Program Outline

Using Ortho, Lidar and Thermal Imaging

Introduction . . . . . Mike Ritchie, PE, PLS, CP

Imagery and LiDAR . . . . . Clay Smith, PLS, CP

Break

Aerial LiDAR Mapping. . . . . .Paul Bishop Sr. LiDAR Manager

Break

Thermal Imaging. . . . . Andrew Brenner Ph.D

Questions

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Photo Science
History & Background

- 1974 – Founded in Lexington
- 1991 – Ownership change
- Today, nearly 200 professionals… exclusively Geospatial
- Full-service Surveying, Mapping, Remote Sensing, and GIS capabilities
- Corporate Headquarters:
  - Lexington, Kentucky

Photo Science has merged with AeroMetric and Watershed Sciences to form the largest Geospatial Services firm in the Nation.

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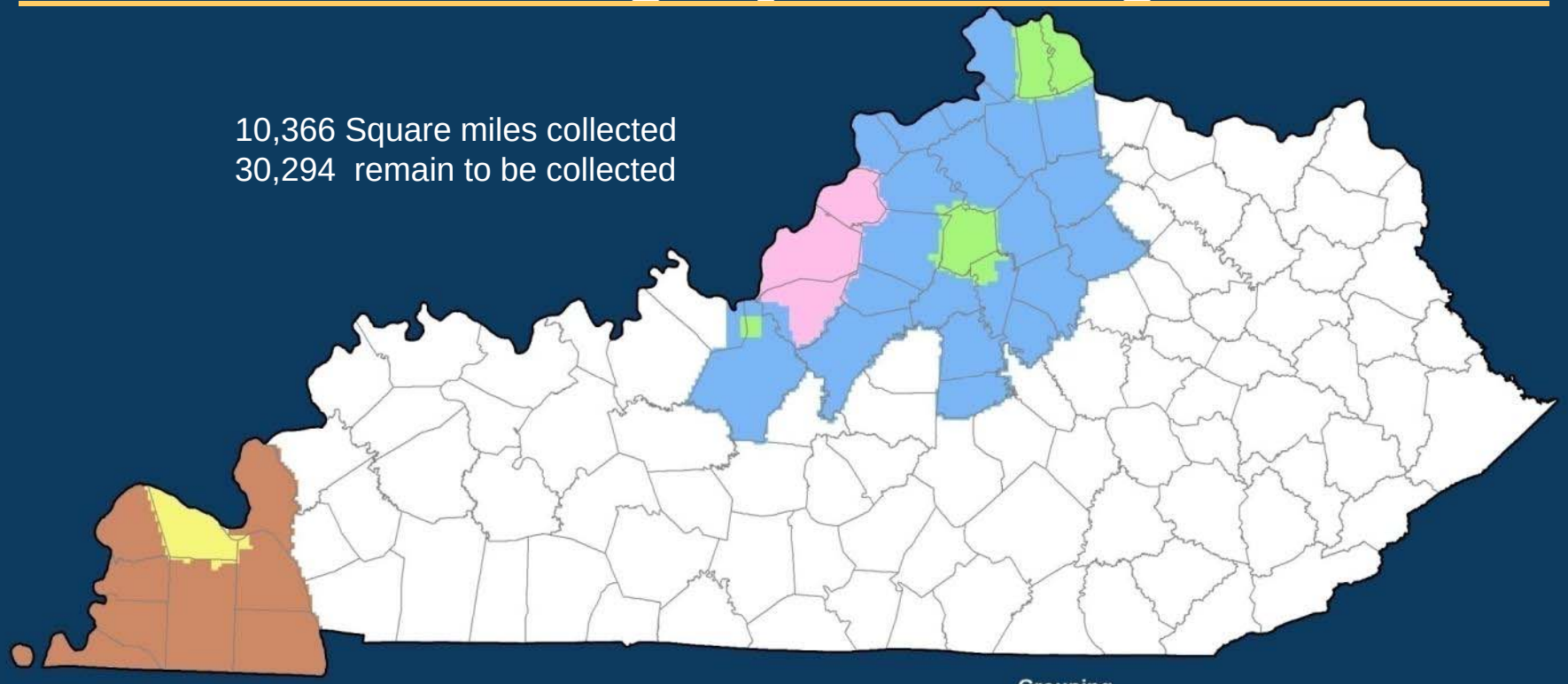
Anchorage
Seattle
Portland
Corvallis
Emeryville
Colorado Springs
Minneapolis
Mission
Sheboygan
Ann Arbor
West Chester
Chesapeake Beach
Dulles
Lexington
Norcross
Orlando
St. Petersburg
17 Offices Nationwide

Current Imagery Coverage Area

10,366 Square miles collected
30,294 remain to be collected



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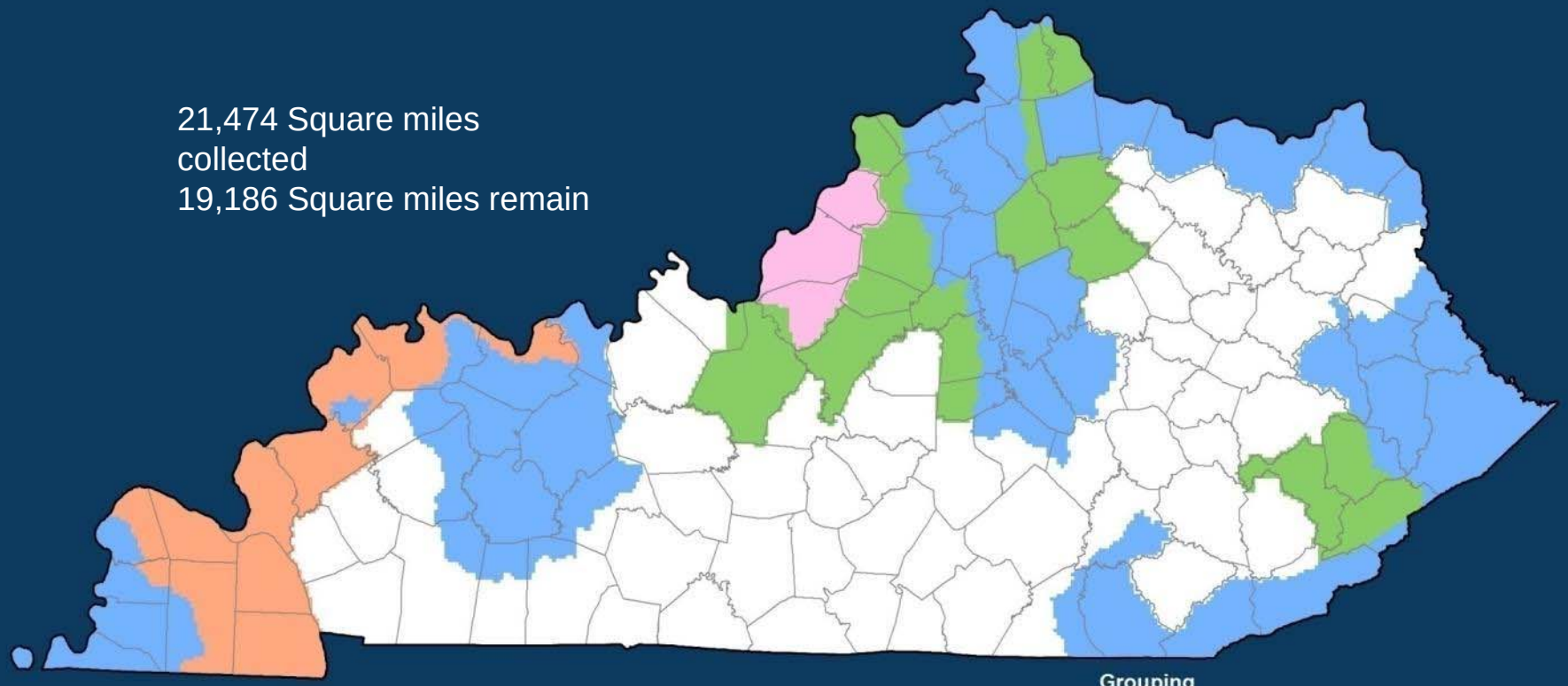
Current LiDAR Coverage Area

21,474 Square miles collected
19,186 Square miles remain



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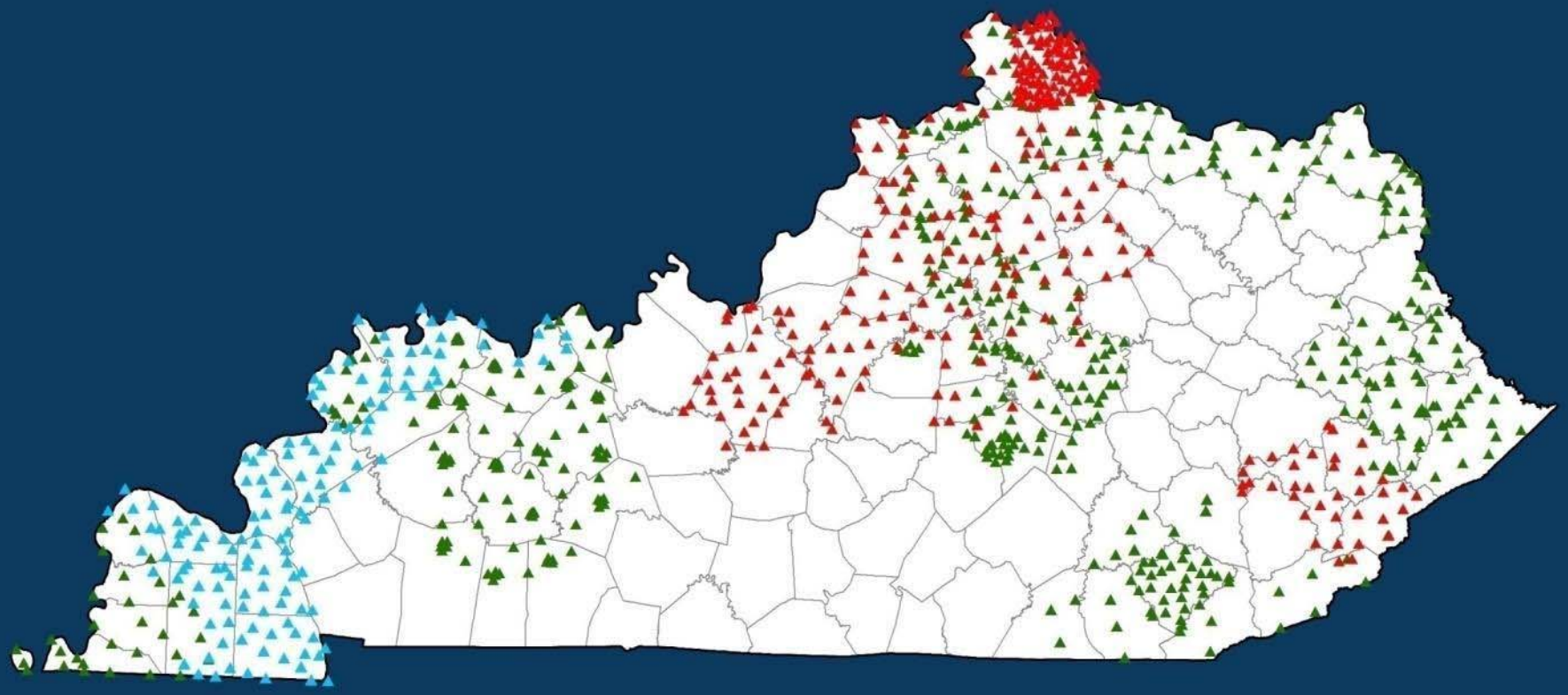
Survey Control



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Imagery and Orthos

- Clay Smith CP, PLS
- Production Manager
- Photo Science

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Presentation Outline

- Project Planning
- Acquisition
- Post Processing
- Ortho Production
- Final Products

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Project Planning

- Purpose of project
  - What will the data be used for?
  - How big is the area?
- Resolution
  - What do you want to be able to see on the ground?
- Accuracy
  - Relative accuracy and absolute accuracy.
  - What is the accuracy of your surface model?

