AUTODESK UNIVERSITY

DV20420

AutoCAD Civil 3D Visualization in 3ds Max, Infraworks or Navisworks

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Learning Objectives

- After this class, attendees will be able to import Civil 3D project data into 3ds Max
- After this class, attendees will be able to import Civil 3D project data into Infraworks
- After this class, attendees will be able to import Civil 3D project data into Navisworks
- After this class, attendees will be able to decide which platform is right for the project

Description

Civil 3D project visualization can be addressed in several different ways depending on the project needs. Full photo realistic visualization can be achieved by exporting data to 3DS Max. A more dynamically adjustable, yet still impressive, visualization can be achieved through Infraworks. It will provide faster access to different project options. Navisworks can provide a more utilitarian option focusing on project construction analysis and presentation. This session will discuss the relative benefits of each and what steps will be needed to achieve the desired results.

Your AU Expert(s)

Paul c.Kirkendall *is an application engineer for MasterGraphics he provides consulting, training, and support for a variety of infrastructure clients. Paul has put together multiple online training videos for WisDOT and Global eTraining. He has presented at the Wisconsin Society of Land Surveyors conference and Autodesk University since 2013. Prior to joining MasterGraphics, Paul gained valuable knowledge and experience working with popular Autodesk, Inc., civil design and mapping software. His duties included installation and implementation, creation of company standards, training of staff, and extensive infrastructure design and planning. During this time, Paul also worked closely with surveying departments. He came to understand the interaction of workflow and data collection across projects. Paul is an Autodesk Approved trainer, Autodesk Civil 3D Certified Professional, Autodesk Certified BIM Specialist: Road and Highway Solution, and AutoCAD Certified Professional*.

Questions to answer before the project starts:

Civil 3D will export into many software applications, but what is the best for each one? There are a few options to bring data into each from Civil 3D. This document will walk through those options.

What type of visualization is required for the project?
What are you trying to convey to your audience?
What is the budget for visualization?

Once these questions are answered, we can access what direction the project should go.

Let's start in Civil 3D assuming the following is already created:

1. Existing Surface
2. Alignments & profiles for the roadways being visualized
3. Corridor
4. Pipe Networks
5. Parcels (optional)
6. Proposed Grading/Surfaces (optional)

Civil 3D Project data Visualized in 3ds Max

What is needed for 3Ds Max Civil View Visualization?

Civil 3D contains a tool for exporting the geometry. During the export of data, Civil 3D will simplify the information within its file based on options selected in the export module. In general, the following things will occur.

1. Point groups are converted to 3ds Max Design Particle Systems.
2. Grading/Site Feature lines, Corridor Baselines and Corridor Feature lines are converted to 3ds Max splines.
3. Corridor Surfaces are converted to surface meshes.
4. Subsurface corridors are not exported unless specifically selected.
5. Duplicate points are removed.
6. Materials are applied based on known subassemblies and link codes.

Exporting model geometry from Civil 3D

This following steps will guide you through getting the scene prepared for importing data.

1. On the Output tab of the ribbon> Export panel Click *Export to 3ds Max*. *(Figure 1)*

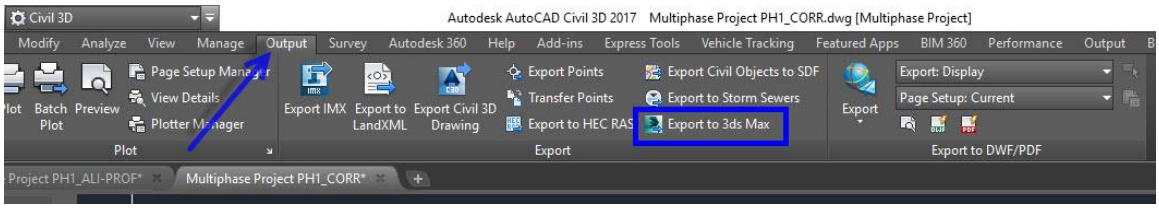

Figure 1

2. On the *Export to Civil view for 3ds Max Design* dialog box check the boxes next to the corridor and any surfaces needed. *(Figure 2)*

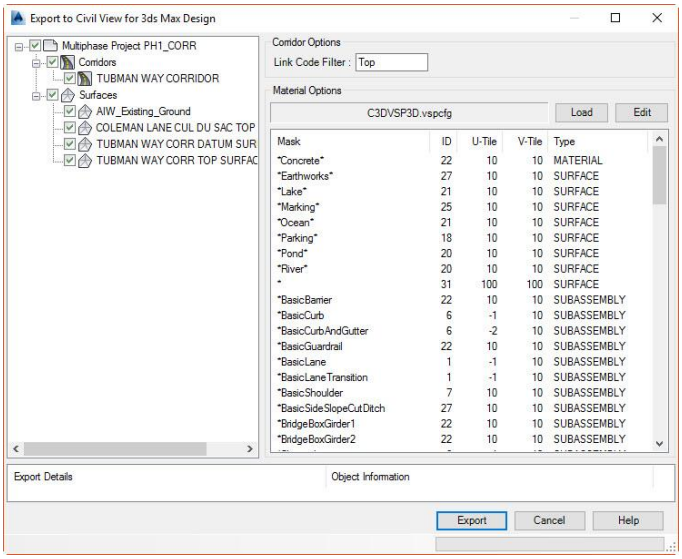

Figure 2

Note: If you get the warning as shown in figure 3, then the corridor will need to be updated before it can be exported. *(Figure 3)*

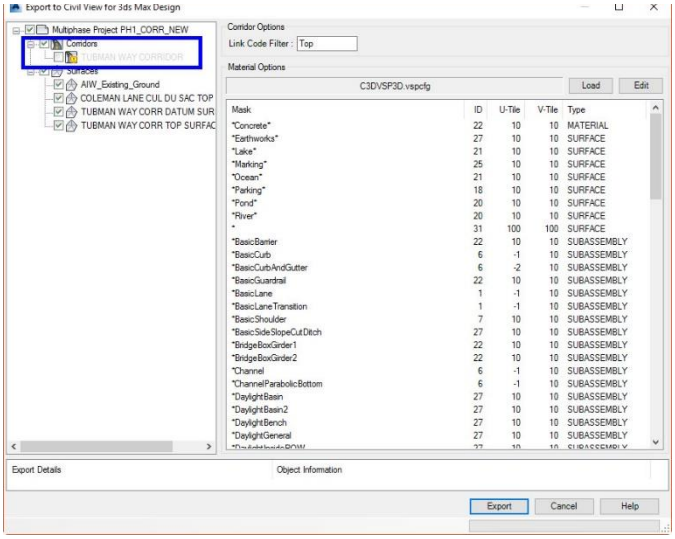

Figure 3

Civil View

Civil View is a plug-in provided with 3ds Max. It is used to import data from Autodesk Civil 3D in an automated way that makes populating the scene faster and easier. Civil View contains its own tools inside 3ds Max for importing and populating geometry.

Civil View retains a link between the existing file and the file the data was imported from. It allows you to quickly update your scene should the design change.

Civil View must be initialized in 3ds Max Design before it can be used.

Process

The process of working with Civil View is broken into the following steps.

1. Export data from Civil 3D
2. Import data into 3ds Max Design
3. Add road lines
4. Add static placed objects
5. Add animated placed objects
6. Render Images/Animations

Starting Civil View

This following steps will guide you through getting the scene prepared for importing data.

1. Click Project Folder on the Quick Access Toolbar to open the Project dialog. Browse to *Your Project Folder* and click OK to set this as the default project directory.

Note: The Project folder setting is to keep project organization and also aids in helping to not duplicate data, add or delete data to an existing project for another client.

2. Expand the Civil View menu and select Start Civil View from the menu, it should be the only choice. *(Figure 4)*
3. Set the System Units to feet and Country Resource Kit to US Imperial in the Initialize Autodesk Civil View dialog then click OK. *(Figure 5)*

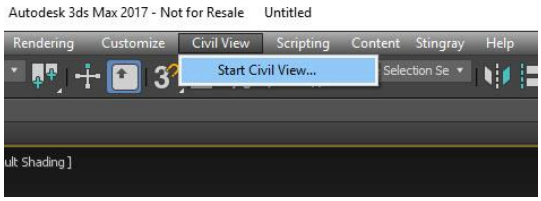

Figure 4

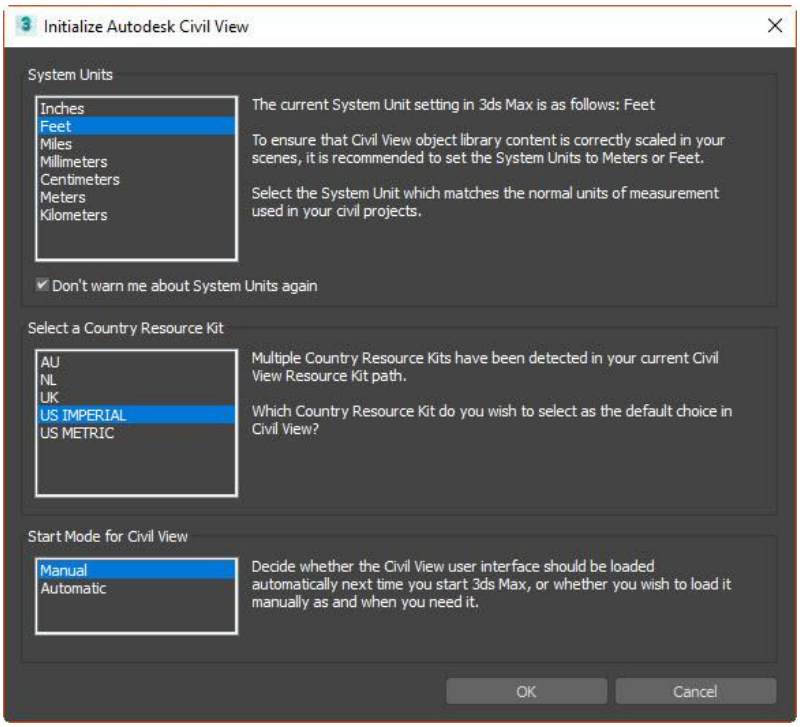

Figure 5

4. A dialog box will open indicating the Civil View has been initialized and stating that you will need to restart 3ds Max. Click OK, then close 3ds Max and restart it.

Importing Data

The following steps will guide you through importing data. You will only import objects from the Civil 3D export that are necessary for this specific project. The primary area of interest is the new Main corridor which is covered in 1 constant region. In addition to these surfaces and the overall surface of the site, you will also need the center of the corridor along with the inner and outer edges of the slope intercepts & pipe networks.

1. If you selected the Manual Start method in the Initialize Autodesk Civil View dialog then you will need to expand the Civil View menu and select Start Civil View. You will see the full Civil View menu once it has been started.
2. Expand the Civil View menu and hover over Geometry Import until the menu expands then select Civil 3D (VSP3D). *(Figure 6)* This will open the Civil 3D Import Panel.

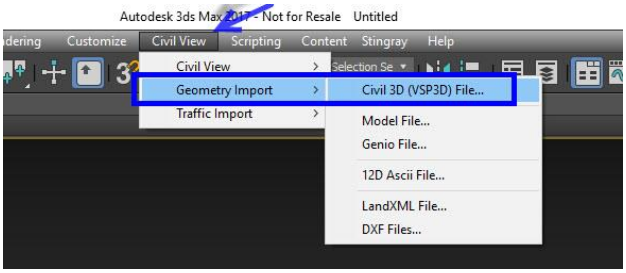

Figure 6

3. Click Open in the Civil 3D Import Panel. A file browser dialog will open in the Import folder of the current project directory. Select and open the *Your Project Export.vsp3d* file.
4. The Civil 3D Import Panel will then open. *(Figure 7)*
5. Click on *Corridors* in the left hand box then check the boxes that apply for what needs to be imported, to select it. *(Figure 7)*

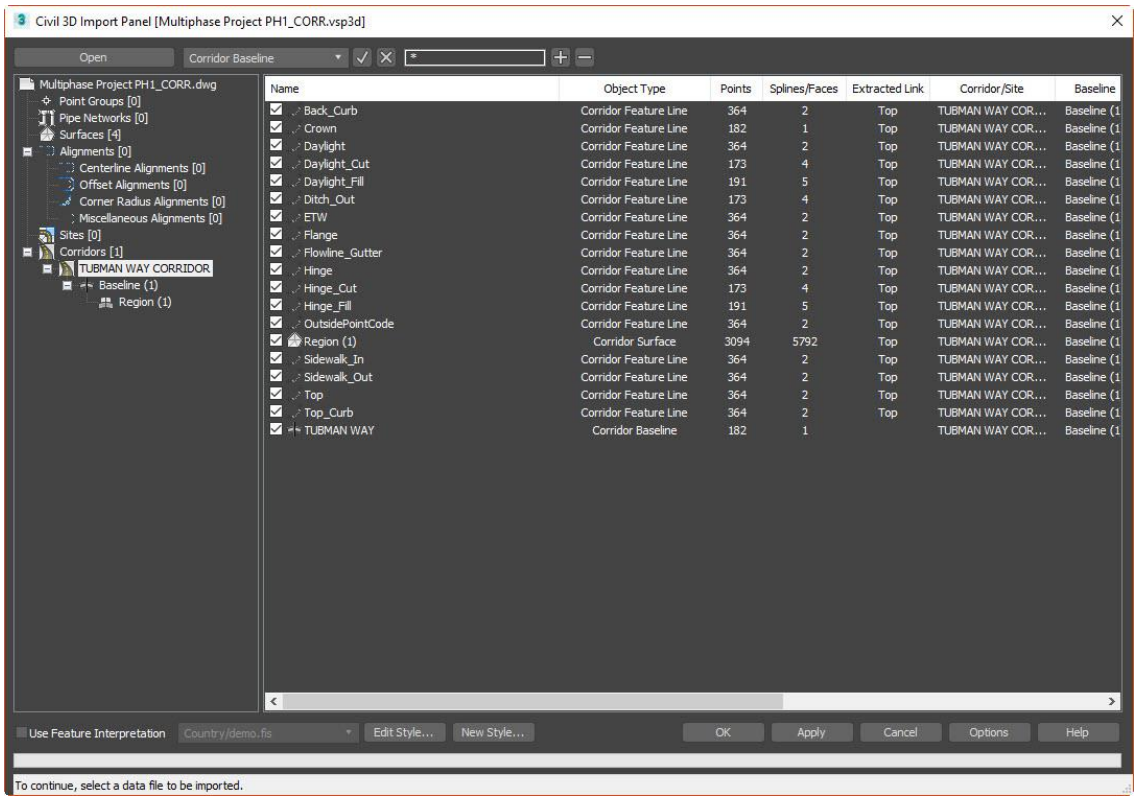

Figure 7

6. A Civil View Information dialog will open stating that the center of the imported data will be placed at an automagically calculated global shift to improve accuracy. *(Figure 8)*
7. Click Yes to agree and close the dialog.

