

A 3D topographic map of Morris County, New Jersey, rendered in shades of green and brown. The map shows the county's irregular shape and internal terrain features like hills and valleys. The map is set against a solid blue background.

Elevation Task Force LiDAR

By the Morris County GIS Department

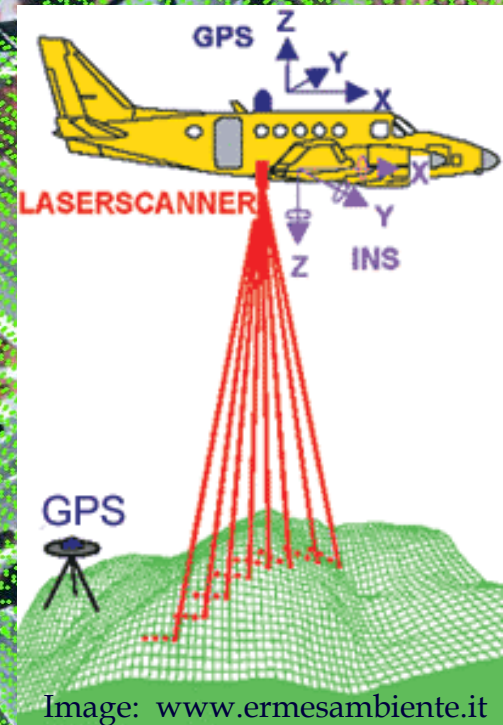
PRESENTED BY:

Michael Umansky

What is LiDAR

Light Detection And Ranging

Laser pulses reflect off ground features and are returned to a sensor on the plane.



LiDAR Considerations



- Storage requirements
- Data format
- CPU demands
- Software requirements

LiDAR Storage Requirements

Morris County Project

- LiDAR average point spacing: **4.5'**
- LiDAR points per square mile: **1.9 million**
- Project Area: **481 square miles**
- LiDAR datasets: First Return
..... Last Return
..... Bare Earth

LiDAR Data Format Options

ASCII Format

413207.758, 755002.133, 779.477, 0.7
413194.093, 755011.564, 783.874, 5.3
413210.768, 755000.540, 860.579, 1.1
413208.024, 755002.853, 860.908, 0.7
413210.869, 755000.933, 860.481, 0.4
413224.130, 755001.481, 778.919, 0.6
413220.502, 755003.996, 778.952, 1.6
413224.394, 755001.677, 846.931, 0.7
413220.798, 755004.159, 846.964, 0.4
413197.652, 755019.749, 782.627, 5.7
413194.546, 755021.899, 784.825, 5.8
413212.397, 755009.983, 853.033, 0.3
413208.867, 755012.431, 853.886, 0.4
413209.752, 755012.230, 853.919, 0.2
413192.751, 755023.551, 785.547, 5.4
413196.020, 755021.333, 783.906, 6.9
413199.060, 755019.215, 781.544, 5.8

LAS Format (binary)

<http://www.lasformat.org/>

LAS Attributes

- **x**
- **y**
- **z**
- **Intensity**
- **Return Number**
- **Number of Returns**
- **Scan Direction Flag**
- **Edge of Flight Line**
- **Classification**
- **Scan Angle Rank**
- **GPS Time**

LiDAR CPU Demands

White Paper

A Performance Overview of the 32-bit QT Modeler running on 64-bit Hardware and Windows XP x64 Platform

January, 2006

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Planning, Development, and Technology
(973) 829-8120

	32-bit System	64-bit System
OS	Microsoft Windows XP Professional Version 2002 SP2	Microsoft Windows XP Professional x64 Version 2003 SP1
Processor	2 GHz XEON	(2) Dual-Core 2.8GHz XEON
RAM	2 GB	8 GB
Disk Drives	40 GB 7200RPM 2MB Cache	SATA Raid Controller (RAID 0) 2 TB Total
	120 GB 7200RPM 8 MB Cache	(4) 500GB 7200 RPM 16MB Cache
Graphics Card	NVIDIA Quadro4 700 XGL 64MB Driver Version 5.6.7.2	NVIDIA Quadro FX 4400 512MB Driver Version 8.1.6.7

New Workstation

Dual Processors

64 Bit O.S.

8 GB RAM

Graphics Card (512 MB)

Large Hard Drive

LiDAR Software Options



ESRI ARC View 9.1

- 3D Analyst
- Spatial Analyst

Applied Imagery

- QT Modeler
- QT Reader

Leica LIDAR Analyst

- ArcView extension

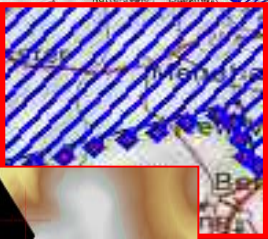
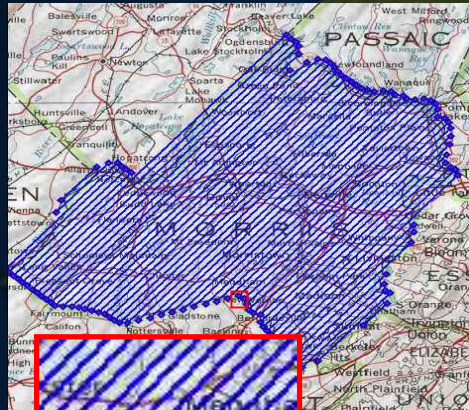
Bentley Terrasolid

- TerraScan
- TerraModeler

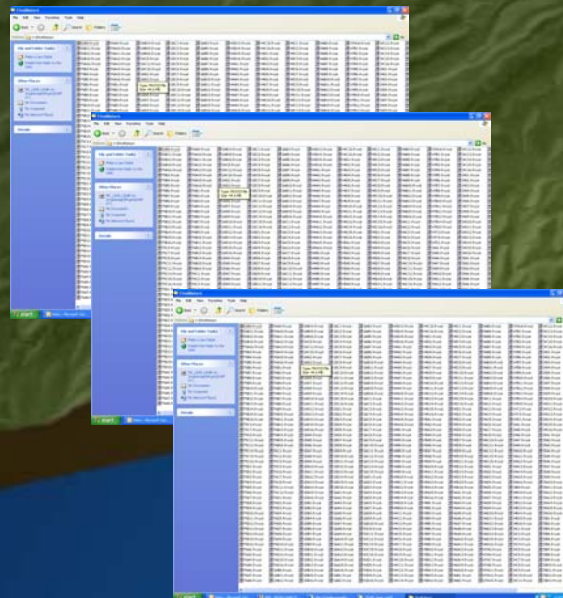
Merrick Advanced Remote Sensing (MARS®) Software

