North Carolina
Department of Transportation

TSM

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

Annual Program Report

Fiscal Year 2024
(October 1, 2023 - September 30, 2024)

Introduction

The North Carolina Department of Transportation (NCDOT) is one of the largest government agencies in the state and is responsible for approximately 80,000 miles of roadway. The Transportation Systems Management & Operations (TSMO) Program oversees the operations of all freeway and arterial corridors in North Carolina and partners with other first responders to improve safety and mobility on the transportation network.

NCDOT's Traffic Signal Management Program supports one of the largest state-owned traffic signal inventories in the nation, which continues to grow each year. The TSMO Program and Signal Management Program are delivered by the TSMO Unit, which is led by NCDOT's State TSMO Engineer.

The purpose of this report is to provide information regarding TSMO and Signal Management activities, with focus on these programs' budgets and expenditures. Since both programs are delivered via separate budgets with different funding sources, each program will be detailed in their own chapters within this report. For each program, this report will highlight key accomplishments in Fiscal Year (FY) 2024 and strategic goals for FY 2025.

NCDOT's TSMO Unit leverages strategies that differ from traditional transportation improvements, which rely heavily on building new lanes or roadways to address transportation problems. Instead, this team seeks to address the underlying causes of mobility and safety issues through innovation, process improvement, and partnership – solutions that typically cost less and are quicker to implement than adding road capacity.

Message from the State Transportation Systems Management & Operations Engineer

FY 2024 was an extraordinarily productive year for TSMO and Signal Management. Our team achieved several major milestones within our programs' most essential, long-term goals. These FY2024 accomplishments include:

- Initiated a **contract for our Incident Management Assistance Patrol (IMAP)**, which expands IMAP support throughout the state, increasing total coverage from 910 centerline miles to over 1,500 miles.
- **Expanded interoperability between NCDOT and its partners** by establishing new memoranda of understanding (MOU) with 12 additional law enforcement agencies.
- **Grew and enhanced traffic management center (TMC) operations** by initiating new designs for the Triad TMC and Mountain TMC and planning for a new TMC to support real-time operations in North Carolina's Eastern Region.
- **Improved statewide interoperability** by deploying a new phone system to dynamically manage calls across all TMCs and by initiating a contract to implement an advanced traffic management system (ATMS), which will enable statewide access to all intelligent transportation systems (ITS) and enhance operational performance through automation.
- Leveraged the ITS device maintenance contract, new asset management systems, strategic communication and deployment plans, and wider broadband connectivity to **mature ITS resiliency and improve device uptimes, statewide**. The NC Broadband Project completed another 132 miles of conduit installation and achieved a device uptime in these areas that exceeded 99% on average.
- **Added new strategies to our Traveler Information tool-kit** including real-time, in-vehicle alerts to commercial motor vehicles and wireless emergency alert messages to targeted audiences via geofencing.
- Upgraded nearly half of the state's legacy signal systems to new software; **reduced delay near interchanges by 85% through signal re-timing**; and conducted multiple pilots of automated traffic signal performance measure (ATSPM) systems to actively manage traffic on North Carolina's arterials.
- **Established a Planning Work Group and closer coordination with NCDOT Work Zone Traffic Control** to improve operational planning and day-to-day response to traffic impacts from major highway construction projects.
- **Developed the Tow Contract Dashboard** to manage performance, administer incentives, and reflect the positive return on investment (ROI) provided by tow contracts.
- **Completed the Strategic Deployment Plan for ITS** in the Metrolina region.
- Implemented practices to prepare for emergency weather operations including formal Hurricane and Winter Weather exercises and updated evacuation plans. **Delivered an effective, innovative, and well-organized response to Hurricane Helene**, which brought unprecedented destruction to Western North Carolina, resulting in over 1,400 road closures and the longest emergency activation in the TSMO Program's history.

Throughout FY 2024, our team demonstrated the immense value of the TSMO and Signal Management programs to safety and mobility in North Carolina. Looking back on the accomplishments of this year and the historic proportions of the challenges we have overcome, it has never been more clear that what we do matters.

Sincerely,

Jennifer Portanova, PE, CPM

State TSMO Engineer

Contents

List of Acronyms

Acronym	Meaning
AAR	After Action Review
AARA	Automating Actionable Road Anomalies
AASHTO	American Association of State Highway and Transportation Officials
ACP40	TRB Committee on Highway Capacity and Quality of Service
ACP80	TRB Committee on Traffic Simulation
API	Application Programming Interface
ATIS	Advanced Traveler Information System
ATMS	Advanced Transportation Management System
ATS	Assistant Traffic Specialist
ATSPM	Automated Traffic Signal Performance Measures
AVL	Automatic Vehicle Location
AWZM	Active Work Zone Management
B/C	Benefit/Cost
BLET	Basic Law Enforcement Training
BLRT	Blue Light Radar Trailers
CAD	Computer Aided Dispatch
CAV	Connected and Autonomous Vehicles
CCTV	Closed Circuit Television
CLCS	Connected Lane Closure Systems
CMAQ	Congestion Mitigation and Air Quality
CMS	Changeable Message Sign
CTSO	Committee on Transportation Operations
DMS	Dynamic Message Sign
DMV	Department of Motor Vehicles
EDC	Every Day Counts
EV	Electric Vehicle
FAST 2.0	Freeway, Arterial, Street & Tactical (Transit)
FHWA	Federal Highway Administration
FY	Fiscal Year
GAO	Government Accountability Office
GIS	Geographic Information Management System
GMR	General Maintenance Reserve
GRITS	Gulf Region ITS
HAWKS	Helping All Work Zones Keep Safe
HELP	Highway Emergency Linked Platform
HSIP	Highway Safety Improvement Program
IAMS/ IWOMS/ FAMS	ITS-related Asset Management Systems
ICM	Integrated Corridor Management
IMAP	Incident Management Assistance Program
IME	Incident Management Engineer
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
ITSC	ITS Carolinas
JFHQ	Joint Force Headquarters (Raleigh)
KPI	Key Performance Indicator
LMS	Learning Management System
MAP-21	Moving Ahead for Progress in the 21st Century
MOU	Memoranda of Understanding
MPO	Metropolitan Planning Organization
NC	North Carolina
NCCIW	North Carolina Correctional Institute for Women
NCDOT	North Carolina Department of Transportation

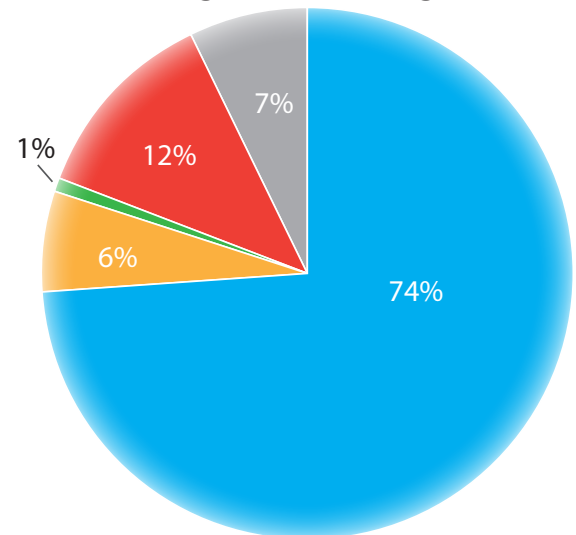| Acronym	Meaning
NCEM	North Carolina Emergency Management (Agency)
NCHRP	National Cooperative Highway Research Project
NCSHP	North Carolina State Highway Patrol
NCSITE	North Carolina Section of ITE
NHS	National Highway System
NOCoE	National Operation Center of Excellence
NTCIP	National Transportation Communications for ITS Protocols
O/D	Origin/Destination
ODOT	Ohio Department of Transportation
ORA	Operational Risk Assessment
PEF	Private Engineering Firm
QC	Quick Clearance or Quality Control
RFP	Request for Proposals
RFQ	Request for Qualifications
RITS	Regional ITS (Engineer)
ROI	Return on Investment
SCSITE	South Carolina Section of ITE
SMART	Strengthening Mobility and Revolutionizing Transportation
SOP	Standard Operating Procedure
SOW	Statement of Work
SPR	State Planning and Research
SSP	Safety Service Patrol
SSTO	Signal System Timing and Operations
STIC	State Transportation Innovation Council
STIP	State Transportation Improvement Program
STOC	Statewide Transportation Operations Center
TE	Traffic Engineer
TETC	The Eastern Transportation Coalition
TIM	Traffic Incident Management
TIMS	Traveler Information Management System
TMC	Traffic Management Center
TMSD	Transportation Mobility and Safety Division
TOM	Transportation Operations Manual
TRB	Transportation Research Board
TS	Tropical Storm
TSMO	Transportation Systems Management & Operations
UAS	Unmanned Aircraft System
UPS	Uninterruptible Power Supply
VDOT	Virginia Department of Transportation
VIP	Valuing Individual Performance
VIPER	Voice Interoperability Plan for Emergency Responders
WEA	Wireless Emergency Alert
WZ	Work Zone
WZTC	Work Zone Traffic Control

TSMO

TSMO Overview

NCDOT's TSMO Program partners with first responders and a host of other stakeholders to leverage a range of active traffic management strategies capable of promoting safety and mobility on the transportation network. The TSMO Program is comprised of the following core focus areas:

- Traffic Incident Management
- Traffic Management Centers
- Intelligent Transportation Systems Operations
- Traveler Information
- Signal System Timing and Operations
- Emergency Weather Traffic Operations
- Active Work Zone Management / Planning for Operations
- Mobility Performance Measures

To accomplish the needs of this $42M program, NCDOT accesses funding from the allocated TSMO Budget, Construction Projects, Grants, and Broadband Project. Leveraging a variety of funding sources, the Department is able to provide impactful safety and mobility services to the traveling public. TSMO strategies often provide a high return on investment as technology is leveraged to increase safety and capacity within existing transportation infrastructure. Overall, NCDOT's TSMO Program has a benefit to cost ratio of 33:1 due to the safety, mobility, and environmental benefits of the specific TSMO strategies in our program.

TSMO Program Funding Sources

- 74% TSMO Budget
- 6% Construction Projects
- 1% Grants
- 12% Resiliency Contract
- 7% Broadband Contract

Return on Investment in FY 2024

NCDOT utilized industry research and analysis from leading TSMO agencies, FHWA, NOCoE, and AASHTO, to develop a return on investment (ROI) analysis for FY 2024. NCDOT specifically evaluated the ROI associated with traveler information, incident management, and signal system timing TSMO strategies. These strategies alone resulted in the following benefits for the program:

- Over $429 million in benefits due to estimated reduced crashes (3,501 crashes, 747 injuries, and 18 fatalities).
- Over $838 million in benefits due to reduced travel time (over 37 million hours of travel time savings).
- Over $132 million in benefits due to reduced fuel consumption (over 33 million gallons) and reduced CO2 emissions (over 297 thousand metric tons).

