# Statewide Quality Level 2 LiDAR & Orthoimagery

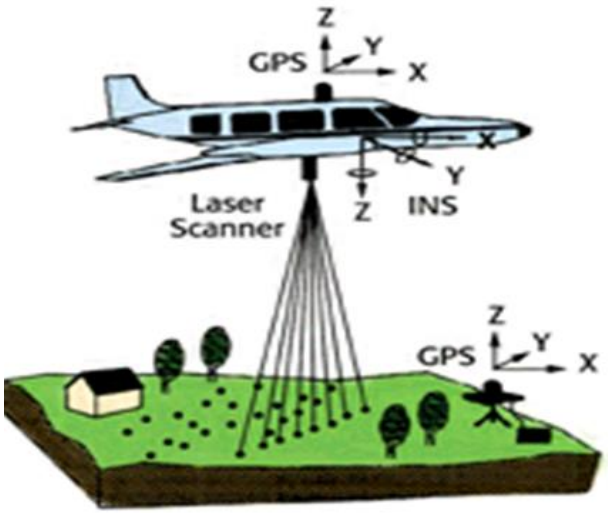
July 28, 2015

# Next Generation LiDAR

- What is LiDAR?
- What is Quality Level 2 (QL2) LiDAR?
- What products will NCDOT receive?
- Accuracy
- Statewide Orthoimagery Program

# LiDAR

- **Li**ght **D**etection **a**nd **R**anging
- Active sensor unlike a camera which is a passive sensor
- Uses thousands of laser pulses/sec to accurately measure distances to the earth's surface



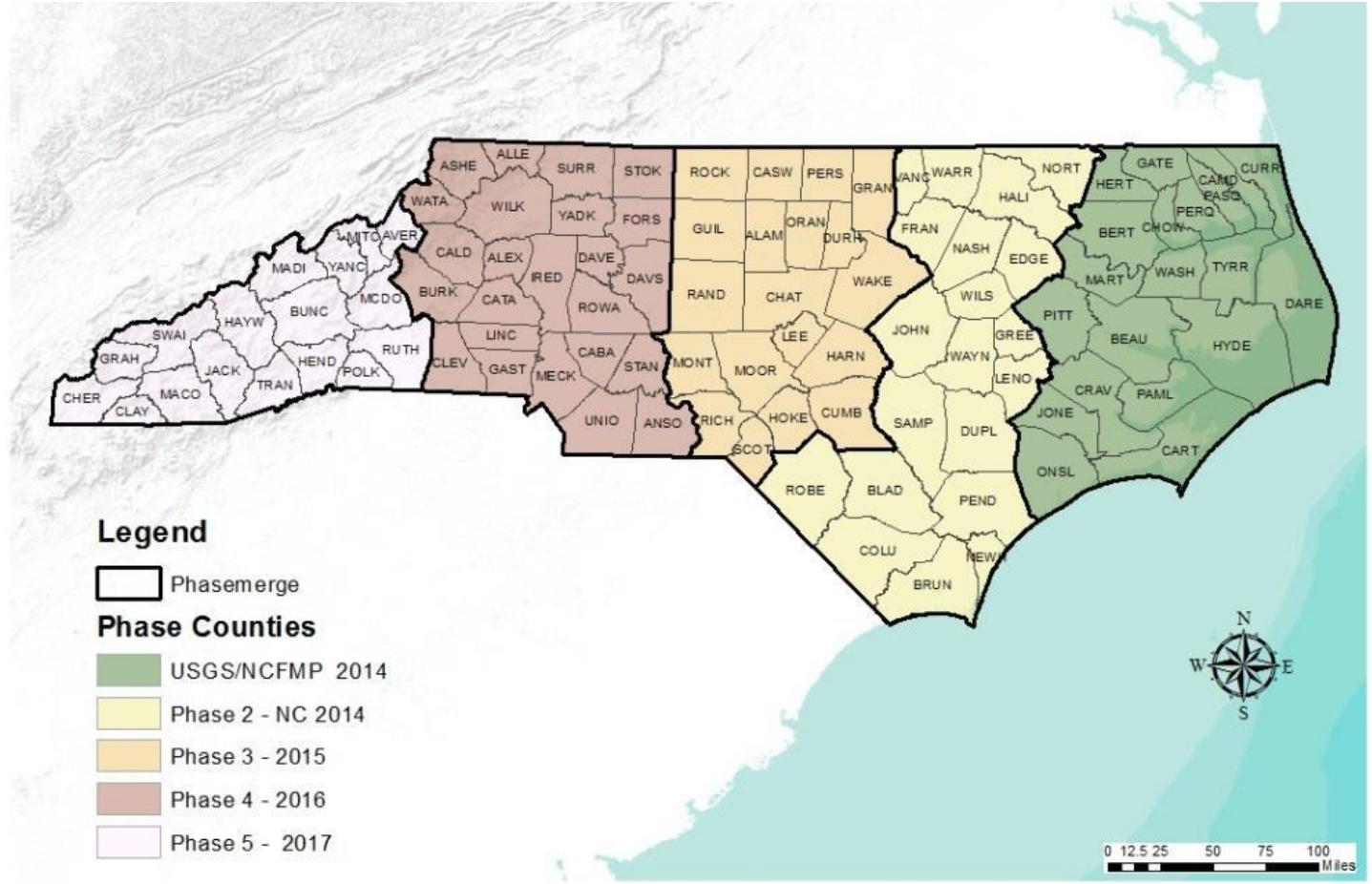

- Each LIDAR pulse is a laser beam of light that reflects back to the LIDAR sensor
- Each reflection is called a return and there are multiple returns collected for each laser pulse
- An X, Y, Z coordinate can be generated for each return
- Intensity (strength of the return) is also collected

# QL2 LiDAR

- What is it?
- National Enhanced Elevation Assessment (2012)
  - Defined by Quality Levels (QL)
  - Lower QL number means more dense point spacing and more accurate data
  - QL2 LiDAR has nominal 2 pulse/$m^2$ spacing
  - QL2 LiDAR has 0.59 ft Fundamental Vertical Accuracy (FVA)
  - FVA represents open terrain accuracy at 95% confidence level
  - http://www.dewberry.com/Consultants/GeospatialMapping/FinalReport-NationalEnhancedElevationAssessment

- North Carolina is collecting QL2 LiDAR statewide over a 4 year period starting 2014

# 4 Year QL2 Planned Collection Program




- Data is available the following year after it is collected
- Data collected in 2015 is available in early 2016, and so forth

