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CI 3940: AIM to Please with Your Transportation Project - Part 2

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CI 3940: Learn how Autodesk® Infrastructure Modeler (AIM) software can enhance your transportation workflows during the design execution phase. In Part 1 of this series, we focused on the classic ability of Autodesk Infrastructure Modeler in the conceptual design space, but what about later in the design? This class will show how a well-established AutoCAD® Civil 3D software model can be fed into Autodesk Infrastructure Modeler to communicate the design visually. In addition, we will discuss interoperability options between Autodesk Infrastructure Modeler and other products within Autodesk Infrastructure Design Suite, such as Autodesk® 3ds Max® Design software.

Learning Objectives

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

- Prepare Civil 3D data for transfer to AIM
- Create an AIM project from multiple data types
- Import and configure Civil 3D data in AIM
- Create visualizations with ease (still and animated)
- Understand how AIM can work with other products in the Infrastructure Design Suite

About the Speaker

Wes Newman is a leading expert in the transportation industry with over twelve years of experience. Working his way through the business he made his start in road construction, progressing to construction surveying, followed by roadway design, and is now a key player in the transportation software arena. While working in the industry full time, he has earned a Computer Science degree. This education coupled with his experience gives him a unique perspective on all things transportation. Throughout his career, Wes has been dedicated to the task of optimization; whether it is a process, strategy, or software. This desire to optimize and attention to detail has helped to make him the leader he is today in the transportation community.
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Alan Gilbert is an Autodesk Technical Specialist supporting the efforts of the transportation sales team. This focus includes departments of transportation within the U.S. and Canada, airport authorities, and all other companies and agencies within the transportation sector. In 2009, Alan joined Autodesk from Bentley Systems where he worked for eight years. For the first six years at Bentley, he worked as a civil support engineer, performed services for the civil group (training, consulting, and implementations), and also did technical pre-sales. During the last two years there, Alan managed Bentley's civil and geospatial technical support team. Prior

to Bentley, Alan worked for a municipal utility company in Alabama. There he worked as a water and natural gas distribution engineer. Alan is registered as a Professional Engineer and Land Surveyor Intern in Alabama.
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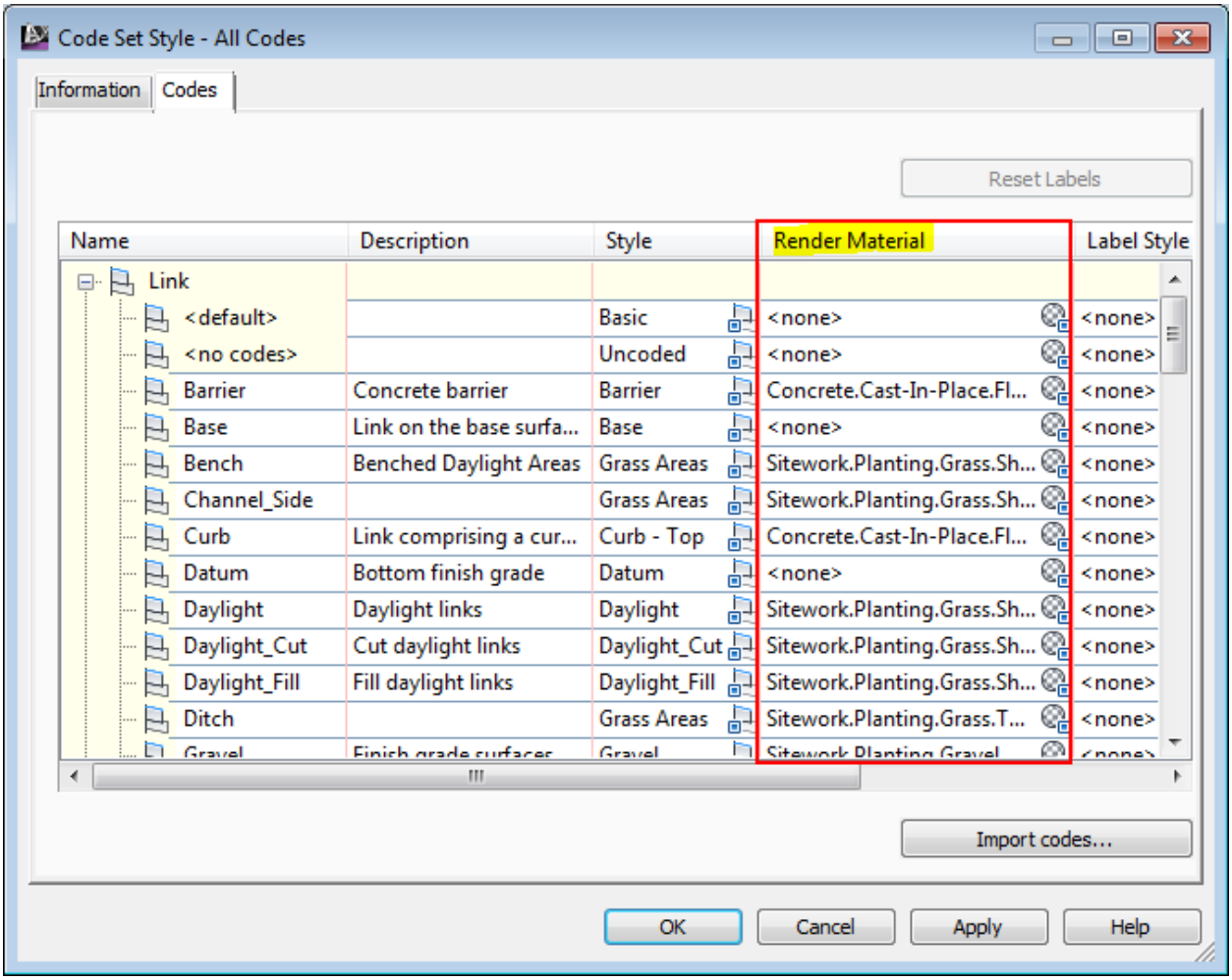
Prepare Civil 3D data for transfer to AIM

