AUTODESK UNIVERSITY 2014

Look Good in Public: Using InfraWorks to Engage the Community

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UT5729

This class will cover the development of an InfraWorks software model from a wide variety of data sources. We will examine the various subjects, including the importation of geographic information system (GIS) raster and vector data, 3D models, civil 3D surfaces and alignments, creation of custom 3D models in 3ds Max software, and use of storyboard and export to create compelling project videos. We will examine workflows of an actual project and focus on the process used to develop an InfraWorks software model for the modernization of a power generating facility in Tempe, Arizona. This model was used in a public outreach process.

Learning Objectives

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

- Import GIS data sources into InfraWorks software
- Import AutoCAD Civil 3D software data sources into InfraWorks software
- Import, create, and use styles in a style palette
- Generate video and export animations

About the Speaker

David first discovered AutoCAD Version 9 in 1987 at the age of 13 when looking for a better way to learn geometry. As the third generation in his family to work in civil design, he has had opportunities to draft by hand and work as a rodman for his father, a licensed surveyor and P.E. Championing more efficient ways to design and communicate complicated design concepts, David has worked for URS Corporation for the past 18 years. He currently serves as leader of the Design Visualization/Multimedia Team in the URS Phoenix office. He is proficient with most products from Autodesk, ESRI, and Adobe, in addition to others. His team has created visual simulations and multimedia products on behalf of Fortune 500 companies and international corporations for presentations to federal, state, and local agencies throughout Alaska, Canada, Mexico, and the western United States.

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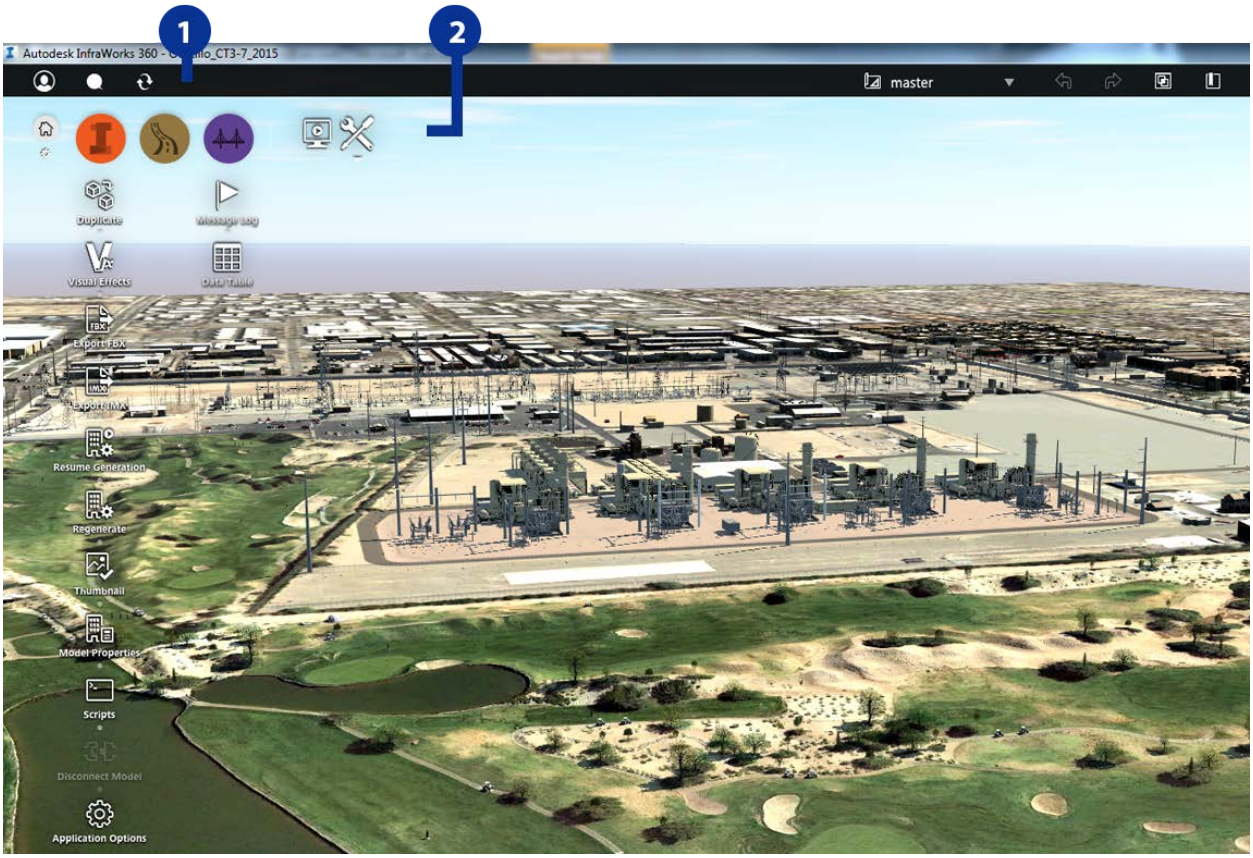
Importing GIS Data Sources into Autodesk InfraWorks

Basics of the InfraWorks Interface

This section of the handout is to help familiarize you with the interface and importing GIS data and is similar to the same section in the handout for the other class I am teaching this week CV6703-P GIS Interoperability with BIG data in InfraWorks.



The Utility Bar

- Autodesk 360 Utilities: Sign in so you can share models and proposals using the Cloud. Use Design Feed to include comments with your models, proposals, and published scenarios. Sync to get the changes made by others and to share your changes with others.
- General tools you will use across all phases of your work.

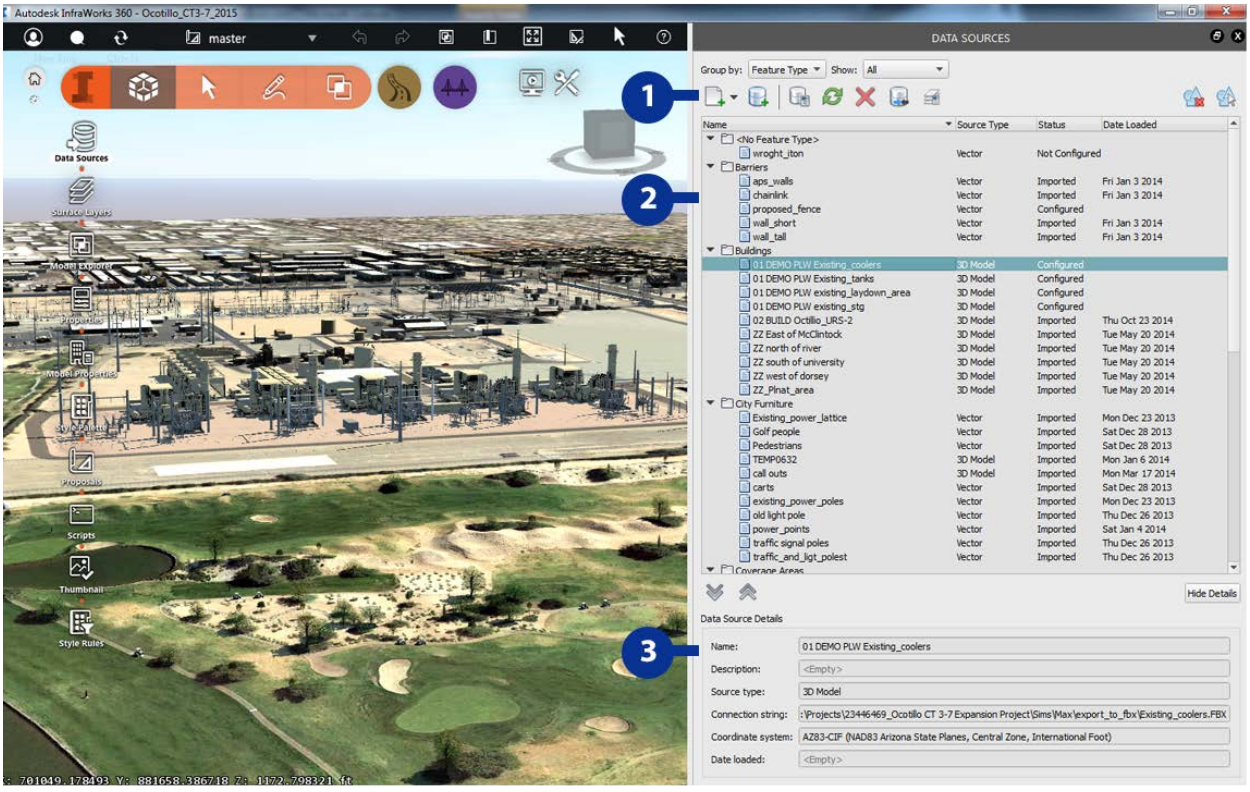
Intelligent Tools

- Tools Grouped by Design task. Basic Design, Roadway Design, Bridge Design, Presentation, and Utilities. Also available but not shown Drainage Design Module.
- Most of your work will be starting in this utility bar.

Data Sources

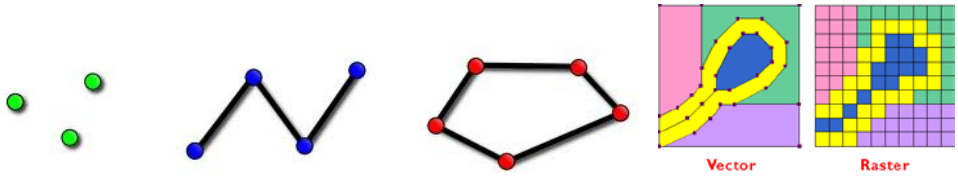
Data import menu is located in the “create and manage” tab in the intelligent tools inside the big orange “I”. Select the Data Sources button to open the Data Sources Panel. There are 3 main sections of this panel that will be used when working all data, and you will need to be familiar with it to import GIS and Civil 3D data.

