FIG

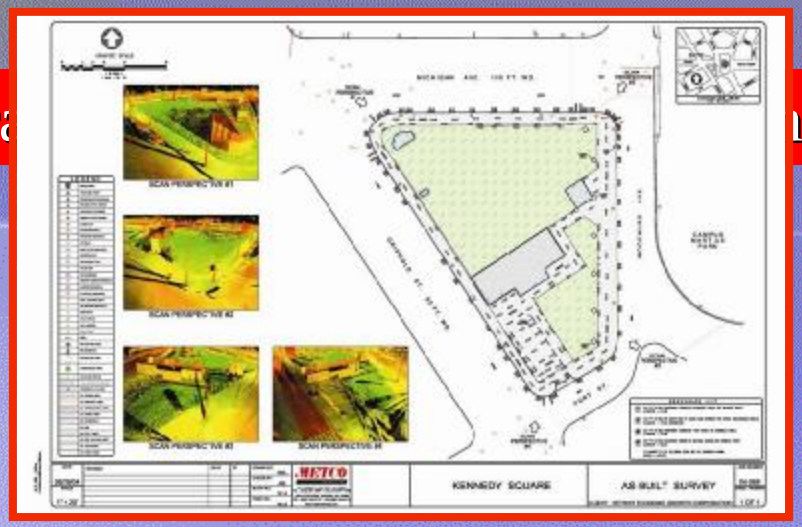
For Everyday Topogra ng

Commissio n 7

Cadastre & Land Management

Madison, Wi.

24-25, June 2005



Extracting Features from 3D Point Clouds in the Preparations of Topographic Survey Maps

By:

Bradley C. Burgess

Midwest Regional Sales Manager

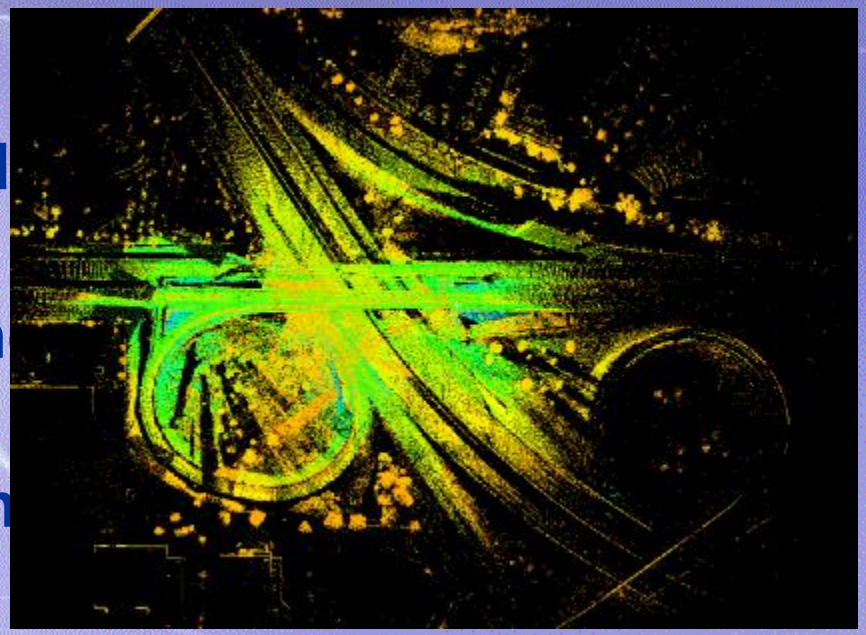
Leica Geosystems HDS, Inc.

high-definition HDS™ surveying

Leica Geosystems

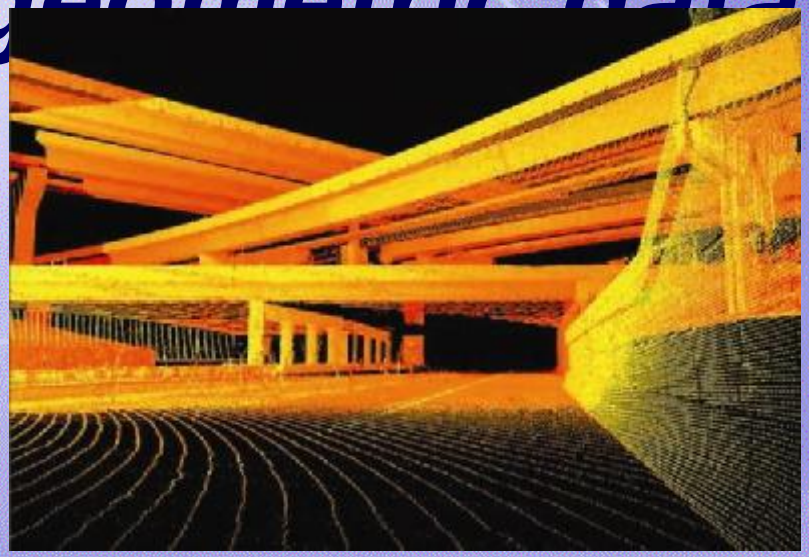
Presentation Outline:

- **High Definition Surveying Explained**
- **Executing Projects that Include Scannin**
- **Basic Methods/ Options for Extractin Geometry**
- **Final Delivery Example**



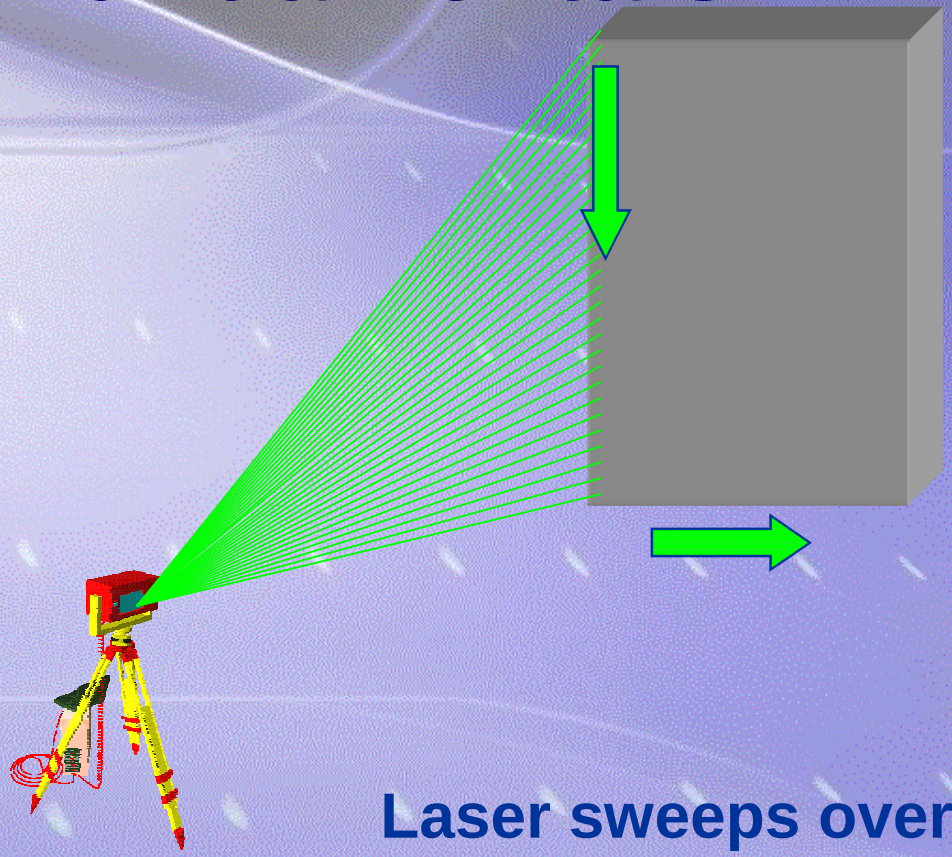
I-94/ Hwy. JJ, Waukesha, Wi.

Primary differentiating feature: high density "as-built" or "as-is" geometric data



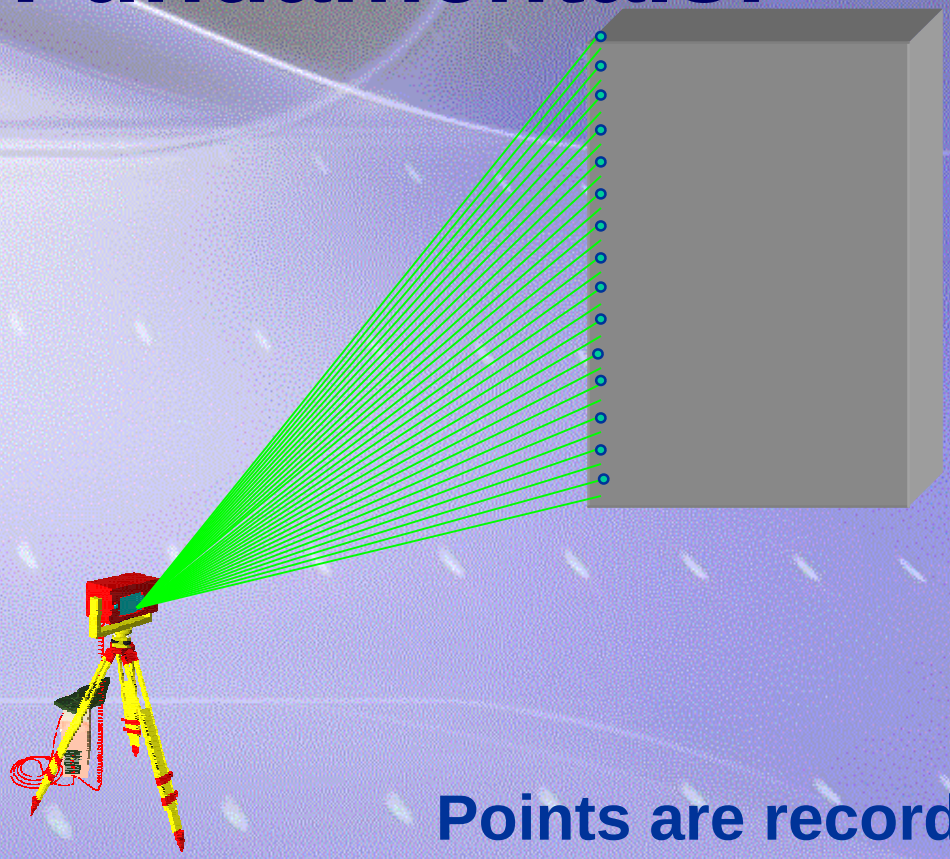
Utilizing 3D laser technology, HDS captures, visualizes and models complex structures and sites with an unprecedented combination of completeness, speed, accuracy, and safety.

