

CI226332

Preliminary Roadway Design Using InfraWorks

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Applied Software

Learning Objectives

- Create a model of the existing conditions of the project area
- Layout a roadway both horizontally and vertically
- Adjust the cross section of the roadway
- Visualize the roadway and share it with stakeholders

Description

Every project begins with an idea. How fast can you go from that idea to a preliminary layout of a road with visualization? Join me In this class to see how you can create a model of the existing conditions, layout the initial roadway alignment, adjust the elevations of the roadway, adjust the cross section of your roadway, visualize the idea, and share it with anyone that you want.

Speaker

In 1998, armed with a Bachelor of Science in Civil Engineering from Colorado State University, I began my career working at a general civil engineering firm using Land Desktop LDT. Within a short time, I became the resident self-taught expert in LDT and AutoCAD and then learned AutoCAD Civil 3D upon its release. Today, as a registered professional engineer in the State of Colorado and technical specialist, it's my goal to deliver best-in-class training and support for CAD-1 clients using AutoCAD Civil 3D, InfraWorks 360 and other Autodesk solutions. To that end, I am professionally certified in Autodesk software, have taught at Autodesk University eight times since 2007 and won the AUGI Top DAUG competition at AU 2011. With a strong technical skillset and experience as a Civil Engineer and instructor, I regularly provide custom, effective trainings for any size firm. These training sessions include AutoCAD, AutoCAD Civil 3D, AutoCAD Map3D, and InfraWorks 360.

Introduction

Every project has a starting point. Many transportation projects begin when a problem has been found and the solution has been identified as either relocating an existing road or creating a new road.

Some of the steps in the preliminary design of the new road include gathering data for and creating a model that represents the existing conditions, laying out the new roadway both horizontally and vertically, calculating quantities, adjusting the cross section of the road, and finally sharing that information with stakeholders that may not have advanced design software.

Create a Model of the Existing Conditions

There are several different ways to get a model of the existing conditions for the area of the project. InfraWorks can be used to create the model directly, GIS data can be used to build a model from scratch, or a combination of the two.

Model Builder

InfraWorks comes with a tool that allows you to very quickly create a model of just about anywhere in the world. The tool is called Model Builder. The basic idea of Model Builder is you select the area that you want, and a model is created for you.

Model Builder is accessed from the home page in InfraWorks along the top of the interface.

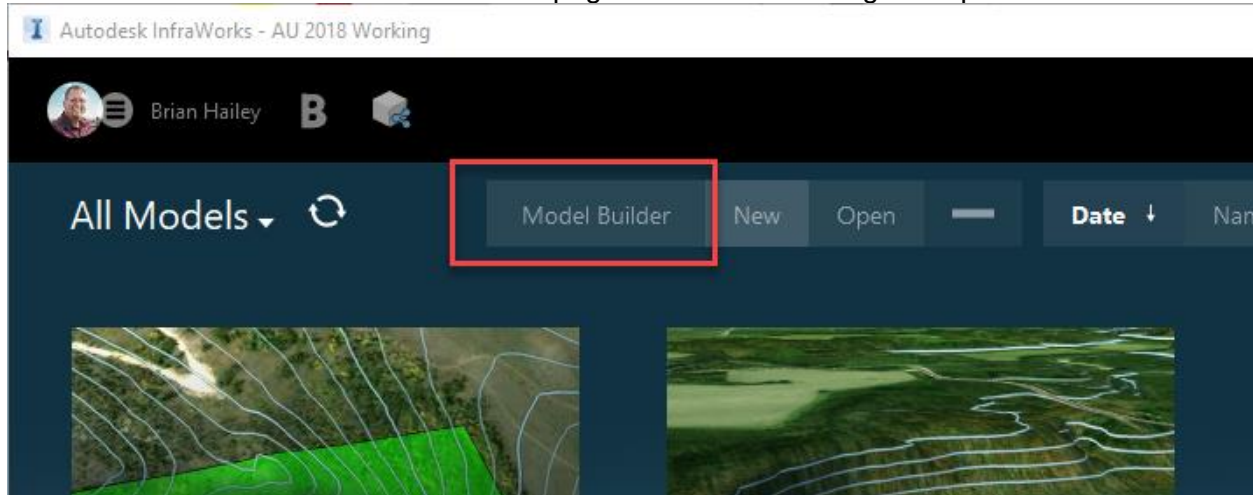


Figure 1 - Accessing Model Builder

Within the Model Builder dialog box, choose the limits of the area for the model. The text box at the top of the dialog box is used to search the map for the location. The map can also be panned and zoomed to more exactly show the area of interest. In the top right of the map, there is an option to control how the map is displayed (Road or Aerial). The AREA OF INTEREST section is used to select the area that will be used to create the model. There are four selection methods; the entire visible map, a rectangle, a polygon, or a polygon in a GIS file. Note that the area of the model is limited to 200 square kilometers. Once the area is selected, enter a name

for the model and where in BIM 360 Documents the model is to be stored. If BIM 360 Documents is not available, the model will be stored locally.

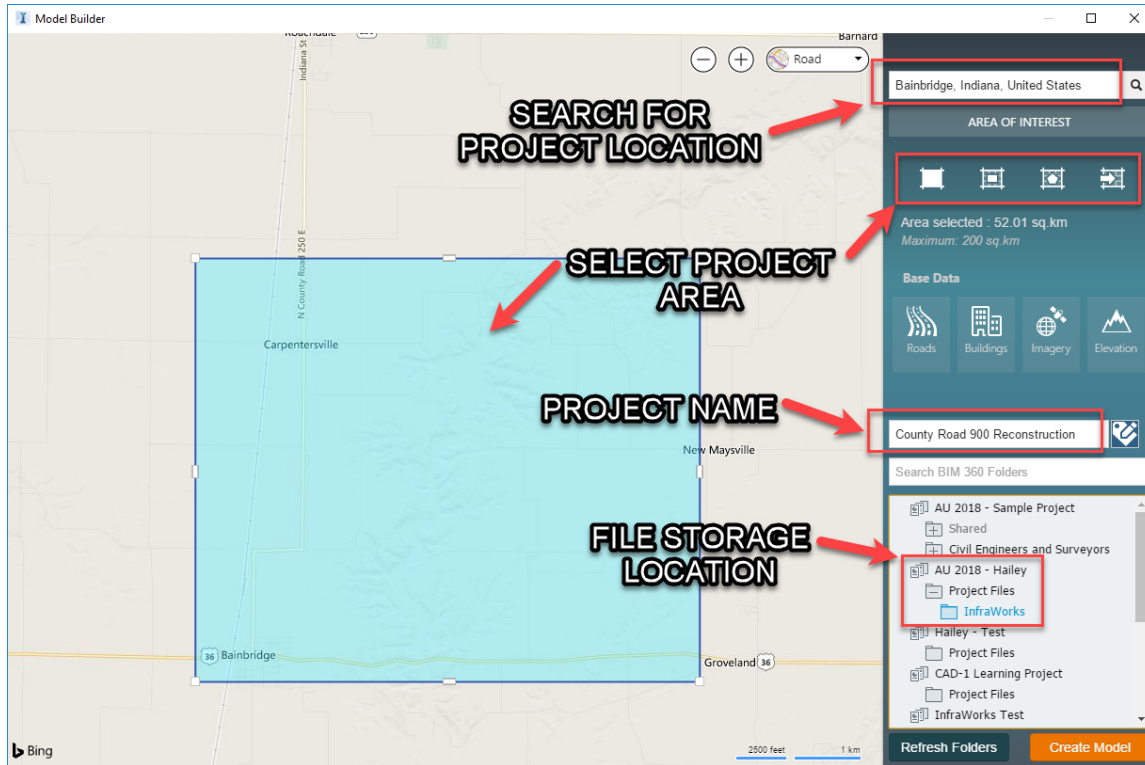


Figure 2 - Create a New Model

After the Create Model button has been clicked, a request is sent up to Autodesk for the model. The servers at Autodesk will gather the data needed for the model and then the model will be available in the Home page of InfraWorks. The data used in Model Builder comes from a variety of sources. The terrain comes from the USGS (10 meter DEMs), the imagery comes from Microsoft Bing (this is the same imagery that is available within AutoCAD), and the rest of the data (buildings, roads, water areas, etc.) comes from openstreetmaps.org. If the cursor is at rest over one of the Base Data icons, a tooltip will provide some information on the source of the data.

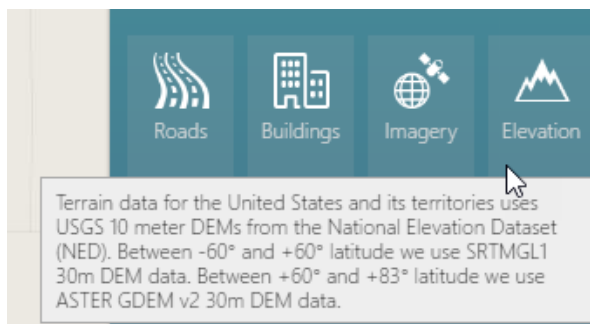


Figure 3 - Model Builder Data Sources

After the data has been gathered, a confirmation email will be sent out and the model will be available on the Home page of InfraWorks. The first time the model is opened, the data will be downloaded and then the model will be generated. Subsequent times, opening the model will be much faster.

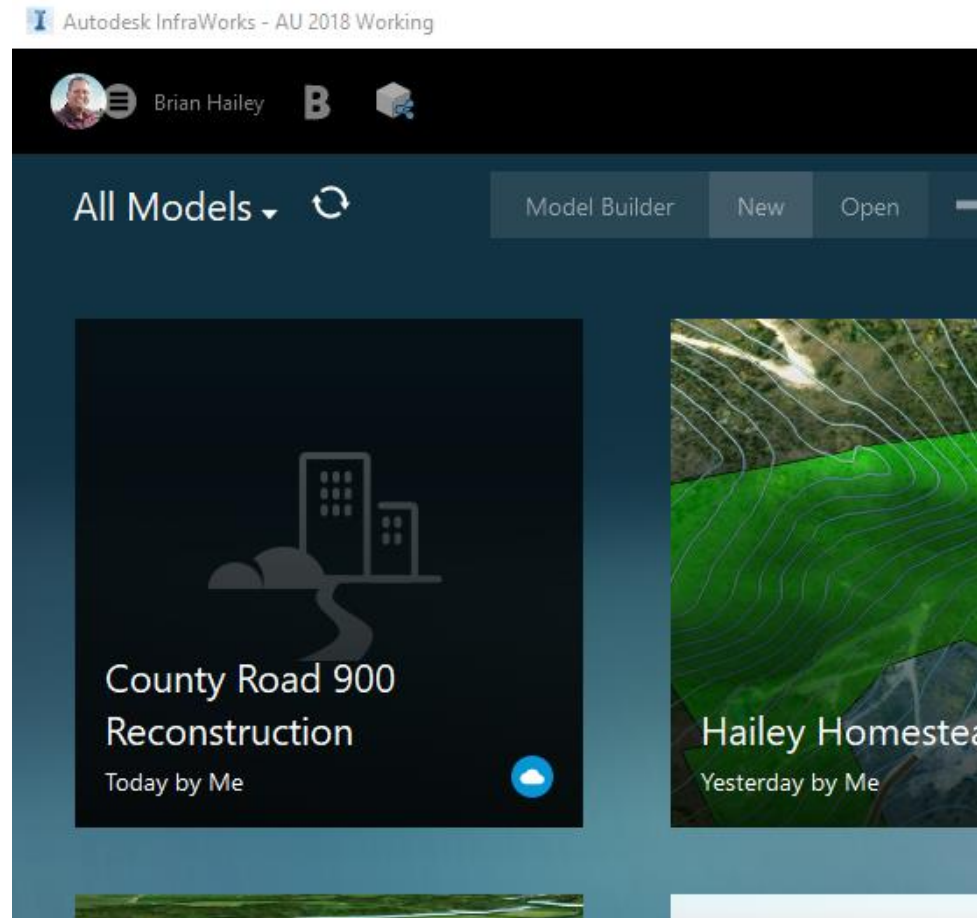


Figure 4 - Model Available on the Home Page

Creating the Model from GIS Data

Model Builder is a quick and easy way to create a model but, often the data provided isn't necessarily the best possible data. Many cities and counties have a very robust GIS database available that is much more accurate than the data available via Model Builder. This data can be used to create a model in InfraWorks from scratch if needed.

To create a new model, on the Home page of InfraWorks, click on the New button (just to the right of the Model Builder button as can be seen in Figure 1 - Accessing Model Builder). In the New Model dialog box, provide a name and description for the model (the description is optional). If the model is to be collaborated on, use the Collaborate option and browse to the location within BIM 360 Documents where it will be stored. Otherwise, use the Work Local option and browse to the network location where the model will be stored. The rest of the options in the dialog box can be used to set some additional controls on the model (such as the

limits of the model, coordinate systems, roadway design standards, etc.). The in-product help system has additional information on these settings.