1. Tool Strip
2. Data Sources List
3. Data Details



Components of GIS Data

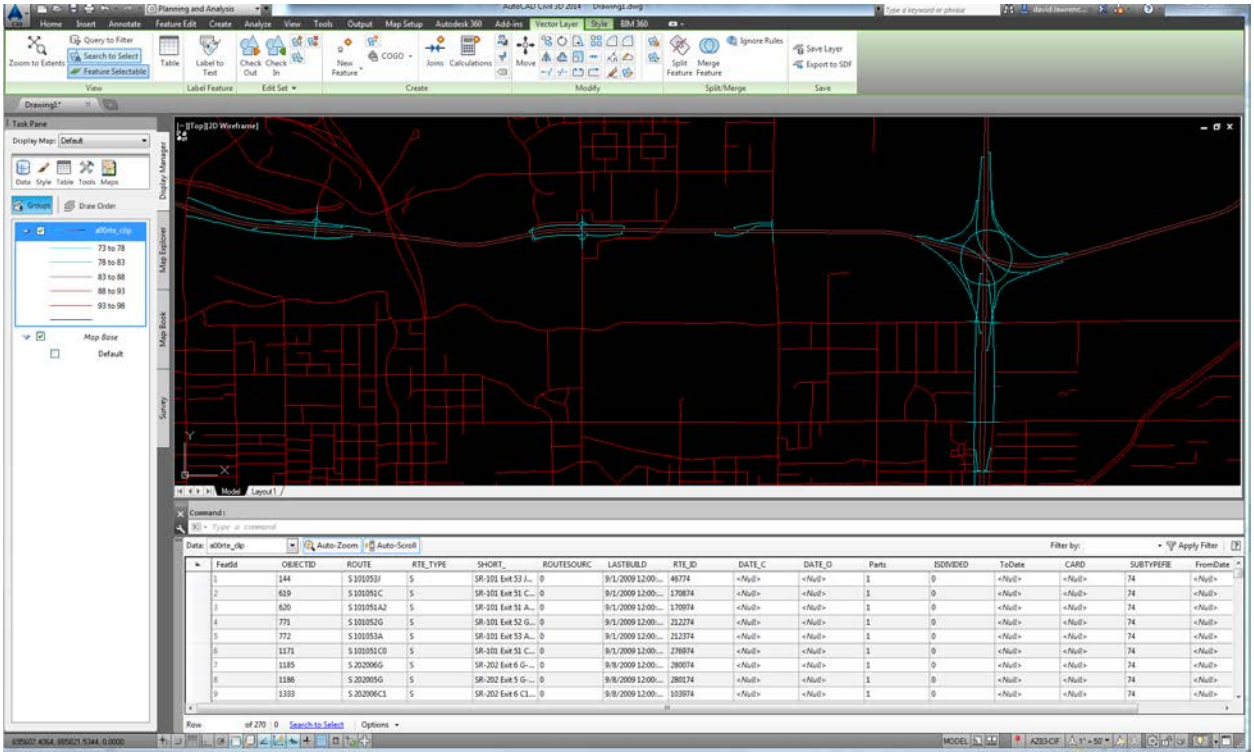
Now that you are familiar with the interface we need to discuss the basics of GIS data. GIS is typically divided into a few classifications: points, lines, polygons, and raster.



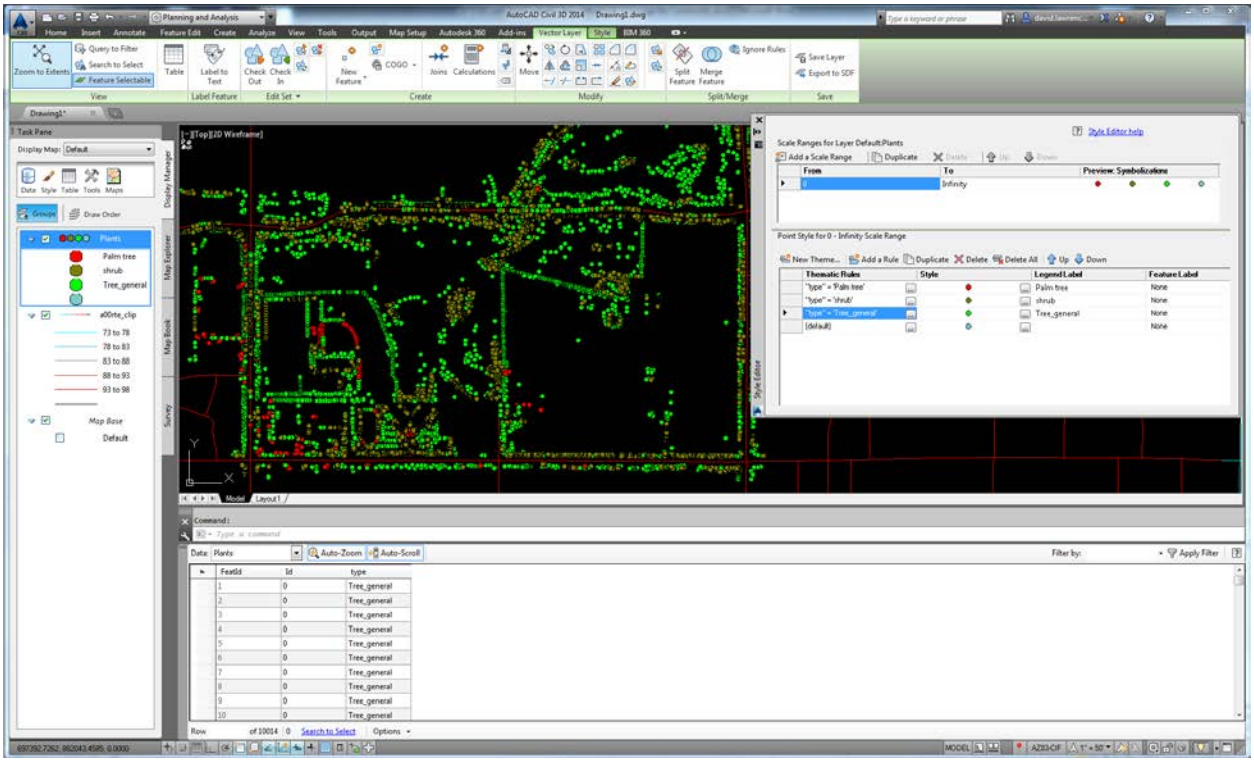
Attributes

More important than the spatial data is the attributed data that is contained in the data fields. The image below shows a very simplistic version of data and the associated data.

Now let's look at a bit more complex data set in Map 3D.

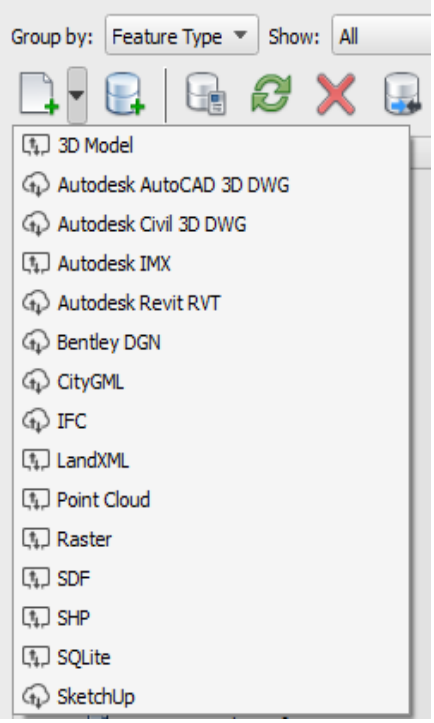


This is a roadway dataset from the Tempe, Arizona area near this project. Each line segment has multiple data attributes including Route type (RTE_TYPE) and subtype (SUBTYPEFIELD) as well as the route name that can be used to query, sort, and symbolize data. As you can see above, the highways are shown in pink, and bridges and ramps are shown in cyan.



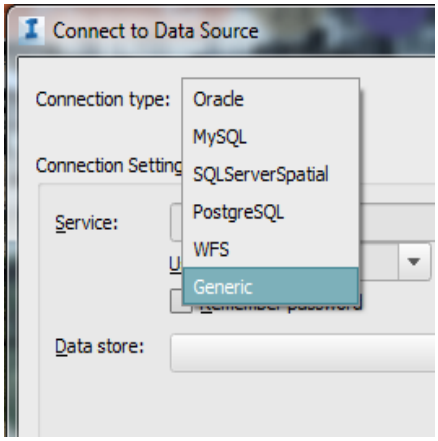
Here is a second smaller dataset for landscape. This table was originally created specifically for a generic visualization so plants were only divided in three groups: palms, trees, and shrubs. All other plant variations were generated using style rules that we will discuss later in this handout.

Add File Data Source and Add Database Data Source

	The Add File Data Source button will allow you to connect to file sources

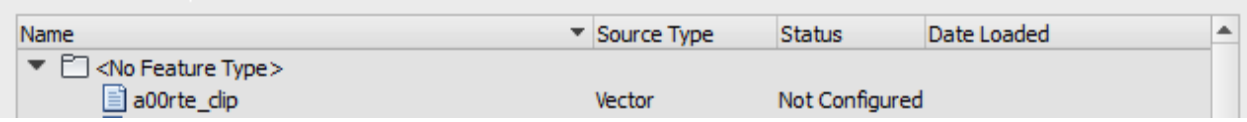
OSGeo.SDF.3.9
OSGeo.SHP.3.9
OSGeo.ArcSDE.3.9
OSGeo.WFS.3.9
OSGeo.MySQL.3.9
OSGeo.PostgreSQL.3.9
OSGeo.OGR.3.9
OSGeo.SQLite.3.9
OSGeo.SQLServerSpatial.3.9
Autodesk.Oracle.3.9
Autodesk.DesignService.3.9
OGR: ESRI Shapefile
OGR: MapInfo File
OGR: UK .NTF
OGR: SDTS
OGR: TIGER
OGR: S57
OGR: VRT
OGR: REC
OGR: Memory
OGR: BNA
OGR: CSV
OGR: NAS
OGR: GML
OGR: GPX
OGR: KML
OGR: GeoJSON
OGR: Interlis 1
OGR: Interlis 2
OGR: GMT
OGR: ODBC
OGR: PGeo
OGR: MSSQLSpatial
OGR: PCIDSK
OGR: XPlane
OGR: AVCBin
OGR: AVCE00

The add Database Data source will provide you with an additional dialog that provides additional abilities. The list of formats is constantly growing.



