



NORTH CAROLINA

Department of Transportation



NCDOT's Integrated Mobility Division (IMD) – **Multimodal Updates**

July 27, 2022



Integrated Mobility Division
N.C. DEPARTMENT OF TRANSPORTATION

IMD GOALS



Increase Access

Eliminate transportation barriers and ensure all North Carolinians have equal access to opportunities and services.



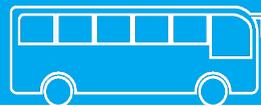
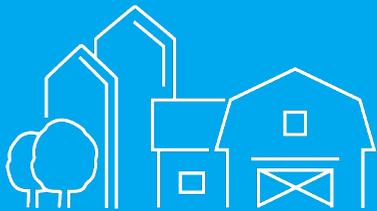
Enhance Quality of Life

Offer a convenient network of multimodal choices to enhance the quality of life for North Carolinians.



Ensure Safety

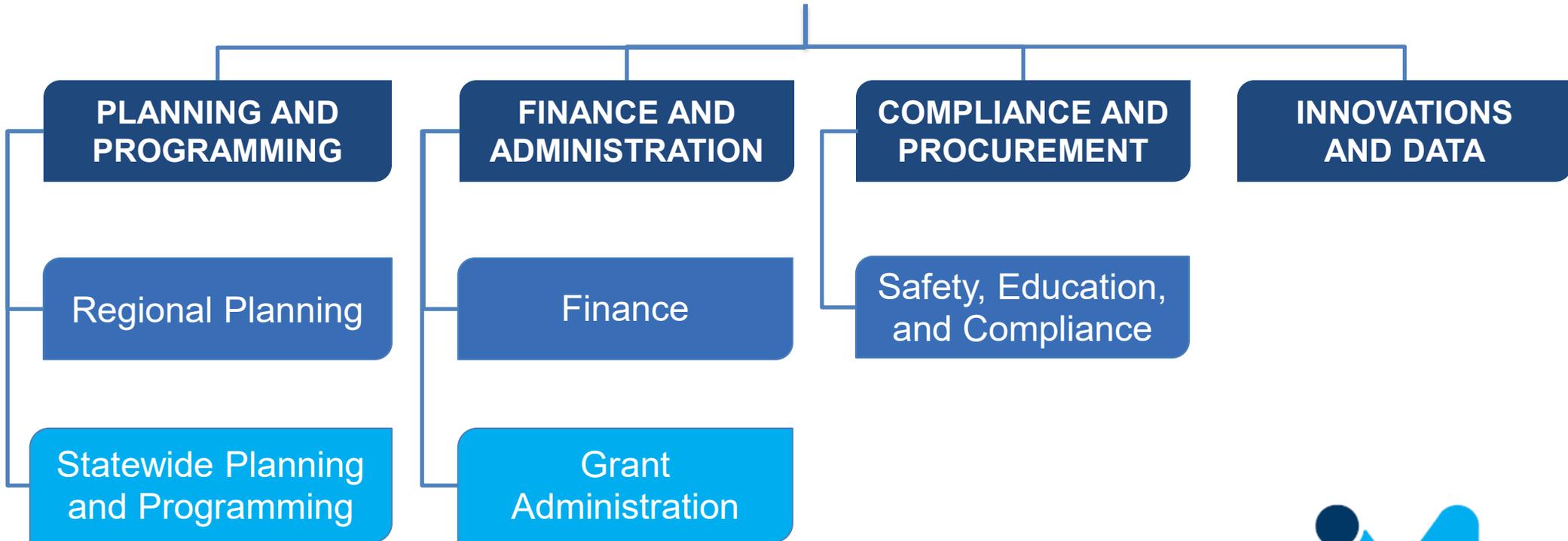
Ensure all road users can travel safely by building complete streets and proactively correcting areas susceptible to crashes involving vulnerable road users.



MISSION

Provide leadership for safe, affordable, and innovative multimodal transportation throughout North Carolina

DIRECTOR



Integrated Mobility Division

N.C. DEPARTMENT OF TRANSPORTATION

IMD Funding Overview FY2023

Funding Opportunities



\$57M FEDERAL

FTA 5303/5304: Metropolitan & Statewide Planning

FTA 5310: Enhanced Mobility of Seniors & Individuals with Disabilities

FTA 5311: Formula Grants for Rural Areas

FTA 5339: Grants for Buses and Bus Facilities

\$72M STATE

Combined Capital
ConCPT

Rural Operating Assistance Program (ROAP)

Rural State Operating

Urban Advanced Technology

Safe Routes to School

Share the Road License Plate Proceeds

State Maintenance Assistance Program (SMAP)

State Planning & Research Funds

Transportation Demand Management (TDM)

Travelers' Aid

\$49M *potential to date* COMPETITIVE GRANTS

5339(b) Bus and Bus Facilities

Combatting Human Trafficking

Helping Obtain Prosperity for Everyone (HOPE)

Integrated Mobility Innovation

Low or No Emissions

Rebuilding American Infrastructure with Sustainability and Equity (RAISE)

Rural Surface Transportation Grant

Transit Service & Planning Initiatives



Transit Services



Transit Capital Projects



Innovations



Multimodal Planning Grants



Regional Transit Plans



Visioning Workshops



Paved Trails Feasibility Studies



Statewide LCP



Microtransit Feasibility Studies

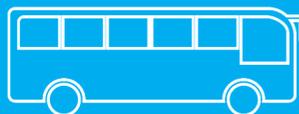


Access to Transit



Bike Helmet Initiative

Achieving IMD Goals



Current Planning and Innovation Initiatives



Visioning Workshops

7 workshops across the state

August 2022 – September 2022

Prepares agencies to leverage IIJA funding and provides resources for visioning, prioritizing goals, and ongoing support for implementation



Multimodal Planning Grants

244 grants + \$7.5M (10 new plans to be announced in August)

Develops comprehensive bicycle plans and pedestrian plans with an added transit component



Feasibility Studies

\$2.5M available

Call for projects Summer 2022

Complements planning studies and supports local governments in the implementation of projects



Microtransit

150% ridership increase

Feasibility Studies / Research / Grants

Assesses the feasibility of introducing microtransit to complement or replace fixed-route and demand response services throughout the state



MaaS Feasibility Study

Mobility as a Service (MaaS)

Seamlessly plan-book-pay for travel across all modes

Assesses the availability and feasibility of MaaS services for a statewide platform



Regional Transit Plans

Upper Coastal Plain + High Country + Land of Sky RPO

Summer 2022 Pilot Projects

Promotes coordinated regional planning across agency boundaries, consolidating requirements for state and federal funding programs



CASSI

Connected Autonomous Shuttle Supporting Innovation (CASSI)

Evolving to include more vehicle types and use cases including testing and integrating autonomous vehicles in fleets to provide safe, reliable, and useful transit service