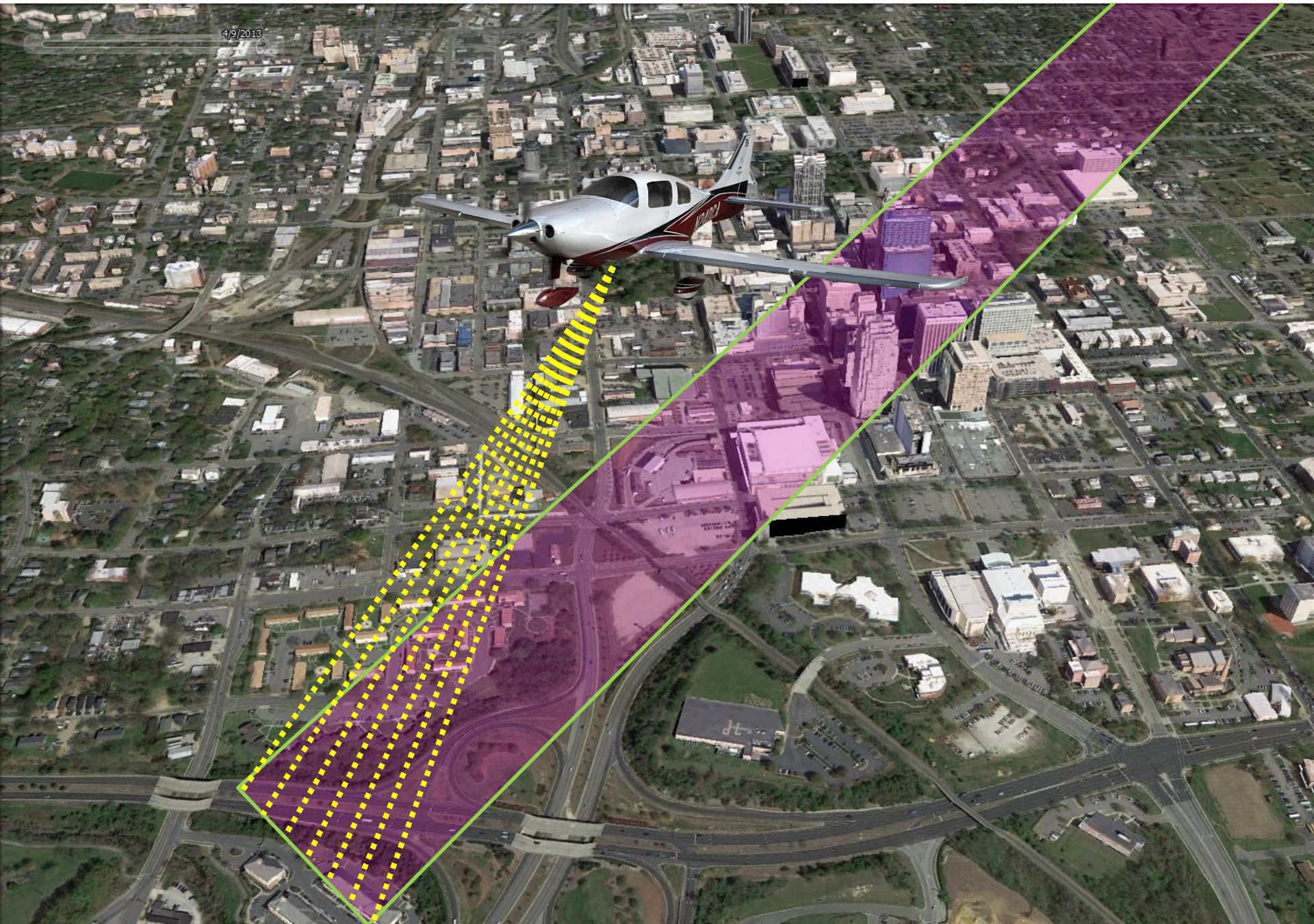
# QL2 LiDAR Usage within NCDOT

- The Photogrammetry and the Location & Surveys Units will use this data on over 100 projects in 2015-2016
- It will be used as part of the Digital Terrain Model (DTM) for base plans sheets for final design purposes
- It will also be used for mapping for preliminary design
- It is also being used by PDEA for Archeological Investigations

# QL2 LiDAR

- What does  it look like?
  - LiDAR Classification Process
  - Feature Comparisons as compared to 2001-2005 statewide collected LiDAR