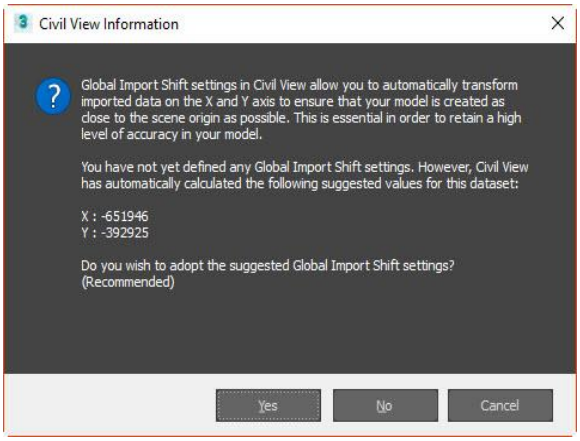

Figure 8

8. A Civil View Information window will appear noting that you have not specified a Feature Interpretation Style. You can apply this later. Click Yes to continue. *(Figure 9)*

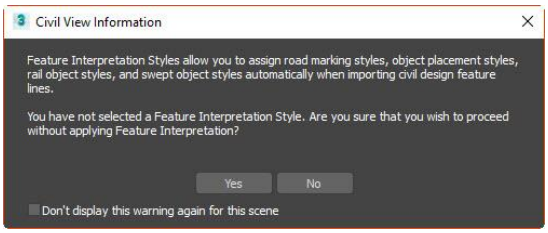

Figure 9

9. After a few moments, the imported geometry will become visible. Zoom in and orbit around to take a look at the scene. *(Figure 10)*

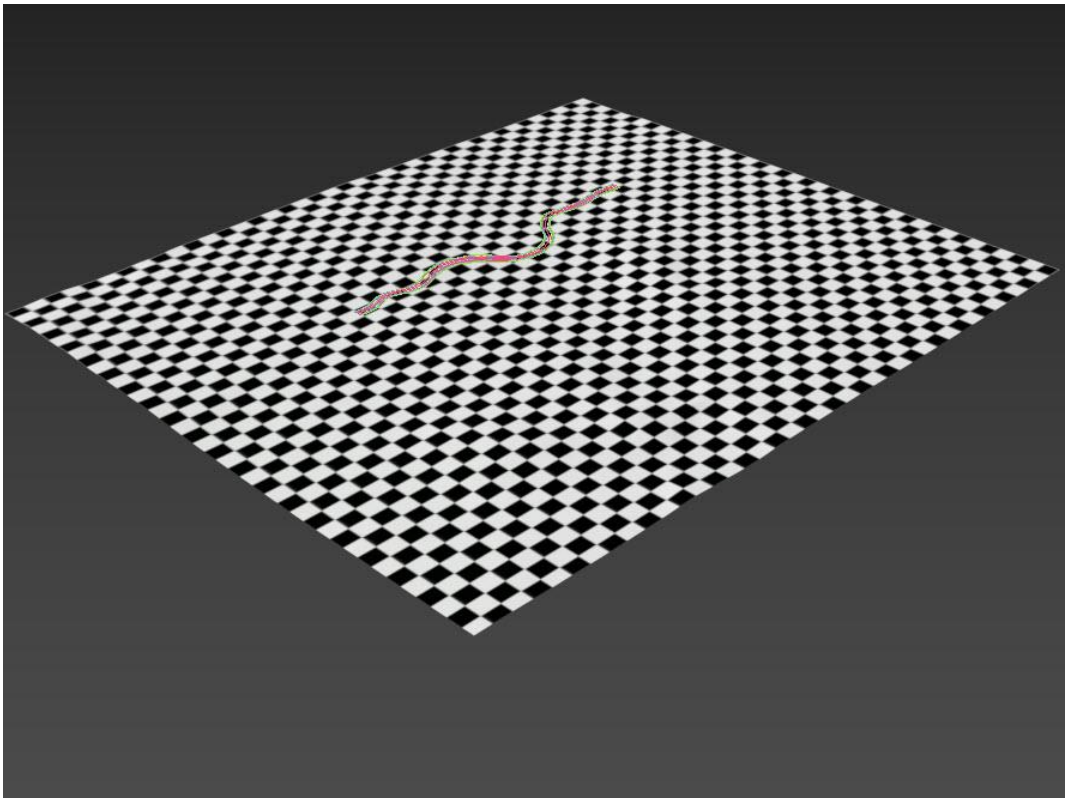

Figure 10

Image Overlay (optional)

The following steps will have you load an image to overlay the site surface.

1. Expand the Civil View top menu and select Civil View Explorer. *(Figure 11)* The Civil View Explorer will open in a floating palette. Right click on the title bar of the palette and select Dock>Left to dock this to the left side of the interface.
2. In the Civil View Explorer, select *Surfaces(#)* from Civil View Objects>Imported Objects.

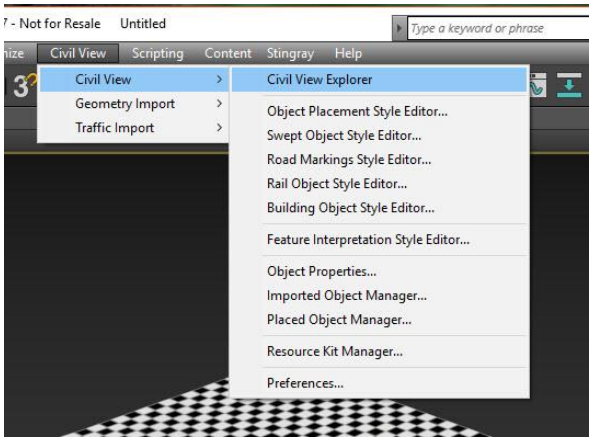

Figure 11

3. In the Object List of the Civil View Explorer tools, select *Your Project Existing Surface*. *(Figure 12)*

Figure 12

4. Click on the Draping tab of the Surface Parameters rollout. *(Figure 13)*
5. Click Choose Bitmap to select a file to overlay the existing site, a dialog will open. Browse to sceneassets>images in the project directory and select and open the *corresponding JPG image file*. *(Figure 13)*
6. A dialog will open asking if you want to display the map in the viewport. Click Yes and the image will now be visible overlaying the site. *(Figure 14)*

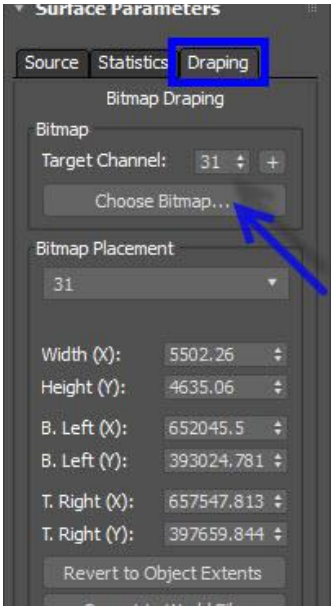

Figure 13

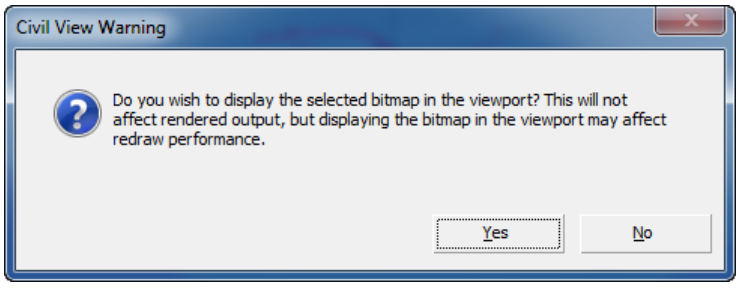

Figure 14

7. Save the file.

Road Lines

The following steps will have you add lines to the roadway including solid stripes at the road edge and solid double center stripes.

1. Zoom in on the road to see it in more detail for placing striping.
2. Expand the Civil View top menu then select Road Markings Style Editor. *(Figure 15)*
3. The editor will open with nothing currently defined. *(Figure 16)*

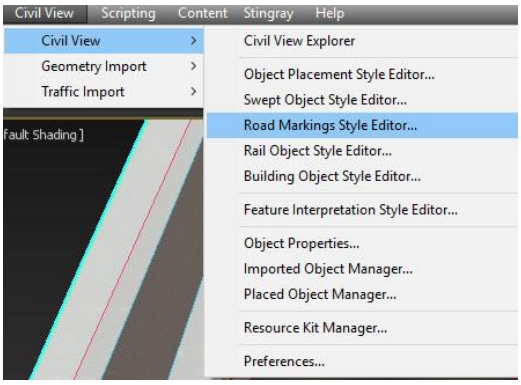

Figure 15

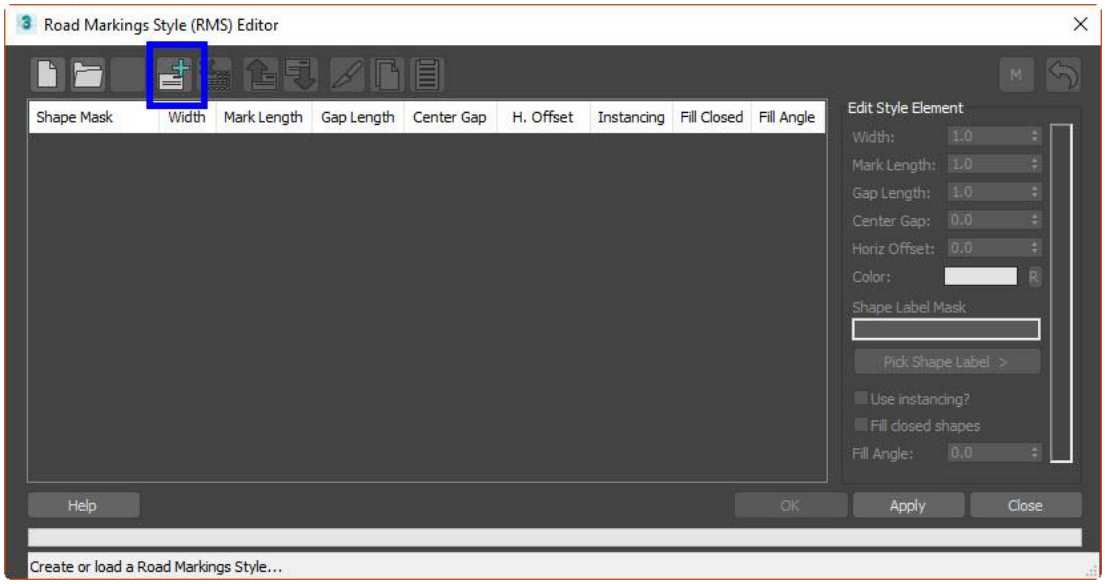

Figure 16

4. Click *add new element* to add a new style to the list. *(Figure 16)*
5. Set the Width to 0.3 and the Center Gap to 0.1, then click on the color swatch to open the Color Selector and set the color to R: 225, G: 183 and B: 0. This style will create a double yellow centerline with stripes 4" wide with a 4" gap in the center. *(Figure 17)*

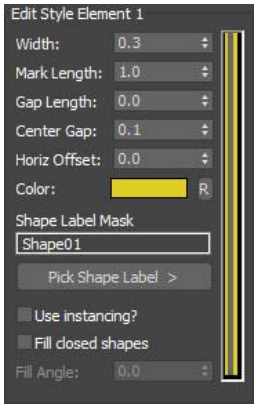

Figure 17

6. Click *Pick Shape Label* then pick the centerline of the road. The Shape Label Mask field will update to show *C3Dalignment – Your Project Sample*. Click the Apply button to add this feature to the road. *(Figure 19)*
7. Click OK to accept your edits and close the dialog. A Civil View Information dialog will appear noting that the style has not been saved. Click Yes and name this *MyStripes*. *(Figure 18)*