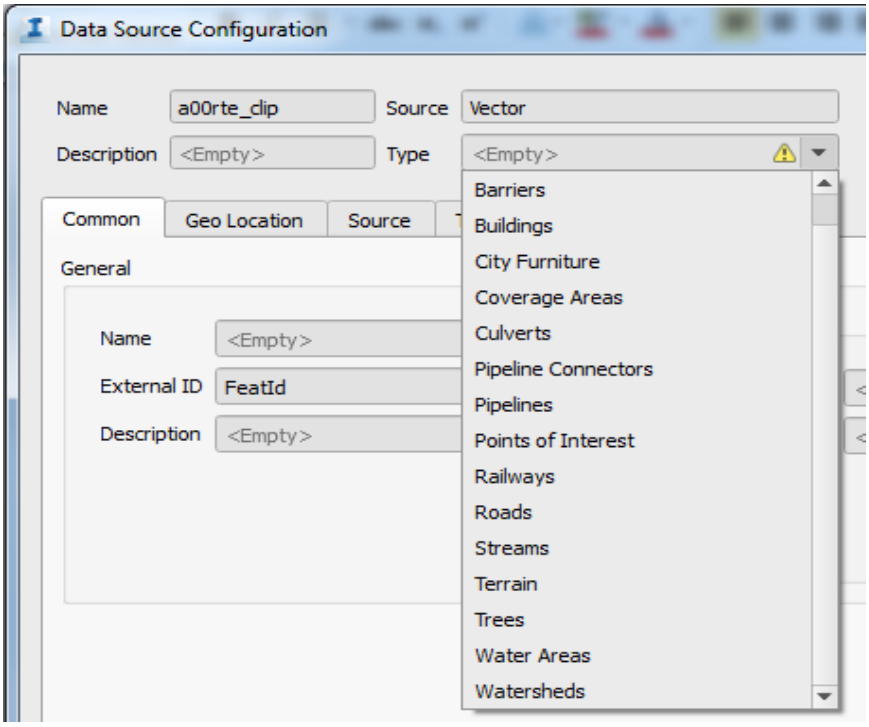
Importing a SHP file

Return to the Data Sources panel and click the File Data Source .
Select SHP.
Select your file.

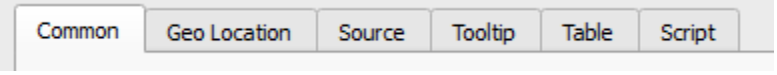


Configuring Your Data

You will notice that the status is not configured; double click on the Data Source or right click and select configure.

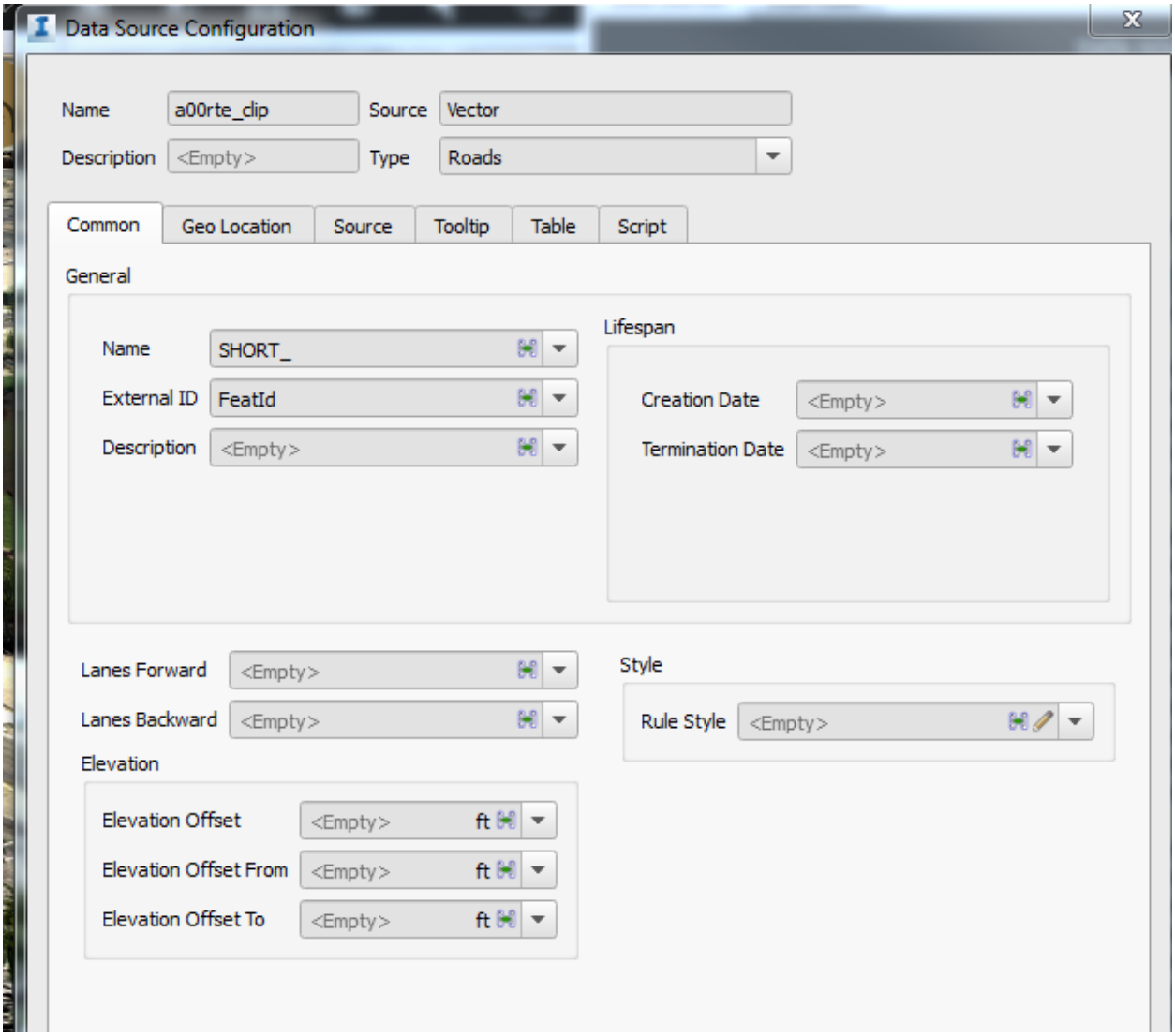


Select how you would like to symbolize the data with the type drop down. By selecting the data type, roads, buildings, pipelines, this selection will configure many of the other menus to help you stylize your data and configurations options. For this example the dataset is a roadway shape file.

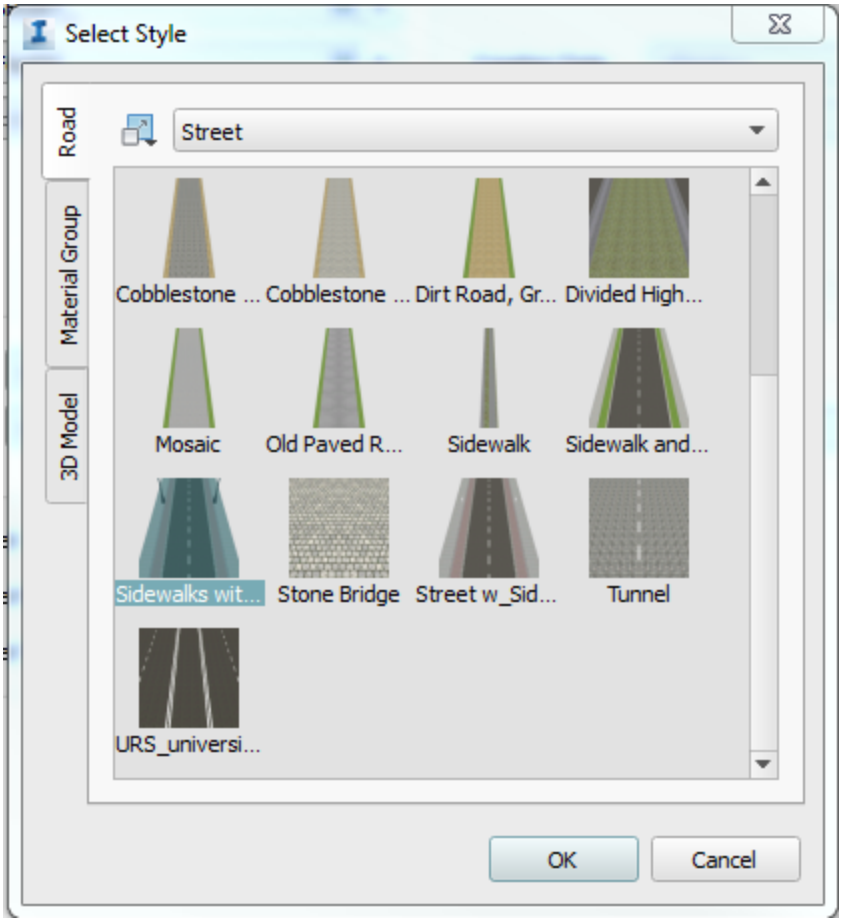


You will notice a set of tabs that allow you to access different tools to stylize the data.

