2025 Climate Strategy Report

North Carolina Department of Transportation (NCDOT)

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Contents

Introduction

About the North Carolina Department of Transportation (NCDOT)

NCDOT's multi-faceted mission is to *"connect people, products, and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina*." Transportation is the backbone of North Carolina's economy, connecting manufacturers with supply chains, consumers with products and tourism, and people with their workplaces, homes, and communities across urban, suburban, and rural landscapes. NCDOT is responsible for the second highest number of state-owned highway miles in the country. The state contributes financial support to elements of non-highway improvements which can integrate resilience into transportation planning and measure resilience- related outcomes across multiple modes.

NCDOT's Vulnerabilities to Climate Change

High impact weather events and natural hazards disrupt the safety and reliability of North Carolina's multimodal transportation network. These weather events cause infrastructure damage and stress resources. The main hazard types found in North Carolina include meteorological (temperature, fog, precipitation, storms, hurricane, tornado, severe wind), climatological (drought, wildfire, sea level rise), hydrological (coastal storm/flood, inland flood, storm surge, saltwater intrusion, riverine flood) and geological (landslide, rockslides/mudslides, sinkholes).

NCDOT's Approach to Fulfilling the Strategies in the Climate Risk Assessment and Resilience Plan

NCDOT is constantly implementing the strategies identified in the Climate Risk Assessment and Resilience Plan. Following the adoption of its resilience policy in September 2021, the agency worked to enhance resilience in all day-to-day organizational activities and deployed a coordinated approach to manage risk to business operations. The enactment of this policy helped NCDOT manage risks from natural and man-made hazards and strengthen the transportation system's overall resilience and ability to maintain a safe, reliable, and efficient transportation infrastructure. In addition, NCDOT is exploring opportunities available through the Infrastructure Investment and Jobs Act (IIJA), also known as Bipartisan Infrastructure Law (BIL) and the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT) Program (formula and discretionary grants), to pursue resilience efforts to reduce system vulnerabilities from climate change.

The department's resilience policy and IIJA opportunities have aided NCDOT in incorporating and achieving new actions, strategies, and programs related to climate change resilience. In addition, the agency is consistently evaluating and testing a suite of new tools with regards to resilience and emergency preparedness, tools such as:

- Our Flood Warning System (Transportation Surge Analysis Predictive Program (T-

SAPP)),

- BridgeWatch,
- The Roadway Inundation Tool (RIT) via the NC Floodplain Mapping Program (NCFMP) that has been greatly expanded,
- NC Coastal Bridge Scour Analysis,
- Geotechnical Asset Management (GAM) database,
- The Flood Inundation Alert Network for Transportation (FIMAN-T), and
- DeepPipe, a deep learning-based underground pipe prediction tool for stormwater systems

NCDOT is actively working on fulfilling its Climate Risk Assessment and Resilience Plans goals. These goals are discussed in more detail in Sections 1 through 4 of this report below. NCDOT would like to highlight several achievements and awards regarding its ongoing efforts to fulfil these goals below.

NCDOT has received a USDOT FY2024 Strengthening Mobility and Revolutionizing Transportation (SMART) Stage 1 Grant for the project entitled "Remote Emergency Support Program for Operational Needs & Delivery (RESPOND)" in the amount of $1,100,000. This project will use innovative aviation technology (uncrewed aircraft systems) to create a drone disaster response and delivery network to address surface transportation and access challenges following natural disaster events. Specifically, RESPOND will plan for and prototype the implementation four DIABs (drone-in-a-box),.

An NCDOT project is being recognized for its use of innovative technology. The Harker's Island Bridge Replacement project (an Accelerated Innovation Deployment (AID) grant award) won an Operations Excellence award as part of the American Association of State Highway and Transportation Official's (AASHTO) annual America's Transportation Awards contest. The bridge project replaced two 50-year-old bridges with a single, 3,200-foot bridge made with glass fiber reinforced polymer and carbon fiber reinforced polymer strands. The materials are designed to better withstand the coastal environment and provide greater durability.

NCDOT has also taken home two top awards from this year's National Operations Center of Excellence's Transportation Systems Management & Operations (TSMO) Awards, awarded by AASHTO's committee on Transportation System Operations. These awards were the "**Best TSMO Project**" and "**Best Overall Winner**" for its response to the challenges faced by our Hurricane Helene recovery efforts. Specifically, the state agency was lauded for serving as a central coordination point for road conditions that local, state, and federal agencies relied on for their response and recovery operations. The department used its advance flood-warning system to help pre-position Incident Management Assistance Patrol (IMAP) crews in locations where staff believed they could help save lives, and shared critical safety information on its traveler-information website at DriveNC.gov.

In addition, to continue supporting the agency's Resilience Program efforts, NCDOT developed a statewide multimodal Resilience Improvement Plan (RIP) that was revised this year to proactively identify critical areas vulnerable to natural events including climate change and for potential resilience improvements projects. The RIP meets the requirements of the PROTECT program overseen by FHWA

and helps the agency qualify for up to a 7% reduction in matching funds for resilience projects developed with federal funds. It will be a living document that will continue to be updated in the future as needed.

Hurricane Helene Damage and Recovery Efforts

In September 2024, North Carolina experienced its most destructive storm in history, Hurricane Helene. The scale of damage was immense. Over 9,400 sites were identified with damage to roads, bridges, and culverts. Approximately 848 bridges were affected, with 150 needing replacement, and over 2,000 culverts required repair. More than 1,400 road closures occurred. The estimated cost of recovery was around $5 billion—far exceeding the costs of previous storms like Matthew and Florence.

NCDOT has made significant progress in rebuilding western North Carolina. As of July 2025, 97% of damaged roads have reopened, and over 460 bridges and over 1,300 large and small culverts have been repaired. A key milestone was reopening Interstate 40, restoring vital access between North Carolina and Tennessee. A key question for agency leadership is how to document and institutionalize lessons learned from Hurricane Helene. Extreme weather events will continue, and NCDOT is responsible for recovering the transportation network as efficiently as possible after emergencies.

NCDOT has already begun facilitating internal peer exchanges to communicate lessons learned and continuous improvement. Disaster response staff have also been updating the Department's disaster playbook and training materials to document critical lessons learned from Divisions of Highway, Integrated Mobility, Aviation, and Motor Vehicles. NCDOT will also actively engage in peer exchanges with partner agencies and states to analyze past incidents to better understand safety and risk management. Intra-state coordination has been a part of disaster recovery, and the Department aims to help other states not only to recover from events when possible but also to proactively share lessons learned. NCDOT will also work to update the 2020 Resilience Plan Recommendations List as needed to mitigate future disruptions to the transportation network.

NCDOTs Progress Toward Reducing Emissions

NCDOT is committed to reducing its own emissions as well as those from the state transportation network whenever practicable. Emissions, and their respective reductions come from both NCDOT owned and/or operated infrastructure, and the state's transportation network users. NC State Agencies such as NCDOT have a mandate to reduce building energy usage by 40% from baseline levels. Currently, NCDOT and the North Carolina State Ports Authority (NCSPA) occupy 2,164 buildings totaling 9,500,271 gross square feet. The utility costs for operating those buildings in Fiscal Year (FY) 2025 totaled approximately $12,000,000. Energy consumption per square foot was 30% less than during the baseline year (FY 2004) at the beginning of FY 2025. There has been an additional reduction of 5% from the prior fiscal year (FY 2024). At the conclusion of FY 2025, energy savings programs at NCDOT and NCSPA have resulted in a total energy cost avoidance of approximately $36,000,000, and a water cost avoidance of

approximately $15,000,000; totaling almost $51,000,000 over the past 21 years.

By the end of FY 2025, cost savings measures have reduced energy and water usage per square foot in NCDOT facilities by 35% and 6% respectively, as measured from the FY 2004 baseline values. NCDOT estimates this trend will continue through 2025. We estimate another 2% reduction in energy consumption resulting in a total reduction in energy use per square foot of 37% from the FY 2004 baseline.

North Carolina Clean Transportation Plan (NC CTP)

The NC CTP is one of the primary avenues for supporting programmatic, department-wide, emissions reduction recommendations to existing programs, and developing new programmatic activities to reduce emissions. After the release of the Clean Transportation Plan in April 2023, NCDOT and its partners have accomplished several major milestones, including:

- Sponsoring public engagement events like the Sustainable Fleet Conference and alternative vehicle ride-and-drive events to encourage electric vehicle adoption,
- Through the National Electric Vehicle Infrastructure (NEVI) program, executing agreements with 7 private businesses to build and operate electric vehicle (EV) charging stations along interstates and major highways,
- Preparing a request for proposals for a second phase of NEVI funding,
- Completing a comprehensive Vehicle Miles Traveled (VMT) Reduction Study and updating the VMT Reduction Toolkit that provides information about Transportation Demand Management (TDM) measures that reduce VMT and the potential funding sources available to implement these measures,
- Installing EV charging stations at two NCDOT facilities - one in Sylva and the other in Hatteras – with funding awarded through the Volkswagen Settlement,
- Working with utilities and other service providers, such as Duke Energy, to ensure grid readiness for large expansions of charging,
- Working with the Institute for Transportation Research and Education (ITRE) to develop recommendations for incorporating environmental measures into the Strategic Prioritization Process for highway mode projects,
- Working with local municipal partners, ITRE researchers, and the New Urban Mobility Alliance (NUMO) at the World Resources Institute (WRI) to recommend VMT reduction strategies through various upzoning and land-use recommendations in urban areas,
- Continuing investment in multimodal transportation solutions across the state with grant funding including the S-Line $1.09 billion passenger rail grant from the USDOT to begin connecting Raleigh and Richmond, V.A.,
- Securing funding for the Ecusta Trail grants from the U.S. Department of Transportation. When the trail is complete, cyclists and pedestrians will have a safer alternative to traveling winding mountain roads. Updating the Congestion Mitigation and Air Quality (CMAQ) Program and the

Carbon Reduction Program (CRP) project selection guidance to incorporate more accurate emissions estimations and co-benefit factors, and

- Improving project delivery timelines for existing CMAQ and CRP projects through our municipal partners.

1.0. Reduce greenhouse gas emissions

1.1 Reduce energy consumption per square foot in state-owned buildings by at least 40% from fiscal year 2002-2003 levels

1.1.1 Establish energy savings programs

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT has established energy savings programs to reduce energy consumption in NCDOT and NCSPA occupied buildings. By the end of FY 2025, these programs have accomplished a reduction in energy usage per square foot in NCDOT and NCSPA facilities by ~36% and ~9% respectively, as measured from the FY 2004 baseline. Some of these initiatives include monitoring and support of two guaranteed energy saving performance projects in Raleigh (five of NCDOT's largest buildings) and across the state (roadway lighting and building lighting upgrades).

NCDOT will continue to implement these programs to continue reducing energy consumption and costs in its buildings.

1.1.2 Implement energy conservation measures (ECMs) in all new buildings and repair and renovation projects

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is implementing ECMs in new or renovated buildings as per the 2018 NC State Building Code: Energy Conservation. NCDOT also specifies in building plans additional ECMs that a project's budget can support, and which do not add to the user's workload or require extensive maintenance or repair costs whenever possible.

There have been no changes during the past 12 months. However, the agency will continue to implement these efforts during the next 12 months.

1.1.3 Improve electrical infrastructure across NC supporting the Roadway Lighting Policy

Status: Ongoing
Expected Completion Date: Ongoing

The NCDOT Roadway Lighting Policy was developed in 2020. In response to this policy, as funds are available, NCDOT is planning multiple projects to improve the electrical infrastructure across the state to support energy efficient roadway lighting for interchanges and along roadways.

There have been no changes during the past 12 months. Within the next 12 months, the agency will complete another seven lighting design projects that have been approved.

1.1.4 Perform energy audits to identify energy conservation measures (ECMs)

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT has performed energy audits to identify ECMs that can generate enough cost savings to pay for the implementation of these energy saving measures within 2 to 3 years – sometimes in less than one year. The agency will continue to identify other facilities where energy audits will be cost effective and implement their findings where appropriate and finically feasible.

Within the next 12 months, the agency will conduct additional energy audits.

1.1.5 Upgrade, replace, and repair existing heating, ventilation, and air conditioning (HVAC) equipment to improve energy savings

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is planning multiple projects to improve existing HVAC equipment to increase energy savings. Some of these efforts include:

- Replacing chillers and split systems,
- Installing more energy efficient roofs as they are repaired or replaced (many NCDOT buildings are over 40 years old),
- Replacing / upgrading existing windows with more energy efficient models,
- Programmable thermostats, building automation and monitoring systems as appropriate and affordable, and
- Lighting upgrades.

