NCGS: Positioning NC today and for the future!

North Carolina
Geodetic Survey

Establishing and Maintaining
the Official Survey Base
in North Carolina

NC General Statutes on county boundaries

- **G.S. § 153A-17. Existing boundaries.**
  The boundaries of each county shall remain as presently established, until changed in accordance with law. (1973, c. 822, s. 1.)

- **G.S. § 153A-18. Uncertain or disputed boundary.**
  Provides directions and procedures for resurveying uncertain or disputed county boundary lines.

If adjacent counties along a boundary elect to change the county line from its original location (as defined by law), then ratification by the NC General Assembly is required.

G.S. 153A-18(a)
Resurvey of an uncertain county line

- Two or more counties may cause the boundary to be surveyed, marked, and mapped
- The participating counties may appoint special commissioners to supervise the surveying, marking, and mapping

Upon request of each county along the uncertain/ambiguous county line, the NC Geodetic Survey can provide assistance with resurveying the county line.

G.S. 153A-18(a)
Resurvey of an uncertain county line

- Each of the participating county's Board of Commissioners must ratify the resurvey with a resolution
- Each of the participating county's ratification resolution must be referenced on the map of resurvey with the following information: date & minutes page
- The map of resurvey must be recorded in:
  - Each of the participating county's Register of Deeds office
  - Secretary of State's office

Research methods

- Original legislative descriptions
- Original surveys or first surveys
- Subsequent resurveys
- Historical maps and records of county line
- Witnesses to county line:
  - Property deed descriptions
  - Historical local witnesses

Report of research findings

- Research discovery information (evidence)
- Weighting of evidence to determine the best evidence
- Preliminary map presents the resurvey line using the best evidence of the original location

Acceptance or Redefining

- **The participating counties may elect to either:**
  - Accept the resurvey line

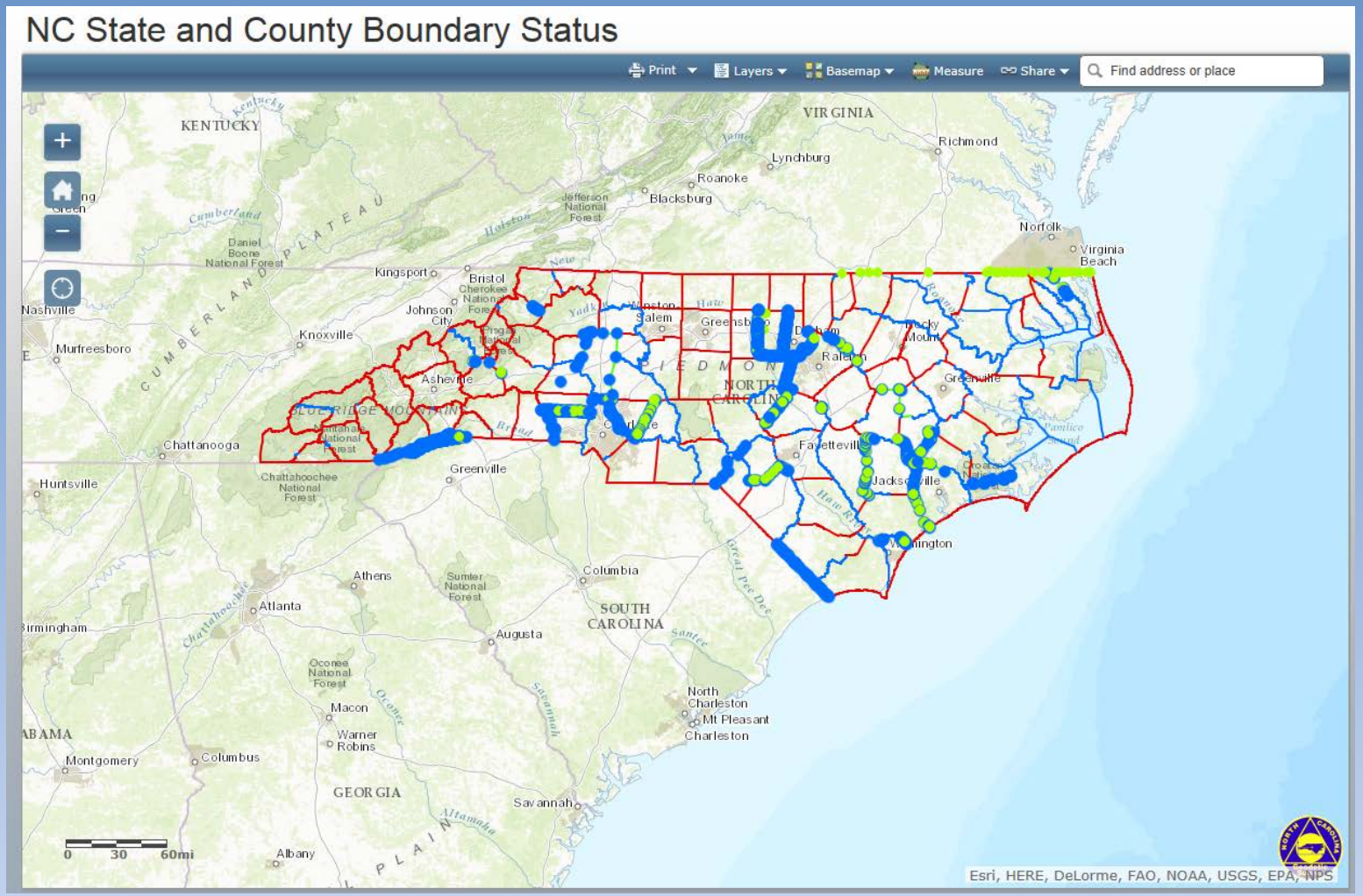
    ~ or ~

  - Redefine the line (change) through legislative process

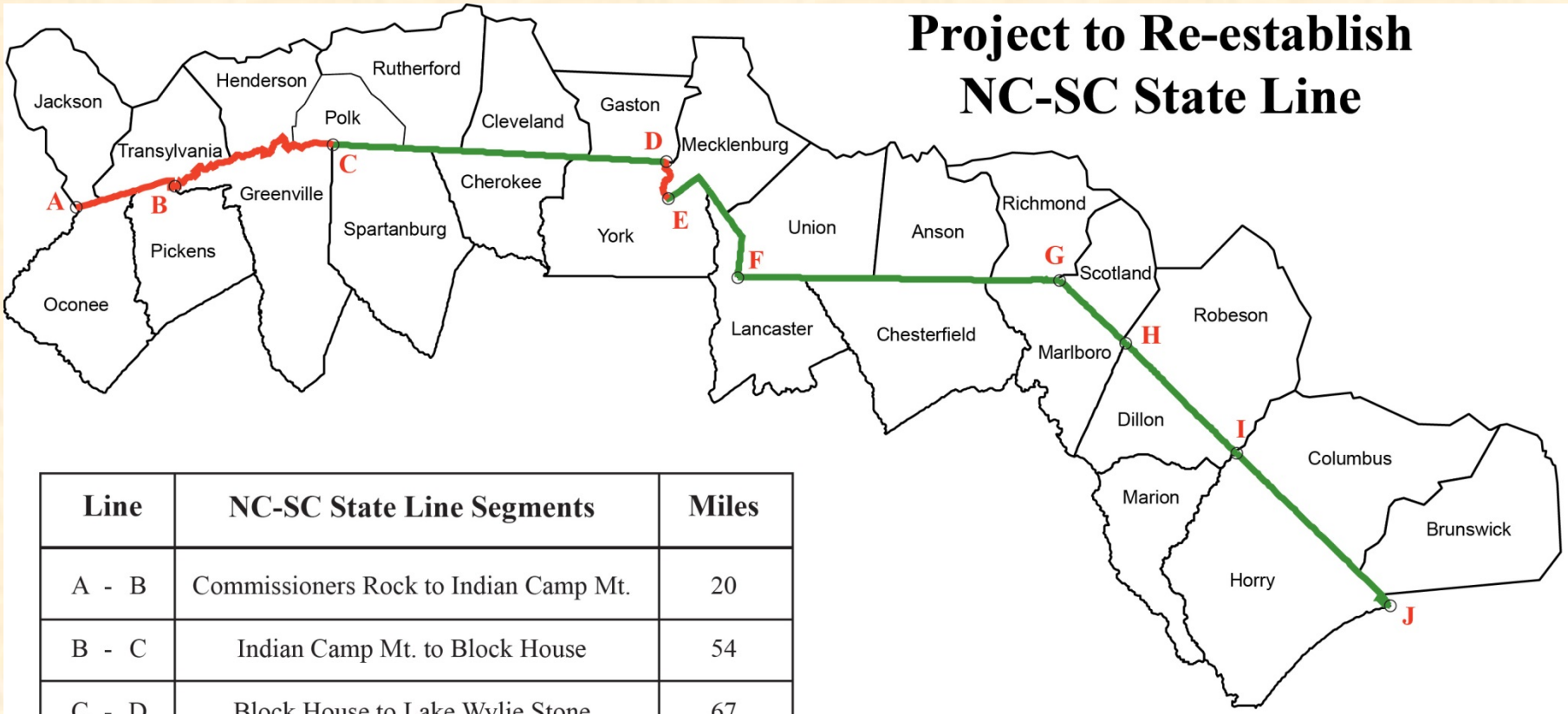
County Boundary Surveys in Progress

- Mitchell-Yancey
- Cabarrus – Rowan
- Harnett – Wake
- Chatham – Harnett – Wake
- Alamance – Guilford
- McDowell – Mitchell
- Jackson – Macon
- Davie – Yadkin
- Bladen – Columbus – Brunswick
- Greene – Lenoir
- Granville – Franklin

How did North Carolina get its shape?



Project to Re-establish NC-SC State Line



Line	NC-SC State Line Segments	Miles
A - B	Commissioners Rock to Indian Camp Mt.	20
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

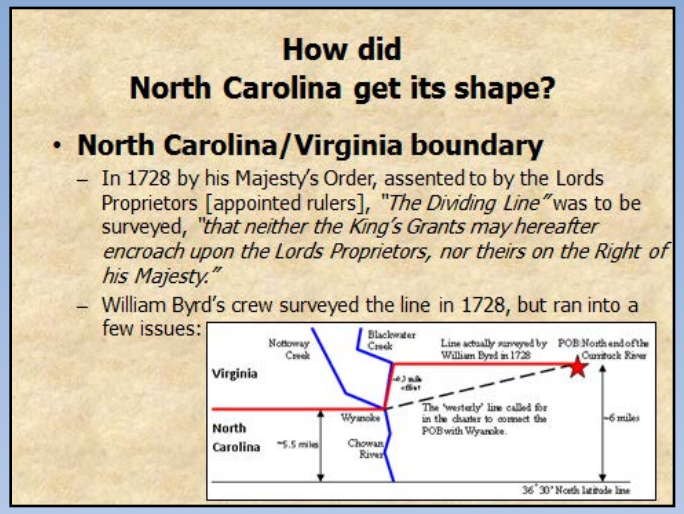
May 6, 2013 Status

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

How did North Carolina get its shape?

- NC Boundary Commission recommends that we start work on the NC-VA boundary
- NC-SC boundary
  - S575 and H834



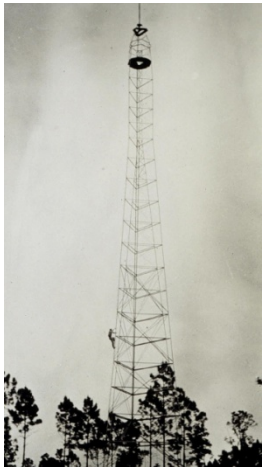
Changes to NAD83
(using North Carolina as an example)

- NAD83(1986)-Started as Classic horizontal network
- NAD83(1995)-High Accuracy Reference Network (HARN)
  - Observed with GPS using some CORS as control
- NAD83(2001)–Federal Base Network (FBN) and Cooperative Base Networks (CBN)
  - Observed with GPS with Tight CORS control. Also aimed at increasing ellipsoid height accuracy
- NAD83(NSRS2007)
  - CORS system primary control, used only quality GPS projects. CORS system well developed.
- NAD83(2011) - Current Adjustment

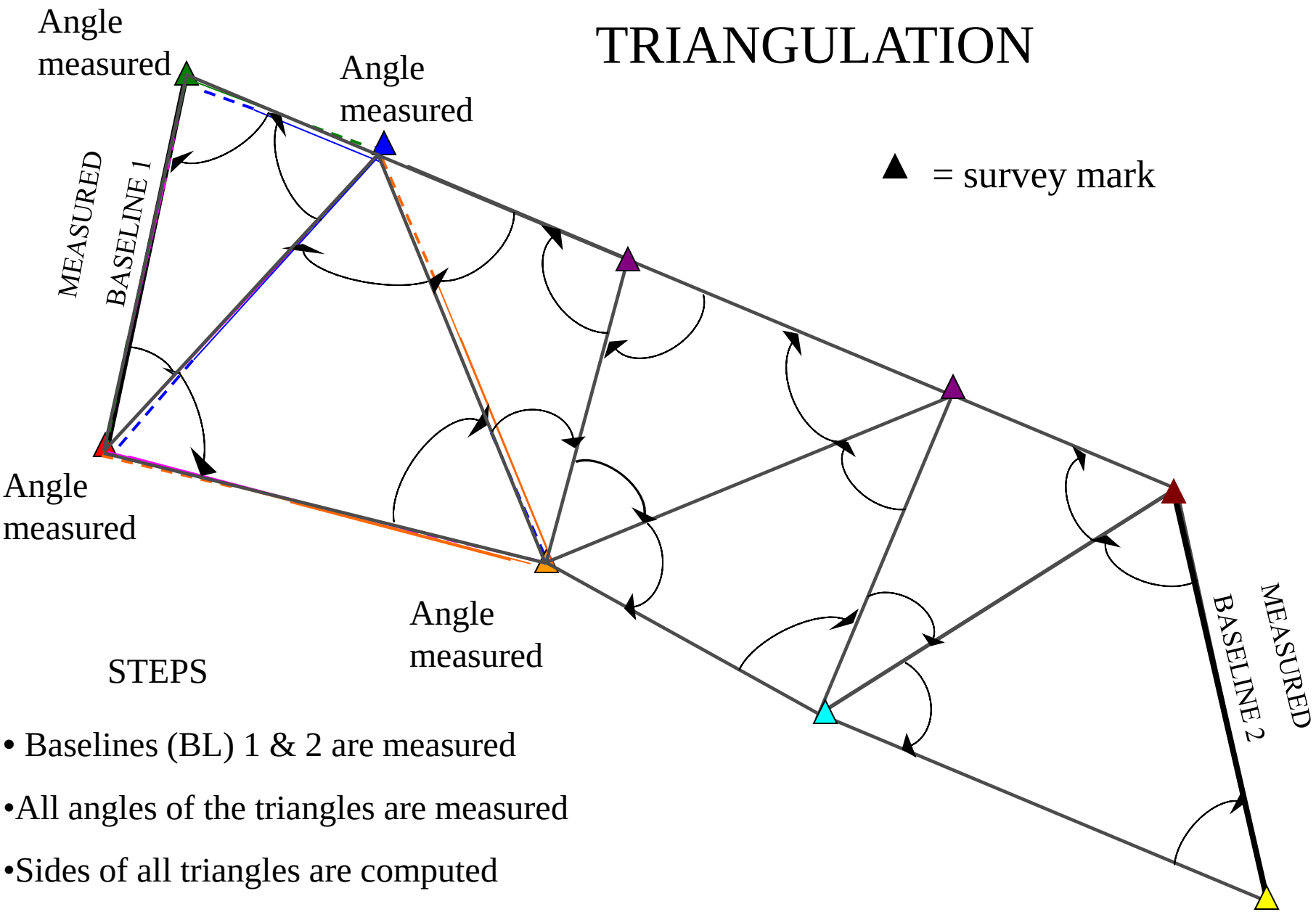
Coordinate shift between NAD83 realizations at station SMITHPORT

