



Sustainable and Automated Transportation  
Solutions: It's Not Just Shiny Tech



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What are your project goals, use cases, and funding structure?

# North Carolina Department of Transportation (NCDOT)'s Integrated Mobility Division (IMD)



Integrated Mobility Division  
N.C. DEPARTMENT OF TRANSPORTATION

## Mission:

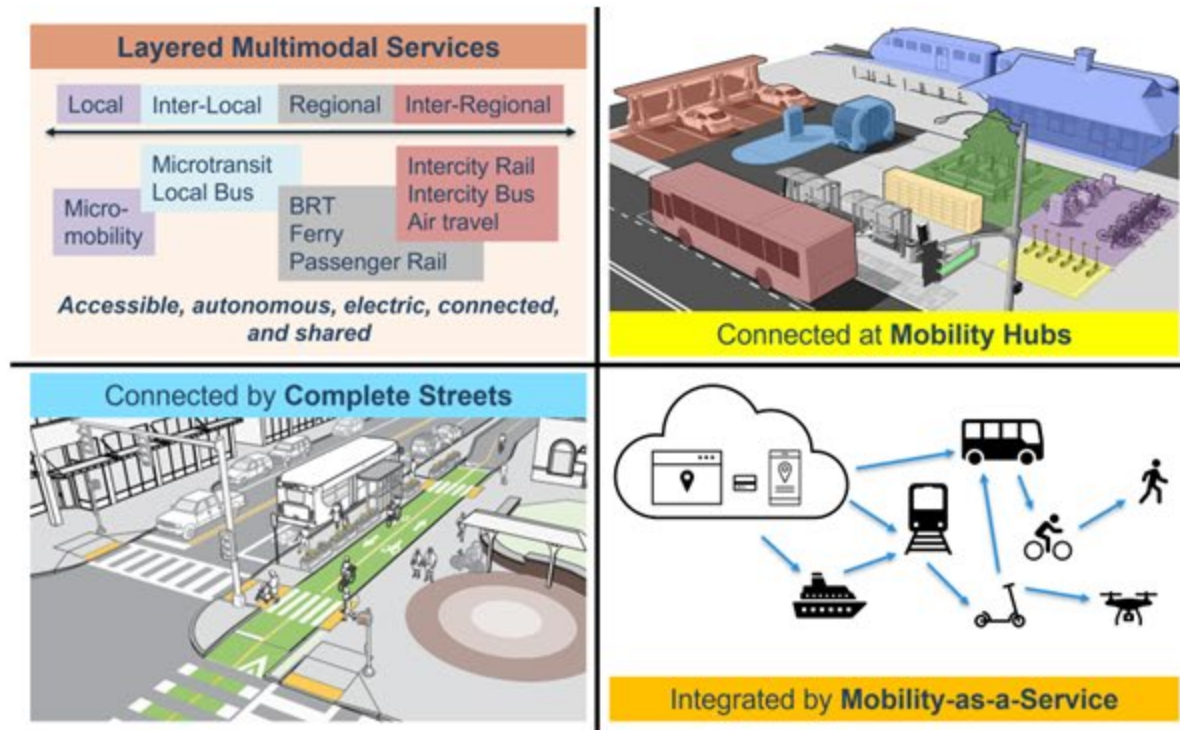
Provide leadership for safe, affordable, and innovative multimodal transportation throughout North Carolina.

## Vision:

- Transportation barriers and unmet needs are minimized.
- Equal access to opportunities and services.
- Multimodal options rival driving in terms of time, convenience, and cost.
- Zero transportation-related fatalities, injuries, or greenhouse gas emissions.

## Goals:

- Increase access.
- Enhance quality of life.
- Ensure safety.



Everyone should have equal access to opportunities and services through transportation systems that make traveling across shared modes and to destinations near and far as easy and convenient as driving.