These benefits, when compared with an annual TSMO Program investment of $42,292,499 resulted in a benefit/cost ratio of 33:1 for the program.

RETURN ON INVESTMENT

$42,292,499
Annual TSMO Program Investment

33:1
Benefit/Cost Ratio

Over $429M in Benefits
Due to Estimated Reduced Crashes

Over $838M in Benefits
Due to Reduced Travel Time

Over 37M Hours of Travel Time Savings

Over $132M in Benefits
Due to Reduced Fuel Consumption and CO2 Emissions

Over 33M Gallons Fuel & 297,000 Tons Emmisions Reduction

TSMO FY 2024 Updates

Report Card (October 2023 - September 2024)

In FY 2024, the Department developed clear goals that aligned with shifting funding dependency away from general maintenance funding sources, implementing strategies from the TSMO Program Report, and advancing key initiatives across the state. Furthermore, the TSMO unit accomplished many of its highest priority goals while remaining responsive to real-time traffic demands, including historic impacts from Hurricane Helene. The following table captures the report card that identifies the state of the Department's FY 2024 goals.
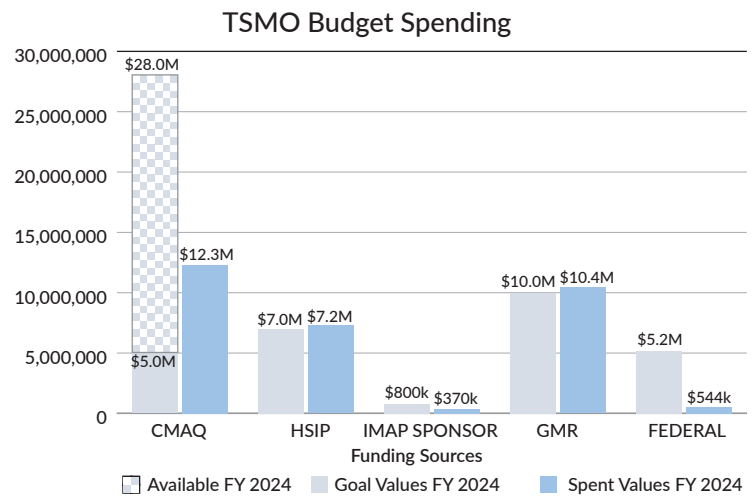
TSMO FY 2024 Updates

Core Focus Area	Goal	Action Plan	Status
Program Wide	Execute 5-year Plan	Implement TSMO Strategic Plan & Funding Plan	Completed
	Transportation Operations Manual (TOM)	Implement AASHTO TOM and host monthly meetings to educate stakeholders	Completed
TIM	Staffing	Hire additional Regional TIM Coordinator and IMAP Training staff	In progress
	IMAP Training	Train new IMAP staff at pace with IMAP expansion	In progress
		Expand training to address new topics and multi-agency training	Completed
	Expand IMAP	Initiate IMAP contract	Completed
		Increase staffing and coverage per TSMO plan	Completed
	Regional Outreach	Sign additional MOUs with local law enforcement and other partner agencies	Completed
TMC	Upgrade Triad and Mountain TMCs	Complete design for Triad TMC upgrade	Completed
		Complete design for Mountain TMC upgrades	In progress
	Establish Eastern TMC	Upfit facility and onboard TMC staff	In progress
	Upgrade Phone System	Deploy new phone system at all centers	Completed
	Enhance TMC Training	Introduce Learning Management System and new training content	Completed
	TMC Interoperability	Conduct Shutdown Exercise for Statewide Transportation Operations Center (STOC) to practice operational support from TMCs	Completed
ITS	ATMS Deployment	Finalize ATMS procurement and establish contract with vendor	Completed
	CCTV Replacement	Replace analog cameras with digital	Completed
	DMS Replacement	Replace end of life DMS scheduled for 2024-2025 replacements	In progress
	Improve Device Uptime	Achieve consistent device uptime of 93% or greater for ITS devices maintained by performance-based contracts (achieved 99% or greater)	Completed
Traveler Information	Enhance DriveNC.gov	Develop new features and improve connection with external data sources	Completed
	TIMS to ATMS	Transition TIMS to new ATMS	In progress
Signal System Timing and Operations (SSTO)	Update Signal Timing	Update signal timing for 49 systems, impacting 245 signals	Completed
		Achieve a 25% reduction in delay through retiming (achieved 85%).	Completed
Emergency Weather Traffic Operations	Emergency Preparedness	Conduct Hurricane and Winter Weather Exercises	Completed
	Evacuation Plans	Complete hurricane evacuation study and develop plans for evacuation routes	Completed
	NCDOT-VDOT Agreement	Establish agreement with VDOT outlining inter-state operations	Completed
Active Work Zone Management (AWZM)/Planning for Operations	ICM Implementation	Deploy ICM for I-6064 work zone	In progress
	Active Let List Coordination	Establish regular coordination with WZTC to plan for upcoming WZs	Completed
	ITS Deployment Guide	Document ITS deployment guidance for regional/municipal stakeholders	In progress

Budget

The TSMO program budget for FY 2024 was $28M and the total expenditures were approximately $31M successfully achieving NCDOT's goal to stay within 10 percent of their designated budget. In FY 2024, the TSMO program was awarded a combination of CMAQ and CRP funds for FYs 2024-2026 to allow for a transition to a dedicated Federal funding source. The CMAQ/CRP funds provided additional funding availability ($28M for FY24). Also, because the Federal funding source was not setup until the second quarter, additional CMAQ/CRP funding was used to balance the two sources. The combined amount of CMAQ/CRP and Federal funding was approximately $13M, and this was within the expected budget totals.

TSMO Budget Spending

Funding Sources: CMAQ, HSIP, IMAP SPONSOR, GMR, FEDERAL

- CMAQ: Available FY 2024 $28.0M; Goal Values FY 2024 $5.0M; Spent Values FY 2024 $12.3M
- HSIP: Goal Values FY 2024 $7.0M; Spent Values FY 2024 $7.2M
- IMAP SPONSOR: Goal Values FY 2024 $800k; Spent Values FY 2024 $370k
- GMR: Goal Values FY 2024 $10.0M; Spent Values FY 2024 $10.4M
- FEDERAL: Goal Values FY 2024 $5.2M; Spent Values FY 2024 $544k

Legend: Available FY 2024, Goal Values FY 2024, Spent Values FY 2024

Transportation Operations Manual Implementation

In 2023, the American Association of State Highway and Transportation Officials (AASHTO) published the inaugural edition of the Transportation Operations Manual (TOM). The TOM serves as a single reference for all TSMO-related knowledge and strategies and provides agencies with a framework to develop future improvements. NCDOT's TSMO Unit played a key role in the TOM's development and embraced supporting its successful implementation in North Carolina. Following the TOM's publication, the TSMO Unit assembled a diverse workgroup of stakeholders from across the state who represent each TSMO core focus area. This workgroup met throughout 2024 and used a collaborative and interactive discussion format to better explore the full contents of the manual and identify takeaways that could immediately be put into practice.

Grants

NCDOT is committed to securing grants to support the TSMO program. NCDOT was successful in securing the following grants:

- STIC Grant: Debris Removal (funded FY23; in progress FY24)
- SMART Grant: Automating Actionable Road Anomalies (AARA) (funded FY22; to be completed FY25)
- SPR Grant: Statewide ITS Deployment Guide
- SPR Grant: Metrolina Regional ITS Strategic Deployment Plan (funded FY23; completed FY24)
- SPR Grant: Wilmington Metropolitan Area Regional ITS Strategic Deployment Plan
- CMAQ Grant: SSTO Program Funding
- CMAQ Grant: TSMO Program Funding

Industry Speaking Engagements

Industry engagements for FY 2024 included:

- Civil Unrest and Traveler Safety Forum (Oct. 2023)
- SCSITE and ITSC Vendor Day Conference (Oct. 2023)
- SafeHighways.org – SSP Idea Sharing Network (Oct. 2023)
- Talking TIM Webinars (Oct. 2023)
- ITS GRITS Conference (Nov. 2023)
- TMSO Webinars on WZTC and Safety at Trail Crossings (Nov. 2023)
- TOM Technical Discussion (Nov. 2023)
- Traffic Signal Technician Conference (Dec. 2023)
- TRB Annual Meeting (Jan. 2024)
- Tesla Safety Research Day Conference (Jan. 2024)
- METTS Conference (Mar. 2024)
- ITS Carolinas Annual Meeting (Mar. 2024)
- EDC-7 Debris Removal Workshop (Apr. 2024)
- The Eastern Transportation Coaltion (TETC Traveler Information Summit (Apr. 2024)
- NOCoE Emergency Ops and TSMO Peer Exchange (Apr. 2024)
- I-77 Tabletop with VDOT (Apr. 2024)
- ITS America Annual Conference (Apr. 2024)
- UAS Peer Exchange (May 2024)
- FHWA SSP Pooled Fund Study Annual Meeting (May 2024)
- AASHTO Leadership Institute Meeting (Jun. 2024)
- Regional Transit Authority Meeting (Jun. 2024)
- Regional Operations Leadership Forum (Jul.2024)
- TOMAR Emergency Vehicle Preemption Meeting (Jul. 2024)
- GAO Congestion and Broadband Meeting (Jul. 2024)
- CTSO Annual Meeting (Aug. 2024)
- TS Debby Response Briefing to Executive Staff and Highway Committee (Aug. 2024)
- EDC-6 Crowdsourcing Summit (Sep. 24)

Active Committees

NCDOT is an active participant in many local and national committees to support the development and research of national studies, guidelines, and manuals, as well as hosting meetings with peers in other states to solve familiar challenges.