Station/ (datum)	Northing (m)	Easting (m)	Δ Northing (m) from preceding datum	Δ Easting (m) from preceding datum
SMITHPORT (83/86)	199,354.569	665,067.183		
SMITHPORT (83/95)	199,354.397	665,067.513	-0.172 m -0.56 USFt	0.330 m 1.08 USFt
SMITHPORT (83/2001)	199,354.384	665,067.503	-0.013 m -0.04 USFt	-0.010 m -0.03 USFt
SMITHPORT (NSRS2007)	199,354.377	665,067.499	**-0.007 m** **-0.023 USFt**	**-0.004 m** **-0.013 USFt**
SMITHPORT (NAD83/2011)	199,354.375	665,067.522	**-0.002 m** **-0.006 USFt**	**0.023 m** **0.075 USFt**

Triangulation



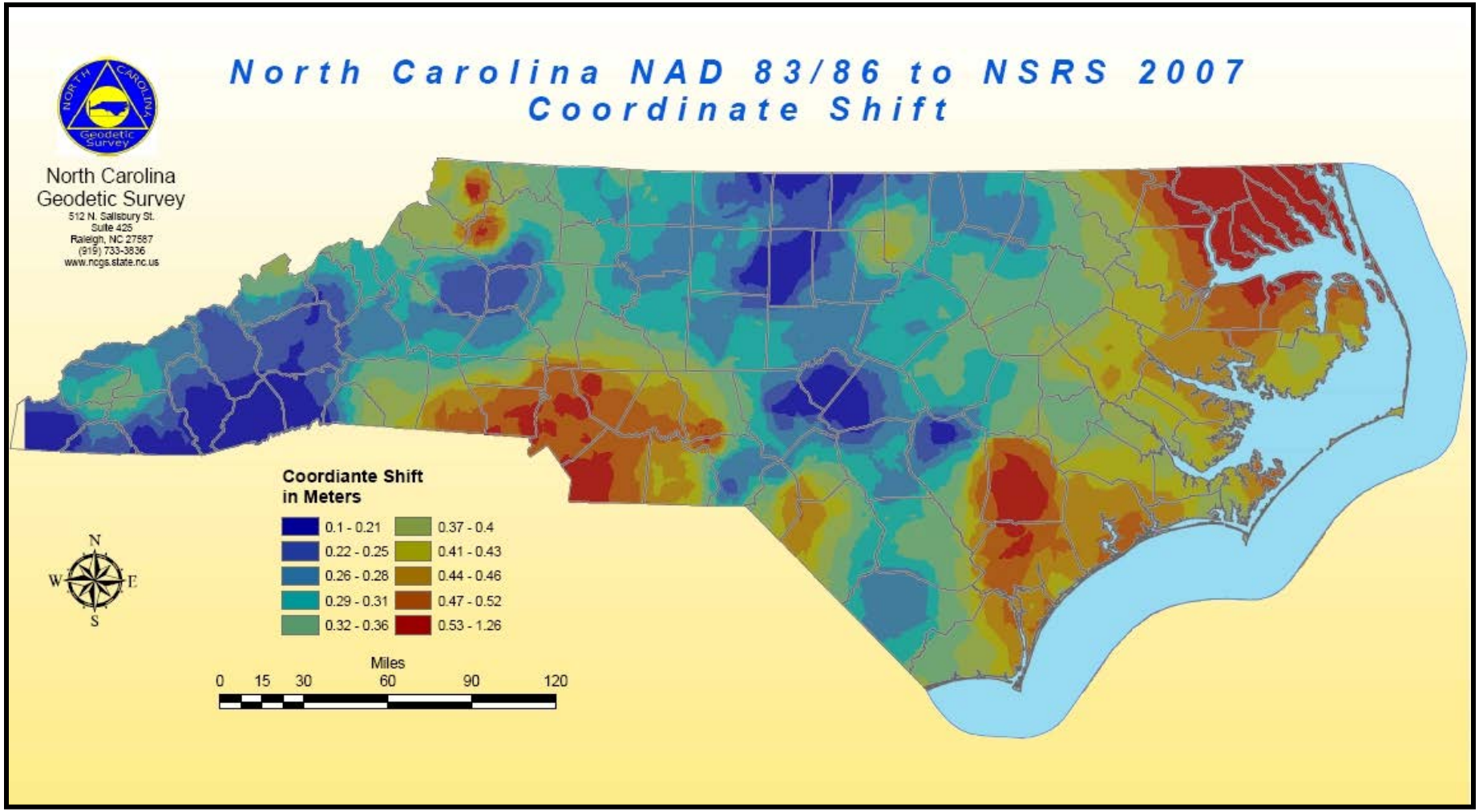
TRIANGULATION



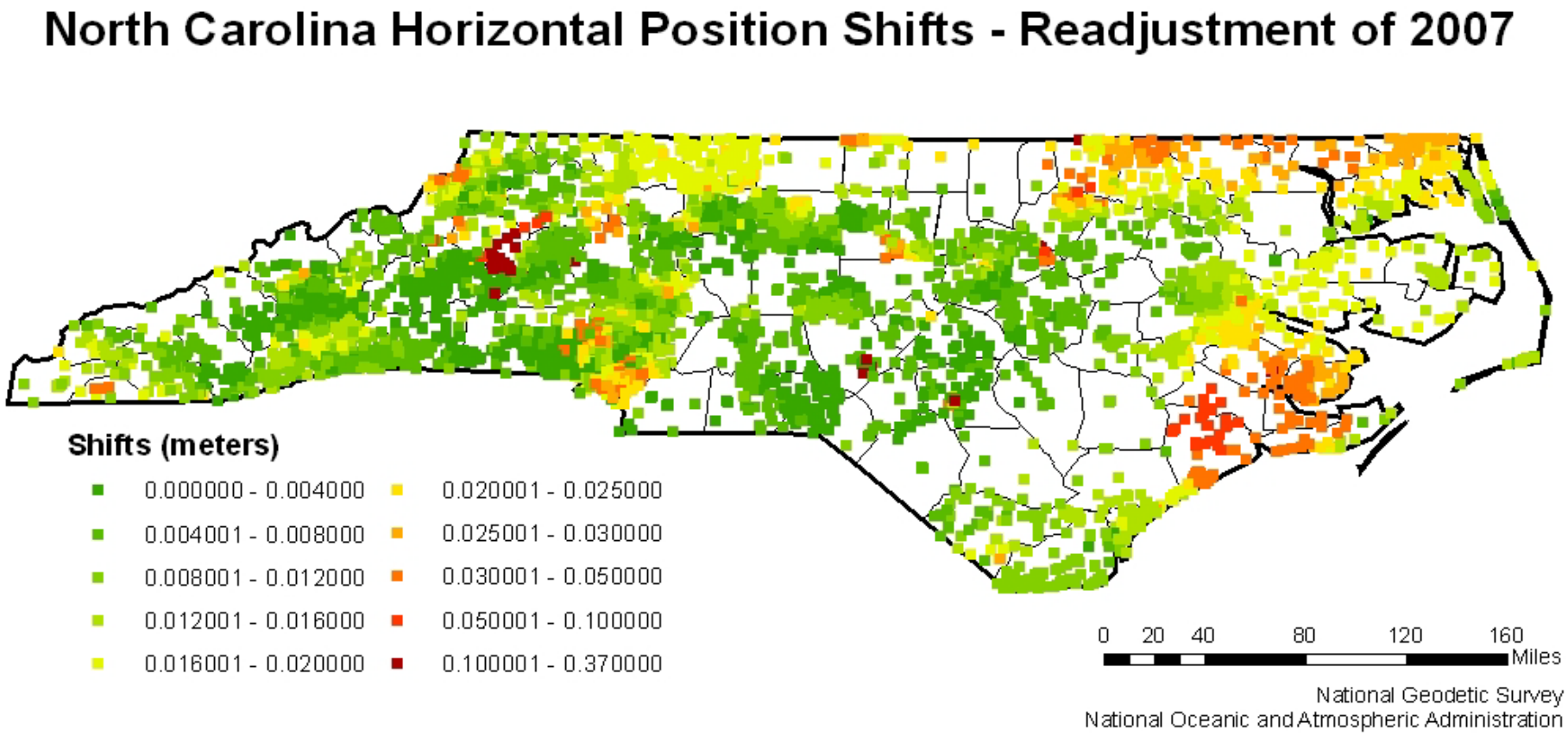
STEPS

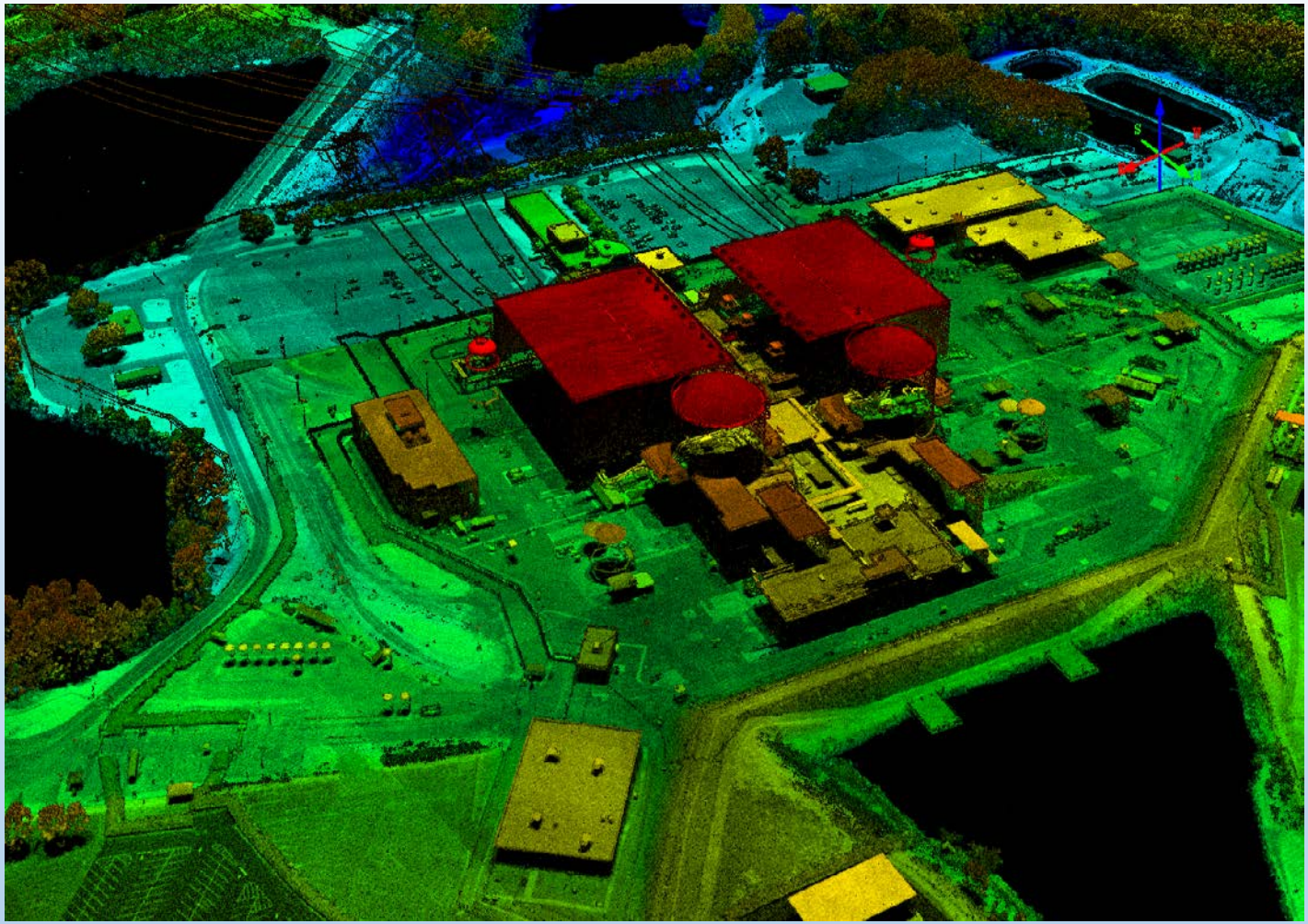
- Baselines (BL) 1 & 2 are measured
- All angles of the triangles are measured
- Sides of all triangles are computed
- Computed length BL2 is compared to measured length of BL2