# LiDAR Collection to Classification

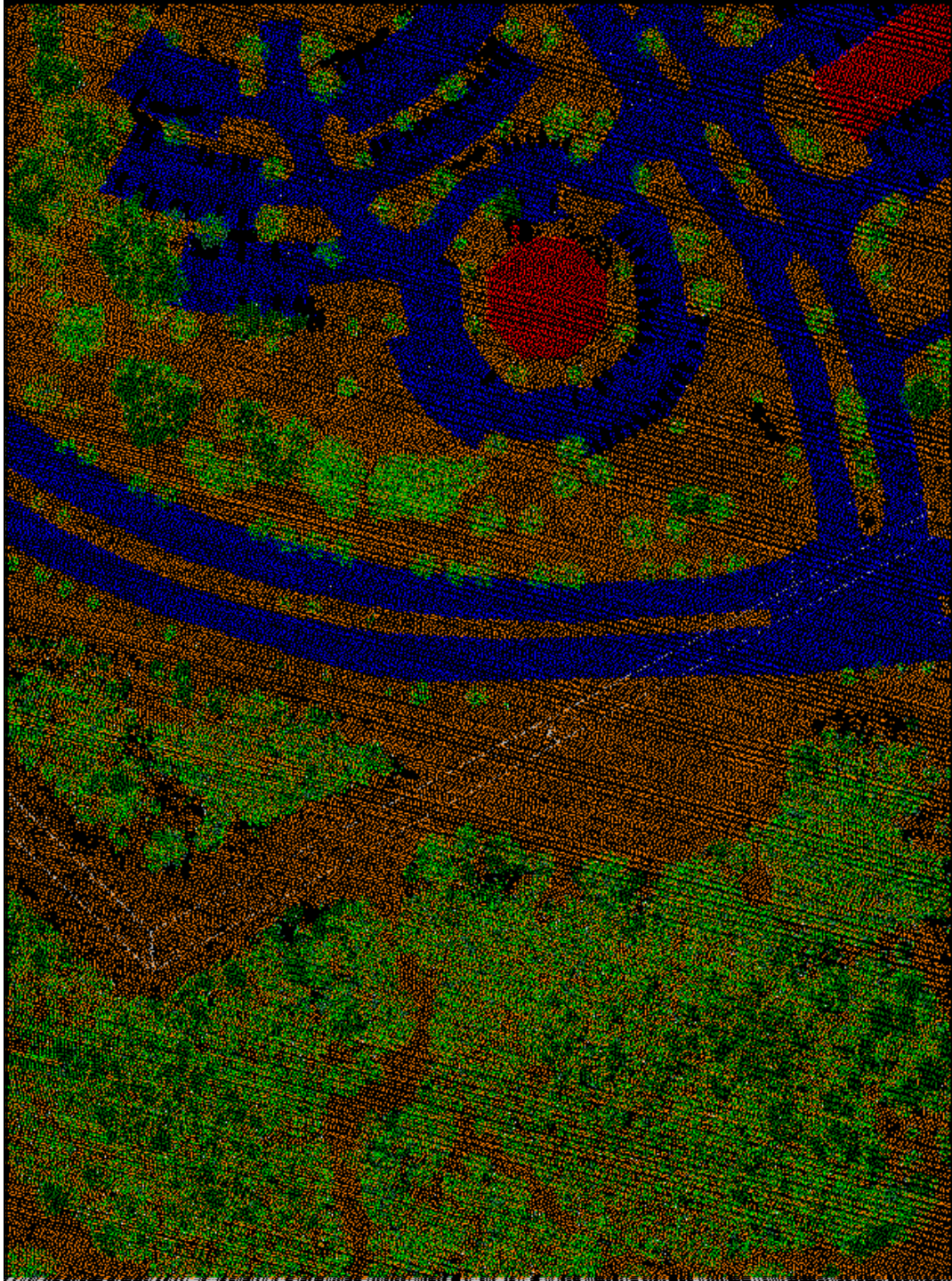


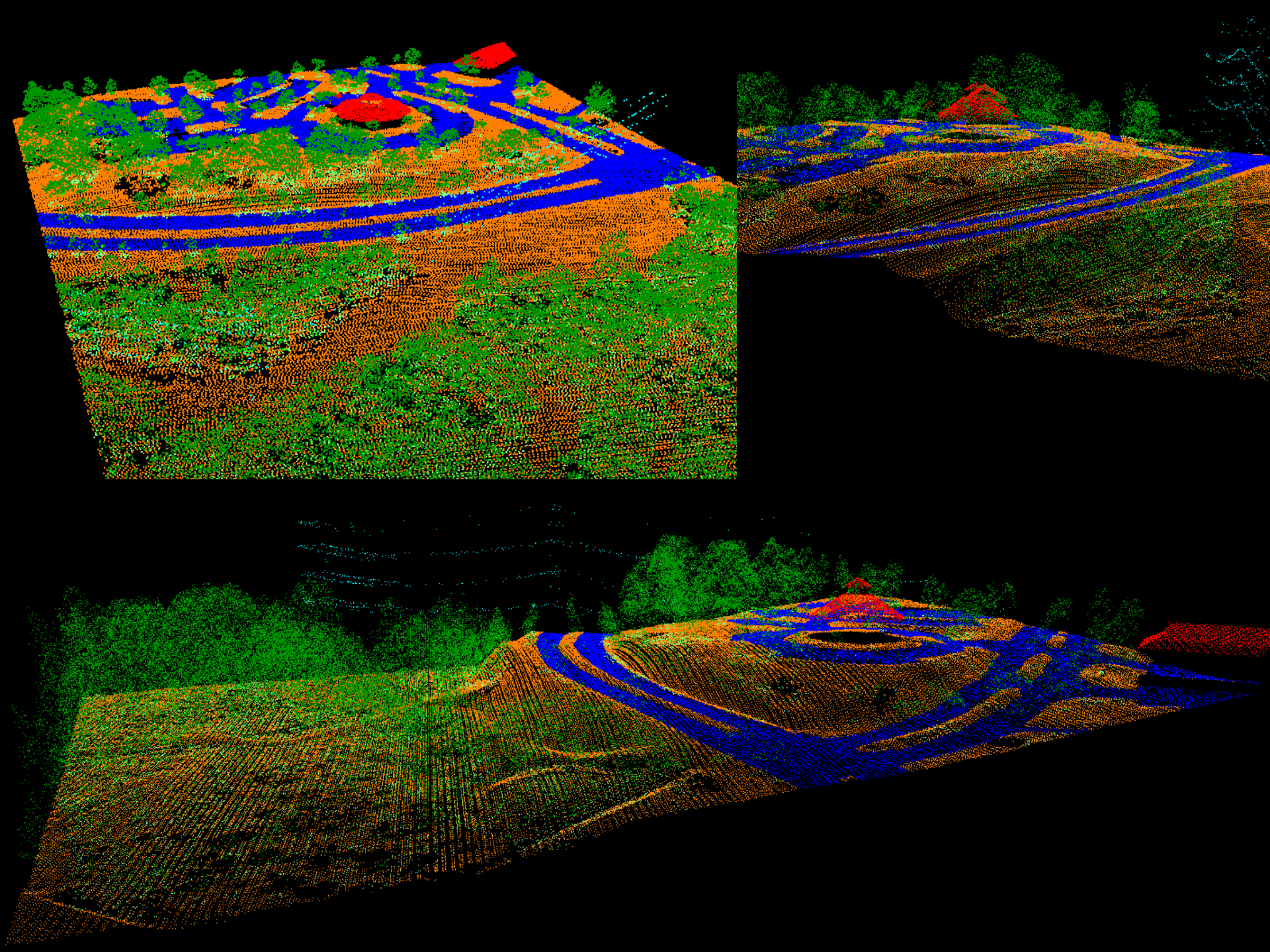
# LiDAR Collection to Classification


Un-Classified