- I-40 Regional Partnership
- Triangle Regional ITS Working Group
- Metrolina Regional ITS Working Group
- NCDOT & ODOT Peer Exchange
- NCSITE ITS User Group
- NCSITE Signal System User Group
- North Carolina Fully Autonomous Vehicle Committee
- AASHTO CAV Working Group
- AASHTO CTSO TOM Technical Committee vice-chair
- ACP40 & ACP80 Joint Planning Working Group
- CTSO Communications Technology Working Group
- CTSO Operations Implementation Working Group
- CTSO Community of Practice on Traveler Information
- EDC-7 Next Generation TIM: Technology for Saving Lives
- FAST 2.0 Steering Committee
- FHWA ATSPM Pooled Fund Study
- FHWA Safety Service Patrol Pooled Fund Study
- NOCoE Planning for TSMO Peer Exchange
- NOCoE Emergency Operations Peer Exchange
- NCHRP 03-145: National Traffic Sensor System Evaluation Program
- NCHRP 03-146: Transportation Operations Manual Implementation
- NCHRP 03-149: Signal Timing Manual: Development of the Third Edition
- NCHRP 20-123: CTSO Strategic Plan
- TETC Highway Operations Group Meeting
- TETC Travel Information Services Committee
- TRB Freeway Operations Committee
- TRB IT & Technology Committee

TSMO FY 2025 Outlook

Goals (October 2024 – September 2025)

TSMO FY 2025 Goals

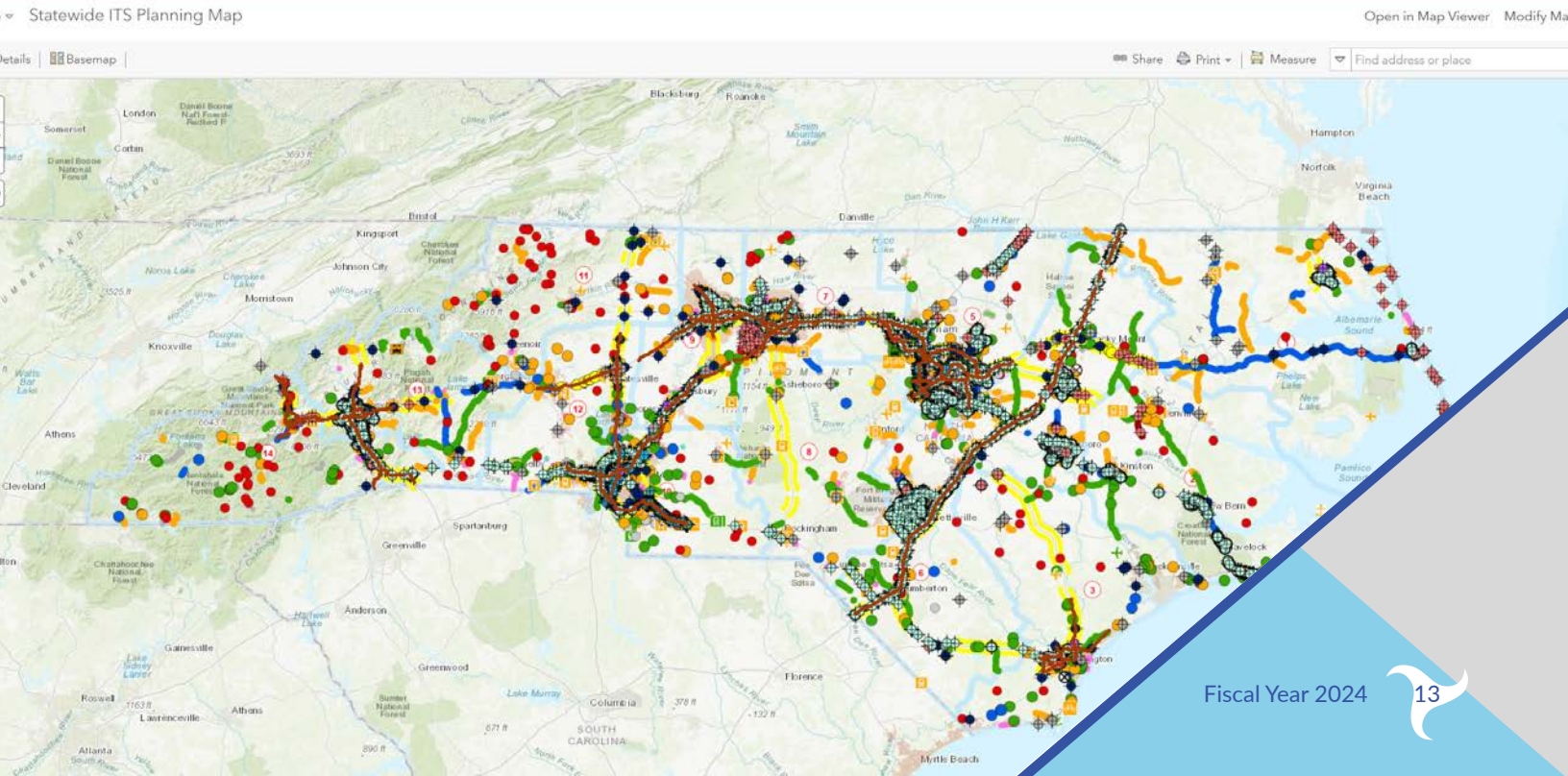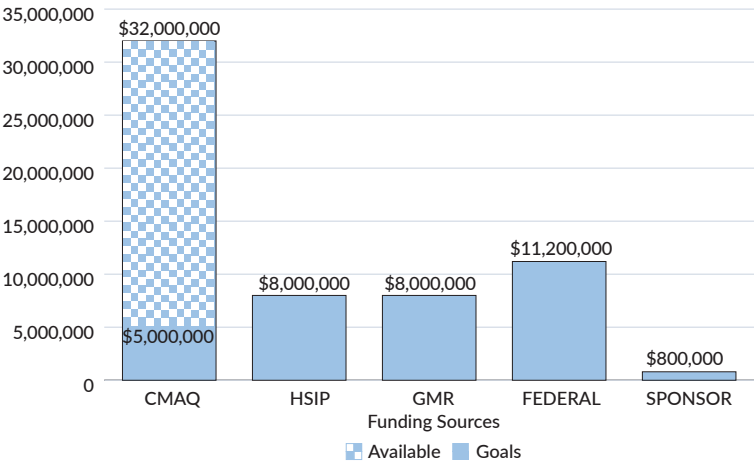| Core Focus Area	Goal	Action Plan
Program Wide	Update TSMO budget to align with 5-year plan	Reduce dependency on GMR as a funding source for TSMO budget.
		Implement dashboard showing regional spending against their goals.
TIM	Staffing	Define roles and responsibilities for TIM Coordinators, IM Engineers, and RITS Engineers
	IMAP Training	Construct training building at TIM Training and Development Track
		Train new IMAP staff at pace with further IMAP expansion
		Conduct in-service training for IMAP staff
	Expand IMAP	Conduct B/C analysis of IMAP routes in all regions
		Execute additional task orders for IMAP contract
	Regional Outreach	Conduct all TIM Team and Open Roads meetings in person
TMC	Upgrade Triad and Mountain TMCs	Initiate construction of Triad and Mountain TMC upgrades
	Establish Eastern TMC	Begin control room operations at Eastern TMC
	TMC Interoperability	Update processes due to expanded ATMS capabilities
		Develop and practice strategies for dynamic coordination across TMCs due to ATMS and new phone system
		Conduct STOC/TMC Shutdown Exercises to practice operational support from statewide and regional centers
		Train all TMC/STOC staff and appropriate Division personnel on ATMS and ATIS
		Begin live ATMS operations across the STOC and all TMCs
ITS	ATMS Deployment	Complete ATMS implementation including development of new ATMS features
		Integrate asset management (IAMS/IWOMS) in ATMS
	Statewide ITS Communications Plan	Integrate FAMS with Statewide Communications Plan
		Expand plan to include additional facilities
		Prioritize fiber infrastructure needs for future funding
	Statewide ITS Resiliency	Continue DMS replacements and begin DMS upgrades
	Storm / Major Event ITS	Use GMR funding ($6M) to procure ITS dedicated to hurricane response including CMS, portable traffic signals, and stream gauges
		Begin detour route signal system coordination for major weather events
	ITS Broadband	Create a FAQ document for Broadband Projects and post on the TSMO website
	Funding Opportunities for Fiber Infrastructure	Monitor STIP to include ITS components
		Pursue grants and investigate other methods including leasing/sharing fiber
Traveler Information	TIMS to ATMS	Incorporate training into Learning Management System for new users
		Improve Work Zone "parent/child" relationship
		Implement new DriveNC.gov
	AARA SMART Grant	Improve real-time, in-vehicle alerts and apply for Stage 2 AARA grant to partner with TETC to share solution throughout and beyond North Carolina

Core Focus Area	Goal	Action Plan
Signal Systems Timing and Operations	Update Signal Timing Active Traffic Management Plan	Achieve a 25% reduction in delay through retiming for existing corridors
		Develop consistent processes for Kinetic Signals that leverage the system's enhanced capabilities
		Develop ATSPM guidelines for Division personnel
		Pursue CMAQ grant for construction of Holly Springs project
		Implement new system (Flow Labs) to evaluate and prioritize projects
Emergency Weather Traffic Operations	Emergency Preparedness	Conduct Hurricane and Winter Weather Exercises
	Multi-State Collaboration	Establish agreement with Tennessee DOT and South Carolina DOT outlining inter-state operations
AWZM / Planning for Operations	ICM Implementation	Deploy ICM for I-2513 and I-5719 work zones
	Feasibility Studies	Develop documentation and guidelines for feasibility studies
	Regional ITS Strategic Deployment Plans	Support the completion of the Wilmington MPO Regional ITS Strategic Deployment Plan
	Planning Tools	Document planning milestones and maintain planning resources
	ITS Deployment Guide	Develop guidelines for ramp metering and other operational strategies

Budget

The FY 2025 TSMO budget will continue to increase the use of Federal and CMAQ/CRP funds and decrease the use of State funds. With the overall funding increase, the TSMO budget will increase to $33M from $28M in FY 2024.

FY 2025 Spending Goals

Bar chart titled "FY 2025 Spending Goals" showing Funding Sources on the x-axis and dollar amounts on the y-axis (0 to 35,000,000). CMAQ shows $32,000,000 (Available) and $5,000,000 (Goals); HSIP $8,000,000; GMR $8,000,000; FEDERAL $11,200,000; SPONSOR $800,000. Legend: Available, Goals.

Statewide ITS Planning Map

Traffic Incident Management

Key components of NCDOT's Traffic Incident Management (TIM) program include the Incident Management Assistance Patrol (IMAP) and the TIM coordination provided across the state. This year, IMAP responded to 39,500 motorist assist calls covering over 900 centerline miles. In 2024, NCDOT initiated a contract to augment state IMAP forces with a vendor, which has increased IMAP coverage to over 1,100 centerline miles and expanded service to Divisions 8 and 11. NCDOT's TIM program supported the IMAP contract by training 24 new IMAP drivers and expanded interagency relationships statewide by establishing MOUs with 12 additional law enforcement agencies for a total of 22.

TIM FY 2024 Updates

Focus Area	Goal	Status
Staffing	Hire a Regional ITS Engineer position for the Eastern Region	Completed
	Hire a Triangle Regional TIM Coordinator	In progress
	Hire an additional IMAP Trainer to conduct in-service training	Completed
IMAP Training	Develop guidance on training material and assessment as a reference for new trainers	Completed
	Conduct multi-agency training sessions in each of the 5 regions	Completed
	Conduct commercial vehicle crash simulation and multi-agency response demonstration	Completed
	Train 24 new IMAP drivers to support new IMAP contract	Completed
	Complete In-Service training for all responders and supervisors	Completed
	Integrate Regional TIM Coordinators into training program to support IMAP assessments and supplemental training needs	In progress
	Establish dashboard providing status of training and certification	Completed
	Conduct EV safety training and integrate into training program	Completed
	Roll-out human trafficking training	Completed
	Complete IM Manual Volume 1	Completed
Expand IMAP	Increase staffing levels and coverage in Divisions 7 and 9 and implement new IMAP routes in Divisions 8 and 11	Completed
	Distribute new IMAP vehicles in coordination with Regions	In progress
	Develop a SOW to advertise work to build the next generation IMAP vehicle	In progress
	Assess the benefits and applicability of different debris removal equipment on IMAP vehicles	In progress
	Assess EV charging technology on IMAP vehicles	Completed
	Conduct a business case analysis for IMAP sponsorship	Completed

TIM FY 2024 Updates (Cont'd.)

