



## **NORTH CAROLINA** Department of Transportation



# North Carolina Leading the Nation in UAS Innovation

Darshan Divakaran

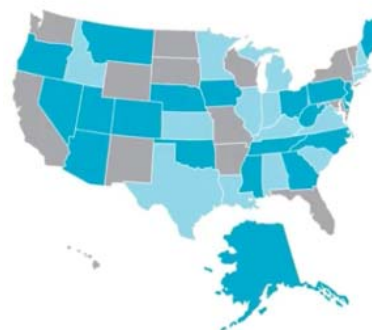
UAS Program Engineer

2018

# American Association of State Highway and Transportation Officials

- A survey by AASHTO finds that 35 of 44 responding state departments of transportation (80 percent) are using UAS for a wide range of purposes.
- March 2018 the survey found that 20 state DOTs have incorporated drones into their daily operations. Another 15 state DOTs are in the research phase - testing drones to determine how they can be utilized.

These DOTs report their agency is either researching or using drones.



**80% STATE DOTs USING DRONES**  
MARCH 2018 SURVEY

## Putting Drones to Work

*20 State DOTs Operating Drones on a Daily Basis*

- All 20 using them to gather photos and videos
- 14 states using them for mapping and surveying
- 12 for public education and outreach
- 10 for bridge inspections,
- 8 for emergency response,
- 6 for pavement inspections,
- 5 for scientific research,
- 2 for daily traffic control and monitoring
- 1 for high-mast light pole inspections



