Speeding Construction Process Using 3D Modeling

By Michael McKee

Questions

Text 208-932-5053

Thornton IC

- US-20
  - 20 Million Design/Construction
  - Eliminated 6 At grade intersections
  - Eliminated 5 RR Crossings
  - 500,000 CY of Material

Thornton IC

- Every Day Counts-3 (EDC-3) Initiative
  - Pilot Project
  - Deliver the Model Pre-Bid
  - New Survey Specification

Thornton IC Collaboration

- Multiple Sections – One Design File
  - Materials – gINT
  - Bridge – Existing/ Proposed Structure
  - Traffic – Traffic Control Plans

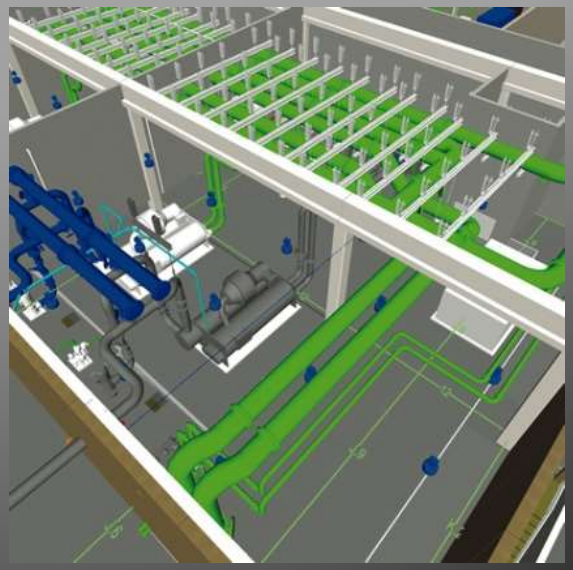
- Documentation
  - Design Specification
  - Pictures/Media
  - Design Calculations

BIM (Information Modeling)

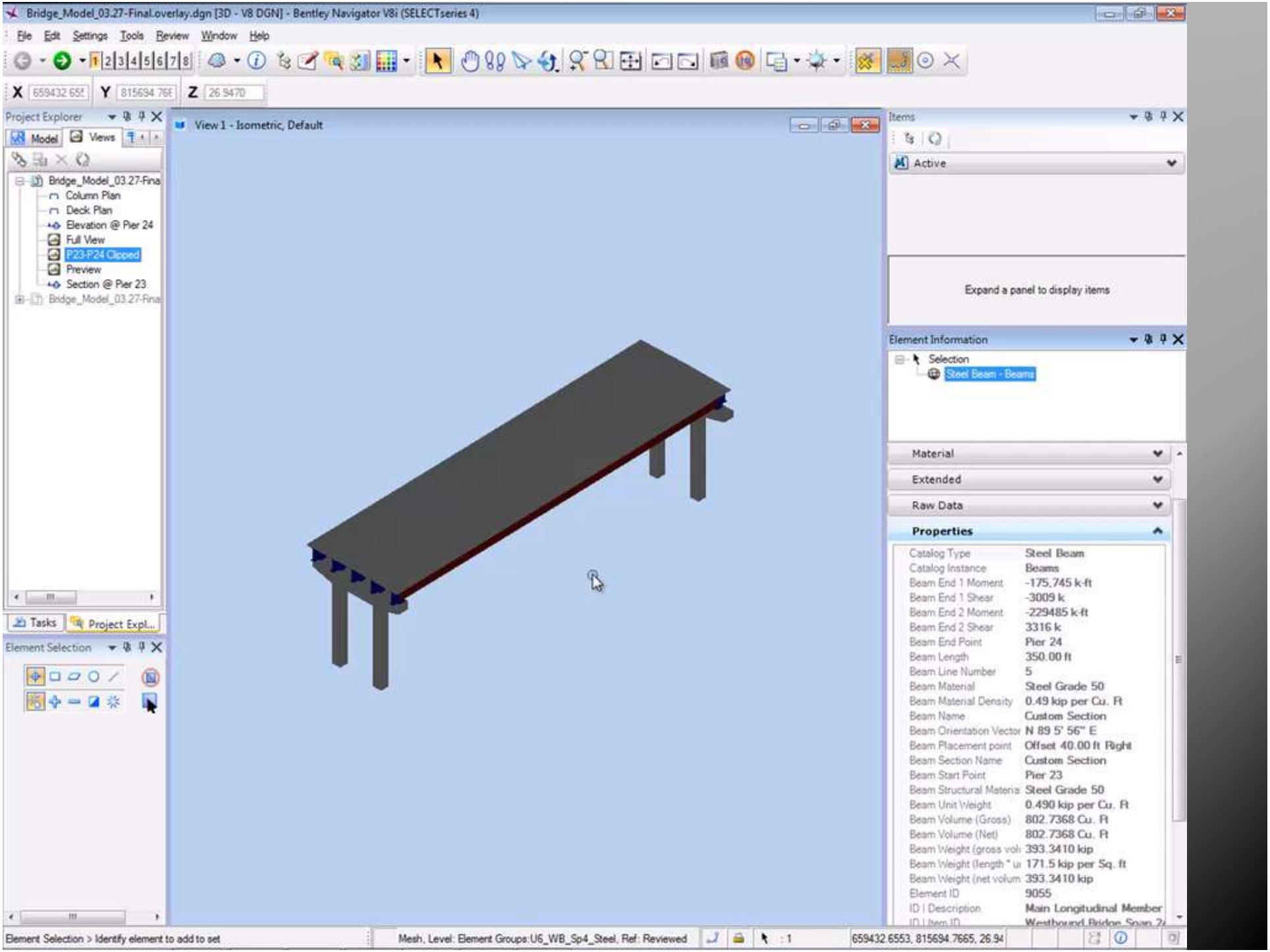
Information Modeling is the process of generating and managing building data during its life cycle. Typically it uses three-dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction.

