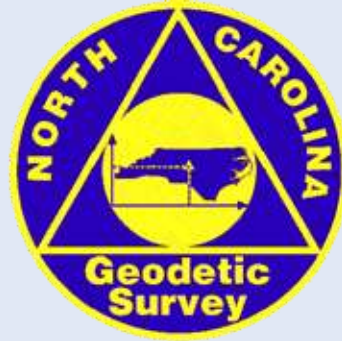


# *NCGS: Positioning NC today and for the future!*



## **North Carolina Geodetic Survey**

March 24, 2017

# Project to Re-establish NC-SC State Line

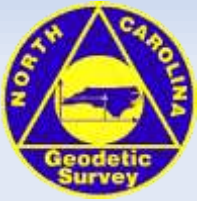


Line	NC-SC State Line Segments	Miles
A - B	Commissioners Rock to Indian Camp Mt.	54
B - C	Indian Camp Mt. to Block House	54
C - D	Block House to Lake Wylie Stone	67
D - E	Center Line of Old Catawba River Bed	8
E - F	Lake Wylie to North Corner	30
F - G	North Corner to 1905 Marlboro County Break Point Monument	64
G - H	Marlboro County SE - NW Line	18
H - I	Dillon County Line	31
I - J	Horry County Line	42

Total 334 miles

## May 6, 2013 Status

- Re-established boundary approved by the NC-SC Joint Boundary Commission 82 miles
- Re-established boundary tentatively approved by the NC-SC Joint Boundary Commission 252 miles



# County Boundary Surveys in Progress

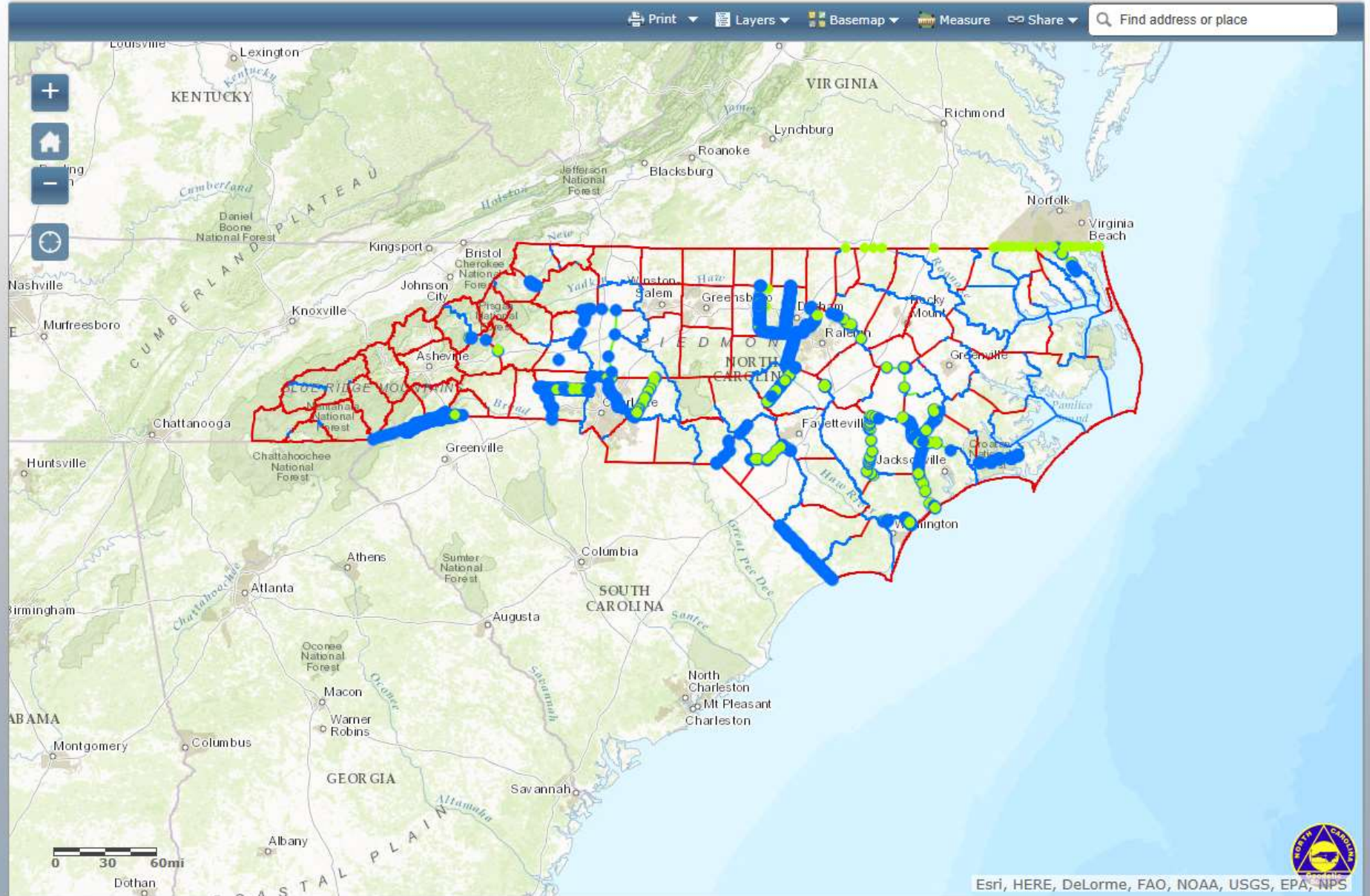
- Mitchell-Yancey
- Cabarrus – Rowan (report submitted to the counties)
- Harnett – Wake
- Chatham – Harnett – Wake
- Alamance – Guilford
- McDowell – Mitchell
- Jackson – Macon
- Davie – Yadkin
- **Bladen – Columbus – Brunswick**
- **Greene – Lenoir (plats recorded)**
- Granville – Franklin
- Rutherford - Polk



**North Carolina Emergency Management**



# NC State and County Boundary Status





# EDMI Baselines



- Replace/Check/Add EDM I baselines
  - Asheville (replaced with new baseline near Rosman)
  - Maxton (replaced)
  - Marion (check)
  - Jefferson (check w/updated information)
  - Smithfield (check w/updated information)
  - Whiteville (check)
  - Maple (check)
  - Star (new baseline installed)
  - Rockingham County (new baseline installed)
  - Statesville (replaced)
  - Sylva (check)