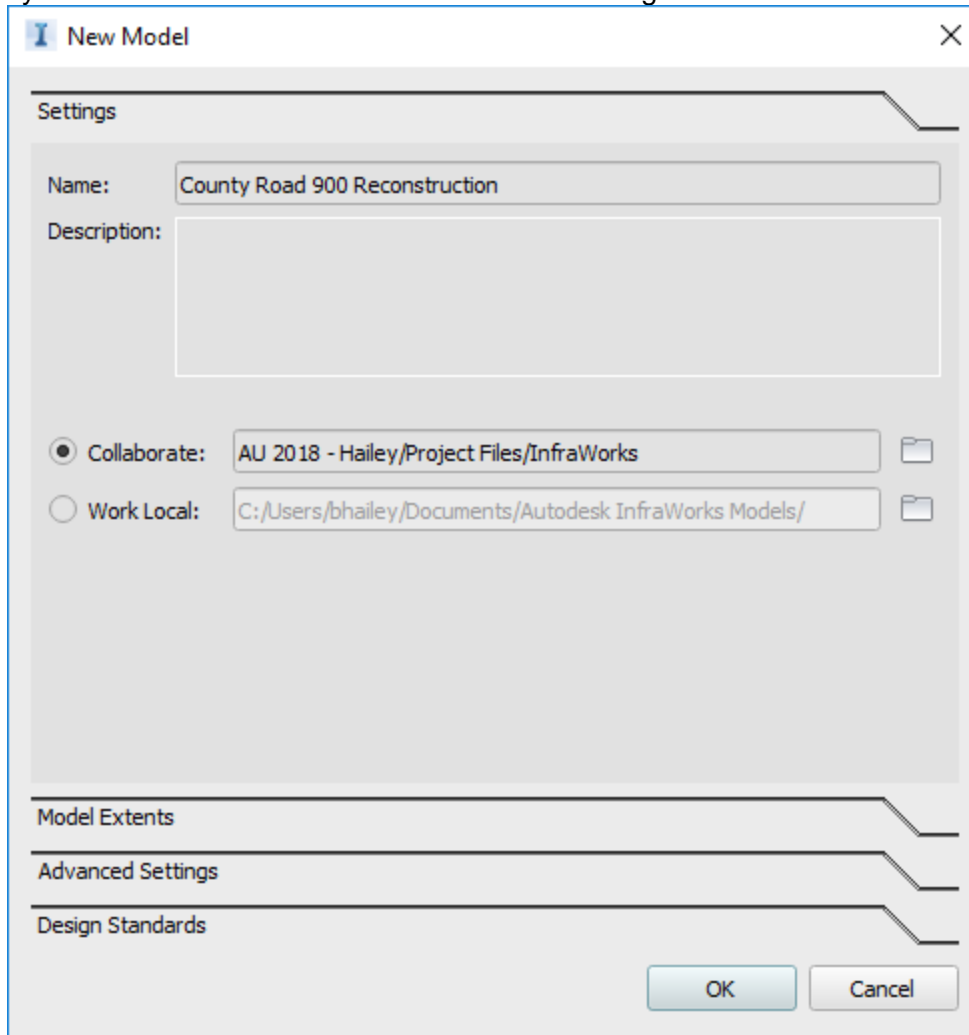


Figure 5 - Create New Model

Once the model has been created, data will need to be provided. There are many different data sources that can be used. Several examples are ESRI Shape Files, Autodesk SDF Files, raster files, point clouds, Revit models, Civil 3D models, etc. To add the data, click the far-left icon along the top (it looks like an orange capital I), then click the icon just to the right (this one always reminds me of the classic arcade game Q-bert), and then choose the Data Sources icon. This opens the Data Sources panel. Within the Data Sources panel, click the little down arrow next to the first button and choose the type of data that will be used to create the model. Some of the available data sources are shown in Figure 6 - Adding Data to the Model below. There are more data sources available by clicking the Database button just to the right Data Source button.

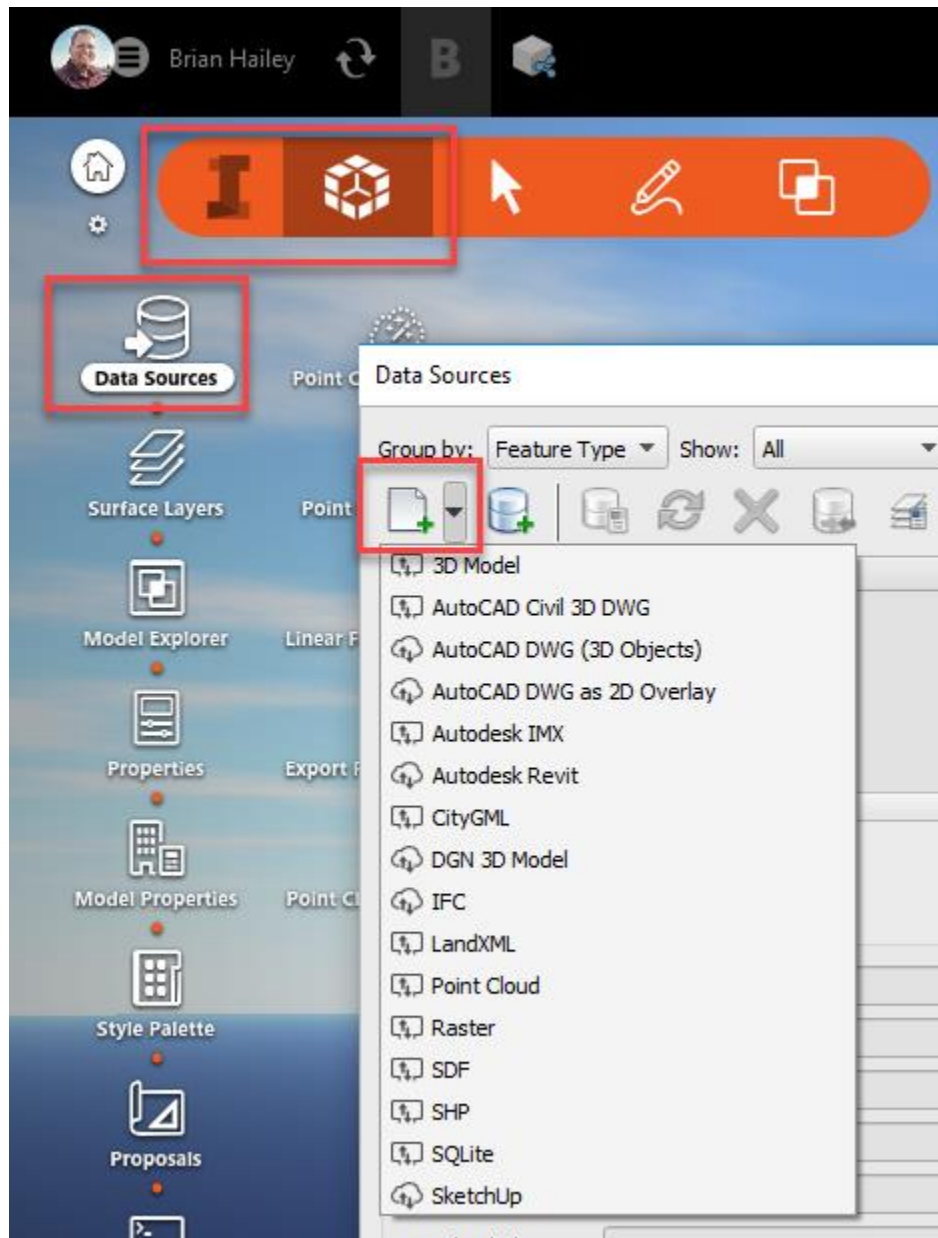


Figure 6 - Adding Data to the Model

When data is added to the model, InfraWorks doesn't necessarily know what the data represents. For example, an ESRI Shape File that contains lines could represent many different types of things. It could be roads, it could be streams, it could be utilities. Once the data is added to the model, it must be configured. To configure the data, double click on it in the Data Sources dialog box. This will bring up the Data Source Configuration dialog box. The most important piece of the dialog box is to choose the data "Type". The data type will determine what type of feature in the model will be created.

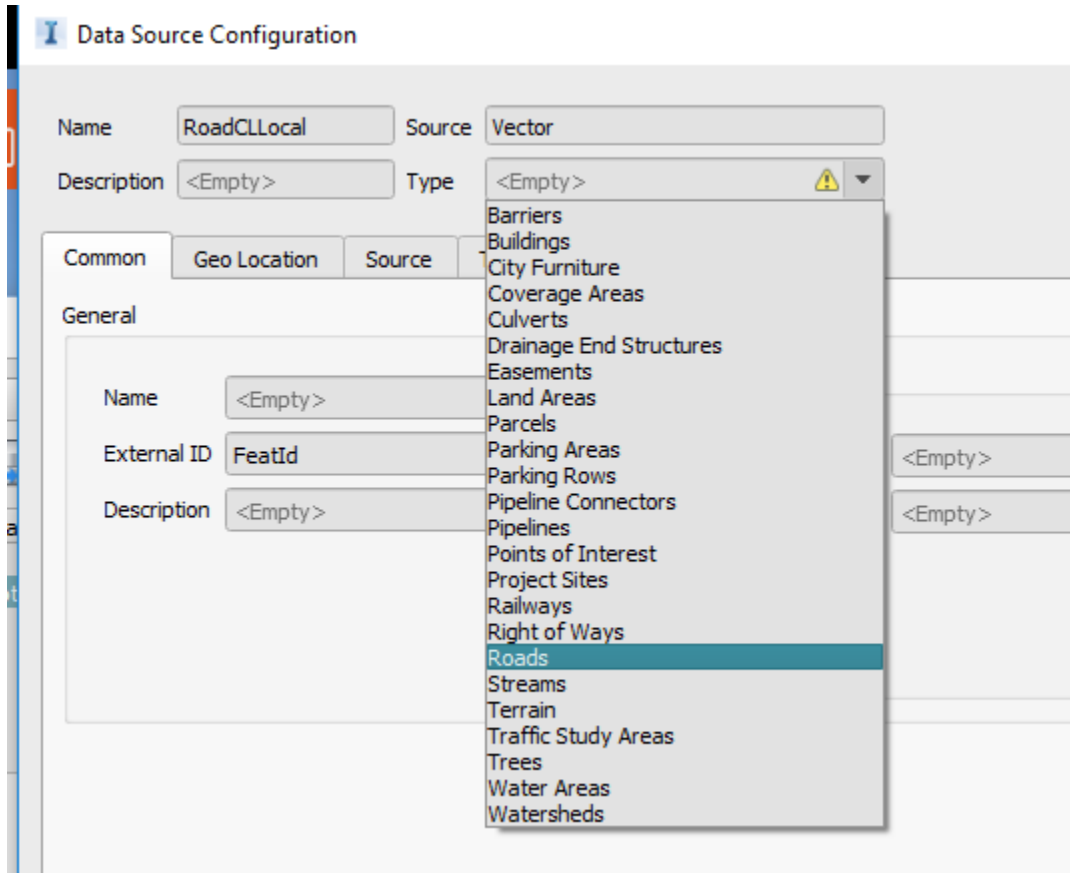


Figure 7 - Data Configuration

Model Builder and GIS Data

Many times, the Model Builder will give you a decent model but there might be better data available. For example, the terrain created via Model Builder is a USGS ten meter DEM. Often there is more detailed elevation available either from a local municipality or by capturing the data directly (i.e. survey or point clouds). The data provided via Model Builder can be removed and replaced by other data. The model created via Model Builder has data sources just as if the model was created directly from the GIS data. The Model Builder data sources can be removed and replaced by other data as needed. To remove the data source, right click on it in the Data Sources panel and choose Remove.

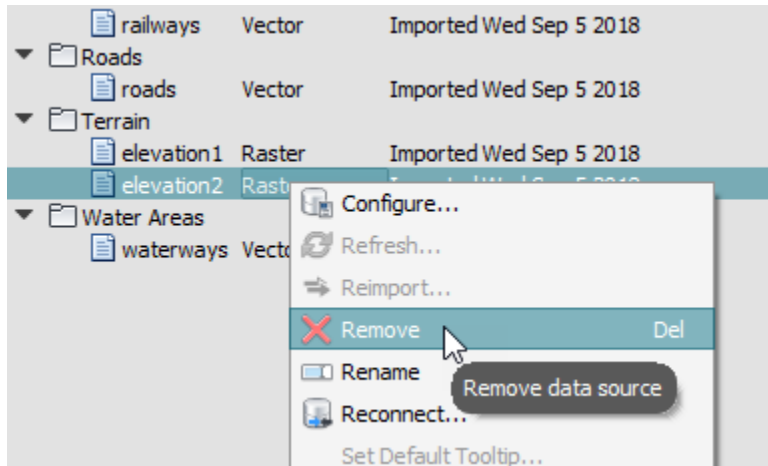


Figure 8 - Remove Data from the Model

Once the undesired data has been removed, the new data can be added in just as in the previous section.

Layout the Roadway

There are several ways to layout out the new roadway. If the site is very constrained and the path of the roadway is known, simply sketch in where the road is to go. If there are many routes available, InfraWorks has a tool that will assist in finding an optimal path.

Manual Roadway Layout

There are two types of roads in InfraWorks, Planning Roads and Component Roads. When roadway data is imported from a GIS file, InfraWorks creates those roads as planning roads. When designing a roadway, it's typically best to use a component road.

Roadway Layout Process

To create a component road, in the Design Roadways tools, select Component Roads.

