TRAFFIC INCIDENT MANAGEMENT

TN TDOT Department of Transportation

2024

PROTECT THE QUEUE!

TN TDOT Department of Transportation

NEXTGEN FOG AND TRAFFIC INCIDENT MANAGEMENT

Rural Grant Application

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Section A - Standard Forms

Standard forms SF-424 and SF-424C were submitted through Grants.gov.

Section B - Project Information Form (Excel)

FY 2024 Multimodal Project Discretionary Grant – Rural Surface Transportation Grant Program (Rural) Project Information Form for the NextGen Fog and Traffic Incident Management System was submitted as a separate file. The Project Information Form is also linked here: Project Information Form

Section C - Project Description

NextGen Fog and Traffic Incident Management Background

The NextGen Fog and Traffic Incident Management Project builds on the foundation of the existing Intelligent Transportation Systems (ITS) infrastructure and technologies along the 30-mile section of I-75 between the cities of Cleveland and Athens, Tennessee. to implement a next generation fog detection and warning system and a next generation traffic incident management (NextGen) system. The NextGen project will include an artificial intelligence (AI) enhanced decision support system (AI-DSS) software to support identification of hazardous conditions such as limited visibility, crashes, stalls, or other incidents. The NextGen system will develop response plans based on real-time and predicted conditions along I-75 and US 11 along the project corridor. Response plans will include queue warning, lane closure warning, visibility warning, and variable speed limits and reduced speed warning using roadside devices such as dynamic message signs and blank out signs, connected and automated vehicle roadside units, and the SmartWay advanced traveler information system.

In 1990, the Project Corridor experienced one of the deadliest traffic incidents in Tennessee history. Dense fog near Calhoun, in the Hiwassee River Valley, caused a 99-car crash resulting in 12 deaths and 42 injuries. In response to this incident, the Tennessee Department of Transportation (TDOT) implemented extensive ITS countermeasures.[1]

The ITS infrastructure and countermeasures installed after the deadly 1990 incident included a fiber-optic cable (FOC) communication network, gates to close I-75 in the event of dense fog, closed-circuit television (CCTV) traffic monitoring cameras, environmental sensing stations (ESS), radar traffic speed detection systems, dynamic message signs (DMS), and a variable speed limit (VSL) system.

The Tennessee DOT Low Visibility Warning System is listed by FHWA among its Road Weather Management Program Best Practices.[2] The fog warning component of the system is made up of fog detectors, six (6) static warning signs with flashing beacons, 10 Changeable Speed Limit Signs (CSLS) (**Figure TN-3)**, 10 overhead DMSs, and two Highway Advisory

[1] See: ITS Deployment Evaluation, ITS Joint Program Office, https://www.itskrs.its.dot.gov/2001-b00219
2 See: FHWA Road Weather Management Program Best Practices, Tennessee DOT Low Visibility Warning System https://ops.fhwa.dot.gov/publications/fhwahop12046/rwm24_tennessee1.htm

Radio (HAR) transmitters. In addition to the warning systems, six remotely operated swing gates are located at interchange on-ramps to control access to the interstate in the most severe conditions (**Figure TN-1**).

TDOT Region 2 Traffic Management Center (TMC) in Chattanooga's effective management of the original ITS implementation of the Fog Zone has prevented a recurrence of the 1990 disaster. Due to aging equipment and environmentally caused deterioration, the system is experiencing a number of issues, at end-of-life, and risks of outages. The original FOC was "direct-buried." Direct-burial cables are difficult to repair when damaged and splices eventually reduce the bandwidth of the fiber. Also, the electrical distribution system that powers the field devices and cabinets has reached its capacity in terms of the number of roadside devices.

Interstate 75 between Cleveland and Athens remains a dangerous corridor with approximately 606 lane-blocking incidents on I-75 plus 33 on US 11 from 2021 through 2023. In addition, poor visibility impacted traffic on I-75 148 times during the same period. Traffic incidents cause traffic to queue, creating the potential for serious end-of-queue crashes. Traffic incidents and fog cause traffic to divert to US 11 which parallels I-75 between the cities of Cleveland and Athens. There is currently no capability to manage traffic signals along US 11 to support incident traffic volumes.

Design Status

The design of the NextGen Fog and Traffic Incident Management Project will largely overlay locations of existing communication infrastructure, ITS devices, and traffic signals. All construction will occur within the existing roadway right-of-way (ROW). Design concepts are complete to approximately 30%, allowing for detailed cost estimating. The preliminary plans are added as an attachment and the plan are also linked here: NextGen Fog and Traffic Incident Management Preliminary Plans.

I-75 and US 11 Transportation Challenges and Countermeasures

Table 1 summarizes the state of good repair, mobility, and safety needs and proposed engineering countermeasures along I-75 and US 11 between the cities of Cleveland and Athens, Tennessee.

Table 1: I-75/US 11 Corridor Needs and Engineering Countermeasures

NextGen Corridor Needs	Engineering Countermeasures
Direct-burial FOC along I-75 needs to be replaced due to damage and deterioration.	New FOC will be installed in the conduit to facilitate future maintenance and replacement to ensure a state of good repair.
Conduit for FOC crosses waterways and wetlands.	Conduit will be mounted to structures over waterways or drilled under to reduce impacts.

NextGen Corridor Needs	Engineering Countermeasures
Electrical systems for I-75 ITS devices and cabinets need to be replaced to increase electrical capacity.	New electrical service will be provided at each ITS field device site with an uninterruptable power supply (UPS) and backup batteries in case of local or regional power outages to ensure a state of good repair and service during power outages.
Excessive traffic and freight delays are caused by daily lane closure crashes and occasional weather events with a need for fast driver assistance.	Implement Rural Service Patrol (RSP) along I-75 to provide portable warning signs to motorists and to assist with the removal of minor lane blockages, reducing delays and improving safety.
Fog still causes closures of I-75 and crashes, so travelers need improved and timely warnings.	Implement NextGen AI DSS visibility predictive analytics to supplement the existing detection and warning systems and messages, thereby improving safety along I-75.
The VSL system provides limited flexibility to changing visibility and traffic conditions.	Implement NextGen AI DSS with real-time and predictive algorithms for generation of VSL speed limit recommendations for use by the TMC operators. See the I-24 Smart Corridor VSL DSS for more information.
Traffic backups create a high potential for end-of-queue crashes, so travelers need fast and accurate warnings. See TDOT's Protect the Queue program for more information.	Implement NextGen AI DSS with end-of-queue predictive analytics, detection, and warnings to supplement the fog detection and warning system.
Curves on I-75 north and south of the Hiwassee River experience run-off-the-road crashes due to excessive speeds, so better curve warnings are needed.	Implement NextGen AI DSS with curve speed predictive analytics and a warning system, reducing crashes related to excessive speed.
Currently the gaps between roadside messaging systems such as DMS limits the ability of TDOT to warn motorists about changing conditions	Implement RSU at approximately one mile spacing to broadcast NextGen AI DSS generated safety and warning messages by the TMC using the updated communication infrastructure and the SmartWay software.
Tennessee Highway Patrol (THP) officers are exposed to traffic when responding to traffic incidents. Once RSP is implemented, RSP operators will also be exposed to traffic. Exposed responders need protection from other vehicles.	Implement roadside units (RSU) along the highway to broadcast connected and automated vehicle (CAV) Traveler Information Messages (TIMs) to vehicle onboard units (OBUs) in THP and RSP vehicles capable of receiving CAV messages to improve responder safety.

NextGen Corridor Needs	Engineering Countermeasures
TDOT's Region 2 TMC needs to be able to monitor and manage traffic diverted to US 11 due to weather, lane blockage, or closure of I-75 due to any reason.	Upgrade traffic cabinets and controllers to advanced traffic controllers (ATC), provide wireless communication systems, and provide CCTV cameras. Equip the TDOT Region 2 TMC in Chattanooga with systems to monitor traffic and manage traffic signals when I-75 traffic incidents impact US 11 to reduce signal delay and improve safety along US 11.
US 11 also experiences fog events in the vicinity of the Hiwassee River and needs more environmental warnings.	Install environmental sensors and CCTV cameras near the river and approaching the river along with warning systems to reduce the potential for weather-related crashes on US 11. Utilize the NextGen AI DSS enhanced SmartWay software to develop real-time and predictive fog warning messages on I-75 and US 11.
US 11 has an excessive signal delay and needs a coordinated signal system.	Update intersections with ATC cabinets, controllers, communication, and CCTV cameras, allowing for improved coordination and active traffic management.
Public transportation needs fog alerts to improve the safety of passengers, including poor, elderly, and disabled passengers.	Implement the NextGen AI DSS with visibility predictive analytics to improve safety along US 11.

