

A photograph of a small waterfall cascading over reddish-brown rocks in a lush green forest. The water is white and frothy as it falls. The surrounding vegetation includes ferns and various green leaves. A large, fallen log lies horizontally across the upper part of the waterfall.

*Welcome to the Workshop*

*2009 AMD Conference  
Johnstown, PA*





# *Photogrammetry*

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*For the  
Environmental  
and Engineering  
Professional*



# *Overview*

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- *Aerial Cameras & Flights*
- *Photo Products*
- *Field Control*
- *Map Compilation & Cad Edit*
- *Field Completion*
- *Digital Imagery, Ortho Photos and LIDAR*
- *Output Formats*
- *Quality Control & Estimating*





# *Photogrammetry*

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- *Engineering Design*
- *GIS / LIS Base Mapping*
- *Quantities & Inventories*
- *Land Use & Planning*
- *Change Detection*
- *Classification Surveys (Pipelines)*
- *Flood Studies*
- *Resource Management*
- *Emergency Services*





# *Aerial Cameras*

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## ■ *Conventional Film*

- *Leica, Kern, Zeiss, E. Coyote...*

## ■ *Digital*

- *Leica, Z/I Imaging, Vexcel, DiMAC...*



# *Digital Cameras*

- *Large and Medium Formats*
- *Push Broom*
  - *Relies on Airborne GPS & IMU*
  - *Records Multiple Views Simultaneously*
- *Frame Capture*
  - *Z/I Has 8 Lenses W/12 Micron Pixel (340 MB Per Exposure)*
  - *Multiple Sensors, Color, B&W, CIR*
  - *Has 4096 Color Levels Available (Film 254 Color)*
  - *Works More Like a Conventional Aerial Camera*
  - *Relies on Airborne GPS*
- *Both Types*
  - *Multiple Sensors, Color, B&W, CIR*
  - *Idea for Image Classification Studies*
- *Geometric Accuracy*





# *Aerial Cameras*

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- *Built for Precision, Calibrated by USGS*  
*Focal Lengths ~ 3 1/2, 6 & 12 Inch*
- *Fiducial Marks*
- *Forward Motion Compensation (FMC)*
- *Gyro-Stabilized*
- *Inertial Measurement Unit (IMU)*
  - *Tracks: Altitude, Location, Roll, Pitch, Yaw*
- *Airborne GPS*







# *Aerial Film Types*

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- *Panchromatic - Black & White*
- *Natural Color*
- *Black & White IR*
- *Color IR*
- *Negative & Positive*





# *Photo Mission*

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## ■ *Flight Seasons*

- *Leaf-On*      *Leaf-Off*      *Sun Angle*

## ■ *Weather*

- *Snow*      *O/C*      *Clouds*

## ■ *Site Conditions*

- *High Walls*      *Water Levels*      *Tides*
- *Tall Buildings*      *Brush*      *Crops*

