

AS126223

AutoCAD Civil 3D, InfraWorks, and Revit Working on a Connective Workflow

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Learning Objectives

- Port content to InfraWorks for presentation to AutoCAD Civil 3
- Register locations (Acquire or the AutoCAD Civil 3D plug-in) to publish to Revit
- Isolate content in AutoCAD Civil 3D for more-effective porting to Revit
- Export the content in a Revit-friendly format
- Compact the Revit site
- Import the site to Revit & Set the site coordinates
- Register locations (Acquire or the AutoCAD Civil 3D plug-in) to publish to Revit
- Port content to InfraWorks for presentation back to AutoCAD Civil 3
- Recognize options for pushing to Revit LIVE, or other possibilities using 3D rendering in the cloud to push for phone VR and VR appliances

Description

In this session, we'll go over the details of how to keep and maintain civil site plans in AutoCAD Civil 3D software, export those to Revit software and Collaboration for Revit cloud service, and incorporate both in InfraWorks software for sharing and presenting.

Speaker: Mike Smith, PE

Civil Project Engineer, Transportation – Rocky Mountain Area

Mike is a civil project engineer at AECOM in Denver, Colorado where he works primarily in land development and transportation. His portfolio contains a variety of projects ranging from commercial development, subdivisions, urban roadway design, waste water system design, and potable water transmission/treatment. Mike is an expert Civil 3D user who manages his group's Civil 3D template and develops custom styles, subassemblies and pipe network parts for designs. Mike has been using InfraWorks in his design workflows for the past two years and has successfully utilized the software on several real-world projects. He is a member of AECOM's Rocky Mountain Area Virtual Reality Task Force and is considered the resident Civil 3D and InfraWorks expert within the Denver Transportation business unit. Mike is licensed professional engineer in the state of California.

Speaker: Ron Allen

Area BIM Manager for the Rocky Mountain Region (CO, AZ, NM, UT)
AECOM B+P (Buildings and Places) Greenwood/Denver Office.

Ron's career has been constantly evolving and refining process and production with emerging technologies. In 1998 he had Bachelors in Architecture with undeclared minors in Art and Computer Science.

As a BIM Tech evangelist, Ron has production experience in virtually all market sectors in Architecture beginning in 1998. This has followed an interest since 1994 in 3D production & modeling platforms and focus on Revit from 2006 on. Ron works with Boyd Johnson and a talented design team out of AECOM Denver B+P to provide vision and integration of current and emerging technologies for in house projects and provides BIM and consultancy to multiple project types through AECOM.

In his current position at AECOM he is continuing the integration and exploration of new and useful technologies including Databases, LIDAR, UAVs, Photogrammetry, IOT, Electronics, VR, AR, Model manager, Model compare, the A360 Suite including Autodesk Navis, C4R, BIM 360 Glue, Docs.

Co-Speaker: Matthew Anderle

Building Information Modeling (BIM) director for the Buildings+Places (focus on the Americas)

Matthew Anderle is the Building Information Modeling (BIM) director for the Buildings+Places business line of AECOM, with focus on the Americas. He is a BIM and technology evangelist with over 17 years of experience establishing global BIM workflows and standards around content, training, interoperability, and BIM consultation as a service. His experience spans over multiple market sectors with emphasis on large healthcare facilities, data centers, aviation, government projects, and science facilities. Mr. Anderle serves AECOM as a leader in the advancement and efficient implementation of BIM processes for a variety of project types. He manages and directs large distributed project teams to successfully implement BIM collaboration workflows, enabling global offices to work as one entity.



Forward

This handout provides a comprehensive guide to a connective workflow between Infracore, AutoCAD Civil 3D and Revit. In order for this workflow to be successful, Architects and Civil engineers must understand their respective roles to coordinate properly. Throughout the handout learning objectives have been designated by discipline using parentheses.

Learning Objective: Port content to InfraWorks for presentation to AutoCAD Civil 3D (Civil Engineer)

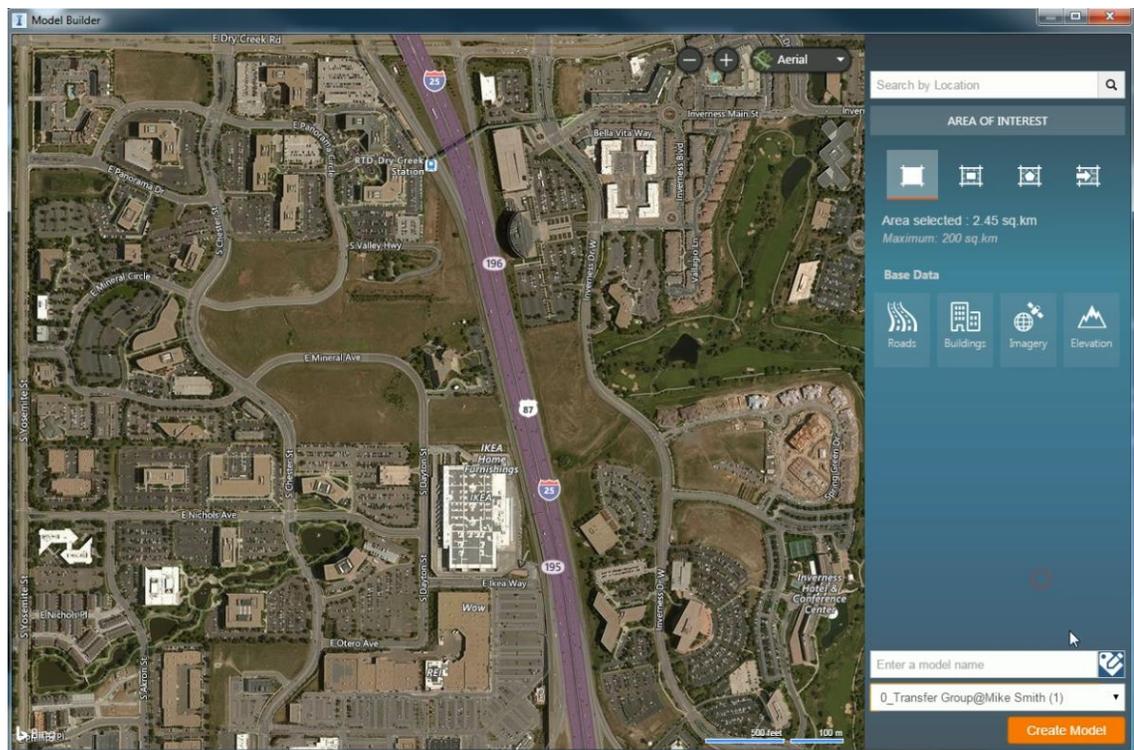
In this section we'll learn how to import an InfraWorks model into Civil 3D and merge the InfraWorks model data with your project Civil 3D data.

Create InfraWorks Model

Unless you already have a large amount of contextual data surrounding your site, I always recommend starting your InfraWorks model from model builder. Beginning in model builder will allow you to automatically generate contextual data which you can later parse to fit your project needs.

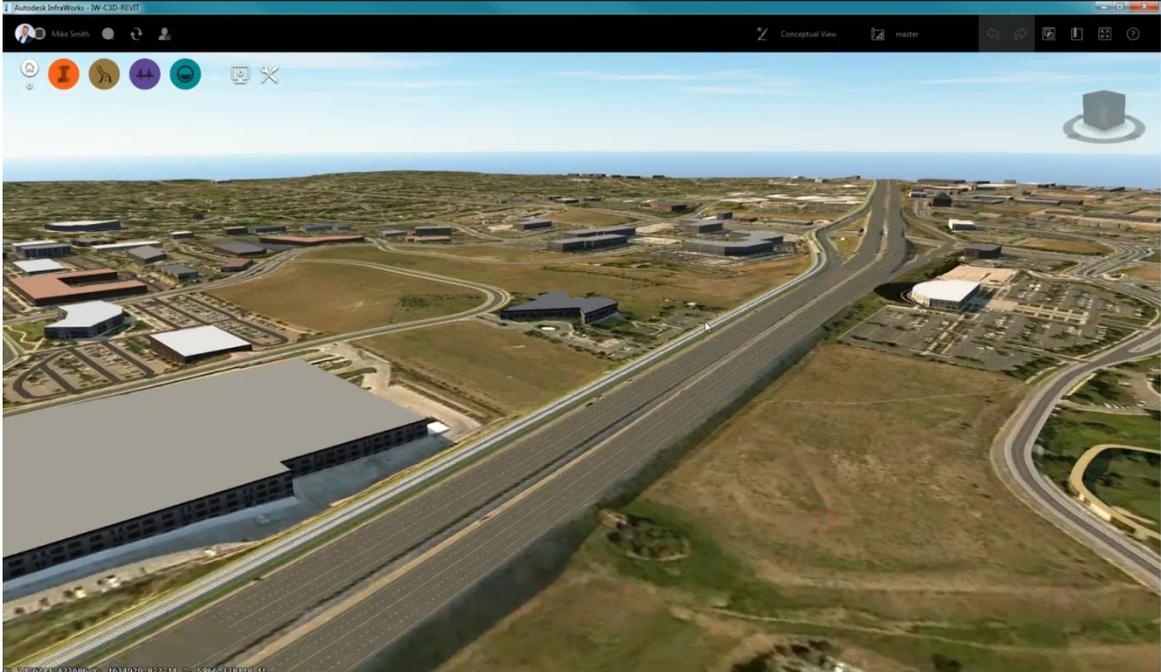
Model Builder

Model builder is very simple to use. Just open up the model builder pane and navigate to your project's location by either using the search bar or by manually zooming into the AOI. Once you've found your project location set the AOI using one of the model builder options, name your project and assign it to an appropriate group. Once satisfied with the AOI, model name and group. Click the create model button. You will receive an email notification when your model is compiled.



1 - InfraWorks Model Builder Pane

Once you receive the email notification, open the model and verify that the model has been generated properly. You should also use this opportunity to add any additional GIS data that you want to supplement your model with (e.g. better GIS terrain, flood boundary shapefiles, more refined building outlines, etc.).



2 - InfraWorks Model Created Using Model Builder

The last step in initializing your InfraWorks model is change the model UCS to the coordinate system that you're designing in. To do this, open up the InfraWorks model properties pane by selecting the tools button, then the model properties button.

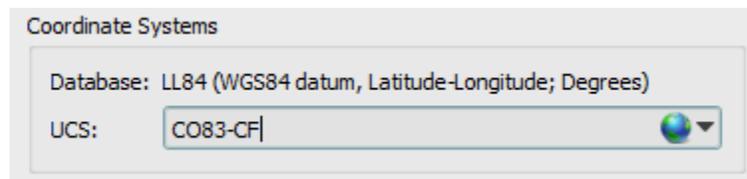


3 - InfraWorks Tools Button



4 - InfraWorks Model Properties Button

Key in your project's coordinate system code or use the world icon in the dropdown to set the UCS to the proper system. Take this opportunity to also verify other options are set properly (i.e. design standards, model extents, etc.)

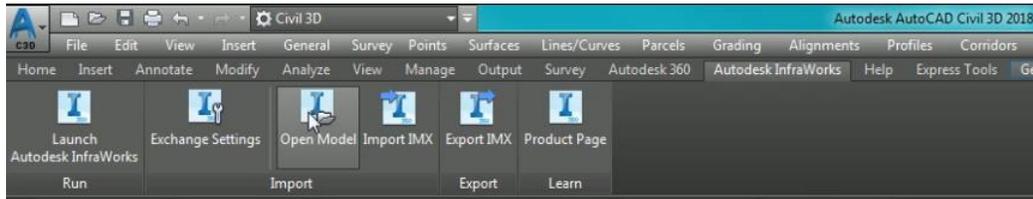


5 - InfraWorks Model UCS

Open Infraworks Model in AutoCAD Civil 3D

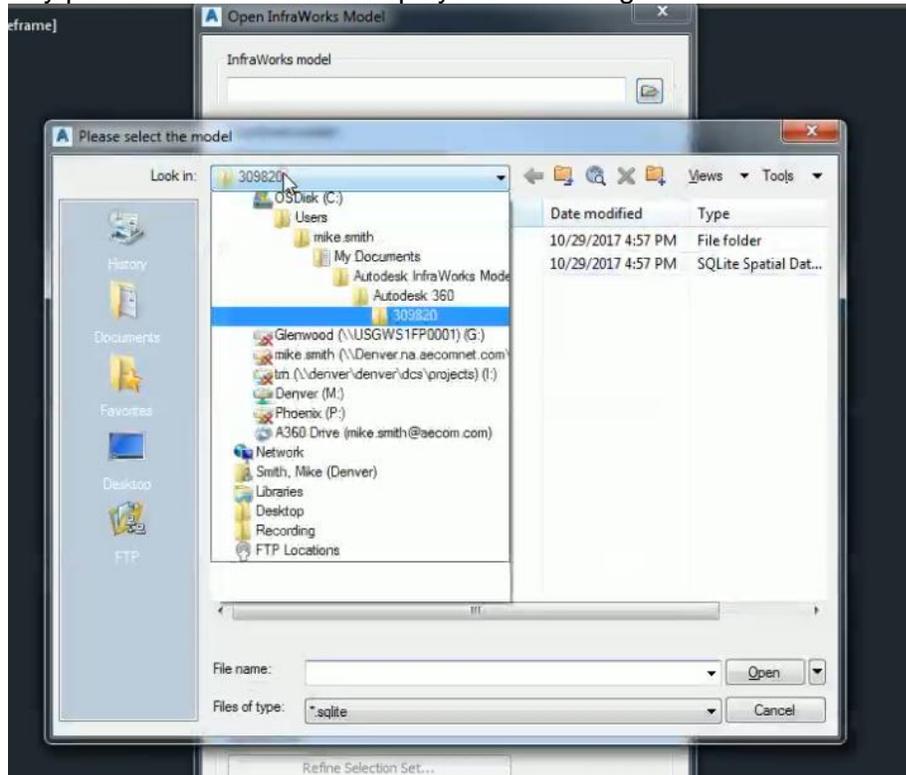
Once your InfraWorks model has been created and customized to your liking, you need to close InfraWorks completely before you can open it in Civil 3D and extract any relevant data. Prior to Civil 3D 2018, you had to export the InfraWorks model to a .IMX file which could then be imported into Civil 3D. However, Civil 3D 2018 allows you to open the InfraWorks model .SQLITE database file which is a superior method. To open the InfraWorks model in Civil 3D use the following procedure.