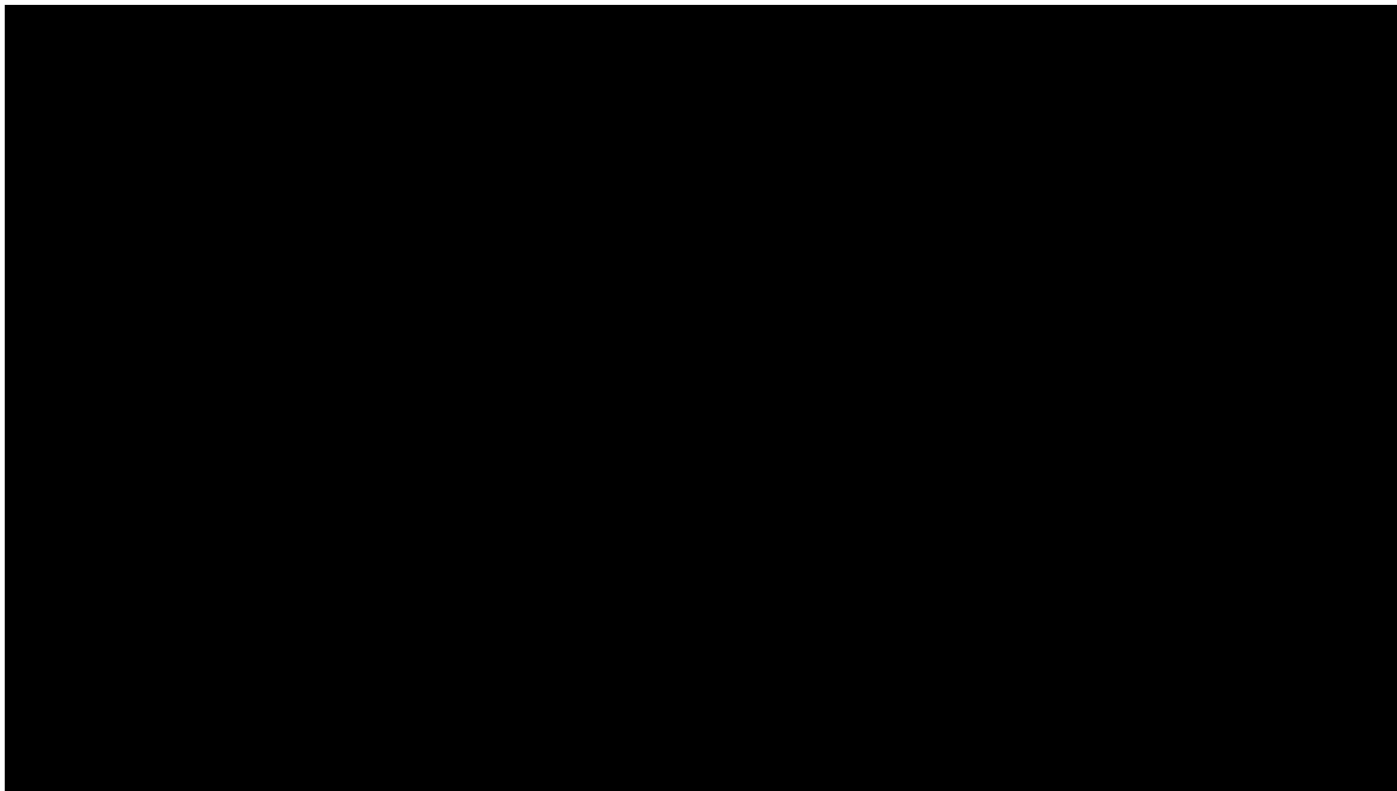
# North Carolina

NCDOT has 14 Divisions which manages -

- 80,000 road miles, second only to Texas.
- 72 publicly owned airports and more than 330 privately owned airports, heliports and other landing areas
- 13,500 bridges
- Nearly 3,300 miles of mainline railroad track



# NC leading in UAS technology



# NCDOT Fleet

- **Division of Aviation** (10)
- **Communications** (2) capture video and photographs of NCDOT events and projects throughout the state.
- **Photogrammetry** (1) focused on developing photogrammetry standards for UAS.
- **Roadside Environmental** (1) photograph jobsite erosion control measures and document the wildflower program.
- **Geotechnical Unit** (1) respond to landslides in the western part of the state.
- **Environmental Analysis Unit** (2) apply herbicide to invasive species on the coast.
- **Safety & Risk Management** (1) assessment of construction sites.
- **Division 1** (2) storm assessment, construction project monitoring
- **Division 8** (1) bridge inspection

# UAS Program Office Fleet



**DJI Inspire 2**



**DJI Phantom 4**



**DJI Mavic Pro**



**Yuneec Q500**



**DJI Matrice 200**

**DJI Matrice 210**



**Sensefly eBee Plus**



**Yuneec H520**



# UAS Operator Permit

To operate UAS in NC for commercial & government -  
**Federal**

- Pass a UAS knowledge test at FAA testing center
- TSA background check
- Apply for Remote Pilot Certificate

## North Carolina

- Pass NC UAS Knowledge test online
- Free permit
- Apply for commercial or government NC Operator Permit online

<https://www.ncdot.gov/divisions/aviation/uas/>



# NC Drone Safe



Search – NCDivisionofAviation



#ncdronesafe

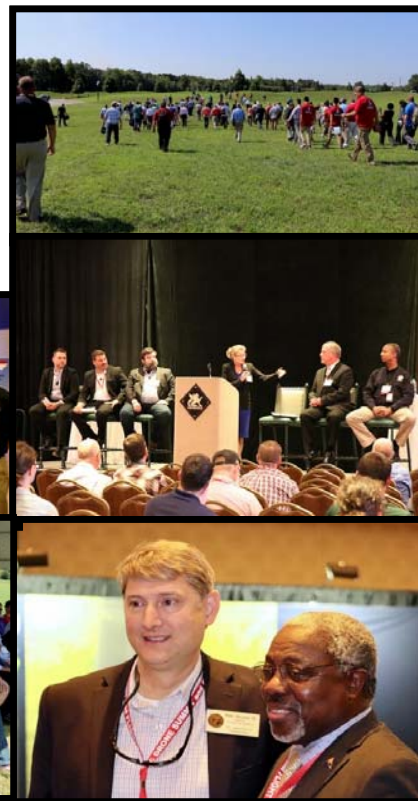


# NC Drone Summit & Flight Expo

Biggest drone event in NC to showcase our commercial, public safety and research UAS capabilities with -

