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Mobile Scanning in the New Economy

Terrametrix™

Michael R. Frecks, PLS
President

Terrametrix

"America's long term competitiveness depends on the stability of our critical infrastructure."

- Current Administration Transportation Plan

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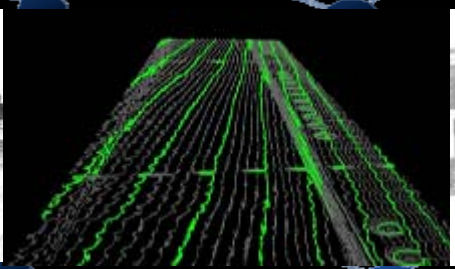
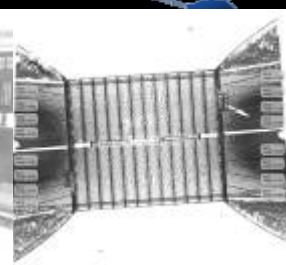
About us…

- 31 years Land Survey experience
- Lidar scanning since 2000
- Terrestrial Mobile scanning since 2007
- Focus on civil / transportation (auto, air, railroad)
- Secondary focus pipeline and telecommunication







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Our Approach to Engineering firms that serve DOTs:
"*Tool in your toolbox*"

- Work through the local companies
  - We provide mobile scanning services
  - Local company can provide control, project coordination, and finished deliverables if desired.
- Provide "Best in Class" service
  - Latest technology, versatile and portable
  - High quality, accurate results
  - Competitive rates
  - Professional approach

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HNTB

animation

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Laser scanning technologies

Airborne Lidar

Land Surveying

Static 3D Laser Scanner

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Proven in the field

Terrestrial mobile lidar system has been in commercial field operations for over 3 years.

- Operation worldwide:
  - North of Arctic Circle in Winter
  - Malaysia/Singapore/Japan
  - Extensively used in Europe
  - Exclusively in North America through Terrametrix

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Scanner configuration

- Class 1 eye-safe scanners
- Flexible location of scanners
  - Highways configuration
    - Best on road surface
  - City modelling configuration
    - Best on facade
  - Coastal surveying configuration
    - 650m range
  - Terrestrial <-> Airborne configuration

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Highway configuration

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- Class 1 eye-safe scanner
- Flexible location of scanner
- Riegl VQ 250
- Direct Inertial Aiding
- Dual frequency GPS
- Digital Video Cameras
  2- 2/4 Mpixel

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Streetscape configuration

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- Class 1 eye-safe scanners
- 2 Riegl VQ 250s
- Digital – 12 Mpixel
- Direct Inertial Aiding
- Dual frequency GPS

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Versatility

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VQ250 Scanner Range
300 m to 80% reflectivity
100 m to 10% reflectivity

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Eastern US Trip, 3600 miles

June 2008

Omaha, NE
Cincinnati, OH
Montreal, Canada
Washington, DC
Newark, NJ
Raleigh, NC

IEEE 2009

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Cincinnati, OH Project: Trolley Route, Cincinnati, OH Data documentation of 4 miles roadway in and around downtown urban canyon. Data collected in 90 minutes. Deliverables were registered point data set.

Montreal, Canada Project: 2.7 mile track collected at night in 2 hours including the pits and garage area. Deliverables were point data.

Washington, DC Project: Lee's Corner Road & Centreville Road, Mc Clean, VA 2500 ft of 4-lane divide urban highway and cross streets for accident investigation. Deliverables were cross sections at 10' intervals and 2D paving geometry.

Newark, NJ Project: Route 46 over Broad Street, Clifton, NJ Project included 3d data documentation on an interchange including overpass and bridges. Data documentation of interchange and bridges was collected in 45 minutes with 1 week office extraction. Deliverables were dtm and 2D topo.

Raleigh, NC Project: 92 miles one pass data collection for Federal Highway Administration and the North Carolina DOT

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National Conference: Highway Asset Inventory & Data Collection Management

Durham, North Carolina

The most exciting application we have seen out of this conference has been within the session on capturing bridge heights while keeping our surveyors safe."

-Steve Varnedoe, Chief Engineer NCDOT

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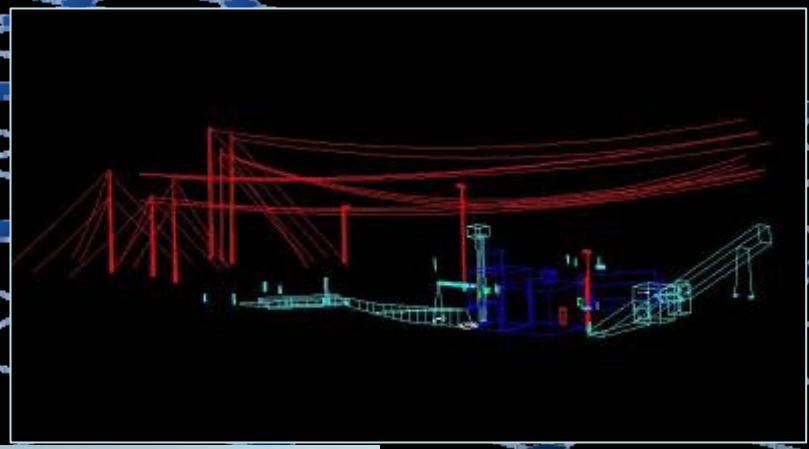
Midwest US Trip, 1200 miles



Lawrence, KS
Des Moines, IA
Minneapolis, MN
Wichita, KS
Kansas City, MO

IEEE 2009

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Lawrence, KS Project: Westar Power Plant Lawrence, Kansas Project included data documentation and 2d topo of 15 acres in and around operating coal fire plant which was completed in 1.25 hours. The data served as a base and tie into static scanning the plant buildings to create an accurate and complete record of the facility.

Des Moines, IA Project: I-35 – Ankeny, IA Project involved 1.7 miles of I-35 from project station 895+00 to 985+00 over the North River being 3.8 miles north of IA. 92. Mobile LiDAR technology was used to collect scan data on the pavement surface. Data was collected in 2 hours. Deliverables were a dtm of the existing paving and median at 25 foot intervals.

Minneapolis, MN Project: 2 miles of I-494 performed in 1 hour. Point data delivered the same day which showed frost heave on the shoulder from previous control due to seasonal changes.

Kansas City, KS Project: 2.65 miles of 2/3 lane interstate and 5.25 miles of ramps and fly-over structures on US 69 / I-435 performed in 1 hour. Deliverables were point cloud data, digital terrain model of paving surfaces and crash walls. Data was compared to scans from 2002 as well as traditional survey topo. RMS error was .03’

Wichita, KS Project: I-235 US 54, Wichita, KS - 6.6 mile interstate project scanned in 2 hours (average speed 40 mph) with no lane closures. Deliverable was a digital terrain model (dtm) delivered in 13 man days. 0.10’ accuracy requirement, RMS error 0.06’

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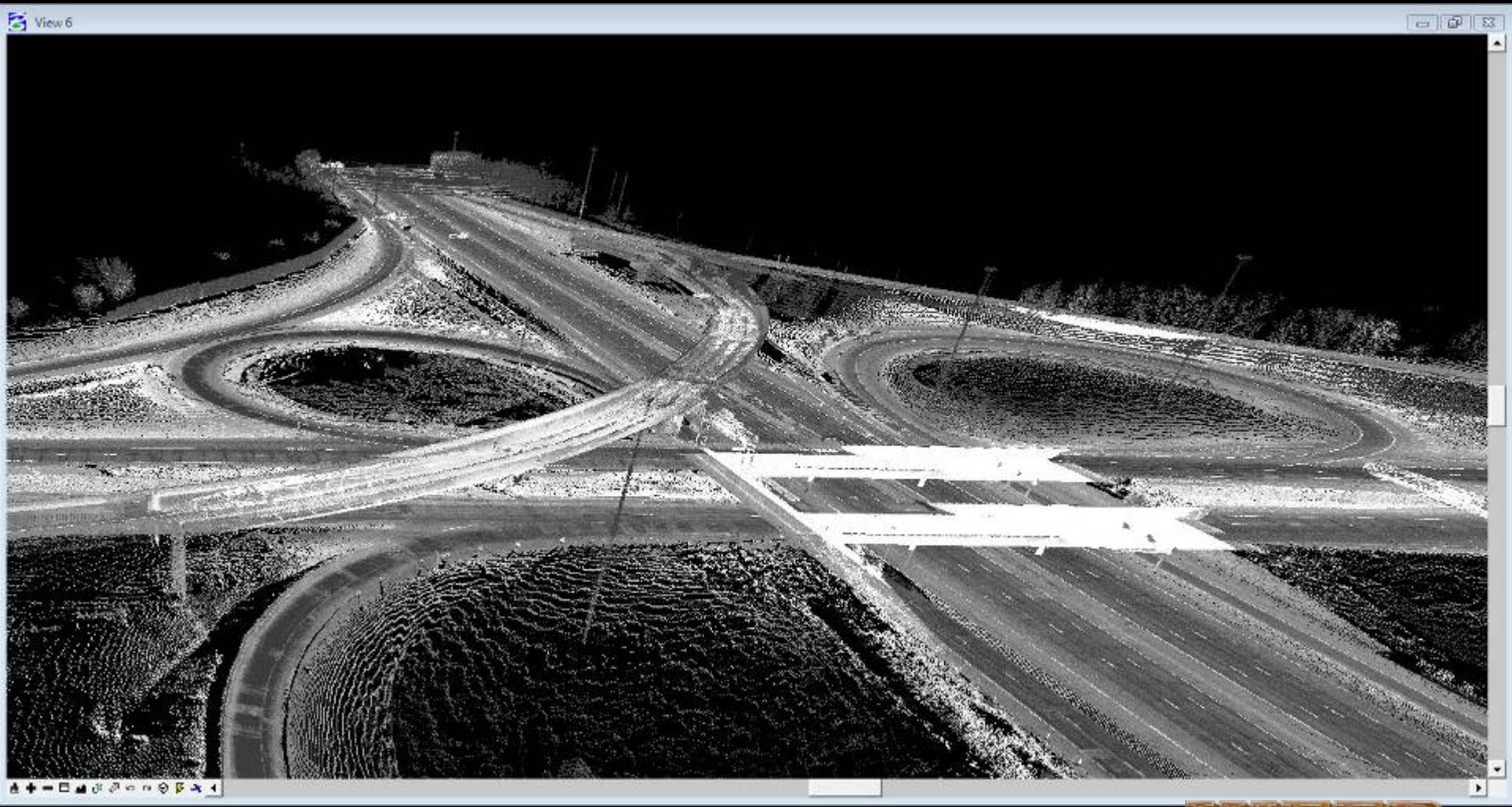

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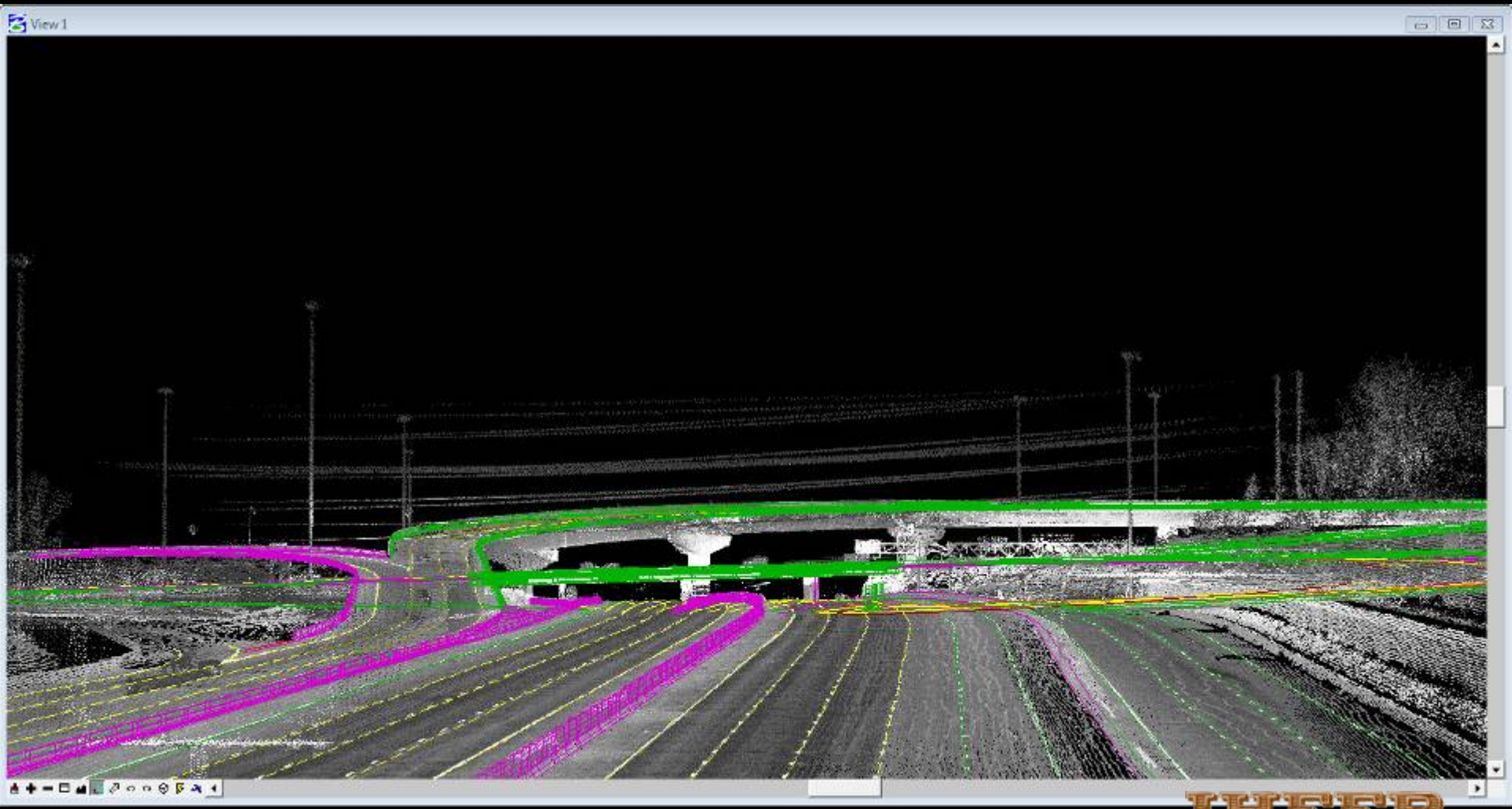

