AUTODESK **UNIVERSITY** 2015

CI10760

Using Infraworks 360 to create schematic utility presentations. FAST!

Matt Wunch
BVH Integrated Services, P.C.

Learning Objectives

- Create a model using Infraworks' Model Builder
- Use Model Explorer to create subsets to control visibility of model elements
- Import lines, polylines or alignments into Infraworks 360 to create utility routings
- Create stunning proposals and animations in a fraction of the time

Description

So you've heard about Infraworks 360 and all of the cool things it can do with roads and buildings. But what about using it to layout out preliminary utility routes and create multiple options? This class is designed for beginners with little or no experience with Infraworks 360 who want to get up to speed FAST and create awesome schematic utility designs and presentations. We'll show you how to create a model using Infraworks' Model Builder and generate utility routings using lines or alignments from Civil 3D and offer a few tips and tricks to help put the focus on your project area to make your presentations *POP*! To finish it off we'll show you how you can create a video of your schematic project design quickly and easily with just a few clicks of the mouse.

About the Speaker

Matt Wunch *received his Associates in Science in Civil Engineering from Springfield Technical Community College and is currently the BIM Manager for BVH Integrated Services, a multidiscipline engineering firm based in Bloomfield, Connecticut with a satellite office in Newton, Massachusetts. He provides BIM implementation and training for the firm's engineering design software including Autodesk Revit, AutoCAD Civil 3D, AutoCAD MEP, Autodesk Infraworks 360, Navisworks and more. Matt has 25 years of experience with Autodesk software including usage, installation and customization and is a Revit Architecture 2015 Certified Professional. This is Matt's third time at Autodesk University and his first time presenting.*

Introduction

About BVH

BVH is a multi-disciplined engineering firm serving clients since 1958. Recognized for its leadership on successful building and commissioning projects in several states, the firm produces over 300 projects annually for educational, healthcare, corporate, governmental, and research clients.

In addition to a knowledgeable, professional engineering staff with experience across the disciplines, BVH's 115-person team has a unique and successful approach to a project. At BVH, a project isn't a collection of different drawings, phases and consultants, it's one design, one team, and one goal. With this unified approach, the multidisciplinary team shares knowledge across the disciplines and efficiently plans, designs, manages, and delivers high quality project results.

BVH is also a regional leader in sustainable design and commissioning projects, carrying professional engineers, LEED accredited professionals, certified commissioning providers and energy modelers on its staff.

The firm has received design awards from the Connecticut Building Congress, American Council of Engineering Companies of Connecticut, Boston Society of Architects, Associated Builders and Contractors, Connecticut Engineers in Private Practice, and AIA National and Connecticut.

Contents

Brief intro to Infraworks 360 4
Using Model Builder 4
Prepping the Model 8
Delete all roads, railways, coverage areas 9
Deleting the roads 9
Deleting railways 9
Deleting water coverages 9
Deleting streams 9
Verify Building heights/shapes with Google Maps or Bing Maps 9
Using Google Maps 3D view 9
Using Bing Maps Bird's Eye view 9
Creating a custom coverage area 11
Creating custom roadway styles 13
Creating sub-sets of buildings 17
Creating Proposals 19
Exporting Data from Civil 3D 20
Exporting a Line/Polyline 20
Exporting an Alignment 22
Importing Data from Civil 3D 23
SHP File 23
LandXML File 27
Create a Storyboard 29
Creating a simple Storyboard 29
Exporting to .AVI / .WMV Format 32
Creating and Publishing Scenarios 33
Using the iPad App 36

Brief intro to Infraworks 360

Using Model Builder

When you open Infraworks 360 you may be prompted to enter your Autodesk credentials – Autodesk ID or email address and password. Once you do, you'll see the main launch page of Infraworks 360 where you can access previous models and create new ones. Creating a model using Model Builder is the fastest way as it gathers readily available terrain data and imagery, roadways and building information. Although it's not the only way to create a model, it's what we're going to focus on for the purpose of this demonstration.

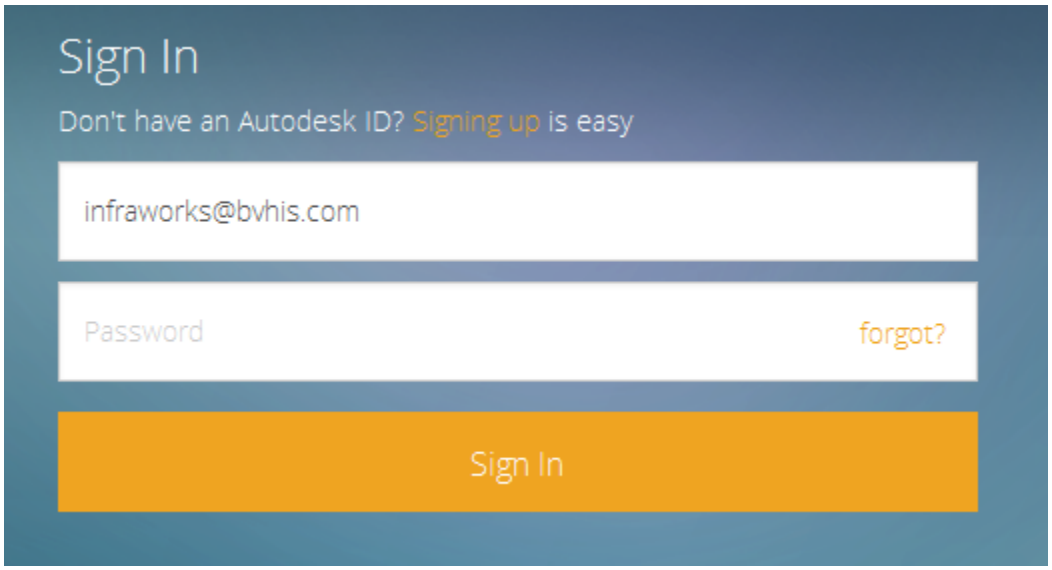


FIGURE 1: AUTODESK LOGIN CREDENTIALS

On the landing page, click the MODEL BUILDER button. The Model Builder interface will be displayed.

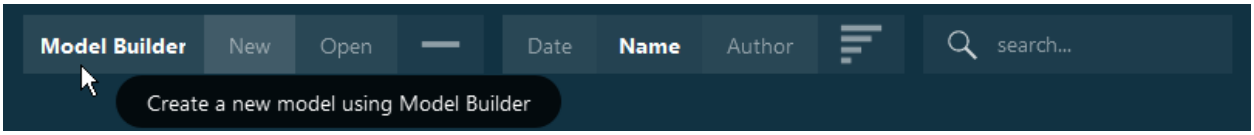


FIGURE 2: LANDING PAGE TOOLBAR

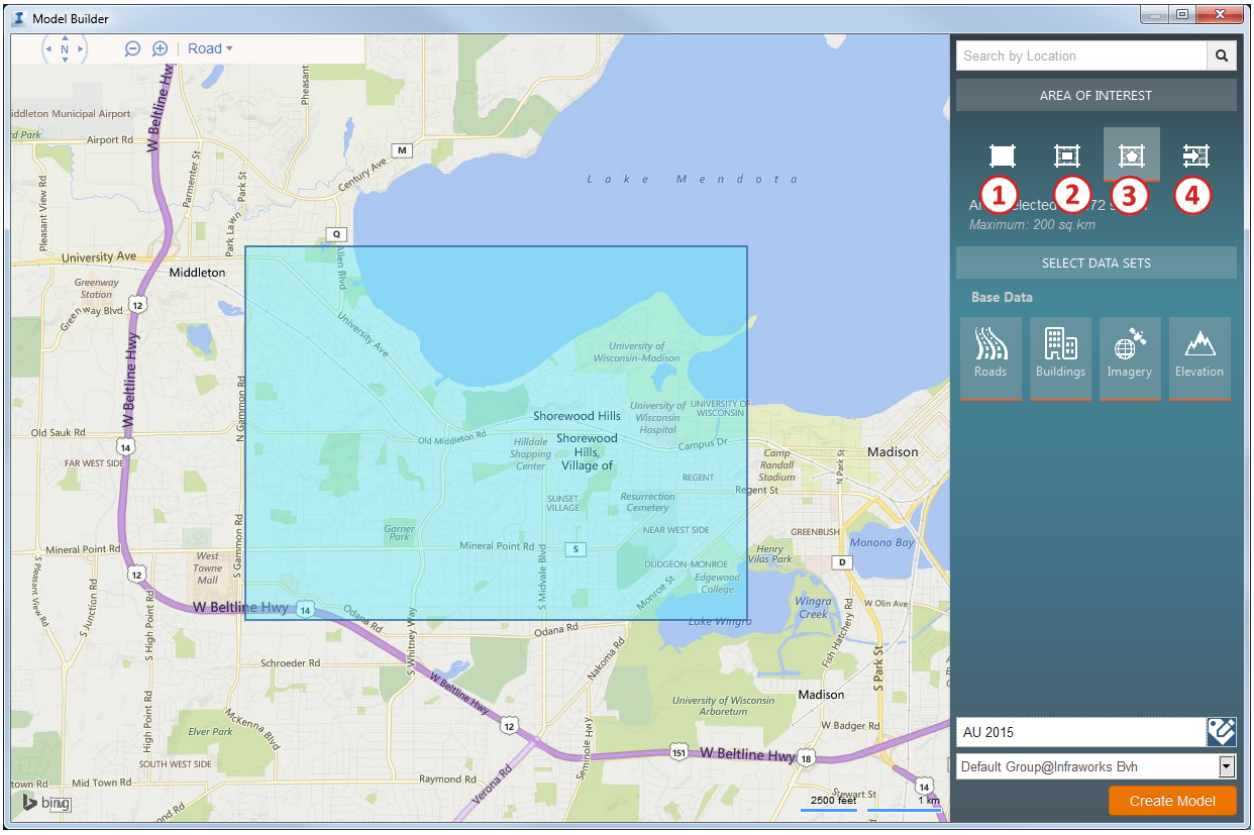


FIGURE 3: MODEL BUILDER

From here, you can create a model using 1 of 4 options:

1. Use the visible area of the map in Model Builder
2. Select a rectangular AREA OF INTEREST (AOI)
3. Create a polygonal shape for your AOI
4. Import an SHP file which defines the extent of the AOI

Once you have your area defined you'll need to give your model a name, select a group where it will be stored in the cloud (lower-right corner of the Model Builder interface) then click CREATE MODEL.

Infraworks will gather the data for your model and send you an email when it's ready to download.