The process produces a model which *encompasses* building geometry, spatial relationships, geographic information, and quantities and properties of building components.

i.e. all required information is *in* the model.



Bentley
Sustaining Infrastructure


Bridge_Model_03.27-FinalOverlay.dgn [3D - V8 DGN] - Bentley Navigator V8i (SELECTseries 4)
File Edit Settings Tools Review Window Help
Project Explorer
Model Views
Bridge_Model_03.27-Fina
Column Plan
Deck Plan
Elevation @ Pier 24
Full View
P23-P24 Clipped
Preview
Section @ Pier 23
Tasks
Project Expl...
Element Selection
View 1 - Isometric, Default
Items
Active
Expand a panel to display items
Element Information
Selection
Steel Beam - Beams
Material
Extended
Raw Data
Properties
Catalog Type Steel Beam
Catalog Instance Beams
Beam End 1 Moment -175.745 k-ft
Beam End 1 Shear -3009 k
Beam End 2 Moment -229485 k-ft
Beam End 2 Shear 3316 k
Beam End Point Pier 24
Beam Length 350.00 ft
Beam Line Number 5
Beam Material Steel Grade 50
Beam Material Density 0.49 kip per Cu. Ft
Beam Name Custom Section
Beam Orientation Vector N 89 5' 56" E
Beam Placement point Offset 40.00 ft Right
Beam Section Name Custom Section
Beam Start Point Pier 23
Beam Structural Materia Steel Grade 50
Beam Unit Weight 0.490 kip per Cu. Ft
Beam Volume (Gross) 802.7368 Cu. Ft
Beam Volume (Net) 802.7368 Cu. Ft
Beam Weight (gross vol 393.3410 kip
Beam Weight (length * u 171.5 kip per Sq. ft
Beam Weight (net volum 393.3410 kip
Element ID 9055
ID | Description Main Longitudinal Member
Element Selection > Identify element to add to set
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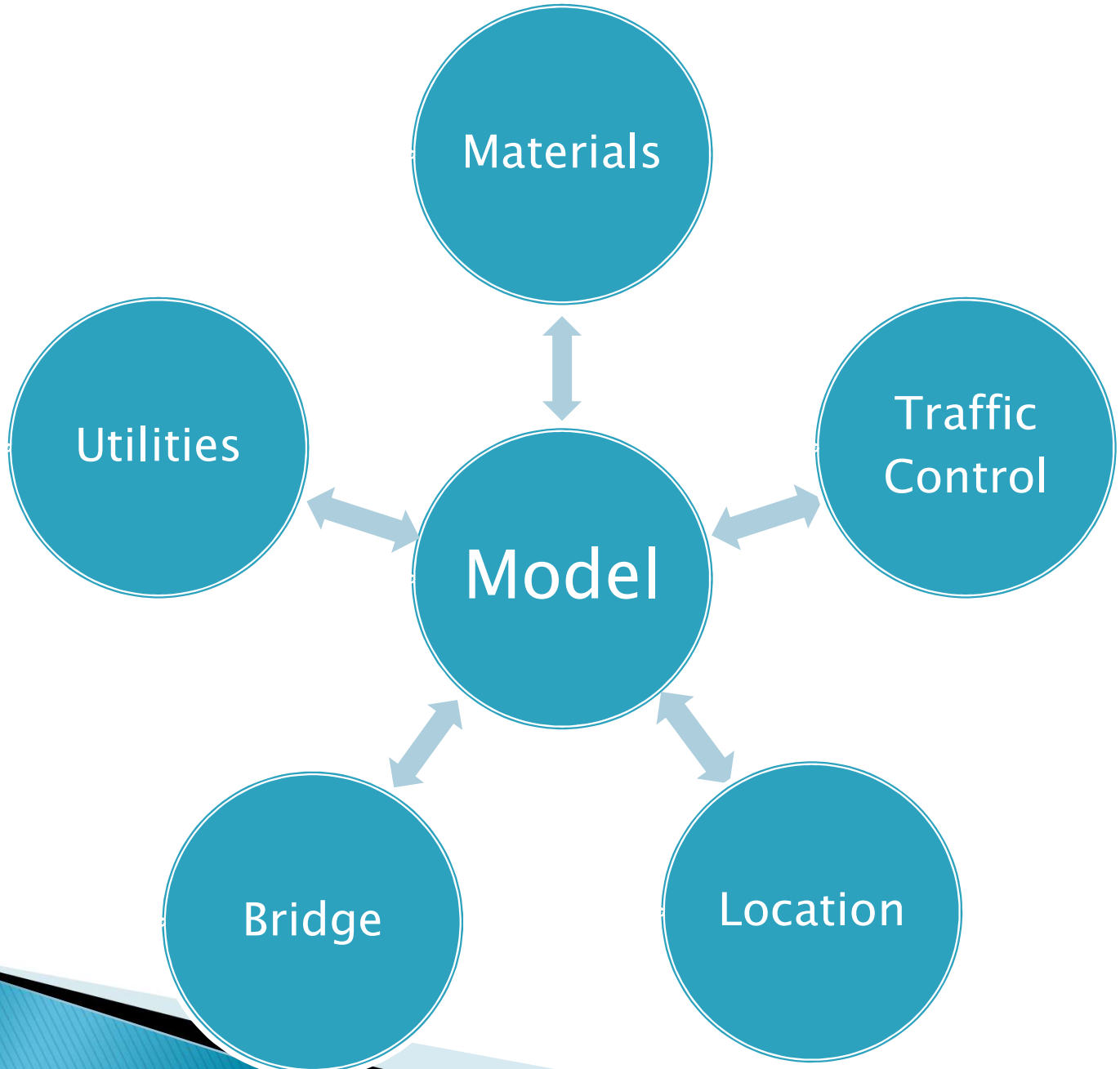
659432.6553, 815694.7665, 26.94