Coordinate shift (m) between NAD 83/86 and NAD 83(NSRS2007) in North Carolina



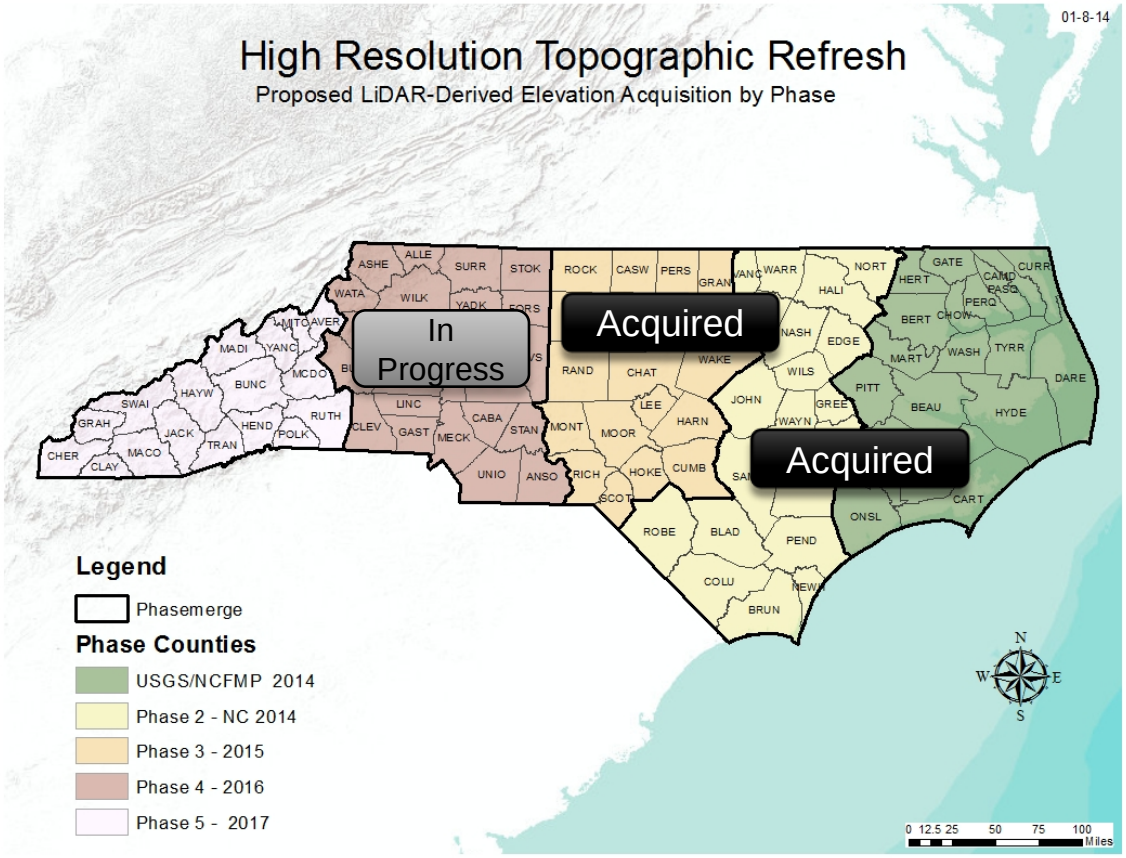
Coordinate shift (m) between NAD 83/2001 and NAD 83(NSRS2007) in North Carolina





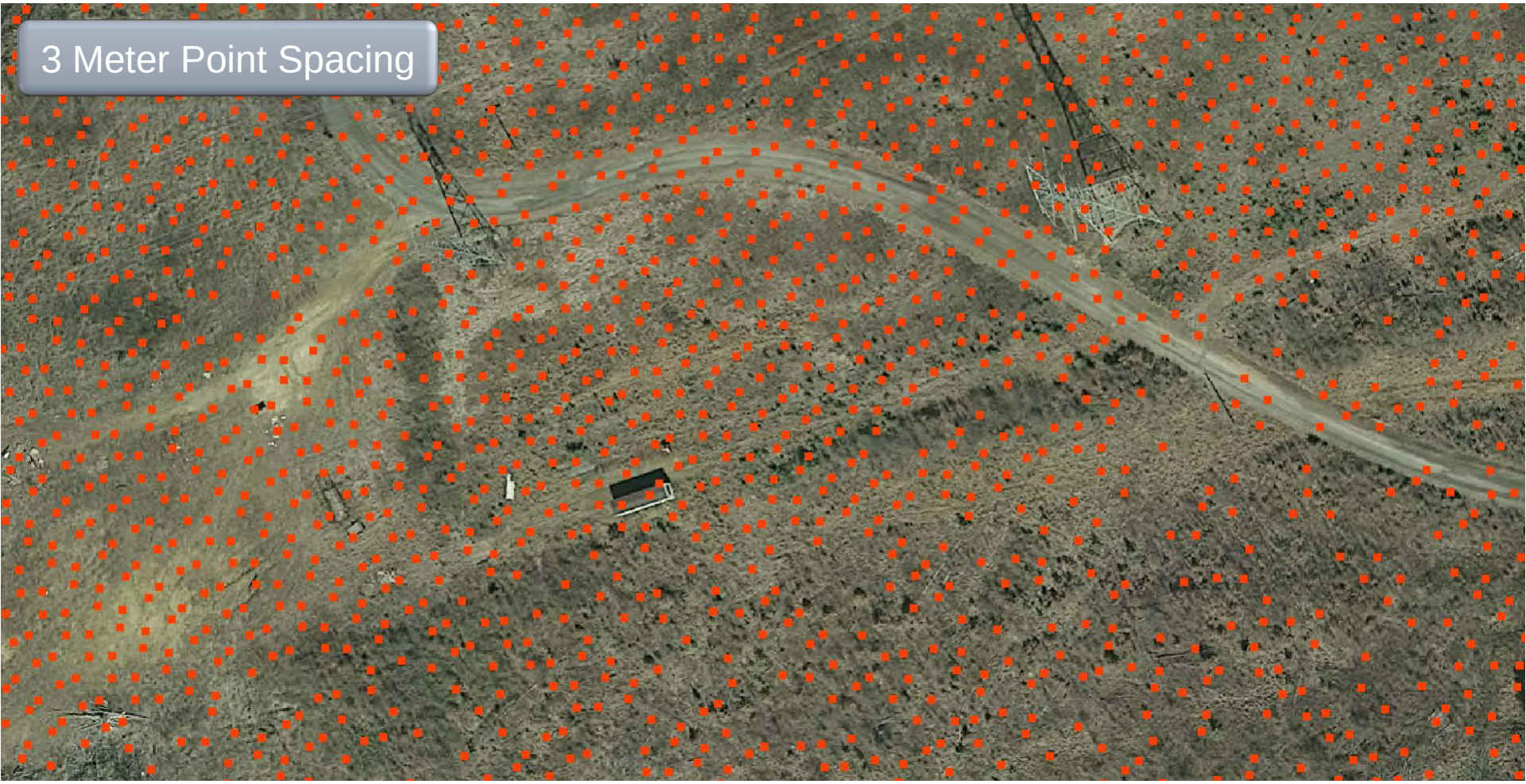
North Carolina Lidar Acquisition

STATEWIDE PHASES

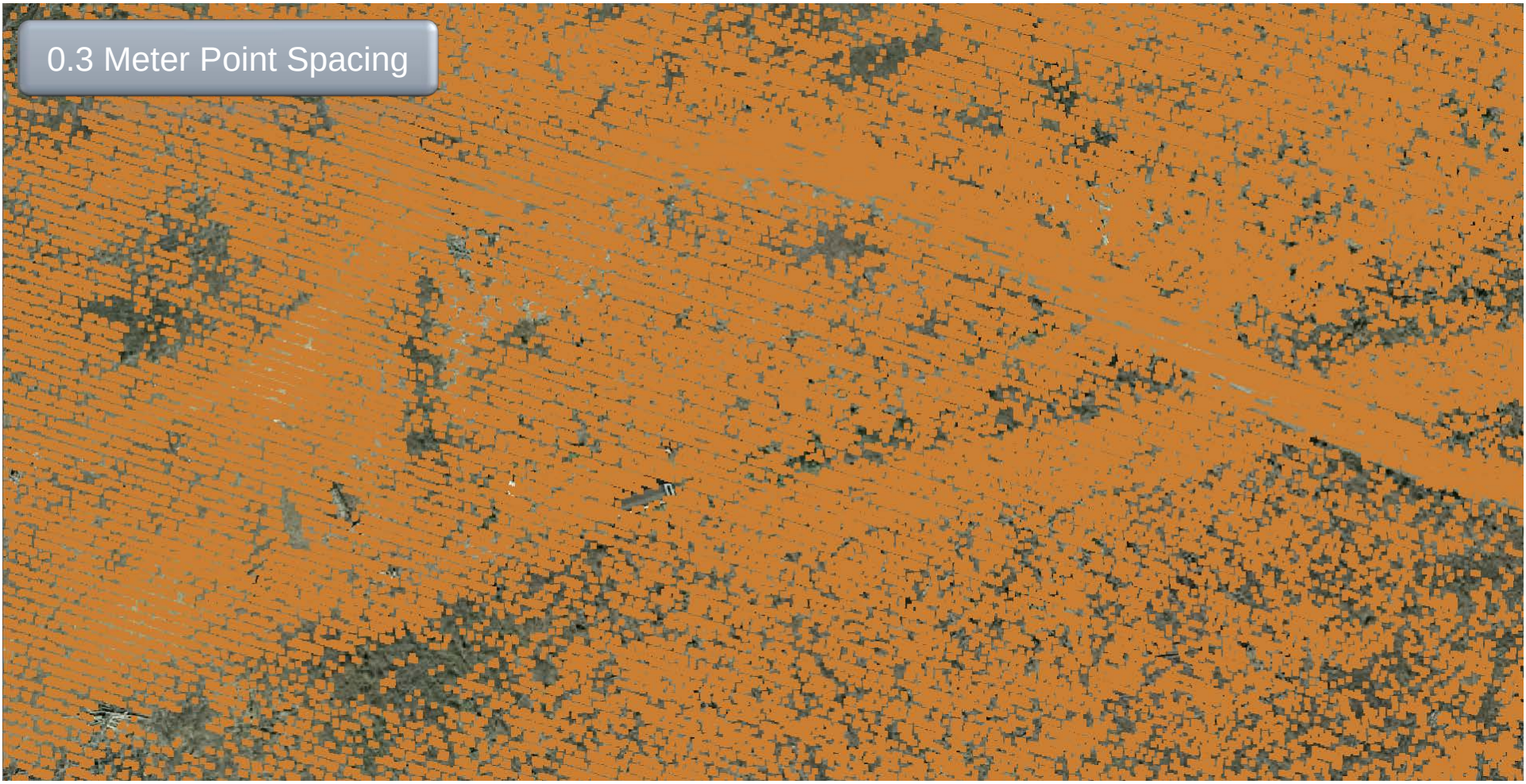


Original Plan

- The Plan put forward was a 5 phase 4 year plan
- Phase 1- USGS
- Phase 2- NC
  - Both occurred in 2014
- Phase 3 – NC (2015)
  - Wrapping up this phase
- Phase 4
  - Data collection in progress