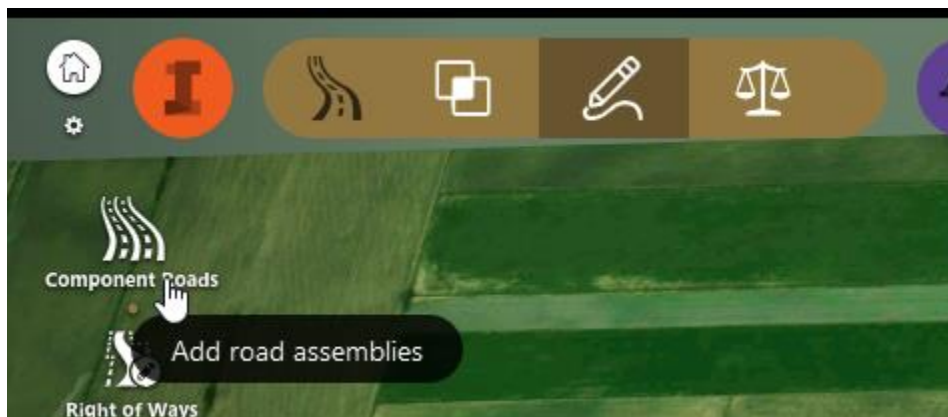
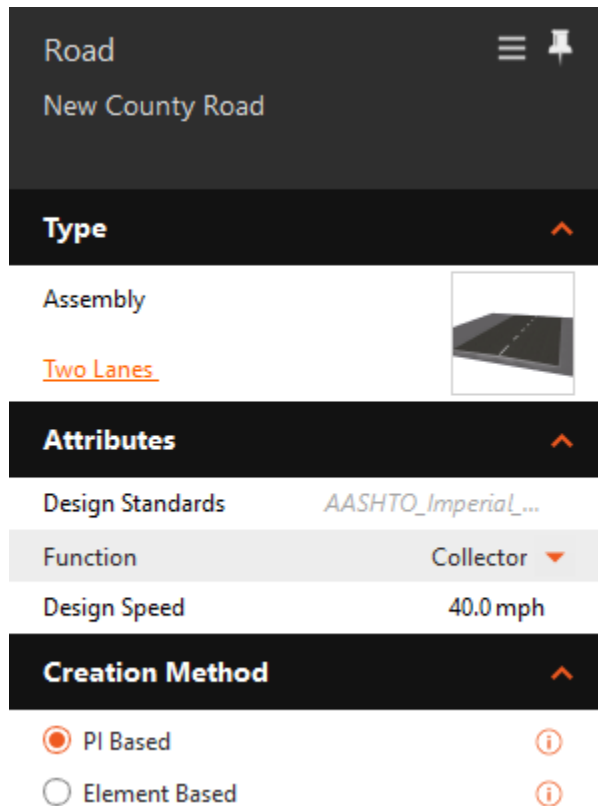


Figure 9 - Component Road

Prior to sketching in the roadway, set the initial properties for the road. These properties include the name of the road, the starting cross section, the classification of the roadway, the design speed (if this needs to be different from the standards), and the creation method.



The screenshot shows a software interface for configuring a road. At the top, the name 'New County Road' is entered. Below this is a 'Type' section with a dropdown menu showing 'Assembly' and 'Two Lanes' (which is underlined in orange). To the right of the dropdown is a small 3D perspective view of a road cross-section. The 'Attributes' section contains three rows: 'Design Standards' set to 'AASHTO Imperial...', 'Function' set to 'Collector' with a dropdown arrow, and 'Design Speed' set to '40.0 mph'. The 'Creation Method' section at the bottom has two radio buttons: 'PI Based' (which is selected) and 'Element Based'. Each radio button has an information icon (a circle with an 'i') to its right.

Figure 10 - Roadway Options

Selecting points on the screen will place new PIs (or element endpoints depending on the creation method) for the roadway in the model. Once the initial roadway has been laid out, the geometry can be edited both horizontally and vertically. To edit horizontally, simply select the roadway and adjust the grips. If PIs need to be added or removed, right click on the PI to be removed. If a PI needs to be added, right click on the line and choose Add Curve. Refer to

Figure 11 for options available when right clicking on different parts of the road (horizontally and vertically).

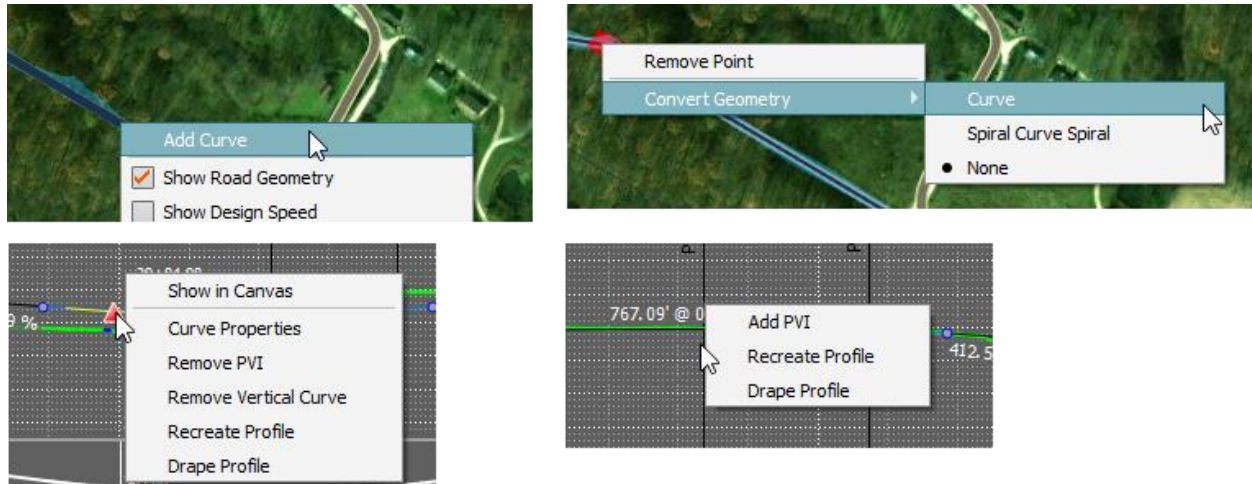


Figure 11 - Right Click Editing

Sometimes bridges and/or tunnels are needed for the road. To add a bridge or tunnel, select the road, right click on it, and choose “Add Structure” -> “Bridge” or “Tunnel”. When prompted, select where the bridge or tunnel should begin and end.

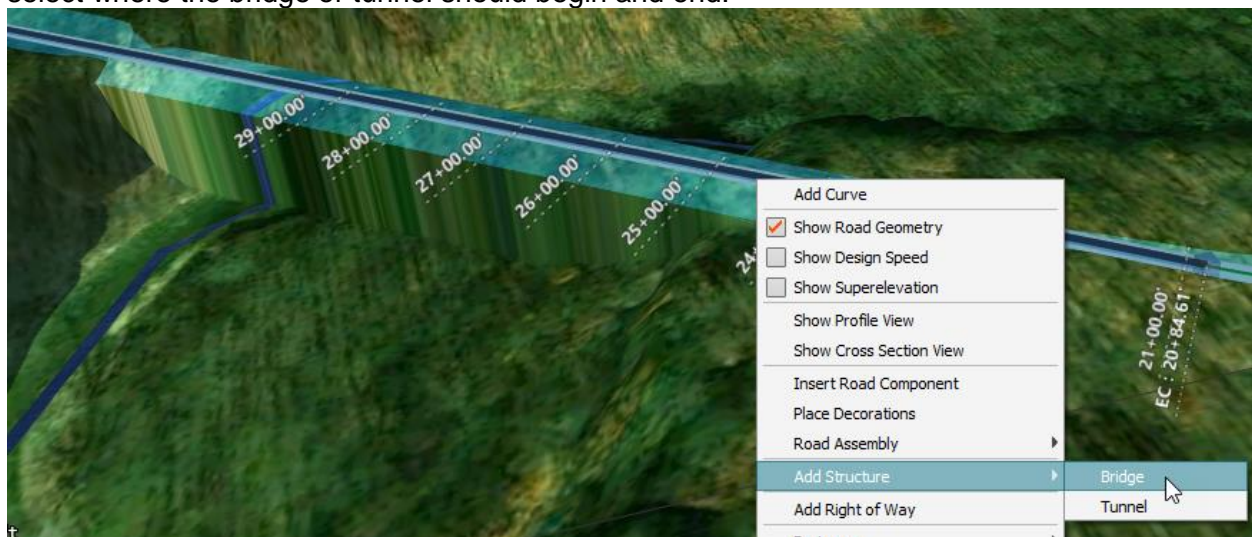


Figure 12 - Adding Structures to the Roadway

Automated Roadway Design

InfraWorks has two tools that can assist with the design of a roadway. The first one, Profile Optimization, will take a road that has already been laid out and will provide an optimized design for the profile. The second one, Corridor Optimization, not only optimizes the profile, it will also optimize the horizontal alignment for the roadway.

Profile Optimization

Once the horizontal alignment of the roadway has been laid out, InfraWorks has a tool that will assist in creating an optimized profile. The tool can be found on the “Review and modify roadway designs” section of the interface:

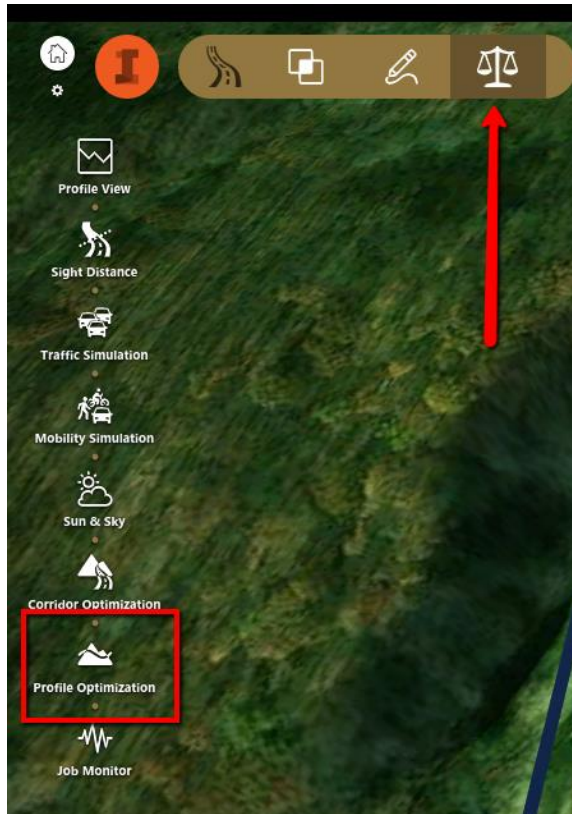


Figure 13 - Profile Optimization Button

The Profile Optimization window is where the design speed for the roadway is set as well as the type of bridge and/or tunnel that will be used (if used at all). In the lower portion of the window, there is the option to set the advanced settings. The advanced settings include the following options:

- **Profile Constraints** – The profile constraints control things such as the minimum and maximum grade for the profile, how often a PVI can be placed, and if any PVIs need to be locked in place (due to a design constraint of some sort).
- **Quantities Options** – The quantities options allow the placement of borrow and waste pits along the roadway for earthwork and mass/haul calculations.
- **Construction Rules** – The construction rules include the options to use bridges and/or tunnels in the design.
- **Construction & Earthwork Cost** – The construction and earthwork cost section is where the cost values for different aspects of the design can be specified. These costs include things such as Excavation, Pavement, Drainage, Bridges/Tunnels, and more. See Figure 15 for an example of the costs settings.

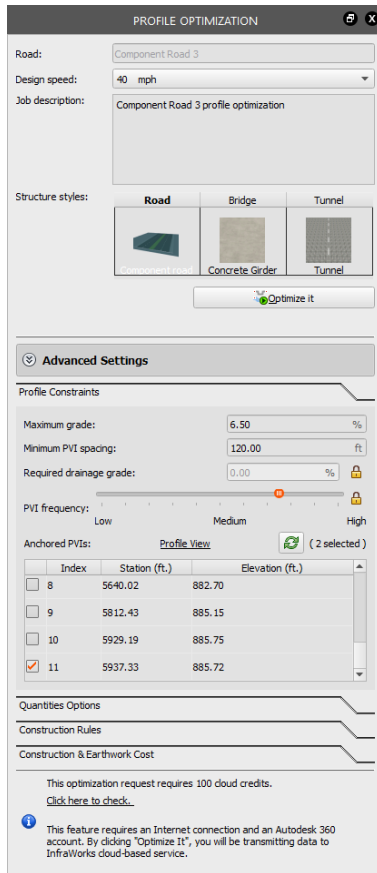


Figure 14 - Profile Optimization Window

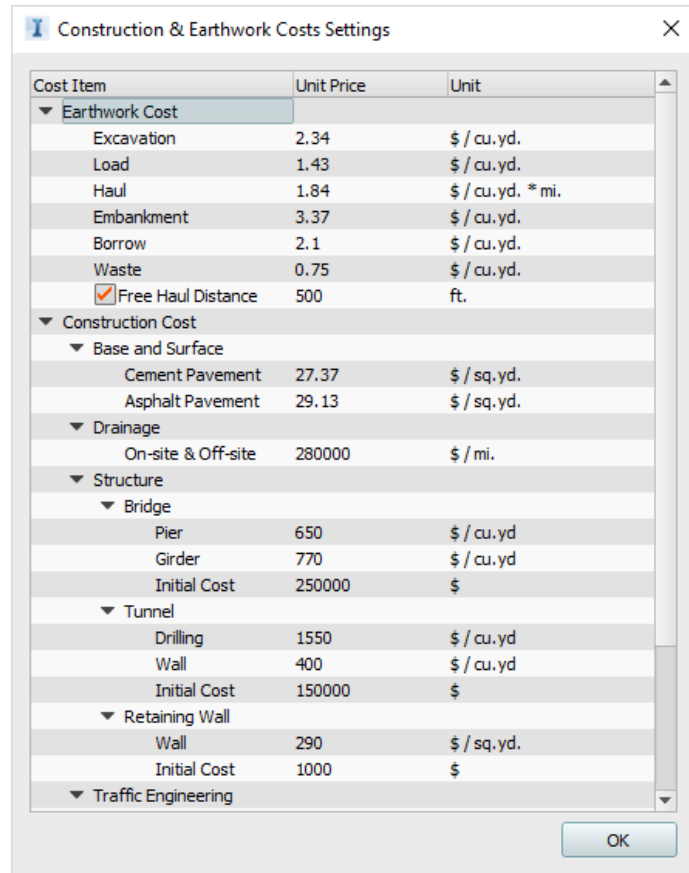


Figure 15 - Construction & Earthwork Costs Settings

Once the profile optimization process has completed, the resultant design can be downloaded into the model. The optimization will be available in the Job Monitor, which is described on page 16.