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Florida Seagrass Mapping

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Corridor Mapping

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Resolution 6” and 12”

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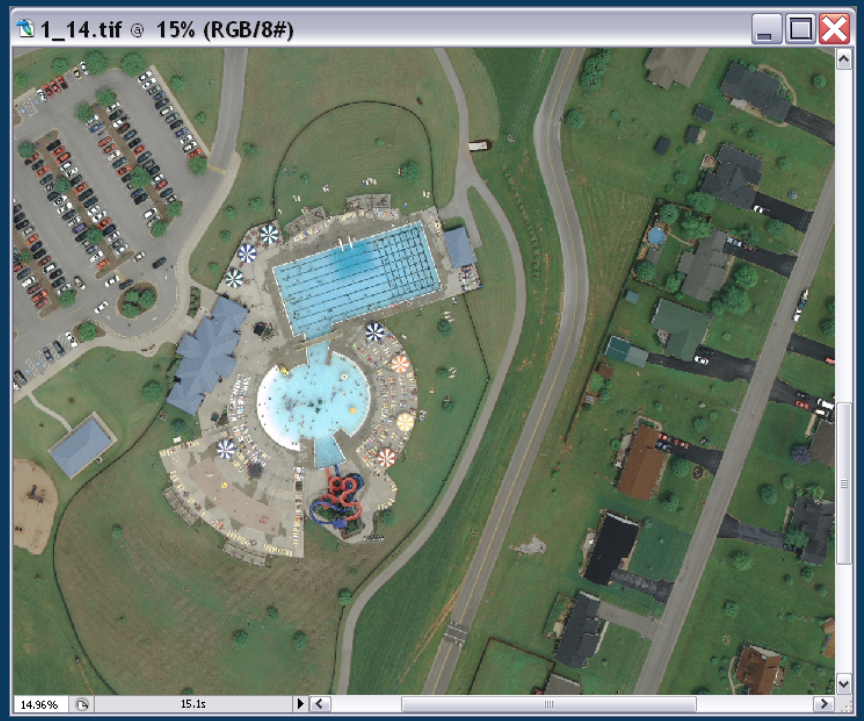
3” Resolution



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2" Resolution

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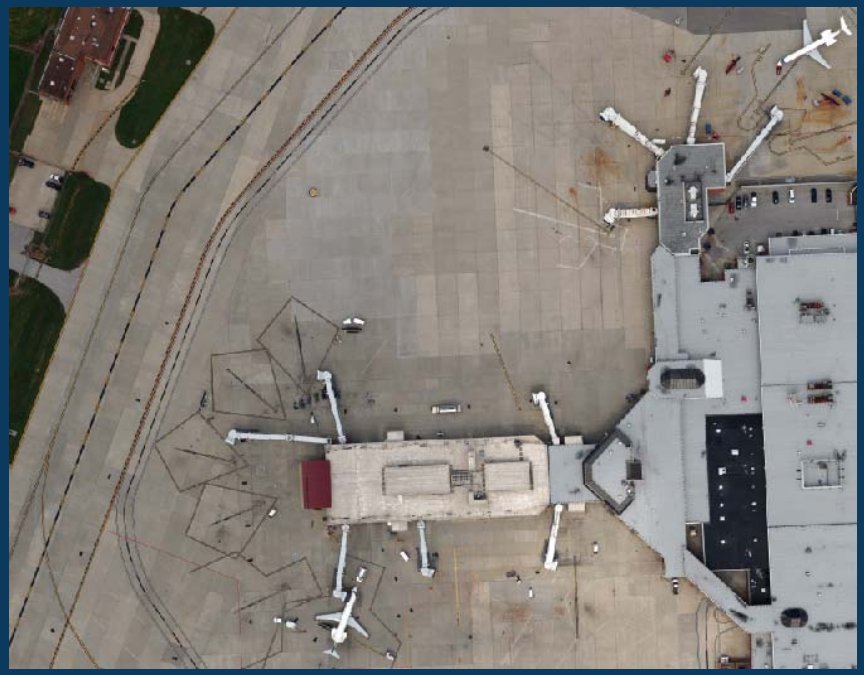
1” Resolution



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1" Resolution

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Existing Data

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Acquisition

- Platform types
  - Planes, Helicopter, Unmanned
- Atmospheric and ground conditions
  - Clouds, standing water, snow, sun angle
    - On 1/1/14 there is zero 30 degree sun
    - On 1/30/14 11:30-2:00 2.5 hours of 30 degree sun
- Other limitations
  - Restricted Airspace, Commercial traffic, PDOP (Positional Dilution of Precision)

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Aerial Surveying Concept

Airborne GPS

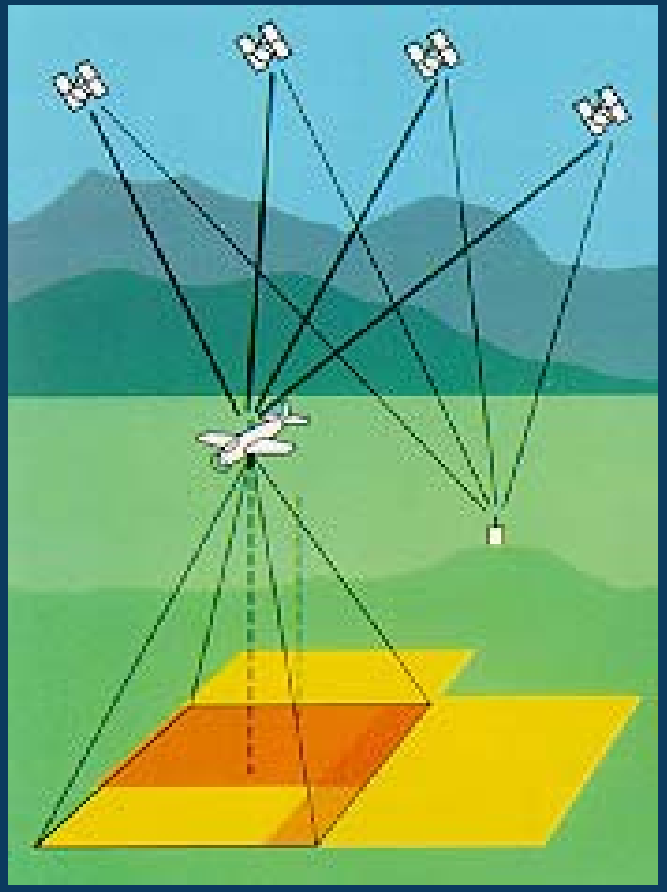
Inertial Motion Units

Multiple Digital Sensors

Aerial

LiDAR

Mobile



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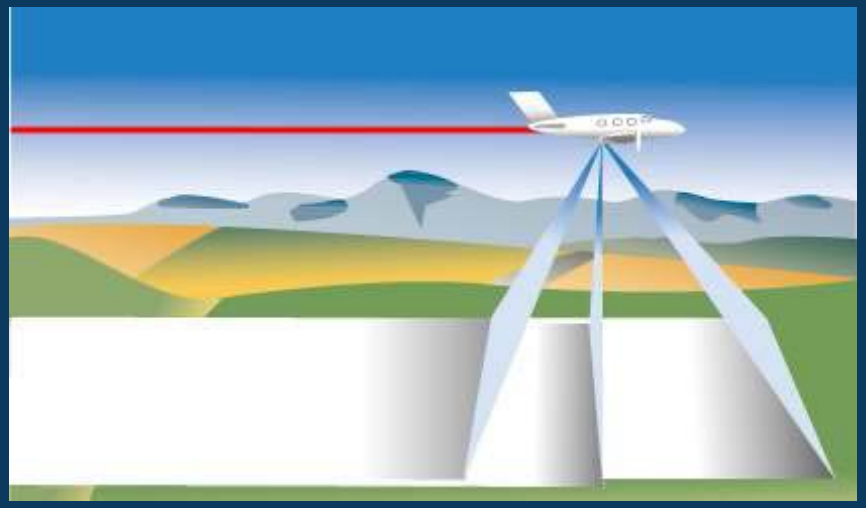
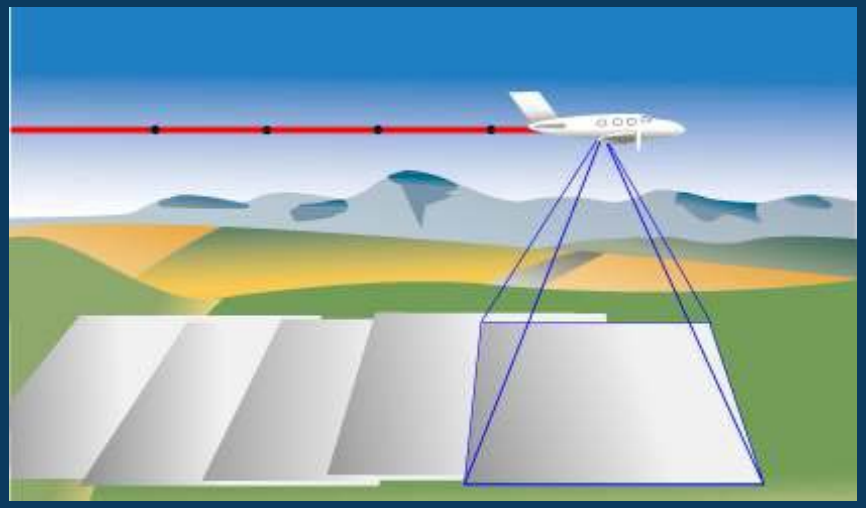
Sensor Types

Continuous Pushbroom Scanning



Frame Based Sensor



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RCD 30 Oblique Camera

- Simultaneous nadir, forward oblique, and aft oblique imagery
- 45 degree look angle for oblique sensors
- Sustained cycle rate of 1.6 seconds per set of (three) frames – forward, aft, down