Now the data fields will have options available. Data fields will have a  for each field which provides you access to the attribute data. If you select the drop down you will be able to select the attribute fields. In my dataset the name of the roadway is (SHORT_) so by selecting this field each piece of geometry will be named based on the corresponding GIS attribute.

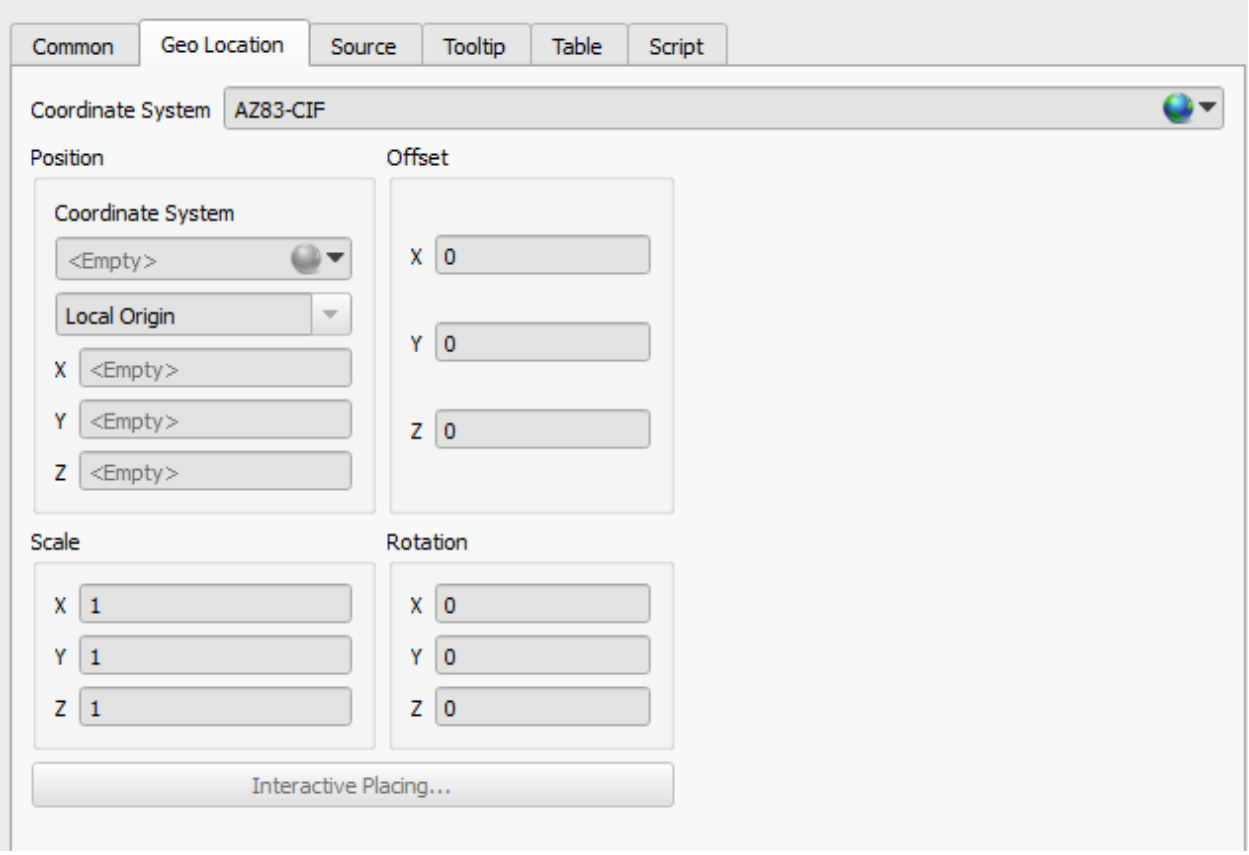


Do not forget to style your data. When you select the pencil you can set the style of the incoming data.



Geo Location

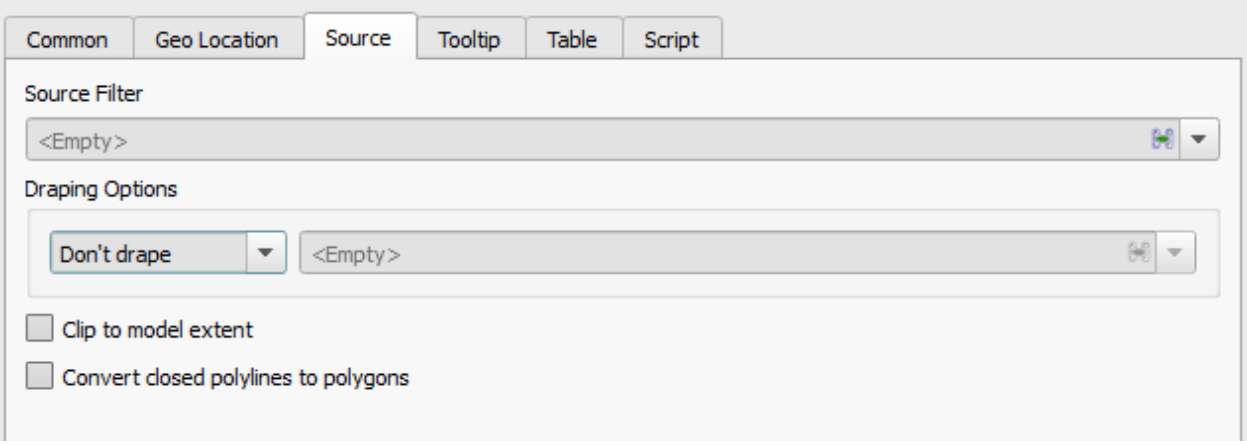
If your data has a PRJ file or a defined projection that is associated with it, InfraWorks will auto populate the coordinate system. My project contains data in NAD83 Arizona State plane central international feet.



If your data does not have a projection or it is using a projection that is not defined in Map 3D or Civil 3D, the coordinate system will show an error. Then you can choose to interactively place the data or manually choose a projection.

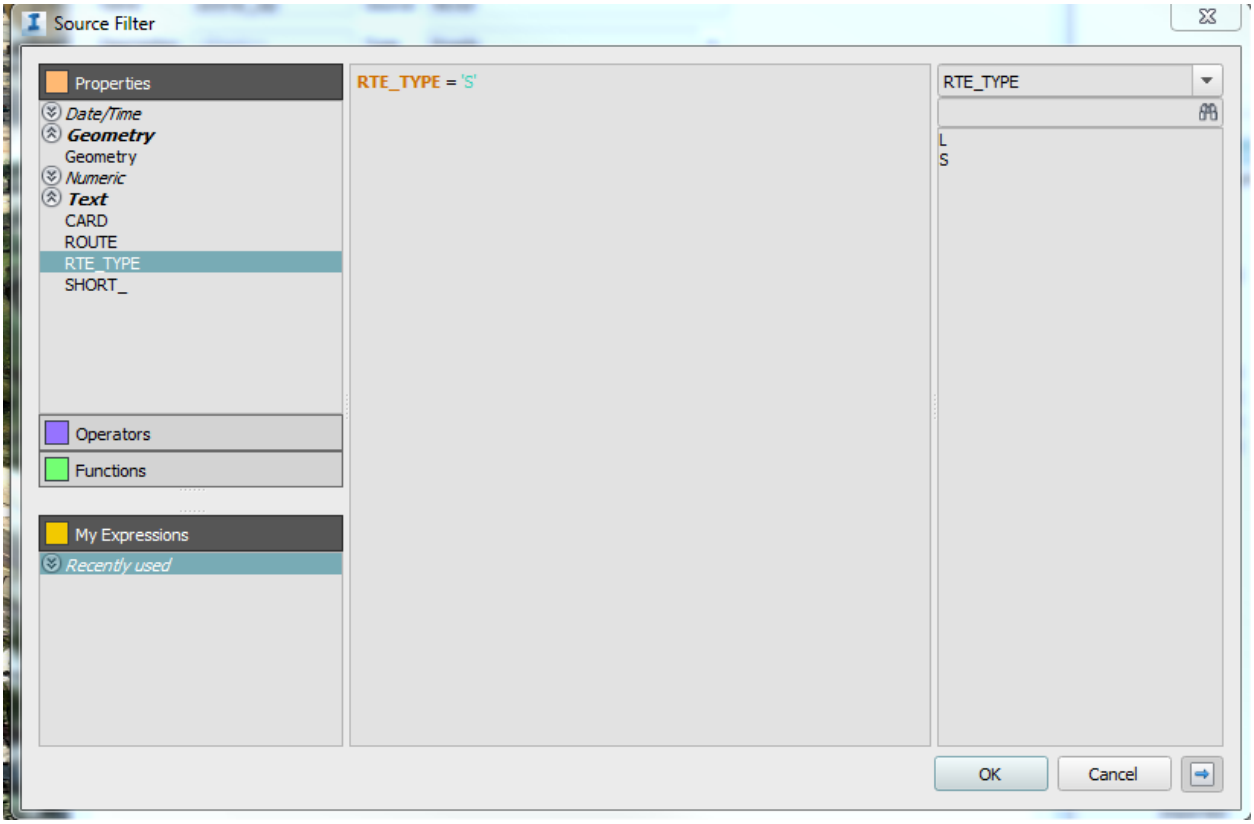
Source

This tab allows you to specify the data you want to load and if you would like to drape it to the loaded surface data.



In the source filter item, leave the field blank for all data or set a filter to only load some data. To filter the data select the  .