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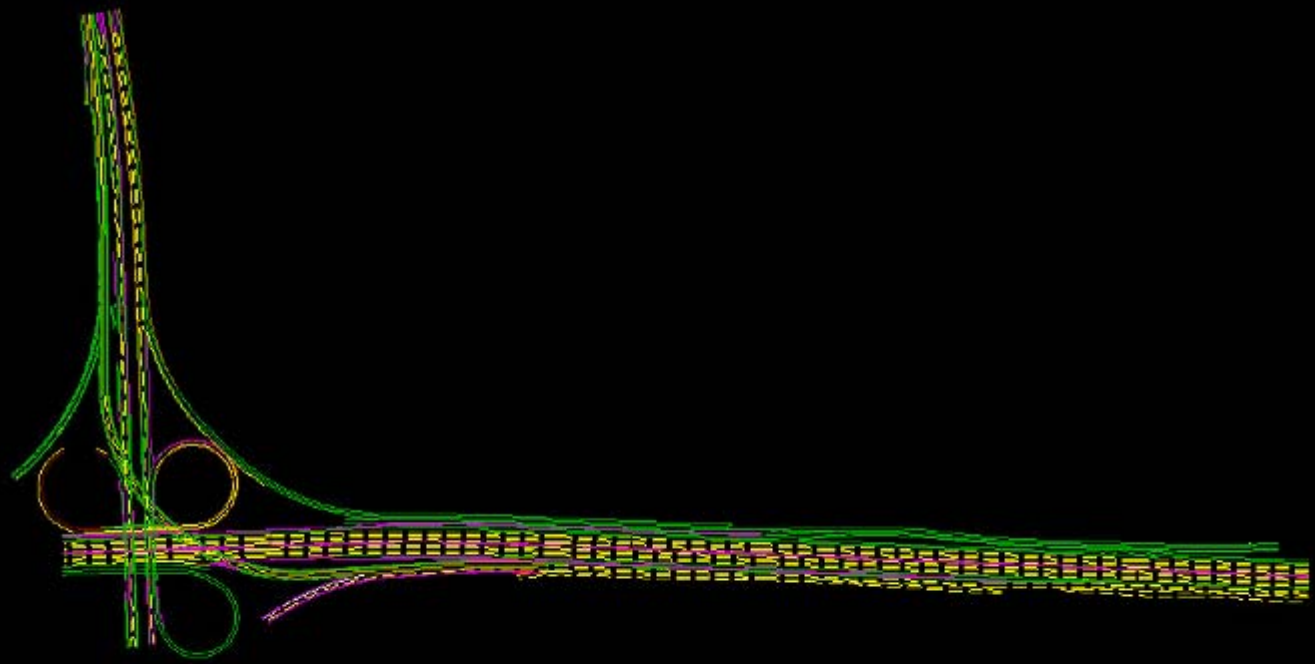

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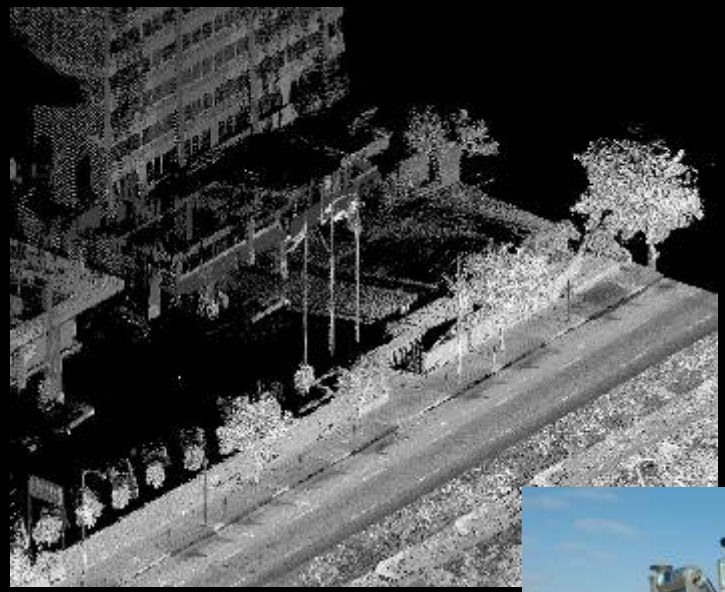
West Coast US Trip, 5,200 miles



Los Angeles, CA
Santa Monica, CA
San Diego, CA

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Los Angeles, CA

Project: LA Streetscapes Los Angeles, CA - 22.7 miles of streetscapes capturing building facades while traveling at 10 mph. The entire project included all lanes of major streets (2 and 4 lane urban highway), scanning approximately 170 side streets 300 feet in each direction (2 minutes each) , and NTA light rail. The scan data was collected from building face to building face or row line along the entire route. Deliverables were registered 3d point data in an ASCII format. Point data was separated into approximately 1/8 mile blocks containing between 10 million and 20 million points each. Data was collected in 4 days.

Santa Monica, CA

Project: Topographical survey of 65 acres of city buildings, streets and overhead. Completed in 2.5 hours. Deliverables point data.

San Diego, CA

Project: Test area for Caltrans to show accuracy in system to their 1500+ control shots on 4,550 feet of pavement surface. The scan data was collected in the spring, processed and raw data delivered to Caltrans for their review.

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Accuracy Study San Diego Test Area

1,500+ control points

RMS error in Z 0.02’

Results compared to control points provided by CalTrans

Average dz	-0.003
Minimum dz	-0.052
Maximum dz	+0.061
Average magnitude	0.018
Root mean square	0.022
Std deviation	0.022

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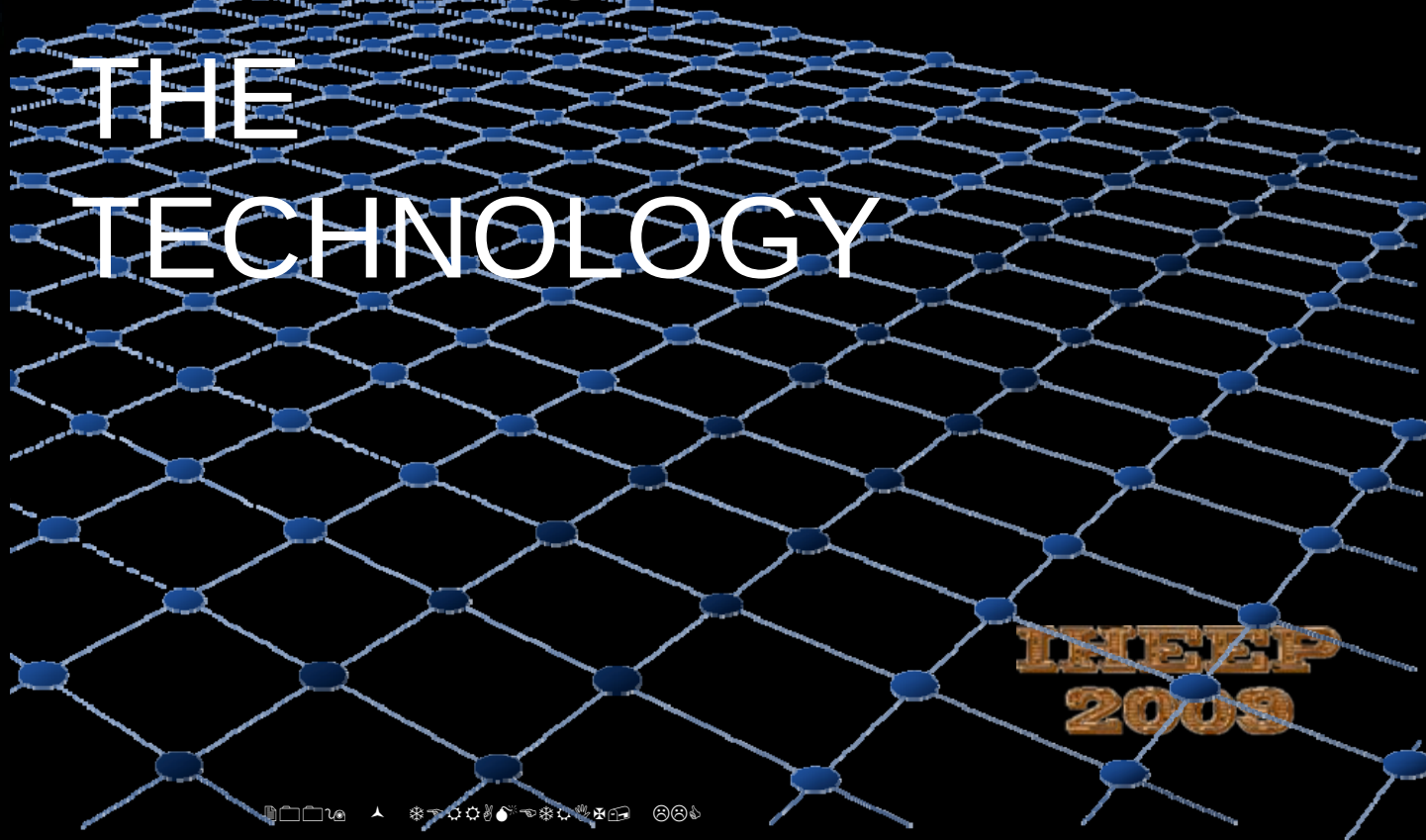
LEVERAGE THE TECHNOLOGY



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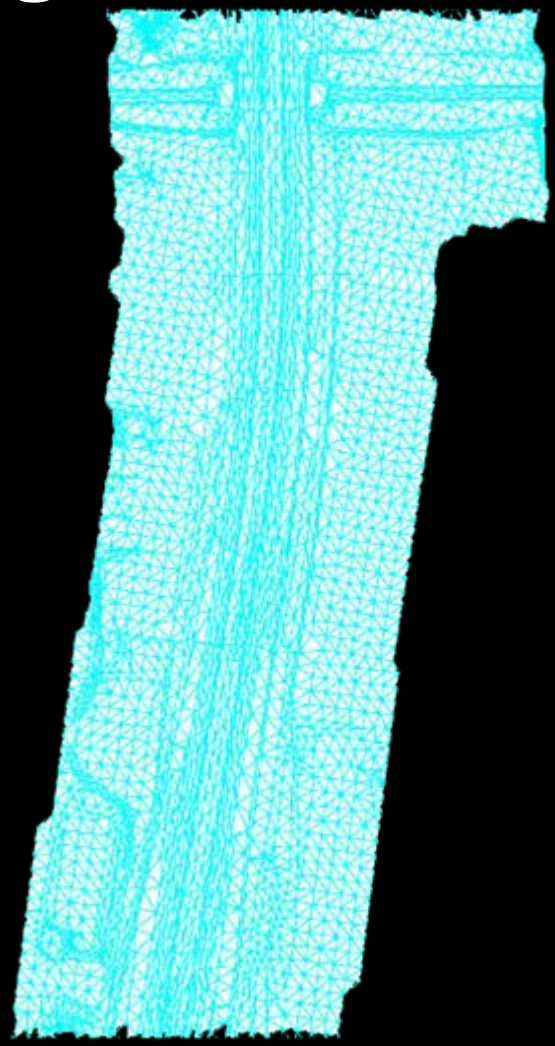
Original DTM



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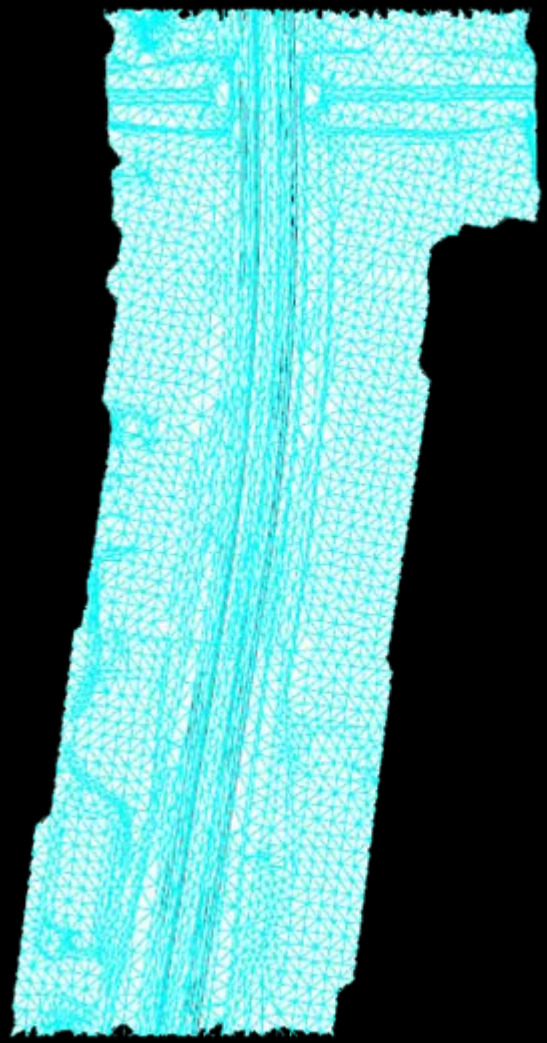
Original DTM with Breaklines



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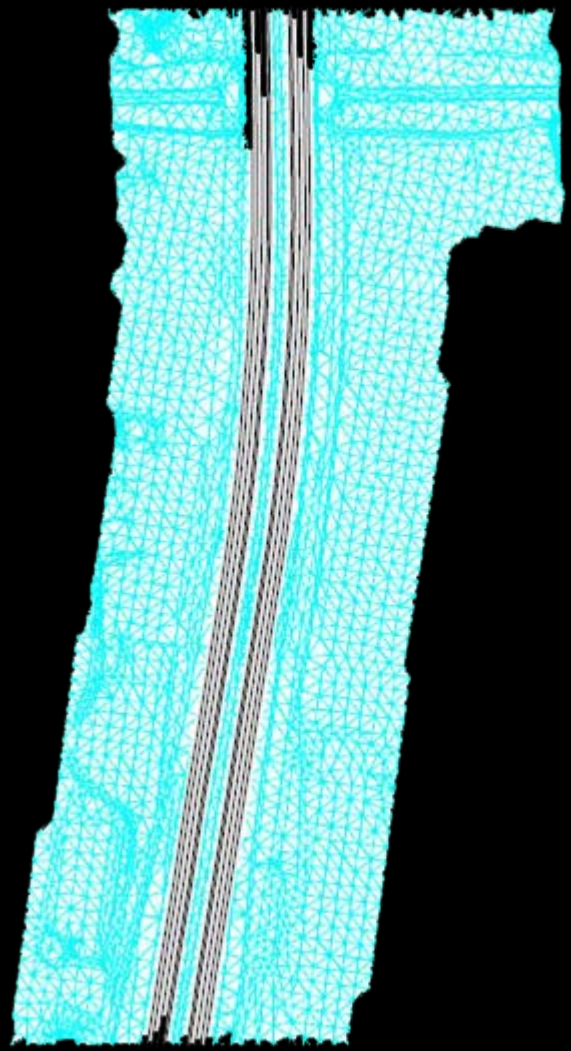
Original DTM Trimmed



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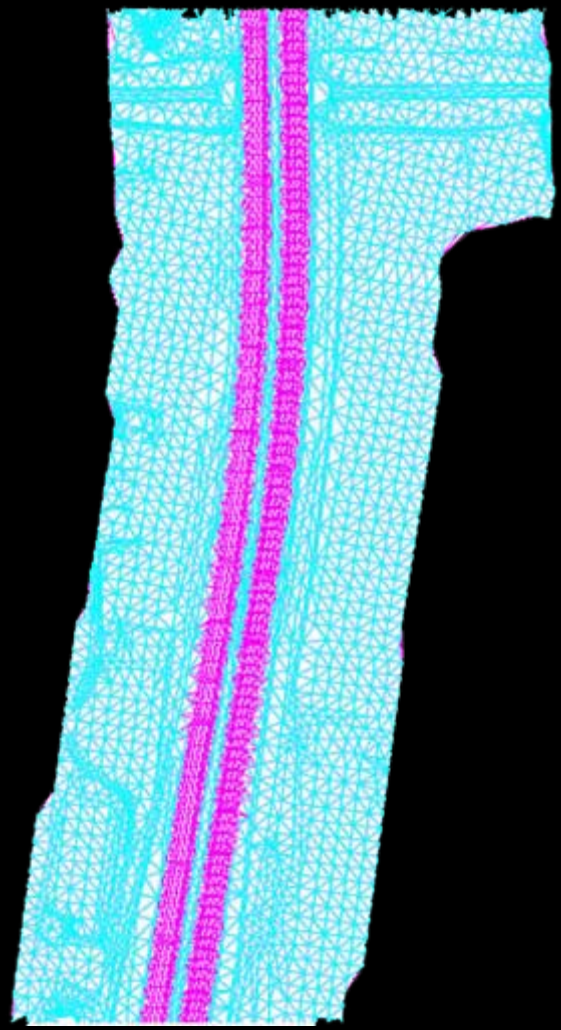
Retriangulated DTM