Corridor Optimization

If the path of the roadway is variable, another option within InfraWorks is to use the Corridor Optimization tool. In much the same way the Profile Optimization tool optimizes the profile, the Corridor Optimization tool optimizes both the profile as well as the alignment. The button to access the tool is found in the "Review and modify roadway designs" section of the interface.

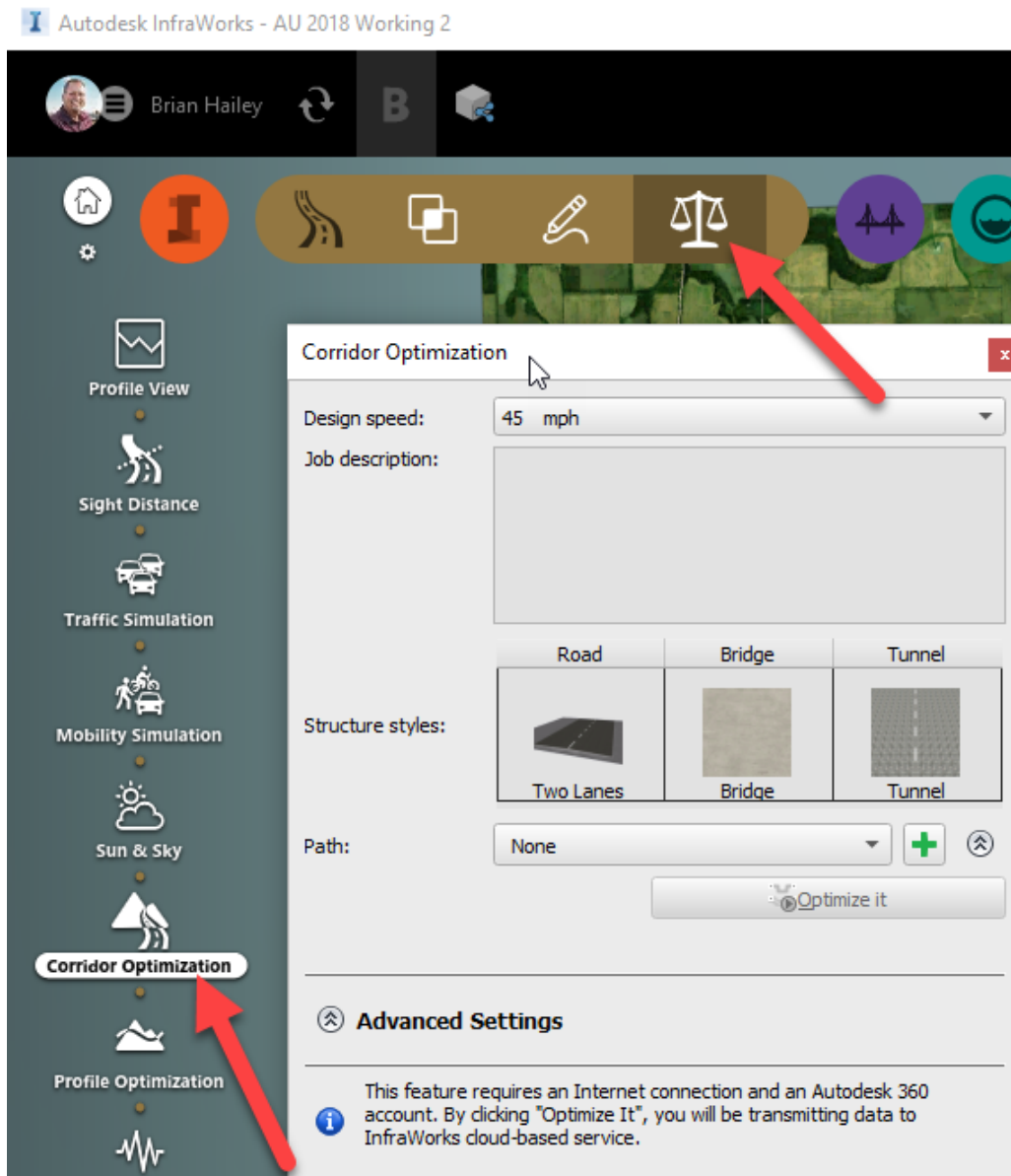


Figure 16 - Corridor Optimization Tool

In the Corridor Optimization dialog box, set the design speed, the structure types, and add a path. Please note that every time the dialog box is opened, the design speed will reset back to 65 mph or 80 km/h. The model can have multiple paths for different design alternatives. To add a path, click the green plus symbol next to the path pulldown. If the path already exists, it can be selected from the pulldown list. The button just to the right of the green plus expands or collapses the list of paths in the model. Here they can be renamed or deleted. A pass-through point for the corridor can be specified. When the path is selected, right click in the model and choose, "Add PI".



Figure 17 - Add PI to Corridor Optimization Path

The advanced settings for the corridor optimization have many of the same settings as the profile optimization tools with the addition of the “Cost Zones & Suitability Map” and “Alignment Constraints”. The only option in the “Alignment Constraints” is to set the minimum radius for the alignment. The “Cost Zones & Suitability Map” section allows the use of avoidance zones and suitability maps.

Avoidance Zones and Suitability Maps

In many situations, there will be locations in the project that the roadway must avoid. The Avoidance Zones allows you to specify these locations. In the advanced settings of the corridor optimization, click the “Draw avoidance zones” link and then use the dialog box to specify the locations within the model to avoid.



Figure 18 - Avoidance Zones

In other situations, there may be areas that don't necessarily need to be avoided right out but, putting the roadway through that area would be costlier. This is where the suitability map comes into play. In the Advanced Settings dialog box, click the "Open suitability map" link to create the suitability maps (the maps can also be accessed from the user interface on the "Analyze your model" section). Most of the data that is in the model can be added to the suitability map and can be added with differing weights. The weights basically control how much more an area will cost to go through than other areas.¹ In the following image, the water areas have been added to the suitability map. The red areas show the greatest weights and the blue areas show the smallest weights. When the corridor is optimized, the costs for these areas are considered to find the optimal path of the corridor.

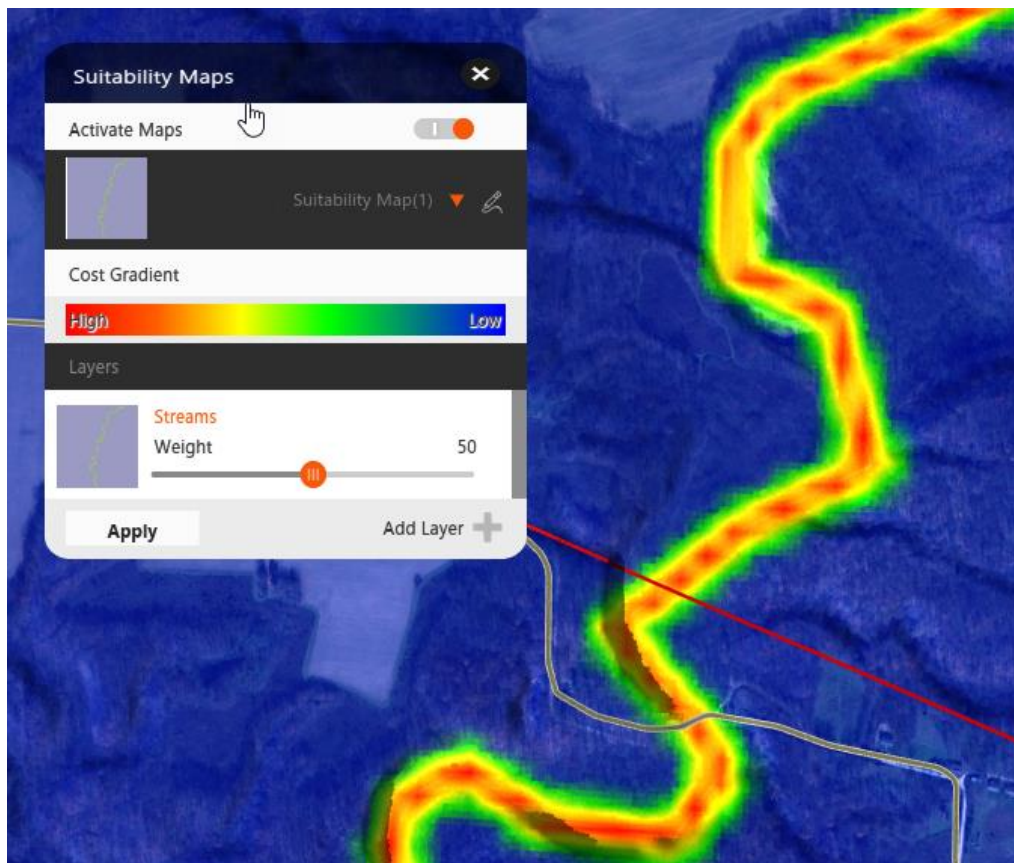


Figure 19 - Suitability Map

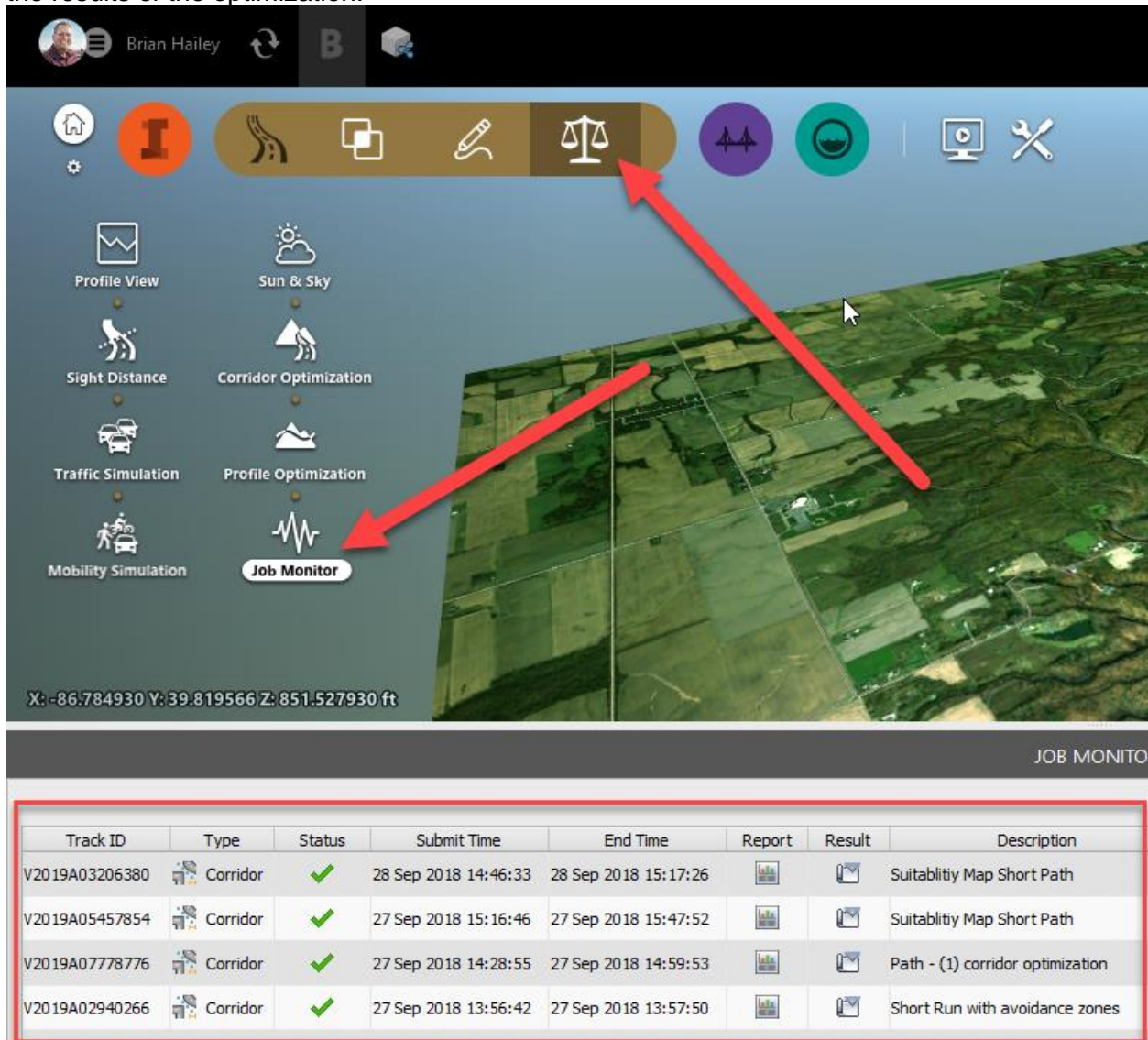
Once the optimization settings have been adjusted, clicking the "Optimize it" button will begin the process. When the optimization has been completed, an email will be sent out indicating the

¹ I have investigated how InfraWorks uses the different weights in the suitability map and I haven't been able to find anything definitive. The only information I've received is that something that has a weight 100 costs more than something with a weight 99. How much more I haven't been able to find out. Also, overlapping data from different sources has an additive property to the maps so there can be areas that are weighted more than 100.

it has completed and attached to the email will be a copy of the optimization results report. The results of the optimization will be available in the Job Monitor within InfraWorks.