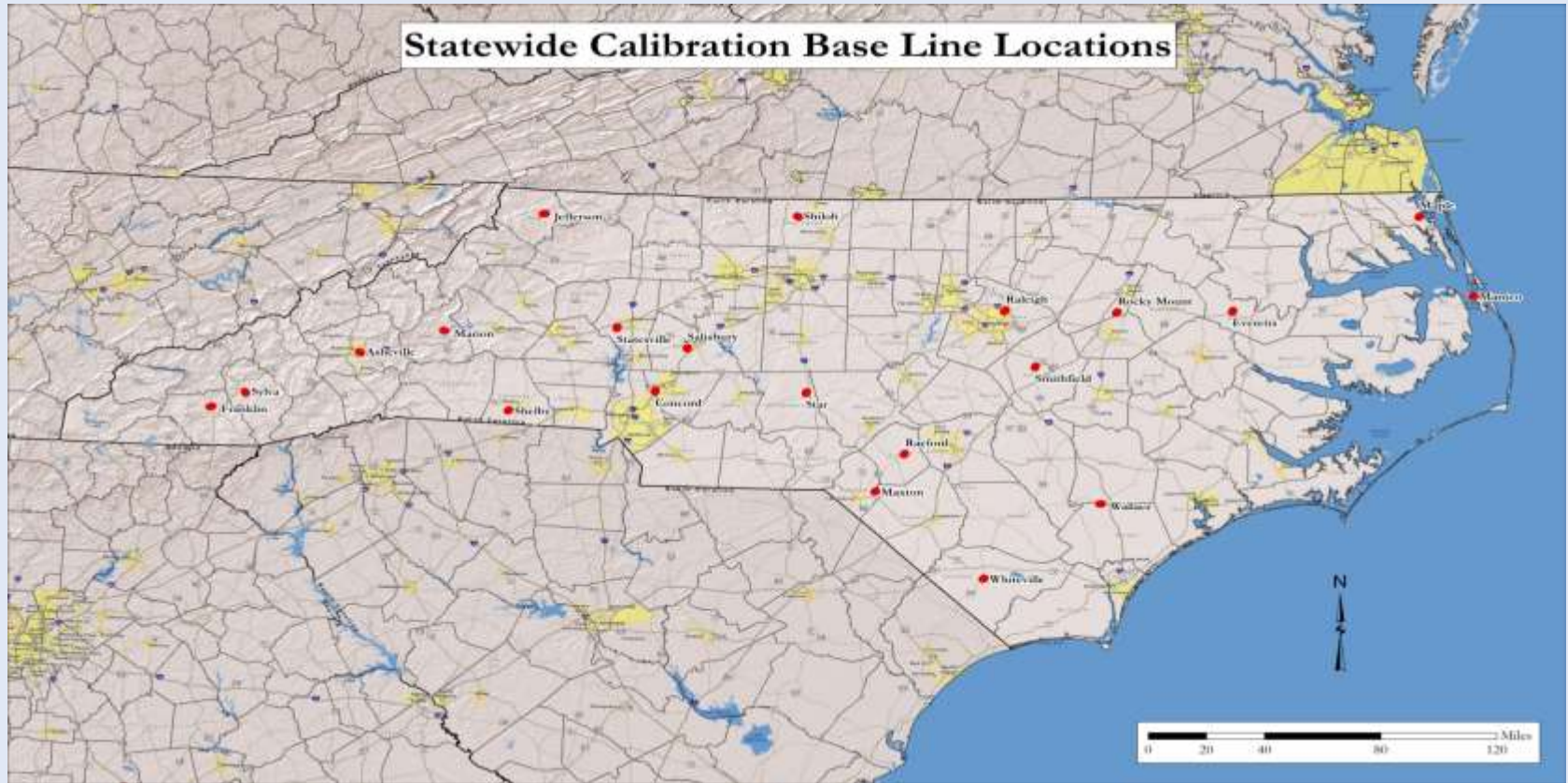


**North Carolina Emergency Management**





# EDMI Baselines



North Carolina Emergency Management



# Rosman Baseline



**North Carolina Emergency Management**



# EDM Calibration: EDMCheq

Press the 'Help' button for detailed instructions on running the program.

The screenshot shows the 'NC DOT, PCEdMChq (EDM Calibration)' window. It features several sections: 'Source for Published Baseline Distances' with radio buttons for 'From File' and 'Predefined', a dropdown menu for 'Existing NC Baselines' (set to 'Asheville EDM Calibration Baseline'), and 'Open' and 'Load' buttons. Below is the 'Measured Distances' section with a 'Measured EDM File' field and 'Open' and 'New' buttons. The 'Input' section contains two large text areas for 'Published' and 'Measured' data, each with 'Save' and 'Save As' buttons. At the bottom of the input section are fields for 'Date/Time' (Date and Time), 'EDM Error' (Constant Err. (mm) and PPM Err.), and 'Comments' (Comment and EDM Description). A large empty text area is at the bottom of the window. The footer contains 'Save As', 'Help', 'About', 'Process', and 'Cancel' buttons.



# Instructional videos (Geodetic News)

Friday, September 9, 2016

**A pair of short, informative videos about EDM I baselines are now available. The videos can be accessed by clicking the links below:**

[EDMI Basics](#)

[EDMI Locations and Procedures](#)

The link below allows the user to download the NCDOT EDM I check program as a zipped file.

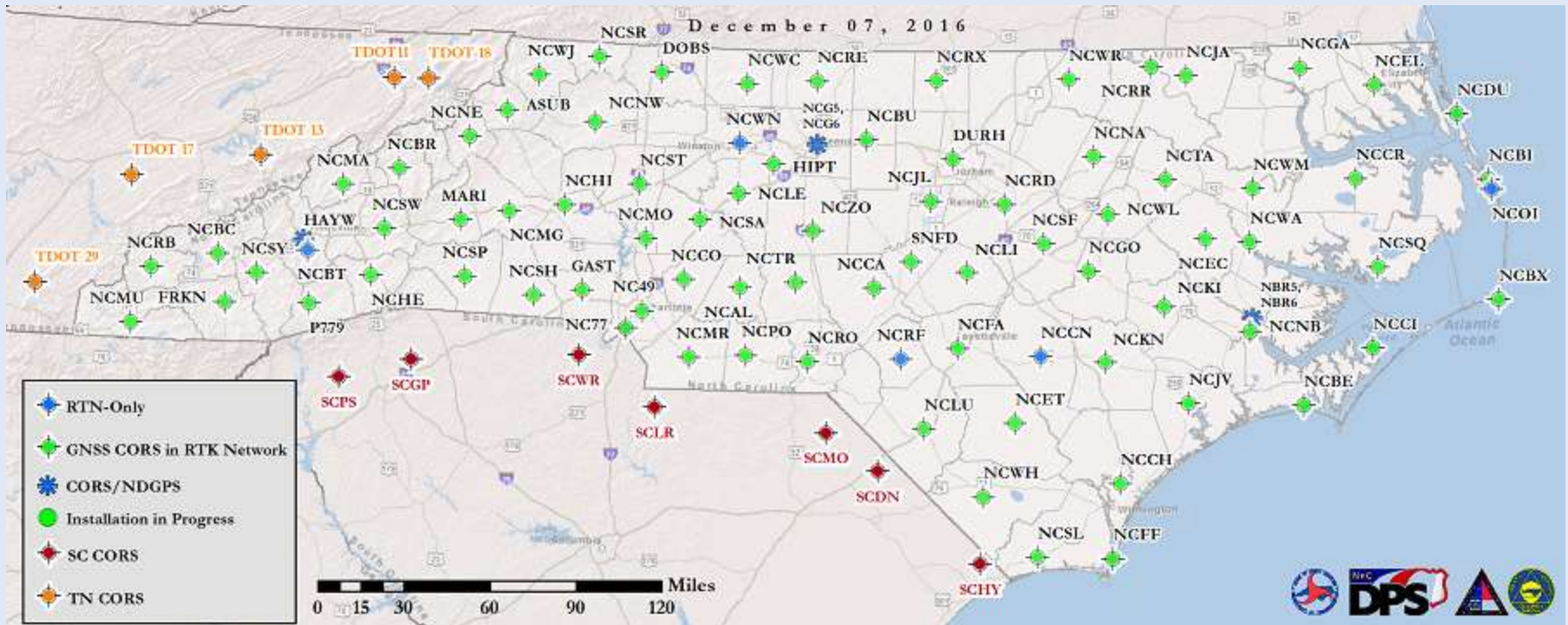
[NCDOT EDM I Check Program](#)



**North Carolina Emergency Management**



# NC CORS Network



<http://geodeticsurvey.nc.gov/Pages/CORS-and-GNSS.aspx>



North Carolina Emergency Management



# NGS CORS 70 km Policy

- NGS CORS 70km policy
  - Four (4) replacement CORS not accepted by NGS
    - NCBT (Bethel)
    - NCWN (Winston Salem)
    - NC49 (University of NC at Charlotte)
    - NCCN (Clinton)
  - One (1) new CORS (NCRF) not accepted by NGS
  - Two (2) CORS not submitted to NGS (NCRR)
    - NCRR (Roanoke Rapids)
    - NCOI (Oregon Inlet)
  - Will the NCSQ replacement be accepted by NGS?