Project Location

Figure 1 shows the location of the NextGen Fog and Traffic Incident Management Project. The Project is located along 23 miles of I-75 in southeast Tennessee from SR 60 (Georgetown Road NW) in Cleveland north to SR 30 (Decatur Pike) in Athens. The Project also improves SR 60 from I-75 to US 11 (SR 2/Lee Hwy/Congress Pkwy) in Cleveland, US 11 from SR 60 to SR 30 in Athens, and SR 30 from US 11 to I-75. Figures 2 and 3 show 2020 and 2010 Areas of Persistent Poverty Census Tracts, respectively. Most of the Project within McMinn County is composed of Areas of Persistent Poverty. No part of the Project is located within an urban area or tribal land.

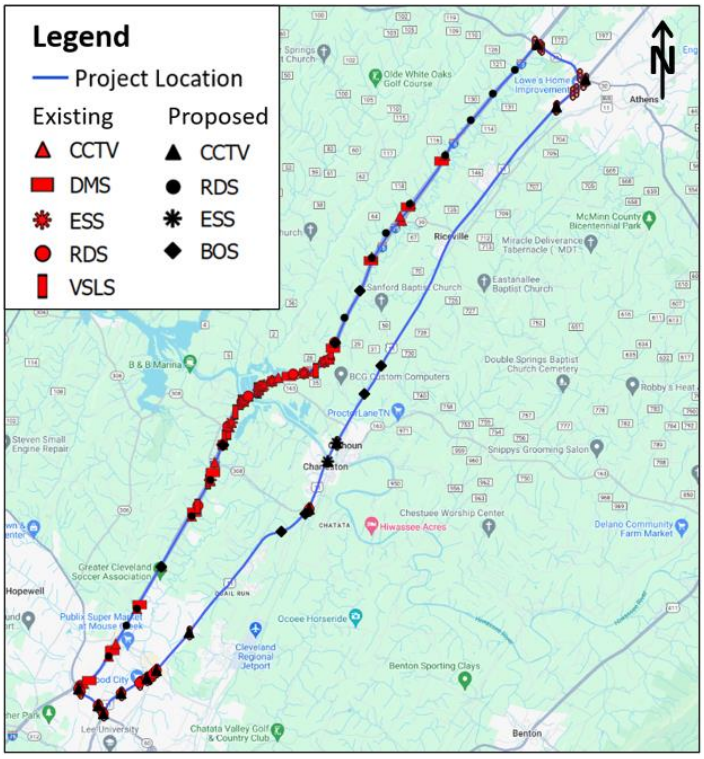


Figure 1: Project Location

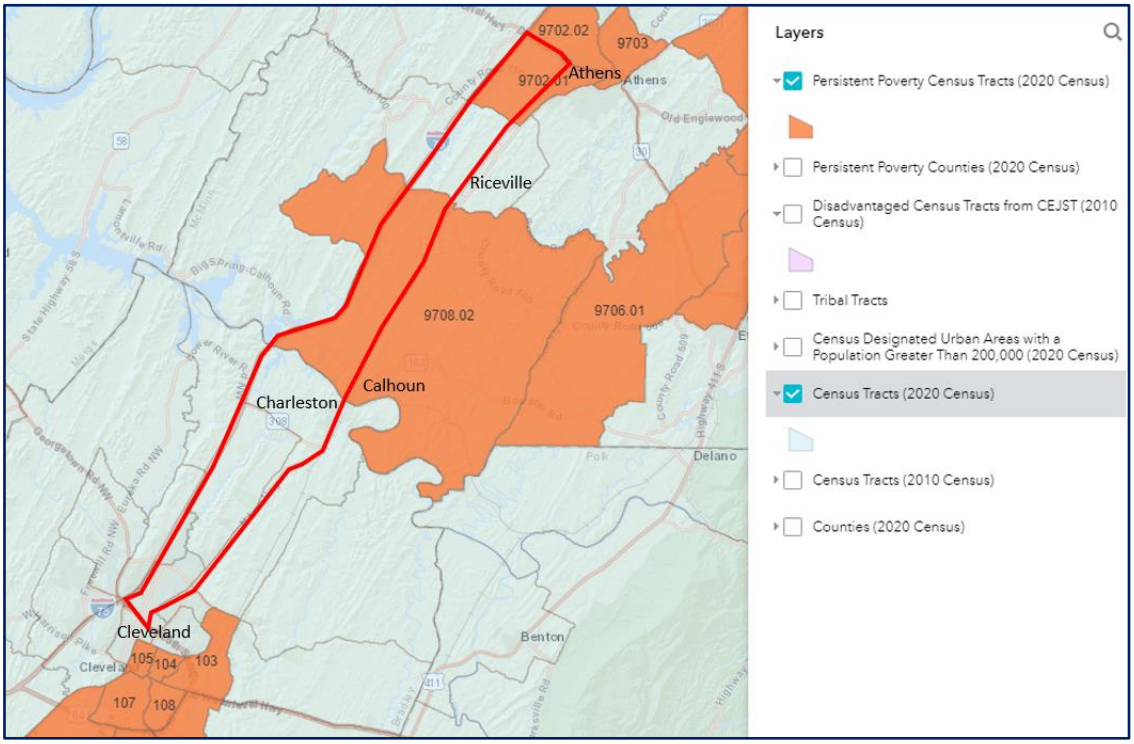


Figure 2: Persistent Poverty Tracts (2020 Census)

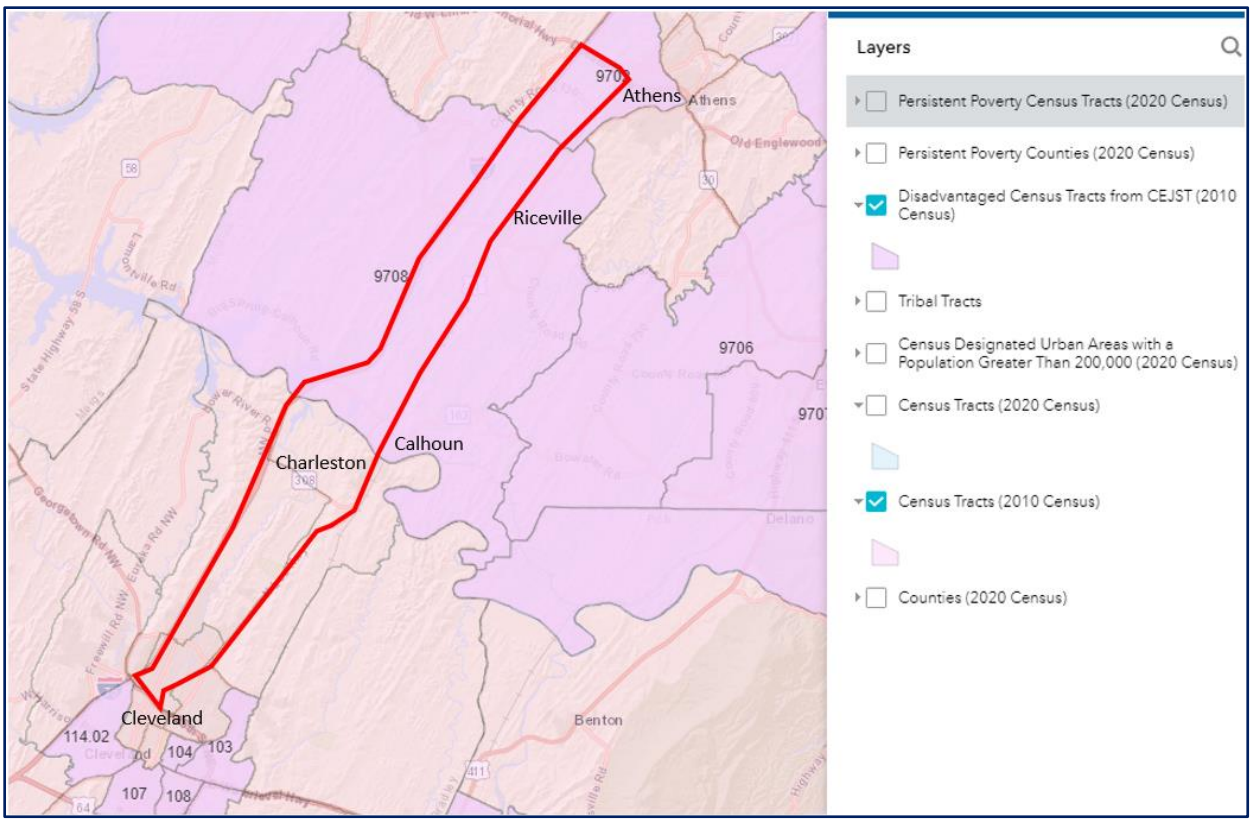


Figure 3: Persistent Poverty Tracks (2010 Census)

The Climate and Environmental Justice Screening Tool identifies two areas of the Project with Historically Disadvantaged Community characteristics. Table 2 identifies characteristics with 90th percentile or higher rankings along with the applicable Census Tracts.