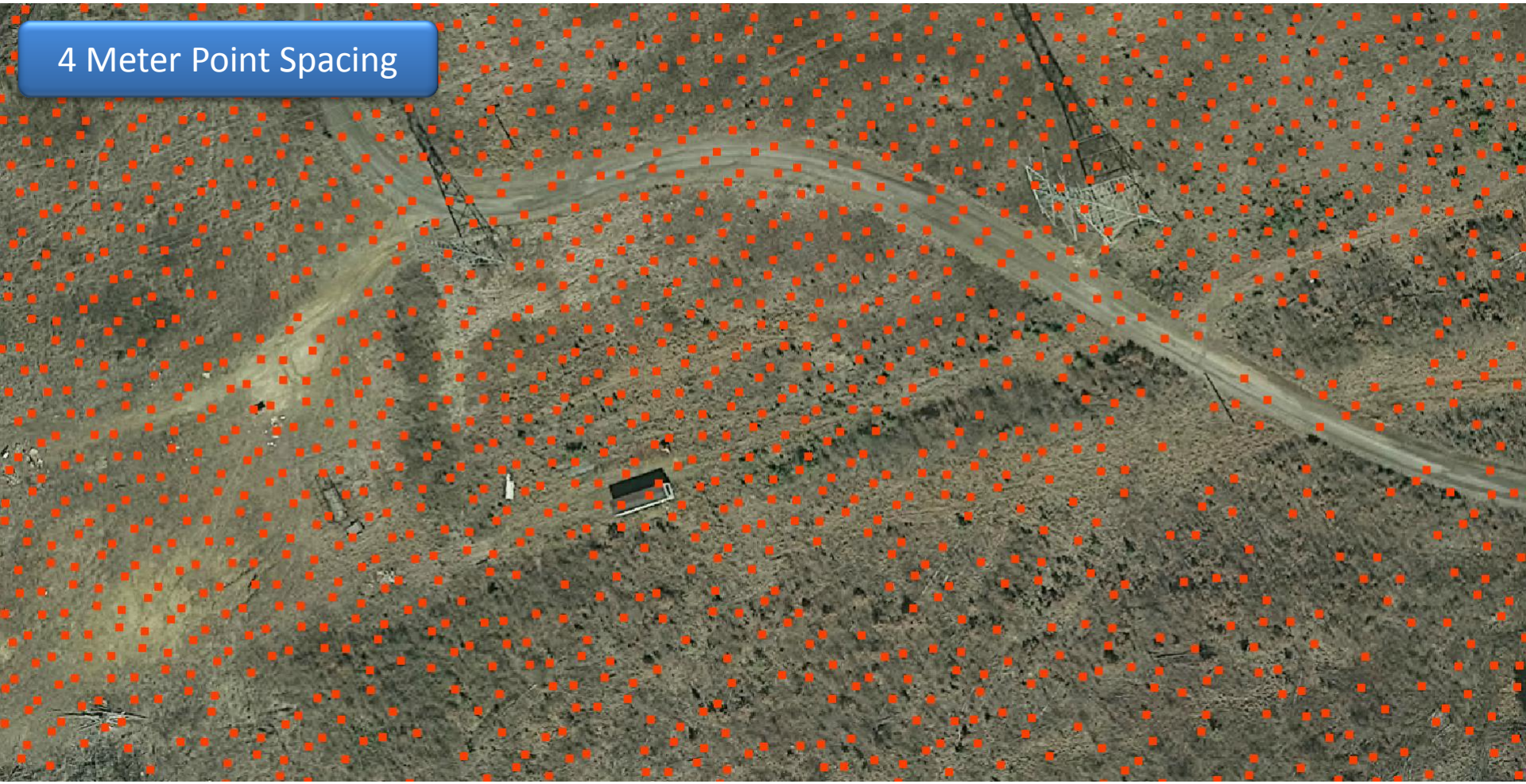
# LiDAR Classification

- Un-Classified Data
  - Ground/Bare Earth
    - Vegetation
      - Buildings