## CASSI Advances Shared Autonomous Mobility Technologies in NC

NCDOT's **Connected Autonomous Shuttle Supporting Innovation (CASSI)** is a program (not a product) that **demonstrates the capability of shared autonomous vehicles** to prepare for the future of mobility and enhance public transportation services.



CASSI evaluates how autonomous vehicles can best be used by riders with different needs and in different environments.

Examples include:

- Transit applications such as first mile/last mile solutions
- Connected vehicle infrastructure



# CASSI is Evolving to Include Latest Technological Advancements

CASSI includes the **continued demonstration of novel-design, low-speed autonomous shuttles** and the **testing and integration of autonomy-enabled conventional vehicles** into high quality, on-demand transit services.



## Novel-design, low-speed automated vehicles



(3) Completed Projects  
2020-2021



NPS Report



USDOT Report



(1) Completed Project & (1) Active Project  
2023

## Autonomy-enabled conventional vehicles



Connected, Rural, Equitable, and Autonomous Transportation for Everyone (CREATE)

FY 2022 USDOT Advanced Transportation Technology and Innovation Program Grant Application



Grant Application Information

## Connected Autonomous Vehicle (CAV) Testbed

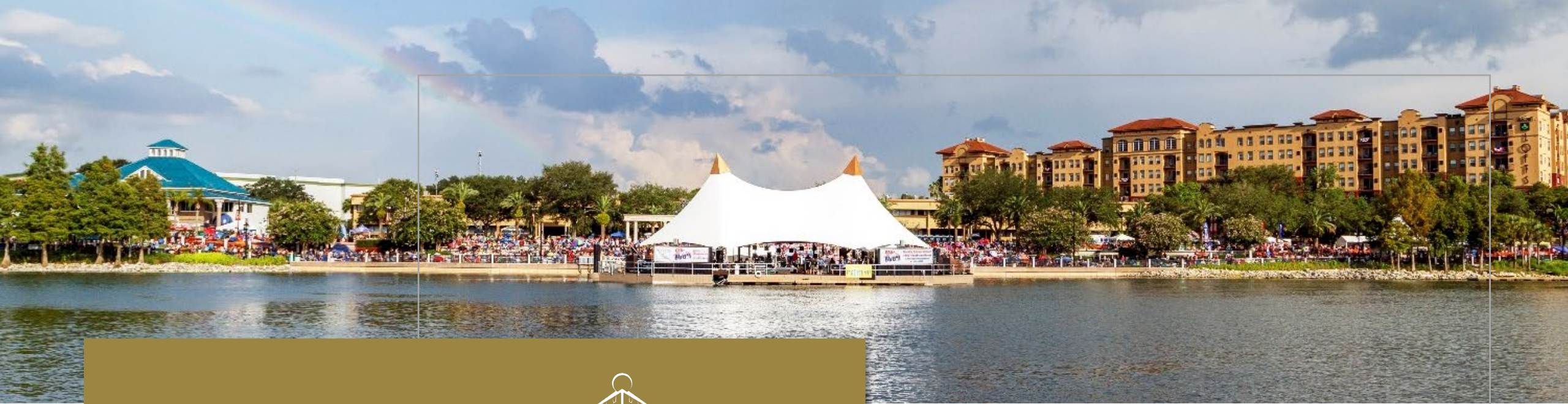


NCDOT is supporting NC A&T State University to develop **shared autonomous vehicles, an innovative rural test track, and an autonomous shuttle pilot** between the university and downtown Greensboro.