It is the agency's preference to install or upgrade to programmable thermostats for buildings unless a lifecycle cost analysis shows that installing a centralized HVAC control system is cost effective. The goal is to avoid installing an HVAC control system that adds to the time and expense of maintaining those systems and to avoid connecting to existing remote NCDOT monitoring and control systems given the time and expense of obtaining approval by NC Department of Information Technology (NCDIT).

There have been no changes during the last 12 months. Within the next 12 months, the agency will continue to implement these efforts.

1.1.6 Implement sustainable construction materials

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is currently implementing more sustainable paving materials that reduce emissions. Warm Mix Asphalt (WMA) technology reduces energy consumption due to the use of an additive that reduces the temperatures at which asphalt mixes are produced and placed. This means less fuel is required at the production plant to heat the aggregates to the traditional hot mix asphalt (HMA) temperatures. With the decreased production temperature comes the additional benefit of reduced emissions at the plant and during asphalt placement.

Unfortunately, NCDOT does not currently have a method for tracking specific projects where WMA might be used. This makes it difficult to determine the impact that such efforts have on specific emission reductions. There are also some practical challenges to WMA usage over traditional HMA. Typically, contractors can determine when, where, and how to use WMA. WMA is often used more as a compaction aid rather than a warm mix additive. It is challenging to track when contractors use WMA for their intended purpose. Another challenge in tracking usage arises from the industry's preference for a 25°F tolerance when using WMA.

This large tolerance can place mixture temperatures back into normal hot-mix asphalt ranges. Contractors also prefer including a statement on a standard hot-mix asphalt job mix formula (JMF) that allows the job mix formula to be used interchangeably as either HMA or WMA, which further complicates efforts to track WMA usage.

1.1.7 Use energy rebates funded by utility companies to support energy conservation measures (ECMs)

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is planning to use energy rebates funded by utility companies to offset the cost of new construction, repairs and renovations. NCDOT has used utility rebates in the past to reduce project costs and to pay for improvements to roadway lighting infrastructure. Additional rebates received from new or renovated buildings will be used to support ECMs as identified.

There have been no changes during the last 12 months. Within the next 12 months, the agency will begin to implement these efforts.

1.1.8 Identify and support efforts to obtain funding for ECMs

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT will work with the Department of Environmental Quality (DEQ) and others to identify funding over the next fiscal year for ECM projects – particularly those that involve optimizing HVAC usage to reduce cooling / heating loads when buildings are not occupied.

There have been no changes during the last 12 months. Within the next 12 months the agency will continue to implement these efforts.

1.1.9 Submit a FHWA Low-Embodied Carbon Transportation Materials (LCTM) grant

Status: Completed
Completion Date: June 2024

NCDOT submitted a grant application to FHWA for LCTM Program. The grant would help offset the increased costs for transportation materials that require lower amounts of carbon to acquire, produce, and place them. In addition, the grant would pay for creating a voluntary Environmental Product Declaration (EPD) Program at NCDOT (primarily for pavements). The grant would also fund opportunities for the purchase of new equipment, training, testing, and travel associated with eligible grant opportunities. The grant application submitted in June 2004, and it was awarded in November 2024. The funding was paused by FHWA in January 2025 and was subsequently rescinded by congress in July 2025.

1.1.10 Implementation of the FHWA LCTM grant from Section 1.1.9

Status: Cancelled

Completion Date: Cancelled

Despite successful selection of the submitted proposal, the LCTM grants were paused by FHWA in January 2025, and rescinded by Congress in July 2025; NCDOT is therefore unable to move forward with the proposed work.

1.2 Support the use and expansion of energy efficient and clean energy resources

The content for this section is also covered in multiple other sections/actions throughout the report.

1.3 Increase the number of registered Zero Emission Vehicles (ZEV) to at least 1,250,000 by 2030 so that 50% of in-state sales of new vehicles are zero-emission by 2030

1.3.1 Develop and implement the North Carolina Electric Vehicle (EV) Infrastructure Deployment Plan

Status: Underway
Expected Completion Date: Ongoing

Under the federal National Electric Vehicle Infrastructure (NEVI) program, NCDOT developed an EV Infrastructure Deployment Plan to provide a framework for the deployment of EV charging infrastructure through reimbursement grants. The plan focused on the build-out of NEVI-compliant stations along the state's designated Alternative Fuel Corridors (AFCs) to support EO246 ZEV goals.

During the last reporting period, NCDOT conducted Round one awardS, including:

- Evaluating 27 complete applications for the 11 locations included in the RFP,
- Awarding nine projects in September 2024 under a "best value" approach,
- Completing NEPA for the nine sites in December 2024,
- Finalizing contractual language for the grants in February 2025, and
- Executing six agreements with awardees and issuing Notice to Proceed for those projects in July 2025.

In addition, NCDOT developed the Round 2 Request for Proposals (RFP) based on feedback from the Round 1 RFP. Part of this included revising the mapping of the proposed NEVI sites. The revised mapping was published to the NCDOT NEVI website in December 2024. In addition, NCDOT initiated outreach efforts for proposed NEVI sites in rural areas without many available station hosts. Outreach included postcards, follow-up phone calls, and two webinars held in January 2025.

However, the program was paused in February 2025 and restarted after the release of new guidance and the approval of our 2026 NEVI Plan. Based on the new guidance, NCDOT was successful in securing "full build-out" certification of the Alternative Fuel Corridors. With this certification, greater flexibility in the location of infrastructure can be considered. As such, we are analyzing needs and gaps in infrastructure along the state's corridors to revise the map released in 2024. It is expected that the RFP for Round 2 will be released first quarter 2026.

1.3.2 Install EV chargers for aircrafts and ground vehicles

Status: Completed
Completion Date: March 2025

NCDOT partnered with BETA Technologies to install an EV charger with charging ports for one aircraft and two ground vehicles at the Raleigh Executive Airport. Installation of the chargers was completed in March of 2025. On March 27, 2025, the state's first electric aircraft charger was used to power an electric aircraft developed by BETA Technologies for the first time. See North Carolina's First Electric Aircraft Charging Station Powers Flight in Aviation Milestone.

1.3.3 Support local transit agencies to increase the use of electric vehicles in their fleets using CMAQ funds.

Status: Ongoing
Expected Completion Date: Ongoing

CMAQ funds will likely continue to fund electric transit vehicles into the future as a variety of transit operators have inquired about the possibility of using CMAQ as a funding source for vehicle procurement.

1.3.4 Perform need assessment for the electrification of medium- and heavy-duty sectors.

Status: Completed
Completion Date: September 2023

1.3.5 Complete a NCDOT Appalachian Regional Commission (ARC) study for rural airport electrification

Status: Underway
Expected Completion Date: March 2026

NCDOT and partner states were awarded a grant by ARC to assess the infrastructure needs of the region's airports, including upgrading electric utility capacity and installing charging capabilities required to support Advanced Air Mobility (AAM) aircraft. The project serves four Western North Carolina general aviation airports and 36 total airports in the multi-state Appalachian region.

1.3.6 Complete a statewide airport electrification gap analysis and needs assessment

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT has conducted an electrification needs assessment of the 72 public-use airports in North Carolina to identify existing infrastructure and upgrades needed to support electric aviation, ground transportation, and airport operations in the future. Feedback from the assessment is currently being evaluated to determine how this data can be used to advance aircraft electrification across the state.

1.3.7 Conduct a Wave Transit zero emissions vehicles transition study

Status: Completed
Completion Date: January 2024

1.3.8 Establish best practices and technical guidance for planning and developing an EV infrastructure network

Status: Underway
Expected Completion Date: December 2025

NCDOT Research Project 2024-10 will develop a series of planning and policy best practices and technical guidance for siting EV charging infrastructure to support the expansion of the charging network and its management in North Carolina. This research will assess local planning policies and power utility considerations to develop guidance that informs the efficient and equitable development of a statewide EV charging network plan. The policy and planning research tasks will result in a practice-ready guidance document.

This document will include guidance for local agencies, draft policies that can be locally adopted to simplify EV infrastructure permitting and approvals at the municipal and county level. Which is guidance that highlights opportunities for NCDOT to collaborate and support external partners in improving statewide EV infrastructure. Additionally, the technical guidance derived from models for siting EV charging infrastructure will support the charging network's expansion and provide insights on charger deployments given geographical limitations, travel demand constraints, electric power grid requirements, and access considerations.

The research results will be practice-ready, implementable guidance on EV network sitting and development. The policy and planning best practice and EV development guidance can be used to support metropolitan planning organizations (MPOs), rural planning organizations (RPOs) and local planning agencies for sitting local EV infrastructure and developing planning policy that encourages the establishment of an equitable and technically sound EV charging infrastructure.

1.3.9 Develop the Light-Duty ZEV Action Plan as part of the North Carolina Clean Transportation Plan (NCCTP) stakeholder process

Status: Completed
Completion Date: April 2023

1.3.10 Support agencies to develop EV fleet transition plans

Status: Completed
Expected Completion Date: December 2025

The NCDOT Integrated Mobility Division (IMD) partnered with multiple transit agencies to fund the development of EV transition plans. The transit agencies included Wilson, Buncombe, Johnston, and Duplin Counties and planning was completed over the course of two years (beginning in October 2023 – July 2025). These agencies are now equipped with adopted plans and may pursue formula or discretionary grants independently or in collaboration with IMD to seek funding for ZEV capital purchases.

Two of the plans resulted in applications submitted to the Low and No Emission programs federal grant in spring of 2024 which also was supported by NCDOT IMD sponsorship. This effort was part of a preliminary program that included the Wave Transit ZEV Plan and may potentially build into a more robust and standardized program offered to all transit agencies on an annual basis. Currently, the future of the program is being evaluated by NCDOT IMD.

The majority of ZEV adoption to date has been in urban areas; however, the NCDOT ZEV program caters to the subrecipient audience that NCDOT works with, with many of these transit agencies servicing rural parts of North Carolina. The EV transition plans are working on answering difficult questions related to the EV technology and how it is best implemented in rural geographies as part of an equitable approach for ZEV to reach all populations in North Carolina.

The Carbon Reduction Program (CRP) and Congestion Mitigation and Air Quality (CMAQ) programs have been assisting local governments with EV fleet transition by awarding federal program dollars for EV fleet procurement. This is currently allowable under the *Waiver of Buy America Requirements for De Minimis Costs and Small Grants (Docket No.: DOT–OST–2022–0124).*

1.3.11 Support local transit agencies to increase the use of electric vehicles in their fleets using CRP funds.

Status: Ongoing
Completion Date: Continuous

CRP funds have been programmed for the Johnston County Area Transit System (JCATS) to procure new electric vehicle buses. This amounts to $408,000 in CRP funds and $510,000 in total project cost (federal share plus local match). NCDOT has had conversations with other transit providers statewide that are exploring electric transit vehicle procurement. Additional EV transit vehicle projects are anticipated for FY 2025-2026.

1.3.12 Develop a database for EV chargers for Transit

Status: Planned
Expected Completion Date: 2026

IMD is developing a database to keep track of EV charging stations for transit locations. IMD solicited and collected data from transit systems in the state that have charging infrastructure, and that are interested in changing their fleets to low emission, or electric vehicles. Information gathered includes identification of sites for (non-public) EV charging stations. This effort will help determine locations that may not be adequately served with current or planned charging infrastructure, and can influence decision-making to ensure equitable access is provided.

1.3.13 Improve ZEV registration data

Status: Ongoing
Expected Completion Date: Ongoing

The ZEV registration data is now updated and posted monthly rather than quarterly. This data is available to external stakeholders and can be used to track progress on the EO 80 and EO 246 ZEV goals as well as determine density of EV ownership to aid in the sitting of EV charging stations.

During the reporting period, NCDOT improved the methodology for accounting for new vehicle registration and vehicles moving out of state or retiring. This changed the historical data as well. The revised vehicle registration tables for all months/years have been posted to the NCDOT website.

1.3.14 Host ride and drive events and educational outreach

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT Partners (NC Clean Energy Technology Center (NCCETC), Plug-in NC, Clean Cities, etc.) are hosting several ride and drive events and vehicle expos.

NCDOT continues to sponsor the Sustainable Fleets Conference through CMAQ funding that was hosted on August 25-27, 2025. Many Ride and Drive events are planned throughout the state.

1.4 Prioritize Zero Emission Vehicles (ZEVs) in the purchase or lease of new vehicles and for agency business travel

1.4.1 Identify NCDOT motor fleet vehicles for conversion to ZEV

Status: Ongoing
Expected Completion Date: Ongoing

Each year, the NC Department of Administration (NCDOA) identifies agency motor fleet vehicles that are candidates for replacement by zero emission or reduced emission vehicles.

The availability of charging infrastructure at NCDOT facilities remains a barrier in the conversion of replacement vehicles to ZEV or hybrid alternatives. The agency is working to use grant funding from the Volkswagen Settlement and is considering other funding options. In past years, NCDOT has purchased several all-electric vehicles that are in various locations across the state.