Both Civil 3D and AIM utilize GIS engines that support many formats along with on-the-fly reprojections. These software attributes make transferring data between the two products fairly simple creating considerable flexibility. Several of the formats include:

- Autodesk IMX – supports many data types including corridors, surfaces, and pipes. IMX is a relatively new format that supports many different objects and is currently supported by several Infrastructure Design Suite products.
- Autodesk SDF (Spatial Data Files) - native Autodesk file-based geospatial format that is optimized for storing large, classified data sets. DF is similar to SHP format in that it contains both spatial data and attribute data. However, unlike SHP, it stores both types of data in a single file rather than a set of files. Using this format you can represent the following types of data in AIM:
    - Barriers
    - Buildings
    - City Furniture
    - Coverage Areas
    - Pipeline Connectors
    - Pipelines
    - Points of Interest
    - Railways
    - Roads
    - Terrain
    - Trees
    - Water Areas
- ESRI SHP – similar to the SDF format. Shapefiles spatially describe geometries: points, polylines, and polygons. They can represent the same data types as SDF.
- LandXML - is a specialized XML data file format containing civil engineering and survey measurement data commonly used in the Land Development and Transportation Industries. Both terrain and roads are supported through LandXML.
- Autodesk DWG - you can import two-dimensional line data with elevation from AutoCAD files. You cannot import blocks. Only the geometry is imported. You can think of a DWG in this context as another GIS file similar to SDF or SHP, representing the same types of data.

Depending on the extent of your design you can use one or several of these formats to supplement your AIM model. The IMX format is quickly becoming the quickest and most

efficient means of transferring your Civil 3D data into AIM. Associating Render Materials to your links through your code set styles will give you the most “Bang for your Buck” when transferring data to AIM. These Render Materials will automatically be transferred and applied to your roads when imported.



Create an AIM project from multiple data types

Creating a model in AIM, like creating a model in other Autodesk products gives you the flexibility to create any level of complexity which suits the project. Where AIM differentiates itself is the ease of creating the models. AIM supports many formats as referenced above as well as direct connection to databases and mapping services.

When creating a Transportation project in AIM I usually try to find the following data types:

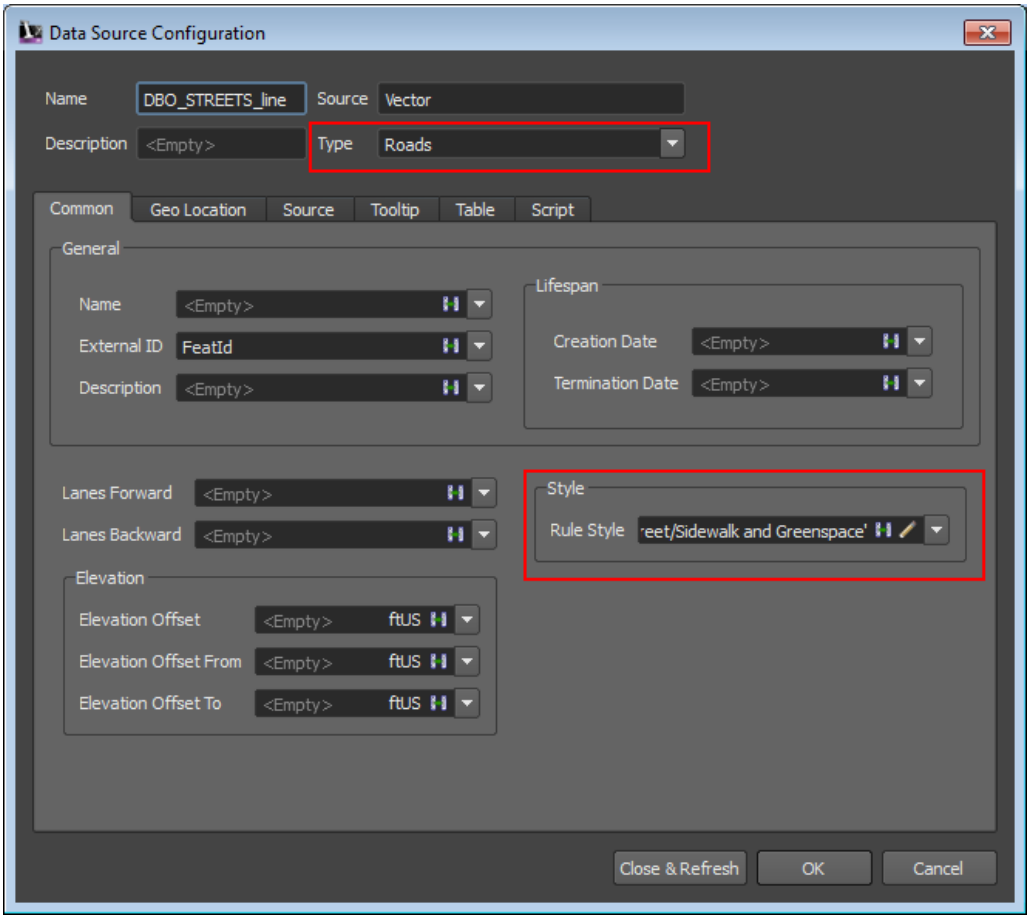
- Aerial Imagery – most of the common raster formats are supported including GeoTIFF, MrSID, and JPEG 2000.