        - Roads/Impervious

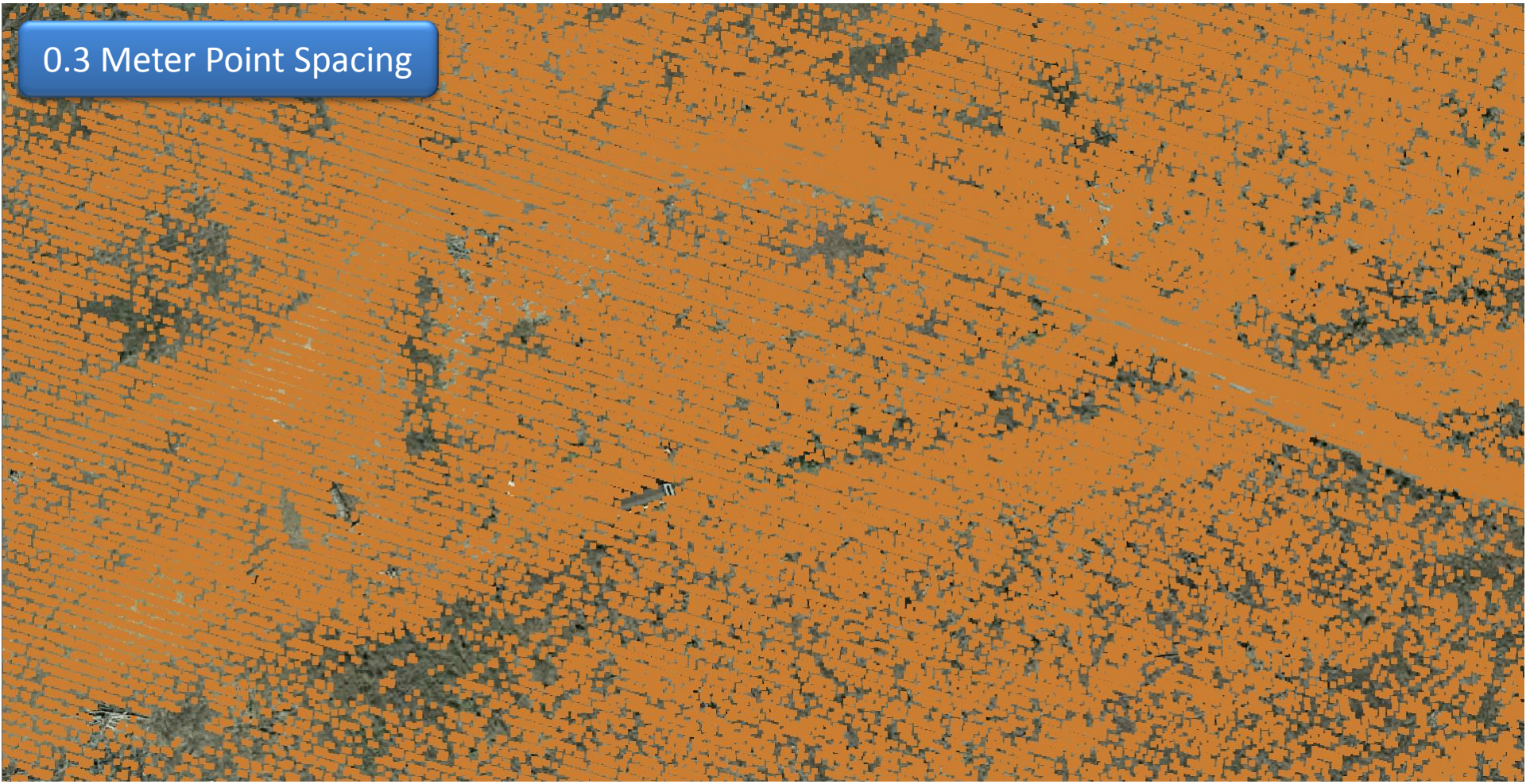




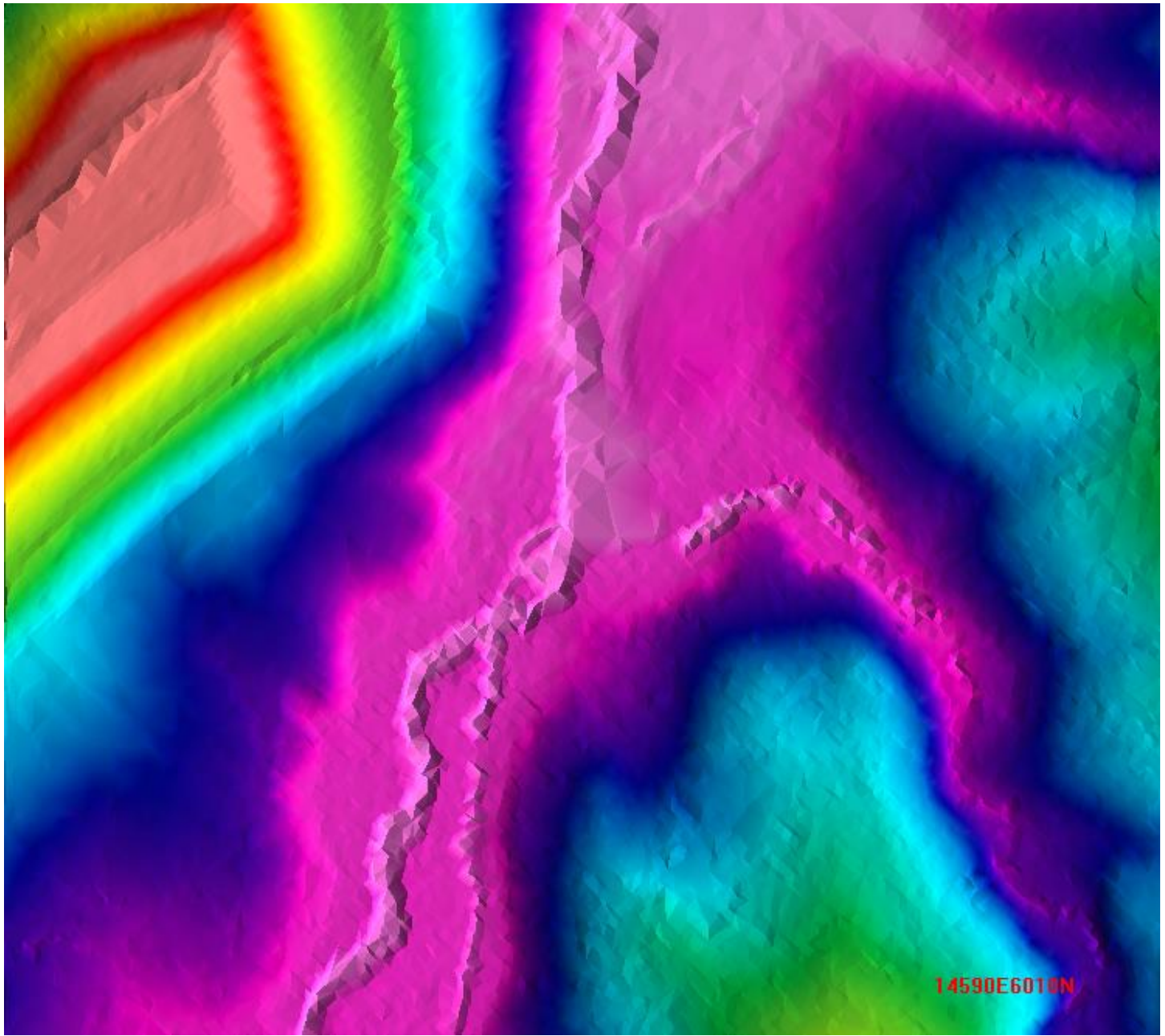
# 4 Meter Elevation Model (2001-2005 NC LiDAR)