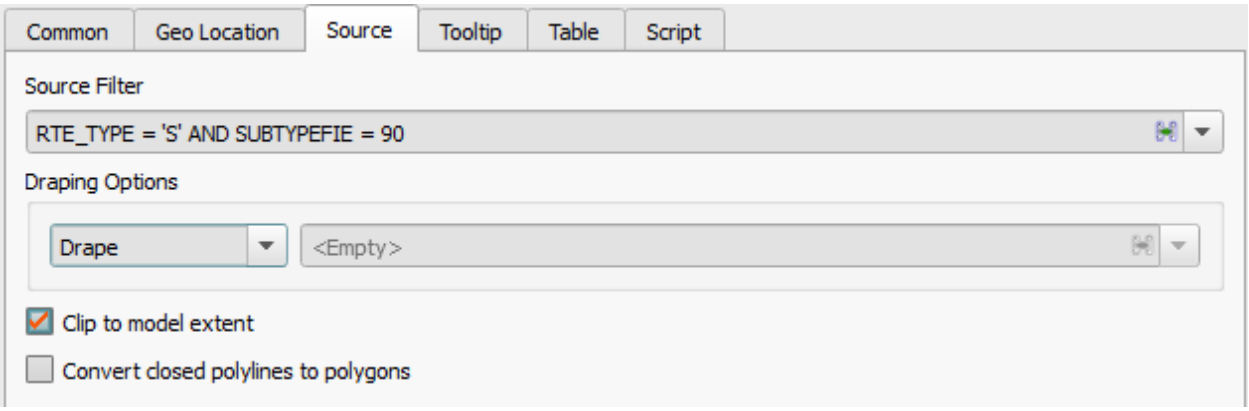
To show only highway data we need to create a filter. In my data the “RTE_TYPE” field is equal to “S” and the line work is associated with a highway. To only show this data, open the spatial filter and select text on the left.



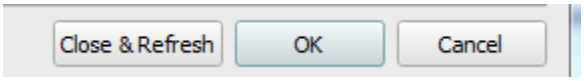
Double click the field on which you want to set a query. In this case it is “RTE_TYPE” and you will see it added to the middle window. We want only the data that is equal to “S”, so type in “a =” in the window or you can choose operators, then math, then “=”. I prefer to just type it. On the right side of the window, select RTE_TYPE in the drop down menu. It will then show you all the options available in that field. In this case we only have two values. The final query looks like this: RTE_TYPE = 'S'

If we would like to further refine the filter to only show mainlines and not ramps we can set a complex filter: RTE_TYPE = 'S' AND SUBTYPEFIE = 90. This will load only data that has a route type of “S” or highways and a subtype of “90” or the mainline. Because my data does not have elevation values, I will set it to drape to the ground.

This is what my source tab looks like when I am done.



Don’t forget to close and refresh.

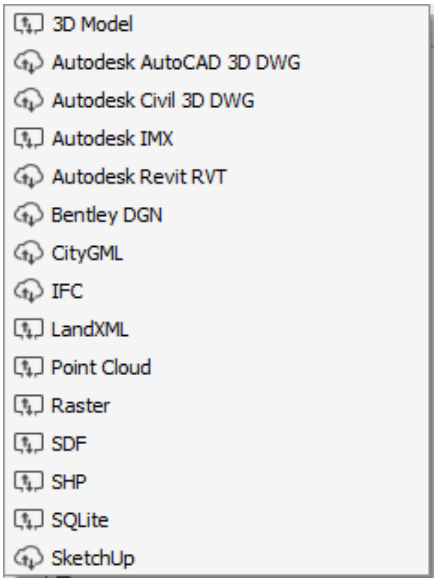


Your model will regenerate and your data will now be visible in your window.

Importing AutoCAD Civil 3D Software Data Sources into Autodesk InfraWorks

File Types

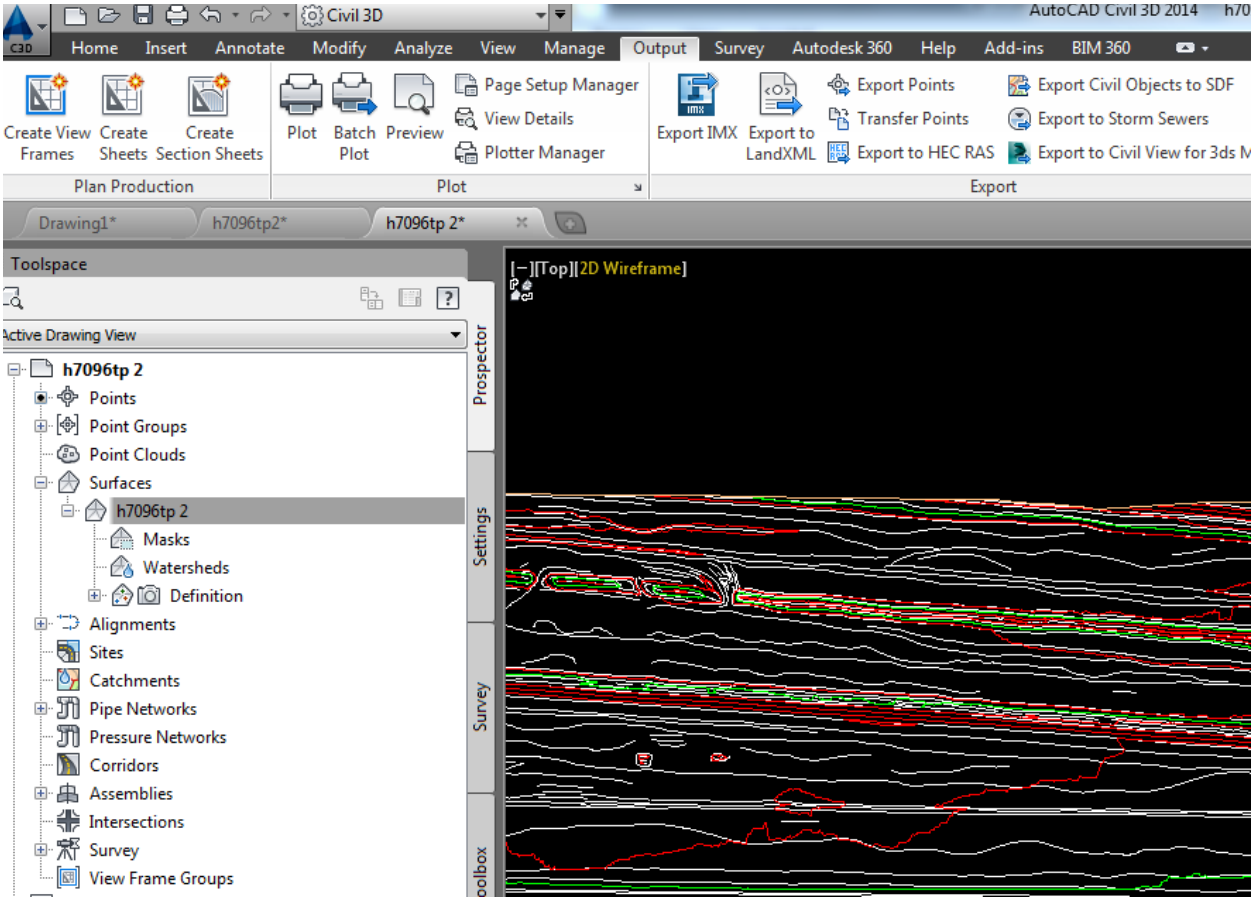
Civil 3D files can be imported in a number of ways, locally  ***or with online translators included with your 360 account***  ***.***



I use Autodesk IMX approximately 90% of the time. You also have the option of using either Civil 3D DWG or LandXML.

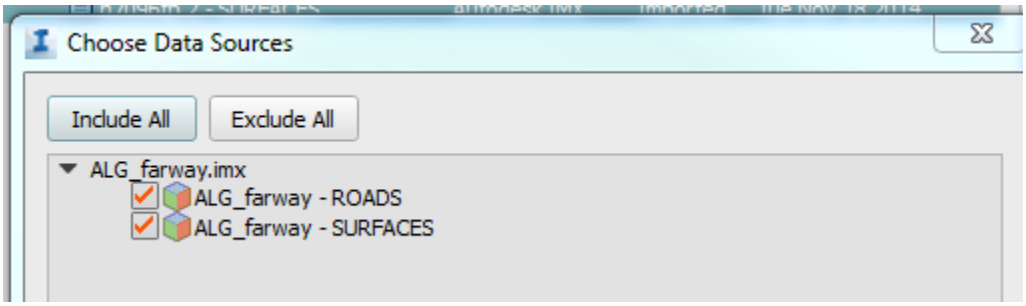
Export IMX from Civil 3D

In Civil 3D load the alignment and surface data you would like to export into your dwg file, and view it in the tools space window. Then browse to the output tab and select export to IMX.