- Panels addressing IPP, UTM, Safety, and Regulations
- Drone racing demo and UAS flight operations
- Technical sessions on latest developments in UAS operations
- Exhibitors showcasing latest technology

[www.ncdronesummit.com](http://www.ncdronesummit.com)



# NCDOT Drone workshops

The NCDOT workshop helps commercial and government operators by educating them on

- Federal and state regulations
- Safe and beneficial uses of drones
- Various drone applications
- Various drone software's and data management
- Flight demonstrations



# Airport Inspection





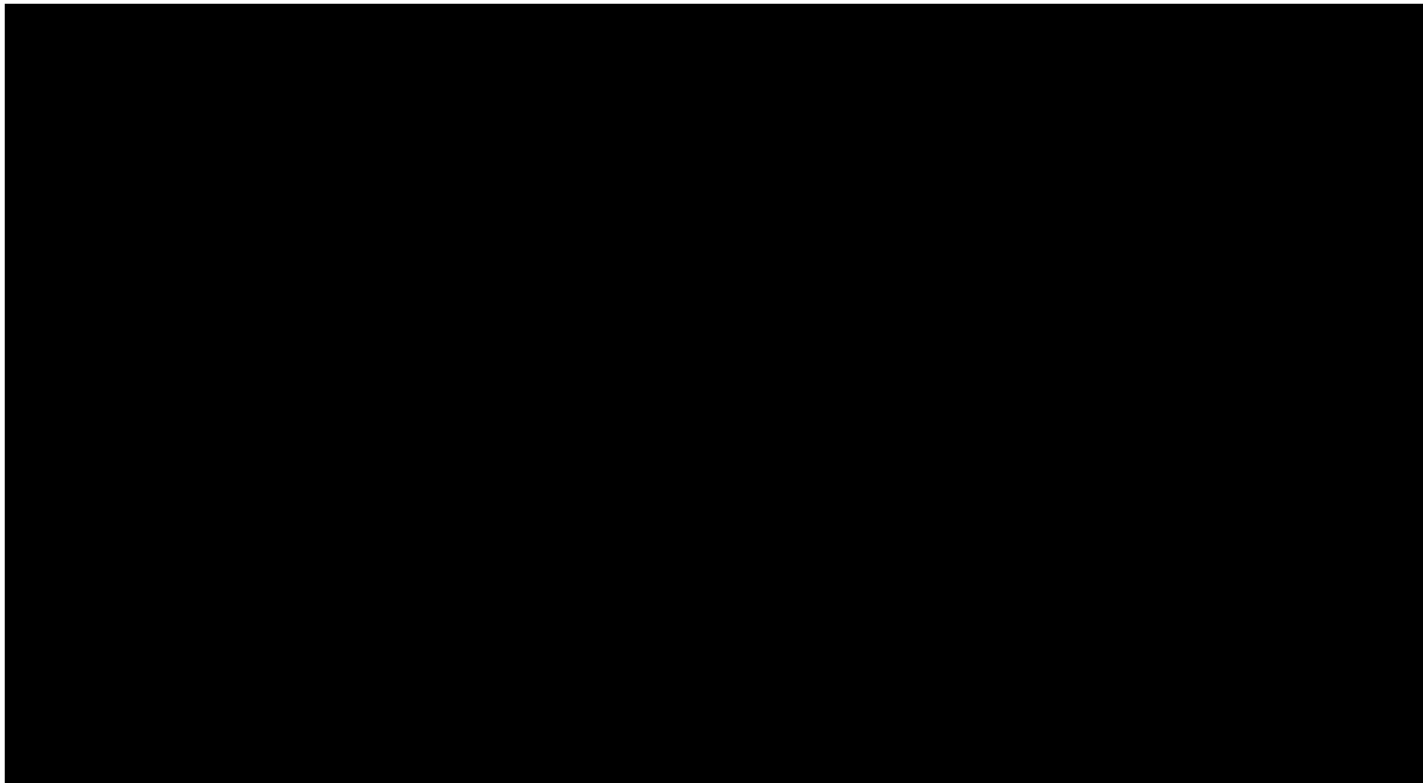
# Airport Inspection Night Operations



# Airport Inspection



# Airport Inspection





# Construction Site Monitoring

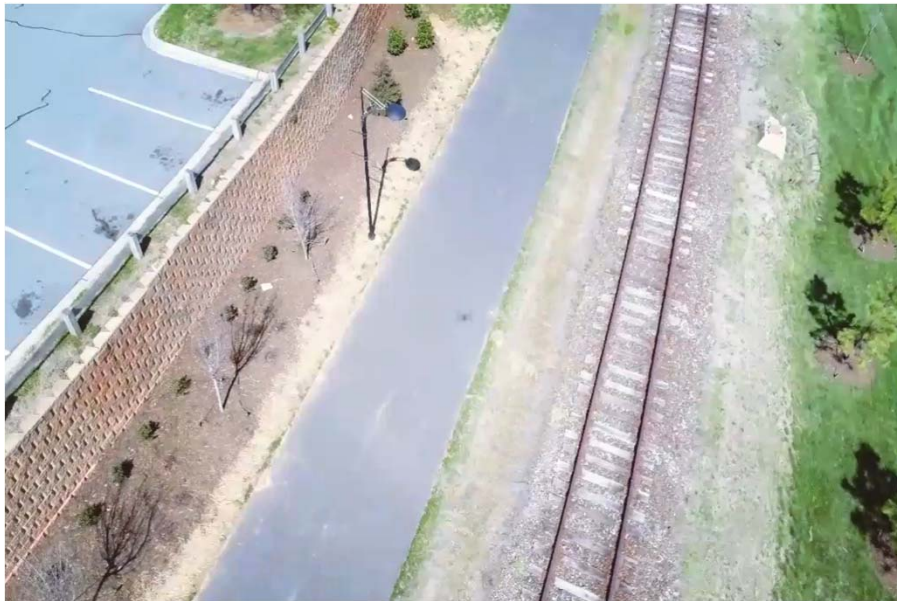