QA/QC - A Major Undertaking

Project Area Coverage



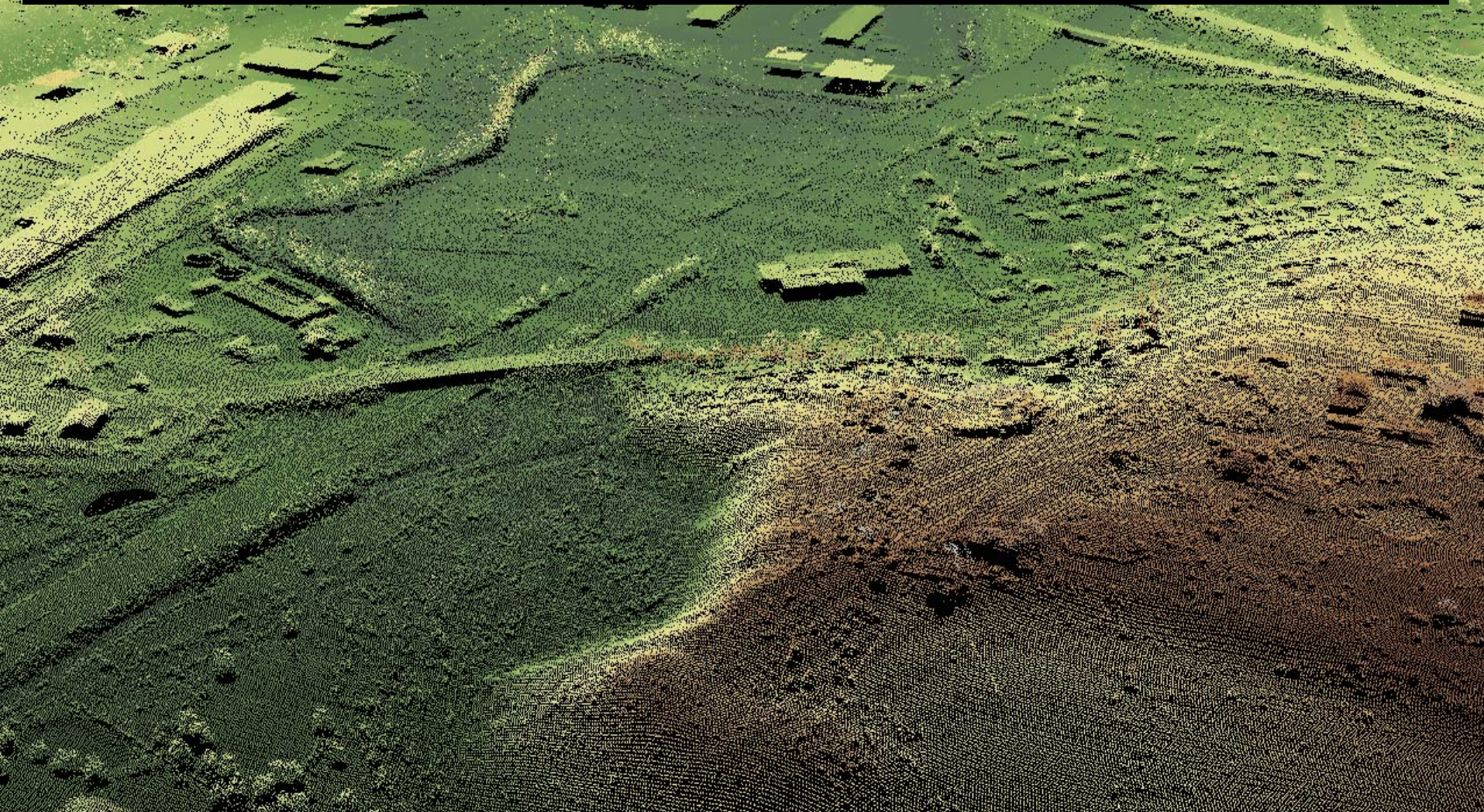
File integrity



Data Integrity

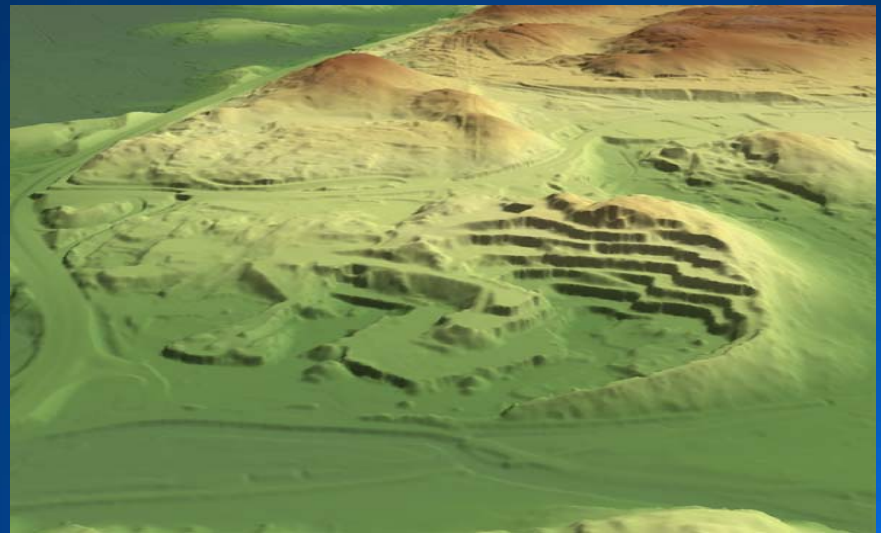
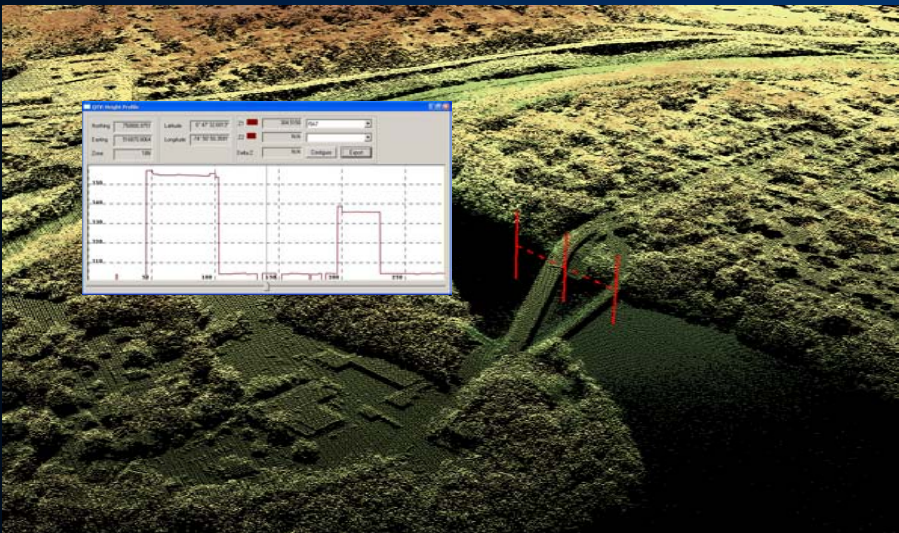