Focus Area	Goal	Status
Regional Outreach	Execute 12 additional MOUs with local law enforcement and other partner agencies	Completed
	Leverage DMV Driver License offices to provide educational videos on TVs located in those offices	Completed
Performance Measures	Update the IMAP Dashboard to use more recent data and to reflect new use cases. Review availability and accuracy of data and determine a process for updating dashboard regularly	In progress
	Implement VIP goals for IM Engineers	Completed
	Initiate monthly audits on IMAP data with each region (routes, vehicles, staffing, needs)	Completed
	Initiate the post-incident review board for IMAP vehicle struck-bys	Completed
Heavy Tow Program	Initiate a Heavy Tow Program outside of a construction project	In progress
VIPER Equipment	Replace end-of-life 800MHz handheld radios	In progress
Basic Law Enforcement Training (BLET) Program	Submit request for integration of TIM training within BLET curriculum	Completed

TIM Program FY 2024 Funding Sources

- Statewide — 16%
- Sponsorship — 7%
- Projects — 19%
- CMAQ — 58%
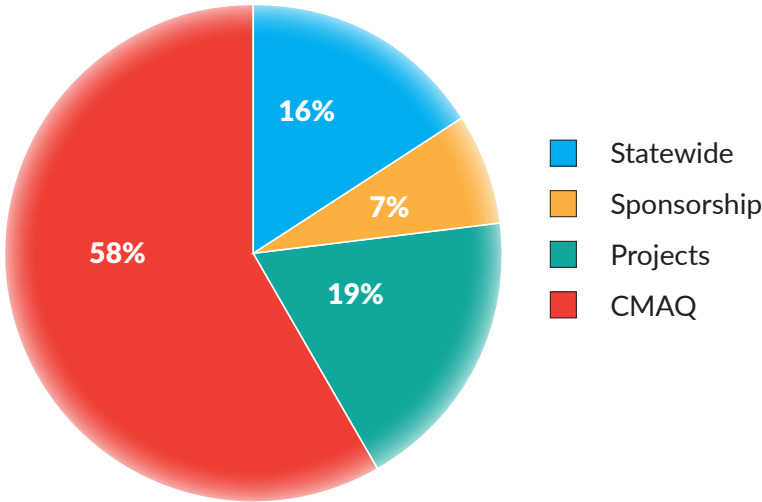
TIM FY 2025 Goals

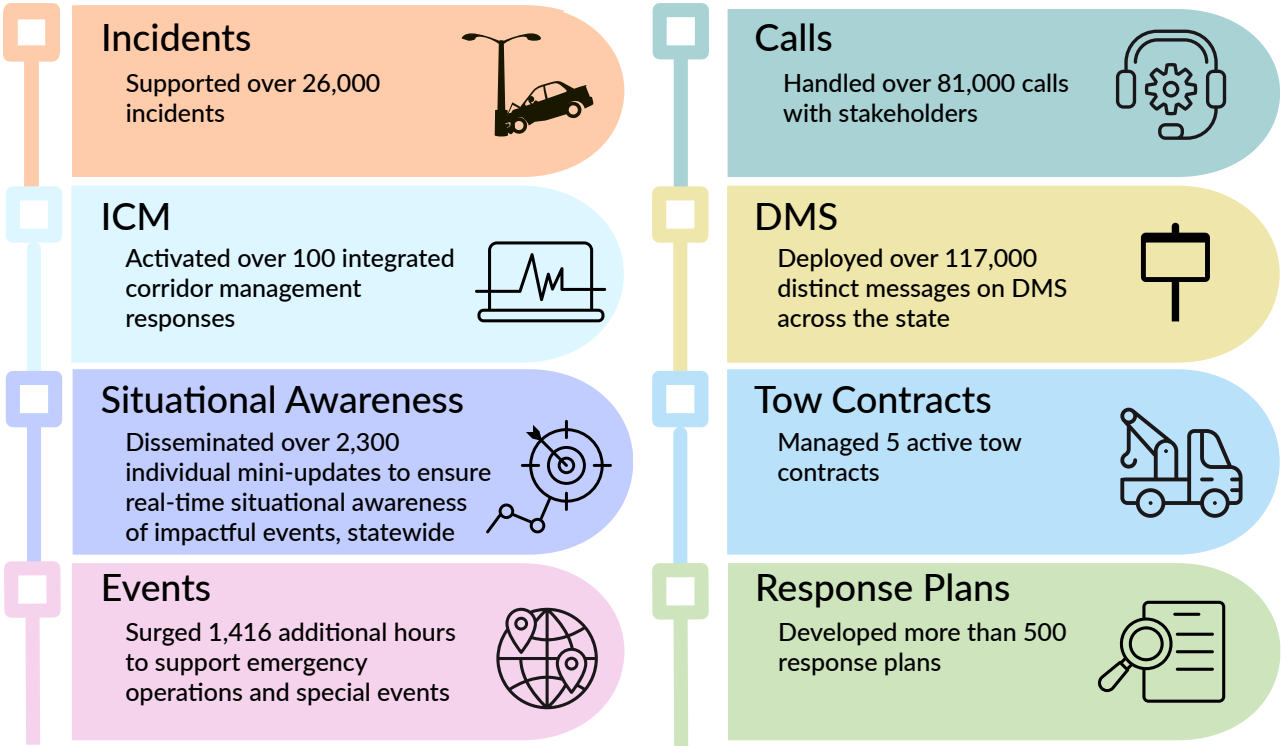| Goal	Action Plan
Staffing	Hire a training program manager and additional trainer
	Hire 2 regional TIM coordinators
	Update job description for all TIM team members
	Complete assessment of existing and needed VIP Goals
	Create roles and responsibilities matrix for TIM Coordinators, IME, and RITS Engineers
	Create guidelines for onboarding new TIM team members
IMAP / TIM Training	Implement transition plan for IMAP Master Trainer
	Construct an upgraded training building at the TIM Training and Development Track
	Develp IM training to be integrated into BLET curriculum or in-service block
	Conduct at least one multi-discipline training exercise in every region
	Implement revised NC TIM Responder Training
	Complete Volume 1 of the Operations Manual to include guidance on IMAP after-hours response using Quick Clearance MOUs, etc.
	Complete Volume 2 of the IM Manual to include guidance on Detours, Active Traffic Management, Incident Command System, etc
	Establish incident management training for towing
	Document and transfer best practices for IMAP training to new instructors
	Develop and distribute training for new IMAP equipment and strategies
IMAP Vehicles	Evaluate F-350 and develop F-450 vehicle strategy and implementation plan
	Identify and pilot new vehicle technologies including SMART lighting and One-Cone strategy
	Access and track fleet using AVL software (GeoTab)
	Implement AVL feed into ATMS
	Conclude debris removal tool pilot and complete assessment
	Continue management of IMAP fleet and replacement of end-of-life vehicles
IMAP Expansion	Develop a broad strategy regarding towing (tow rotation, training, non-WZ tow contracts, tow contracts)
	Refine expansion plan and timeline based on analysis of traffic and incident data and B/C analysis
	Develop and implement additional IMAP expansion plan in the Triad and Metrolina, weekend patrols, and indentify options for coverage in other regions.
Regional Out-reach	Identify priority agencies for Quick Clearance MOUs and execute 40% of priority MOUs.
	Conduct 95% of TIM Team and Open Roads meetings in person
	Support regional and statewide resources required around special events
Performance Measures	Define process and metrics for capturing the impacts of QC MOU
	Assess all incidents over 90 minutes and conduct AARs when necessary
	Evaluate return on investment of current tow contract language and work orders, and refine and improve future contracts (I-5729 and I-2513)
Tools	Pilot a non-work zone tow strategy on at least one corridor
	Establish VIPER radio management plan
	Establish resource management plan in response to emergencies
Communications	Implement new Move Over video on GasTV and in driver's license offices.
	Issue quarterly IMAP Newsletters.
Expand IMAP	Advertise new Sponsorship Request for Proposals (RFP)

Traffic Management Center

(Control Room Operations)

Traffic Management Centers (TMC) are the communication hubs of NCDOT's Traffic Incident Management Program. These centers play an essential role in the Department's situational awareness, decision-making, and realtime response by proactively detecting incidents, collecting and relaying critical intel, and implementing measures that prevent and mitigate traffic impacts.

TMC Activity in 2024

Incidents
Supported over 26,000 incidents

Calls
Handled over 81,000 calls with stakeholders

ICM
Activated over 100 integrated corridor management responses

DMS
Deployed over 117,000 distinct messages on DMS across the state

Situational Awareness
Disseminated over 2,300 individual mini-updates to ensure real-time situational awareness of impactful events, statewide

Tow Contracts
Managed 5 active tow contracts

Events
Surged 1,416 additional hours to support emergency operations and special events