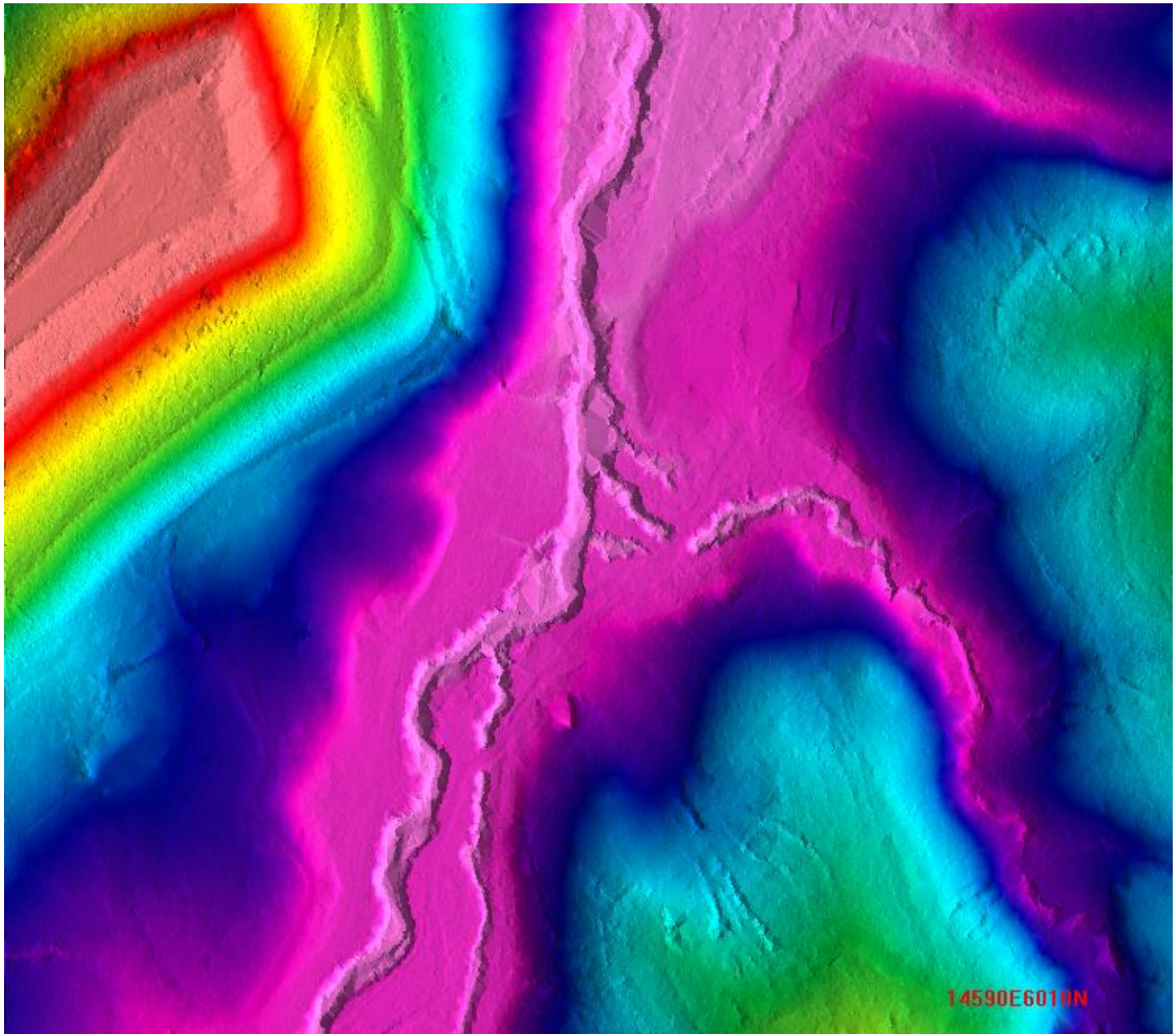
# QL2 Elevation Model



# 4 Meter Elevation Model (2003 NC LiDAR)

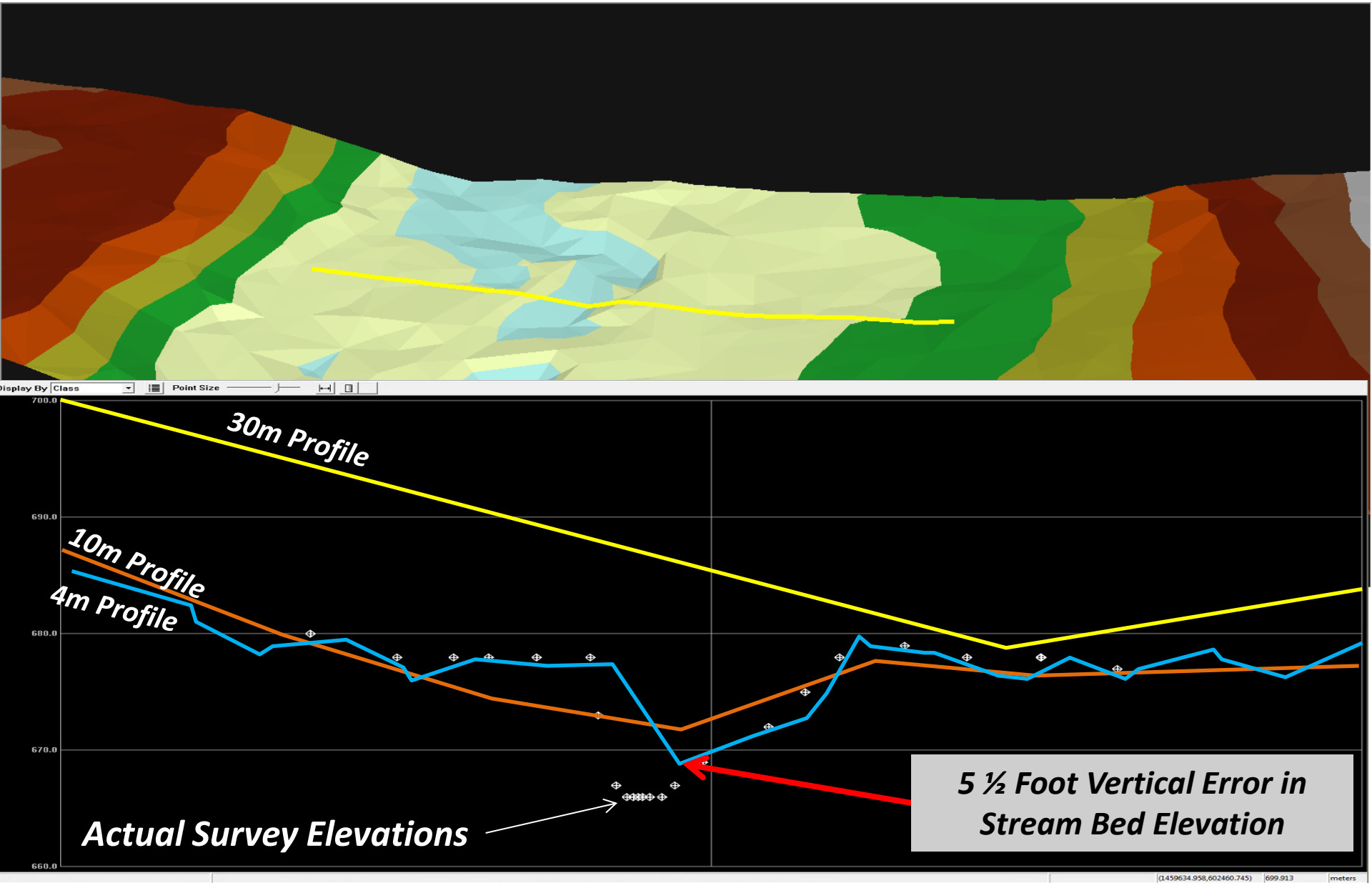


# QL2 Elevation Model



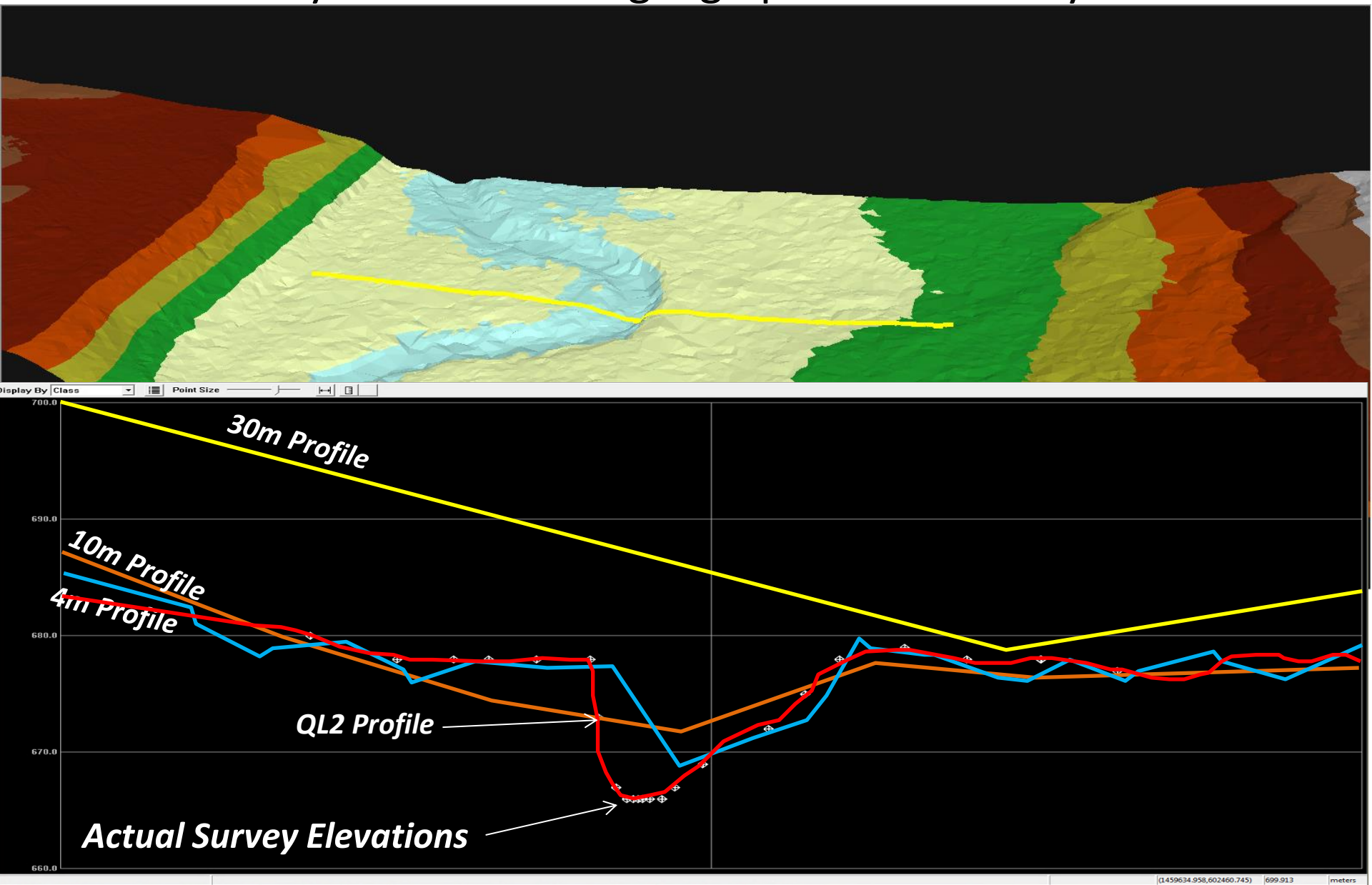
# 4 Meter LiDAR (2003)

*A more defined surface.  Lacks true channel topographic definition.



# NC QL2 LiDAR (2014)

*Nearly mirrors existing high precision survey data.