HDS Fundamentals:



Laser sweeps over surface

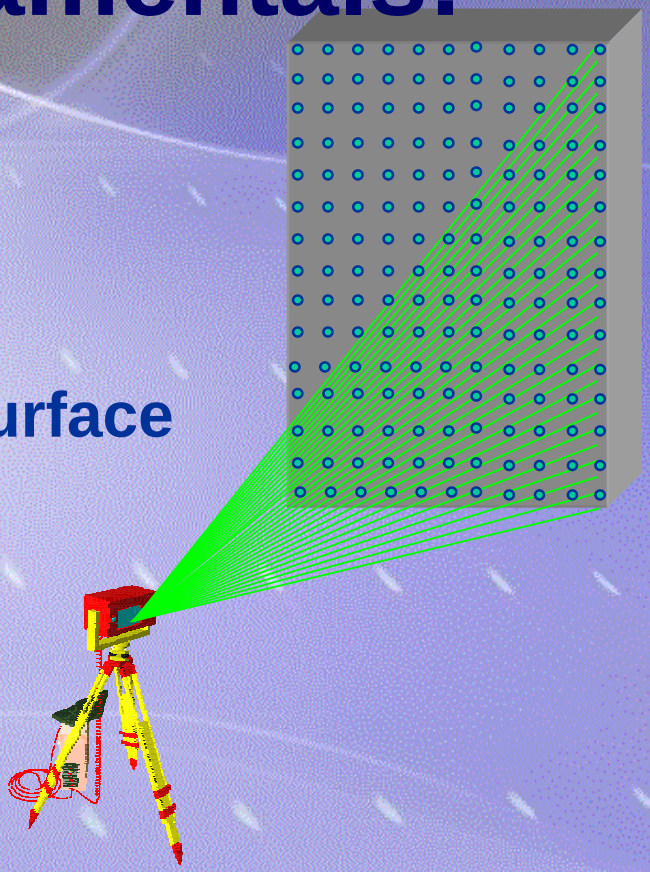
HDS Fundamentals:



Points are recorded . . .

HDS Fundamentals:

. . . Over the entire surface



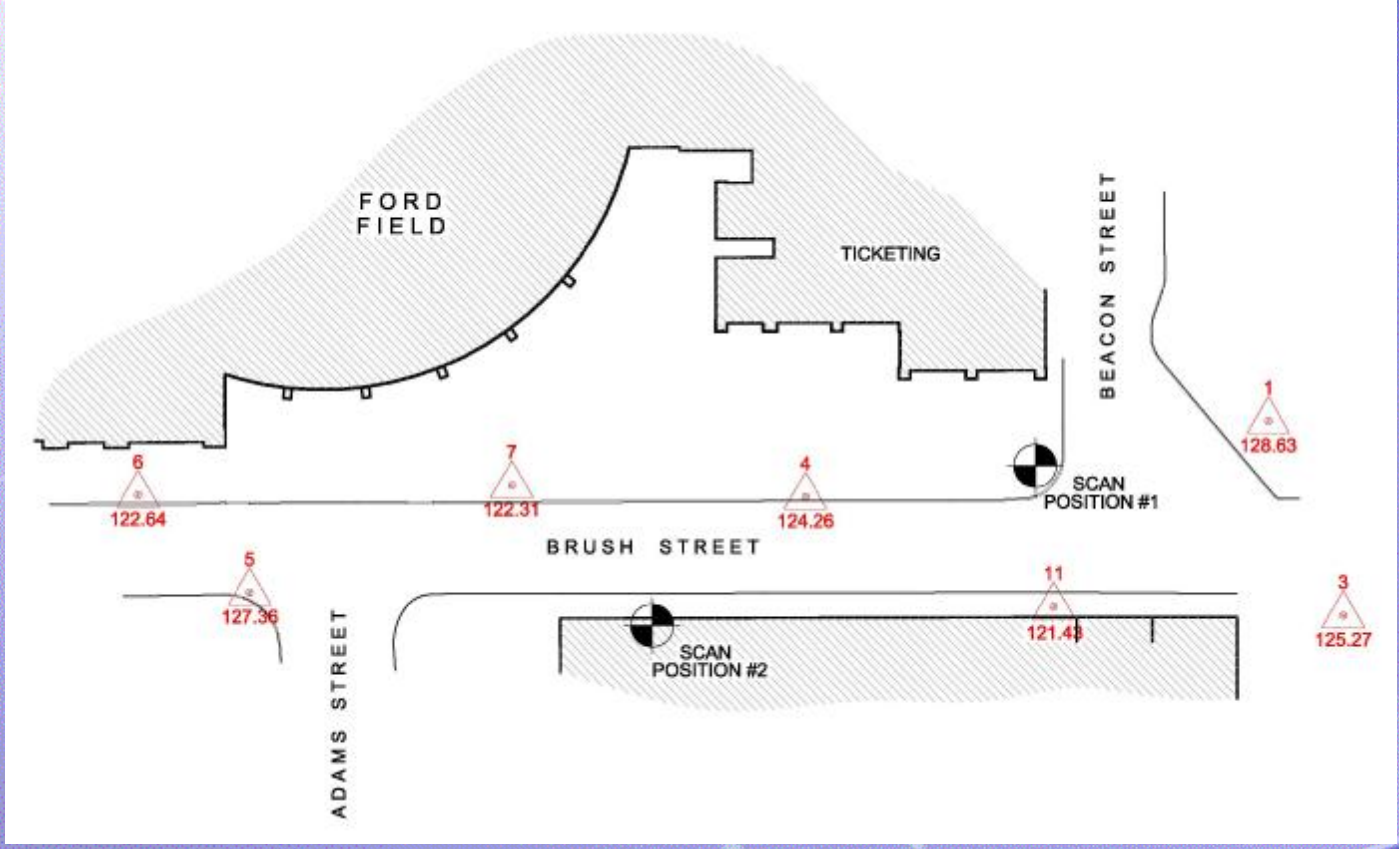

The data is so dense, you get the added value of an image

Executing Projects that Include Scanning

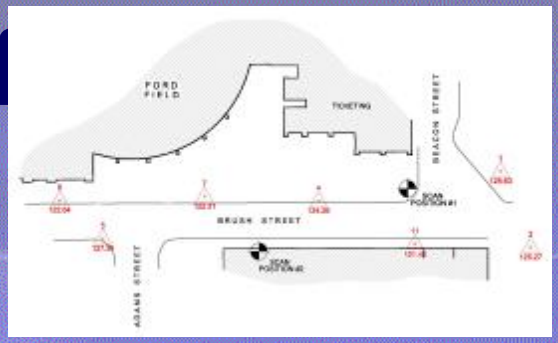
- Overall project flow
- Field workflow
- Office workflow

Overall Project Workflow

Planning, Site Visit?

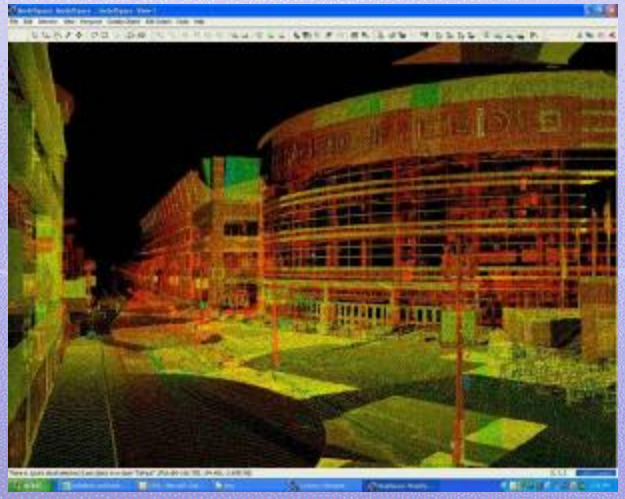


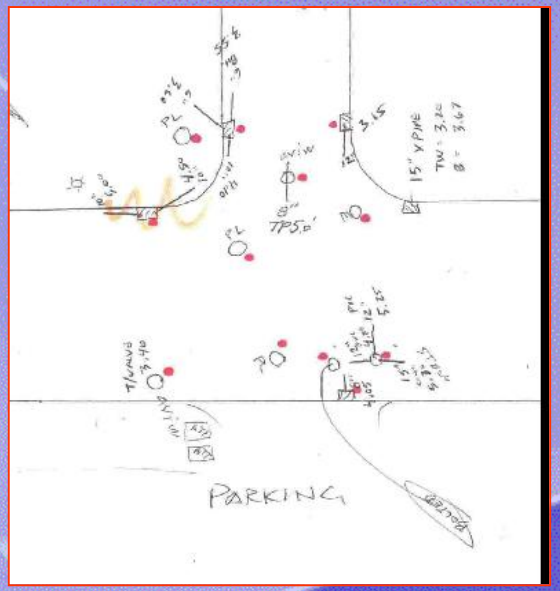
Overall Project Workf



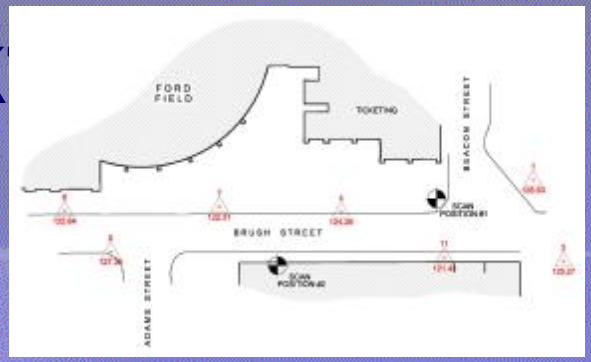
Planning, Site Visit?