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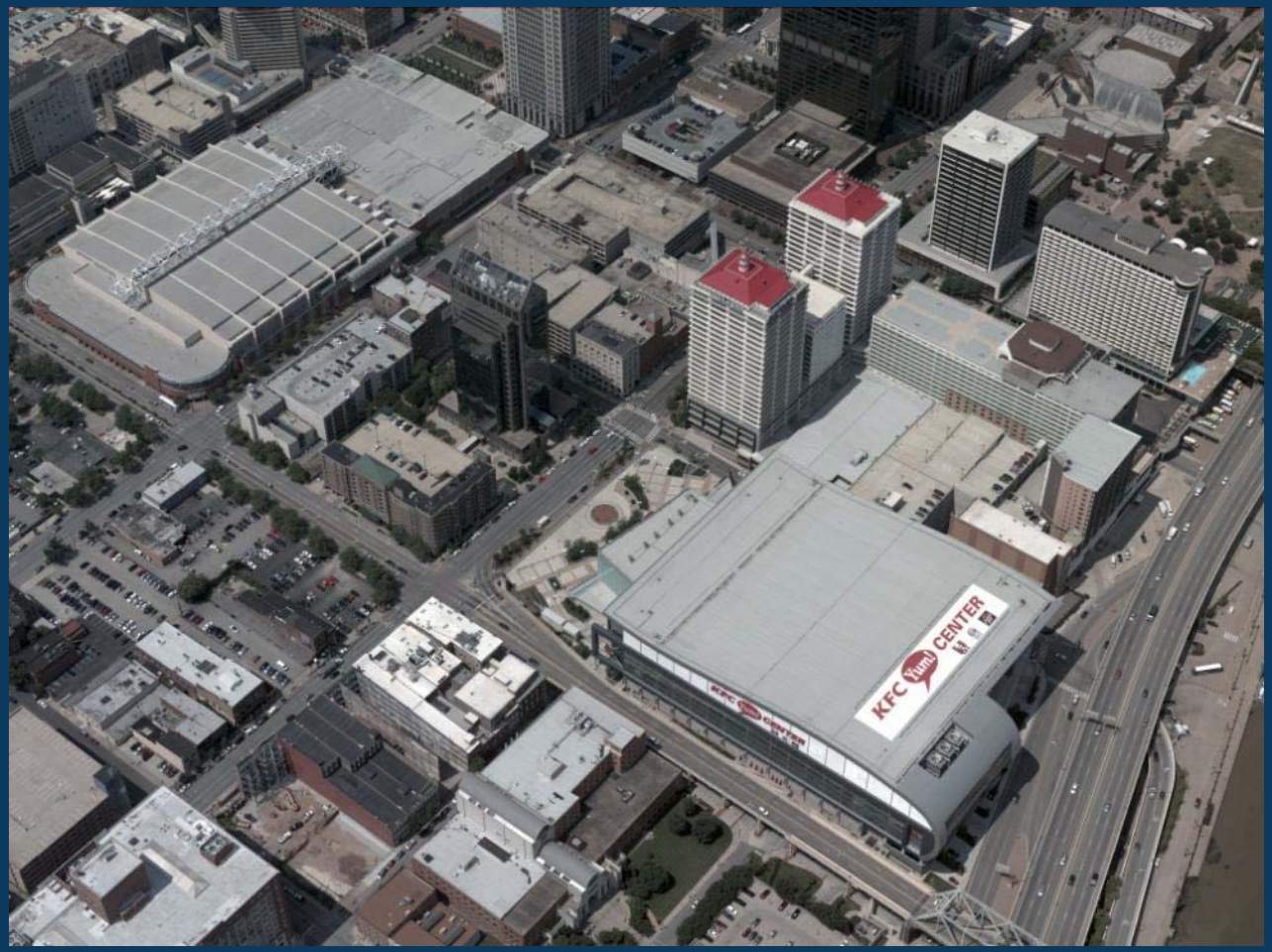
Oblique Imagery 2" Resolution



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Oblique 2" Resolution

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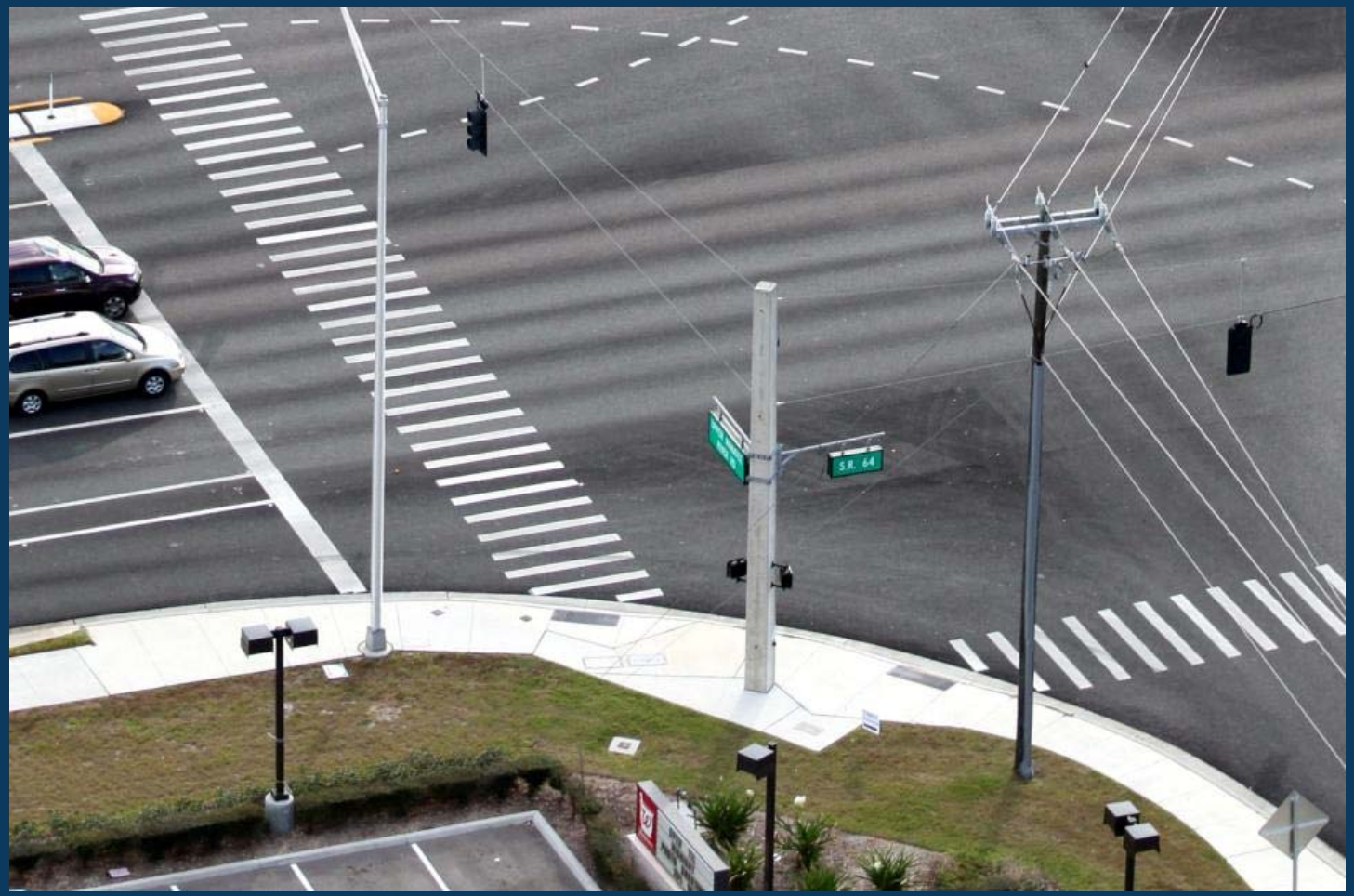
.8" Resolution



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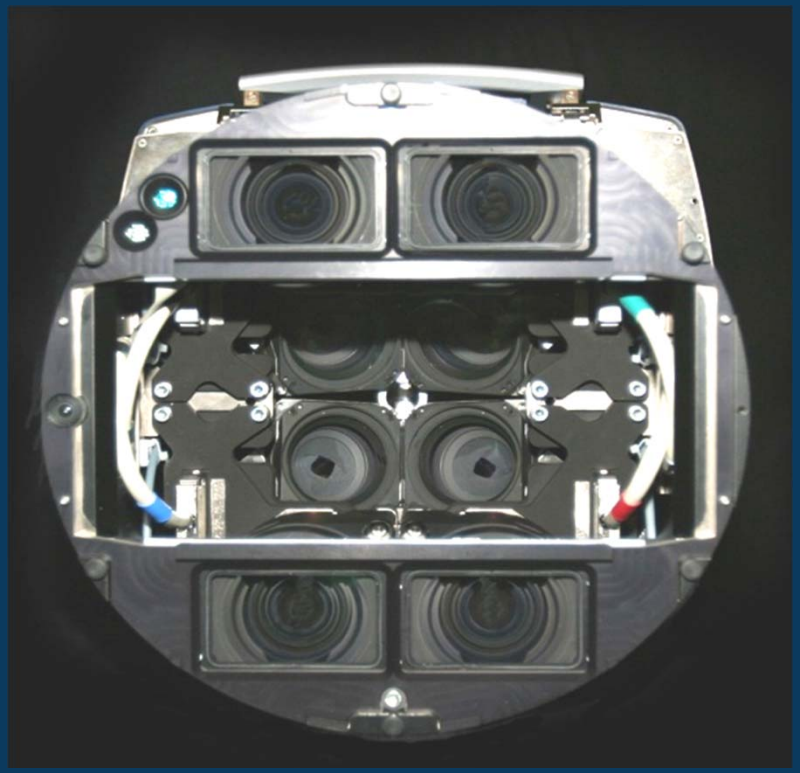
DMC

- Z/I Imaging DMC System (Large Format Framing)
- 120 mm focal length
- CCD pixel size 12 microns
- Radiometric resolution: 12 Bit
- 8 cameras
- Individual Frames



