LD22481-L: A Tale of 2 Coordinate Systems: Bridging AutoCAD Civil 3D and Revit Together

Will Ikerd, P.E. (TX)

Principal info@IKERD.com | 214-382-9811

@Ikerd_com

Class summary

The lab will provide a hands-on approach of best practices for how to combine civil site designs in AutoCAD Civil 3D software with foundation designs in Revit software to ultimately collaborate with architects. The discussion will give guidelines for where utility modeling for building should transition from Revit MEP software above grade to AutoCAD Civil 3D software below grade, and how to use Navisworks software in this review process. A key concept to review will be the difference between local coordinate systems that building designers work in and the state plane coordinate system that civil engineers typically use. The discussion will consider civil/structure interaction and the new BIM Forum Level of Development (LOD) specification, and how it relates to setting up projects in AutoCAD Civil 3D software and Revit software. This session features Revit and AutoCAD Civil 3D. AIA Approved

Speaker: Will Ikerd, PE (TX)
info@IKERD.com | 214-382-9811

Key learning objectives

At the end of this class, you will be able to:

- Discover best practices for working with teams in AutoCAD Civil 3D and Revit, and how Navisworks can be used to aid the coordination process
- Gain best practices for working with teams in AutoCAD Civil 3D and Revit, and learn how Navisworks can be used to aid the coordination process
- Learn how to use the Action recorder to document transforms in AutoCAD Civil 3D
- Understand what the BIM Forum LOD Specification is and how it can be used with AutoCAD Civil 3D and Revit for site modeling

Speaker: Will Ikerd, PE (TX)
info@IKERD.com | 214-382-9811

IKERD

People | Building | Clarity

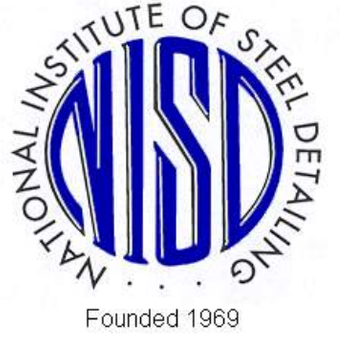
- Began in 2003
- **IKERD** is an internationally recognized consulting group in **buildings, civil and industrial** construction markets.
- Using our knowledge of engineering, team dynamics, communication and technology, we have built an extensive breadth of experience on a wide variety of integrated construction project types with BIM.
- Engineering and construction grade modeling.
- 3D laser scanning.

BIMFORUM

Board of Directors, served since 2008

Co-Chair of the SEI – CASE Joint Committee on BIM

Chair Sub-Committee on Dev., Soft. & Train.
Served since 2007

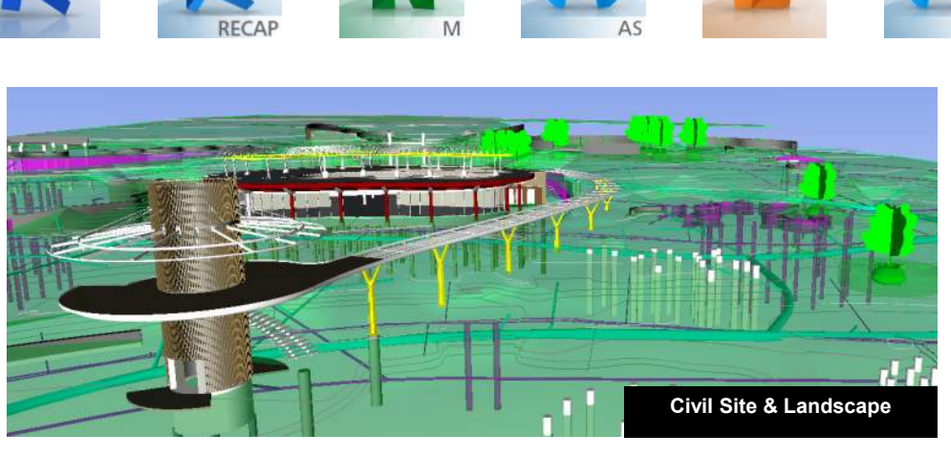


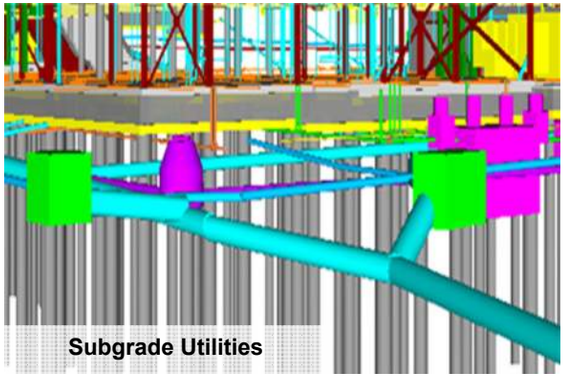
CD-BIM.com

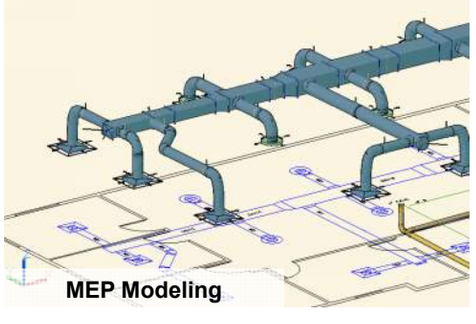
Certificate of Development in
Building Information Modeling

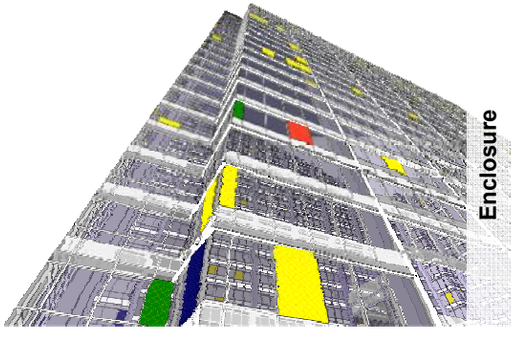
Washington University in St.Louis

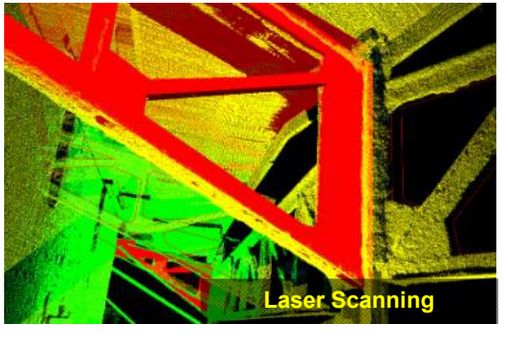
Mid-90's Graduate Work in Parametric Structural Engineering of Buildings with EDI

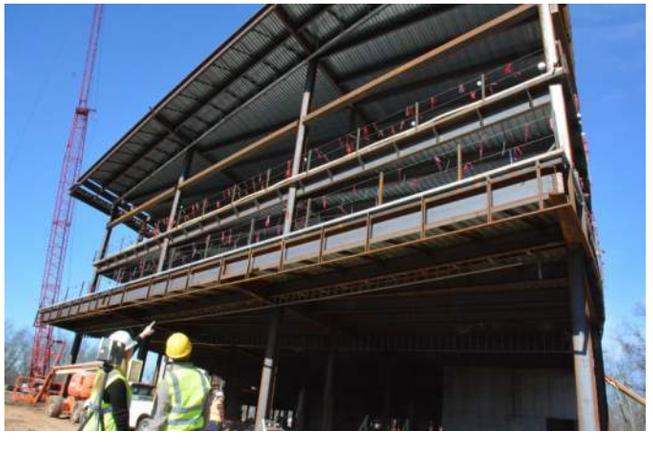

Civil Site & Landscape

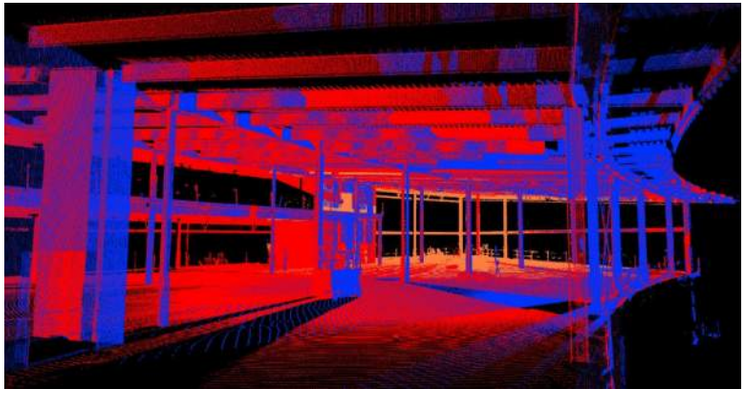

Subgrade Utilities


MEP Modeling


Enclosure


Laser Scanning



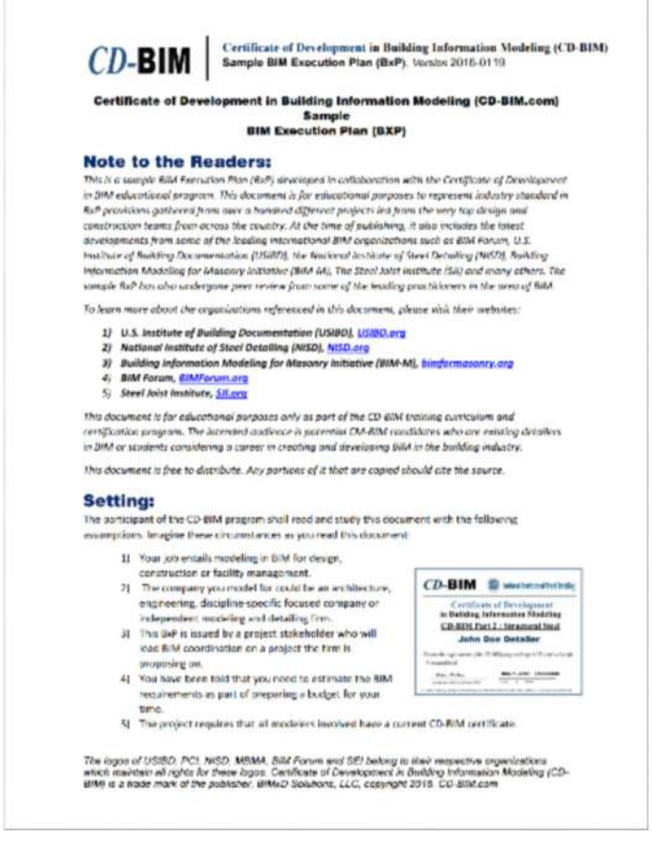


CD-BIM

Certificate of Development in BIM

1) One Line Training Content
2) Basics of BIM for Modelers
3) Simple Online 1.5 hr Exam.

www.cd-bim.com



CD-BIM | Certificate of Development in Building Information Modeling (CD-BIM)
Sample BIM Execution Plan (BxP). Version 2015-01 19

Certificate of Development in Building Information Modeling (CD-BIM.com)
Sample
BIM Execution Plan (BXP)

Note to the Readers:

This is a sample BIM Execution Plan (BxP) developed in collaboration with the Certificate of Development in BIM educational program. This document is for educational purposes to represent industry standard in BxP provisions gathered from over a hundred different projects led from the very top design and construction teams from across the country. At the time of publishing, it also includes the latest developments from some of the leading international BIM organizations such as BIM Forum, U.S. Institute of Building Documentation (USIBD), the National Institute of Steel Detailing (NISD), Building Information Modeling for Masonry Initiative (BIM-M), The Steel Joist Institute (SJI) and many others. The sample BxP has also undergone peer review from some of the leading practitioners in the area of BIM.