Field scanning ····· **Site Control** ···· **Traditional surveying**





Overall Project Work



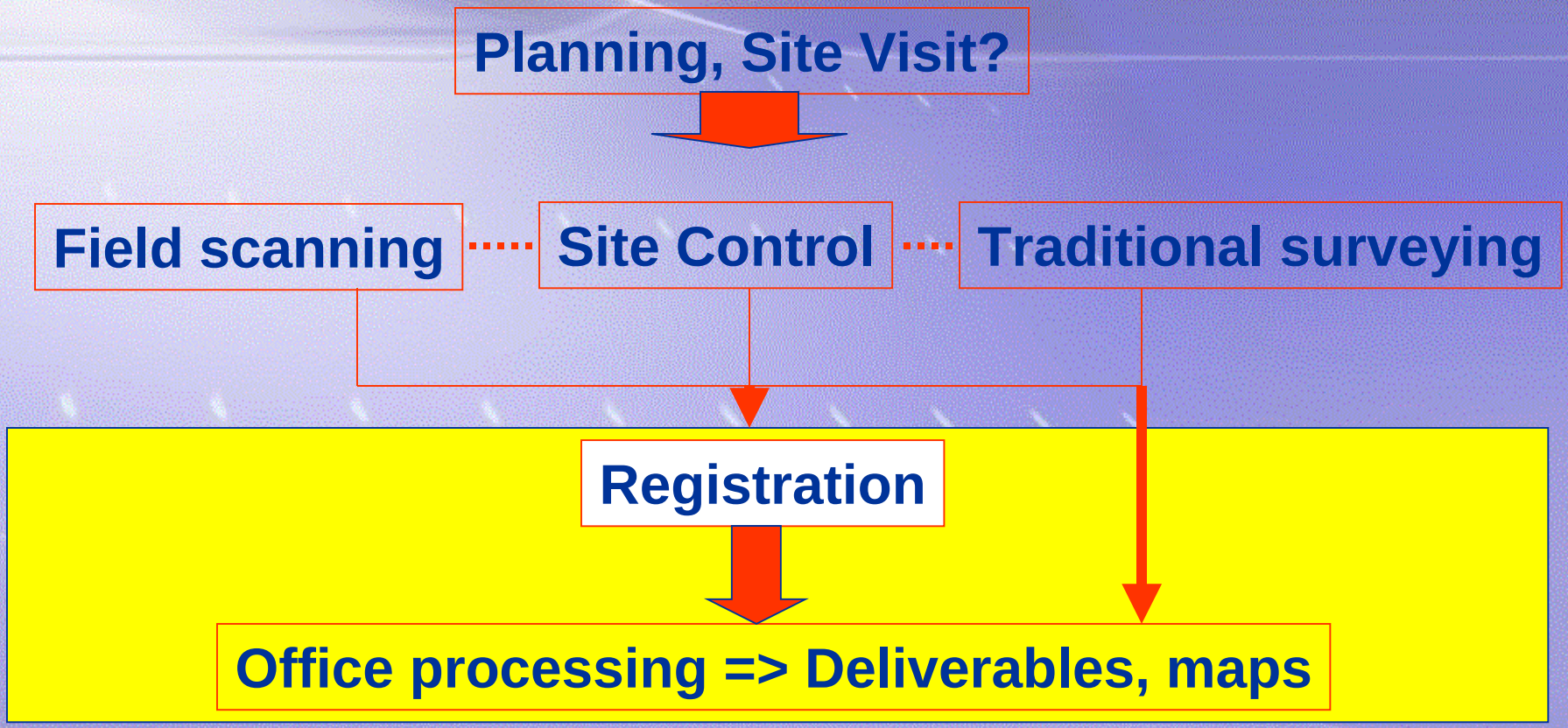
Planning, Site Visit?

