals for IMAP drivers
 - 4.1.2 VIP goals for IMAP Supervisors
 - 4.1.3 VIP goals for IMEs
 - 4.1.3 VIP goals for RITS Engineers
- 4.2 Define Regional Metrics
- 4.3 Define Statewide Metrics
- 4.4 Define shared metrics with partner agencies

5. Increase the integration of TIM Strategies in projects and programs

- 4.1 Leverage **Pilot Projects** to evaluate emerging technologies
- 4.1.1 Develop an action plan for unmanned aerial vehicles (UAV)
 - 4.1.2 Assess and determine the value of a truck mounted debris removal solution
- 4.2 Expand **Quick Clearance Strategies** in non-construction areas (Tow Contracts)
- 4.2.1 Use of Tow Contracts outside of construction project limits
 - 4.2.2 Snatch truck

6. Mature towing industry with performance measures, training, and incentive-based heavy towing program

- 6.1 Partner with the towing industry to conduct training exercises.
- 6.2 Educate towing industry on performance measures and their impact on roadway and incident clearance times.
- 6.3 Garner support during the roll-out of an incentive-based heavy towing program

Traffic Management Centers (TMC)

Service Layer Plan

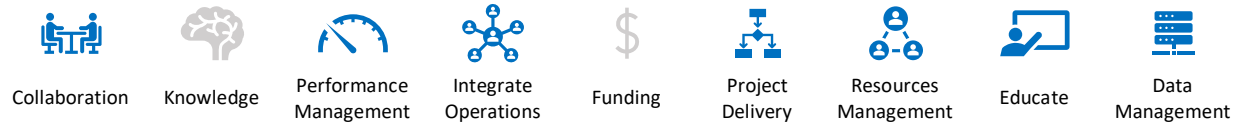
Traffic Management Centers (TMCs) are the communication hubs that are responsible for situation awareness of activities on the roadway network. The TMCs are responsible for real-time monitoring, coordination, and traffic management. These functions are accomplished by both staff and systems. TMCs provide a safer transportation system for users by being both responsive to incidents and innovative in technologies to accomplish that goal.





Objectives

1. *Mature TMC knowledge internally, including documenting business processes and operator roles.*
2. *Increase automation to decrease manual processes and duplicated efforts.*
3. *Implement Freeway-focused Advanced Traffic Management System (ATMS) software to consolidate tools and systems into one platform.*
4. *Enable data driven decisions for TMC operations, including a Performance Management Program.*
5. *Grow the knowledge and support for the value of TMC activities and the program.*
6. *Develop TMC workforce, with a focus on recruitment and retention.*
7. *Define methods for intentional partnership building between teams.*
8. *Standardize and fully staff all positions in each TMC*





Action Items

1. *Mature TMC knowledge internally, including documenting business processes and operator roles.*

- 1.1 Document all **business processes**
 - 1.1.1 Program Document
 - 1.1.2 TMC standard operating procedure
 - 1.1.3 Develop standard practices that align with SOPs in support of higher level of understanding and adoption
 - TMC after-hours response
 - Construction and Maintenance event management (TIMS events)
 - IMAP after-hours response
 - 1.1.3 IMAP operator manual
- 1.2 Define the operators' **roles and responsibilities**
 - 1.2.1 Connect the what to the why within the documentation
 - 1.2.2 Identify the owners and the process
 - 1.2.3 Establish guidelines that promote and enforce statewide consistency.
 - Application of SOPs within the TMCs (Z:\511 Operators\Standard Operating Procedures (SOP)\Current Standard Operating Procedures (SOP)
 - Application of performance measures
 - Efficient turnaround and rollout on new guidance
 - Educate management level (RITIS, IME, etc.) with a clear understanding of SOPs and so they can support decisions that align within the program
 - Define the role of the TMC specific to asset management
 - How does the TMC use the data?
 - Does the TMC have a role in assessing?
 - What reports are needed for who?
- 1.3 Refine the **change management process** for all documentation
 - 1.3.1 Document the change management process
 - 1.3.2 Define the priority for revisions
 - 1.3.3 Implement an annual auditing process of documentation
 - 1.3.4 Document approval process for revisions
 - Minor edits can be implemented and approved quickly
 - Significant revisions must follow correct approval process
- 1.4 Define a wholistic approach to **response plans**
 - 1.4.1 Confirm use of existing assets within response plans
 - 1.4.2 Auditing of response plans (correct cameras, DMS, other tools?)
 - 1.4.3 Refine response plans based on after action reviews
 - 1.4.4 Integrate new technologies into corresponding response plan
- 1.5 Conduct ongoing **training program** including assessment and status
 - 1.5.1 Implement strategy for auditing performance and enforcing SOP accuracy
 - 1.5.2 Integrate new technologies into corresponding response plan
 - 1.5.3 Hire a training manager to mature the TMC training program



- 1.6 Refine the existing statewide **detour database** process
 - 1.6.1 Statewide development of the detour database
 - 1.6.2 Regional review of detour database for accuracy
 - 1.6.3 Regional revisions to database as necessary

2. Increase automation to decrease manual processes and duplicated efforts.

- 2.1 Implement strategies that reduce the need for **operator intervention**
- 2.2 Optimize traveler information and traffic management applications through **proven tools** (i.e., waze closures)
- 2.3 Assess the menu of available **detection sources** to determine if TMCs are using the best option
- 2.4 Define a process to assess **automation opportunities**
 - 2.4.1 Define the risk, reliability, and benefits of each opportunity
 - 2.4.2 Determine where the ATMS implementation can support these automations

3. Implement Freeway-focused Advanced Traffic Management System (ATMS) software to consolidate tools and systems into one platform.