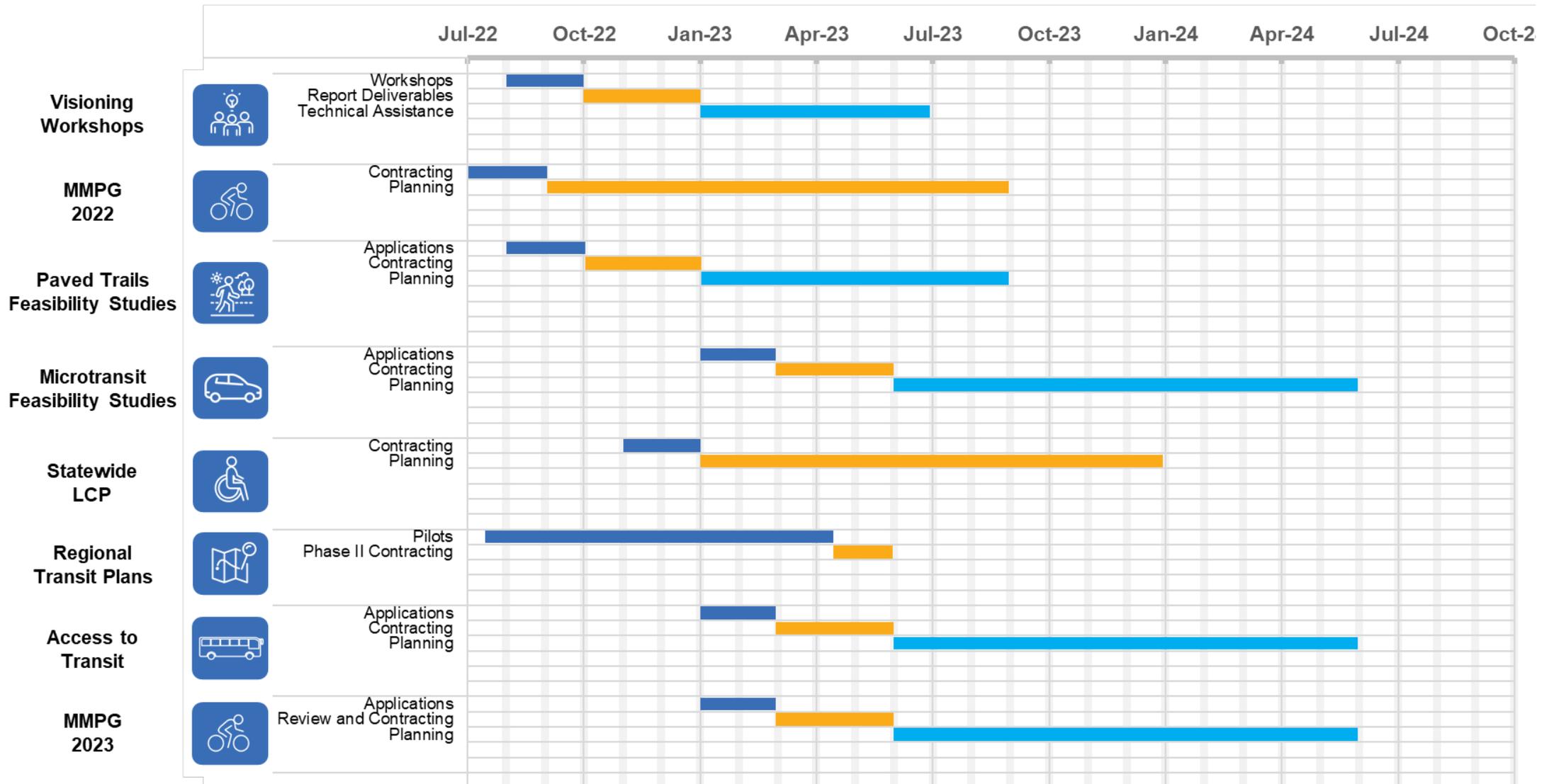
Bike Helmet Initiative

19,900 Helmets + 256 Organizations

Reducing severe brain injuries by 90%

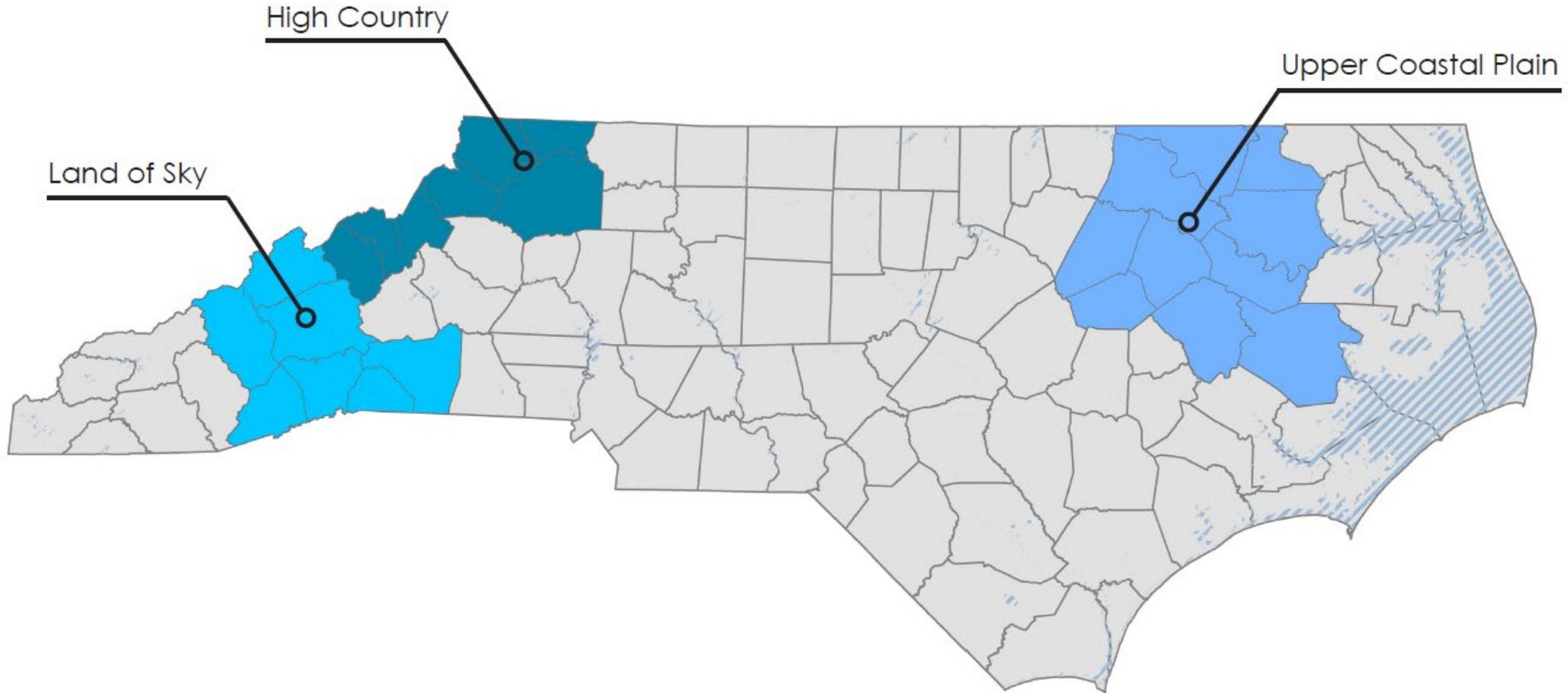
Distributes helmets to underprivileged children by government and non-government agencies since 2007

IMD Planning Calendar FY 23



Coordinated Regional Transit Plan Program

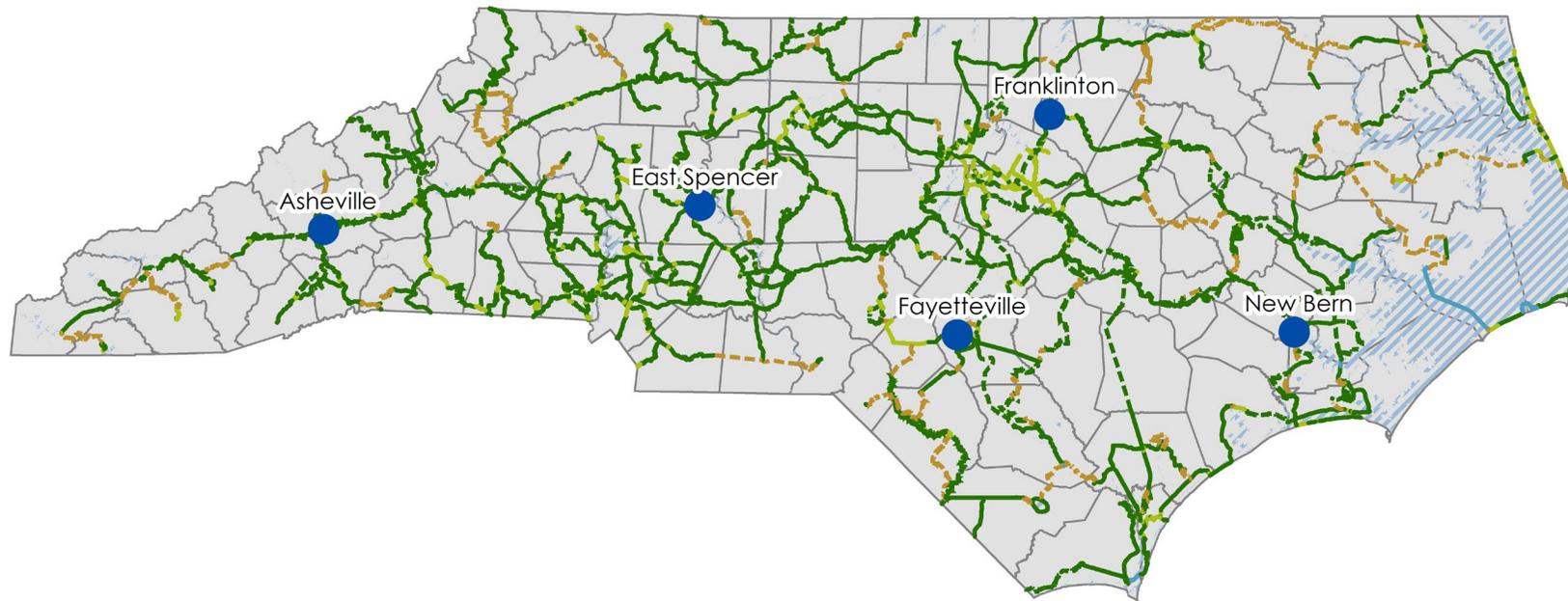
(study area boundaries are tentative)



Great Trails State Plan



Great Trails State Plan: Further Analysis



TRAIL SEGMENT PRIORITIZATION: EQUITY FOCUS (2022)

- List of GTS spine routes connecting to top tiers of NCDOT's Transportation Disadvantage Index (TDI)¹

Draft List of 120
Trail Segments

- Narrow TDI list by overall connectivity and most functional segments (trails that could serve local communities independent of overall network)

Draft List of 23
Trail Segments

- High-level analysis of overall constructibility based on right-of-way, local interest, and local/regional steps taken in support of segments to-date
- Broad geographic distribution across NC

5 Priority Trails
for Equity Focus

- Establish local project contacts
- Locally driven project extents
- Develop Draft Project Cut-Sheets
- Finalize and Present Project Cutsheets