To learn more about the organizations referenced in this document, please visit their websites:

1) *U.S. Institute of Building Documentation (USIBD), USIBD.org*
2) *National Institute of Steel Detailing (NISD), NISD.org*
3) *Building Information Modeling for Masonry Initiative (BIM-M), bimformasonry.org*
4) *BIM Forum, BIMForum.org*
5) *Steel Joist Institute, SJI.org*

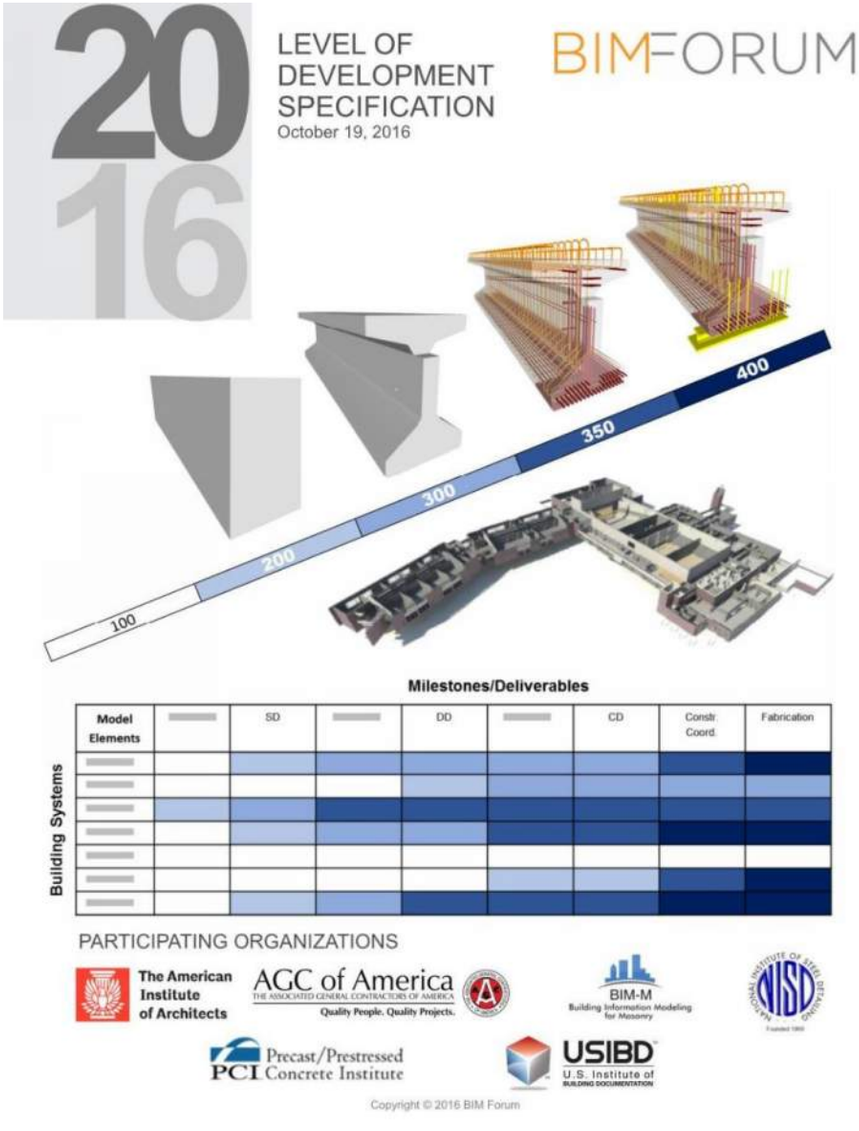
This document is for educational purposes only as part of the CD-BIM training curriculum and certification program. The intended audience is potential CM-BIM candidates who are existing detailers in BIM or students considering a career in creating and developing BIM in the building industry.

This document is free to distribute. Any portions of it that are copied should cite the source.

Setting:

The participant of the CD-BIM program shall read and study this document with the following assumptions. Imagine these circumstances as you read this document:

1) Your job entails modeling in BIM for design, construction or facility management.
2) The company you model for could be an architecture, engineering, discipline-specific focused company or independent modeling and detailing firm.
3) This BxP is issued by a project stakeholder who will lead BIM coordination on a project the firm is proposing on.
4) You have been told that you need to estimate the BIM requirements as part of preparing a budget for your time.
5) The project requires that all modelers involved have a current CD-BIM certificate.



BIMFORUM

Level Of Development (LOD)

BIMFORUM

Level of Development Specification

- Scope cannot address all of BIM
- There is NO LOD of a whole model.
- LOD does not always match design phase.
- **2008** - American Institute of Architects (AIA) First Published definition for 100, 200, 300 & 400 in 2008 E202.
- **2009-10** LOD 350 was authored and first presented at Autodesk University sessions by Ikerd.
- **2011** - BIM Forum LOD Taskforce formed
- **2013** – BIM Forum published the first LOD Spec ratifying LOD 350
- BIM forum LOD Specification is published yearly: ’13, ‘14, ‘15, & ‘16.

In summary these 5 coordinate systems are:

1. **Object / Equipment:** relative system that defines items such as assemblies and equipment.

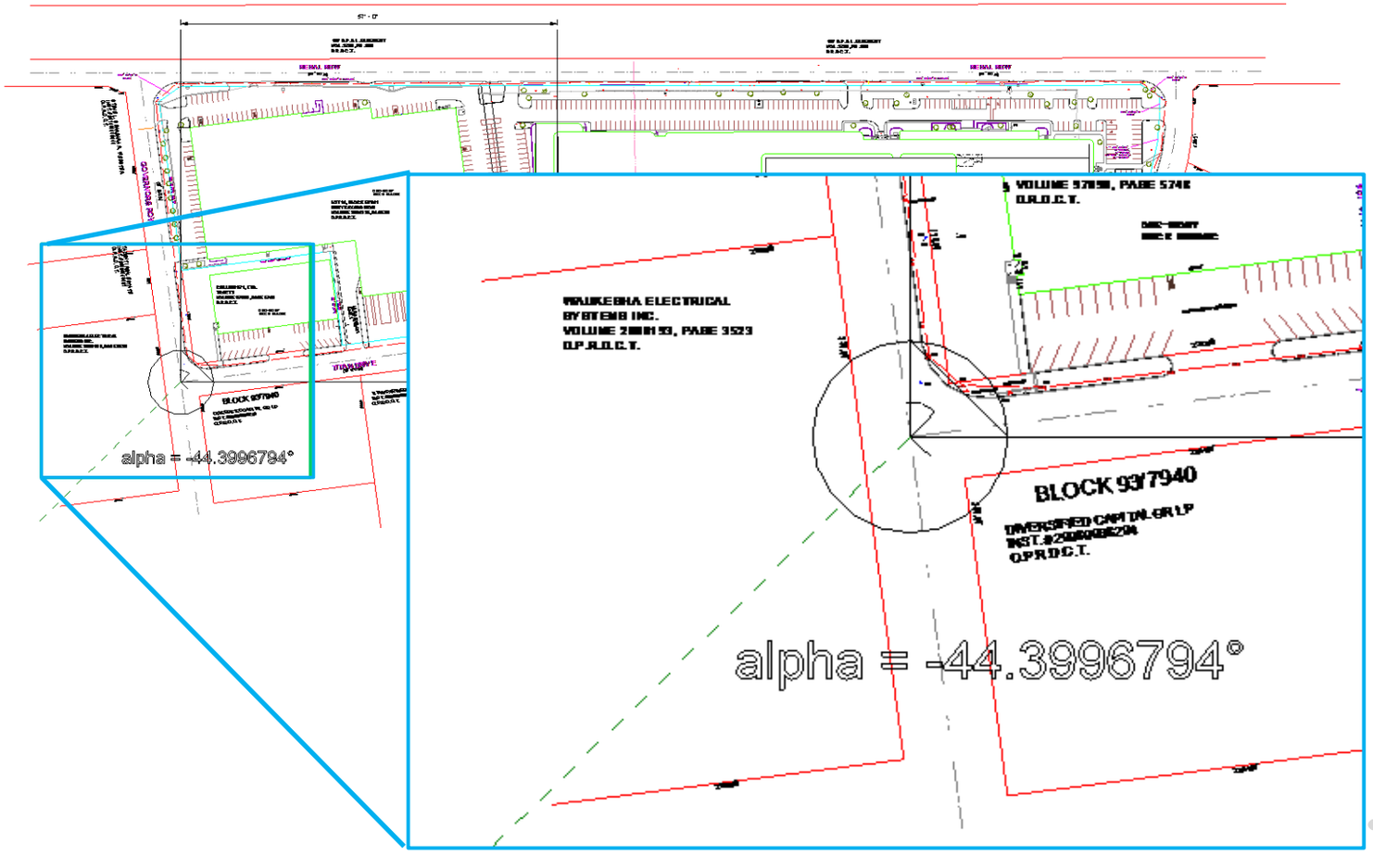
2. **Building, Local**: relative building coordinate system normally defined so that the entire building is in positive point coordinates.

3. **Campus, Site**: relative coordinate system of the building's site defined so that the entire site is in positive point coordinates.

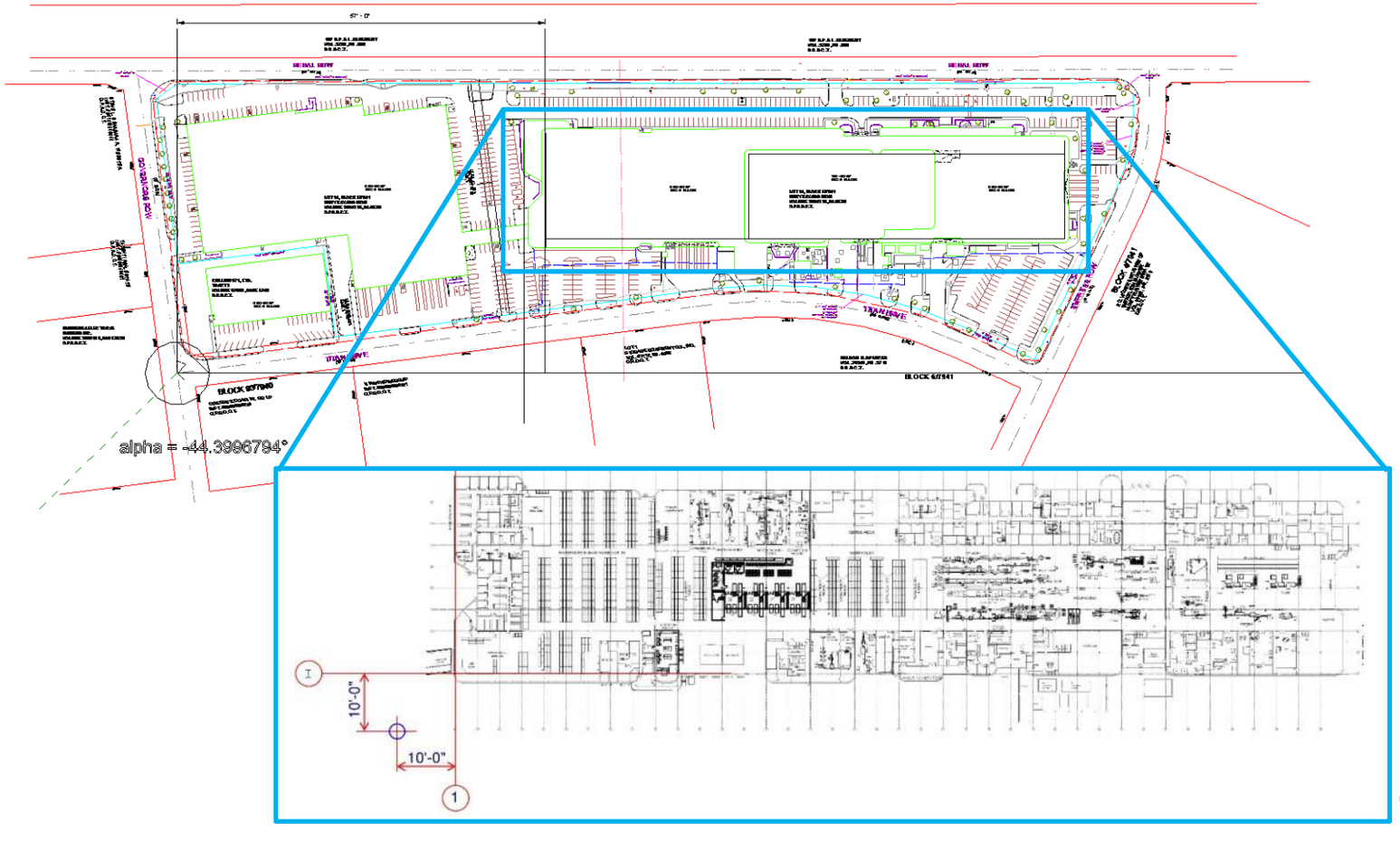
4. **Civil (State Plane):** Absolute coordinate system with Northing and Easting used by surveyors and civil engineers. This is also used by owners tying in their BIM to

5. **Global Coordinates System**: Accounts for the curvature of the earth.