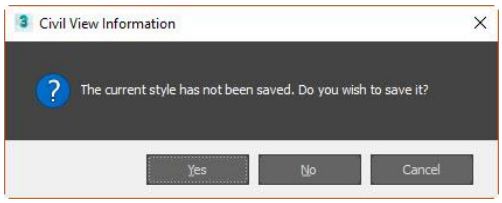

Figure 1818

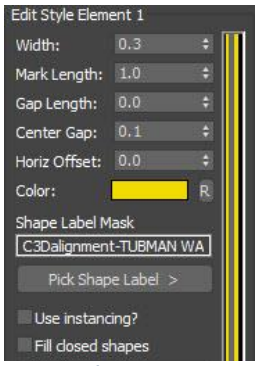

Figure 19

8. Looking at the viewport, you will notice areas where the stripes do not appear properly. This is due to single byte precision and interpolation issues and can be corrected.
9. Click on Scene Settings in the Civil View Explorer dialog. In the lower panel, locate the Global Road Marking Settings area and change the Vertical Shift from 0.025 to 0.05 and the stripes should now appear properly. *(Figure 20)*

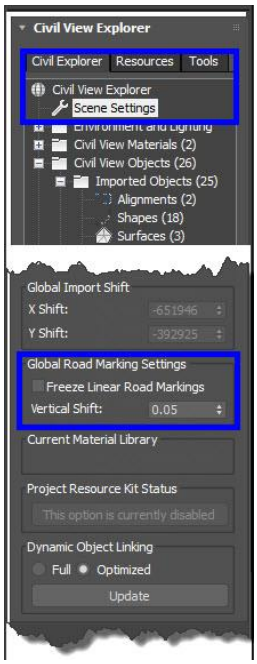

Figure 20

Static Placed Objects

The following steps will be adding street lights at a regular interval as well as a road sign at one end of the roadway.

1. Zoom in on a section of the road near the beginning.
2. Expand the Civil View top menu and select Object Placement Style Editor to open the dialog. *(Figure 21)*

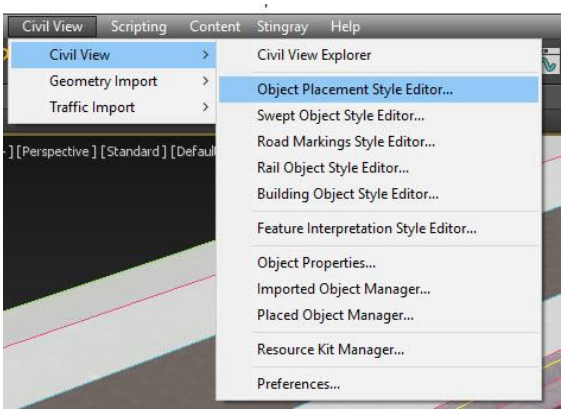

Figure 21

3. Click *Parent Shape* then click on the centerline of the roadway to set that as the Parent Shape for this style. *(Figure 23)*
4. Click *Add New Element* to add a new element to the style.
5. Click on the Furniture tab in the bottom half of the dialog to open it.
6. Select the Lamp Columns in the left hand pane and then select 30' Single Column in the right hand column.
7. In the Longitudinal Placement, check the radio button for Multiple (Regular Interval) and change the Interval to 150.
8. In the Lateral Placement pane, set the Horizontal Offset to 24.
9. Click Apply to place the lamps in the view.
10. Right click on 30' Single Column in the list and select Copy, then right click below it and select Paste to duplicate this entry.
11. In the Lateral Placement pane, change the Horizontal offset to -24 and the Rotation to 180 to place these on the other side of the road with the lamp head oriented in. *(Figure 23)*
12. Click Apply to see the changes to the view.

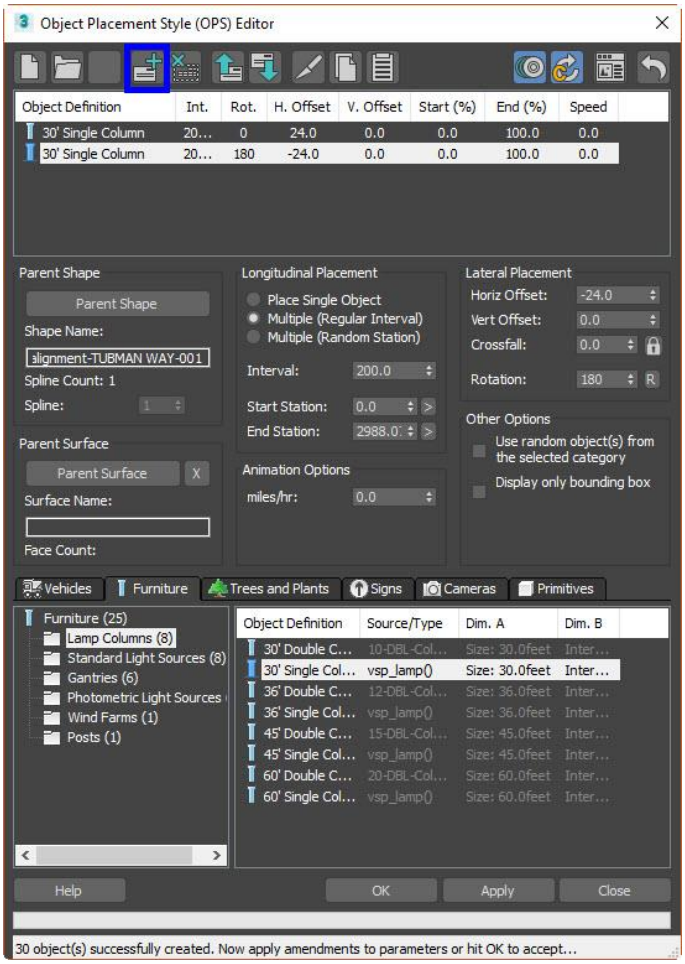

Figure 22

13. Click *Add New Element* to add a new element to the style. *(Figure 24)*
14. Select the Signs tab at the bottom of the dialog, select the Miscellaneous category and then pick the *Hill* sign.
15. In Longitudinal Placement, set the Start Station to 90 and in Lateral Placement set Horizontal offset to 24 and click Apply. This places the new sign near the upper entry to the link road on the correct side of the road. *(Figure 24)*
16. Click OK at the bottom of the Object Placement Style dialog
17. Click Yes and name the style *MyLights.*

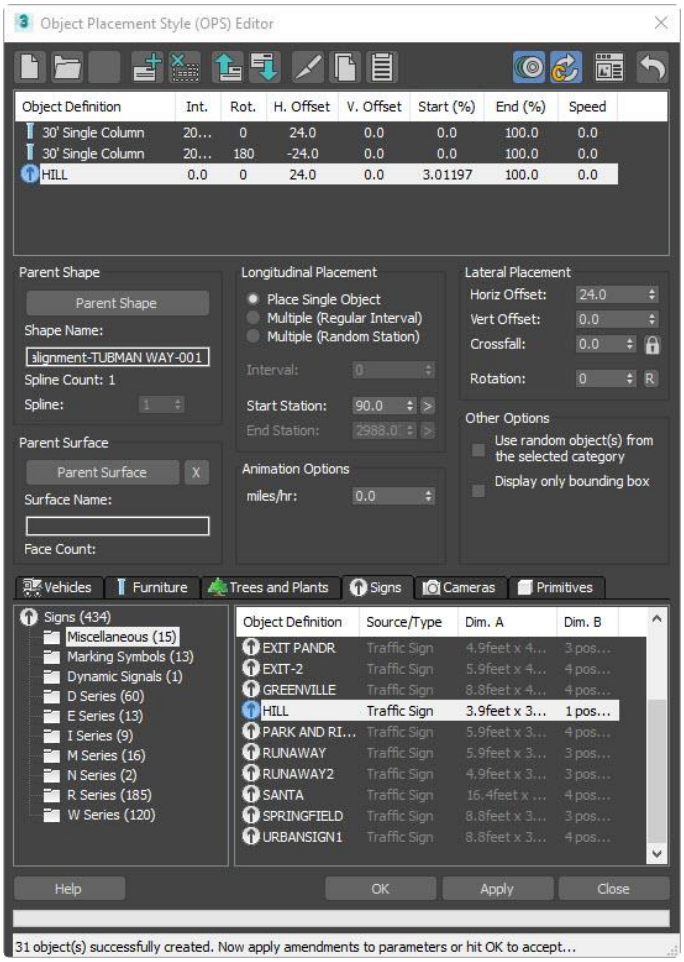

Figure 23

Animated Placed Objects

In the next steps you will be adding traffic and a camera to the scene.

1. Zoom in on a section of the road near a bridge end.
2. Expand the Civil View top menu and select Object Placement Style Editor to open the dialog.
3. Click *Parent Shape* then click on the centerline/alignment of the roadway to set that as the Parent Shape for this style. *(Figure 25)*
4. Click *Add New Element* to add a new element to the style.
5. Click on the Vehicles tab to open it then select the Cars folder in the left pane.
6. In the Longitudinal Placement pane, check the radio button for Multiple (Random Station) and set the Count to 30.

7. In the Lateral Placement set the Horizontal Offset to 6.0.

8. In the Animation Options, set the mph to 65.

9. In the Other Options dialog, check the box to use random objects from the selected category.

10. Copy and paste the Random [Cars] entry in the table at the top of the OPS editor to make a duplicate.
11. Change the Horizontal Offset to -6, Rotation to 180 and mph to -65 and click Apply to see the changes. *(Figure 25)*

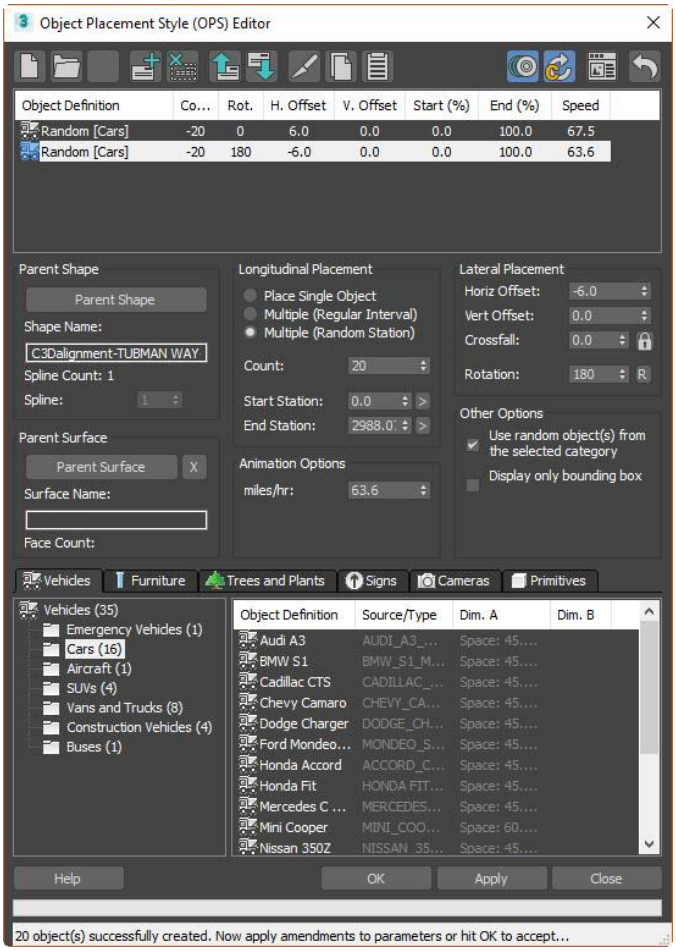

Figure 24

12. Click OK and click Yes to save your style as *MyTraffic.ops* then close the editor.
13. Click OK and a dialog will appear asking if you want to expand the length of the animation to match the time it will take a car to drive the route. Click Yes.

14. Scrub the timeline to see the cars move.
15. Select *Shapes(6)* from Civil View Objects>Imported Objects in the Civil View Explorer then select *C3Dbaseline-Your Project Sample* in the Shapes list in the Object List rollout.

16. Right click on *C3Dbaseline-Link Road-Centreline 1* in the Shapes list and select Apply Object Placement Style from the menu. In the resulting dialog, select Country and click Yes to use the line as the Parent Shape.
17. The Object Placement Style Editor will open. Click *Open Style* to load an existing style and select *Camera-90kph.ops.* Click Apply then close the dialog.
18. Press C to switch to the camera view and play the animation.
19. Save the file as *CV05.max*.