Response Plans
Developed more than 500 response plans

TMC FY 2024 Updates

Focus Area	Goal	Status
Triad TMC Upgrade	Complete Triad TMC design	Completed
	Acquire funding from legislature	In progress
	Implement 2 dispatchers per shift to support IMAP expansion	Completed
Mountain TMC Upgrade	Complete Mountain TMC design	In progress
Establish Eastern TMC	Select location for Eastern TMC	Completed
	Build and furnish Eastern TMC	In progress
	Hire Eastern TMC control room staff including operators, supervisors, and Assistant Traffic Specialists (ATS)	In progress
	Evaluate responsibilities for STOC as Eastern TMC is activated	In progress
Upgrade Phone System	Develop functional requirements for new phone system	Completed
	Configure and deploy new phone system	Completed
	Establish new procedures and train staff at all centers	Completed
Control Room Quality Control	Maintain a quality score of 92% throughout 2024	Completed
	Improve quality control process by assessing individual staff performance	Completed
STOC/TMC Training	Onboard and train 21 new Operators and 4 new Supervisors	In progress
	Introduce a Learning Management System (LMS) to deliver content, improve learner engagement and provide instructional flexibility.	Completed
	Introduce a new Dispatch Training curriculum to enhance IMAP support and dispatch capabilities.	Completed
	Introduce a new Supervisor Training program to reinforce best practices and empower new supervisors to manage their teams.	In progress
	Facilitate quarterly refresher training to reinforce key concepts and expectations	Completed
	Restructure new IMAP driver visits to STOC to include a formal STOC/TMC overview	Completed
Project Facilitation	Onboard and train 3 new Assistant Traffic Specialists (ATS)	Completed
	Develop and implement Detour Database	Completed
	Standardize format of all reports	In progress
Tethered Drone use by TMCs	Train control room staff to coordinate tethered drone deployment	Completed
TMC Interoperability	Conduct STOC Shutdown Exercise to practice statewide operational support from regional TMCs	Completed
Portable Devices	Implement routine process to confirm locations for 118 CMS and 43 portable CCTV	Completed
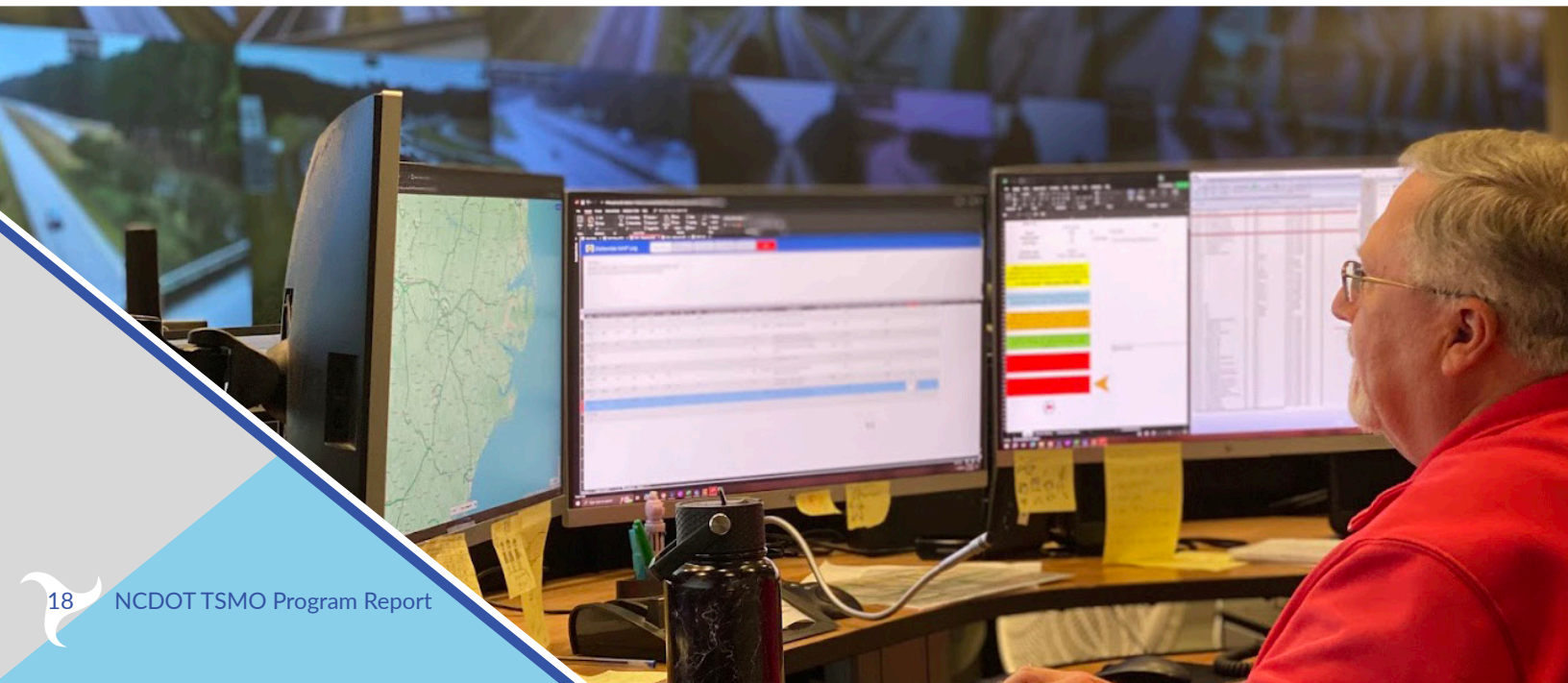
TMC FY 2025 Goals

Goal	Action Plan
Upgrade Triad and Mountain TMCs	Initiate and continue construction to support TMC upgrades
Establish Eastern TMC	Complete facility and outfit control room
	Evaluate responsibilities for STOC as Eastern TMC is activated
	Begin control room operations
STOC/TMC Training	Identify and document process changes and new strategies resulting from ATMS deployment
	Implement Operator 1-2-3 program
	Expand LMS for refresher and on-demand training
	Integrate simulation and scenarios-based training into LMS
	Assess training needs and develop and implement effective ATMS training to all TMC staff and appropriate Division personnel
Project Facilitation	Implement real-time task tracking/prioritization solution for ATS and STOC Traffic Engineers
	Develop plan for TMC KPIs and other operational performance measures
TMC Interoperability	Mature and update processes relative to expanded ATMS capabilities
	Document and practice strategies for improved coordination and dynamic workload shifting across TMCs due to ATMS and new phone system

NCDOT Traffic Management Center (TMC) Progression

- Greensboro
- Asheville
- Raleigh
- Selma
- Charlotte

Current NCDOT TMC Locations

- Eastern Regional TMC
- Mountain Regional TMC
- STOC and Triangle Regional TMC
- Metrolina Regional TMC
- Triad Regional TMC

**New Mountain and Triad TMC buildings anticipated in 2026

1997
- Western Piedmont TMC opens in Division 9 Office

1998
- Eastern Piedmont TMC opens on Justice Drive with 911 Dispatch
- Metrolina Regional TMC opens

1999
- Triangle Regional TMC opens on District Drive

2000
- Triangle Regional TMC moves to Roscoe Trail

2004
- Triangle Regional TMC begins STOC functions
- Eastern and Western Piedmont consolidate into Triad Regional TMC

2011
- Triangle Regional TMC and STOC move to NC National Guard Joint Force Headquarters with Emergency Management and NCSHP Dispatch

2019
- Mountain Regional TMC opens

2025
- Eastern Regional TMC opens

Intelligent Transportation Systems Operations

NCDOT strives to modernize and maintain our ITS network and elevate the asset management practices across the state. 2024 marked the completion of the second year of the Statewide ITS Resilience contract. Many of the devices that were initially down or had issues at the start of the contract were repaired or replaced. The contractor was able to continue supporting NC 811 for the state and exceeded 98% uptime for all device types and asset classes under performance-based maintenance. The contract also made significant progress towards preparing for deployment of a new asset management system and DMS replacements that will come to fruition in FY 2025.

ITS FY 2024 Updates

Focus Area	Goal	Status
Analog CCTV Camera Replacement	Replace 345 analog cameras with digital	Completed
End of Life DMS Replacement	Complete design of 56 DMS	Completed
	Replace 31 DMS	In progress
Fiber Asset Management System (FAMS)	Complete setup of FAMS	Completed
	Integrate existing infrastructure in the Triangle	In progress
	Configure segments 1-9, 12, and 19 of NC Broadband Project in FAMS	Completed
Statewide ITS Communications Plan	Complete evaluation of fiber optic needs and prioritization of fiber deployment along key freeway corridors across the state	Completed
Asset Management	Deploy Infrastructure Asset Management System (IAMS) to support statewide ITS infrastructure asset management	Completed
ATMS Deployment	Complete negotiations for ATIS	Completed
	Work with vendor to develop schedule and plan for configuration and deployment	Completed
	Finalize ATMS procurement and establish contract with vendor	Completed

ITS FY 2025 Goals

Goal	Action Plan
STOC Technology	Replace STOC video wall
	Procure and install video wall and VIPER consoles for Eastern TMC
FAMS	Configure segments 10-11, 13-22, and 34-36 of NC Broadband Project in FAMS
	Integrate FAMS with Statewide Communications Plan
	Configure Asheville Signal System
	Populate urban regions: Metrolina, Triad, and Triangle
Statewide ITS Communications Plan	Expand communication plan to include additional facilities and evaluate existing and future camera and DMS deployments
Statewide ITS Resiliency	Continue replacing end of life DMS
	Begin DMS retrofit upgrades
	Complete network-manageable UPS upgrades
	Install cyber locks on hub buildings
	Complete Dynamic Trailblazer replacements
	Advertise and award next phase of Statewide ITS Resiliency contract
Asset Management	Integrate asset management systems with ATMS during initial phase of ATMS deployment
ATMS Deployment	Enhance asset management systems to have one data source for ITS and fiber while integrating all data sources into a single GIS webmap for comprehensive planning, design, and maintenance of assets
Storm / Major Event ITS	Purchase portable CCTV and CMS dedicated to hurricane/event response
	Design DMS and CCTVs, and begin detour route signal system coordination
	Develop mobile communications trailers
	Maintain satellite communications capabilities that are ready to deploy
	Establish process to rent portable traffic signals during emergency events

ITS Initiatives Outside of TSMO Budget

NCDOT's TSMO program supports numerous initiatives that are funded outside of the TSMO budget. Two major initiatives include NCDOT's Broadband project and Statewide ITS Resiliency contract. These initiatives have enabled NCDOT to better plan and budget for ITS investments, expanded ITS deployment opportunities to new locations, and supported routine and responsive maintenance practices that have improved device uptimes statewide.

NC Broadband

Preventative maintenance, regular replacements, and performance-based repairs of fiber and ITS devices for I-95, US 70, and US 74 corridors. Includes fiber, cameras, DMS, hubs, fiber connections for rest areas, weigh stations, and closed-loop signal systems.

With the I-95 and US 70 segments nearing completion at the end of FY 2024, this project has:

- Constructed 46 new cameras and hubs to support situational awareness and redundant network connectivity in the eastern region.
- Enabled 170 cellular ITS devices to be transitioned to a more reliable fiber optic connection and established connectivity to some previously unconnected devices such as closed-loop signal systems.
- Improved NC 811 response time along these routes, reducing NCDOT's risk for fiber optic cable cuts during construction.
- Achieved an average device uptime of 99+% for ITS devices maintained under the performance-based maintenance contract.