3 Meter Elevation Model (2003 NC LiDAR)

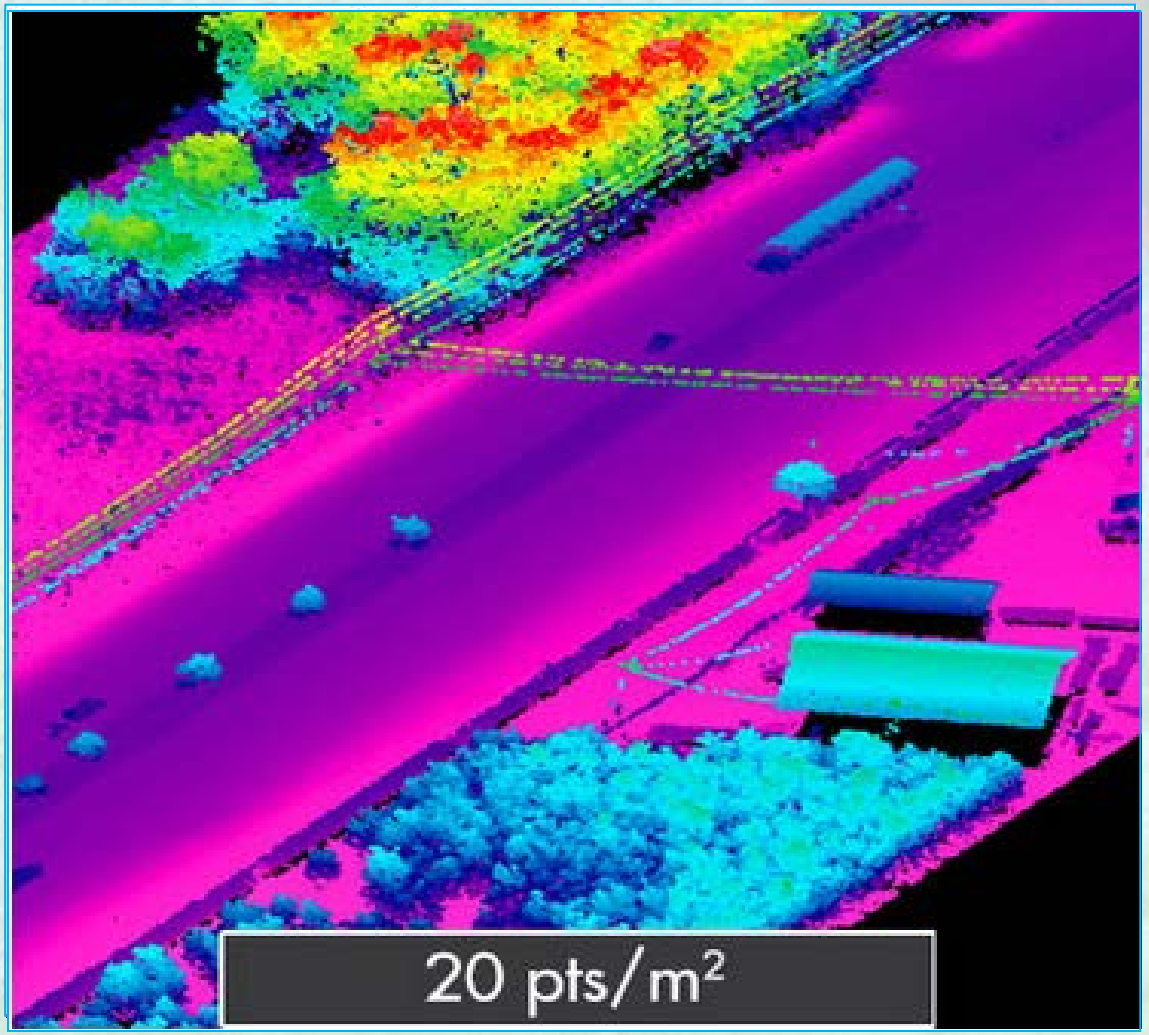


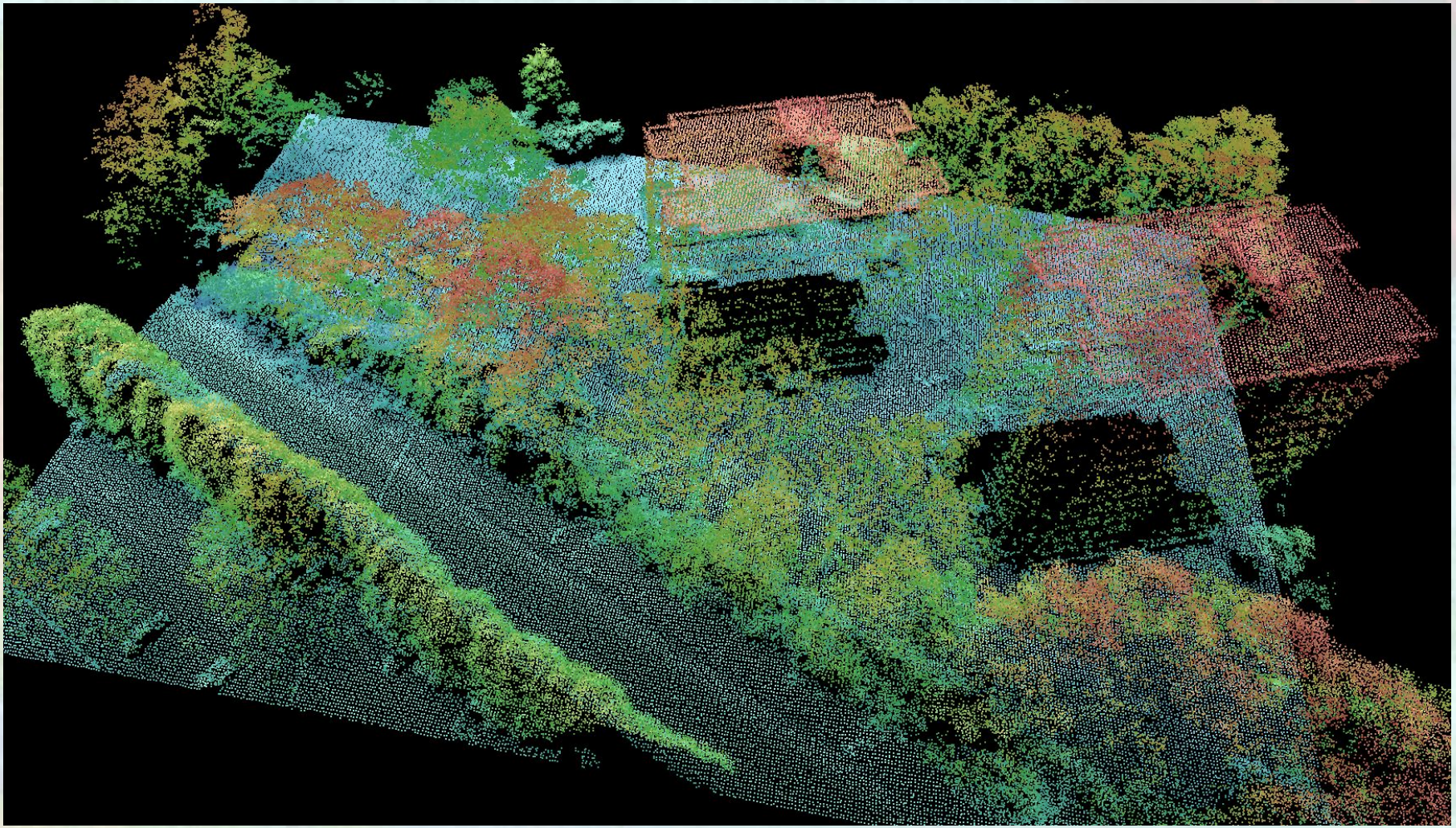
QL2 Elevation Model

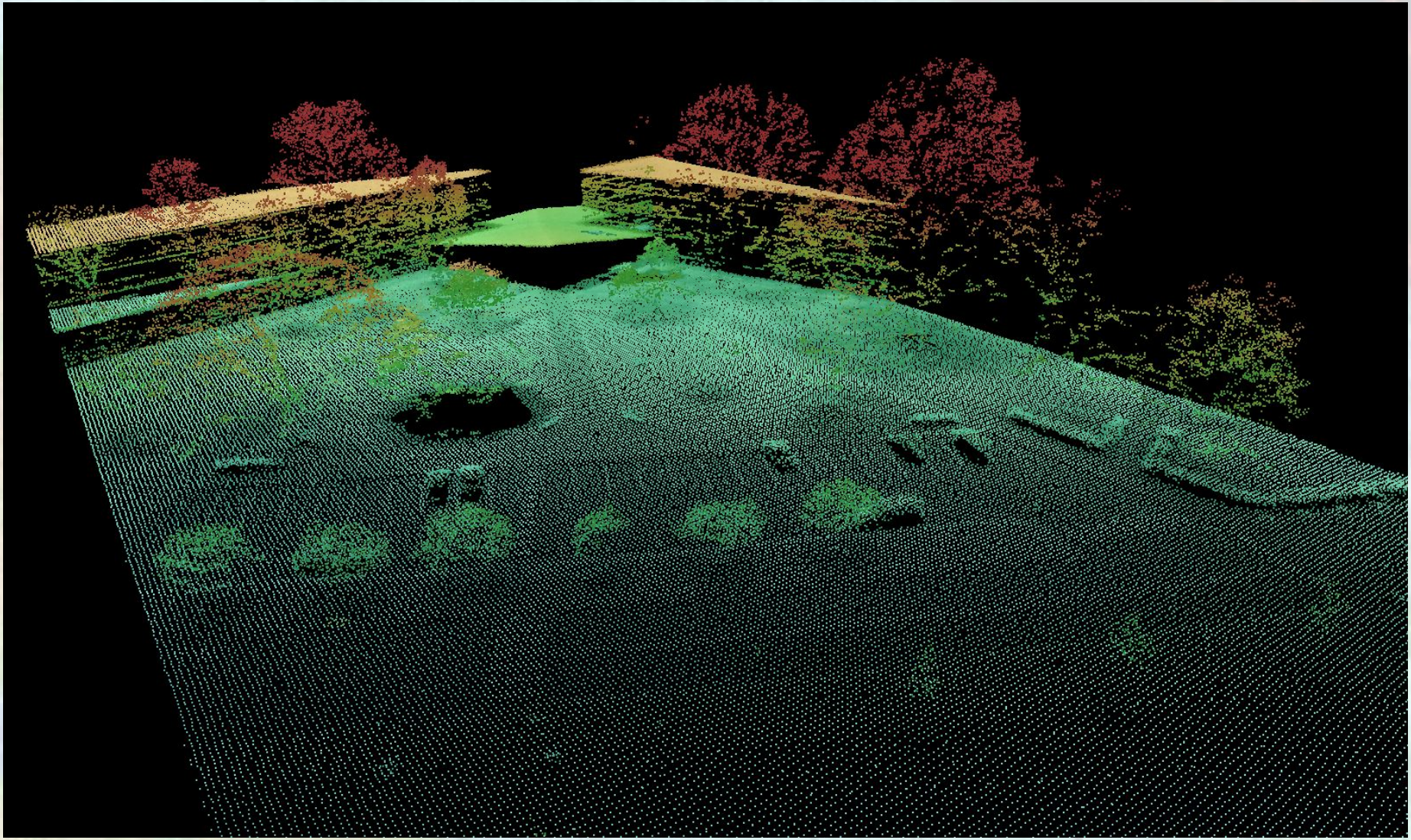
2016 Data Collection

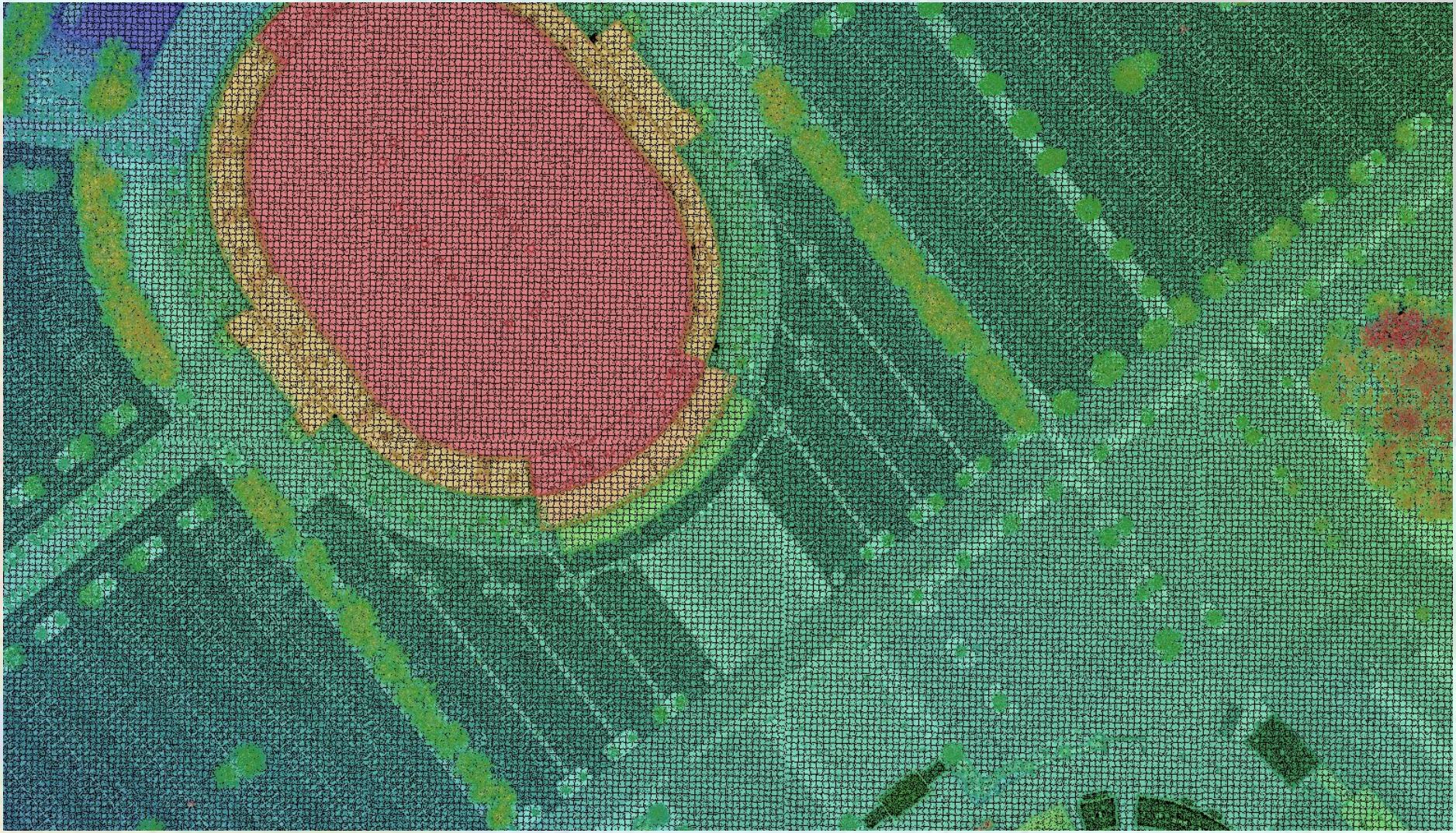
Geiger Mode Sensor

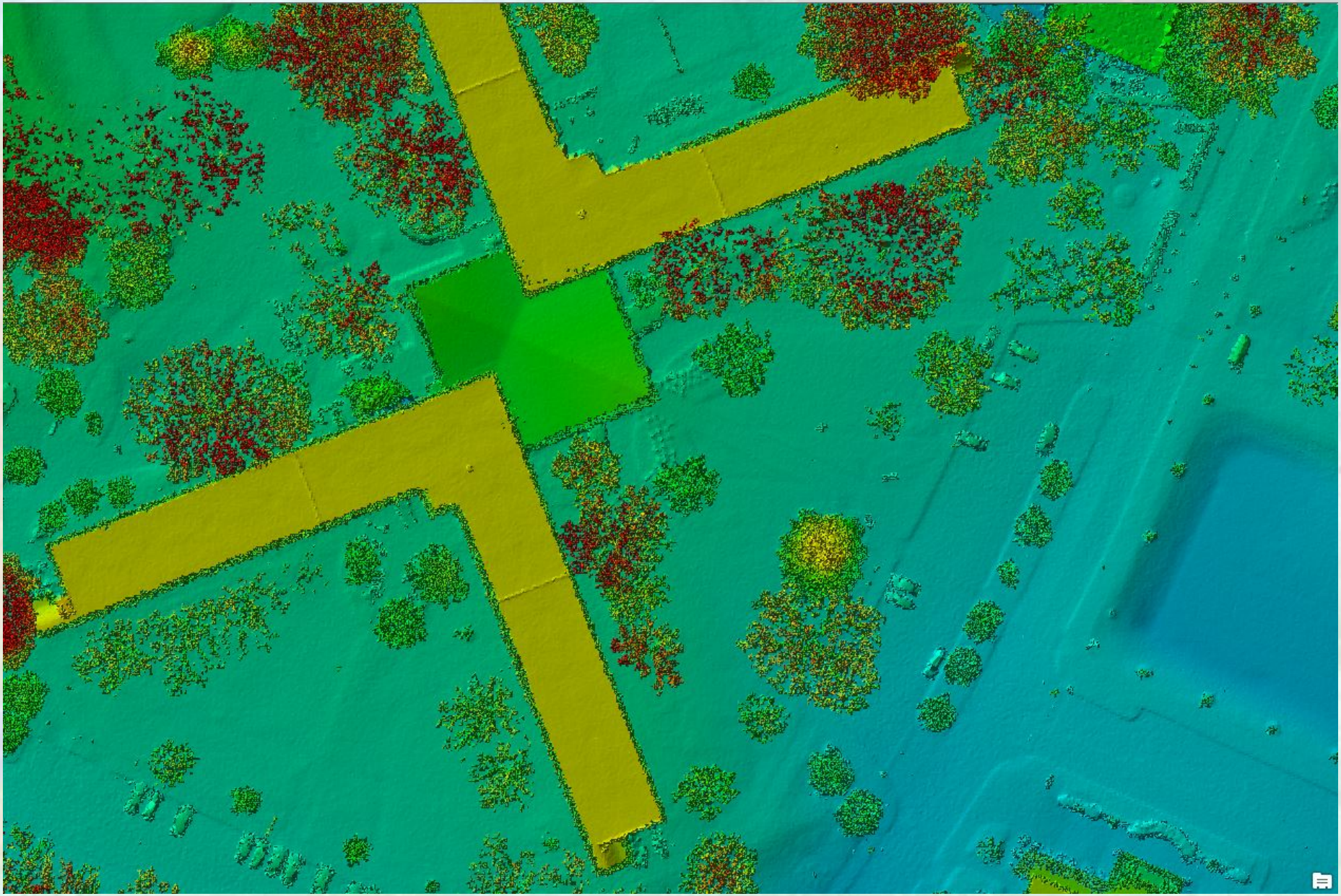
- Pilot test area in Mecklenburg County.
  - 20 points per square meter with nominal post spacing of 0.7 meters.
  - 8 ppm deliverable at same or reduced cost.
  - Data collected will support a 9.25 cm (3.36 inches) RMSEz.