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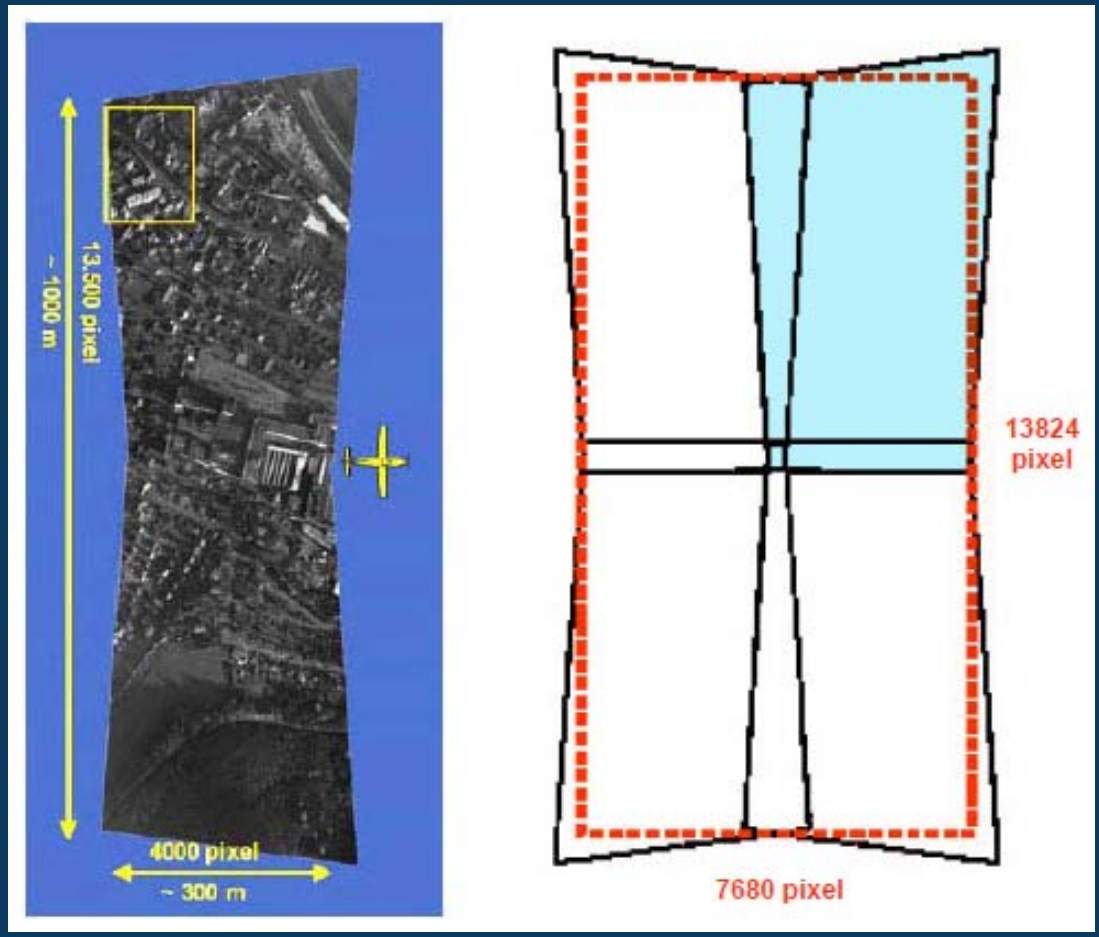
DMC Raw Image



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Digital Cameras

Vexcel Ultra CamX
Digital Mapping System

Applanix DSS-439
Digital Sensor Systems

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Camera inside of plane

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Post Flight Processing

- Initial processing
  - DMC workflow
- Color matching
  - Flight line to flight line and mission to mission
- QC

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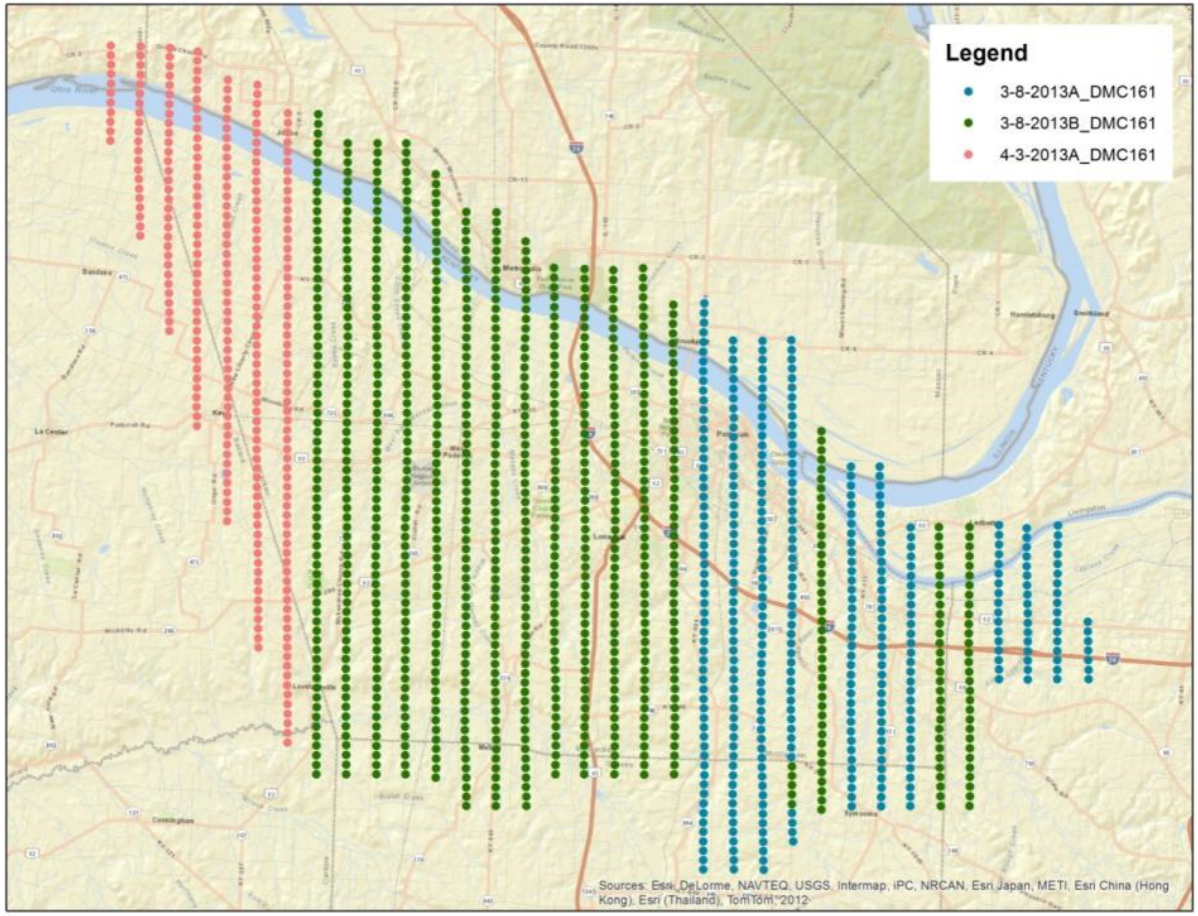
2013 McCracken 6" Flight Lines



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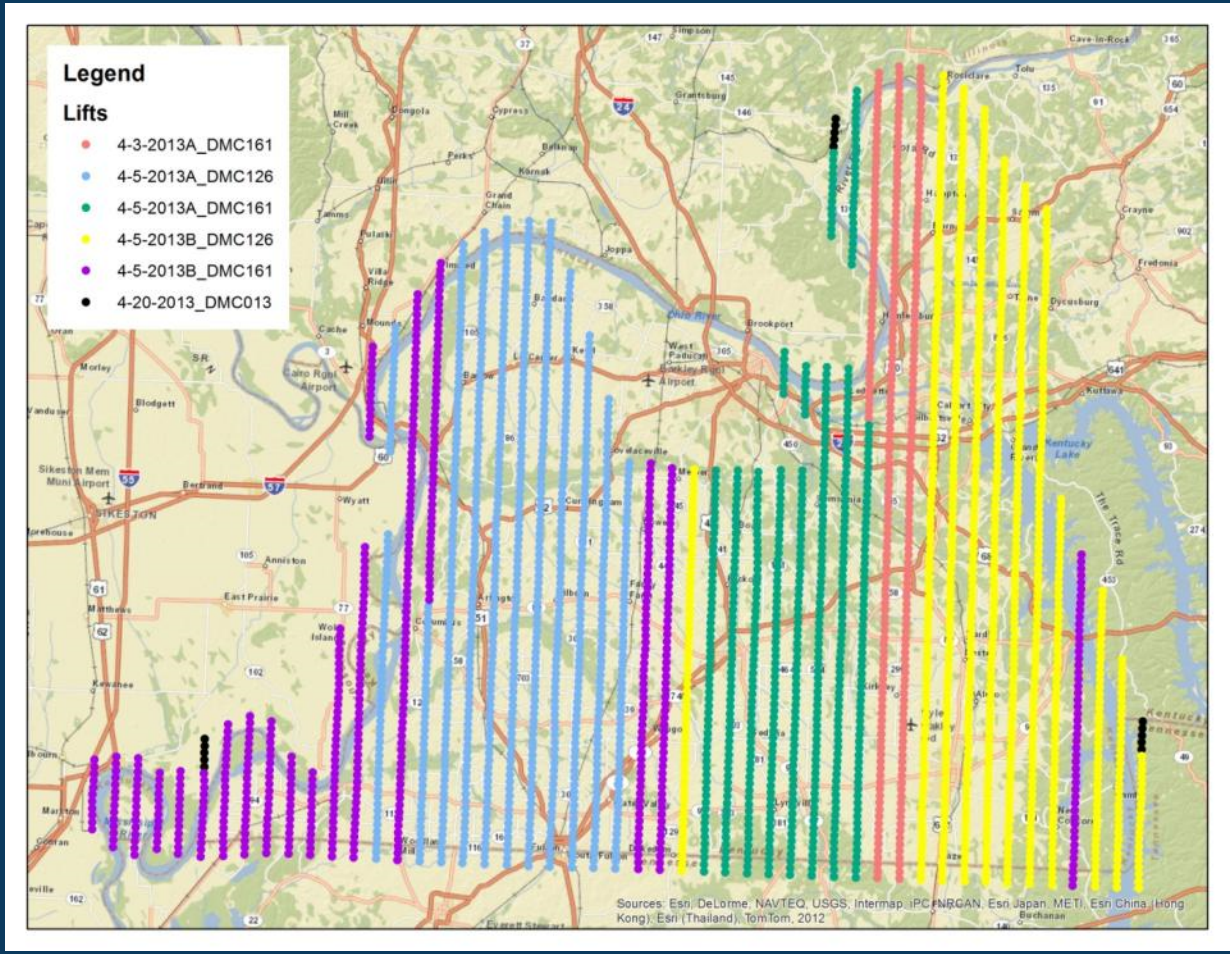
2013 DMC 12" Flight Lines
3,164 Total Frames