## ■ *Flight Area*

- *Accurate Map*      *Outline of Area*





# *Super Low Altitude Flights*

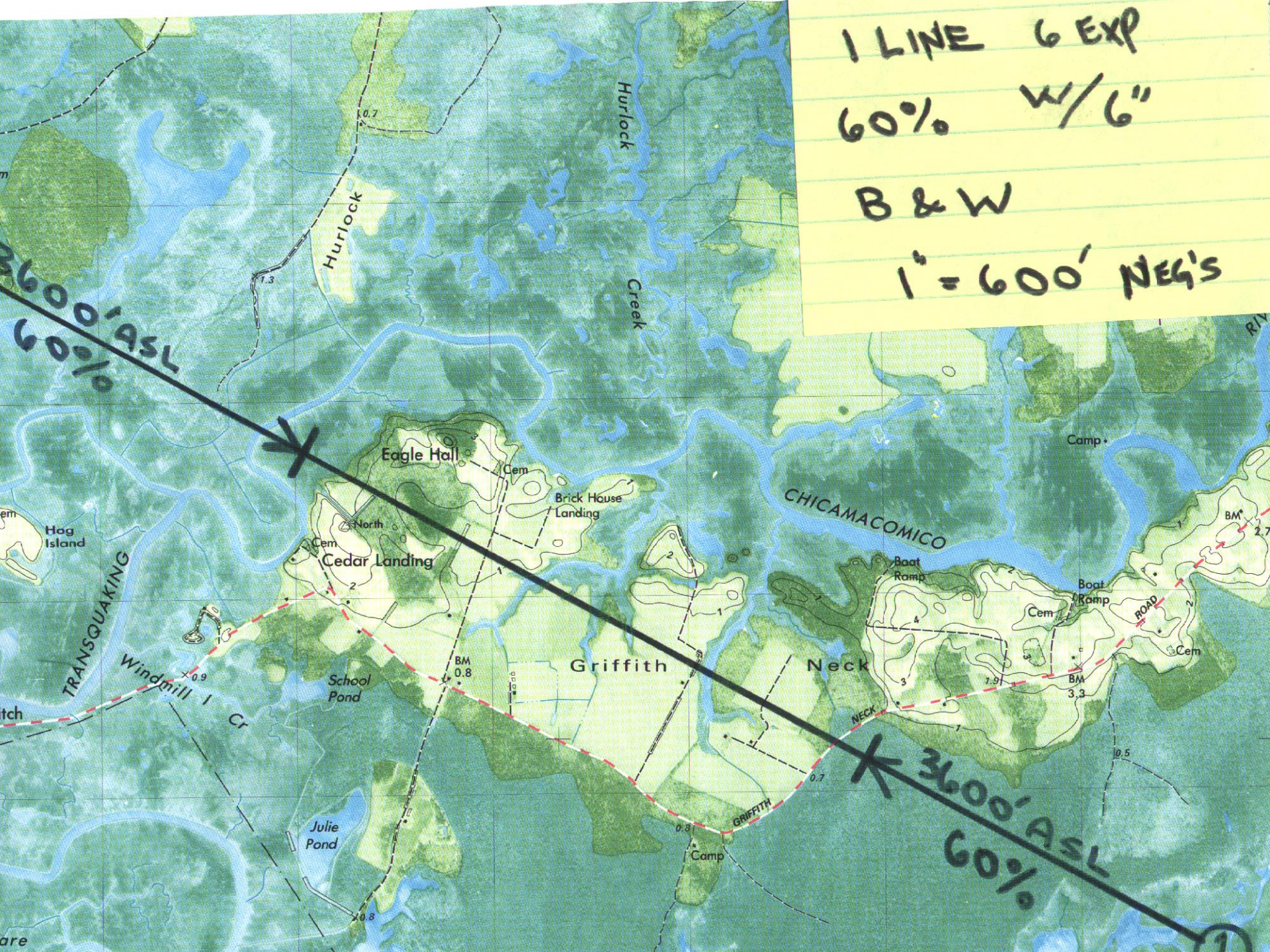








1 LINE 6 EXP  
60% W/6"  
B & W  
1" = 600' NEG'S









# *Field Control*

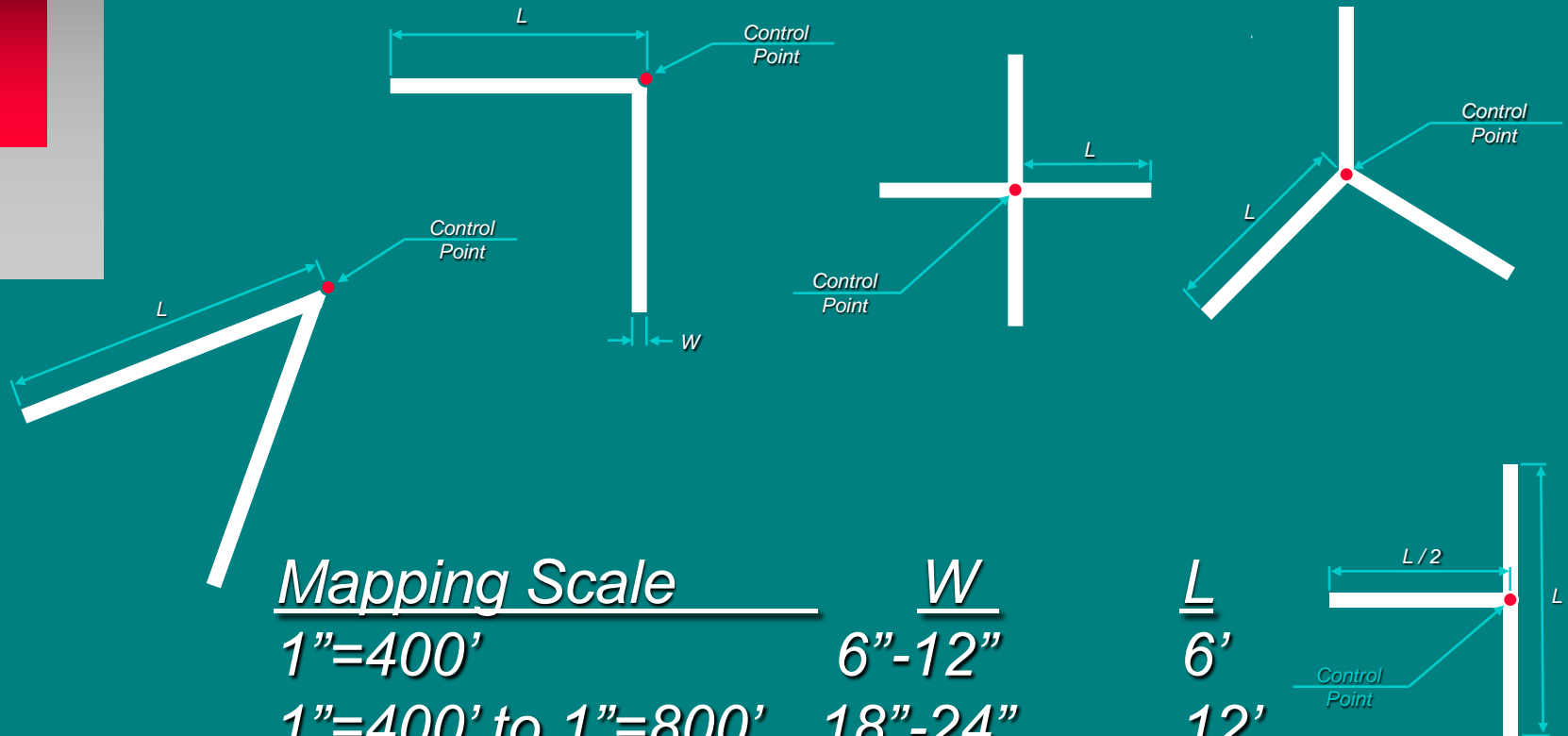
- *Stereo Model ~ Scale & Level*
- *Feet or Meters ?*
- *Datum Systems*
  - *NAD 1927      NAD 1983 / 19\*\**
  - *NGVD 1929      NAVD 1988*
- *Local & Site*
- *Grid or Scale Factor*
- *GPS & Airborne GPS*
- *Monumentation, If by others ask for a report.*
- *Closure Requirements*







# Panel Shapes & Sizes



## Mapping Scale

1"=400'

1"=400' to 1"=800'

1"=800' to 1"=1200'

1"=1200' & Over

## W

6"-12"

18"-24"

24"

24" to 36"+

## L

6'

12'

16'

24' Min.