1. Navigate to the InfraWorks tab on the Civil 3D toolbar and select the “Open Model” button



6 - InfraWorks Toolbar

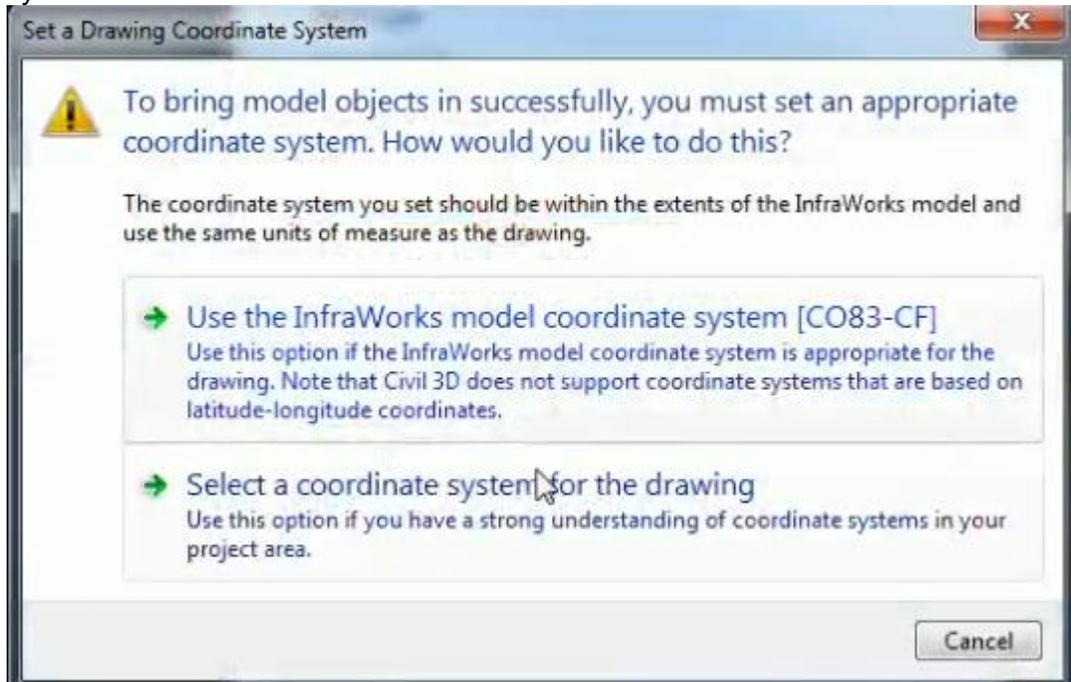
2. Browse to the location where the InfraWorks model is stored locally on your computer. Unless you made changes to the save location in the software properties, this should be in a directory path similar to the one displayed in the image below:



7 - Browse to InfraWorks Model Database Location

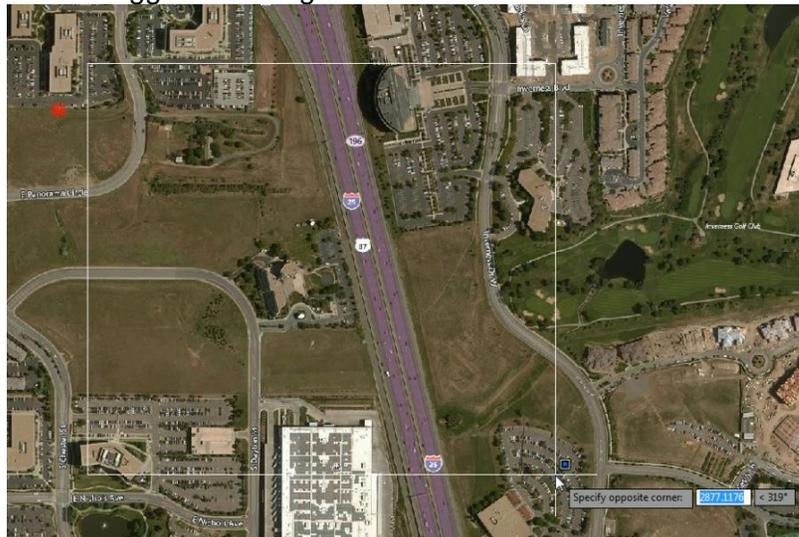
3. If possible, match your drawing coordinate system to the InfraWorks model UCS. This is not required, but it does help avoid confusion. If you're using a custom coordinate

system, that's ok, Civil 3D will automatically transform the InfraWorks data into that system.



8 - Match InfraWorks or Assign C3D Coordinate System

4. Set area of interest for the InfraWorks model import. This will vary from project to project, but as a general rule of thumb you should limit the amount of InfraWorks data that you import, as Civil 3D struggles with large datasets.



9 - Select Area of InfraWorks Model to Import

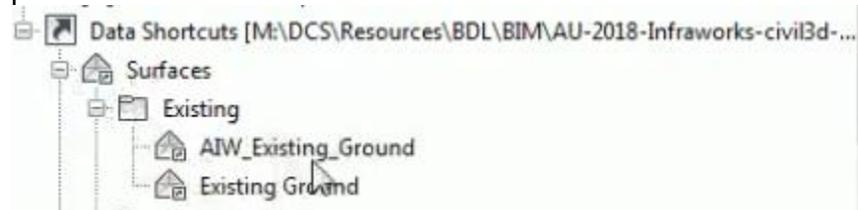
5. Use the “Refine Selection Set” tool to pick only the data you wish to import. For smaller AOI’s this typically has a negligible impact on import time.

6. Once you are satisfied with all the parameters, click the open model button and review the results. Typically imported data will include surfaces for existing ground and “transportation”, alignments and polylines. It’s worth narrowing this data down to only what you need. In this case, we’re going to only keep the existing ground surfaces and the existing roadway alignments.



10 - Imported Model Data

7. Once you’ve parsed the imported data, save it as something recognizable (e.g. InfraWorks_Import.dwg) in your typical Civil 3D file structure.
8. After the drawing has been saved, create data shortcuts for the pertinent Civil 3D data that was imported from InfraWorks.



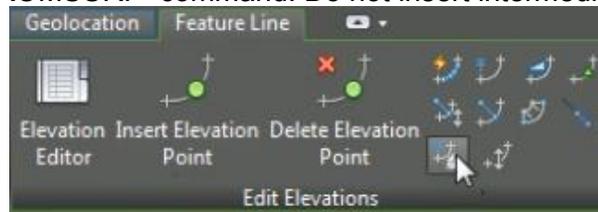
11 – Data Shortcut for “AIW_Existing_Ground”

“Warp” Civil 3D Data to Match InfraWorks Data

In all likelihood, your project survey elevation data is going to be different than the topography that InfraWorks generates using model builder. This can be problematic when you ultimately port your design into InfraWorks for visualization, as the bust will appear as a ledge between the InfraWorks topo and your design topo. In this subsection we’ll learn how to create a “warp” between the surfaces to smooth out the transition.

As with many things in Civil 3D, there are several ways to accomplish creating this warp; however, the method presented below will work in most situations and the principles could be applied to other techniques.

1. Open the drawing which contains your **project** survey existing surface data.
2. Reference the data shortcut for the “AIW_Existing_Ground” surface that we created in the previous section and apply a “No_Display” style to surface.
3. Select the boundary of your existing survey surface data. Ideally this is already a feature line, but if it’s not then you will need to convert it to one. Ensure that the boundary line has the proper elevations by draping it on the survey surface using the “FEATUREELEVSFROMSURF” command. Do not insert intermediate grade breaks.

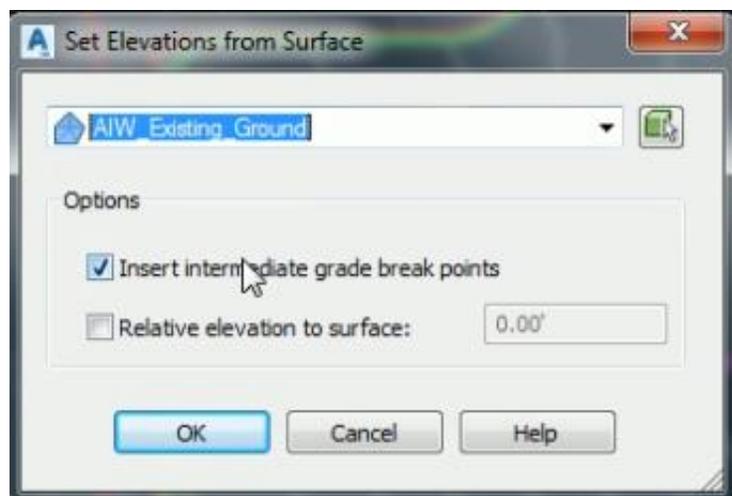


12 - “FEATUREELEVSFROMSURF” Command Button

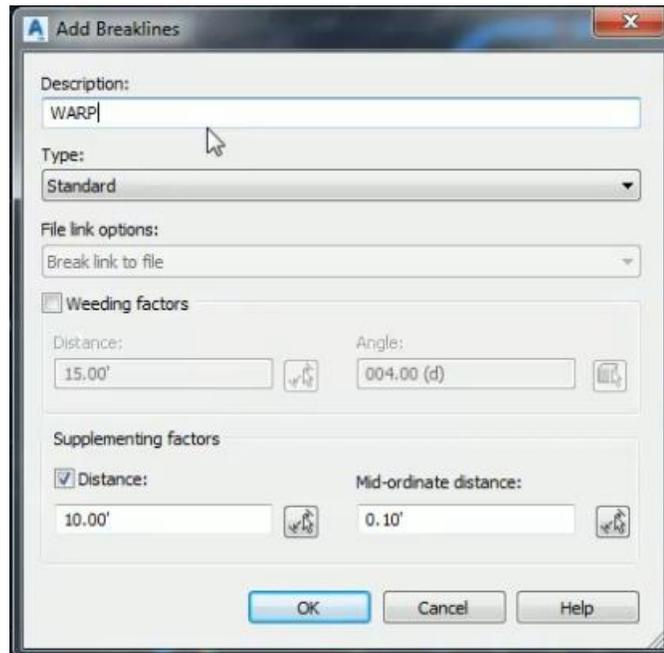
4. Offset the boundary feature line. You will need to use your own judgement for the offset distance depending on the project conditions. A couple guidelines are presented below:

- Use smaller offsets (5-20 feet) when warping data around nearby streets or areas that generally have higher detail
- Use larger offsets (20-100 feet) when warping existing terrain or areas that generally have less detail

5. Use the same “FEATUREELEVSFROMSURF” command to then drape the offset line on the “AIW_Existing_Ground” surface. Insert intermediate grade breaks. Depending on how many grade breaks are added, you may want to weed the feature line.
6. Add both the boundary line (if it wasn’t already) and the new offset warp line to the existing ground project surface as standard breaklines.

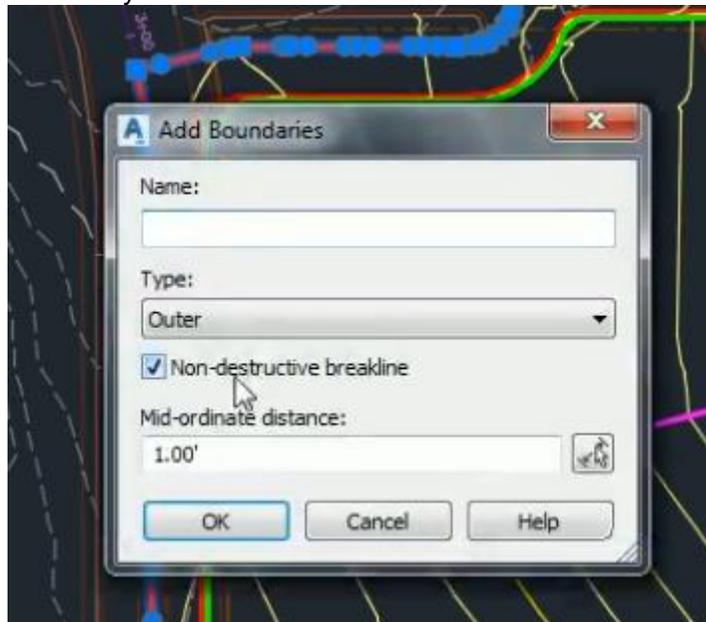


13 - “FEATUREELEVSFROMSURF” Dialog Box



14 - Add "Warp" Offset Feature line as Standard Breakline to Project Existing Ground Surface

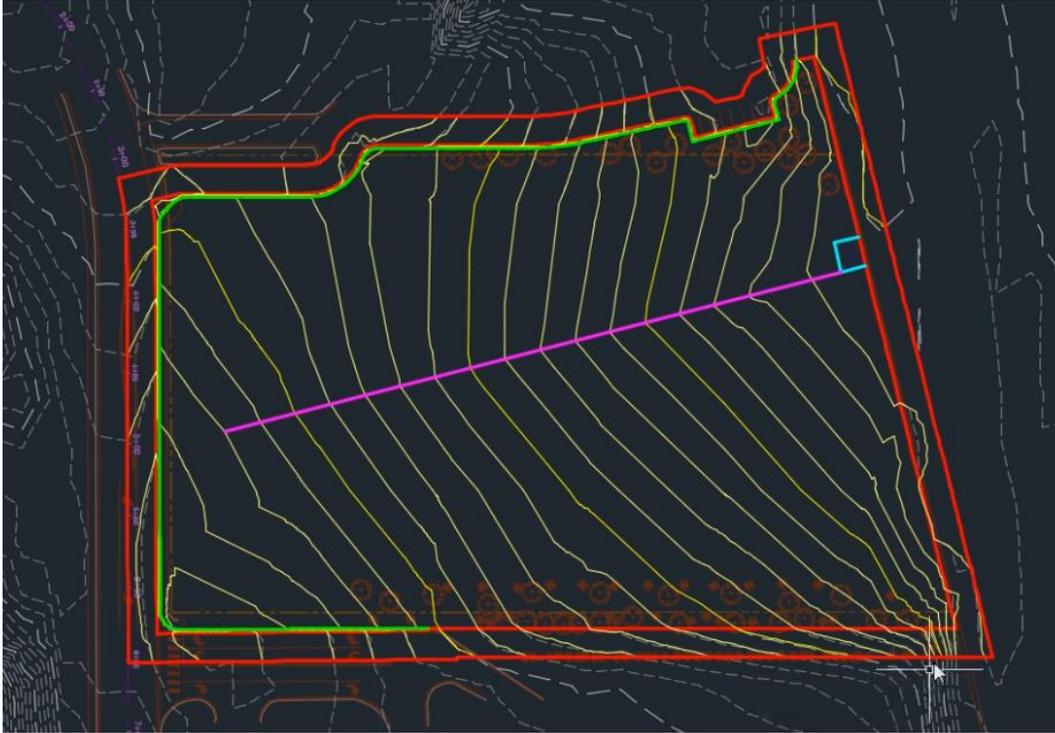
7. Remove any exiting surface outer boundary definition, then add the "Warp" feature line as the new outer boundary.



15 - Add "Warp" Line as New Outer Surface Boundary

If you performed the above process correctly, you should end up with new data in your project existing ground surface which essentially daylight it to the InfraWorks existing ground surface. This will allow you to import your project data into InfraWorks with a relatively smooth transition between the model builder data and the project data.

NOTE: It is very important that you perform this warp well outside of your design area so that the warping is not misconstrued as actual survey data.



16 - Existing Ground Surface with Boundary "Warp"

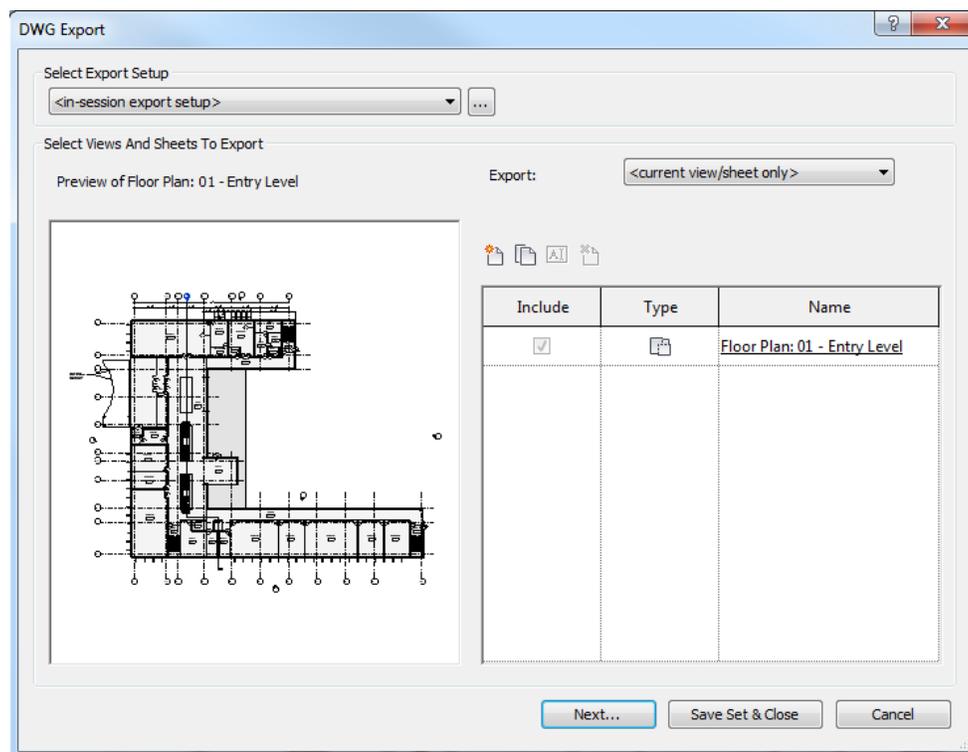
Learning Objective: Register Locations Using the Autodesk Shared Reference Point Tool (Civil Engineer and Architect)

In this section we'll examine how to use the Autodesk Shared Reference Point Tool to create XML files which will allow the architect to establish real-world shared coordinates in their Revit model(s).