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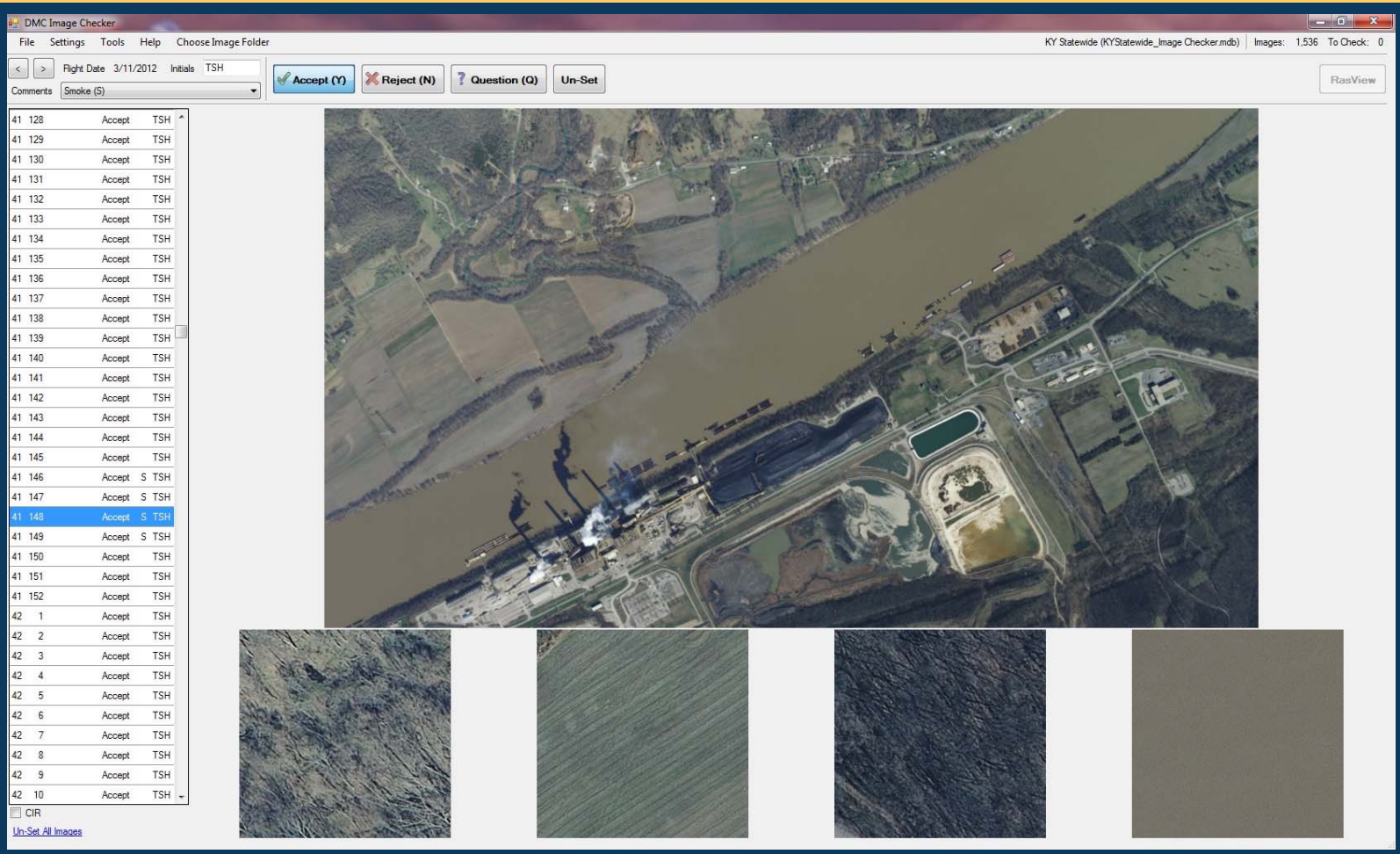
PSI Image Checker



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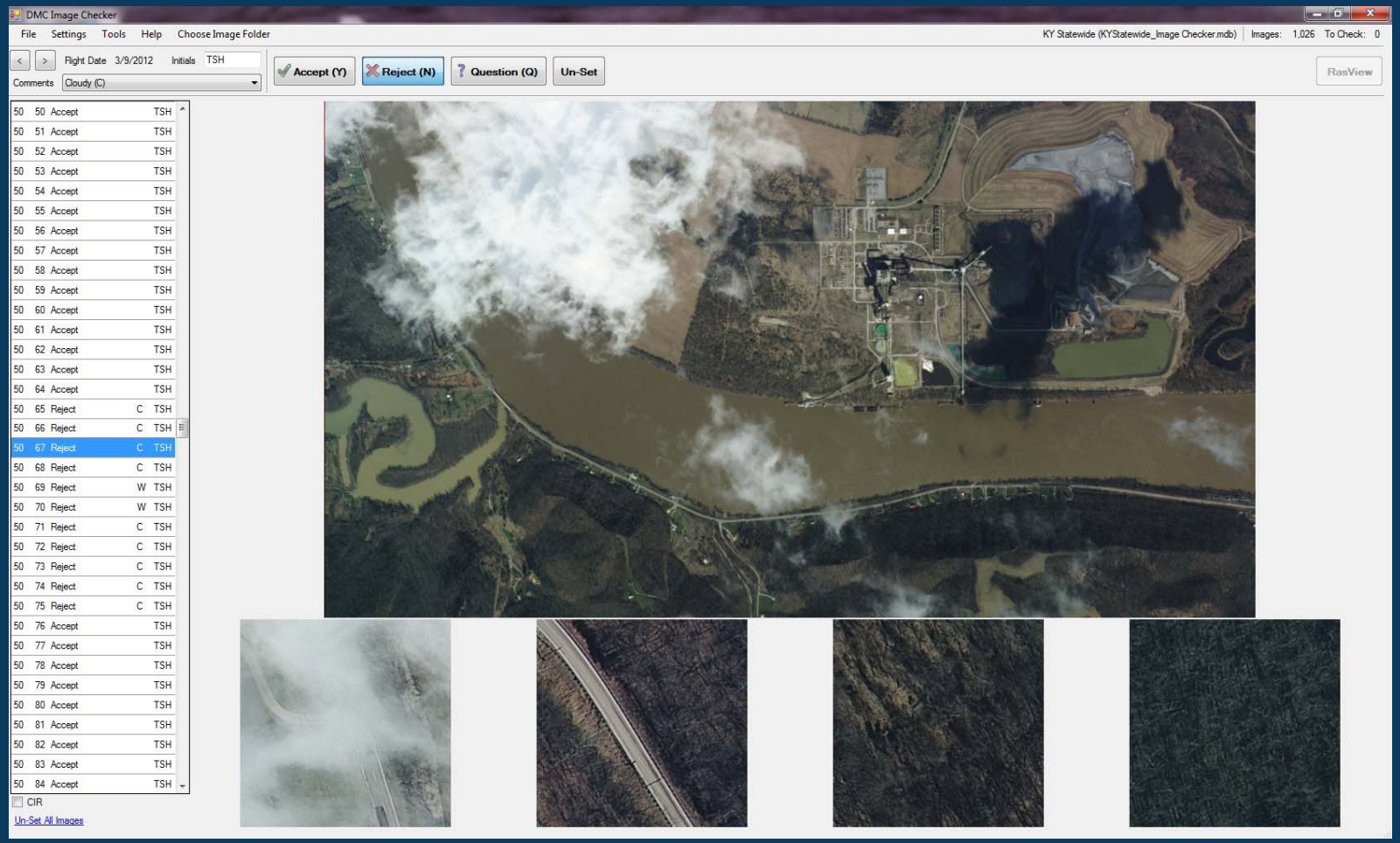
Rejected Frame



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Flightline tone issues

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Ortho Production

- Control
- Aerial Triangulation (A/T)
- Surface
- Seamlines
- Mosaic
- Edits

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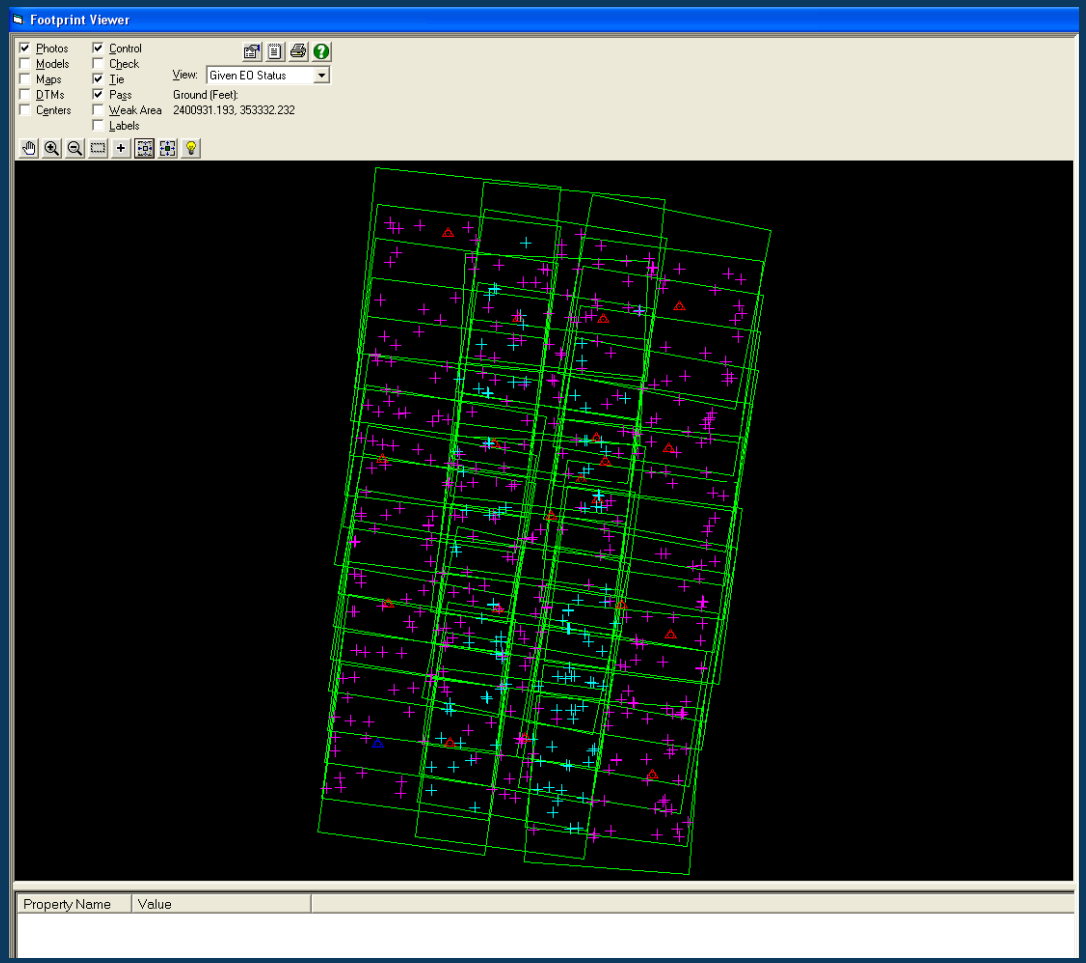
Aerial Triangulation