1094355  
1094377

1094555  
1094577

1094179

1094299



# *Paneling Information*

*Maximum contrast between the target and its background is of primary interest. White material in areas of dark background and black in areas of light. On hard surfaced roads oil based paint is recommended, keeping out of the high traffic areas if possible. If needed a white panel can be*

*outlined with black material of approximately two panel widths to improve contrast.*

*While just about any material can be utilized for panels, oil based paint and roll plastic are the accepted materials. Plastic material can be secured with rocks, spikes wires, etc. Also in areas of high wind wire or plastic mesh can be used to extend durability. Painted boards could also be used as a alternative.*

*Just as in other areas of field survey we must place special consideration as to the location and material utilized in this process. The material can be ingested by livestock, destroyed by vandals or removed by property owners whom were never contacted.*













4053



5062



4063



0199

5063





# *Stereo Plotters*

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- *Optical Projection Instruments*
  - *Kelsh, Ballplex, Multiplex, Etc.*
- *Analog Plotters*
  - *PG-2, B-8S, Santoni 2C, Etc.*
- *Analytical Plotters*
  - *Zeiss P Series, Kern DSR Series*
  - *Wild BC Series, Etc.*
- *Softcopy*





# *Softcopy*

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- *100% All “Digital Flow” on Larger Projects*
- *Works Very Well With Digital Camera Output*
- *Accuracy Equal to Conventional High End Analytical Plotters*



StereoGlasses

DELL

ViewSonic

Notes -  
working on  
4/16/17

Don  
504-930-1111

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PROFESSIONAL  
MAPS, CAD, GIS, Aerial Photography, etc.  
SERVICES  
10000 N. 10th Ave. Suite 100  
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Fax: (520) 298-1112

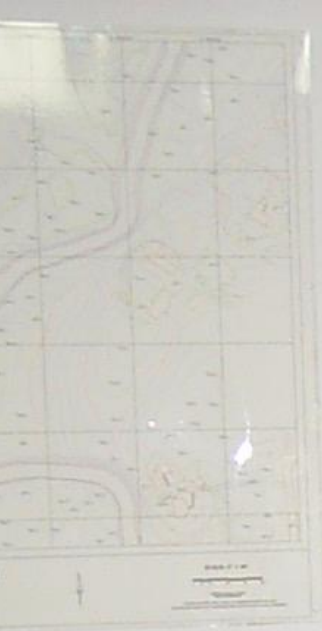
Map Showing  
Property Owned By



# *Map Compilation*

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- *Collection Procedures*
  - *Planimetric*
  - *Topographic*
  - *DTM & DEM*
- *Features & Content*

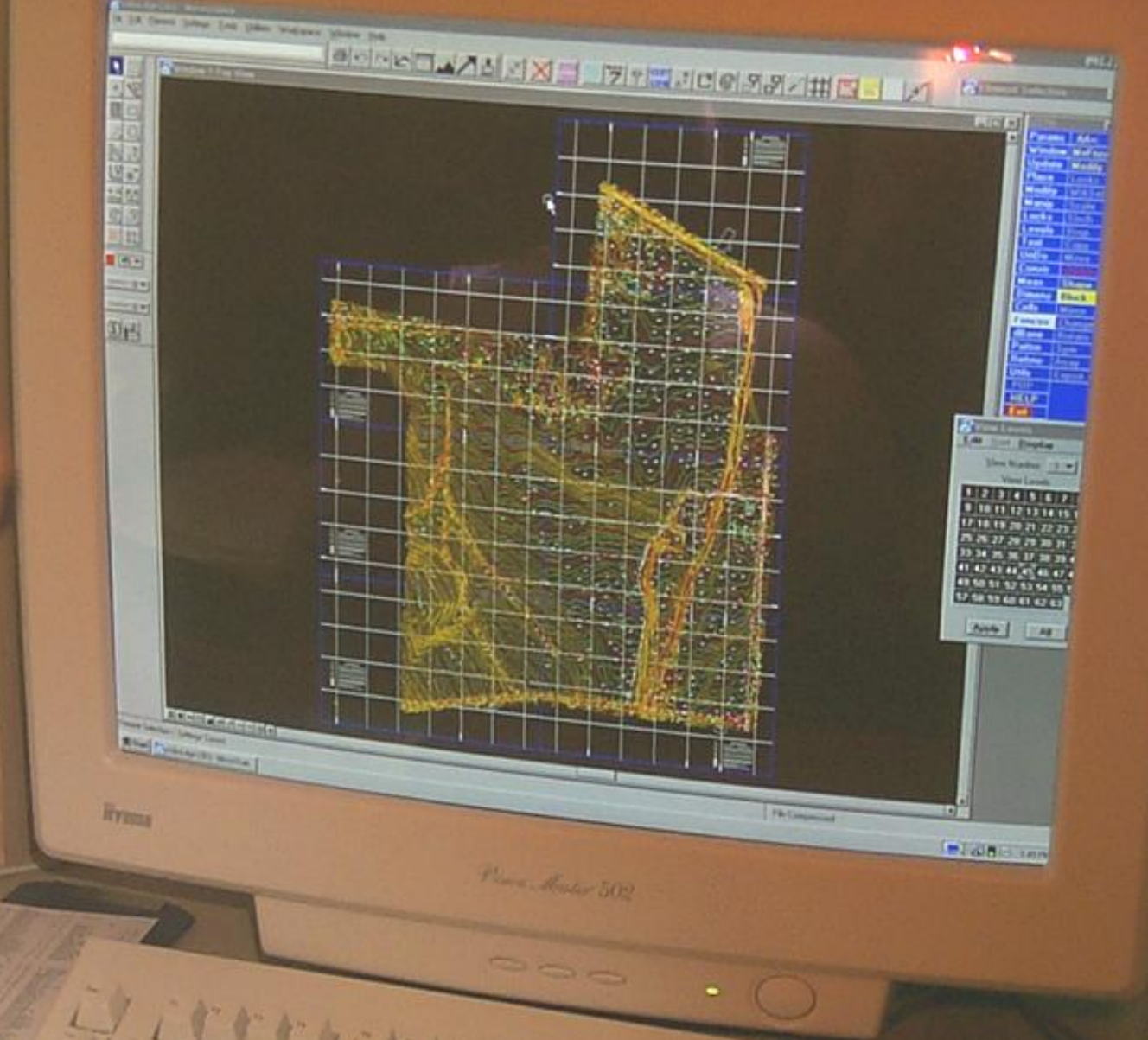




# *Cad Edit*

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- *Data Layers, Levels & Colors*
- *Sheet Layout “Seamless”*
- *Smoothing & File Size*
- *Translations*
- *Digital Images*