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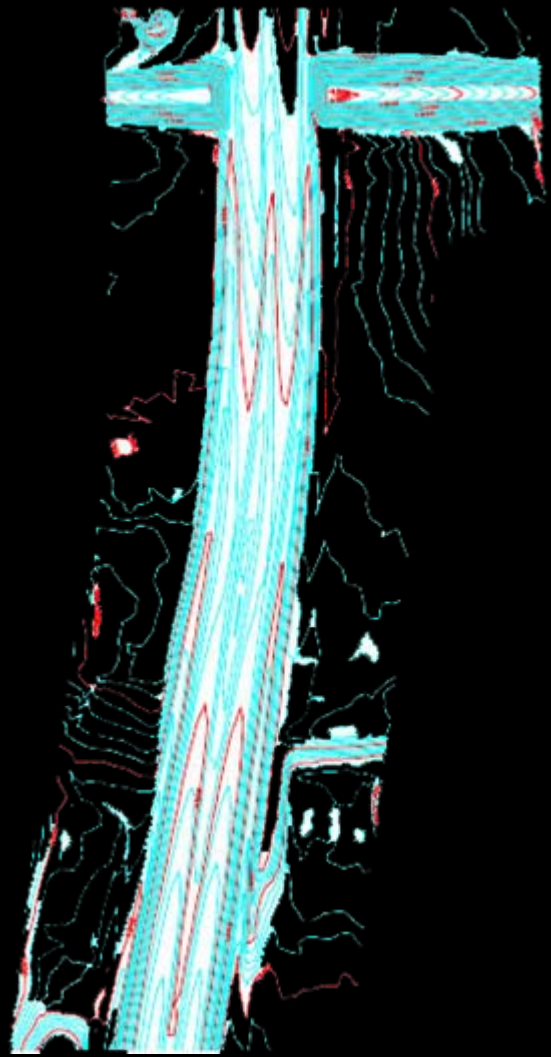
1’ Contour Interval



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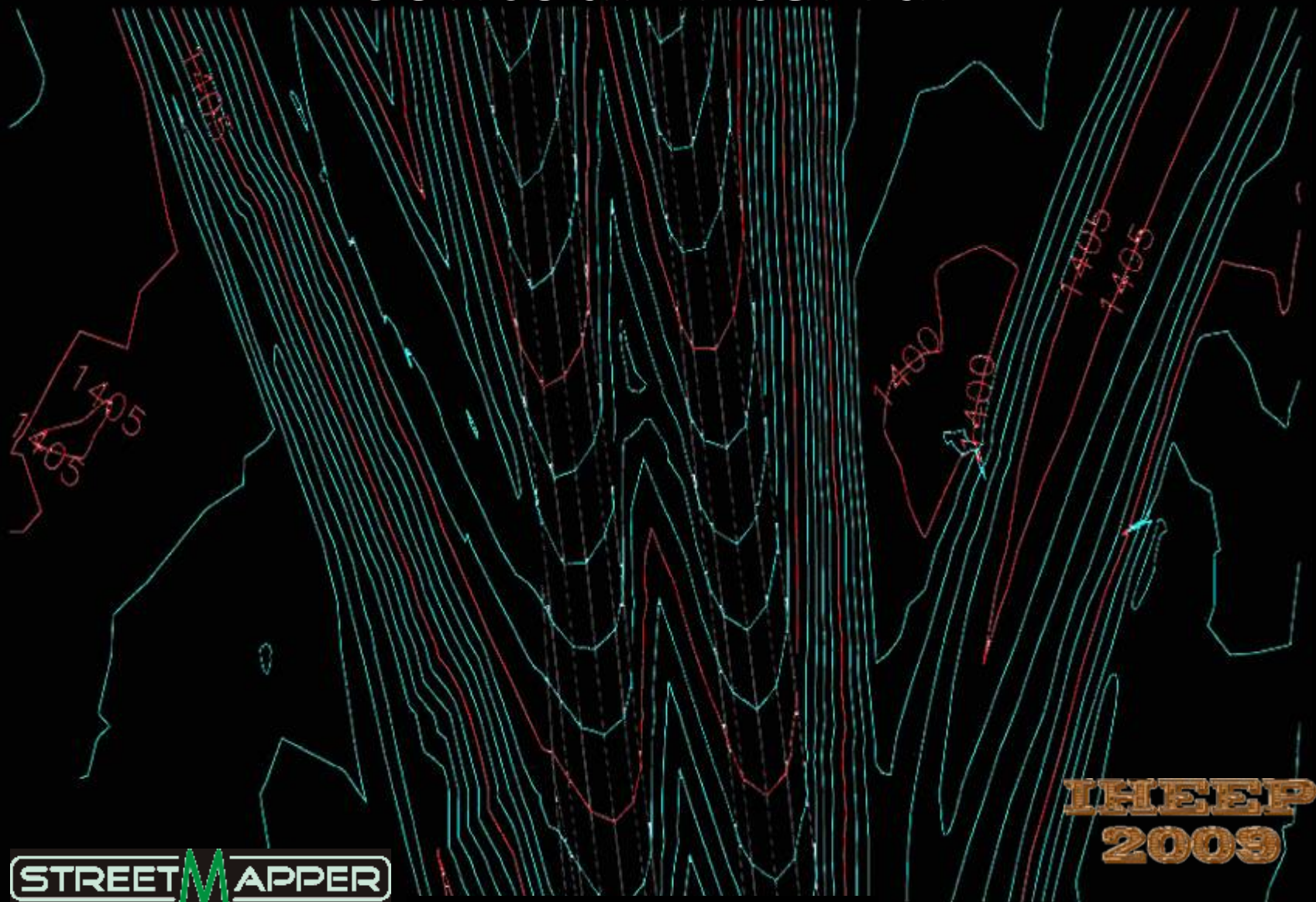

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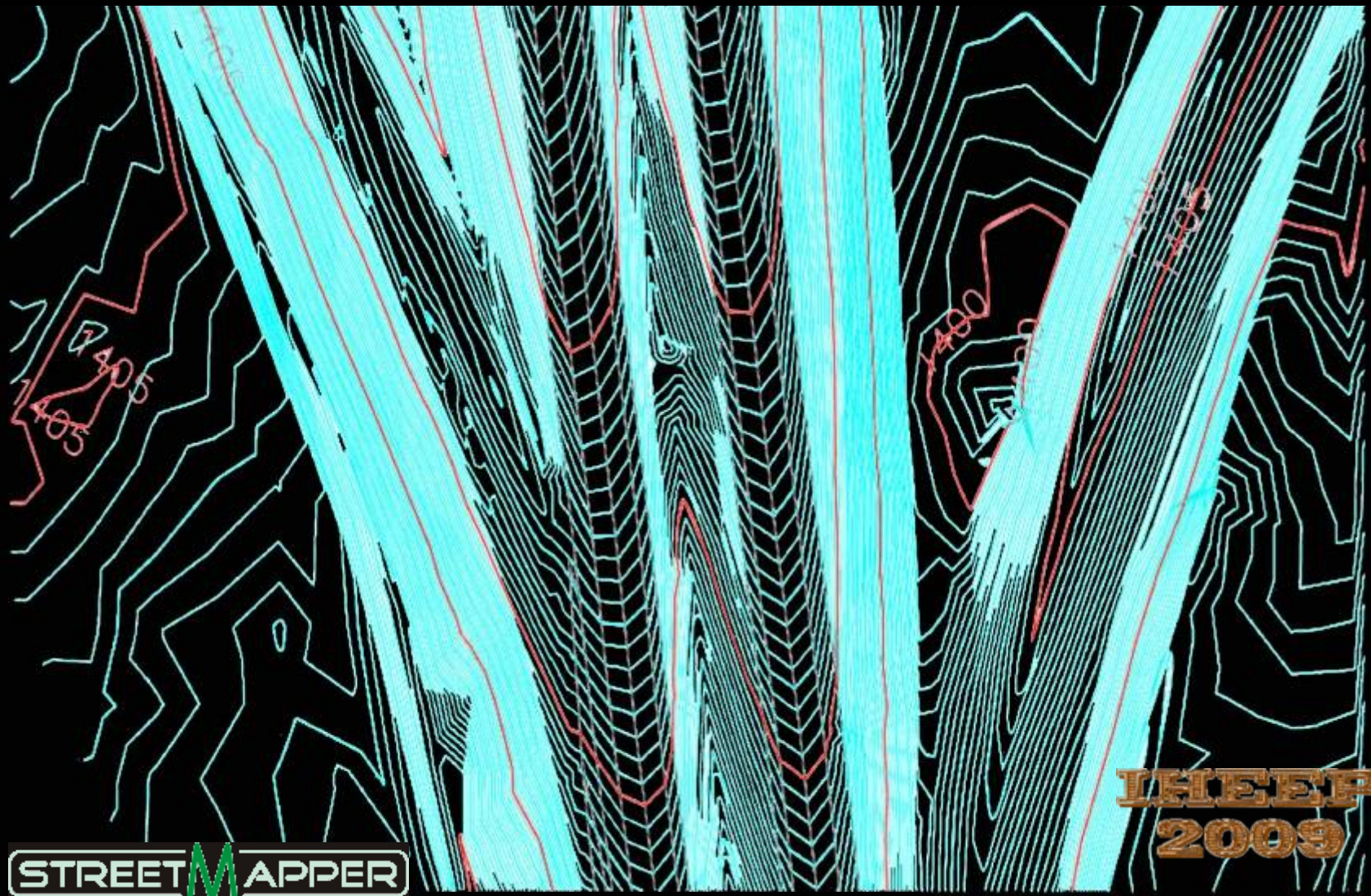
0.25’ Contour Interval



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Video Deliverables

Documentation video

Colored points

Highway surface ortho-photo

Photogram metric processing (TerraPhoto)

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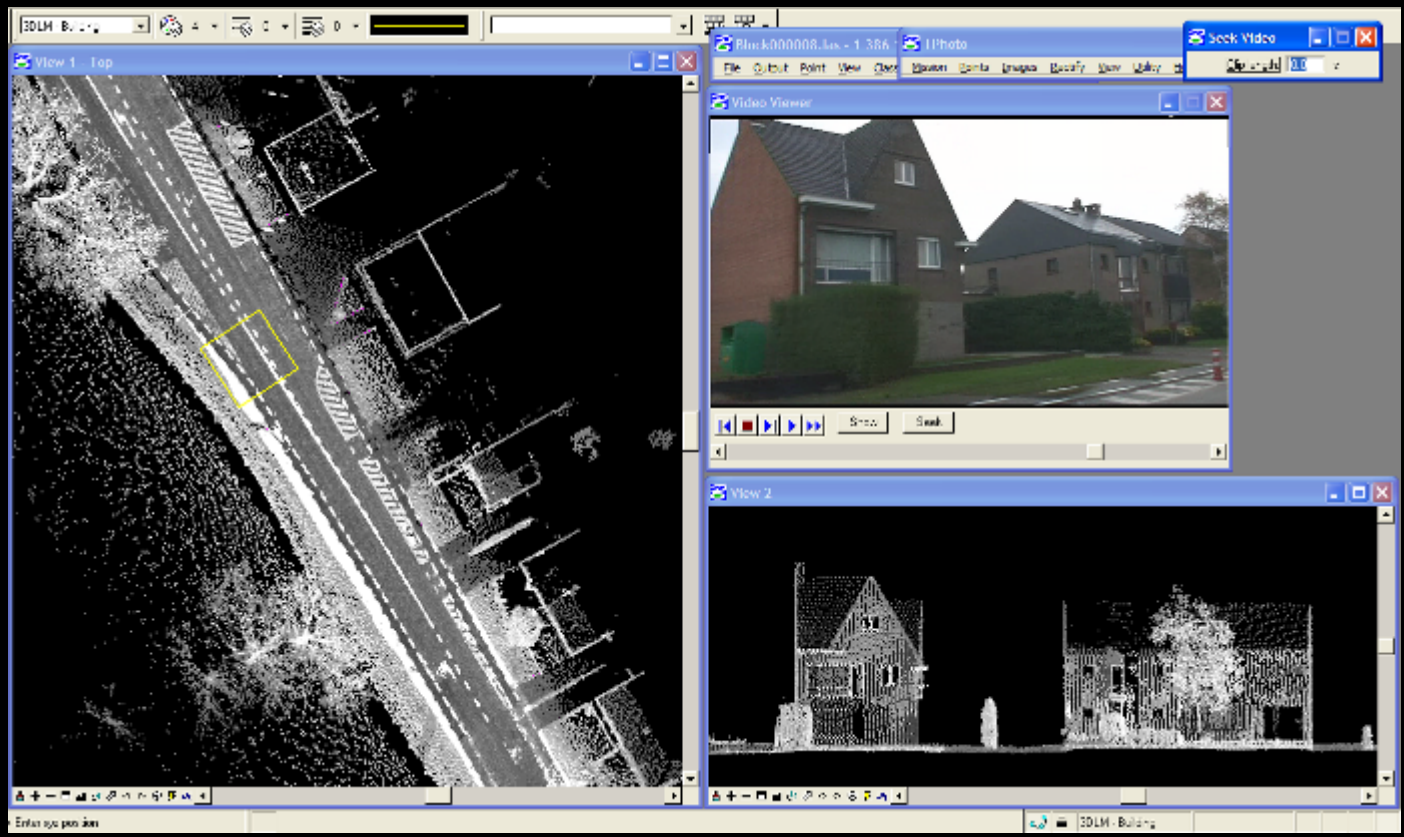
Documentation Video



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Colored Points -1

Colored Points - 2

TerraPhoto 1

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TerraPhoto 2

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Dynamic Multi-directional Scanning