- Terrain – multiple terrain formats are supported including, DEM, GeoTIFF, Binary Terrain, Arc ASCII Grid, and LandXML.
- Roads – typically use Shapefiles as they are the most widely distributed.
- Railroads - typically use Shapefiles as they are the most widely distributed.
- Water - typically use Shapefiles as they are the most widely distributed.
- Buildings – these are usually the hardest to find, typically only found in large urban areas. Scripts can be utilized to randomize, the facades, roof slopes, or most any attribute associated with them. As above these are usually found in Shapefiles.

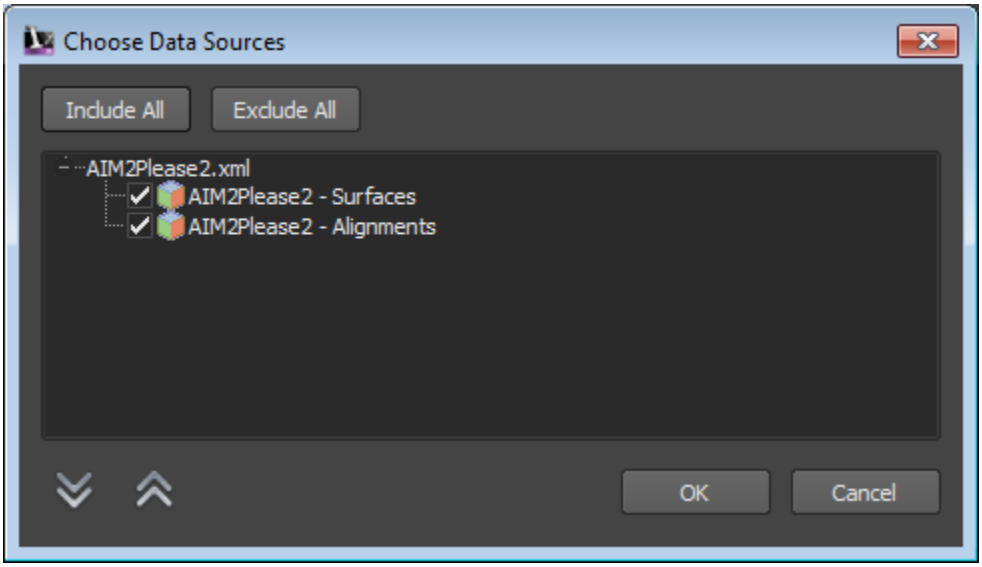
Where to find GIS data in order to create an AIM project from is one of the most common questions I run into. Unfortunately there is no easy answer here. I typically start an internet search with an ascending order of City->County->State, with the terms GIS data, or Aerial Imagery, Ex. “[Place] GIS Data”. If no data turns up you can get lower quality data through USGS or the Census Bureau.

Import and configure Civil 3D data in AIM

As with any data added to an AIM model it must be configured after being imported. If using SHP or SDF formats the process is fairly straight forward. At minimum identify the Type and a default Style.

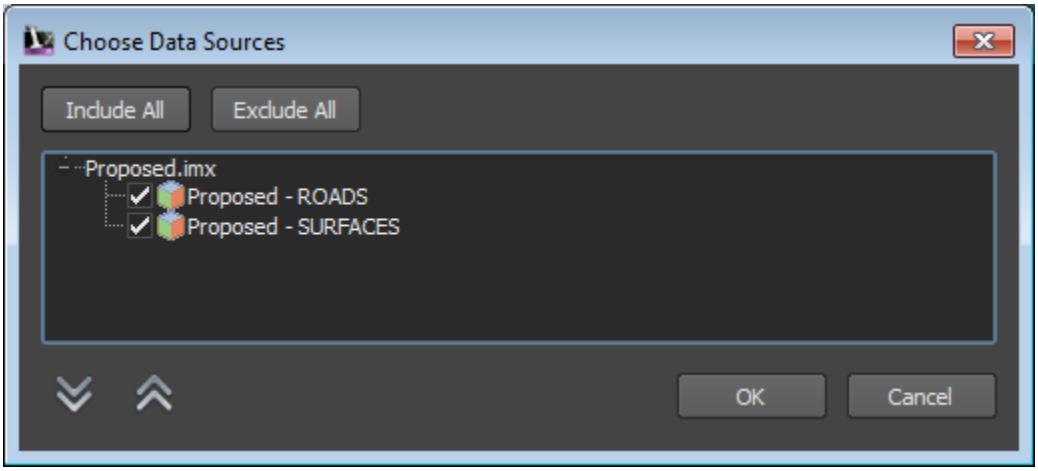


When attaching LandXML files, you will first be prompted to select what types of data to import.