KEY TRONIC



# *Digital Products*

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- *Raster & Vector*
- *Base Mapping*
- *Digital Orthos*
  - *Scanning Resolution*
  - *Sheet Center Photography*
- *Imagery*
- *Backdrops*

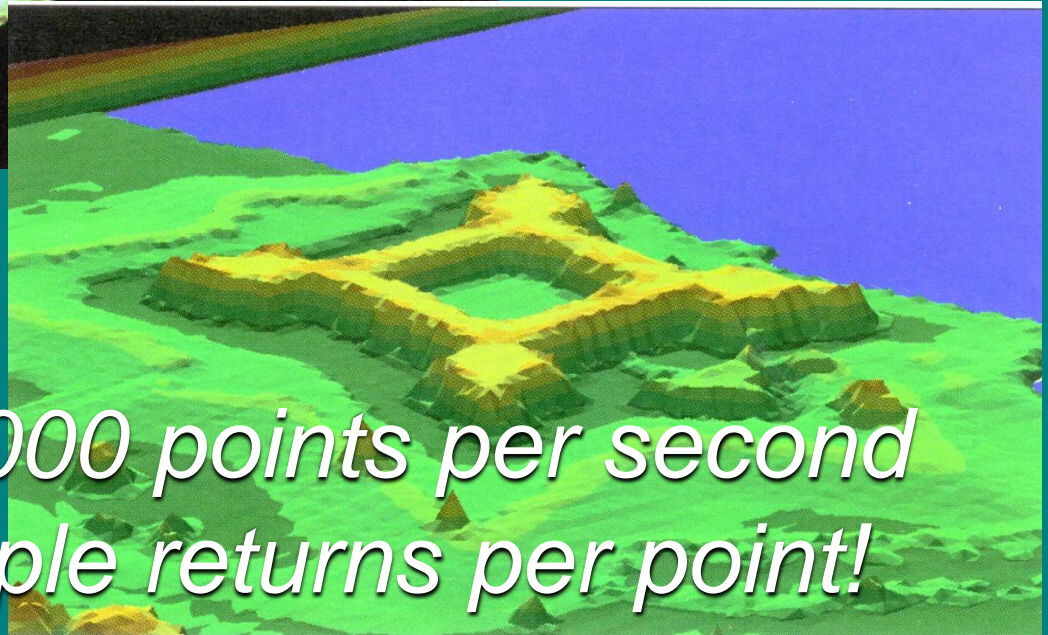
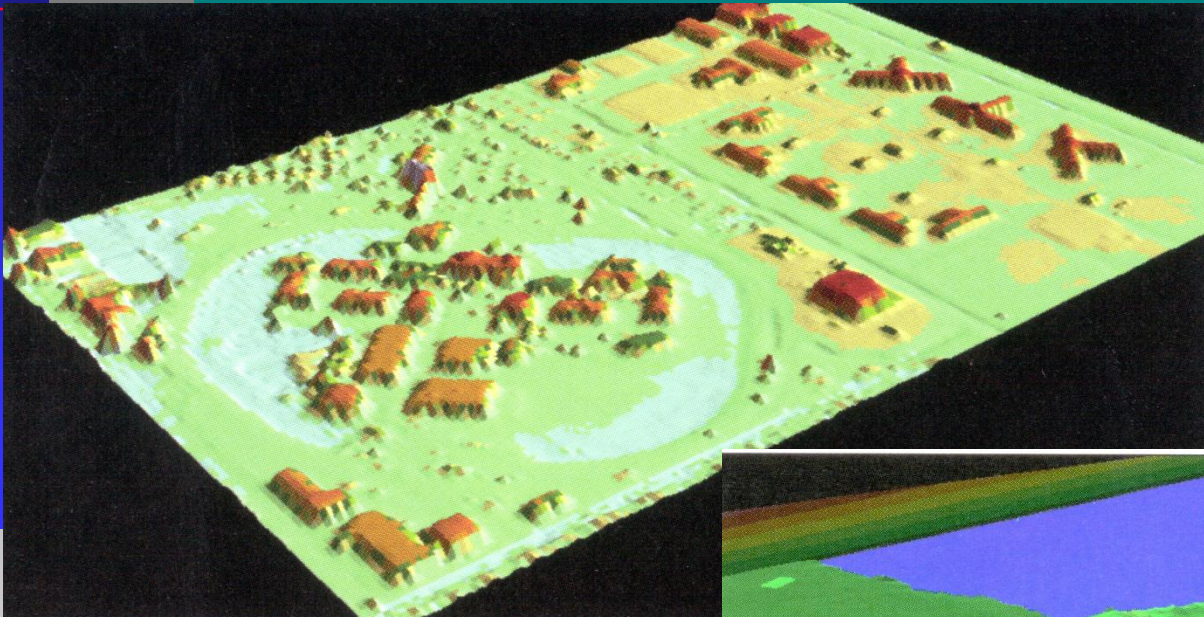