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SAFETY

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At traditional survey costs

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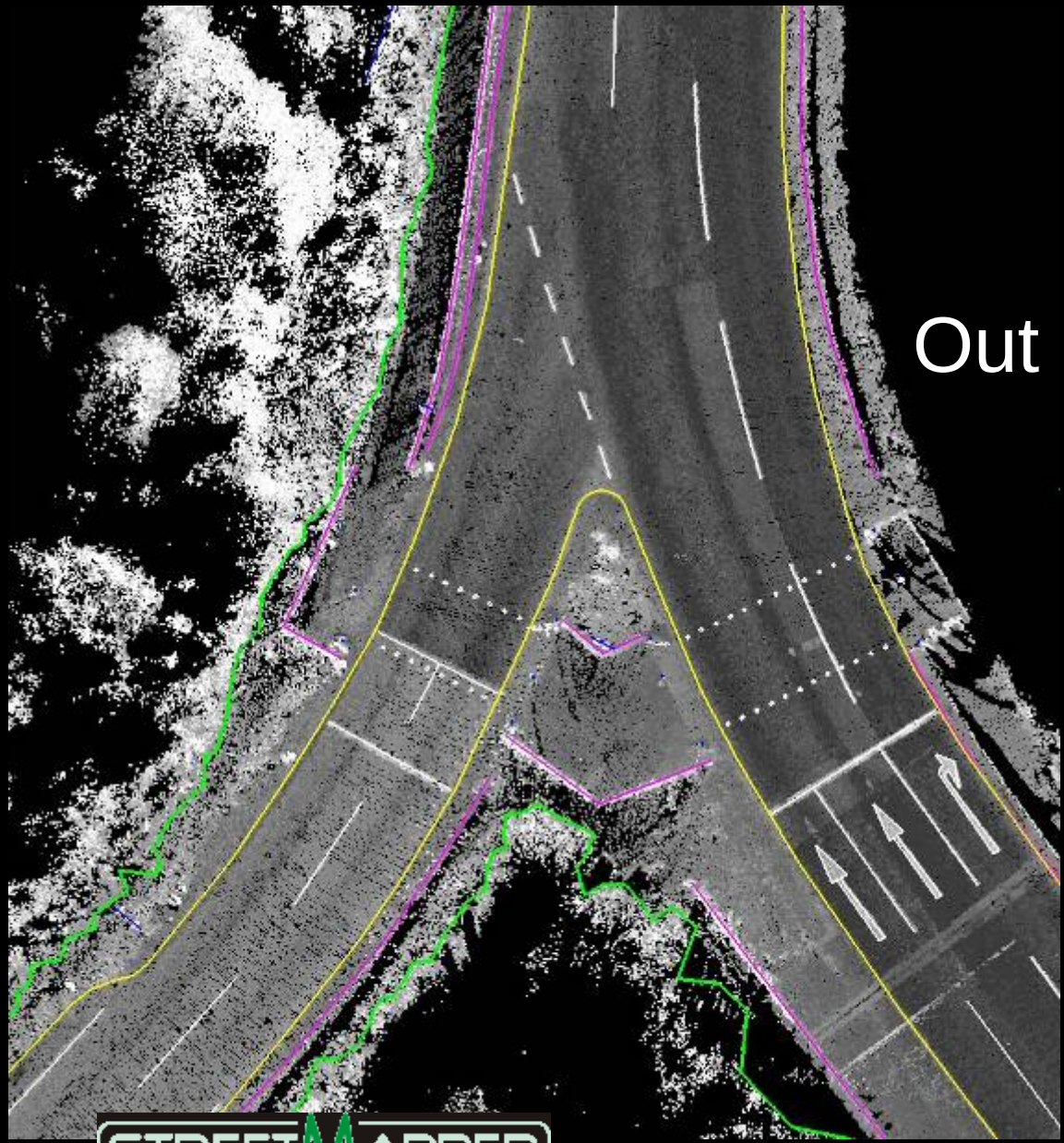

Out of the Gore Area

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Mix with Travelling Public

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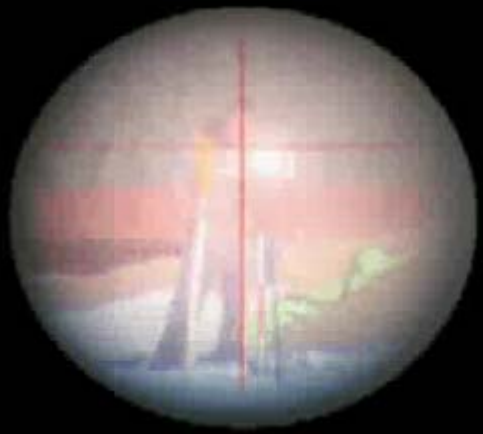

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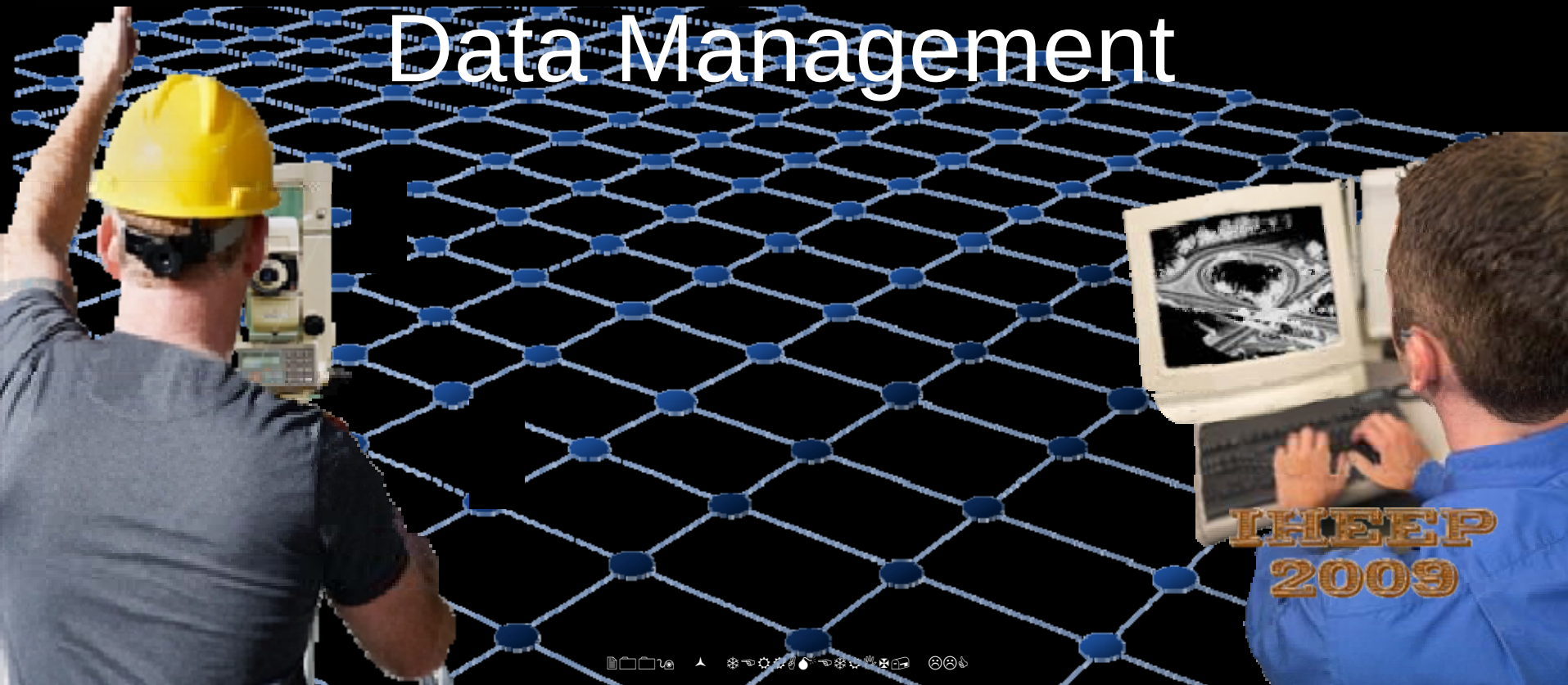

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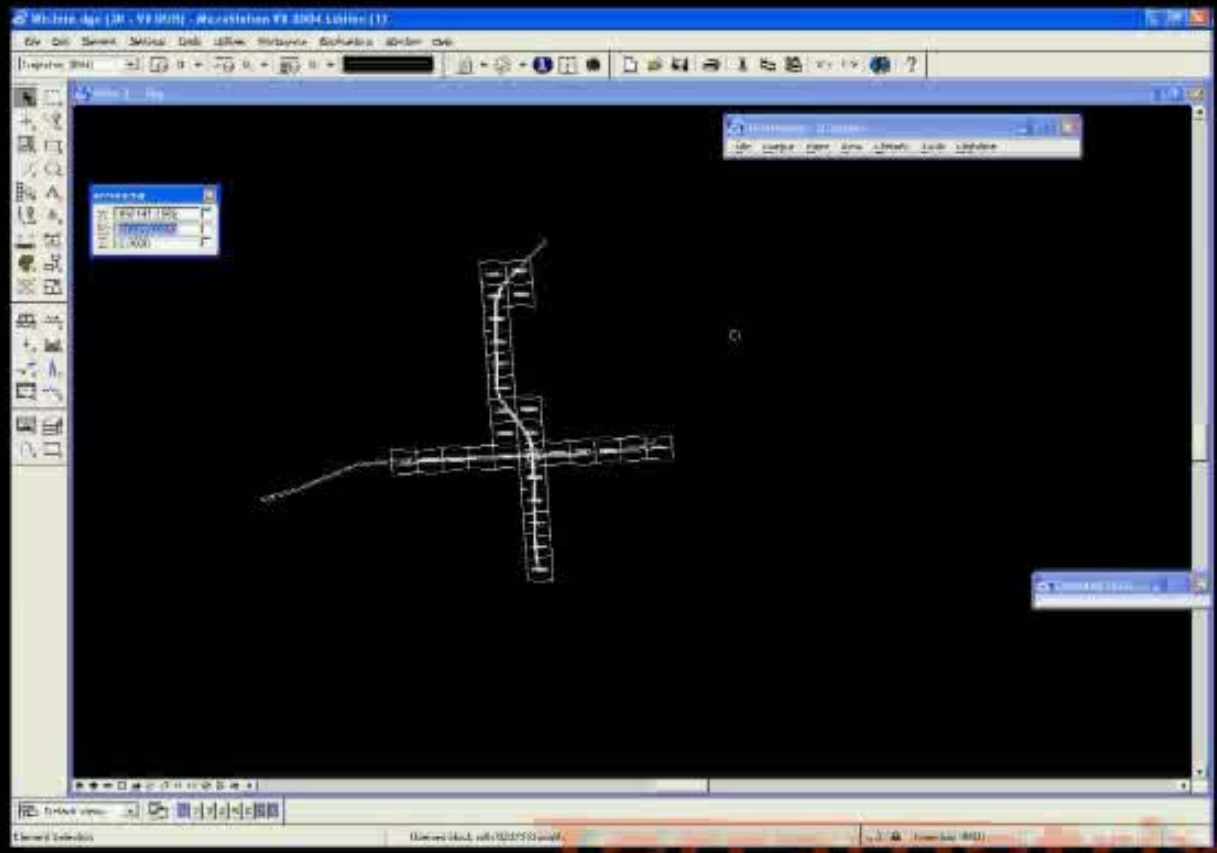

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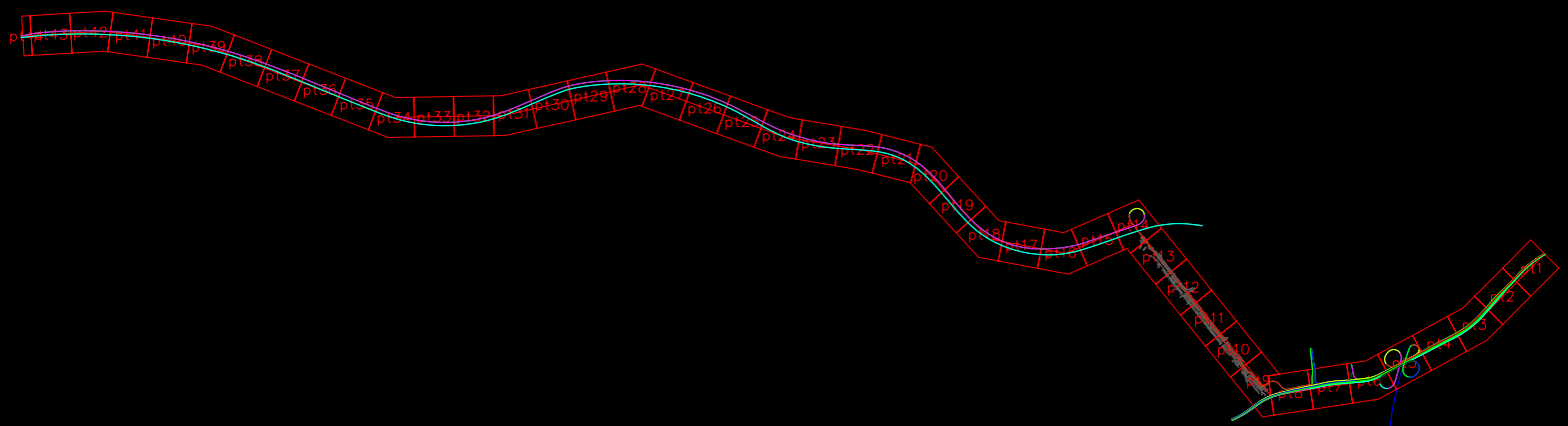

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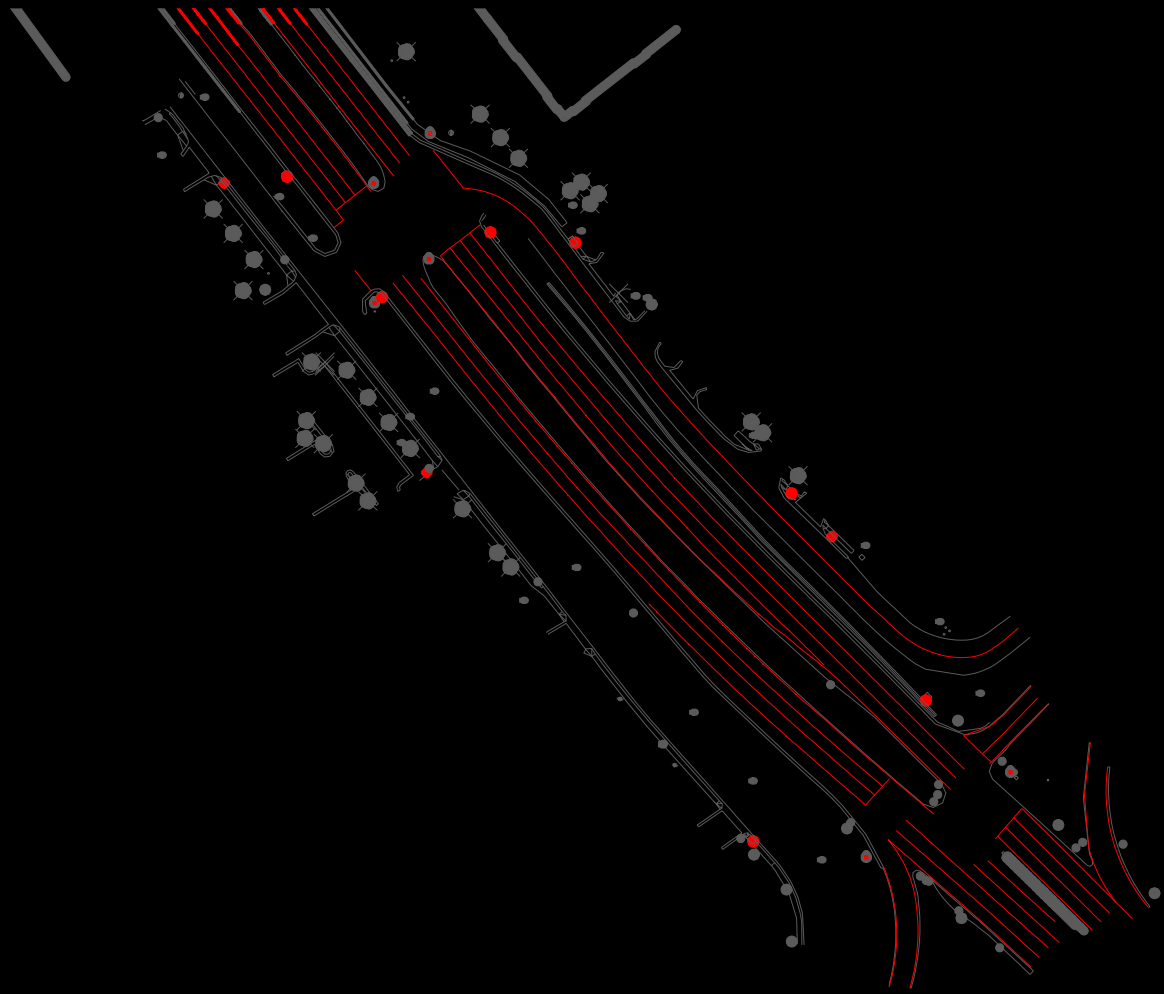