Next Steps

S-Line TOD Planning Study Activities To-Date

June - October 2021

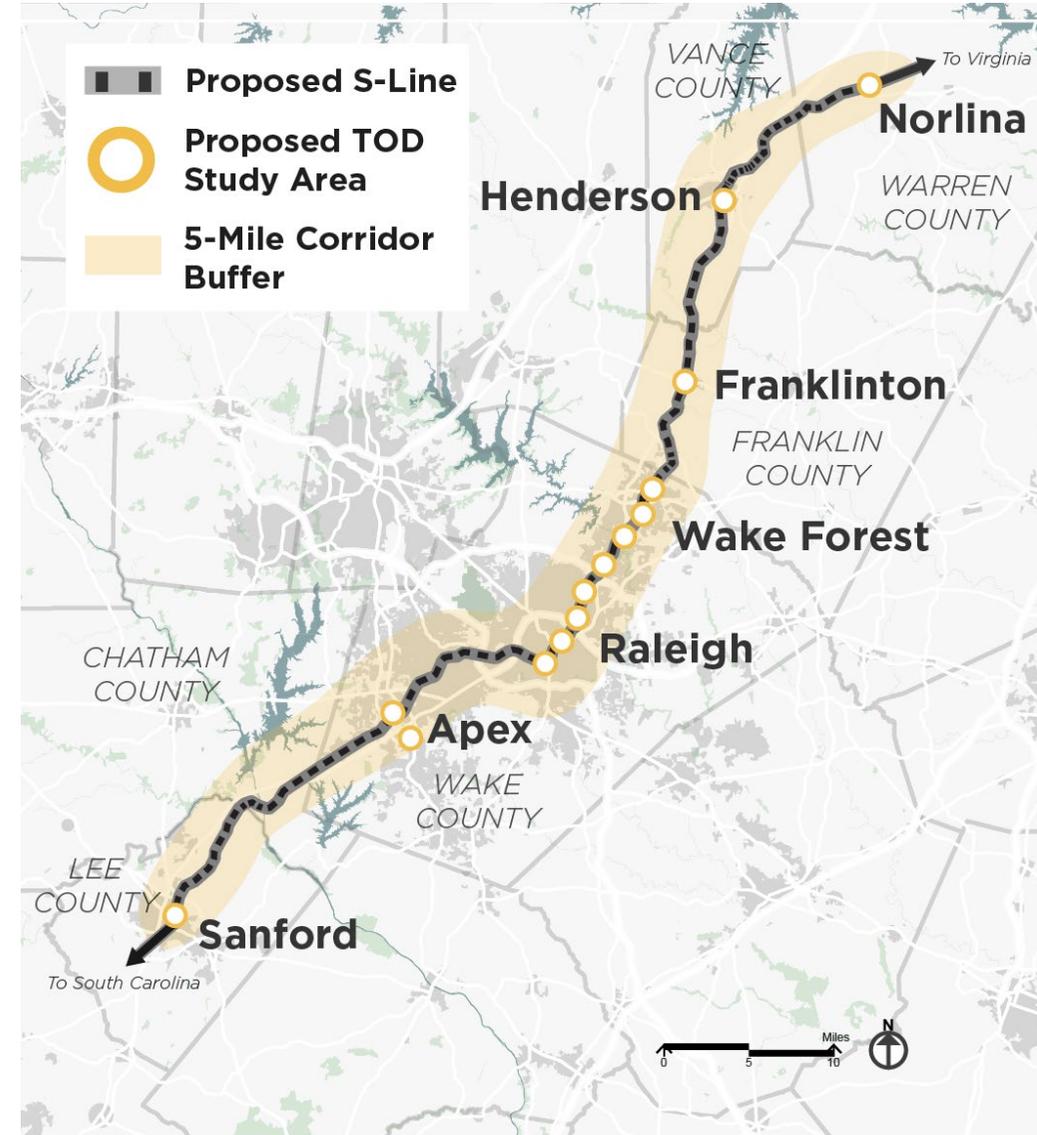
- TOD Readiness Assessment
- Technical & Advisory Committee Kick-offs
- First Round of Stakeholder Interviews

November 2021-March 2022

- First Round of Community Engagement at holiday events in each of the towns
- Market-focused interviews
- Market Assessment

April – July 2022

- Held 9 day-long Community Design workshops & public meetings in June
- Hosted first TOD education series session at RUS: TOD Win/Win around Development Projects
- Conducted walking tours with each community



S-Line TOD Planning Study - Next Steps

- Final Joint Advisory & Technical Committee Meeting



September 13th

10:30am-Noon

Perry Memorial Library in Henderson

- TOD Education Series Sessions (2)



September 2022

- Final Round of Community Engagement



Present the draft TOD plan to the public

December 2022



Transportation Disadvantaged Index (TDI) Tool

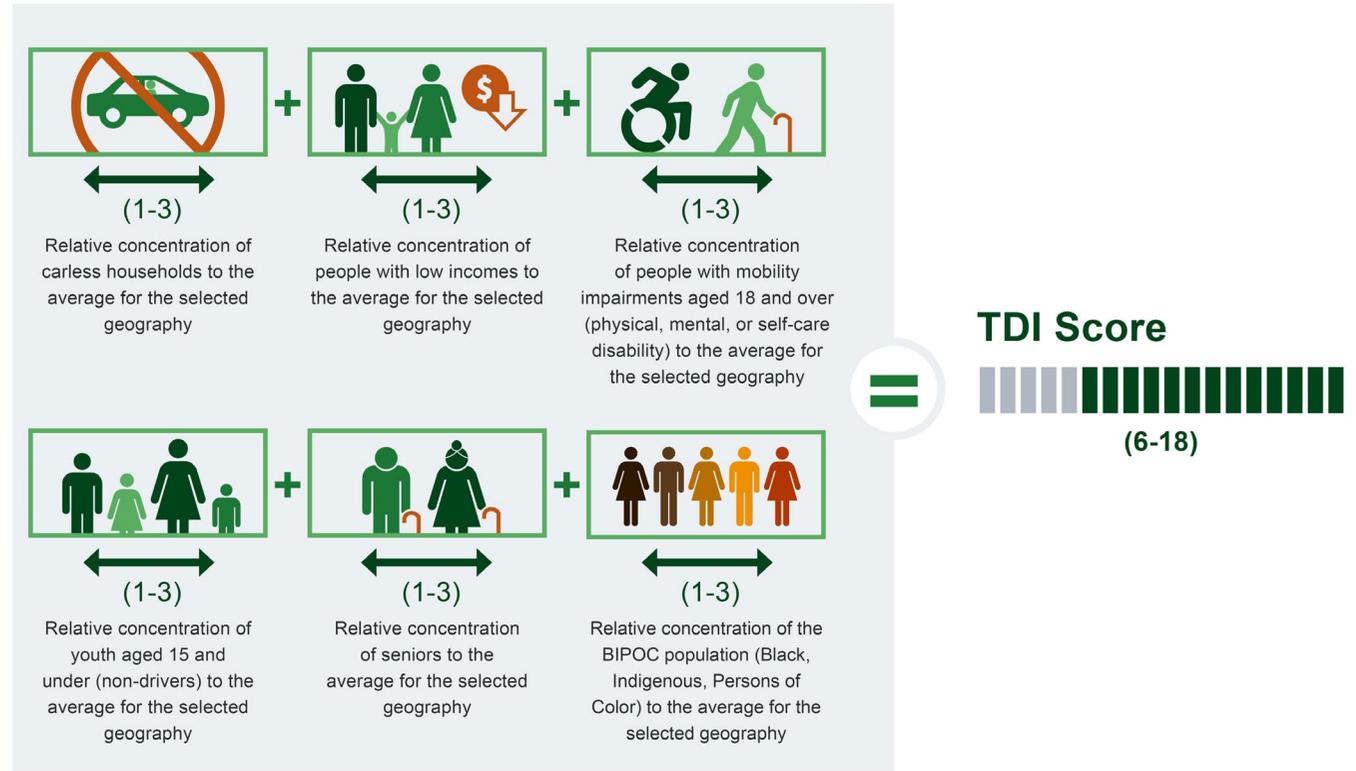
- NCDOT's strives to improve the quality of life, build healthy communities, support job creation and provide equal opportunities so all people can thrive
- Transportation disadvantage is a concept that **identifies and calculates relative barriers to accessing transportation.**
- Understanding and evaluating transportation disadvantage can:
 - Help achieve NCDOT's mission
 - Improve policies, planning, and project development
 - Change the culture on addressing impacts
 - Foster adoption across NCDOT's programs



Transportation Disadvantaged Index (TDI) Tool

- Six indicators to generate a Block Group score based on variance from the geographic mean.
 - Vehicle ownership
 - Income
 - Disabilities
 - Age: Youth
 - Age: Seniors
 - BIPOC

Higher score = greater level of transportation disadvantage.



Upcoming Tool, Trainings and Feedback Form – mid-August

Complete Streets Implementation Update

February '22 – Released updated and new guidance for Complete Streets Implementation