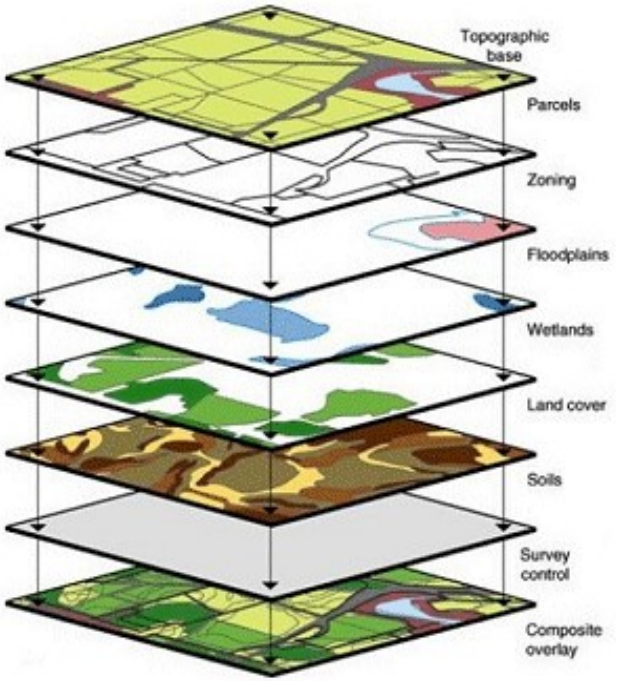

Materials
Utilities
Traffic Control
Model
Bridge
Location

Thornton IC Layout

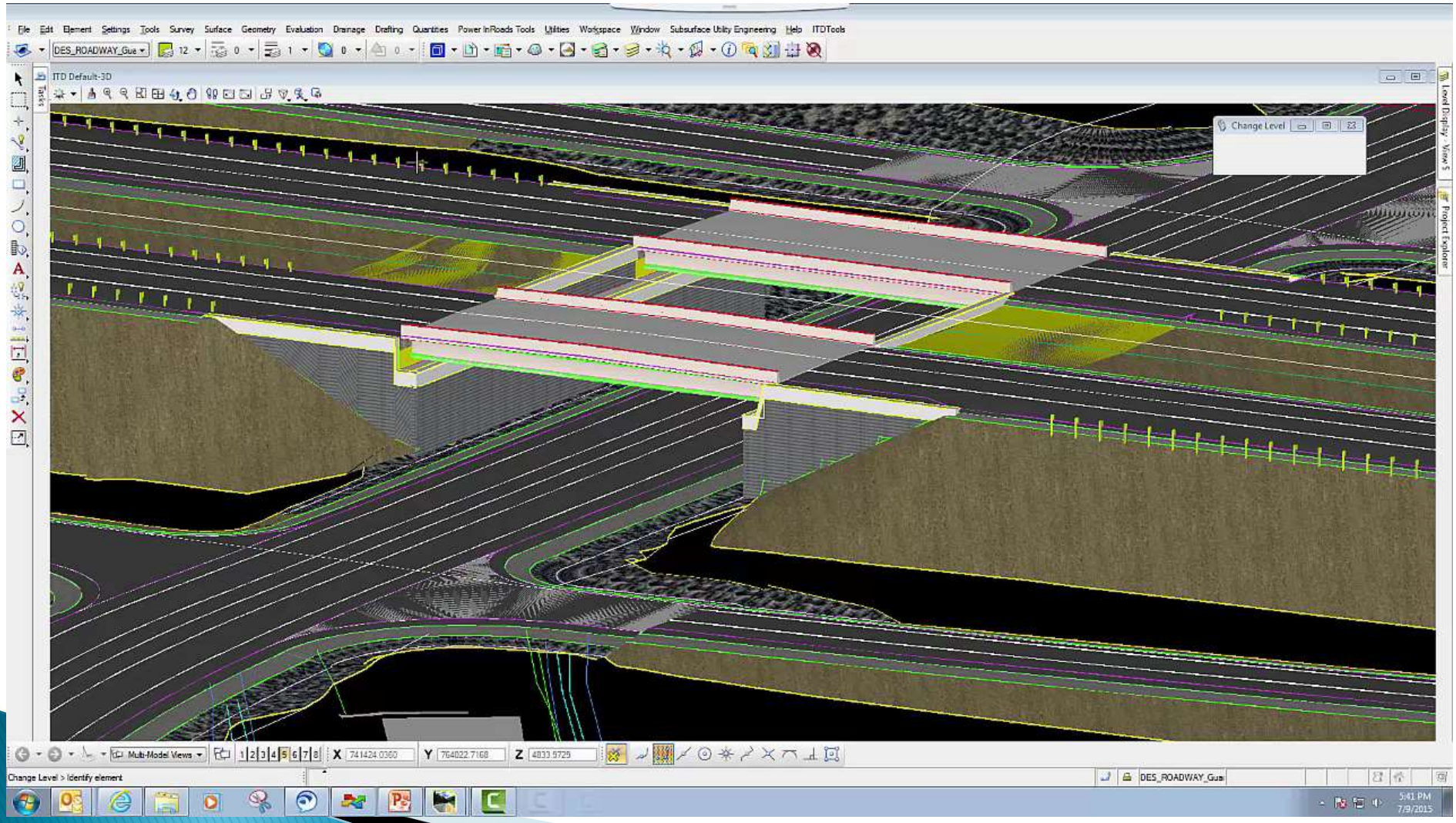
- 9 Corridors
- 9 Alignments
- 18 Templates