**North Carolina Emergency Management**



# NC CORS Network

---

- Continuously Operating Reference Station (CORS)
  - A permanent and continuously recording Global Navigation Satellite System (GNSS) receiver, antenna (with a surveyed reference position), & support equipment
    - Composed of 94 CORS
    - 2 new CORS installation in progress
      - Dare County (Oregon Inlet) ✓
      - Replacement of NCSQ in progress
    - Upgrades in 2015
      - Bodie Island (NCBI)
      - Washington 2007 (NCWA)
      - Jacksonville (NCJV)



North Carolina Emergency Management



# NCOI

---



# NCOI

---





# NC CORS Network



- Continuously Operating Reference Station (CORS)
  - CORS upgraded in 2017
    - Goldsboro (NCGO)
    - Nashville (NCNA)
    - Tarboro (NCTA)
    - Elizabethtown (NCET)
    - Fort Fisher (NCFF) 



# NC CORS Network

- Testing weather sensor to support FIMAN
  - Installed a weather sensor at the ASUB CORS

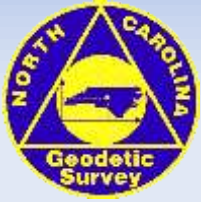
- RINEX Meteorological Data File



```

2.11 METEOROLOGICAL DATA RINEX VERSION / TYPE
teqc 2016Apr1 20161231 01:04:16UTC PGM / RUN BY / DATE
OSX ker:10.10.3|Core i5|gcc 4.3 -m64|OSX ker:10.10+|=+ COMMENT
41 MARKER NAME
41 MARKER NUMBER
7 PR TD HR WS WD RI HI # / TYPES OF OBSERV
0.0 PR SENSOR MOD/TYPE/ACC
0.0 TD SENSOR MOD/TYPE/ACC
0.0 HR SENSOR MOD/TYPE/ACC
0.0 WS SENSOR MOD/TYPE/ACC
0.0 WD SENSOR MOD/TYPE/ACC
0.0 RI SENSOR MOD/TYPE/ACC
0.0 HI SENSOR MOD/TYPE/ACC
0.0000 0.0000 0.0000 0.0000 PR SENSOR POS XYZ/H
END OF HEADER
16 12 30 3 0 0 898.8 0.0 50.0 2.0 15.0 0.0 0.0
16 12 30 3 1 0 898.8 -0.1 50.5 1.8 337.0 0.0 0.0
16 12 30 3 2 0 898.9 -0.1 50.8 4.6 338.0 0.0 0.0
16 12 30 3 3 0 898.9 -0.2 50.7 1.5 330.0 0.0 0.0
16 12 30 3 4 0 898.8 -0.2 51.0 2.4 25.0 0.0 0.0
16 12 30 3 5 0 898.8 -0.2 51.3 1.4 275.0 0.0 0.0
16 12 30 3 8 0 899.0 -0.1 51.7 1.6 348.0 0.0 0.0
16 12 30 3 9 0 898.9 -0.1 52.7 2.1 25.0 0.0 0.0
16 12 30 3 10 0 898.9 -0.2 53.9 0.9 351.0 0.0 0.0
16 12 30 3 11 0 898.9 -0.3 55.5 1.6 223.0 0.0 0.0
16 12 30 3 12 0 898.9 -0.4 56.0 0.8 147.0 0.0 0.0
16 12 30 3 13 0 898.9 -0.5 56.4 2.2 324.0 0.0 0.0
16 12 30 3 14 0 898.8 -0.6 56.0 1.7 259.0 0.0 0.0
16 12 30 3 15 0 898.8 -0.6 55.1 0.9 332.0 0.0 0.0
16 12 30 3 16 0 898.8 -0.6 55.1 4.3 344.0 0.0 0.0
16 12 30 3 17 0 898.7 -0.6 54.6 3.3 17.0 0.0 0.0
16 12 30 3 18 0 898.7 -0.6 54.4 1.3 57.0 0.0 0.0
    
```





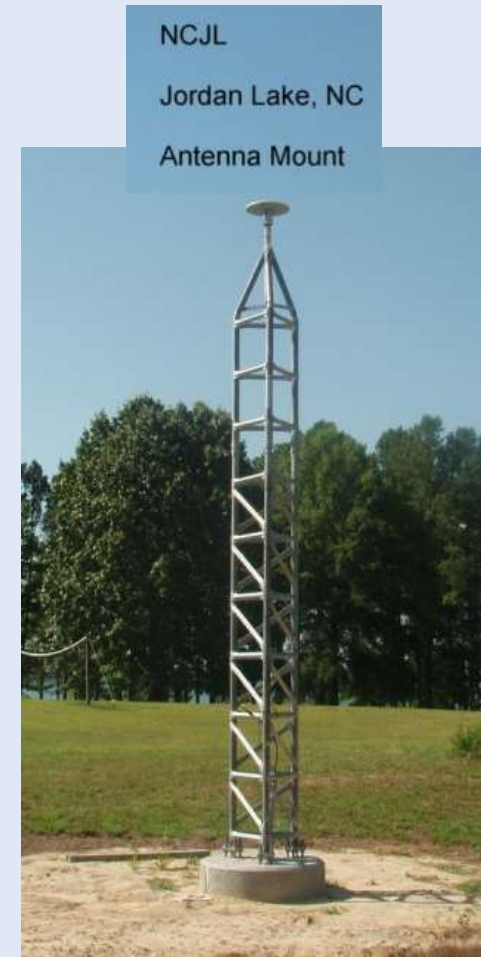
# NC CORS Network



- Continuously Operating Reference Station (CORS)

- NC CORS Network

- Partnering with NCDOT install a CORS near Rodanthe (solar powered)
- Working with US Coast Guard to transfer the Greensboro NDGPS CORS infrastructure to NCGS
- CORS/NCRTN backup server system installed (operational)
- Will upgrade the system in 2017 to support L5 and Galileo



# NC CORS Network

- Working with NC Department of Agriculture to obtain funding from Tobacco Trust Fund (equipment replacement)
- CORS GNSS receiver information
  - 83 CORS operated by NCGS
    - 76 are National CORS
    - 65% of receivers are > 5 years old
  - Types of GNSS receivers
    - NetR9 = 21
    - NetR5 = 61
    - NetRS = 1