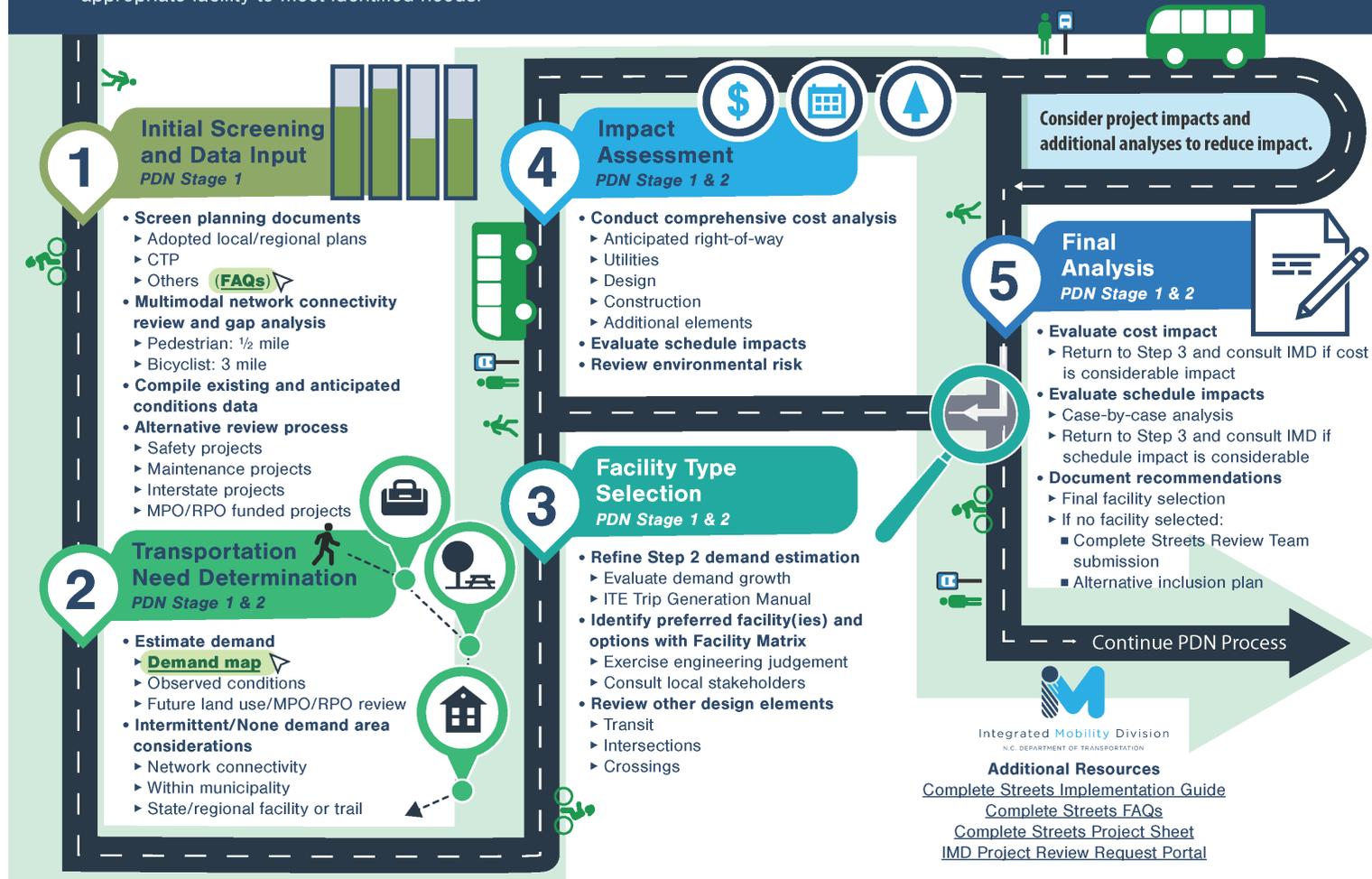
- Updated implementation guide
- New evaluation methodology

Ongoing Implementation Work:

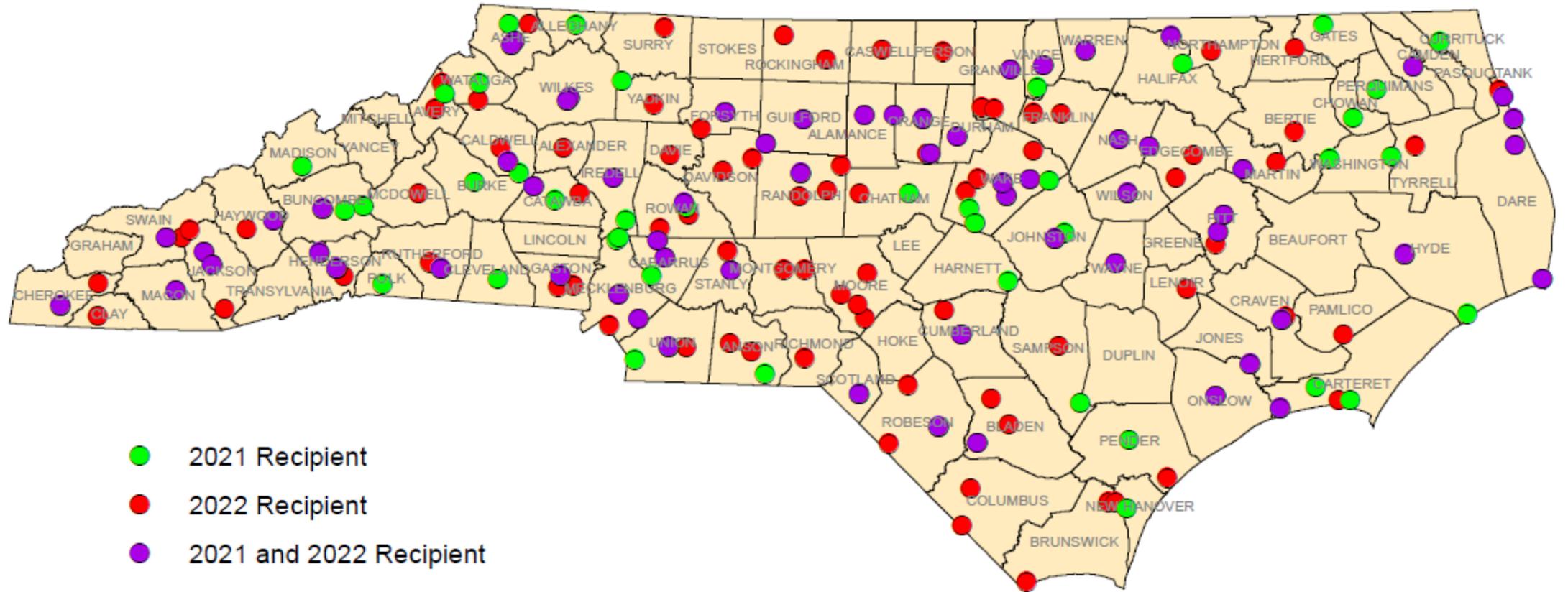
- **Project Delivery** – ongoing workgroup for PDN updates, have made initial recommendations for updates reflected in most recent version of the PDN document.
- **CTP** – ongoing collaboration with TPD partners, have met every two weeks since March and will be finalizing recommendations in coming weeks.
- **Maintenance** – first workgroup held in July, several deliverables and more research is ongoing, second workgroup TBD for Fall '22.
- **Cost** – first workgroup held in July, several deliverables and more research is ongoing, second workgroup tentatively scheduled for first week of September '22.

Complete Streets Implementation Update

The **Complete Streets Project Evaluation Methodology process** serves as guidance to aid in the evaluation of highway projects for Complete Streets elements. This guidance is intended to support Project Leads and Managers throughout the PDN stages, beginning with all five steps in PDN Stage 1 and select steps revisited in PDN Stage 2. Project Leads and Managers should supplement this process with local conversations, detailed analysis of conditions, and engineering judgement to design the appropriate facility to meet identified needs.



2021 - 2022 Bicycle Helmet Initiative



[Web Link](#)

Hickory Parks, Recreation & Sports Tourism

The event was held from 10 am to 1 pm on June 27th at Hickory City Park. About 50 helmets were distributed. There were several stations at this event. Upon reaching the helmet station, kids were able to receive a free bike helmet, water, or snack. They then went to have their helmet properly fitted by a bike officer. A zig zag course, figure eight, hand signs course, speed race, and balance test comprised the bike rodeo station. Last but not least, participants received their own police car tour. A food truck and an ice cream truck were also available. They provided a free group ride at 11 am by an experienced cyclist.



Kannapolis Police Department

On June 18, 2022, the school resource officers with the Kannapolis Police Department hosted a bike rodeo. The rodeo was designed to get parents in the community to bring their children out for not only a day of fun and exercise, but to let them listen to officers about bicycle safety. We had someone to look at the bikes to make sure they were in good operation as well as the helmets the kids wore. Sometimes we have kids to show up with no helmet, so this is a great thing to let the public know we care by issuing them one. Several kids did show up for the rodeo and it appeared that had a great time. We did give several helmets away as well. This time it was not children without helmets, but more the helmets had aged or just did not fit correctly. We are working on another event that we will be attending before the summer is out.



State Bike Routes Update



Interim Design Safety Project (Tactical Urbanism)

- FHWA STIC project
- Interim design countermeasures to be evaluated - protected intersections, curb extensions and median refuge islands
- Coordination with Highway Divisions and Municipalities
- Materials and Installation
- Evaluation/Data Collection

CURB EXTENSION



Curb extensions reduce vehicle turning speeds, shorten crossing distances for pedestrians, and increase space for those waiting to cross.