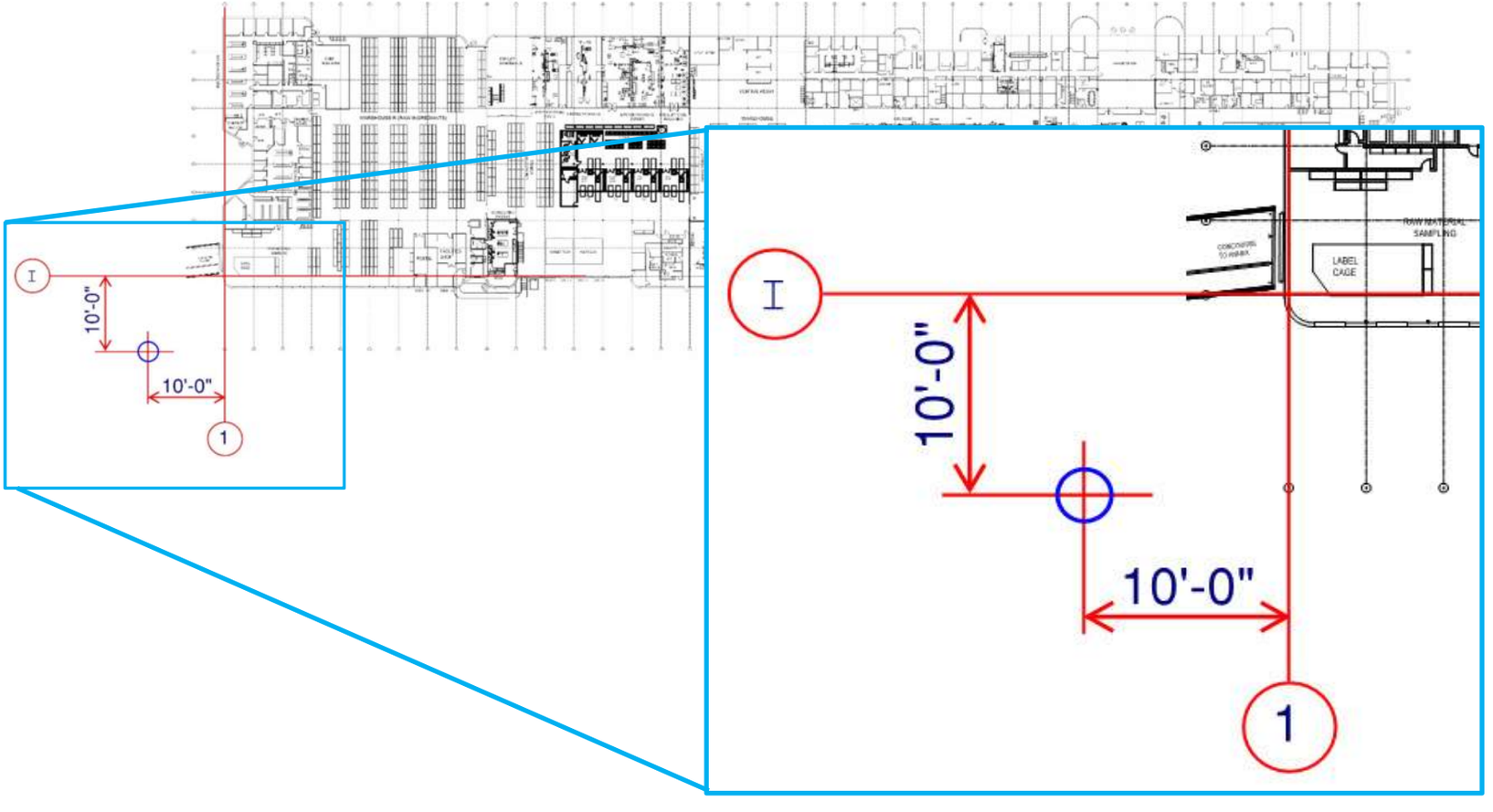
SITE PLAN & CAMPUS COORDINATES



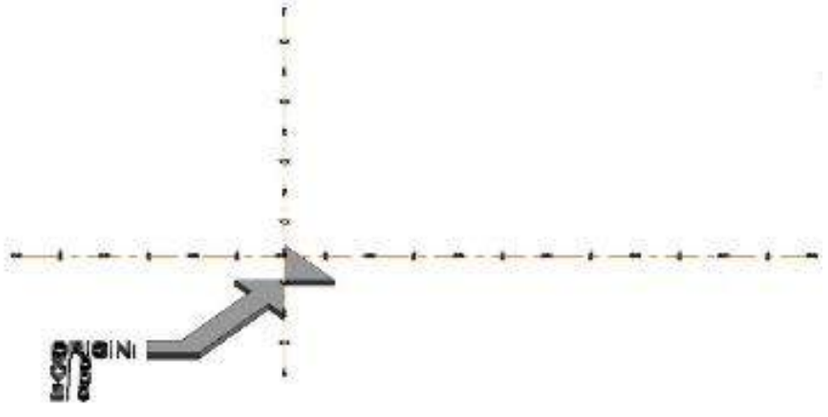
LOCAL BUILDING COORDINATES

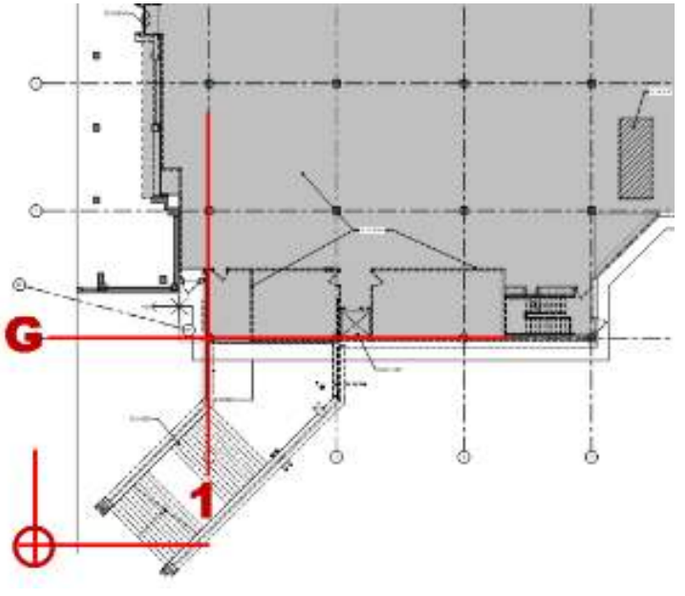


LOCAL BUILDING COORDINATES



BXP Project Coordinates

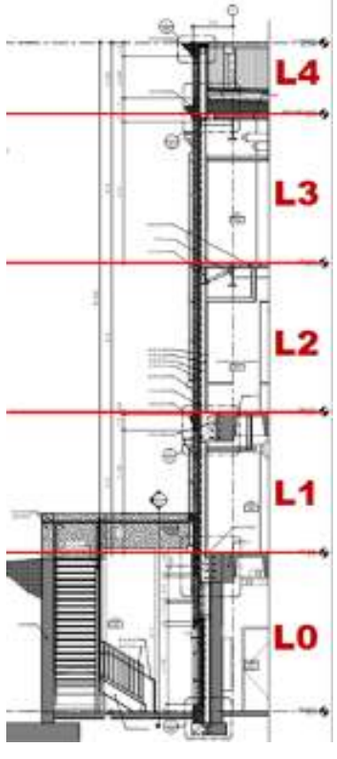




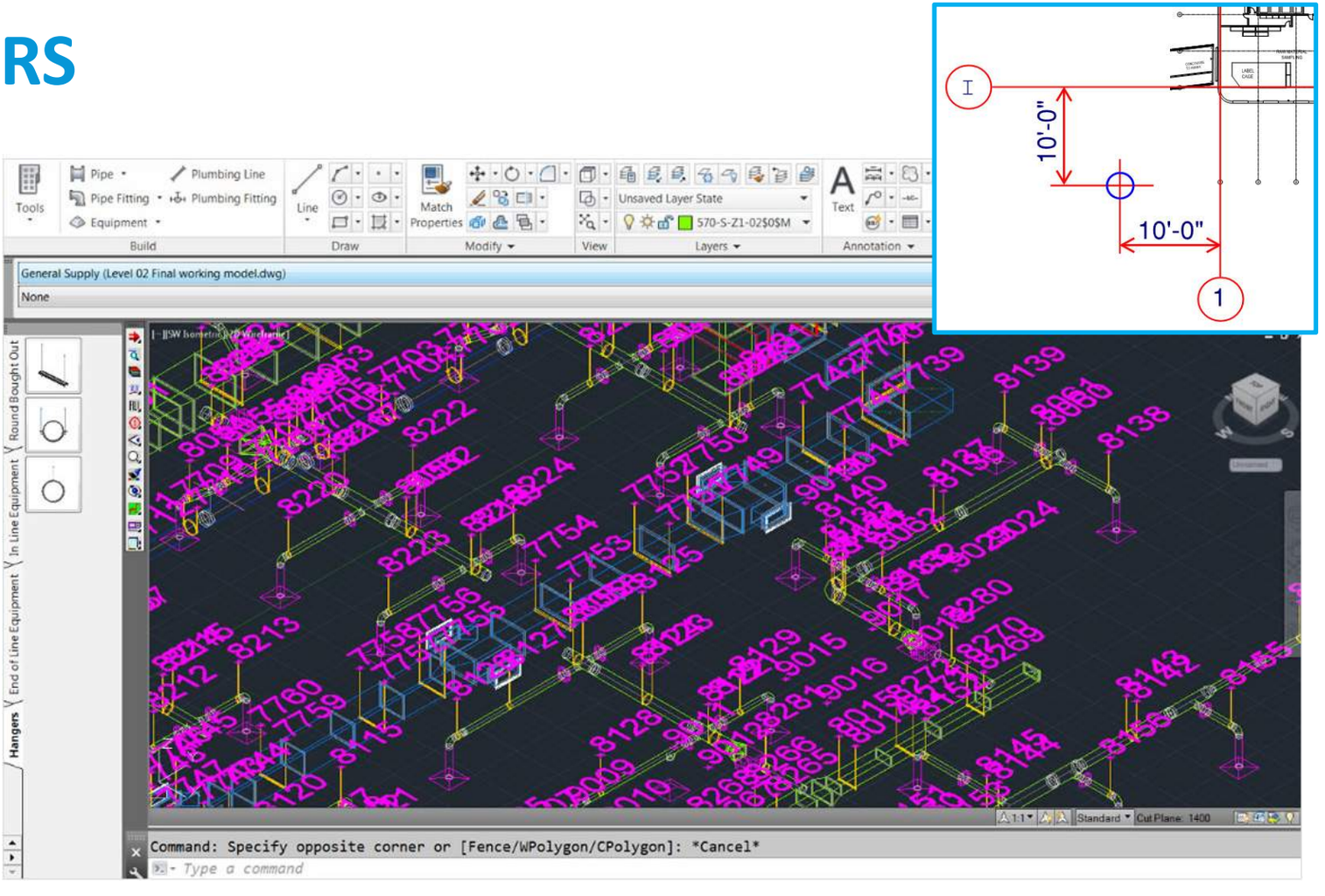
BXP Project Zones

- Defining zones and levels of project
- Note: zones ≠ structural steel sequ.