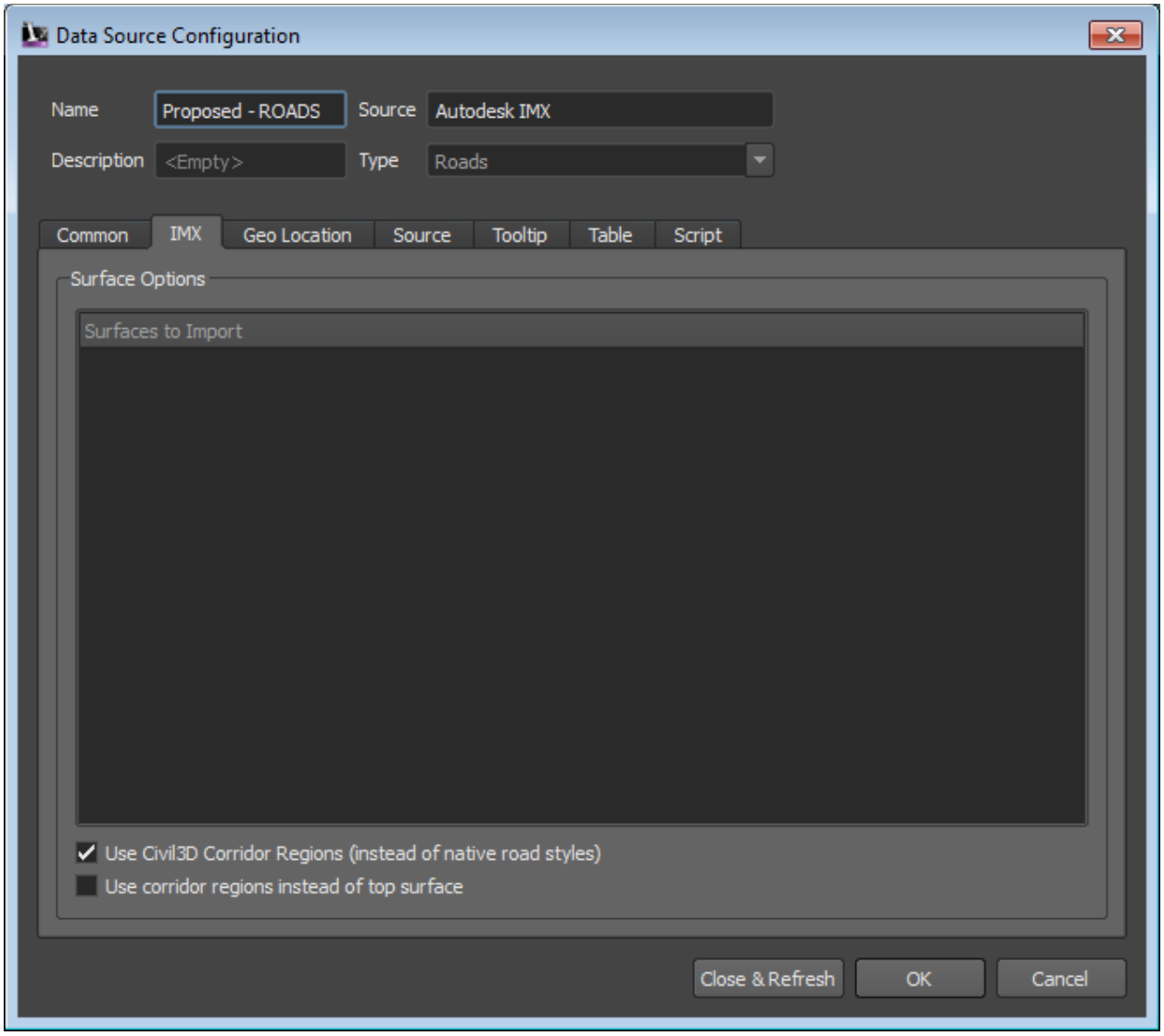


After you select the data types to import the selected data types are added and then all must be configured before import is complete.

When attaching IMX files, you will be presented with a similar dialog as the LandXML. You must then select what data types to import and configure each one.