Locate Building Onsite

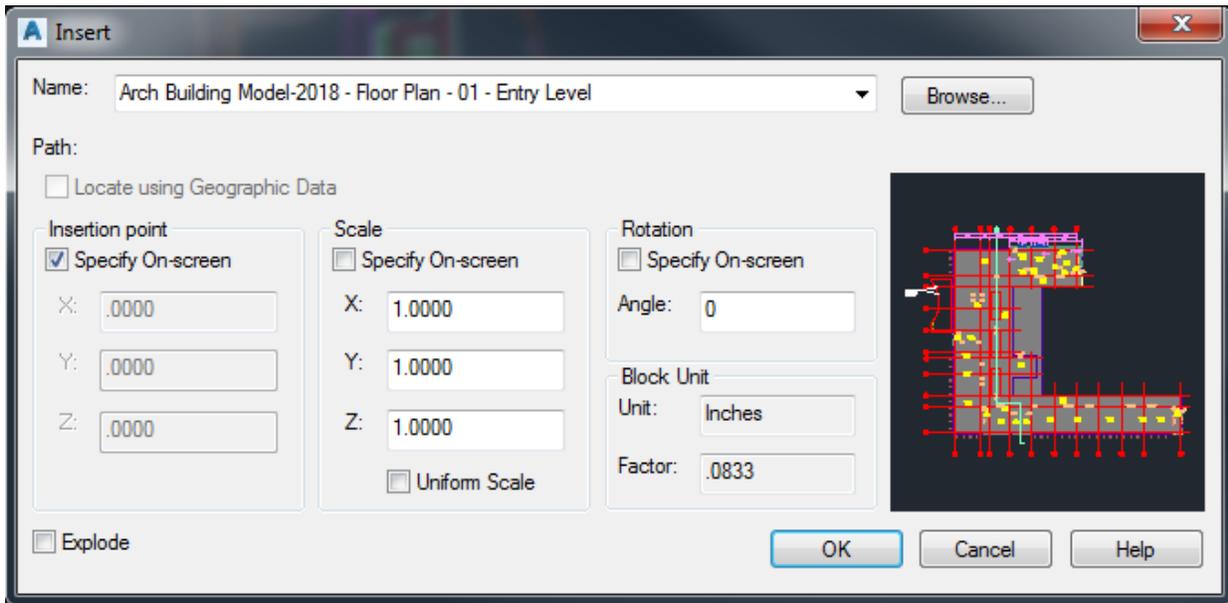
Before the Civil Engineer can tell the architect where the building is in the real world, he or she first needs him/her to tell them what the building looks like. The Civil should request that the architect send he or she a .DWG export of the Revit Model with the following properties:

- 2D View
- Level at which the building intersects the ground
- Includes grid lines
- Set to the default "Internal " coordinates

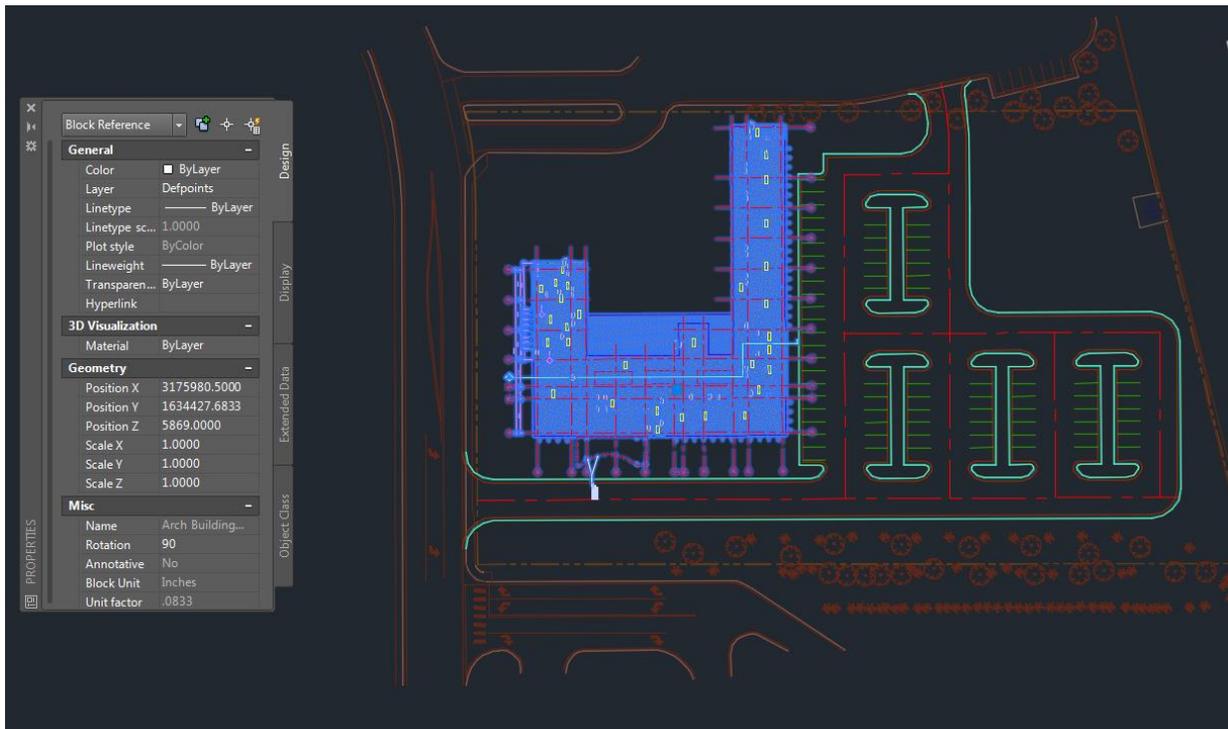


17 - Revit Export

Once the Civil Engineer receives the .DWG export that the Architect creates, he or she should insert it as either an attached XREF or a block into the Site Plan drawing using a manual basepoint entry to place it near the site. They can then use the move, rotate and align commands to shift the building to the desired location on site. Once aligned horizontally, they should set the Z-Value of the block to the proposed finished floor elevation at the at-grade level.



18 - Insert Exported .DWG as Block



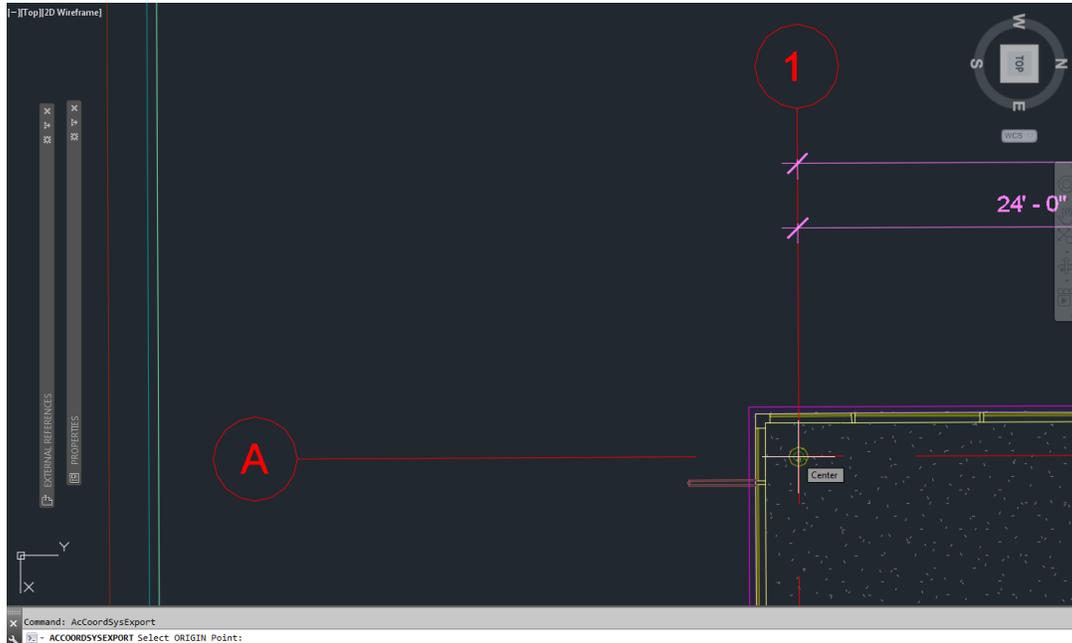
19 - Manually Locate Building Block at Desired Location

Create Shared Reference Point XML Files

After the Revit model has been exported and located properly on site the Civil Engineer can generate the data which will be used by Revit to mark the building's real world position and rotation. This is accomplished using the Autodesk Shared Reference Point tool. This tool is sometimes not included with default installations of Civil 3D. If you don't have it, it is typically available through your [Autodesk account](#) Subscription Center. To launch the tool, navigate to the toolbox tab in the Civil 3D prospector, then drop down the subscription extension manager tree until you are able to launch the command by double clicking on it.

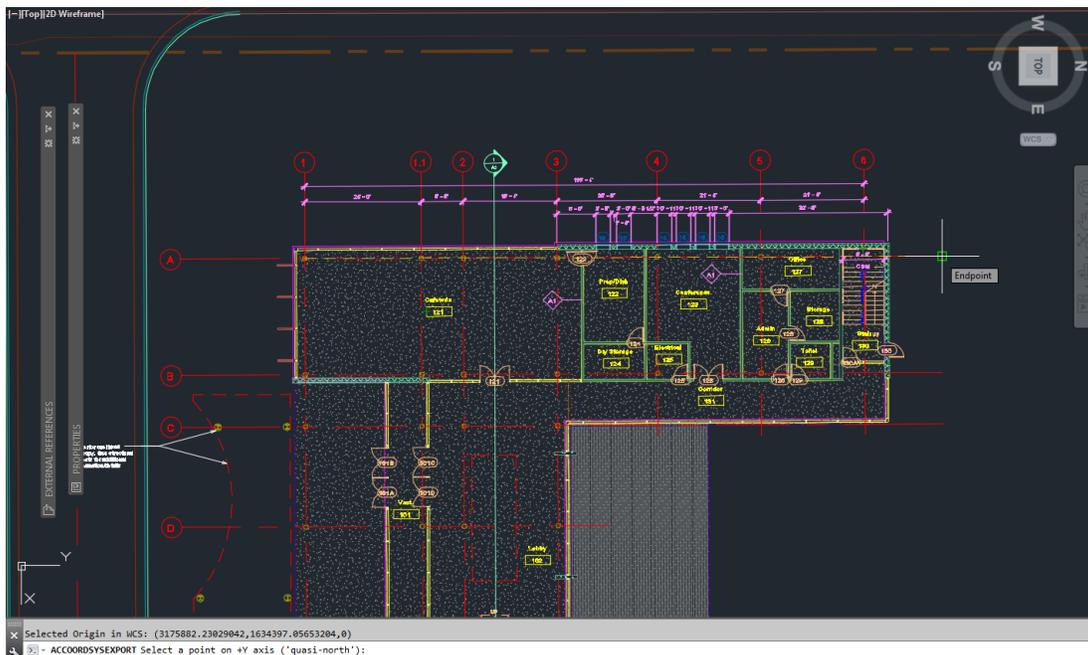


Once the command (ACCOORDSYSEXPORT) is launched, it will prompt the user to select and origin point. This point should be somewhere that both the Civil Engineer and Architect can easily identify. In our experience, the intersection of Gridlines (A) and (1) is a good choice.



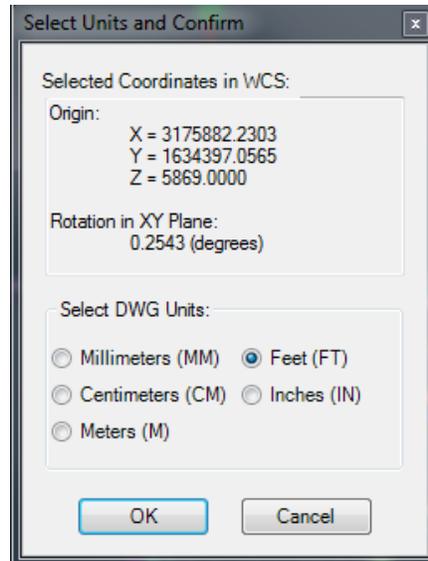
21 - Use Intersection of Gridlines A and 1 as Origin Point

The next phase of the command will prompt the user to select a point along the +Y Axis (quasi-north). Regardless of how the building will ultimately be rotated, best practice is to always snap this along the (A) gridline.



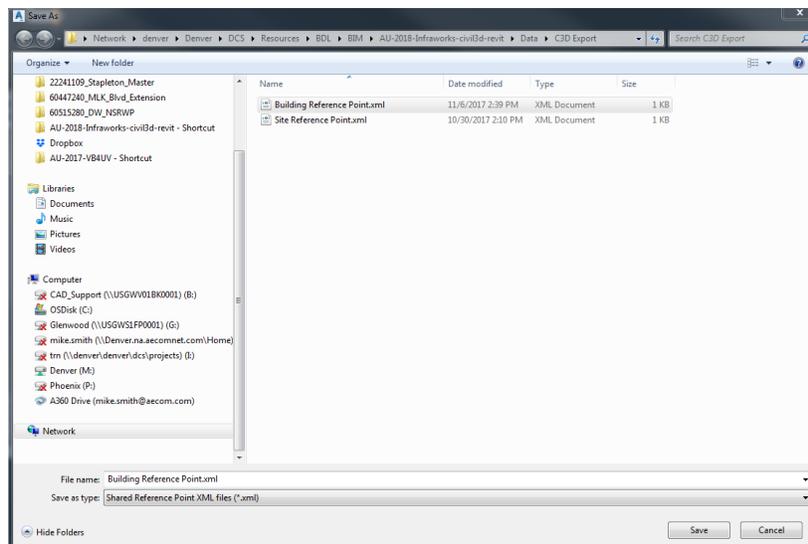
22 - Use Gridline A as +Y (Quasi-north) Direction

Once the Civil Engineer has selected the +Y axis by snapping along the A gridline the final dialog box will appear. This dialog box contains a summary of the data generated by the command.



23 - Final "Select Units and Confirm" Dialog Box

The Civil Engineer should verify the information shown in this box is correct, especially the Z-value and the units. The command is completed by clicking the "OK" button, then designating an appropriate name and save location for the resulting .XML file. The Civil Engineer will be providing this file to the Architect at the same time that he or she transmits the CAD file discussed in the following section.