Table 2: Historically Disadvantaged Communities

Project Area	Category	Characteristic	Percentile	2020 Census Tracts	2010 Census Tracts
Calhoun to Riceville	Transportation	Transportation barriers	96th	9708.02	9708
Athens Area	All	Low income	98th	9702.01 9702.02	9702
	Health	Diabetes	94th		
	Health	Heart disease	97th		
	Workforce Development	Low median income	91st		
		Poverty	95th		

Section D - Project Location File

Please see the Project Location File. The file is in KML format for ease of review in Google Earth. The Project Location File is linked here: Project Location File

Section E - Project Budget (5 pages)

Budget Narrative

The Project Budget includes costs for engineering, including final environmental approvals, systems engineering analysis, and final design; implementation costs for infrastructure, technologies, and software applications; construction engineering and inspection; before and after evaluation; Rural Service Patrol (RSP) operations; and contingencies.

The budget cost estimate is based on the following:

Table 3: Next Gen Fog/TIM Cost Estimate

Major Project Element	Total Estimate Cost
I-75 Construction Elements (new communication infrastructure, updated electrical systems, new and updated ITS and CAV field devices)	$12,285,990.00
US 11 Construction Elements (new ITS, CAV, and communication field devices)	$1,575,266.00
CAV On-Board Units (on Rural Service Patrol and maintenance vehicles)	$250,000.00
Mobilization, Maintenance of Traffic, & Construction Contingencies	$3,527,814.00
Rural Service Patrol operations	$1,285,900.00 per year, total $6,429,500.00
Software and CAV Applications (NextGen Fog/TIM AI-DSS, CAV queue, speed, visibility, and curve warning system applications)	$550,000.00
Engineering support (System engineering, final design and construction engineering and inspection)	$6,893,199.60
Total Project Cost	$31,511,769.60
Federal Rural Grant Funds	$25,082,269.60 (79.60%)

Table 4 identifies the approximate quantity of the infrastructure and technology devices that are included in the $12,285,990.00 construction cost shown in table 3.

Table 4: ITS infrastructure and equipment quantities

Infrastructure and Technology Type	Quantity
Fiber Optic Communication Infrastructure	22.8 miles
CCTV Cameras	1
Blank out signs	8
Curve speed detection and warning system	1
RSU	25
ESS with CCTV	3
Cellular modems	24
Upgraded power connections	45
New power connections	12
On board units	10
NextGen AI DSS Fog detection and warning system	1
NextGen AI DSS VSL and curve speed warning module	1
NextGen AI DSS end-of-queue warning module	1

PREVIOUSLY INCURRED COSTS

TDOT previously installed the existing ITS infrastructure along I-75 within the project limits. TDOT is currently operating this ITS infrastructure from the Region 2 TMC in Chattanooga. Preliminary design to approximately the 30% level has been completed at TDOT expense. The preliminary design effort identified needed devices, approximate device locations, and preliminary cost estimates. No costs from those expenditures are included in the budget for future eligible costs.

In addition, TDOT is planning to implement Rural Service Patrol services along I-75 in the project limits. Those costs are included in the budget for future eligible costs and will be the source of the matching funds for the project.

BUDGET FOR FUTURE ELIGIBLE COSTS

Table 3 provides a high-level summary of the detailed cost estimate. All costs in this table are future, planned, eligible expenditures for the NextGen Fog and Traffic Incident Management Project. TDOT will support contract management and procurement efforts with in-house personnel and continuing service consultants. These costs are not included in the Project costs. Other TDOT support costs, such as maintenance and TMC operations, are also not included in Table 3 but are shown in Table 7.

Table 5: Budget Table

Funding Source	Infrastructure and Software Applications Funding Amount	I-75 Rural Service Patrol Funding Amount	Total Funding
MPDG Rural Funds:	$25,082,269.60	$0	$25,082,269.60
Non-Federal Funds:	$0	$6,429,500.00	$6,429,500.00
Total:	$25,082,269.60	$6,429,500.00	$31,511,769.60

CONTINGENCY AMOUNT

The budget estimate includes a contingency amount of 15% of the field equipment costs, or $2,116,688.40, distributed between SR 60, SR 30, US 11, and I-75 as shown in Table 4:

Table 6: Project Contingency Budget

Route	Contingency
US 11, SR 30, SR 60	$236,289.90
I-75	$1,880 ,398.50
Total Contingency	$2,116,688.40

Table 5 provides the cost breakdown per2020 Census Tracts.

Table 7: Cost Estimate Summary 2020 Census Tracts

2020 Census Tracts	Project Costs per Census Tract
101	$3,479,233.74
112.01	$504,519.74
112.03	$6,426,851.16
112.04	$3,219,033.51
9702.01	$4,162,957.16
9708.01	$3,077,436.89
9708.02	$10,641,738.41
Total Project Cost	$31,511,770.60

Table 8. Operations and Maintenance (O&M) Cost Estimate

Table 6 identifies the estimate for the operation and maintenance of the ITS infrastructure and for the RSP. Operation and maintenance are not identified as a source of matching funds for this project.

Operation & Maintenance (O&M) Category	Total Cost
Annual O&M Cost for Infrastructure and Device (start at 2027)	$2,730,151
Annual Service Patrol Cost (start at 2025)	$1,239,975
Annual Total O&M Cost (start at 2027)	$3,970,126

Section F – Funding Commitment Documentation

The TDOT matching funds are programmed for RSP operations and can only be used for RSP operations. RSP will operate on I-75 at an approximate cost of $1.28M per year for a total of $6.4M over the five years from approximately August 2025. RSP will have an integral role in clearing and managing traffic incidents on I-75. Additional information on TDOT matching funds is linked here: Matching Funds Letter

Section G - Outcome Criteria Narrative (15 Pages)

Table 7 summarizes how the project meets high and medium criteria for all eight merit criteria factors. Additional outcome criteria narrative follows the table. .

Table 9: Outcome Criteria Summary

Outcome Criteria	Summary
Safety	The Project delivers measurable safety benefits. See the Safety Narrative below, the BCA Spreadsheet, and the Benefit Cost Narrative for additional details.
Environmental Sustainability	The Project provides resilience of at-risk infrastructure to be resilient to extreme weather events and national disasters that result in power outages. See the Environmental Narrative below for additional details.
Quality of Life	The Project increases affordability for travelers through improved travel-time reliability, reduced backup from traffic incidents, quicker incident clearance, and fewer crashes due to adverse weather events. See the Quality of Life Narrative below for additional details.
Mobility and Community Connectivity	The Project indirectly improves mobility and community connectivity by improving access from the rural, largely economically disadvantaged, communities served by the Project to the more extensive services available in the Chattanooga and Knoxville urban areas. Through improved fog alerting, the Project also supports regional public transportation offered by the Southeast Tennessee Human Resource Agency (SETHRA). SETHRA provides transit for both Bradley and McMinn Counties with a focus on serving poor, elderly, and disadvantaged persons. See the Mobility and Community Connectivity Narrative below for additional details.
Economic Competitiveness and Opportunity	The Project increases economic competitiveness and opportunity through improved travel-time reliability, reduced and safer backup from traffic incidents, quicker incident clearance, and fewer crashes due to adverse weather events. The Project will reduce commercial vehicle crashes and delays. See the Economic Competitiveness and Opportunity Narrative below for additional details.
State of Good Repair	The Project upgrades existing ITS infrastructure with modern, proven technologies, and communication infrastructure. See the state of good repair narrative below.
Partnership and Collaboration	The Project will include partnerships and collaboration with Bradley County, McMinn County, the City of Cleveland, the City of Athens, THP, and SETHRA. Public outreach is also planned to engage smaller communities and residents along US 11. See the Partnership and Collaboration narrative below for additional details.
Innovation	The Project incorporates CAV and automated weather and delay warning systems. See the Innovation narrative below for additional details.

Safety

CRASH FREQUENCY

The reduction of crash frequency and severity is a primary objective of the NextGen Fog and Traffic Incident Management Project. Table 8 provides crash statistics for the years 2021 through 2023 along the Project corridor. Crashes were counted as "secondary" when they occurred in the backup from a previous incident such as a crash or stalled vehicle.

Table 10: Crash Statistics

Crash Frequency (2021 through 2023)						
	(A) Suspected Serious Injuries	(B) Suspected Minor Injuries	(C) Possible Injury	(K) Fatal Injury	(O) Property Damage Only	Total
All Crashes						
I-75						
Total crashes per year	10	33	18	5	241	306
Fog-related crashes per year	0	0.33	0.33	0	1	1.67
US 11						
Total crashes per year	15	23	47	2	318	406
Fog-related crashes per year	0	0	0	0	1	1
Total for Both I-75 and US 11						
Total crashes per year	25	56	65	7	559	712
Fog-related crashes per year	0	0.33	0.33	0	2	2.67
Secondary Crashes						
I-75	3	7	0	1	33	44
US 11	0	1	1	0	4	6
Total	3	8	1	1	37	50
Average Per Year	1.00	2.67	0.33	0.33	12.33	16.67
Crashes with Truck-Bus Involved						
I-75	10	20	14	3	193	240
US 11	4	3	8	0	39	54
Total	14	23	22	3	232	294
Average Per Year	4.67	7.67	7.33	1.00	77.33	98

Figure 4 shows a heat map of crash locations on I-75 and US 11. On I-75, crashes are more frequent in the vicinity of the Hiwassee River between the Charleston and Calhoun exits (MM 25 and 48.5). For US 11, crashes are most frequent in Cleveland and Athens in the vicinity of SR 60 and SR 30, respectively.