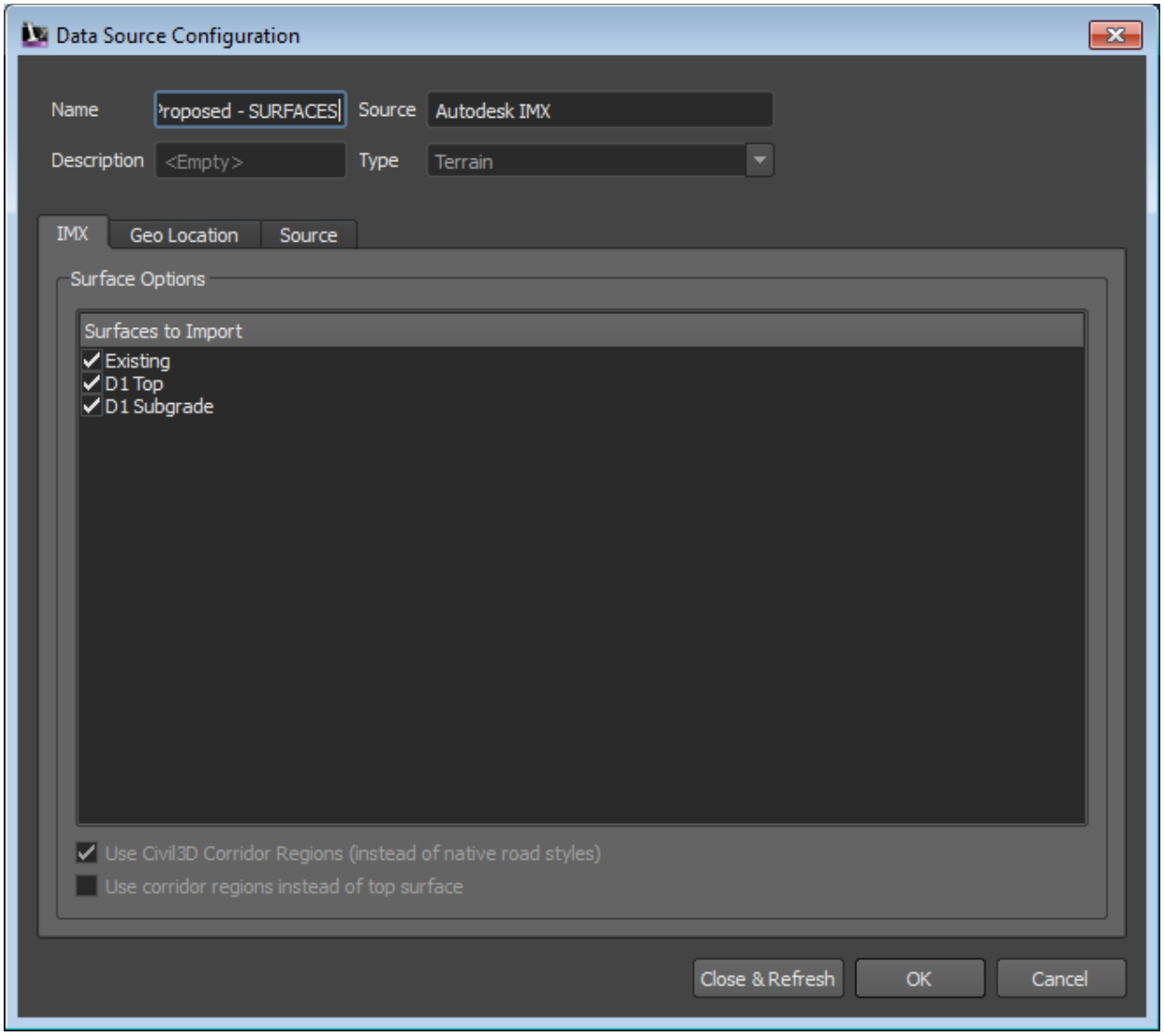


If Corridors are part of your IMX data you will be presented with an extra tab when configuring.



Notice the options; this is where the Render Materials and regions can be utilized instead of the AIM Styles.

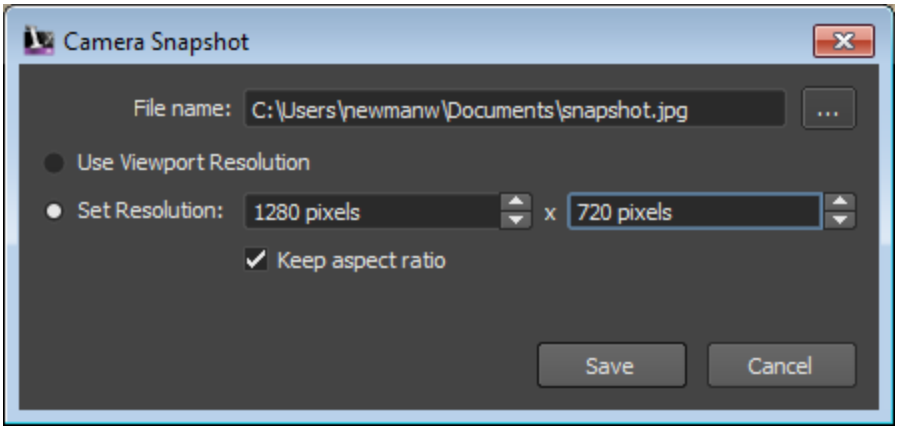
If Surfaces are part of the IMX you will be given the same IMX tab, but will be able to select which surfaces to import.



Create visualizations with ease (still and animated)

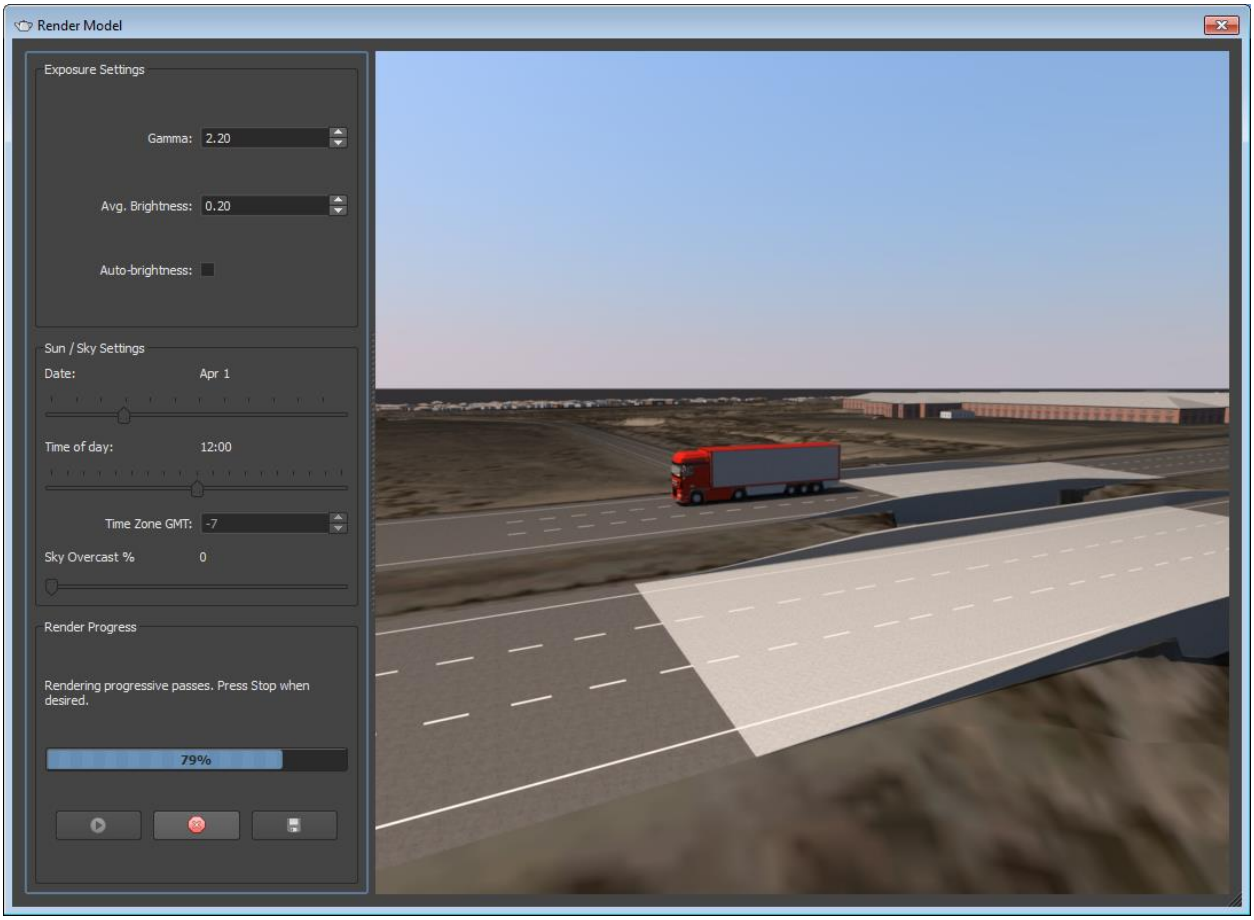
Visualizations are one of the major components of AIM. The ease of use and rapid creation of videos and stills makes AIM an ideal tool for those with limited visualization experience.