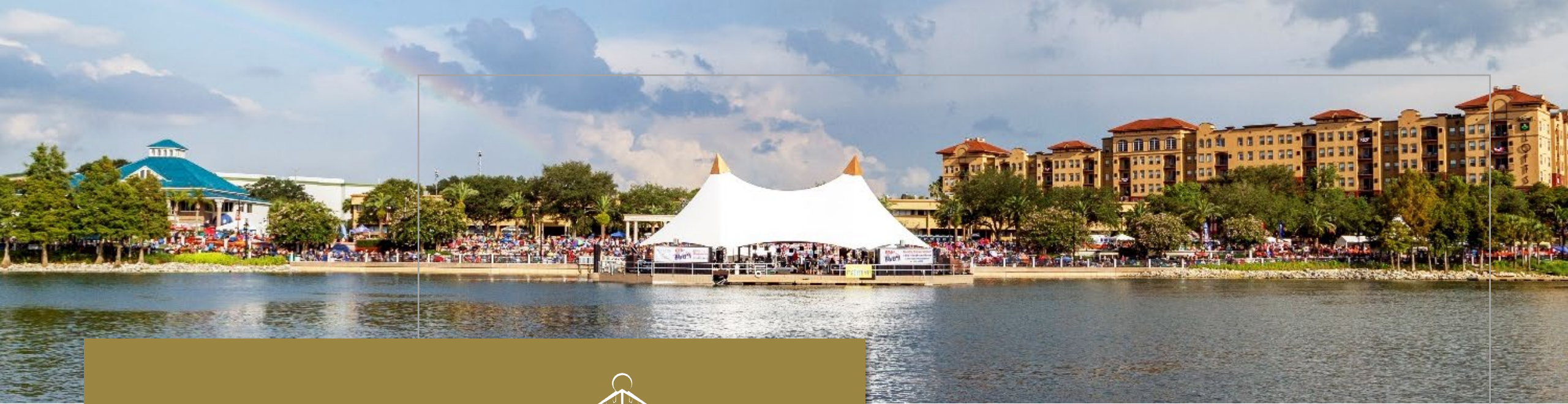
Autonomy at A&T





[www.Altamonte.org](http://www.Altamonte.org)

WHERE  
INSPIRATION  
SPARKS  
INNOVATION



[www.Altamonte.org](http://www.Altamonte.org)

**ALTAMONTE  
FLEX PATH &  
AUTONOMOUS  
VEHICLES**



# INNOVATION

...is a verb...

## INNOVATION

Useful innovation requires communities to learn to use something that is new to them.



## INNOVATION

...requires our public  
sector teams to become  
teachers.

# INNOVATIVE IDEAS



## Internship Program

In 2022, the City launched an internship program for high school and college interns. The year-round program offers hands-on experience and the opportunity to explore future career options, build a portfolio, create a professional network and more.



## On-the-Job Training

The Building and Fire Safety Department offers a specialized certification training program, which includes experience in every construction discipline for both inspector and plan examiner fields. At this time, the City is the only municipality in Florida with a 40-hour approved course.



## Virtual Inspections

The City has implemented a virtual inspection program, which uses online video conferencing to allow inspectors to remotely view the site using a webcam controlled by the owner or contractor. Remote inspections include windows, residential A/C units, roofs and more.



# INNOVATIVE IDEAS



## Altamonte Springs Science Incubator

A program promoting career readiness in the high-tech, high-demand fields of science, technology, engineering and math. AS<sub>2</sub>I offers hands-on activities and experiences for Seminole County middle and high school students.



## Project H<sub>2</sub>O Tx

An AS<sub>2</sub>I course providing high school seniors with formal instruction and practical, hands-on experience in water resource management, wastewater treatment process control and, more specifically, in the operation of wastewater treatment facilities.



## A-FIRST

A-FIRST captures I-4 stormwater run off, treats it and redirects it into the City's reclaimed water system which is used for irrigation. The City sends remaining water to the City of Apopka, which has increasing water demands. The project also reduces impacts to area springs.

## SYSTEMS APPROACH

Right place...

...right time.