- 3.1 Conduct a dedicated conversation on how to accomplish the **ATMS transition**
- 3.2 Dedicate resources to **ATMS software implementation**
- 3.3 Define a **change management process** for the ATMS implementation
- 3.4 Define **transition plans** from existing tools and software to the ATMS
- 3.5 Establish effective simulated **training environments** for operators
 - 3.5.1 Environment should address ATMS software
 - 3.5.2 Environment should support onboarding of new staff
 - 3.5.3 Environment should support continuous training

4. Enable data driven decisions for TMC operations, including a Performance Management Program.

- 4.1 Connect **Performance Measures** output to summarize program benefits
 - 4.1.1 Define the skillset needs to capture the best data and apply to decision-making
- 4.2 Define why we have a control room and use that to drive the **derivation of the PMs**
 - 4.2.1 PMs should be actionable metrics of performance
 - 4.2.2 PMs should directly drive decisions
 - 4.2.3 PMs should connect to owner accountability
 - 4.2.4 Define what data can be used to support the defined PMs
- 4.3 Define **outcome-based PMs** for the Control Room
 - 4.3.1 DMS usage
 - 4.3.2 Average time to complete activity
 - 4.3.3 Adherence to SOPs
 - 4.3.4 Data accuracy for key activities, avoiding QC of unnecessary fields
 - 4.3.5 Time between incidents and response
 - 4.3.6 Percent accuracy of automated alerts
 - 4.3.7 Staff retention (voluntary turnover)



- 4.4 Define metrics for each **level of staff** (ATS, RITS, IME, Traffic Engineers, Operator)
 - 4.4.1 Define individual performance metrics and connect with VIPs
 - 4.4.2 Integrate metrics into annual performance reviews (update as needed to align with program goals)
 - 4.4.3 Define data and system needs to support the performance metrics

5. *Grow the knowledge and support for the value of TMC activities and the program.*

- 5.1 Establish **common messaging** of the program
 - 5.1.1 Define the top metric for the impact of the program
 - Value of the control room
 - Value of the infrastructure to the control room
 - Value of the control room to support TravInfo
 - 5.1.2 Communicate the value of the program
- 5.2 **Benefit/Cost Analysis (BCA)** for TMC strategy investments
 - 5.2.1 Integrated Corridor Management (ICM)
 - 5.2.2 ATMS software
 - 5.2.3 Ramp meters
 - 5.2.4 Other strategies
- 5.3 Identify and submit for awards and special recognitions to **celebrate program wins**
 - 5.3.1 TSMO awards
- 5.4 Emphasize the importance of **TMC partnerships**

6. *Develop TMC workforce, with a focus on recruitment and retention.*

- 6.1 Recruit passionate staff
- 6.2 Investment in staff to mature skillsets and support career growth
- 6.3 Assess market value relative to desired skillset (define reasonable compensation and recognition)
- 6.4 Confirm that all job descriptions and titles accurately represent the skillsets needed
- 6.5 Identify opportunities for resource sharing with other agencies
- 6.6 Invest in the training program which includes dedicated trainers
- 6.7 Grow staff to be the next leaders

7. *Define methods for intentional partnership building between teams.*

- 7.1 Control Room to Control Room (STOC to regional; Regional to Regional)
- 7.2 Control Room to External Comm Centers (NCSHP, Local LE)
- 7.3 Control Room to IMAP
- 7.4 Control Room to Emergency Management
- 7.5 Control Room to municipalities
- 7.6 Control Room to NCDOT IT
- 7.7 Control Room to Contractors (significant projects, maintenance)
- 7.8 Control Room to Divisions (DOT Staff, CMEs)
- 7.9 Control Room to management
- 7.10 Control Room to other



7.11 Hold regular communications meetings across all teams

8. Standardize and fully staff all positions in each TMC

- 8.1 Establish functional redundancy within the TMC facilities
- 8.2 Develop a Continuity of Operations Plan for TMC functions
- 8.3 Establish an Eastern TMC
 - 8.3.1 Establish new Eastern TMC location
 - 8.3.2 Establish all necessary staff to support the Eastern TMC
 - 8.3.3 Define adequate office space within facilities to support staffing levels defined
 - 8.3.4 Establish new Eastern TMC functions
- 8.4 Fully staff existing TMCs to appropriate levels
- 8.5 Standardize position levels, training, and goals for all TMCs

Intelligent Transportation Systems (ITS)

Service Layer Plan

This Intelligent Transportation Systems (ITS) Service Layer is focused on communications redundancy and resiliency, with the goal of supporting the ITS infrastructure that relies on the communications network. ITS infrastructure includes technologies and communications, used to improve efficiency and safety of a transportation network.





Objectives

1. *Develop an asset management plan for ITS devices*
2. *Develop work force to provide guidance on technology implementation*
3. *Develop a Statewide Communication Plan that includes existing conditions and a phased build out to support the future ITS infrastructure*
4. *Define a performance measurement program to assess the performance of the infrastructure*
5. *Develop workforce to support ITS and Communications operations and maintenance*



Collaboration



Knowledge



Performance Management



Integrate Operations



Funding



Project Delivery



Resources Management



Educate



Data Management



Action Items

1. *Develop an asset management plan for ITS devices*

- 1.1 Define a clear plan to implement and migrate to a statewide asset management platform for existing ITS devices
 - 1.1.1 Define what devices will be managed in which asset management tool
 - 1.1.3 Define how signal communications should be addressed within program
 - 1.1.4 Determine a strategy for integrating or sharing data for municipal communications and assets
 - 1.1.5 Leverage a state license for tools and share tools with local agencies, where feasible
- 1.2 Document how the asset management program supports maintenance activities and the health of the infrastructure
 - 1.2.1 Define critical vs. noncritical devices and infrastructure
 - 1.2.2 Define acceptable level of service for device availability relative to the criticality of the equipment
 - 1.2.3 Define the data that is used to determine the timeline for device replacements to modernize systems
- 1.3 Integrate the asset management program with the role of the resiliency contract to manage the health of the network

2. *Develop work force to provide guidance on technology implementation*

- 2.1 Develop additional procurement experts within the team.
 - 2.1.1 Define the possible procurement paths for technology implementations
 - 2.1.2 Define the rules associated with each procurement path
 - 2.1.3 Identify partners within each procurement office that can support implementations
- 2.2 Develop workforce to assess the anticipated benefit relative to technology integration costs
 - 2.2.1 Focus on effective methods for connecting with municipal systems
 - 2.2.2 Explore additional flexibility in solutions. (e.g., cloud-based technologies to support signal software)
- 2.3 Develop additional in-house support to increase the efficiency of implementation
 - 2.3.1 Assess existing resources that can support technology implementations
 - 2.3.2 Determine the need to grow additional resources to support technology implementations? (e.g., Utah has access to a team of programmers that can develop tools in response to identified needs)