1.4.2 Support the installation of electric vehicle charging stations for ZEV at NCDOT buildings

Status: Ongoing
Expected Completion Date: January 2026

NCDOT is working on increasing the number of EV charging stations in the state for plug-in hybrid and battery electric vehicles. Through the solicitation for projects from the Volkswagen Settlement, NCDOT was awarded funding for three EV charging stations at NCDOT owned buildings: the Transportation Building in Raleigh, the Ferry Terminal in Hatteras, and the Division 14 office in Sylva. The funding requires supporting public charging during business hours and allows fleet charging at night.

- NCDOT has a 7-kW Level 2 charger with two ports open to both the public and NCDOT fleet vehicles at the Division 14 office in Sylva, NC, as of August 2024. This charging station has dispensed 1,120 kWh of electricity since January 2025 when NCDOT began tracking its use.
- NCDOT installed its second 7-kW Level 2 charger in April 2025. This charger is not

open to the public while policy is being approved.

- NCDOT submitted an electrical design to the State Construction Office for two 19-kW Level 2 chargers located at the Main Office and received comments in May of 2025. However, due to difficulties with location and charging policy, this station will no longer be constructed.

1.4.3 Investigate vessel electrification for the NCDOT Ferry Division fleet

Status: Completed
Completion Date: October 2023

1.5 Initiate other initiatives to decarbonize the transportation sector

1.5.1 Update the Vehicle Miles Traveled (VMT) Reduction Study and toolkit

Status: Completed
Completion Date: November 2024

In August 2019, NCDOT began the facilitation of a VMT reduction task force and a VMT Reduction Study. This study identified strategies to reduce VMT in urban, rural, and regional areas of NC. The VMT Reduction Study was released in April 2021 and provides summary pages as a comprehensive introductory resource to organizations considering methods to reduce VMT in their areas. Following this study, NCDOT developed the VMT Reduction Study Toolkit. The toolkit is an interactive document with information about Transportation Demand Management (TDM) measures that reduce VMT and the potential funding sources available to implement these measures.

The VMT Toolkit was recently updated with a variety of new information sources and ideas in February of this year. The VMT Study was updated to include sections on VMT reduction scenarios, and a section on the benefits of land use/zoning reform as it relates to VMT reduction efforts and a more efficient transportation network.

1.5.2 Quantify and assess ferry vessel emissions data

Status: Underway
Expected Completion Date: December 2025

The Ferry Division has a long-term goal to move toward sustainable technology and operations. A baseline emission inventory is needed to assess which ferry vessels, routes and engine emission-reducing interventions would be the most beneficial. However, there are no empirical data based on representative and actual operations upon which to quantify baseline main and auxiliary engine emission rates for existing NCDOT ferry fleet. NCDOT Research Project 2024-08 is examining these issues.

The objectives of this project are to:

- Establish a methodological framework to measure real-world ferry main and auxiliary engine exhaust concentrations,
- Quantify real-world ferry engine energy use and exhaust emissions,
- Develop a baseline emission inventory for NC ferry vessel engine fleet, and
- Identify and recommend opportunities to reduce emissions.

The research team will deliver an estimated baseline fuel use and emission inventory for selected ferry vessels as well as documentation describing the methods and results for quantifying fuel use and emissions reduction potential as well as assessing the cost effectiveness and health benefits associated with ferry engine upgrades.

1.5.3 VMT reduction strategies through various zoning and land-use recommendations

Status: Ongoing
Expected Completion Date: March 2026

NCDOT is working with local municipal partners, ITRE, and the New Urban Mobility Alliance (NUMO) at the World Resources Institute to recommend reduction strategies for VMTs through various up-zoning and land-use recommendations in the largest 11 urban areas within the state.

The objectives of this project are to:

- Inform and further develop NCDOT vehicle miles traveled (VMT) reduction planning scenarios and identify co-benefits associated with land-use/zoning reform scenarios in the 11 most populous municipalities in NC, and
- Acquire essential data used to evaluate the impact public transportation and parking policies have on vehicle miles traveled.

Future research will look to expand upon the recommendations of this project.

1.5.4 Improving upon the existing CMAQ/CRP Project selection guidelines

Status: Ongoing
Expected Completion Date: Summer 2026

NCDOT is working to develop better quantitative focused criterion for the selection of projects submitted to the CMAQ and CRP programs. The new scoring rubric will emphasize quantitative elements but will contain both quantitative and qualitative project selection criterion.

1.6 Initiate other projects aimed at reducing statewide greenhouse emissions

1.6.1 Develop a Transportation Demand Management (TDM) Plan for The Greater Charlotte Region

Status: Completed
Completion Date: September 2024

This project was initiated in March 2023. This initiative involved partnering with the Centralina Regional Council to develop a regional TDM plan and outline immediate steps for starting up a regional program for the Greater Charlotte Region. The process has involved developing a vision and goals, conducting stakeholder engagement, assessing prime TDM focus locations, and developing an existing regional TDM conditions report. These initial steps have supported the development of recommendations for a TDM program support structure, creation of a prioritized list of actionable TDM strategies, and preparation of an approach for TDM program implementation.

Centralina staff and key partners will use the remainder of the fiscal year to transition from planning to implementing a full TDM program focused on the following TDM priorities:

- Education & Marketing: Outreach on existing non-single-occupancy vehicle (SOV) options and providing workplace travel planning for employers.
- Regional Partnerships & Coordination: Encourage employer-led TDM programs and collaboration.
- Incentives & Facilitation: Develop direct or partner incentives and TDM toolkits for non-SOV travel.
- Technical Assistance: Support the development and implementation of TDM policies and regulations.

This plan was awarded a 2025 Impact Award from the National Association of Development Organization (NADO). The implementation of this plan can be found in Section 1.6.10.

1.6.2 Provide recommendations to the highway project prioritization process

Status: Ongoing
Expected Completion Date: January 2026

NCDOT has been working with ITRE and a broad user group to craft proposed changes to the highway project prioritization (scoring) process. After the completion of the current technical assistance request (TAR), the group will present a recommendation to the Prioritization Workgroup (PW) to consider. The recommendation will include a new measure to the cost-benefit criteria. The measure is expected to monetize at least four air-pollution constituents based on currently accepted USDOT values. The new measure will be aimed at reducing air emissions of future highway projects.

1.6.3 Prepare Appalachia for a sustainable electric aviation future

Status: Underway
Expected Completion Date: March 2026

The Division of Aviation, partnering with other agencies and universities, will work with state departments of aviation to prepare a plan to integrate new aviation technologies in 36 regional airports in Ohio, Kentucky and North Carolina. The ongoing development of Advanced Air Mobility (AAM) – a new generation of less expensive, more flexible electric aircraft – is expected to create economic growth opportunities and expand the availability of this aviation service. AAM aircraft will provide new air transportation options, both within Appalachia and between the region and adjacent urban centers. This planning study will support regional airports' efforts to prepare to meet the requirements for this new aviation technology.

1.6.4 Document recycled materials used in the NCDOT Resource Conservation Program

Status: Ongoing
Expected Completion Date: July 2026

The NCDOT Resource Conservation Program looks to document the amount of recycled and recyclable materials used in maintenance and construction projects, as well as general office recycling every year. The program encourages NCDOT personnel, consultants, and contractors to specify and use recycled and reclaimed materials whenever practicable. The program is looking to increase the Department's use of these materials over the next 12 months. One new topic of interest is the use of recycled plastics in asphalt pavements. The reuse of materials reduces the amount of waste sent to the landfill, ultimately reducing greenhouse gas emissions emitted by the decomposition of waste.

In addition, NCDOT is using more resilient materials such as stainless-steel reinforcement and carbon fiber in the construction of coastal bridges. These materials provide better structural integrity. NCDOT is currently collaborating with N.C. State University (NCDOT Research Project 2024-14) to evaluate the performance of asphalt mixtures containing recycled asphalt materials (RAM). Increasing permissible RAM contents through effective Recycled Binder Ratio (RBR) percent specification could potentially reduce costs and waste while better preserving the environment. The research team has completed and submitted an extensive literature review and started evaluating previous mix findings to outside supply plant mixtures and has also developed schematics to explain proposed processes being used to arrive at a recommended recycled asphalt pavement (RAP) preheating procedure.

1.6.5 Track agency decarbonization effort

Status: Ongoing
Expected Completion Date: Ongoing

As part of the NC CTP, NCDOT conducted an internal survey to document a preliminary inventory of known decarbonization efforts that have been achieved by the agency. This included reduced emissions from transportation-related activities, as well as building related activities, such as energy efficiency or deployment of renewable energy. The results from the survey will help summarize decarbonization efforts across all NCDOT divisions and units.

Progress on departmental decarbonization efforts will continue to be tracked annually.

1.6.6 Develop Carbon Reduction Program (CRP) Strategy Report (FHWA program)

Status: Complete
Completion Date: November 2023

1.6.7 Raleigh to Richmond segment of the Southeast Corridor along the S-Line

Status: Ongoing
Expected Completion Date: Ongoing

The Raleigh to Richmond segment of the Southeast Corridor will provide high performance intercity passenger rail between Charlotte and Washington, DC. Six or more roundtrips per day with speeds up to 110-125 mph are planned. The project will help divert highway trips to rail, reducing greenhouse gas emissions.

In concert with Amtrak and the Virginia Passenger Rail Authority (VPRA), the Rail Division submitted a grant application to the Federal 2023– State Partnership for Intercity Passenger Rail Program for final design, right-of-way, and construction on the Raleigh to Wake Forest segment of the Southeast Corridor, which generally follows the CSX S-Line in NC. The application built on previous federal awards to purchase the active portion of the CSX S- Line, prepare preliminary designs, and plan mobility hubs along the corridor. In December 2023, USDOT announced the award of $1.09 billion federal grant funds to complete this first segment of Raleigh to Richmond project.

1.6.8 Expand intercity passenger rail to additional communities in North Carolina

Status: Ongoing
Expected Completion Date: Ongoing

North Carolina plans to expand successful NC By Train state supported intercity passenger rail service to more destinations across the state. The NCDOT: Corridor Identification & Development Program used federal funding assistance to plan service and prerequisite capital projects. Corridors in the program include extending service from the existing network to Asheville, Wilmington, Fayetteville, Winston-Salem, and Kings Mountain. Additional corridors are being evaluated through feasibility studies. These services will help divert highway trips to rail, reducing greenhouse gas emissions.

1.6.9 Implementation of the TDM Plan for the Greater Charlotte Region

Status: Ongoing
Expected Completion Date: September 2026

There will be targeted outreach efforts aimed at implementing the TDM Plan for the Greater Charlotte Region. Such efforts will include:

- **Direct Employer Outreach:** Employers will be a key focus of program outreach in FY2026 to help recruit travelers to non-SOV travel.
- **Economic Development Partnerships**: Conduct outreach to economic development commissions and develop toolkit for new employers
- **Promoting Microtransit:** Partner with Centralina Clean Cities Coalition with the goal of sharing best practices about Microtransit from region and beyond *(Sept. 9th Centralina Learns)*
- **Other Projects:** Participate in Centralina's Mobility Hub work; I-85 and TDM planning work for upcoming construction projects

TDM Marketing to provide information, advice, and guidance to decision makers and individuals to prompt changes in transportation behaviors to more efficient and sustainable transportation modes. Key audiences include:

- Local governments/Officials,
- Individual Residents,
- Regional, State and Federal transportation Partners,
- Other key stakeholders (Employers, Higher Ed, Community Groups)

TDM communication tools will include:

- Updated website,
- TDM video,
- Employer TDM Toolkit,
- Social media campaigns such as National Week Without Driving, and
- Event/tabling opportunities

NCDOT Press Release: https://www.ncdot.gov/news/press-releases/Pages/2025/2025-08-15-ncdot-partnerhsip-earns-national-award.aspx

2.0. Increase statewide resilience to the impacts of climate change

2.1 Evaluate the impacts of climate change on NCDOT programs and operations

2.1.1 Conduct scour risk assessment for coastal bridges due to USACE South Atlantic Coast Study (SACS) and coastal storms

Status: Underway
Expected Completion Date: July 2026

NCDOT is conducting Research Project 2025-27 to assess the risk for coastal bridges to scour. This project will be completed in three major steps. The first step will screen all NC coastal bridges to identify bridges that may experience scour by analyzing bridge substructures and site-specific hydraulic parameters. The second step will apply two well-established empirical methods to calculate bridge scour: the USDOT FHWA Hydraulic Engineering Circular (HEC)-18 method and the FDOT method, and both are recommended by USDOT FHWA HEC-25 to estimate bridge scour in the US. This study will estimate bridge scour under three scenarios: the current level of coastal hazards and two additional scenarios with sea level rises of 2.73 ft and 7.35 ft. The last step analyzes scour results estimated by the HEC-18 and FDOT methods. Both statistical methods and spatial analysis using a Geographic Information System (GIS) tool, ArcGIS, will be applied to quantify NC bridge scour potentials caused by coastal storms and sea level rises.