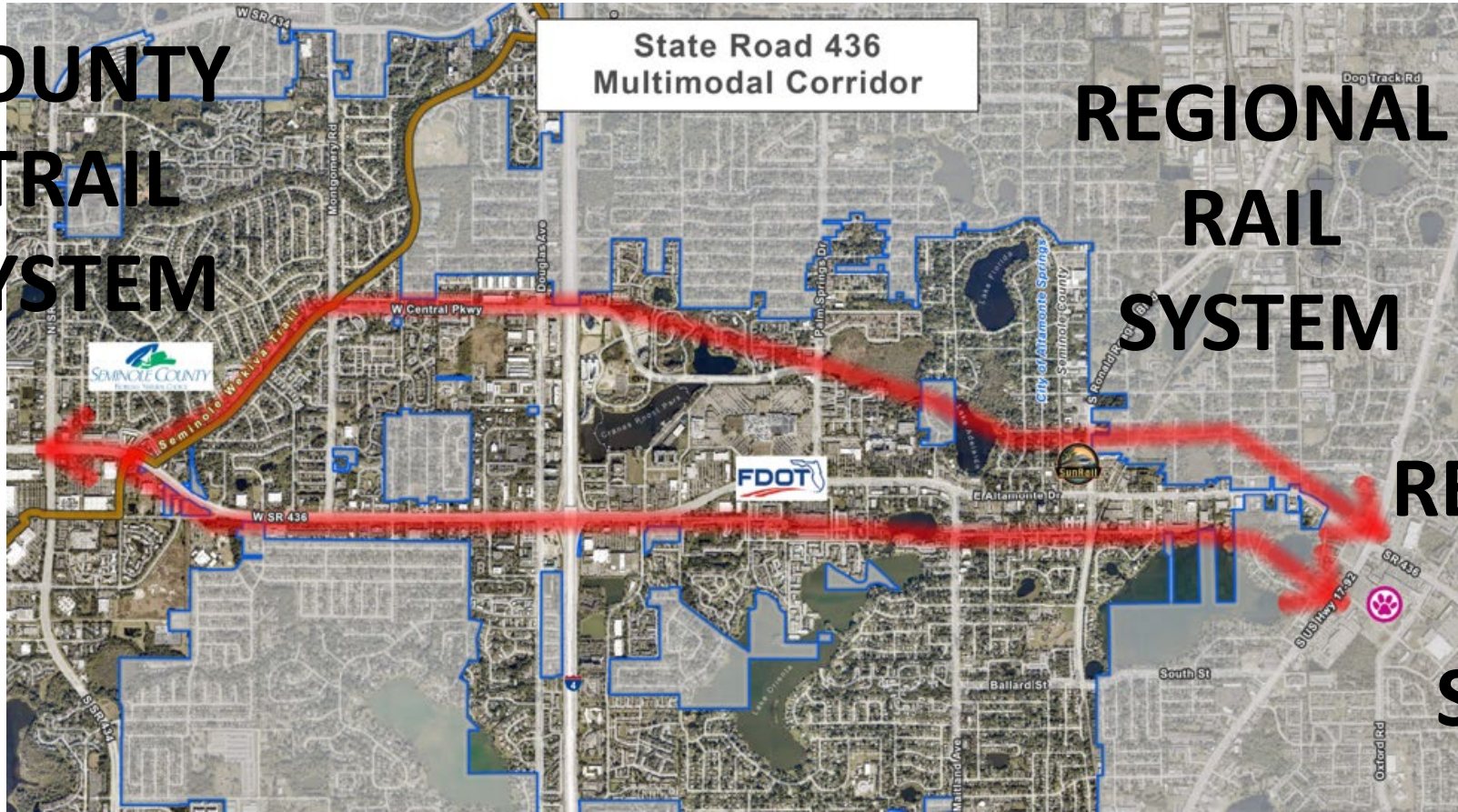
# S.R. 436 MULTIMODAL CORRIDOR

**COUNTY  
TRAIL  
SYSTEM**

State Road 436  
Multimodal Corridor

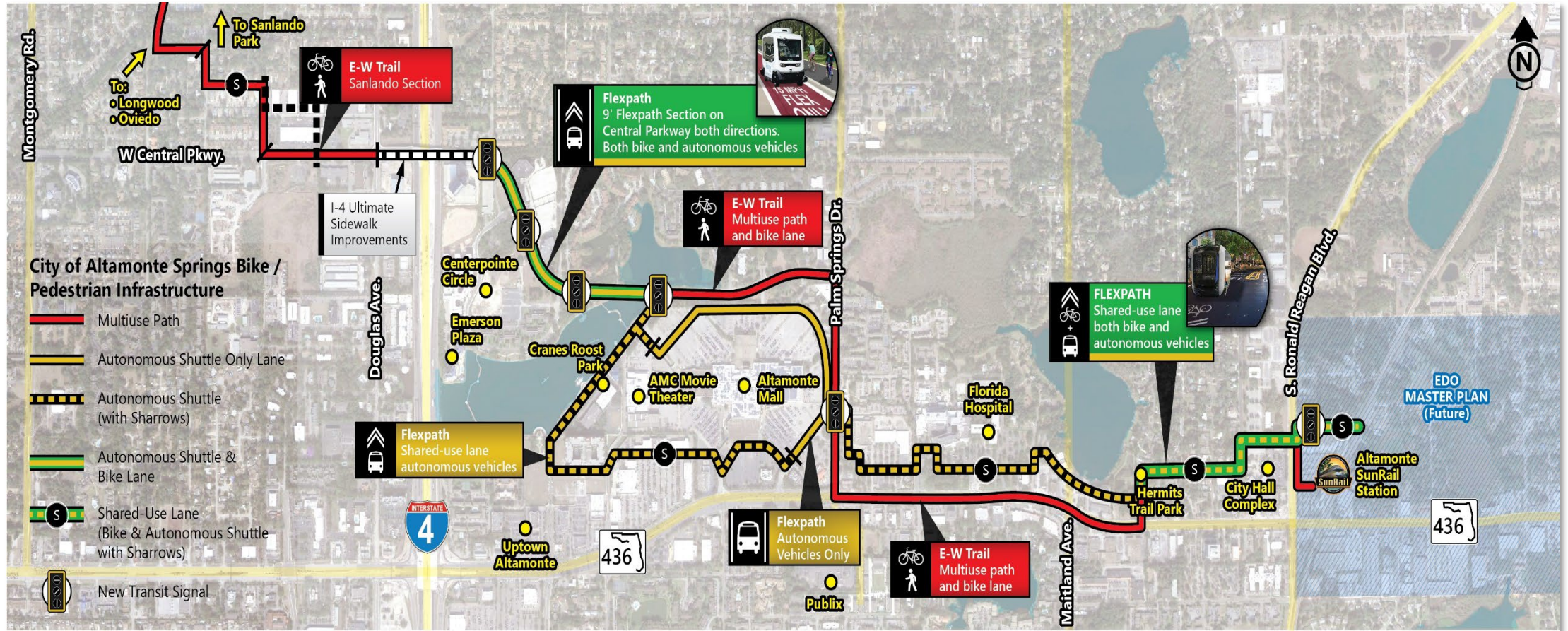
**REGIONAL  
RAIL  
SYSTEM**

**REGIONAL  
BUS  
SYSTEM**





# FLEXPATH & AV PROGRAM

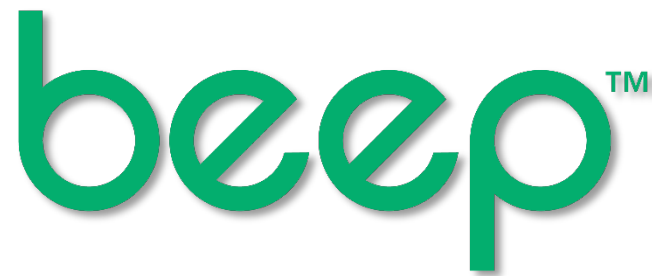