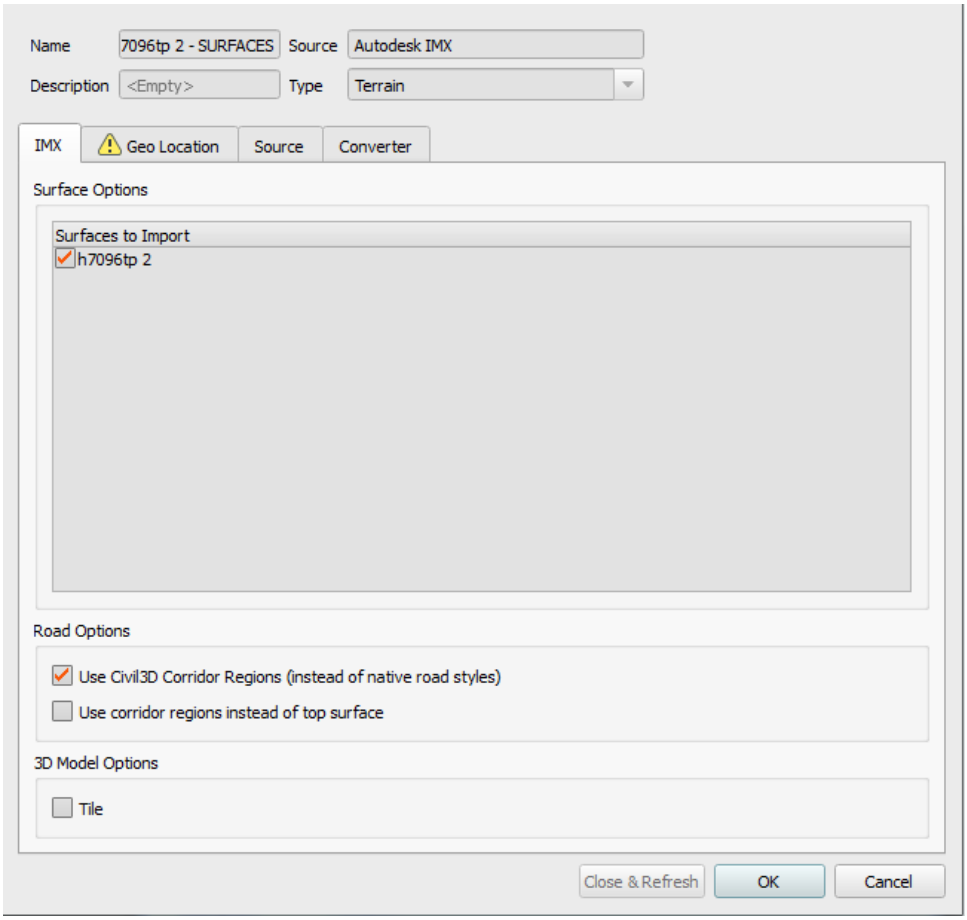


Import an IMX

Importing a Civil 3D file is similar to the procedure we used for importing a SHP file. Select the  and drop it down to the IMX file type, then browse to your IMX file. Once you have selected your file you will have slightly different options than SHP file data. If your data has more than one type of data you will be prompted to choose the data to be loaded.

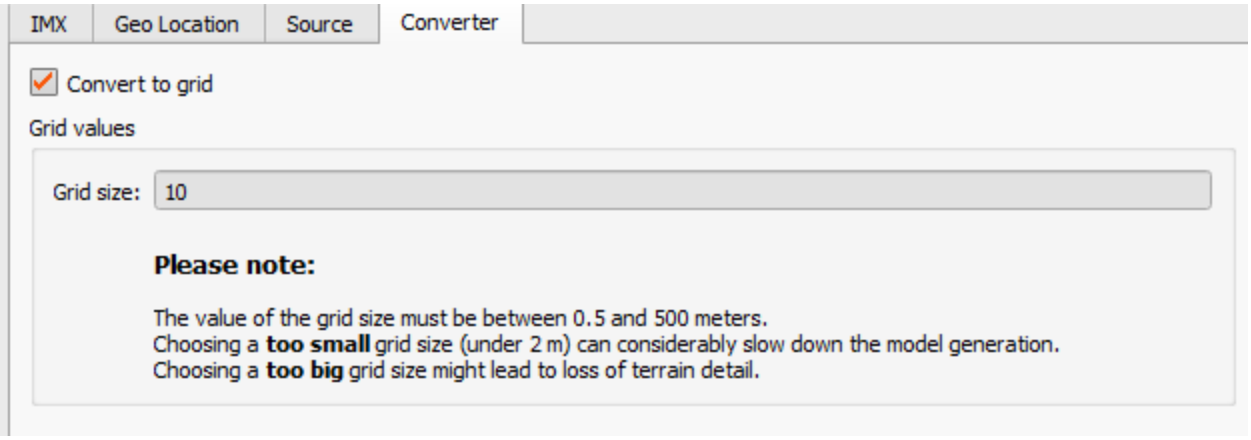


You can load all the data or selectively load it.Different data types will show up separately in the Data Sources panel.



IMX surface files only show 4 tabs, while the road alignments are similar to the SHP file imports. The IMX tab lets you select what data you would like to load. If your IMX contains multiple surfaces or alignments, you can select what surfaces you would like to load. You can choose to use Civil 3D regions instead of InfraWorks styles for roadways, or top of surface.

You can see my error in the Geo Location. This is because the IMX file did not have a projection assigned in the Civil 3D file. The projection can also be selected manually, but if you work in a group team enviroment, I recommend setting the projection to the Civil 3D file so that there will never be any confusion of what projection the data is in. The source tab is simillar to all other data imports.



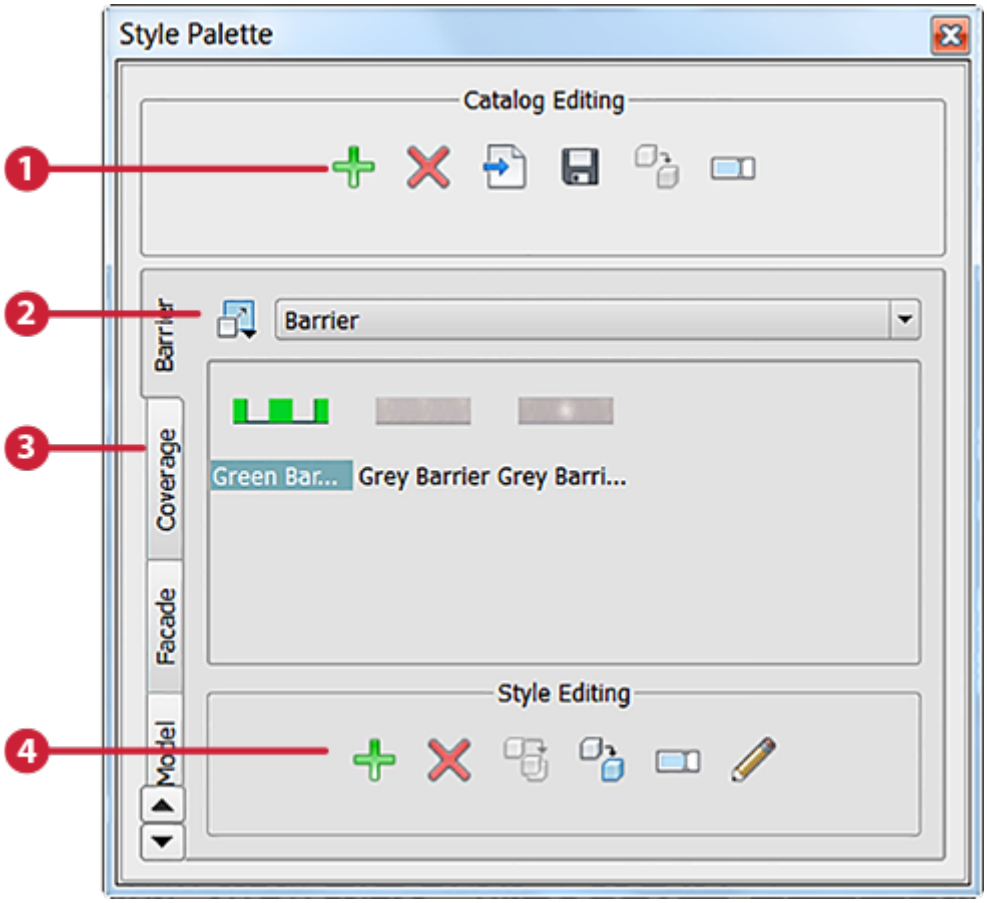
The last tab is the converter tab this is similiar to all raster surface data. The default is for InfraWorks to convert your surface data to a grid to generate the surfaces faster. This will work, but you can just unselect this check box and regenerate the surface.

Autodesk Civil Engineering Data Translator

Released in October 2014, the Civil Engineering Data Translator 2015 extension provides the ability to translate Bentley GEOPAK and Bentley InRoads files. Files can then be opened in AutoCAD Civil 3D and then imported into InfraWorks.

Import, Create, and Use Styles in a Style Palette

Style Pallete.



1. Catalog Editing Tools — These tools affect the style catalogs, not the styles themselves.
2. Current Style Catalog — The dropdown list shows the current style catalog. To change it, select a different catalog. Click to change the size of the previews that display the contents of the catalog. A slider lets you change the size dynamically.
3. Category Tabs — Each tab contains catalogs of styles for a particular type of style.
4. Style Editing Tools — These tools affect the styles within the catalogs.

Style Pallet Icons

Copy Style to **Another** Catalog

This button copies the selected style to a catalog within the current category. For example, use this option to copy a barrier style from one barrier catalog to another.

Make a Local Copy (same catalog)

Copies the selected style to the current catalog. Use this option to create a new style that is similar to the one you are copying. The copy appears in the preview area. Double-click it to make your changes.

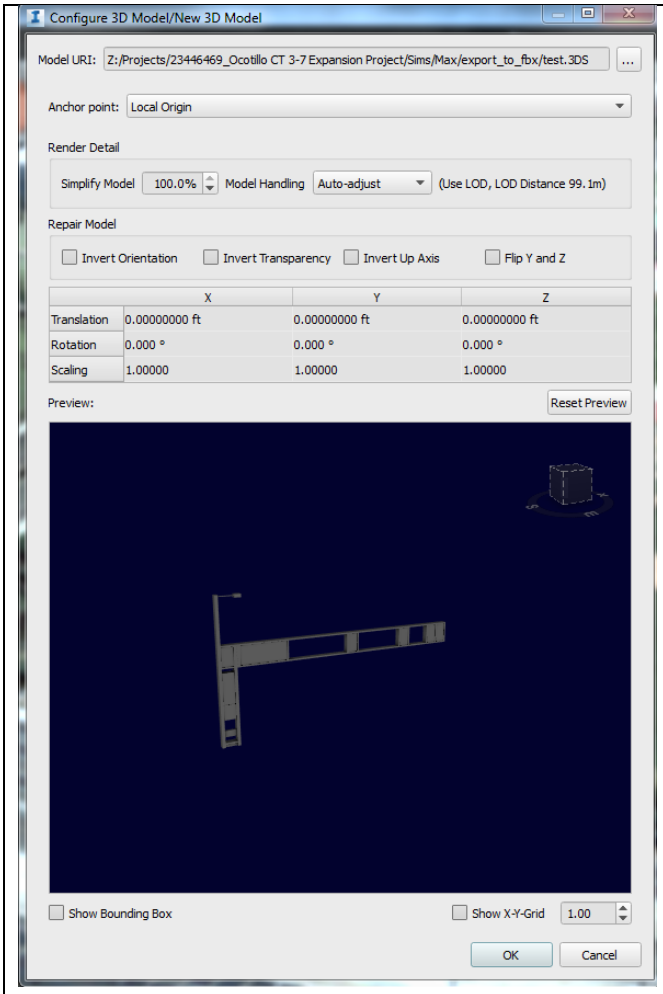
Import Style Catalog From File

Imports a style catalog from the XML file you specify. It is added to the Style Palette and becomes the current style catalog.