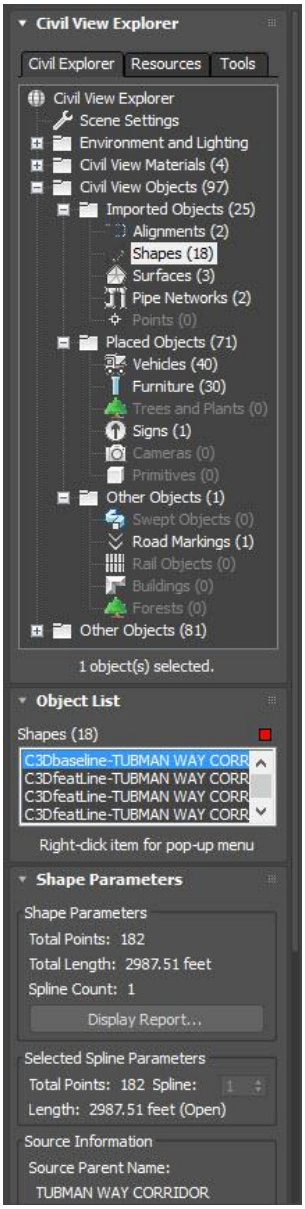

Figure 25

Civil 3D Project data Visualized in Infraworks 360

Start with Model Builder

The purpose of starting with the model builder is to have the software collect as much data as is out there and then supplement with better data for each object necessary.

1. Once in Infraworks 360 click the model builder button. A map will open to select an area for the model extents. *(Figure 27)*
2. Zoom to the project area and with the selection tools select an area no bigger than 200 sq. kilometers. *(Figure 27)*

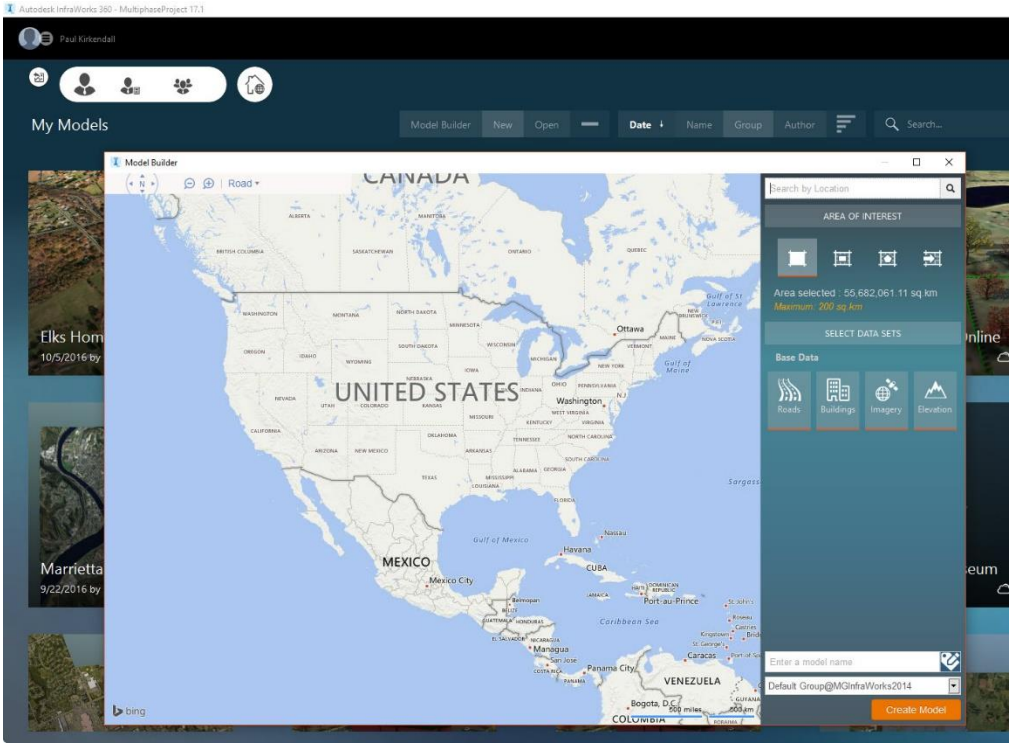

Figure 27

3. Add a name and select a group to put the model in and select Create Model. A dialog box will pop up to say the model is being prepared and a notification will be sent via email as soon as it is processed. *(Figure 26)* Once the email comes or the thumbnail pops up on the start page of Infraworks 360 then the model is ready to be downloaded locally.

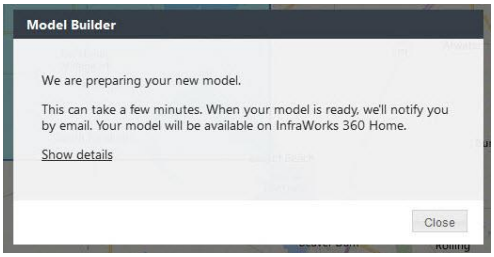

Figure 26

4. Click on the thumbnail to activate the download. *(Figure 28)*

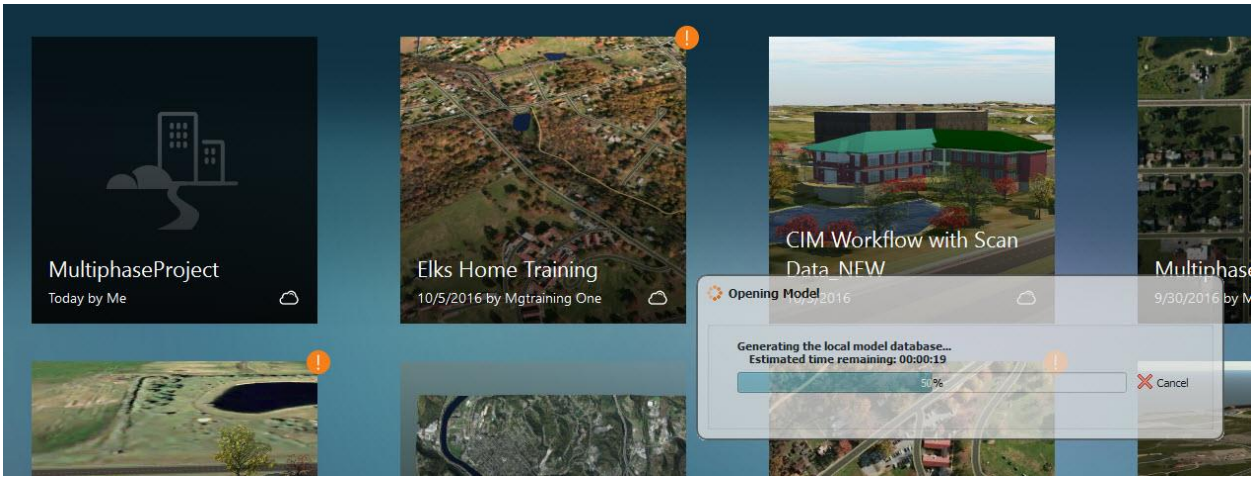

Figure 28

NOTE: Figure 29 Represents what you will get from the Open street map source that model builder grabs data from. *(Figure 29)*

Included in Model Builder data is the following:

- Image
- Terrain
- Road alignment (Planning roads)
- Railroads
- Waterways
- Buildings (depending on the area)

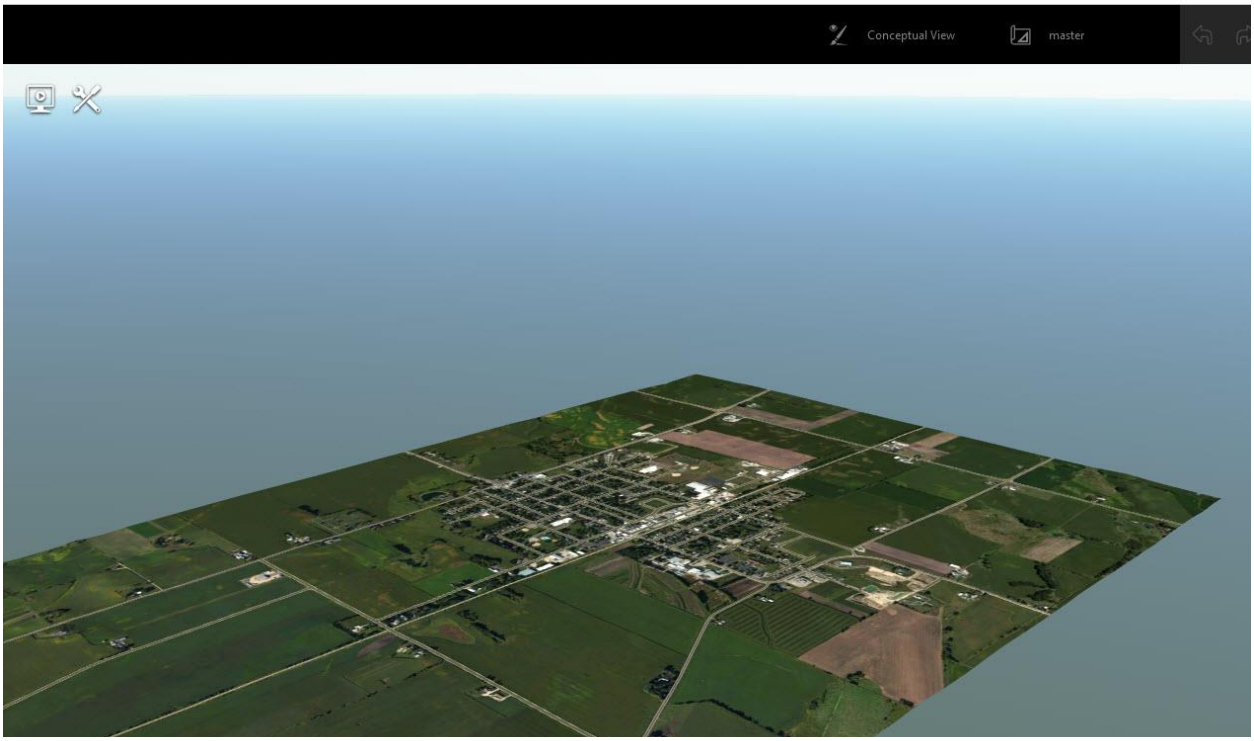

Figure 29

Creating new proposals

New proposals are created for the purpose of visualizing different options in a project.

1. On the right side of the quick access toolbar select the proposal icon. *(Figure 30, blue arrow)*
2. Click add at the bottom of the dropdown.

Note: Make sure the proposal to be copied is the current or active proposal. The active proposal will be copied as the new proposal that is added.

Import the Civil3D corridor file

1. Navigate to the Civil 3D file location
2. Drag and drop the file into the model
3. DWG file Import dialog box will open asking what type of file it is.
4. Select Autocad civil 3D DWG
5. Click OK. *(Figure 31)*

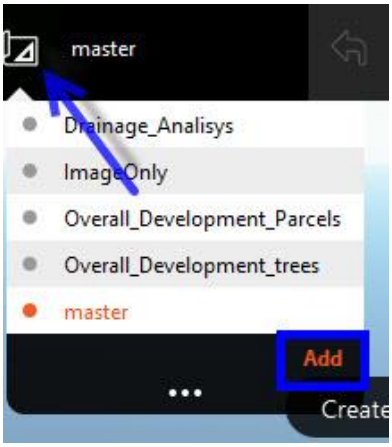

Figure 30

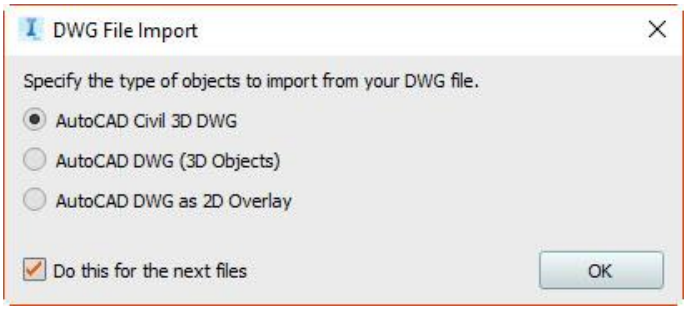

Figure 31

6. In the Data Source Configuration dialog box select close and refresh. *(Figure 32)*

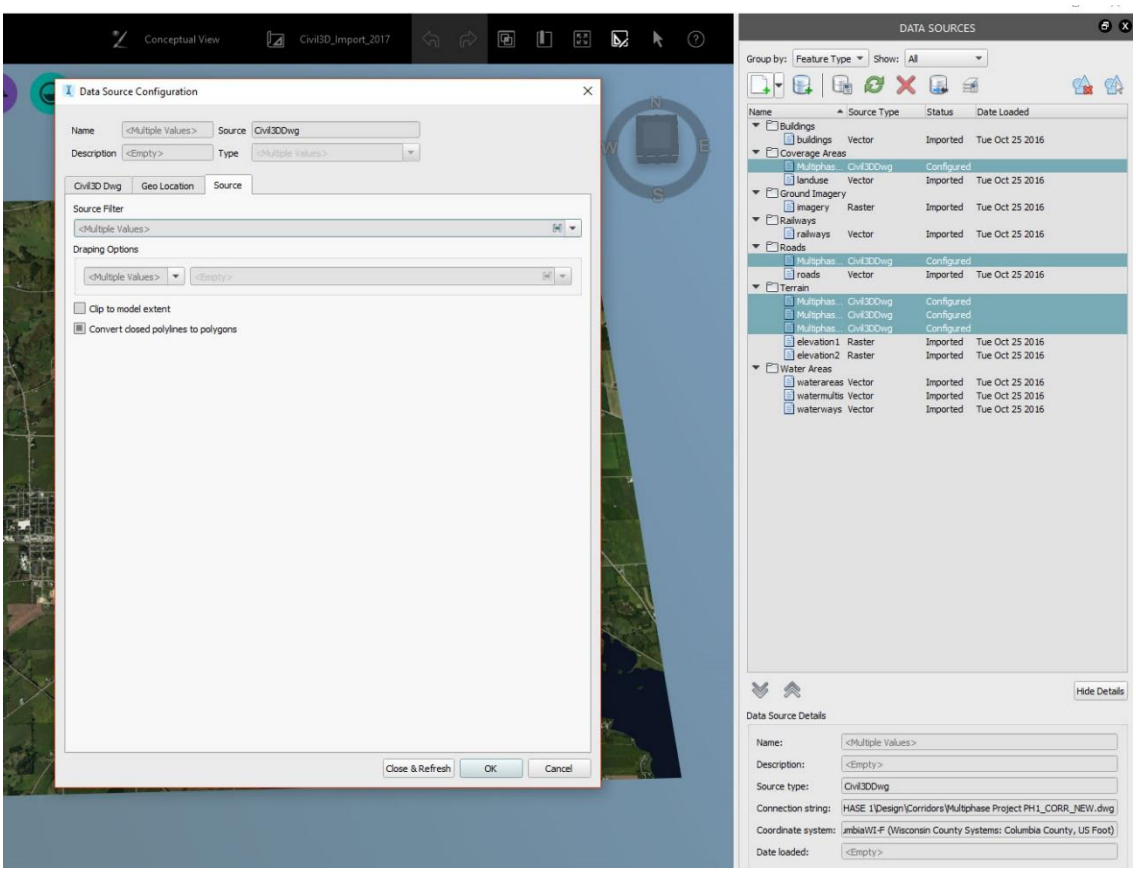

Figure 32

Note: An issue will appear as the road interacts with existing alignments and surfaces imported *(Figure 33)*