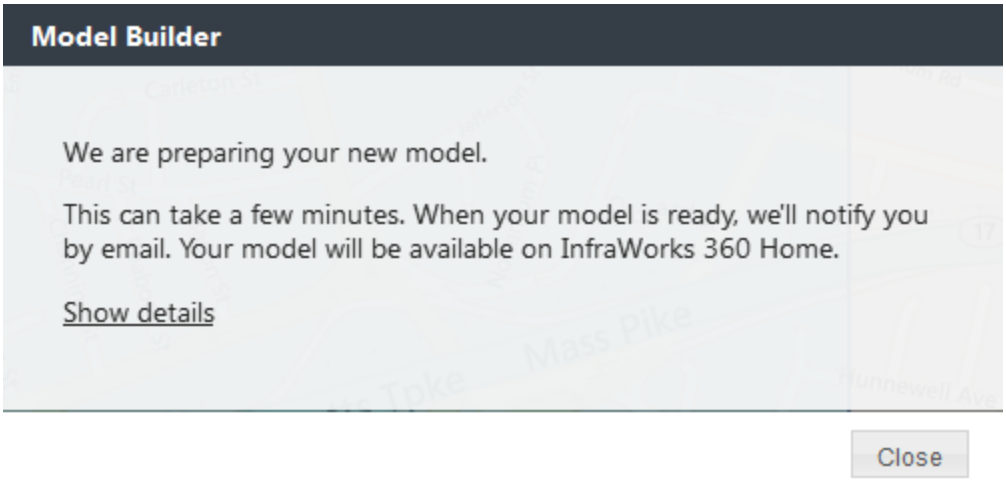


FIGURE 4: MODEL BUILDER NOTIFICATION

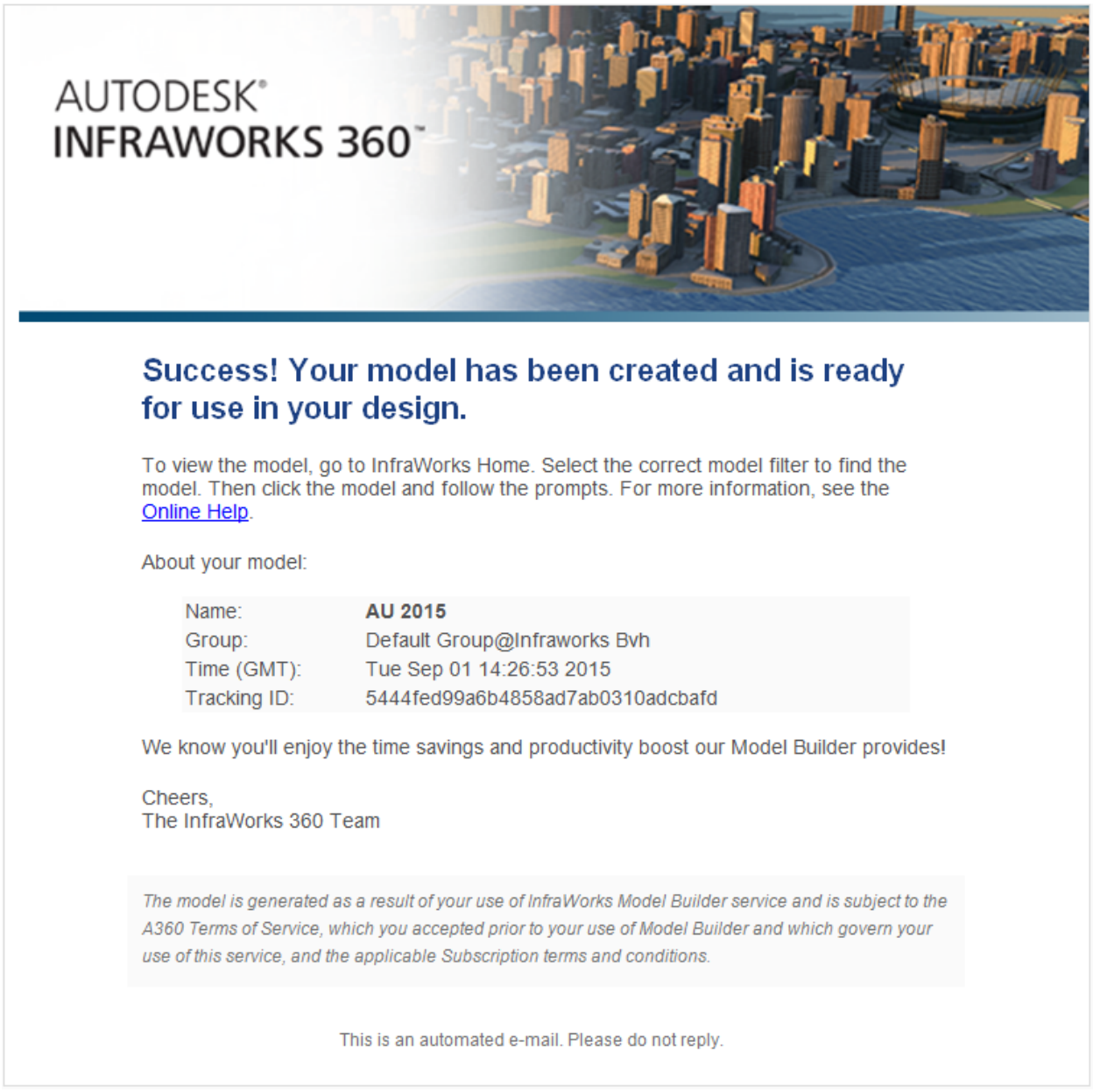


FIGURE 5: INFRAWORKS EMAIL NOTIFICATION

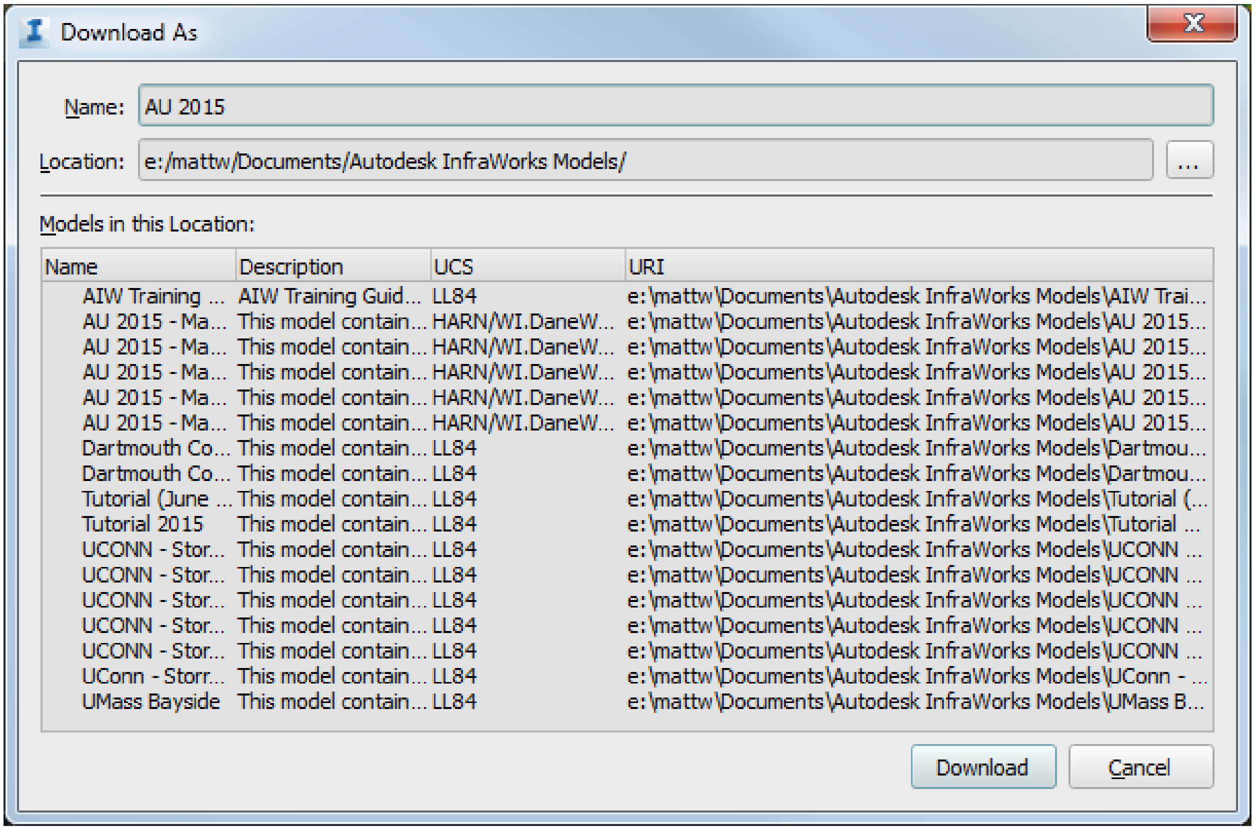


FIGURE 6: MODEL DOWNLOAD DIALOG BOX

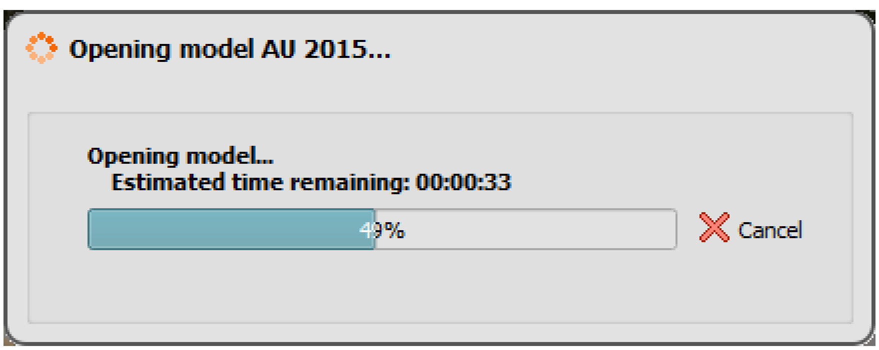


FIGURE 7

Prepping the Model

To really make our schematic utility presentation models *POP!* we first need to delete some of the data that Model Builder gathered for us. But before you do, take a few moments to examine the roads, buildings and water coverages. Notice that, whenever possible, Model Builder pulls in the names of the roadways, buildings, water coverages, etc.

In addition to removing those items, we also need to add a custom coverage area, create custom roadway styles that will be used for our utilities and change the appearance of the existing buildings.

Delete all roads, railways, coverage areas

Now that Model Builder has created this beautiful, intelligent 3D model for us, we're going to delete all of the roads, railways and water coverage areas & streams and use the terrain imagery and buildings as our background model.

***Optional**: By default, Infraworks 360 downloads 17 @ ground resolution of 1.1943 m/pxl resolution terrain imagery. You can download higher resolution imagery by clicking on BUILD, MANAGE AND ANALYZE YOUR INFRASTRUCTURE MODEL → CREATE AND MANAGE YOUR MODEL → DATA SOURCES → double-clicking on Imagery from the Data Sources panel and selecting the 0.2986 m/pxl resolution from the Bing Maps drop down on the Raster tab. Be aware that the higher the resolution, the longer it will take to download. For this model the hi-res imagery took 2-1/2 hours to download and refresh.*

https://msdn.microsoft.com/en-us/library/bb259689.aspx

Deleting the roads

Deleting all of the roads is a quick and easy process. Simply open the MODEL EXPLORER panel (click on the BUILD, MANAGE & ANALYZE button → CREATE AND MANAGE button → MODEL EXPLORER), select the ROADS category, right-click and SELECT ALL. Notice that all of the roads are highlighted in the model. Move the mouse to the canvas and press the delete key.

Deleting railways

This process is the same as deleting the roads except instead of Roads, select Railways.

Deleting water coverages

This process is the same as deleting the roads except instead of Roads, select Water Areas.

Deleting streams

This process is the same as deleting the roads except instead of Roads, select Streams.

Verify Building heights/shapes with Google Maps or Bing Maps

There are times when you may need to adjust the building heights for one reason or another or re-create buildings. A couple of good tools for checking building roof heights are Google Maps and/or Bing Maps.

Using Google Maps 3D view

To use Google Maps 3D view you must first select the Earth view option. Hold the Shift key + left mouse button and rotate to a 3D view.

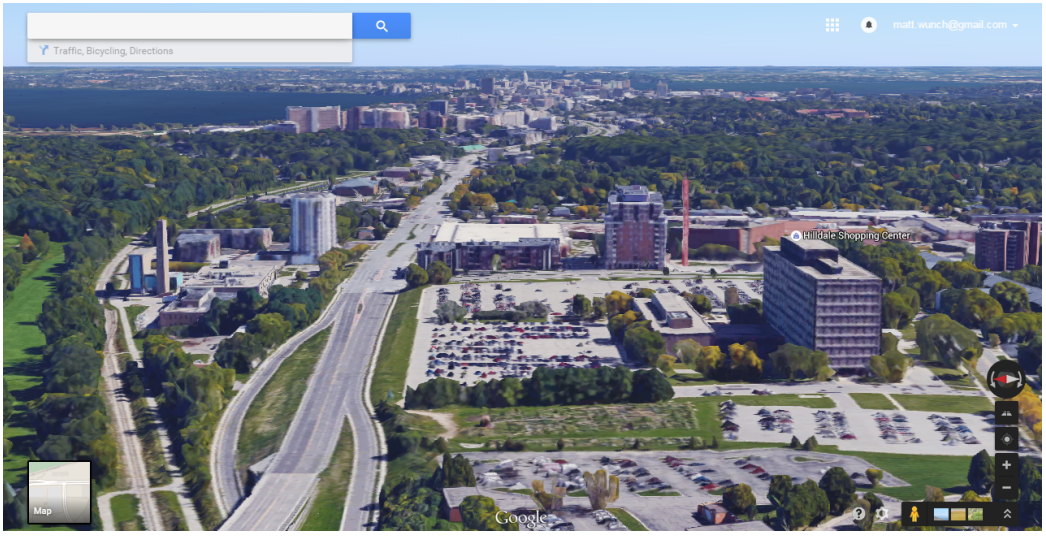
Using Bing Maps Bird's Eye view

To use Bing Maps Bird's Eye view, select the Bird's eye option to automatically flip the 2D map view to a 3D view.

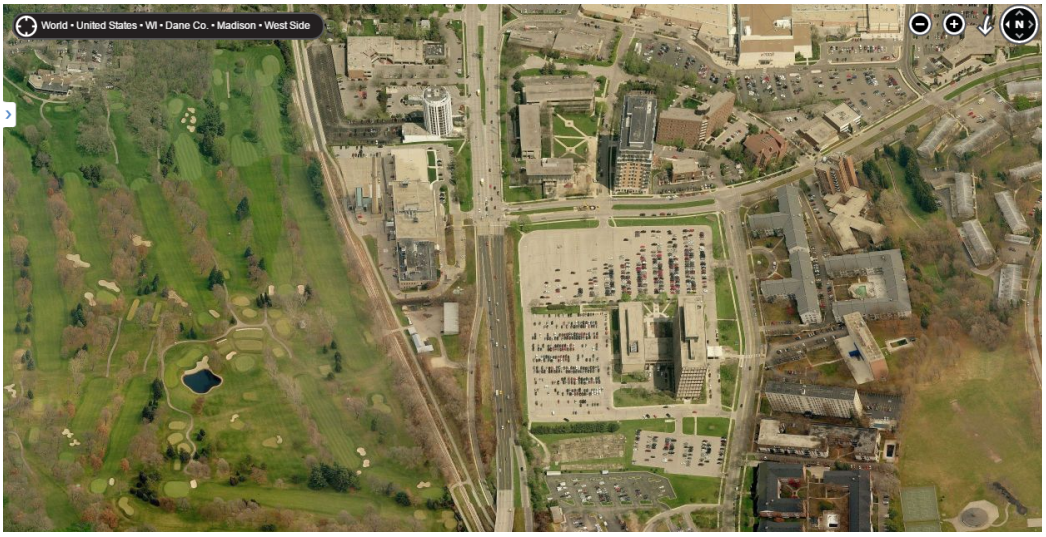
If you do need to re-create a building in Infraworks 360, the 3D views in either Google Maps or Bing Maps are a good resource for determining if a building has multiple roof elevations.