# INNOVATION

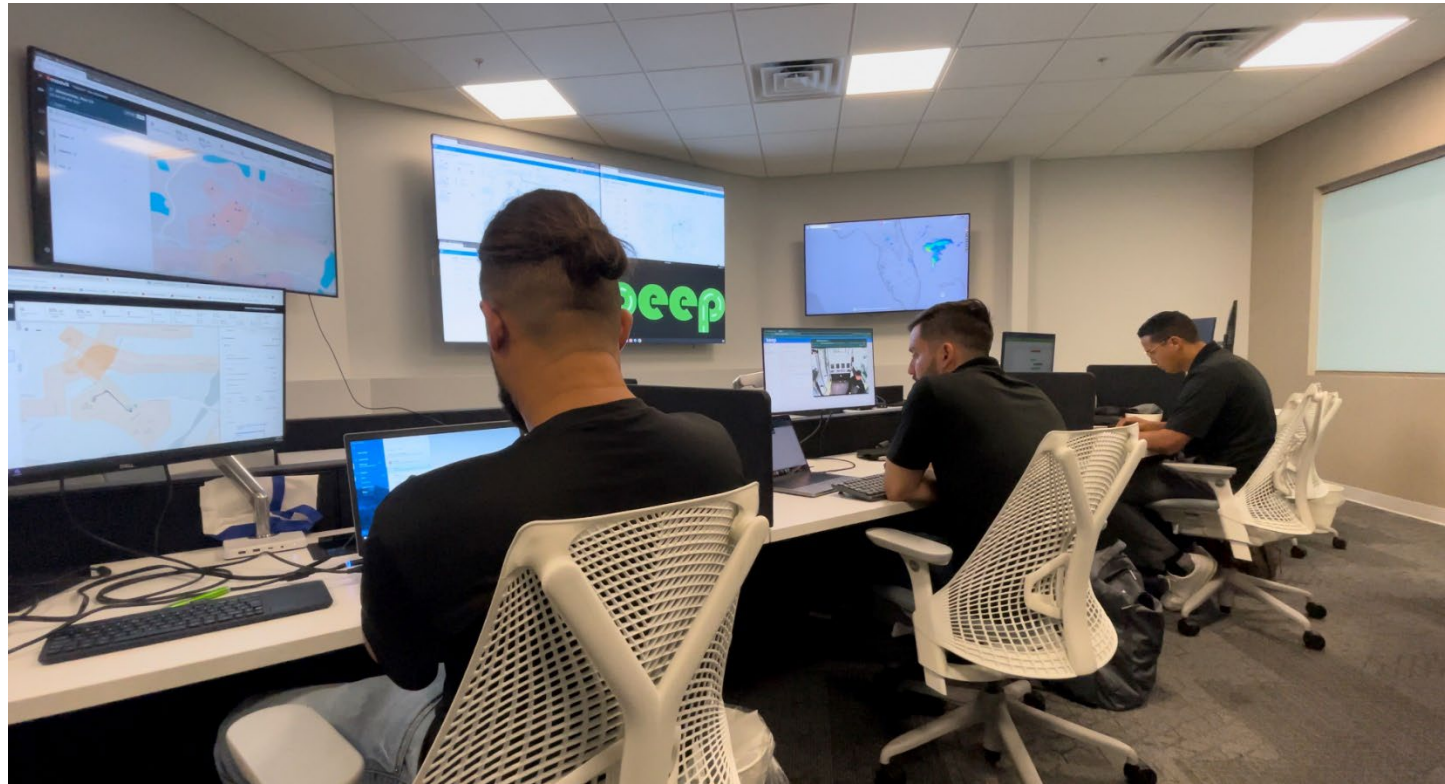
Requires the right team.



# THE RIGHT TEAM



# FLEXPATH & AV PROGRAM



# MN CAV PUBLIC DEMOS GOALS

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**Advance technology – in all seasons  
and for all people**



**Engage with communities**



**Increase transportation options**

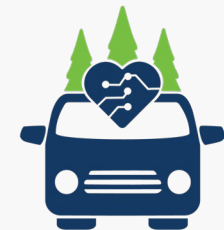


**Enhance the workforce and economic  
opportunity**

**MED CITY  
MOVER**



**BEARTRACKS**



**goMARTI**





How are your projects helping your respective states inform policy and testing of autonomous vehicles near-term & long-term?