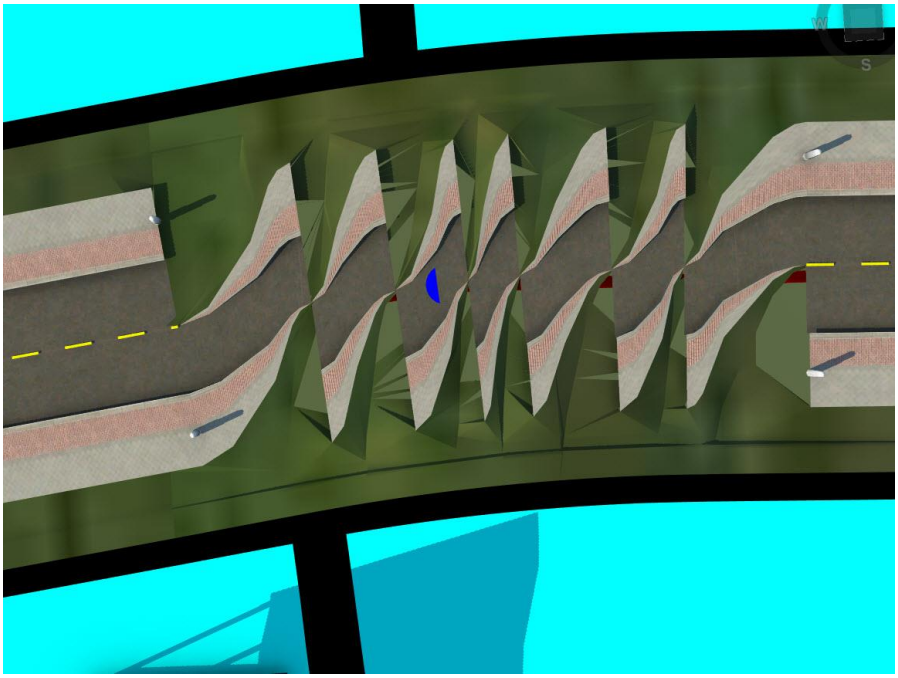

Figure 33

Note: If the corridor is brought in and then the surfaces of the corridor are removed, all will be good again. However, there are some issues with tying in to the planning roads. *(Figure 34)*

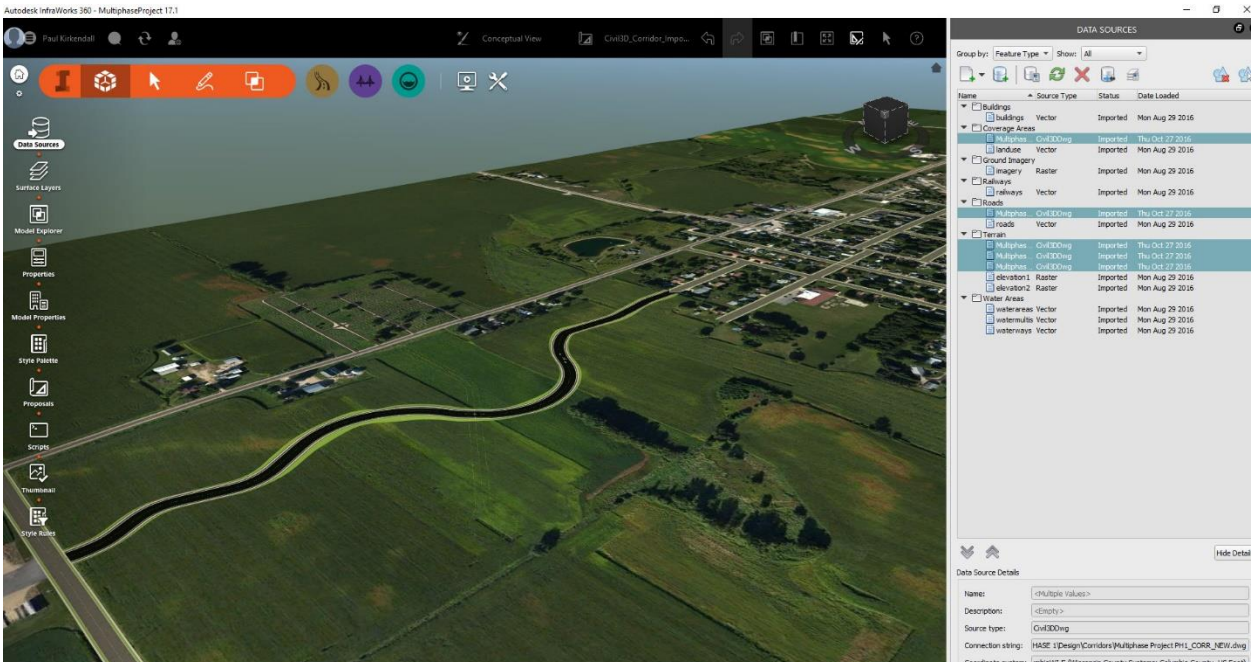

Figure 34

7. Double left click or right click select configure for the roads. *(Figure 32, right side)*
8. On the Choose Data Sources check all that are relevant. *(Figure 35)*

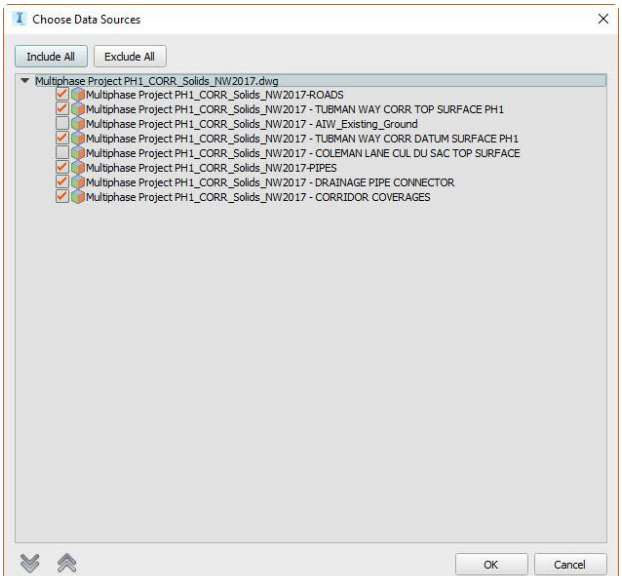

Figure 35

9. Data source configuration dialog will open. Under style on the common tab, select the pencil icon to add a style to the alignments. *(Figure 36)*
10. Select a road style and click OK.

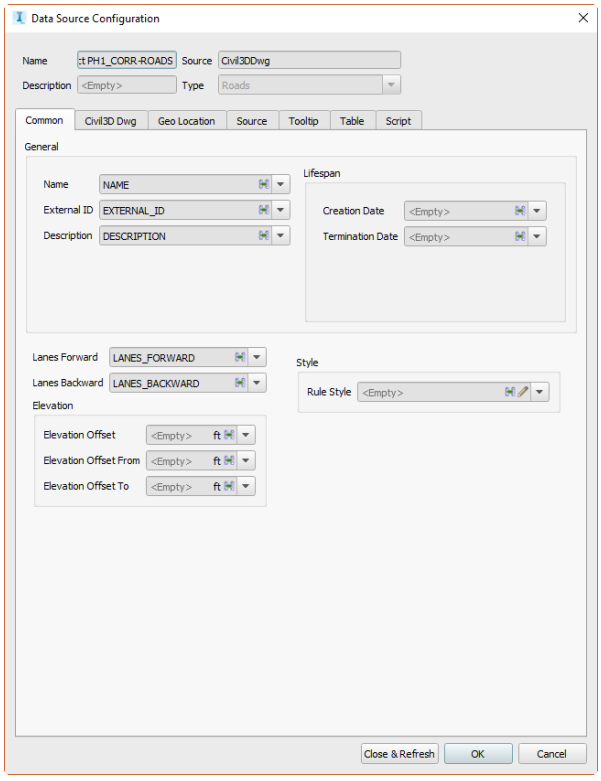

Figure 36

11. On the Civil 3D Dwg tab, check the alignments to be added to the proposal. *(Figure 37)*

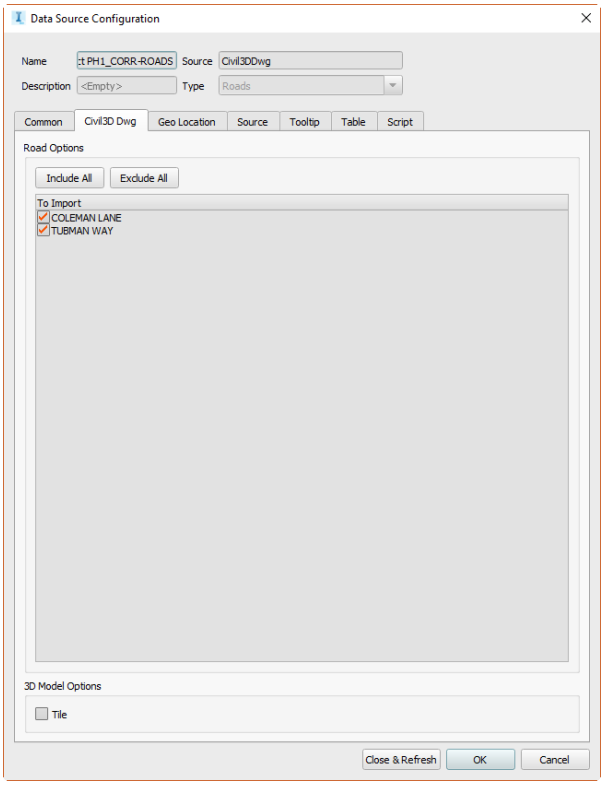

Figure 37

12. On the Geo Location tab, double check or set the coordinates. *(Figure 38)*

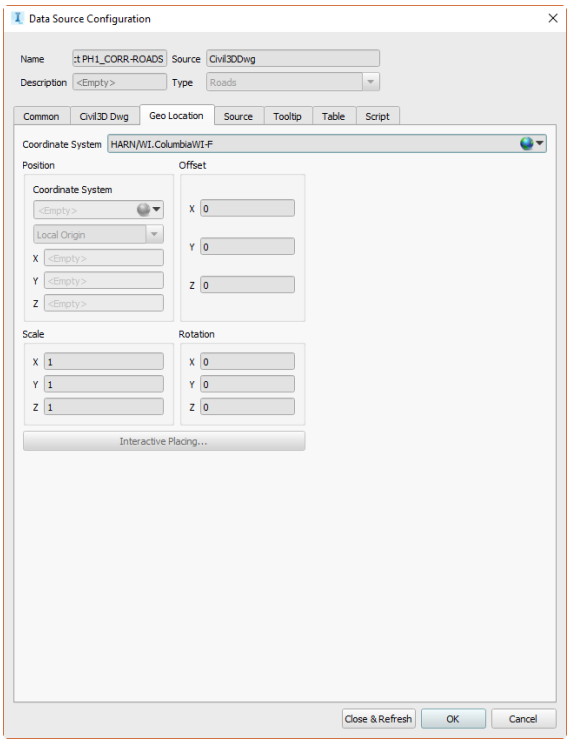

Figure 38

13. Click Close & Refresh to add alignments with styles to the proposal.
14. Figure 39 is a result of the roads being assigned an Infraworks road style. *(Figure 39)*