Field scanning ····· Site Control ···· Traditional surveying

Registration

Office processing => Deliverables, maps

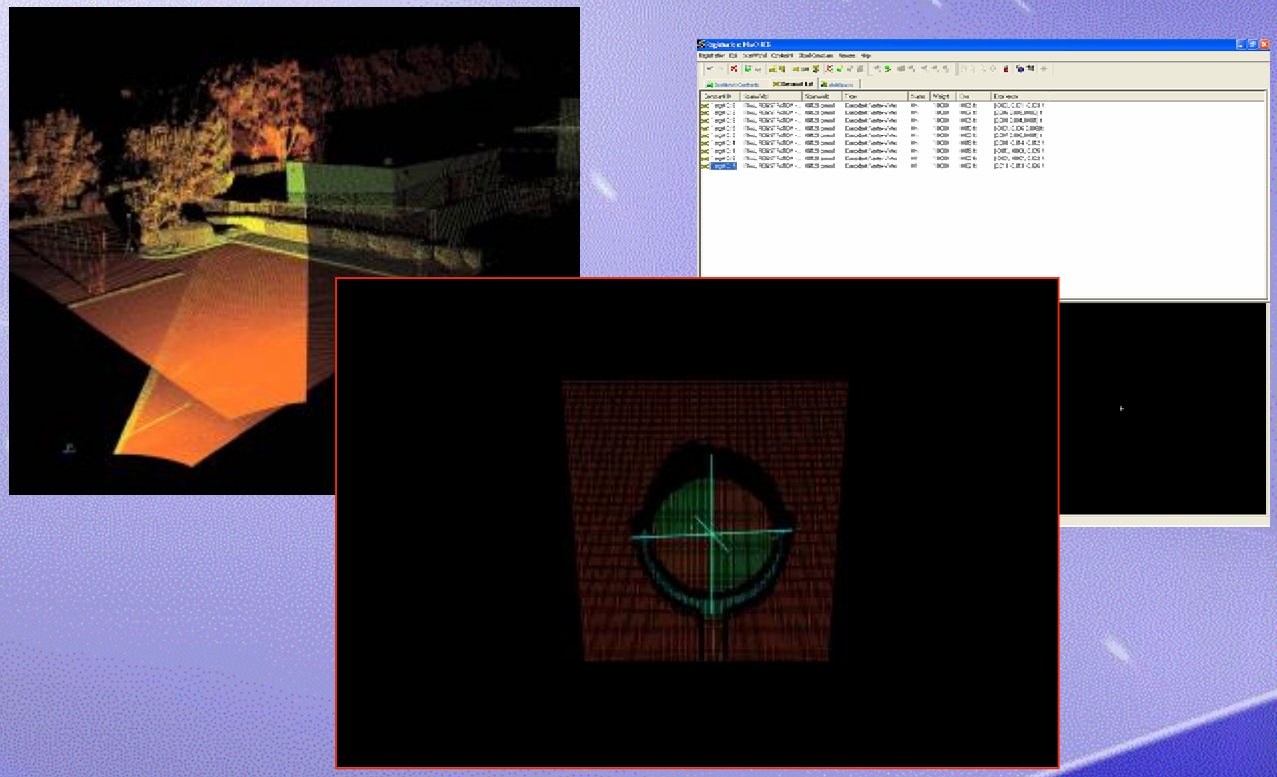
Overall Project Workflow



Office Workflow

Geo-referencing/registration

Import other survey data

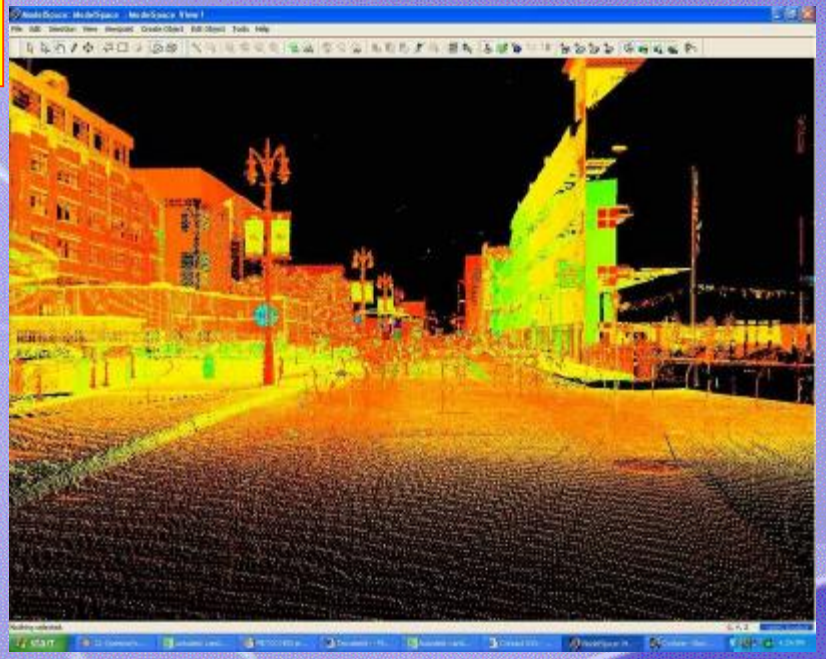


Office Workflow

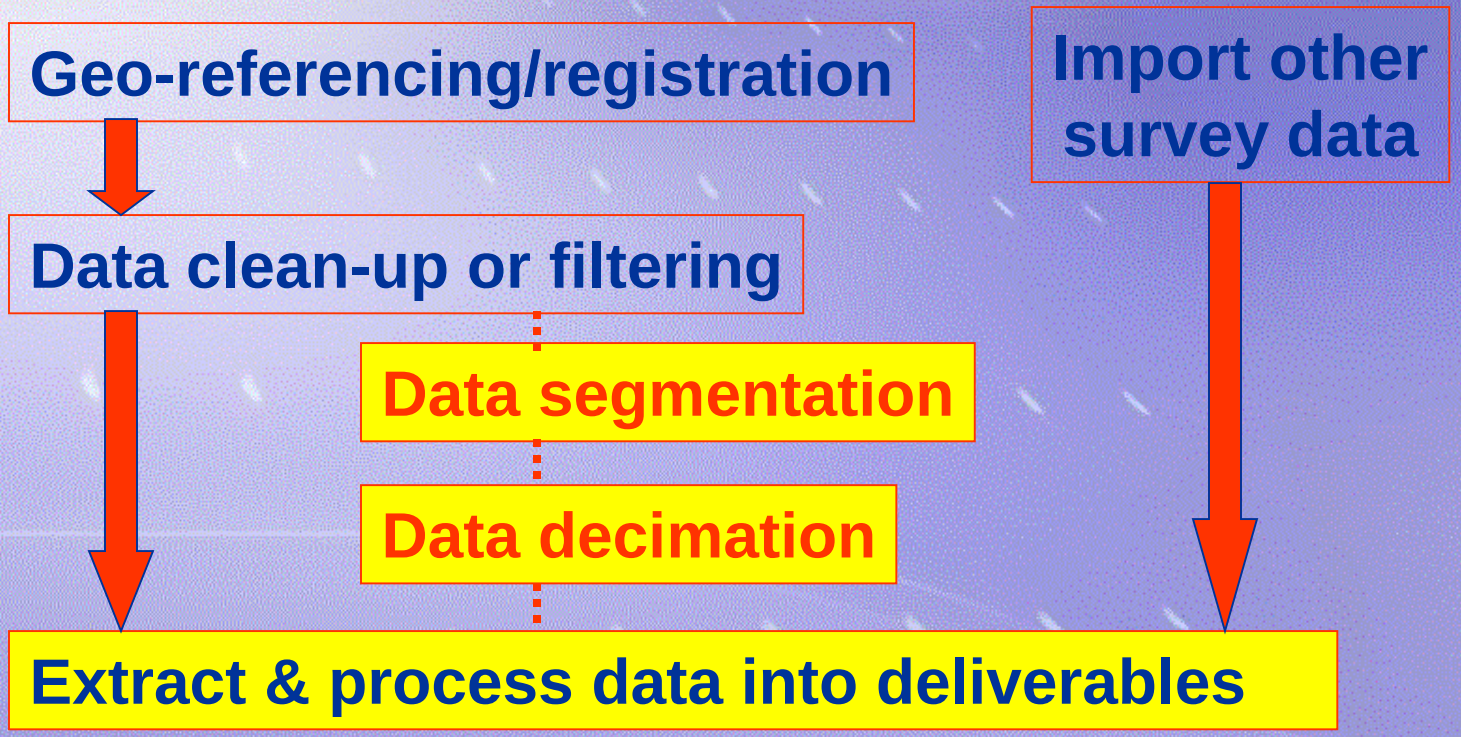
Geo-referencing/registration

Data clean-up or filtering