Job Monitor

Roadways that have been submitted for optimization can be monitored with the Job Monitor function within InfraWorks. The Job Monitor can be accessed via the “Review and modify roadway designs” tools. The Job Monitor will show the status of the jobs submitted as well as the results of the optimization.



Track ID	Type	Status	Submit Time	End Time	Report	Result	Description
V2019A03206380	Corridor	✓	28 Sep 2018 14:46:33	28 Sep 2018 15:17:26			Suitability Map Short Path
V2019A05457854	Corridor	✓	27 Sep 2018 15:16:46	27 Sep 2018 15:47:52			Suitability Map Short Path
V2019A07778776	Corridor	✓	27 Sep 2018 14:28:55	27 Sep 2018 14:59:53			Path - (1) corridor optimization
V2019A02940266	Corridor	✓	27 Sep 2018 13:56:42	27 Sep 2018 13:57:50			Short Run with avoidance zones

Figure 20 - Job Monitor

Once the optimization has been completed, the Job Monitor gives access to the results. There are two deliverables from the Job Monitor, a report and the results. The report is a .pdf file that gives quite a bit of information about the job. The report includes the alignment and profile information, the earthwork quantities, and cross sections, among other things. If the report is

satisfactory, the layout of the corridor (or just the profile if using the profile optimization tools) can be imported into the model. When doing this, a new proposal is created and the roadway is brought into the new proposal.

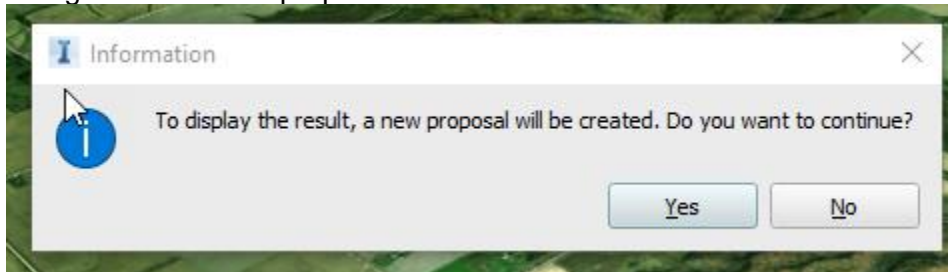


Figure 21 - Import Results

Quantities

At any point during the design process of the road, quantities can be calculated. The quantities can include earthworks, roadway materials, and structure (i.e. bridge and/or tunnel) materials. To calculate the quantities for a bridge or tunnel, select the structure, right click, and choose "Quantities". This will display the Quantities panel and show the materials required for the bridge. Depending on the type of bridge chosen, different quantities will be displayed.



Figure 22 - Bridge Quantities

There are two options for the quantities for the roadway, Earthwork Quantities and Material Quantities. The quantities tools are displayed at the bottom of the right-hand panel when the road is selected.

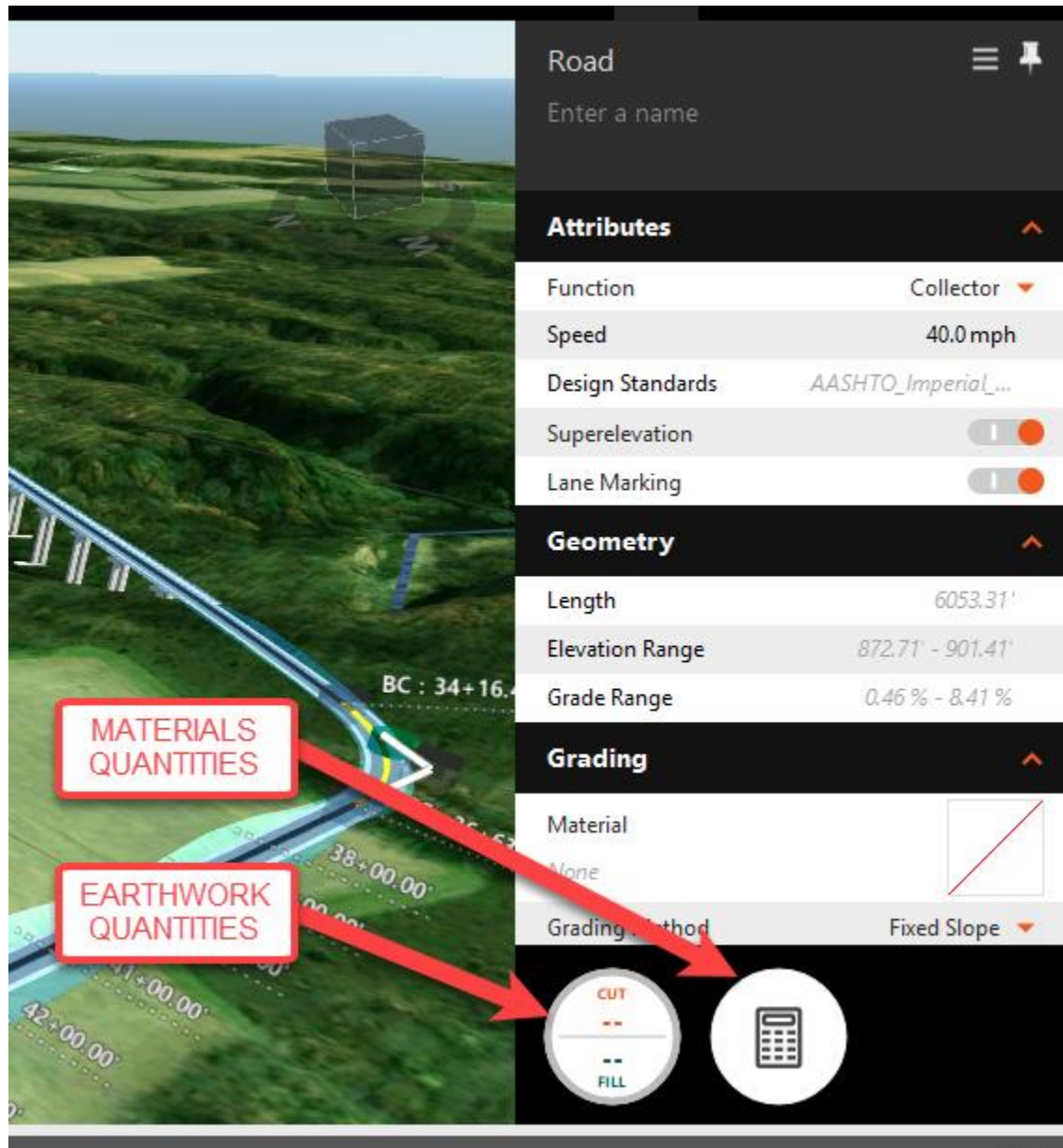


Figure 23 - Quantities Buttons Location

Materials quantities is straight forward, select the button and the quantities are displayed. There is an option in the dialog box to calculate the quantities for a specified station range if needed. At the bottom right corner of the window is a button to generate a report. The report is simply

the data listed in the window in .csv format. This can be used to assist in estimating the material costs for the road.

Material Quantities				
Component Road 3				
Station Range: 0+00.00 - 60+53.31				
▼ Bridge				
▼ Bridge 1				
	Concrete-Precast (cu.yd.)	Concrete-CIP (cu.yd.)	Steel-Structural (T.)	Steel-Reinforcing (T.)
Total	609.25	5558.27	0.00	0.00
Superstructure	609.25	1125.65	0.00	0.00
Substructure	0.00	4432.63	0.00	0.00
▼ Road Component				
▼ Lane				
Surface Dark Grey Asphalt ...		Length (ft)	Area (sq.ft.)	Volume (cu.yd.)
		12106.61	142991.50	3475.05
▼ Shoulder				
Surface Light Grey Asphalt...		Length (ft)	Area (sq.ft.)	Volume (cu.yd.)
		10595.29	52142.16	1267.19
▼ Curb & Gutter				
Surface Light Grey Concre...		Length (ft)	Area (sq.ft.)	Volume (cu.yd.)
		1511.33	3273.99	117.59
▼ Jersey Barrier				
Surface Concrete Linear P...		Length (ft)	Area (sq.ft.)	Volume (cu.yd.)
		1511.33	3022.65	226.60
▼ Sidewalk				
Grey Patterned Sidewalk		Length (ft)	Area (sq.ft.)	Volume (cu.yd.)
		1511.33	7437.63	90.38
* Some items are not included in quantity calculations, see help documentation for details.				
				Generate Report

Figure 24 - Materials Quantities

The tools for calculating the earthwork quantities are a little different. When the large circular button is pressed, it will bring up the Earthwork Quantities window but the values will all be blank. To calculate the quantities, the button that looks like a video play button needs to be selected. After it is selected, the quantities will be listed. To the right of the computer materials

button, are two buttons, one brings up the settings for the quantities and the other creates the report.

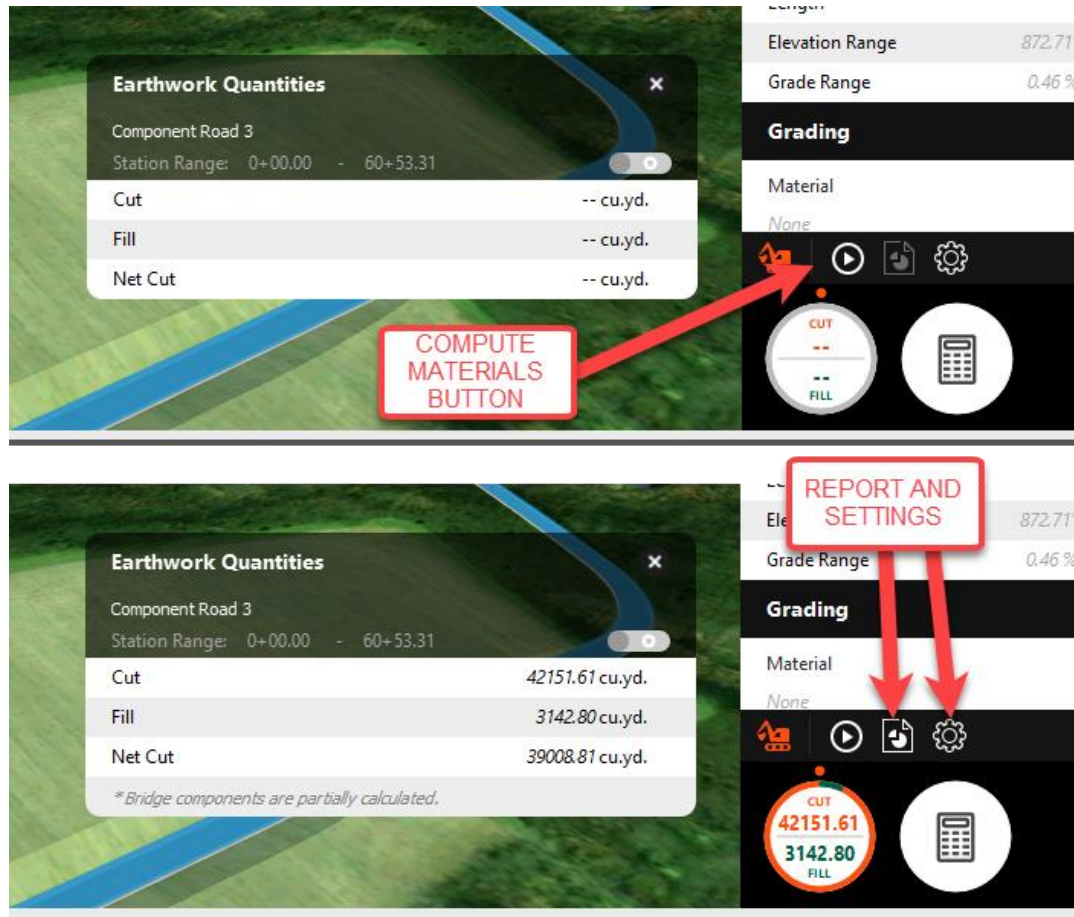


Figure 25 - Earthwork Quantities

Adjust the Cross Section of the Roadway

After the horizontal and vertical creation of the roadway has been completed, often times the cross section needs to be adjusted for specific areas. The corridor optimization tools create a component road in the model that can be changed as needed. Within InfraWorks, there is the ability to visually inspect the cross section of the roadway as well.

Inspect Cross Sections

To view the cross section of the roadway, select the road, right click, and choose "Show Cross Section View".