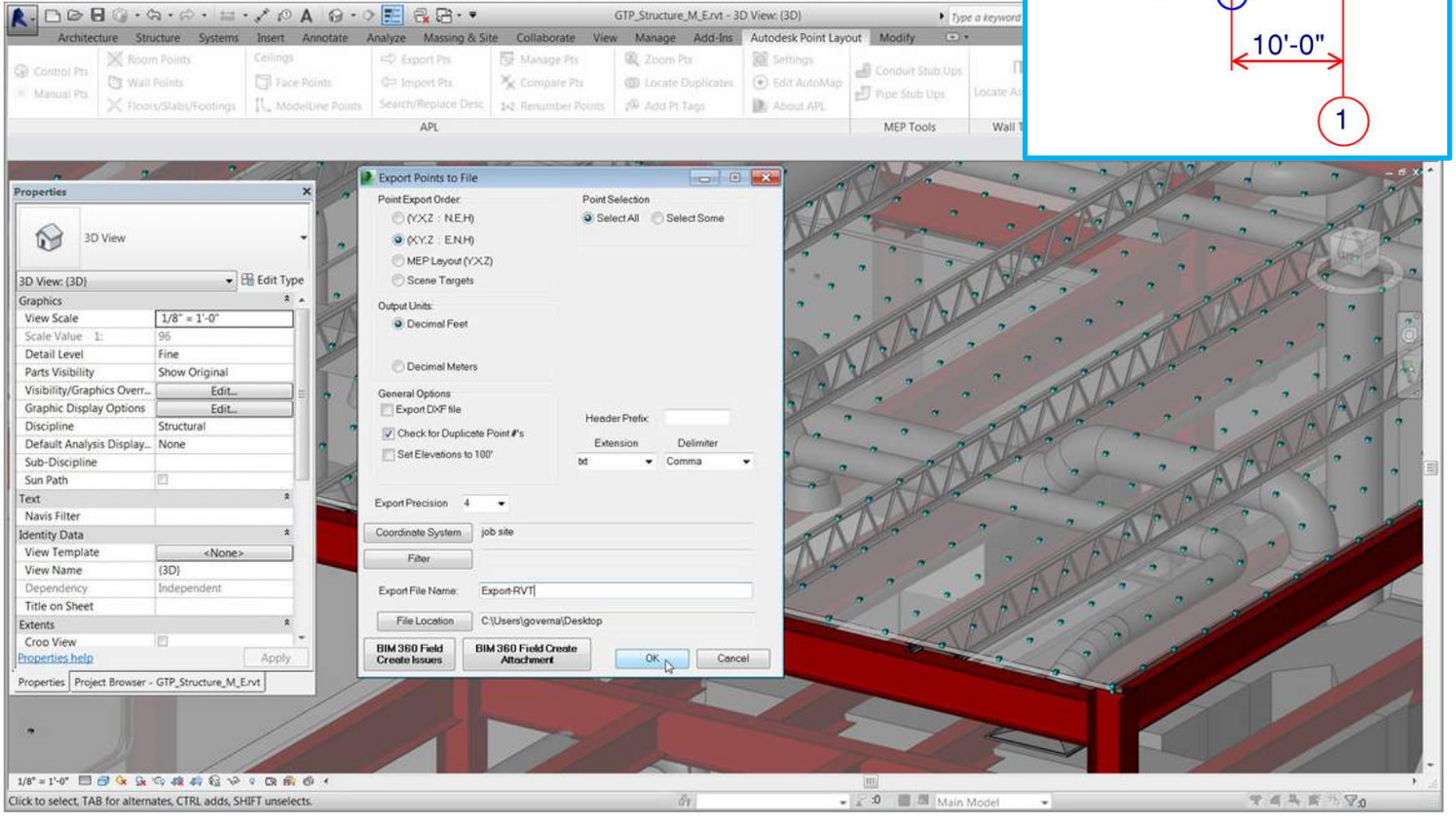
Zone L00: Below [UPDATE PER PROJECT]
Zone L01: EL= [UPDATE PER PROJECT] to [UPDATE PER PROJECT]
Zone L02: EL= [UPDATE PER PROJECT] to [UPDATE PER PROJECT]
Zone L03: EL= [UPDATE PER PROJECT] to [UPDATE PER PROJECT]
Zone L04: EL= [UPDATE PER PROJECT] to [UPDATE PER PROJECT]

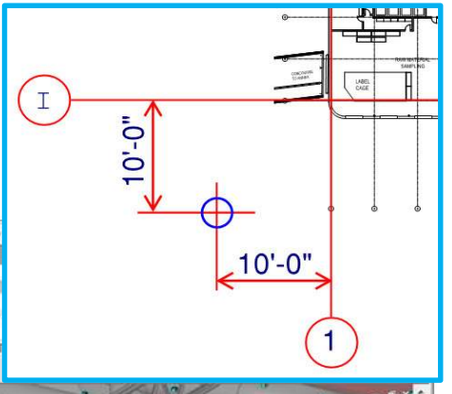


HANGERS

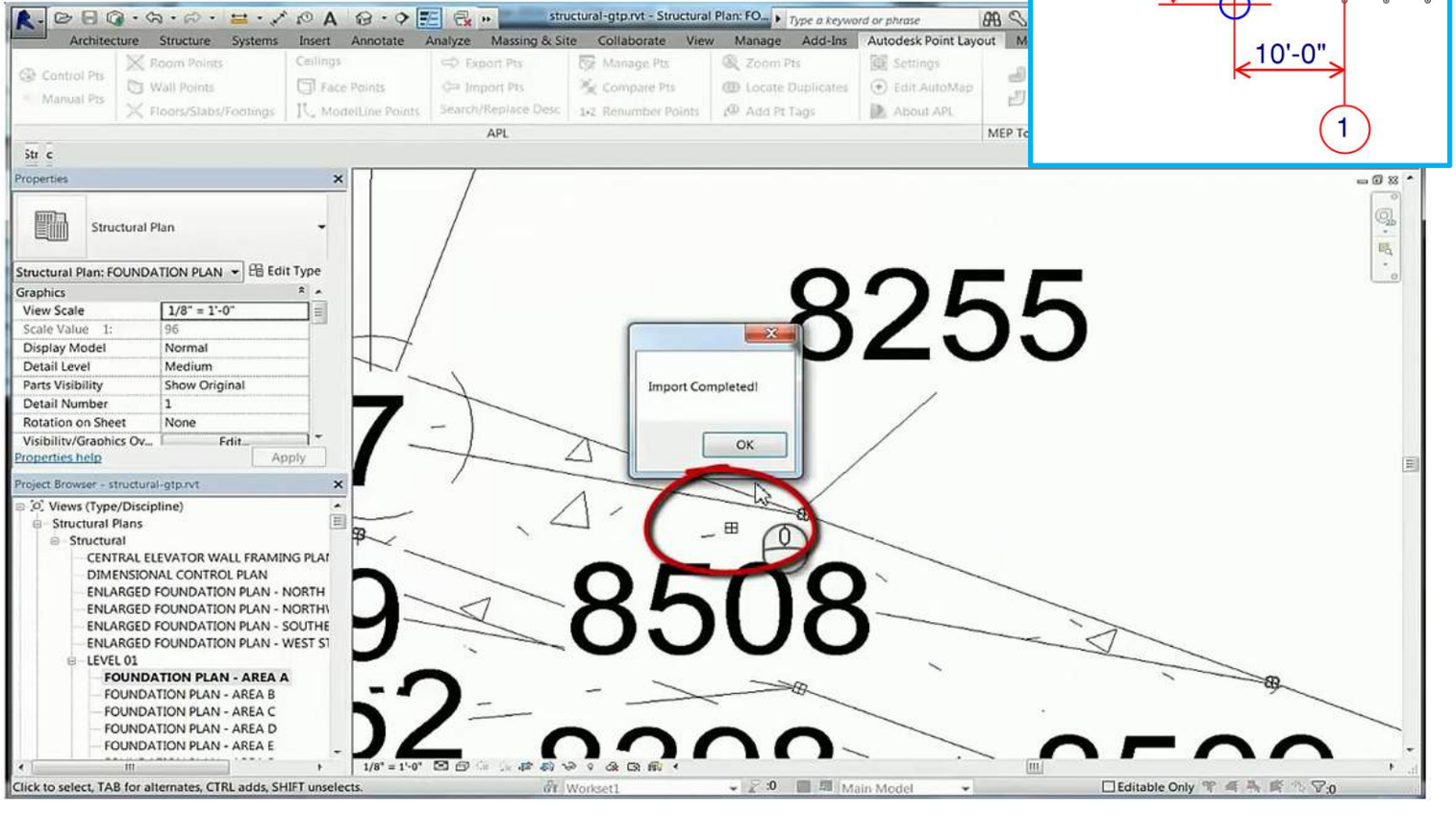

Tools
Pipe
Plumbing Line
Pipe Fitting
Plumbing Fitting
Equipment
Build
Line
Draw
Match Properties
Modify
View
Unsaved Layer State
570-S-Z1-02$0$M
Layers
Text
Annotation
General Supply (Level 02 Final working model.dwg)
None
Round Bought Out
In Line Equipment
End of Line Equipment
Hangers
10'-0"
10'-0"
1
Command: Specify opposite corner or [Fence/WPolygon/CPolygon]: *Cancel*
Type a command