# Traffic Monitoring





# Rail Corridor Mapping



# Bridge Inspection

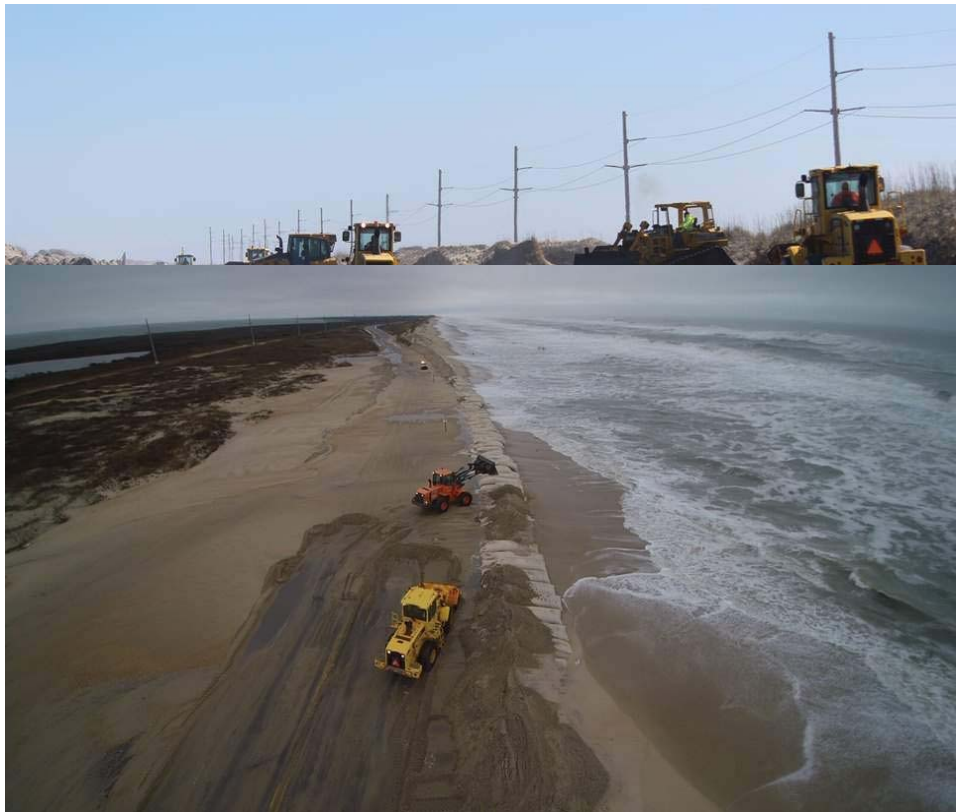




# Landslide Inspection



# Storm Damage Assessments





# Sub Aquatic Vegetation Mapping



# Environmental Applications

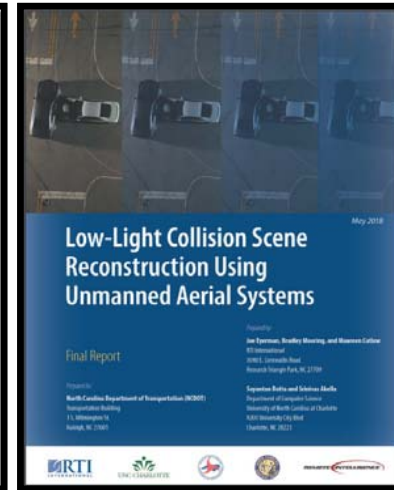
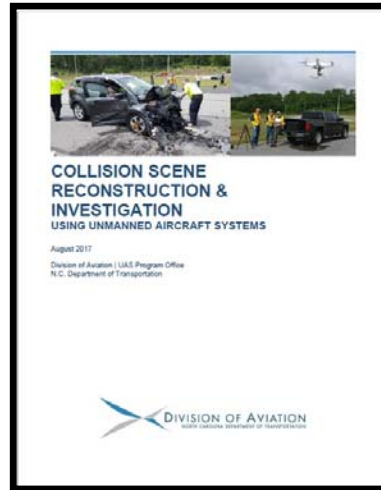
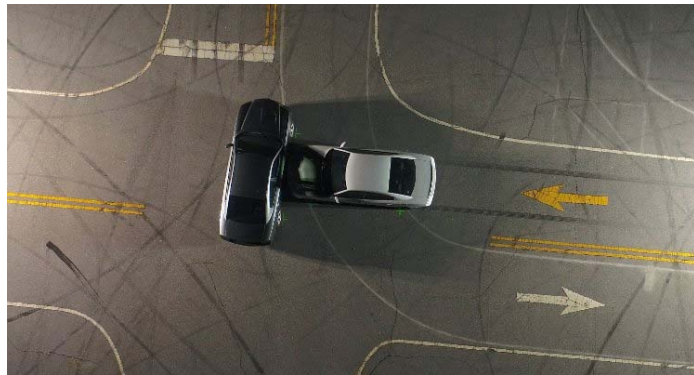
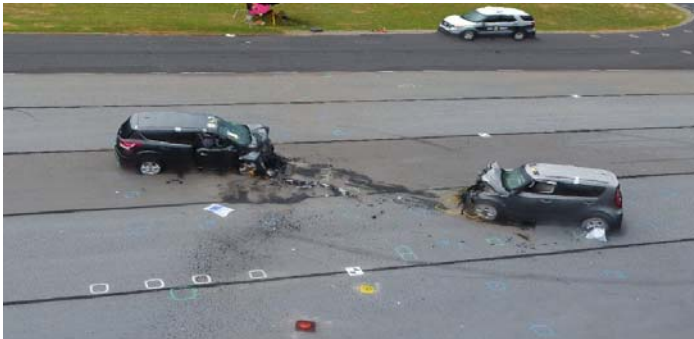