MEDIAN REFUGE ISLAND



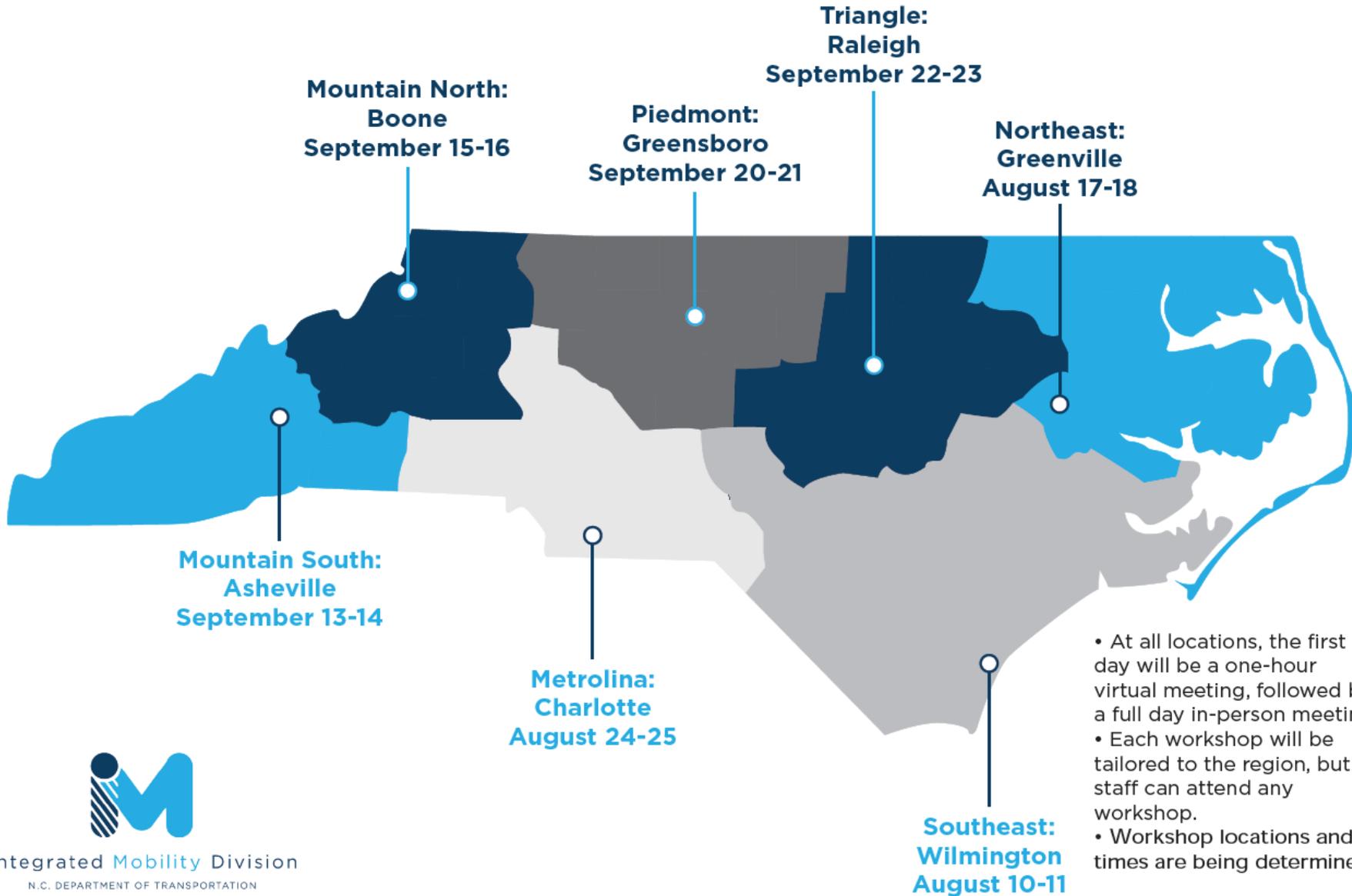
Median refuge islands reduce crossing distances and provide protected space in the center of the roadway for pedestrians and bicyclists.

PROTECTED INTERSECTION



Protected intersections reduce vehicle turning speeds, improve sight lines, and provide people on bicycles advanced queuing to travel through an intersection.

Transit Visioning Workshops



Transit Visioning Workshops

August – September 2022

Day 1 (60-minute virtual format)

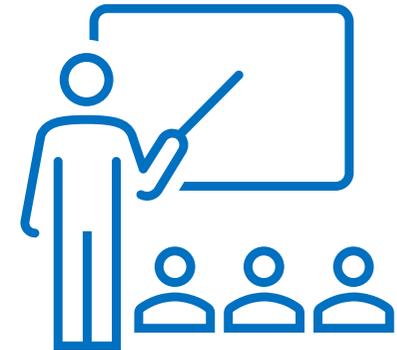
- Introduction
- Why Visioning?
- Why Now?
- Overview of Workshop

Day 2: (Six, one-hour modules)

- How to Vision
- The User Experience
- Operations and Technology Strategies
- Funding Opportunities
- Partnerships and Staffing
- Creating Your Agency's Vision



Integrated Mobility Division
N.C. DEPARTMENT OF TRANSPORTATION



Transit Visioning Workshops

August – September 2022



Integrated Mobility Division
N.C. DEPARTMENT OF TRANSPORTATION

Region	Hosting City	Location	In-Person Workshop	In-Person Workshop
Southeast	Wilmington	Northeast Branch Library	August 10	August 11
Northeast	Greenville/Rocky Mount	Marriott Courtyard	August 17	August 18
Metrolina	Charlotte	Urban Design Center	August 24	August 25
Mountain South	Asheville	TBD*	September 13	September 14
Mountain North	Boone	TBD*	September 15	September 16
Piedmont	Greensboro	TBD*	September 20	September 21
Triangle	Raleigh	TBD*	September 22	September 23

For more information, contact Bryan Lopez at balopez@ncdot.gov

IMD's Innovation Process

- Understand emerging mobility trends and challenges
- Develop ideas
- Secure funding
- Pilot innovations
- Shape new policy, deploy proven concepts broadly, and disseminate best practices

Recent Examples



Mobility for All



Connected Autonomous Vehicles (CAV)



Why CASSI?

PILOT: LEARNING ABOUT AV

LEARN ACROSS DOT AGENCY

EVALUATE SAFETY

FIRST MILE/LAST MILE

SOLUTION FOR LIMITED MOBILITY

PED AND VEHICULAR INTERACTIONS WITH AV

INFRASTRUCTURE NEEDS

STUDY VARIOUS TRANSIT USE CASES

PROVIDING OPPORTUNITIES FOR PARTNERS

ADVANCE TECHNOLOGY

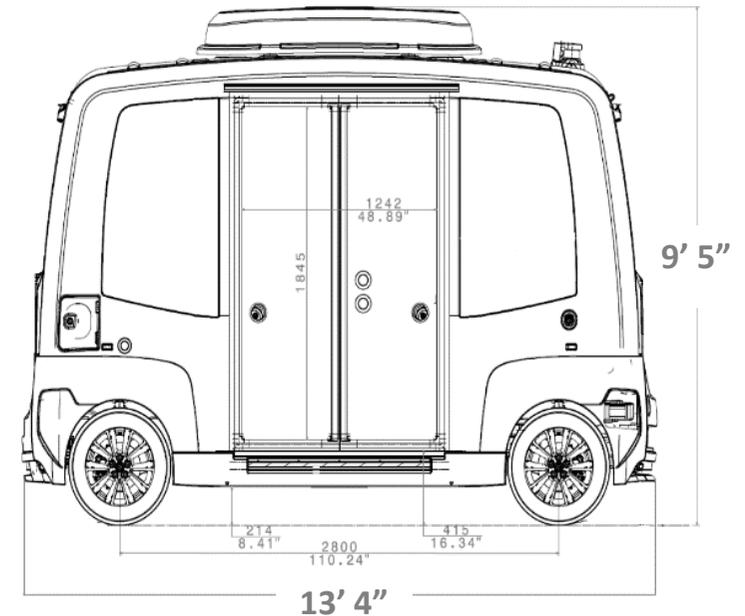
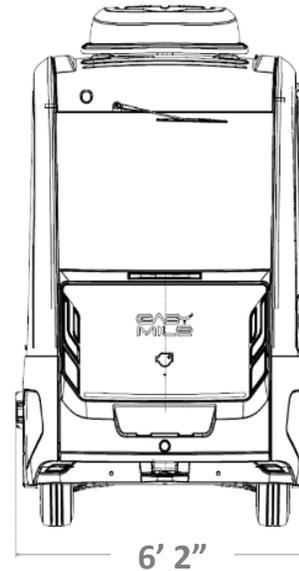
INFORM POLICY AND RULEMAKING



Automated vehicles that accurately detect, recognize, anticipate, and respond to the movements of all transportation system users could lead to breakthrough gains in transportation safety.

The Shuttle

- EasyMile EZ10 Gen3 vehicle
- Low-speed, electric, driverless shuttle
- Level 4 automation
- Transport up to 6 people plus the operator
- 12 mph top speed
- Fixed route – pre-determined, pre-mapped
- Up to 16 hours of operations
- ADA compliant with access ramp



Completed Projects (2020-2021)

Deployment 1:

NCDOT Transportation Summit
Raleigh Convention Center



Dates: Jan 8-9, 2020
Ridership: around 300
Length: 2,000 feet
Speed: 7-8 mph

Available for attendees

Deployment 2:

NCSU Centennial
Campus



Dates: Jan 21-Feb 25, 2020
Ridership: 260
Length: 0.8 mi
Speed: 10 mph

Open to public

Deployment 3:

Wright Brothers National
Memorial

First autonomous shuttle deployment at a National Parks site



Dates: Apr 20-Jul 16, 2021
Ridership: 3,335
Length: 1.2 mi
Speed: 10-12 mph

Open to public

Evaluation and Lessons Learned

- Technology
- Route Design
- Infrastructure
- Operations
- Regulatory
- Public Perception

First in Flight, First in Automation:
NCDOT and NPS Pilot an Automated Shuttle
at the Wright Brothers National Memorial

Joshua Cregger, Kendall Mahavier, Amalia Holub, Elizabeth Macheck, Travis Crayton, Rahi Patel,
Stephanie Sudano, Amanda Good, Katie Wong, and Steve Suder

FINAL REPORT — May 2022
DOT-VNTSC-NPS-22-02
WRBR 361/180195

Prepared for:
National Park Service
Washington Support Office
Washington, DC

North Carolina Department of Transportation
Integrated Mobility Division
Raleigh, NC

U.S. Department of Transportation
Volpe Center

[Link to Report](#)

National Park Service
U.S. Department of the Interior

Park Planning, Facilities and Lands Directorate
Park Facility Management Division
Washington, D.C.

National Park Service

**Automation in Our Parks: Automated Shuttle Pilots at
Yellowstone National Park and Wright Brothers National
Memorial**



NATIONAL PARK SERVICE
June 2022

[Link to Report](#)

Mobility as a Service (MaaS)



Mobility as a Service (MaaS)

Mobility as a Service (MaaS) is “an **integrated** mobility concept in which travelers can access their **transportation modes** over a single **digital interface**. MaaS primarily focuses on passenger mobility, allowing travelers to seamlessly **plan, book, and pay** for travel on a pay-as-you-go and/or subscription basis.”