The simplest method of image capture is using the Snapshot command.

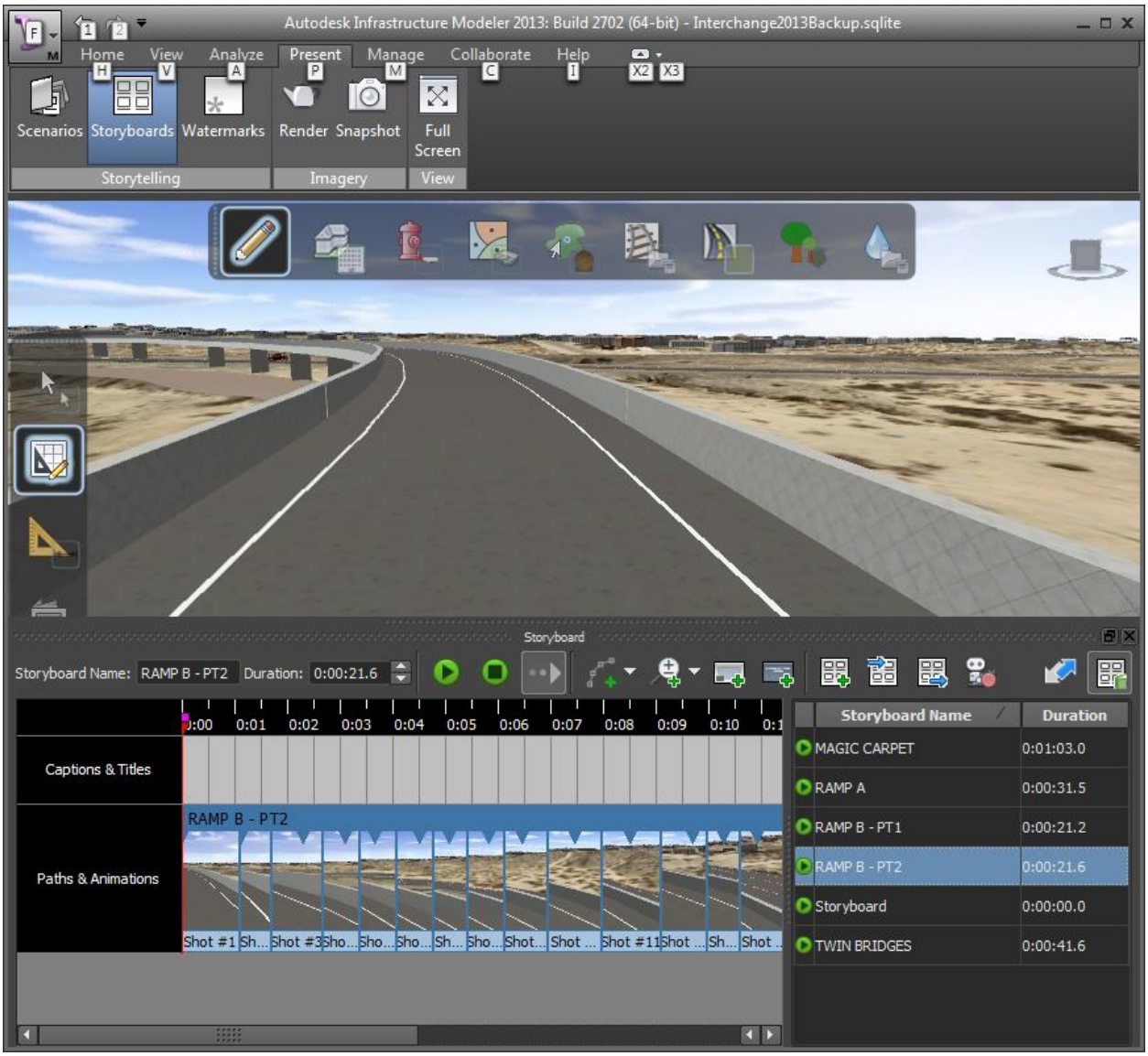


You simply set the resolution and select the File Name. The saved image will look similar to your current view, but bounded by the aspect ratio specified.

The next level of image capture is using the Render command. This command loads the scene into the render engine. Press start and allow it to render until the desired detail is reached. You can then save the image.