Statewide ITS Resilience

Preventative maintenance, regular replacements, and performance-based repairs of fiber and ITS devices in non-attainment areas in the Metrolina, Triad, and Triangle regions. In FY 2024, this initiative achieved the following:

- 89% of urban devices and all urban freeway fiber is now being maintained under a performance-based maintenance contract.
- Replaced 345 obsolescent cameras.
- Re-designed 56 obsolescent DMS and currently scheduling replacement work orders.
- Replaced all existing device UPS or device batteries.
- Improved NC 811 response time along urban freeway facilities, reducing NCDOT's risk for fiber optic cable cuts during construction.
- Achieved an average device uptime of 98+% for ITS devices maintained under the performance-based maintenance contract, with most devices experiencing a 99+% uptime on average.
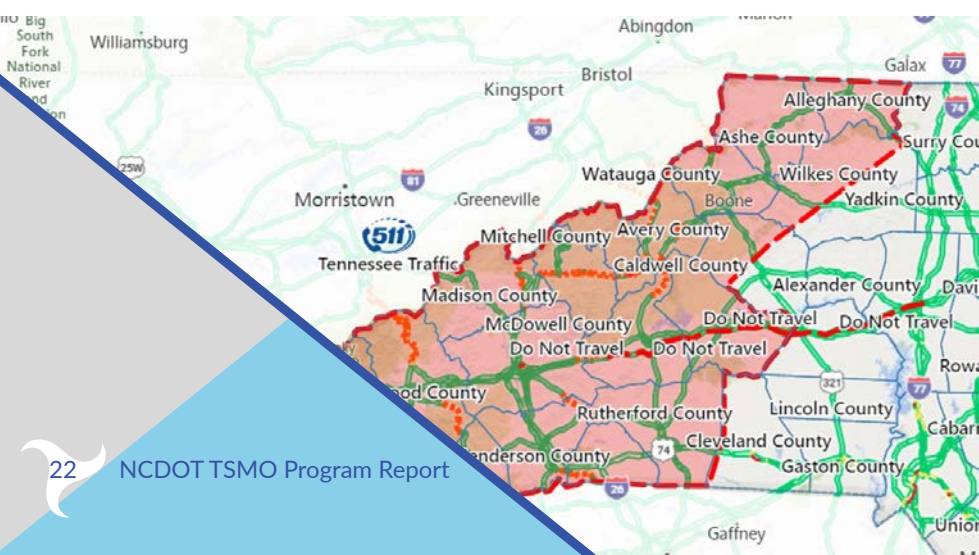
Traveler Information

North Carolina's Traveler Information Management System (TIMS) is essential to storing incident management information and disseminating information out to the public and key stakeholders. NCDOT is currently leveraging the Automating Actionable Road Anomalies (AARA) SMART grant to improve how drivers receive real-time, in-vehicle alerts as they approach lane closures and stopped traffic. By working with the Eastern Transportation Coalition (TETC), NCDOT hopes to share this solution with other states to enhance end-of-queue warning for travelers from Maine to Florida.
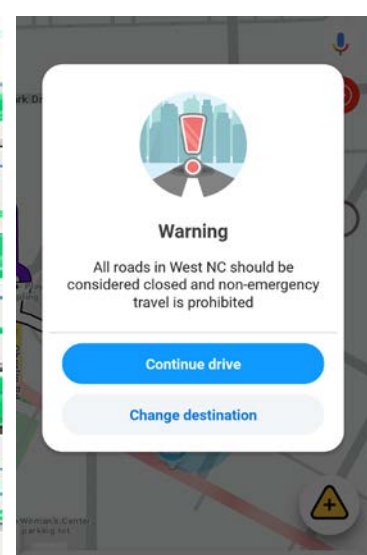
Traveler Information FY 2024 Updates

Focus Area	Goal	Status
TIMS & DriveNC.gov Enhancements	Compare functionality of TIMS to expectation of future ATMS	Completed
	Develop transition plan from TIMS to ATMS	In progress
	Begin transition from TIMS to new ATMS	In progress
	Complete 3 TIMS training sessions	Completed
	Enhance DriveNC: Bridgewatch feed, SHP CAD feed, Notifications, API, "Add Incident" functionality, What's New, polyline accuracy verification, ferry information, Twitter feed, event incident reporting, and resiliency during Bing map outages	Completed
511 & Customer Service	Implement new TMC phone system	Completed
	Provide training sessions at North Carolina Correctional Institute for Women	Completed
	Serve 21,693 511 callers	Completed
	Serve 44,252 DOT Customer Service callers	Completed
Drivewyze	Leverage IMAP support to validate Drivewyze alerts	In progress
	Issue more than 160,606 Drivewyze Alerts	Completed
	Enlist more users with the help of NC Trucking Association	Completed
AARA SMART Grant	Complete preliminary design and issue RFQ	Completed
HELP Deployment	Deploy HELP	Completed
	Issue HELP alerts	Completed

Traveler Information FY 2025 Goals

Goal	Action Plan
TIMS & DriveNC.gov Migration to ATMS	Deploy new DriveNC.gov
	Incorporate ATIS Training into Learning Management System for new users
	Create Minor, Intermediate, Major Incident Categories
	Improve Work Zone parent/child relationship
AARA SMART Grant	Deploy and evaluate system
	Apply for expanded operations, throughout and beyond NC
	Apply for Phase 2 grant
Improve Situational Awareness	Pilot reported incident validation solution using motorist dash cams

Signal Systems Timing and Operations

NCDOT's Signal System Timing and Operations group (SSTO) is responsible for the timing and operation of the signal systems across all 14 Divisions in North Carolina. NCDOT's Signal Modernization project is midway through its second year with approximately 910 signals upgraded to MaxTime and connected to Kinetic Signals (the new statewide central signal system). The next phase of the project, years three and four (2025-26), will aim to upgrade the remaining closed loop system signals to MaxTime and then connect them to the Kinetic Signals platform. SSTO is also pursuing several pilot projects investigating the many facets and advantages of probe data and hardware-based ATSPMs in pursuit of an operational pivot toward a more active traffic management style for North Carolina's arterials.

Signal Timing/Operations FY 2024 Updates

| Focus Area	Goal	Status
FY 2024 Signal Timing Projects	Let FY 2024 signal timing projects	Completed
	Update signal timing for 49 systems, impacting 245 signals	Completed
	Reduce delay near interchanges by 85% via signal timing – target is 25%	Completed
Probe Data ATSPM Pilot	Evaluate the INRIX.IQ signal analytics tool	In progress
CMAQ ATSPM	Let project to install detection for equipment-based ATSPM and enhanced detection - anticipated construction completion June 2025	Completed
Kinetic Signals	Develop training material for field staff and technicians	Completed
	Complete additional system onboarding and training for Divisions with new signal systems	Completed
Active Traffic Management Plan	Develop a plan for moving towards active traffic management	In progress

Signal Timing/Operations FY 2025 Goals

Goal	Action Plan
INRIX Transition	Transition from INRIX Signal Analytics to Flow Labs for prioritization and evaluation
FY 2025 Signal Timing Projects	Let FY 2025 signal timing projects
	Achieve a 25% reduction in delay for signal timing projects
CMAQ ATSPM	Begin comparing for ATSPMs for equipment-based with standard detection and enhanced detection and Probe Data Signal Analytics tool
Kinetic Signals	Develop consistent processes for Kinetic Signals and strategies to leverage the system's enhanced capabilities and data availability
Active Traffic Management Plan	Develop ATSPM guidelines for Division Personnel
Probe Data ATSPM Pilot	Expand pilot to evaluate Axillion, Iteris ClearGuide, and Flow Labs

Flow Labs
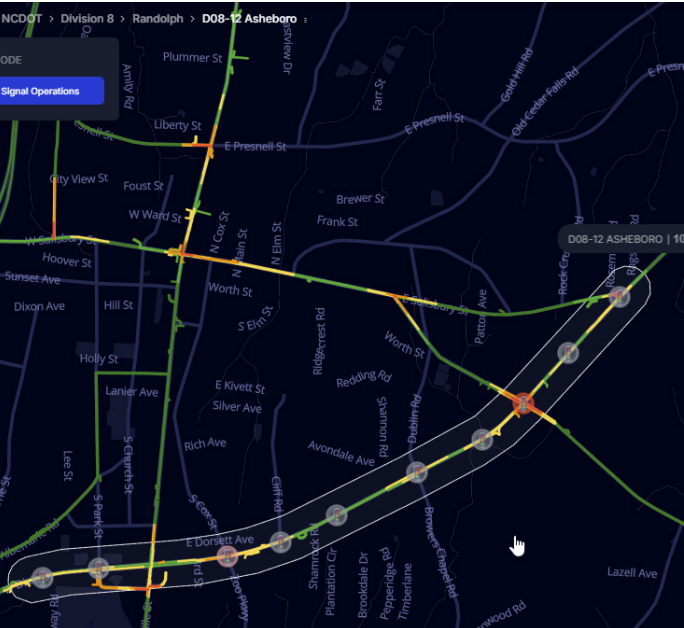
Signal Coordination Diagram
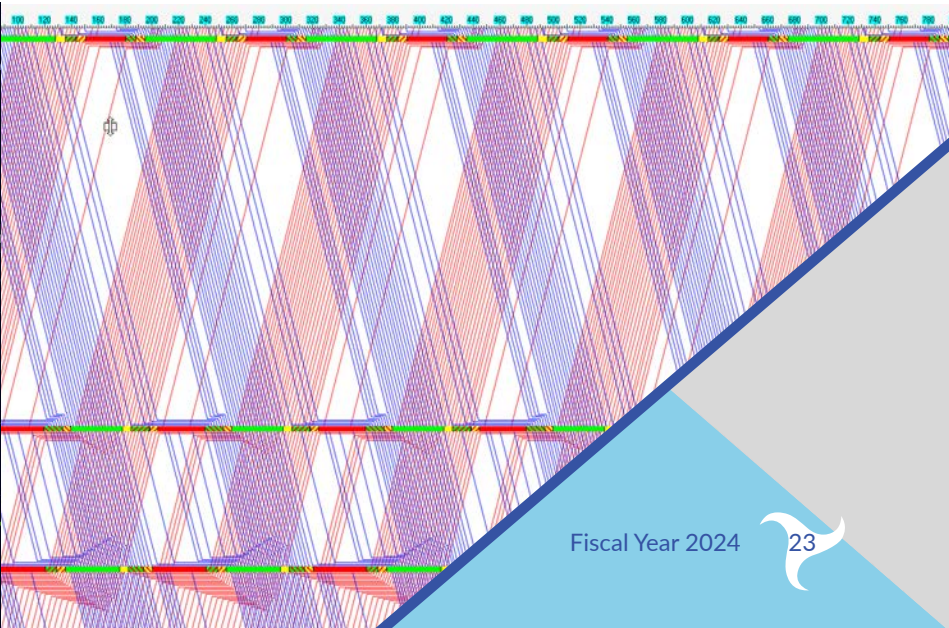
Emergency Weather Traffic Operations

Emergency weather operations and management is a critical function of NCDOT's TSMO program. Our team works to provide accurate information, support first responders, and navigate traffic around impacted areas during hurricanes, major rain events, and winter weather.

This year saw multiple emergency weather events that affected every part of the state and resulted in nearly 2,700 road closures. The 2024 hurricane season proved particularly impactful, starting with Tropical Storm Debby which damaged roads throughout North Carolina's coastal region. The season closed with Hurricane Helene, which reshaped the landscape of Western North Carolina overnight, destroying homes and leaving thousands of citizens without water or electricity. Multiple major corridors for the region, including I-26 and I-40 were closed and numerous rural communities became completely isolated when the roads connecting them collapsed or were wiped away. Before, during, and after the storm, the TSMO Unit and its partners played a central role in response and recovery efforts by providing traveler information, restoring communications, and coordinating logistics and relief efforts.