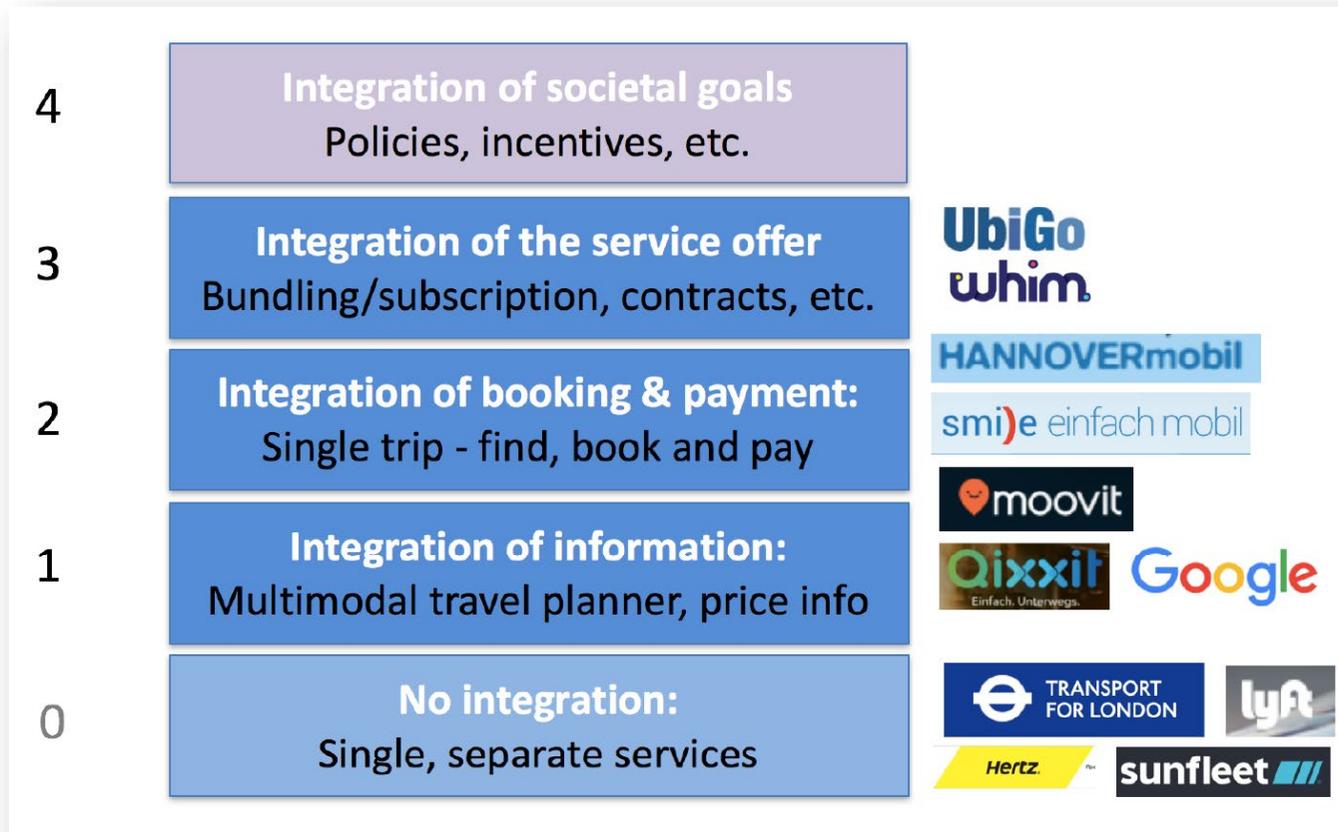
Source: National Center for Applied Transit Technology’s “Mobility as a Service: Now and in the Future” White Paper
Free Download: <https://n-catt.org/resources/mobility-as-a-service-now-and-in-the-future/>

IMD's Transit Technology Vision

- Anyone can plan, book, and pay for travel across all modes of transportation in one place
- On-demand transit (day-of or hour-of pickup) statewide with seamless cross-jurisdiction trips
- Statewide advanced scheduling software connected by Mobility-as-a-Service (MaaS)



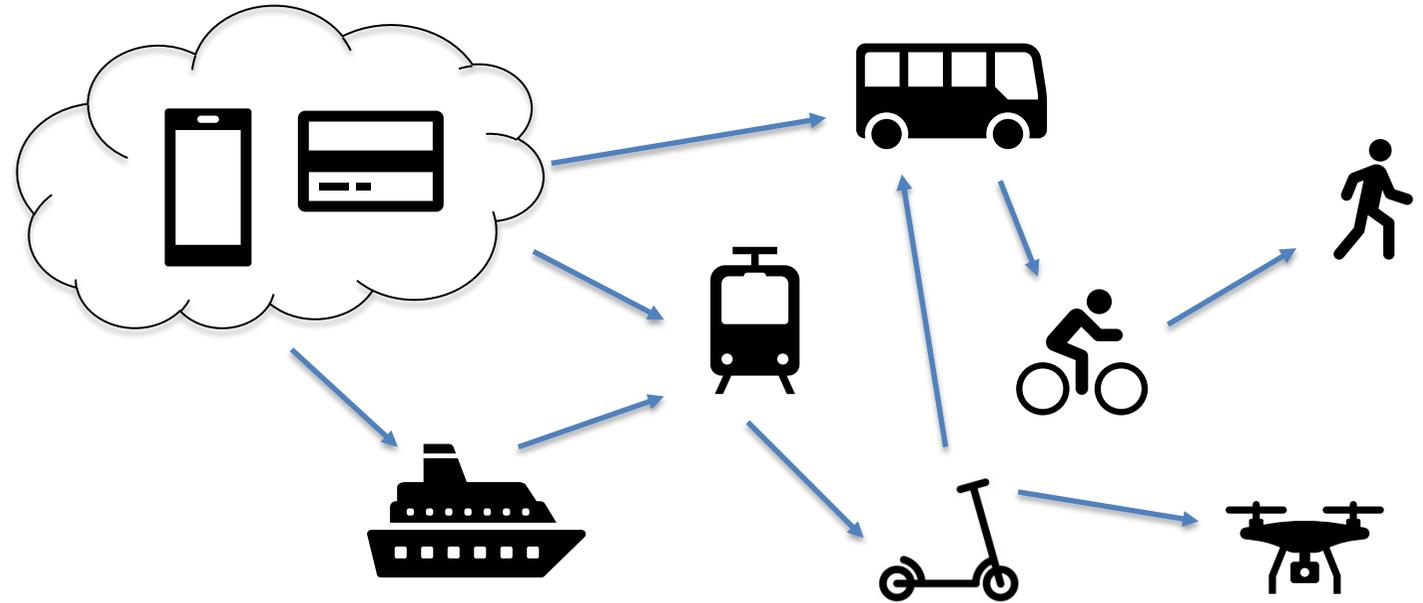
Mobility as a Service (MaaS) Levels



Source: Jana Sochor, Hans Arby, MariAnne Karlsson, and Steven Saranini, "A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals," 1st International Conference on Mobility as a Service, Tampere, Finland, November 28-29, 2017.

IMD's Mobility as a Service (MaaS) Initiatives

- Level 1 MaaS Virtual Training
- Request for Information (RFI)
- Statewide Feasibility Study
- Statewide Transit Software Solution RFP

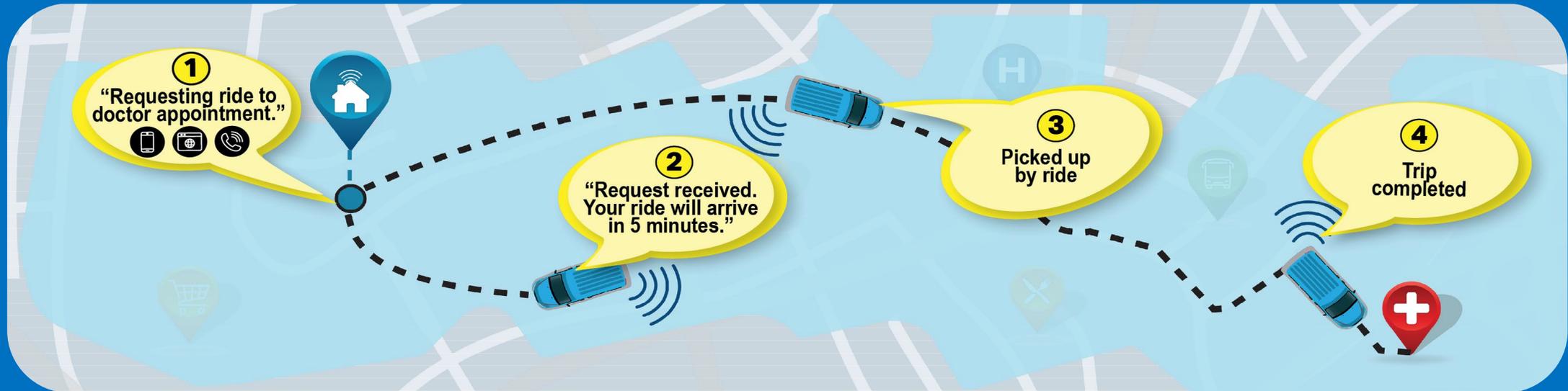


Microtransit



Microtransit Overview

A technology-enabled transit service that typically uses shuttles or vans to provide pooled on-demand transportation with dynamic routing.