# Shaping policy and testing

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Tech isn't "there"  
yet

Share  
information

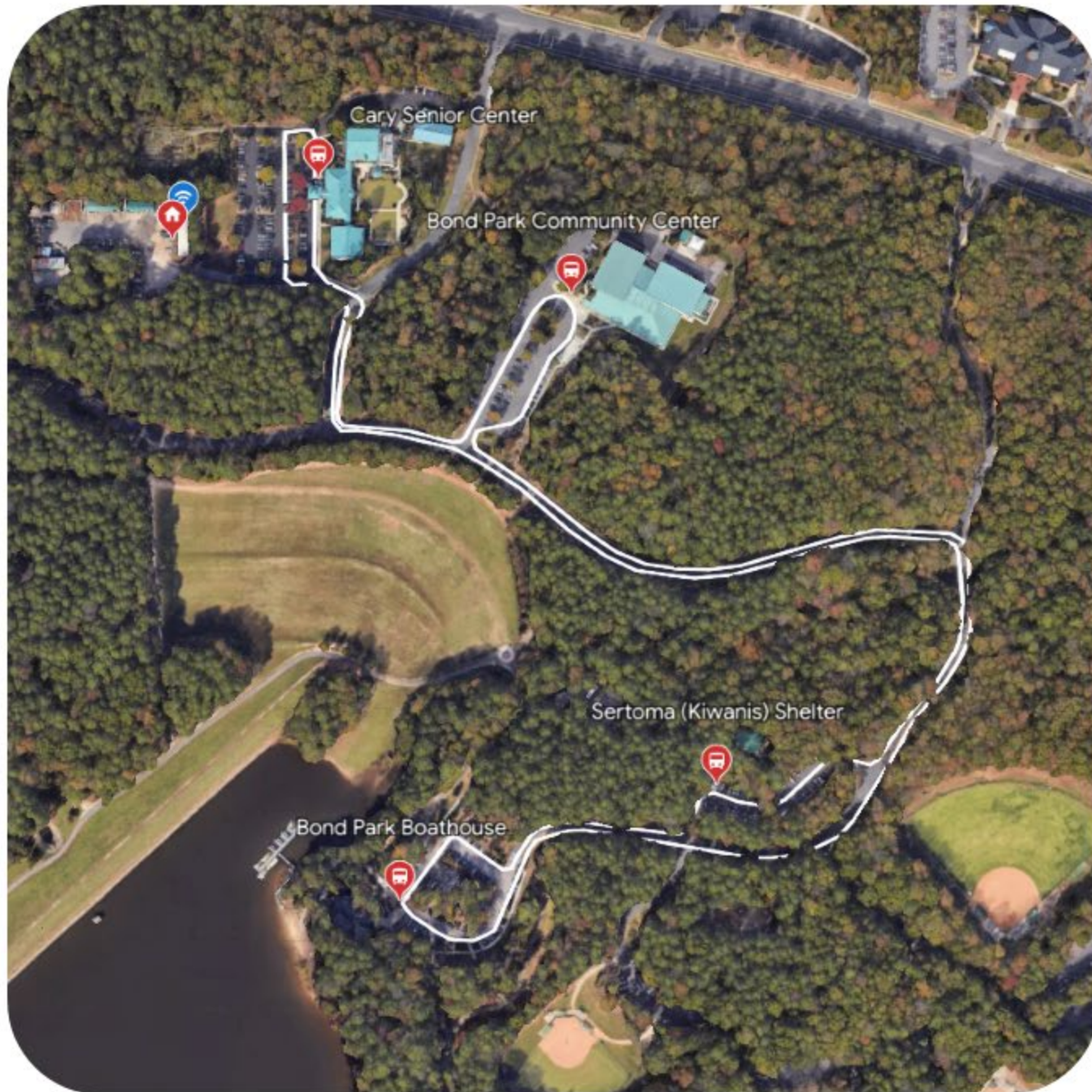
Be prepared

What do we  
want?