CRASH FREQUENCY REDUCTION STRATEGIES

The Project includes several strategies to reduce crash frequencies.

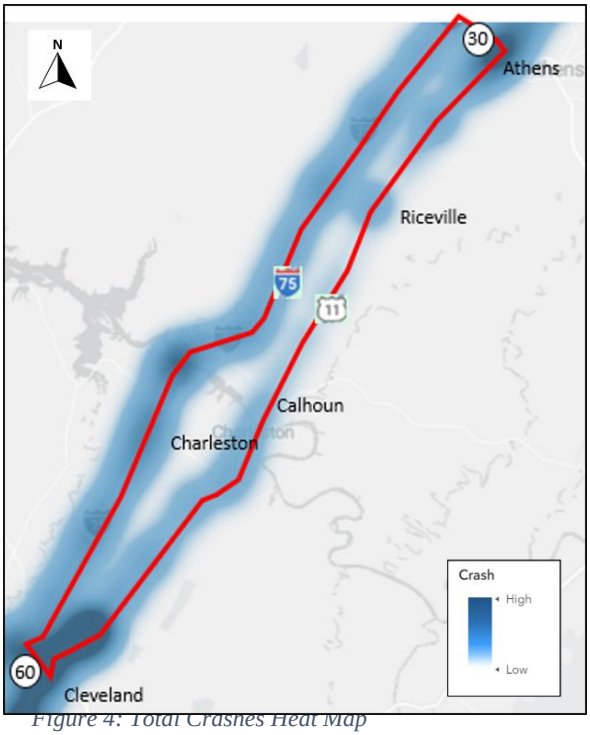


Figure 4: Total Crashes Heat Map

- *Enhanced fog management*: NextGen Fog Management on both I-75 and US 11 will be accomplished using software applications using analytics to predict fog events and produce timely warning messages both through existing DMS, blank-out signs (BOS), and the SmartWay traveler information website and through CAV basis safety messages broadcast from RSUs to vehicles equipped with onboard units (OBUs).
- *Additional safety systems*: Implementation of CAV technologies to broadcast curve warning and back-of-queue warning messages. These systems will use existing traffic detectors and predictive analytics to send warning messages to vehicles and to alert the Region 2 Traffic Management Center (TMC) of a potential incident. The TMC operator can activate DMS, post messages to the SmartWay website, notify the Tennessee Highway Patrol (THP), notify RSP, or take other actions, as appropriate and required by the TMC operational procedures.
- *Enhanced traffic signal management*: Implementation of advanced traffic controller (ATC) cabinets and controllers, closed-circuit television (CCTV) cameras, and communication at traffic signals along US 11 will allow Region 2 TMC operators to manage traffic along US 11 and more quickly address congestion and traffic incidents at traffic signals.
- *Enhanced traffic incident management*: Implementation of the Rural Service Patrol (RSP) on I-75 will reduce secondary crashes by over 20.9%[3]. The use of CAV RSUs will also enhance safety for incident responders with CAV Traveler Information Messages sent to driver OBUs to be alert for emergency responders.

Most traffic incidents (from debris on the roadway to multi-vehicle crashes) ultimately block one or more lanes either due to the incident itself or due to response vehicles. Table 9 shows the number of lane-blocking incidents for the years 2021 through 2023. Each of these incidents in turn delays other traffic. Some of these incidents resulted in the secondary crashes shown in Table 8 above.

Table 11: Lane Blocking Incidents

[3] See FDOT Report Crash Modification Factors (CMFs) for TSM&O Strategies, 2020 https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/research/reports/fdot-bdv29-977-46-rpt.pdf

Route	Total Lane-Blocking Incidents (2021 through 2023)
I-75	606
US 11	33
Total	639
Number of lane-blocking incidents per day	0.6

Environmental Sustainability

The Project improves the resilience of at-risk ITS infrastructure, including underground communication infrastructure, electrical service connections, and above-ground ITS equipment to be resilient to extreme weather events and natural disasters that produce widescale or localized power outages, flooding, lightning, low visibility, and high winds. Long-term deterioration also poses risks to continuity of service. For example:

- *Fiber-Optic Communication Network*: The existing, direct-buried, fiber cables will be replaced with new fiber in trenched or horizontal-directionally-drilled conduit. The conduit will protect the fiber from damage from flooding. The conduit along I-75 will be drilled under any protected environmental features such as ponds, wetlands, streams, and rivers to avoid any damage to these natural resources. In addition, the conduit will be strategically located to avoid impacts on natural animal or plant habitats along the corridor.
- *Electrical Service*: The electrical service to existing ITS equipment is over 20 years old and subject to outages due to lightning, surges, and grounding issues. These issues will be addressed with the complete replacement of electrical services for the existing and new ITS equipment in the corridor. Also, uninterruptable power supplies and backup batteries will minimize the impact of short-term commercial power outages along the corridor.
- *Roadside Equipment*: Roadside ITS equipment will be strategically located for both optimal effectiveness and to avoid impacts on water resources or natural animal and plant habitats. Along US 11, the Project concept calls for mounting new CCTV and wireless communication antennas on existing traffic signal structures and poles.
- *Low Visibility*: The Hiwassee River crosses the Project in approximately the middle of the Project corridor. The Hiwassee River Valley is prone to low-visibility conditions. Environmental sensing stations (ESS) collect real-time visibility, temperature, precipitation, and pavement surface conditions. The ESS will support the Tennessee Road Weather Information System (RWIS) to enable warning messages to travelers en route via active roadside signs and in-vehicle messages and pre-trip on Tennessee's SmartWay Advanced Traveler Information System website.

Quality of Life

TRAFFIC DELAYS AND IMPACTS

In addition to fatalities, injuries, and property damage caused by traffic crashes, each crash and incident, such as a stalled vehicle or debris on the roadway, can cause lane closures and significant traveler and freight delays. Mainline lane closures are done by THP with the assistance of DMS messages. TDOT can close access to I-75 with six remotely operated swing gates on ramps. The use of these ramps improves safety at the expense of compounding delays.

Figure 5: I-75 Fog Closure Swing Example

Most traffic incidents (from debris on the roadway to multi-vehicle crashes) ultimately block one or more lanes either due to the incident itself or due to response vehicles. Table 9 shows the number of lane-blocking incidents for the years 2021 through 2023. Each of these incidents in turn delays other traffic. Some of these incidents resulted in the secondary crashes shown in Table 8 above. Figure 6 depicts the heatmap of the 1,133 lane-blocking incidents on I-75 and US 11 for the years 2021 through 2022. Travel cost and reliability are also impacted by stop/slow-go speeds and queues due to poor visibility and lane-blocking crashes.

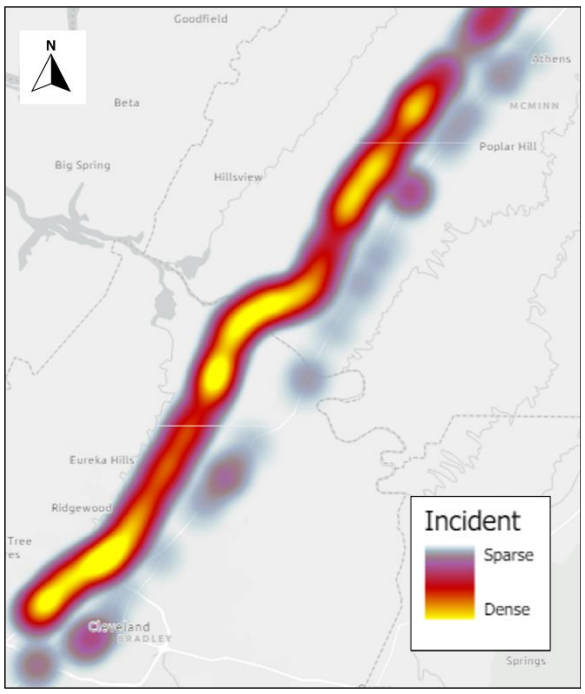


Figure 6: Lane-Blocking Incident Heatmap

QUALITY OF LIFE ENHANCEMENTS

The Project will increase travel safety, affordability, and reliability for both motorists traversing the corridor and motorists with trip origins and/or destinations within the corridor. The Project will add systems that provide advanced, real-time warnings about reduced visibility and end-of-queues. The existing variable speed limit signs will harmonize speeds and reduce stops, speed variations, and secondary crashes. In addition, it is anticipated that these systems will reduce the need for TDOT to close I-75 approaching the Hiwassee River Valley.