3. *Develop a Statewide Communication Plan that includes existing conditions and a phased build out to support the future ITS infrastructure*

- 3.1 Define a clear goal for the plan
 - 3.1.1 Develop a Statewide ITS Architecture and Statewide Deployment Plan focused on state level and interregional connectivity
 - 3.1.1 Align Regional and local level plans with the Statewide Plan
 - 3.1.2 Focus to connect everything to the backbone network (signals comm to interstate fiber)



- 3.1.3 Document how devices/equipment will connect to the network
- 3.1.4 Define gaps in the infrastructure that should be addressed
- 3.2 Address resiliency and redundancy within the plan
- 3.3 **Partner with regional and local agencies** for strengthening and expanding regional ITS infrastructure
 - 3.3.1 Define processes that promote agencies sharing communication infrastructure
 - 3.3.2 Develop guidelines for agencies to share CCTV cameras
 - 3.3.3 Develop guidelines for agencies to share other field devices
- 3.4 Investigate opportunities for funding through **specialized grants** and **priority projects**
 - 3.4.1 Identify grant opportunities that align with the identified infrastructure gaps
 - 3.4.2 Identify any defined gaps that may align with priority projects

4. Define a performance measurement program to assess the performance of the infrastructure

- 4.1 Track ITS device uptime to supplement corrective maintenance efforts
- 4.2 Track ITS device lifecycle to inform future cost estimate
- 4.3 Track number of device failures to supplement preventative and corrective maintenance efforts
- 4.4 Track age of ITS devices to inform preventative maintenance efforts
- 4.5 Track ITS device usage to inform future ITS device investments
- 4.6 Track communications infrastructure uptime to inform corrective maintenance efforts

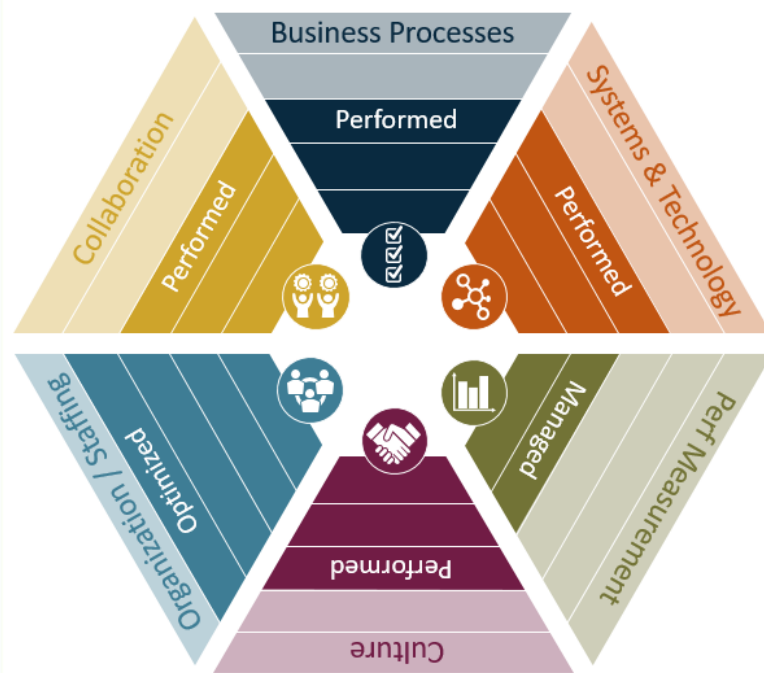
5. Develop workforce to support ITS and Communications operations and maintenance

- 5.1 Align resources to **support the growth of ITS Operation**
 - 5.1.1 Define the staffing resources needed to support the breadth of the program
 - 5.1.2 Grow the skillset to support the breadth of the program (i.e., device replacement, ATMS software, asset management, broadband management, ITS resiliency, fiber management and networking)
 - 5.1.3 Establish a contracting mechanism for access to specialized resources (beyond TMC and TIM staffing)
- 5.2 Recruit individuals for specific expertise
- 5.3 Develop and facilitate internal workshops focused on technical training topics
- 5.4 Focus on strengthening the bench strength at both the statewide and regional level
- 5.5 Create redundancy in knowledge and skills to address potential single points of failure in knowledge
- 5.6 Determine opportunities to use existing internal staff to conduct cross-training on specific skill sets
- 5.7 Collaborate with external partners for **knowledge sharing** around ITS and Communication
 - 5.7.1 Leverage existing and new P2P knowledge sharing opportunities
 - 5.7.2 Identify cross training opportunities
 - 5.7.3 Partner with professional organizations to address gaps and needs in technical training

Traveler Information

Service Layer Plan

Traveler Information provides real-time information to transportation system users to make informed decisions as it relates to safe and efficient travel. This information can be related to congestion, incidents, or generally unsafe conditions due to weather or other unexpected conditions. The information can be shared via dynamic message signs, agency websites, social media, 511, or directly to connected vehicles.





Objectives

1. *Mature traveler information internally, including an internal TravInfo training program*
2. *Integrate emerging data sets into traveler information tools (DriveNC, APIs)*
3. *Define clear goals and implement a performance measurement program for traveler information*
4. *Grow the knowledge and support for the value of TravInfo*
5. *Develop traveler information workforce*
6. *Define and implement Next Generation Advanced Traveler Information Systems (ATIS)*
7. *Establish and manage customer service goals*




Collaboration



Knowledge



Performance Management



Integrate Operations



Funding



Project Delivery



Resources Management



Educate



Data Management



Action Items

1. *Mature traveler information internally, including an internal TravInfo training program*