Power InRoad SS4 Layout

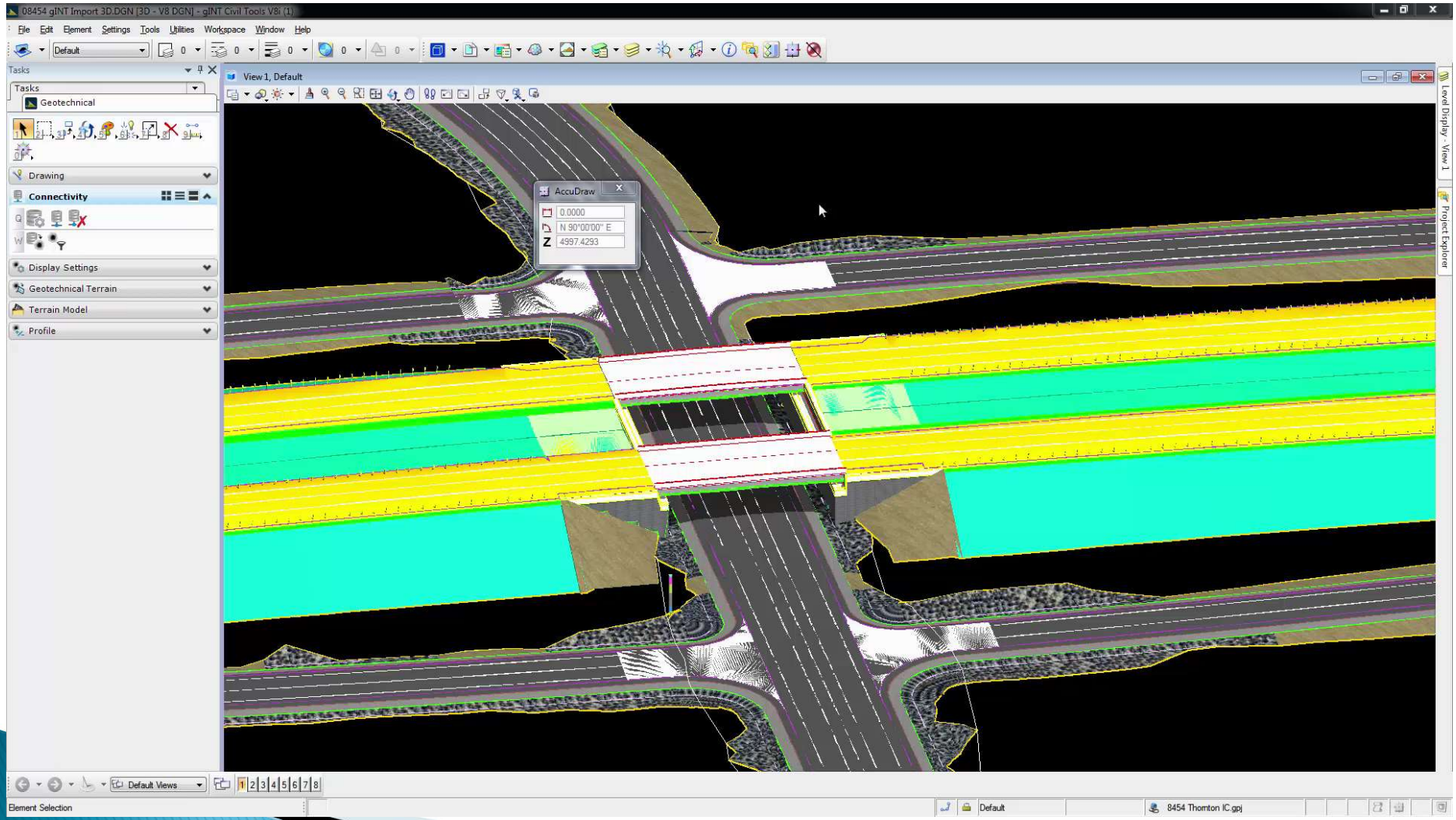
- Terrain Model –3D
- Alignment – 2D
- Right of Way – 2D
- Utility File – 2D
- Retaining Wall (Bridge)– 2D
- Design File – 2D
- Traffic Control – 2D