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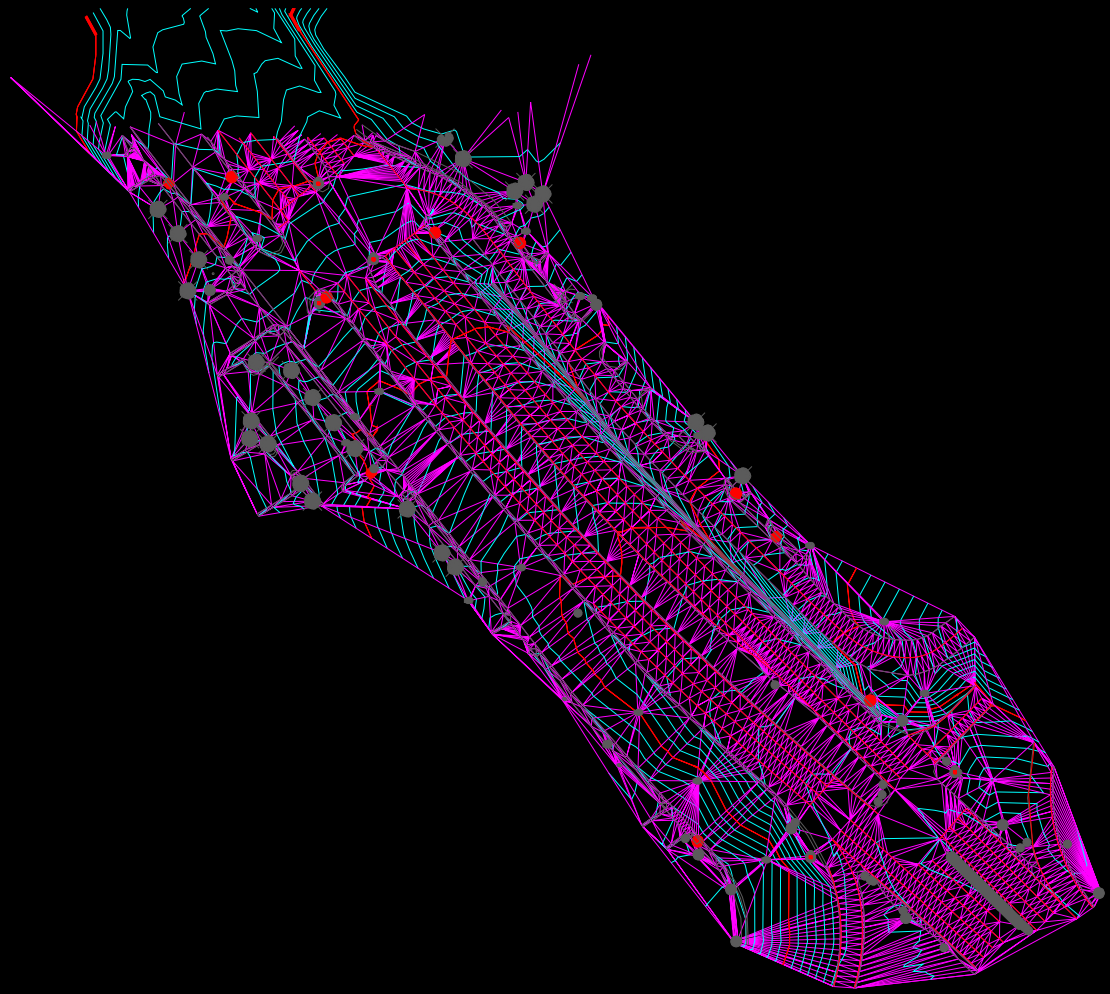

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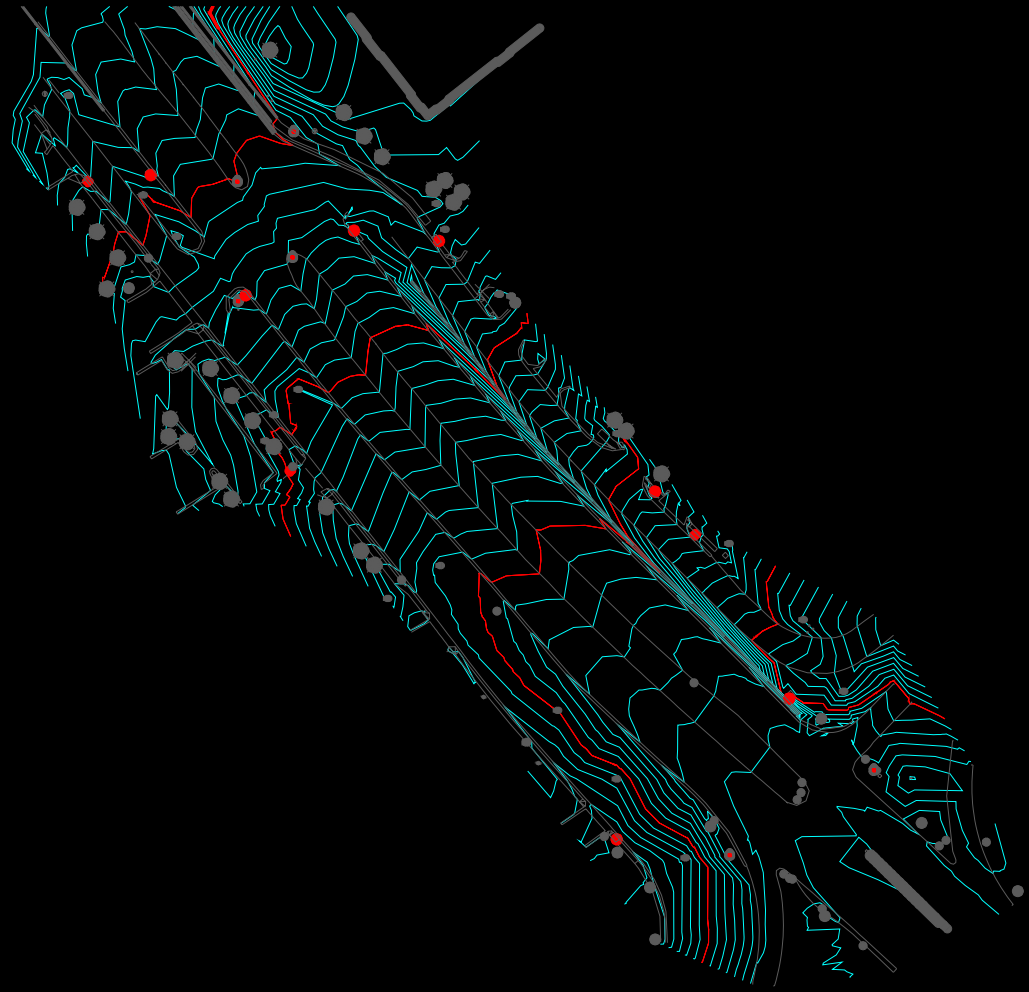

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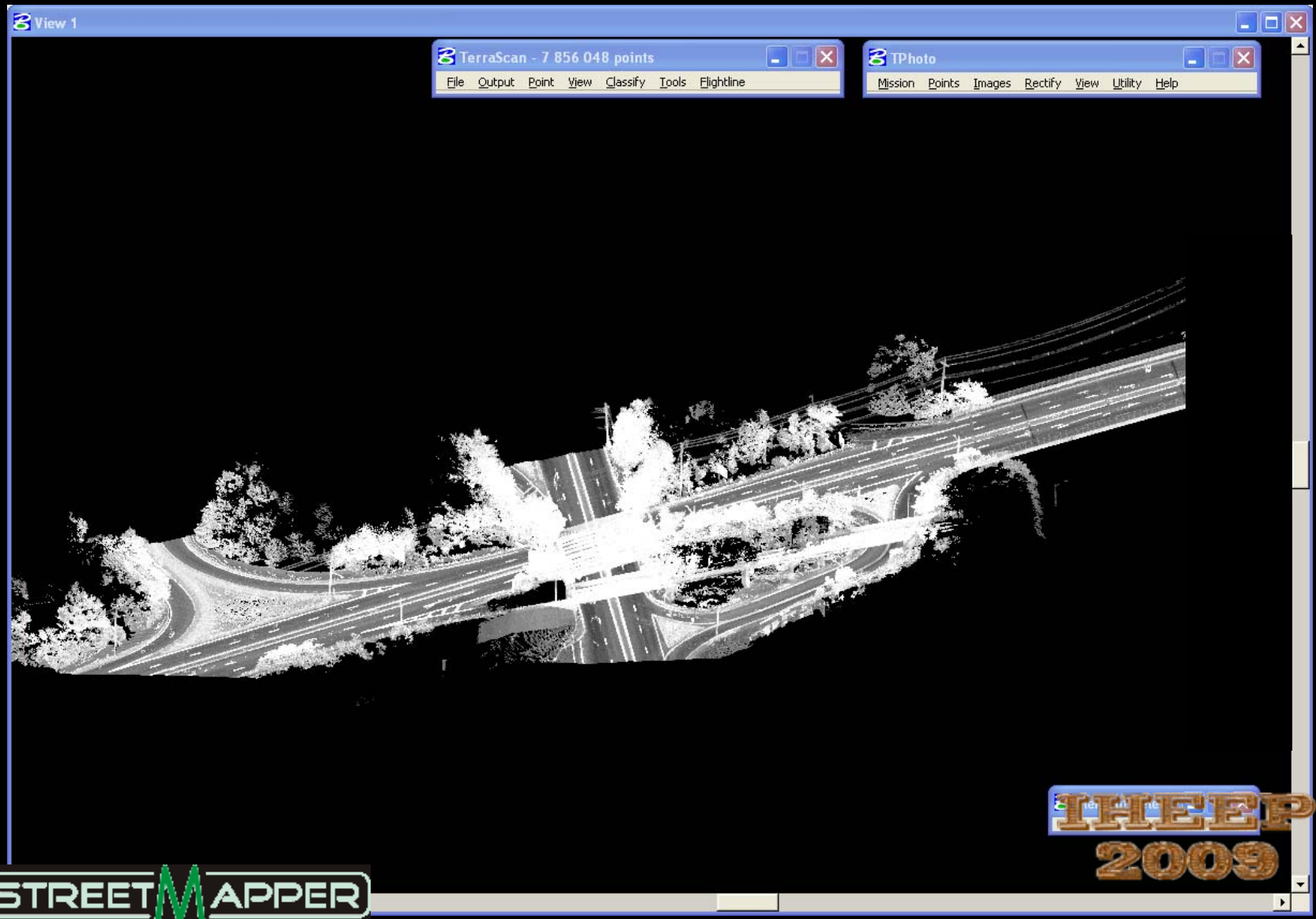
Data Extraction



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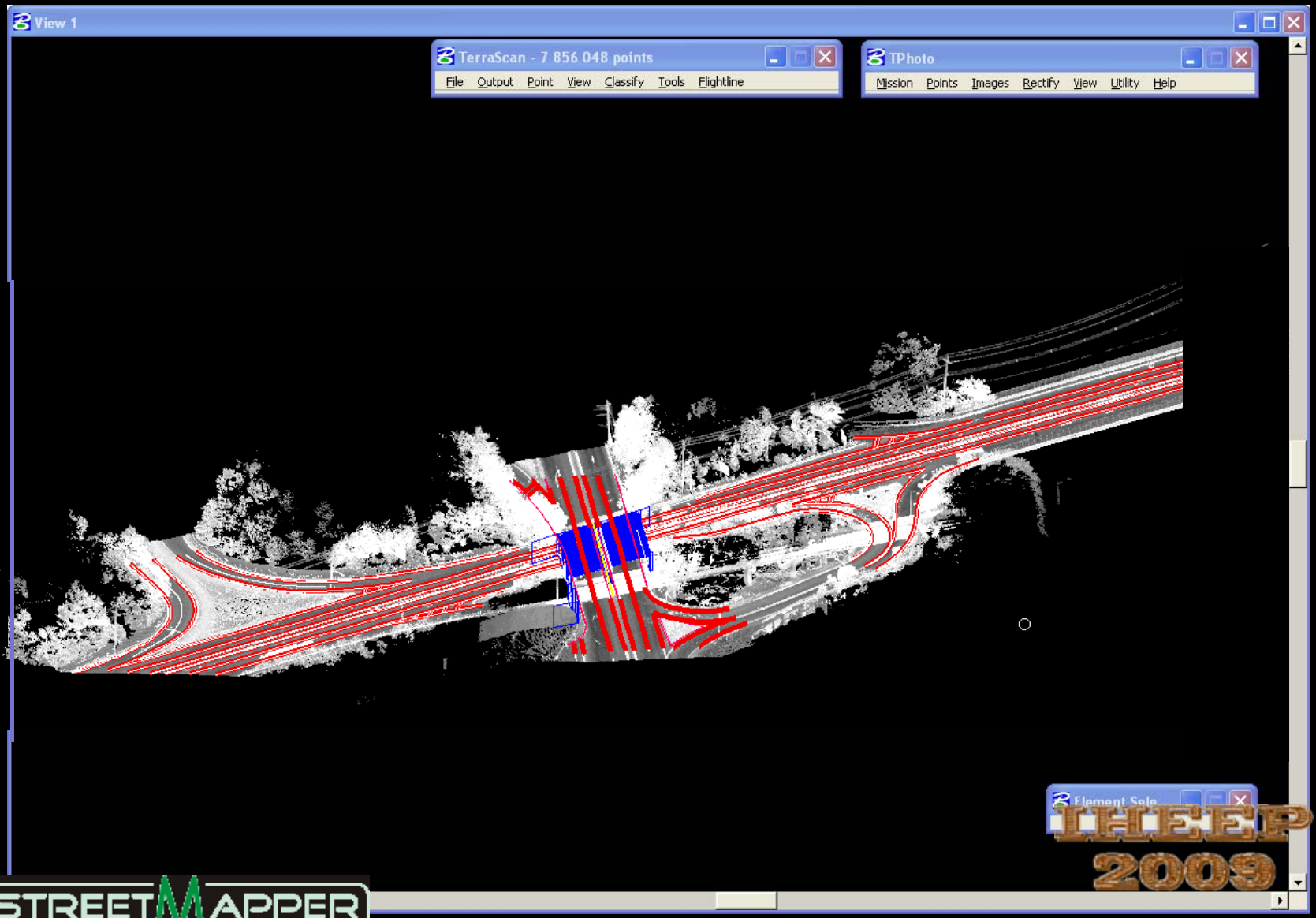