***TIP:** When sketching in Infraworks 360, if you notice the cursor snapping or jumping around, hold down the CTRL key. This will give you more control over your sketch.*

INFRAWORKS 360



GOOGLE MAPS 3D VIEW



BING MAPS BIRD'S EYE VIEW

TIP: *To help you set the approximate date/time you can use http://mvexel.dev.openstreetmap.org/bing/ to display the approximate date a BING Maps image was taken.*

Creating a custom coverage area

To put the emphasis on our project area we're going to fade the area outside of our project limits. To do this, we'll need to create a custom coverage area with a transparency of 50% or so.

Note: *Depending on the brightness of the terrain imagery, the transparency may need to be adjusted up or down.*

To create a new coverage style click on BUILD, MANAGE, AND ANALYZE YOUR INFRASTRUCTURE MODEL → CREATE AND MANAGE YOUR MODEL → STYLE PALETTE → COVERAGE tab. Click the green + button in the STYLE EDITING section at the bottom of the palette.

FIGURE 8: STYLE EDITING TOOLBAR

This brings up the DEFINE NEW COVERAGE dialog box. Now we need to define what our custom coverage area will look like.

- For the FILL STYLE click the ellipses button  and select black for a color. To add transparency to the color we'll need to adjust the Alpha Channel value. For 25% transparency, set the ALPHA CHANNEL value to approximately 1/4 of 255 or 64 (the maximum value for the ALPHA CHANNEL is 255 – opaque. The minimum value is 0 – 100% transparent) for 50% transparency, set the ALPHA CHANNEL value to approximately 128 and for 75% transparency set the ALPHA CHANNEL value to approximately 191.
- Clear the OUTLINE STYLE
- Set the OUTLINE WIDTH to 0
- Rename the style using the RENAME THE SELECTED STYLE button in the STYLE EDITING section of the STYLE PALETTE.

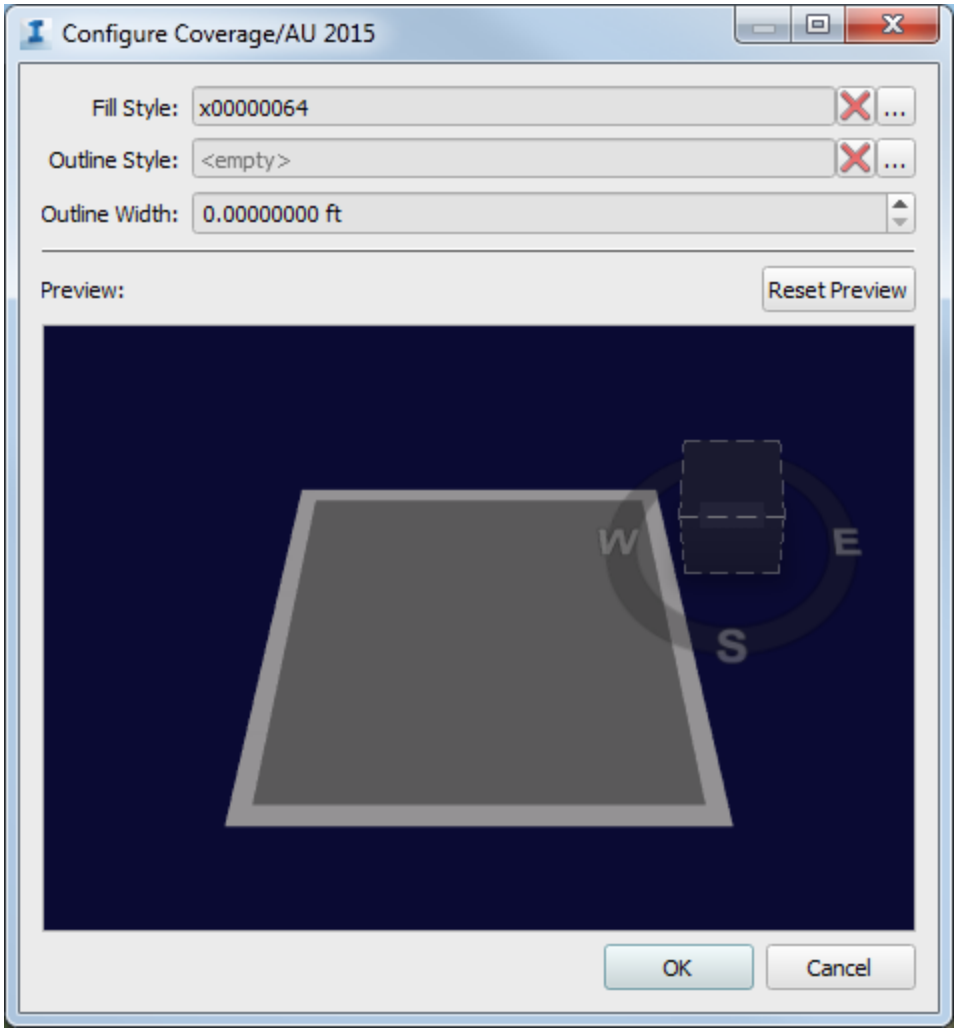


FIGURE 9: CONFIGURE COVERAGE DIALOG BOX

FIGURE 10: COVERAGE STYLE EDITING TOOLBAR – RENAME TOOL

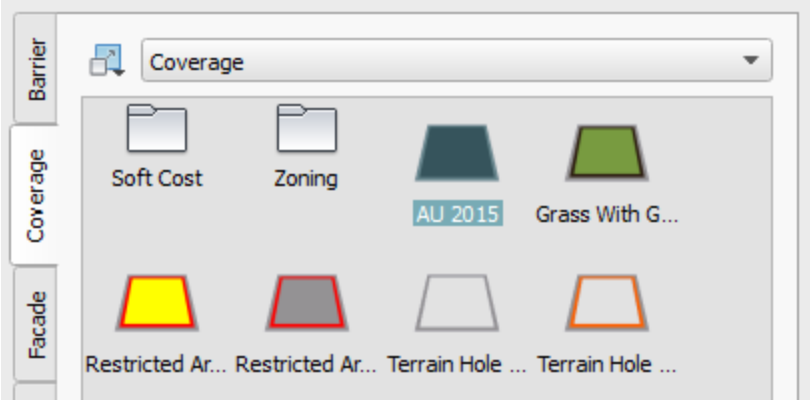


FIGURE 11: COVERAGE STYLES

Creating custom roadway styles

For our utility roadways, we're going to create a simple roadway style consisting of two colors – the main interior portion and a highlight color on either side of the roadway. Before we create the roadway styles, we need to create material groups which the roadways will reference for their display.

To create a new material group click on BUILD, MANAGE, AND ANALYZE YOUR INFRASTRUCTURE MODEL → CREATE AND MANAGE YOUR MODEL → STYLE PALETTE → MATERIAL GROUP tab. Click the green + button in the STYLE EDITING section at the bottom of the palette.

FIGURE 12: MATERIAL GROUP STYLE EDITING TOOLBAR – NEW TOOL

This brings up the DEFINE NEW MATERIAL GROUP dialog box. Now we need to define what our custom material group will look like.

For the default material, select any color you'd like (I use the Call-Before-You-Dig colors). The default material will be the main roadway surface. I've named mine with an "AU 2015" prefix to help separate them from the default material groups.

FIGURE 13: UTILITY COLORS

To define the outer material, click the ADD MATTERIAL icon, select a color and click OK twice. Rename the Material Group.

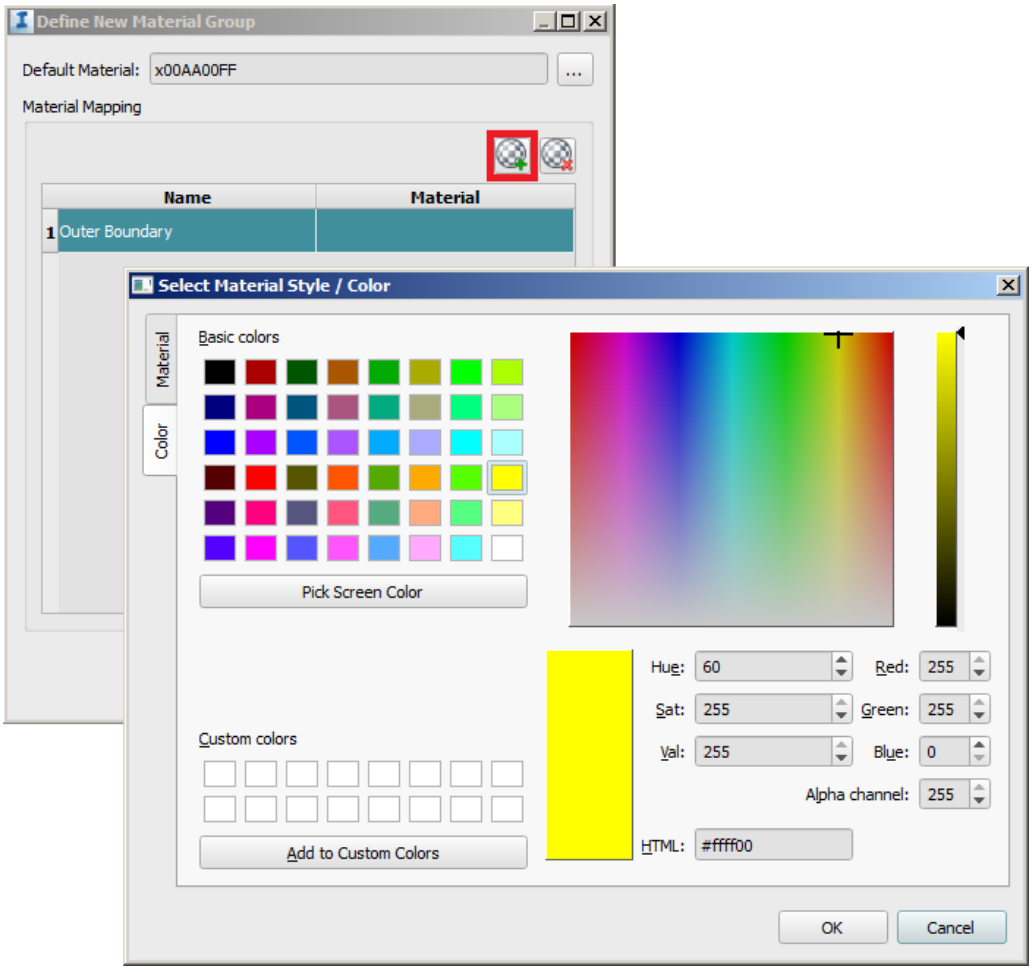


FIGURE 14: MATERIAL GROUP EDITOR

After you have your various material groups defined, you can then create the actual roadway styles. To do this, click on BUILD, MANAGE, AND ANALYZE YOUR INFRASTRUCTURE MODEL → CREATE AND MANAGE YOUR MODEL → STYLE PALETTE → MATERIAL GROUP tab. Click the green + button in the STYLE EDITING section at the bottom of the palette.

FIGURE 15: STYLE EDITING TOOLBAR

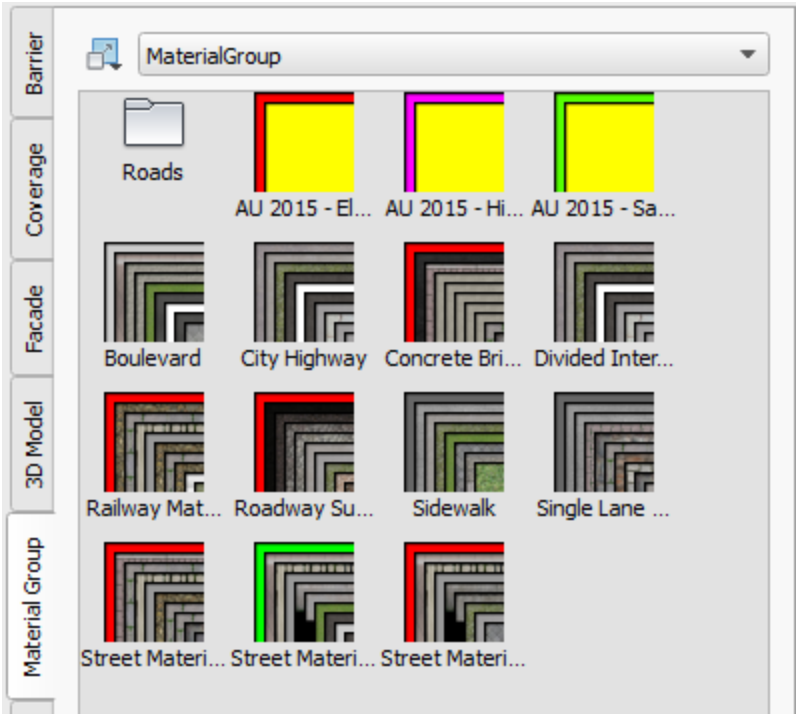


FIGURE 16: MATERIAL GROUP STYLES

Now click on the ROAD tab of the STYLE PALETTE and click the NEW STYLE button in the STYLE EDITING section. This will display the DEFINE NEW ROAD dialog box. Change the settings to match the image in Figure 17. Adjust the TRACK WIDTH values to suit your preference.