North Carolina Emergency Management





# NC CORS GNSS Receiver Age

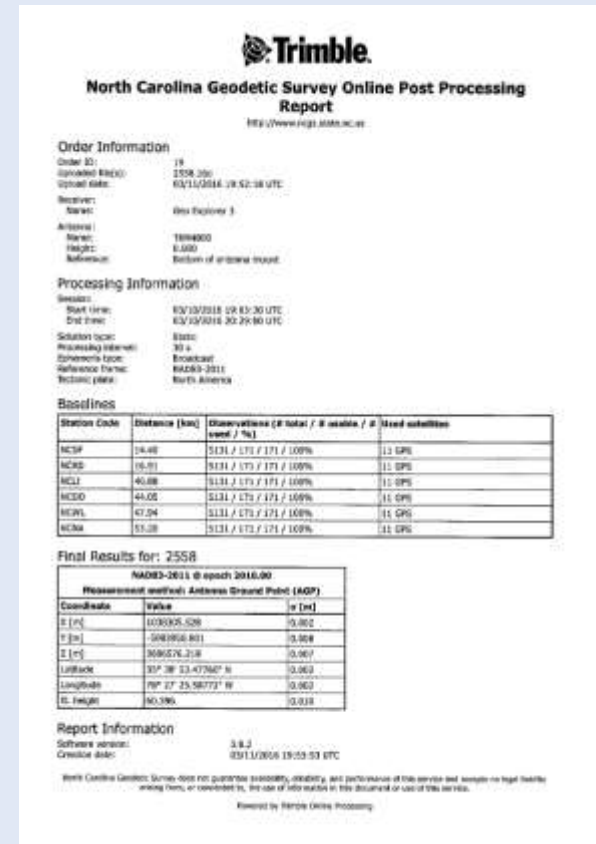


North Carolina Emergency Management



# NC CORS Network

- Tested Trimble PIVOT post processing application
  - Can be put into operational status when needed
  - Similar to OPUS, but with less options



North Carolina Emergency Management



# Virtual Reference Station



North Carolina Geodetic Survey

North Carolina GNSS Real Time Network

- Home
  - Sensor Map
  - Position Scatter Plot
  - Status Messages
  - Network Information
    - 195 Ionosphere
    - IRIMGRIM
  - Reference Data Shop
  - My Account
    - Personal Data
    - Change Password
    - Logins
    - Sessions
  - Active Subscriptions
  - Administration
    - Status Messages
      - Add Status Messages
      - Edit Status Messages
    - Regions
      - Add Regions
      - Edit Regions
    - User Management
      - User Management
      - Create User
      - Approve Users
      - Export e-mail addresses
      - Extended User Info
        - Extended User Info
        - Info Fields
        - Add Field

## Reference Data Shop - Virtual Reference Station

Enter the coordinates of a virtual reference station or drag the marker to the desired location on the map. You can switch between the geographical and geocentric coordinate system.

### Virtual Reference Station - Geographical Position

Latitude:\*   N  S

Longitude:\*   E  W

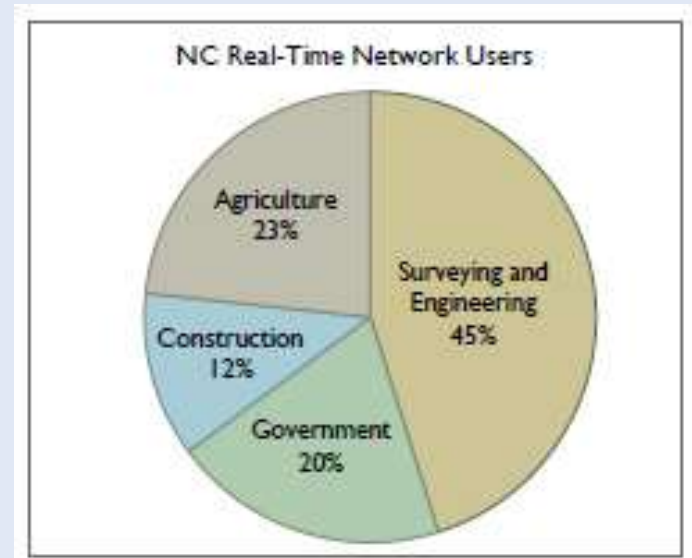
Elevation:  m

\* You can enter the geographical coordinates in three formats:

- Deg Min Sec Example: 45 1 21.60
- Deg Min Example: 45 1.36
- Deg Example: 45.02267

# 2016 Economic CORS Benefits

- 2017 economic benefits report available April 2017
- New Real Time Network (RTN) users in 2016 as of 11/30/16
  - 167
  - January 2017 = 17
  - February 2017 = 30



# RTN port request

NCEM - Geospatial and Technology Management  
**NORTH CAROLINA GEODETIC SURVEY**  
Positioning North Carolina today and for the future.

Home About NCGS Geodetic Control **CORS and GNSS** County and State Boundaries Library Other Programs Tools Web Page

NCGS

**Geodetic News**  
**Cabarrus-Stanly County Boundary Recorded**

Monday, June 30, 2014

The Cabarrus-Stanly County Boundary resurvey has been approved and recorded.

Cabarrus County Register of Deeds:

- Plat Book 66, pages 25-29

Stanly County Register of Deeds:

- Plat Book 23, pages 290-293

**Unmanned Aircraft Systems Forum**

Monday, June 02, 2014

**AGENDA**  
Unmanned Aircraft Systems (UAS) Forum

June 12, 2014  
9:00 a.m. to 12:15 p.m.

Magnolia Building (#15 on the campus map), rm #103  
Asheville-Buncombe Tech  
340 Victoria Rd (Google coords: 35.570079, -82.557235)  
Asheville, NC 28801

**North Carolina Geodetic Survey**  
North Carolina GNSS Real Time Network

> Home > Register

**Create Account**  
Register a new account:

**Personal Data**

First Name:

Last Name:

Address:

Zip Code:

City:

District:

Country:

E-Mail:

Separate multiple e-mails by ", "

Additional E-Mail:

Phone Number Home:

Phone Number Business:

Phone Number Mobile:

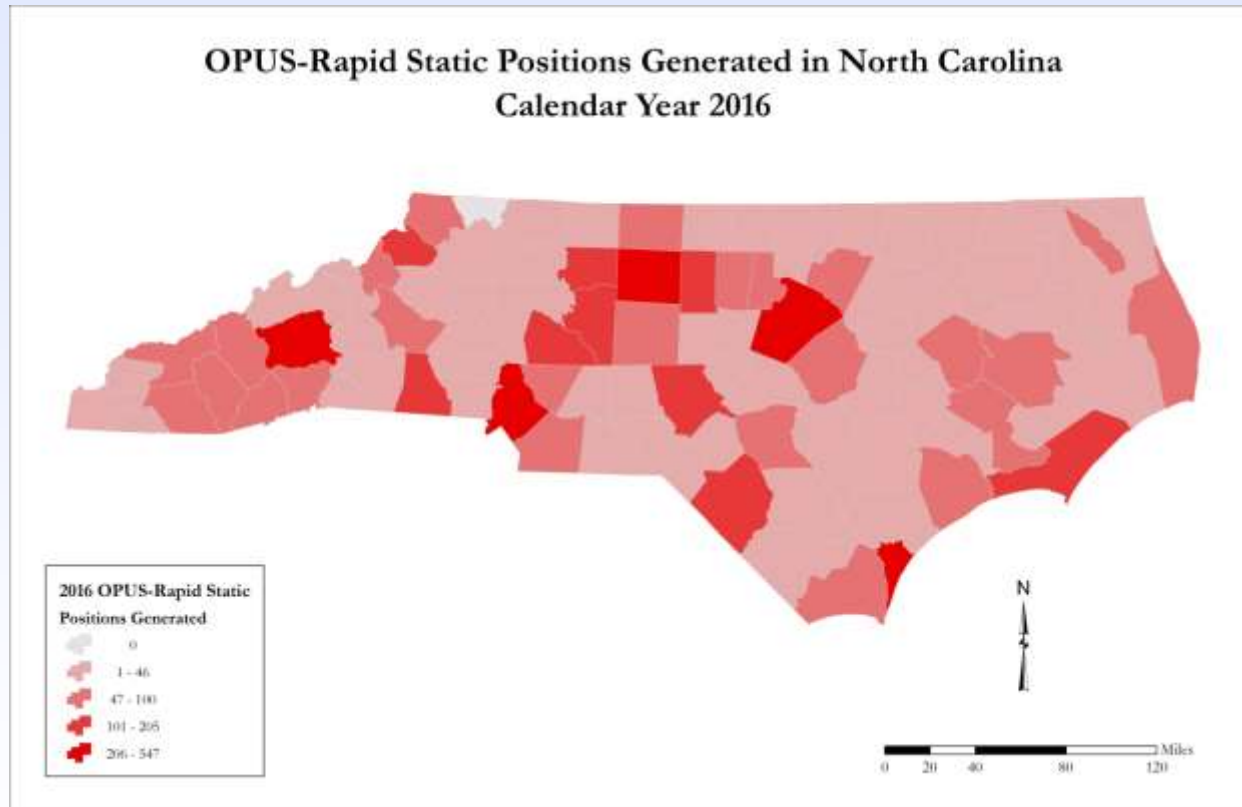
GSM Phone Number for TNC:

Language: English (en-US)

Next

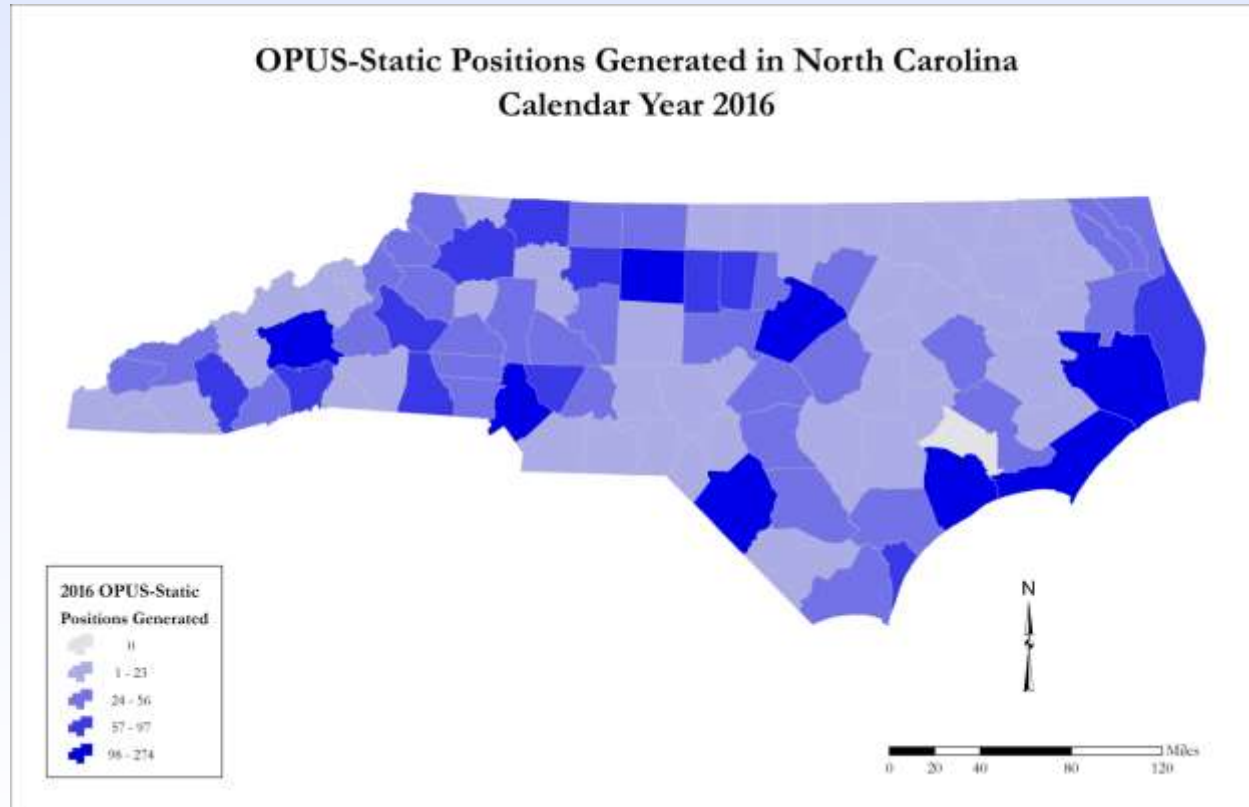
<http://geodeticsurvey.nc.gov/Pages/CORS-and-GNSS.aspx>

# 2016 OPUS-RS



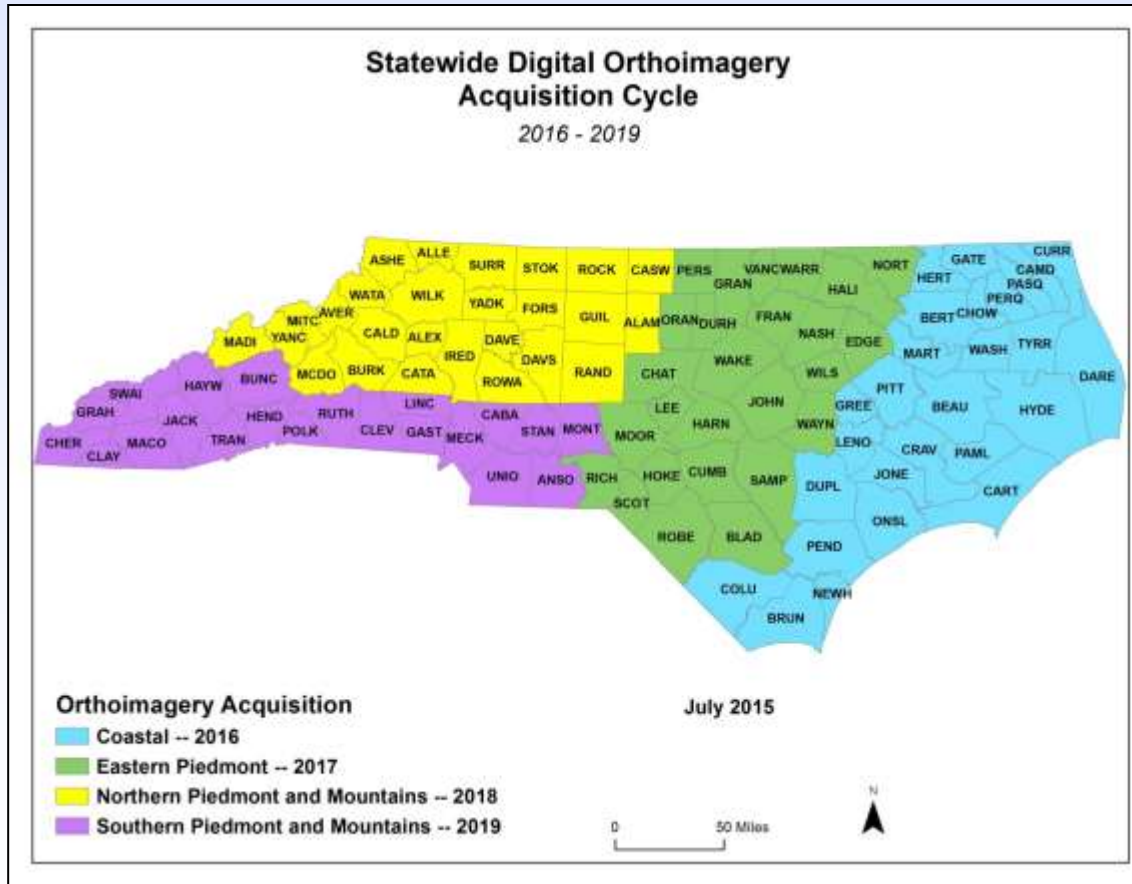


# 2016 OPUS-S



# Statewide Imagery

Project <https://nconemap.maps.arcgis.com/apps/MapSeries/index.html?appid=c503fa08ae9744b3b3c307457a231db2>