Mobility and Community Connectivity

The Project enhances the ability of all drivers to safely respond to fog and other visibility and weather-related difficulties.

The Project directly increases the reliability of freight movement by improving the response of freight drivers resulting from crashes, fog, and other weather hazards. I-75 is a major national freight route from Michigan to Florida with 25% truck along I-75 in the project area. These

improvements are important both regionally (between Chattanooga and Knoxville) and nationally. In large pileups, freight vehicles have the potential to cause the most damage to neighboring vehicles. Delays and liabilities due to fog-related crashes are expenses to freight operations and supply chains.

When I-75 lane or roadway closures cause traffic to detour to US 11, the Project will improve the ability to manage traffic on US 11 benefitting both through and local traffic on US 11.

While Universal Design doesn't directly apply to the Project, the Project benefits all people who drive, their passengers, and anyone receiving goods transported on the road. This includes people with diverse abilities who may experience benefits while traveling in cars and buses. However, Universal Design would apply more to the access capabilities of travelers to enter and leave cars and buses. The Project does not affect such design issues, per se, but does support passenger safety for the only public transportation service in the region, SETHRA, which provides fixed-route transit in the Cleveland area and door-to-door rural transit services in several counties, including Bradley and McMinn, focusing on removing transportation barriers for poor, elderly, and disabled persons.

Economic Competitiveness and Opportunity

The Project has several economic competitiveness and opportunity benefits that include improving travel-time reliability, improved movement of goods, and safety of travelers.

The Project will also create jobs related to the Project's delivery during construction and ongoing operations by increasing the use of personnel in the TMC to evaluate the validity of fog-related alerts and announcements.

The Project will increase the use of US 11 for alternate routing from I-75, which will improve the use of the US 11 corridor for local businesses. The Project will also improve signal coordination along US 11, which will make the road more supportive of area businesses' customers and freight deliveries.

State of Good Repair

Existing ITS communication infrastructure, power, and traffic-signal controllers in the corridor were designed over 30 years ago and have reached the end of their service life, meaning they are not easily upgradable through routine replacement. Examples of how the Project improves the state of good repair for ITS in the corridor include:

- *Replacing the fiber-optic cable along I-75*: The direct-buried, fiber-optic cable along I-75 will be replaced with new fiber in conduit. The conduit will improve the ability to repair or replace sections of the fiber that become damaged. The design looks for opportunities to add splice boxes along the 144-count, backbone fiber to allow connections to future ITS technologies such as truck parking information systems at rest areas, weigh stations, and dedicated truck parking locations along I-75.
- *Replacing the electrical power for ITS locations along I-75*: The existing electrical power is a distribution system consisting of direct-bury conductors and one major power source. The direct-buried conductors are difficult to repair or replace when damaged. Damage to

the conductors can result in an outage of many miles of the network. The existing power will be replaced with power services at each ITS field cabinet. An uninterruptible power supply and batteries will be provided at each location to ensure new and existing systems remain operable in the event of local or regional power outages.

- *Replacing traffic-signal cabinets and controllers along US 11, SR 30, and SR 60*: The existing traffic controllers will be replaced with ATCs to support active traffic monitoring and timing plan adjustments when traffic is diverted from I-75 due to lane-blocking incidents or closures.
- *Adding communication and CCTV cameras to traffic signals along US 11*: Currently, the only way to troubleshoot a traffic-signal problem or update a signal-timing plan is to physically visit the intersection. Signals along US 11, particularly in Athens, are many miles from the TDOT Region 2 regional office in Chattanooga. It can take hours before a signal technician can diagnose and repair even a minor problem. With the addition of CCTV cameras and communication at each signal, the Region 2 TMC will be able to monitor traffic conditions, download diagnostics from the controller, adjust timing plans, upload new timing plans, and expeditiously dispatch the signal maintenance technician, if necessary.
- *Implementing Rural Service Patrols*: As early in the Project as possible, TDOT will implement RSP on I-75 to respond to and help manage traffic incidents. RSP will work with THP to reduce the duration of lane and roadway closures resulting in reduced transportation delays and costs.

These improvements will ensure many more years of economical and effective ITS operations and maintenance.

Partnership, Collaboration, and Public Outreach

To effectively engage key stakeholders in support of TDOT's NextGen Fog and Incident Management System, a comprehensive and strategic public engagement strategy is essential. This strategy will aim to involve TDOT Region 2, THP, Bradley County, McMinn County, the City of Cleveland, SETHRA, and the public and freight users of I-75 and US 11. TDOT will conduct targeted outreach campaigns tailored to each stakeholder group.

The outreach campaigns will include updates on the Project's scope, timeline, and potential impacts on traffic and safety. Engaging with local government officials and departments responsible for transportation and public safety will help address any concerns or requirements specific to the areas along I-75 and US 11.

Engaging with freight providers would involve direct communication through industry associations, workshops, webinars, and newsletters to explain how the Project will impact their operations and how they can benefit from the new technologies.

TDOT will develop a Public Involvement Plan (PIP) that outlines its intent to conduct meaningful public outreach and effectively communicate with stakeholders and the public throughout the life cycle of the proposed Project.

The PIP will detail strategies and tools the Project Team will use to effectively inform members of the public and stakeholders about the proposed Project at key milestones in the Project development process. The purpose of the PIP is to create opportunities for the public and stakeholders to provide meaningful input on decisions that will affect their community. When the public is engaged in the process, their insights better align the proposed Project with the community's needs.

The plan will fulfill the Federal Highway Administration's (FHWA) requirements to carry out a public involvement program pursuant to 23 U.S.C. 139 and will be consistent with the public involvement requirements under the National Environmental Policy Act (NEPA), Title VI of the Civil Rights Act, Executive Order 12898 – Environmental Justice (EJ) and other federal and state plans and policies including TDOT's Public Involvement Plan, P3 Communications Plan, and Alternative Delivery Strategic Communications Plan.

The Project Team will develop and update the PIP considering the current demographics within the proposed Project Area, including the EJ Communities along I-75 such as Historically Disadvantaged Communities and Areas of Persistent Poverty identified between the cities of Cleveland and Athens, Tennessee. TDOT will explore diverse public engagement strategies, including traditional, digital, and multilingual communications that best engage these communities.

The PIP will identify specific goals, strategies, and tactics TDOT will use to inform and engage the public throughout the life cycle of the proposed Project. In addition to outgoing messaging, the PIP will outline opportunities for TDOT to offer stakeholders, the public, elected officials, and other state and federal agencies with an interest in the proposed Project various ways to communicate their questions, opinions, and ideas.

The Project will seek out user feedback through the PIP to engage stakeholders representing the entire I-75 and US 11 community of road users.

SETHRA focuses on eliminating generational poverty in southeast Tennessee through providing financial assistance for employment and education-related expenses to low-income families. SETHRA also operates SETHRA Rural Transportation and the Cleveland Urban Area Transit System which provide the only public transportation services in the corridor.

Innovation

The Project will use new, state-of-the-practice, commercial-off-the-shelf technologies which will include:

- A new environmental sensing station to detect fog and low visibility along US 11 near the Hiwassee River.
- Upgraded traffic signal cabinets and controllers along US 11, SR 60, and SR 30 to ATC standards.
- New cellular modems at traffic signals along US 11, SR 60, and SR 30 to provide real-time communication with traffic signals and ITS devices allowing active traffic management from the Region 2 TMC in Chattanooga.

- Electronic BOS that will be activated for low-visibility conditions on I-75 and US 11, for end-of-queue warnings on I-75, and for curve speed warnings on I-75.
- Internet Protocol (IP) CCTV cameras will be installed at key locations along US 11, SR 30, and SR 60 to further enhance active traffic management capabilities from the Region 2 TMC in Chattanooga. Using IP cameras will allow higher-resolution video to be transmitted over cellular modems than cameras meeting analog video standards.
- RSUs: RSUs will be installed along I-75 at approximately 1-mile intervals. The RSUs on I-75 will broadcast safety messages such as lane-closure warning, end-of-queue warning, and visibility warning. Seven RSUs will be installed along US 11, primarily to provide low-visibility warning messages. For an end-of-queue message, a CAV message warning (i.e., a TIM) would be sent to a single RSU (or multiple RSUs) saying, for example, "NB queue ahead" that drivers in range with OBUs would receive. (SB drivers would need to ignore the message as every OBU in range of the RSU would receive it.) What's helpful is that this is an in-vehicle message that can be read in fog, basically an in-vehicle DMS message.

Ultimately, the key Project innovation is to support active traffic management when traffic is diverted between I-75 and US 11 between Cleveland to Athens the corridor warrants diversions. This will depend on TMC's use of the new technologies being implemented. TMC operators will ascertain the applicability of diversion with the ESS instrumentation and CCTV (to monitor traffic and confirm visibility conditions) and field reports from the RSP and THP. Operators will use information from field devices and output from the decision support systems to send messages via DMS, BOS, RSU, and the SmartWay traveler information system to drivers as appropriate. The US 11 bypass route will experience less delay and fewer crashes with coordinated and actively managed traffic signals.