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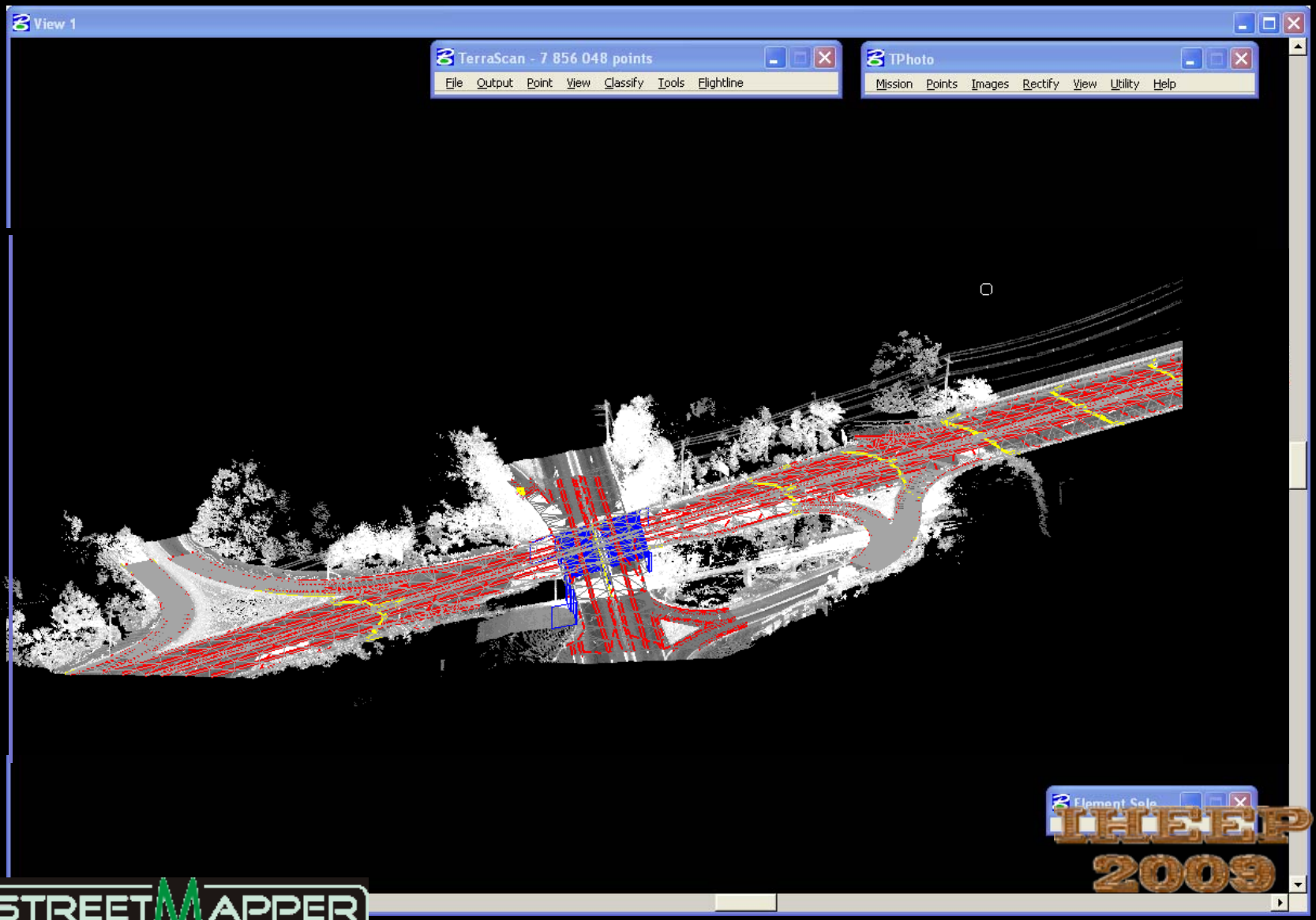

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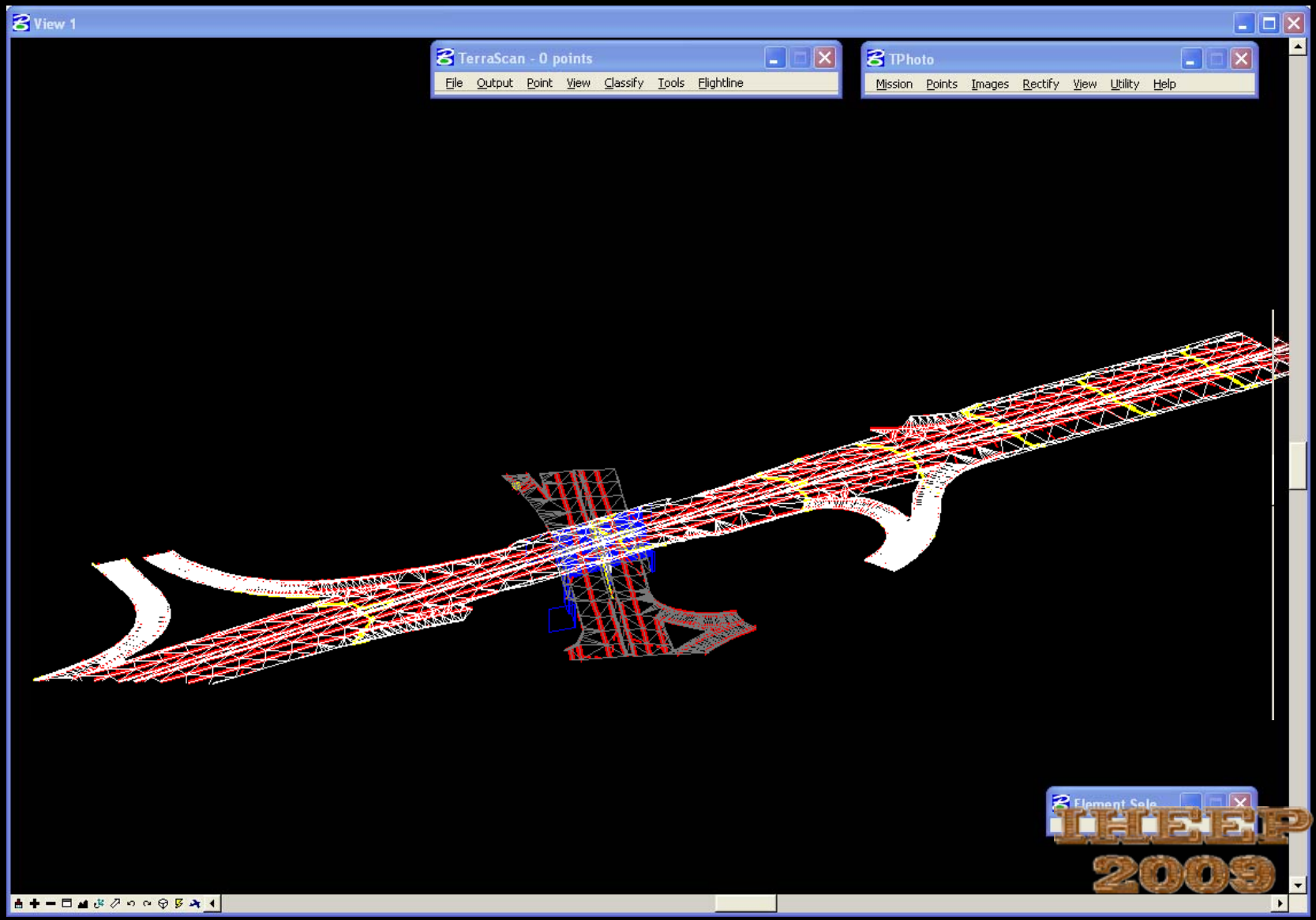

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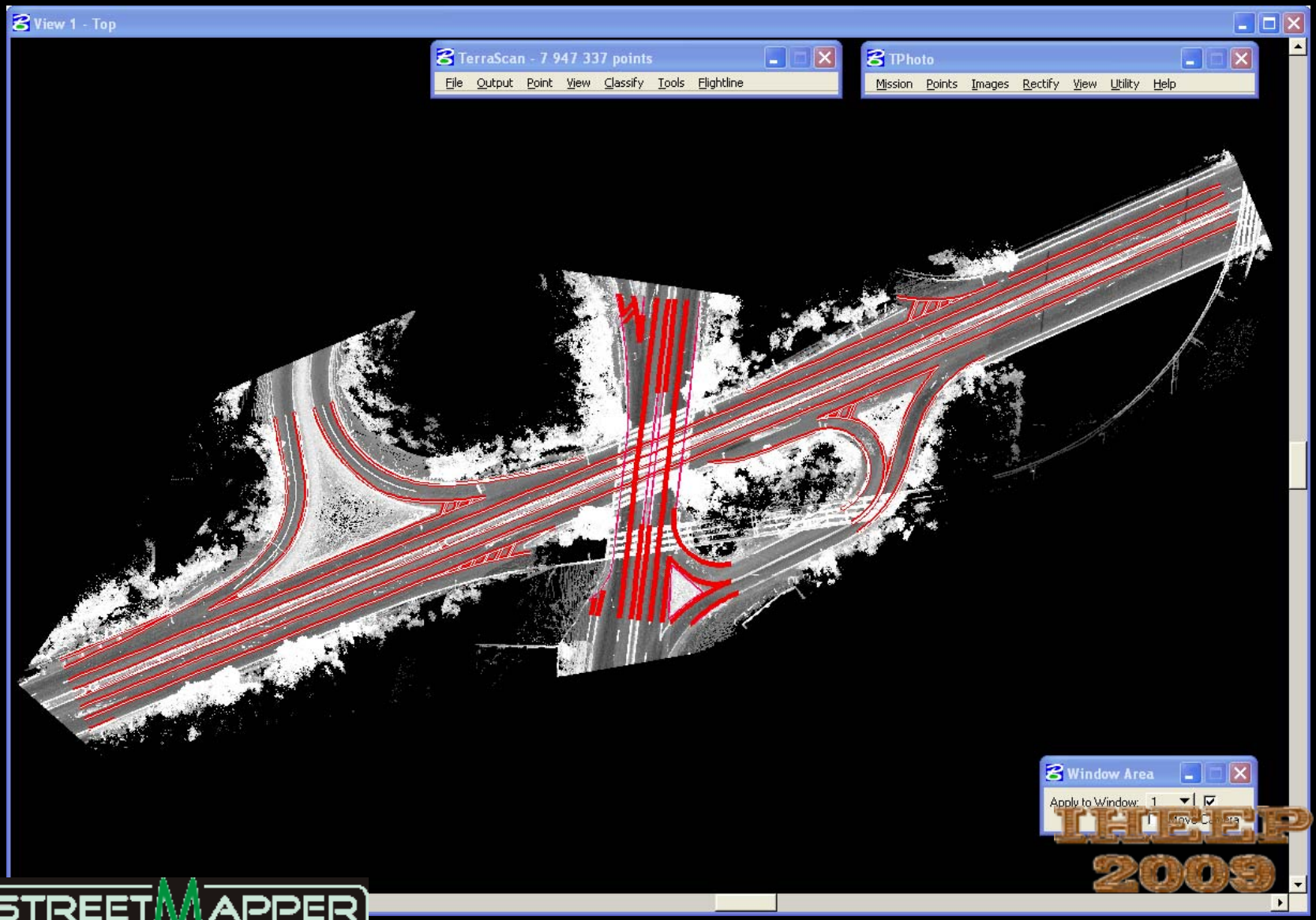

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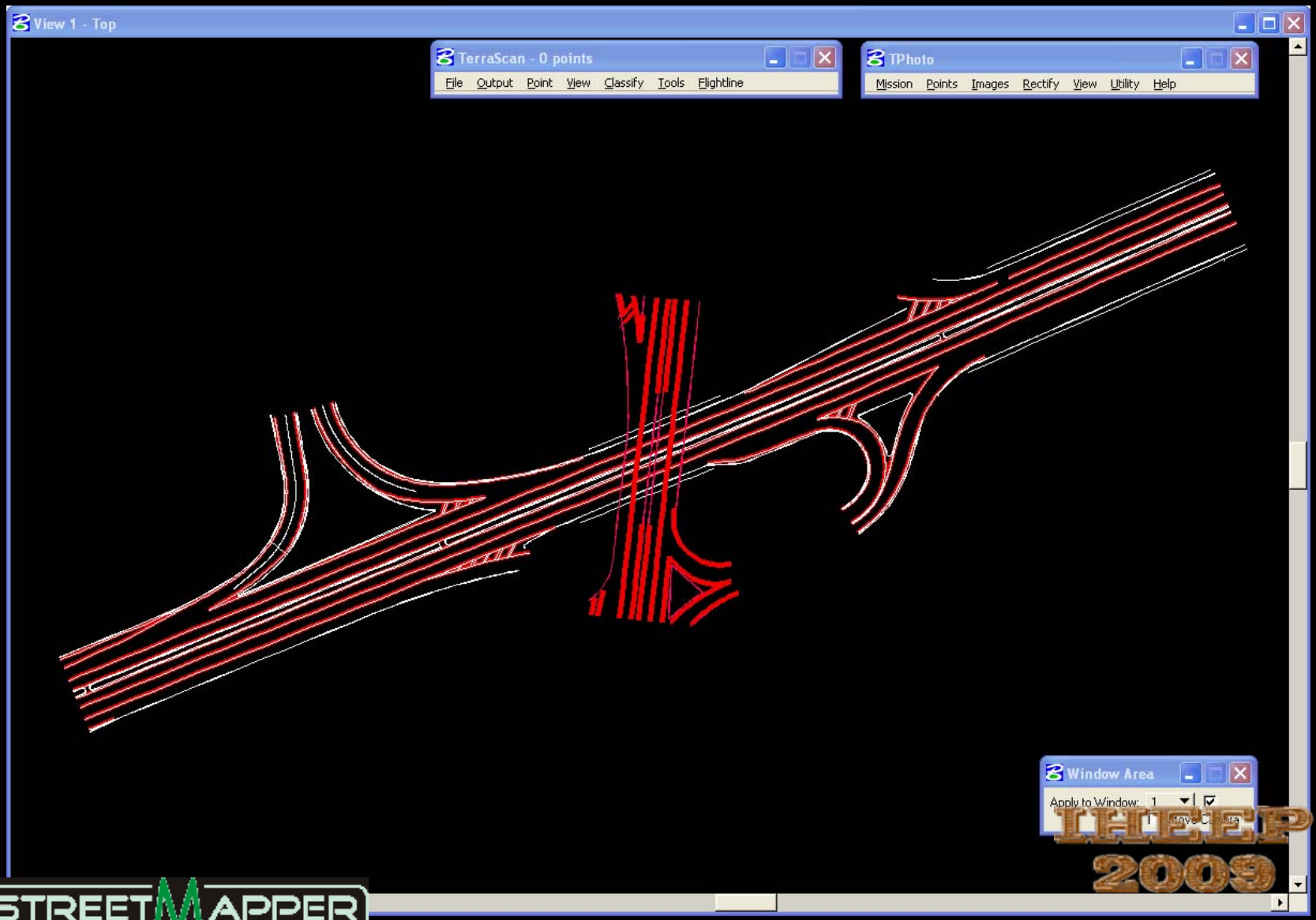