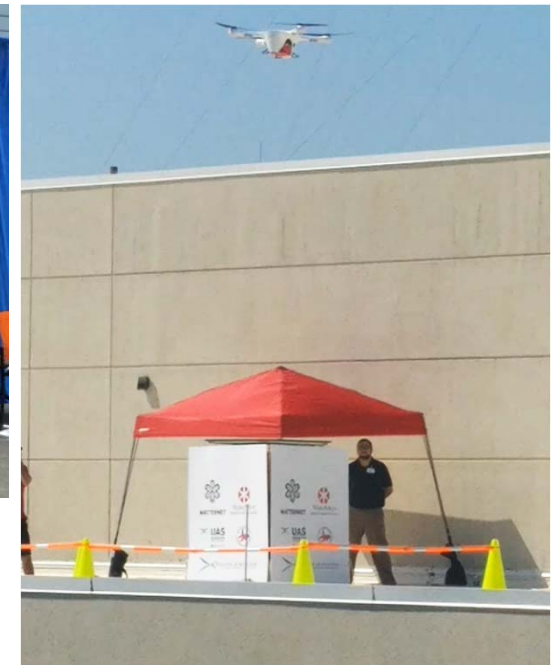
# Crash Scene Reconstruction



# Crash Scene Reconstruction



# NC Integration Pilot Program



North Carolina chosen as 1 of 10 UAS IPP winner from 150 Applications nationwide, the winning proposal from the NCDOT was medical package delivery and package delivery

**August 29<sup>th</sup> First Medical Package Delivery Flight in North Carolina**



# Post Hurricane Drone Video





# NCDOT UAS Command Center



## State Agency Partners

- NC Dept. of Transportation
- NC Dept. of Public Safety
- NC State Highway Patrol
- NC Public Safety Drone Academy

## On-Call Consultants

- Dronescape
- North State Engineering
- PrecisionHawk
- SM&E

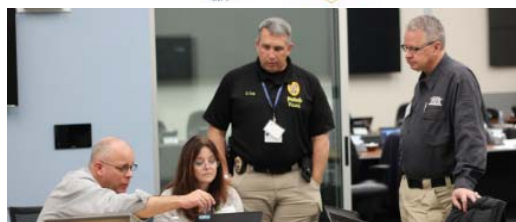
# Post Hurricane Success

NCDOT's UAS Program Office clearly demonstrated its value in its first test in a disaster situation:

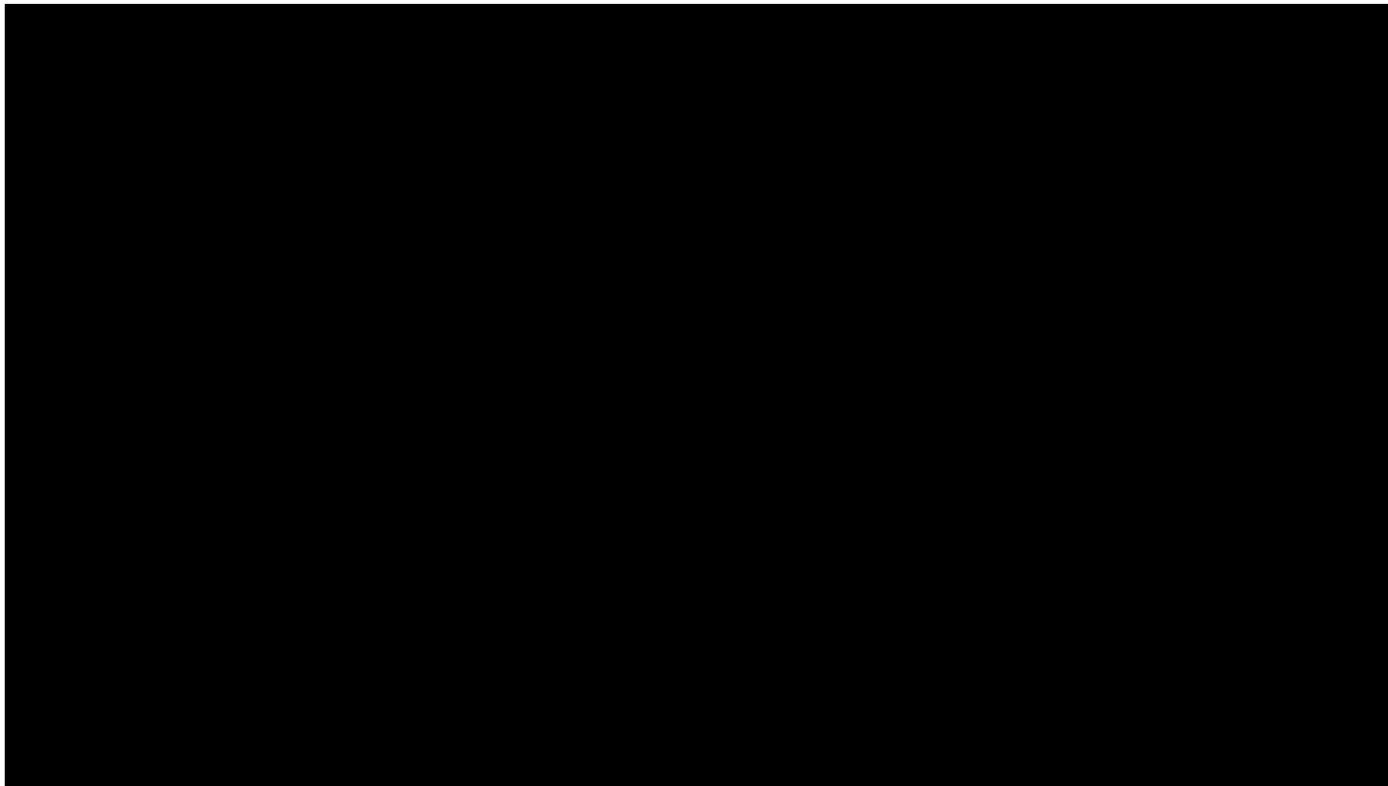
- Communicate conditions to the public to get people off the road.
- Monitor evacuation routes and traffic.
- Gather and push real-time information on infrastructure and road conditions.
- Post-storm damage assessment to plan for repairs.
- Coordinate with both state agencies and private sector UAS teams for efficient and safe operations

# NC UAS Working group

The group will work with FEMA, NOAA, FAA, Civil Air Patrol during time of disaster. The group will help establish a collaborative environment where local, state, federal and private sector UAS partners can share best practices, participate in state and regional UAS exercises and establish working relationships that can be leveraged during times of disaster and to promote the UAS technology within our state.



# NCDOT Drone Safety video



# NC Flight Team



**Thomas Walls**  
NC Department of  
Transportation



**Trooper Brian Leventhal**  
NC State Highway Patrol



**Sergeant John Collins**  
NC State Highway  
Patrol



**Riley Beaman**  
NC Public Safety Drone  
Academy



**Jeremy Strafford**  
Ideal Blasting





**NORTH CAROLINA**  
Department of Transportation

For more information visit  
<https://www.ncdot.gov/divisions/aviation/uas/>  
UAS Program Office  
Email - [UAS@ncdot.gov](mailto:UAS@ncdot.gov)  
Phone - 919-814-0550



<https://connect.ncdot.gov/resources/Pages/Aviation-Division-Resources.aspx>



**Basil Yap**  
UAS Program Manager  
(919) 814-0572  
[bkyap@ncdot.gov](mailto:bkyap@ncdot.gov)

**Darshan Divakaran**  
UAS Program Engineer  
(919) 814-0584  
[ddivakaran@ncdot.gov](mailto:ddivakaran@ncdot.gov)

**Tom Walls**  
UAS Technical Trainer  
(919) 814-0555  
[tmwalls@ncdot.gov](mailto:tmwalls@ncdot.gov)