The Project may make road conditions, traffic conditions, and visibility information available to SETHRA for their use in scheduling trips. This will allow SETHRA drivers and passengers including poor, elderly, and disabled passengers to adjust their schedules based on real-time conditions. Details of this innovation would be worked out in the PIP and stakeholder involvement phases.

The RSP will be an important innovation for the corridor. Freeway service patrols have proven effective and popular with the public and this crash and fog-prone corridor would benefit immensely from roadside assistance.

The Project will introduce CAV RSUs to the area to send messages to vehicles equipped with OBUs. Details of their use will be worked out in the systems engineering phase of the Project plan, which will include how the technology shall operate and how TMC operators will be trained to create effective and appropriate early fog warning messages for CAV users. Messages will include fog ahead warnings and, eventually, curve speed warnings and other CAV applications as needed. RSU's introduction will also give TMC operators an incentive to consider other innovative CAV applications to apply in the future. The TMC has a radio connection to the THP now and will have radio contact with the RSP. Reports from the field on ongoing incident management will be used to inform drivers of delays and alternate routing options.

Level of Design

The following discusses the level of design for the Project.

- Regional Intelligent Transportation System Architecture (RITSA): The responsibilities of the Chattanooga Traffic Management Center (TMC) and the Cleveland Traffic Operations Center (TOC) will be defined in detail in the systems engineering phase of the Project. The Cleveland Metropolitan Planning Organization (MPO) and Chattanooga-Hamilton County/North Georgia Transportation Planning Organization have a Memorandum of Understanding (MOU) in place that states the fog detection equipment in McMinn County should be included in the Chattanooga RITSA.[4] Extension of the TDOT-operated, HELP motorist assistance program to rural areas along I-75, as the RSP herein, will also fall under the Chattanooga TMC and RITSA.[5]

  All of the ITS technologies, RSP, and applications included in the proposed Project are covered by ITS Services in the April 2017 *Cleveland Regional Intelligent Transportation Systems Architecture (RITSA) and Deployment Plan* and the 2022 *Chattanooga Regional Intelligent Transportation System Architecture and Deployment Plan*.

  Both RITSAs identify stakeholders and ITS needs and goals for Bradley and McMinn counties. The RITSAs identify ITS service packages, including the identification of roles and responsibilities. Most of the ITS and traffic-signal technologies already exist but are being upgraded with this Project. RSP services and RSU devices and messaging are entirely new. The low-visibility detection and warning system on US 11 will be implemented with the Project. Public transportation improvements, through new information flows and the CAV technology, would need to be added to the RITSA.
- Systems Engineering Analysis: TDOT will prepare a Systems Engineering Analysis Report (SEAR) using a Simplified Systems Engineering Analysis Form (SSEAF) for this low-risk, ITS Project. If elements of the Project are deemed higher risk, they will be tracked separately through the systems engineering analysis. Coordination with local agencies regarding placement of equipment at traffic signal system locations is underway.
- Design: The Project design is 30% complete. The 30% design includes approximate ITS field device types and locations to support the visibility, end-of-queue, and curve speed warning systems and to upgrade existing ITS and traffic-signal technologies in enough detail to develop the Project cost estimate. All devices are geocoded and mapped to facilitate the development of detailed plans. Included in the 30% design are field device types and locations to support the visibility, end-of-queue, and curve speed warning systems and to upgrade existing ITS and traffic-signal technologies.

[4] Cleveland RITSA, Section 1.2.1.
[5] Chattanooga RITSA, Section 1.2.

Cost Estimates

The following discusses how, when, and by whom Project costs were estimated. Cost estimates are based on the 2023 bid history.

- Communication and ITS Devices: The cost estimate for the Project communication infrastructures and ITS field devices were developed in January and February 2024 for TDOT by the statewide Transportation Systems Management and Operations (TSMO) on-call consultant under the oversight of the TDOT Traffic Operations Division. Costs were based on TDOT historical bid costs through 2023, where available. Costs were supplemented with Florida Department of Transportation historical bid costs through 2023 where TDOT costs were not available or were unusually high to do small quantities. No inflation factors were applied to the unit costs in the estimate.
- Rural Service Patrol (RSP): The cost estimate for the RSP was also developed by the statewide TSMO on-call consultant under the oversight of the TDOT Traffic Operations Division. RSP is in the process of being procured by TDOT so the actual price may be higher or lower. The RSP contract will be managed by task work orders.
- Software and Applications: Cost for software and applications were also estimated by the statewide TSMO consultant under the oversight of the TDOT Traffic Operations Division. Application costs are based on costs TDOT typically experiences for the development of SmartWay software modules.
- Systems Engineering, Design, and Construction Engineering and Inspection: TDOT uses fixed percentages for engineering support. These values were used on the cost estimate.
- Contingency: TDOT typically applies a 10% factor to all other costs to cover unknowns, risks, and items not fully developed during preliminary Project development.

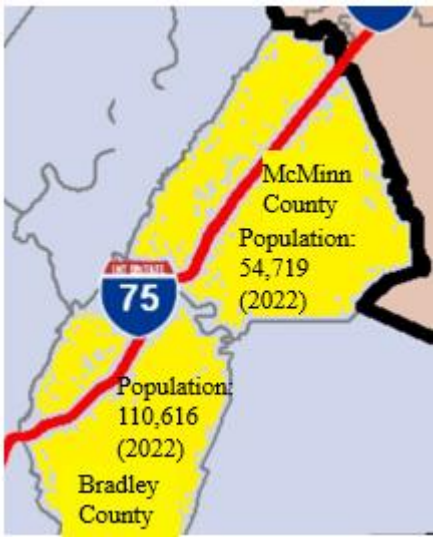


Figure 7: Project Counties and Population

Cost Share or Non-Federal Funding Match

The Project satisfies the 20% non-federal funds matching requirement. The RSP services will be the match. In other words, the federal funds will pay for engineering and construction and TDOT funds will pay for the RSP.

In addition to RSP, ongoing operations and maintenance will be performed through the TDOT Region 2 TMC in Chattanooga. Funds to operate and staff the TMC are not included in the TDOT matching funds. Likewise, funds to maintain the ITS infrastructure are not included in the TDOT matching funds.

The Project is located in Bradley and McMinn counties. Per the census.gov website, the estimated 2022 population of Bradley County is 110,616, and of McMinn County is 54,719. No part of the Project is located within a Census-designated urban area that had a population greater than 200,000 in the 2020 Census.

Section H - Benefit-Cost Narrative

The BCA spreadsheet calculates the BC ratio to be 10.97 to one. The BCA only used crash and delay savings to generate the overall value of the benefits.

Table 10 describes the current baseline, changes to the baseline, and example benefits.

Table 12: BCA Assessment

Baseline /Current Status and Problem to be Addressed	Change to Baseline /Proposed Project to Address Problem	Example Impacts
I-75 between Cleveland and Athens experiences, on average, a lane-closure traffic incident daily. Over half of the closures are the result of traffic crashes.	Implement additional Intelligent Transportation Systems (ITS) strategies including curve speed warnings, and end-of-queue warnings that use predictive analytics to support the generation of warning messages.	End of queue warning is expected to reduce crashes by 16.1%. The combination of all ITS strategies is expected to produce safety benefits of over $22M per year.
Crashes and lane closures result in secondary crashes.	Improve traffic incident response and information using Rural Service Patrol, CAV RSU, and blank-out signs (BOS) to improve information about road closures.	These strategies are expected to reduce secondary crashes by 20.9%.
Crashes and other traffic incidents cause diversion of traffic to US 11 between Cleveland and Athens but no agency has the ability to manage traffic on US 11 when this occurs.	Update traffic cabinets and add advanced traffic controllers (ATCs), ethernet switches, wireless communication, and closed-circuit television (CCTV) cameras, as needed for coverage, to US 11, SR 60, and SR 30.	These strategies will enable active traffic management and reduce delays by up to 30% when traffic incidents divert traffic.

Data input parameters for the safety analysis are as follows:

- *No-Build Crashes*: No-Build crash data was derived from the Tennessee crash database for the years 2021 to 2023.
- *Crash Severity*: The injury and property damage only (PDO) crashes were calculated by taking the average of the last three years' data on I-75 and US 11.
- *Crash Predictions*: Crash predictions for future years are based on future VMT from the Tennessee traffic volume database.
- *Future Crashes*: The crash for Build condition was calculated using the crash reduction factors below:

Table 13: Crash Modification Factors

Project Strategy	Crash Modification Factor
Rural Service Patrol	0.209 of secondary crashes
Fog detection and warning	100% of fog-related crashes
End-of-queue detection and warning	0.16 of injury crashes and (- 0.16) of PDO

Data sources for the crash modification factors include:

- https://www.cmfclearinghouse.org/results.php
- https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/research/reports/fdot-bdv29-977-46-rpt.pdf

Data input parameters for the travel-time savings analysis are as follows:

- *No-Build*: The vehicle delay hours are calculated based on the year 2021 to 2023.
- *Build*: The delay hours reduction rate is considered 28.6% for all non-work, zone delay hours.
  The non-work, zone delay is 50% of the total delay.