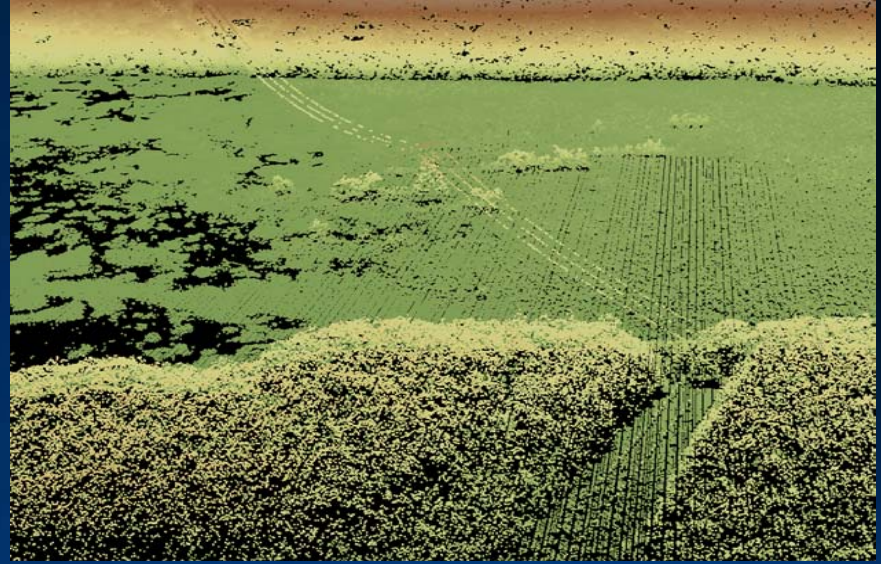
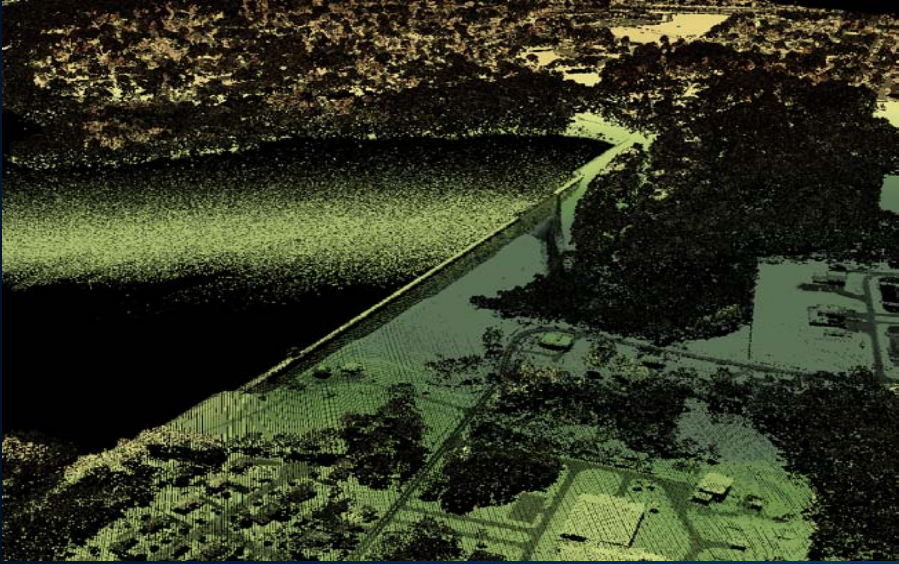


What is Intensity?



Last Return

LiDAR Uses

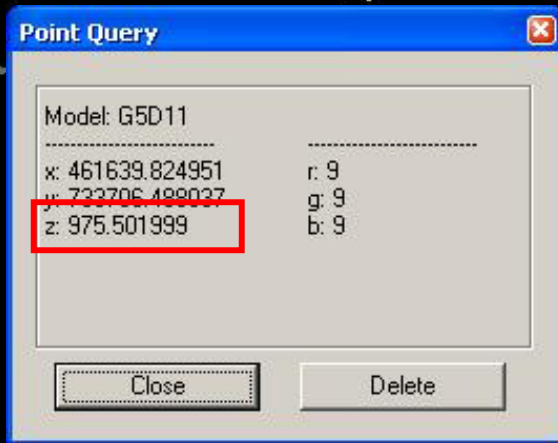
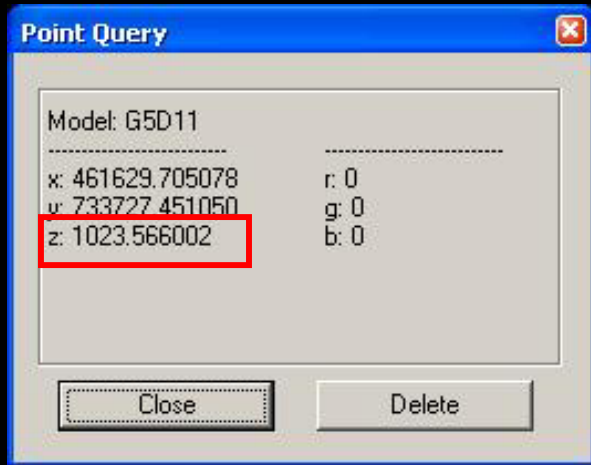