24 - XML Name and Save Location

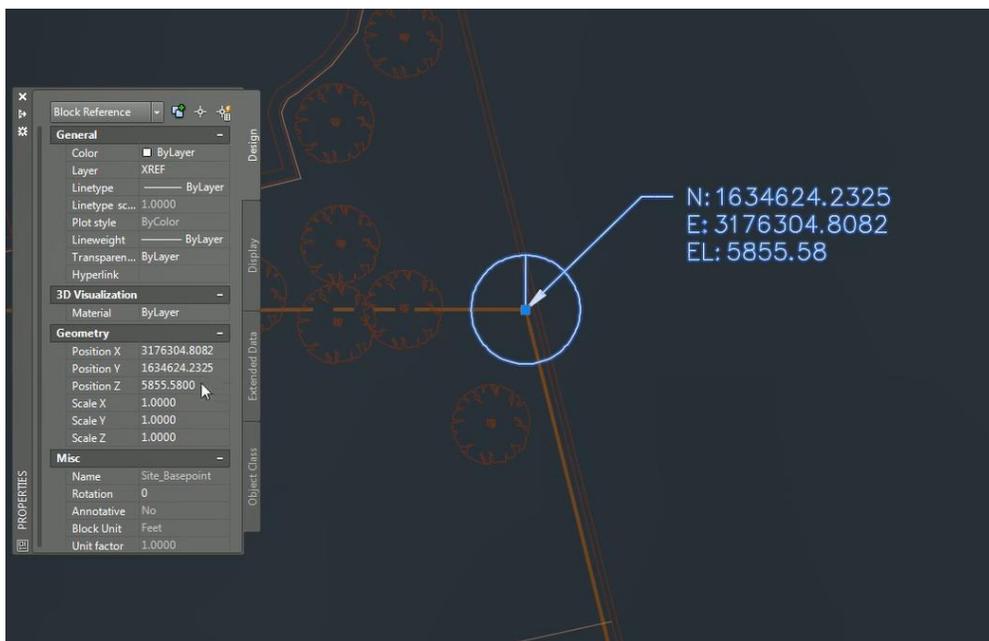
Learning Objective: Isolate content in AutoCAD Civil 3D for more-effective porting to Revit (Civil Engineer)

In this section we'll examine how Civil engineers can export their Civil 3D content to maximize its usability in Revit.

Establish a Site Basepoint

Choose a property corner or other known location on site and designate it as the site base point. Create a new drawing which contains a block at this location. This block should consist of the following elements:

1. Circle with a 10-ft radius
2. Line aligned to true north
3. MLEADER or text with coordinate data (i.e. Northing, Easting and Elevation)



25- Site Basepoint Block

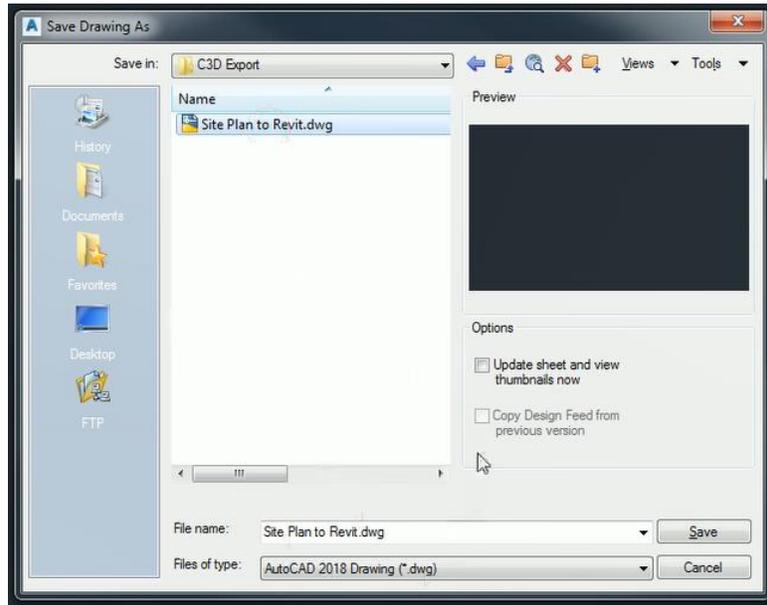
Some additional considerations for the basepoint:

- Label the existing ground at the point so that the elevation remains constant throughout the project duration
- Elevate the block to the elevation displayed in the leader
- Make leader text proportional to the size of the circle so that it is legible from a distance.

NOTE: Once the basepoint block is created, use the same procedure outlined in the previous section to produce a Shared Reference point XML file for the Site basepoint. Use the line oriented to true north as the +Y Axis snap and save the XML file in the same directory as the building reference point file.

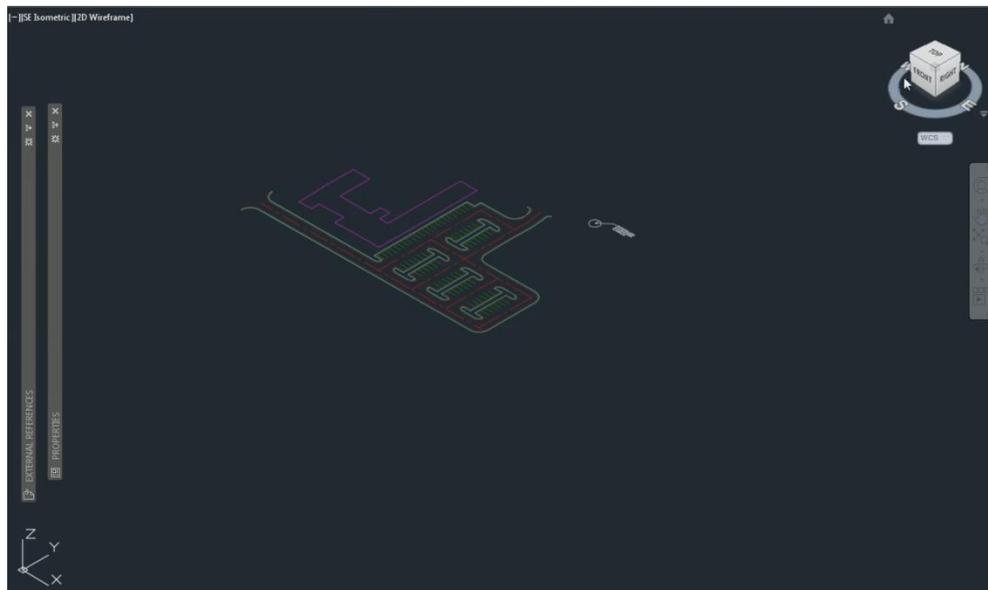
Create Site Export Drawing

Create a new dedicated drawing in which you will aggregate your Civil 3D project data for export to Revit. Save this drawing in a new directory outside of your project files as it should not be a referenced in your actual design. This drawing will contain several elements.



Attach External References

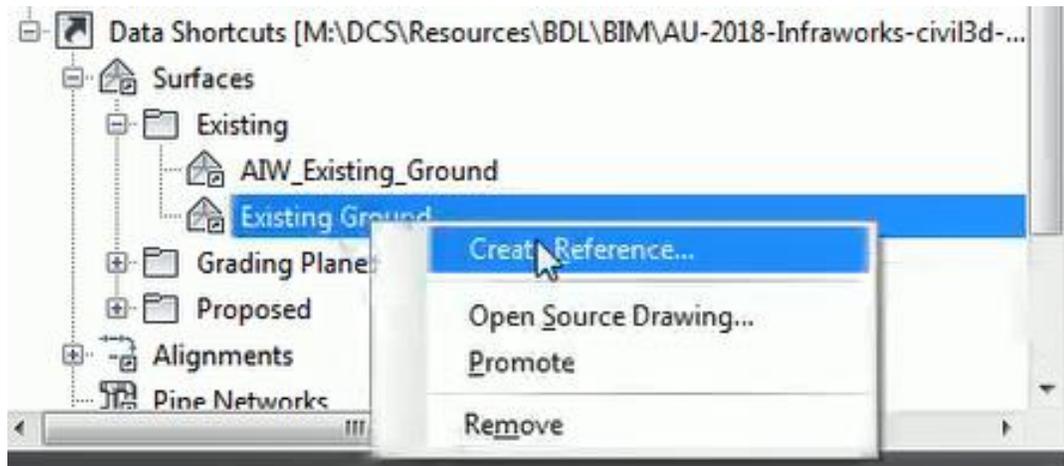
Attach your 2D Site layout drawing as well as the Site Basepoint drawing that you should have just created. Using the XREF insertion point z-value move the 2D Site layout drawing XREF up to within +/- 100 feet or so within the site basepoint elevation. Once referenced and elevated, temporarily unload the XREFs to free up the display area.



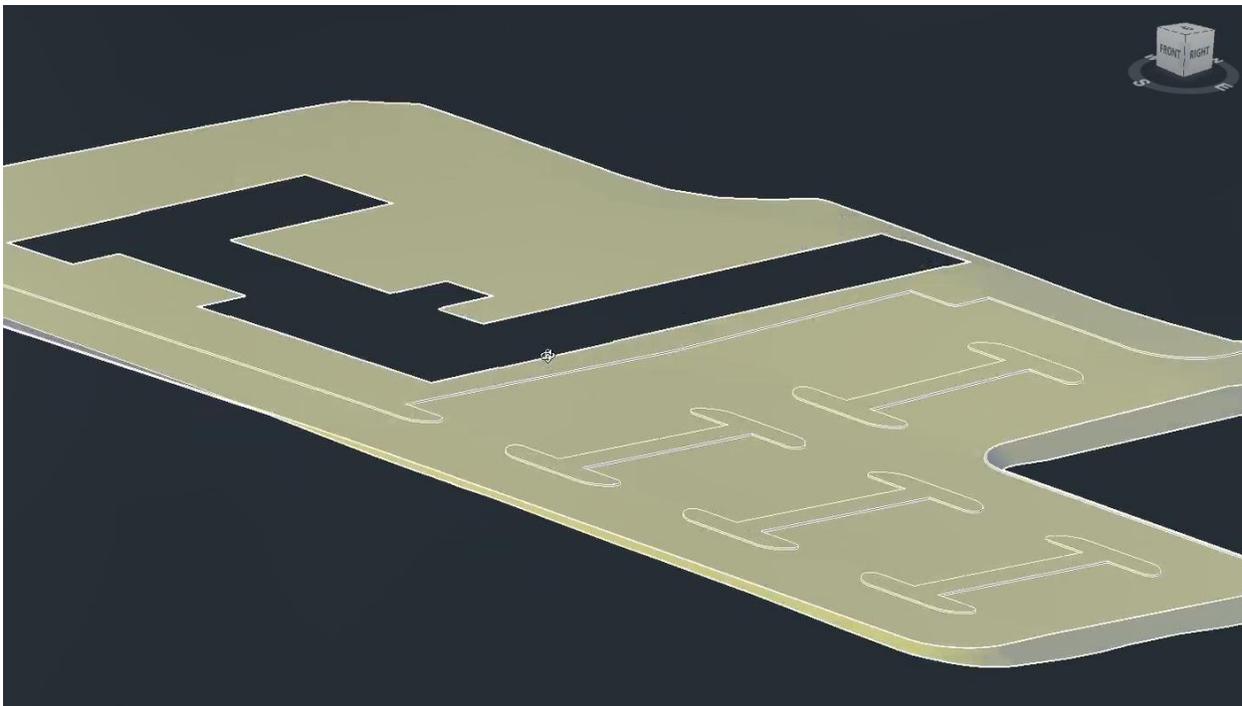
26 - Elevated Site Basepoint and Plan XREFS

Reference Existing and Proposed Surfaces via Data Shortcuts

In addition to the site layout and basepoint XREFS attached in the previous step, we also need to bring in both the existing and proposed surfaces for the project. This should be done using data shortcuts. Set both surfaces to a “No Display” style.



27 - Create Reference to Existing Ground via Data Shortcuts

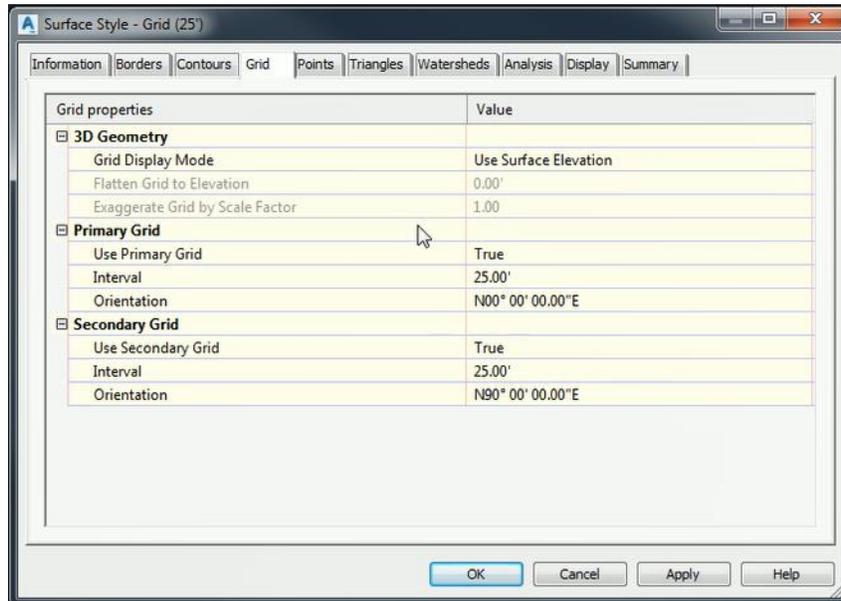


28 - Proposed Surface as Seen in the C3D Object Viewer

Create Surfaces Specifically for Revit Export

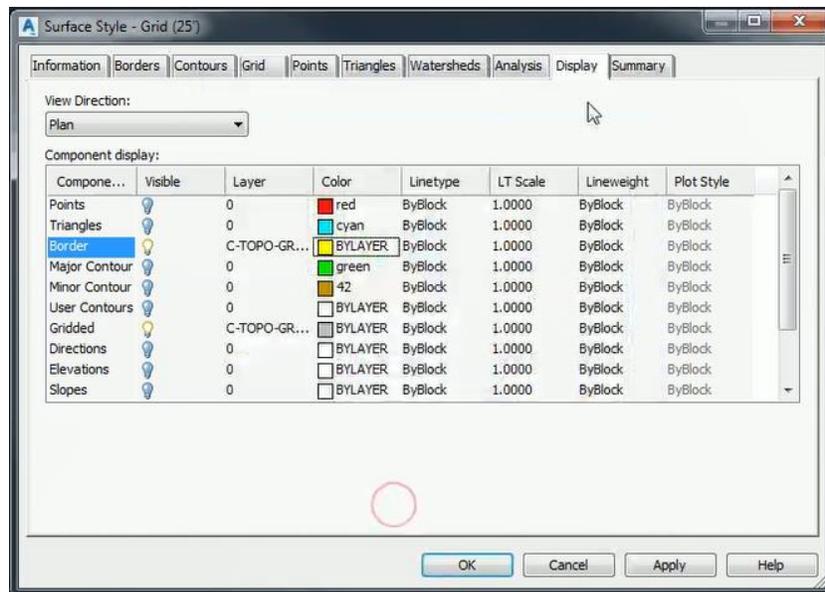
Create a new empty surface named “Revit – Existing Context” and create a new Surface Style named “Grid (25’)”. Follow the following guidelines when creating the new “Grid (25’)” Surface Style:

Set the Grid Interval to 25’ in both directions.