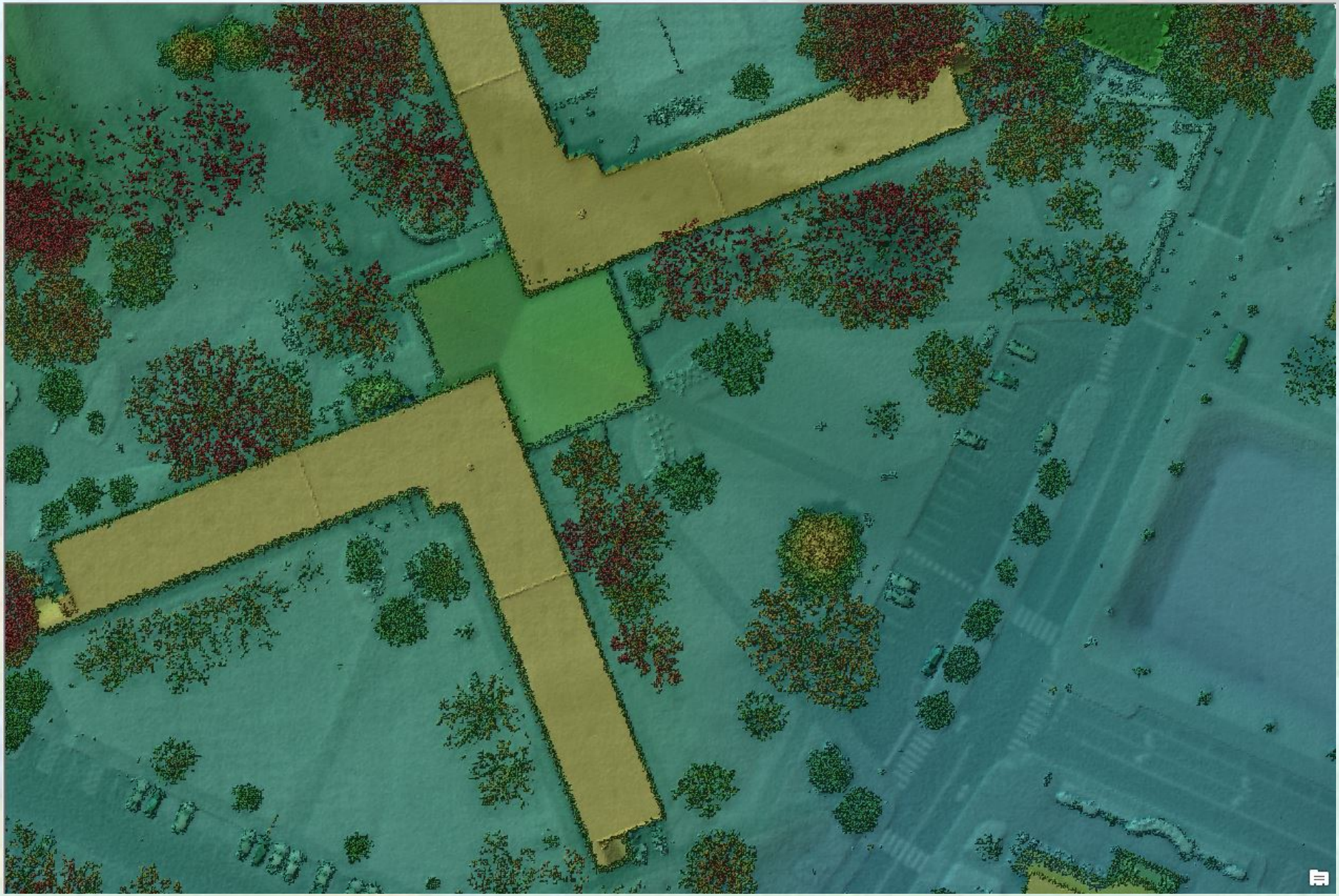


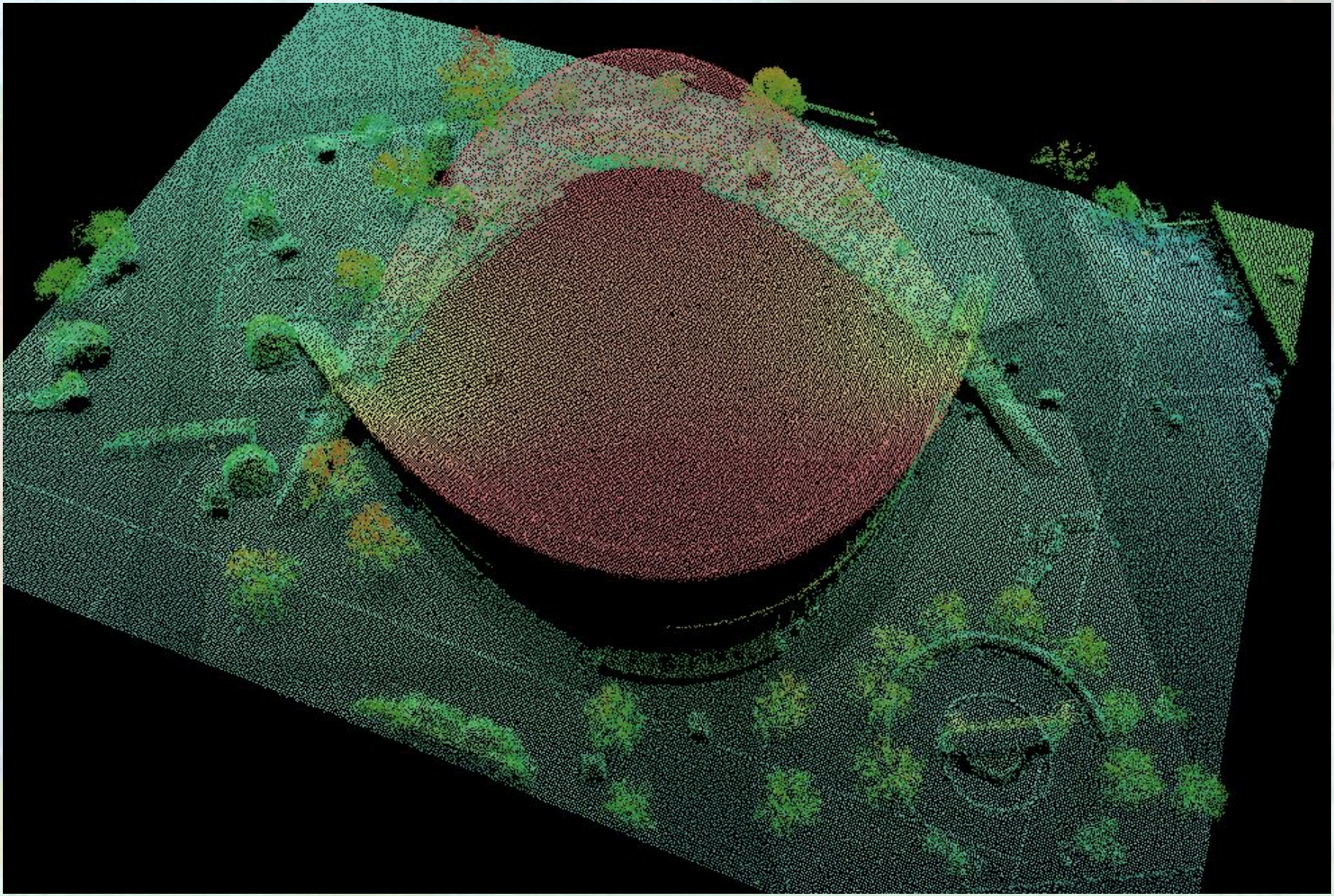


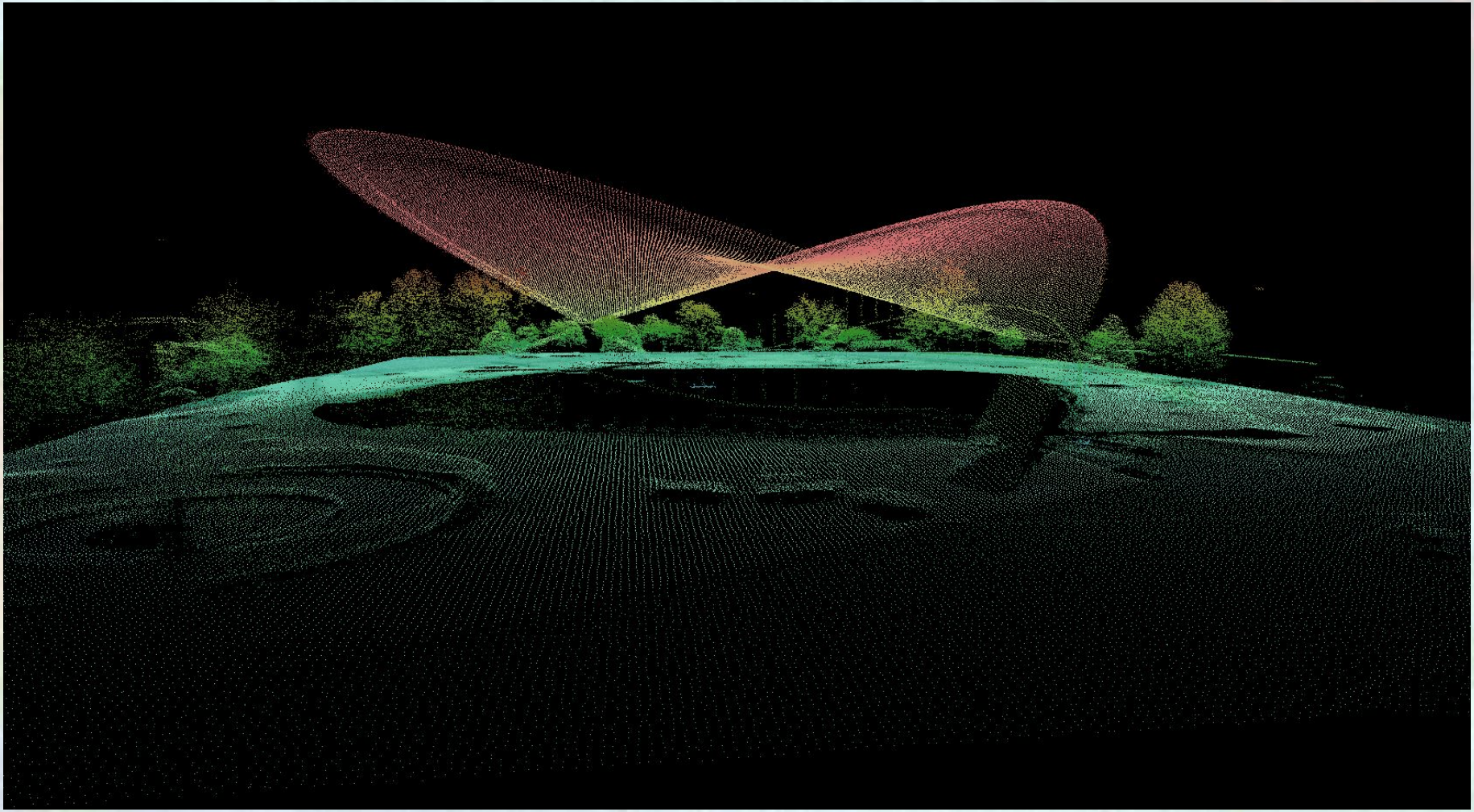


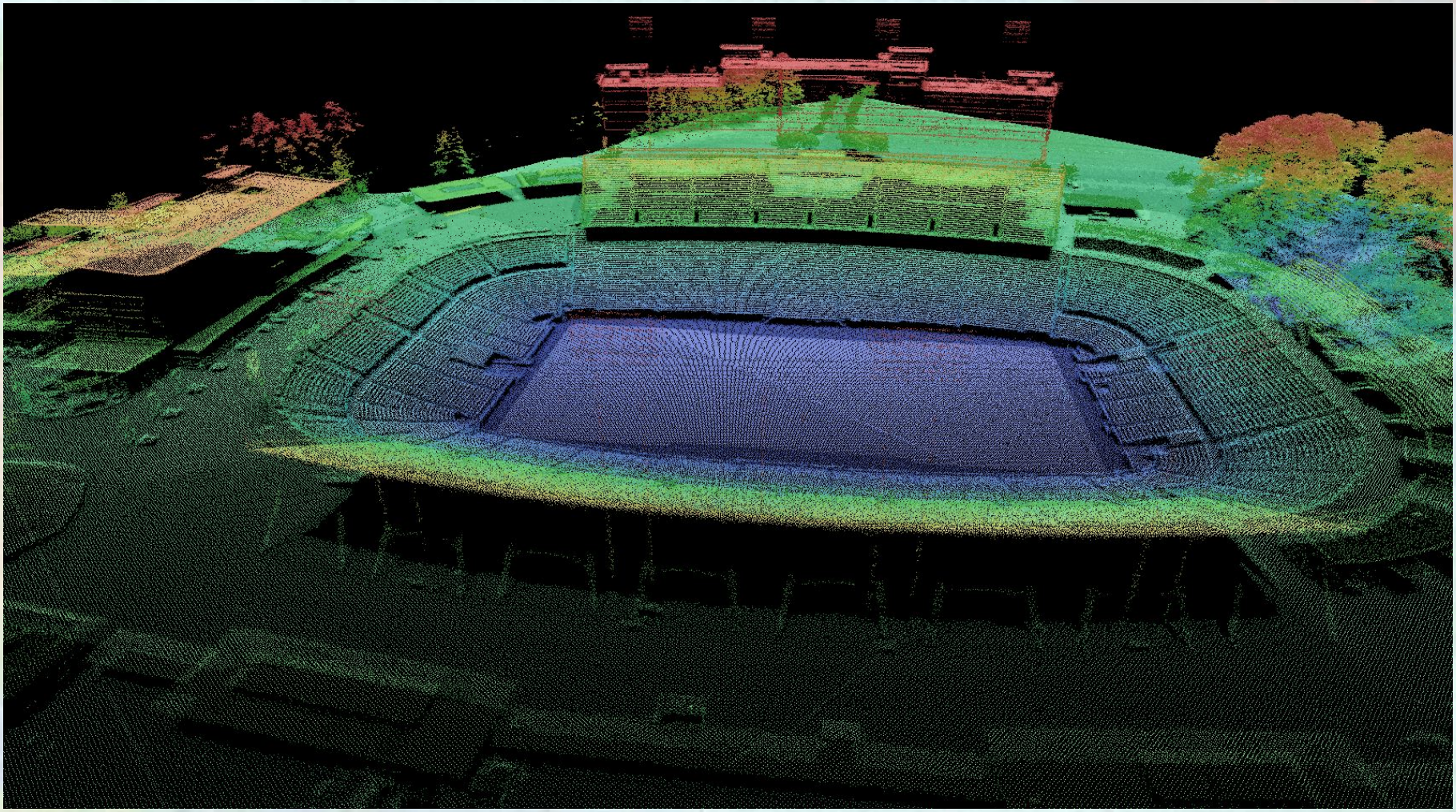


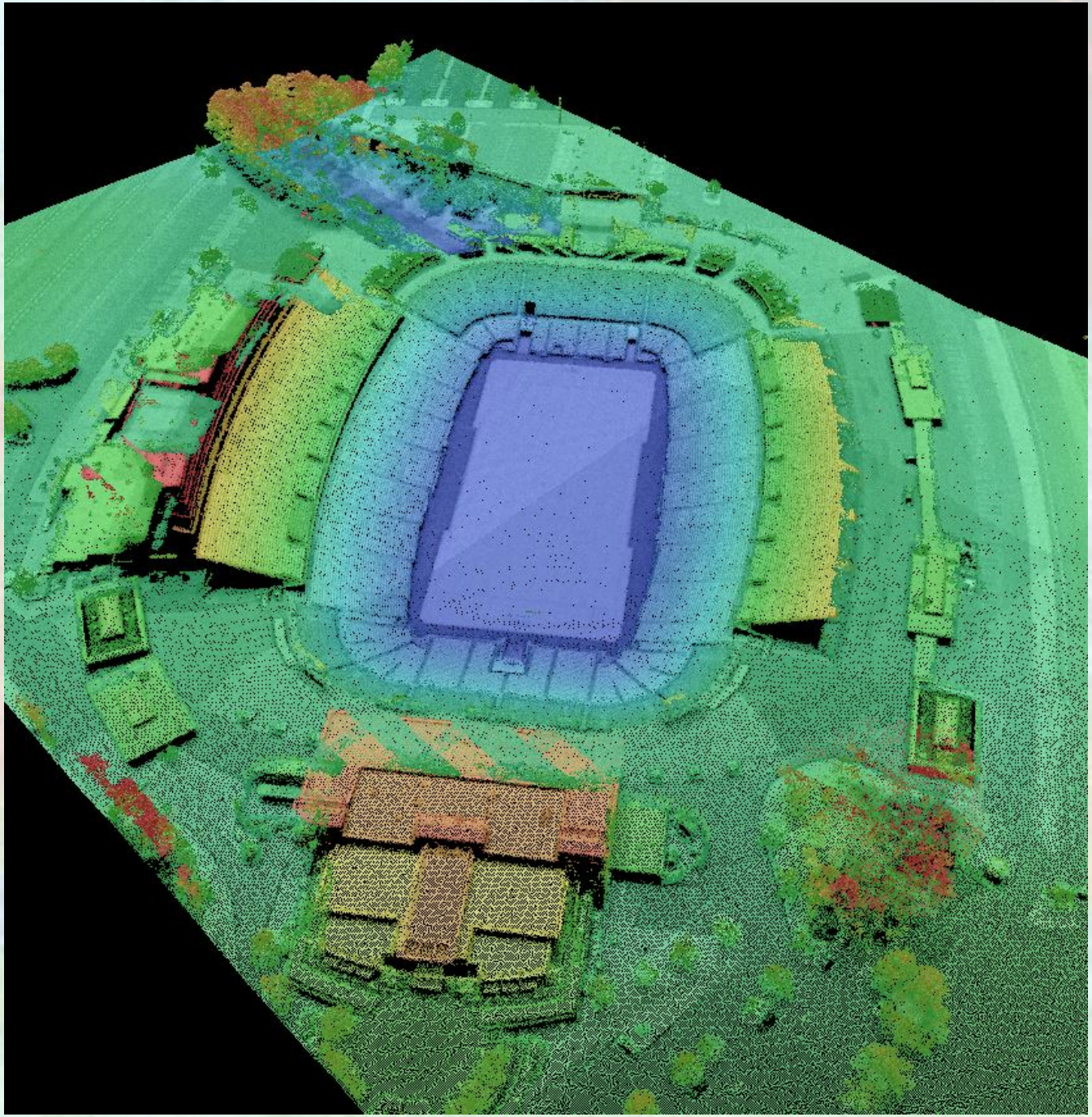












File Edit View History Bookmarks Tools Help

North Carolina Spatial Data Do...

rmp.nc.gov/sdd/

Search

Most Visited DocuSign Index of ftp://ftp1.nce... North Carolina Spatial ... Most Visited ASPRS_Positional_Acc... NCDENR - NC Geodeti... Latest Headlines

SPATIAL Data Download

Login with NCID

A North Carolina ID (NCID) is required.

Don't have a NCID? Sign up here.

NCID USER NAME:

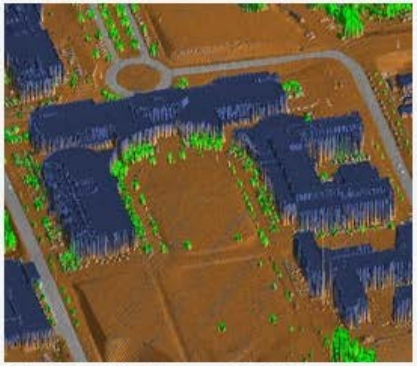
skaufman

PASSWORD:

••••••••

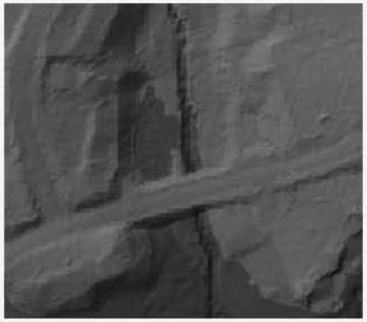
LOGIN

Login here for QL2 LiDAR



This data is Quality Level 2 (QL2) and was collected at a spacing of approximately 2 points per meter. All returns classified data is available.

Download legacy LiDAR at NC FRIS



All counties in North Carolina currently have legacy bare earth LiDAR from the initial statewide collection conducted from 2001-2005. This data was collected at a spacing of approximately 1 point per 3-4 meters.