Oblique Views

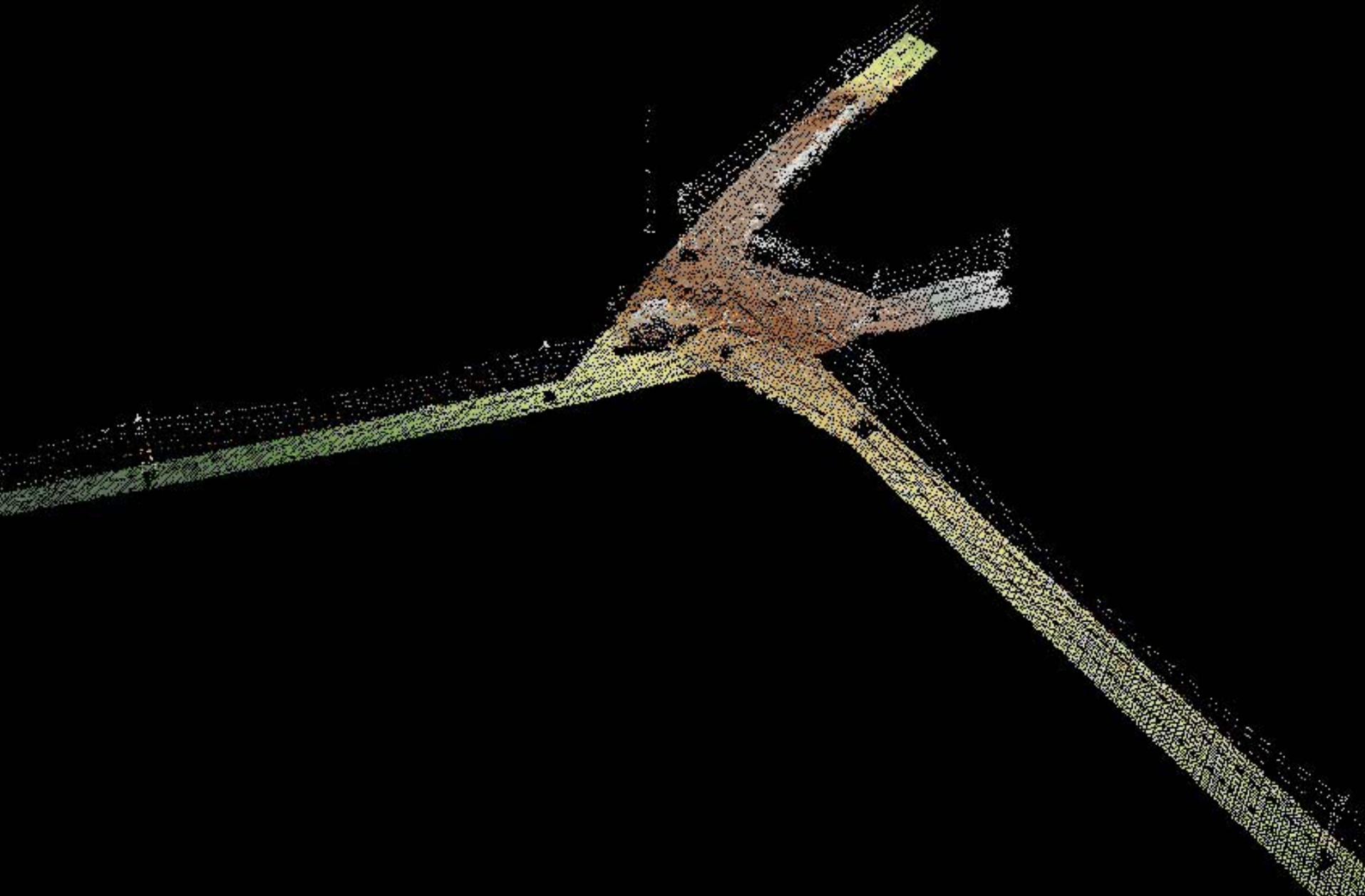
Jersey City Reservoir

An aerial photograph of the Jersey City Reservoir, showing a large body of water surrounded by dense green trees and some buildings. The text "Jersey City Reservoir" is overlaid in a blue, cursive font, following the curve of the reservoir's edge.