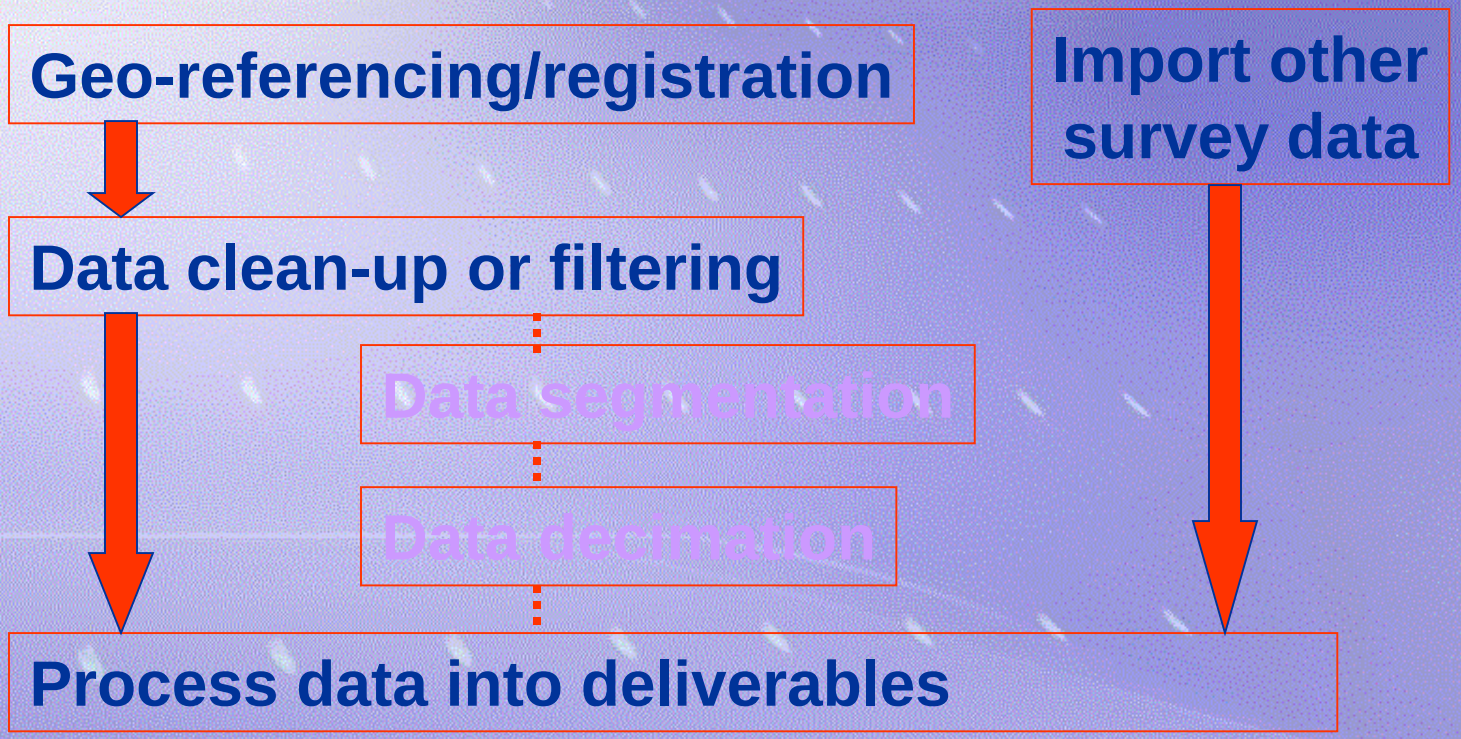
Import other survey data



Office Workflow

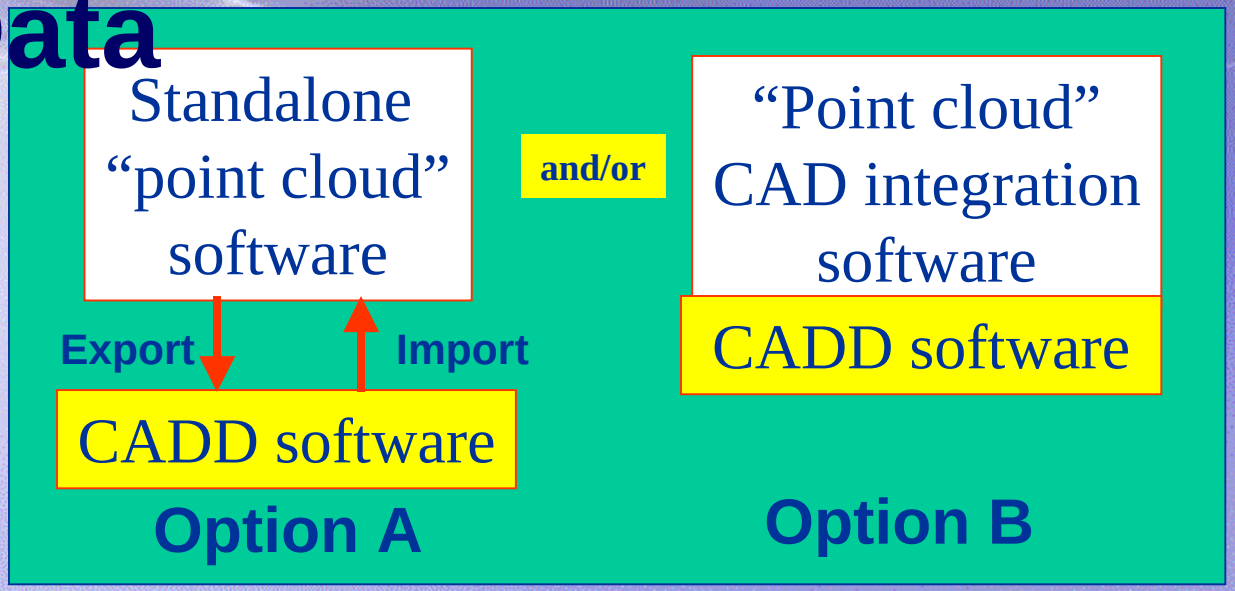


Office Workflow

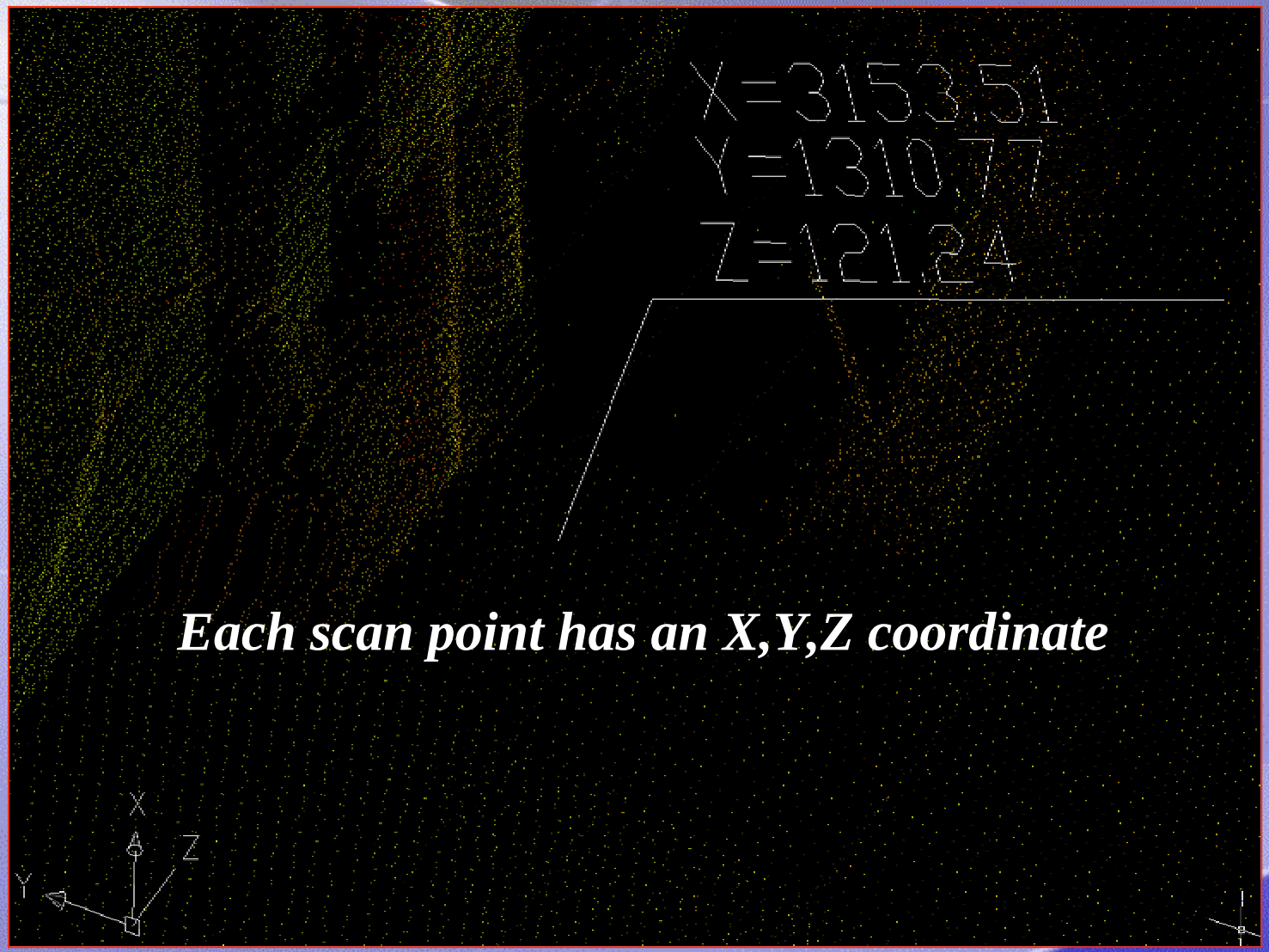


Basic Methods/ Options for Extracting Geometry & Creating Deliverables from Scan Data

1. Points
2. Distances
3. Lines
4. Surfaces
5. Volumes
6. Features
7. Models
8. Using point clouds directly in design and construction QA