- 1.1 Update documentation (flow chart) for **data integration** with TIMS
- 1.2 Document **standard operating procedures** for each TravInfo tool
 - 1.2.1 HELP
 - 1.2.2 Drivewyze
 - 1.2.3 Customer service
- 1.3 Establish **training program** that supports education on available TravInfo tools
- 1.4 Effectively migrate all data flows from **ATMS software** to existing tools (DriveNC, APIs)
- 1.5 Increase the TravInfo bench depth for TravInfo program
 - 1.5.1 Identify and grow the next champions
 - 1.5.2 Document and train on existing programs and planned expansions
 - 1.5.3 Grow the **skillset and talent pool** to support TMCs
- 1.6 Continue to leverage industry advancements and partner with private sector for **pilot deployments**
 - 1.6.1 Expand beyond current deployments (Drivewyze, Waze, Google, Recor, Wejo, HELP)
 - 1.6.2 Educate staff regarding emerging technologies through peer-to-peer exchanges, technical training opportunities, and general educational sessions from the private sector
- 1.7 Assess the **value** of the variety of tools being used
 - 1.7.1 Determine if some tools are demographically relevant
 - 1.7.2 Determine if tools are providing value relative to the investment

2. *Integrate emerging data sets into traveler information tools (DriveNC, APIs)*

- 2.1 Define which data sources should be integrated into which delivery platforms
 - 2.1.1 Smart work zones
 - 2.1.2 Emergency Vehicle Alerts
 - 2.1.3 Drivewyze
 - 2.1.4 Slow down alerts
 - 2.1.5 Streaming video
- 2.2 Assess the anticipated benefit relative to the cost to integrate

3. *Define clear goals and implement a performance measurement program for traveler information*

- 3.1 Establish clear and manageable tool for maintaining TravInfo data
- 3.2 Increase agility in the application of TravInfo resources to meet more dynamic demands (Emergency Response, seasonal)
- 3.3 Benefit/Cost Analysis (BCA) for TravInfo investments
- 3.4 Data accuracy



4. *Grow the knowledge and support for the value of TravInfo*

- 4.1 Establish common messaging of the program
 - 4.1.1 Integrate messaging strategy with NCDOT Communications
 - 4.1.2 Partner with media to support goals and objectives through outreach
 - 4.1.3 Equip champions to present on program performance
 - 4.1.4 Share messaging tools with thought leaders in the community
- 4.2 Benefit/Cost Analysis (BCA) for TravInfo strategy investments
 - 4.2.1 Report on **ROI** of traveler information strategies to support funding

5. *Develop traveler information workforce*

- 5.1 Recruit passionate staff
- 5.2 Investment in staff to mature skillsets and support career growth
- 5.3 Assess market value relative to desired skillset (define reasonable compensation and recognition)
- 5.4 Confirm that all job descriptions and titles accurately represent the skillsets needed
- 5.5 Identify opportunities for resource sharing with other agencies
- 5.6 Invest in the training program which includes dedicated trainers
- 5.7 Grow staff to be the next leaders

6. *Define and implement Next Generation Advanced Traveler Information Systems (ATIS)*

- 6.1 Implement the ARRA Smart Grant and determine potential applications of the proven technology
- 6.2 Continue to evolve TIMS to support newly defined ATIS tools
- 6.3 Effectively manage the integration of the new ATMS software with the existing ATIS tools
- 6.4 Manage the partnerships and integration of evolving navigation companies
- 6.5 Mature the event management system (TIMS/ATMS/ATIS) to capture all live data related to activities on the roadway
- 6.6 Partner with other service layers (TIM, TMC) to ensure all fields within ATIS tools are correctly represented and provide accurate data

7. *Establish and manage customer service goals*

- 7.1 Provide training sessions at the North Carolina Correctional Institute for Women (NCCIW)
 - 7.1.1 Directory refresher
 - 7.1.2 All Things Trucks
 - 7.1.3 Traffic related education
- 7.2 Implement a new TMC phone system
 - 7.2.1 Incident types
 - Severity (minor, intermediate, major)
 - Incident timelines
 - Regional and partner agency notifications
 - 7.2.2 Leverage Open Roads and TEAM meetings to review needs and define revisions

Signal System and Timing Operations

Service Layer Plan

Arterial & Signals Management focuses on signalized arterial routes which play a significant role in NCDOT's transportation network. Most signalized arterial routes are managed by interconnected, coordinated signal systems. This service layer is focused on arterial management as it relates to signal operations and performance. In the future, this service layer will be split into two separate focus areas: signal system timing and signal modernization.





Objectives

1. *Develop a roadmap for active traffic management on arterials that includes automated traffic signal performance measures (ATSPM)*
2. *Document the return on investment of signal modernization and timing investments from the TSMO Budget. Develop a business case for signal maintenance funding to meet the current needs.*
3. *Develop and institutionalize appropriate outcomes-based performance measures for arterial performance, signal management and operations, and signal modernization to drive decisions.*
4. *Evaluate and integrate emerging technologies for active traffic management and modernization of signal operations and arterial management.*
5. *Develop an Urban Arterial Active Traffic Corridor Management Strategy.*
6. *Develop workforce to have skillsets relating Arterials and Signals Operations support.*
7. *Standardize existing Schedule C & D agreements and develop guidance for new agreements with municipalities.*
8. *Develop a communication plan to partners and the public about new or emerging technologies.*





Action Items

1. *Develop a roadmap for active traffic management on arterials that includes automated traffic signal performance measures (ATSPM)*