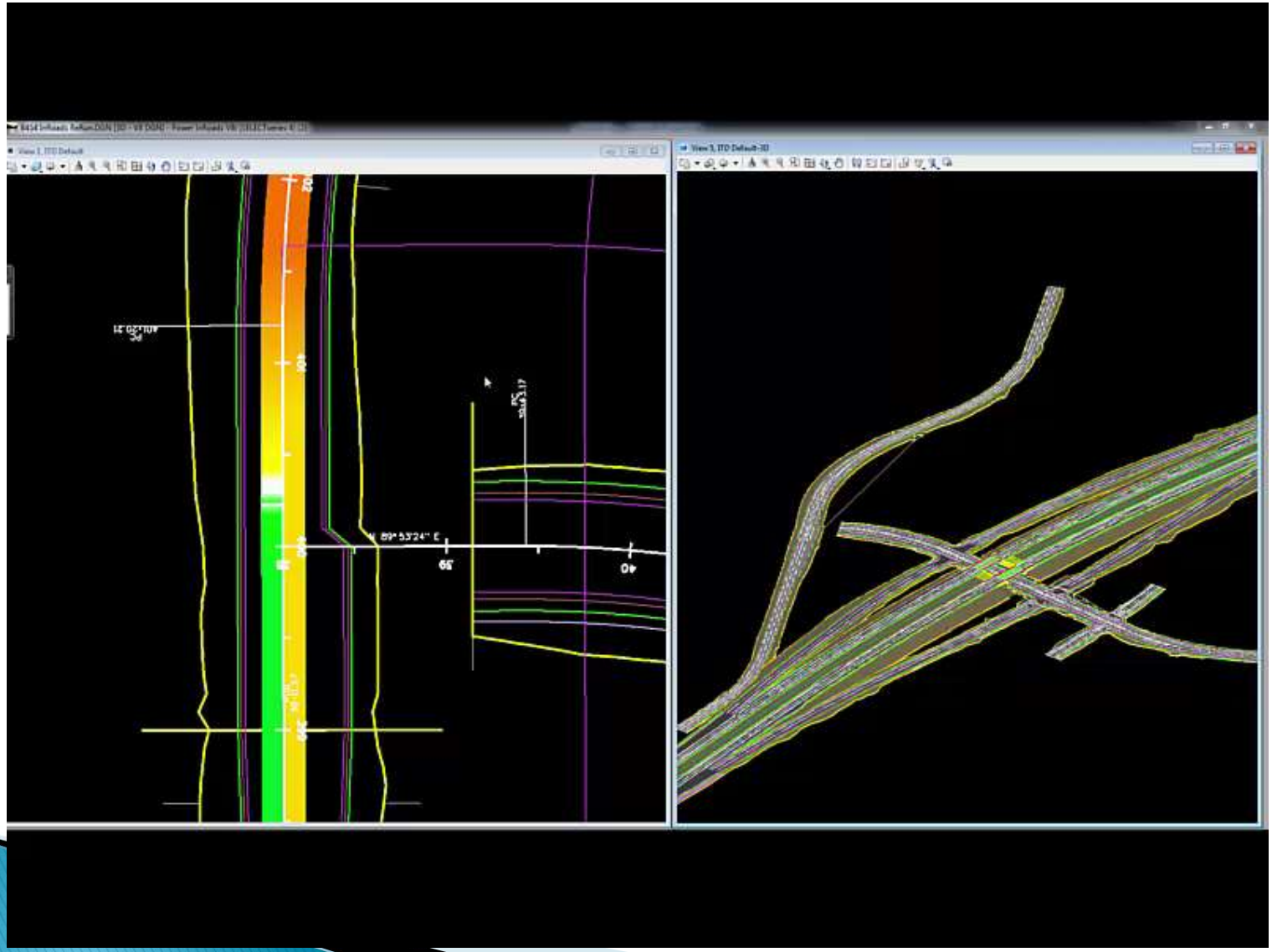
Thornton IC


File Edit Element Settings Tools Survey Surface Geometry Evaluation Drainage Drafting Quantities Power InRoads Tools Utilities Workspace Window Subsurface Utility Engineering Help ITDTools
ITD Default-3D
Change Level
Multi-Model Views
X 741424.0360
Y 764022.7168
Z 4833.9729
Change Level > Identify element
DES_ROADWAY_Gue
5:41 PM
7/9/2015