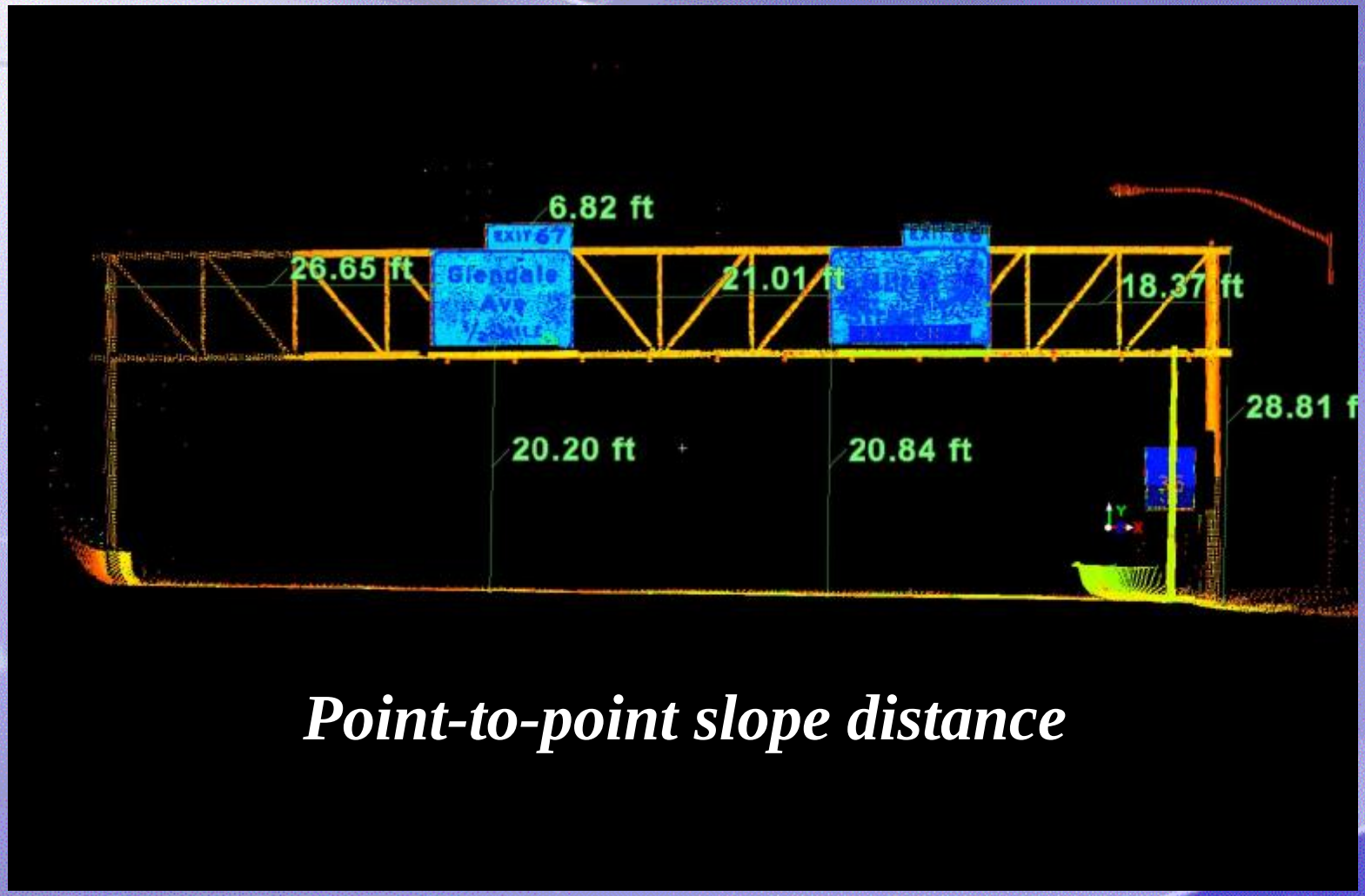


Extracting Points & Distances



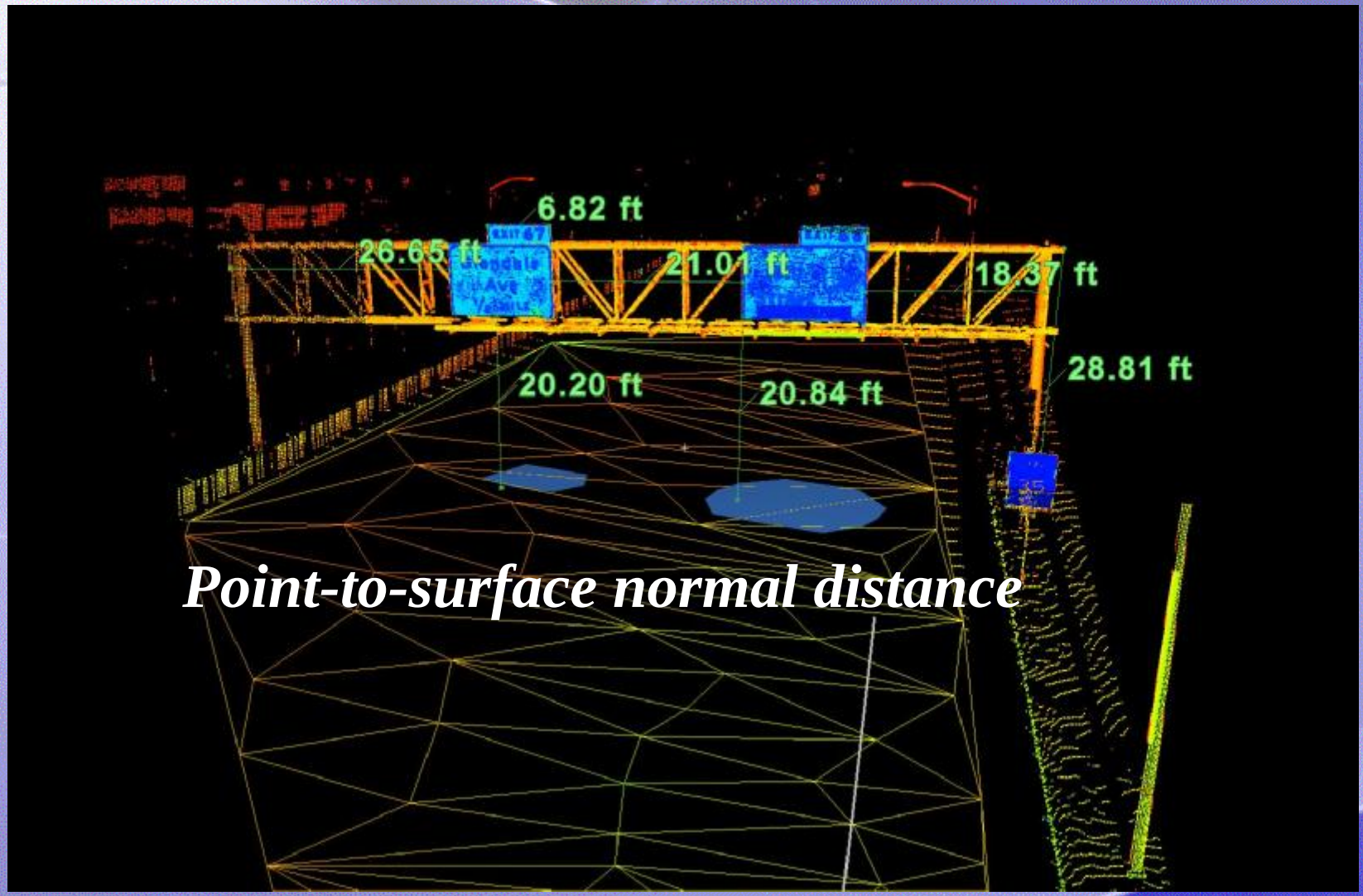
Each scan point has an X,Y,Z coordinate

Extracting Points & Distances

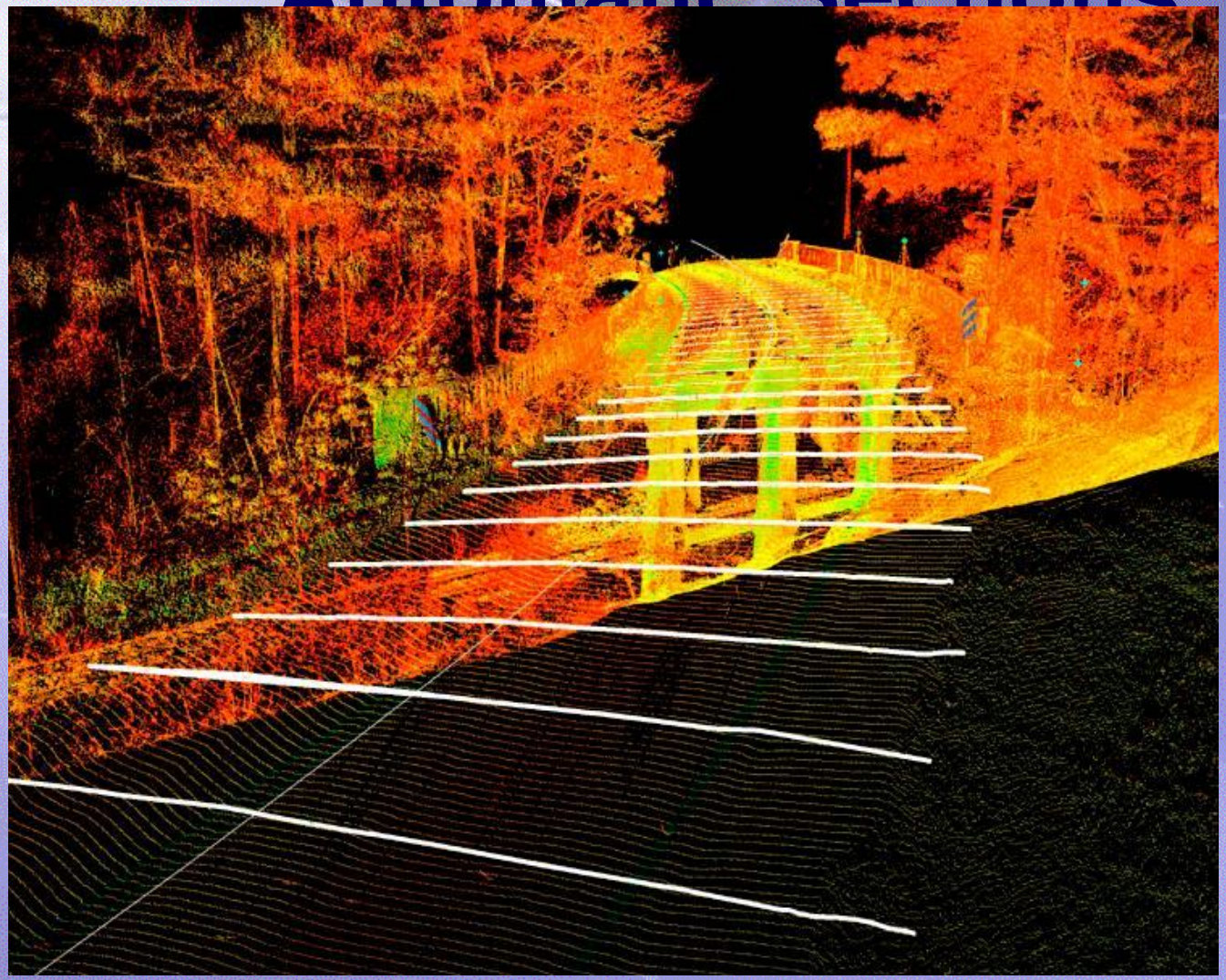


Point-to-point slope distance

Extracting Points & Distances

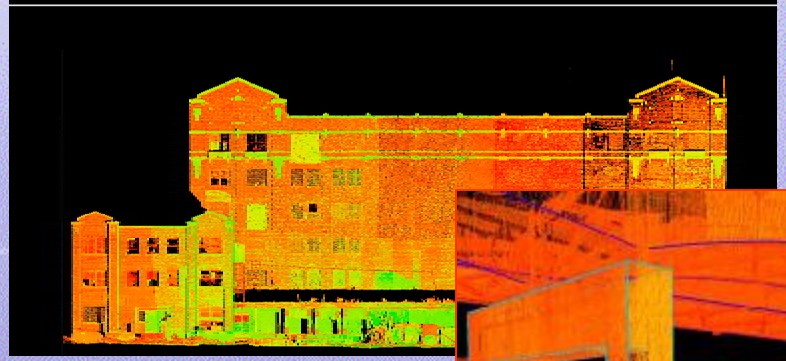


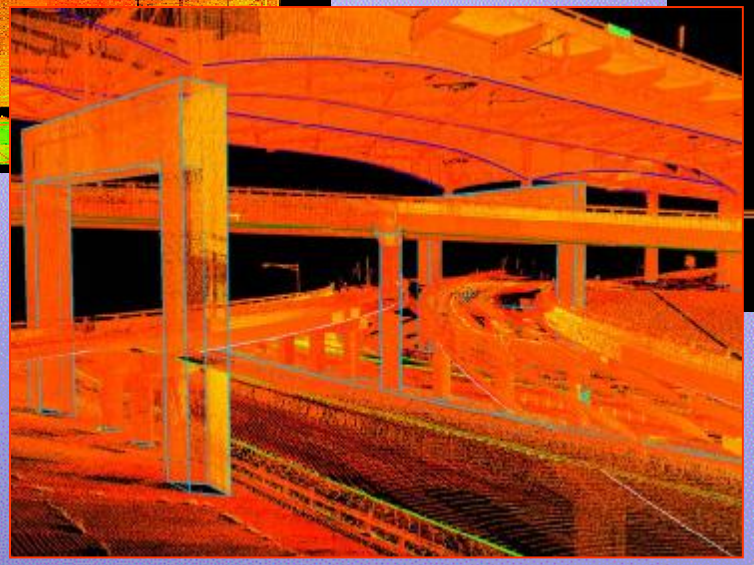
Extracting Line Work: Automatic Sections



Any interval along the alignment can be selected

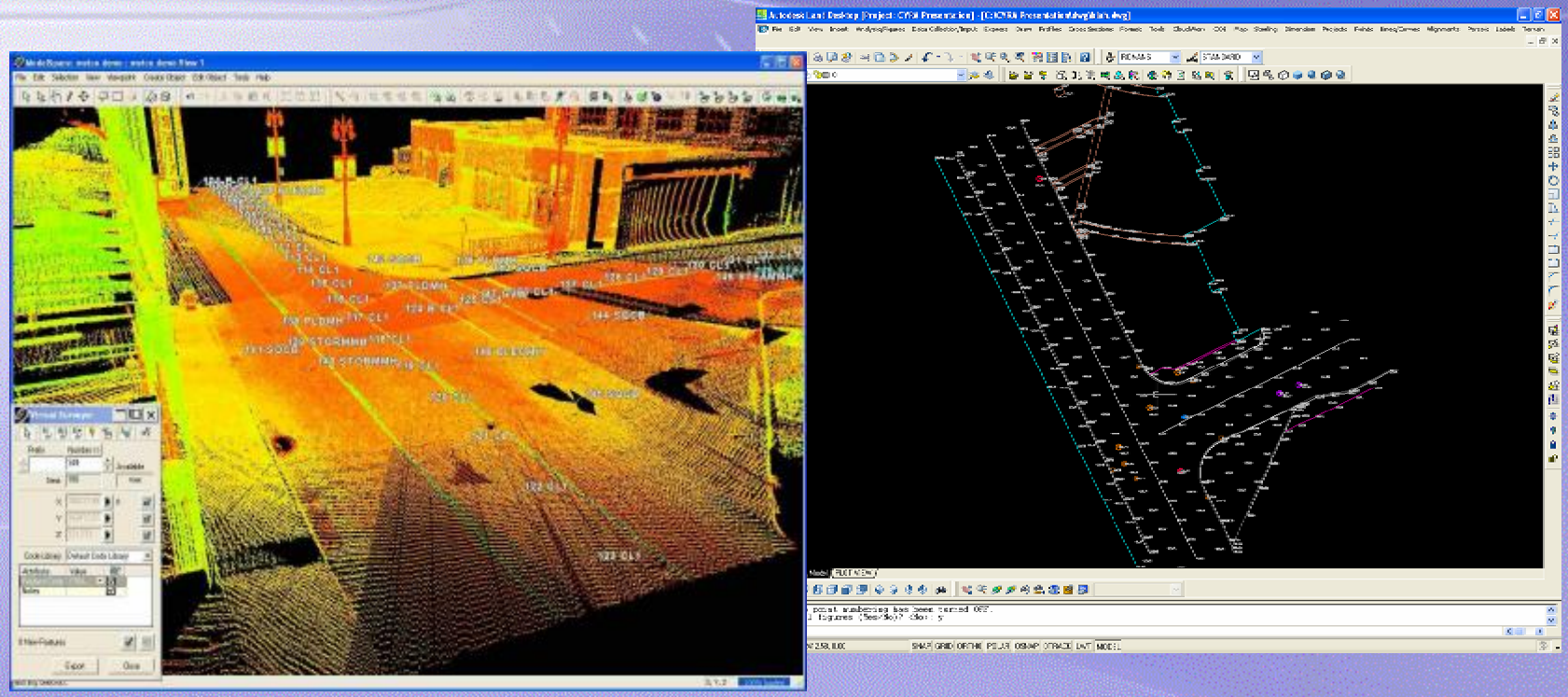
Extracting Line Work: Tracing Over Points