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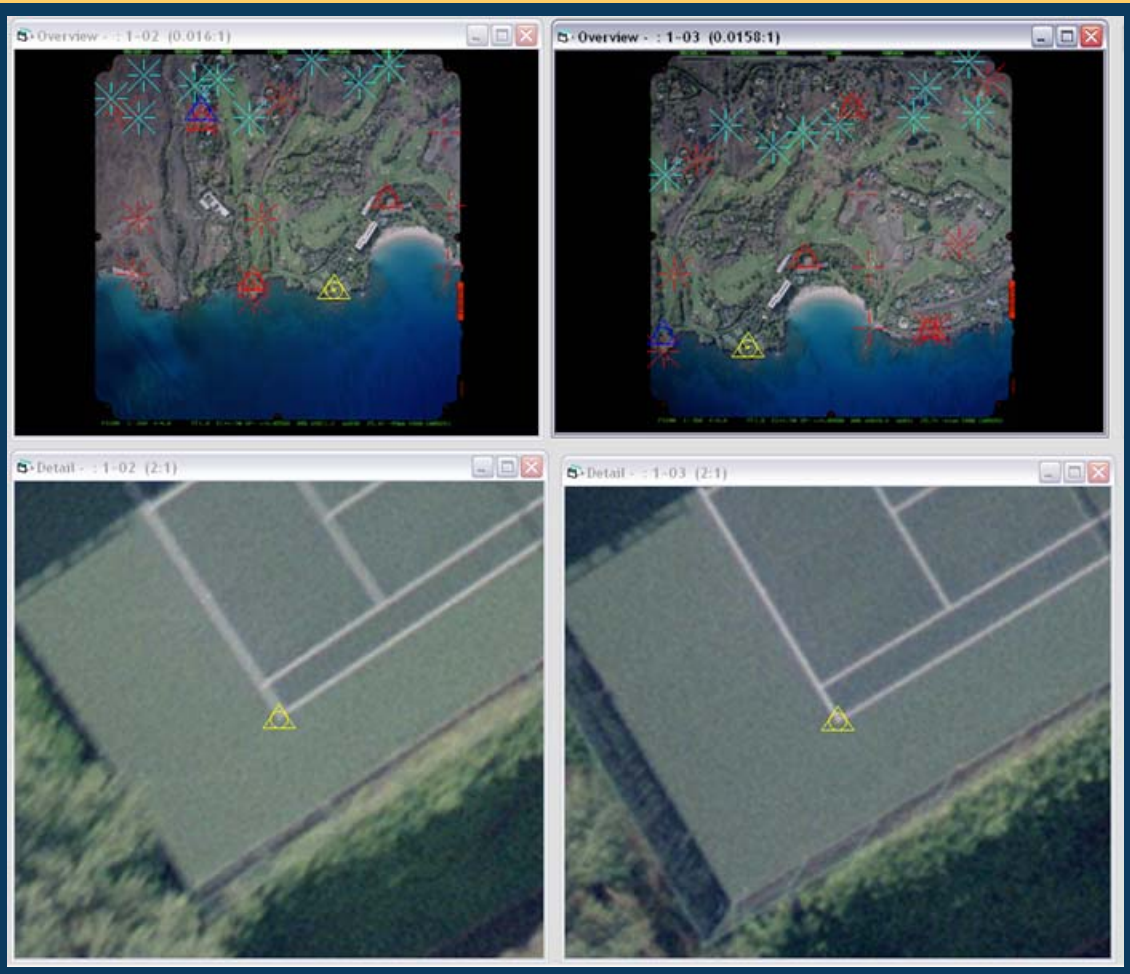
Tie Points



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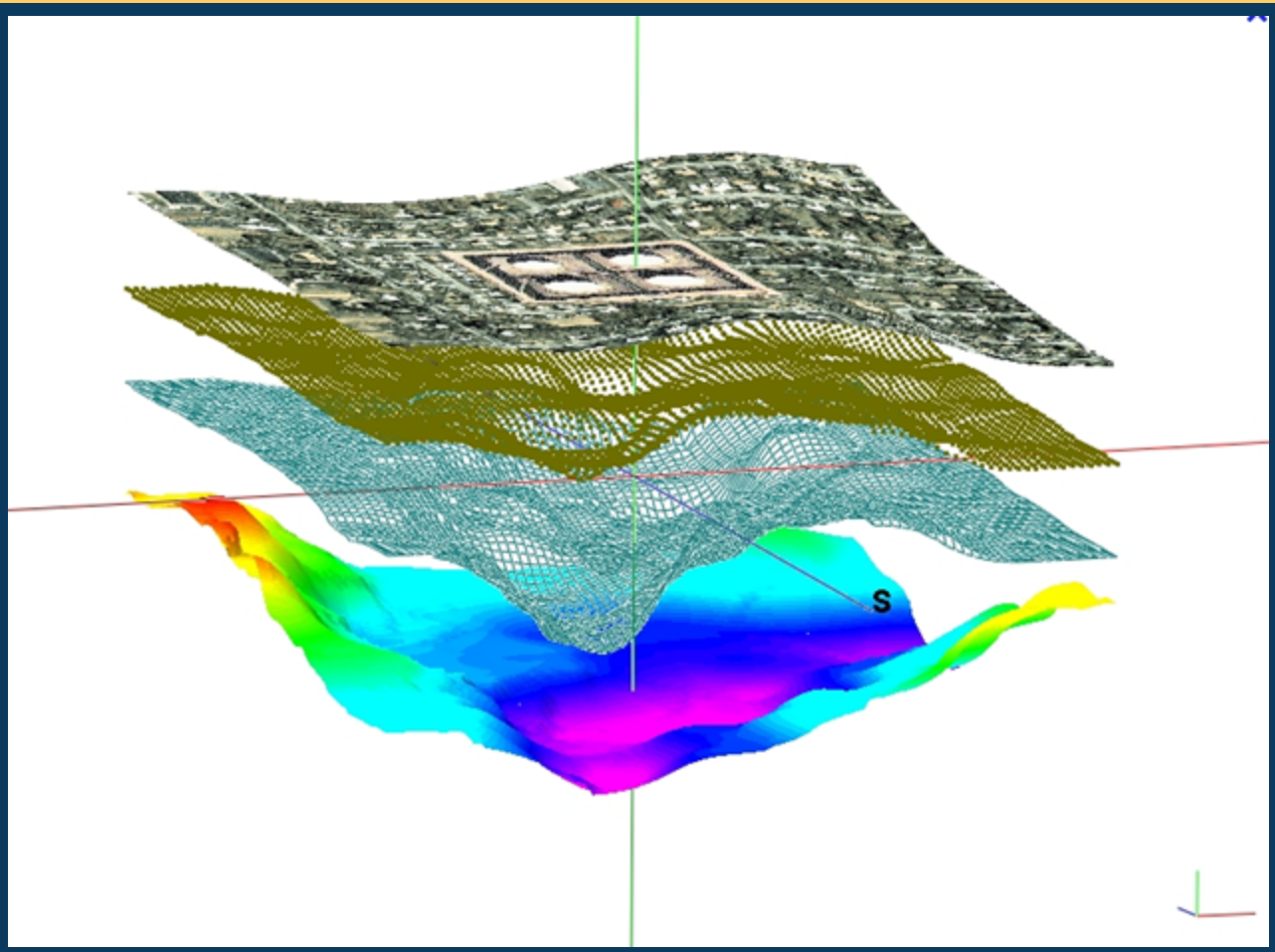
Layers of an Ortho



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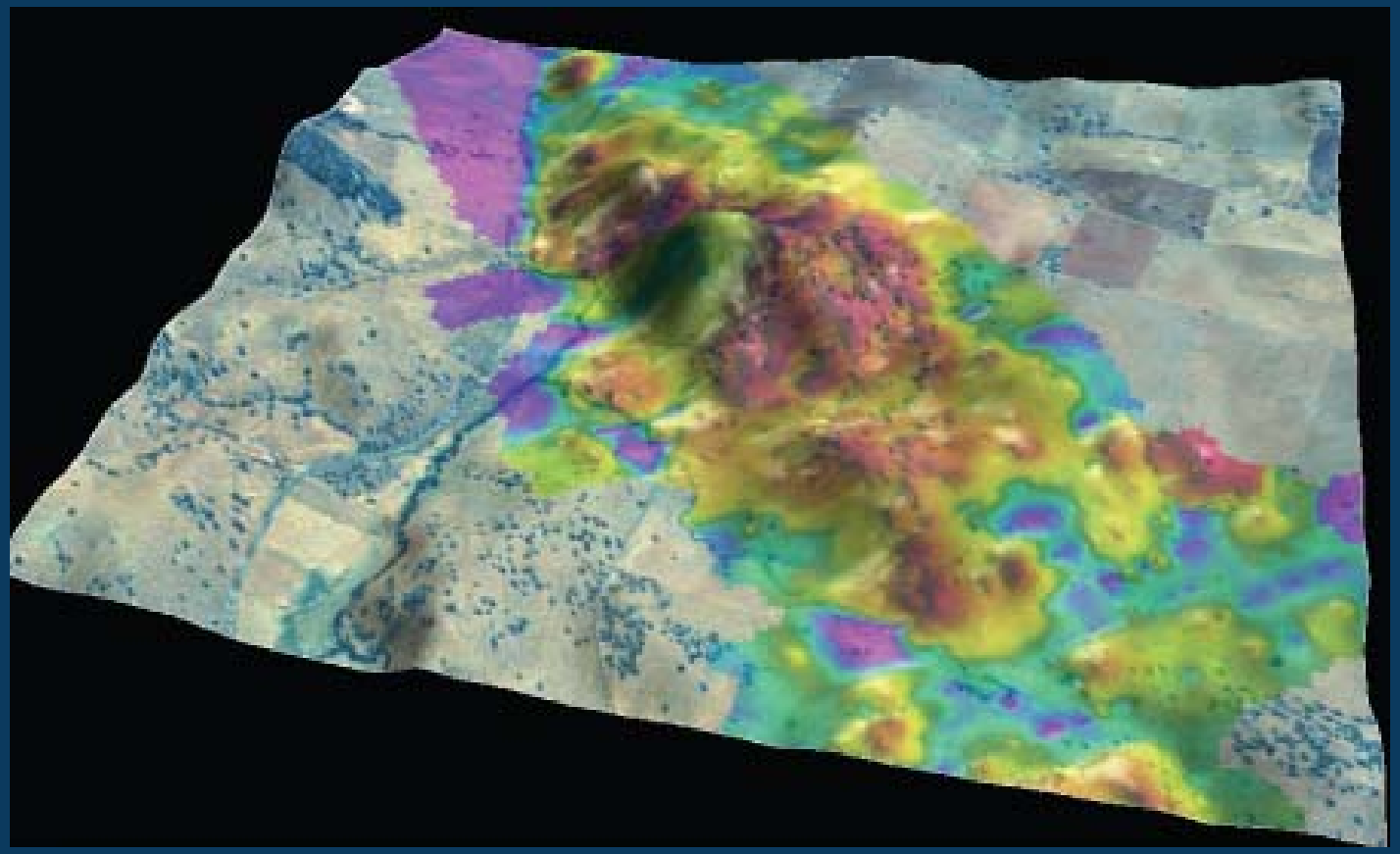
Ortho Image