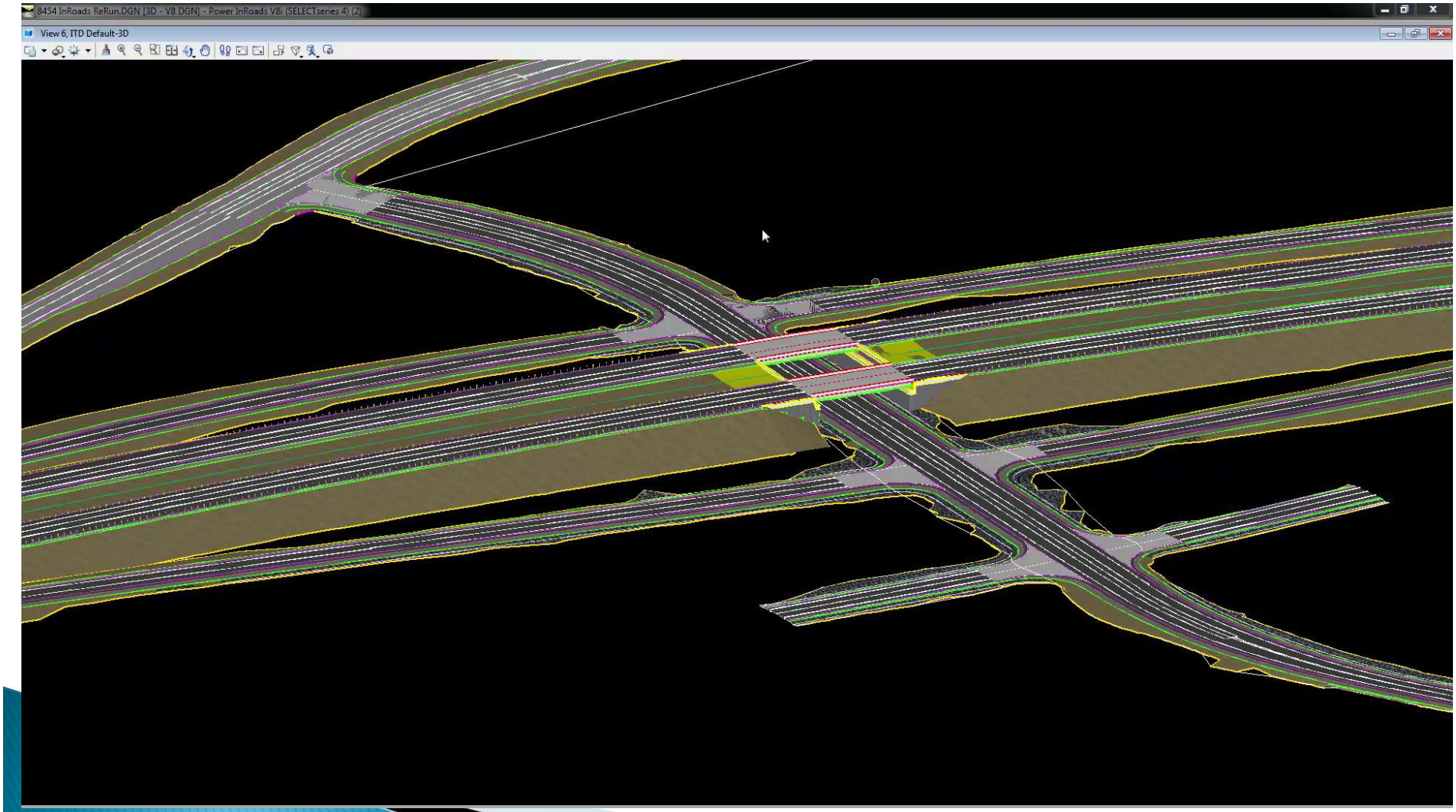
Thornton IC– gINT



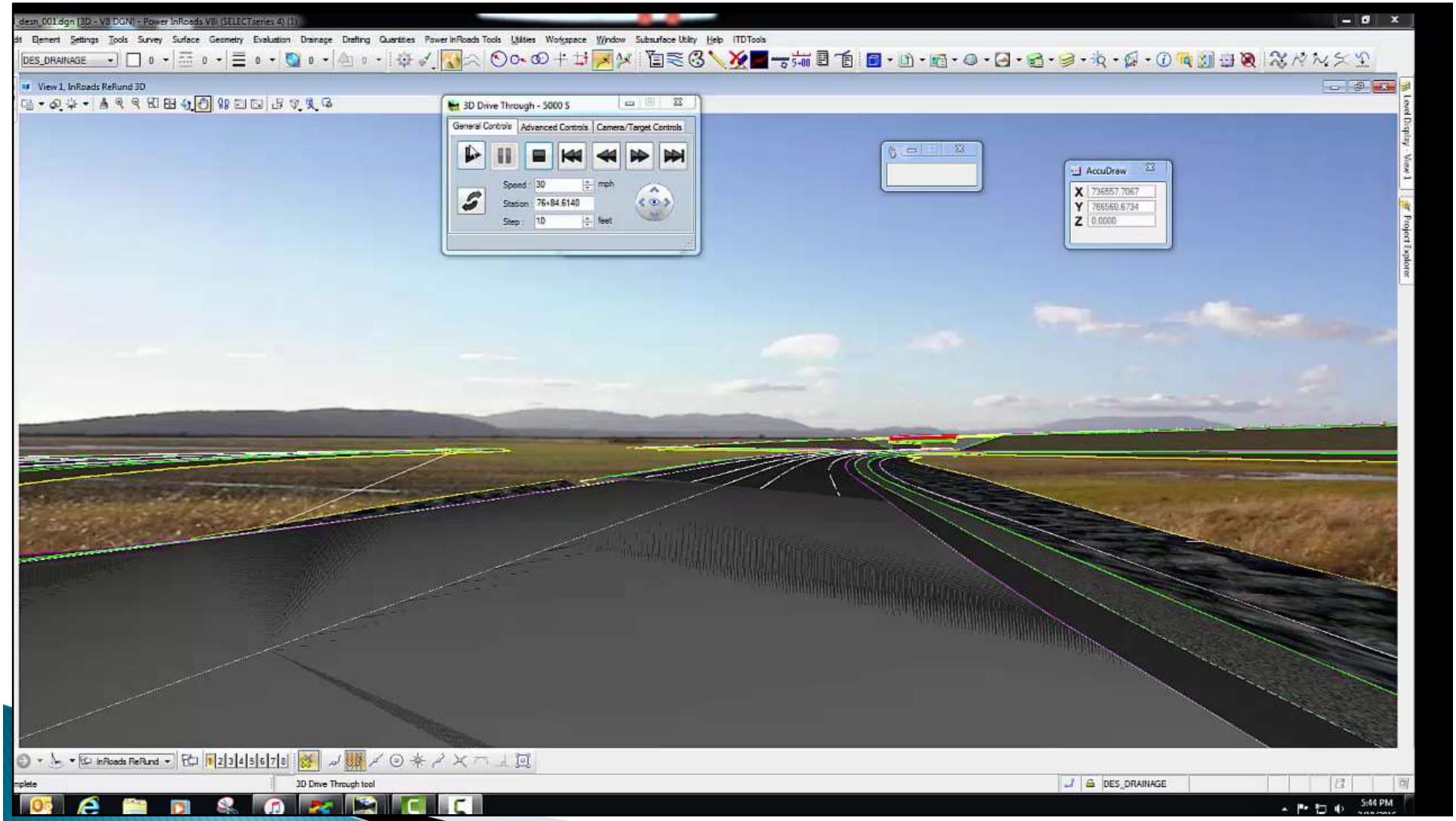
Thornton IC- Intersection



Thornton IC- 3D PDF

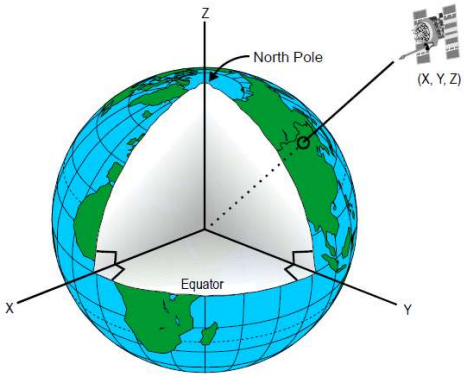