This project is expected to generate two research products. The primary product is a comprehensive assessment of bridge scour in 20 coastal counties. It consists of detailed scour calculations, statistical analysis of bridge scour, and a GIS database allowing an interactive visualization of scour results. The second product is a technology transfer workshop on NC coastal bridge scour analysis. The workshop will facilitate the implementation of project products at NCDOT. Safety concerns along with community impacts will be incorporated into the bridge assessments.

2.1.2 Expand the Geotechnical Asset Management (GAM) database

Status: Underway
Expected Completion Date: Fall 2025

The Geotechnical Engineering Unit (GEU) has been rating slopes of known concern for several years, while also performing geotechnical subsurface investigations and design of Transportation Improvement Plan (TIP) projects. The GAM database includes a rating system for embankments, rockfalls, rockslides and landslides in NCDOT rights of way. The expansion of the GAM database would allow for more sites to be analyzed, slopes to be rated, and preliminary investigations and designs to be made to mitigate potential disruptions.

The agency completed the assessments of the slopes for Highway Division 14 in the winter of 2023-2024 where the bulk of sites existed prior to Hurricane Helene. The agency began rating slopes in Divisions 11 and 13 just before Hurricane Helene hit the mountain region. GEU personnel along with our consultants that were brought in to specifically do our ratings began collecting landslides, rockslides and rockfall sites post Helene. This area included sites in Division 14 that were just rated a few months prior. The field work was completed in the Spring of 2025. GEU is now completing the update to the GAM database and expects that to be completed by the end of 2025.

The agency plans to utilize this information to help decision makers in our mountain Divisions evaluate risk and prioritize maintenance and planning activities with the goal of becoming more proactive in reducing and mitigating future potentially dangerous earth movements

2.1.3 Linking scour evaluation and data from geotechnical, erodibility, and hydraulic investigation-an integrative approach

Status: Underway
Expected Completion Date: July 2026

NCDOT partnered with N.C. State University on Research Project 2024-19 to obtain site-specific erodibility through linking parameters with geotechnical data to assess site-specific scour magnitude, which accounts for variability of channel-bed soil layers with depth. This will provide reliable estimations of scour on the stability of bridge foundation systems. The objectives of the study are:

- To provide a means of estimating the magnitude of sediment erodibility parameters through correlation with physical and engineering parameters obtained from site geotechnical investigation, and to provide correlations between flow parameters and the flow-induced shear stress to facilitate the computation of scour and erosion magnitude for piers, abutments, and embankments.

The work will develop parameters needed for rational approaches of scour assessments at bridge sites, which are important steps for NCDOT's efforts in designing, constructing and maintaining bridges.

2.1.4 Identify and prioritize vulnerable roadway segments for proactive resilience planning and response

Status: Underway
Expected Completion Date: July 2026

During Hurricane Florence there were more than 2,730 pavement sites that were damaged where hydraulic structures were not involved. To improve the resilience of these pavements, it is important to conduct an engineering informed assessment, which requires a detailed understanding of the particular design features and the variation thereof inherent to the infrastructure element or system in question and pathways by which that infrastructure can fail. In light of these issues, NCDOT is sponsoring a research study (Research Project 2024-13) to:

- Provide a better understanding of the failure pathways and factors contributing to pavement failures during past events,
- Identify gaps and critical data linkages that hinder the use of existing NCDOT information to support resilience-based planning with respect to pavements,
- Develop a framework for identifying and prioritizing road segments as part of resilience-based improvement plans/programs,
- Develop a design feature selection and repair strategy decision tree that considers specific features, planned needs, sustainability considerations, and possible extreme event stressors at a given pavement site, and
- Identify data gaps and critical data linkages that hinder the use of existing NCDOT information to support this effort and provide recommendations to improve data collection and information to support resiliency efforts.

This research will provide NCDOT personnel with the tools necessary to take a proactive approach to inform pavement resilience project identification and prioritization based upon the as-built and current condition of roadway segments.

The research team has completed an extensive literature review. The team continues analyzing damaged sites reported after floods caused by extreme events. In addition, work is focused on developing strategies to optimize identifying vulnerable road sections. A database of road sections vulnerable to flooding to aid in understanding the deterioration process of structures is being developed with a focus on the Bertha and Isaias events. The team will develop a final report summarizing the methodology, results, and recommendations.

2.1.5 Evaluate North Carolina bridge vulnerability and resilience feasibility to coastal storms and sea level rise

Status: Underway
Expected Completion Date: July 2026

NCDOT is currently sponsoring Research Project 2024-17 to assess the status of North Carolina bridge vulnerability to coastal storms and a projected sea level rise in the next 50 to 100 years and to identify possible solutions to enhance bridge resilience to coastal hazards.

The project consists of three major steps: assessing vulnerability, defining resilience criteria, and identifying improvement options. We will start by determining bridge vulnerability to coastal storms and sea level rise. This project will utilize simulated design water levels and wave parameters from the US Army Corps of Engineers (USACE) South Atlantic Coastal Study (SACS) to calculate wave loads. In addition, the project will use the USDOT FHWA HEC-25 3rd edition "Highways in the Coastal Environment" to determine wave loads on structures. Based on this, bridge resilience criteria to coastal storms and sea level rise based on engineering practice in North Carolina and other coastal states in the US will be determined.

In addition, the project will identify potential solutions or recommendations for project implementation. The outcomes of this project will assist NCDOT in planning for bridge upgrading and maintenance as well as helping the agency and its stakeholders make an informed decision on infrastructure planning and development to adopt appropriate climate resilient policies in response to long-term sea level rise.

The research team has developed a screening process to create a tier of bridges and includes bridges along hurricane evacuation routes. Bridge data has been extracted and organized to use in quantifying storm water levels, waves, and sea level rise hazards.

The research team will continue quantifying the above parameters and calculating potential forces on selected bridges as well as host a 2-day technology transfer training workshop on coastal bridge vulnerability analysis facilitating NCDOT to implement project products. In addition, a GIS-based tool will be developed to easily access and analyze the data.

2.1.6 Conduct multimodal vulnerability assessment on Strategic Transportation Corridor (STC)

Status: Underway
Expected Completion Date: Fall 2025 (Future I-87)

NCDOT is conducting vulnerability assessments including resilience considerations on multiple strategic transportation corridors (STC): US-70 (STC P) is completed; US-74 (STC U) was completed February 2025; and future I-87 (STC M and part of STC O) is almost complete. The NC 12 vulnerability assessment study will start this year. The objectives of the US-74 study were to determine goals and objectives for future US-74 resiliency; identify and define any vulnerabilities to future extreme weather events, develop and stress-test potential mitigation and adaptation scenarios against future conditions; and quantify benefits relative to goals and objectives.

Similarly, the US-70 Vulnerability and Risk Assessment pilot study assessed the vulnerability of routes to airports, ports, and the North Carolina Railroad Company rail line adjacent to the corridor including stakeholder engagements, and other agency expertise/resources.

NCDOT is conducting a vulnerability assessment along the future I-87 corridor from Raleigh to the NC/VA state line. This assessment will include people, economy, weather, and infrastructure. This assessment also takes a stakeholder-inclusive approach by including several NCDOT units, NC state agencies, federal partners, metropolitan planning organizations, and rural planning organizations.

In addition, the team is developing a story map of the US-74 and I-87 projects to make available to the public. It will be available along with study documentation on the NCDOT resilience website. This is a web app that presents the results of the 2022 US-74 and the 2025 future I-87 resiliency studies, which focused on impacts of future extreme weather, flood, and heat on the corridors. The simulations were run over the 2020 - 2060 time period for US-74 and 2020 - 2100 time period for the future I-87 corridor.

2.1.7 Assess the vulnerability of the Ferry Division's infrastructure assets, including waterway channels, with respect to natural hazards

Status: Completed
Completion Date: July 2024

In July 2024, the agency completed Research Project 2023-14 to assess the vulnerability of the Ferry Division's infrastructure assets. The scope of the study was to:

- Assess the vulnerability of the Ferry Division's infrastructure assets with respect to natural hazards (from the present and forecasting to the 2040 and 2060 planning horizons),
- Assess the condition of ferry channels at present, as well as potential climate impacts,
- Prioritize assets for adaptation measures where needed, and
- Provide recommendations on potential adaptation options as well as timeframes for implementation and ballpark cost estimates.

The research team has completed a literature and best practices review along with collecting state and federal data to be used to develop the vulnerability index.

2.1.8 Develop a web-based geospatial analytics tool for quantifying freight risk and resilience in transportation

Status: Completed
Completion Date: Fall 2024

In June 2021, NCDOT embarked on a comprehensive study (Research Project 2022-18) of the risk and resiliency profiles of North Carolina public roads, specifically primary and secondary freight routes. The objective of the study was to establish a geospatial analytics platform for transportation data integration and modeling. This platform, Geo-FRIT, provides a web-based geospatial analytics tool for quantifying freight risk and resilience in transportation. Geo-FRIT will allow for data collection and sharing among NCDOT divisions and allow for routing analytics and advanced modeling of disaster data for risk-based freight routing through spatial simulation-driven scenario analysis. This project will enhance freight management and safety via web-based data access, integration, and automation, which also promotes transportation resiliency.

The Geo-FRIT tool will provide solid support for risk-based freight routing analysis that can lead to significant labor and operational cost savings for NCDOT and enhance highway safety, emergency management, community transportation planning and public health. The research team has finalized the development of the spatial simulation of alternative extreme events for scenario analysis. In addition, the team has completed a web GIS-based dashboard to support data management. Freight routing analytics in response to disruption events have also considered less impactful routes as well as fairness considerations when suggesting route designations.

2.1.9 Improve landslide spatiotemporal mapping, monitoring and change detection at Howard Gap slide

Status: Underway
Expected Completion Date: July 2026

NCDOT partnered with N.C. Agricultural and Technical (A&T) State University to conduct a research study (Research Project 2023-04) to create an effective 3D-geospatial framework by integrating field monitoring data with high-resolution remote sensing data (from Unmanned Aerial Vehicle (UAV) optical, Light Detection and Ranging (LiDAR) and Synthetic Aperture Radar (SAR)) using machine learning methods to assist in further understanding the mechanics of this large debris slide, and to remotely monitor other landslides that impact North Carolina transportation corridors. The study will leverage available satellite imagery to improve the Howard Landslide monitoring by expanding the spatial extent from point sampling to whole area characterizations while reducing associated time and cost compared to the current techniques.

In addition, a predictive model using machine learning methods will be developed to hindcast over the last few years (testing if the model correctly predicts historical events) and forecast the occurrence and extent of future debris flow and slope failure. The research methods and outcome (codes and spatio-temporal tools) can be used by NCDOT to monitor landslides at other locations in North Carolina and establish an early warning system for the area to predict the landslide displacement and quantify the uncertainties. Researchers have conducted two flights to gather data across the Howard Gap Road region. In addition, the team has created a landslide susceptibility map for the area and an ArcGIS online portal and a data management plan.

The team is completing a comprehensive comparative analysis of multiple machine learning models. The ArcGIS online tool will continue to be enhanced, and a cost, accuracy, and flexibility model analysis will be refined. During the next 12 months, a technology evaluation will be completed to evaluate the appropriateness, effectiveness and impact of different geospatial data options. This will help identify the most suitable geospatial data and process. Specifications and guidelines will be developed and shared.

2.1.10 Develop a statewide Resilience Improvement Plan (RIP) (NCDOT RIP)

Status: Completed
Completion Date: April 2024 (Version 1), March 2025 (Version 2)

NCDOT engaged a consultant to assist with the development of a multimodal statewide RIP. This plan includes a statewide criticality map to identify the criticality of the state's major routes. The main criteria to estimate roadway criticality includes "Use and Operations", "Socioeconomic" including the NCDOT Transportation Disadvantage Index (TDI), and "Health and Safety". In addition, it identifies areas and assets (bridges, culverts, roadways and rail) vulnerable to flood and geohazards based on existing data and tools such as Flood Warning System, Transportation Surge Analysis Prediction Program (T-SAPP), BridgeWatch, FIMAN, and Geotechnical Asset Management (GAM) ratings.

It includes outcomes from previous pilot vulnerability assessments for I-95/I-40 east, US-70, and US-74. The RIP also includes a prioritization process to select potential projects for improving the resilience of the corridors/system to the identified threats. The development of the RIP will allow NCDOT to apply for project match reductions of up to 10 % under the PROTECT program for those projects identified and prioritized on the plan. The initial RIP was updated in March 2025 and includes the vulnerability assessment of the Ferry Division.