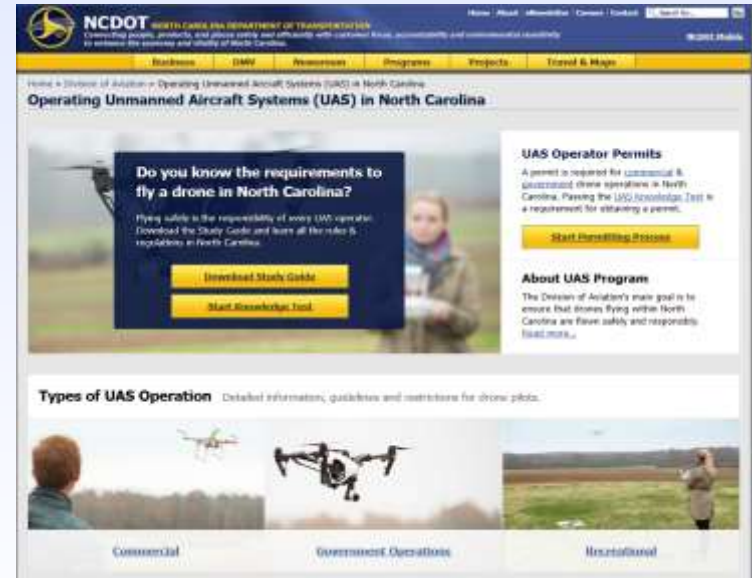


**North Carolina Emergency Management**



# NC UAS regulations

- **A permit is required for commercial & government UAS operations in NC**
  - Requires a UAS operator to pass a test covering the following NC General Statutes:
    - Chapter 63 – Aeronautics
      - §63-95 Training required for operations of UAS
      - §63-96 License required for commercial operation of UAS
    - Chapter 15A – Criminal Procedure
      - §15A-300.1 Restrictions on use of UAS
      - §15A-300.2 Regulation of launch and recovery sites



<https://www.ncdot.gov/aviation/uas/>  
[https://www.ncdot.gov/aviation/download/UAS\\_Memo.pdf](https://www.ncdot.gov/aviation/download/UAS_Memo.pdf)

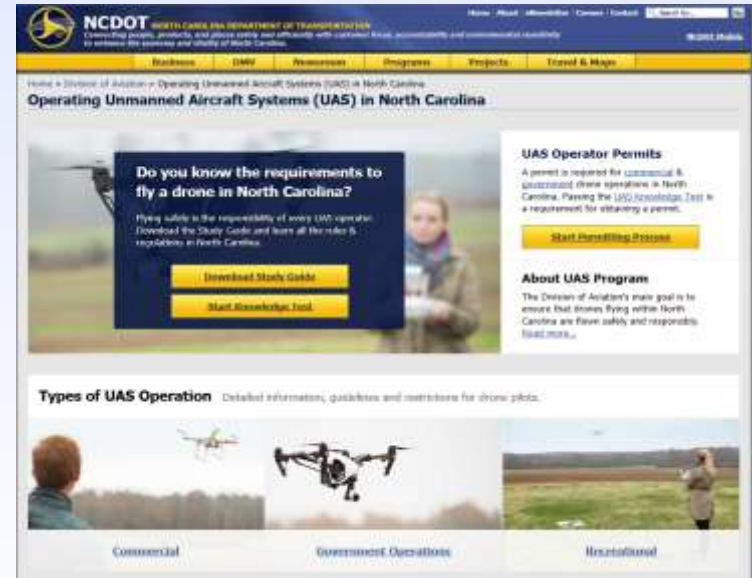


**North Carolina Emergency Management**



# NC UAS regulations

- **A permit is required for commercial & government UAS operations in NC**
  - Requires a UAS operator to pass a test covering the following NC General Statutes:
    - Chapter 14 – Criminal Law
      - §14-7.45 Crimes committed by use of UAS
      - §14.280.3 Interference with manned aircraft by UAS
      - §14.401.24 Unlawful possession and use of UAS (Weapon attached)
      - §14.401.25 Unlawful distribution of images
    - Chapter 113 – Conservation and Development
      - §113-295 Unlawful harassment of persons taking wildlife resources



<https://www.ncdot.gov/aviation/uas/>  
[https://www.ncdot.gov/aviation/download/UAS\\_Memo.pdf](https://www.ncdot.gov/aviation/download/UAS_Memo.pdf)



**North Carolina Emergency Management**



# Unmanned Aircraft Systems (UAS)

- Next Generation Air Transport (NGAC)
  - Performing test flights at Lake Wheeler
- NC A+T State University (School of Technology/Geomatics)
  - Performing test flights at the NC A+T State University farm
  - Determine the accuracy of imagery collected with a UAV
- NC Forest Service (DuPont State Forest)
  - MOA signed
  - Site will be used for multi-rotor test flights
- Public Safety Blanket COA approved by FAA
  - Performed operational flights to support:
    - Hurricane Matthew
    - Western NC forest fires