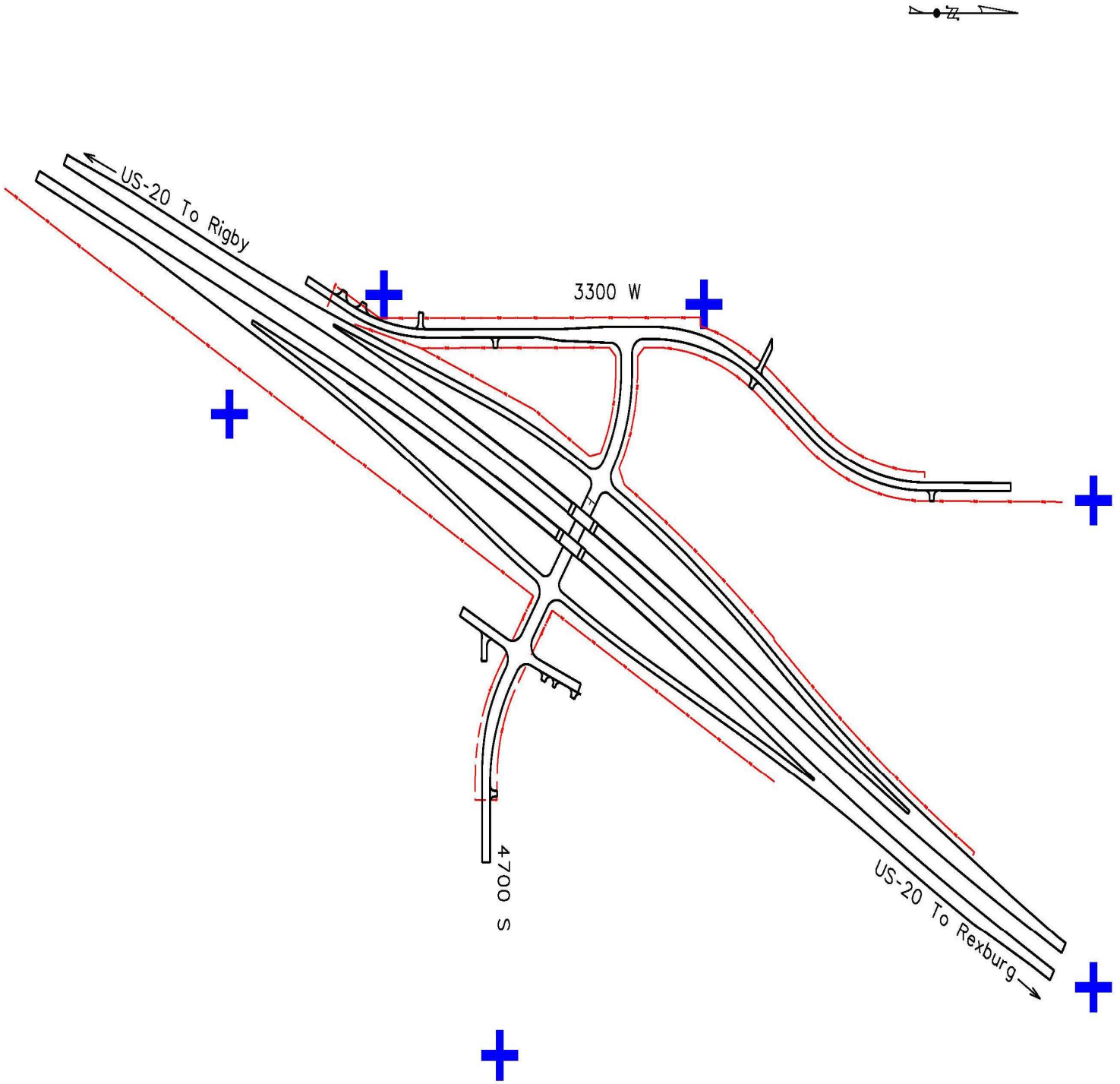
Thornton IC- Public Involvement



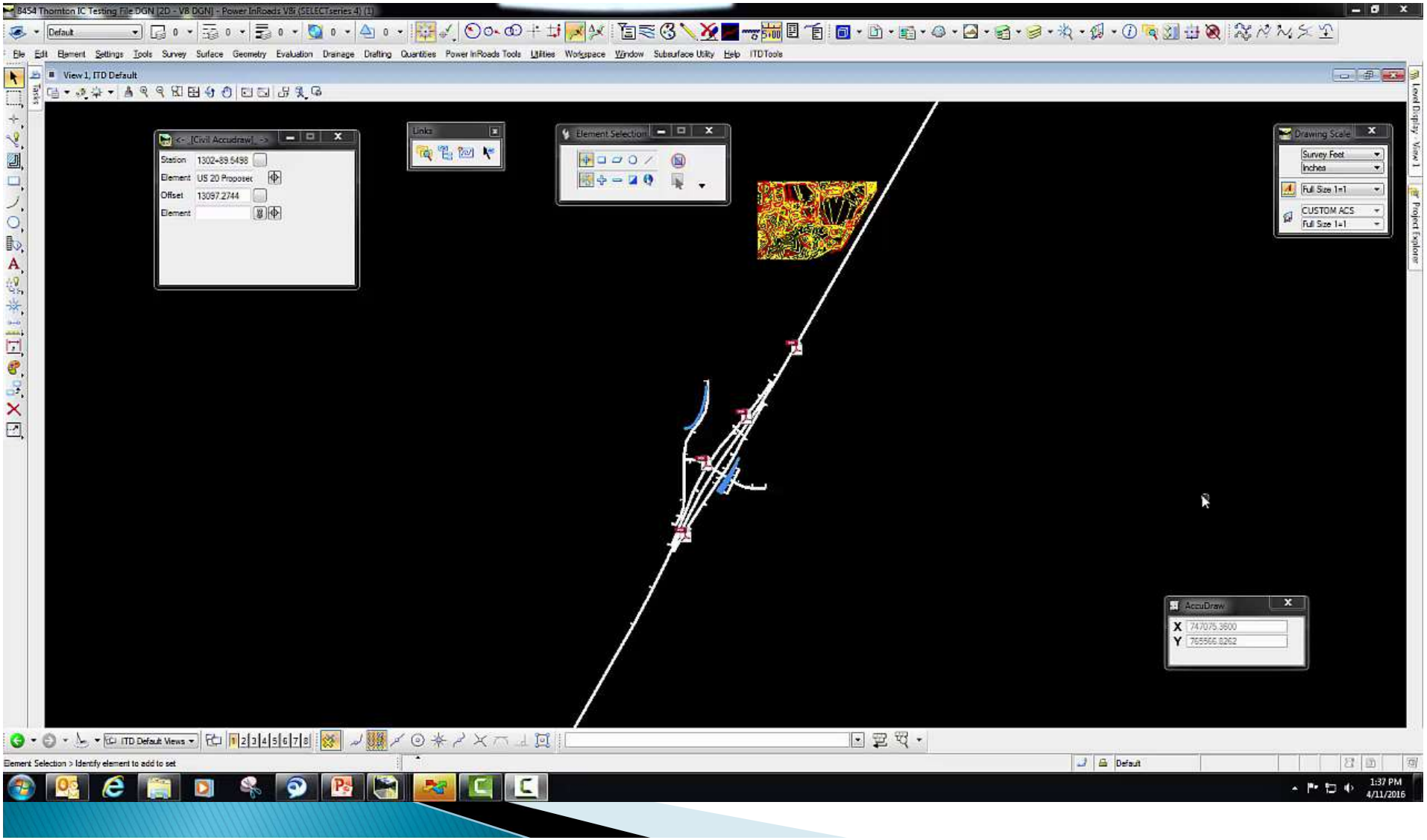
Model Check

- Export Model to XML format
- Vertical Surface lines (0.01 offset)
- Local Coordinate System