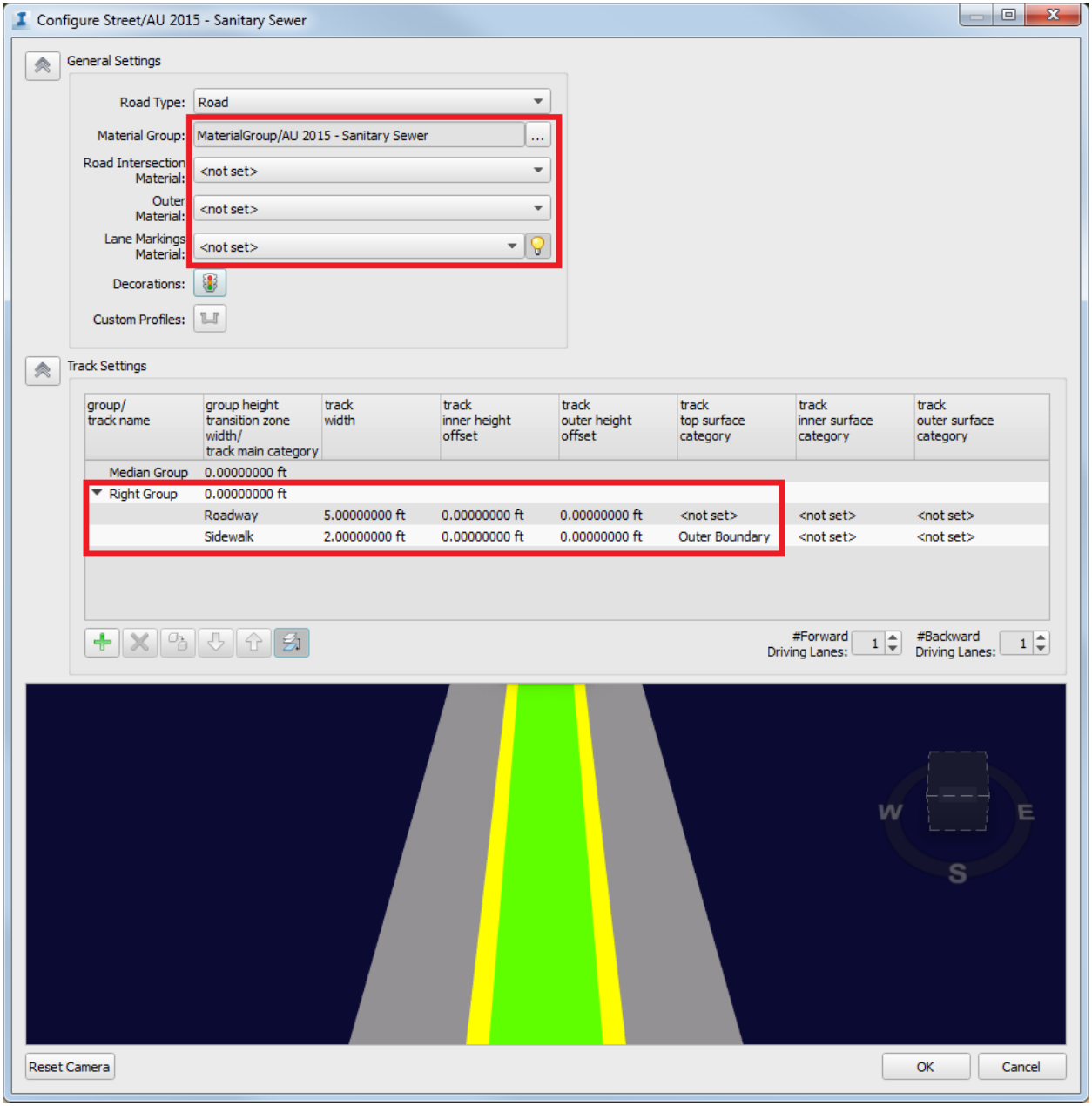


FIGURE 17: ROADWAY STYLE EDITOR

Click OK to close out of the CONFIGURE STREET dialog box and save your changes. Rename the new roadway style. Again, I've named them with an "AU 2015" prefix to help separate them from the other roadway styles. This will also come in handy when filtering the roadway styles for use later on. Repeat this process for all of your different utilities.

Tip: Because Infraworks 360 doesn't use a template like AutoCAD or Revit, you can save your custom company styles to a network location for quick loading into a new model. Click the EXPORT icon in the CATALOG EDITING section and select a location to save the .styles.json file.

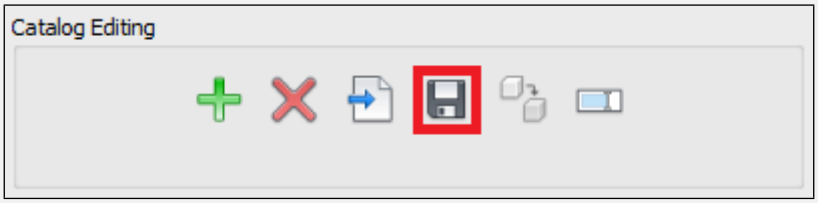


FIGURE 18: EXPORT CATALOG

To import saved styles, simply click the IMPORT icon, browse to a location that has your saved .styles.json file and click OK.

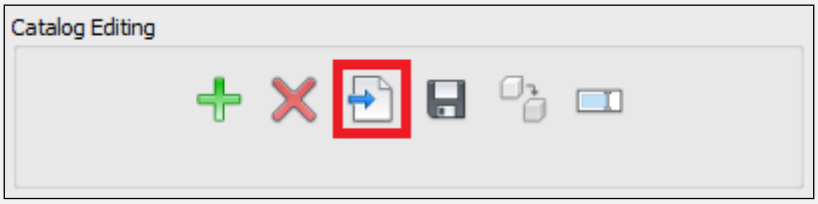


FIGURE 19: IMPORT CATALOG

Creating sub-sets of buildings

The next thing we need to do is create a sub-set for the buildings that lie within the project limits so we can quickly and easily control their display. A sub-set is simply a selection set of buildings, roads, etc. While holding the CTRL key down, click on each of the buildings within the project limits. Right-click and select PROPERTIES to display the Properties palette. In the DESCRIPTION box enter AU 2015 then click the UPDATE button. We will use the description as a filter to define our sub-set of buildings.

In the MODEL EXPLORER palette right-click on the BUILDINGS category and select CREATE SUBSET to display the CREATE NEW SUBSET dialog box. Since we want to use the description 'AU 2015' as a way to filter out just the buildings within the project limits we need to enter the following expression, DESCRIPTION LIKE 'AU 2015' which means select anything that has the description 'AU 2015'. Click OK when you're done to close the CREATE NEW SUBSET dialog box and rename the new subset. Notice that the buildings that contain the description 'AU 2015' are highlighted. If you missed a building or included some that are outside the project limits, you can quickly see which ones you need to modify.

Tip: *To create a subset that will select all buildings that do NOT have the description 'AU 2015', use the following expression:* NOT DESCRIPTION LIKE 'AU 2015' OR DESCRIPTION NULL

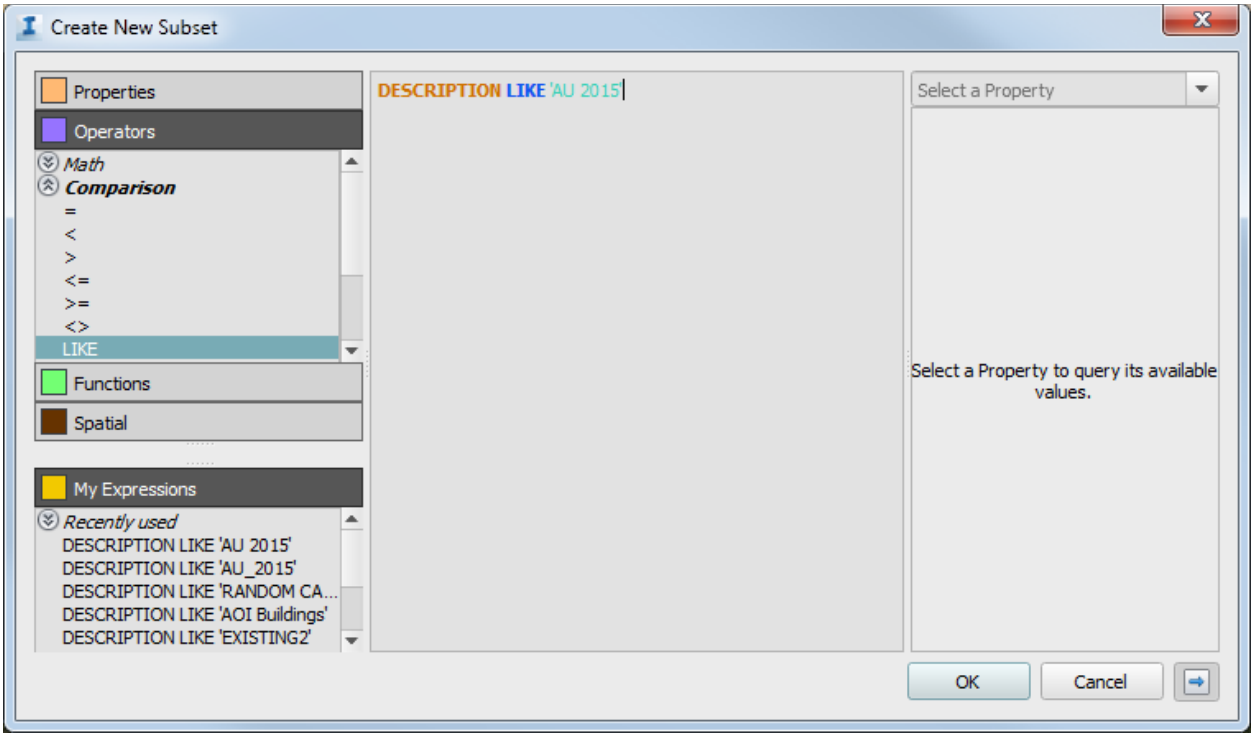


FIGURE 20: SUBSET EXPRESSION EDITOR

Now we need to change the façade and roof styles of the buildings because we don't want the owner, client, stakeholders, etc. to get hung up on the fact that the surrounding buildings may not look *exactly* like they do in real life. Do this by right-clicking the BUILDINGS category in the MODEL EXPLORER palette and choose SELECT ALL. On the PROPERTIES palette clear the MANUAL STYLE and RULE STYLE values and change the building base and roof color to those below and then click the UPDATE button.

- Base color: x5B5A4FFF
- Roof color: x5B5A4FFF

Notice the building façades have been removed and the buildings now have a cardboard-like appearance to them.

Back on the MODEL EXPLORER palette right-click the building subset you created earlier and choose SELECT ALL to select just the buildings within the project limits and change their base and roof colors to those below and click the UPDATE button.

- Building base color: xDDDBC0FF
- Building roof color: x8F8E7CFF

Notice how the subset of buildings appear lighter/brighter than the buildings outside of the project limits.

FIGURE 21: BUILDINGS WITH FAÇADE STYLES REMOVED

Creating Proposals

PROPSALS are basically different options or alternatives within the Infraworks model. Any modifications done in a proposal are specific to that individual proposal and will not be visible in any other proposal.

To create a new Proposal, display the Proposal list in the utility bar then click CREATE NEW PROPOSAL.

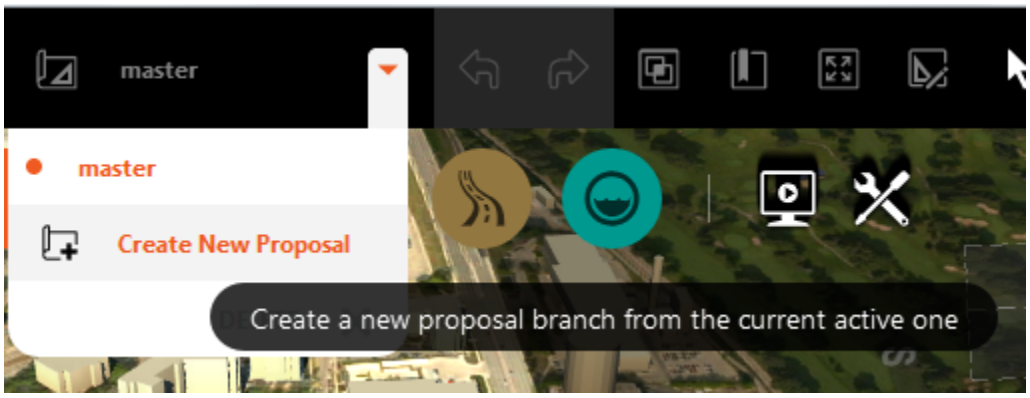


FIGURE 22: PROPOSALS

In the ADD NEW PROPOSAL dialog box enter a name for the new proposal. Repeat the process to create as many proposals as you need.

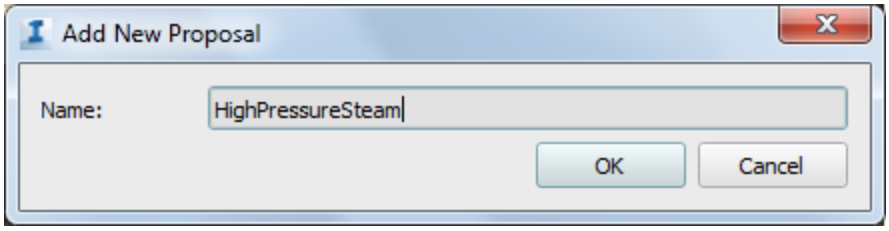


FIGURE 23: NEW PROPOSAL DIALOG BOX

Note: *Proposals contain only the data that has been imported into them.*

Exporting Data from Civil 3D

Data such as lines, polylines and alignments can be exported from Civil 3D and imported into Infraworks 360 and defined as roadways. The following examples demonstrate how to do this with each type of object.