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Relief Displacement

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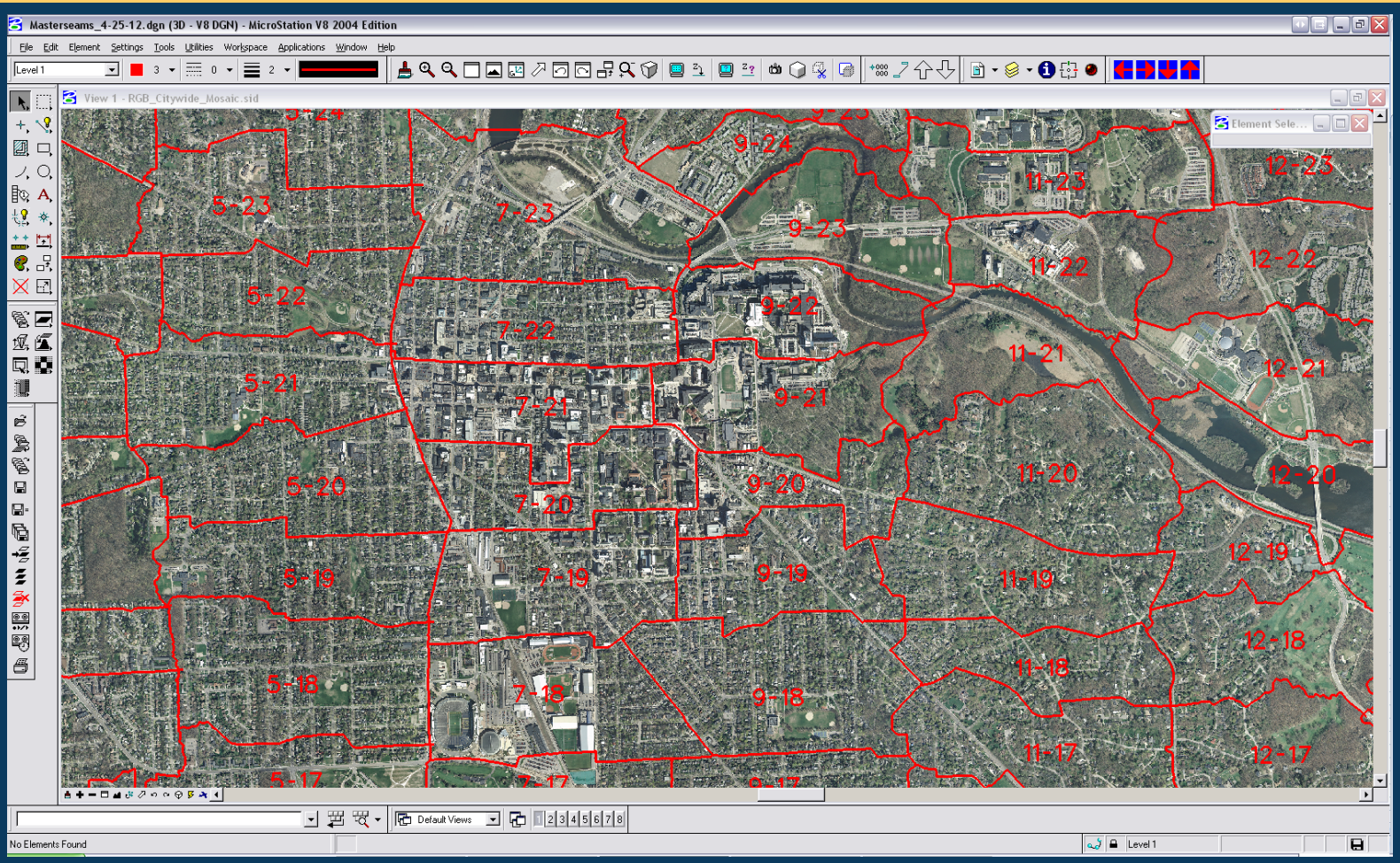
Seamlines



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Frames to Mosaic

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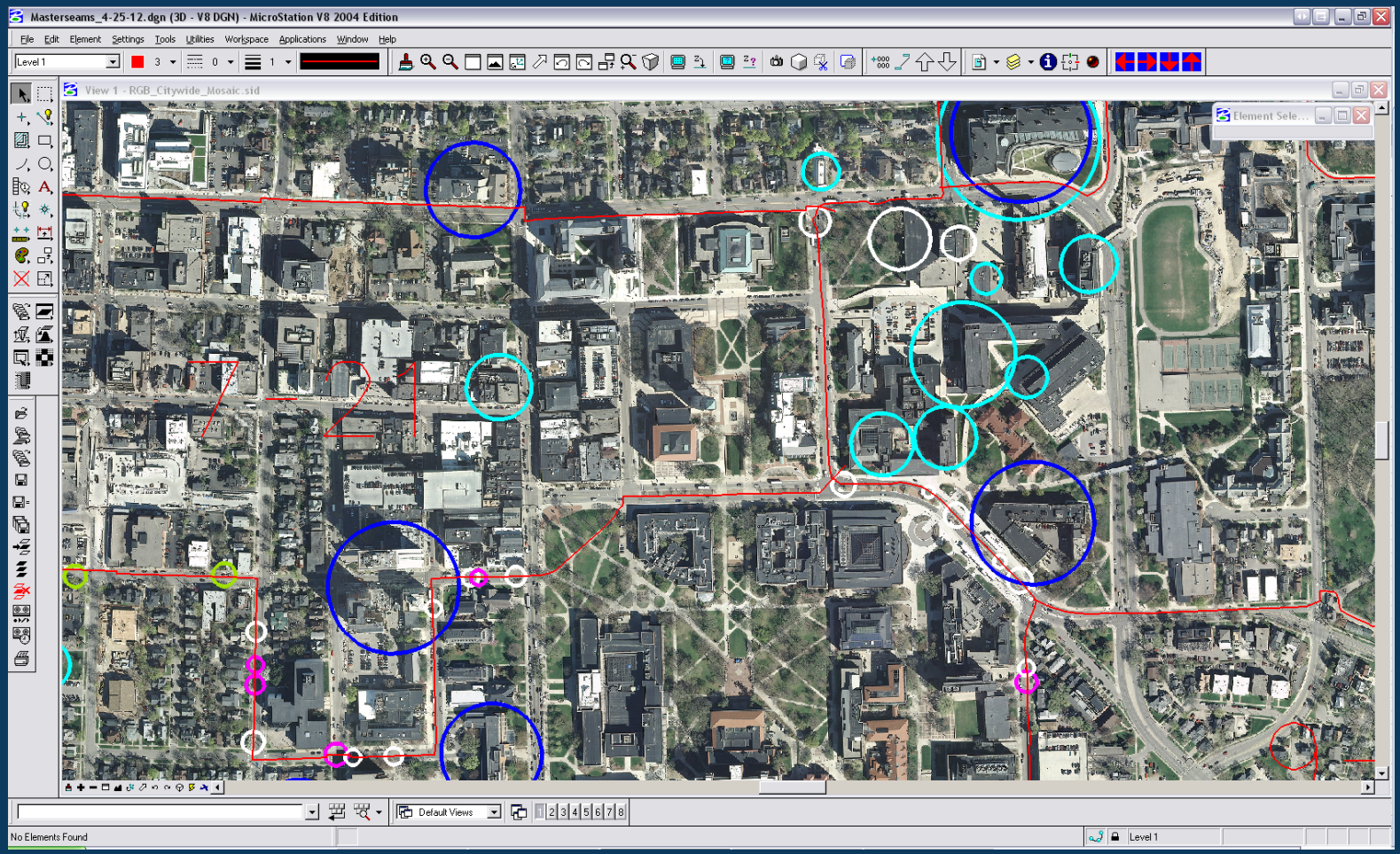
Tile QC



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Offset

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Wavy Bridge

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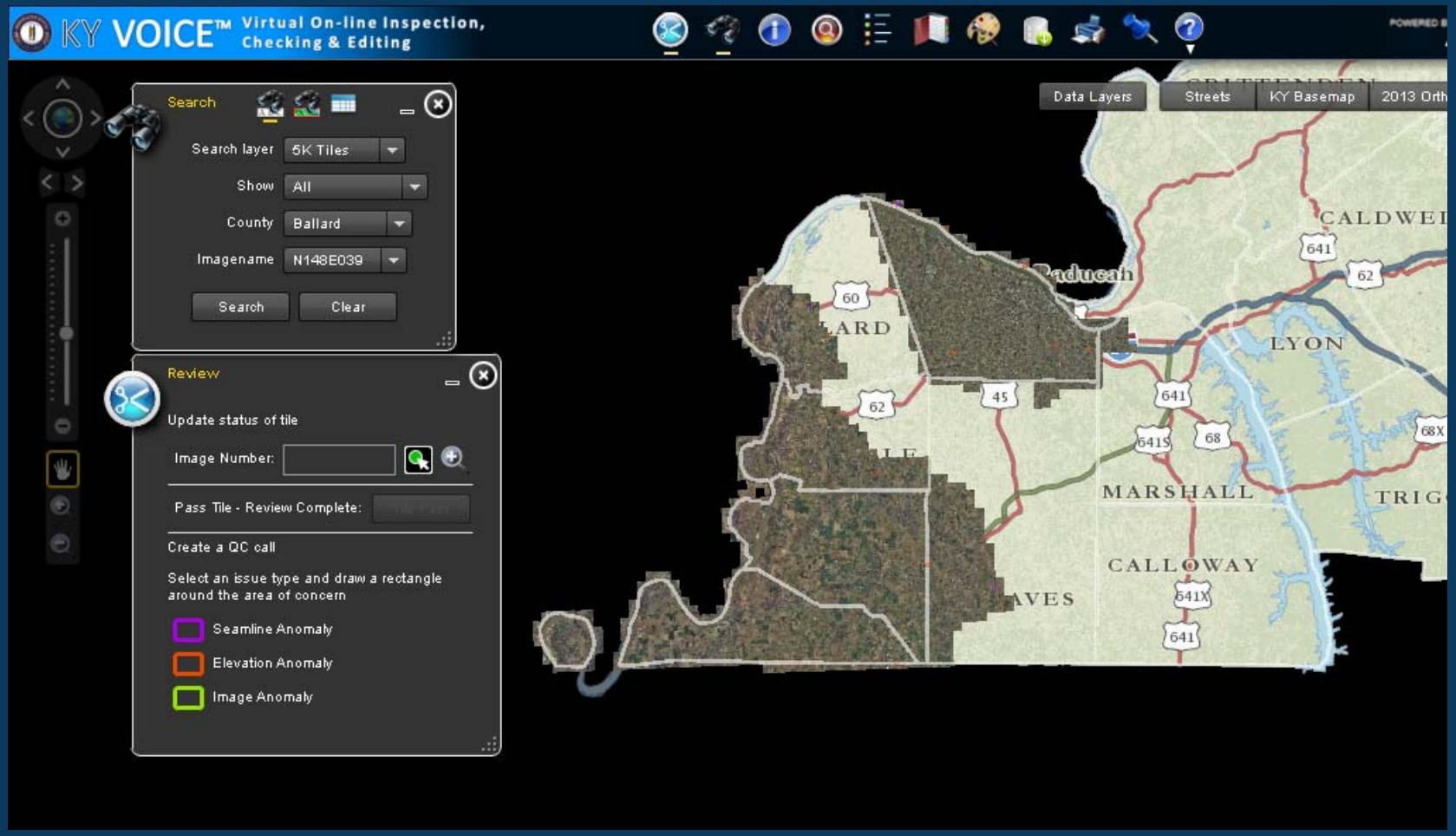
Virtual On-line Inspection, Checking and Editing