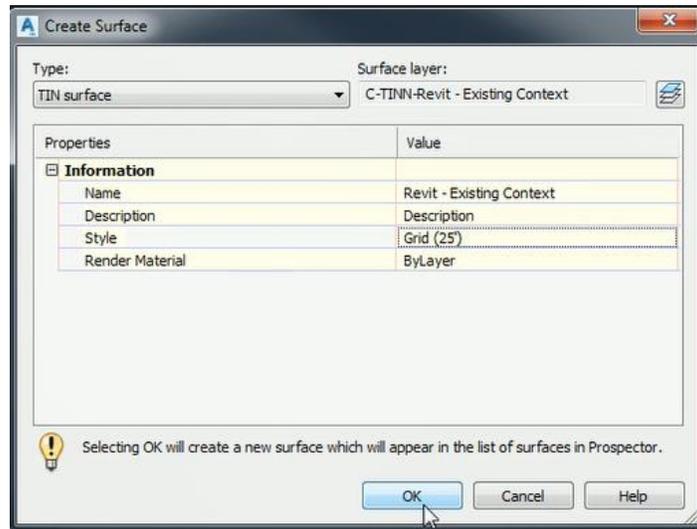
29 – Surface Style Grid Interval

Turn on both the “Gridded” and “Border” Components. Assign the Components to the layers “C-TOPO-GRID-25FT” and “C-TOPO-GRID-BNDY”.



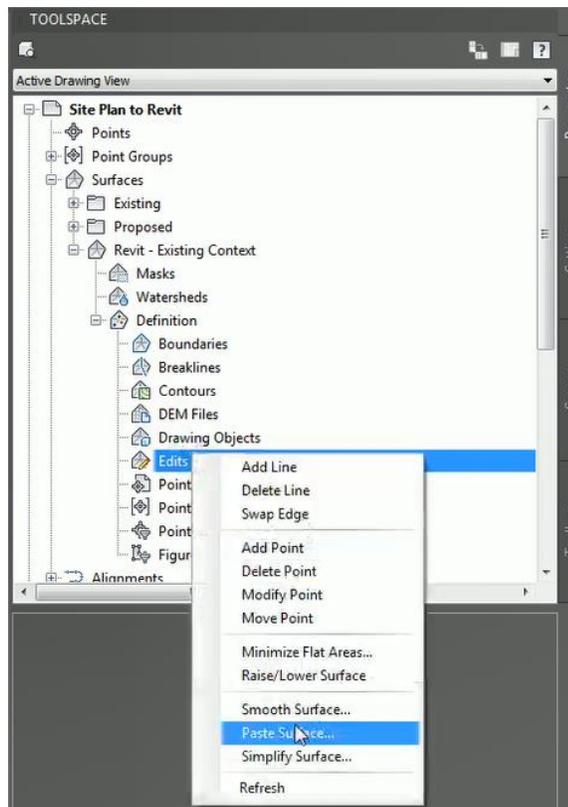
30 - Surface Style Display Options

Assign the newly created style to the newly created surface.

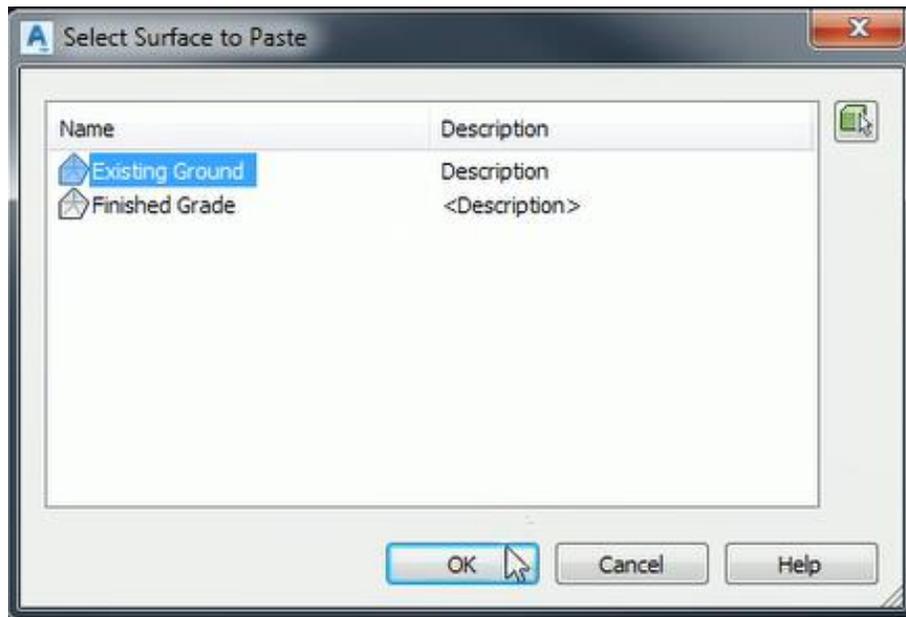


31 - Surface Creation Dialog

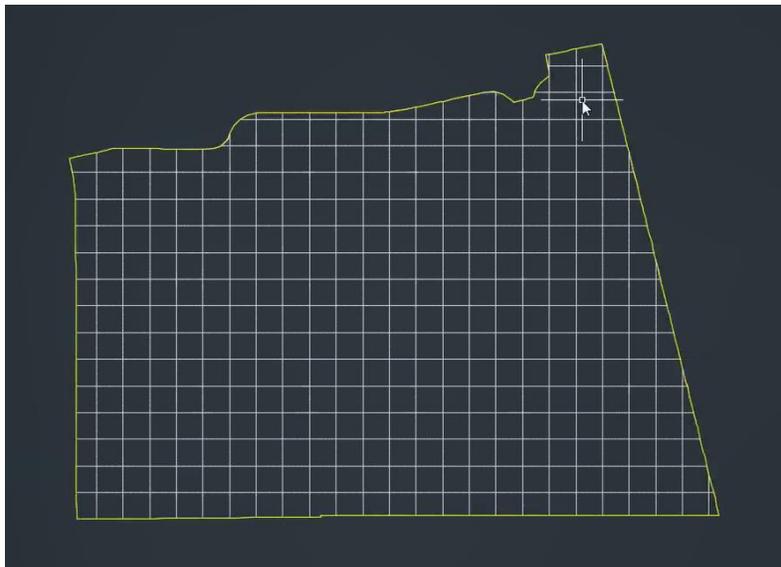
Now, edit the new “Revit – Existing Context” surface by pasting in the project’s existing ground surface referenced in the previous step.



32 - Paste Surface Edit

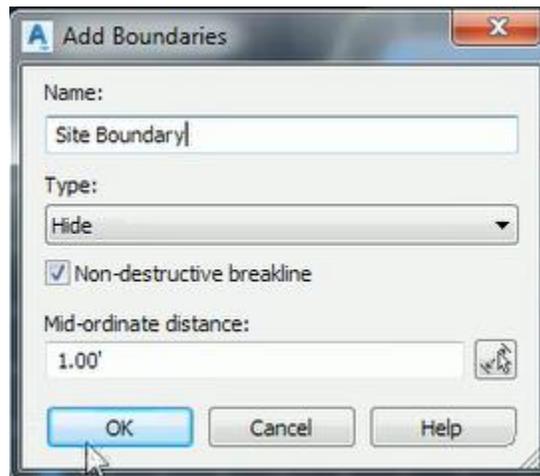


33 - Select Surface for Surface Paste Edit



34 - "Revit - Existing Context" Surface Displayed with "Grid (25)" Style

Repeat this process to create two additional surfaces named "Revit – Site (Macro)" and "Revit – Site (Micro)" but instead of pasting the existing surface, paste the proposed surface. Create new surface styles for both of these new surfaces with grid intervals of 10' and 1' respectively. Make sure that you create discrete layers for the different grid intervals in the spacing (i.e. "C-TOPO-GRID-10ft" and "C-TOPO-GRID-01ft".) When finished, you should have the following three "Revit" surfaces:

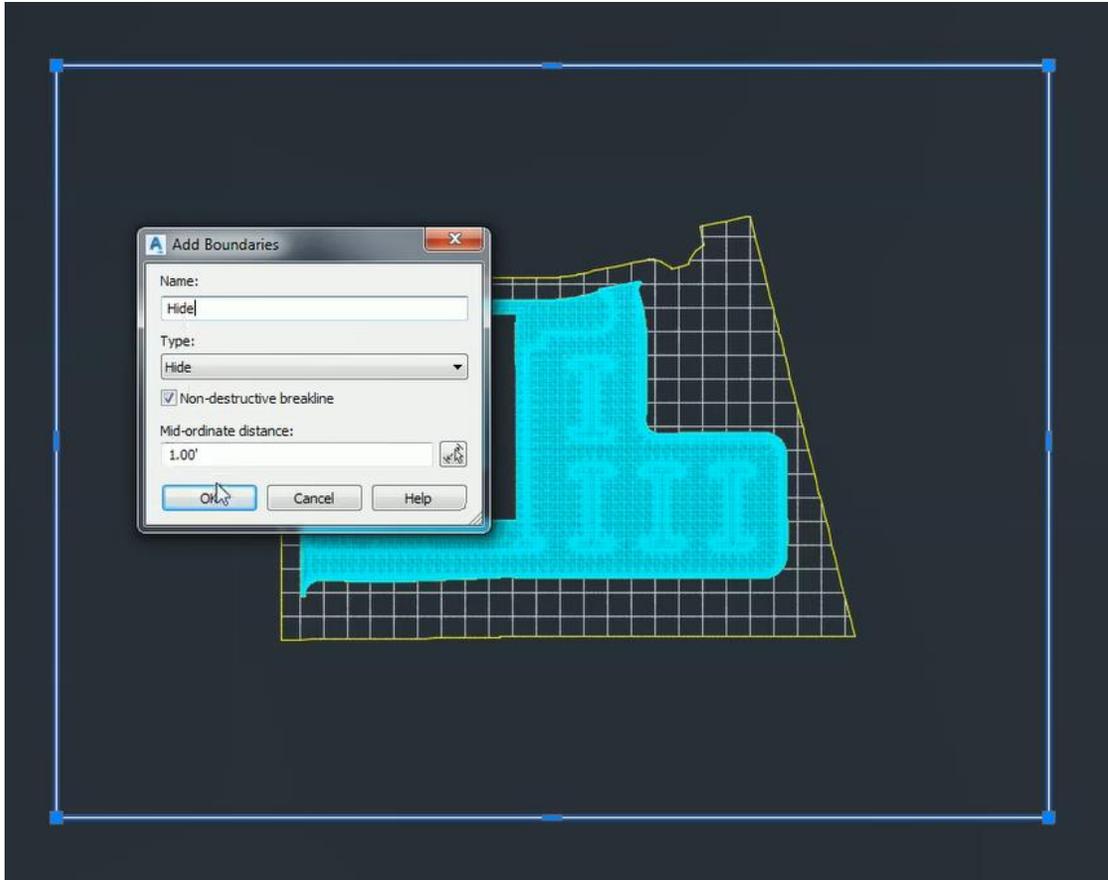


37 - Add "Hide" Boundary to the "Revit - Existing Context" Surface



38 - "Clipped" Revit - Existing Context Surface via "Hide" Boundary

Create a polyline rectangle that encompasses the entire project area. Add this line to the “Revit – Site (Micro)” Surface as a “Hide Boundary” to globally hide the entire surface.



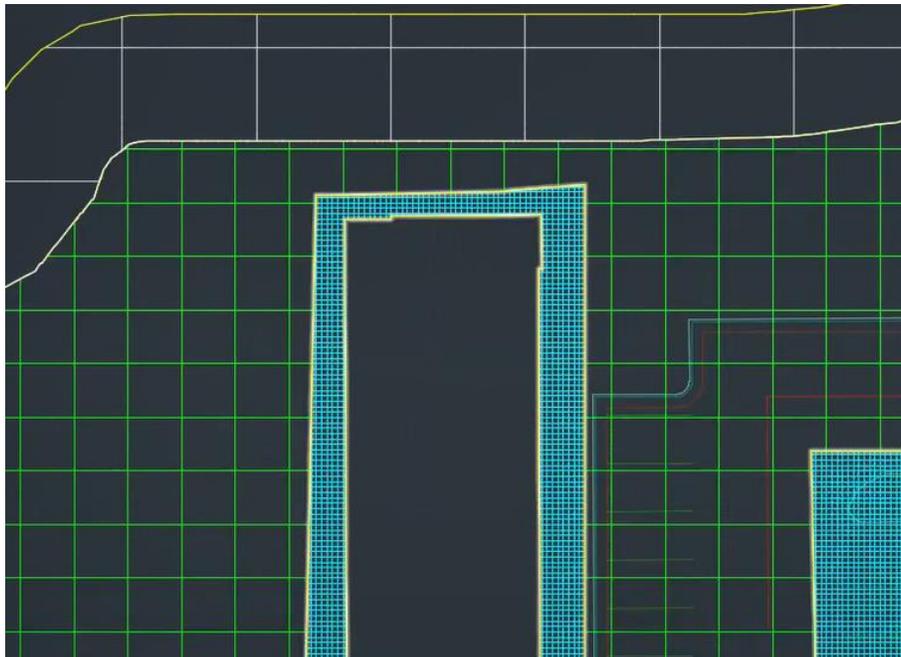
39 - Add global "Hide" Boundary to "Revit - Site (Micro)" Surface

Then, draw smaller breakout areas with closed polylines where you'd like the “Micro” level of detail to appear (e.g. around the immediate areas surrounding buildings, retaining walls, curbs etc.). Add these “breakout” areas as “show” boundaries to the “Revit – Site (Micro) Surface” and as “Hide” Boundaries to the “Revit – Site (Macro) Surface”. Because of the way the surfaces were created and structured, we can now dynamically adjust the level of detail in areas around the site by simply moving and/or grip editing our “_Manual Boundary Lines” polylines.

NOTE: In some circumstances, the Gridded surface display may not be the best option when looking at very detailed areas in the TIN. Occasionally, it is appropriate to use a triangle display or a tighter (sub 1' grid interval) to provide additional detail in the data for the “Micro” surface. You can also use the surface smooth tools in Civil 3D to add supplemental points to these “Revit” series surfaces in areas that you need additional points for proper triangulation in Revit.



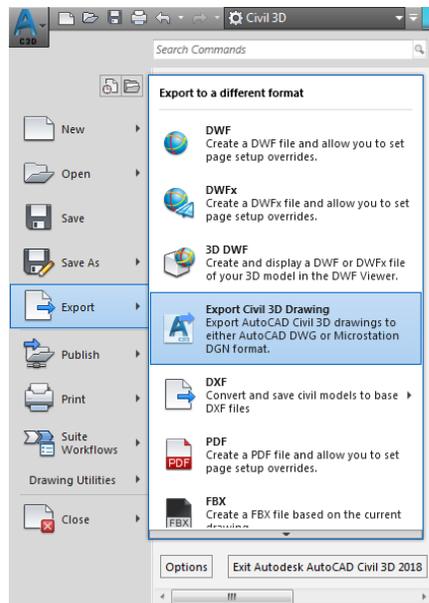
40 - "Revit - Site (Micro)" Show Boundary and "Revit - Site (Macro)" Hide Boundary



41 - All Three "Revit" Surfaces Displayed Concurrently

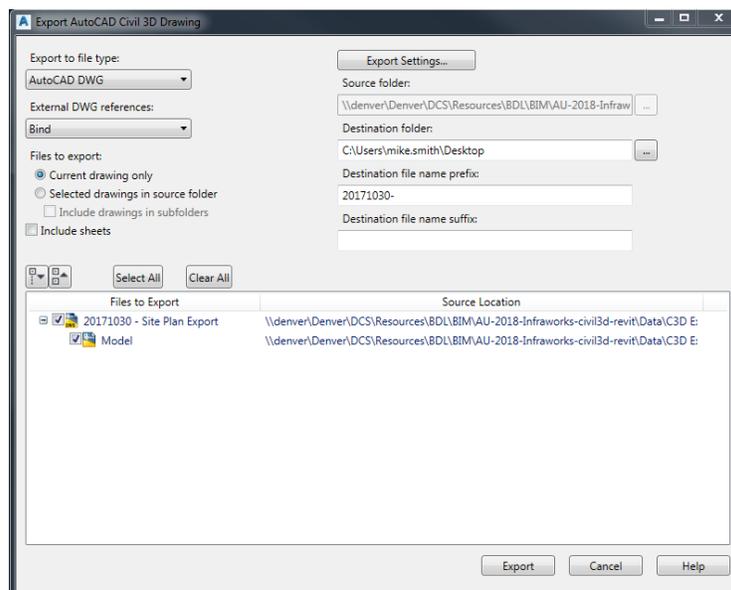
The image above shows all three of the 'Revit' surfaces shown concurrently. In the next section we will examine how to package this drawing up for export to Revit.