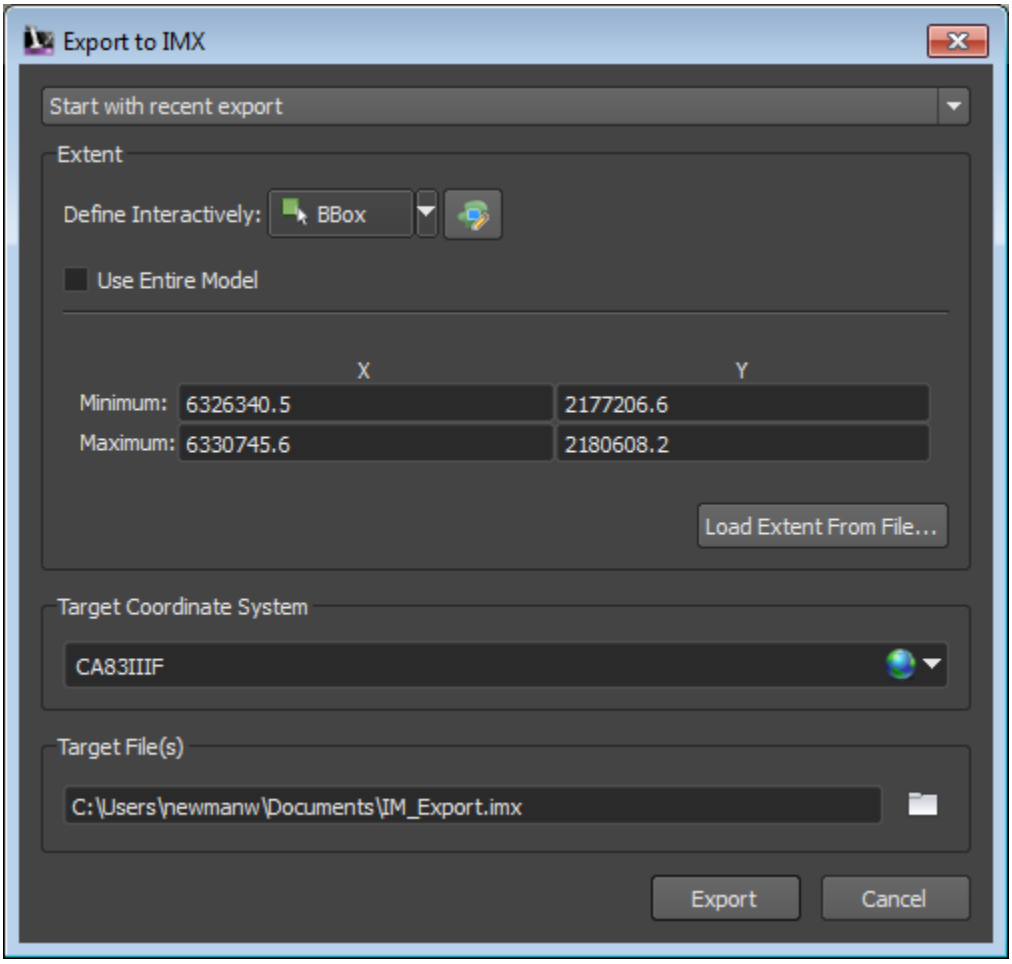
The final and most dynamic visualization is using the Storyboards and Camera Path. Create a new Storyboard, and then add a new camera path animation.