- 1.1 Develop a signal management strategic plan
 - 1.1.1 Clearly define the current direction for the program
 - 1.1.2 Refine the activities currently identified to what can provide impact in the next few years.
 - 1.1.3 Grow the culture to support the defined evolution of the program
- 1.2 Develop a Maintenance and Operations Manual with an emphasis on actively managing arterial traffic
 - 1.2.1 Define the roles and responsibilities of the different agencies and contractors that have a commitment to managing arterials
 - 1.2.2 Integrate the appropriate components within maintenance contracts
 - 1.2.3 Focus on the expectations of the Divisions
 - Conduct a survey to assess the Divisions' current activities and capture the range of approaches that exist
 - Define lessons learned that can be leveraged to make the overall approach more consistent
 - 1.2.4 Identify roles and responsibilities that can help in setting the strategic direction for active traffic management in the state
- 1.3 Develop a path to evolve through the next phase towards proactive management.
 - 1.3.1 Grow beyond preventative and corrective maintenance.
 - 1.3.2 Define communications needs and gaps that elevate the program.
 - 1.3.3 Define processes that can take traffic management beyond a responsive activity.
 - 1.3.4 Address challenges and needs around security and access.
 - 1.3.5 Grow all agencies' understanding of effective maintenance protocols that support active management.
 - Define expectations for emergency maintenance. This includes define priorities for critical and non-critical arterials or intersections.
 - Define level of service and expectations related to preventative maintenance cycles for arterial equipment. Define challenges and strategies to meet and exceed that level of service.
 - Provide guidance on Lifecycle planning for all equipment.
 - 1.3.6 Define a resiliency and reliability strategy that supports a more proactive support of the arterial equipment.
 - Focus on efficient responses to communications issues and more reliable connectivity to traffic signals.
 - Focus on supporting and expanding the connectivity from central systems to traffic signals.
 - Address the connectivity to remote signals by supporting and expanding the communications from the Divisions to central.
 - Leverage the direction of the Broadband project, which is connecting traffic signals a every interchange, to expand the connectivity to more traffic signals.



- 1.4 Strengthen institutional knowledge by defining a library of what needs to be documented.
 - 1.4.1 Define how we set-up signal systems.
 - 1.4.2 Define the roles and responsibilities.
 - What occurs once signals are connected, and remote access is available.
 - Who is responsible for handling the range of issues that arise.
 - 1.4.3 Document when new processes and technologies are implemented to support a more seamless handover of responsibilities.
 - 1.4.4 Define the audience for each document.
 - 1.4.5 Determine the appropriate location which each type of documentation should be hosted.
 - 1.4.6 Define the frequency and processes to needed to effectively maintain current documents.
 - 1.4.7 Determine a roll-out and education plan for each document that is developed.
- 1.5 Roll-out the documentation and training on how it is done.

2. Document the return on investment of signal modernization and timing investments from the TSMO Budget. Develop a business case for signal maintenance funding to meet the current needs.

- 2.1 Clearly define the current funding procedures and processes.
- 2.2 Define the gaps in funding sources and related risks.
- 2.3 Develop a plan to migrate signal maintenance out of GMR funding and into the TSMO budget.
- 2.4 Use data to support the level of funding needed to obtain proactive management.

3. Develop and institutionalize appropriate outcomes-based performance measures for arterial performance, signal management and operations, and signal modernization to drive decisions.

- 3.1 Define what data is needed to support selecting corridors that need to be retimed.
- 3.2 Define how data is currently being used and develop a plan to mature that approach.
 - 3.2.1 Currently, Division activities are driven by calls from the public.
 - 3.2.2 Investigating strategies that use newer data sources such as Inrix data.
 - Once vetted, formalize how the data can be used by agencies.
 - Assess trends on corridor performance and determine potential maintenance needs.
 - Expectation is that a proactive approach to managing the traffic signals will decrease the number of calls received by the Divisions.
 - 3.2.3 Continually evolve how the data is used to educate and manage the resources.
- 3.3 Proactively address impacts from **corridor developments**
 - 3.3.1 Define potential system upgrades that should be implemented.
 - 3.3.2 Determine when the corridor should be evaluated and retimed.
- 3.4 Establish clear procedures for **integrating new traffic signals** into corridor or systems.



- 3.5 Leverage an **asset management program** to proactively monitor and budget for system maintenance, upgrades, and expansions
 - 3.5.1 Define strategies for scheduling and conducting asset replacement.
 - 3.5.2 Define how an asset management can better support emergency and preventative maintenance.
 - 3.5.3 Use the asset management program to guide communications upgrades and expansions of the communications network to **increase accessibility for remote traffic signals.**
- 3.6 Develop an effective data governance plan that incorporates the use of **new data sets** (CV, Probe Data)
- 3.7 Define shared goals for an acceptable level of service.
 - 3.7.1 Signal equipment failure
 - 3.7.2 Signal display failure
 - 3.7.3 Detection failure
 - 3.7.4 Controller/programming failure
- 3.8 Define shared goals for the travel time reliability of a corridor

4. Evaluate and integrate emerging technologies for active traffic management and modernization of signal operations and arterial management.

- 4.1 **Effectively accommodate multimodal operations** on arterials
 - 4.1.1 Be an active participant in how Bus Rapid Transit (BRT) services are implemented in NC.
 - 4.1.2 Determine guidelines for accommodating and protecting Vulnerable Road Users (VRU) - Bicyclists, pedestrians, electric scooter users
 - This could include an increase in how pedestrian movements are factored into signal coordination.
- 4.2 Effectively integrate the new centralized signal system software.
 - 4.2.1 Determine documentation needs to support the implementation of the software.
 - 4.2.2 Assess the likelihood or willingness of municipal systems to migrate to the statewide software.
 - 4.2.3 Determine strategies to support that migration and the integration of systems that are not planning to migrate.
 - 4.2.4 Leverage the economies of scale of a consistent Central Signal Systems to support better system synchronicity.
- 4.3 **Leverage pilot projects** to assess emerging technologies and guide program expansions.
- 4.4 Establish a means for **managing publicly available data** and legal implications.
 - 4.4.1 Ensure all data is effectively managed in accordance with the Freedom of Information Act (FOIA).
 - 4.4.2 Define how SPaT data may be used by the Department and the public.
 - 4.4.3 Determine strategies that support real time data sharing to monitor equipment and corridor performance.
- 4.5 Establish the initial investment and the foundation for the Department's **ATSPM program.**
 - 4.5.1 **Partner with local agencies** to expand ATSPM program
 - 4.5.2 Prioritize potential local agency partners.
 - 4.5.3 Conduct a Benefit-Cost-Analysis for where to best implement ATSPM infrastructure.