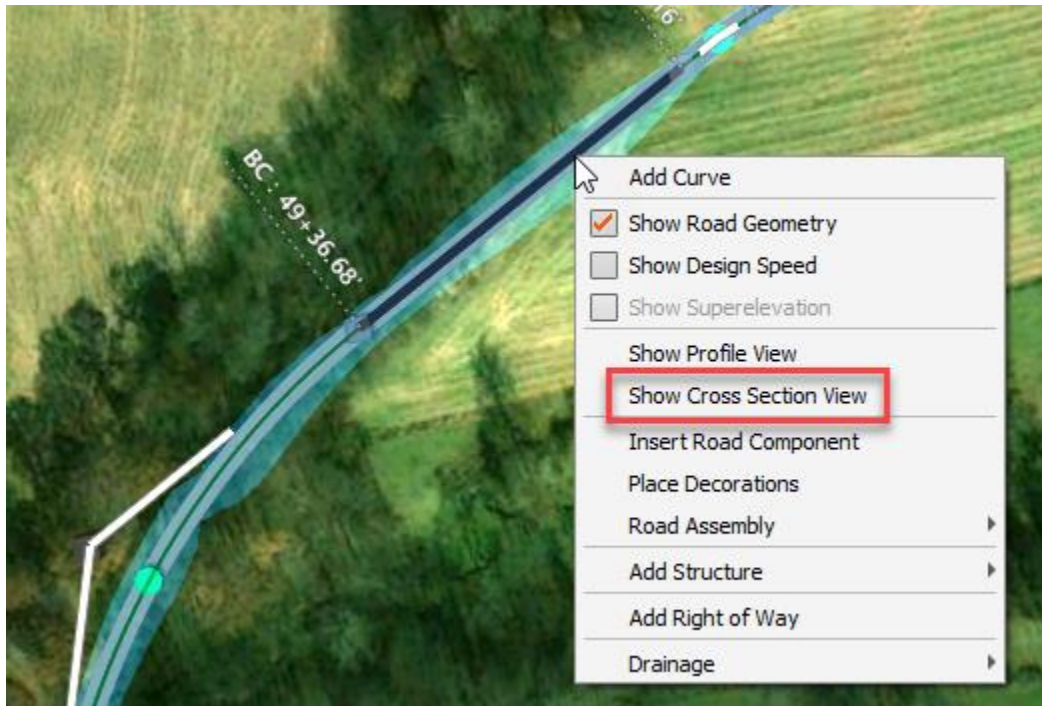


Figure 26 - Show Cross Sections

There are three different display modes of the cross section view, Superelevation View, Road Assembly View, and Cut Fill Areas. These can be accessed via the three small circles in the bottom right corner of the section view. Figure 27 below shows the three options.

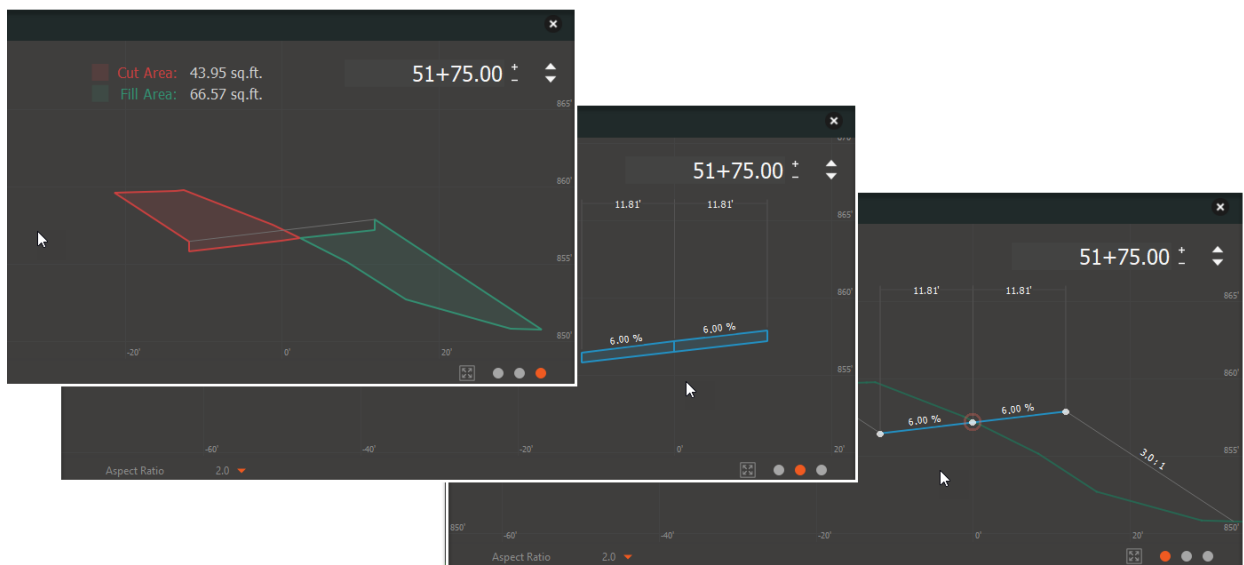


Figure 27 - Section Viewing Options

The section view window can be moved onto another monitor and as changes are made to the model, the section view automatically updates.

The superelevation can be toggled on and off in the properties of the road. The amount of superelevation applied to the road in a curve is controlled by the radius of curvature for the curve, the design speed of the road, and the design standards applied. The design standards can't be changed for an individual road but is controlled by the

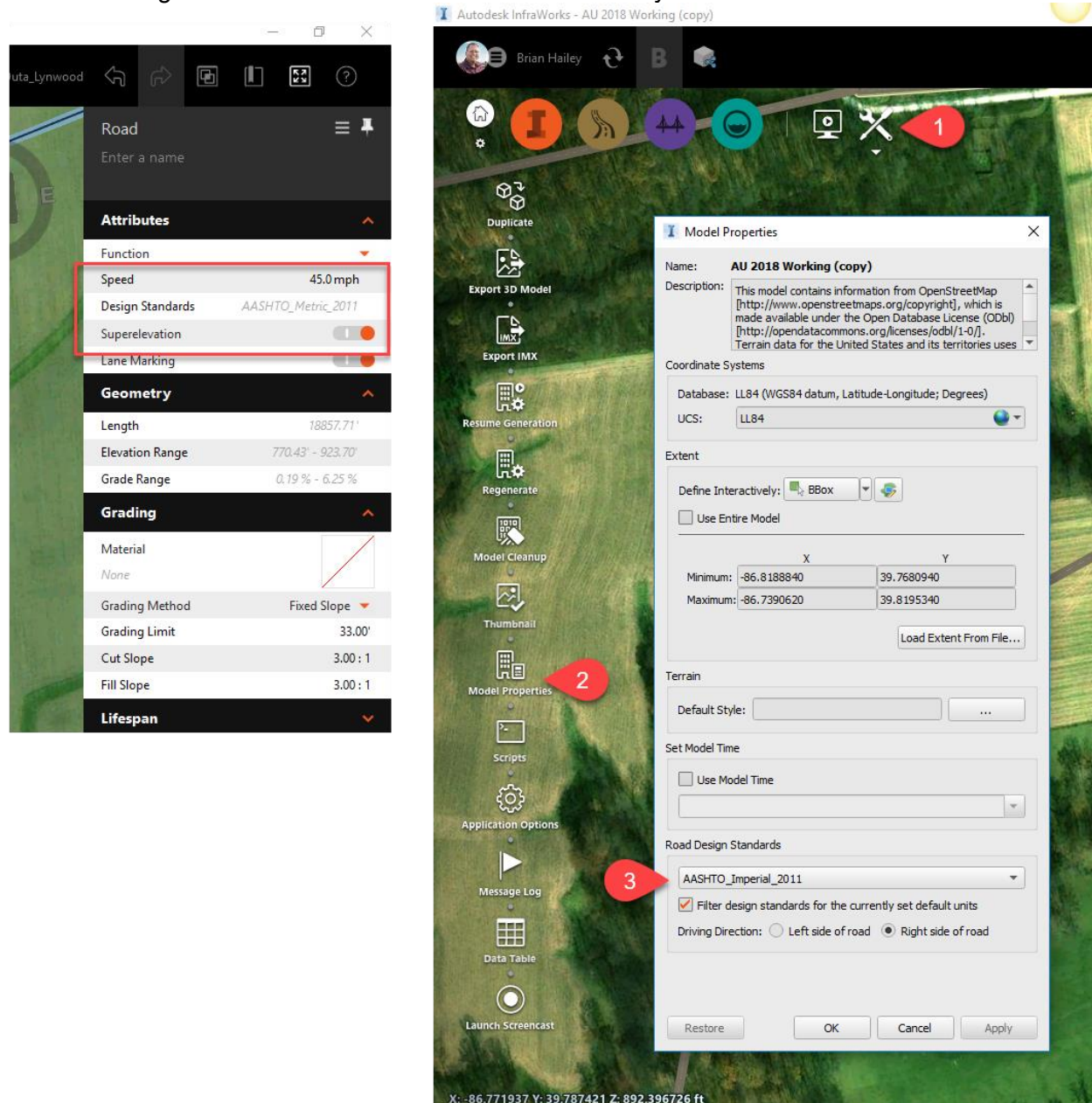


Figure 28 - Superelevation via Road Properties (left) and Model Properties (right)

Adjust the Cross Section

After the optimization has been completed, the cross section can be adjusted as needed. The cross section can be changed for the entire length of the road or at specific locations.

Additionally, the entire assembly can be swapped out for a new assembly or different components can be added, adjusted, or removed.

To swap out the entire assembly, select the road, right click, and choose “Road Assembly -> Replace Road Assembly”. This will bring up a dialog box with the available assemblies in the file that can be used to swap out the existing assembly.

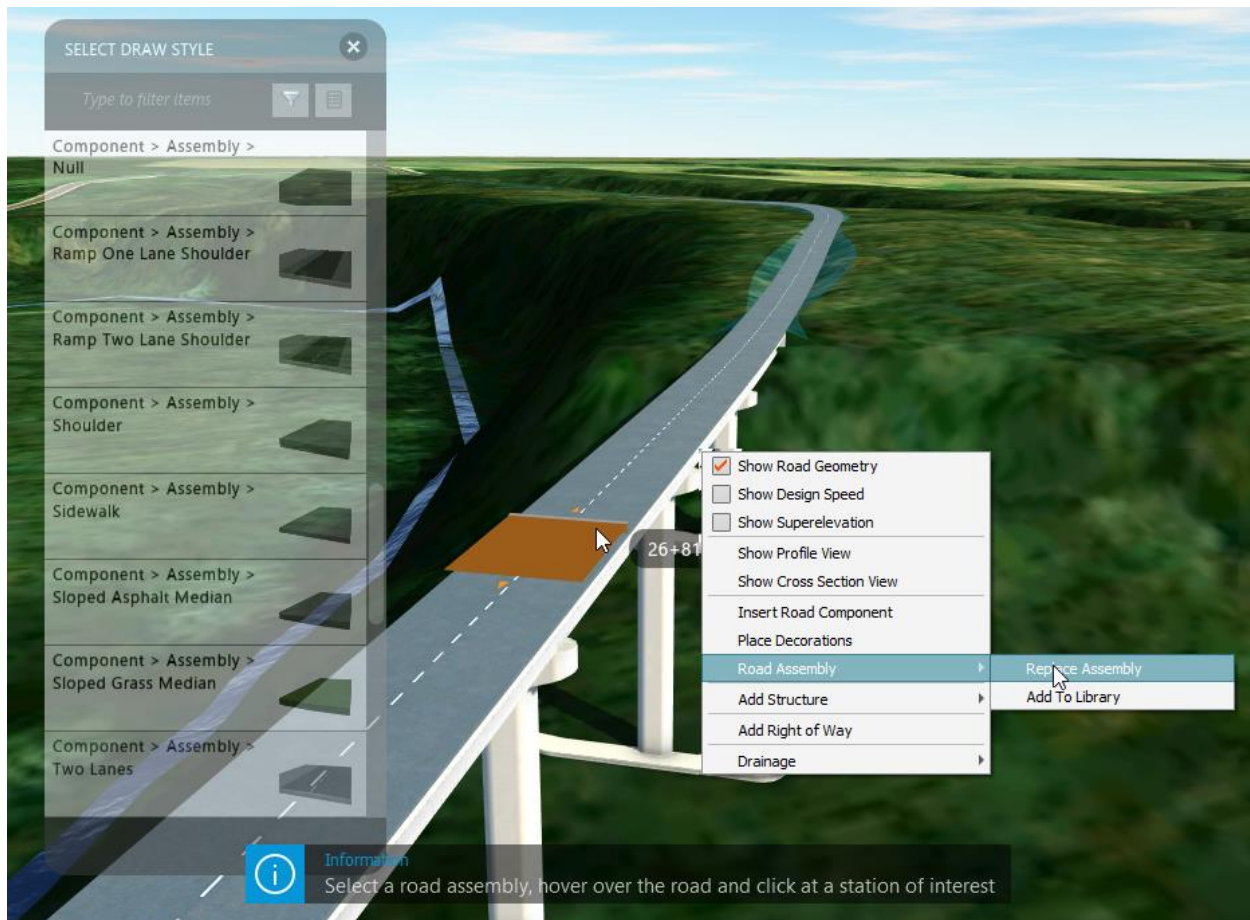


Figure 29 - Replace Assembly

Once the assembly is chosen, the station range the new assembly will be applied is required. Select a location that is close the beginning and/or end of the range and then use the grips to adjust the range of the assembly. If the assembly needs to replace the entire length of the road (or start/end at one end of the road), when adjust thing station for the grip, there is an option to “Align to:”. This will set the station for that grip to the end or start of the road. Doing this to both grips will replace the assembly for the entire length of the road.



Figure 30 - Replace Assembly for Entire Road

In situations where the cross section needs to be adjusted but there isn't a prebuilt assembly, components can be added and adjusted. Components in InfraWorks are similar concept to subassemblies in Civil 3D, they are the pieces that make up the assembly. To edit a specific component, it must be selected. Selecting the component once will select the entire road, selecting it a second time selects that specific component. With the component selected, a panel will open with the properties of that component. Any properties values that are black can be edited whereas any that are grey cannot be edited.