LiDAR Point Selection



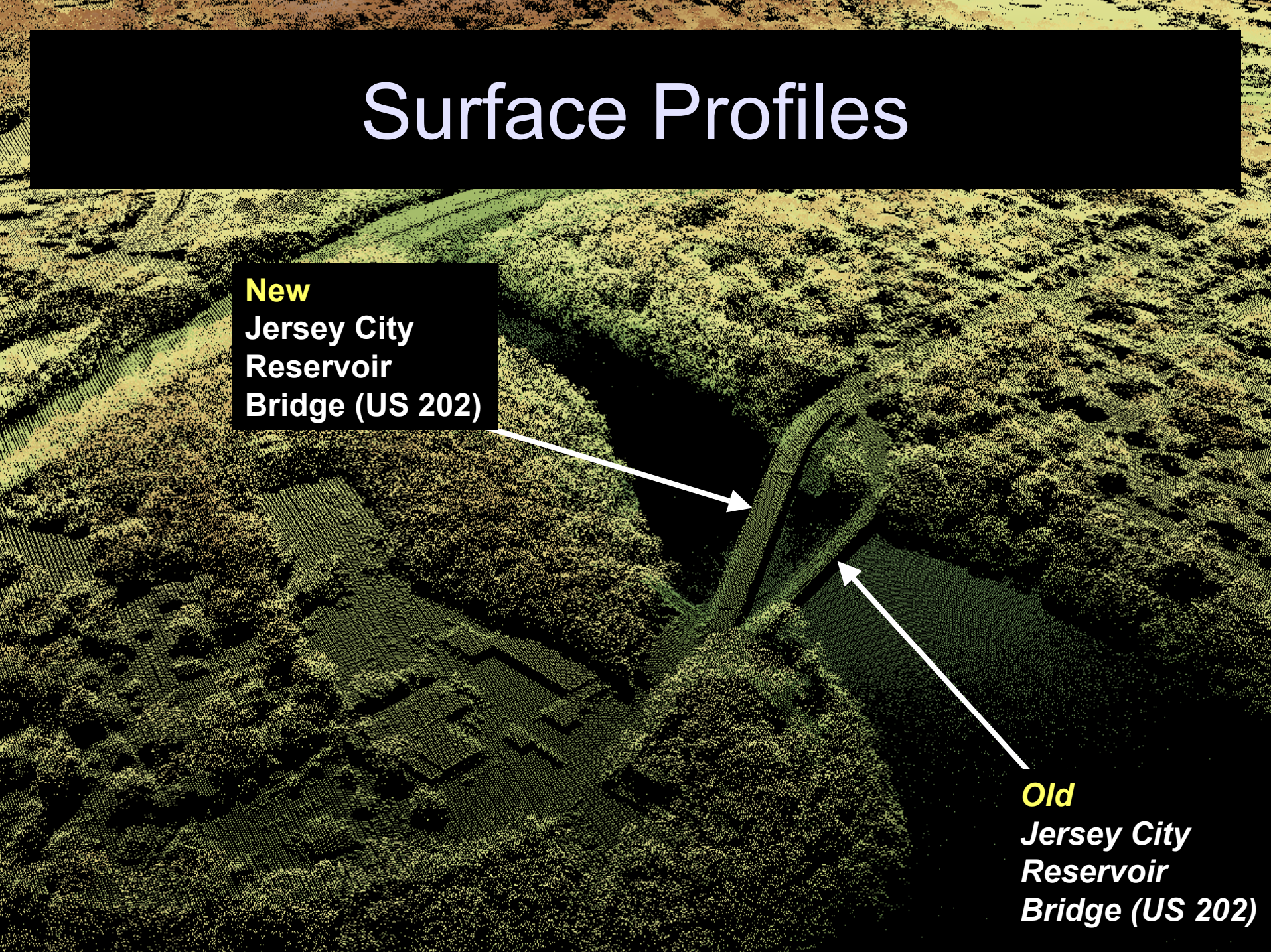
Virtual Tours



Surface Profiles

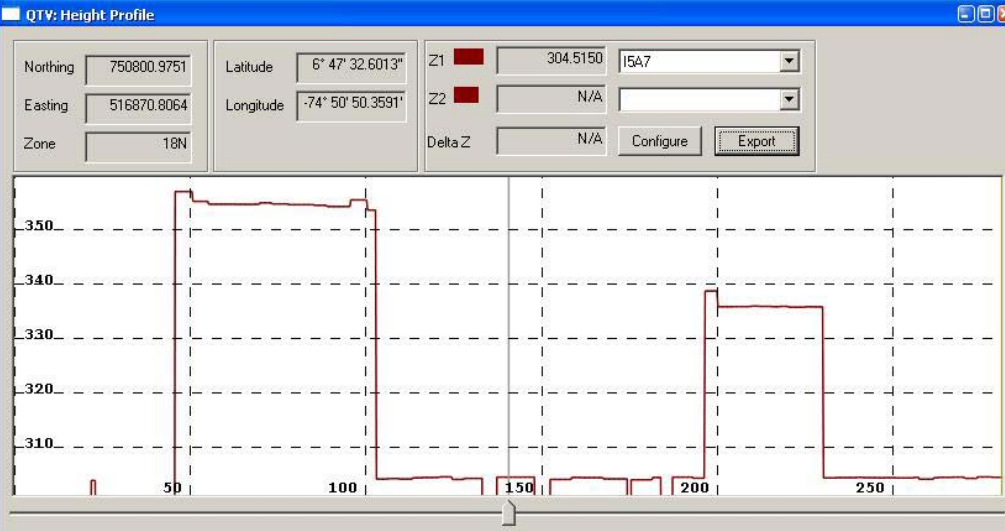
New
Jersey City
Reservoir
Bridge (US 202)

Old
Jersey City
Reservoir
Bridge (US 202)