Save

This saves the style catalog to an external JSON file for external editing or import into a different InfraWorks file

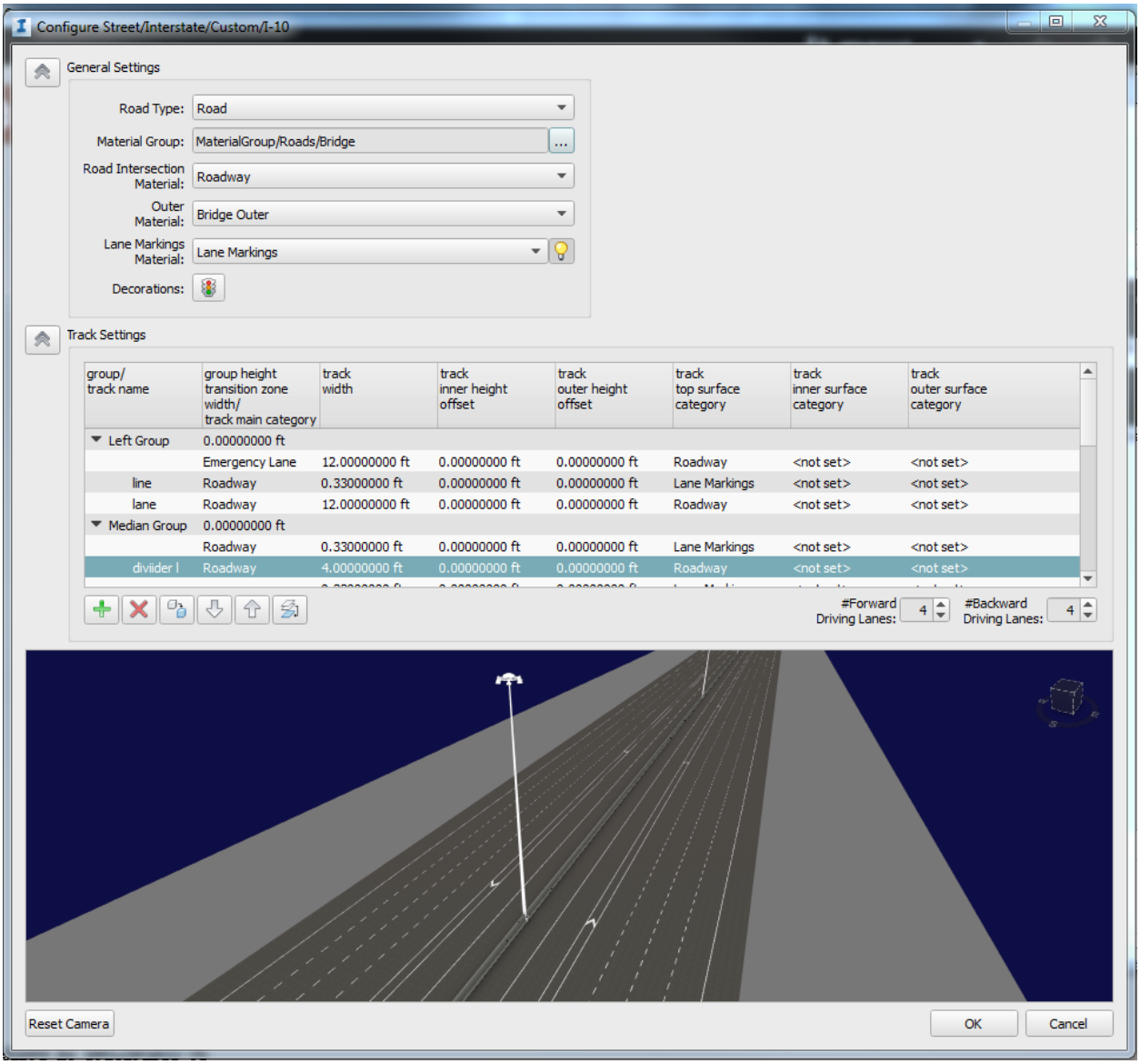
Import 3D Model



1. Chose the 3D Model tab on the style pallete.
2. Select the folder you would like to add the model into.
3. The define/configure model tool will open. Select the model you would like to import in the model URL by selecting the ... file. Formats include: 3DS, FBX, DAE, DXF, and STF. *(I personally like to import my files into 3ds Max Design first and prep and clean them and then export to FBX for import).*
4. By default the anchor point is the local origin of the imported file. If this is not what you want you can modify.
5. Set the render detail for highly complex models. This can help with software performance. The default is auto- adjust. Direct display will be in full resolution. The other options allow you to adjust the level of detail based on viewing distance.

The other settings are used to adjust the model for display which includes rotation, translation, and scaling. Transition is used often to offset objects if the origin is not in the correct place for model placement. This gives you the ability to shift the model in any direction.

The Style Pallete is also where you set up other styles for roads, rail, converges, and anything you want to stylize in InfraWorks.



Export to JSON

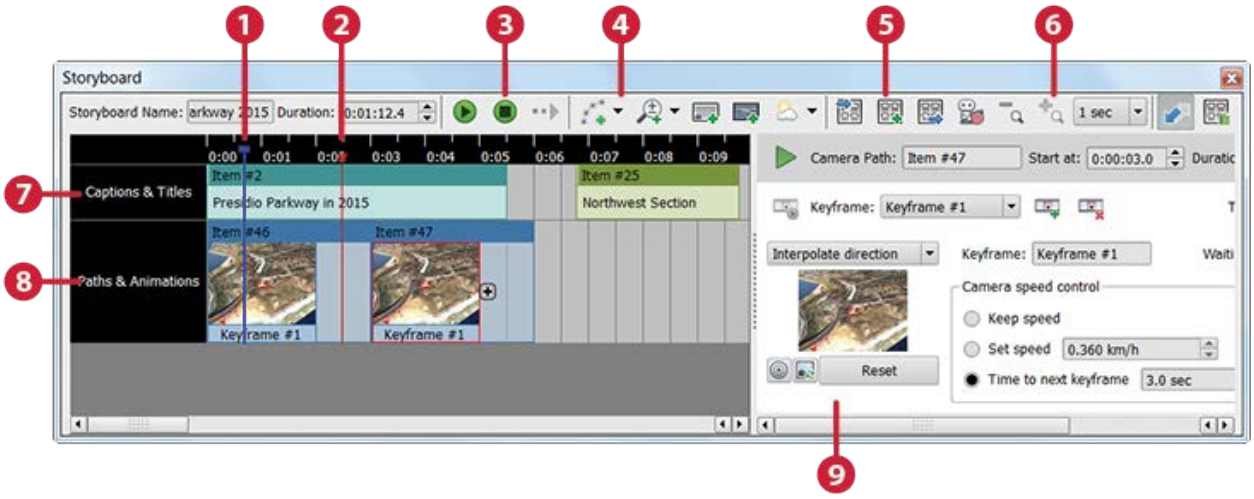
Once you have styles set up, export them as an external file. This allows you to import styles from one InfraWorks file to another. Setting up styles can be time consuming and you do not want to have to redo style setups. One thing to consider when developing your styles is that 3D models hold the path of the original imported file. If that path is not available on other

workstations, you should consider making a standard file structure for the imported files so they can be copied to a library on each workstation.

Create Animations, and Export Video

Storyboard Creator

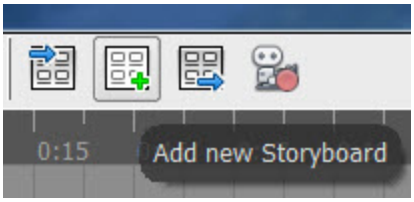
Click , presentation tools, then click .



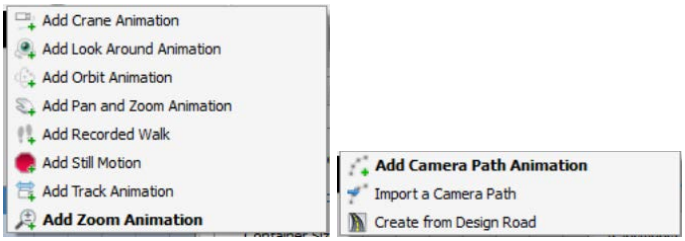
1. Play head indicator (the blue line) sets the starting point for playback.
2. Marker (red arrow) indicates the insertion point for new elements.
3. Playback controls play the entire storyboard, starting from the play head indicator (blue line). Individual elements have their own playback controls.
4. Storyboard tool bar contains controls to create elements and manage storyboards.
5. Import and export storyboards.
6. Zoom in and out of the storyboard, and specify the zoom resolution. You can also zoom the storyboard extents.
7. Captions and tiles appear in the top track.
8. Camera paths and animations appear in the bottom track.
9. Settings for the selected item appear to the right.