While it uses similar technology such as a mobile app for requesting and scheduling rides, microtransit is different than a rideshare like Uber or Lyft:

- Typically subsidized
- Operates in defined service zones
- Combines trips rather than serving single trips
- Provides lower fares
- Employs professional drivers and dedicated vehicles

Service Models



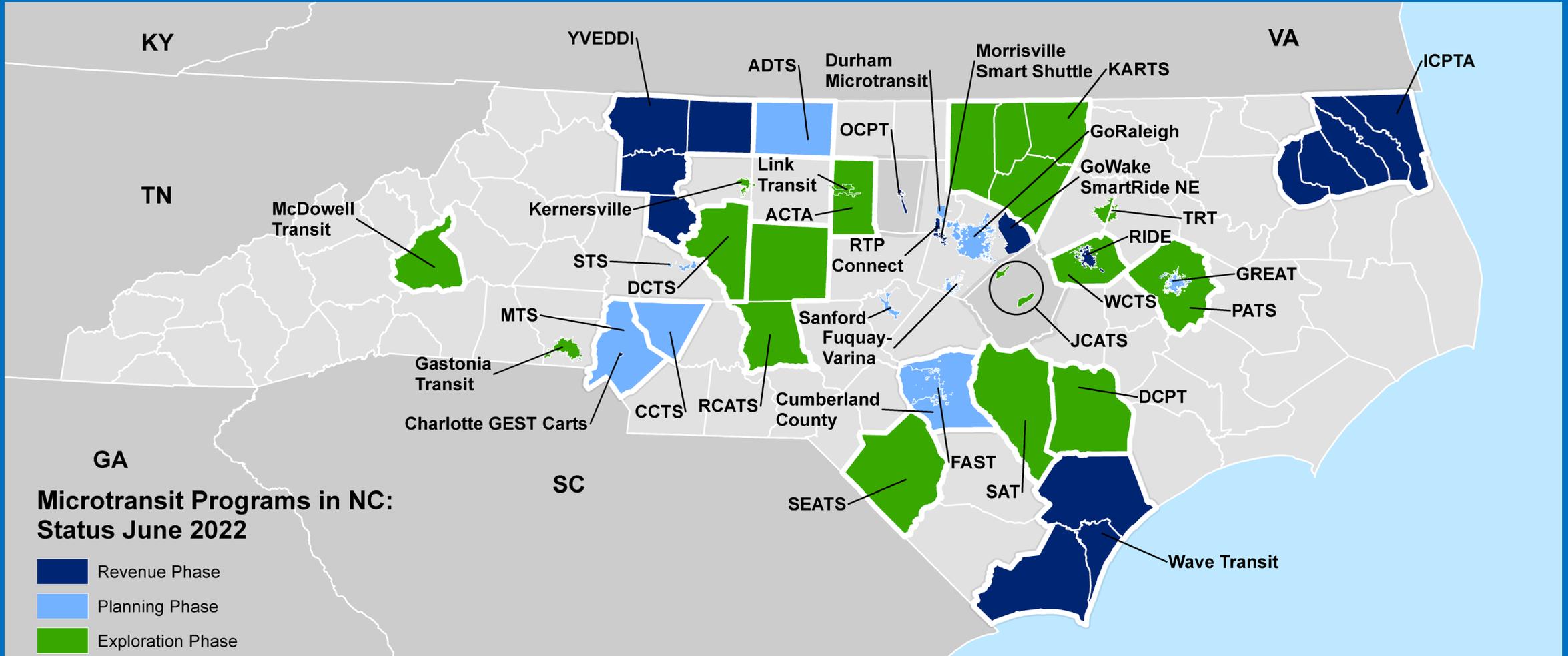
Software as a Service (SaaS)

Provides the software and the transit agency provides the drivers, vehicles, and operations management.

Transportation as a Service (TaaS) / Turnkey

Provides the drivers, vehicles, software, and operations management as a turnkey solution on behalf of the transit agency.

Where is Microtransit Being Implemented?



North Carolina Examples



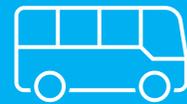
IMD's Microtransit Initiatives

- Feasibility/Service Planning Studies
- Research Study – *Public Microtransit Pilots in the State of North Carolina: Benefits, Costs and Lessons Learned* (ITRE/NC State University)
- USDOT Rural Surface Transportation Grant Application – [Mobility for Everyone, Everywhere in North Carolina \(MEE NC\)](#)

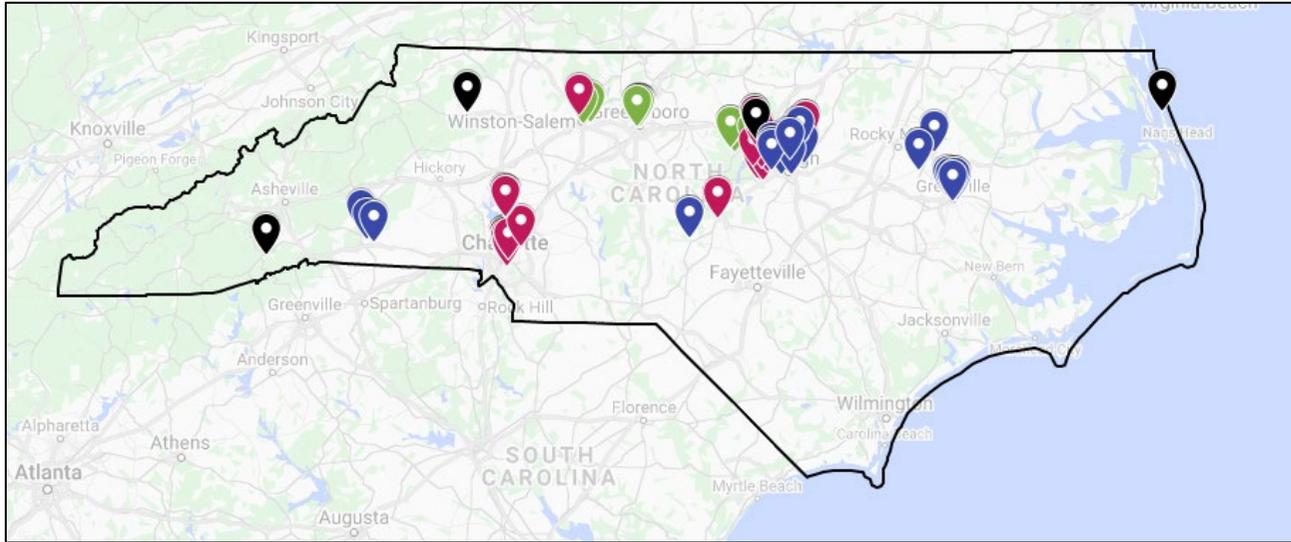


Multimodal Data Warehouse

Bicycle + Pedestrian + Transit



North Carolina Non-Motorized Volume Data Program (NC NMVDP)

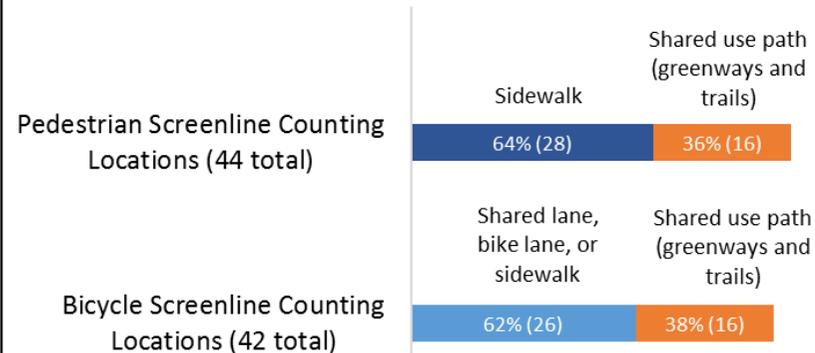


NCDOT-Purchased Counters in the NC NMVDP:

- **Eco-Counter MULTI Systems**
 - Passive infrared pedestrian sensors and inductive loop bicycle sensors
- **48 Counting Locations (Stations)**
- **71 Counting Systems (Loggers)**
- **141 Total Sensors**

20+ additional counting locations were onboarded into the program that were purchased/installed by local agencies in the state.

Screenline Counting Locations by Mode and Facility Type (NC NMVDP Phase 1 & 2)



Phase 1 & 2 Agencies

- Winston-Salem
- Greensboro
- DCHC MPO
- *Durham*
- *Brevard*
- *North Wilkesboro*
- *Duck*
- Charlotte
- Davidson
- Sanford
- CAMPO

North Carolina Non-Motorized Volume Data Program (NC NMVDP)

NC STATE UNIVERSITY COVID-19 UPDATES RESOURCES search ncsu

Institute for Transportation Research and Education

About Focus Areas Research Training Technical Services Search ITR

North Carolina Non-Motorized Volume Data Program

About

ITRE manages the North Carolina Non-Motorized Volume Data Program (NC NMVDP) for the North Carolina Department of Transportation (NCDOT). The NC NMVDP began as a research project to test a bicycle and pedestrian count protocol for replication across the state. The program currently includes one of the most extensive statewide networks of continuous bicycle and pedestrian counting sensors and provides data management and reporting support for multiple local agency partners. The bicycle and pedestrian counting systems are installed on sidewalks, bike lanes, shared lanes, and shared use paths across the state. The program is a team effort that involves cooperation and collaboration between local agency partners (municipalities and regional planning agencies), NCDOT, ITRE, and our counting technology vendor, Eco-Counter.

The data produced from this program can be used to evaluate facility usage over time, inform the project prioritization process, provide quantifiable evidence to support multi-modal Complete Streets policies, and improve municipal and regional active transportation planning. The data can be used in planning tools to measure existing patterns and model future trends at the site, corridor, and regional levels.

COVID-19 Impacts on Bicyclist and Pedestrian Activity in North Carolina

ITRE examined the impact of the COVID-19 pandemic on bicyclist and pedestrian activity in North Carolina by analyzing count data from the NC NMVDP.

Results from these analyses were shared in a presentation at the *Another Way to Get from Here to There: NCDOT Integrated Mobility Division Innovation & Technology Webinar Series* ([video](#) and [slides](#)).

[The Bicycle and Pedestrian Explosion in Covid Novern...](#)

What we are seeing nationally?