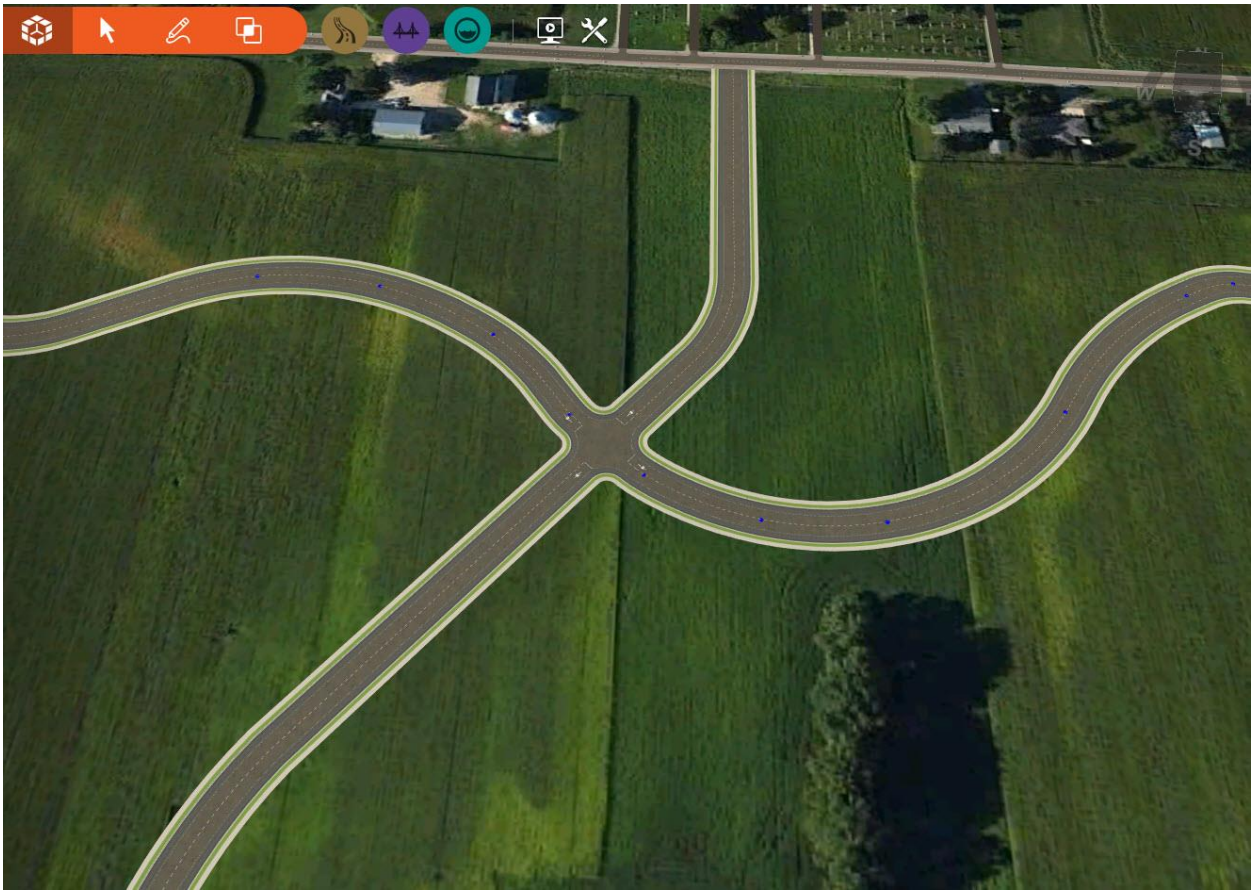

Figure 39

Create a Drive through Animation

1. Click the TV icon (Create and conduct infrastructure presentations) *(Figure 40)*
2. Click the Storyboard creator tool.
3. In the storyboard panel, click *Add camera path animation* drop down, select *Create from design road*. *(Figure 40)*
4. In the model, select the design road that the animation is going to be for.

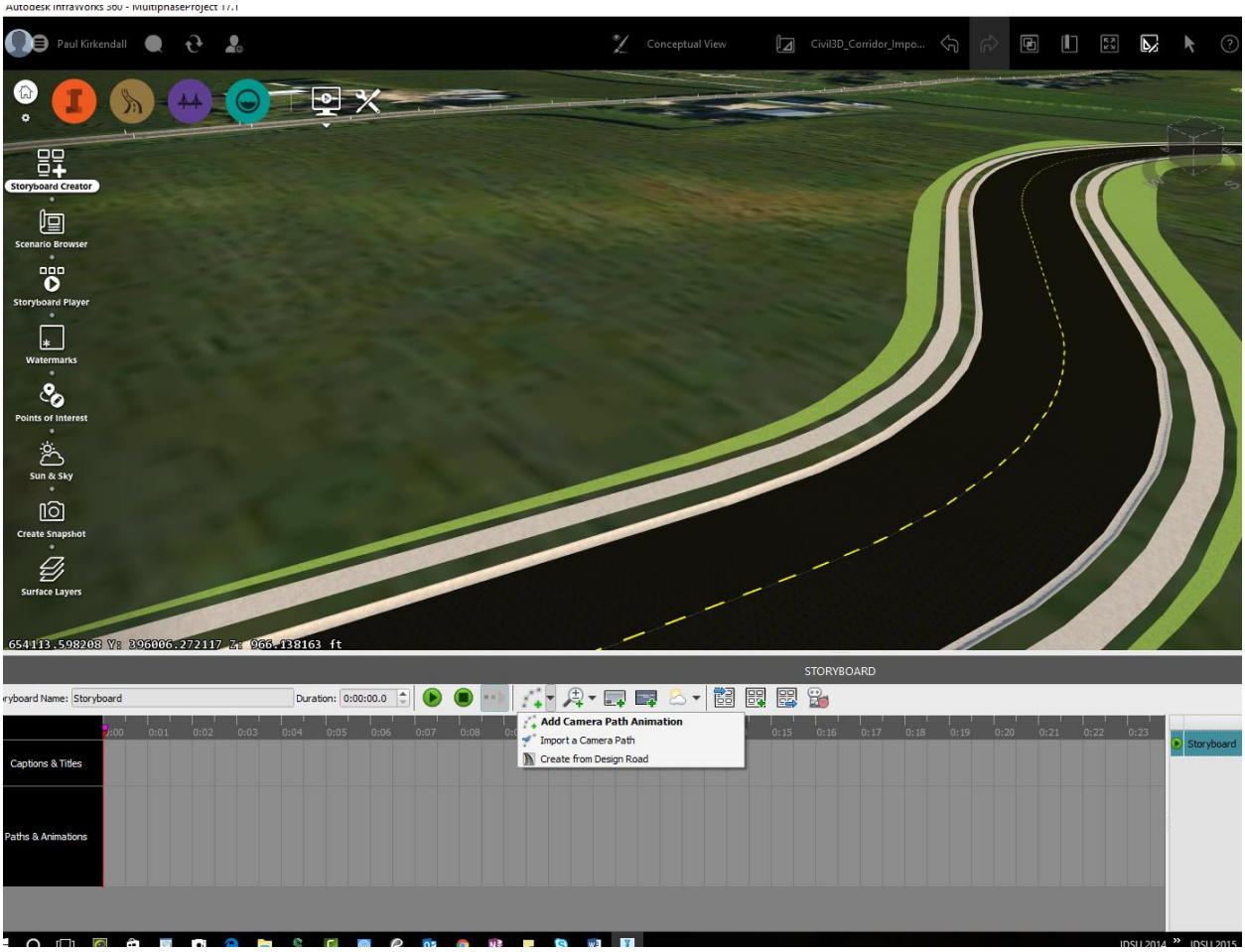

Figure 40

5. In the *Create a Camera Path from a Design Road* dialog under Camera Position Offset, enter 5.00 for Horizontal offset and 4.00 for vertical offset. *(Figure 41)*
6. Under Target Position Offset enter 3.00ft for vertical offset
7. Click create to close the dialog and create the animation with the necessary keyframes. *(Figure 41 & Figure 42)*

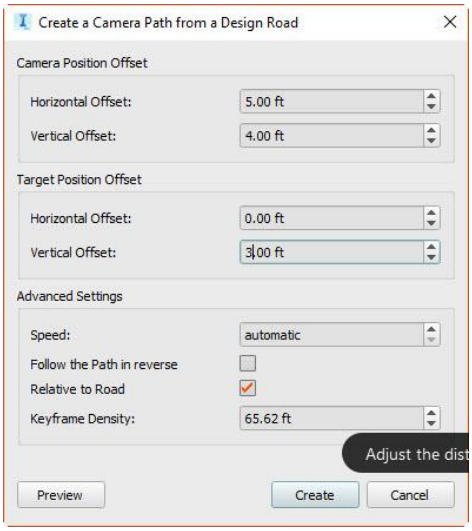

Figure 41

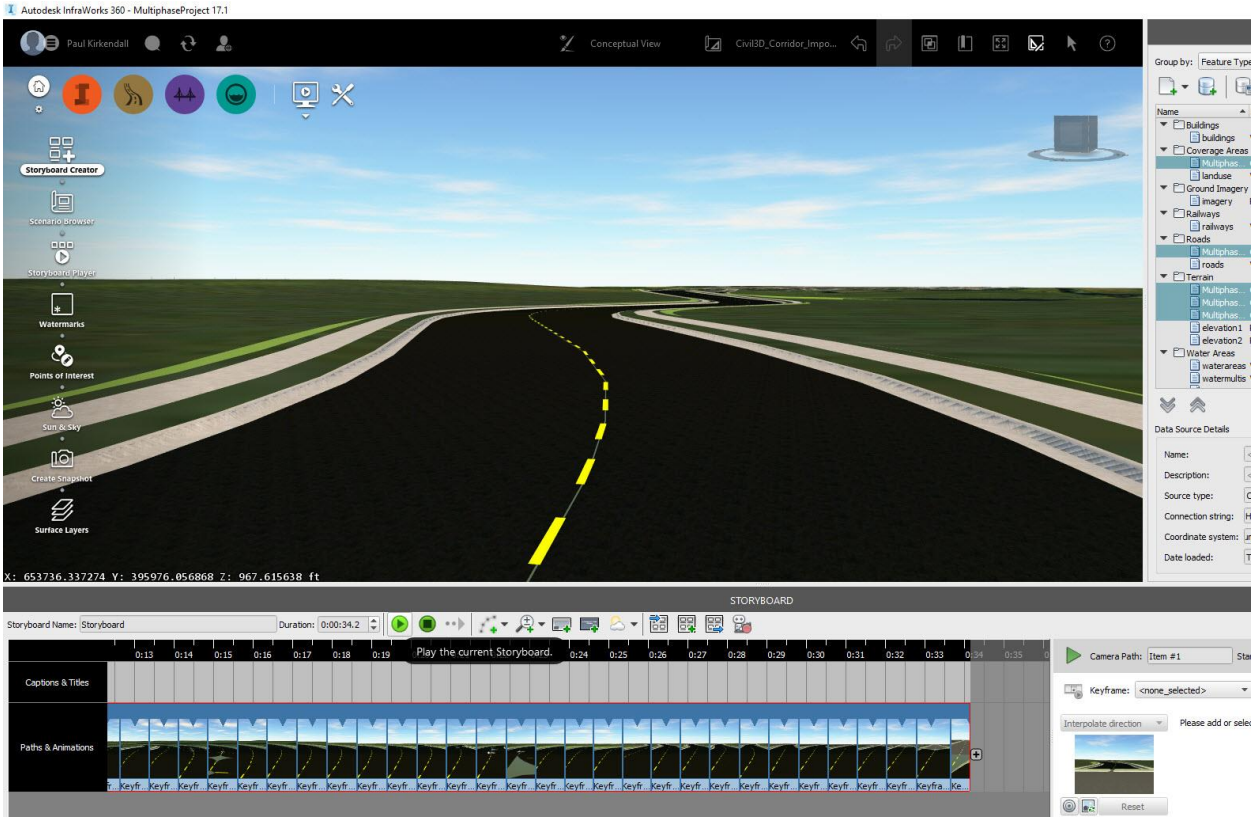

Figure 42

Civil 3D Project data Visualized in Navisworks

Exporting model geometry from Civil 3D

The following steps will guide you through exporting data for consumption in Navisworks.

1. In Civil 3D, Select the corridor, on the contextual tab of the ribbon>Corridor Tools panel select *Extract Corridor Solids.* *(Figure 43)*
2. Select the region to be extracted. If multiple regions are in the corridor they can be added all at once from the command line. In this example the corridor only has one region.