Data sources for the travel-time savings factor factors include:

- https://ops.fhwa.dot.gov/publications/fhwahop10050/ch2.htm

Section I - Benefit-Cost Analysis Calculations

The Benefit-Cost Analysis (BCA) spreadsheet is submitted as a separate file.

Link to BCA: Attachment: USDOT BCA Spreadsheet

Section J - Project Readiness (5 pages)

The following sections describe the Tennessee Department of Transportation's (TDOT) preparedness to move the Project forward once the Rural grant is received. This section provides a Project schedule, an environmental risk assessment, an assessment of environmental approval status, an assessment of risks and risk mitigation, an assessment of TDOT's technical capacity to complete the Project, and other information described on the DOT Navigator website.

Project Schedule

The NextGen Fog and Incident Management Project schedule is depicted in Figure 8. The schedule covers all major phases of the Project. Currently, I-75 experiences, on average, about one, lane-blocking crash per day. For this reason, the Rural Service Patrol (RSP) will be implemented as soon as possible once the USDOT issues the notice to proceed. RSP is expected to have a significant impact on traffic delays and secondary incidents.

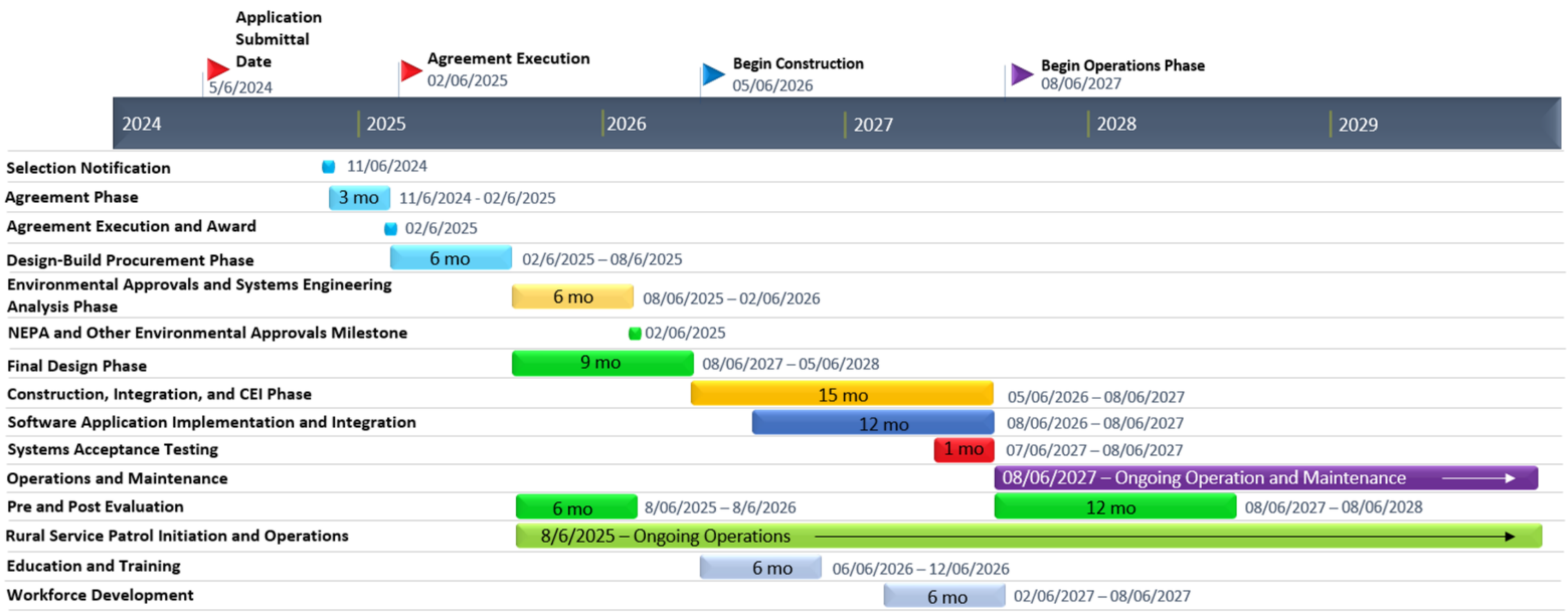


Figure 8: Fog and TIM Project Schedule

Project and contract management and stakeholder outreach and coordination will begin at Notice to Proceed and continue until all phases of the Project are completed.

Environmental Risk Assessment (capital projects only)

TDOT under the authority of the Federal Highway Administration (FHWA) granted in the National Environmental Policy Act (NEPA) of 1969 assumes responsibility for the environmental review of federalized highway projects that qualify as categorical exclusions (CEs). Given the Project's description of minimal land disturbance for the upgrade and new installation of a fog detection and warning system within the existing right-of-way (ROW), the Project meets the criteria for a Type I CE class of action under 23 Code of Federal Regulations (CFR) 771.117(c)(21):

REQUIRED APPROVALS

All necessary approvals and permits for the Project to proceed will be acquired with no impact on the schedule. There are no permitting risks to meet the statutory obligation deadline, including all federal, state, and local requirements.

NEPA Status

The NEPA process will begin with notice to proceed. TDOT will conduct the environmental analysis constituent with the Programmatic Agreement with FHWA under 23 United States Code (U.S.C.) 327 – 7/17/July 17, 2023. Since the Project is taking place within the existing ROW, the impacts on the human and natural environment are anticipated to be minor.

Other Agency Reviews, Approvals, and Permits

TDOT will initiate permitting activities and coordination with resource agencies during the initial design efforts to identify any required concurrences and permits. The project will be designed to avoid the multiple wetland crossings that are present along I-75 and US 11. TDOT will coordinate with the Tennessee Department of Environment and Conservation to avoid all wetland impacts. Additional permits and approvals may be required as the Project progresses. Potential involvement from the following agencies may also be anticipated:

- U.S. Fish and Wildlife Service and the Tennessee Wildlife Resources Agency – State and Federally Protected Species
- State Historic Preservation Office – Cultural and Archaeological Resources

Environmental Studies

No prior environmental studies have been completed for this Project.

FHWA Discussion

TDOT has an extensive history of working collaboratively with FHWA to efficiently deliver projects and manage federal funds, including grants. FHWA will be informed throughout the steps of the NEPA process and final documentation will be provided once approval is complete.

Right-of-Way Acquisition

The proposed Project work will be completed within the existing ROW. No new ROW acquisition is required.

Public Engagement

TDOT will develop a Public Involvement Plan (PIP) to provide a framework for building awareness about the Project, gathering public feedback at key milestones, and supporting the NEPA process. Project notifications and updates will be distributed through:

- Direct mail/email to elected and appointed officials; agencies; property owners, within a minimum of 300 feet of the Project ROW, as well as those tenants; and other community stakeholders during the Project's sociocultural effects evaluation
- Display advertisements in the local newspapers
- Official notices on the TDOT website

STATE AND LOCAL APPROVALS

The Project is included in the State Transportation Improvement Program (STIP) and all regional and local plans, such as Cleveland FY 2023-26 TIP, see Figure 9. It has received all local and state approvals and all phases will be integrated into the state fiscal programming documents when federal commitment is secured.

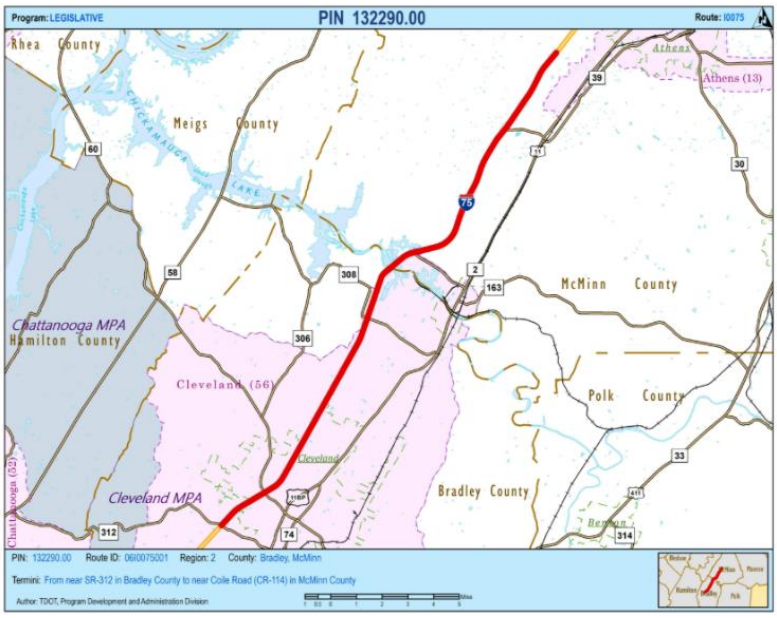


Figure 9: Project STIP Information

FEDERAL TRANSPORTATION REQUIREMENTS AFFECTING STATE AND LOCAL PLANNING

Once the NEPA process is completed for this Project, it will satisfy the federal transportation requirements of the Project development process. TDOT will coordinate closely with FHWA to ensure that federal requirements are followed throughout the next phase of the Project.