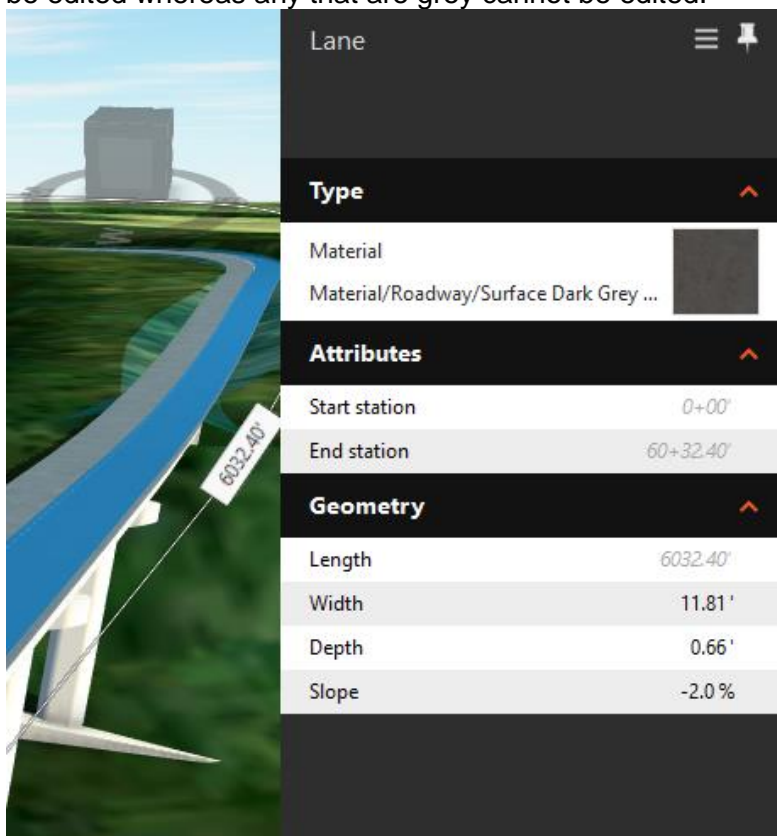


Figure 31 - Editing a Component

Right clicking when an individual component is selected will bring up additional methods of editing the component. There are options to replace the component, split the component, flip the component (i.e. flip the side the gutter is on for curb and gutter), transition the component in and out (if it doesn't span the entire length of the road), and delete the component.

If the road needs an additional component, select the road, right click, and choose, "Insert Road Component". This process is very similar to replacing the assembly, select the component, place it in the correct location on the assembly (between two components or on the outside of the assembly), and specify the start and end station (the align to options are available for components too).

In the following image, the bridge needs curb and gutter, a sidewalk, and a barrier whereas the rest of the road is simply a two-lane road with a shoulder. When the corridor optimization was done, the assembly was simply a two-lane road. Adding the additional components helps realize what the final roadway will look like as well as give more accurate results if materials are calculated.

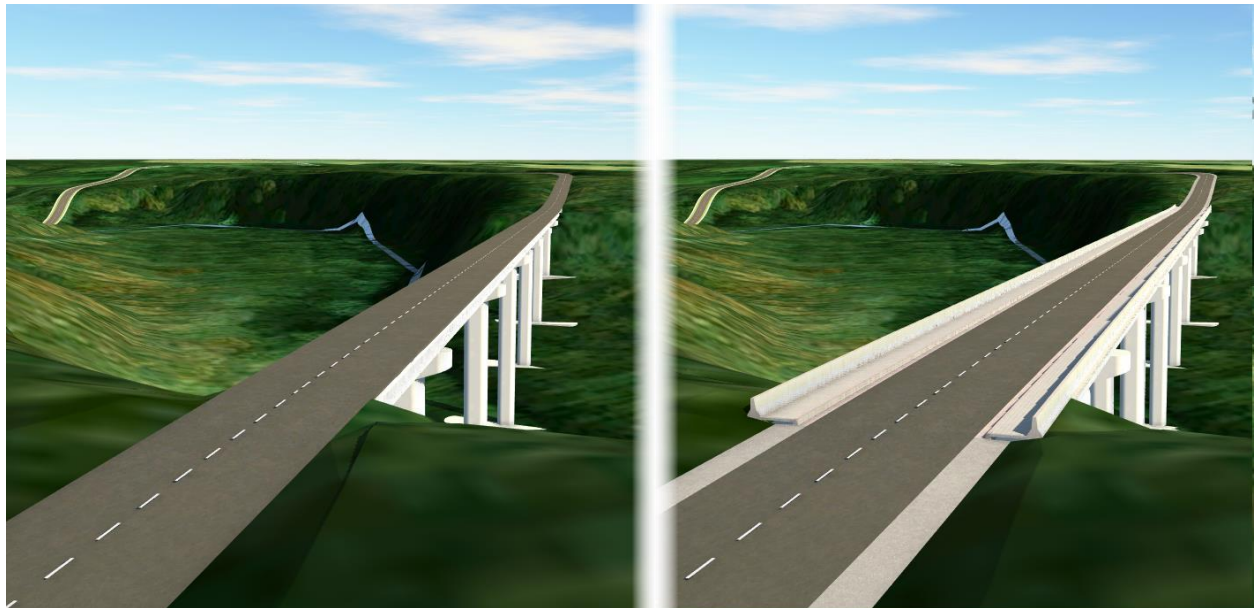


Figure 32 - Roadway Components Added

Visualize the Roadway and Share it with Stakeholders.

When it comes to sharing the model with people outside the organization, there are two primary methods. The first is to create a video flythrough of the project and the second is to share the model with them directly via shared views.

Creating a Flythrough Video

Creating a video of the model in InfraWorks is fairly simple. There's no need for advanced study in cinematography or photo rendering. The basic steps are to set the view of the model where the video should start, create the storyboard (which adds in the first keyframe), advance the model to the next location for the video, add the next keyframe of that spot, and continue until done. The software will do the transitioning between the keyframes automatically for you.

The steps to create the flythrough are shown in Figure 33 and are as follows: 1) Click on the “Create and conduct infrastructure design presentations” icon. 2) Click on the “Storyboard Creator” icon. This will open the Storyboard section at the bottom of the screen. 3) Zoom in on the area that you want to show at the beginning of the flythrough and then click on the option for, “Add Camera Path Animation”. 4) Zoom and pan to the next location for the flythrough and then click the plus symbol to add an additional keyframe. Continue to add keyframes until the flythrough path is created.

Once the storyboard has been created, settings for each keyframe can be adjusted to create a better video. Examples of things that can be changed are the speed of the transition, wait times prior to the transition, and the type of transition (cut, fade from black, or fade from white).

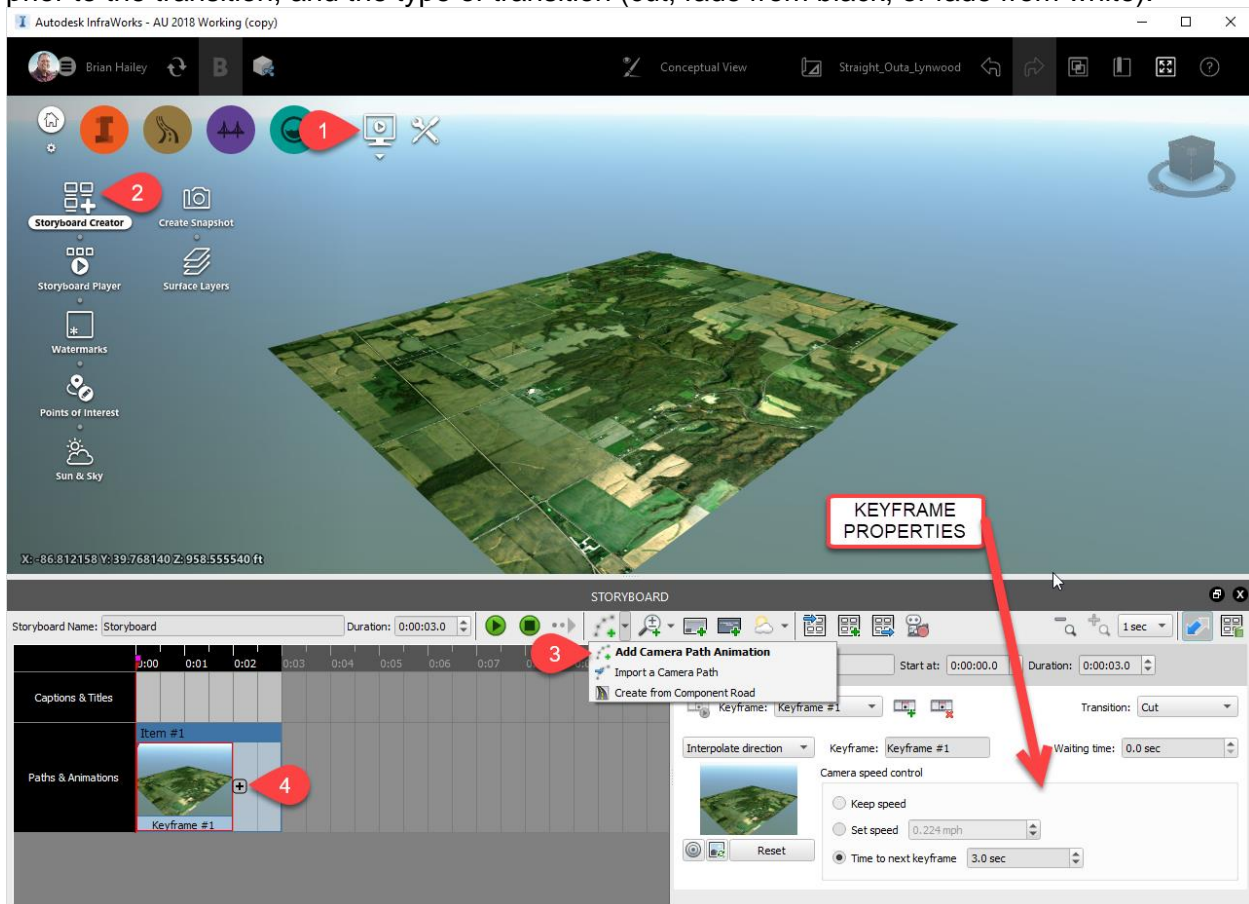


Figure 33 - Creating a Flythrough

There are additional tools that allow greater control on how the video looks. These are available in the pulldown to the right where the camera path animation was added. To add these additional camera movements, the camera path animation will end, the new camera movements will be added in, and then, if needed, a new camera path animation can be added to the storyboard.

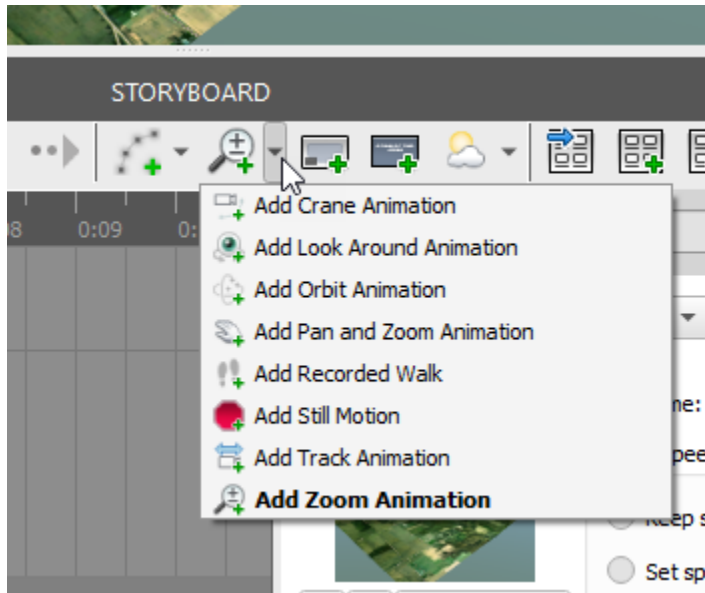


Figure 34 - Additional Camera Controls

Alternatively, if the flythrough is intended to follow the road as if someone was driving along the road, there is an option to create a storyboard from a component road. This option is found in the same pulldown as the command, “Add Camera Path Animation”. Run the command, “Create from Component Road”, select the component road, and then apply the desired settings. Changing the horizontal and vertical offsets allow the simulation of different types of vehicles

(based on the height the driver would be looking at the road) and can account for driving in a specific lane or changing from a right hand drive to a left hand drive.