NCDOT is also coordinating and providing support to planning organizations for the development of their RIPs and implementing the plan within their MTPs to ensure their plans meet the FHWA PROTECT Program requirements. Specifically, this past year, NCDOT was working with Charlotte Regional TPO, and the French Broad River MPO The CRTPO plans to map the recommendations from NCDOT's RIP and bring in high-level recommendations within the scope of the 2055 MTP report.

2.1.11 Evaluate road network resilience to natural hazards using network analysis

Status: Underway
Expected Completion Date: July 2026

The objective of this project (Research Project 2023-16) is to improve predictions of roadway vulnerability by using network science and network analysis to understand the connectivity of road networks during extreme events. By treating road intersections as 'nodes and road segments as 'edges', it is possible to successively remove nodes based on some criteria (such as increasing elevations, akin to flooding or another extreme event) to identify the threshold where the entire network begins to fail. The network analysis proposed in this project is focused on coastal settings, and specifically flood hazards, but the methodology is broadly applicable to other regions of North Carolina and additional natural hazards (e.g., landslides).

More broadly, this project will lead to a more holistic framework for identifying roadway and network vulnerability to a range of hazards and inform resilient management of roadway networks in a changing climate. The research team has developed a new network model for the rural Downeast region of Carteret County. The team has installed a camera/sensor and are monitoring flooding at sea level. The camera monitors a flood hotspot and water has been identified on the roadway 21 times since installation. The research team has also finalized solar-powered camera design, manufactured new cameras, completed a literature search, and obtained permits to install cameras in Cedar Island and Davis, NC.

This research project required a new contract to be executed, Research Project 2024-56. The prior researcher departed their university and a new university and PI were selected to complete the work. Therefore, the project scope and end date needed to be modified to account for this unforeseen setback.

2.1.12 Predict roadway washouts during extreme rainfall events

Status: Completed
Completion Date: December 2023

2.2 Integrate climate change adaptation practices and resiliency planning into NCDOT policies and operations

2.2.1 Incorporate resilience in long-range plans

Status: Ongoing
Completion Date: CTP Guidance completed (April 2025)
Expected Completion Date: MPO MTP Guidance (December 2025)

NCDOT is working on multiple efforts to incorporate resilience into its long-range plans. The department's efforts are in keeping with the Fixing America's Surface Transportation (FAST) Act in 2015, and FHWA and FTA metropolitan and statewide transportation planning regulations requiring agencies to take resiliency into consideration during the transportation planning process.

Guidance for considering resilience in the development of comprehensive multi-modal long-range plans (CTPs) has been completed. The guidance is being implemented, and there is a pilot project for the Camden-Currituck-Pasquotank Counties Comprehensive Transportation Plan (CCP CTP).

A consultant is working with NCDOT to develop guidance for MPOs on how they could incorporate resilience into their metropolitan transportation planning (MTP) process. It will also provide a list of funding and grant opportunities currently available for resilient related projects.

NCDOT continues the efforts to increase collaboration with local and regional agencies by sharing the flood inundation tools it has developed in the past years to help the Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs) use this information in their planning efforts.

NCDOT is also participating in the River Basin Blueprint project that NCDEQ is leading. The Transportation Planning Division (TPD) MPO and RPO Coordinators are involved with the gathering of local projects information.

2.2.2 Increase consideration of resilience in freight rail programs

Status: Completed
Completion Date: October 2023, Implementation (Fall 2024)

The Rail Division revised its Freight Rail and Rail Crossing Safety Improvement (FRRCSI) program criteria to reflect resilience when evaluating proposed projects. Under the Short Line Infrastructure Assistance (SIAP) arm of FRRCSI, the Rail Division included a new Resiliency question and scoring metric in time for state fiscal 2024 SIAP Call for Projects. Under the new Freight Rail Diversion arm of FRRCSI, projects that connect and/or divert freight from highways to rail provide resiliency in the event one mode is blocked by a climate or human-induced event. The Rail Division collaborated with the NCDOT IT Enterprise Business Services (EBS) group to get this programmed into our online EBS application (2024 update).

2.2.3 Investigate incorporating resilience into design guidance

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is implementing resilience design considerations into projects. Hydraulics, Geotechnical, Roadway Design, and Structures Management Units all continue to collaborate on the design of projects to increase resiliency. An example is the Alligator River Project that incorporates resilient materials through the application of Glass Fiber Reinforced Polymer (GFRP) reinforcing bars and Carbon Fiber Reinforced Polymer (CFRP) prestressing strands within the bridge's concrete substructure (foundation) and deck (riding surface). The use of non-corrosive Fiber Reinforced Polymer (FRP) reinforcement significantly enhances the structure's resiliency and reduces lifecycle maintenance requirements compared to conventional steel-reinforced concrete bridges. Additionally, the concrete mix design has been optimized with performance-enhancing admixtures to improve mechanical properties and long-term durability under aggressive marine exposure conditions. Also, USDOT awarded the N.C. Department of Transportation more than $1.8 million to reinforce a 1000-foot-long section of shoulder and embankments where US-74 crosses the Lumber River near the Columbus County town of Boardman. The improvements are necessary to reduce the potential for roadway deterioration and bridge approach damage from flooding from heavy storms, also known as overtopping. US-74 is also a major east-west evacuation route connecting Wilmington and Charlotte, making it essential to communities in need of emergency and community services during extreme weather events. Construction is scheduled to begin in late 2026. Finally, NCDOT is building resiliency into the western NC Hurricane Helene recovery projects. Roads, bridges and culverts are being reviewed closely to incorporate resilient design features to reduce future flood impacts.

2.2.4 Incorporate resilience within Integrated Project Delivery (IPD)

Status: Ongoing
Expected Completion Date: Ongoing

The current objective for incorporating resilience within IPD will require an inventory of products and map resiliency outputs for NCDOT system-wide planning, project prioritization and programming, and individual project planning and development. To facilitate this, there will be a survey conducted to better understand how our business units and partners are using NCDOT products and information and how they could better use them in the future. The overall goal of IPD is to streamline how projects move from planning to construction, a crucial part of which is having appropriate resiliency information readily available where relevant in the process. Risk assessment criteria and benefit-cost-analysis (BCA) are some of the factors that are being considered in the US-74, US-70 and I-87 pilot vulnerability studies. The results of these studies will help determine how these factors can be utilized by specific Project Development Networks within the IPD.

2.2.5 Continue the development of flood inundation tools

Status: Planned
Expected Completion Date: Ongoing

NCDOT, in collaboration with other agencies, has developed multiple flood inundation tools. Some of the inundation tools developed since 2019 include the Coastal Roadway Inundation Simulator (CRIS), the Roadway Inundation Tool (RIT), and Wave Analysis Tool. These tools allow planners and emergency managers to simulate predicted roadway inundation from coastal and inland flooding, quantify potential effects of inundation, and see potential overtopping depths on the roadway system.

The roadway inundation tool represents the entire state. However, there are gaps in the tool that need to be addressed due to the limited amount of available data in western NC. These gaps are scheduled to be resolved in 2026/27.

This past year the RIT tool was updated to include pluvial flood modeling completed by the NC Floodplain Mapping Program (NCFMP) by greatly expanding the Roadway Inundation Tool (RIT) to include pluvial flooding, which impacts one-fifth of the state. This area will be expanded in 2026 to include the French Broad River Basin and then over the next three years will complete mapping the rest of the state and upgrade existing mapping to include impacts along major rivers. Also, the tools have been moved to the cloud to increase resiliency and speed.

Within the next 12 months, NCDOT will continue to develop the data that is needed to continue the development of the tools with the main focus on conducting a major rewrite of backend code that is now six years old and requires maintenance to ensure future compatibility with the tech stack. Once this is complete, major enhancements are planned that will include adding bridge impacts, adding building flood impacts, reporting upgrades, and recent hurricane impacts.

These tools have been used to support the development of vulnerability studies to assess the exposure of the transportation network to different levels of flooding. This provides underserved areas with a better understanding of their flood risk and impacts to the public.

2.2.6 Predict resilience and reduce failure of stormwater control measures (SCMs) to extreme storm events

Status: Ongoing
Expected Completion Date: December 2025

Due to multiple failures of stormwater infrastructure (including stormwater control measures) from several extreme rainfall events during the past few years. NCDOT is conducting Research Project 2023-15 to better understand how large a storm is when SCMs no longer provide hydrologic mitigation and are likely to fail, leaving significant structural degradation and costly reconstructive repair. Moreover, the study will identify if there are simple retrofits to existing SCMs (or design features for to-be-built SCMs) that can enhance or extend hydrologic mitigation and reduce the chances of failure. Researchers have completed a literature review and selected four sites to be studied, as well as model calibration. SCM breaking points have been determined and design enhancement selection criteria are being determined. Data analysis scenarios are being modeled and analyzed.

A final report is currently being reviewed by the Research Unit and should be ready for dissemination by the end of 2025. The report will include modeling scenarios, enhanced design recommendations and data analysis.

2.2.7 Expand flood warning tools

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT, in collaboration with NC Emergency Management, has developed multiple flood monitoring tools including T-SAPP, BridgeWatch, and FIMAN-T. These tools help detect, prepare for, alert, and record potentially destructive flooding events that affect structures. They also allow NCDOT to monitor bridge and roadway infrastructure in real-time so NCDOT can better respond to or prevent hazardous, costly, and potentially catastrophic events. The agency is constantly evaluating, testing, and improving these tools in preparation for extreme weather events. In addition, training on these tools is continuously provided. A total of 120 NCDOT staff members were trained on the flood warning tools in July 2024. In 2023, the system was nationally recognized by the American Association of State Highway Transportation (AASHTO). In the spring of 2024, the FHWA awarded NCDOT an Environmental Excellence Award for its flood warning system.

In the past year, the FIMAN tool and the NCDOT stream gauge network have seen tremendous growth. FIMAN-T has been merged into FIMAN to reflect all roadway flood impacts and was made available to the public. The second phase of the FIMAN website improvements was also completed. Installation of 30 new stream gauges along US-74 was completed and respective flood impact data incorporated into FIMAN. NCDOT completed planning for the largest expansion of the NCDOT owned stream gauge network that includes installation of 55 new stream gauges across the state. This task included site selection, field reconnaissance and installation of 20 of the 55 gauges by June 2025. These gauges are all along or east of I-95. Other gauges were installed by local agencies in Greene and Cumberland counties.

Within the next 12 months, the one remaining gauge will be installed at the Elwell river cable ferry to provide remote access to river levels to increase the operational efficiency. Gauges were installed in 2024 at the other two river ferry sites. 34 new stream gauges will be installed to complete the gauge expansion project. Development of FIMAN gauge flood impact data for the 55 newly installed gauges will be completed and added to FIMAN. In addition, eight existing gauges will have their data expanded to include additional flood impacts at each gauge site. Through our continued partnership with North Carolina Emergency Management, in late 2025, 300 existing sites without flood impact data will be evaluated and also added into FIMAN. This will provide a much more comprehensive coverage of sites across the state, particularly in the Piedmont and rural areas.

2.2.8 Evaluating isolated areas, alternative routing, & economic impact for resilient transportation in NC

Status: Ongoing
Expected Completion Date: December 2027

The primary research objective of Research Project 2026-16 is driven by the question: "How will the hazards resulting from a changing climate impact alter transportation routes and commute patterns, potentially leading to economic consequences?" Answering this question will be accomplished through the following project tasks:

- Comprehensive literature review,
- User research and discovery,
- Data gathering and processing,
- Isolation analysis,
- Evaluation of alternate routes and drive time assessments,
- Economic analysis,
- Social Vulnerability analysis, and
- Inclusion of analysis results into other NCDOT workflows and applications.

2.2.9 Camden Currituck Pasquotank Comprehensive Transportation Plan inclusion of resilience - Pilot Study

Status: Ongoing
Expected Completion Date: December 2027

A pilot project for the Camden-Currituck-Pasquotank Counties Comprehensive Transportation Plan (CCP CTP) is currently being conducted on how to best incorporate Resilience into CTPs. After the conclusion of this pilot project, it is anticipated that the findings will be incorporated into future CTPs for other regions. For more information, please visit the CTP Resilience website.

2.2.10 Incorporate resilience within Integrated Project Delivery (IPD) – NC 12 Study

Status: Ongoing
Expected Completion Date: Spring 2026

NCDOT was awarded a PROTECT discretionary grant to conduct a planning and environmental study. The agency will receive over $1.8 million to conduct a study along an 11-mile stretch of NC 12 between Oregon Inlet and Rodanthe on Pea Island. The goal of the study is to develop long-term, comprehensive plans for keeping the roadway passable during and following major storm events. The project will identify future construction projects, streamline environmental reviews, include public engagement and establish plans to secure the resiliency of the highway.