# Road Cross Section Comparison

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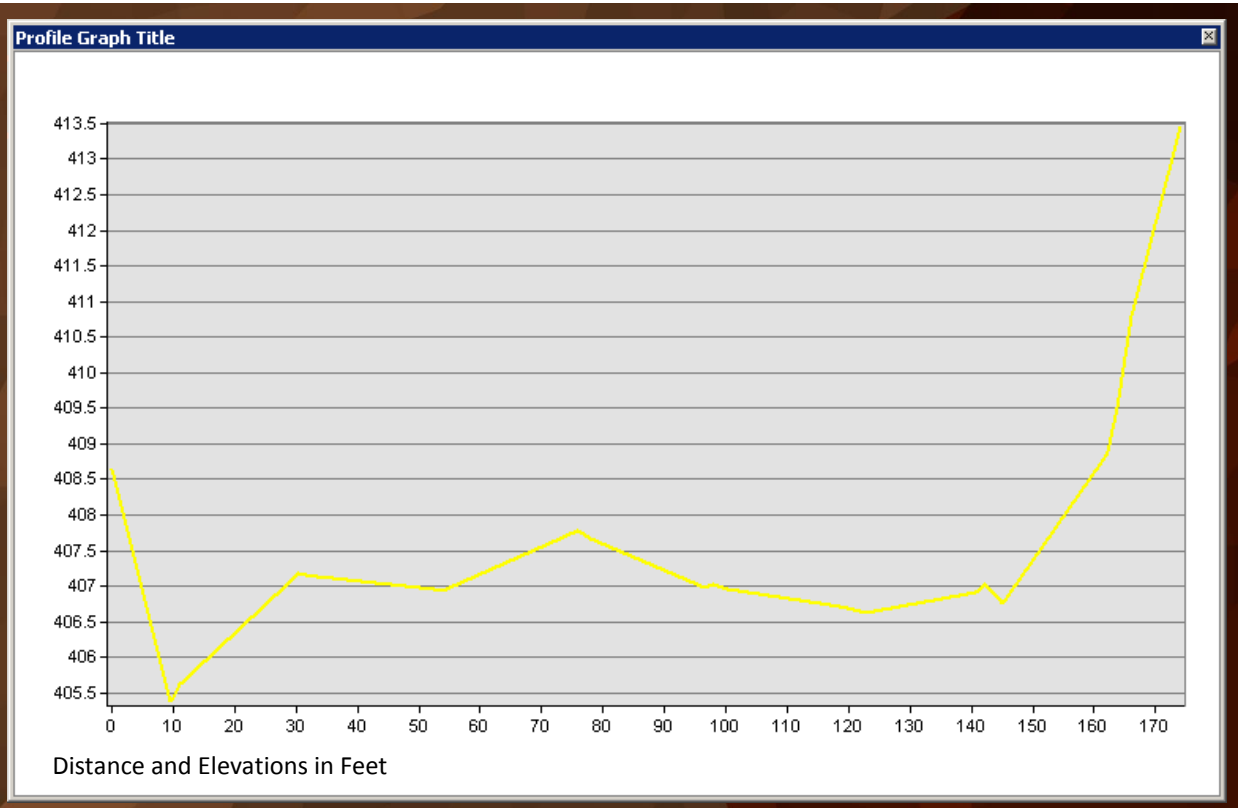
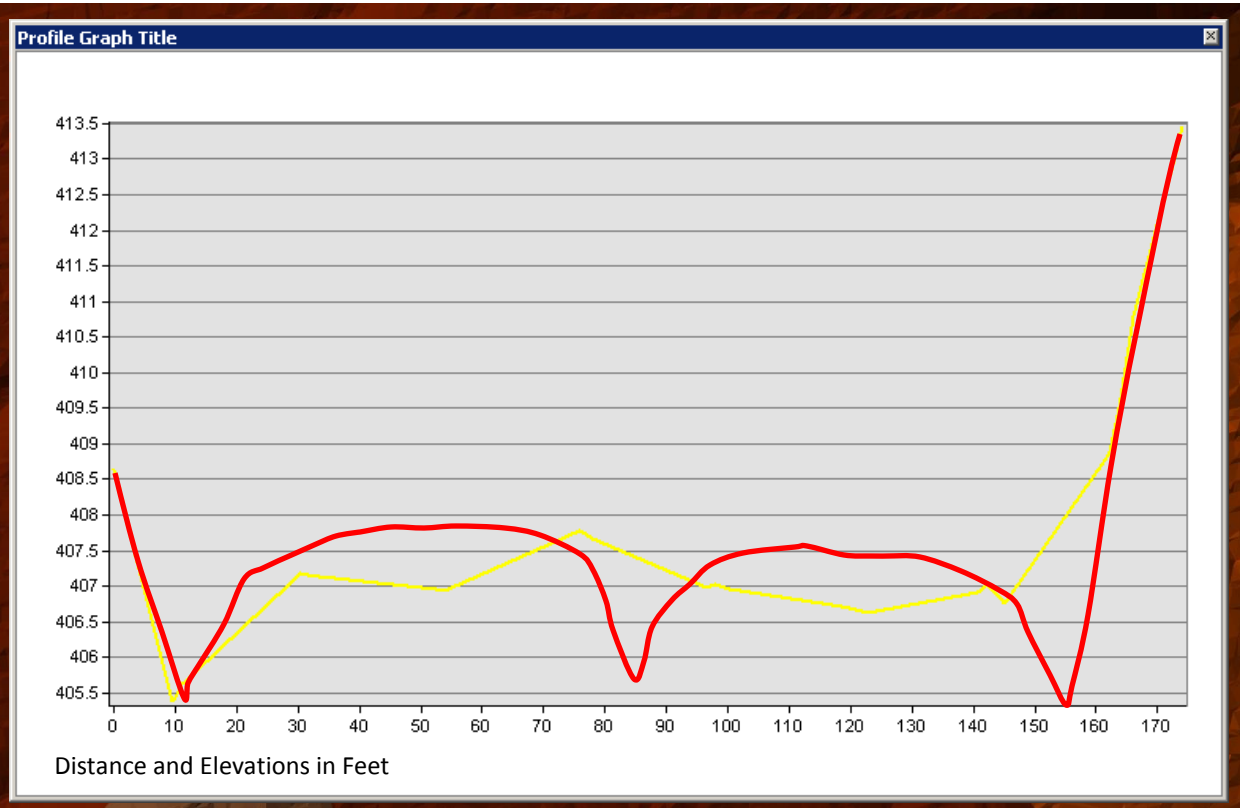
-Existing NC LiDAR TIN and Road Profile



# Road Cross Section Comparison

-New QL2 NC LiDAR from 2014
-Much higher definition in road shape and extent



# What Products will NCDOT receive?

| Deliverable Description |
| --- |
| **Height Modernization** (Maintenance on CORS systems/ operations and equipment) |
| **LiDAR Collection** (Acquisition of Data) |
| **LiDAR in LAS format** ASPRS LAS version 1.3 |
| **Roads & Bridges Classification** included in **LiDAR in LAS format** ASPRS LAS version 1.3 |
| **Digital Elevation Models by tile** (10 foot Hydro Enforced DEM, 20 foot DEM, 50 foot Hydro Enforced DEM) |
| **Terrain datasets for each county** (Bare earth data in formatted for GIS) |
| **Quality Control** (Survey approximately 55 NVA and 45 VVA points per 1000 sq miles) |