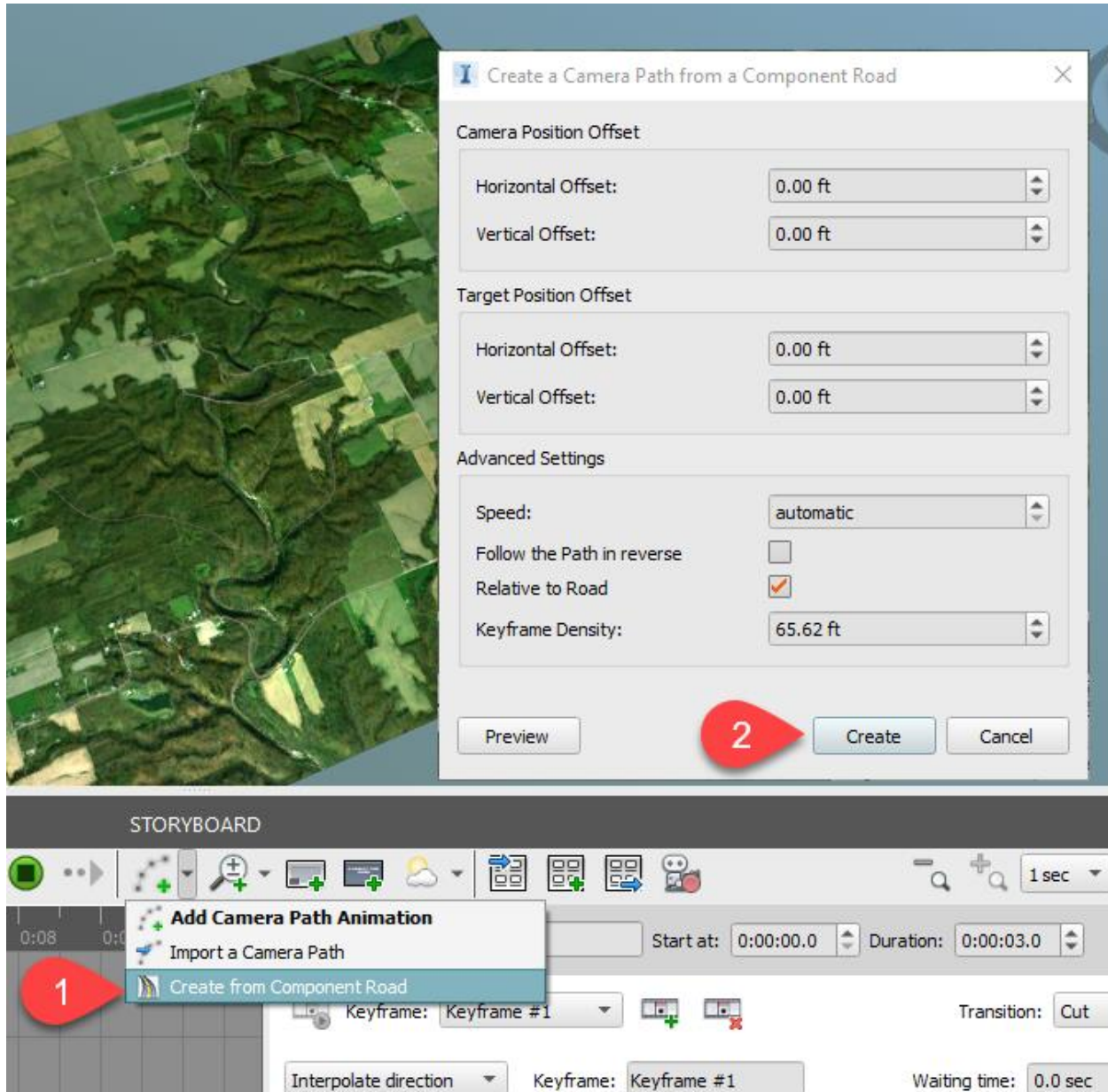


Figure 35 - Create Storyboard from Component Road

Once the storyboard has been created, the video can be exported. Clicking on the camera looking icon in the storyboard panel will create a video file. There are four options for the file type, Windows Media Video, DV Video Encoder, MJPEG Compressor, and uncompressed video. Each option will create a video of different quality and size. In one test, the uncompressed video created a file that was almost 4 GB in size whereas the Windows Media Video created a file that was around 20 MB. Once the options have been set for the video,

clicking the Record button will create the video.

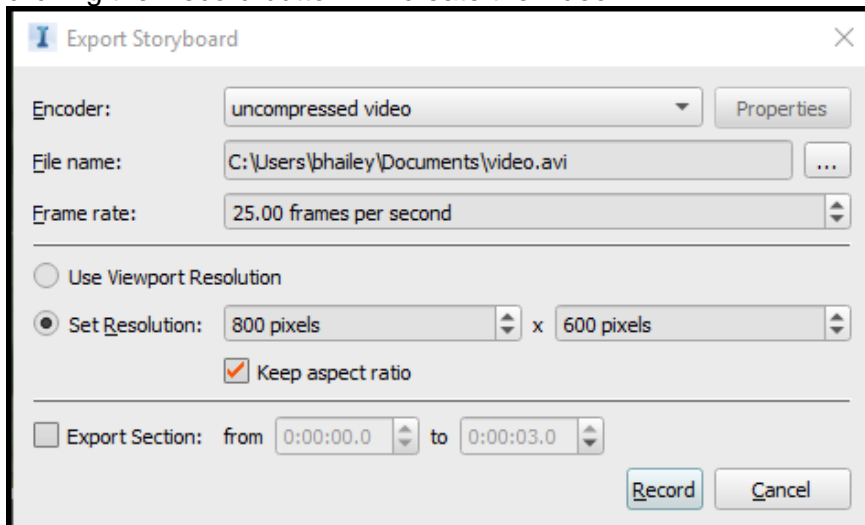


Figure 36 - Recording Storyboard

Shared Views

One of the newer features in InfraWorks is the ability to create a Shared View. In essence, this allows the model to be viewed by anyone using a modern web browser and a sufficient internet connection. There is no need to install additional software. To access the shared views panel, click on the shared views button at the top of the interface. In the Shared Views panel, simply click the button to create a new shared view.

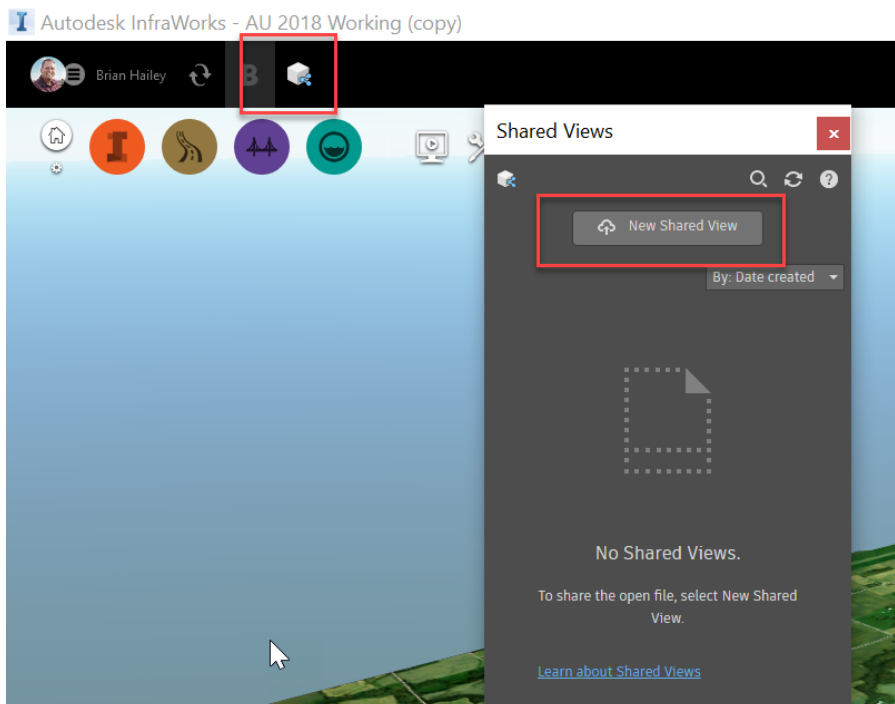


Figure 37 - Shared Views Panel

In the Create a Shared View dialog box, give the view a name and make any appropriate changes to the settings. If the entire model isn't needed in the view, choose the desired area via a rectangle, bounding box, or polygon (the bounding box is always aligned with the coordinate system whereas the rectangle can have any orientation). To aid in navigation, bookmarks can be included with the shared view. Finally, the properties of the objects can be shared as well.

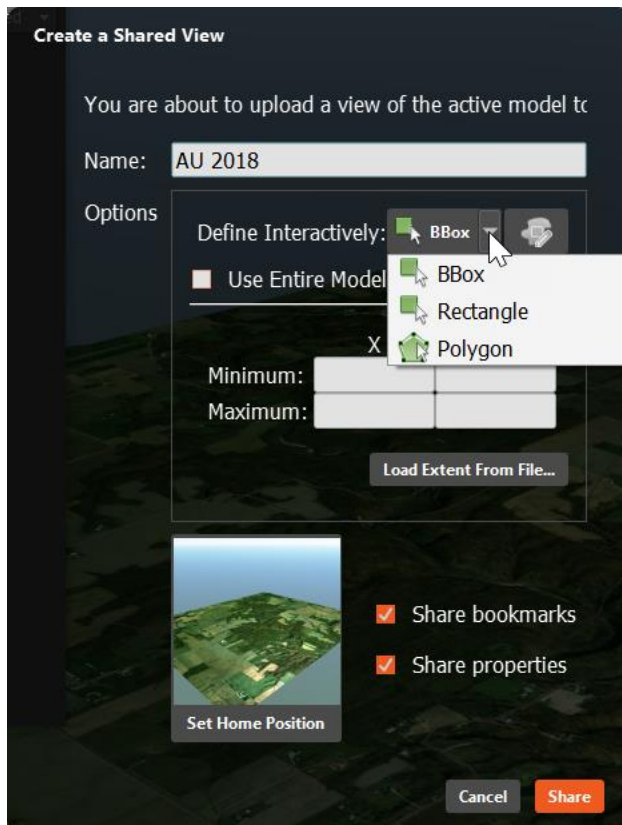


Figure 38 - Create Shared View

Once the shared view has been created, it will be listed in the Shared Views panel. To interact with the shared view, simply click on it in the panel and this will open a web browser with the view in it. Alternatively, click the icon with the three dots (this is called an “ellipsis”) in the upper right corner of the view will give additional options. To give access to the view to someone that does not have InfraWorks, click the ellipsis and choose, “Copy link”. The link can then be shared with anyone.

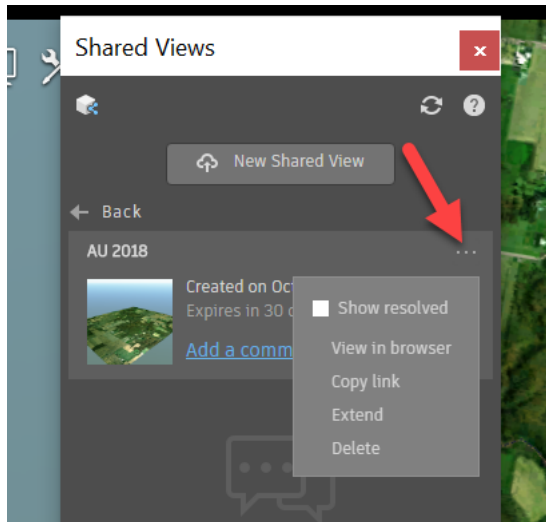


Figure 39 - Sharing the Shared View

The shared view will open in a web browser. Navigating the shared view can be a little tricky at first, it's very similar to the navigation in InfraWorks but not quite the same. Many people have issues with the orbiting of the model particularly zooming in on the edge of the model and then orbiting. When orbiting, the model will always orbit around the same spot and this spot defaults to the center of the model. To change the center point of the orbit, hold down the ALT key and click in the model. This relocates the center of the orbit to the location selected.

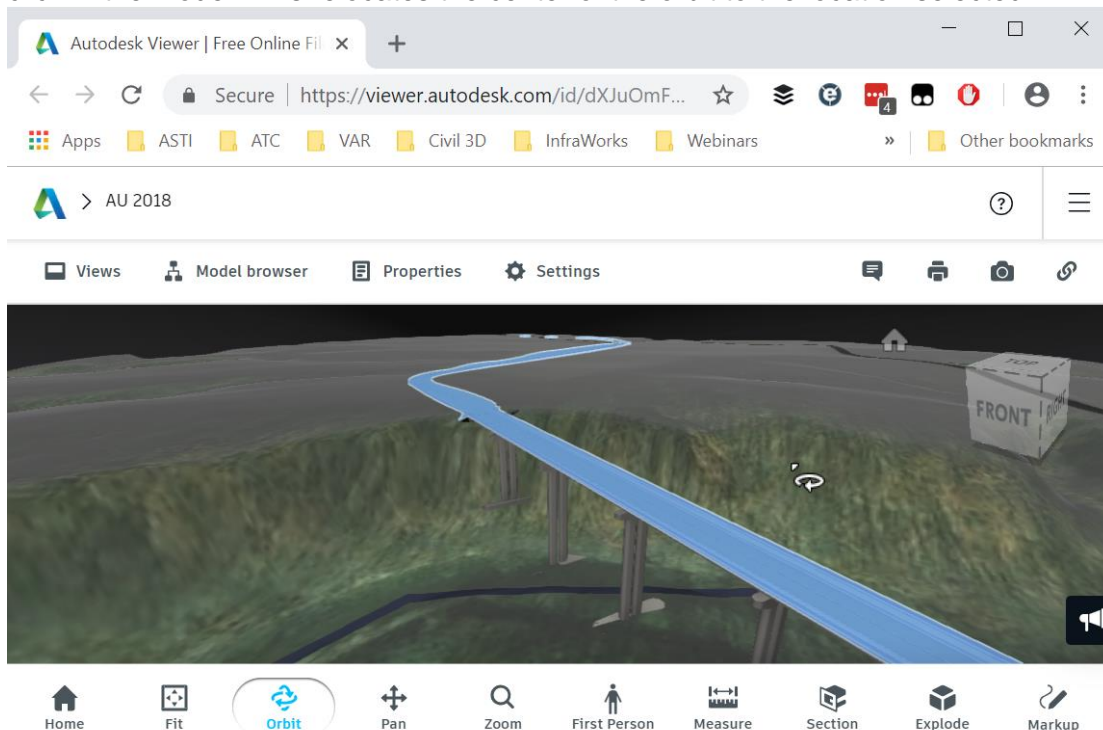


Figure 40 - Shared View in Autodesk Viewer

There are many options within the viewer including being able to see the properties of the objects in the model, measuring, commenting, and sectioning. For more information on the Autodesk Viewer and its capabilities, please see the online [HELP](#).

Conclusion

With the help of InfraWorks, creating a preliminary design for the roadway is simple, quick, and very accurate. The data from InfraWorks can be transferred to other software, such as Civil 3D or Revit, for the final design of the roadway.