5. *Develop an Urban Arterial Active Traffic Corridor Management Strategy.*

- 5.1 Define a strategy focused on providing major regional and interregional traffic movements in a safe and operationally efficient manner
 - 5.1.1 Maximize capacity and minimize cost (delay, stops)
 - 5.1.2 Consider midblock treatments, intersection treatments, public transport, goods movement, pedestrians, and cyclists
- 5.2 Establish effective agreements with local agencies that operate and maintain devices
- 5.3 Involved all key stakeholders in the development of the individual corridor plans

6. *Develop workforce to have skillsets relating Arterials and Signals Operations support.*

- 6.1 Actively recruit for specific expertise that support the program's goals.
- 6.2 Conduct internal workshops on technical training topics.
- 6.3 Establish a process to leverage cross-training activities for specific skill sets.
- 6.4 Focus on growing the bench strength at both the statewide and regional level.
- 6.5 Identify potential single points of failure and determine strategies that prioritize redundancy in knowledge and skills.
- 6.6 Integrate real world training exercises to provide a more effective environment.

7. *Standardize existing Schedule C & D agreements and develop guidance for new agreements with municipalities.*

- 7.1 Assess the current success and gaps of the program. Some agencies are leading the way with their programs, whereas others are unable to meet primary responsibilities.
- 7.2 Define a potential way forward based on the defined gaps.
- 7.3 Need to focus on clear accountability and expectations relative reimbursements.

8. *Develop a communication plan to partners and the public about new or emerging technologies.*

- 8.1 Develop a strategy to share the vision for achieving proactive arterial management.
- 8.2 Share current and future plans for implementing, integrating, and applying ATSPM technologies.
- 8.3 Continue to educate on the benefits and impacts of ICM implementations.
- 8.4 Communicate NCDOT's vision for accommodating and integrating CV technologies.
 - 8.4.1 Share how the Department is expecting to use the data.
 - 8.4.2 Share the Department's intent relative to the density of field equipment (frequency of RSUs in equipment cabinets?).
- 8.5 Share the plan for upgrading and replacing existing cabinets. Communicate the impacts or expectations of Divisions or local agencies.
- 8.6 Communicate the Department's strategy for upgrading to cyber locks on equipment cabinets.
- 8.7 Determine and share how the Department is assessing the use of video analytics
 - 8.7.1 Determine how to address the lack of trust in the technology.
 - 8.7.2 Define strategies to assess emerging technologies of newer solutions.
 - 8.7.3 Provide insight into the use and effectiveness of Lidar to provide out of pavement detection solutions.

Emergency Weather Traffic Operations

Service Layer Plan

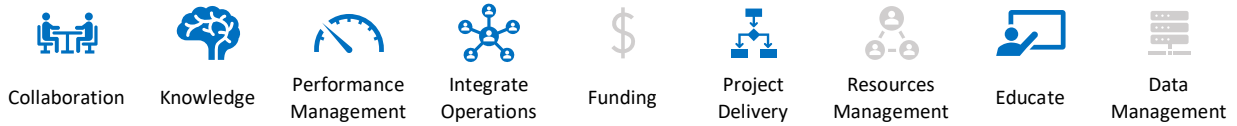
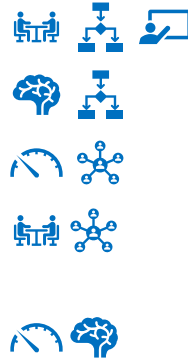
Emergency Weather Traffic Operations is focused on traffic impacts from significant weather events. This includes activities that should occur prior to, during, and after the event. Agencies typically involved are transportation agencies, emergency management, state police, local law enforcement, and others that manage traffic and can provide real time data related to impacts or resources during different phases of the event.





Objectives

1. Institutionalize TSMO roles and responsibilities related to Emergency Response
2. Integrate TSMO strategies and emerging tools
3. Implement a performance measurement program for traffic management during emergency response
4. Practice Continuity of Operations Plan (CoOP) with TMC and IMAP.
5. Develop TSMO focused resiliency goals that focus on roadway resiliency for day-to-day events (e.g., crashes), digital networks that support our traveler information systems, software, and devices, and cybersecurity.





Action Items

1. Institutionalize roles and responsibilities related to Emergency Response

- 1.1 Maintain consistent **documentation** of emergency response processes and procedures
 - 1.1.1 Maintain the current hurricane response plan (Z:\Events\Hurricane\Template)
 - 1.1.2 Document hurricane resource sharing, training exercises, briefings (DOT and other agencies), and information sharing
 - 1.1.2 Document winter weather event (e.g., snowstorm) response plans, resource sharing, training exercises, briefings (DOT and other agencies), and information sharing
 - 1.1.3 Document emergency response plans, resource sharing, training exercises, briefings (DOT and other agencies), and information sharing. (Z:\Events\Winter Weather)
 - 1.1.4 Revise the Continuity of Operations Plan (COOP)
- 1.2 Develop plans for hurricane response routes
- 1.3 Maintain formalized education and training exercises
 - 1.3.1 Conduct the **Pre-seasonal education** to management (prior to hurricane season and winter weather impacts)
 - 1.3.2 Conduct pre-season exercises with staff in advance of hurricane and winter weather seasons
 - Involve all partners
 - Revise response plans and other documents based on findings from conducting the exercise.
- 1.4 Sustain information sharing opportunities to promote statewide consistency
 - 1.4.1 Document integral partners and their role within the emergency response
 - 1.4.2 Document system integration requirements that support and are integral to emergency response
 - 1.4.3 Develop information transition plans are individuals approach retirement or plan to leave an agency.
 - Document the roles and responsibilities of the agency
 - Document lessons learned and why the agencies responsibilities are important to the overall program
- 1.5 Establish formal agreements regarding coordination and communication with bordering states. Include nearby states where large scale hurricane evacuations can affect NC.
 - 1.5.1 Virginia
 - 1.5.2 Tennessee
 - 1.5.3 Georgia
 - 1.5.4 South Carolina
 - 1.5.5 Florida

2. Formalize the integration of strategies and tools

- 2.1 Establish resiliency in the **tools** that support internal and external communications
 - 2.1.1 Document the processes for VIPER radio management
 - 2.1.2 Document the processes for supporting phones that support TOW contracts