Surface Profiles

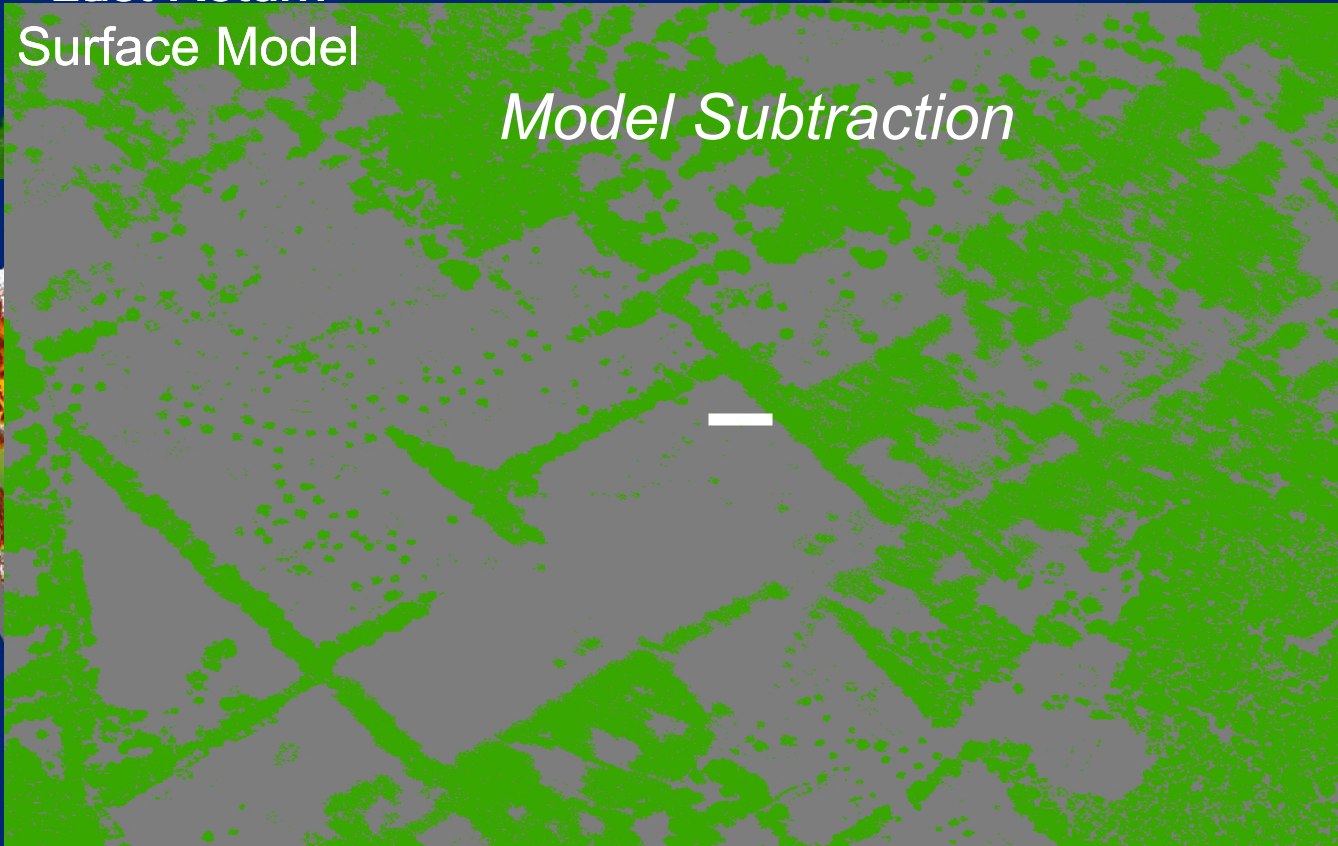
Reservoir Bridge
Cross Section



Feature Extraction - Deciduous Trees

First Return
Surface Model

Model Subtraction



Feature Extraction - Deciduous Trees

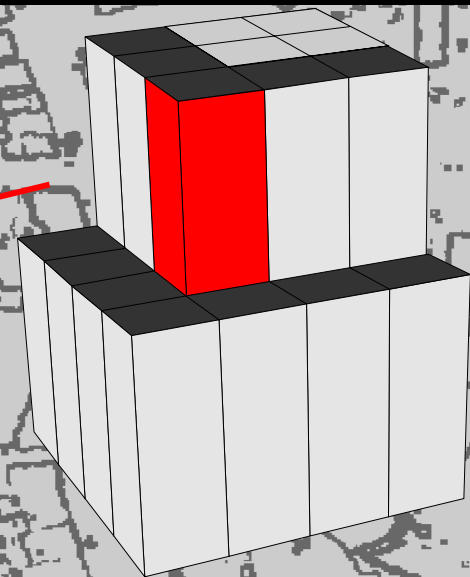


Feature Extraction – Building Outlines



Feature Extraction – Building Outlines

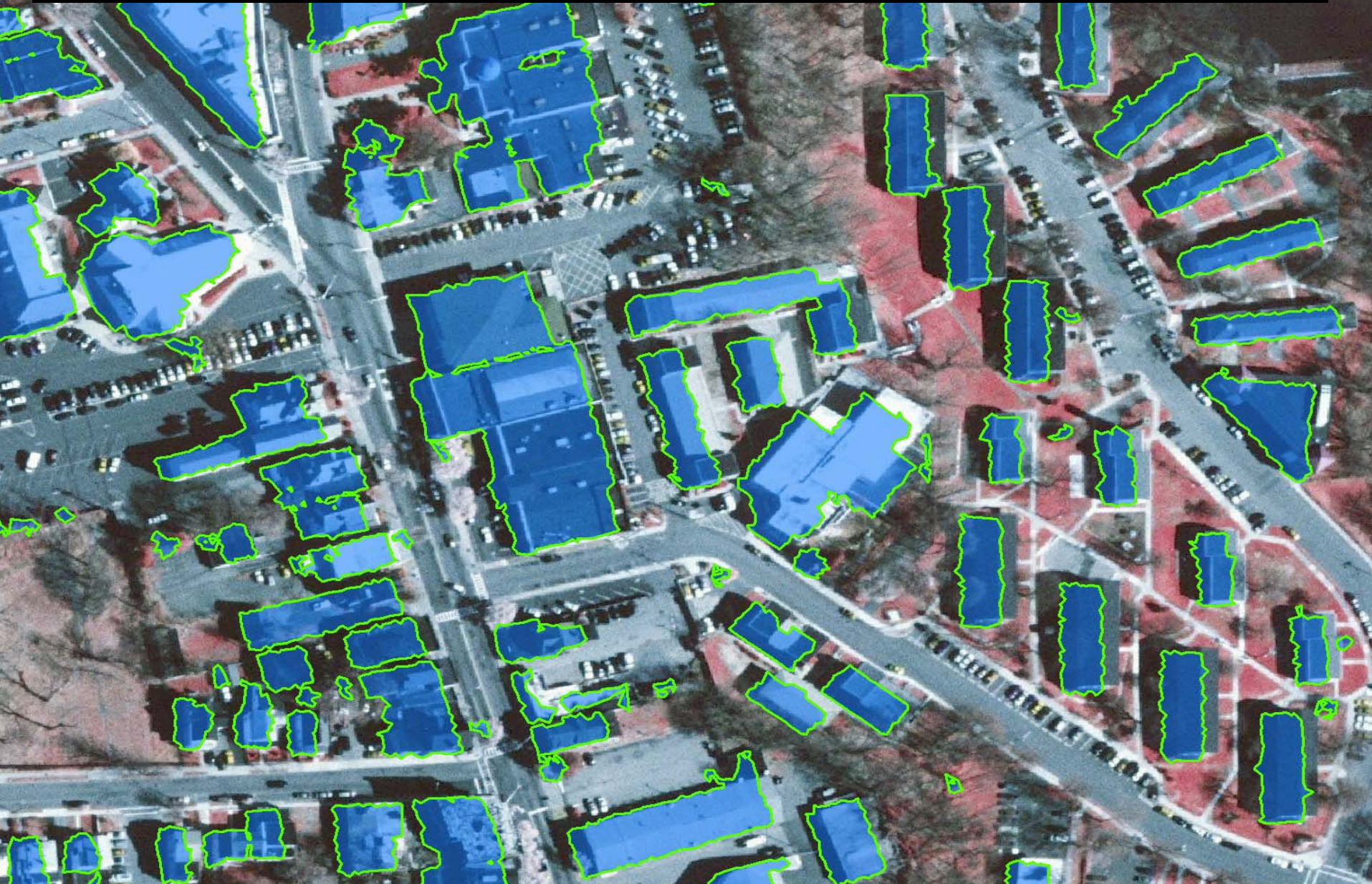
**Neighborhood Statistics
comparing elevation values**