2.3 Assist the communities served by NCDOT to implement climate change adaptation practices and resiliency planning

2.3.1 Implement N.C. Highway 12 (NC 12) Task Force Plan

Status: Ongoing
Expected Completion Date: Ongoing

The primary mission of the NC 12 Task Force is to develop a long-term, prioritized transportation plan for NC 12 that identifies vulnerable highway locations (a.k.a. "hotspots"), projects future challenges related to erosion, storms and sea level rise, refines and recommends location-specific solutions, and identifies funding strategies and a timeline for implementation. The NC 12 Task Force stakeholders developed a plan designed to accomplish the following:

- Recognize the need for safe, reliable routine and emergency transportation for the thousands of residents in communities in Dare and Hyde Counties and the millions of visitors that travel to the area from around the world.
- Incorporate information on climate change and sea level rise which may exacerbate existing transportation challenges and present new ones.
- Recognize the missions of the refuge, seashore, and other public lands within the project area and balance ecological values and the restoration of barrier island processes while maintaining public access.
- Be collaborative and include substantial opportunities for input from stakeholder agencies, organizations, and the public.
- Utilize existing NCDOT transportation feasibility studies and other information as important, foundational information that contributes to a regional plan.
- Evaluate the economic impacts associated with the status quo and other transportation options.
- Develop a strategic financial plan that leverages existing funding and identifies new funding sources.
- Be designed to help overcome barriers to coastal resilience and adaptation planning and support a proactive and sustainable approach to resilient transportation planning and project implementation.

NCDOT was awarded a PROTECT discretionary grant to conduct a planning and environmental study. The agency will receive over $1.8 million to conduct a study along an 11-mile stretch of NC 12 between Oregon Inlet and Rodanthe on Pea Island. The goal of the study is to develop long-term, comprehensive plans for keeping the roadway passable during and following major storm events. The project will identify future construction projects, streamline environmental reviews, include public engagement and establish plans to secure the resiliency of the highway. NCDOT continues to maintain access along NC 12 as conditions allow and dictate.

2.3.2 Provide technical transportation resilience assistance to communities

Status: Ongoing
Expected Completion Date: Ongoing

Local communities requested NCDOT join their transportation resilience projects as a stakeholder. This past year, NCDOT has assisted the Lumber River Council of Governments and City of Asheville in their studies to identify and evaluate resilient transportation routes and generate conceptual solutions.

Within the next 12 months, NCDOT will continue to assist existing and additional communities as requested.

2.3.3 Assist Pender County with N.C. Highway 210 (NC 210) hurricane evacuation route resiliency analysis

Status: Completed
Completion Date: Fall 2023

2.3.4 Assist Town of Leland with transportation infrastructure resilient routes project

Status: Completed
Completion Date: July 2024

NCDOT assisted Leland with the Leland Resilient Routes Project which identified critical routes in and surrounding the town limits. These routes include evacuation routes, NCDOT-owned roadways, town-owned roadways, and privately-owned roadways. The routes were analyzed to determine how resilient each route is to coastal hazards such as flooding and storm surge. For routes that exhibit vulnerabilities to coastal hazards, potential solutions to mitigate the vulnerability were identified.

The project developed a project prioritization matrix and generated the final modeling. The project was completed in July 2024 and presented at the August 15, 2024 town council meeting.

2.4 Help complete initiatives in the Natural and Working Lands Action Plan and Executive Order 305, An Order to Protect and Restore North Carolina's Critical Natural and Working Lands

2.4.1 Coordinate the NCDOT Land Stewardship Program - Restoration

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT completed construction on a 312-acre mitigation project in New Hanover County, adjacent to the future Hampstead bypass project (STIP project: R-3300) in the spring of 2023. The project will restore 121 acres of wetlands to offset impacts associated with transportation projects in the region. The project is in a key recharge area for the Castle Hayne aquifer, a major source of freshwater in the Wilmington area.

NCDOT will continue the project with seven years of hydrologic and vegetation monitoring. The agency is currently in the second year of monitoring. Once monitoring is completed, the site will continue to be protected through annual site inspection assessments.

2.4.2 Coordinate the NCDOT Land Stewardship Program - Protection

Status: Ongoing
Expected Completion Date: Ongoing

The NCDOT Land Stewardship Program is responsible for the long-term monitoring and protection of stream and wetland mitigation lands statewide. The program currently manages over 38,000 acres of forested stream, wetland, and/or riparian buffer properties statewide.

These lands are protected through acquisition or conservation easement. The stewardship and protection of these forested lands help with floodplain protection, carbon sequestration, and mitigation of greenhouse gas emissions.

Over the next 12 months, 407 site inspection assessments totaling over 38,000 acres will occur to ensure the continued protection of these diverse lands.

2.4.3 Coordinate the NCDOT Land Stewardship Program – Property Transfers

Status: Ongoing
Expected Completion Date: Ongoing

The NCDOT Land Stewardship Program is responsible for the transfer of legacy mitigation properties to appropriate third parties for assistance with long-term land protection. To date, NCDOT has transferred 11,048 acres to the N.C. Wildlife Resources Commission (NCWRC), 1,300 acres to North Carolina State Parks, and 68 acres to Wake County. The transfer of these properties increases recreation and tourism opportunities for North Carolina's residents and visitors.

Over the last 12 months, NCDOT worked to enroll an additional 586 acres as game lands with NCWRC. This will provide boating and fishing opportunities adjacent to the Tar River in Grimesland, N.C. This area of Pitt County is classified by the USDOT as an Area of Persistent Poverty (APP) and a Historically Disadvantaged Community (HDC). The NCWRC opened the Grimesland Public Fishing Area on October 8, 2024.

2.4.4 Incorporate nature-based solutions (living shoreline) to improve coastal resilience on NC 24

Status: Completed
Completion Date: July 2023

2.5 Initiate other projects aimed at increasing statewide resilience to the impacts of climate change

2.5.1 Quantify future precipitation extremes within NC for resilient design

Status: Underway
Expected Completion Date: June 2026

In June 2020, NCDOT partnered with N.C. State University to conduct Research Project 2020-57; a study to improve confidence in climate change projections by quantifying future precipitation extremes within North Carolina for resilient design (e.g., precipitation intensity, duration, frequency curves). This project incorporates guidance developed for the National Cooperative Highway Transportation Research Board, NCHRP 15-61, with additional methods and numerical model experiments to improve confidence in future precipitation extremes, and to inform design concepts for potential future events. The research team has developed a co-production framework to guide the project and is continuing to improve confidence in future precipitation data. Researchers have completed initial simulations of Hurricanes Floyd, Matthew, and Florence based on future projected climate conditions to predict potential damage from such events. The team is finalizing the development of ATLAS 14 scale factors for future precipitation and working on future hurricane simulations for the mountains of North Carolina.

Researchers have assisted NCDOT with climate adoption and resilience planning associated with Executive Order 80 (EO 80) by giving several presentations to various groups and societies on future precipitation research using statistical and historical analysis. Researchers are creating future gridded Intensity-Duration-Frequency (IDF) values and determining confidence percentiles. Work is also being performed on how the precipitation characteristics could change in the future.

Researchers will continue to improve confidence in future flood risks for downstream hydrology modeling. Researchers will continue analyzing model simulations for eastern North Carolina and continue developing production quality simulations for western North Carolina. Future high flows and hydrology modeling will be developed to produce tailored high-resolution climate model projections.

2.5.2 Improve the resilience of transportation infrastructure to hurricane damage

Status: Completed
Completion Date: August 2023

2.5.3 Develop a geospatial map for consolidating resilience initiatives

Status: Planned
Expected Completion Date: Summer 2026

During the past five years, NCDOT has invested in numerous resilience, vulnerability and climate change initiatives.

Within the next 12 months, the department, in coordination with a consultant, will work to develop a geospatial map to consolidate past, current, and planned resilience initiatives. This map will help the agency showcase its resilience efforts in a more visual way and will help with the development of the agency's Resilience Business Case to help justify future resilience investments.

2.5.4 Evaluate primary and secondary roadway pavement conditions using deep learning

Status: Complete
Expected Completion Date: December 2025

NCDOT partnered with the University of North Carolina at Charlotte (UNC-Charlotte) to assist the department in making appropriate pavement maintenance decisions. Research Project 2023-01 proposes to evaluate primary and secondary roadway pavement conditions using deep learning, a state-of-the-art artificial intelligence technique. Roadway surfaces will be videotaped using a vehicle mounted camera. These video footage and raw roadway surface images provided by the data collection vendor will be labelled at a high resolution to develop high quality datasets for training, testing and validation, and then deep learning algorithms will be developed to recognize roadway surface distresses in an automatic manner. Deliverables are expected to aid in pavement distresses being automatically recognized at a more accurate and cost- effective level, leading to a substantial increase in the effectiveness of the pavement condition assessments carried out by, or on behalf of NCDOT. This methodology will also provide the opportunity to correlate how pavement deteriorates with changes in climate condition.

2.5.5 Explore resilience funding opportunities

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is continuously exploring funding opportunities from IIJA, in particular under the PROTECT program, focusing on resilience planning and making improvements to existing transportation infrastructure and evacuation routes. NCDOT was awarded two PROTECT grants, one for planning purposes to Solving Access for NC 12 in Dare County (SAND), and the other one for community resilience and evacuation routes for protecting US-74 at the Lumber River. The agency is considering PROTECT grant application for new projects once the next Notice of Funding Opportunities (NOFO) is proposed to be released early 2026. In addition, NCDOT is working with local entities to prioritize transportation and emergency response improvements and address vulnerabilities. NCDOT is pursuing other grant opportunities beyond PROTECT such as different grants from the National Oceanic and Atmospheric Administration (NOAA), Better Utilizing Investments to Leverage Development (BUILD), USDOT National Culvert Removal, and Replacement & Restoration grants (Culvert Aquatic Organism Passage (AOP) Program). NCDOT also works with local governments to identify opportunities and provides letters of support for applications to programs such as the Federal Transit Administration's (FTA) No- or Low-Emission Bus or Bus Facility grants.

Within the next 12 months, NCDOT is preparing to deploy a landing webpage for federal competitive grants that will also include opportunities for projects beyond resilience. The webpage would include information on grant opportunities, resources, and SOPs, and how to request letters of support for NCDOT. In January 2025, NCDOT created an email service account that would be used to collect inquiries about competitive grants, and this account is linked to the new grant webpage. The webpage is now active.

2.5.6 Establish University Center of Excellence: Sustainable and Resilient Infrastructure

Status: Underway
Expected Completion Date: December 2026

NCDOT Research Project 2024-39 is sponsoring the NC Sustainable and Resilience (SuRe) Infrastructure Center of Excellence (COE) focusing on sustainable and resilient infrastructure research. Our proposed research consortium brings together diverse interdisciplinary approaches and expertise to address issues of sustainability and resilience in the transportation system. Our team consists of researchers from N.C. State University, Fayetteville State University, and East Carolina University with multiple areas of disciplinary expertise spread across nine departments and research centers. The consortium will also engage undergraduate and graduate students at the three universities. Through these efforts, students will receive workforce development opportunities that prepare them for the future.

The proposed research projects included in the consortium were developed by the research team to address specific sustainability and resiliency needs outlined by NCDOT in its request for proposal, as well as the agency's staff. The projects developed for the Center of Excellence are focused on the three specific themes, each of which are designed to address disruptions in the transportation system stemming from natural hazards, everyday disruptions, and other unexpected large-scale disruptions to the network. The three projects proposed for the center of excellence will address the following themes:

- Theme #1: Resilient Infrastructure and Asset Management
- Theme #2: Electric Vehicle (EV) Resilience
- Theme #3: Resilient Cyber Security

The proposed consortium of universities and researchers address these three sustainable and resilient research themes. Research products from these projects will yield future-focused, practice- ready solutions for enhancing the sustainability and resilience of NCDOT transportation infrastructure investments. Community impacts for implementation will be studied and incorporated into the final guidance documents.

The COE research teams are working on completing extensive literature reviews, mining and organizing data, beginning model coding, scheduling policy interviews and conducting security resilience cyber threat reviews.