EXPORTING FROM REVIT

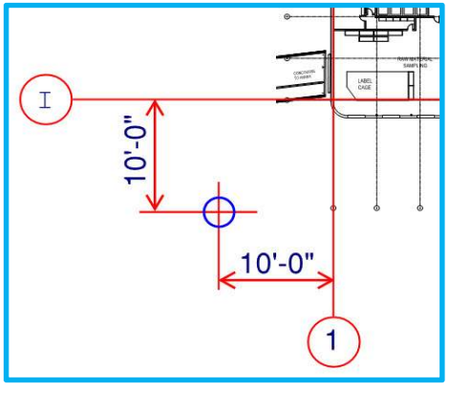




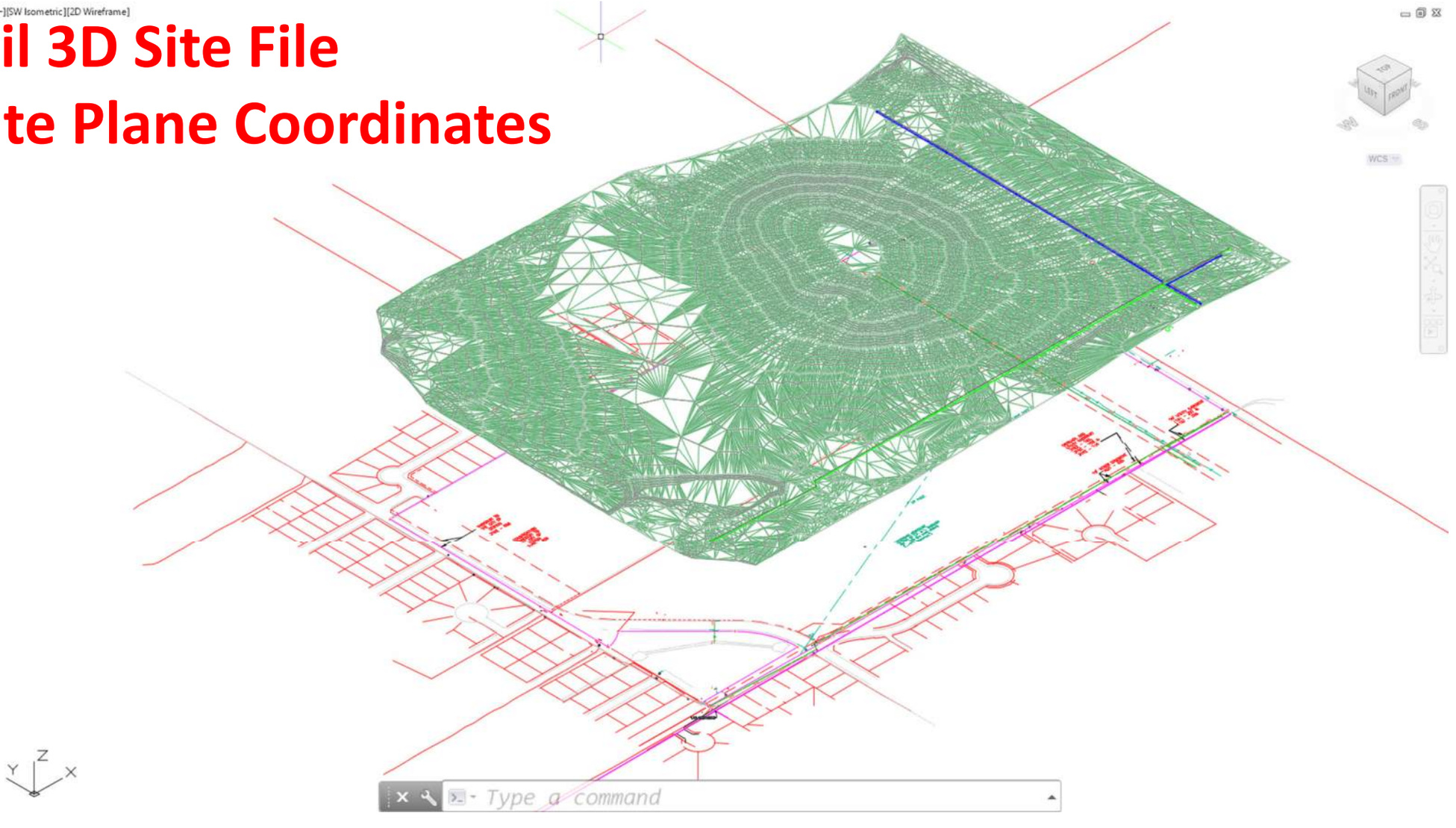
IMPORT AS BUILT POINTS



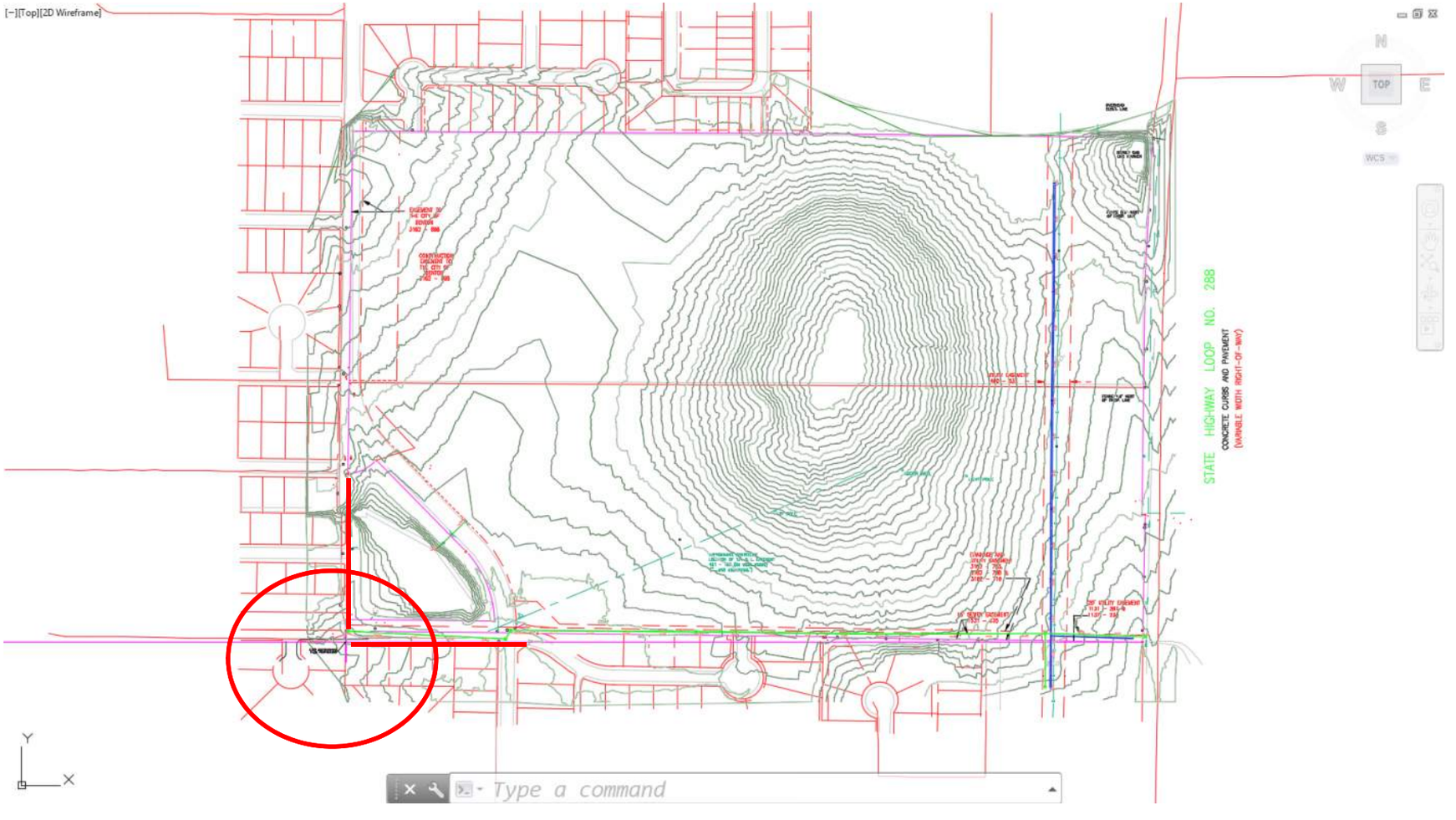
Point Layout



Civil 3D Site File
State Plane Coordinates



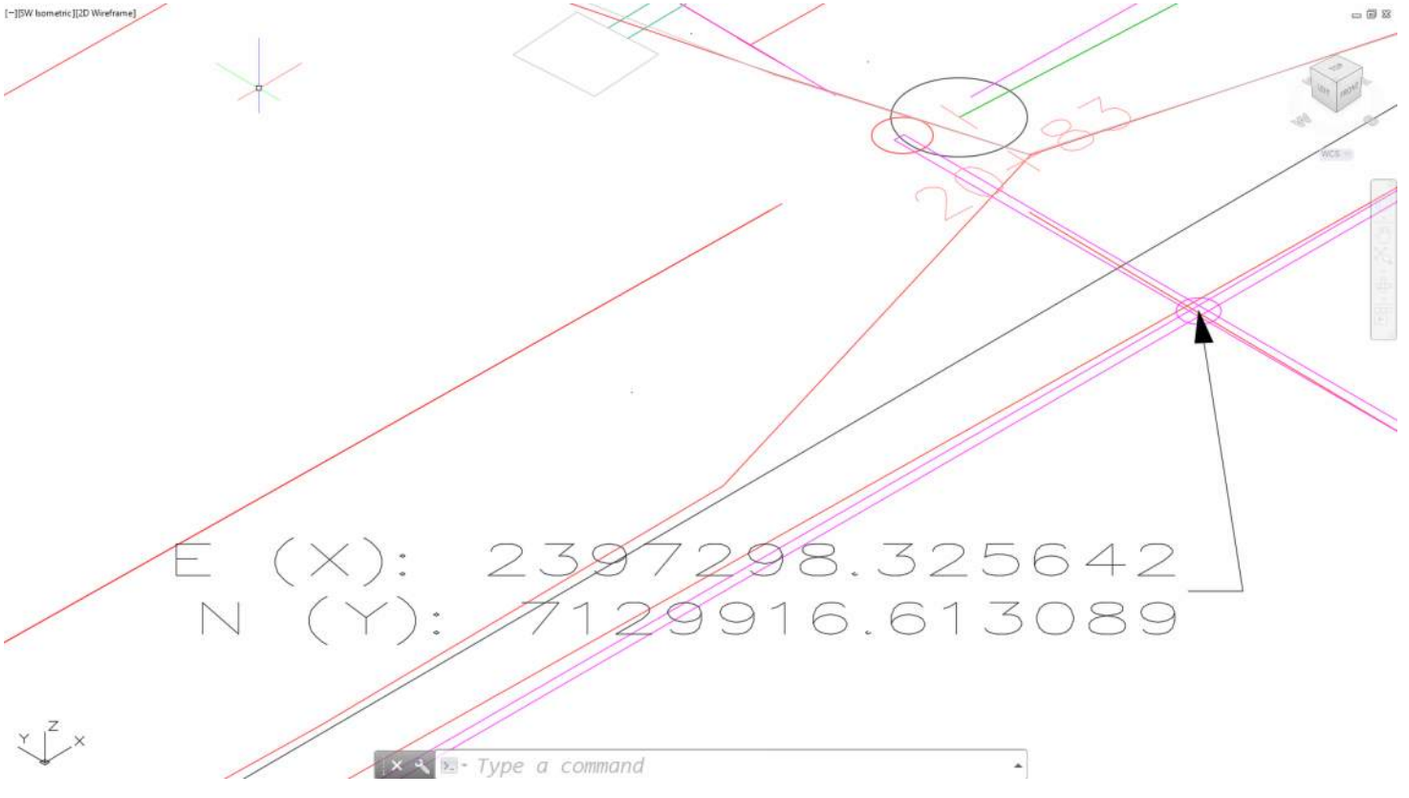
STATE PLANE


[−][Top][2D Wireframe]
N
W
TOP
E
S
WCS
STATE HIGHWAY LOOP NO. 288
CONCRETE CURBS AND PAVEMENT
(VARIABLE WIDTH RIGHT-OF-WAY)
Type a command

STATE PLANE COORDINATES

State Plane

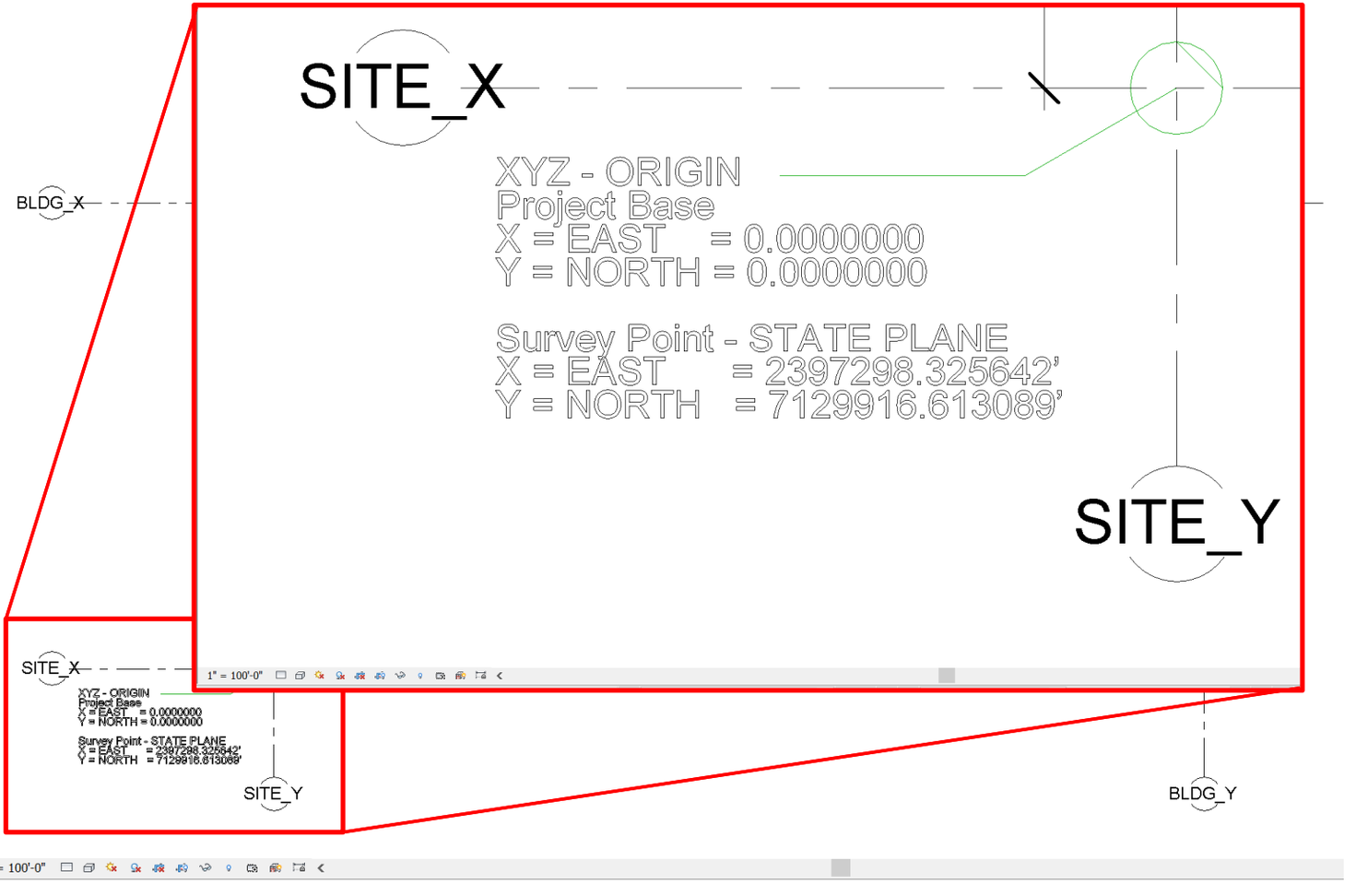
E (X) = 2397298.325642’
N (Y) = 7129916.613089’



LOCAL SITE PLAN

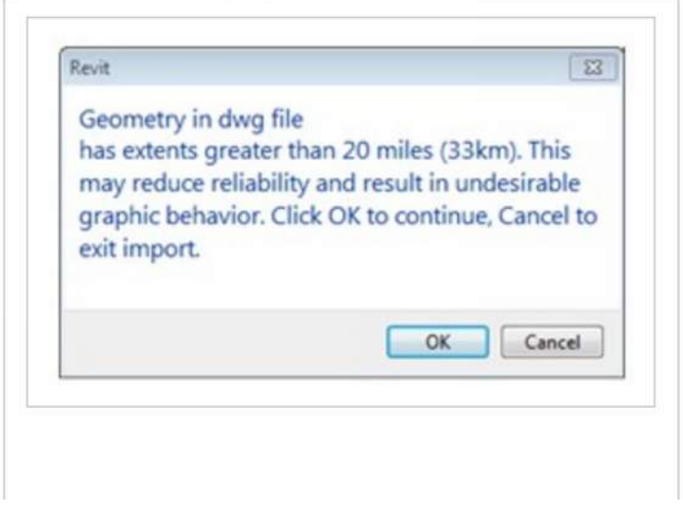
Make 3D model text of the coordinates.