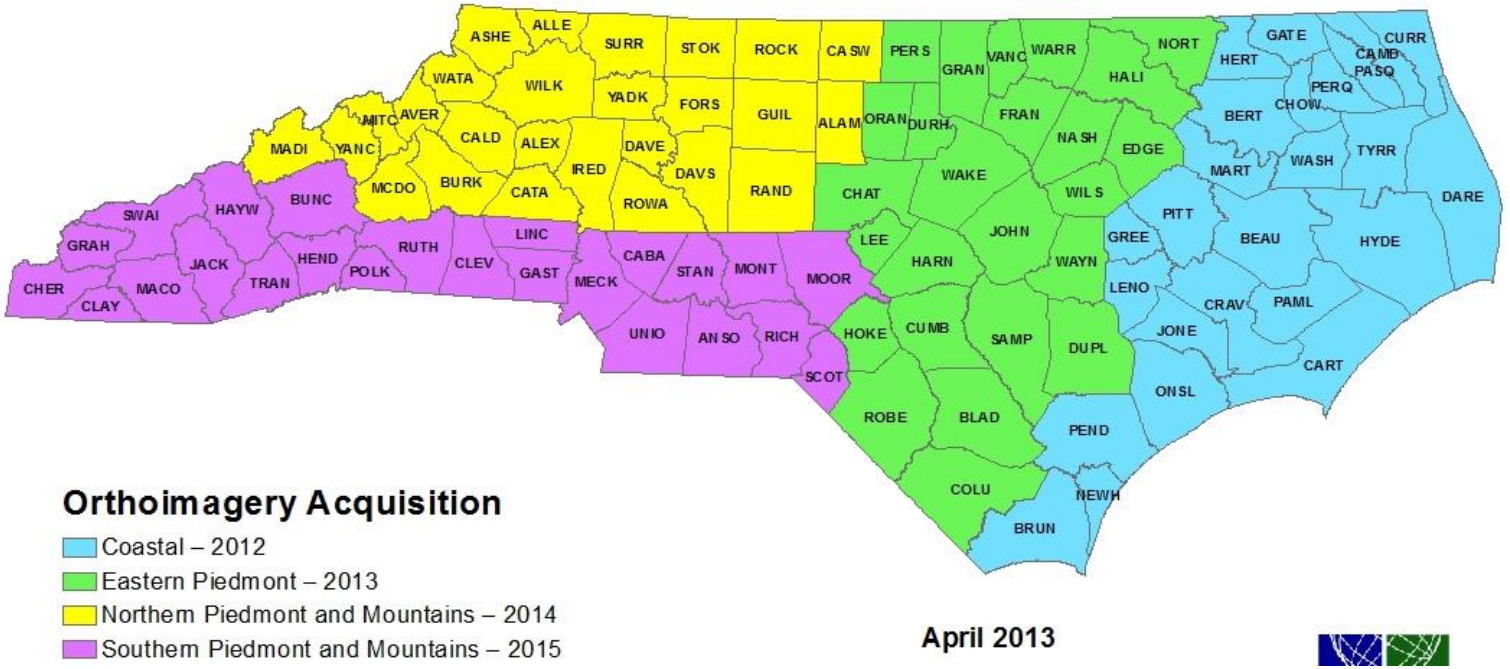
- Classified LiDAR from vendor is available for NC QL2 Validation Range
- Photogrammetry generated DEMs and Terrain Datasets are also available for NC QL2 Validation Range

# Vertical Accuracy

- Point Cloud Data Open Terrain Vertical Accuracy
  - 4 Meter (2001, 2003, & 2005 NC collection)
    - Fundamental Vertical Accuracy (FVA): **1.6 feet at a 95% confidence level**
  - QL2 (nominal 2 points per meter)
    - Fundamental Vertical Accuracy (FVA): **0.59 feet at a 95% confidence level**

# Statewide Imagery Program 2012-2015 Cycle

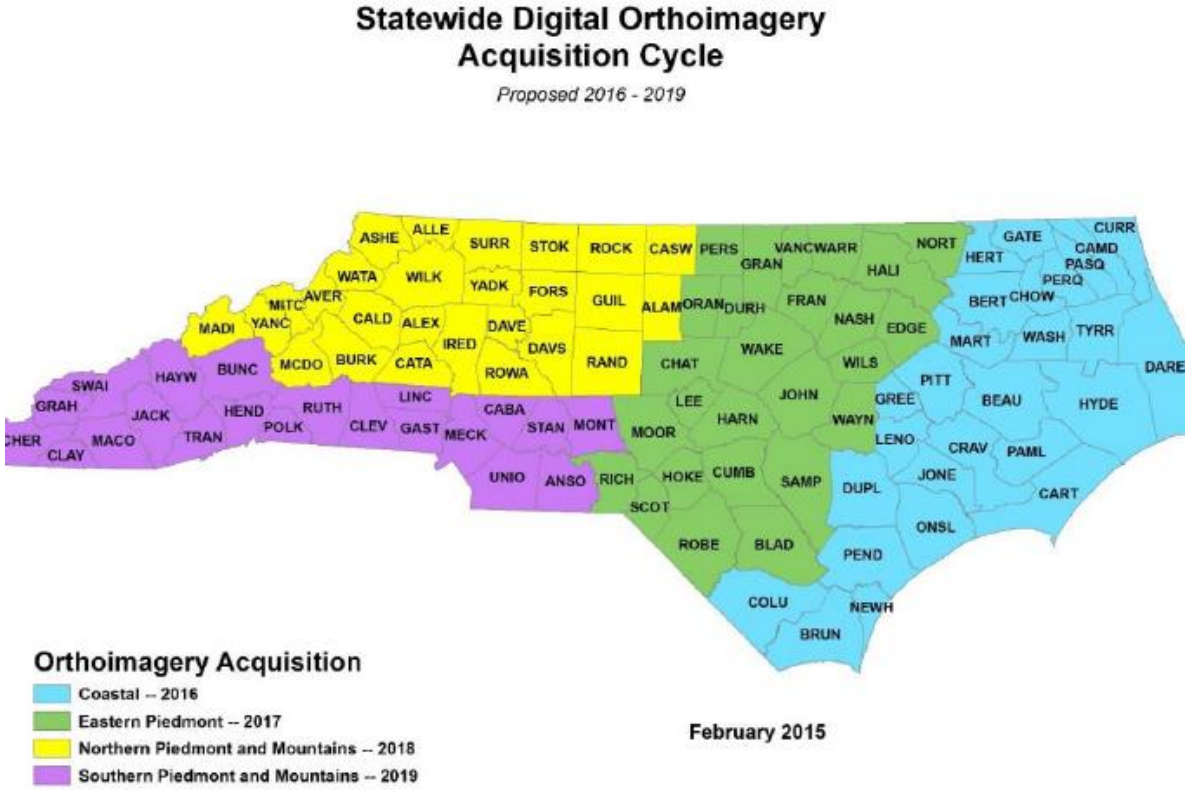
- 0.5 foot color orthoimagery collected over a 4 year cycle




- Contracts administered by NC Center for Geographic Information & Analysis
  - NCDOT Photogrammetry serves as Technical Advisor
- Data available at http://www.nconemap.org or from Photogrammetry Unit

# Statewide Imagery Program 2016-2019 Cycle

- 4 year cycle has been funded by E911 Board

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# Statewide QL2 LiDAR & Orthoimagery

# Questions

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