# *LiDAR*

## *(Light Detection And Ranging)*



*Over 100,000 points per second  
with multiple returns per point!*



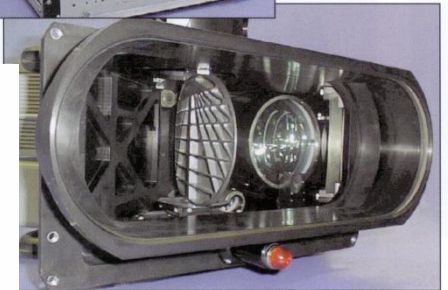


# *LiDAR Units*

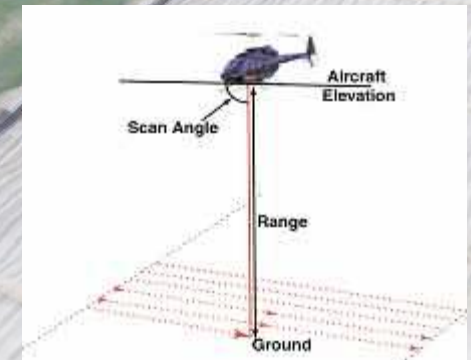
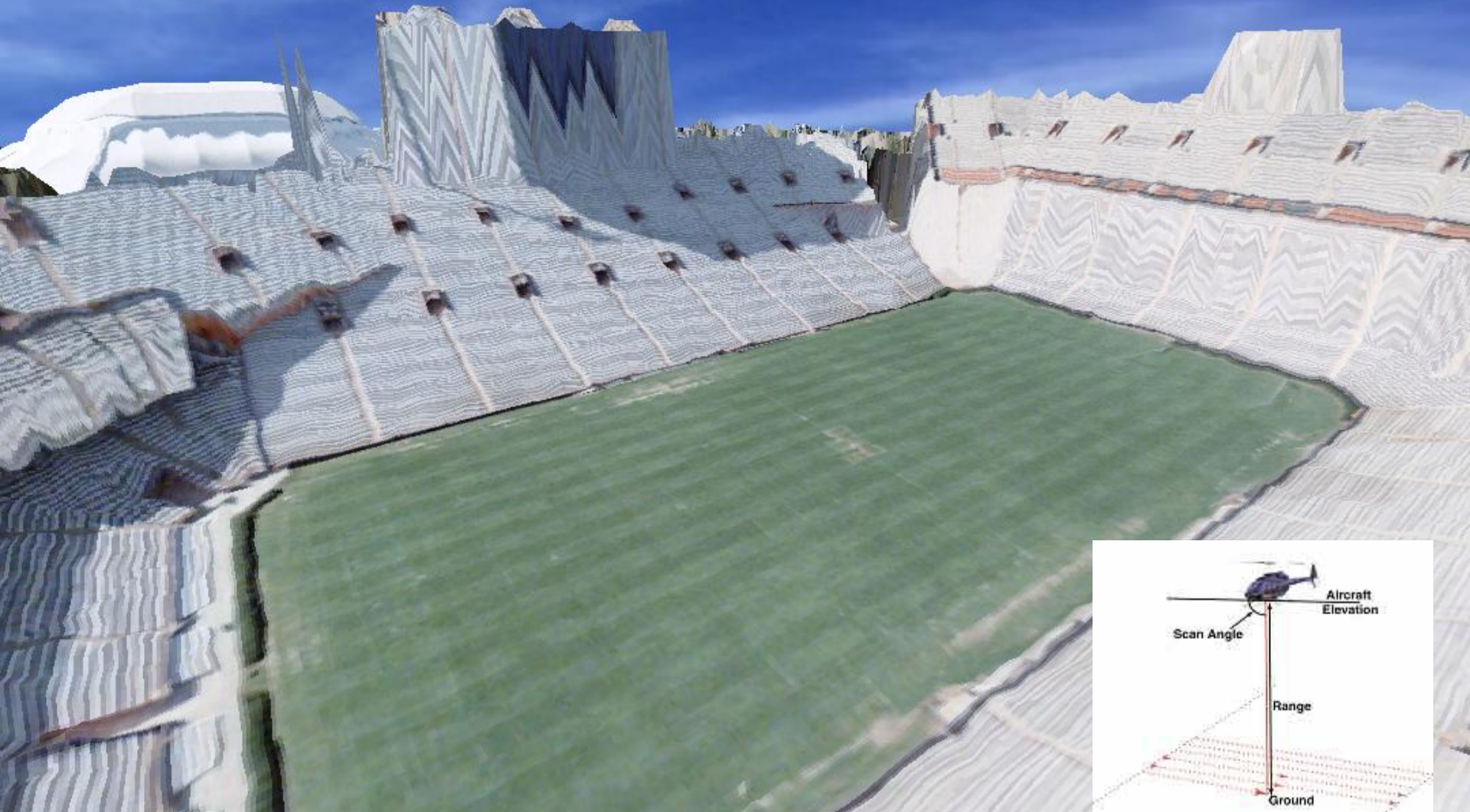


◀ Top:  
Aeroscan System  
Processor Rack

Bottom:  
Aeroscan Scanner  
Mirror and Lens  
Assembly ▼



**"Color aerial photography draped over LIDAR surface model, University of Florida stadium."**







# *Output Formats*

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- *Operating Systems*

- *PC / Workstation*

- Software Format*

- *Intergraph*

- *AutoCAD*

- *ARC / INFO*

- *Map Info*

- *And Many More*





# *Data Sources*

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## ■ *Private*

- *Aerial Photography Firms*
- *Photogrammetry Firms*
- *Large Tract Holders ~ Timber, Mining Etc.*

## ■ *Public*

- *Local*
- *State*
  - *PA Map Program, State Forest, DOT, SCS / CO-OP Ext., Etc.*
- *Federal*
  - *USGS, NAPP / NHAPP, USDA, US Army COE*