Note the local and State Plan Coordinates.



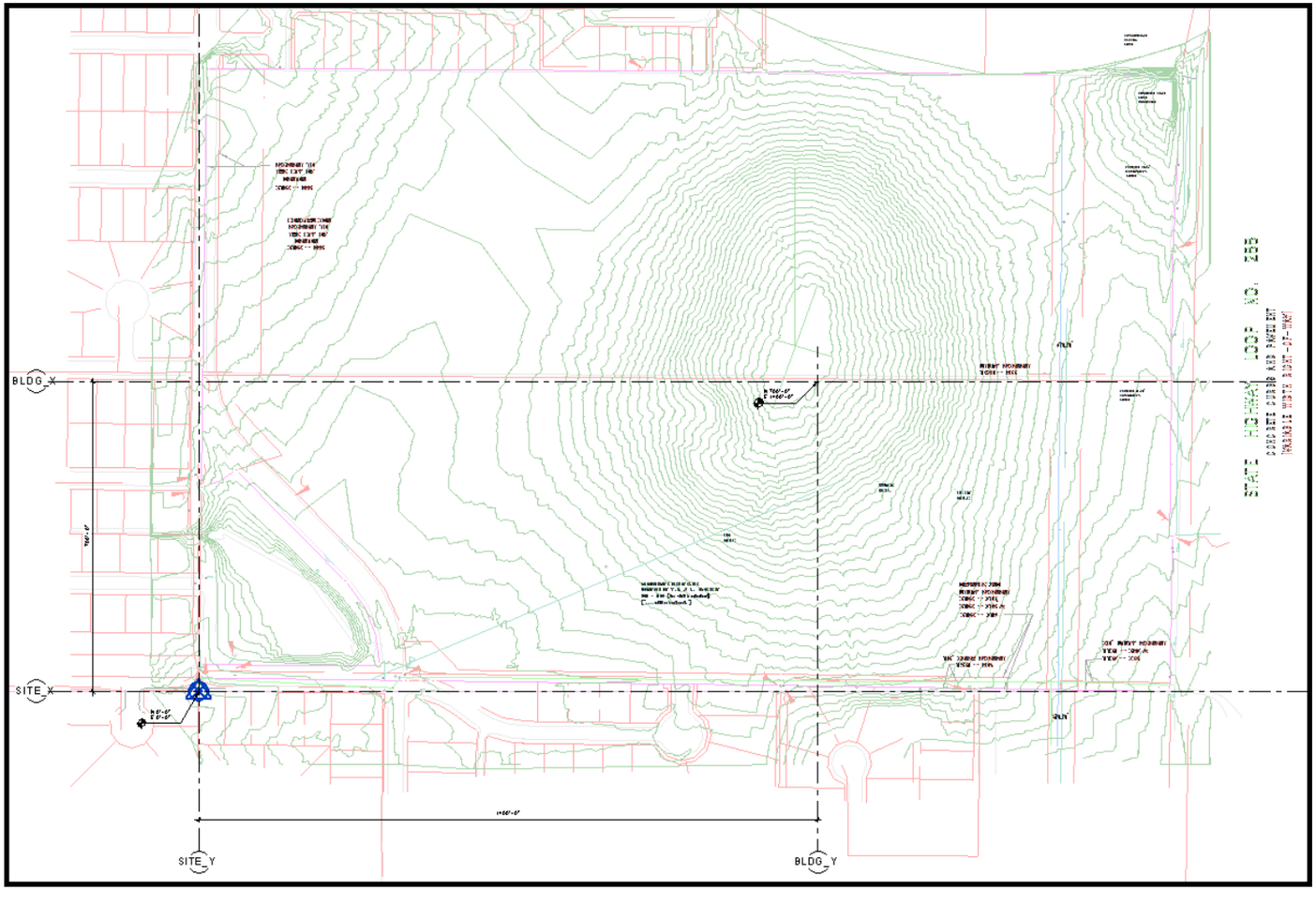
Revit 20 Mile Limit

For Revit 2011 and later versions the limit has been increased to 20 miles. You will still receive the following error if attempting to import geometry over the 20 mile limit however you can choose to continue in 2011 products.



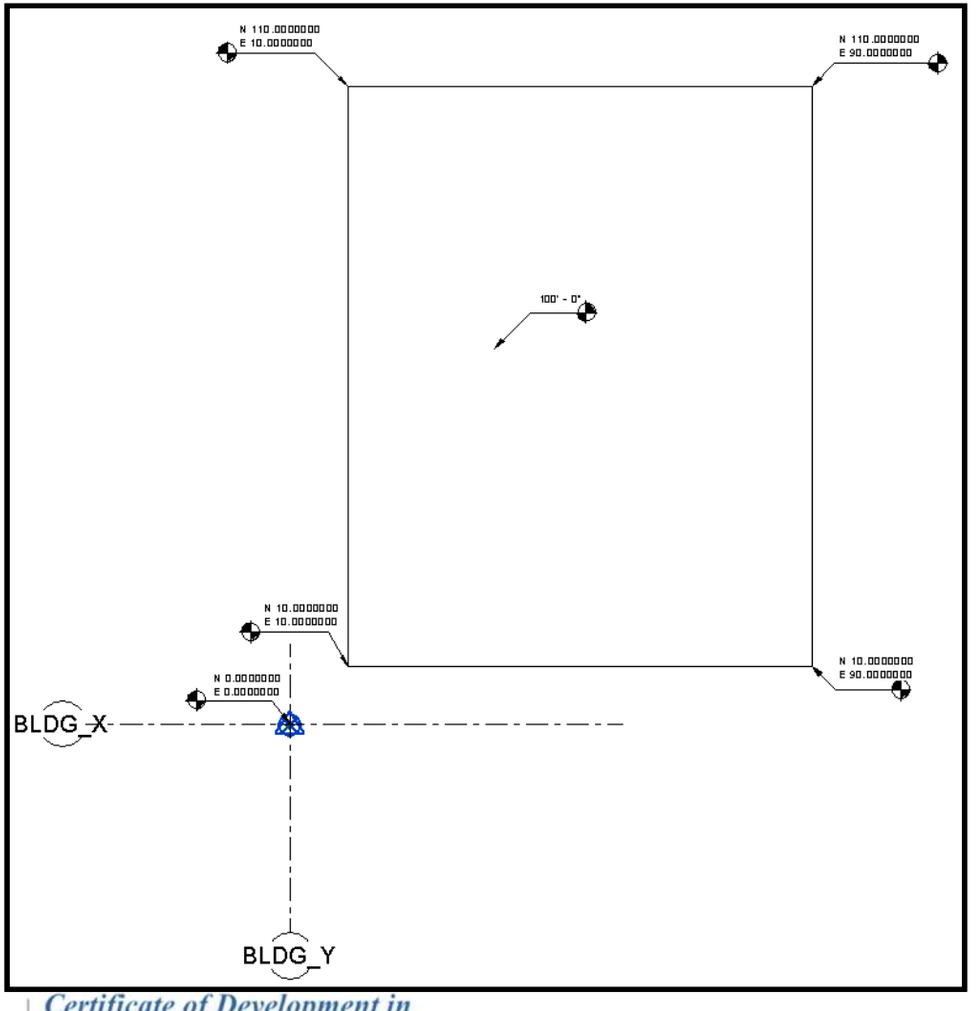
Step 1: Site Model

- Determine the site coordinate point.
- Move the Civil 3D file site coordinate to 0,0,0
- Bring the Civil 3D file into Revit “Origin to Origin”.
- Lay out building survey point on the site.



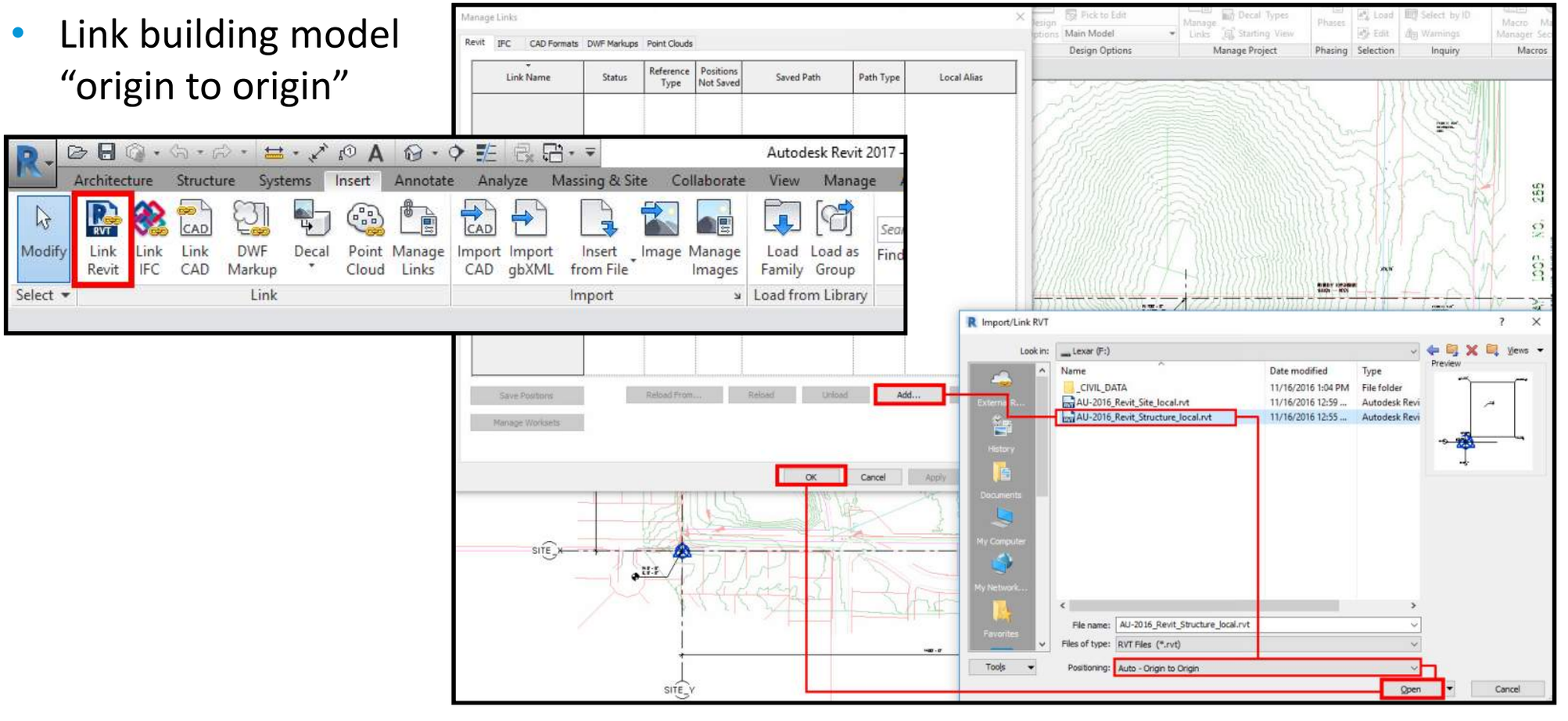
Step 2: Building Model

- Model the building 10’-0” North and East from the origin point.