2.5.7 Develop a spatially explicit deep learning-based underground pipe prediction for urban stormwater management (DeepPipe)

Status: Underway
Expected Completion Date: June 2026

NCDOT partnered with UNC-Charlotte on Research Project 2024-18 to develop a spatially explicit network modeling framework and software package (DeepPipe) based on deep learning, a state-of-the-art artificial intelligence approach, for automated characterization and anomaly detection of existing underground stormwater drainage pipe network. DeepPipe will focus on the prediction of pipe location, features, and service life using deep learning-based graph neural network techniques as pipe networks are fundamentally graphed. To enhance underground stormwater pipeline network management, robust spatially explicit deep learning algorithms and other machine learning techniques will be developed as a core component of DeepPipe. This will aim to resolve the challenge facing the auto-recognition, extraction/migration, and transfer of pipe network data. Web- and mobile app-based implementations will be provided to facilitate the use of the DeepPipe system within in-situ environments. The DeepPipe system can be used by several NCDOT divisions and other government entities working on various aspects of urban flooding management. Over the past 12 months, the research team has conducted a literature review and begun data collection. The team has made improvements to the Pipe Assessment and Selection Software functionality and conducted preliminary experiments to identify potential new metrics. In addition, a geodatabase management dashboard is being developed.

Over the next few months, the research team will continue to refine the literature review and collect corresponding data, investigate additional improvements to the pipe assessment software, and refine the deep learning-based model and geodatabase management dashboard.

3.0. Address the public health impacts of climate change

3.1 Increase understanding and awareness of the health impacts of climate change

This section is not applicable to the mission of NCDOT.

3.2 Initiate other projects aimed at increasing statewide resilience to the impacts of climate change

3.2.1 Strengthen access to N.C. ferries to support coastal communities' resiliency, health and mobility

Status: Completed
Completion Date: September 2024

The N.C. Ferry System faces challenges such as declining ridership, keeping pace with evolving technology, operations affected by extreme weather events, and a lack of sustainable funding sources. Prior studies have examined N.C. ferry operations and made recommendations regarding ways in which future passenger ferries can enhance ridership and improve operations. This includes building connections to existing shuttle terminals and extending transit services. These studies have been oriented to tourism and existing business owner interests, and do not fully account for the broader community goals related to economic opportunities, health, and transportation access. They also do not account for the unique needs of marginalized populations.

In Research Project 2022-20, the transdisciplinary team is investigating ways in which innovations related to walking, bicycling, micro-mobility, transit operations, and mobility on demand (MOD) services may be employed to support the department's work to ensure that transportation projects provide far-reaching and equitable benefits to communities, the economy, and the quality of life and health of North Carolinians.

The project has been completed. The research team completed a literature review, data collection and interviews with peer states and North Carolina stakeholders. Short- and long-term plans were developed. The research team submitted a final report and will post it on the Research and Development website.

3.2.2 Utilize better construction materials that withstand climate change and improve working health conditions

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT is always exploring the use of more advanced materials that are sustainable and resilient. The agency is currently using Warm Mix Asphalt (WMA) when feasible. WMA typically incorporates the use of an additive to allow a reduction in the temperatures at which asphalt mixes are produced and placed. Thus, asphalt can be placed in cooler temperature conditions often found at night, early and late in the paving season, and during changing weather conditions. The ability to place asphalt outside of the hottest part of the day will decrease the potential for heat-related illnesses among outdoor workers. The application of this type of asphalt also provides much healthier working conditions at both production plants and construction sites, making workers inhale fewer airborne lung irritants.

3.2.3 Include air quality and physical health impacts in benefit-cost analysis (BCA)

Status: Completed
Completion Date: August 2023

4.0. Invest in historically underserved communities

4.1 Increase energy affordability

This section is not applicable to the mission of NCDOT.

4.2 Create clean energy and resilience related jobs and economic growth

4.2.1 Increase the On-the-Job Training Program capacity for the clean energy sector

Status: Ongoing
Expected Completion Date: Ongoing

The NCDOT Office of Civil Rights (OCR) is continuing to provide opportunities for North Carolina's workforce and businesses. The On-the-Job Training (OJT) Supportive Services Unit is working with non-profit organizations, community colleges, and local governments to provide training focused on clean energy. In the past 12 months, presentations were made to three cohorts of the STEPS4GROWTH (S4G) Clean Energy Program at Edgecombe, Wilson and Nash community colleges. An Introduction to current and emerging transportation careers in clean energy has been added to the Highway Construction Trade Academy and Transportation Summer Accelerator. Research and development work continues so course content can include training on the installation, maintenance and repair of electric vehicle charging stations.

OCR continues to secure funding and work with stakeholders to implement training opportunities. Initial trainings, hiring events, and business development activities are expected to start in the next year.

4.2.2 Establish the Transportation Apprenticeship Program (TAP+)

Status: Ongoing
Expected Completion Date: Ongoing

NCDOT established the Transportation Apprenticeship Program (TAP+) in partnership with NC Community Colleges. According to the North Carolina Community College System (NCCCS), "about 40 of North Carolina's 58 community colleges serve at least one rural county, which is close to 70% of the state's community colleges."

The program provides individuals with the ability to gain the skills and experience needed to succeed in careers in transportation engineering and construction. Launched in 2023, the NCDOT TAP+ program is a federally registered apprenticeship program that recruits apprentices as transportation workers and engineering technicians. The one- and two-year programs prepare apprentices for 21st century transportation and construction leadership careers. The first round of recruitment will focus on engineering technician apprentices, who will have the opportunity to participate in a variety of projects such as design, construction, bridge work, erosion control, aviation, rail, integrated mobility and maritime. This type of knowledge and capacity development will provide the tools to design, construct and plan for more reliable and resilient infrastructure.

Hiring in the TAP+ program began October 2024 and currently there are eight registered apprentices across North Carolina. The apprentices are full-time community college students as well as NCDOT employees where they earn their on-the-job training hours. These apprentices are in different stages of the program with the first projected graduate should be in the fall of 2026

NCDOT Pre-Apprenticeship program saw 24 pre-apprentices during the 2024-25 year. The

training for these apprentices was held at four different locations across North Carolina with the apprentices' earning credentials in: OSHA 10, CPR and Work Zone Flagger. Participants were also introduced to Civil Engineering. Currently in 2025-26 (Year will end May 2026) there have been 40 pre-apprentices with six participating sites to date.

4.2.3 Establish the Transportation Summer Accelerator Program

Status: Ongoing
Expected Completion Date: Ongoing

The NCDOT Transportation Summer Accelerator Program, offered through the Office of Civil Rights (OCR) and Supportive Services Unit, delivers a compact summer program to high school youth across North Carolina. The program seeks to engage, immerse, and inspire students about careers in transportation construction and engineering. The current two- week program delivers five industry-valued credentials, including OSHA 10 safety certification, flagger certification, Cardiopulmonary resuscitation (CPR)/First Aid certification, Defensive Driving Certification, and the National Center for Construction Education and Research (NCCER) Introduction to Transportation Certificate. It is also a federally registered pre-apprenticeship that delivers classroom and hands-on learning. The 2024 program has seen 32 students graduate at the time of this report. Those students came from four different schools in Highway Divisions 3, 4, 12 and 13. Schools that participated in the program were located in low-income tracks, such as Halifax, Yancey, and Cleveland Counties. Over 50% of the participants are from underserved communities.

Year-round activities are scheduled to start in September with a webinar on the apprenticeship.

4.2.4 Collaborate with agency partners to offer internships and fellowships focused on clean energy

Status: Ongoing
Expected Completion Date: Ongoing

The Office of Historically Black Colleges and Universities (HBCU) Outreach manages the NCDOT HBCU/Minority Serving Institution (MSI) internship program for undergraduate students and fellowship program for graduates and graduate students. These programs provide opportunities for students attending a historically black college or university or a minority serving institution to explore career opportunities in transportation. The program aims to diversify the department's workforce and enhance workforce development efforts.

During summer 2023, HBCU Outreach, with a consortium of other state agencies (Department of Health and Human Services (DHHS), Department of Public Safety (DPS), and Department of Natural and Cultural Resources (NCR)), visited DEQ for an informational session on sustainability and the agency. Additionally, the interns and fellows were able to meet other HBCU/MSI interns from the agency consortium.

Continuing in summer 2024, HBCU Outreach worked with the consortium on planning a visit to DEQ. HBCU Outreach incorporated educational experiences within NCDOT for interns and fellows on clean energy.

During the Summer of 2025, HBCU Outreach interns toured the N.C. A&T autonomous vehicle track and learned about research related to self-driving vehicles. Additionally, they toured the Charlotte Area Transit System (CATS) to learn about electric vehicles as a part of their transit services.

4.2.5 Incorporate business and workforce development as a recovery support function in state disaster framework

Status: Ongoing
Expected Completion Date: Ongoing

The NCDOT Office of Civil Rights (OCR) has included its programs in a recovery support function in the N.C. Department of Commerce's State Disaster Framework. The Business Opportunities and Workforce Development unit has created and will maintain a database of contractors who are qualified and capable of mobilizing for emergency event cleanup efforts, including waste removal and hazardous materials, and hauling, to respond to disasters across the state. The On-the-Job Training and Supportive Services unit will be able to quickly launch "pop-up" versions of its programs in impacted areas. Programs can include OSHA-10, Flagger, and CPR-First Aid credentials plus a focus on erosion control, snow and ice removal, basic work zone safety, and use of hand-held power tools. Additional training opportunities could be offered according to specific disasters. These tasks could include debris removal, trenching, excavation, and bridge carpentry.

In August 2024, OCR hosted a Disaster Recovery event in Highway Division 3 that focused on how firms should position themselves to be "ready, willing, and able" to assist following a disaster, given the relevant impacts from Tropical Storm Debbie.

4.2.6 Incorporate clean energy components into Science, Technology, Engineering and Math (STEM) programs

Status: Ongoing
Expected Completion Date: Ongoing

HBCU Outreach manages the National Summer Transportation Institute (NSTI) for middle and high school students. The institute provides students with hands-on experience in transportation.

Beginning in 2024, staff in the HBCU Outreach program encouraged NSTI program coordinators to incorporate a clean energy component into the curriculum to encourage students to consider clean energy courses in college.

During the summer of 2025, several of the NSTI host sites incorporated solar cars for the students to build during the program. The NSTI program coordinator will continue to encourage site coordinators to incorporate clean energy into the curriculum for the students.

4.2.7 Increase Small Business and Small Firms in the Clean Energy Program

Status: Ongoing
Expected Completion Date: Ongoing

In compliance with applicable laws and regulations, OCR will remain available to assist small businesses and small firms ("SB/SF") in the Clean Energy Program. SB/SF that are using innovative research to develop energy efficient and clean energy technologies receive support from OCR's Business Opportunity Workforce Development (BOWD) program. Training, webinars, and research are provided to those SB/SF to increase their opportunities to compete for contracts as a subcontractor. The BOWD program will continue to partner with the OJT program to facilitate connections among training providers and organizations that are interested in collaborating with NCDOT's workforce development and training programs. This effort is in accordance with the Clean Energy & Clean Transportation in NC: A Workforce Assessment report.

In June 2023, NCDOT developed and approved a Small Professional Services Firms (SPSF) Procurement Policy. Through this policy and the SPSF Procurement Procedures, NCDOT will administer the Small Business Program to foster growth of small firms so they can build capacity and manage projects as primes.

Those areas that utilize professional consultants for delivering projects and services, including the chief engineer for the Division of Highways, the agency's deputy secretary for Business Administration, the deputy secretary for Multimodal Transportation, and the executive director for the N.C. Turnpike Authority, will ensure that procurement of Small Professional Services Firms is considered. At a minimum, a yearly report will be prepared, coordinated between the Chief Engineers Office and the OCR on the utilization of SPSF firms.

OCR educated and engaged with communities across the state about National Electric Vehicle Infrastructure Program (NEVI) contracting opportunities for small businesses. From August 2023 to August 2024, nine outreach events to small and disadvantaged businesses included discussion and notice of NEVI contracting opportunities.

At the N.C. Transportation Summit in May 2024, OCR sponsored 17 SB/SF to attend the summit and the pre-event which featured autonomous vehicles, electric vehicles and buses, unmanned aerial systems, and electric wheelchair charging stations.

4.3 Alert residents and businesses of state and federal grant opportunities that advance climate and resilience goals

4.3.1 Host several webinars to bring together a wide and varied group of people and business, albeit over the internet

Status: Ongoing
Expected Completion Date: Ongoing

The webinars consist of participation from subject matter experts to increase the content available for interested parties. Webinars address common questions and concerns harbored by residents and businesses. Webinar recordings can be converted to blog posts or Questions and answers (Q&A) articles and videos can be viewed later. A collection of Q&A, as well as poll data information is used to build a profile for future grant topics. This effort can also provide a demographic of the audience for future marketing strategies.

In 2023 NCDOT hosted webinars related to NEVI for a variety of stakeholders and created an online database for companies interested in working together on EV charging efforts. The NEVI Team continued to update the database during the current reporting period.

NCDOT initiated outreach efforts for proposed NEVI sites in rural areas without many potential commercial sites that could host a charging station. Outreach included postcards, follow-up phone calls, and two webinars held in January of 2025. Results were mixed with some businesses expressing interest and others not responding.