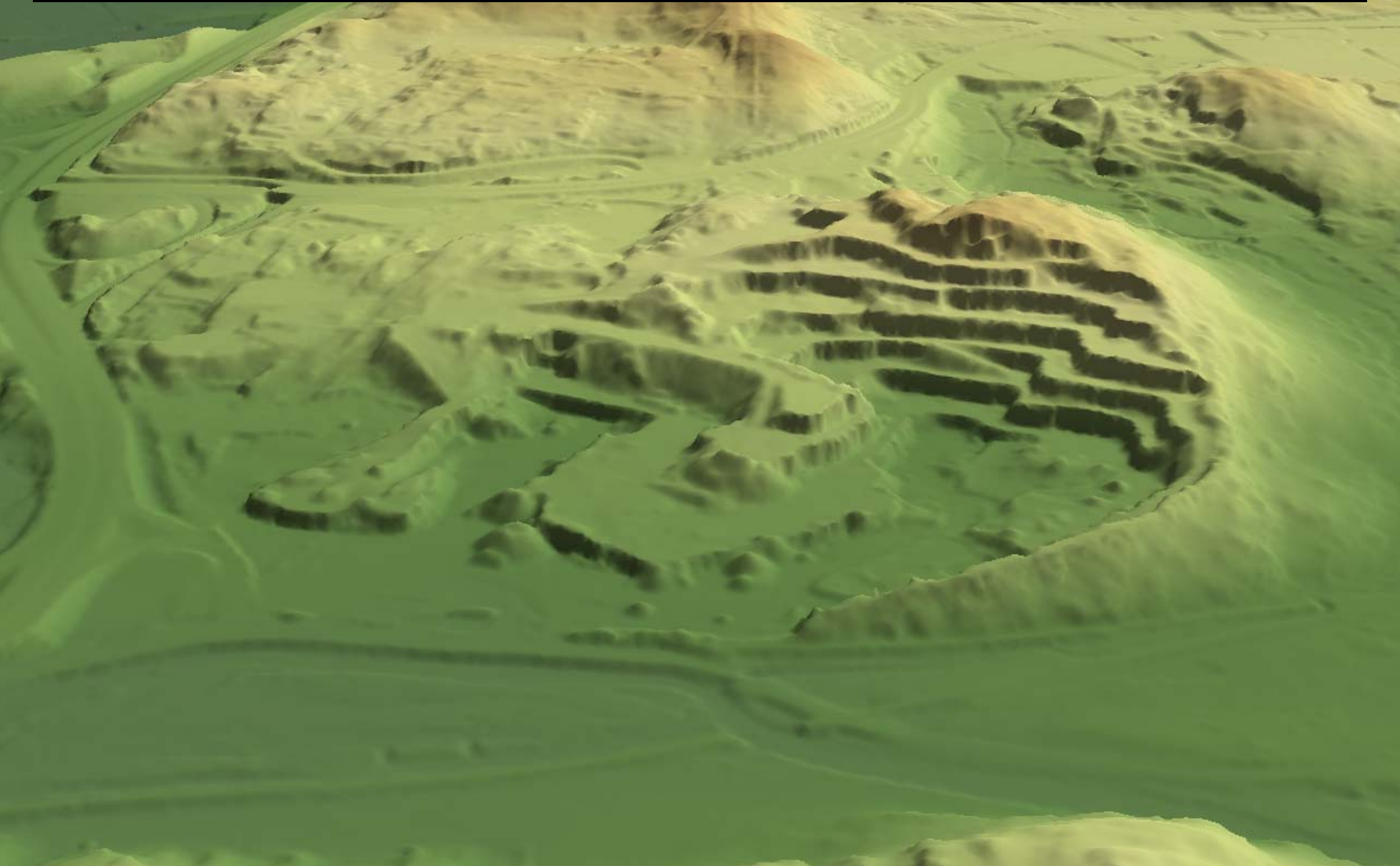
Feature Extraction – Building Outlines



Feature Extraction – Building Outlines

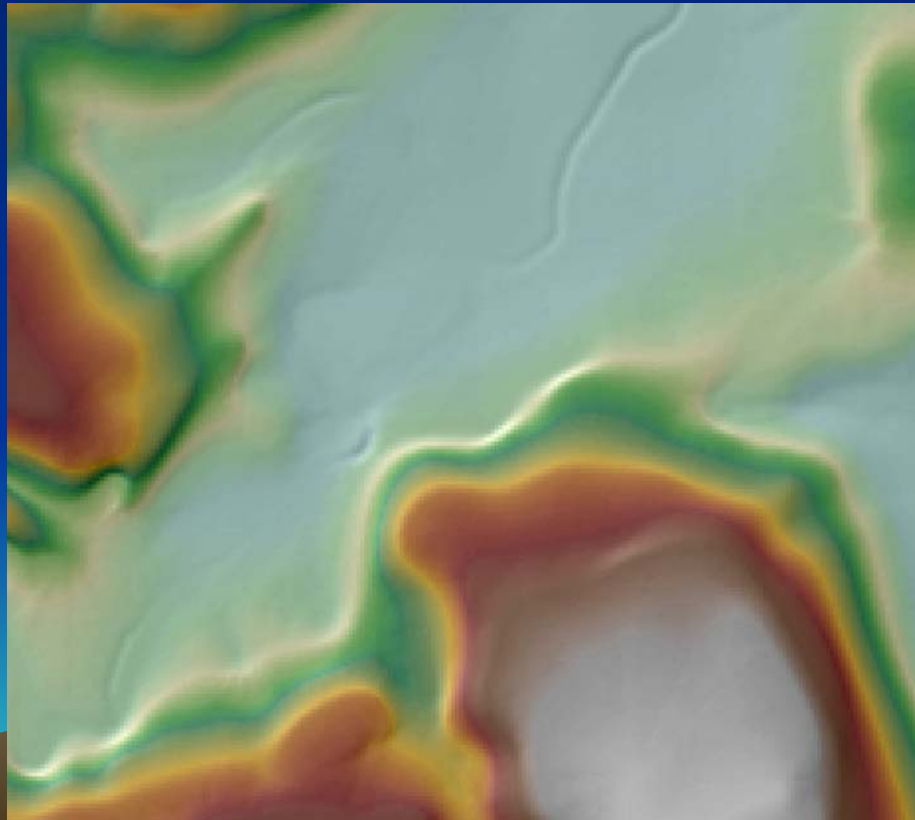


Terrain Modeling

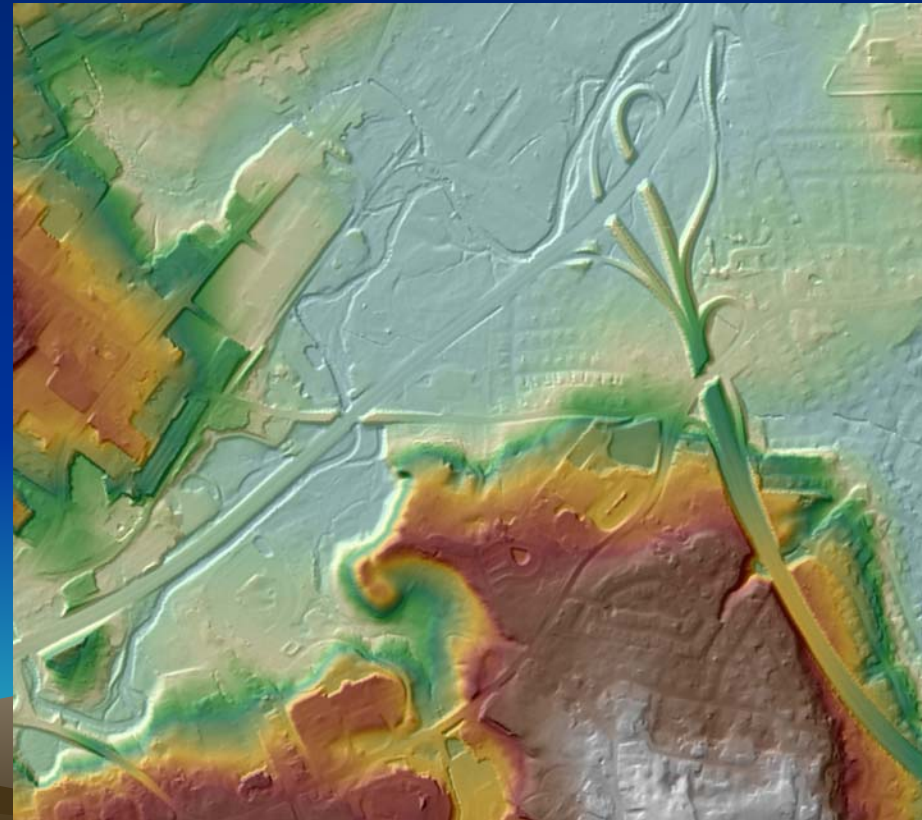


Bare Earth Data