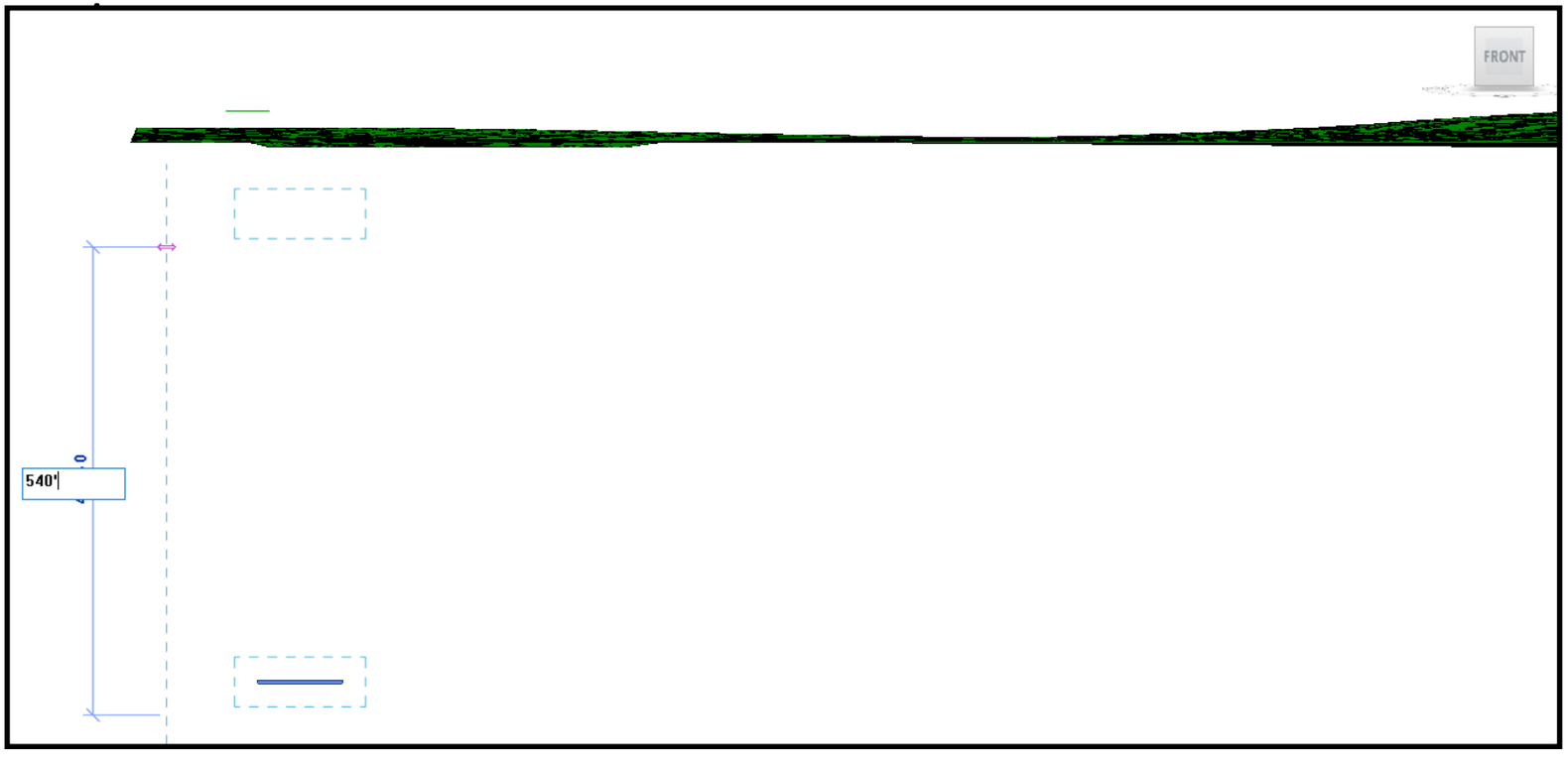
Step 3: Site Model

- Link building model “origin to origin”



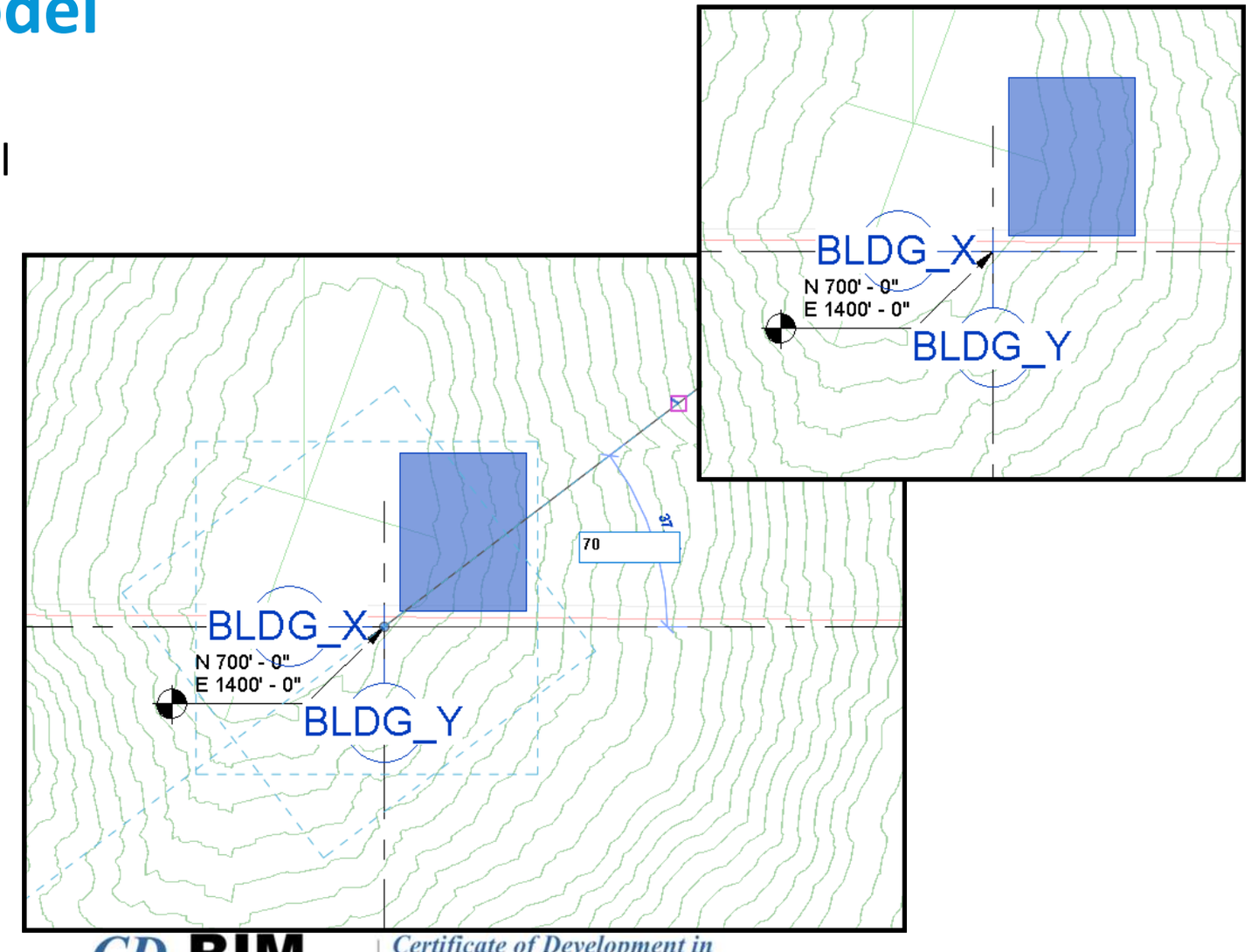
Step 4: Site Model

- Move the building model 540’-0” the Z direction



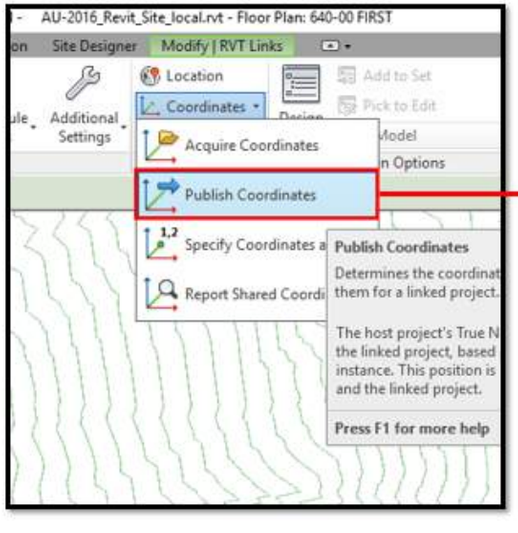
Step 5: Site Model

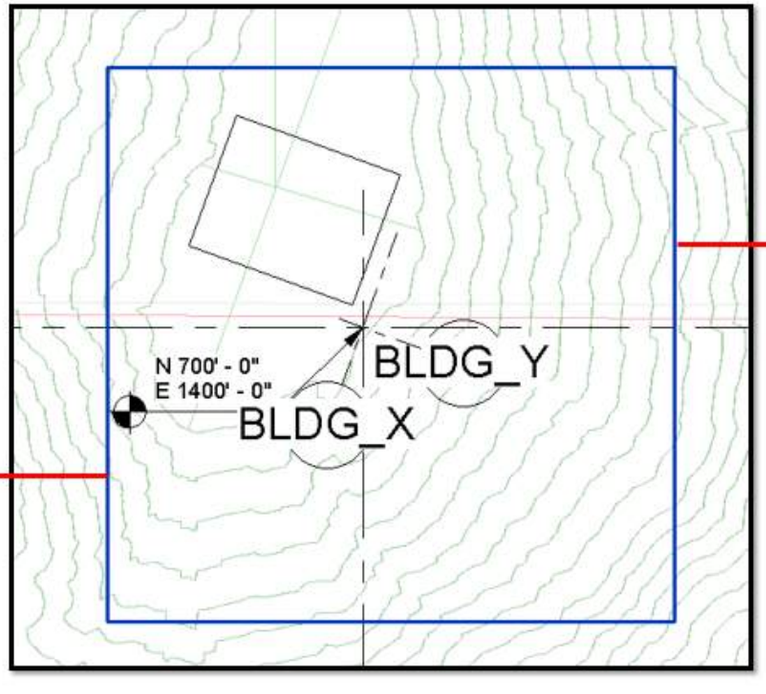
- Move building model to the building site origin in the site model.
- Rotate the building model into place from the site point 70 degrees

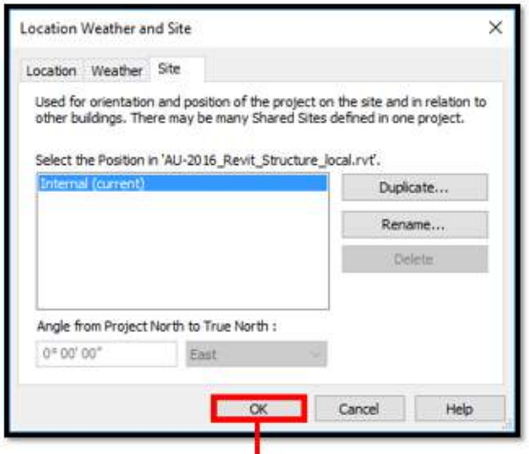


Step 6: Site Model

- Publish coordinates
- Select building model
- Click “OK”