Exporting a Line/Polyline

Using the MAPEXPORT command in Civil 3D you can select the line(s)/polyline(s) you want to export, specify a file name and location for the SHP file.

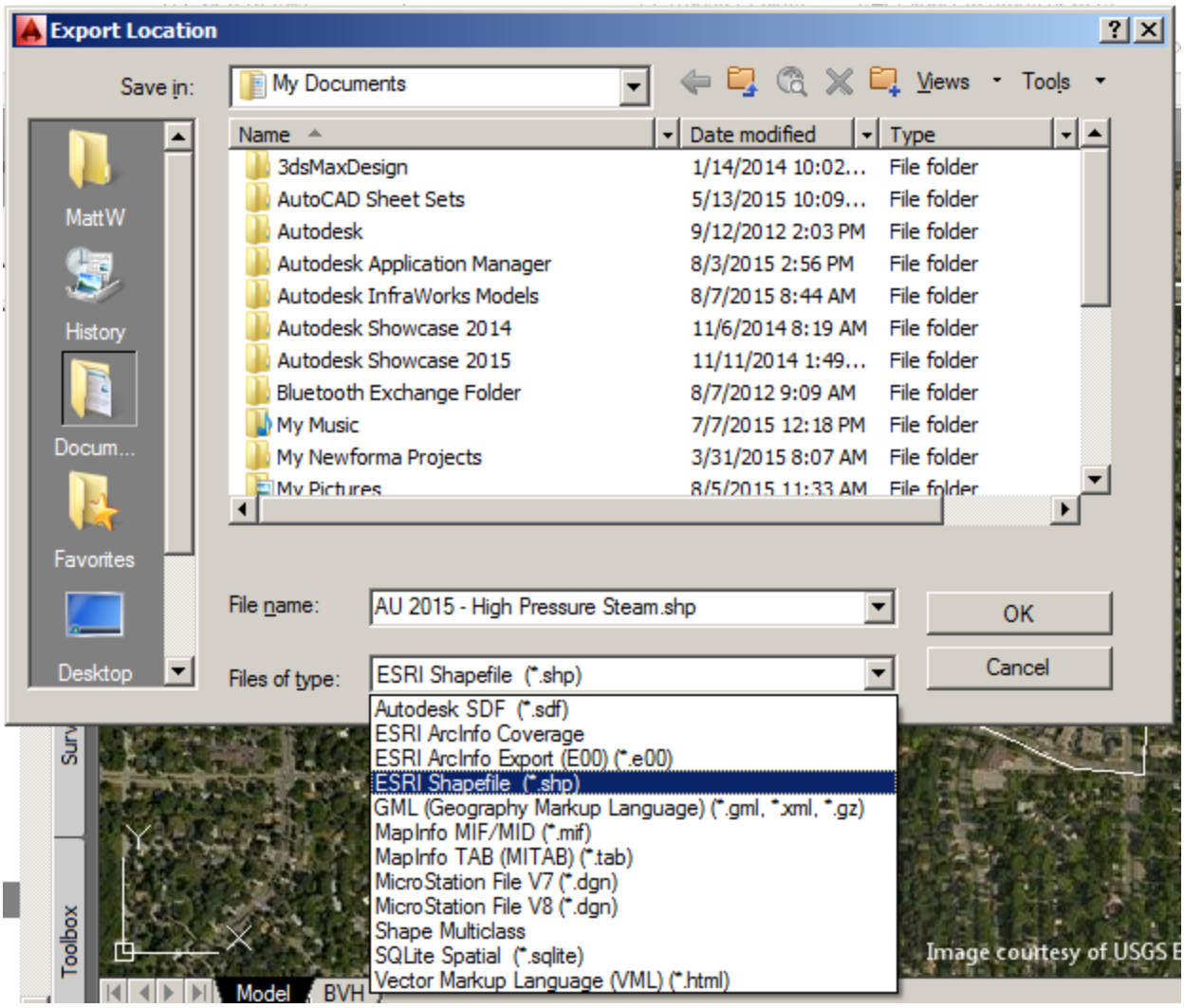


FIGURE 24: EXPORT SHP - MAPEXPORT

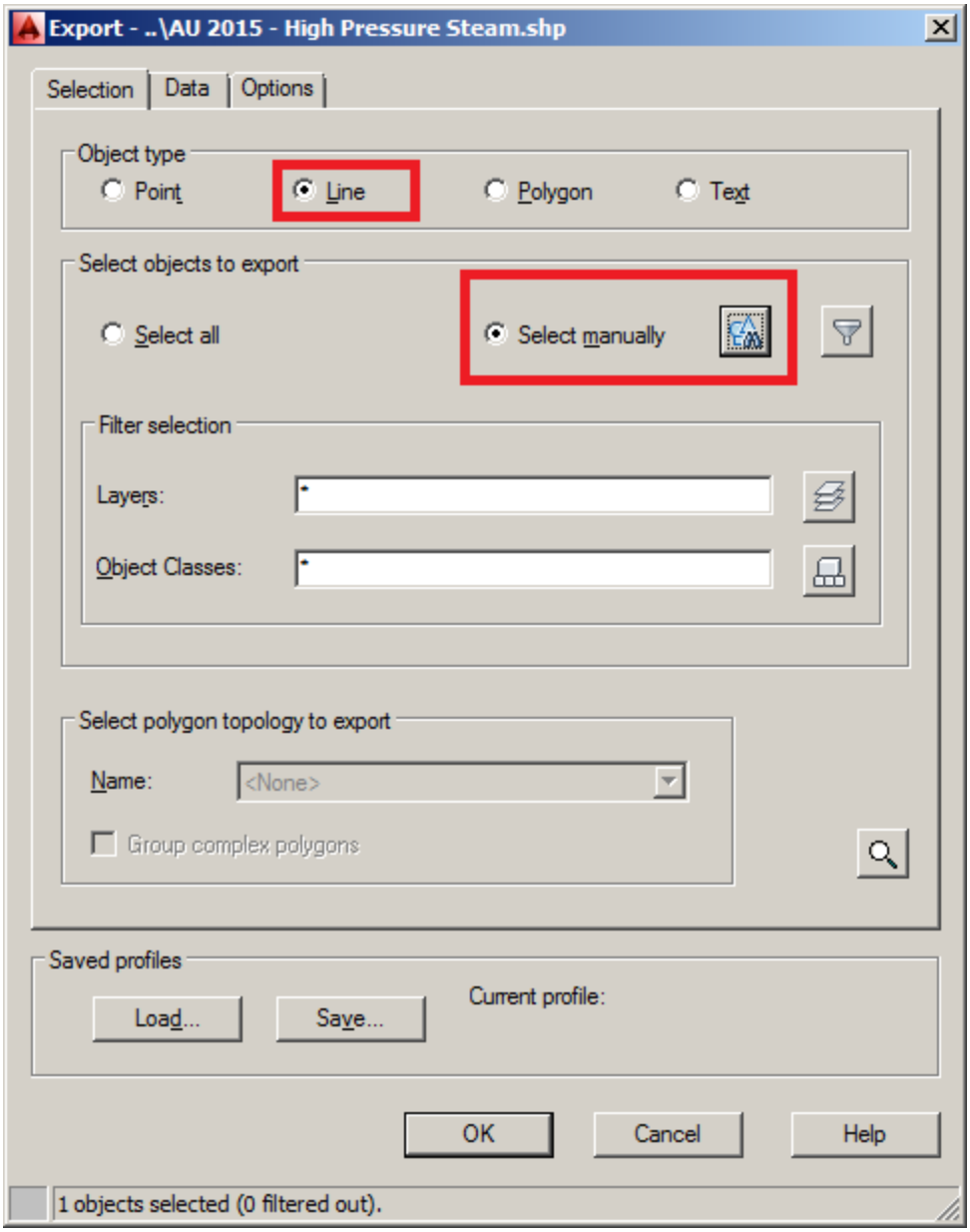
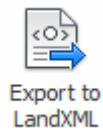


FIGURE 25: MAPEXPORT OPTIONS

Exporting an Alignment



Using the Export to LandXML command you can select the alignment(s) you want to export, specify a file name and location for the XML file.

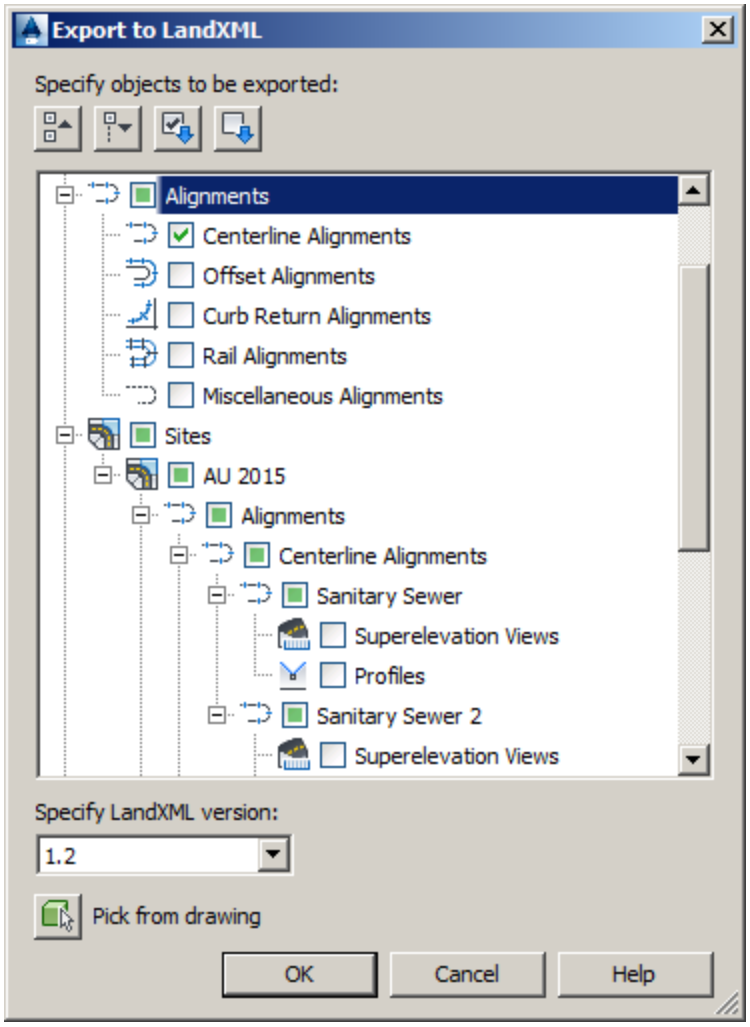


FIGURE 26: LANDXML EXPORT OPTIONS

Importing Data from Civil 3D

SHP File

To import the SHP information click on BUILD, MANAGE, AND ANALYZE YOUR INFRASTRUCTURE MODEL → CREATE AND MANAGE YOUR MODEL → DATA SOURCES to display the DATA SOURCES palette.

FIGURE 27: DATA SOURCES

On the DATA SOURCES palette click the ADD FILE DATA SOURCE drop down, select SHP and browse for the SHP file you created earlier. Doing this only imports the data, it doesn't display it. In order for Infraworks to display the data, you need to configure it, or tell Infraworks WHAT KIND of data it is.

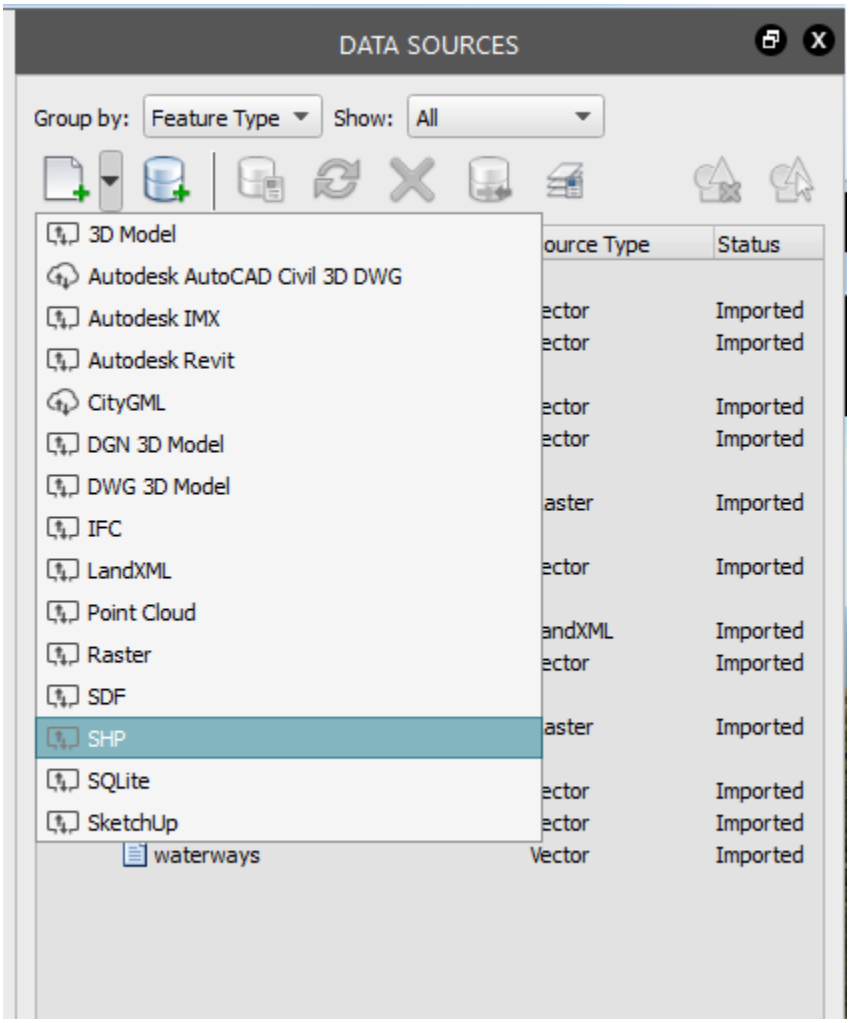


FIGURE 28: IMPORT DATA SOURCES

To configure the imported data, you can either double-click it on the DATA SOURCES palette or select it, right-click and choose CONFIGURE… When the DATA SOURCE CONFIGURATION dialog appears a few items will have a yellow exclamation mark ⚠ next to them. These items need to be addressed in order to continue. The first item we're going to address is the TYPE. Select ROAD from the drop-down. Optional: select "AU 2015 – HIGH PRESSURE STEAM" for the RULE STYLE in the STYLE section to automatically apply one of the custom roadway styles to the imported data.