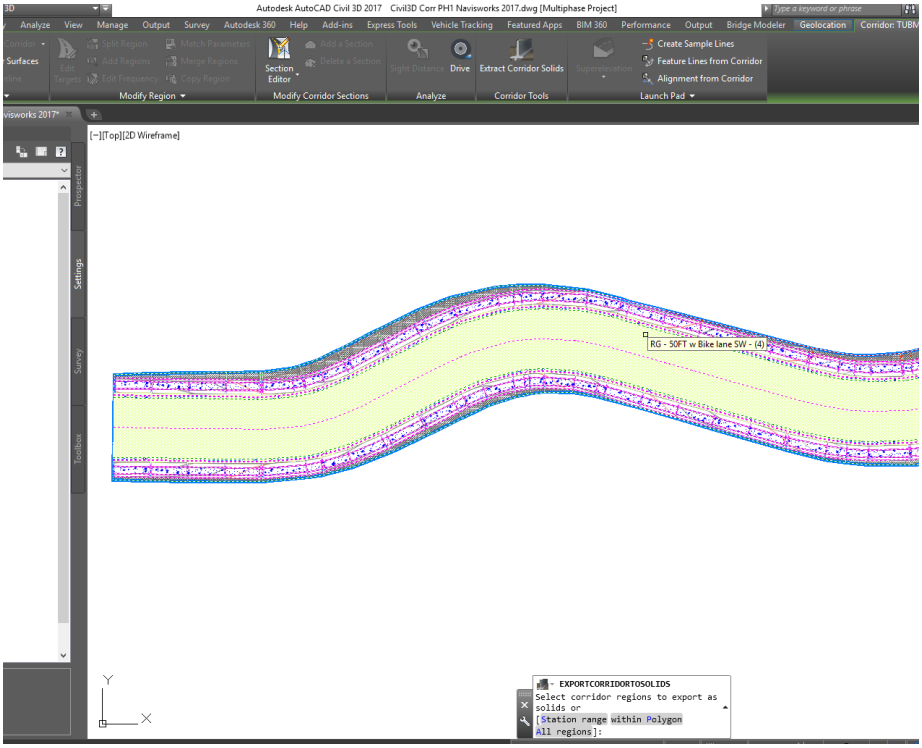

Figure 43

3. On the Extract Corridor Solids dialog, the entire region with assembly and subassembly are showing as one region. *(Figure 44)*

4. Select Add Regions from the dialog. *(Figure 44)*

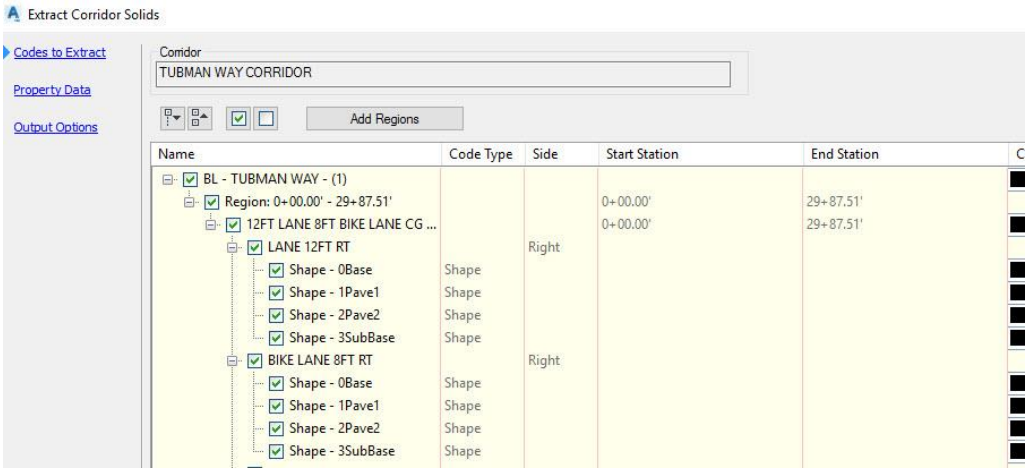

Figure 44

5. The dialog will close and bring you to model space.
6. Select a start station then and end station for the first region. *(Figure 45)*

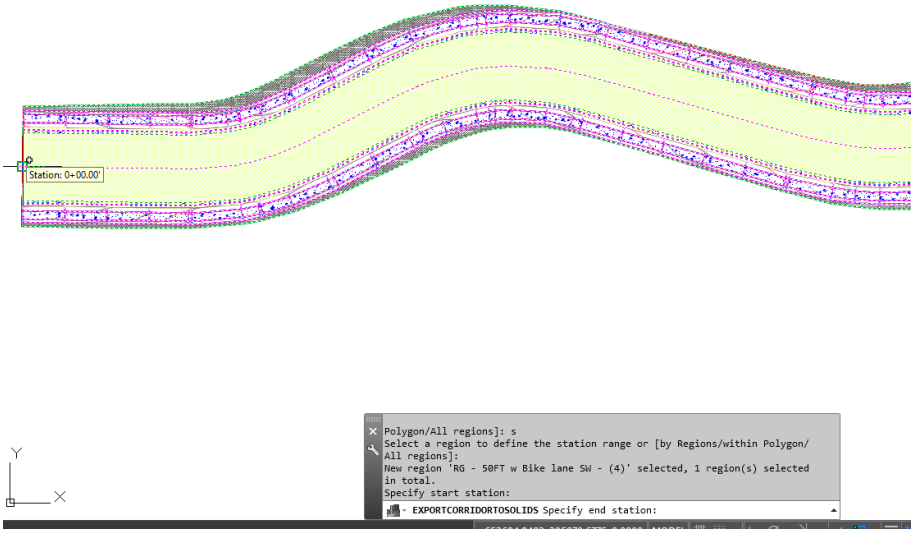

Figure 45

7. Repeat step 4 & 5 until the last region is added. *(Figure 46)*

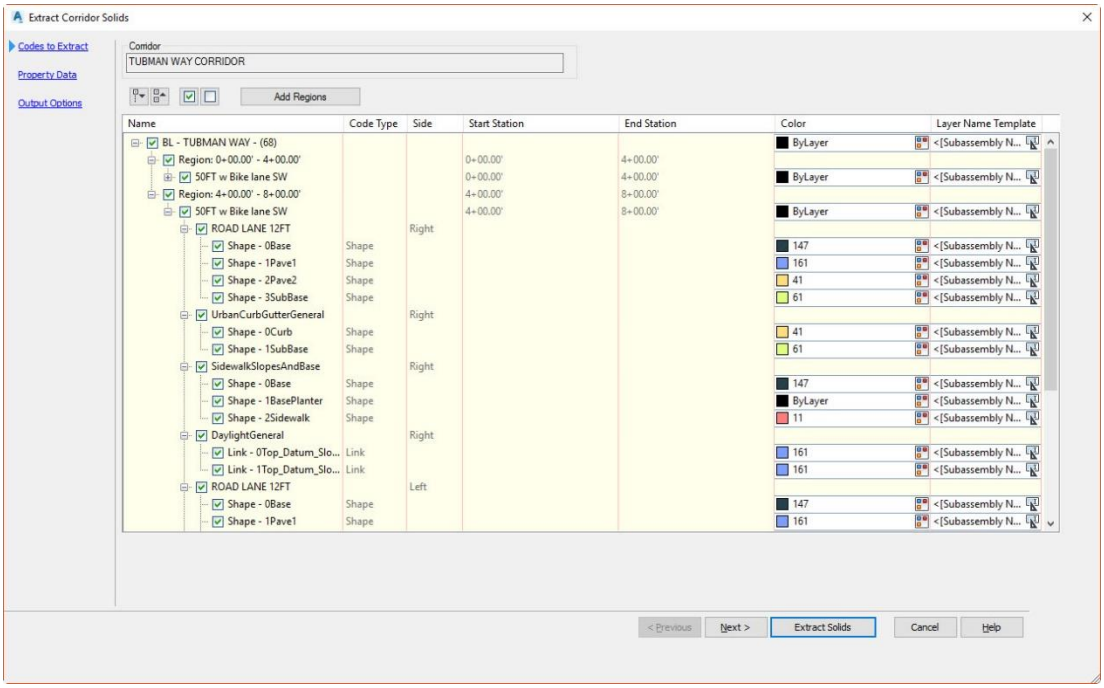

Figure 46

8. Navisworks will read and create tasks from layer names. Automating the naming of layers when exporting from Civil 3D is simple but needs to be done when exporting.
9. In most cases, adding [Subassembly Shape Index] [Subassembly Side] [Construction Region Start Station] and [Construction Region End Station] to the baseline will add the property fields to all region shapes. *(Figure 47)*

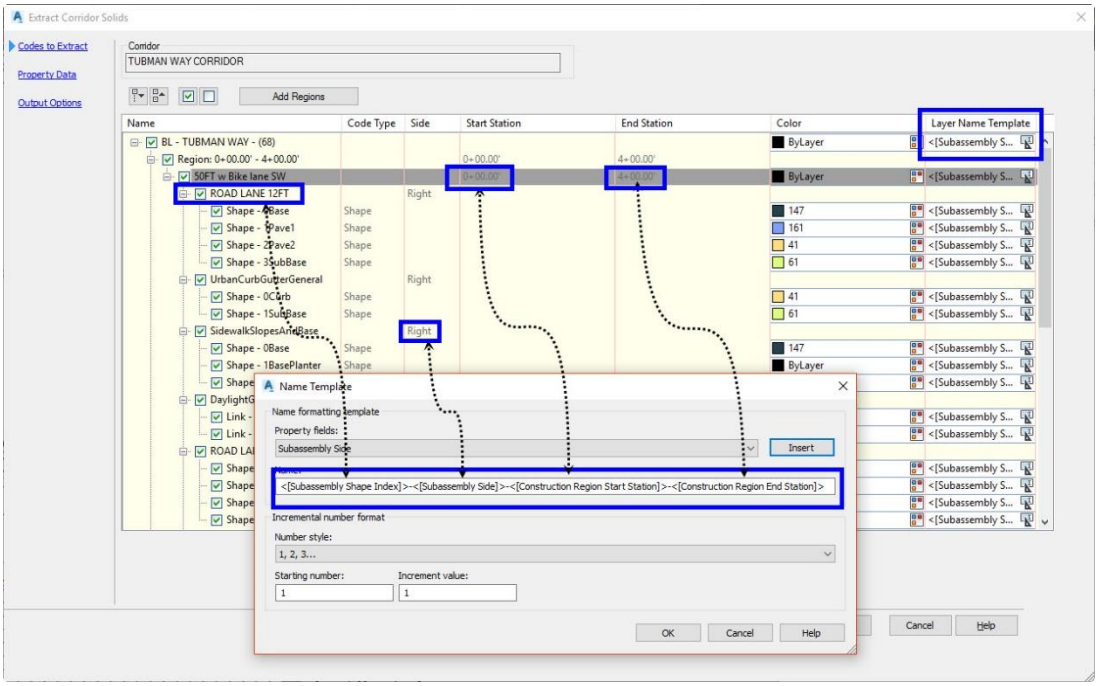

Figure 47

10. On the *Output Options* section of the dialog, change the *Output Object Type* to AutoCAD 3D Swept Solids and select add to a new drawing. *(Figure 48)*

Note: The solids are only able to be dynamic if they are in the same drawing file as the corridor. In the case of Civil 3D 2017, the corridor can be data referenced into another file. Then create the solids in that file to keep them dynamic.

11. Click Extract Solids at the bottom of the dialog to save the solids. *(Figure 48)*

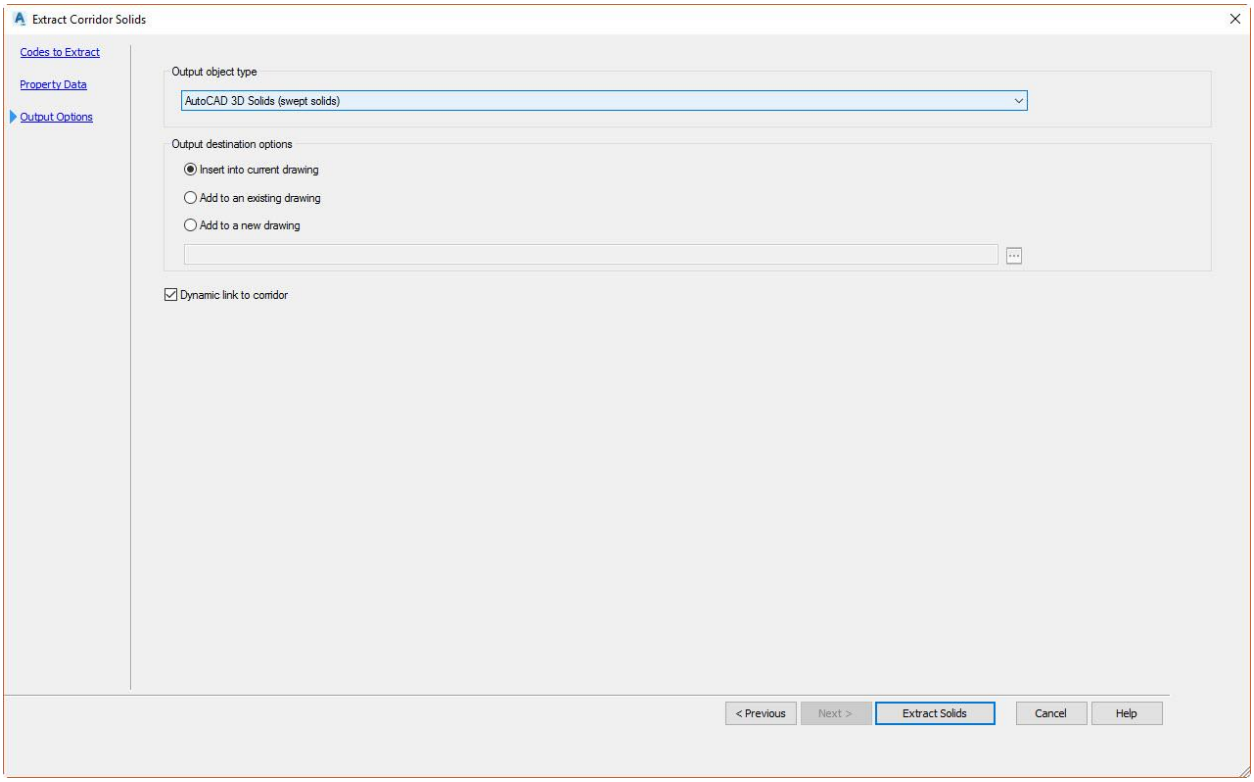

Figure 48

12. On the Civil 3D command line type NWCOUT. This will create an NWC file for navisworks to consume with all the Solids. Alignment, profiles, surfaces, corridor objects, etc. will also come along for the ride if they are all in the same file. *(Figure 49)*