beta This is a beta version of the Spatial Data Download site.

This is not the final version and you may encounter downtime, errors or bugs. If you do: **Email Your Feedback**

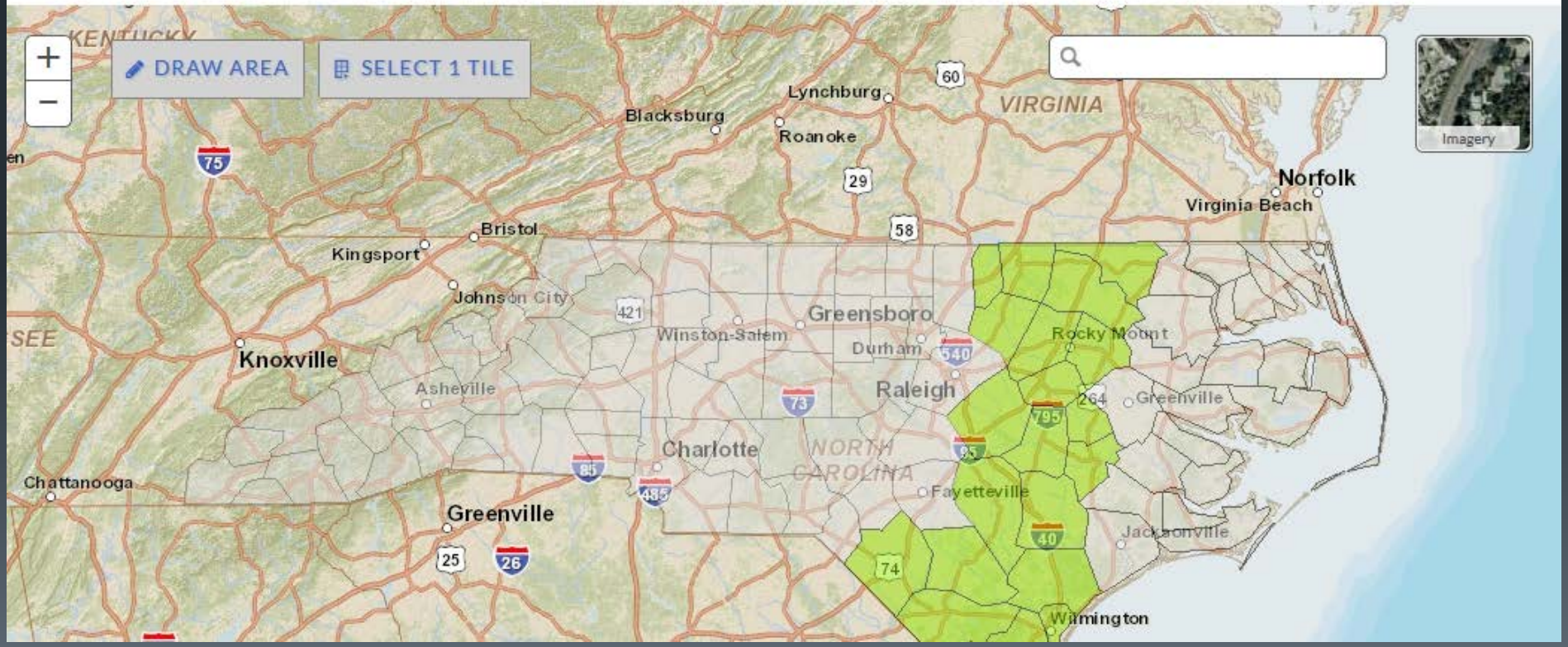
NCFMP will not be liable for any loss suffered by any party as a result of their use of the site. Any downloading of material is done at the users own risk and the user will be solely responsible for any loss that results from such activities.

QL2 LIDAR DATA DOWNLOAD

To request an entire city or county, go to the **Large Data Request** page. Download legacy LiDAR at **NC FRIS**

Select Area — Select File Output — Submit Request

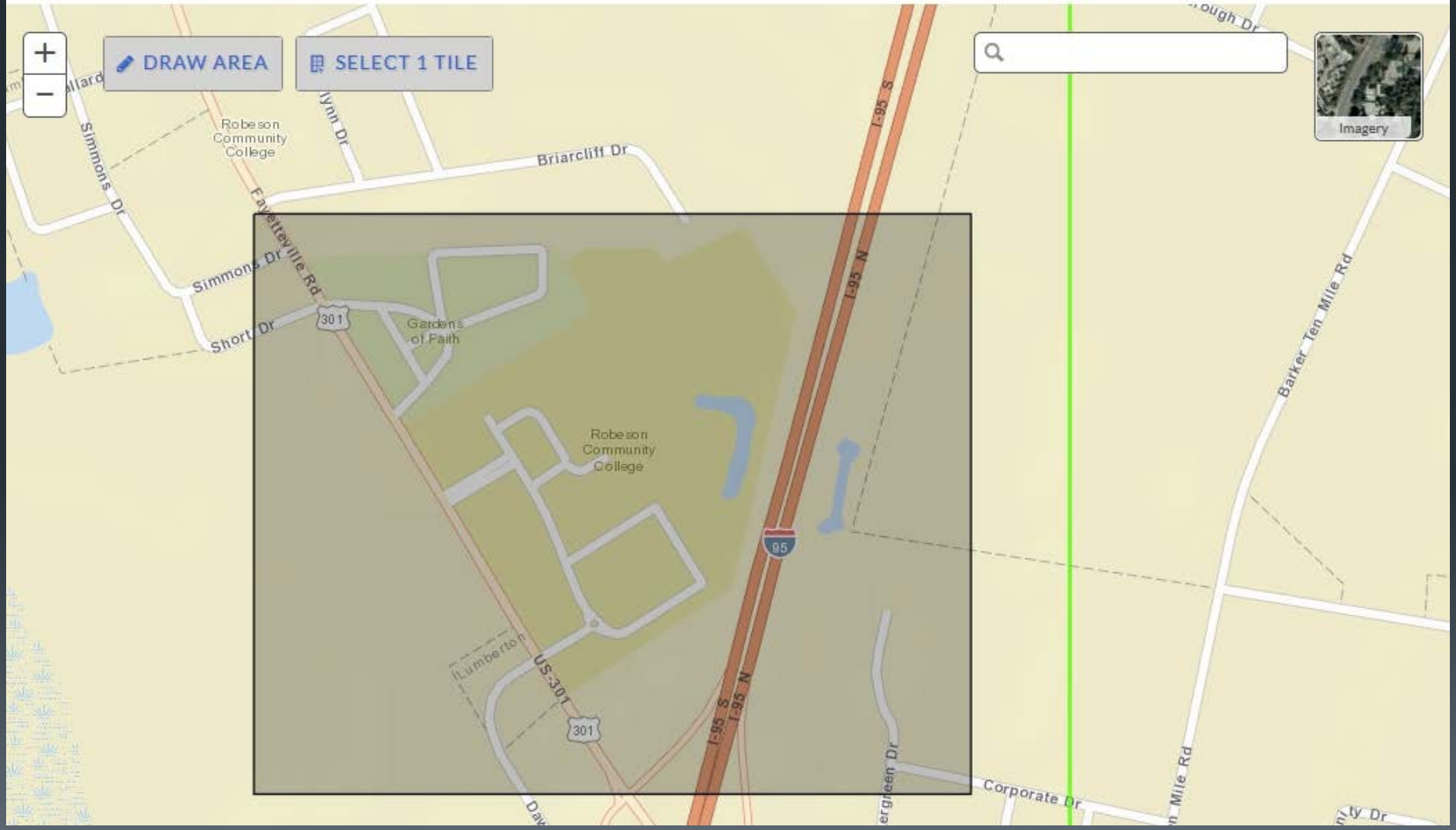
QL2 LiDAR is available on the green areas on the map. To select an area crossing **multiple tiles**, click "Draw Area" and then draw a small box on the map. Areas must be less than 4 tiles.



QL2 LiDAR is available on the green areas on the map. To select an area crossing **multiple tiles**, click "Draw Area" and then draw a small box on the map. Areas must be less than 4 tiles.