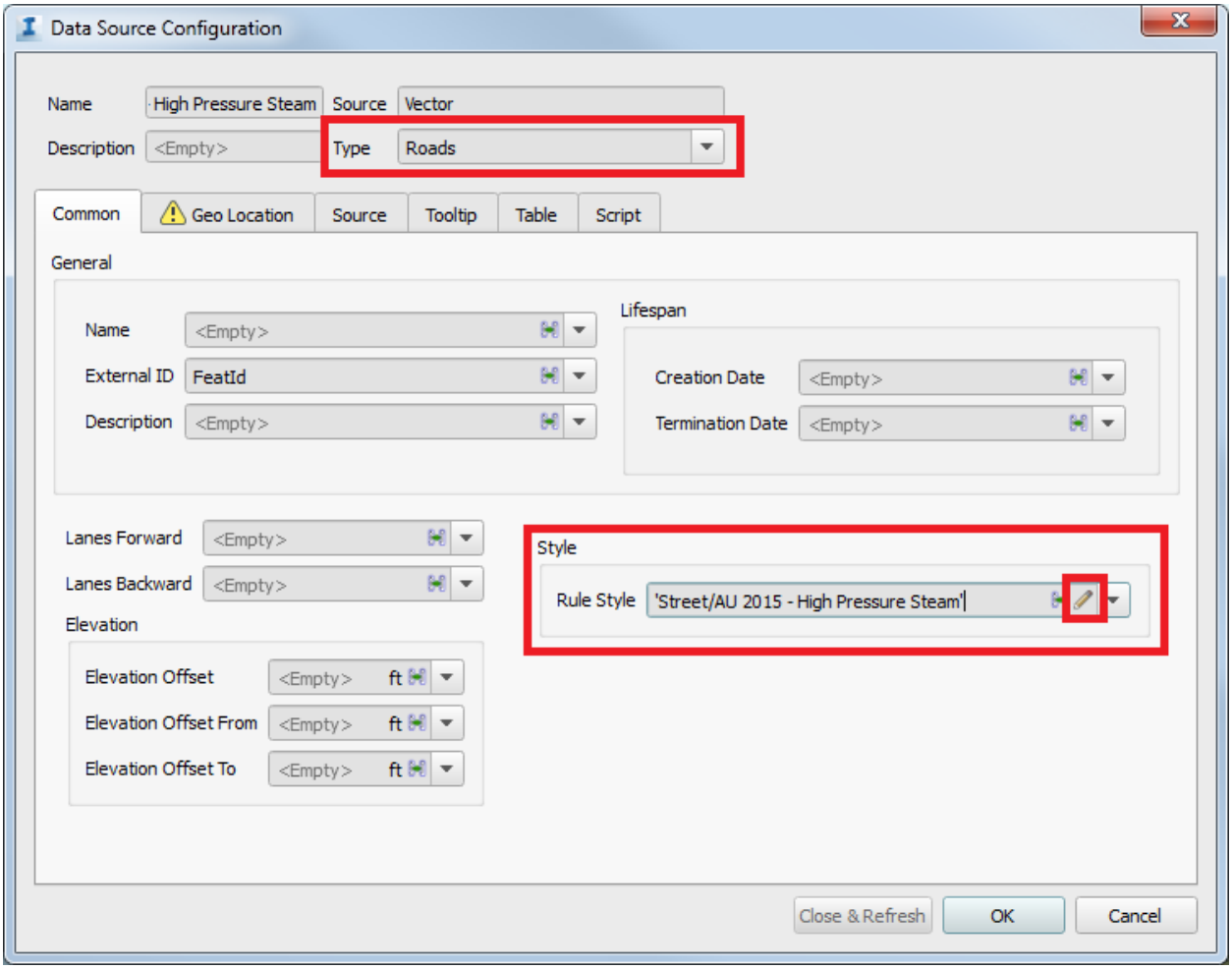


FIGURE 29: DATA SOURCE CONFIGURATION – COMMON TAB

Next, select the GEO LOCATION tab and change the coordinate system to HARN/WI.DaneWI-F. This will ensure that our data is geo-located correctly. When you're done, click CLOSE & REFRSH to close the dialog box and refresh the data that was loaded.

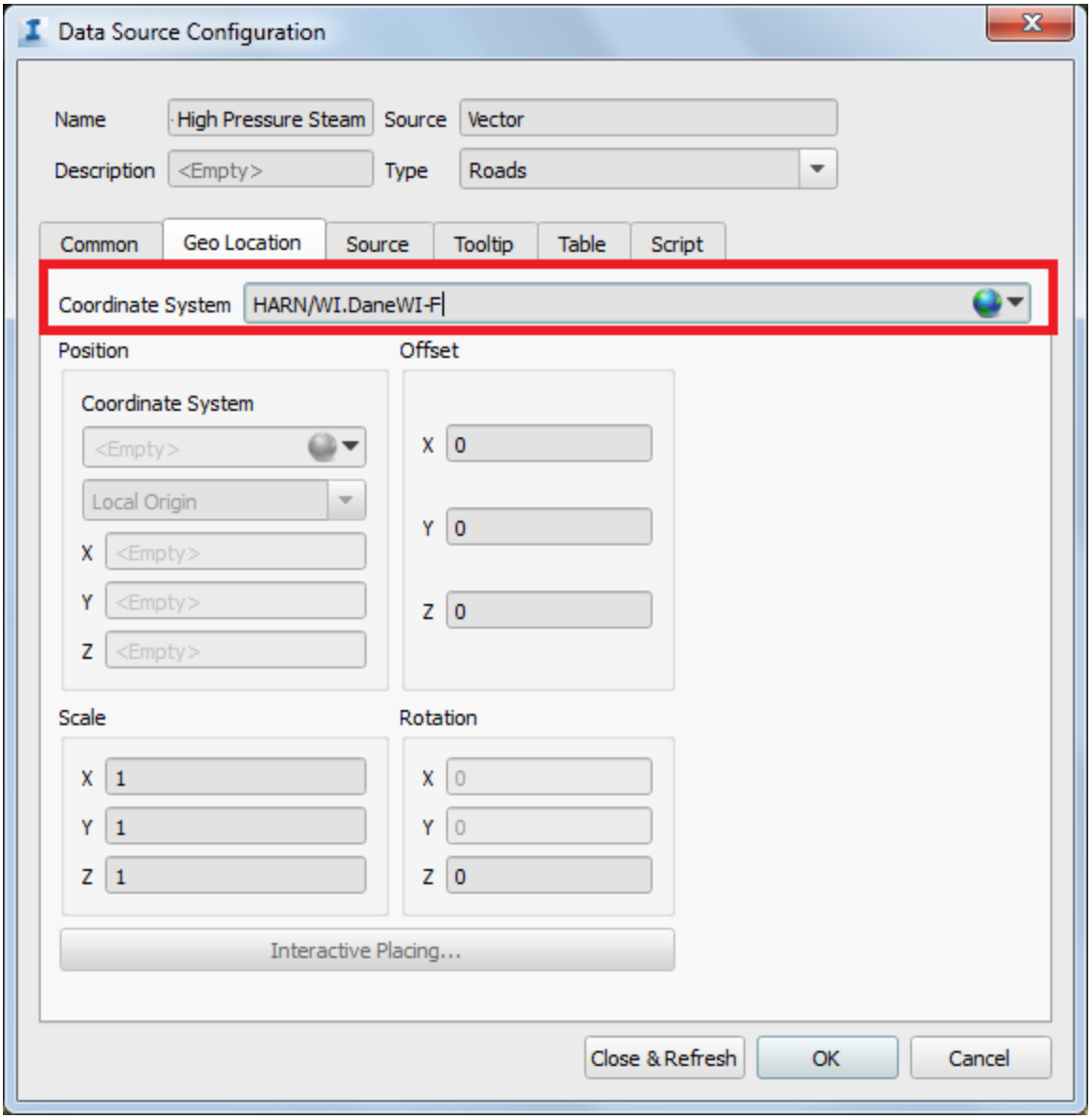


FIGURE 30: DATA SOURCE CONFIGURATION – GEO LOCATION TAB

You can now see the high pressure steam line running down University Ave.

FIGURE 31: UTILITY ROADWAY STYLE

LandXML File

Loading the XML file is very much the same as loading the SHP file but you have fewer options to worry about. In the DATA SOURCE CONFIGURATION dialog box verify that the type is set to ROADS and that the coordinate system is set to HARN/WI.DaneWI-F then click CLOSE & REFRESH.

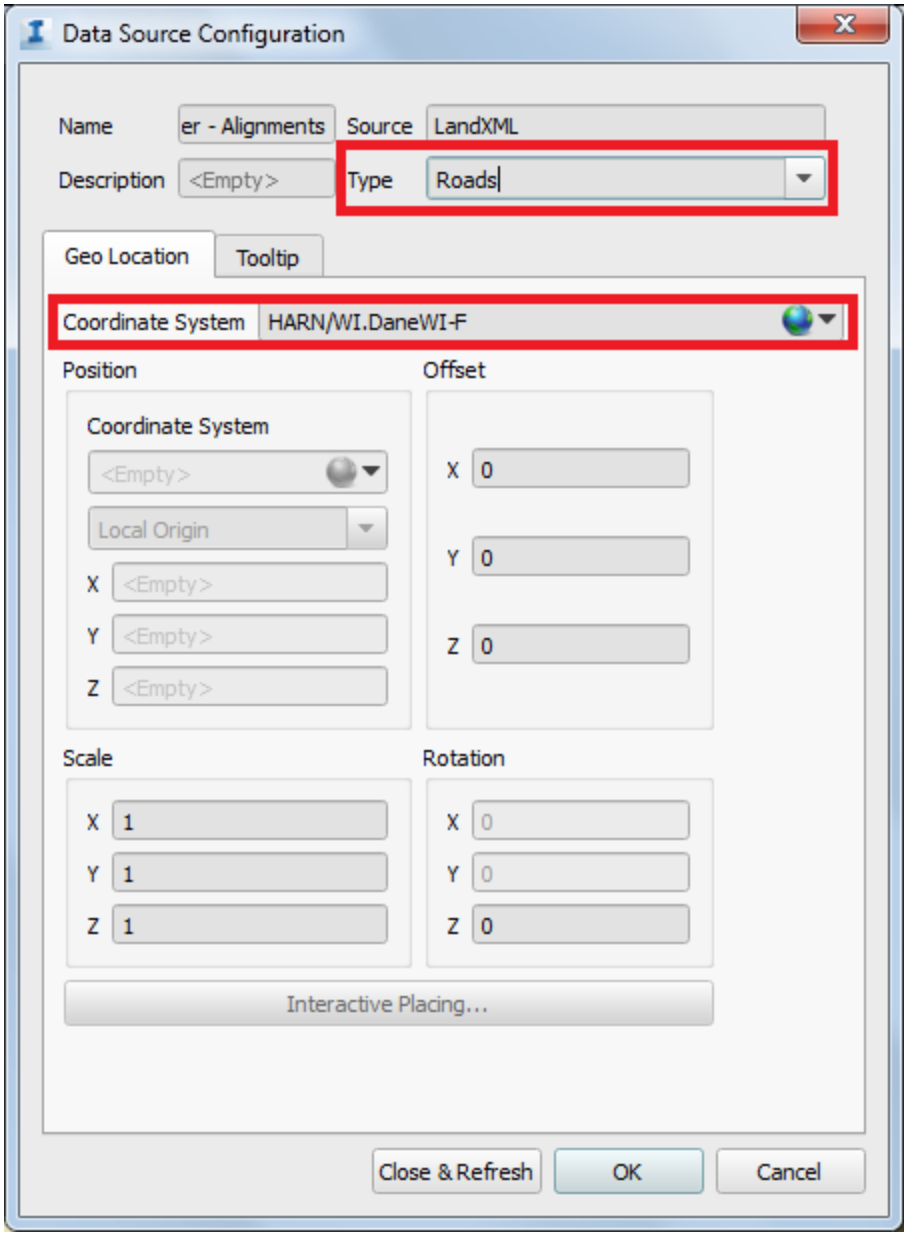


FIGURE 32: DATA SOURCE CONFIGURATION – LANDXML

After the data has been refreshed you will need to change the road style. To do that select the road, right-click and select PROPERTIES to display the PROPERTIES palette if it isn't already displayed. In the RULE STYLE section under STYLIZATION click the ellipses button and choose the AU 2015 – SANITARY SEWER road style then click UPDATE to update the data. Alternatively, you can drag & drop a style directly onto a road to automatically change its style.