- 2.2 Leverage additional **technologies or infrastructure** to support enhanced situational awareness
 - 2.2.1 Document the value and applications of drones to support visual confirmation of conditions and weather impacts
 - 2.2.2 Document existing and potential data sources and the use of traffic volume data through third-party probe sources
 - 2.2.3 Determine the gaps or need of additional field infrastructure near hot-spots or critical transportation infrastructure
 - 2.2.4 Continue to identify and integrate other data sources that support managing the emergency response such as flood prediction, weather data
- 2.3 Establish **workflow management tools** to streamline the volume and effectiveness of communication between emergency responders.
- 2.4 Solidify **staffing strategies** that can accommodate surges in response to emergency weather
 - 2.4.1 Document how and when TMC staffing surges are decided and implemented
 - 2.4.2 Document how and when IMAP or TIM team staffing is decided and implemented
- 2.5 Optimize **data sharing** that supports emergency response
 - 2.5.1 Define critical data sets including data owner, accessibility, and use
 - 2.5.2 Document existing APIs that are critical to response
 - 2.5.3 Document additional APIs that can improve data sharing with partners

3. Define clear goals and implement a performance measurement program for emergency response

- 3.1 Document the number and trends of website hits as related to the event
- 3.2 Document the number of calls received and ability to accommodate the increase in demand
- 3.3 Monitor the accuracy and timeliness of road condition data during the event
- 3.4 Assess the effectiveness of the evacuation routes used during the event
- 3.5 Assess the effectiveness and management of the supply routes used during the event
- 3.6 Assess the effectiveness and management of the reentry routes used during the event
- 3.7 Assess the effectiveness of IMAP coverage (pre-event, during an emergency, and post event)
- 3.8 Assess the responsiveness and clearance times at hot spots
- 3.9 Assess the accuracy and reliability of third-party data providers during an event

4. Practice Continuity of Operations Plan (CoOP) with TMC and IMAP.

- 4.1 Conduct mock exercise of CoOP plan for TMC.
 - 4.1.1 Involve all individuals that would be involved in a TMC handoff.
 - 4.1.2 Walkthrough all system procedures that are included in the transition of functions
- 4.2 Conduct mock exercise for the CoOP plan for IMAP.
 - 4.2.1 Include everyone with a role within the plan (drivers, supervisors, IMEs, RITS Engineer)
 - 4.2.2 Walk through example event so those involved understand the motivation behind decisions made



5. *Develop TSMO focused resiliency goals that focus on roadway resiliency for day-to-day events (e.g., crashes).*

- 5.1 Ensure resiliency plan addresses the integrity of the digital networks that support traveler information systems, software, and devices.
- 5.2 Ensure resiliency plan addresses cybersecurity and risks to the digital networks.

Active Work Zone Management/ Planning for Operations

Service Layer Plan

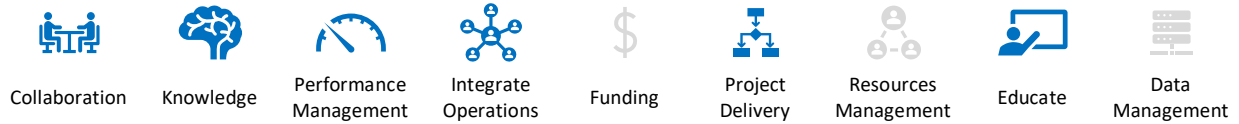
This is a cross-cutting service layer plan that integrates coordination efforts between planning, programming, project development, design, construction, and operations to ensure NCDOT is effectively employing active traffic management or TSMO strategies that align with the objectives of safety and mobility. It includes program delivery and active work zone management.





Objectives

1. *Mature stakeholder engagement, education, and planning efforts to include Planning for Operations*
2. *Integrate TSMO Strategies in significant projects*
3. *Increase technical competency among project stakeholders for identifying and applying TSMO strategies.*
4. *Validate the effectiveness of different tools that can improve TSMO strategies in work zones*
5. *Mature the consideration of TSMO strategies as a viable option to address transportation needs.*





Action Items

1. Mature stakeholder engagement, education, and planning efforts to include Planning for Operations

- 1.1 Develop and deliver education to specific internal and external partners.
 - 1.1.1 Integrate information from the Transportation Operations Manual (TOM) into training initiatives and programmatic processes.
 - 1.1.1 Educate senior and executive management on the value of active traffic management (tenacity, consistency, and redundancy in messaging of the program)
 - Integrate BCA for impactful strategies.
 - Leverage the current strength of Senior Management buy-in to grow the investment from other partners in the Department.
 - 1.1.2 Establish a library of educational tools that can be used for educating partners and management on the overall TSMO program.
 - Summarize Benefit-Cost-Analysis (BCA) for TSMO strategies. (ICM, IMAP, and other tools)
 - Establish planning level costs for TSMO strategies. (ICM, IMAP, and other tools)
 - 1.1.3 Provide education to groups involved in the project delivery process.
 - Confirm the groups and individuals.
 - Feasibility Study Unit
 - Project Management
 - Technical Services
 - TIP
 - Program Delivery
 - Define the process for educating the partners.
 - Identify some strategies to introduce TSMO into the project development process.
 - Determine how to assess TSMO strategies within the existing project development processes.
 - Define how to assess.
 - Define how to align with the project scoring process. (Kelly involved in some scoring conversations)
 - 1.1.4 Sustain the maturity of TSMO integration with the Project Delivery Network (PDN) – (https://connect.ncdot.gov/projects/Project-Management/Documents/NCDOT_ProjectDeliveryNetwork.pdf)
 - Traffic Operations elements have been defined within the process (number 50).
 - Standard scope language has been provided for inclusion within the documentation.
 - Develop additional training for project managers on how to include TSMO into project scopes.
 - Partner with HNTB, who is very involved with PDN, on making refinements to the process based on lessons learned.
 - Determine strategies to better connect PDN with TSMO.