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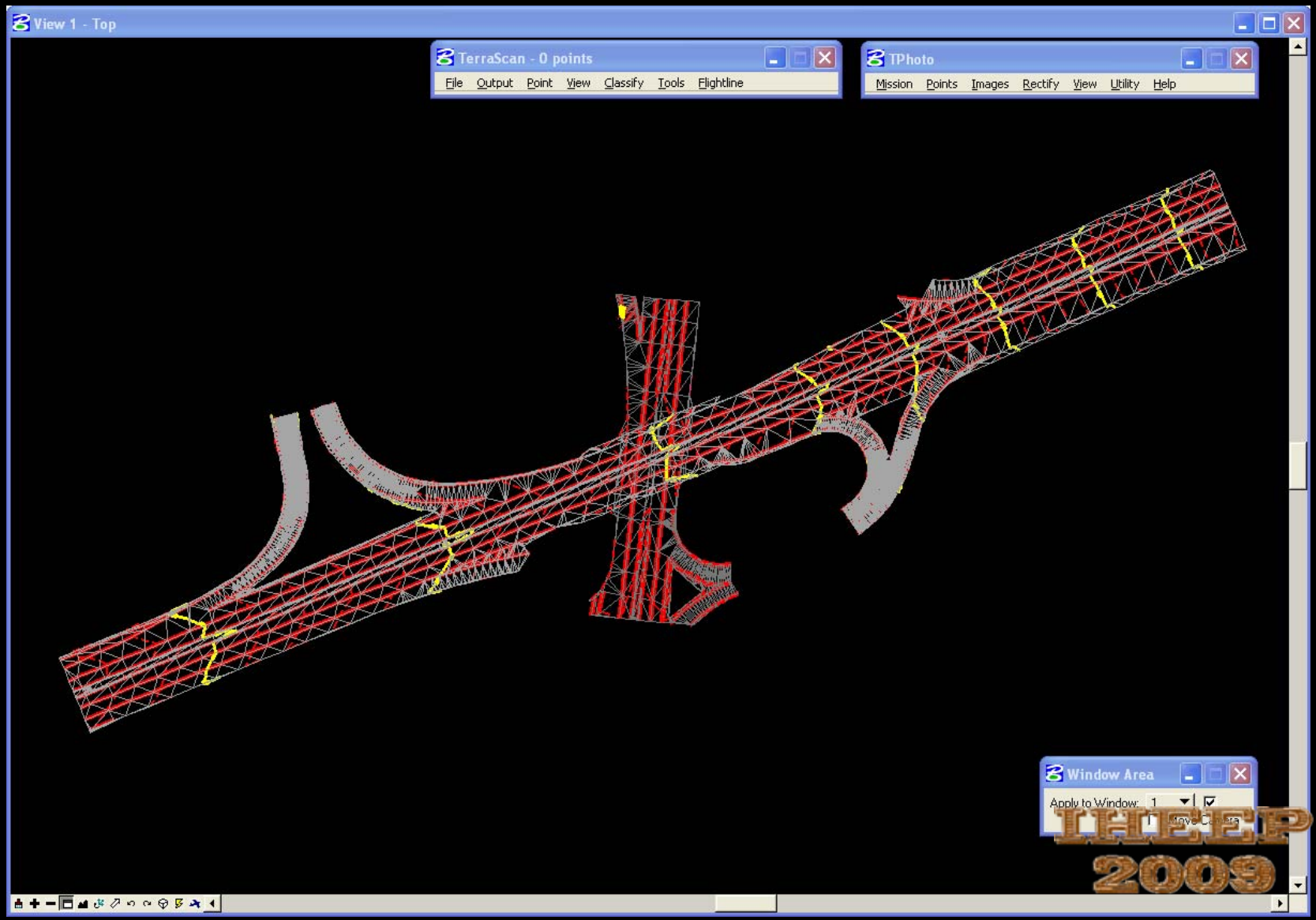

Data Extraction

Bridge Documentation

Shovel Ready

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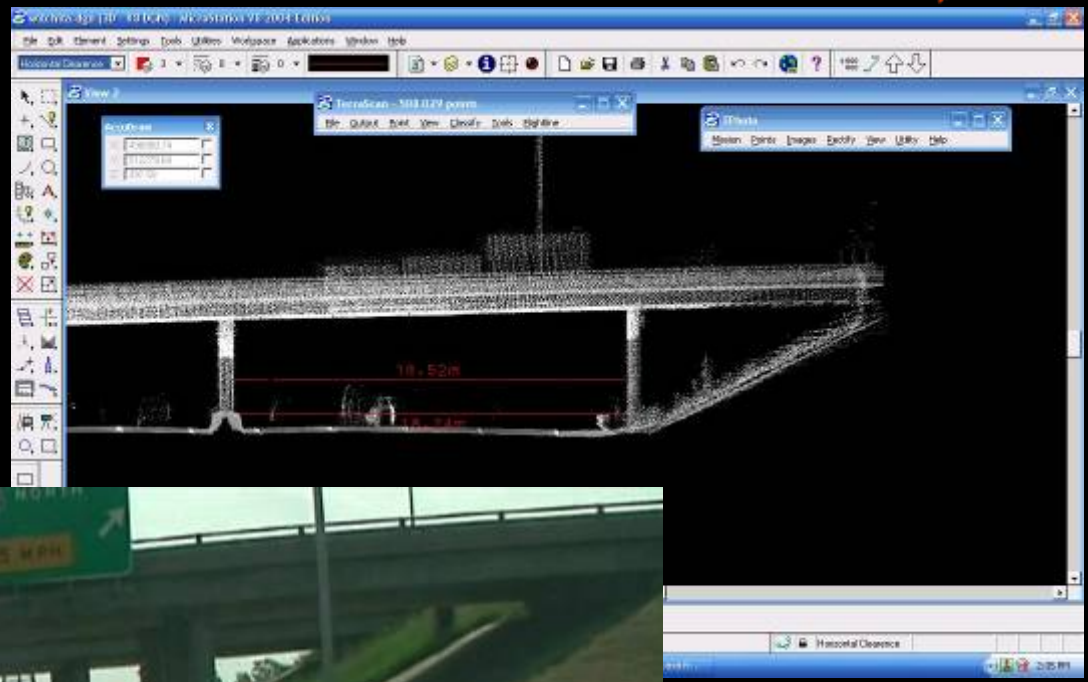

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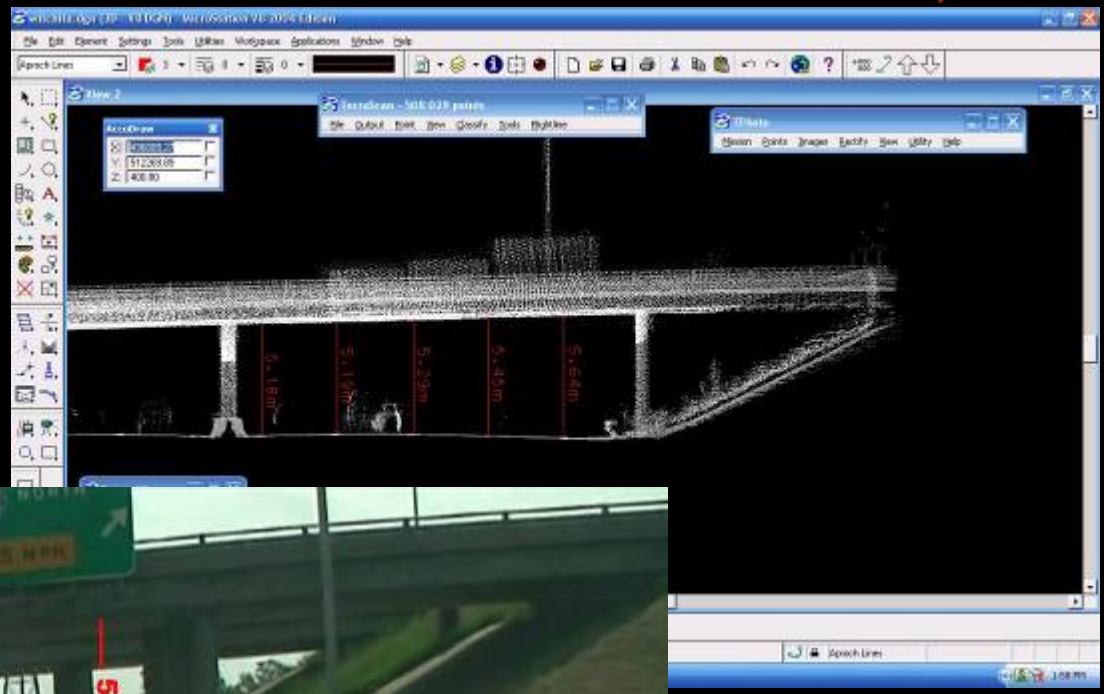

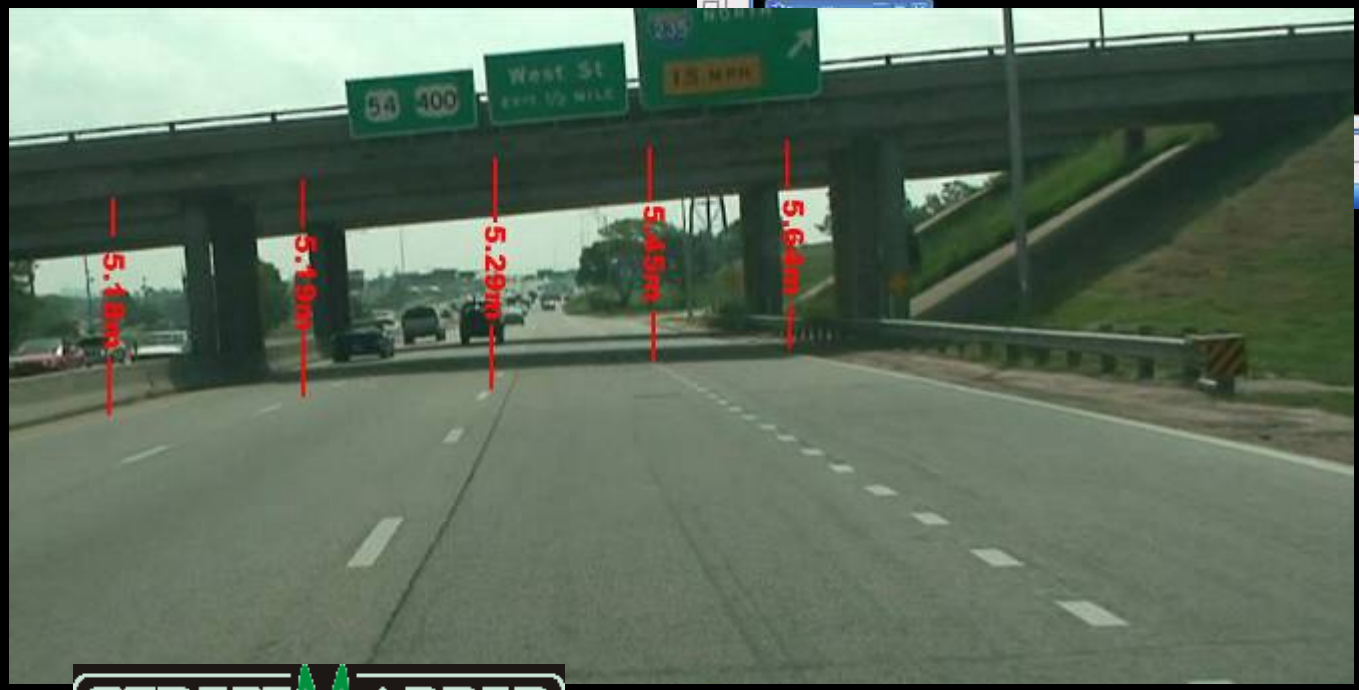

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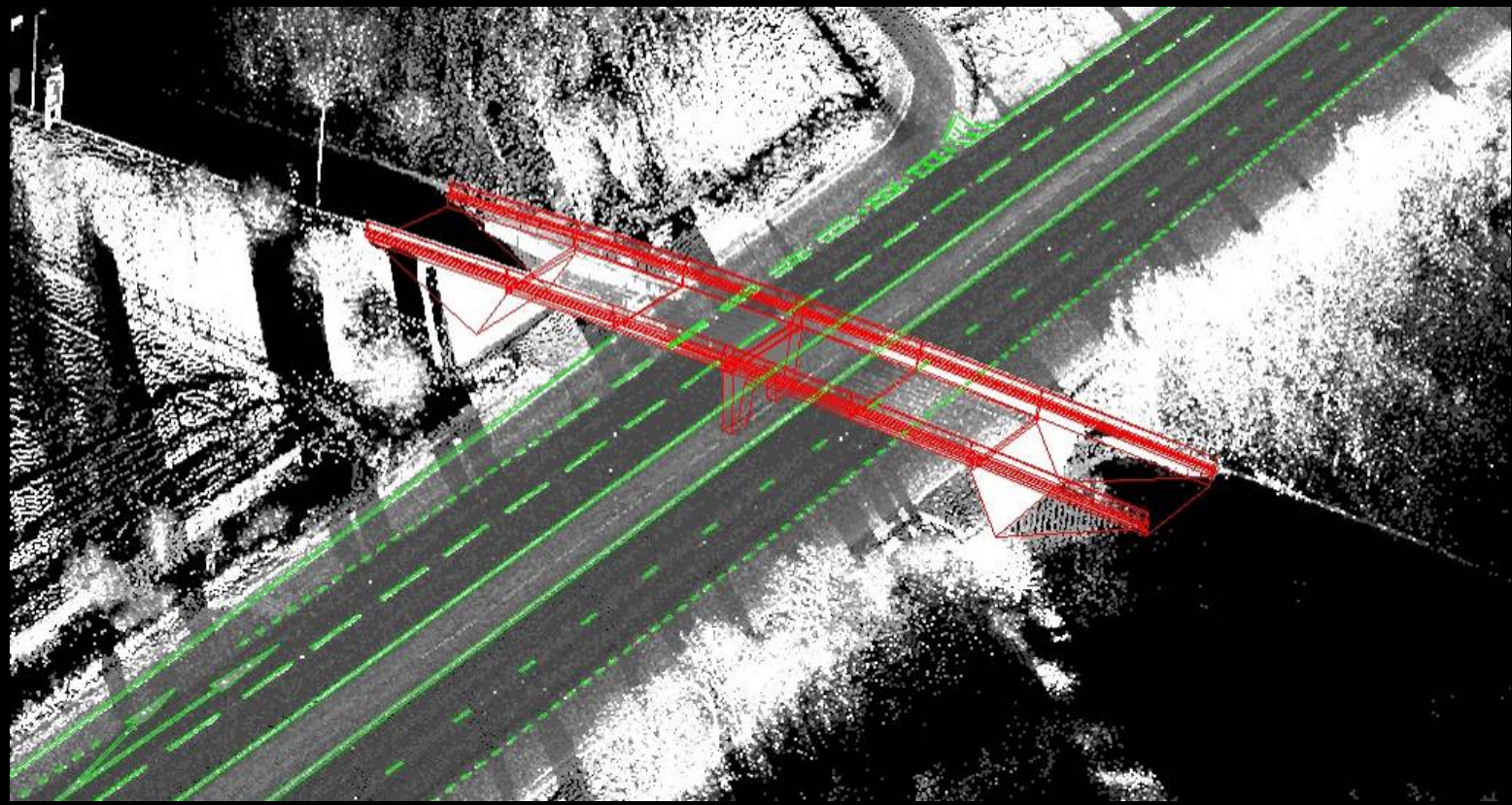