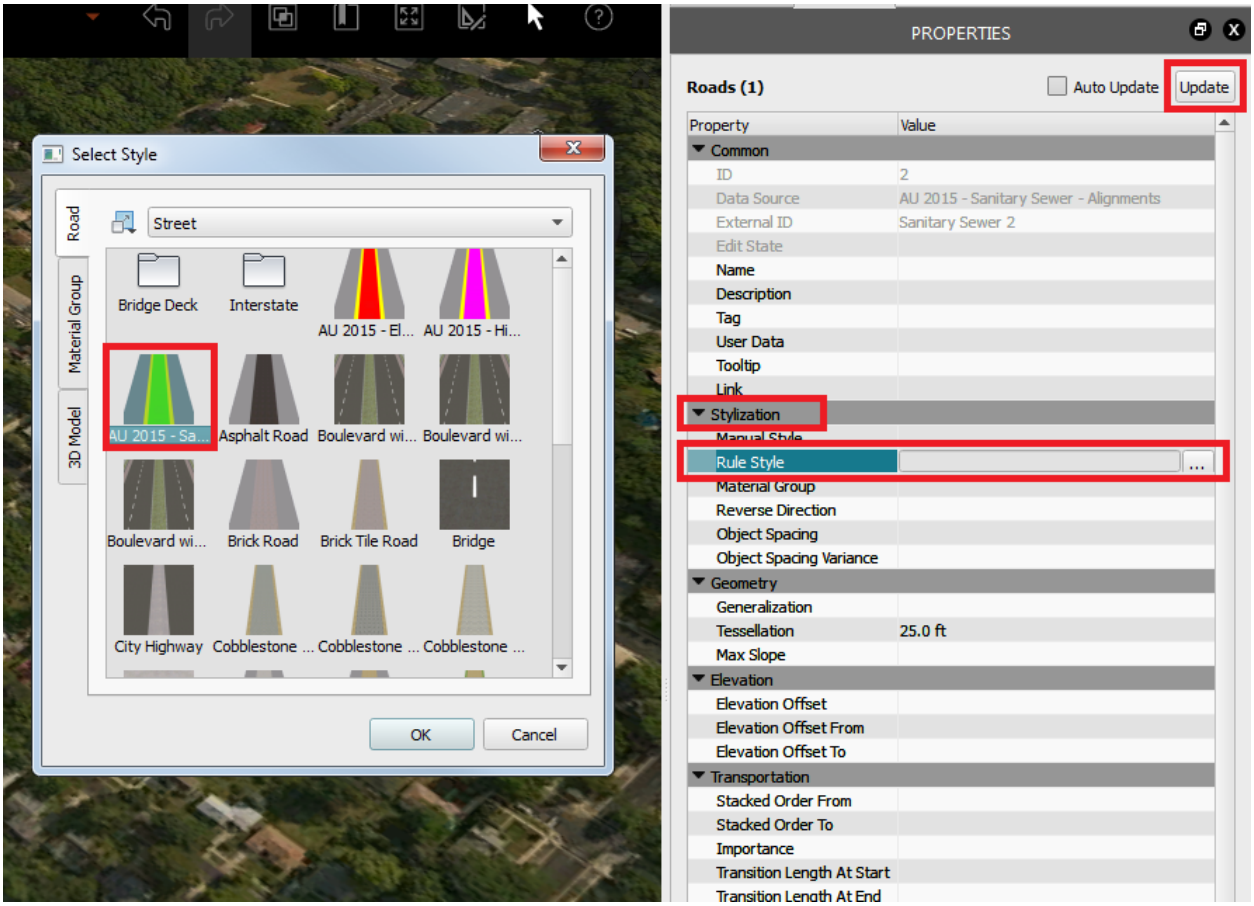


FIGURE 33: APPLYING STYLE TO SELECTED ROADWAY

Create a Storyboard

A Storyboard is a dynamic presentation of key parts of your design model.

Click on the CREATE AND CONDUCT INFRASTRUCTURE DESIGN PRESENTATIONS → STORYBOARD CREATOR to display the Storyboard palette. One of the easiest ways to create a presentation is by capturing keyframes within the model and letting Infraworks 360 stitch them together to create the presentation which can then be exported to an AVI or WMV file for viewing on your computer. Alternately, you can publish scenarios and storyboards to the web for viewing on a web browser or use the Infraworks 360 iPad app.

Creating a simple Storyboard

Begin by clicking on CREATE AND CONDCUT INFRASTRUCTURE DESIGN PRESENTATIONS → STORYBOARD CREATOR to display the Storyboard palette.

FIGURE 34: STORYBOARD CREATOR

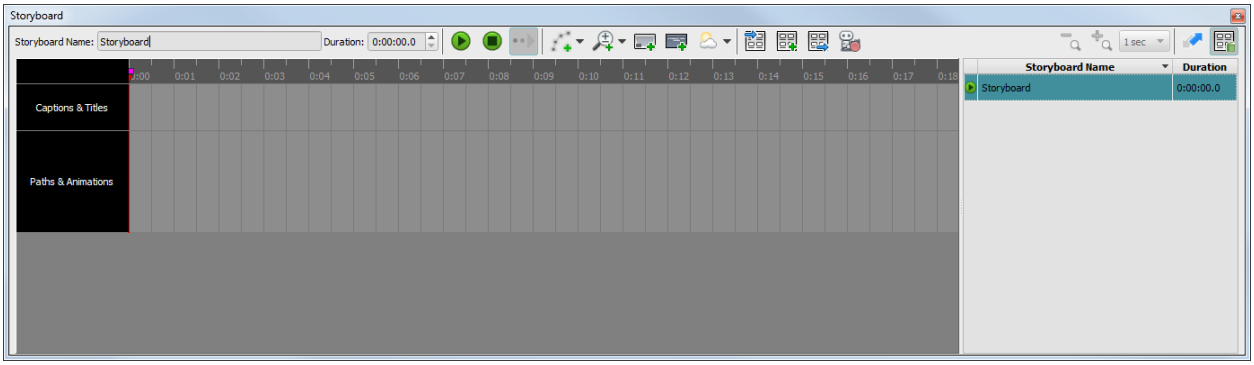


FIGURE 35: STORYBOARD PALETTE

One of the easiest ways to create an animation is to use keyframes. Keyframes are really nothing more than snapshots of your design model.

Let's start by adding a title by clicking the ADD A NEW TITLE button on the Storyboard tool bar. This will add a new title at the beginning of the current storyboard.

FIGURE 36: STORYBOARD EDITOR TOOLBAR

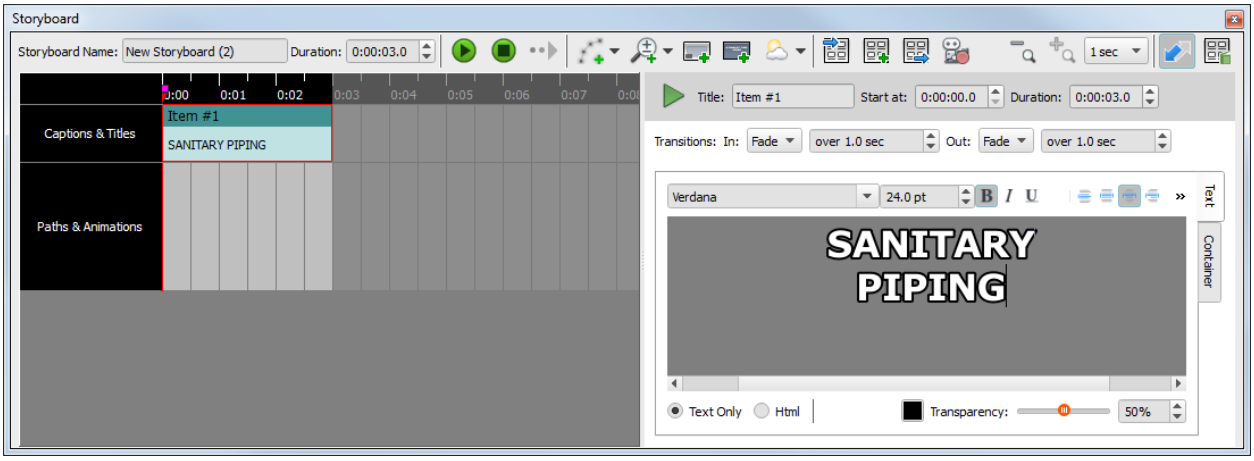


FIGURE 37: STORYBOARD TITLE SETTINGS

Next, navigate to where you'd like the animation to begin and select ADD CAMERA PATH ANIMATION from the drop down on the storyboard tool bar. This will create a keyframe in the current storyboard.

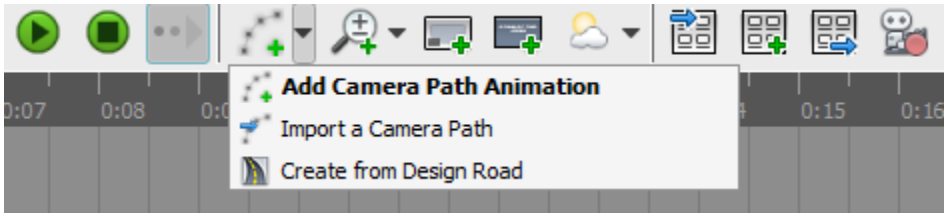


FIGURE 38: STORYBOARD EDITOR – CAMERA PATH TOOLS

Navigate in the model to where you'd like to create another keyframe and click the ADD A NEW KEYFRAME AFTER THE CURRENTLY SELECTED ONE button. Repeat this process to add as many keyframes as needed.

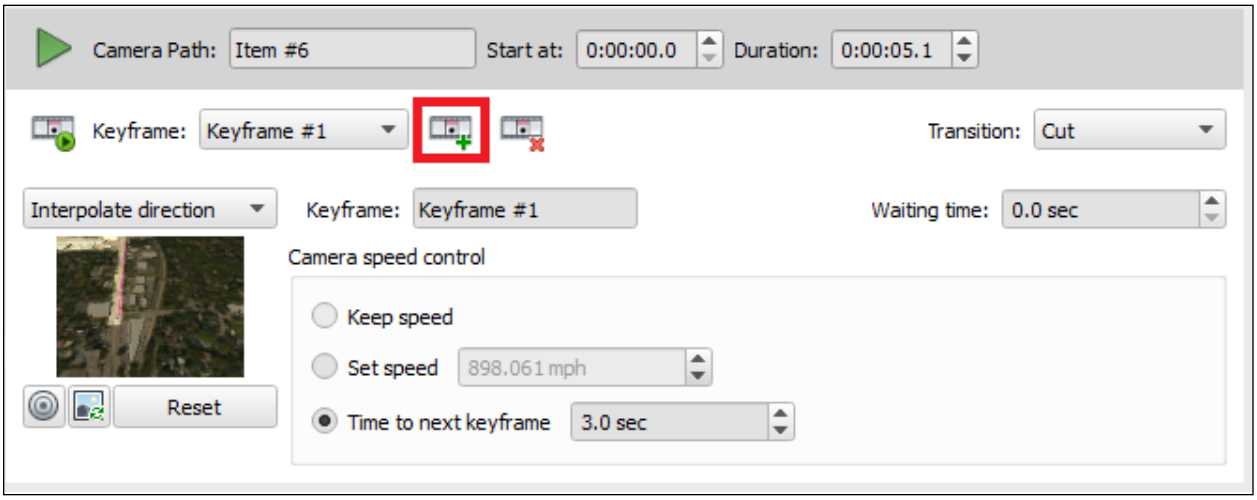


FIGURE 39: KEYFRAME OPTIONS

For the camera speed I prefer a constant, consistent speed. This can be done by selecting the first keyframe and setting a speed. Verify that the subsequent keyframes have the KEEP SPEED toggle

enabled. This will ensure that storyboard maintains the same speed from one keyframe to the next to the next. Experiment with various speeds until you obtain the desired result, keeping in mind that you don't want something too fast or too slow – you don't want your audience to miss anything and you also don't want them to lose interest. I've found that 15-20 seconds is usually enough time to get the point across.

You can also adjust the PATHS & ANIMATIONS section to begin the animation a few seconds after the title appears. This helps make the storyboard a bit more interesting and gives the audience a few seconds to read the title to understand what the video is about BEFORE the animation begins.

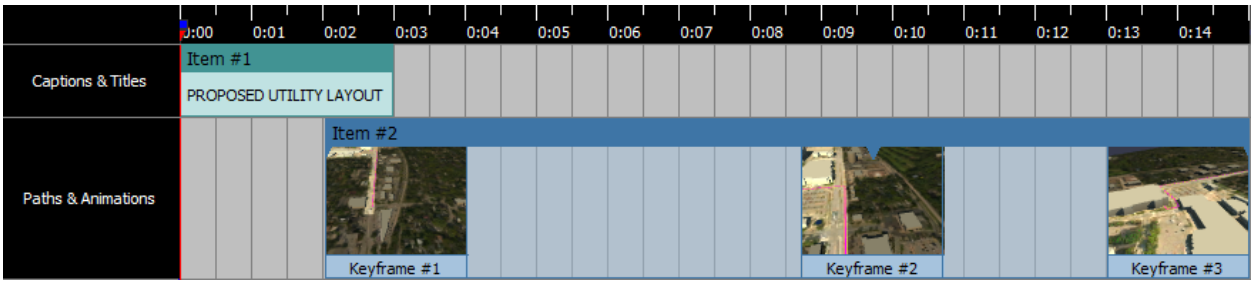


FIGURE 40: STORYBOARD

Exporting to .AVI / .WMV Format

When you're satisfied with your storyboard you can export to .AVI or .WMV file format by clicking the EXPORTS CURRENT STORYBOARD TO VIDEO icon.