ASSESSMENT OF PROJECT RISKS AND MITIGATION STRATEGIES

TDOT is the risk owner and will work with stakeholders and contractors to mitigate delays and other problems risks pose. Identifying, assessing, and mitigating risk is an important purpose of systems engineering management. The systems engineering process will further reveal potential issues before TDOT encounters them. Identifying potential risks early in the Project is an important part of systems engineering that reduces Project costs over its life cycle. There are no significant obstacles to deployment and certainly no insurmountable ones. Preliminary Project risks have been identified in the Risk Table below.

Table 14: Project Risk Assessment and Mitigation Strategies

Risk #	Description of Risk and Impact	Mitigation Strategy
1	Agreements – agreements not in place, resulting in delays.	Timely meetings and discussions to resolve legal points.

Risk #	Description of Risk and Impact	Mitigation Strategy
2	Stakeholder coordination brings up issues that result in delays.	Timely review and discussion of plans; meetings and discussions to resolve stakeholder interests.
3	Delayed development of Standard Operating Procedures (SOPs) for Operations and Maintenance (O&M).	Timely review of systems engineering documents; meetings and discussion to resolve operations sticking points.
4	Delayed software integration with existing SmartWay TMC Operating System or RWIS.	Select qualified contractors who work with continual TDOT oversight and adequately test interfaces.
5	Cellular communications gaps may present operational problems for traffic signal and ITS device communication along US 11, SR 60, and SR 30.	Preliminarily, Verizon, AT&T, and T-Mobile cover the Project area. The designer will assess cellular signal strength and cellular interference along the corridor early in the schedule.
6	Equipment procurement, initial component and system testing, configuration, and troubleshooting lead to delays.	The design build procurement process allows these risks to be addressed early in the design phase.
7	For CAV, Federal Communications Commission (FCC) permission to use Cellular Vehicle-to-Everything (C-V2X) bandwidth is delayed, or the Security Credential Management System (SCMS) poses difficulty.	Request FCC license to use C-V2X early in design. Investigate and determine early in design the need and requirements for SCMS in the I-75 corridor from Cleveland to Athens.
8	Cybersecurity is threatened by equipment and systemwide exploits and attacks leading to shutdowns and/or ransoms.	All consultants and contractors meet Tennessee and National IT requirements and work cooperatively to ensure cyber support of the entire system.

Mitigation measures are further accentuated and extended to include:

- Generating systems engineering documents with well-written Project specifications and requirements to ensure knowledgeable and experienced contractors can design and build the system.
- Conducting the needed number of coordination meetings among Project stakeholders to identify concerns so they can be addressed early in Project development.
- Requiring appropriate levels of quality control and quality assurance.
- Applying Lessons Learned from the Pilot Project on I-75 and any similar national projects.

TECHNICAL CAPACITY ASSESSMENT (CAPITAL AND PLANNING PROJECTS)

- *Federal Funding*: TDOT uses federal funding for planning and construction of transportation improvement projects of all types.
- *Federal Requirements*: TDOT complies with Title VI/Civil Rights requirements and the Buy America provision as described in section E.1 of the NOFO. TDOT complies with the Americans with Disabilities Act, Uniform Relocation Assistance and Real Property Acquisition Act, Davis Bacon Act, etc., as required for the use of federal funds.
- *Project Planning*: The Project is identified on page six of the Cleveland Metropolitan Planning Organization (MPO) FY 23-26 Transportation Improvement Plan (TIP), Amendment 2 as the I-75 ITS Infrastructure and Network Improvement Project. The Project aligns the TIP goals for safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, and environmental sustainability.

The Project is also included in the TDOT five-year project list but is currently unfunded. The Cleveland Regional ITS Architecture (RITSA) was developed with input from Project stakeholders and includes all of the Intelligent Transportation Systems (ITS) Service Packages needed to implement NextGen Fog and Traffic Incident Management. When this Project is approved for funding, a change request will be prepared as required by the Cleveland RISTA.

Project Delivery: Two examples of successfully delivered projects of similar size, scope, and complexity include the original ITS and fog warning system on I-75 and the I-24 Smart Corridor in Nashville. The I-24 Smart Corridor enhanced and interconnected ITS infrastructure and devices on I-24 and US 41 creating an integrated corridor management system. Lessons learned from the I-24 Smart Corridor have been and will be incorporated into the NextGen Fog and Traffic Incident Management including updates already developed for the SmartWay TMC software used by the TDOT regional TMCs.

Section K – Project Requirements

The Next Generation Fog Detection and Incident Management project meets the five requirements described in 23 U.S.C. § 173(g) and below and further described in Sections D.2.vii and E.1.v.b, as follows:

1. Regional economic, mobility, and safety benefits: The project improves fog detection and warning; incident detection, warning, and management; and excessive curve speed detection and warning. The project will provide the capability to monitor and manage traffic on US 11 improving overall traffic operations and improving TDOT's ability to manage traffic when I-75 is closed due to heavy fog or a severe crash. These improvements are important both regionally (between Chattanooga and Knoxville) and nationally. I-75 is a major national freight route from Michigan to Florida.
2. The project will be cost-effective: The estimated benefit-cost ratio is 10.97 to 1.
3. Accomplishment of national goals under 23 U.S.C. § 150: The project will accomplish the following goals:

(1) Safety – The project will achieve a significant reduction in traffic fatalities and serious injuries on I-75 and US 11. The analysis shows it will reduce one fatal crash (K) and four serious injury crashes (A) per year along the routes.
(2) Infrastructure condition – The project will improve the condition of the ITS communication infrastructure and electrical power supply along I-75.
(3) Congestion reduction – The project will reduce the severity and duration (will reduce almost 193,710 hours of delay per year) of congestion resulting from traffic incidents along I-75 and US 11.
(4) System reliability – To improve the efficiency of the surface transportation system.
(5) Freight movement and economic vitality – I-75 is an important link in the national freight network. The project will reduce impacts on freight movement caused by low visibility and traffic incidents to support the achievement of economic advantages associated with just-in-time delivery.

4. The project is based on the results of preliminary engineering. The cost estimate was based on a conceptual design analysis that determined approximate locations for roadside devices, as follows:
    - *Location of new conduit for fiber-optic communication cables*: The conceptual design includes generally following the alignment of the existing fiber-optic cable along I-75. Subsurface utility engineering will be performed at locations where the conduit crosses intersection roadways.
    - *Location of field devices on I-75*: Most new field devices will be installed on existing poles. All other devices will be installed within the maintained right-of-way. TDOT as-built documents will assist with locating existing underground electrical cables that support ITS or traffic lighting and underground draining infrastructure.
    - *Location of devices on US 11 and connecting routes*: Most new devices will be installed on existing traffic signal infrastructure. New fog detection systems will require additional right-of-way surveys and subsurface utility locates prior to the final location and installation of poles.
    - *Location of electrical service connections*: Most existing ITS devices are located in the proximity of other developments along I-75 that have electrical service. Locations in the vicinity of the Hiwassee River area may require the implementation of a 1-2-mile electrical distribution system. This will be determined during the final design.
5. *Construction will begin no later than 18 months after the date of the obligation of funds for the project*: TDOT will use a Design-Build procurement to ensure construction will start within 18 months after the obligation of funds. Most project elements are covered by TDOT standards and specifications. TDOT has an ITS Qualified Products List that covers most of the equipment required for the project. TDOT has completed projects implementing RSU in the Nashville and Chattanooga areas and plans to reuse any needed special provisions from those projects.

Section L - Mega Data Plan

A Mega Data Plan is not required for a Rural project.

Section M - Letters of Support

Letters of Support from project stakeholders are linked here: Letter of Support

THANK YOU

TO OUR STAKEHOLDERS

TN TDOT Department of Transportation

HELP Rural Service Patrol Free by TDOT

TIM TRAFFIC INCIDENT MANAGEMENT

TENNESSEE STATE TROOPER HIGHWAY PATROL

McMINN COUNTY 1819 - 2019 200 years

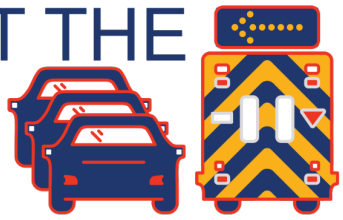
CLEVELAND TENNESSEE EST. 1842

SOUTHEAST TENNESSEE HUMAN RESOURCE AGENCY SETHRA

SEAL OF THE COUNTY OF BRADLEY AGRICULTURE INDUSTRY 18 36 STATE OF TENNESSEE

PROTECT THE QUEUE!

TN TDOT Department of Transportation



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