Emergency Weather Traffic Ops FY 2024 Updates

Focus Area	Goal	Status
Prepare for Hurricane Season	Conduct NCDOT Hurricane Exercise	Completed
	Participate in EM Hurricane Exercise	Completed
	Participate in Barco Diversion Plan Exercise	Completed
Hurricane Evacuation Plans	Conduct hurricane evacuation study	Completed
	Develop plans for hurricane evacuation routes	Completed
	Deploy traffic count stations	Completed
Prepare for Winter Weather Season	Conduct NCDOT Winter Weather Exercise	Completed
Multi-state Adverse Weather Collaboration	Establish agreement with Virginia DOT outlining inter-state operations	Completed
	Establish agreement with Tennessee DOT outlining inter-state operations	In progress
	Participate in FHWA Road Weather Management "All States" Roundtable series	Completed

Road Closures from Storm Events

Storm Event	Date	Number of Road Closures
17 Dec 2023 Rain	December 2023	81
January Severe Weather	January 2024	377
2024 TS Debby	August 2024	644
2024 Sep 16 Severe Weather	September 2024	144
2024 Hurricane Helene	September & October 2024	1,441
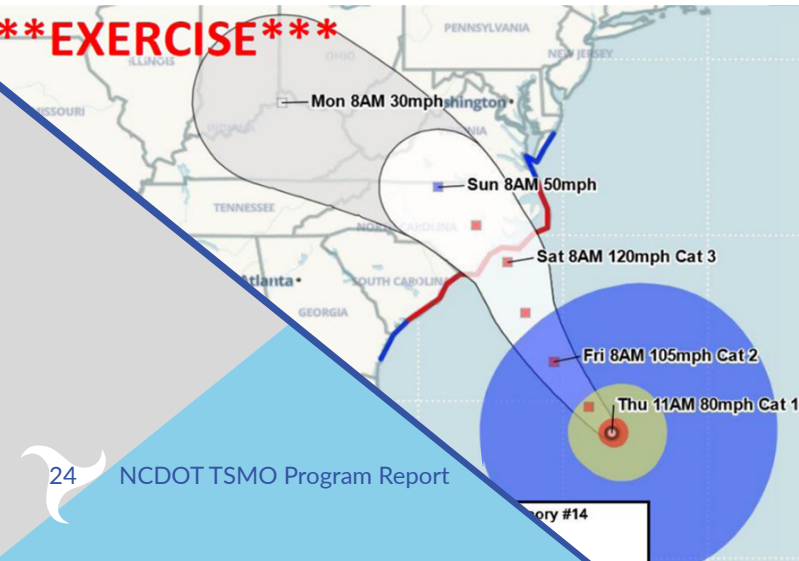
Emergency Weather Traffic Ops FY 2025 Goals

Goal	Action Plan
Prepare for Hurricane Season	Conduct NCDOT Hurricane Exercise
	Use GMR funding ($6M) to procure ITS dedicated to hurricane response including CMS, portable traffic signals, and stream gauges; and to optimize signal system timing for evacuation and detour routes
Prepare for Winter Weather Season	Conduct NCDOT Winter Weather Exercise
Multi-state Adverse Weather Collaboration	Establish agreements with Tennessee DOT and South Carolina DOT outlining inter-state operations
Hurricane Evacuation Plans	Deploy evacuation strategies based on current assets/procedures and identify future resources to optimize evacuation efforts.

Active Work Zone Management / Planning for Operations

In FY 2024, the TSMO Program continued their commitment to improve safety and traffic flow near major work zones and other bottlenecks by initiating the Planning Workgroup and establishing a position dedicated to AWZM planning and stakeholder engagement. NCDOT also worked to define and document best practices for the design and implementation of successful traffic mitigation strategies and other solutions, to better guide future deployments.

AWZM/Planning Ops FY 2024 Updates

Focus Area	Goal	Status
Ramo Meters	Complete Ramp Meter study to evaluate potential ramp meter locations throughout state and to develop design and deployment guidance	Completed
	Pursue grant to deploy ramp meters on I-85	Completed
	Develop NCDOT Ramp Meter design and systems engineering documents	Completed
ICM Planning & Implementation	Deploy I-6064 ICM Solutions	In progress
	Analyze monthly crash trends in ICM projects	Completed
	Deploy Forsyth/Davie ICM solutions	In progress
	Develop Tow Contract Dashboard to manage and reflect the positive return on investment (ROI) provided by tow contracts	In progress
HAWKS Funding	Request approval for additional funding	Completed
	Coordinate with the North Carolina State Highway Patrol (NCSHP) to manage the $2 Million HAWKS program	Completed
	Maintain list of active and upcoming HAWKS projects	Completed
Planning Workgroup	Establish Planning Workgroup	Completed
	Develop TSMO milestones for planning	Completed
	Post position dedicated to AWZM and planning	Completed
Active Let List Coordination	Establish regular meetings with WZTC, etc. to track and plan for upcoming WZs	Completed
Feasibility Studies	Evaluate projects in feasibility and planning for TSMO strategy and inclusion	Completed
Blue Light Radar Trailers (BLRT)	Develop BLRT deployment process and deploy 46 trailers to projects across the state	Completed
Update Planning Tools	Review existing planning tools and update, including ITS Planning Map, ORA Guidelines, Incident Management Plan, ITS Database, etc.	In progress
ITS Deployment Guide	Document ITS deployment guidance for regional/municipal stakeholders	Completed
Regional ITS Strategic Deployment Plans	Deploy ITS plan for Metrolina	Completed

AWZM/Planning Ops FY 2025 Goals

Goal	Action Plan
ICM Planning & Implementation	Deploy ICM Solutions for I-2513 and I-5719
Develop a Preliminary TSMO – Traffic Operations Planning Manual	Draft an outline document
Feasibility Study Guidelines	Finalize documentation and guidelines for feasibility studies
Blue Light Radar Trailers (BLRT)	Complete pilot to analyze effectiveness of BLRT and capture regional stakeholder feedback
Regional ITS Strategic Deployment Plans	Complete ITS Strategic Plan for Wilmington
Planning Tools	Document TSMO planning milestones
	Update ITS planning map
	Organize system engineering documentation
ITS Deployment Guide	Finalize guidelines for ramp metering
	Develop guidelines for managed freeways

Mobility Performance Measures

NCDOT is responsible for providing several metrics to the North Carolina General Assembly and Federal Highway Administration (FHWA) including:

- Maintenance Operations and Performance Analysis Report (MOPAR) as required by G.S. 136-44.3. NCDOT's TSMO program is responsible for providing the following performance measures:
  - Travel Time Index – the variability of travel time during rush hour
  - Average Number of Congested Hours – the number of hours that speeds are slow
  - Travel Time Reliability – the variability of travel time on a "bad day"
- Moving Ahead for Progress in the 21st Century (MAP-21) administered by FHWA. Reliability results and targets can be found in the following table:

NCDOT shares probe data with 50 public agencies and private engineering firms (PEF). The TSMO program onboards and provides technical support to each of these users.

Performance Measurements based on Probe Data

Performance Measure	2022 Actual	2023 Actual	Proposed 2024 Target	Proposed 2025 Target
Percent of person-miles traveled on the Interstate that are reliable	95%	92%	75%	75%
Percent of person-miles traveled on the non-Interstate NHS that are reliable	95%	94%	70%	70%
Truck Time Reliability Index	1.33	1.4	1.7	1.7
Peak Hours of Excessive Delay – Charlotte Urbanized Area (NHS only)	9	14	34	34
Peak Hours of Excessive Delay – Concord Urbanized Area (NHS only)	3	4	10	10

The results above were calculated using probe speed data. NCDOT shares INRIX speed with public agencies and private engineering firms (PEF). Currently, there are 33 public agencies and PEFs using INRIX data. NCDOT also uses Streetlight data for origin/destination (O/D) and volume data. Currently, there are 14 public agencies and PEFs using Streetlight data. NCDOT assists these users with onboarding and technical assistance for data usage.

Mobility Performance Measures FY 2024 Updates

| Focus Area	Goal	Status
Dashboard Plan	Develop plan to display performance measures through an automated dashboard	Completed
Mobility Data	Purchase Streetlight for origin/destination (O/D) and volume data	Completed

Mobility Performance Measures FY 2025 Goals

Goal	Action Plan
Field Data Sources	Procure and evaluate dash cam images as field data sources
Performance Measures Service Layer	Implement Performance Measures Plan
Dashboard Implementation	Develop and implement dashboard
Mobility Data	Support users and use cases for speed, O/D, and volume data.

Signal Management
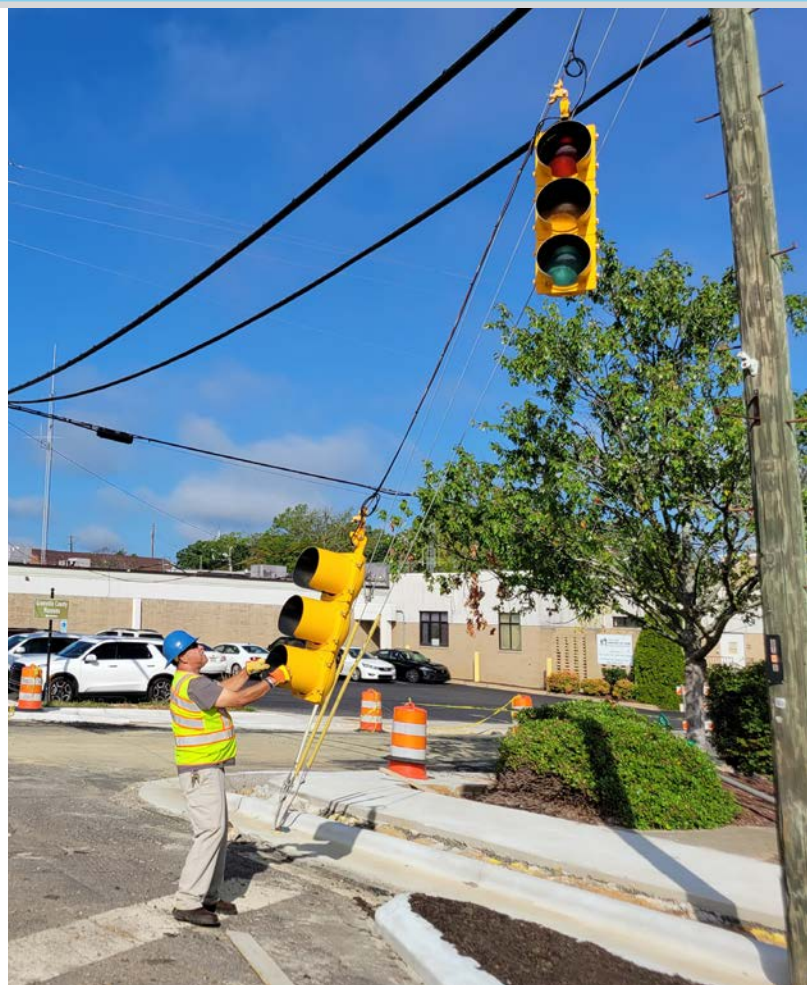
Signal Management

Signal Management Overview

Traffic signal management is integral to NCDOT's mission of connecting people, products, and places safely and efficiently across North Carolina. NCDOT's traffic signal management program includes one of the largest state-owned traffic signal inventories in the nation and continues to grow each year. With over 11,000 traffic signals dispersed throughout the state and approximately 40% of them being maintained and operated by municipal partners, effective management of these assets is essential for mitigating traffic congestion, enhancing safety, and supporting economic development and vitality.