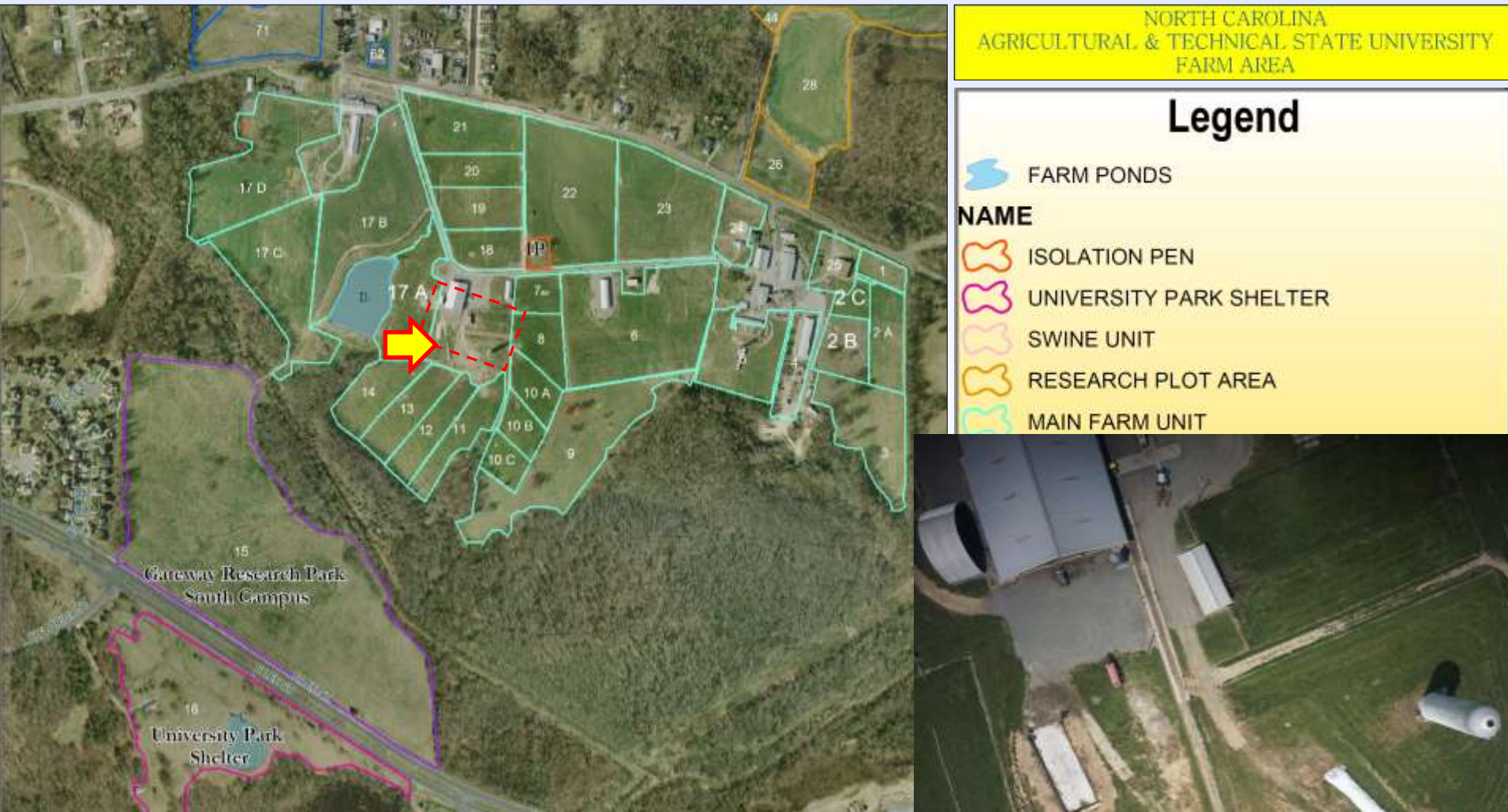


**North Carolina Emergency Management**



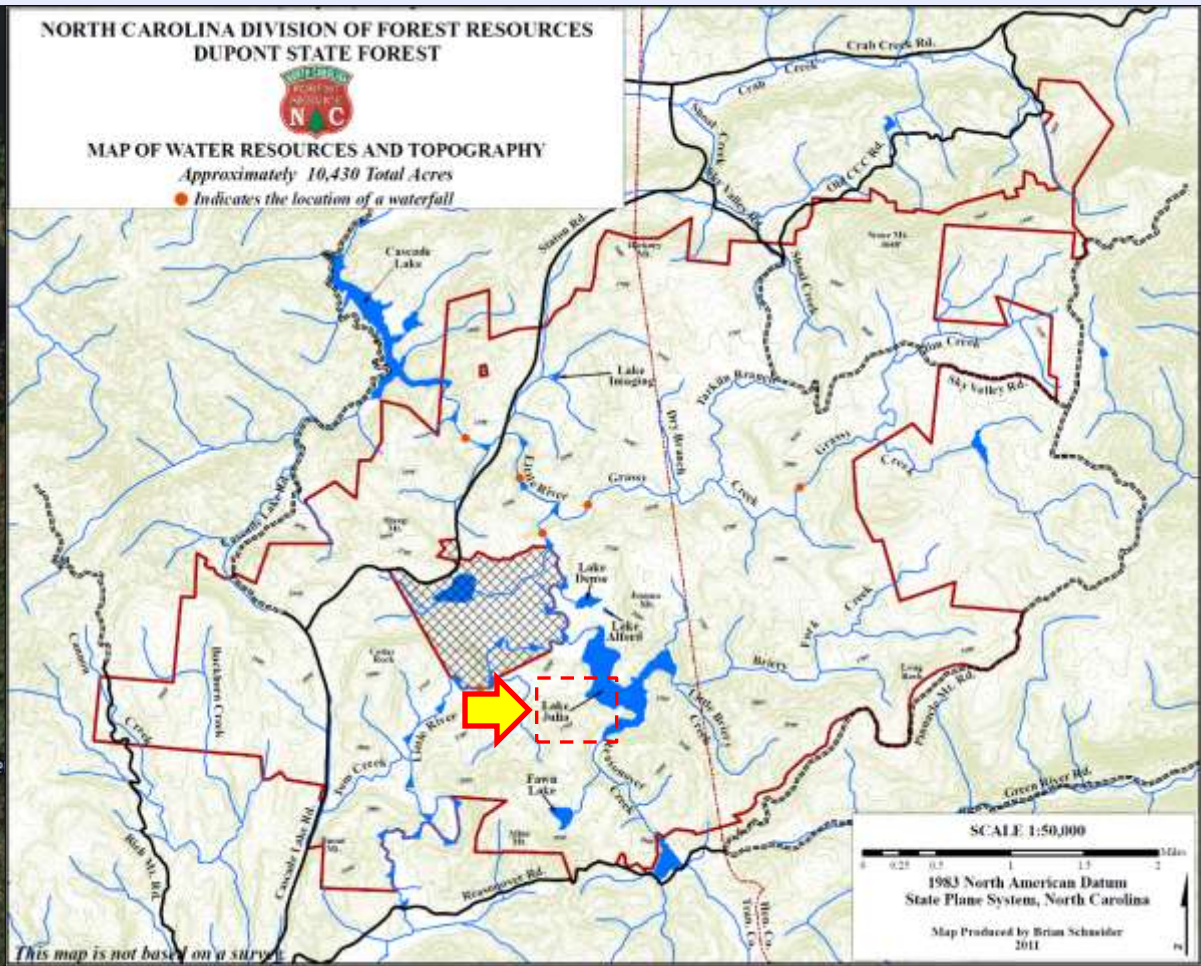
# NCEM has partnered with N.C. A&T State University

- Performing UAS test flights at the N.C. A&T farm located east of Greensboro



# NCEM has partnered with the NC Forest Service

- Will perform UAS test flights at the DuPont State Recreational Forest, which is a 10,430 acre forest located in Henderson and Transylvania counties



# Hurricane Matthew Unmanned Aircraft Vehicle (UAV) Imagery



North Carolina Emergency Management





# Instructional videos

- NC – SC Boundary ✓
- NC Geodetic Survey Database ✓
- EDM I Basics ✓
- EDM I Locations and Procedures ✓
- NC Real Time Network
- NC VRS Post Processing Application
- Mount Mitchell Height Determination
- Grid – True – Magnetic Bearings



North Carolina Emergency Management



# NCEES CPC Tracking Tool



**NCEES**  
*advancing licensure for  
engineers and surveyors*



**MyNCEES**

[home](#) [about](#) [engineering](#) [surveying](#) [licensure](#) [news](#) [contact](#)

## CPC Tracking

Most [state licensing boards](#) require licensed engineers and surveyors to meet a continuing professional competency (CPC) requirement to renew their license. You can conveniently track and report your CPC requirements for free through your [MyNCEES](#) account.

### How to track your CPC courses and requirements

1. Identify the [state licensing board\(s\)](#) for which you would like to track CPC requirements. Log into your [MyNCEES](#) account and select CPC Tracking to select the appropriate state licensing boards and enter renewal period information for each.
2. Enter CPC course information  
When you complete a continuing education course, add the course information and corresponding professional development hours (PDH). Supporting documentation can be uploaded to your account and the course and PDHs will be applied to the appropriate states.
3. Track your progress  
View a side-by-side comparison of the state's requirements and your completed CPC courses.
4. Transmit your completed CPC report  
Send your CPC transcript electronically to a state licensing board. Check with your state licensing board for specific requirements.