Once you're happy with the surface detail save the drawing, then export the drawing to a "vanilla" AutoCAD file using the Export Civil 3D Drawing command.



42 - Export Civil 3D Drawing Command

Configure the export so that the XREFS are bound into the drawing and that only the model view is exported. Use a date as prefix or some other identifier to denote the drawing is an exported version. Its typically also good practice to save the file down to an AutoCAD 2013 DWG format since the AutoCAD 2018 DWG format has not been widely adopted yet.



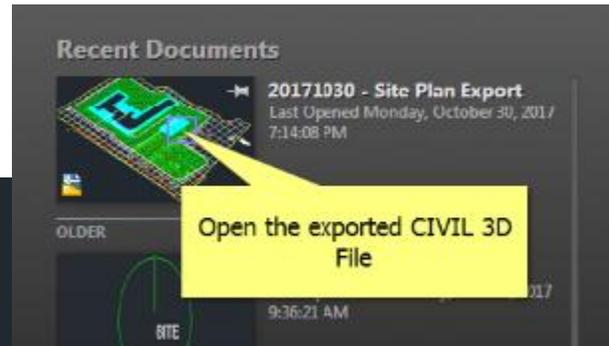
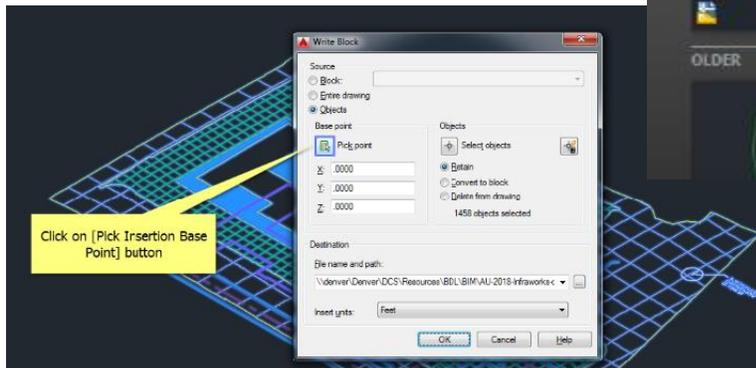
43 - Export Civil 3D Drawing Dialog Box

Package up the exported drawing as well as the two basepoint XML files created in the previous step then transmit to the Architect.

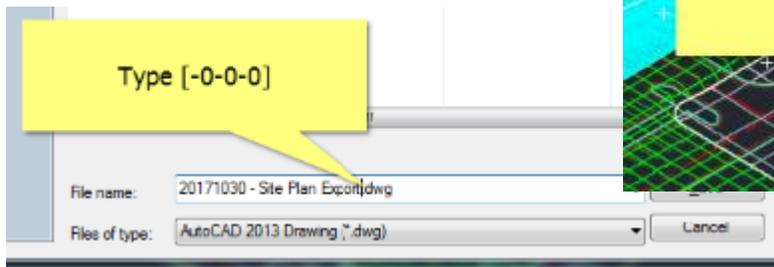
Learning Objective: Export the content in a Revit-friendly format (Architect)

Getting the CAD base file clean to get ready for REVIT file import:

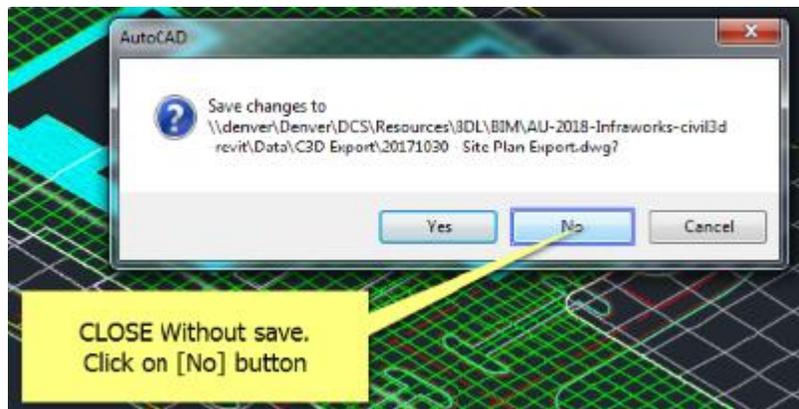
- Open the file
- Use the command BURST and burst all objects to get rid of any proxies
- Wblock the file out to a 0,0,0 version



- Use the CENTER of the registration mark
- Add a 0-0-0 suffix to the file name



- Close the civil file without changes



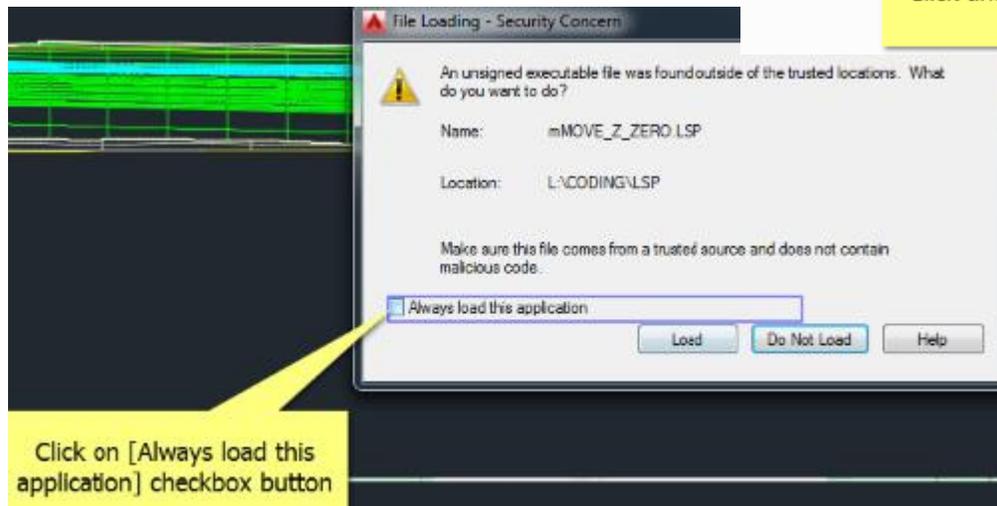
Compacting the CAD site For import to REVIT:

Compressing the site to Revit coordinate limits under 5000 ft - this will eliminate errors on exporting the file back out as a CAD file.

- Open the 0-0-0 version of the file
 - Click and drag the mMOVE_Z_ZERO.LSP (In the back of this document) into AutoCAD
- Always load application if promoted:

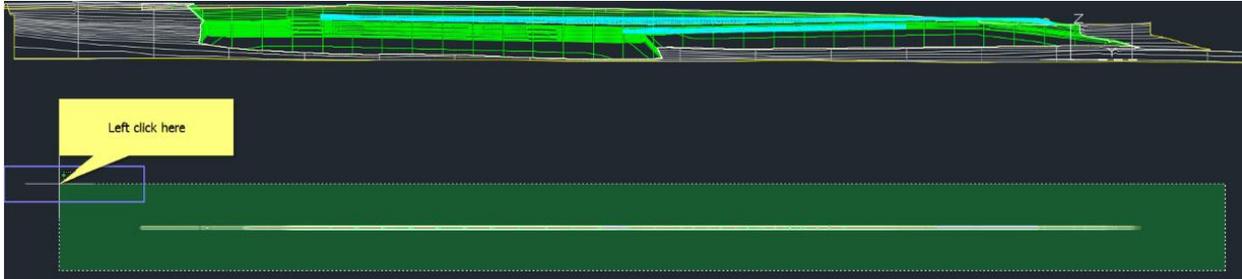
Name	Date modified
mMOVE_Z_ZERO.LSP	10/23/2017 2:13 P

Click and drag LSP into file



- Move the drawing to 0,0,0 by:
 - [Move ENTER][ALL ENTER][CENTER] of the registration point [0,0,0 ENTER]
 - Set the BASE point using
 - [baseENTER] to <0,0,0 ENTER>
 - [DVIEW ENTER]
 - Select objects or <use DVIEWBLOCK>: [ENTER]
 - Enter option [CAmera/TArget/Distance/POints/PAn/Zoom/TWist/CLip/Hide/Off/Undo]: [CAMERA ENTER]
 - Specify camera location, or enter angle from XY plane, or [Toggle (angle in)] <90.0000> [0 ENTER]
 - Specify camera location, or enter angle in XY plane from X axis, or [Toggle (angle from)] <90.00000>: [0 ENTER]
 - Enter option [CAmera/TArget/Distance/POints/PAn/Zoom/TWist/CLip/Hide/Off/Undo]: [ENTER]
 - Regenerating model.
 - This sets the view to 3d elevation to see elements displace in the Z

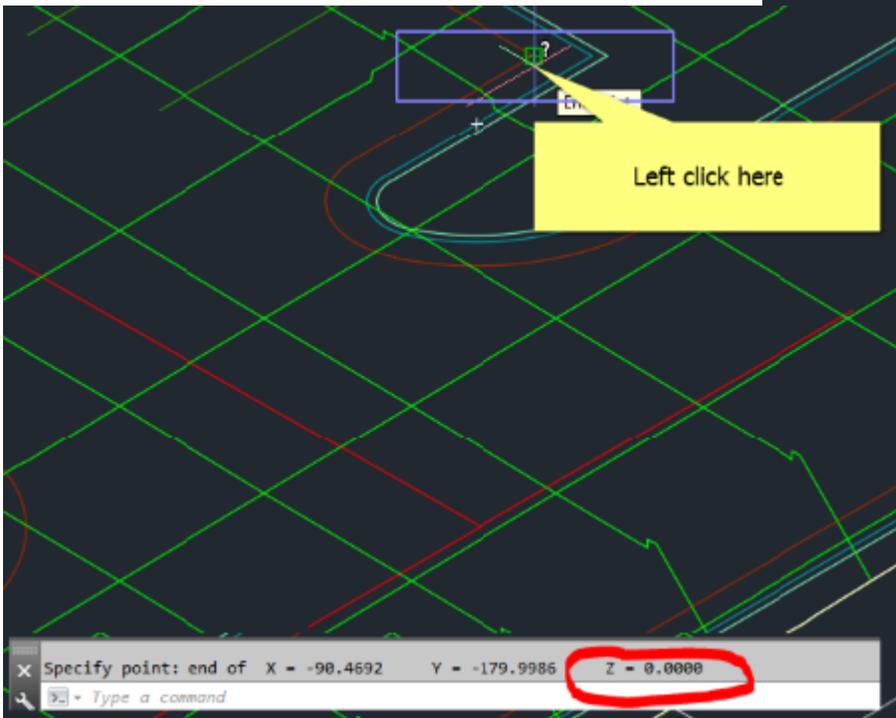
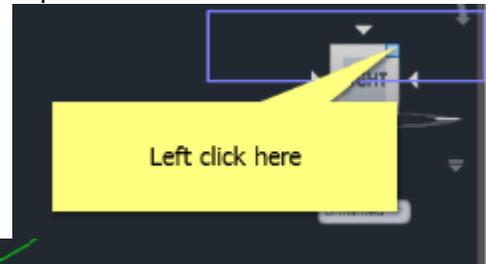
- Type mz0 to initiate the move zero command
- [2 ENTER] to "select items to flatten"
- Select the elements using a left to right top-to-bottom window



- [ENTER] to finish
- All elements should be flat and coplanar with the registration point.
- Select an oblique view:

Spot check one of the flat-cad elements by using [ID ENTER]

Left click one of the flat-cad elements (Not the topo!)



Learning Objective: Compact the Revit site (Architect)

Acquire the MSI plugin from Autodesk subscription center (Included in this handout) and install the addin in Revit

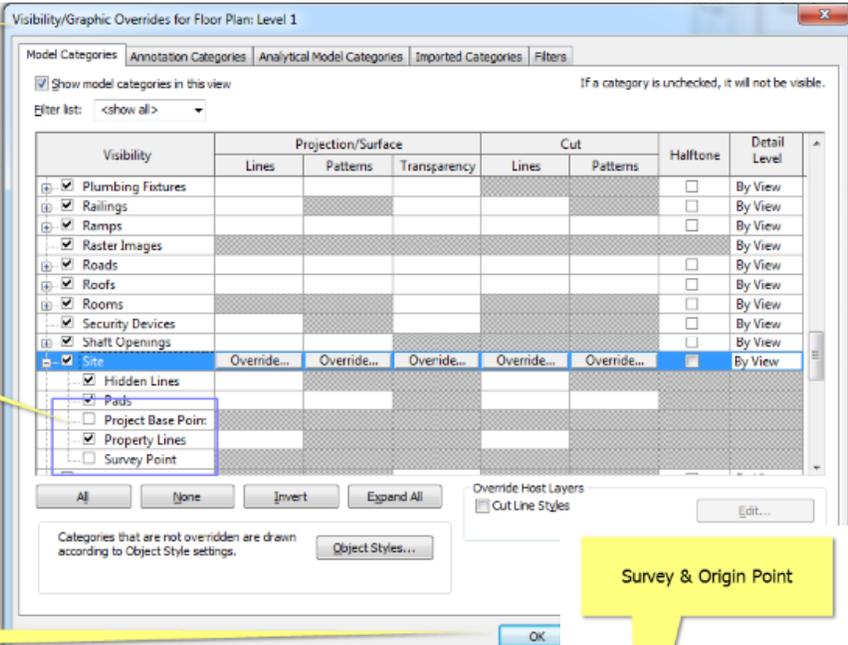
- Double click the MSI file to install.