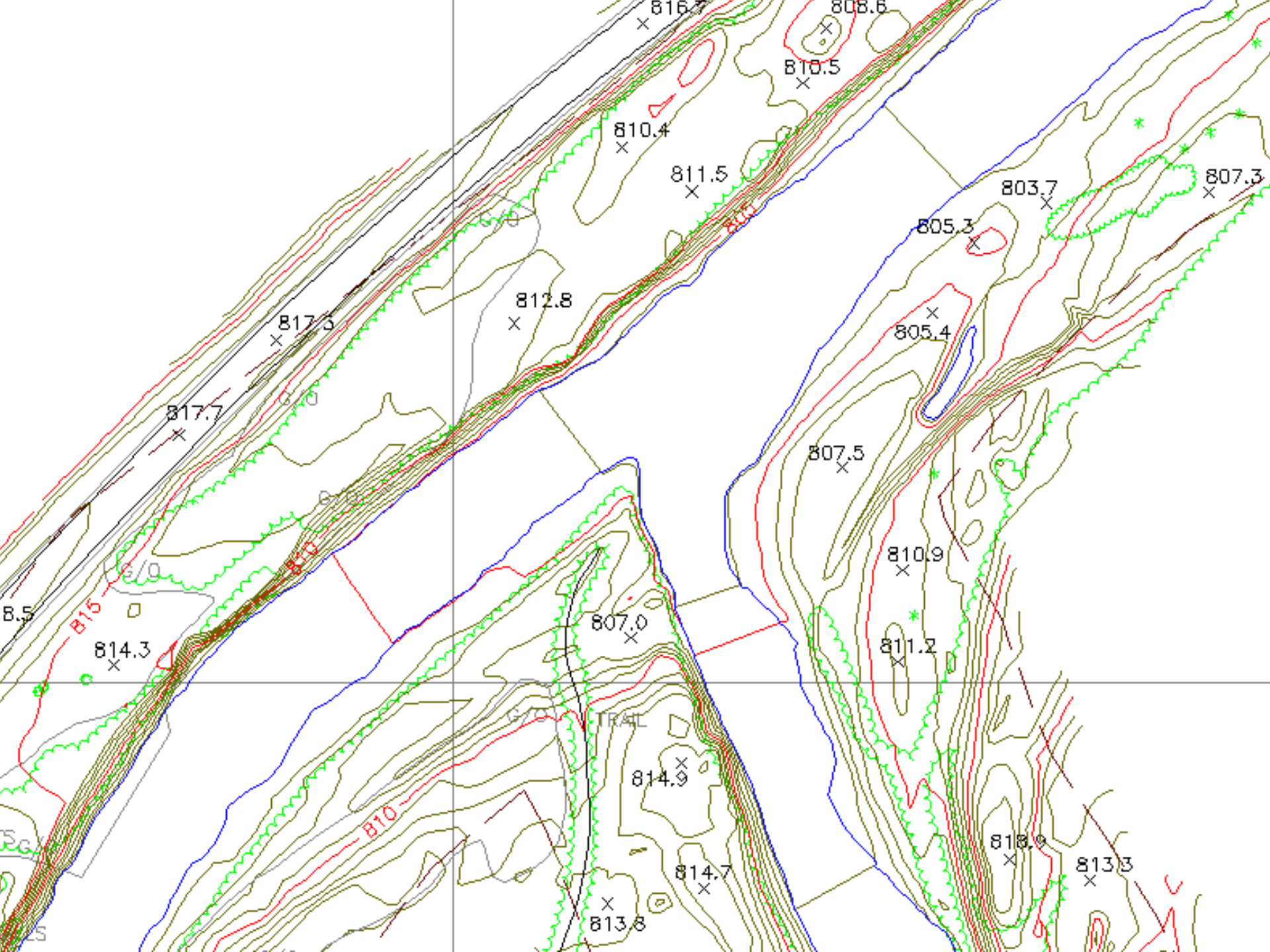


# *Field Completion & Edit*

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- *Preliminary Mapping*
- *Field Location Methods*
  - *Swing Ties*
  - *Station Offset*
  - *Total Station*
  - *GPS*
- *Missing Information*
  - *Obscured & Shadow Areas*
  - *Building Lean*
  - *Addition of Underground Utilities*