- 3X increase in bicycle use
- 107% increase in pedestrian use
- 65% increase in bicycle use
- 217% increase in pedestrian use

Another Way to get from Here to There

Watch on YouTube

An [ArcGIS StoryMap](#) is also available that highlights daily user volumes and hour of day patterns on trails in North Carolina during the COVID-19 pandemic from March through September 2020 and compares these to user volumes in previous years.

Analyses of bicyclist and pedestrian volumes between March and September 2020 showed that:

Resources for Local Agency Partners

Additional Resources



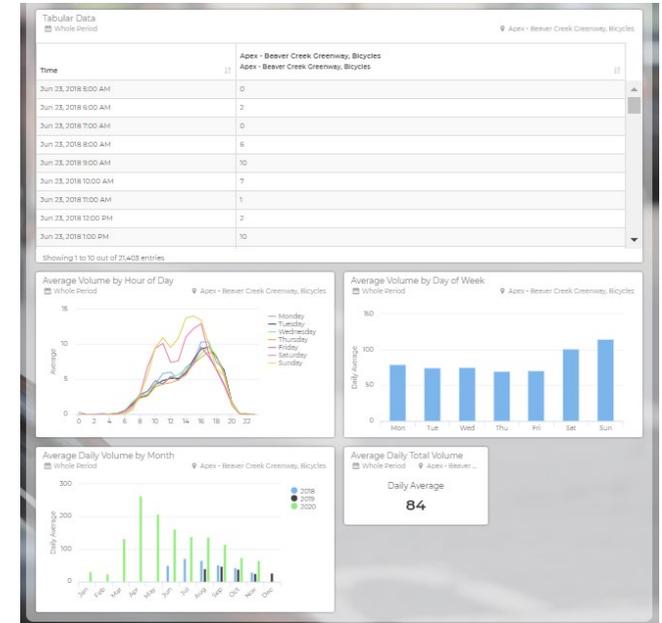
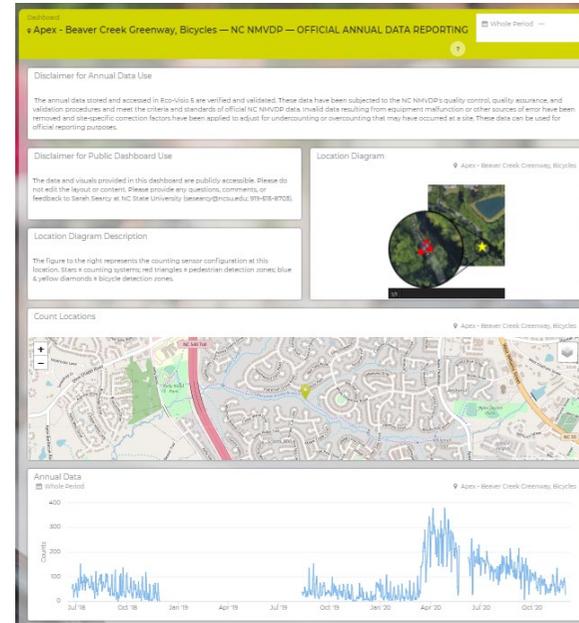
[2020 BikeWalk NC Summit: North Carolina Non-Motorized Volume Data Program \(NC NMVDP\) - An Update](#) [Link]



[2020 BikeWalk NC Summit: Accessing and Analyzing Public Count Data from NC's Pedestrian and Cyclist Counters](#) [Link]



[Conversations with Colleagues 02/23/19: Standardizing and Collecting Data with Local Partners](#) [Link]



Access the quarterly and annual data reports from the NC NMVDP



go.ncsu.edu/nmvdp

Transit Data Warehouse

ITRE's Public Transportation Group (PTG) is the data warehouse for the transit industry in North Carolina. We collect and maintain a vast array of transportation related information which includes asset utilization, asset management, operating statistics, service areas, urbanized areas, and many more datasets. Our warehouse includes spatial and non-spatial data that is contained in the appropriate database for easy access and retrieval of information. We continuously analyze each dataset and develop reports and other analytical documents based on these datasets.

- › [Economic Benefits of Transit](#)
- › [Intercity Bus](#)
- › [Trip Planner Development \(GTFS\)](#)
- › [Enterprise Asset Management](#)
- › [NTD Reports](#)
- › [Op Stats](#)
- › [VUD](#)
- › [Trip Maker](#)
- › [Technology Implementation and Support](#)



Upcoming in Innovations & Data

- Build capacity in the Innovations & Data Branch
- Explore the next frontier of CAV technology by evolving the CASSI project
- Advance Mobility as a Service (MaaS) through feasibility studies and pilots
- Support microtransit implementation in the state
- Establish a data inventory and develop a plan to consolidate and streamline data collection, warehousing and analysis
- Engage on state and national committees about emerging mobility trends and innovations



Upcoming Plans/Initiatives

- Appalachian Regional Commission – Accessibility Metrics
- WAVE ZEV Transition Study
- Centralina TDM Program Structure and Plan
- Micromobility Strategy
- Transportation Disadvantage Dashboard
- Completion of IMD Website

This presentation and recording will be uploaded to the Multimodal Updates Webinars website:

<https://connect.ncdot.gov/business/Transit/Pages/Multimodal-Updates-Webinars.aspx>



Next Multimodal Updates Webinar – October 26, 11am - noon

IMD Contacts

Planning & Programming

Ryan Brumfield

Director

rbrumfield@ncdot.gov

John Vine-Hodge

Deputy Director, Planning & Programming

jvinehodge@ncdot.gov

Joe Furstenberg

Statewide Planning and Programming Manager

jcfurstenberg@ncdot.gov

Bryan Lopez

Regional Planning Manager

rbalopez@ncdot.gov

Innovations & Data

Sarah Searcy

Deputy Director, Innovations & Data

sesearcy1@ncdot.gov

Michael Stafford

Program Analyst

Data Programs Section Lead

mrstafford1@ncdot.gov

Darcy Downs

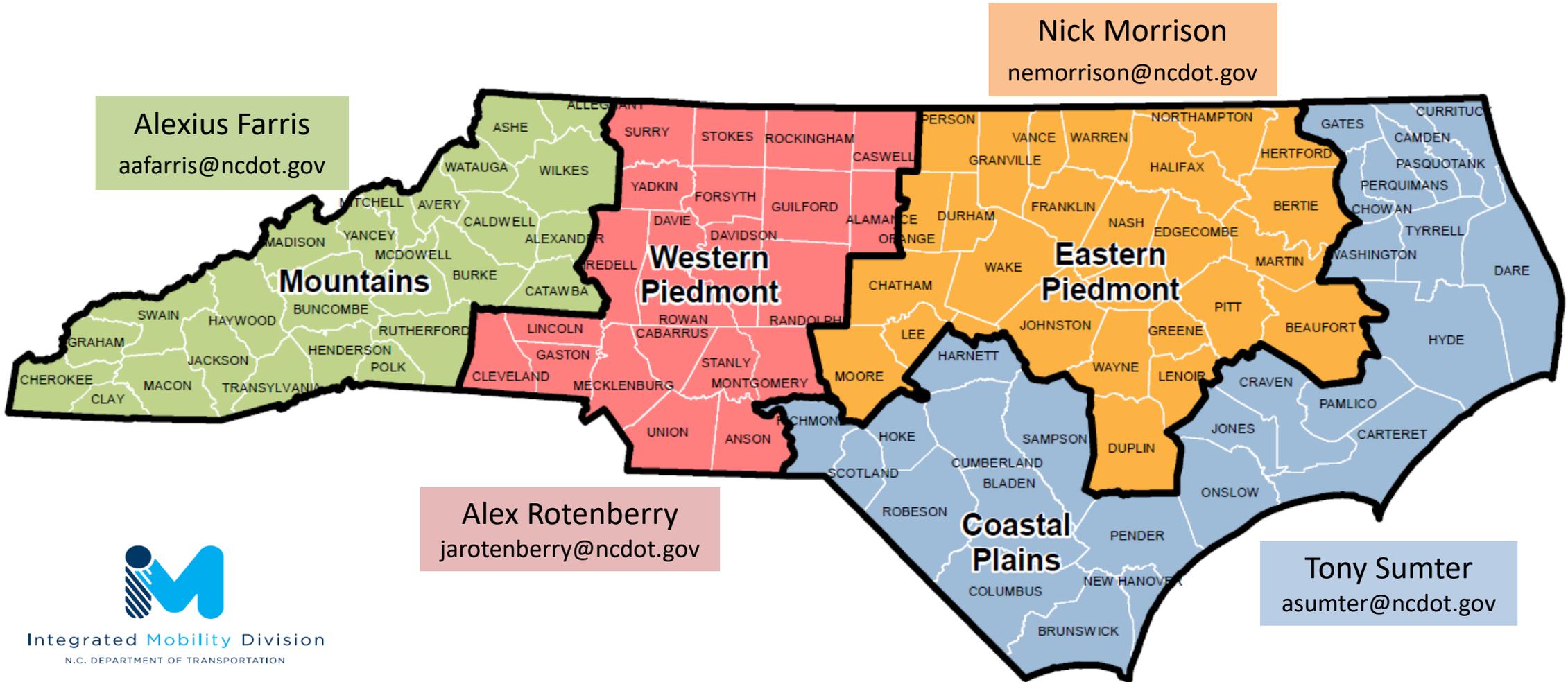
Program Analyst

ext-dbdowns1@ncdot.gov



Integrated Mobility Division
N.C. DEPARTMENT OF TRANSPORTATION

IMD Regional Planner Contacts



Integrated Mobility Division
N.C. DEPARTMENT OF TRANSPORTATION

[Link for Regional Contact Information](#)