Learning Objective: Import the site to Revit & Set the site coordinates (Architect)

- Create a NEW site plan from the desired template starter
- In a ASSP plan view:

Type [VV] Visibility Graphics

Show Project Base Point and Survey Point



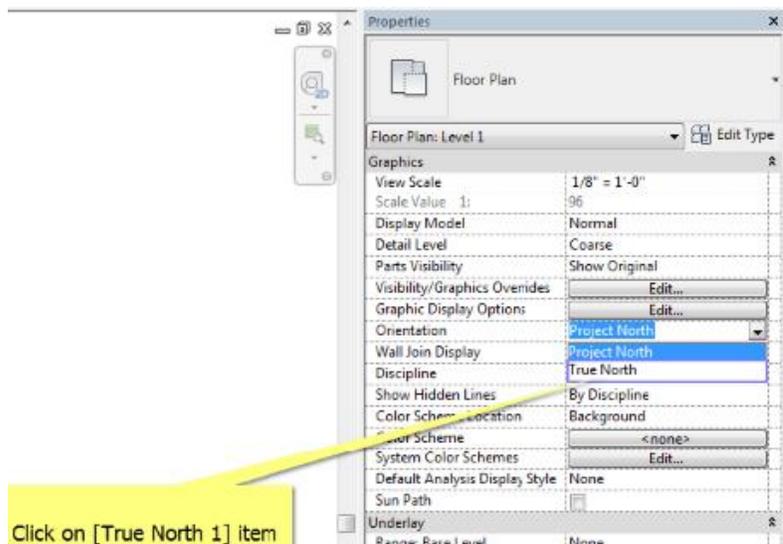
Click on [OK] button

Survey & Origin Point

Project Base Point
Shared Site:
NS 0' 0"
EW 0' 0"
Elev 0' 0"
Angle to True North 0.00°

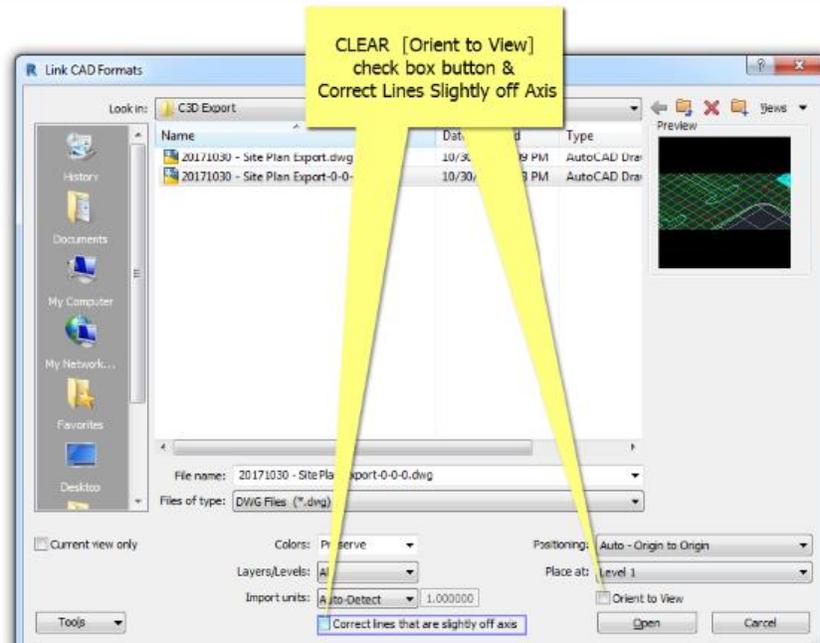
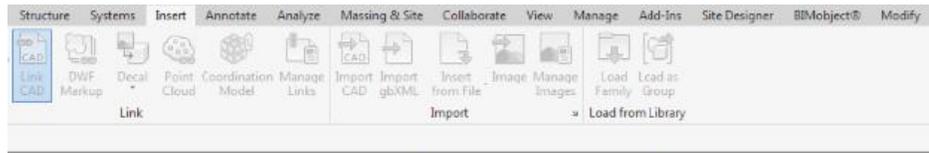
- Shows the survey point (At right)

- Set the AS-3D-SP (Architectural Site plan 3D) view to True north

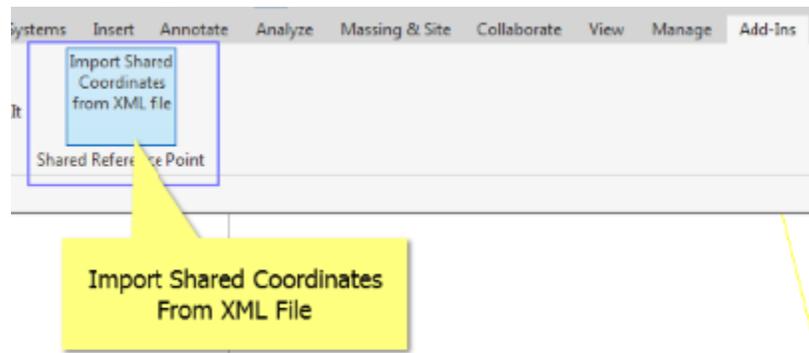


Click on [True North 1] item

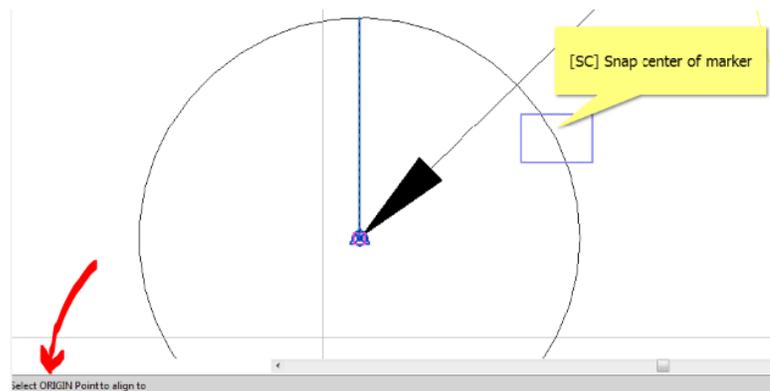
- INSERT Tab
- LINK CAD
- Clear the correct lines off axis and orient to view
- Set origin-to-origin to align
- OPEN the file



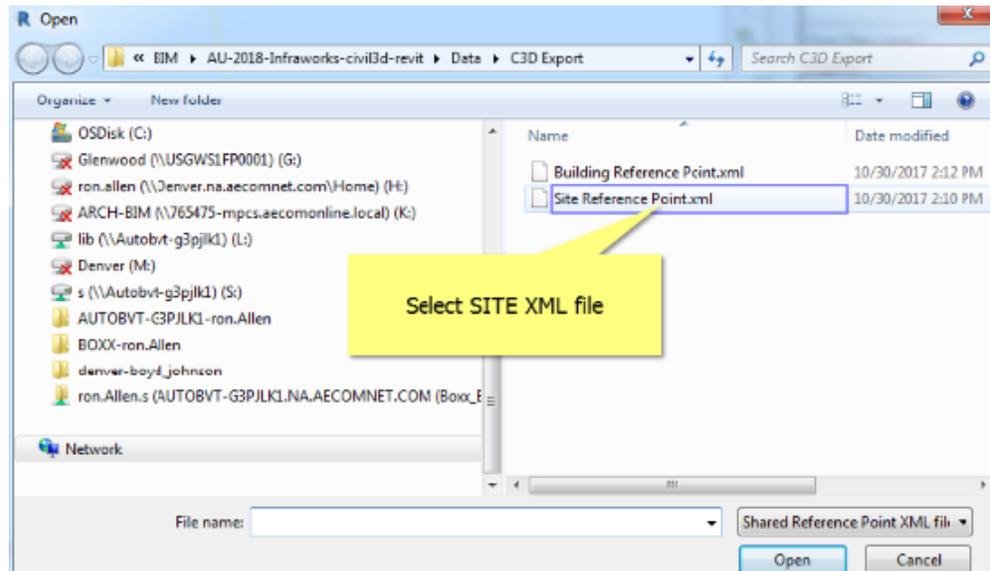
- Click ADDINS to launch the "Import Shared Coordinates from XML file":



- Note display in options bar at bottom of screen:
- SC to snap-center of the REGISTRATION marker
- Then select the DUE NORTH top of the registration marker to complete the orientation

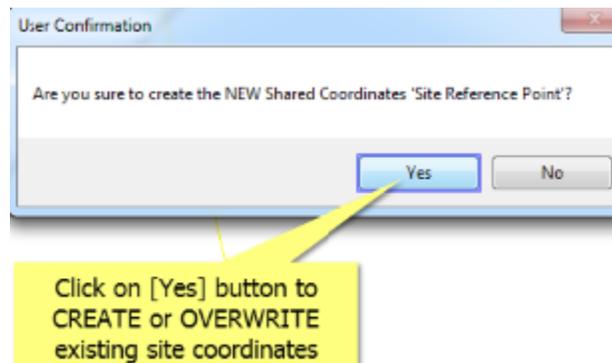


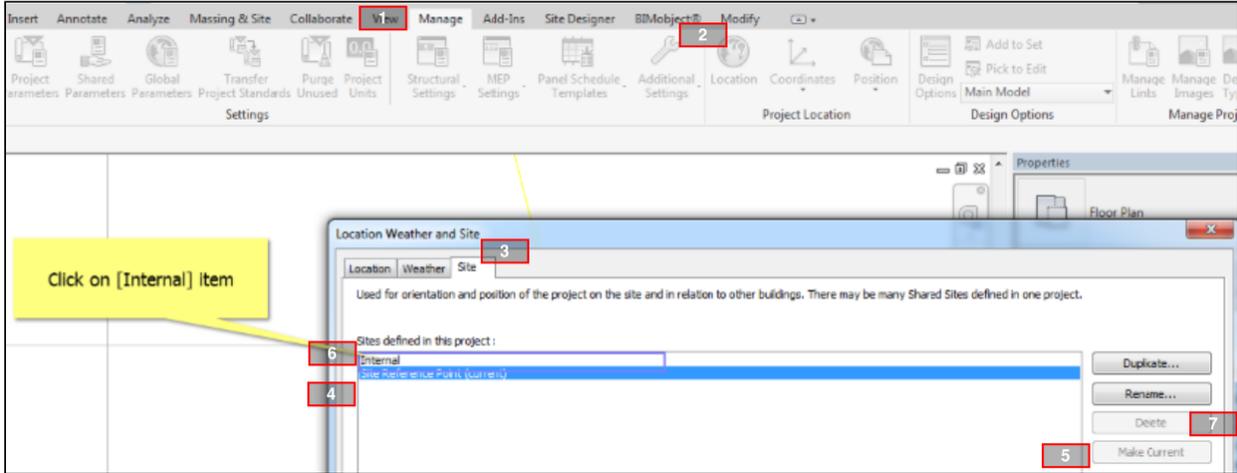
- Select the SITE



REFERENCE POINT.XML (Or corresponding CIVIL provided file) and OPEN the file

-
- Click YES to CREATE or OVERWRITE the shared coordinate:





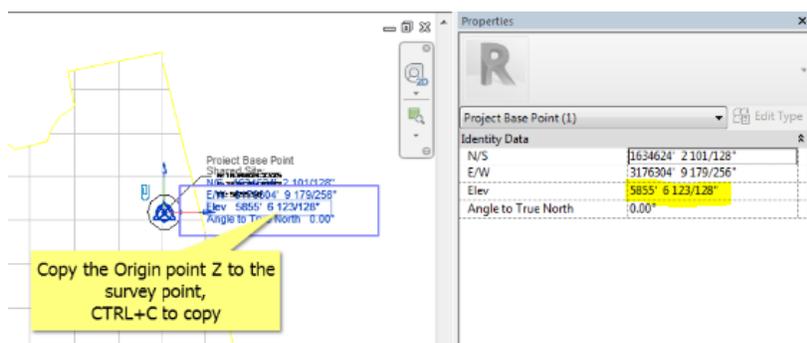
1. In the Manage TAB>
2. under LOCATION button
3. in the Location weather and (3.) Site
4. Select the SITE REFERENCE POINT (Name from the XML file above)
5. MAKE CURRENT

FOR THE SITE PLAN ONLY

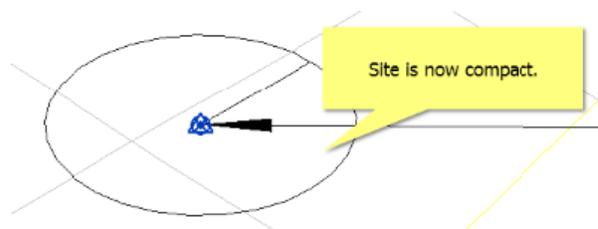
6. Select any and all other points
7. Delete them- the SITE may have ONLY ONE location!

Tighten up the survey point and the base point

- Unclip the survey point
- Move it to the oriting point using SZ to snap points.
- Set the survey ELEVATION to the same elevation as the base point

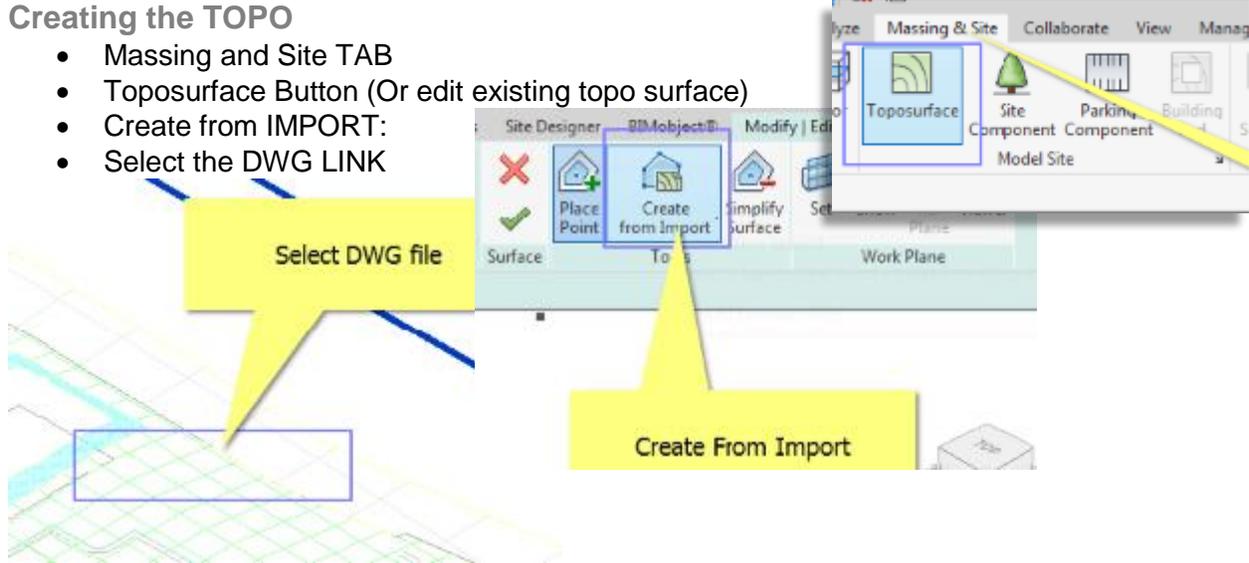


- Re-clip the survey point.
- In a 3D view show the survey&site points. The Image at right shows correct base&Survey points on the registraion point- the site is now "compact"