- Connect data and project elements with Atlas.
- Provide samples of standard plans, specs, etc.
- 1.2 Coordinate recurring meetings with Divisions/Regions.
 - 1.2.1 Document process for developing planning level maps and driving discussions on needs assessments.
 - Leverage the experience of the TMC, existing data and reports, and established performance measures.
 - Define the data to include. (hot spots, existing infrastructure, blind spots, mobility issues, TIP Projects, etc.)
 - Define how the data is intended to be used during the meeting.
 - Define the level of detail needed at the planning stage.
 - Define the process to maintain the data.
 - Change management and implementation processes for ITS maps
 - Define all of the content we want to maintain and who owns, maintains
 - Marry with the asset management processes
 - 1.2.2 Determine the frequency for meeting with each Division/Region.
 - 1.2.3 Define the timeline of the meetings based on the timeline of existing project development and planning level processes.
- 1.3 Define the overall program for maintaining Regional ITS Plans.
 - 1.3.1 Develop a Statewide ITS Plan.
 - Develop a planning level map of ITS needs
 - Define the future communications needs to support the ITS devices anticipated
 - 1.3.2 Define the regional boundaries for all of the regional plans in NC.
 - Confirm the current status of those regional plans.
 - Develop a work plan for maintaining regional plans.
 - 1.3.3 Evolve all stakeholders to using TSMO terminology.
 - 1.3.4 Define how the TSMO Planning process aligns with federal requirements.
- 1.4 Conduct Operational Risk Assessments (ORAs) for significant projects.
 - 1.4.1 Develop a process for how to apply the existing ORA manual.
 - Less significant projects could be led internally by safety engineers
 - More significant projects could be led by firms to support enhanced project development.
 - Apply the ORA to assess alternate routes, timing of projects, and other elements that can impact the project delivery.
 - Define mitigation strategies associated with each identified risk.
- 1.5 Document the statewide direction on route management.
 - 1.5.1 Consolidate the state's approach to evacuation routes.
 - Define existing technology that is in place.
 - Define what TSMO strategies should be used on evacuation routes.
 - Connect the evacuation route management plan to the major event response plans.
 - 1.5.2 Document the state's approach to Integrated Corridor Management.
 - 1.5.3 Document the state's approach to hot spots during winter weather events.
 - 1.5.4 Define detour and alternate routes.



- 1.6 Increase the understanding and application of the Systems Engineering process.
 - 1.6.1 Provide an overview of the importance of applying the SE process.
 - 1.6.2 Provide training on development a Concept of Operations and how it supports the delivery of a TSMO project.
 - 1.6.3 Provide education on how to apply the process and document to address federal requirements.

2. Integrate TSMO Strategies in significant projects.

- 2.1 Institutionalize TSMO as part of the Integrated Project Delivery (IPD) process.
 - 2.1.1 Continually engage with senior leadership to sustain NCDOT culture that is committed to active traffic management.
 - 2.1.2 Integrate the systems engineering methodology with IPD to appropriately account for defining and implementing successful elements of active traffic management strategies.
 - 2.1.3 Promote an approach that considers active traffic management strategies as consistently as infrastructure focused capital improvements.
 - 2.1.4 Provide education that demonstrates how active traffic management strategies can address the wide range of mobility and safety needs.
 - 2.1.5 Feeding operational needs into projects/grants/programs
 - Layout grant schedule
 - Prepare concepts in advance of application timing
 - Maintain records of past submissions, ideas, and wins
 - 2.1.6 Validate that all stakeholder agencies are involved in project development
- 2.2 Develop a methodology for prioritizing investments across all projects – place a focus on funding what provides the largest benefit
 - 2.2.1 Look into projects that are more regional/local and how a project can fit into the overall construction schedule
 - 2.2.2 Don't look at projects in isolation
- 2.3 Define the benefits of implementing TSMO strategies in the early phases of a project
 - TSMO strategies can be quickly implemented
 - TSMO Strategies can support real time traffic management during all phased on construction

3. Increase technical competency among project stakeholders for identifying and applying TSMO strategies.

- 3.1 Define the stakeholders that need training.
 - 3.1.1 TMC Staff
 - 3.1.2 Construction Staff (Resident Engineers)
 - 3.1.3 TIM Staff (Regional ITS Engineers, Incident Management Engineers (IME))
 - 3.1.4 Work Zone Traffic Control
 - 3.1.5 Designers



- 3.2 Define the topics that require educational materials.
 - 3.2.1 Establish definitions and use cases for adopted strategies
 - TIM
 - TMC
 - Arterial Management
 - ICM
 - Incident Management Plan
 - Tow Contracts
 - Planning for TSMO strategies
 - 3.2.2 Establish definitions and use cases for emerging technologies
 - More granular probe data (volume data)
 - Connected and Autonomous Vehicles
- 3.3 Develop a clear definition for smart work zone technologies.
 - 3.3.1 Define where the technology should be implemented (types of projects – size, route type, duration)
 - 3.3.2 Define how the technology should be managed.
 - Roles and responsibilities for the Department staff.
 - Roles and responsibilities for the contractor
 - Roles and responsibilities for first responders or other agencies.
 - 3.3.3 Define specific work zone characteristics and TSMO strategies that can mitigate the impacts.
 - Lack of shoulders (incident clearance strategies)
 - Decreased lane widths
 - Increased queues (back of queue warning)

4. Validate the effectiveness of different tools that can implement TSMO strategies to address needs and challenges.

- 4.1 Define how TSMO strategies fall under the TMP requirements
- 4.2 Establish a platform for coordination with WZTC for upcoming projects and active construction projects
 - 4.2.1 Leverage monthly ATS crash/safety reports for major construction projects
 - 4.2.2 Confirm recurring coordination meetings with WZTC and other groups (i.e. Contractors)
 - 4.2.3 Confirm what has and has not worked in the past
 - 4.2.4 Leverage Open Road Teams to adopt and promote technologies that support active work zone management
 - 4.2.5 Define clear goals and implement a **performance measurement** program for active work zone management
- 4.3 Evaluate the tools and reports that are being used to assess the benefit of current TSMO strategies
- 4.4 Establish the needs that can be addressed with a real time lane management system (new ATMS software)
- 4.5 Discuss the needs (in terms of work zone impacts) for commercial vehicles in the freight industry
- 4.6 Leverage **Pilot Projects** to evaluate emerging technologies



5. ***Mature the consideration of TSMO strategies as a viable option to address transportation needs.***
 - 5.1 Establish guidance that supports TSMO projects to compete in the STIP process
 - 5.2 Educate staff and stakeholders so TSMO project can be considered first as a viable solution. (permanent solution or interim solution prior to a major construction project)