VOICE



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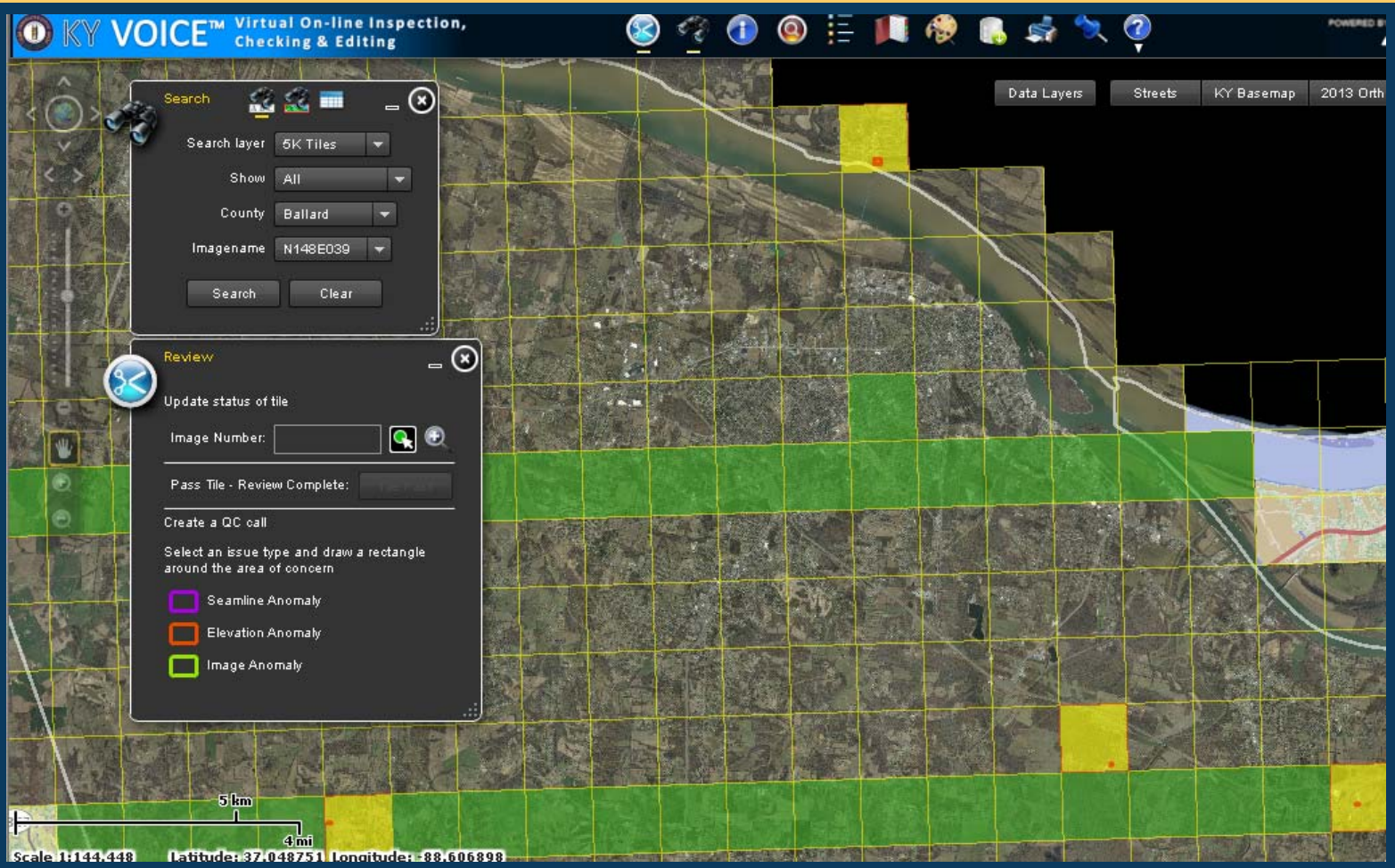
VOICE



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Accuracy Report

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accuracy analyst™ http://www.spatialis.com

Point PID-13:

X1: 827495.784 Y1: 378271.876 X2: 827496.283 Y2: 378272.331 Delta X: 0.499 Delta Y: 0.456

Point PID-14:

X1: 836375.707 Y1: 363984.248 X2: 836376.597 Y2: 363984.052 Delta X: 0.89 Delta Y: -0.195

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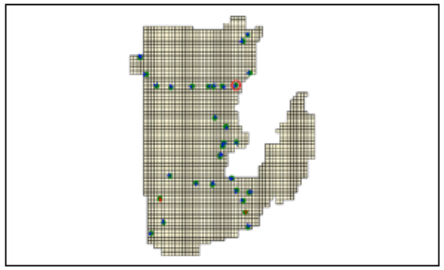
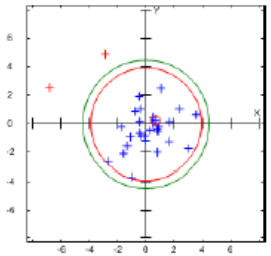
accuracy analyst™ http://www.spatialis.com

Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min ΔX:	-6.836	Min ΔY:	-3.668	SX:	1.954
Max ΔX:	3.537	Max ΔY:	4.864	SY:	1.696
Mean ΔX:	-0.122	Mean ΔY:	-0.163	SH:	1.825
Skew ΔX:	-1.183	Skew ΔY:	0.737		
RmseX:	1.925	RmseY:	1.676	RmseH:	2.552
SRMSE H:	0.333				
CE 90:	3.916	CE 95:	4.467	CI:	0.653
No. Observations:		30			
Horiz. Bias:		0.204		NSSDA:	4.406

Report for 5748-006: Dade County
Accuracy Analyst 6/15/2012 2:46:09 PM

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Final Products

- Composites
- 3 band/4 band
- Compression
- Resampled datasets

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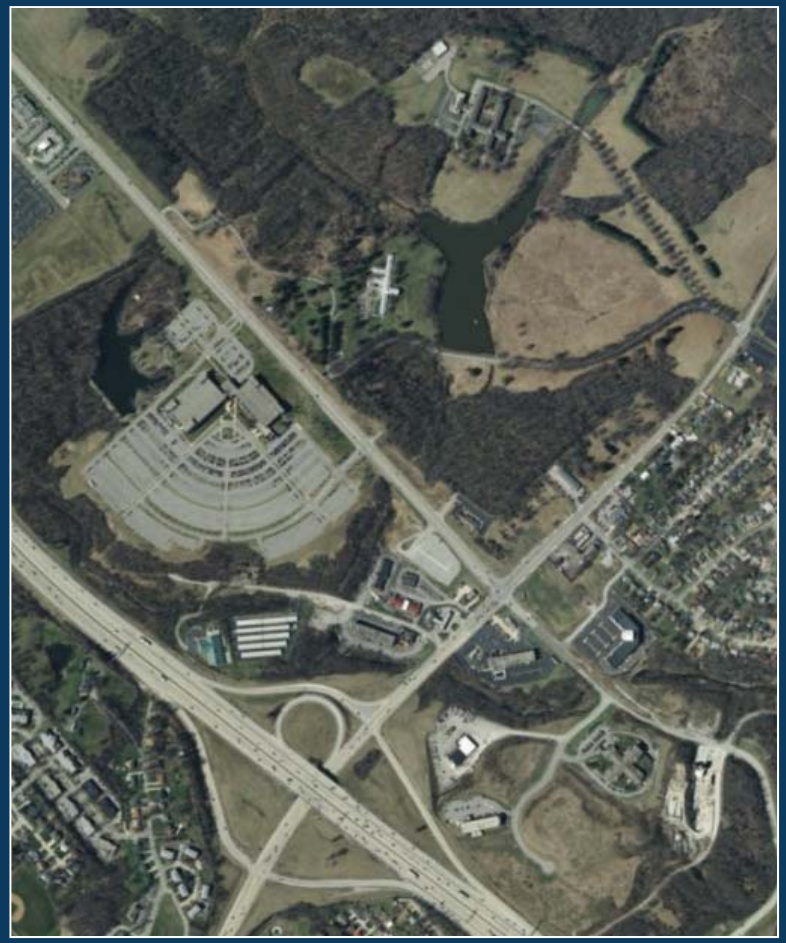
RGB/CIR



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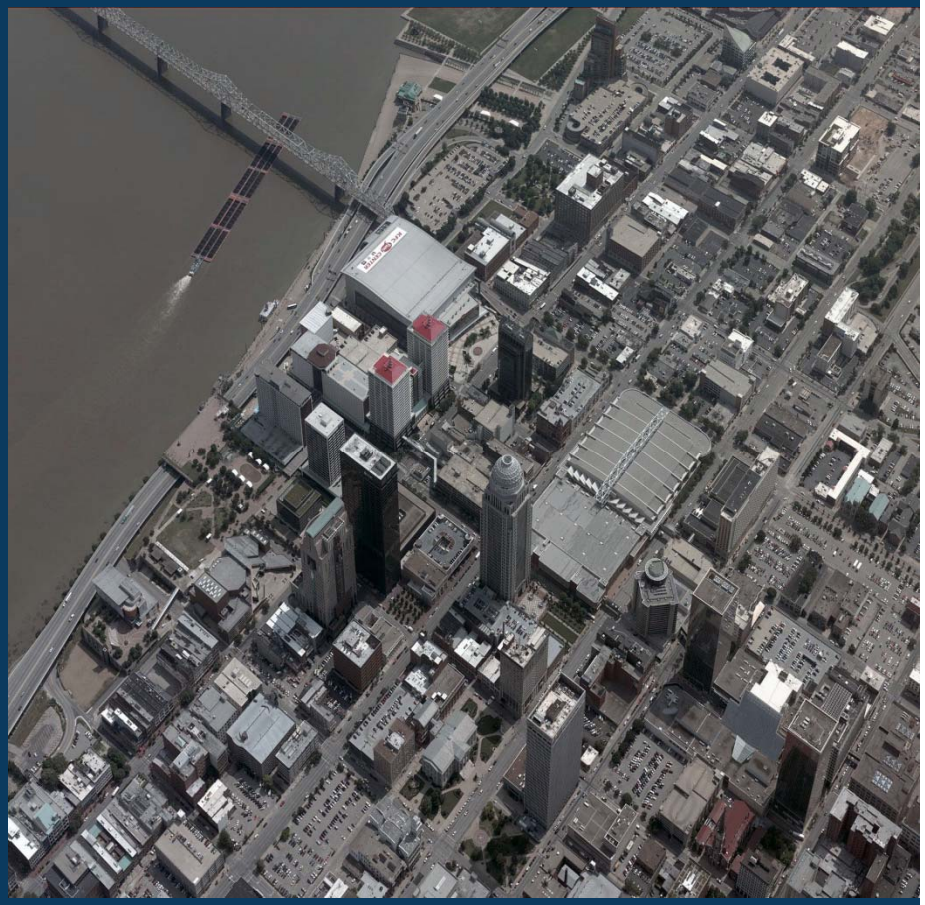
Questions?

Thank You!



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