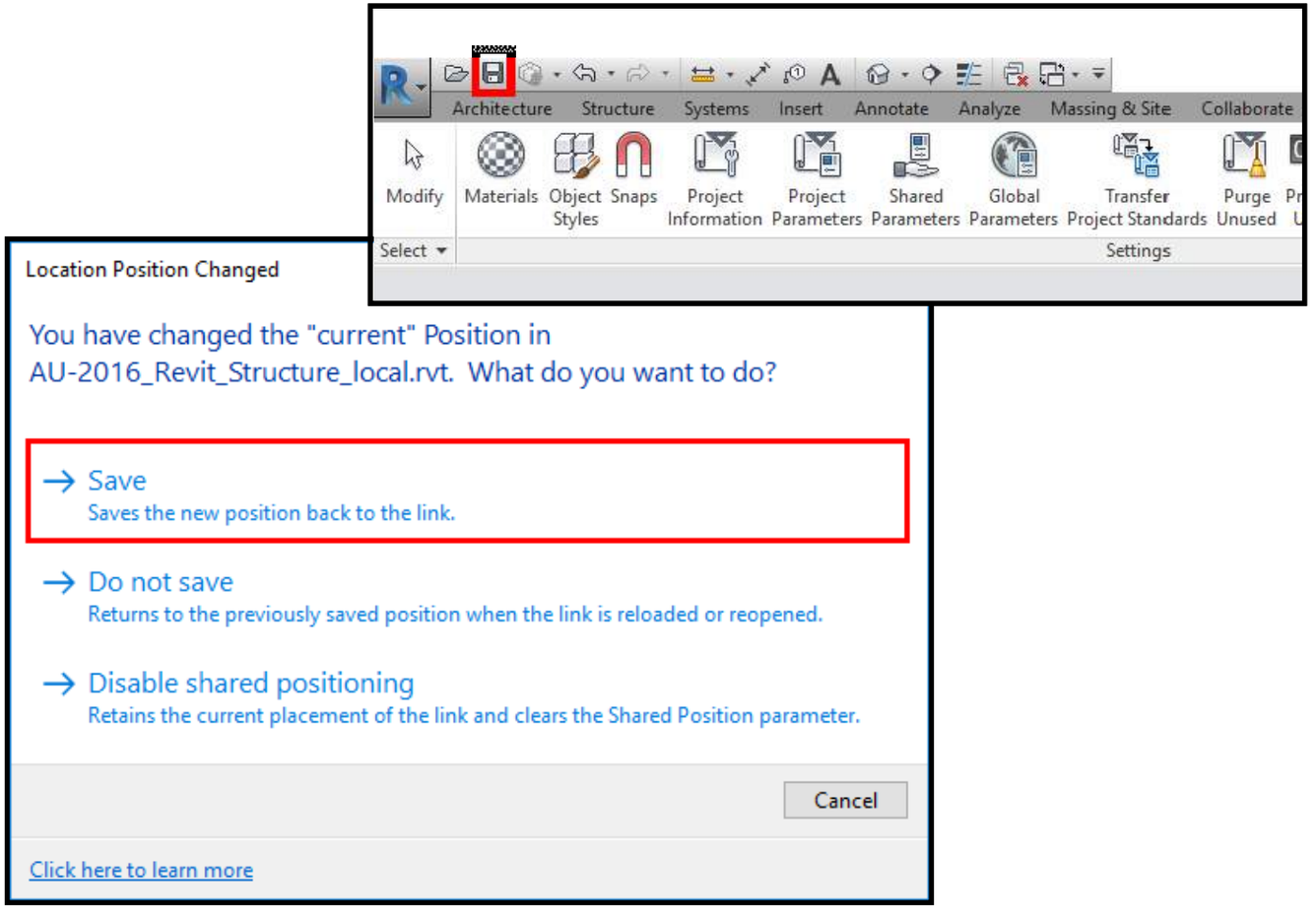






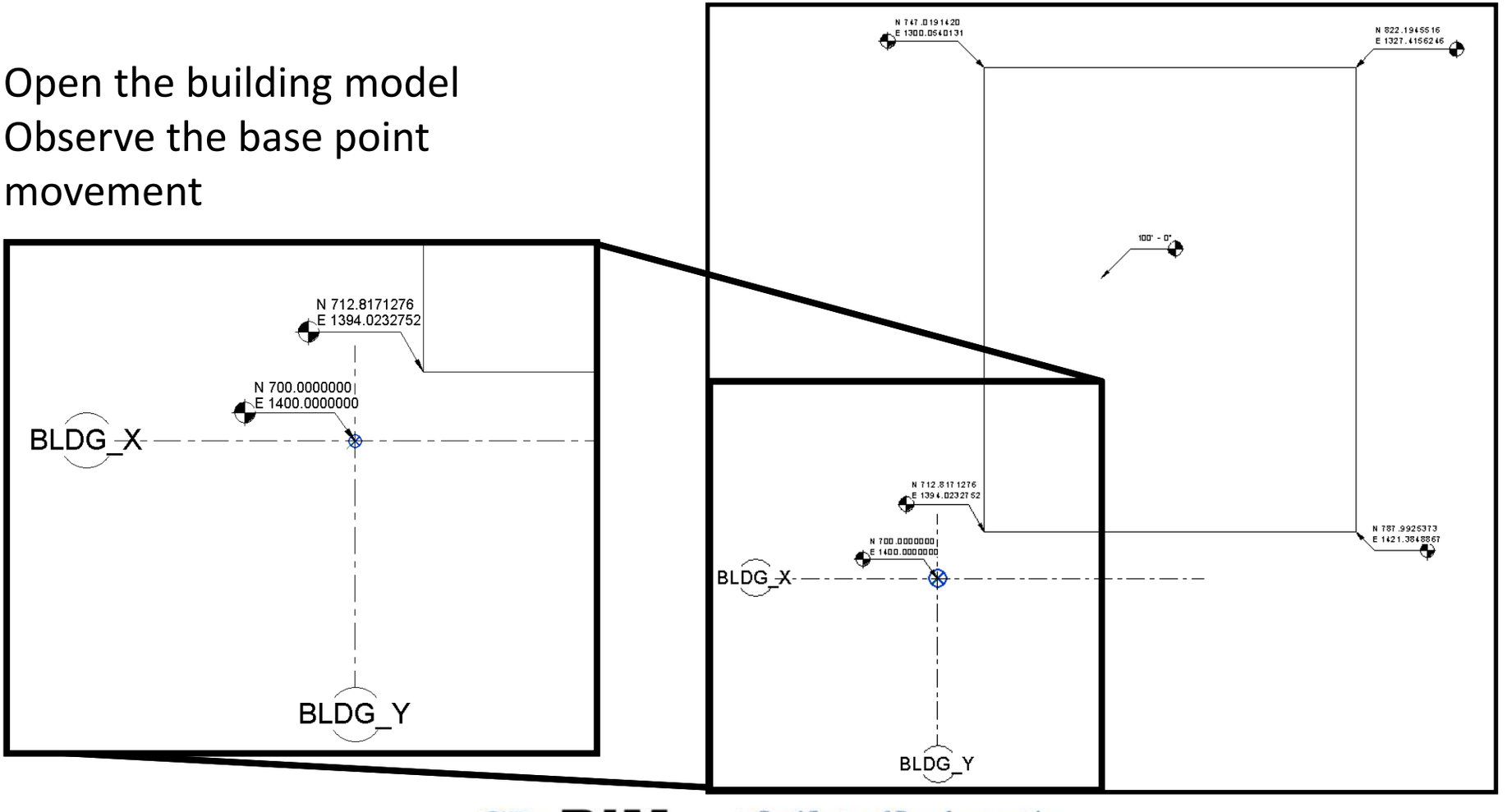
Step 7: Site Model

- Save site model
- “Save the new position back to the link”

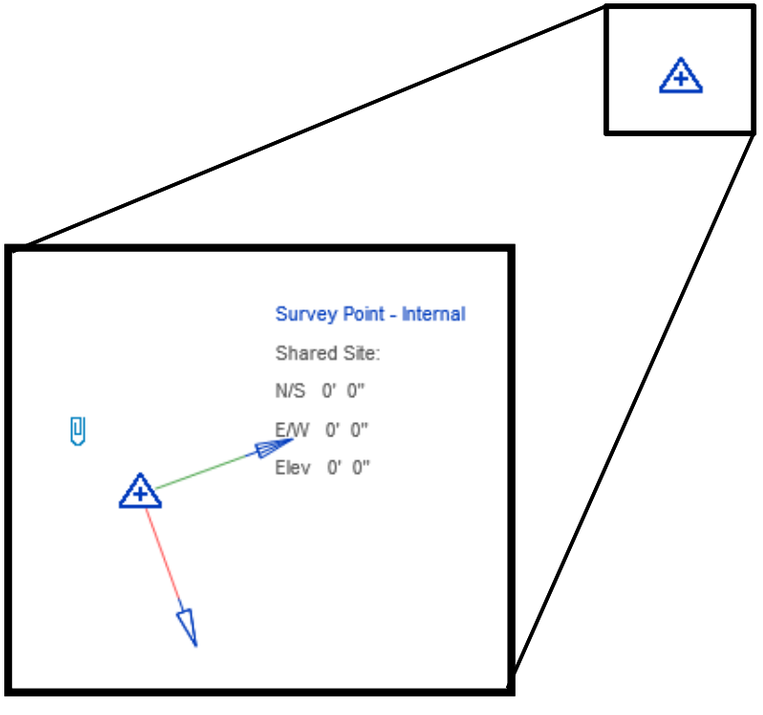


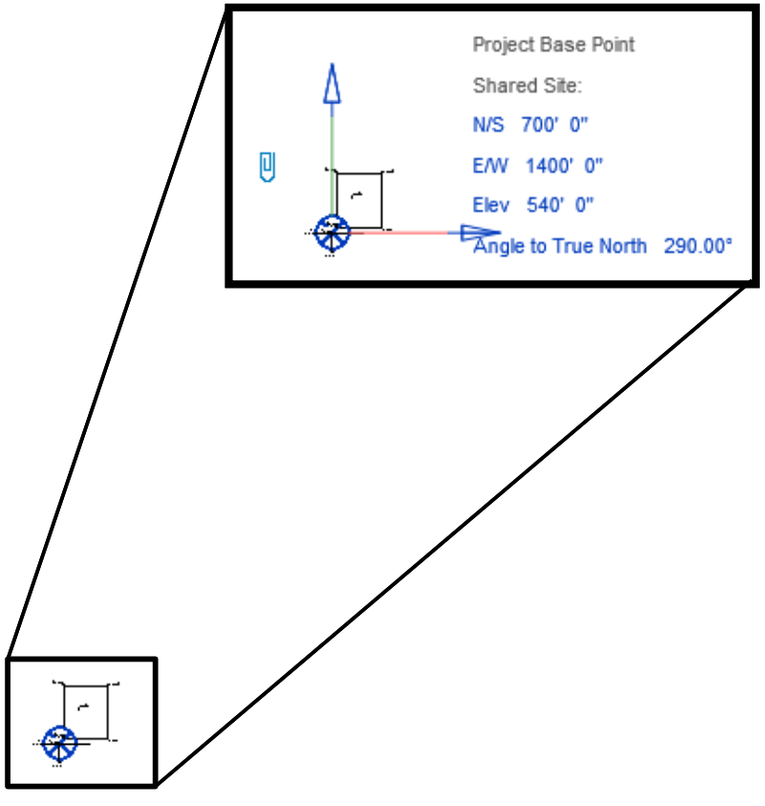
Step 8: Building Model

- Open the building model
- Observe the base point movement



Step 8: Building Model





LIVE ONLINE TRAINING FOR LOD & LOA

CD-BIM.com

Certificate of Development in

Building Information Modeling

Solution: CD-BIM.com

Certificate of Development in BIM

1) Free Training Content
2) Basics of BIM for Modelers with BIM Forum LOD & USIBD LOA
3) Simple Online 1 hr Validation
4) Targeted at beginning and experienced BIM team members

CD-BIM.com
Certificate of Development in
Building Information Modeling

Workshops: CD-BIM Part 1 Certification with LOD & LOA

Visit:

CD-bim.com/workshops/

8am-noon PT

Dec. 16, 2016 has a discount code "BIM20" for 20% off

Friday, January 20, 2017
Friday, February 17, 2017
Friday, March 17, 2017
Friday, April 21, 2017
Friday, May 19, 2017
Friday, June 16, 2017
Friday, July 21, 2017
Friday, August 11, 2017
Friday, September 15, 2017
Friday, October 20, 2017
Friday, November 17, 2017
Friday, December 15, 2017

THANK YOU!

Will Ikerd, PE, CM-BIM

info@IKERD.com

IKERD.com

@IKERD_com