Click Next to Continue

NEXT



QL2 LIDAR DATA DOWNLOAD

To request an entire city or county, go to the **Large Data Request** page. Download legacy LiDAR at **NC FRIS**

Select Area — **Select File Output** — Submit Request

Select the classes of LiDAR you wish to include in your output .LAS file.

ALL CLASSES

This dataset contains all classes including ground, roads, vegetation and water

BARE EARTH

This dataset represents the earth's surface with all vegetation and human-made structures removed. The output .LAS file will contain classes 2 (Ground) and 13 (Roads).

INDIVIDUAL CLASSES

- Ground
- Strata/Vegetation
- Buildings
- Roads
- Bridges

PREVIOUS

SUBMIT REQUEST

This is a beta version of the Spatial Data Download site

QL2 LIDAR DATA DOWNLOAD

To request an entire city or county, go to the **Large Data Request** page. Download legacy LiDAR at **NC FRIS**

Select Area — Select File Output — **Submit Request**

Your request has been submitted!

Jobs are processed in the order they are received and may require up to 24 hours for processing. You will receive an email from **rmpclipandship@ncdps.gov** when your files are ready for download. Please make sure to add **rmpclipandship@ncdps.gov** to your safe sender list.

SUBMIT ANOTHER REQUEST | VIEW REQUEST HISTORY

beta This is a beta version of the Spatial Data Download site.

This is not the final version and you may encounter downtime, errors or bugs. If you do: **Email Your Feedback**

NCFMP will not be liable for any loss suffered by any party as a result of their use of the site. Any downloading of material is done at the users own risk and the user will be solely responsible for any loss that results from such activities.

SPATIAL Data Download

NC Floodplain Mapping Program
4105 Reedy Creek Drive
Raleigh, NC 27607

Phone: (919) 715-5711

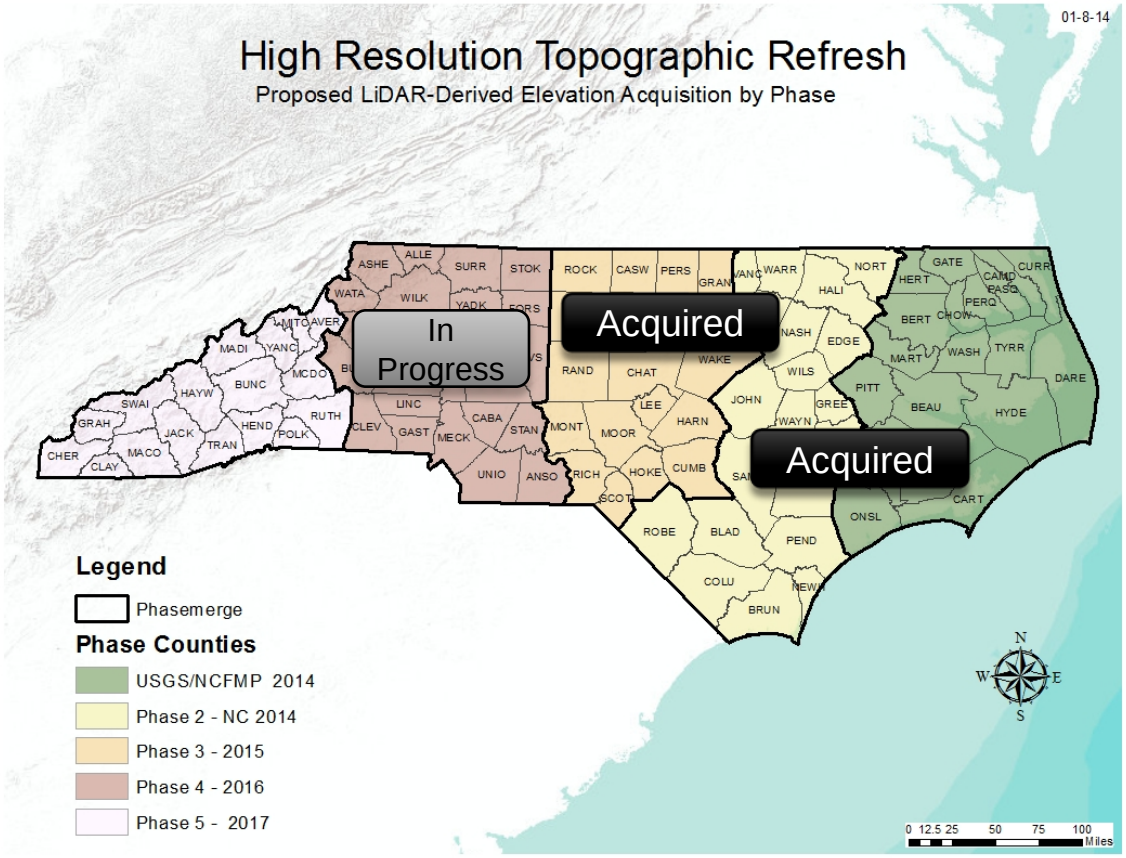
Mailing Address
4218 Mail Service Center
Raleigh, NC 27699-4218

REQUEST SUMMARY

Click the column names to **sort** your requests.
Pending requests may take up to 24 hours to process. You will receive an email when your data is ready for download.
Click the Download button to access your completed data request files.

Status	ID	Date	Type	
Pending	61	3/11/2015 9:30:40 AM	Rectangle	
Complete	32	3/2/2015 1:54:51 PM	Rectangle	DOWNLOAD

STATEWIDE PHASES



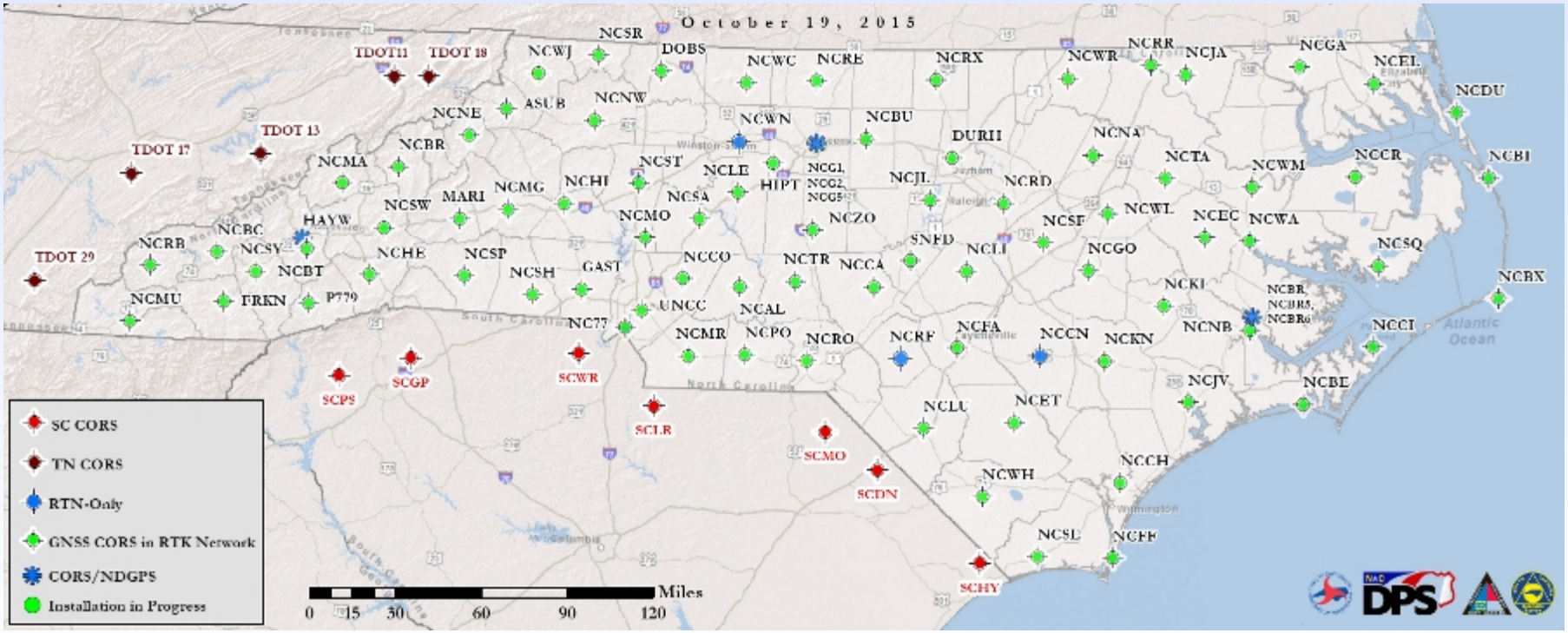
Original Plan

- The Plan put forward was a 5 phase 4 year plan
- Phase 1- USGS
- Phase 2- NC
  - Both occurred in 2014
- Phase 3 – NC (2015)
  - Wrapping up this phase
- Phase 4
  - Data collection in progress

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
      - 1 new CORS installation in progress
        - Dare County (Oregon Inlet)
        - Replacement of NCSQ
      - Receiver upgrade in 2015 at:
        - NCBI
        - NCWA
        - NCJV

NC CORS Network

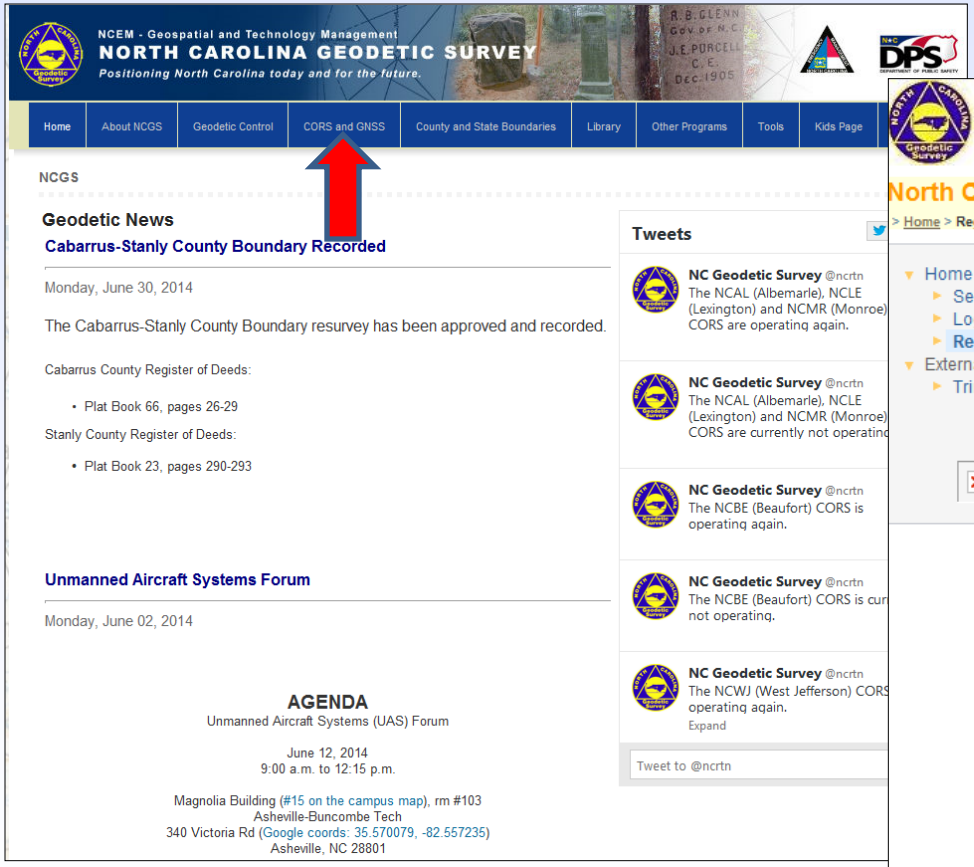


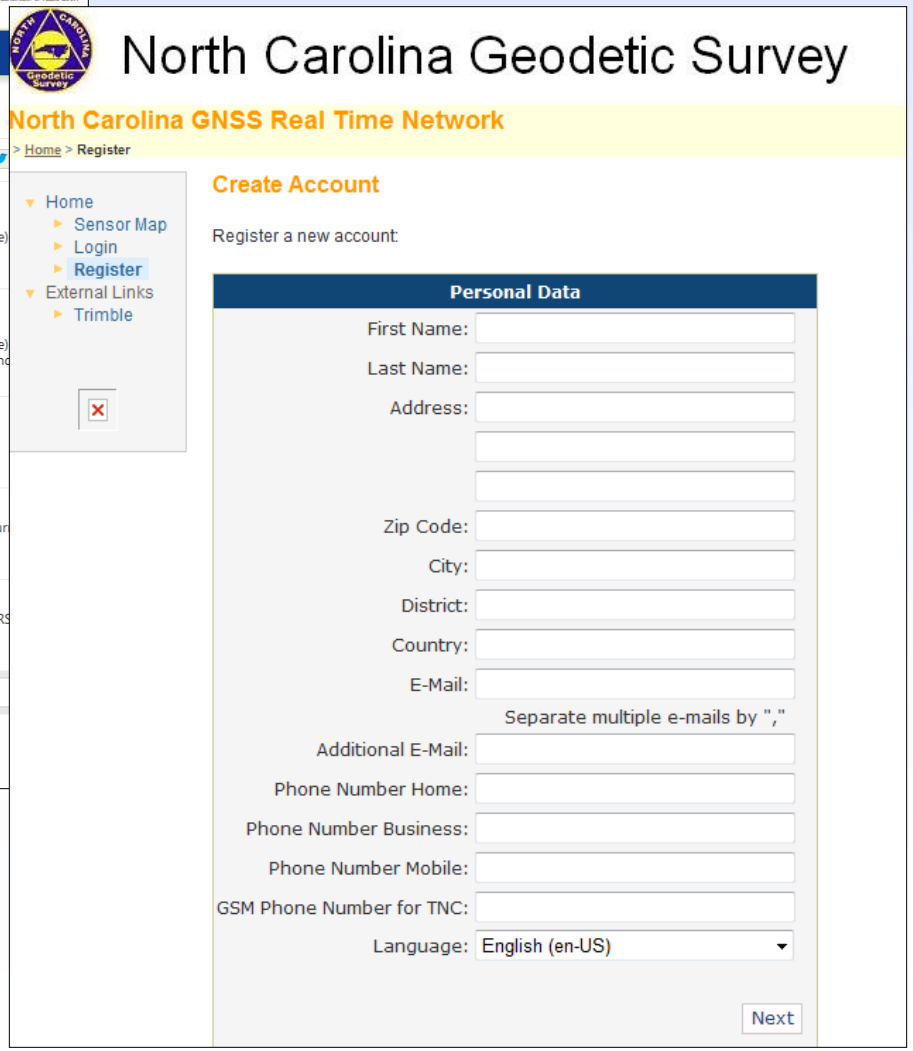
http://geodeticsurvey.nc.gov/Pages/CORS-and-GNSS.aspx