  - Scale Reduction in the model (ground to grid)

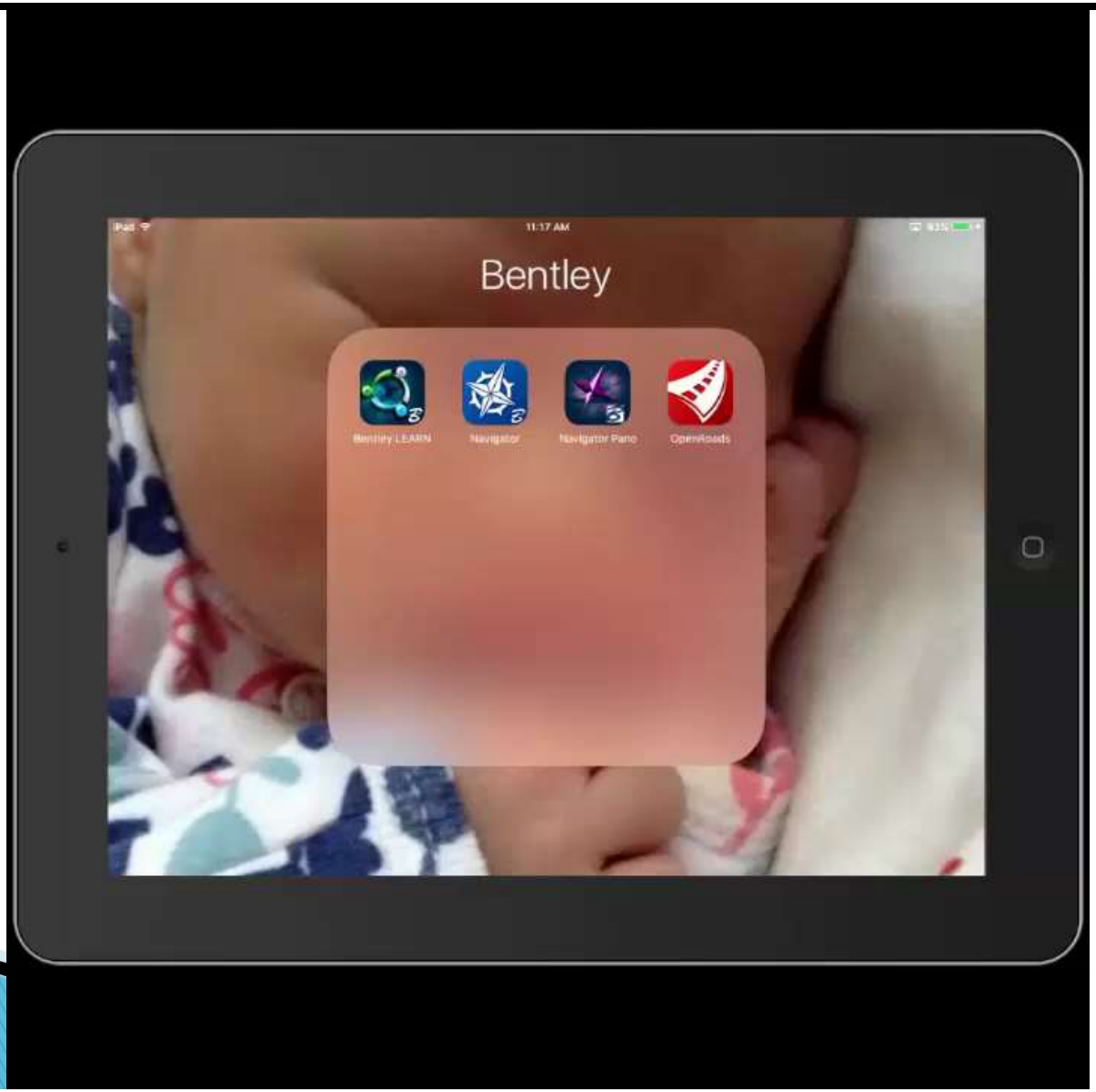



N
US-20 To Rigby
3300 W
4700 S
US-20 To Rexburg

Thornton IC Testing



Thornton IC Testing



Questions