## CASSI in Cary's Bond Park

NCDOT partnered with the Town of Cary to bring a novel-design, low-speed autonomous shuttle to Fred G. Bond Metro Park.

- ❖ 13-week pilot from March 6-June 2, 2023
- ❖ Free and open to the public on weekdays, 10 a.m. to 4 p.m.
- ❖ 1.6-mile route with four stops





## CASSI in Cary's Bond Park

### Special features of the project included:

- ❖ Shared stop with GoCary Routes 4 and 8 at the Cary Senior Center
- ❖ Temporary traffic signal that demonstrated the shuttle's vehicle-to-infrastructure communication capabilities





# CASSI at UNC Charlotte

July 12 through December 22, 2023

Compared to previous pilots under the CASSI program:

- ❖ Most signals (four total)
- ❖ Longest route (2.2 miles)
- ❖ Longest duration (6 months)
- ❖ Most complicated mixed traffic environment
  - Includes bicyclist, scooter, pedestrian, motor vehicle, and transit interactions and shared stops with the existing campus bus fleet









# FLEXPATH & AV PROGRAM



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MULTIMODAL FLEX PATH | CITY OF ALTAMONTE SPRINGS | FLORIDA



VHB p + d studio | March 24, 2022 | 3

# FLEXPATH & AV PROGRAM





# FLEXPATH & AV PROGRAM





# FLEXPATH & AV PROGRAM



# FLEXPATH & AV PROGRAM



beep™

What are your lessons learned?



**SHARED KNOWLEDGE**



## BEING OF SERVICE

It's not about the tech.  
It's about the people tech  
can serve.

# What have we learned

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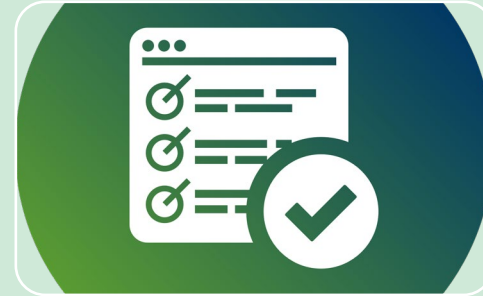
## Technology

- Vehicle
- Infrastructure's role



## Weather

- Conditions
- Environment changes



## Project Building

- Purpose
- Location
- Roles
- Length



## Safety

- Defined
- Who benefits?



# Recommended Resources

- **NCDOT Integrated Mobility Division (IMD)** [webpage](#)
- **[“It’s about moving people.”](#)** [A Conversation with Ryan Brumfield of NCDOT’s Integrated Mobility Division.](#) (NCMJ, 2023).
- **NCDOT Connected Autonomous Shuttle Supporting Innovation (CASSI)** [webpage](#)
  - [About](#)
  - [Completed Projects](#)
  - [Current Project](#)
- **NCDOT MEE NC Project** [awarded for FY 2022] – [grant application materials](#) to the USDOT Rural Surface Transportation grant program
- **NCDOT MEE NC Project** [awarded for FY 2022] – press releases for grant award from [USDOT](#) and [NCDOT](#)
- **NCDOT CREATE Project** [not awarded for FY 2022] – [grant application materials](#) to the USDOT Advanced Transportation Technology and Innovation (ATTAIN) program for a project that builds on MEE NC by integrating shared autonomous vehicles into on-demand transit
- **NC A&T State University – CAV Testbed** research projects ([1](#), [2](#)), [press release](#), and [video](#)
- **NC A&T State University – [Region 4 UTC](#)** (“University Transportation Center for Regional and Rural Connected Communities”)

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Questions?



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