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Asset Inventory

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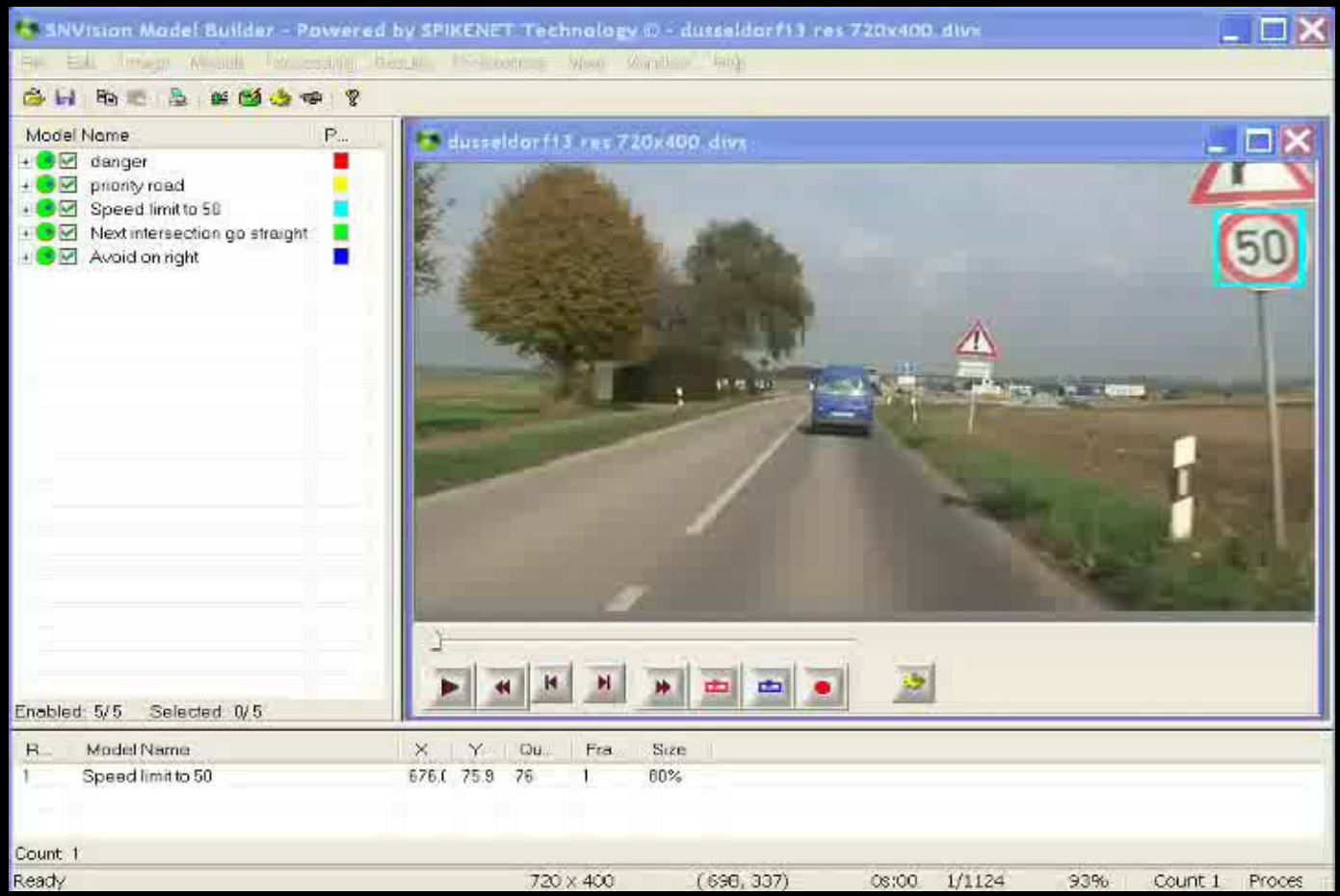
Asset Inventory – Real time Collection



animation

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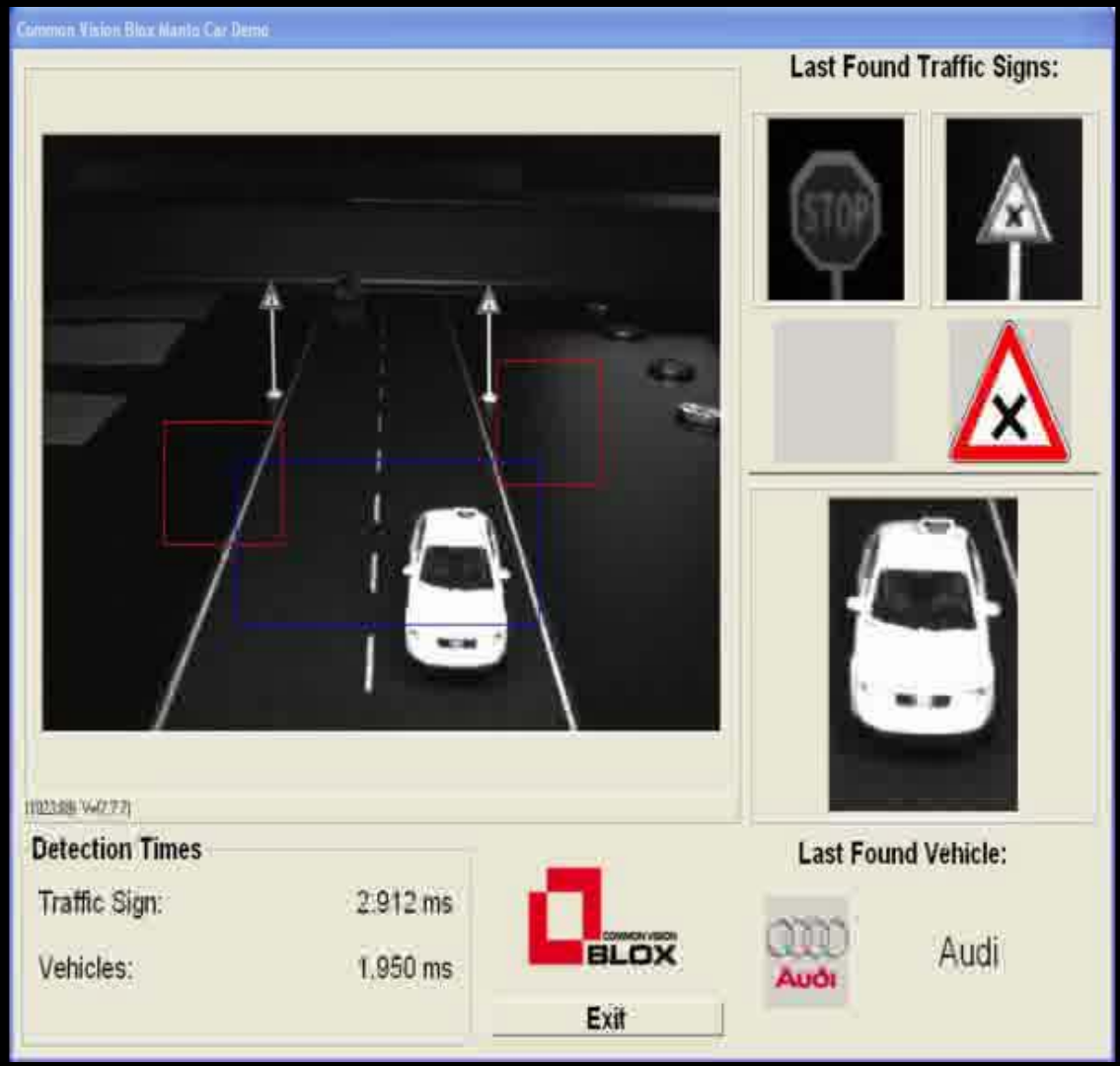

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Cross Sections Through Bridge

animation

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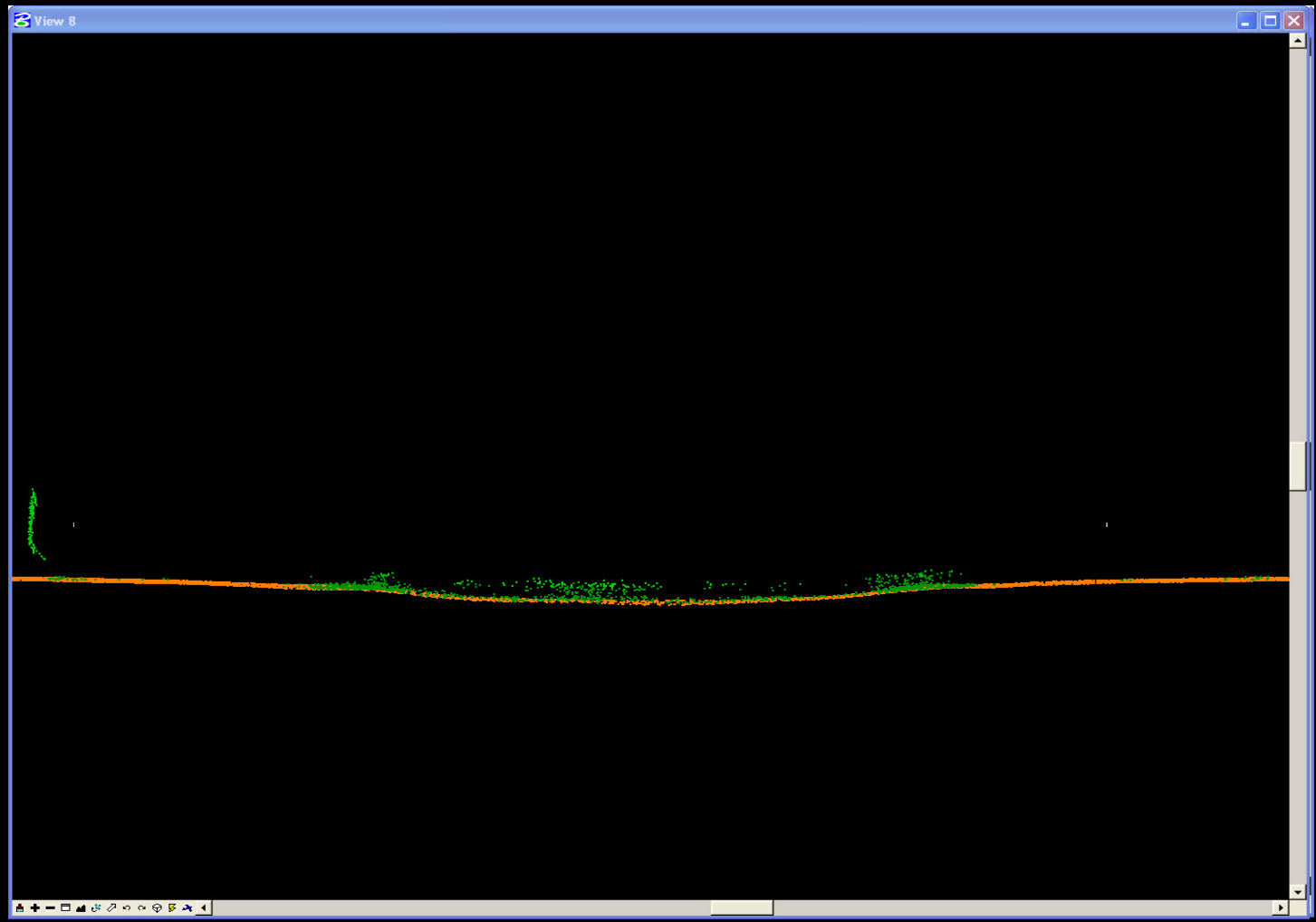

Cross Sections

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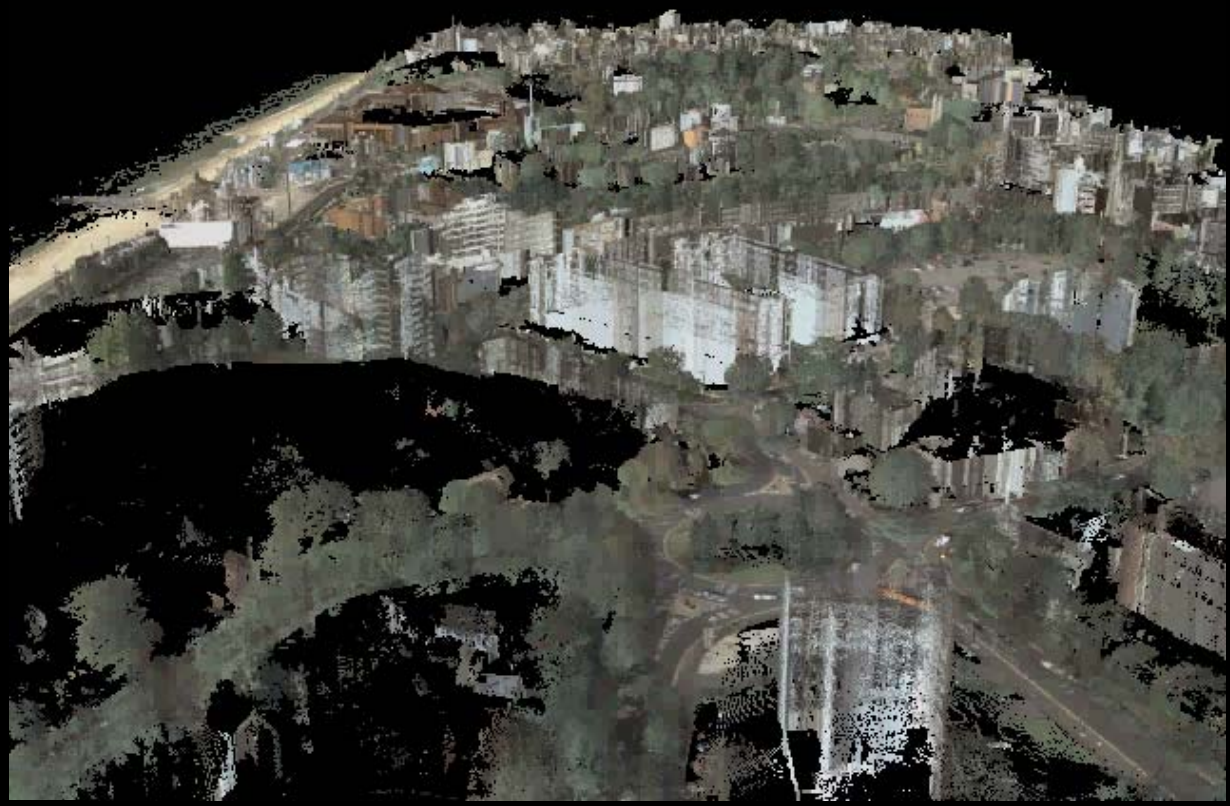
Orbit 360



animation

3D laser mapping

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www.terrametrix3d.com

QUESTIONS?

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