> The Signals Management Program supports 11,000 signals – one of the largest state-owned signal inventories in the nation.

The maintenance and operations of the system is conducted by over 200 traffic signal technicians and timing engineers on a static and constrained budget of $28M/year. The funding and staffing remain fixed despite the number of signals growing approximately 3% per year, closely mirroring the population growth of 3%, bringing increased demands on our transportation system. The traffic signal program must mature at an equally aggressive rate to be able to proactively manage the traffic signal program at levels of service acceptable to the motorists of the State.
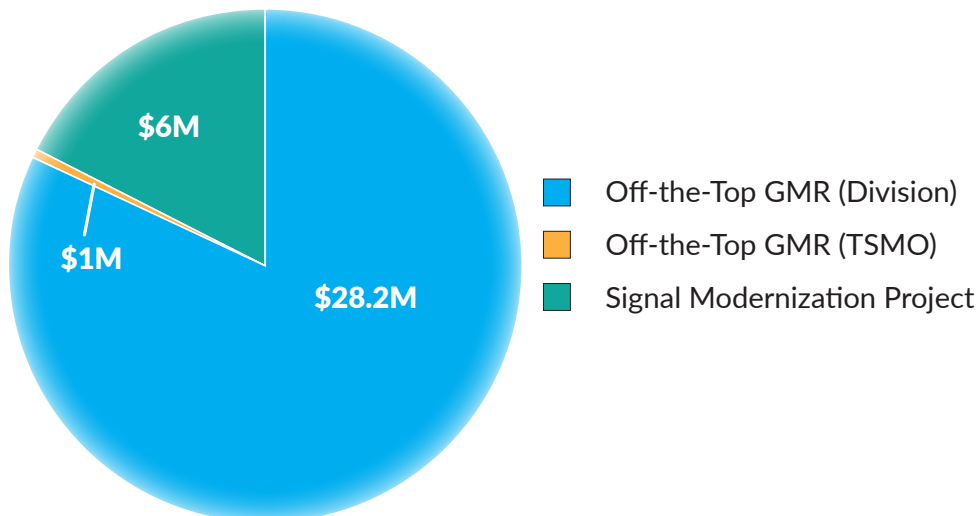
> The number of signals grows by 3 percent every year, but funding and staffing for Signal Management remain fixed.

The Department faces significant hurdles as we continue to strive to deliver quality maintenance and operations of traffic signals. In 2016 , funding levels for the traffic signal management program were severely restricted. Remarkably, NCDOT traffic signal staff have been able to optimize allocated resources to provide reasonable levels of service. However, with the addition of signals every year, compounded by workforce challenges, we are nearing a tipping point where some have had to pivot to reactive stances for operations and maintenance. Based on our experience with other Transportation Systems Management and Operations (TSMO) programs, this downward trend will result in unacceptable levels of service if not addressed soon.

It is for all of these reasons that the TSMO Unit is in the process of developing a Statewide Traffic Signals Management Program intended to formalize and document the current state of North Carolina's traffic signal maintenance and operations, set targets, performance measures, and achievable goals for the program, identify gaps in funding, training, standards, and staffing, and plot the course to a well-managed, properly-funded, and optimally-maintained statewide signal system.

Signal Management Funding Sources

- $6M
- $1M
- $28.2M

Legend:
- Off-the-Top GMR (Division)
- Off-the-Top GMR (TSMO)
- Signal Modernization Project

Signal Management FY 2024 Updates
(October 2023 – September 2024)

Within Signal Management, NCDOT's Signal Modernization efforts seek to address antiquated legacy signal controller hardware and signal software platform which is non-compliant with the National Transportation Communications for ITS Protocol (NTCIP). Unlike newer advanced controllers, legacy controllers are unable to utilize the latest technological advances in traffic signal safety, operations, and maintenance, like Connected Vehicle connectivity and ATSPM. To address legacy software and hardware deficits, new local controller and central signal system software was procured in 2022 and more than 5,000 traffic signals across the State will be modernized through 2028.

Signal Management FY 2024 Updates

Focus Area		Goal	Status
Signal Modernization	Transition to Kinetic Signals	Upgrade 600 signals to new software	Completed
		Develop signal plans to support 600 signal upgrades	Completed
		Procure controllers to support 600 signal upgrades	Completed
		Conduct kickoff meetings with remaining Divisions	Completed
	Begin transition of half of signals from Centracs to Kinetic Signals	Establish communication between 550 controllers and Kinetic Signals	Completed
		910 systems upgraded to MaxTime and connected to Kinetic Signals	Completed
		Convert 285 coordination databases across 41 systems	Completed
		Migrate signal coordination parameters and schedules	Completed
		Remove signals from Centracs	Completed
Signal Management	Statewide Traffic Signals Management Program Plan	Complete plan development	In progress
	Traffic Signals Training Plan	Complete plan development	In progress
	Traffic Signals Management Program Business Case	Complete plan development	In progress
	Traffic Signal Municipal Agreements	Begin developing updated framework	In progress
	Improve Signal Maintenance Tracking	Develop Signal Maintenance Dashboard version 1	Completed
		Train regional stakeholders to use Signal Maintenance Dashboard	Completed
	Signal Structures Inspection	Inspect 1,000 metal poles per year to maintain 10-year service inspection schedule	Completed
		Increase inspection budget 2%-3% per year to keep up with new poles	In progress
		Update SOP for inspection and action reports	In progress
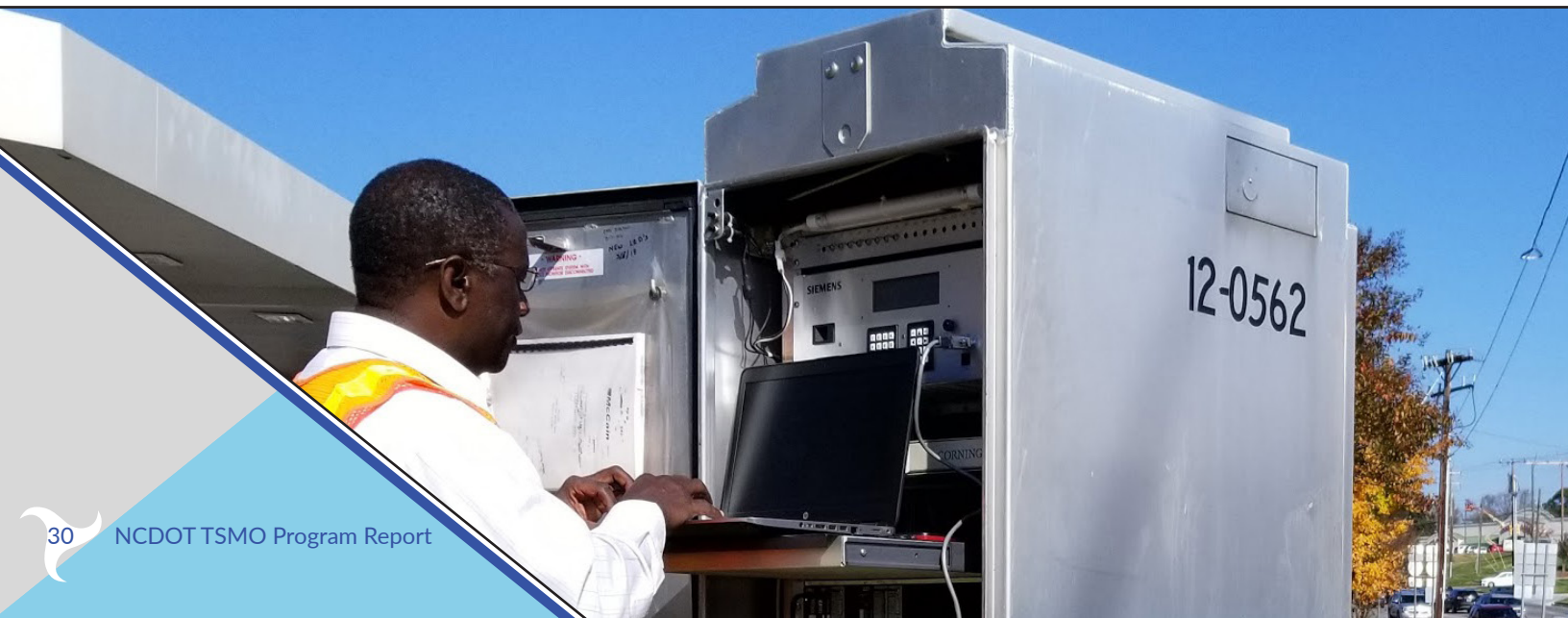
Signal Management 2025 Outlook
(October 2024 – September 2025)

Every year, new devices and infrastructure are added to the state's traffic signal network. NCDOT has maintained a functional level of service in their traffic signals but must continuously pursue additional funding to not only stay at pace with reoccurring malfunctions and critical replacements, but to position the department to enhance traffic signal performance. With additional funding, NCDOT can increase inspections to align with AASHTO recommendations, decrease time to repair critical assets, and train signal technicians throughout NC to deploy signal solutions consistently and effectively.

Signal Management FY 2025 Goals

	Goal	Action Plan
Signal Modernization	Continue Signal Upgrades	Upgrade 1,000 signals to new software
		Develop signal plans to support 1,000 signal upgrades
		Procure controllers to support 1,000 signal upgrades
	Complete transition of all signals from Centracs to Kinetic Signals	Configure intersections in Kinetic Signals
		Establish communication between controllers and Kinetic Signals
		Migrate signal coordination parameters and schedules
	Implement quarterly progress tracking	Implement quarterly progress tracking of signal upgrades
Signal Management	Statewide Traffic Signals Management Program Plan	Present Signals Management Program State of the State to Executive Leadership
	Traffic Signals Training Plan	Acquire funding for training
		Developing training materials
		Deliver training
	Traffic Signals Management Program Business Case	Present to Executive Leadership
	Traffic Signal Municipal Agreements	Finalize updated framework
	Improve Signal Maintenance Tracking	Institutionalize use of Signal Maintenance Dashboard
		Develop method for tracking condition of traffic signal equipment
		Institute traffic signals asset management into Signal Maintenance Dashboard
	Traffic Electronics Center	Maintain spending within +/- 10% of budget
		Repair 85% of equipment within 4 weeks
		At least 90% of traffic signal equipment items on contract in stock at central warehouse
	Signals Structure Inspection	Inspect 1,700 metal poles per year to maintain 6-year service inspection schedule as recommended by AASHTO
		Inspect additional 600 poles per year for 5 year to clear out backlog of 4,500 currently eligible poles.

Recommended Performance Measures for Reoccurring Goals

Goal	Target
Operational Performance Reviews completed at 6-month and 12-month intervals	100% of signals
Respond on-site within 4 hours to emergency maintenance calls	80% of calls
Repair signal pole knockdowns within 8 hours	90% of knockdowns
Replace faulty signal indications within 1 business day	90% of faulty indications