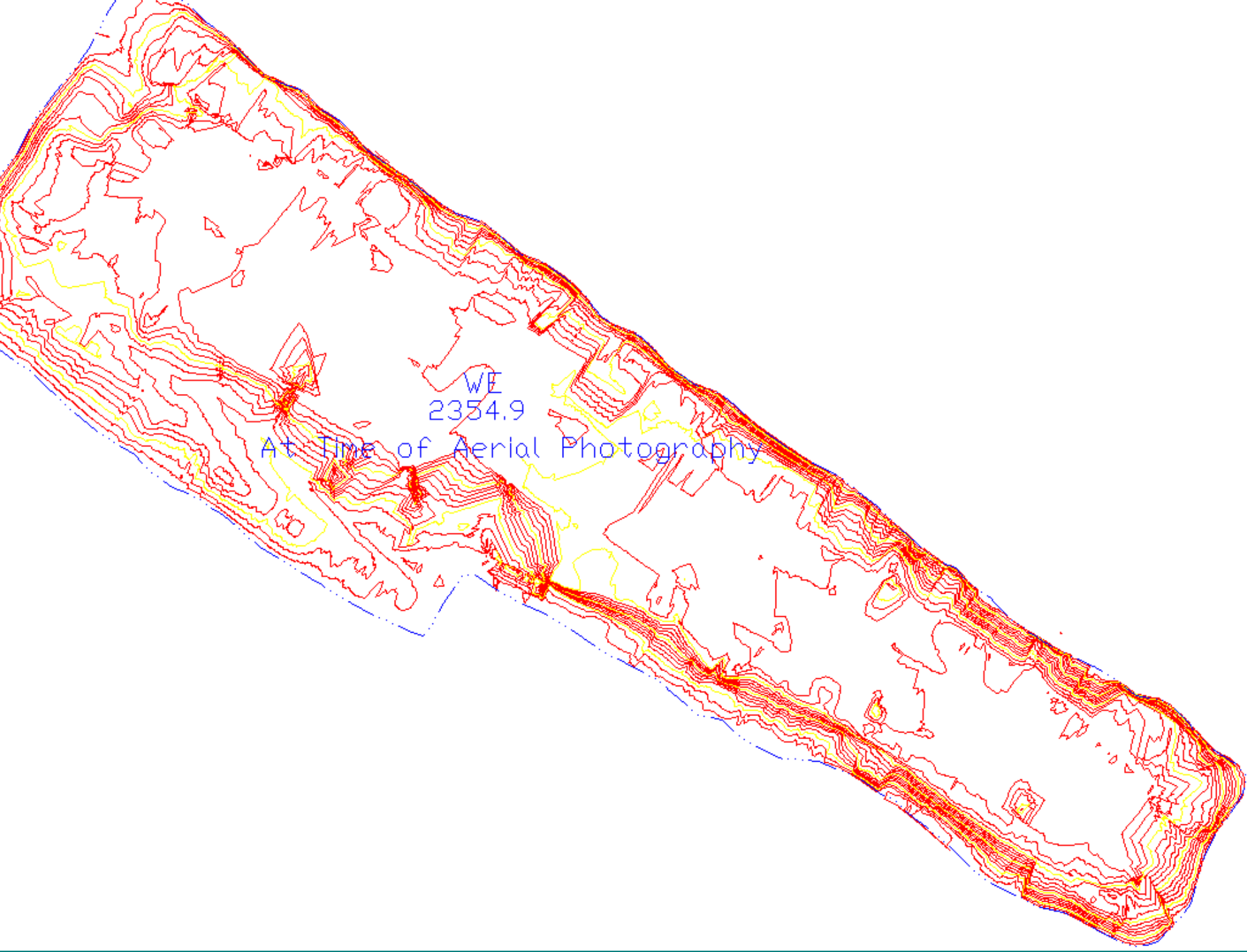




# *Estimating*

- *Area of Coverage*
  - *Allow coverage to bring in utilities, buffer area, intersection improvements, etc.*
- *Working Scale, Contour Interval, Accuracy*
- *New Vs. Existing Photography*
- *Flight Seasons & Weather*
- *Control Requirements (Future Use)*
- *Site Conditions, Access, Locked Gates*
- *Digital Formats, Levels, Layers, Colors, Etc.*
- *Shipping Media*





WE  
2354.9

At Time of Aerial Photography

## *Jumbo Mapping Services*

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***Jumbo Mapping Services*** invites your inquiry for an estimate on your next surveying and mapping project. So that we may respond accurately, please complete the attached ***“Fax Quote”***.

Client: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Attn.: \_\_\_\_\_  
Phone: ( \_\_\_\_ ) \_\_\_\_ - \_\_\_\_\_ Fax: ( \_\_\_\_ ) \_\_\_\_ - \_\_\_\_\_  
Project Name: \_\_\_\_\_  
Project Location - City: \_\_\_\_\_ State: \_\_\_\_\_  
Quad Name: \_\_\_\_\_  
Property, R/W or Boundary Survey Required Yes ☐ No ☐  
Aerial Photography Required: Yes ☐ No ☐ (If provided at What  
Negative Scale 1"= \_\_\_\_\_ & Source \_\_\_\_\_)  
Sets of Photo's Required: 1 ☐ 2 ☐ 3 ☐ \_\_\_\_\_ ☐  
Additional Photo Products: \_\_\_\_\_  
Include a Quote for Field Control. Yes ☐ No ☐  
If Required, What Datum's. Horiz.: \_\_\_\_\_ Vert.: \_\_\_\_\_  
Mapping Scale: 1"= \_\_\_\_\_' Contour Interval: \_\_\_\_\_  
Hard copy Requirements: Mylar ☐ Paper ☐  
Final Computer Output Format: \_\_\_\_\_  
Shipping Media for Digital Files: 3 ½" ☐ CD ☐ DAT Tape ☐  
Cartridge Tape ☐ (Type \_\_\_\_\_) Other \_\_\_\_\_  
Other Specifications or Requirements: \_\_\_\_\_  
\_\_\_\_\_  
Anticipated Schedule: \_\_\_\_\_  
Additional Information Required: Jumbo Brochure ☐ SF255 ☐  
Sample Digital Files ☐ Equipment Listing ☐  
Call to setup a meeting ☐

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*Ask for a  
control diagram !*