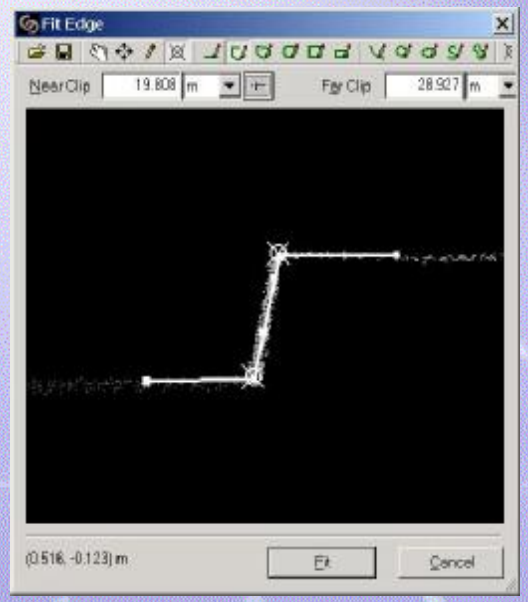
Work in 2D or 3D

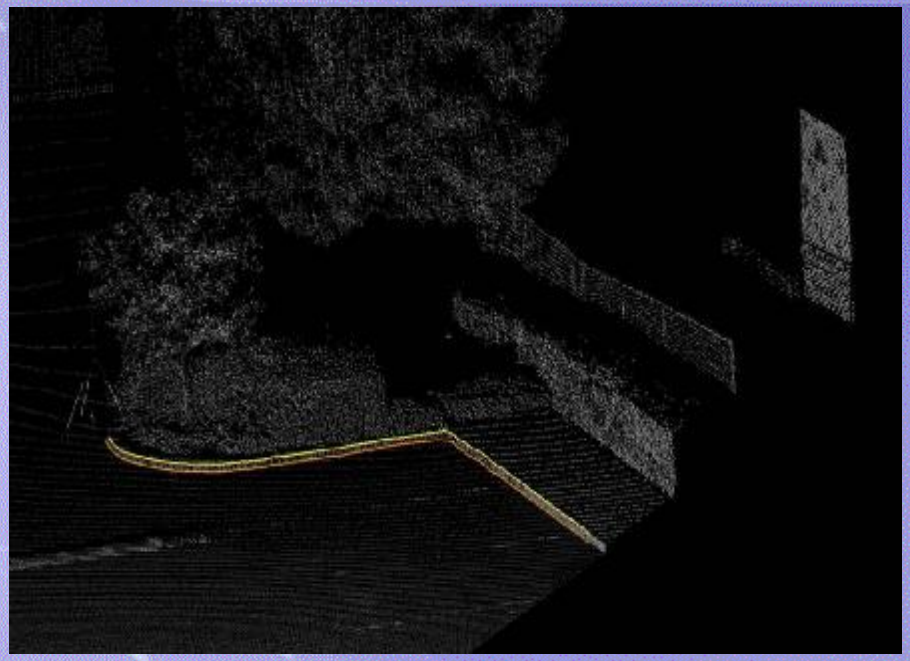
Extracting Line Work: from ASCII Coded Points



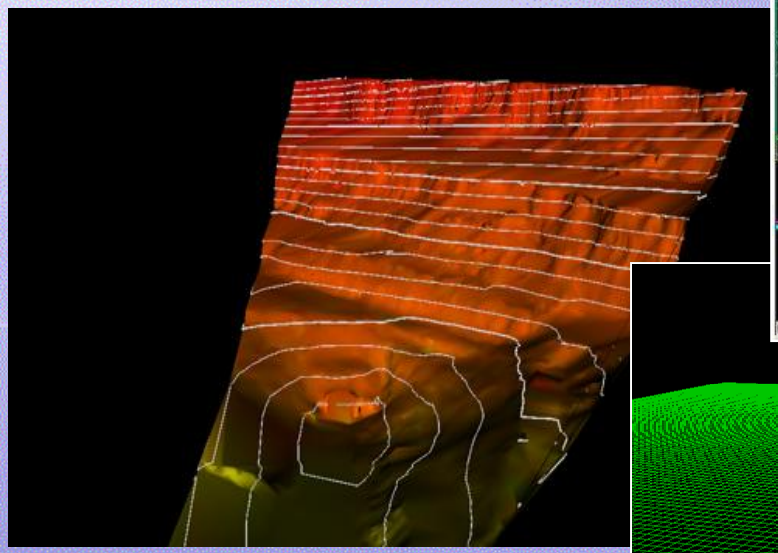
This technique is also known as "Virtual Surveying"

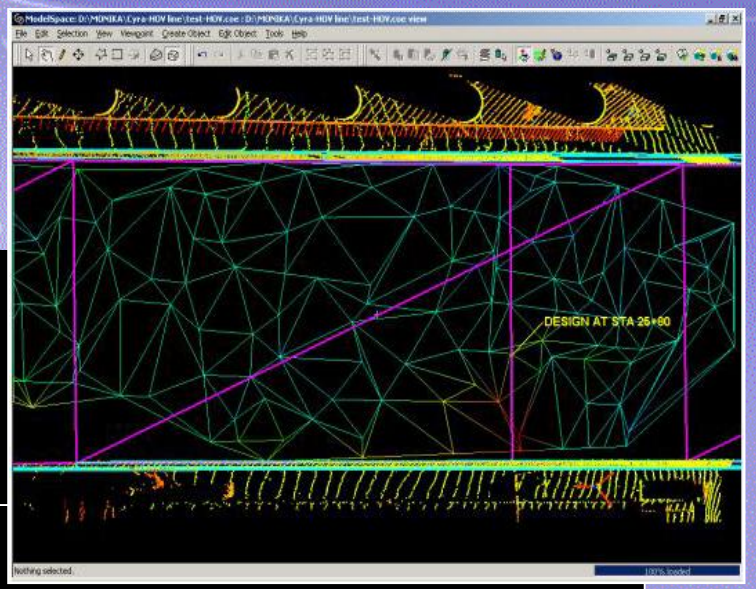
Extracting Line Work: Best-fitting of Curb Lines