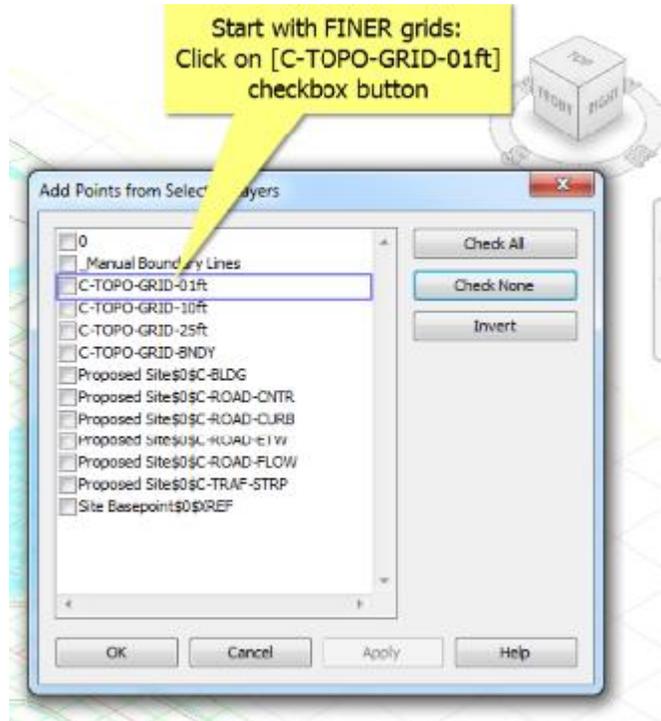


Creating the TOPO

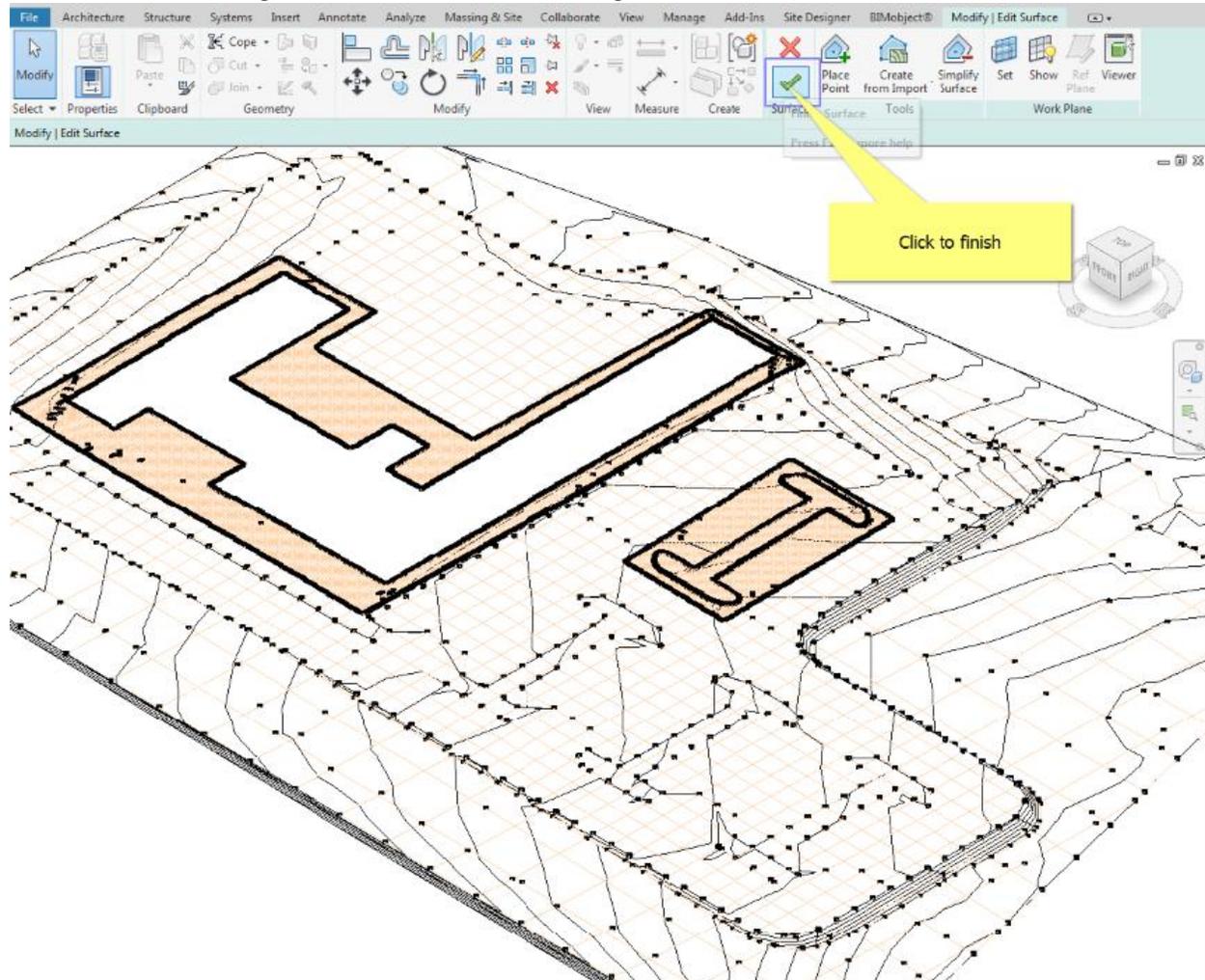
- Massing and Site TAB
- Toposurface Button (Or edit existing topo surface)
- Create from IMPORT:
- Select the DWG LINK



- Start building with the finer grids.
- Click OK
- Repeat for the coarser and coarser grids
- This allows the points to generate from finer to coarser grids which may only represent context outside the site boundary.
- If points are exceeded or an error occurs, stop and accept the limits of the site.



Note the resultant site is not a perfect representation of the civil site TIN as it uses nearest-neighbor to determine triangulation,

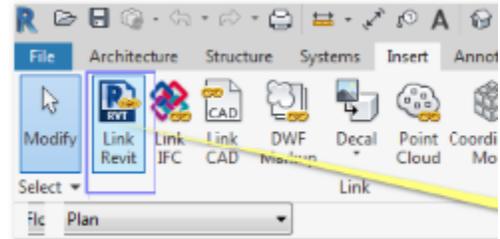
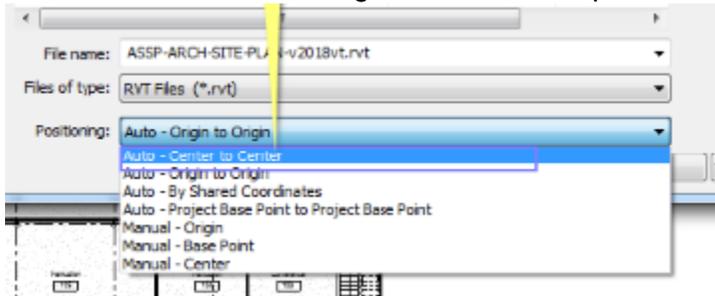


Site pads will need to be added based on the Flat-cad 2D and offset to rest UNDER the extents of each building's base structure to create a clean section cut. Note the PADS may be 1'-0" down from the XML indicated top-of-slab if the slab itself is 1'-0" thick.

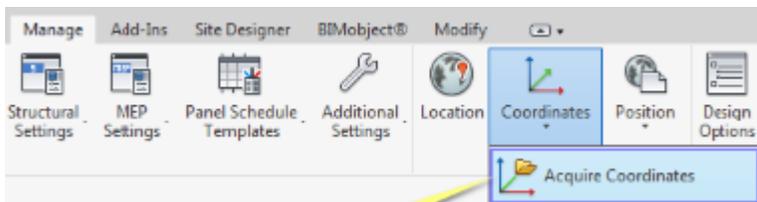
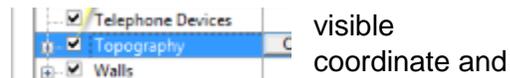
- Link in the 0-0-0 version of the file and delete the CAD layers to generate the ASSP-2D view of the file in CURRENT VIEW ONLY
- Create an option for the CAD 3D plan with two options, off by default, and Edit. Set OFF BY DEFAULT as the default and move the 3D CAD to the EDIT option only. This will make it invisible unless it is on the EDIT option. Or just delete the 3D CAD file for now.

Learning Objective: Register locations (Acquire or the AutoCAD Civil 3D plug-in) to publish to Revit (Architect)

- Open a building file
- Insert tab
- Link in the Site using center-to-center positioning



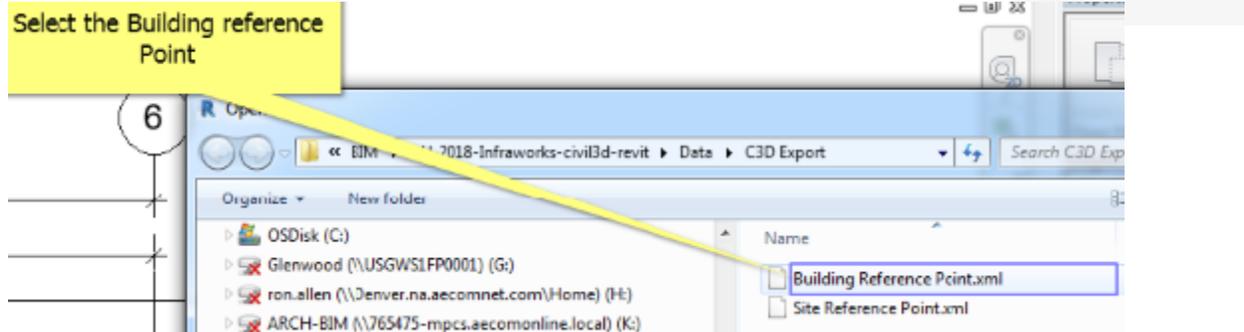
- Type V V and make the topography visible
- Under the manage tab, select acquire coordinates



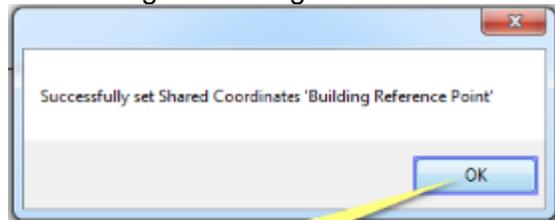
- Select the site - this synchronizes the Site ID (GUID HANDLE) to the coordinate system
- Repeat the process and reselect the site until a dialog appears indicating the site has been synced.

Align the building to XML coordinates

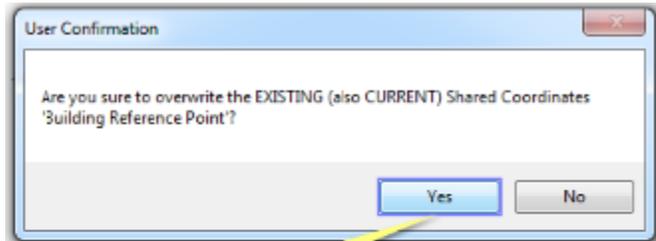
- Zoom in on the (A)(1) Location gridline intersection (This should be the BASE POINT for the project as well.)
- Turn off everything BUT the grids
- Launch the Import Shared Coordinates from XML file for the current building.
- Select the (A)(1) intersection and then
- Select a point UP the (A) grid
- Open the Building reference point file



- Create or overwrite the file:
- Message indicating success:

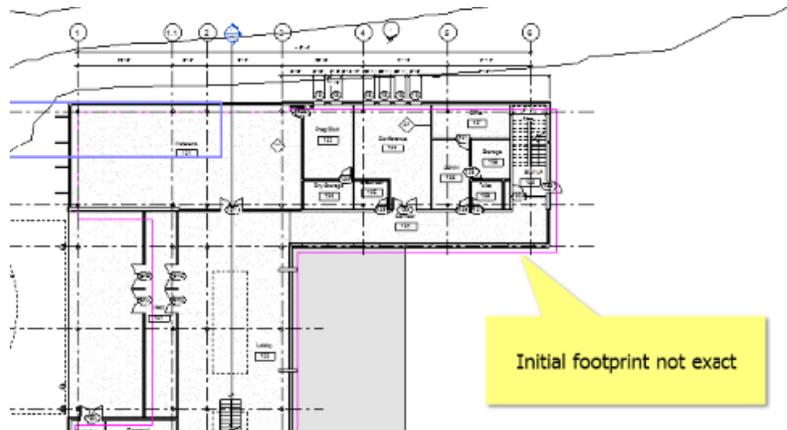


Click on [OK] button



Click on [Yes] button to CREATE or OVERWRITE

- The initial footprint may not be exact, but round-tripping the CAD export from REVIT to Civil 3D will tighten up the outline of the building footprint and synchronize everything on reload of the flat-cad file.
- Export as DWG using ASSP with the registration mark in CAD and REVIT visible



Learning Objective: Port content to InfraWorks for presentation back to AutoCAD Civil 3D

After the Revit shared coordinates have been established both the Civil 3D design and the Revit model can be imported to InfraWorks for in-context visualization using the following procedure.

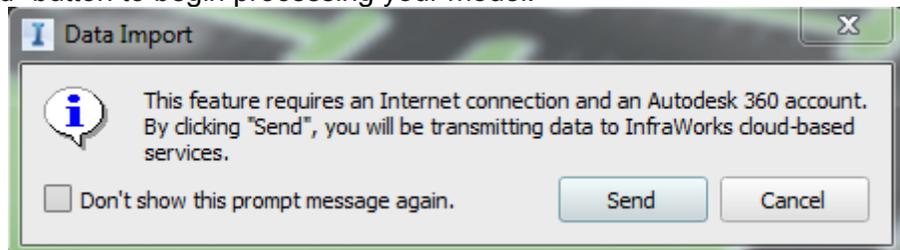
1. Add your Civil 3D design data into InfraWorks and configure it to display appropriately. Techniques for importing and visualizing Civil 3D data in Infraworks are not covered in this handout. However, we recommend checking out this excellent video produced by Jeff Bartels which explains some techniques to accomplish this:

<https://www.youtube.com/watch?v=pY2V4xjhNJ4>



44 - Civil 3D Design Visualized In InfraWorks

2. Import the Revit Building Model into InfraWorks using the data import button in the Data Sources Pane. Importing Revit models requires Autodesk Cloud based services. Select the "Send" button to begin processing your model.



45 - Upload the Revit Model for cloud Processing

- 3.



Learning Objective: Recognize options for pushing to Revit LIVE, or other possibilities using 3D rendering in the cloud to push for phone VR and VR appliances

Appendix:

mMOVE_Z_ZERO.LSP:

Three routines for flattening files. MZO, MZO_EL and z0_arcs , and z0_smash

```
; This program makes z co-ordinate 0 for entities selected
;
(defun c:MZO ()
  (setq s nil)
  (if (= "" (setq s (getstring "Globally change ALL objects in drawing(1) Select objects to change (2) <1>")))
    (setq s "1")
  )
  (if (= s "1")
    (progn
      (command "move" (ssget "x") "" "0,0,0" "0,0,1e99")
      (command "move" (ssget "p") "" "0,0,0" "0,0,-1e99")
      (princ "\nZ coordinates of all objects changed to 0")
    )
    (progn
      (princ "\nPick entities to set to a Z co-ordinate of 0")
      (setq sset (ssget))
      (command "move" "p" "" "0,0,0" "0,0,1e99")
      (command "move" "p" "" "0,0,0" "0,0,-1e99")
      (princ "\nZ coordinates of selected objects changed to 0")
    )
  )
  (princ)
)

(defun C:MZO_EL () ; Macro to make objects at elevation 0'
  (prompt "\nChange Objects To Elevation Of 0'-0: ")
  (setq cll (ssget))
  (command "change" "p" "" "p" "TH" 0 "")
  (command "change" "p" "" "p" "EL" 0 ""))

(defun c:z0_smash ()
  (command "MOVE" (ssget "x") "" "0,0,0" "0,0,1e99")
  (command "MOVE" (ssget "p") "" "0,0,0" "0,0,-1e99")
)

(defun c:z0_arcs (/ ss1 etdata)
  (setq ss1 (ssget '((0 . "arc"))))
  (and ss1
    (mapcar '(lambda (y)
      (apply 'command-s
        (append '("._arc")
          (mapcar '(lambda (x) (reverse (cdr (reverse (vlax-curve-getpointatparam y x))))
            (list (vlax-curve-getstartparam y)
              (/ (+ (vlax-curve-getstartparam y) (vlax-curve-getendparam y)) 2)
              (vlax-curve-getendparam y))))))
          (entmod (subst (assoc 8 (entget y)) (assoc 8 (setq etdata (entget (entlast)))) etdata))
          (entdel y))
        (vl-remove-if 'listp (mapcar 'cadr (ssnamex ss1))))))
    (princ))
)
```