NCDOT also held a webinar on Phase 2 - NEVI Community Charging. This included a survey for participants to provide information on how to design and implement community charging in North Carolina.

4.3.2 Develop an outreach program to make stakeholders aware of state and federal grant opportunities

Status: Underway
Expected Completion Date: Spring 2026

In the Spring of 2025, the NCDOT Grants Management Office developed the draft content for the grants webpage. This webpage will inform the public of competitive grant funding opportunities through USDOT and how to engage with NCDOT on their applications. The Grants management Office is working with the NCDOT Communications Office to publish the webpage to the NCDOT website by early next year.

In January of 2025, the Grants Management Office created an email service account to collect inquiries from local governments and NCDOT Business Units related to competitive grant opportunities. This email will be linked to the new grants webpage on the NCDOT public-facing website.

The Grants Management Office conducted outreach by presenting grant information to internal NCDOT staff and working with the Office of Civil Rights to inform partners of grant opportunities. NCDOT expects to host additional presentations on grants later this year.

4.4 Initiate other projects aimed at investing in communities to achieve climate and resilience goals

4.4.1 Use socioeconomic data in project prioritization

Status: Completed
Completion Date: Spring 2025

In 2021, NCDOT partnered with N.C. State University to conduct Research Project 2021-17 to enable the agency to incorporate data into the Prioritization Process that has been historically challenging to integrate; including geo-located socio-economic (social, health, economic, etc.) datasets. The project provided NCDOT with implementation-ready tools to incorporate data-driven socioeconomic measures into the STI prioritization process for pedestrian, bicycle, and transit projects. Focused community impact considerations are also considered in the prioritization processes.

NCDOT is continuously looking for opportunities to use these tools to incorporate socioeconomic parameters and focused impacts into the decision-making process.

However, the Prioritization Workgroup didn't adopt any changes to their current process regarding this item in P8.0, but they did discuss including TDI measures in the Transit scoring process. This topic may be revisited later in P9.0.

4.4.2 Implement the inclusion of equity in Benefit Cost Analysis (BCA)

Status: Completed
Completion Date: Spring 2025

NCDOT partnered with N.C. State University to conduct Research Project 2024-34 for implementation assistance in relation to methodologies and concepts that were previously developed. The research team prepared a State of the Practice review that builds on previous work to include recent examples of project prioritization processes that include equity. The team also reached a unified understanding with the workgroup on what is meant by equity. The team also provided a detailed accounting of how to use the methodology, workbook, and GIS tool to evaluate complete streets benefits within the prioritization process. The Prioritization Workgroup didn't adopt any changes to their current process regarding this item in P8.0. This topic may be revisited later in P9.0.

4.4.3 Assess metrics and indicators for the Office of Civil Rights (OCR)

Status: Completed
Completion Date: July 2023

4.4.4 Assess specific community impacts and historical transportation impacts in North Carolina

Status: Ongoing
Expected Completion Date: Spring 2026

NCDOT sponsored Research Project 2023-29 to develop a methodology of best practices to use when analyzing inequitable transportation impacts and how to best prevent those impacts. This method was designed to capture before-and-after impacts at the community level, including a consistent collection of current and historical data.

The research team developed a plan to establish a framework NCDOT can use to identify and address transportation inequity at the community level. The research team proposed an approach that included:

- Conducting research and developing a series of best practices,
- Developing a definition for "transportation inequity,"
- Performing an extensive data review and gap analysis to capture existing data and geospatial coverage,
- Conducting case studies of communities impacted by transportation inequity, and
- Developing a framework that can be implemented to identify and address historical and potential transportation inequities.

Researchers completed the final report. In addition, the final ArcGIS storyboard online platform is being enhanced. It is being reviewed by the Communications Office before it is published.

4.4.5 Pilot the FHWA Environmental Justice (EJ) training course

Status: Completed
Completion Date: September 2023

4.4.6 Analyze incorporation of parity for Long-Range Transportation Planning (LRTP)

Status: Underway
Expected Completion Date: December 2025

The gaps in transportation planning, implementation of projects, and differences in service opportunities became more evident during the COVID-19 pandemic for certain population groups, including people with limited access to transportation. The objectives of Research Project 2023-12 are:

- Review the recent developments in transportation parity related research, the recent research initiative "RP 2022-17: Including Equity in Benefit-Cost Analysis" (refers to initiative 4.4.4. in this report) and identify the best practices, existing gaps, limitations and challenges,
- Survey the staff of MPOs, RPOs, and other state departments of transportation

(DOTs) as well as conduct focus group meetings and gather information on how parity can best be addressed in the early stages of long-range transportation planning. Another goal of this research focuses on the timely delivery of perishable necessary goods,

- Identify data, data sources, specific performance measures and evaluation tools for parity analysis in long range transportation planning, and
- Develop guidelines and propose a complementary methodology that can be applied to ensure parity is appropriately addressed during project proposal development and alternatives analysis for long range transportation planning in North Carolina.

Researchers have completed a literature review, completed a review of deliverables for RP2022-17, surveyed MPOs, RPOs, and other agencies to identify parity needs and practices, surveyed other state DOTs to identify parity practices, and conducted focus group meetings.

Over the past several months, the researchers have developed, distributed, and compiled survey results and completed three focus group meetings. Ranking scenarios are completed and the team is currently working on methodologies. Over the next few months, the research team will refine the developed guidance to address parity, complete the assessment tool, and prepare the final report and associated project deliverables.

4.4.7 Develop Statewide Local Area Resource Contacts (LARC)/ Community-Based Organizations (CBOs) Network stakeholder database within Public Input customer relationship management (CRM)

Status: Ongoing
Expected Completion Date: Spring 2026

NCDOT teamed with a consultant to source contact information for development of a Local Area Resource Contacts/Community-Based Organizations (LARC/CBOs) Network database of local stakeholders and community organizations statewide. The database empowers NCDOT to discover and manage LARC/CBOs to reach critical stakeholders in hard-to-reach communities. Some of the categories included in the LARC/CBOs Network include:

- Faith-based organizations,
- Professional organizations and chambers of commerce,
- Housing development foundations,
- Parent-teacher associations,
- Public health organizations,
- Environmental and natural resource organizations,
- Public media and news organizations,
- Anti-discrimination organizations,
- Public libraries, and
- Rural and urban economic development groups.

The LARC/CBOs Network includes over 500,000 contacts and is integrated with CRM, Equity Mapping, and customizable targeting options to allow planners and consultants to reference contacts in their project's area and document this step as part of their public involvement process. The first version of the database has been released, and a 30-minute video was created to guide users through the features and functionalities of the CBO Module and Network.

The Public Involvement Team is also developing the **Empowering Networks for Geographic Access and Grassroots Engagement (ENGAGE) Framework** to strengthen its partnerships with Community-Based Organizations (CBOs) across the state.

The Framework provides a structured, scalable process for embedding trusted community organizations into all stages of transportation project development – from early planning to post-construction evaluation.

ENGAGE is a practical, nationally-informed strategy to improve public involvement, advance transparent project delivery, and steward infrastructure investments that reflect community needs.

4.4.8 Create a Specialized Public Involvement Plan (PIP) for State Transportation Improvement Program projects (STIP projects: R-5876 and U-4434)

Status: Ongoing
Expected Completion Date: Fall 2026/Spring 2027

Project R-5876, NCDOT (working in collaboration with the South Carolina Department of Transportation), -is proposing to extend the Carolina Bays Parkway from SC 9 in Horry County, South Carolina, to US-17 in Brunswick County, North Carolina. The purpose of the project is to improve the transportation network in the study area by enhancing mobility and connectivity for traffic moving in, and through the corridor. A Draft Environmental Impact Statement (EIS) has been prepared for the Carolina Bays Parkway Extension Project. Public input collected during the development of the EIS indicated potential impacts to low-income and minority communities within the study area. A PIP was created in 2022 to engage communities in discussions about project alternatives and strategies to minimize potential harm.

Due to the anticipated impacts to historically underserved communities, additional outreach was conducted to ensure the populations were informed about the project and had opportunities to provide feedback on the proposed alternatives. This outreach effort, along with the Outreach Plan, will be included in the final EIS.

Similarly, for project U-4434, NCDOT is proposing to construct a multi-lane facility on a new location in New Hanover County, North Carolina. Located within the urban core of Wilmington, the proposed 1.7-mile-long project would extend the existing Independence Boulevard (SR 1209). An PIP was also developed for this project.

Throughout the duration of project development for both R-5876 and U-4434, the agency will continue to update the PIPs as needed. The Draft Environmental Impact Statements for both projects have been approved. Corridor Public Hearings for the Carolina Bays Parkway project were held on October 20 in Longs, SC, and October 23 in Sunset Beach, NC. The Corridor Public Hearing for the Independence Boulevard project is scheduled for December 1. Following the close of the public comment period and the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA), the agency will initiate Phase 2 of the outreach effort for both projects. This phase will focus on targeted engagement with impacted communities, in collaboration with local governments, and South Carolina DOT.

4.4.9 Develop cemetery mapping for indigenous and enslaved people's remains

Status: Underway
Expected Completion Date: June 2026

NCDOT has partnered with the Institute for Transportation Research and Education (ITRE) to expand upon existing NCDOT and Office of the State Archaeologist (OSA) mapping and datasets. Research Project 2025-11 will accomplish this by providing a methodology to capture the cultural and historical significance of burial sites, use-community driven approaches to identify new sites, employ a field verification process, and highlight opportunities to embed these approaches into existing NCDOT project planning and development processes. Beyond expanding a mapping dataset for cemeteries and burial sites, the project team will develop a community engagement methodology to allow community members to participate in the identification of unmapped burial sites and inform the historical and cultural significance of sites. Using a county-level project study area, with Edgecombe County as the pilot, this project will yield a proof of concept and a community participation roadmap for engaging communities around the state in an effort to map previously unmapped cemetery and burial sites. The project will focus on cemeteries of indigenous and enslaved peoples and culturally historic community cemeteries. Identified impacts will be studied and addressed in the final product.

In the next 12 months, the research team will (1) develop a community-informed data collection process, (2) establish a typology of cultural significance developed with a stakeholder advisory board, (3) conduct and document a field verification process, (4) develop a tool for communities to collect and report local burial sites and (5) develop a process for NCDOT to work with local communities to expand and maintain the cemetery mapping dataset.

4.4.10 Work with stakeholders on strategic NCDOT projects within the state to create opportunities in historically underserved communities

Status: Ongoing
Expected Completion Date: Ongoing

The OCR through its BOWD and the OJT is coordinating to connect communities to opportunities. Current projects in collaboration with OCR include:

- Rail Division, Virginia DOT S-Line Corridor-Eastern Region development,
- Toyota Battery Plant,
- Central region I-26 in Asheville, N.C.,
- Western North Carolina, and N.C. Clean Transportation, and
- Equitable outcomes in NEVI plan development and implementation.

In service to these projects and programs, OCR has developed public information sessions and partnerships to provide training that increases participation in department activities. A research project was completed in July 2023 that will enable OCR to understand qualitatively and quantitatively the best ways to measure the impacts of NCDOT projects on historically underserved communities that can inform policy and project decisions.

In addition, NCDOT worked with the Governor's Office and Wake Tech Community College on a pilot certification program for EV charging station repair and maintenance. In June 2024, the first cohort graduated from the Wake Tech EVSE certificate course. NCDOT held a webinar in June 2024 to educate community members and obtain feedback on community EV charging stations being built under the NEVI program. Additionally, the OCR used feedback from recent listening sessions to inform the development of a comprehensive list of considerations for small businesses. This list is a useful reference for North Carolina's small businesses to best participate in NEVI contract opportunities.

The NEVI Charging Site Business Considerations include 1) electricity cost analysis and utilization of site, 2) profit, payback period, and reimbursement schedules, 3) capital investment and variable costs (20% match to federal funds), 4) site amenities and opportunities for additional sales of food/merchandise while charging, 5) operations and maintenance – replacement, insurance, and 6) access to capital and partnerships.

4.4.11 Implement the Environmental Justice (EJ) / Transportation Disadvantage Index (TDI) tools

Status: Completed
Completion Date: June 2024

Additional Information

The 2023 North Carolina Appropriations Act (S.L. 2023-134, § 5.6(f)) authorized the Emergency Management Disaster Relief and Mitigation Fund (EDRMF) to provide funding for grants to help North Carolina communities become more resilient. The fund can be used for resilience projects, which can be

applied for by state agencies, local governments, nonprofit organizations, and public authorities. The funds can be used to address the following areas: flood mitigation, transportation resilience, disaster relief, technical assistance for small and historically underserved communities, and local cost share assistance for federal funds on approved federal mitigation grants. NCDOT is part of the review and selection committee in charge of the bill.