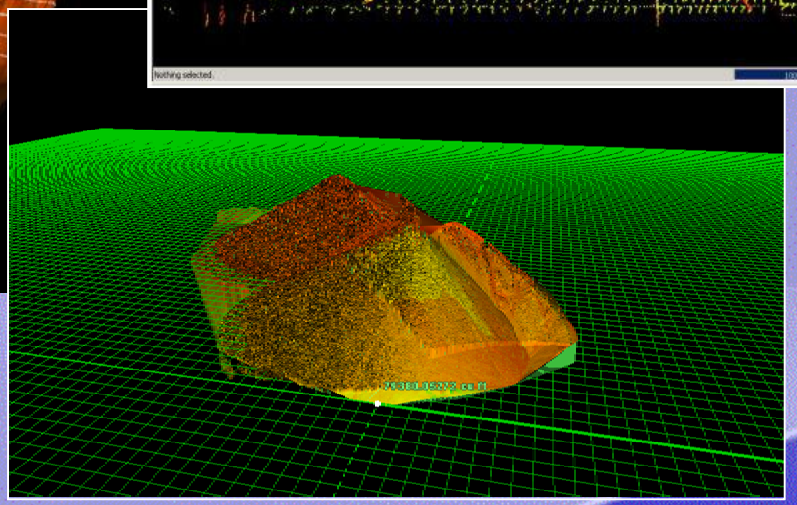




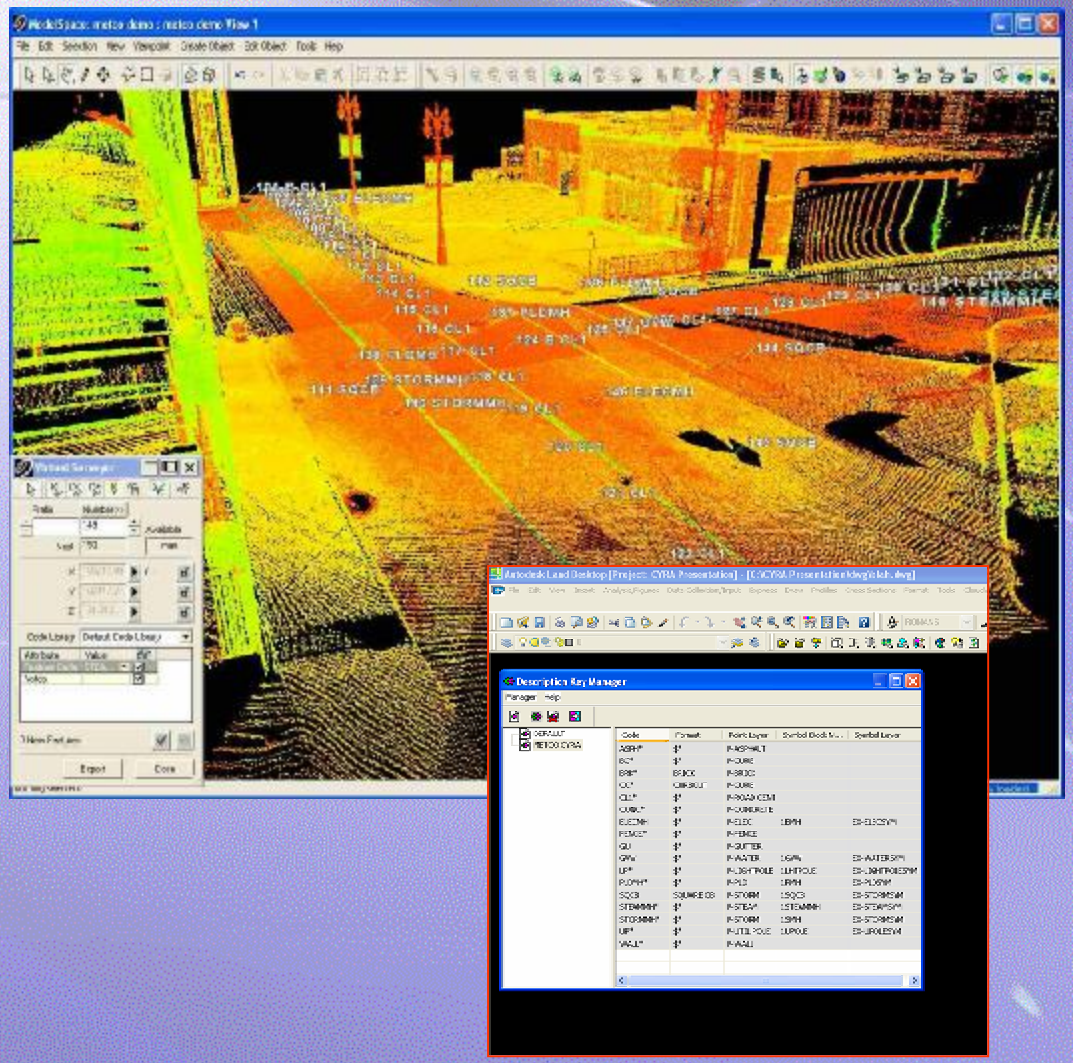
Extracting Surfaces & Volumes







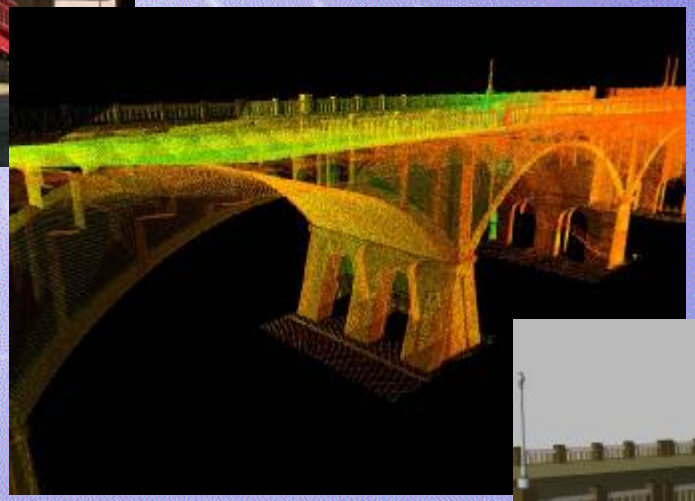
Extracting Features & Symbols



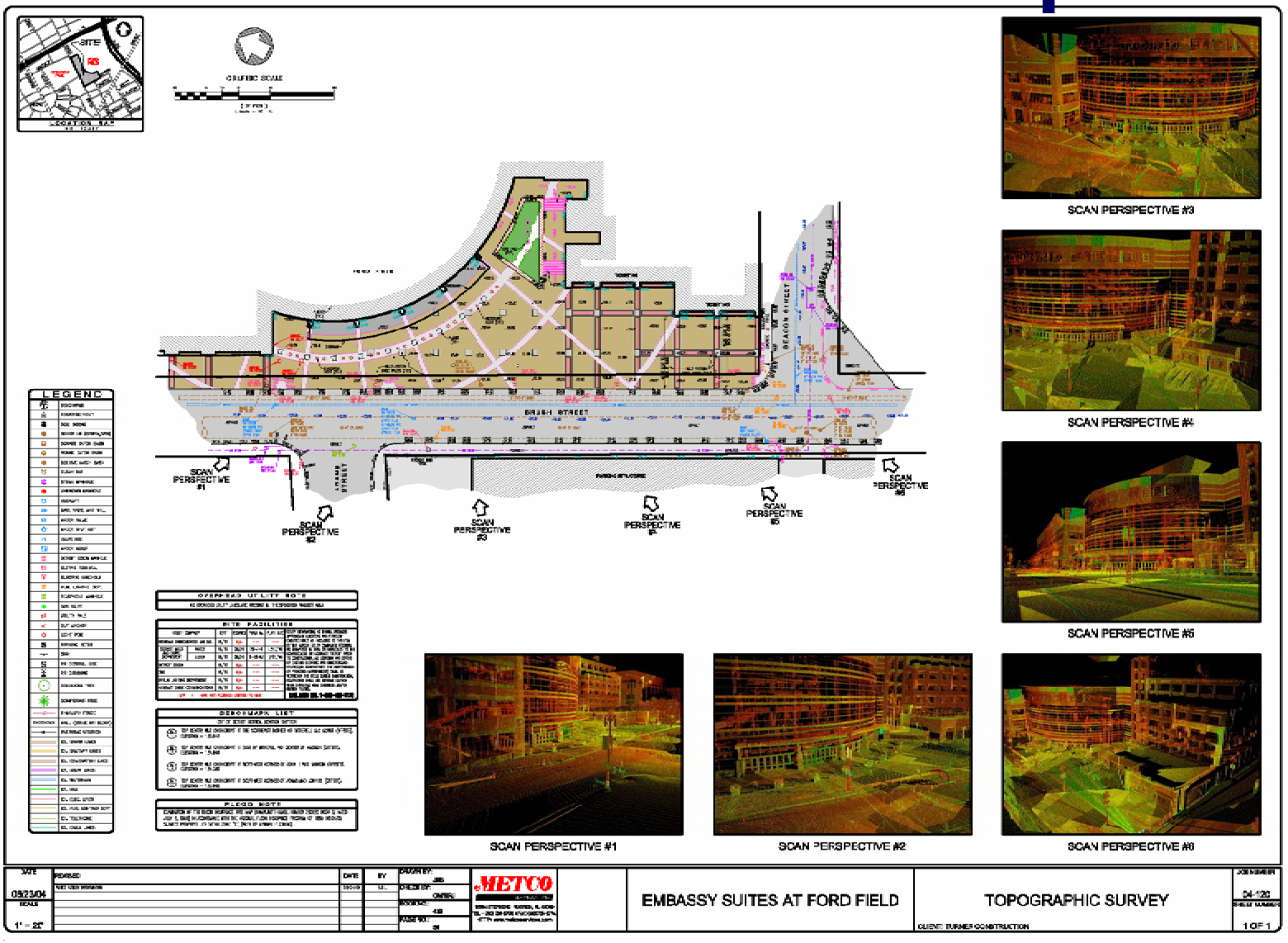
Description keys allow points to be imported to designated layers with symbols attached according to point descriptions.

Data is imported to AutoCAD as Fieldbook file (.fbk)

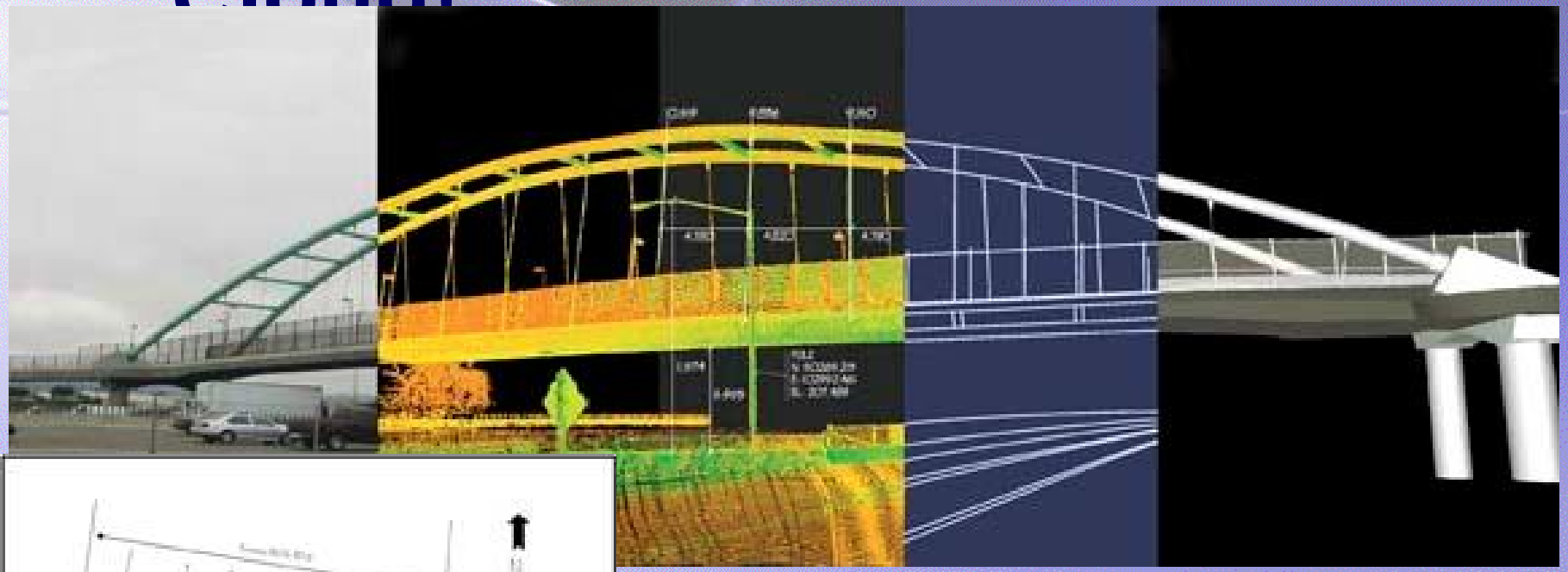
Creating Models



Final Deliverable Example



HDS: The Potential is in the Cloud!



Mining the Cloud…

Capturing Reality

"Delivering the Deliverables"