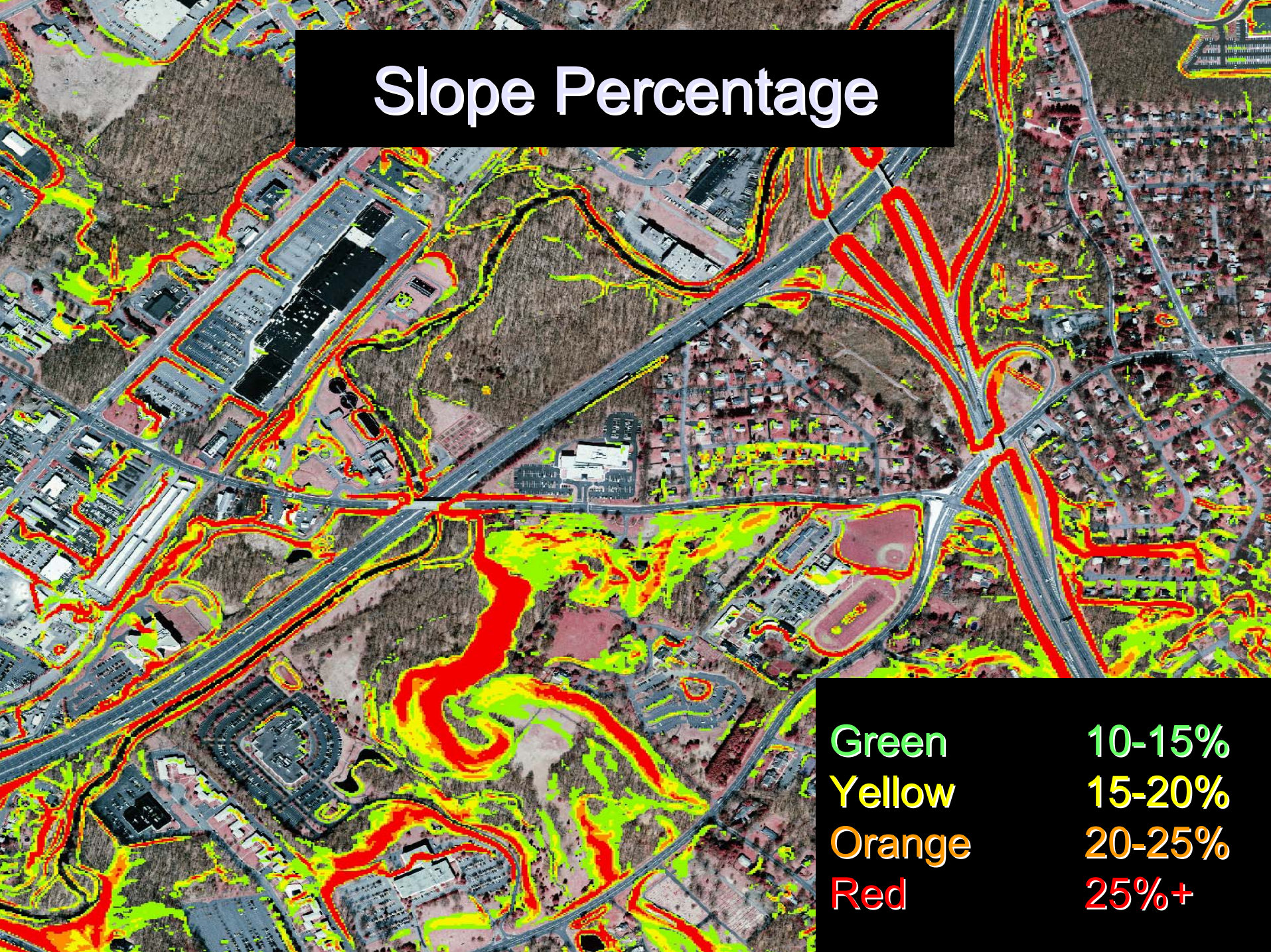
State 32 Foot DEM



County 10 Foot DEM

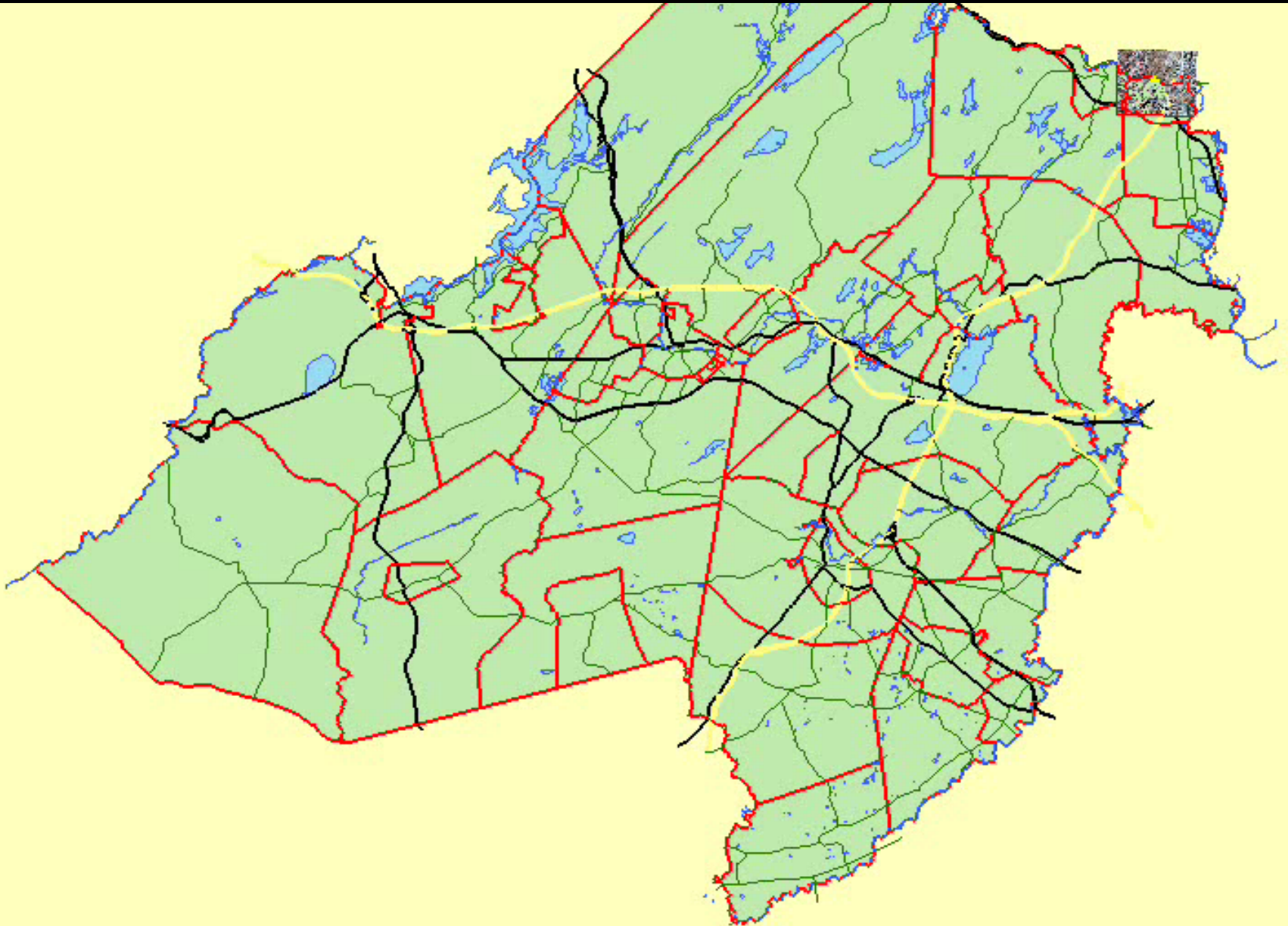


Slope Percentage



Green	10-15%
Yellow	15-20%
Orange	20-25%
Red	25%+

3D Visualizations





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