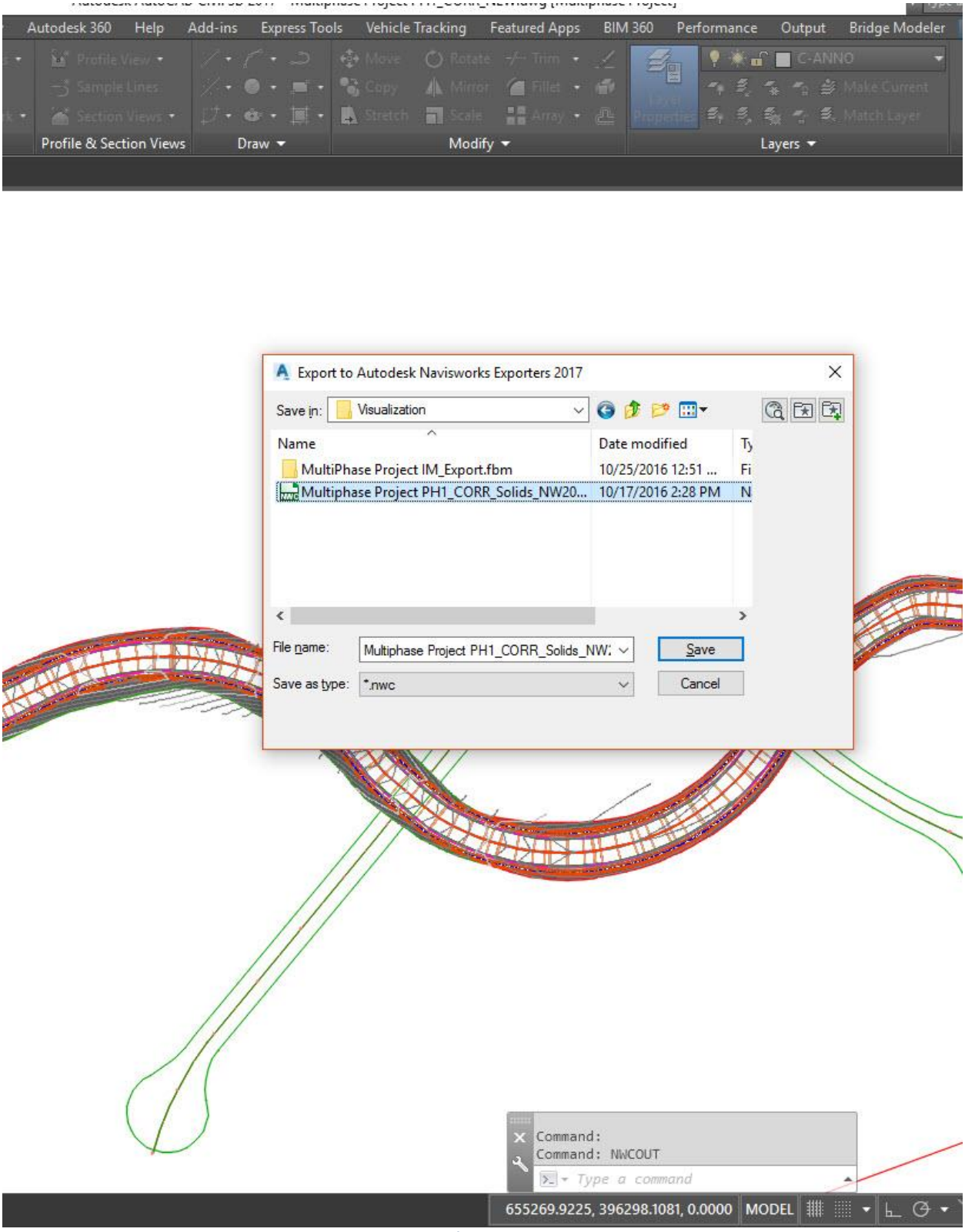
Autodesk 360
Help
Add-ins
Express Tools
Vehicle Tracking
Featured Apps
BIM 360
Performance
Output
Bridge Modeler
Profile View
Sample Lines
Section Views
Profile & Section Views
Draw
Move
Rotate
Trim
Copy
Mirror
Fillet
Stretch
Scale
Array
Modify
C-ANNO
Make Current
Match Layer
Layer Properties
Layers
Export to Autodesk Navisworks Exporters 2017
Save in:
Visualization
Name
Date modified
MultiPhase Project IM_Export.fbm
10/25/2016 12:51 ...
Multiphase Project PH1_CORR_Solids_NW20...
10/17/2016 2:28 PM
File name:
Multiphase Project PH1_CORR_Solids_NW:
Save
Save as type:
*.nwc
Cancel
Command:
Command: NWCOUT
Type a command
655269.9225, 396298.1081, 0.0000
MODEL

Figure 49

Importing Civil 3D data into Navisworks

The following steps will guide you through importing Civil 3D model geometry into Navisworks.

1. In Navisworks, on the home tab of the ribbon, click *Append* navigate to the NWC file exported from Civil 3D in the previous section. *(Figure 50)*
2. Some drawing cleanup may need to be done before moving to the next section. Selecting objects and right clicking, then select hide will help with clutter in the file.

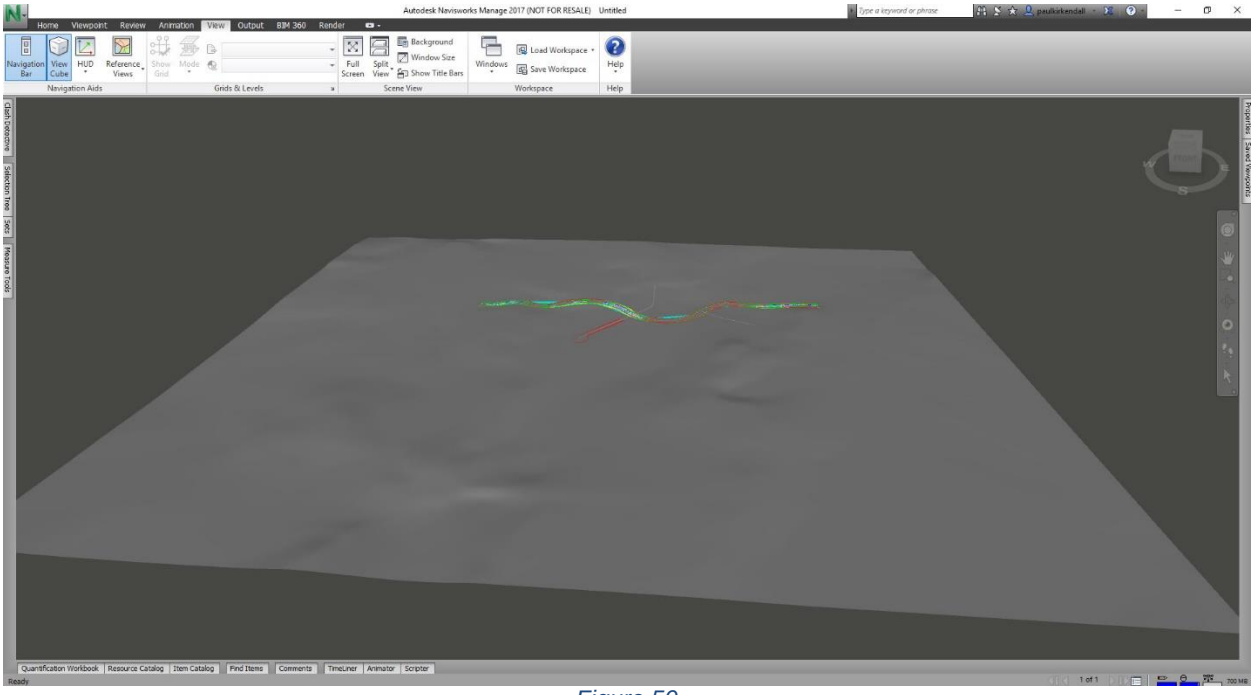

Figure 50

Visualizing Construction Phasing

The following steps will guide you through a basic construction sequence using the Timeliner in Navisworks.

1. Open Timeliner from the home tab of the ribbon. The timeliner will open at the bottom of the window. *(Figure 51)*

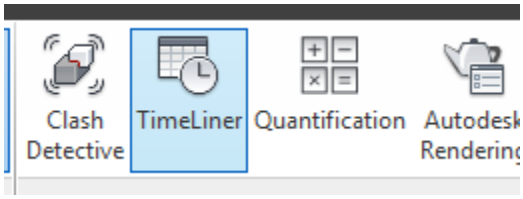

Figure 51

2. Tasks can be added manually to the tasks tab by clicking add task.
3. Alternatively, tasks can be automated from a Microsoft Project, Primavera or CSV Import.
4. Switch to the Data Sources Tab and select the Add drop down, select CSV Import and navigate to the CSV file to be imported. *(Figure 52)* The tasks and gant chart will be automatically populated with the information from the import file.
5. Next, the model geometry needs to be attached to the tasks.
6. Select *Auto-attach Using Rules.* *(Figure 53)*

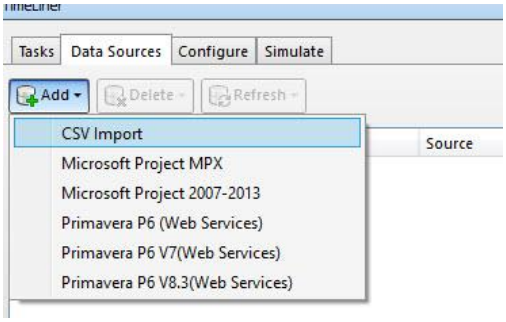

Figure 52

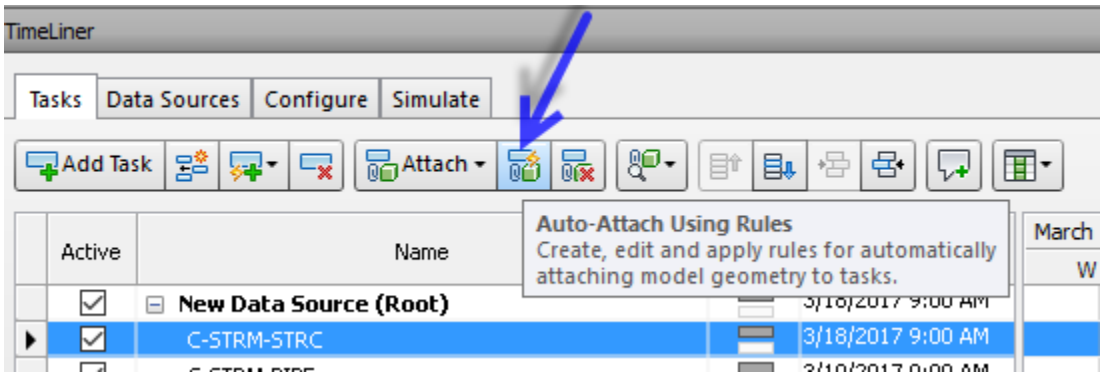

Figure 53

7. On the Timeliner Rules dialog, check Map Timeliner Tasks from column name to layers. *(Figure 54)*
8. Click Apply Rules to apply rules and close dialog. *(Figure 54)*
9. Switch to the Simulate tab and select play to run the simulation.

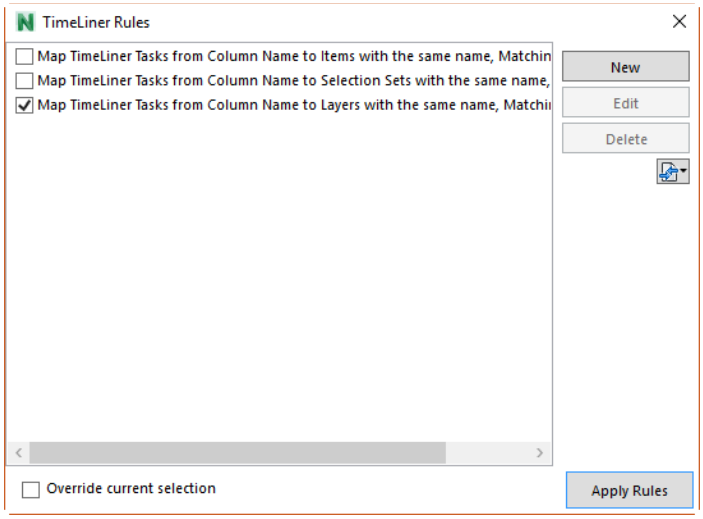

Figure 54