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Aerial Photography



Topographic Maps



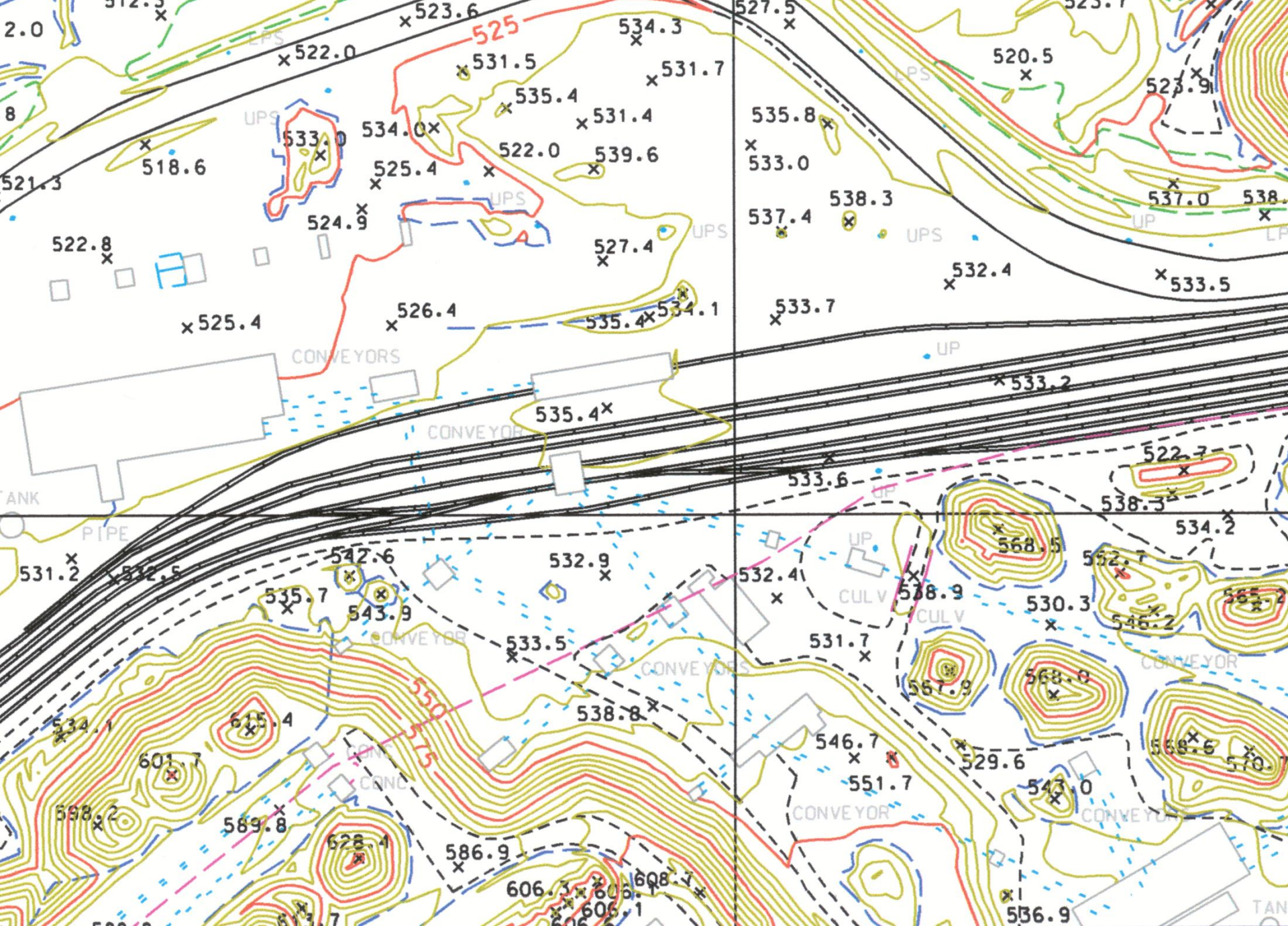
State-wide Data



Browse FTP







## Download New Data

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- **PAMAP LiDAR**

data now available for download [Quick Link>>](#)

- **Allegheny County**

data now available in Mapservices and for download [Quick Link>>](#)

- **PAMAP Imagery**

- Imagery now available in Mapservices and for download [Quick Link>>](#)

- **DVRPC Imagery**

- 

Imagery now available in Mapservices and for download [Quick Link>>](#)

- **FEMA DFIRM**

flood insurance rate map data by county is now available for download [Quick Link>>](#)







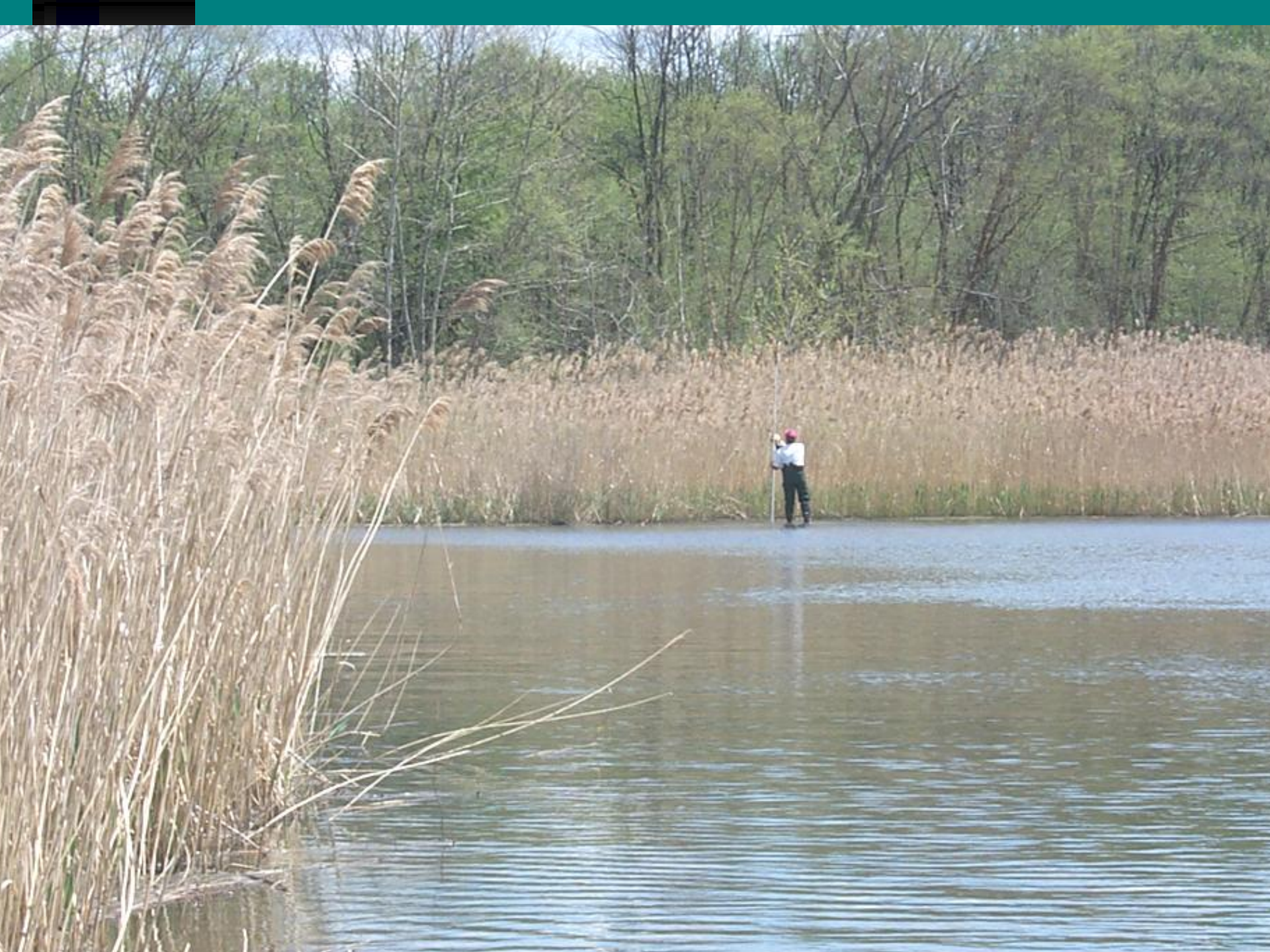
# *Contact Information*

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*Jeff Gilmore*

*jgilmore@mapres.com*







A scenic photograph of a forest stream. The water flows over large, moss-covered rocks, creating a small waterfall. The surrounding forest is dense with tall, thin trees, some with green foliage and others bare. The ground is covered in fallen leaves and moss. The text "The End" is overlaid in the center of the image.

*The End*