DEPARTMENT OF PUBLIC SAFETY

North Carolina Emergency Management

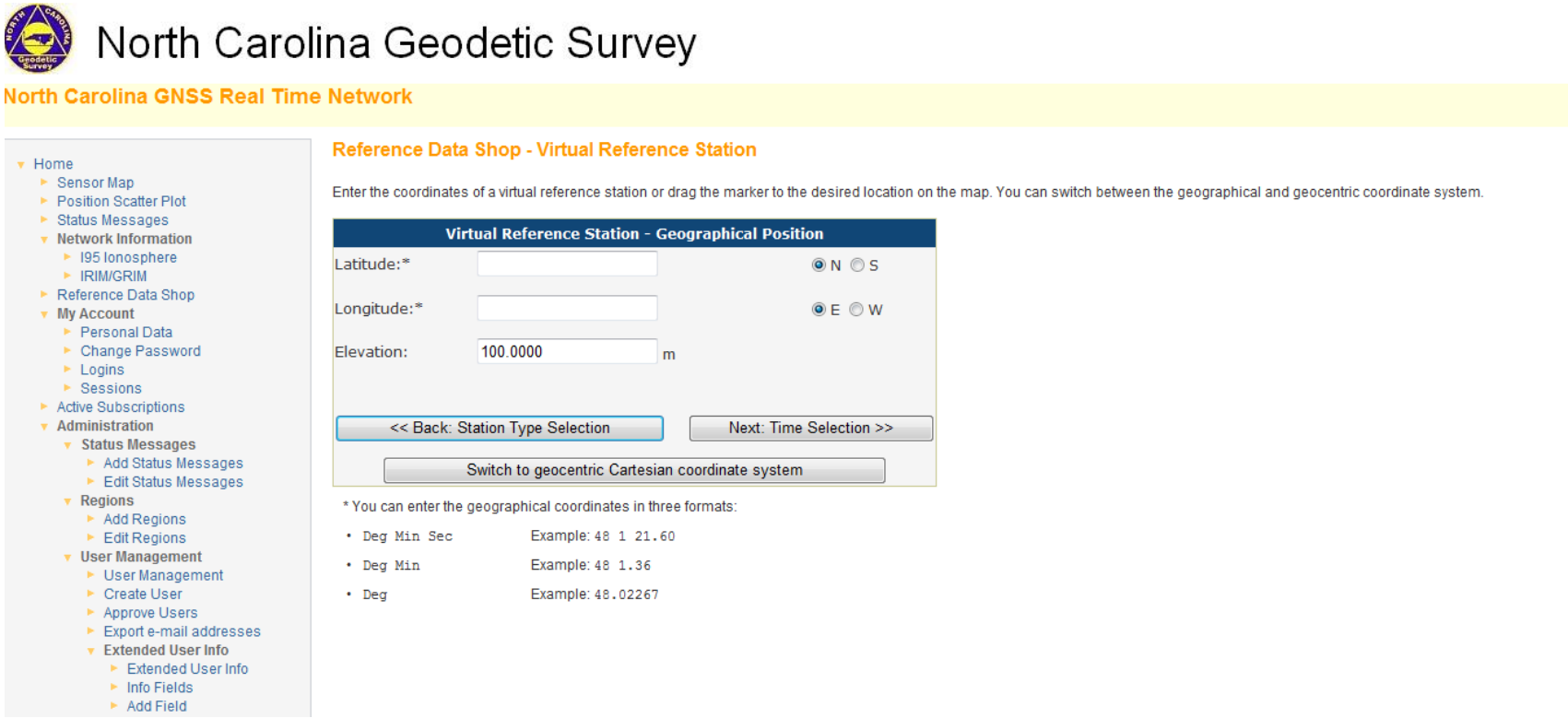
RTN port request





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

Virtual Reference Station



New Datums are Coming in 2022!

- Both a new geometric and a new geopotential (vertical) datum will be released in 2022.
- The realization of the new datums will be through GNSS receivers.
- NGS will provide the tools to easily transform between the new and old datums.

Publications/Videos

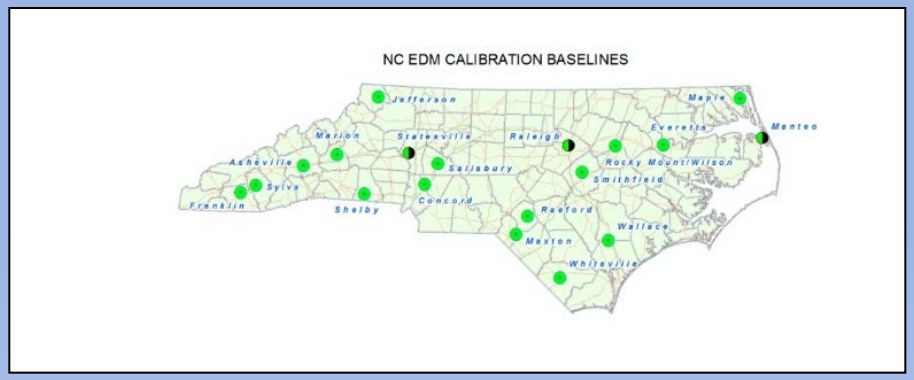
- Developed instructional videos
  - NCGS database
- Plan to develop additional instructional videos in 2016
  - Suggestions?
- NC-SC boundary video

A series of short video tutorials are now available to help navigate the most-recently developed NC Geodetic Database. The videos can be accessed by clicking the link below:

NCGS 1 Access Database
NCGS 2 Navigating
NCGS 3 View Details
NCGS 4 Station Recovery
NCGS 5 Export Data

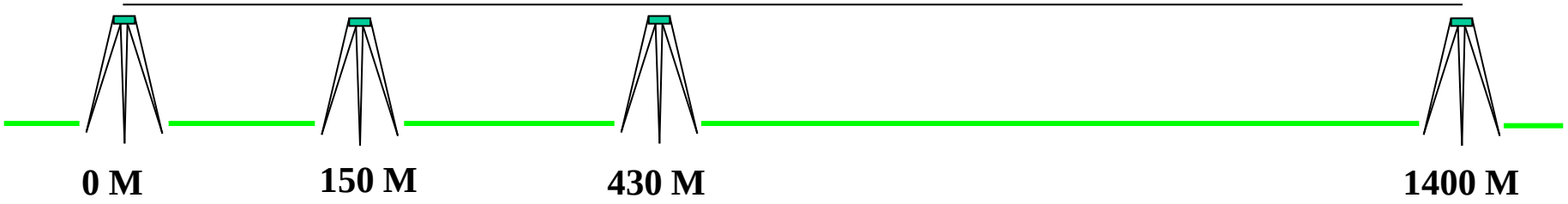
Future projects

- Check EDMI baselines
  - Asheville (replace)
  - Maxton (check)
  - Whiteville (check)
  - Maple (check)
  - Raleigh (replace)
  - Manteo (check)

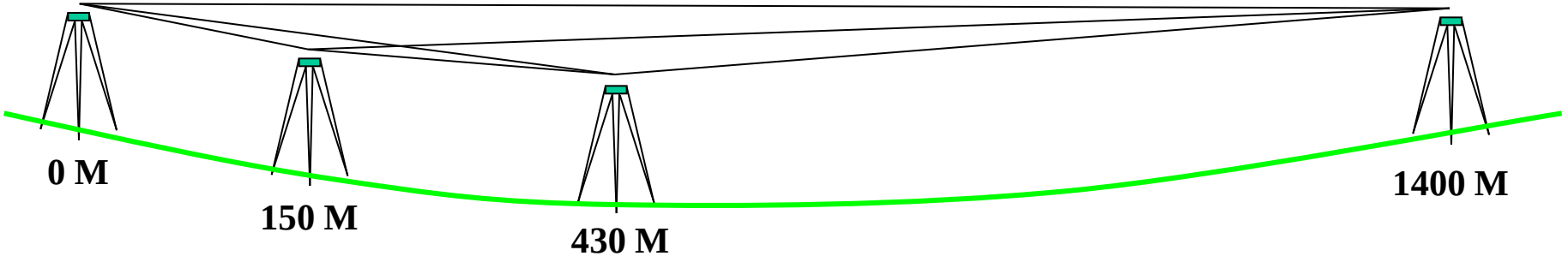


What Is A Calibration Base Line?

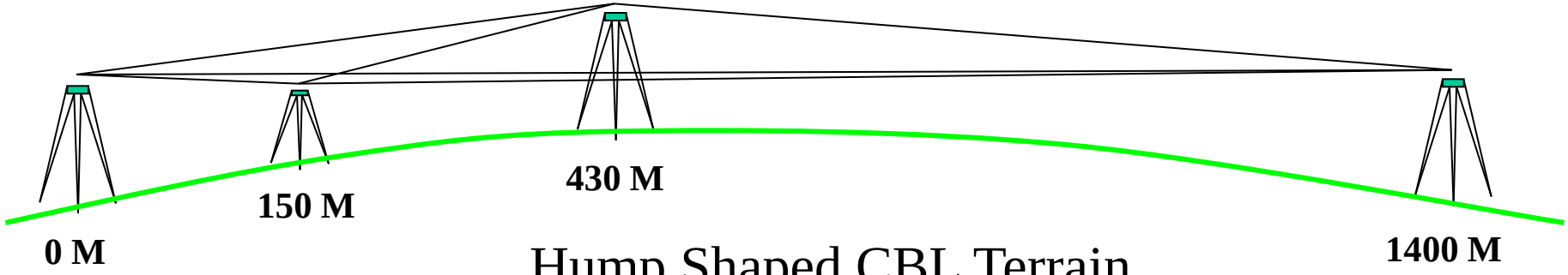
- **A series of stable monuments (marks) in a straight line (to within 2 arc minutes) whose published mark-to-mark distances and horizontal distances between all marks compare favorably with the National Standard of Unit Length.**
- **The National Standard of Unit Length is determined by the National Institute of Standards and Technology (NIST).**
- **NIST calibration services link the makers and users of precision instruments to the basic and derived units of the International System (SI) of measurements.**
- **For more information see http://www.nist.gov/public_affairs/guide/**



Flat CBL Terrain



Sag or “Dish” Shaped CBL Terrain



Hump Shaped CBL Terrain

NCDENR - NCGS Database - Windows Internet Explorer

http://portal.ncdenr.org/web/lr/geodetic/database

File Edit View Favorites Tools Help

Google Search More Sign In

NCDENR - NCGS Database

Page Tools

You are using an outdated browser. For a faster, safer browsing experience, upgrade for free today. Learn more X

Division of Land Resources

HOME LAND QUALITY GEOLOGICAL SURVEY GEODETIC SURVEY

Search DENR ... - Text +

Display distances in Meters

Monument search | My Folder | Inverse Calculator | Data Export | Station Recovery | Contact NCGS

Station name

PID

County All

Order All

Search Radius 2000

Latitude 35 ° 13 ' 18.84136 " N

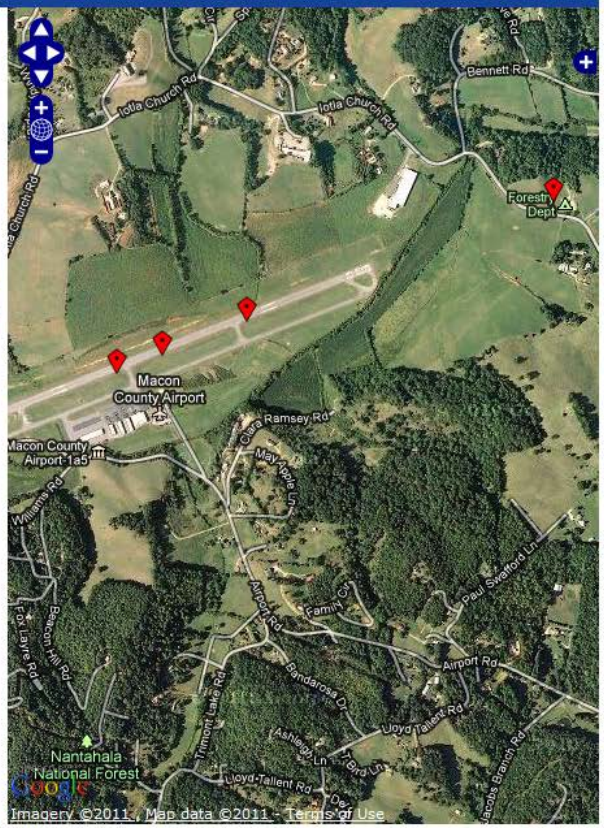
Longitude 083 ° 25 ' 14.40236 " W

Find monuments Clear search form

Showing 1 to 9 of 9 monuments << prev next >>

County	Name	PID	Type	Condition
Macon	1A5 A	AJ3424	Disk	Good
Macon	AIRPORT	FB3509	Disk	Not found
Macon	FRANKLIN CBL 000	FB4103	---	---
Macon	FRANKLIN CBL 1400	FB4104	Disk	Good
Macon	FRANKLIN CBL 150	FB4105	---	---
Macon	FRANKLIN CBL 410	FB4106	Disk	Good
Macon	MAC 1	AJ3419	Disk	Good
Macon	MACON CBL 000 2	AJ3417	Disk	Good
Macon	MACON CBL 150 2	AJ3418	Disk	Good

Add to My Folder



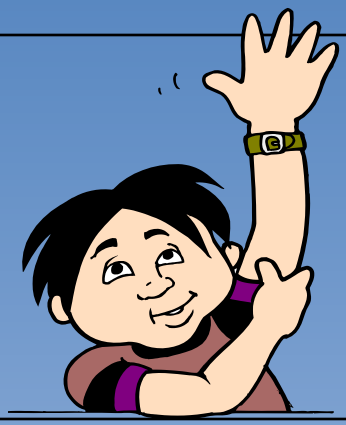
feedback

Done Internet 100%


NC SURVEYORS
Following
In Their
Footsteps
1939 PS
NORTH CAROLINA

Questions?

Gary W. Thompson, PLS
Office: 919-733-3836
Direct: 919-948-7844
Email: gary.thompson@ncdps.gov



Mailing address:	**Building (shipping) address:**
Gary W. Thompson, PLS NC Geodetic Survey 4298 Mail Service Center Raleigh, NC 27699-4298	Gary W. Thompson, PLS NC Geodetic Survey Bowers Building NC National Guard complex 4105 Reedy Creek Rd Raleigh, NC 27607

EMERGENCY MANAGEMENT
NORTH CAROLINA