To Create a Storyboard

1. Open the model.
2. Click ➤ .
3. Click Add New Storyboard.



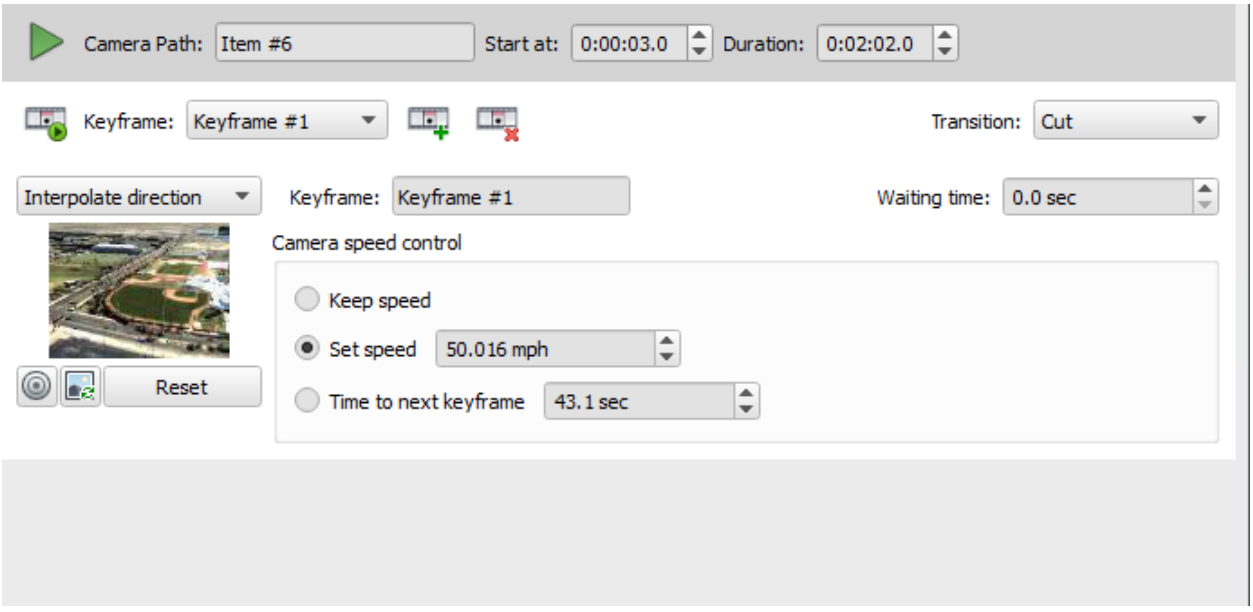
Make a Flight Path 



There are several options for creating an animation on a storyboard. I often use the Camera Path Animation tool to fly over a route or around a project area. Play with each to find what works best for your animation.

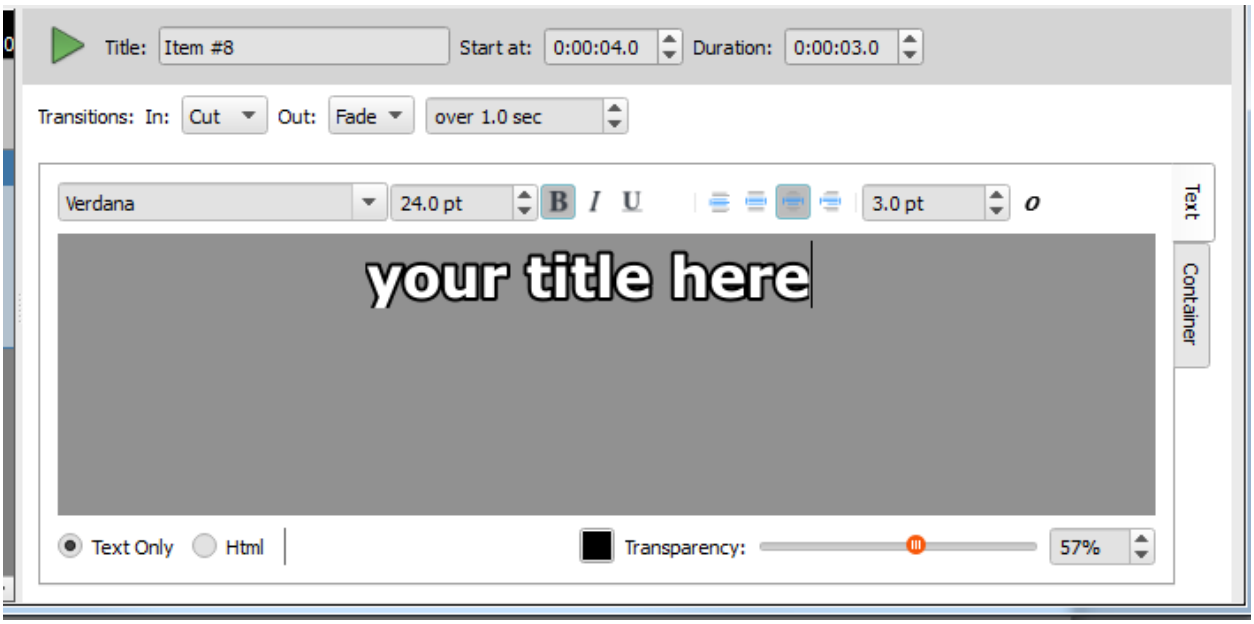
Use Bookmarks

When creating Camera Path Animations, I prefer to set bookmarks at the key locations that I would like to see in my video before I start my storyboard. This gives me the ability to always get back to saved views. Before starting the path, set your window to the view you would like your animation to begin with. Add key frames simply by choosing your bookmarks, then selecting the green plus button icon to add key frames. Adjust the speed so the viewer is going to get motion sickeness.



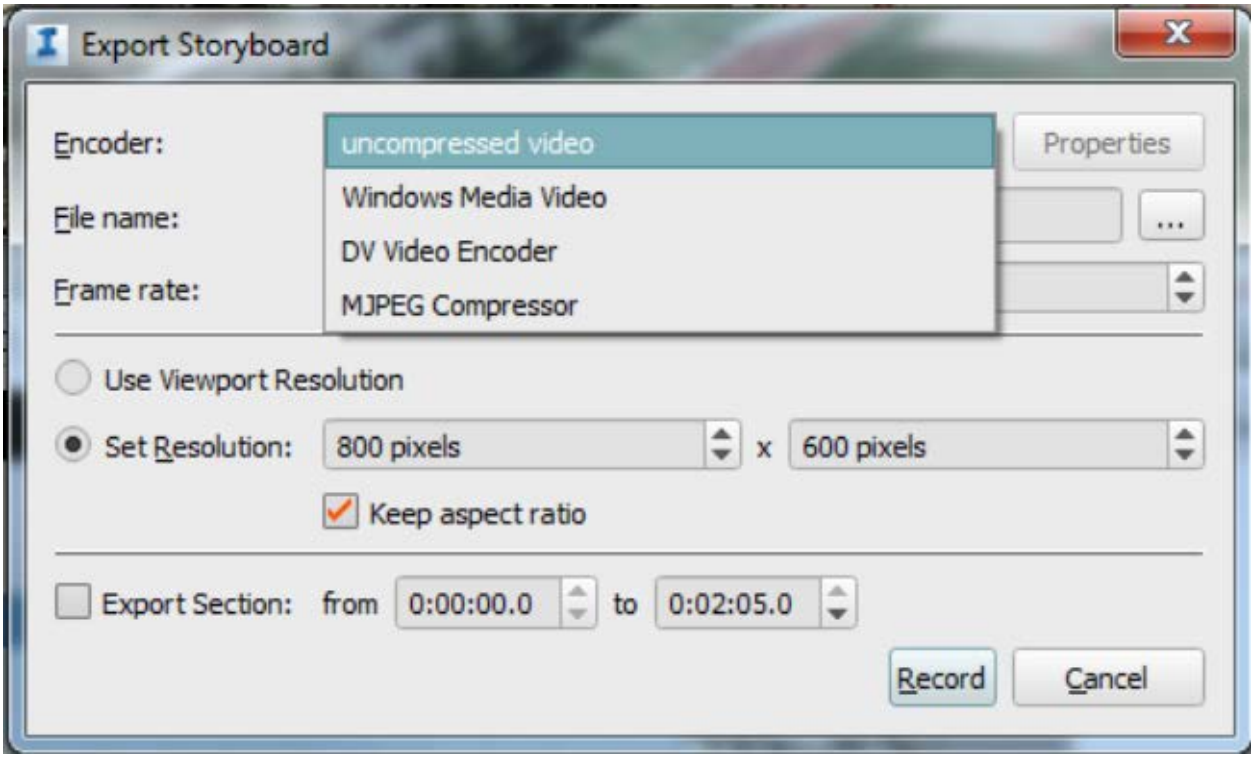
Titles

When you are setting up your titles, keep in mind if the end product will be either an online storyboard or exported video. If you are exporting to video, you will have to keep a few things in mind. The titling in the storyboard assumes you are viewing the titles in InfraWorks not online. Titles tend to shift when exported to video. Titles on the very bottom or top of the screen may be cut off on export, so you need to be careful.



Exporting to Video

When exporting to video, there are four available options. What I recommend at this point depends on if you will be editing your animation later in another video software program. I have not had much luck editing WMV files exported from InfraWorks into other programs. I am spoiled and have a fast workstation with a lot of storage, so I like to export to uncompressed AVI files and then convert the animations in another video editing program. You can also modify your frame rates if needed.



Make sure to set the aspect ratio of your video. By default, InfraWorks will export 800 x 600. If you do any video editing you know this is not a standard video size (like HD 1280x720 or 1920x1080). If you forget to reset it, you will have black bars (pillar boxes) in your video if you play the video on a standard sized monitor.

For more information on the user interface see the Autodesk website **http://tinyurl.com/nsu3k5d.**