FIGURE 41: STORYBOARD EDITOR TOOLBAR – EXPORT STORYBOARD

From here you change the encoder, set the file location and name, change the frame rate, set the export resolution and set the length of the storyboard to export (if you don't want to export the entire storyboard).

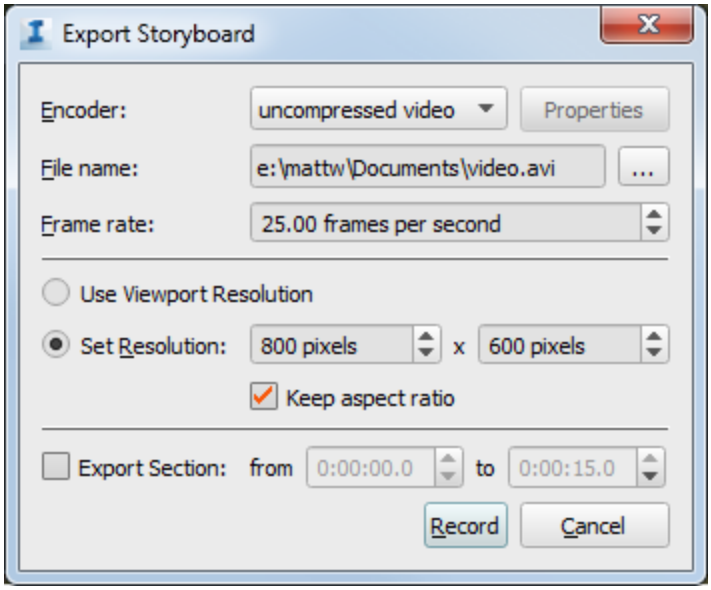


FIGURE 42: STORYBOARD EXPORT OPTIONS

Creating and Publishing Scenarios

What is a scenario? A scenario is a presentation package featuring all or part of a model. Scenarios can be shared in the cloud and viewed on either a web browser or an iPad using the Infraworks 360 iPad app. For this example we will publish a storyboard as part of our scenario. To do this we first need to switch to an existing proposal. Next, we need to open the SCENARIO BROWSER by clicking on CREATE AND CONDUCT INFRASTRUCTURE DESIGN PRESENTATIONS → SCENARIO BROWSER.

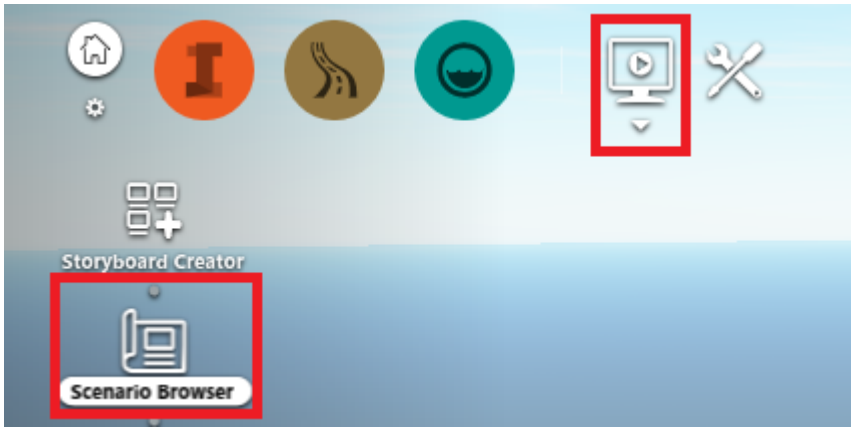


FIGURE 43: SCENARIO BROWSER

Click the ADD A NEW SCENARIO button to display the SCENARIO EDITOR asset card. Give the new scenario a name, description (optional), select a proposal to publish, define the area of interest, select a storyboard and designate access rights.

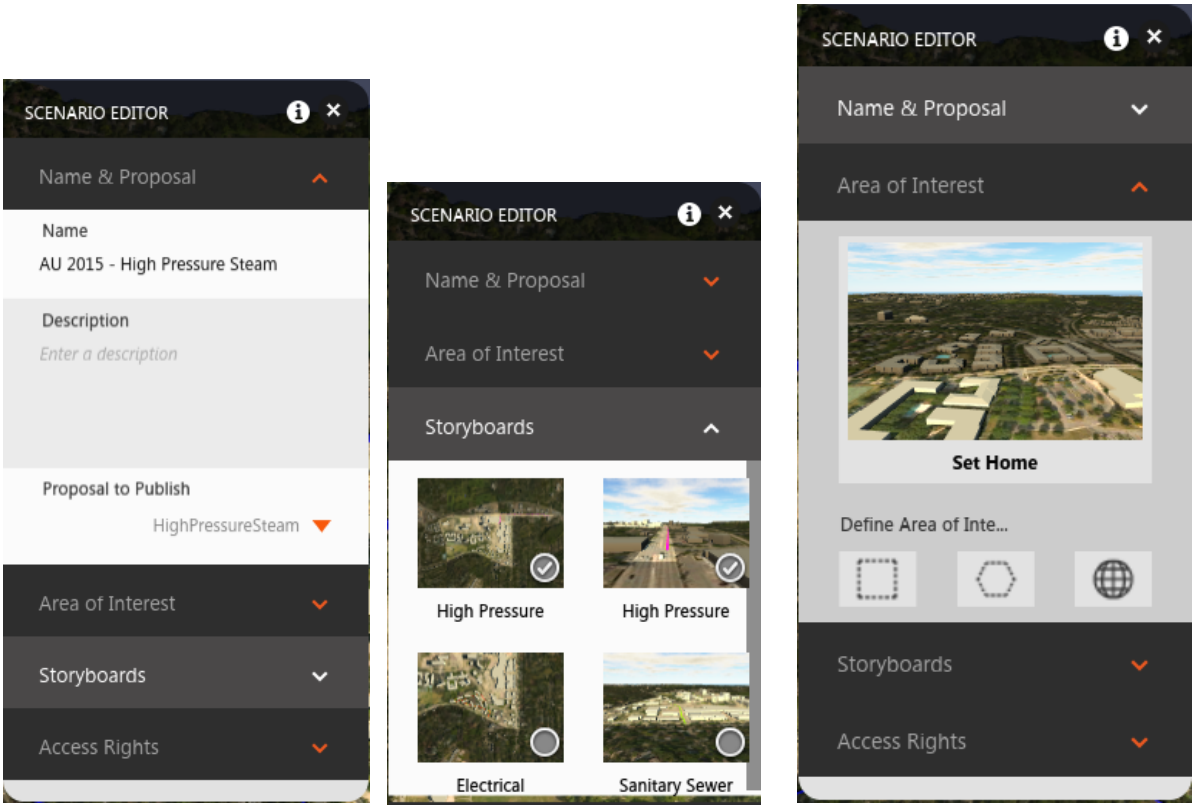


FIGURE 44: SCENARIO EDITOR ASSET CARD

The final step is to publish the model, scenario(s) and proposal(s) to the cloud. To do this simply click the PUBLISH THIS MODEL TO INFRAWORKS 360 button and select the proposal(s) and scenario(s) to publish.

Note: *When Access Rights is set to PUBLIC ACCESS, ANYONE can view your scenario(s).*

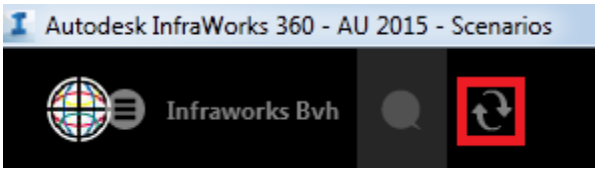


FIGURE 45: SYNC TO WEB

You will receive an email notification when your model has been successfully published.

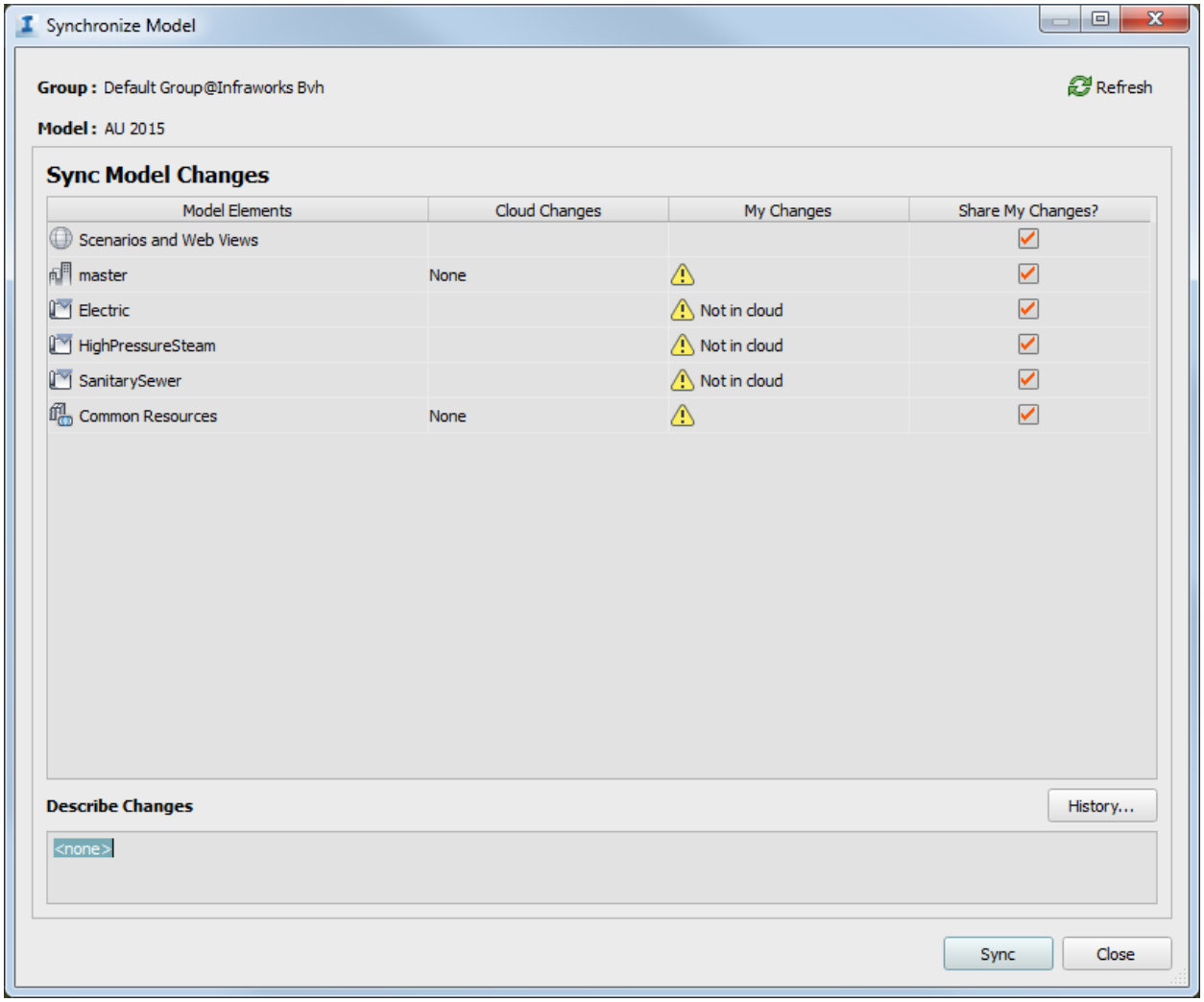


FIGURE 46: SYNCHRONIZE MODEL OPTIONS

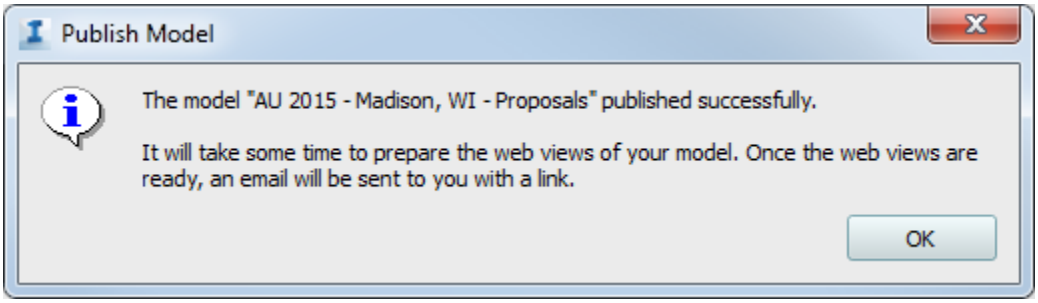


FIGURE 47: PUBLISH MODEL NOTIFICATION

Using the iPad App

Download the InfraWorks 360 app from the iTunes store (https://itunes.apple.com/us/app/autodesk-infraworks-360/id557267648?mt=8), log in with your Autodesk credentials and you'll have access to your published scenarios, proposals and storyboards.

For more detailed information about using the InfraWorks 360 app, please see the online Autodesk help page.

https://knowledge.autodesk.com/support/infraworks-360/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/InfraWorks-MobileApp/files/GUID-ECBBC81C-908A-4443-A354-424C105C233D-htm.html

FIGURE 48: AUGMENTED REALITY ON THE IPAD APP