**get started**

https://account.ncees.org/cpc/all

Most Visited | NCEES | Travel | Personal | Technical Society | Pearson | Clemson University | Google | Projects | Weather Forecast Cl... | Fcbr Dashboard | Day M... | Indiana Cookies | La... | Deter Det Week The...

**CPC Tracking** Edward McDowell ID: 15-729-44

**Courses** [+ Add Course](#)

Sort by date | Sort by area

Date	Course	Area	Hours	
			<b>2016</b>	<b>18.0 hours</b>
06/27/2016	An Introduction to BIM and Automated Specifications	Technical	1.0	<a href="#">View</a>
06/27/2016	The Seven Success Secrets for Super Project Managers	Business Practice	1.5	<a href="#">View</a>
06/24/2016	NSPE Annual Conference	Technical	4.0	<a href="#">View</a>
06/24/2016	NSPE Annual Conference	Ethics	2.0	<a href="#">View</a>
06/23/2016	NSPE Annual Conference	Business Practice	4.0	<a href="#">View</a>
04/18/2016	National Academy of Engineering Convocation	Technical	3.5	<a href="#">View</a>
01/22/2016	Radiant Heating Design and Controls	Technical	1.0	<a href="#">View</a>
01/21/2016	Total Bathroom Design	Technical	1.0	<a href="#">View</a>
			<b>2015</b>	<b>7.5 hours</b>
07/07/2015	The Future of the Professional Engineer	Ethics	1.5	<a href="#">View</a>
07/16/2015	Licensure and Our Obligations	Ethics	1.5	<a href="#">View</a>
07/07/2015	Snow and Ice Melting Systems	Technical	1.0	<a href="#">View</a>
04/20/2015	National Academy of Engineering Convocation	Technical	3.5	<a href="#">View</a>
			<b>2014</b>	<b>6.5 hours</b>
10/07/2014	ASCE Annual Meeting Seminars	Technical	6.5	<a href="#">View</a>

**Boards** [+ Accepts NCEES Standard](#) [x](#)

South Carolina  
07/01/2014 - 06/30/2016

[Add Another Board](#)

**State Licensing Board**  
Each state licensing board for which you would like to track your CPC requirements must be added to your account. Click add a board above.

**Add Courses**  
Select "Add Course" to enter course information and upload supporting documentation. Individual courses will be applied to the appropriate state boards for tracking purposes and do not need to be entered more than once.

**CPC Registry Guidelines**  
Use of this Registry to enter, upload, and store information on completed CPC courses/activities does not guarantee that an individual jurisdiction's CPC requirements have been met. The user retains the responsibility of ensuring that CPC courses/activities have been properly accounted for, and that CPC requirements for each jurisdiction of licensure have been met, including details such as acceptability of courses, requirements for approved providers, required categories and number of hours, credit equivalency or conversion, renewal period requirements, and carry-over allowances.

[Privacy Statement](#) • [Terms of Use](#)

[Chat now](#)



R. B. GLENN  
 GOV. OF N. C.  
 J. E. PORCELL  
 C. E.  
 DEC. 1905



- Home
- About NCGS
- Geodetic Control
- CORS and GNSS
- County and State Boundaries
- Library**
- Other Programs
- Tools
- Kids Page
- Feedback

Home » **Library**

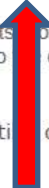


A complete library of NCGS documents is provided below. To help find documents more quickly, documents are categorized by NCGS program area and document type. Filter the list by clicking the down arrow next to the column name. To view a document, click the file name. The document can then be saved to your hard-drive.

Alternatively, download a document by hovering over the file name until a drop-down arrow appears to the right of the name. Click the arrow and then click Download.

You may also view a group of documents based on their type by clicking one of the links below. For example, click Presentations to view a list of all presentations in the library. The displayed list can be further filtered by selecting from the NCGS Program Area values.

Document Type	File Type	Name	Document Type	NCGS Program Area
Presentation		CORS	Presentation	CORS
		CORS	Presentation	CORS
		CORS_11_03_2012	Presentation	CORS
		NC_SC_Boundary_Western_NC	Presentation	County and State Boundaries
		NC_State_Boundary_Archives	Presentation	County and State Boundaries
		Duke_2014	Presentation	County and State Boundaries
		GNSS_Elevation_Certificates_v3	Presentation	GNSS
		NGAT UAS Overview Surveys Meeting April 14	Presentation	Library
		Experience with Non-Metric Cameras	Presentation	Library
		UAS Business	Presentation	Library
		2012 Coastal Imagery Project (1)	Presentation	NCGS



# Certified Floodplain Surveyor (CFS) Program

## FEMA Information for Surveyors

<https://www.fema.gov/information-surveyors>



## CFS Contacts

### NC NFIP Coordinator

John Gerber  
[jgerber@ncem.org](mailto:jgerber@ncem.org)

### NC FMP Program Director

John Dorman  
[jdorman@ncem.org](mailto:jdorman@ncem.org)

### NCFMP Program Manager

Tonda Shelton  
[tshelton@ncem.org](mailto:tshelton@ncem.org)

### Flood Risk Information System

Stacey Bobbitt  
[stacey.bobbitt@ncdps.gov](mailto:stacey.bobbitt@ncdps.gov)

### GIS and LiDAR Data

Hope Morgan  
[hope.morgan@ncdps.gov](mailto:hope.morgan@ncdps.gov)

### Letter of Map Change

Steve Garrett  
[steve.garrett@ncdps.gov](mailto:steve.garrett@ncdps.gov)  
John Gerber  
[jgerber@ncem.org](mailto:jgerber@ncem.org)

### NFIP Engineering

Dan Brubaker  
[dan.brubaker@ncdps.gov](mailto:dan.brubaker@ncdps.gov)

### NFIP Outreach & Training

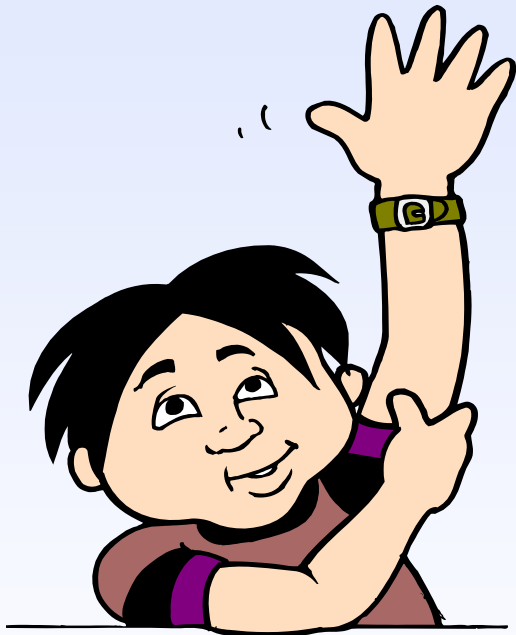
Randy Mundt  
[randy.mundt@ncdps.gov](mailto:randy.mundt@ncdps.gov)

### NFIP Planners

Milton Carpenter (Piedmont region)  
[milton.carpenter@ncdps.gov](mailto:milton.carpenter@ncdps.gov)  
Terry Foxx (Western region)  
[terry.foxx@ncdps.gov](mailto:terry.foxx@ncdps.gov)

# Questions?

---



Gary Thompson, PLS  
NC Geodetic Survey  
4105 Reedy Creek Road  
Raleigh, NC 27607

Main office: 919-733-3836  
Direct line: 919-948-7844

[gary.thompson@ncdps.gov](mailto:gary.thompson@ncdps.gov)