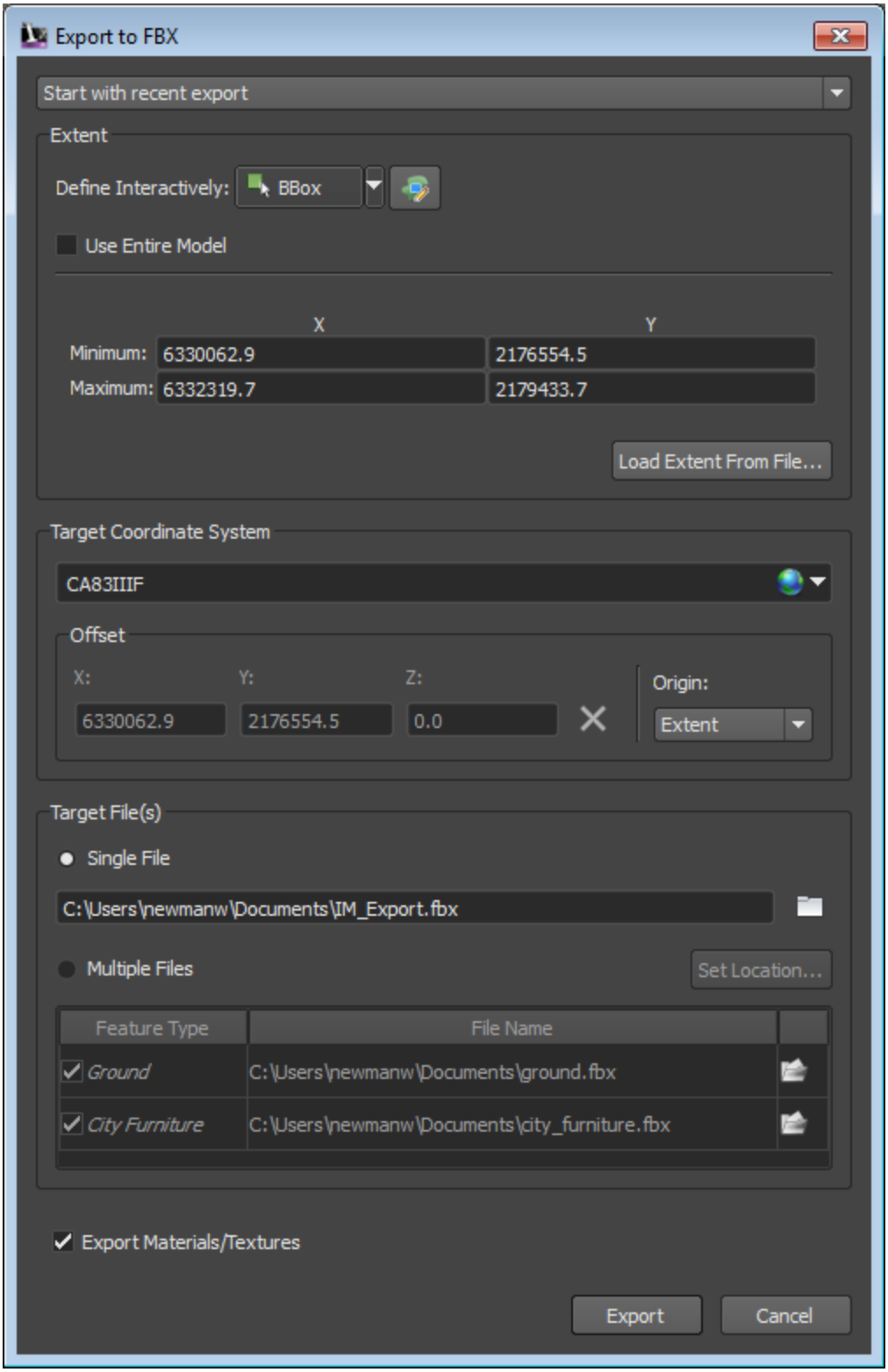


When creating a new camera path your current view is used as the first frame. Simply navigate to your next transition point for your video then add another keyframe, continue add keyframes at critical transitions until you reach the end of your intended visualization. The software will interpolate between each keyframe as the video is played. There are several options for speed and interpolation type, I suggest you play with these to see how your video is affected. Other options for adding Titles and Captions have also recently been added. After your storyboard is set, you can export this to a video, where you can further edit if desired.

Understand how AIM can work with other products in the Infrastructure Design Suite

There are multiple methods for sharing AIM Data/Models with other products in the Infrastructure Design Suite as seen in the previous session Part 1. The two major methods for exporting data are IMX and FBX. Both allow for defining a perimeter and Target Coordinate System. Currently only Civil 3D supports importing IMX, but multiple products support FBX, including 3DS Max and AutoCAD.




Export to FBX
Start with recent export
Extent
Define Interactively:
BBox
Use Entire Model
X
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Minimum:
6330062.9
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Maximum:
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Target File(s)
Single File
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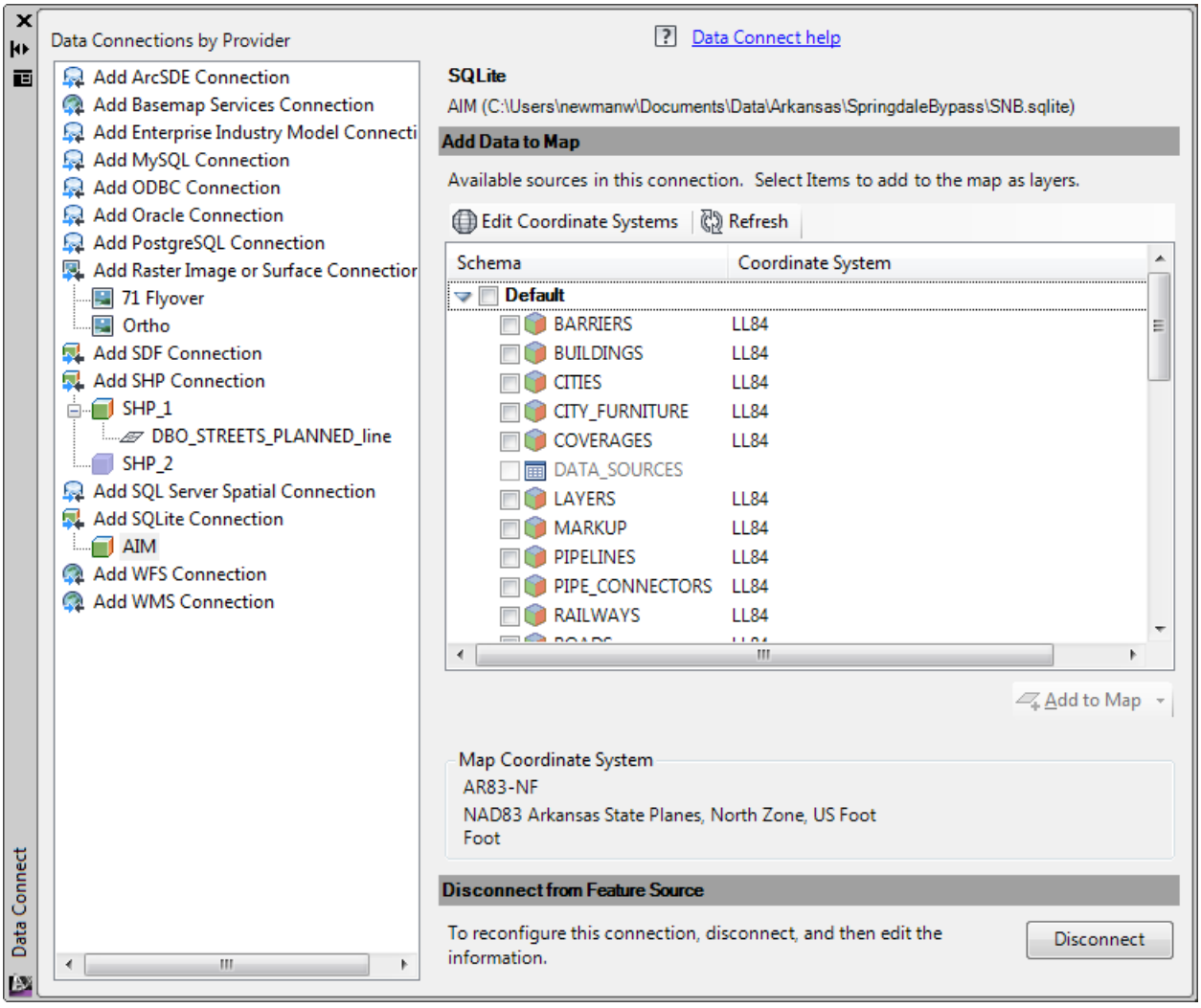
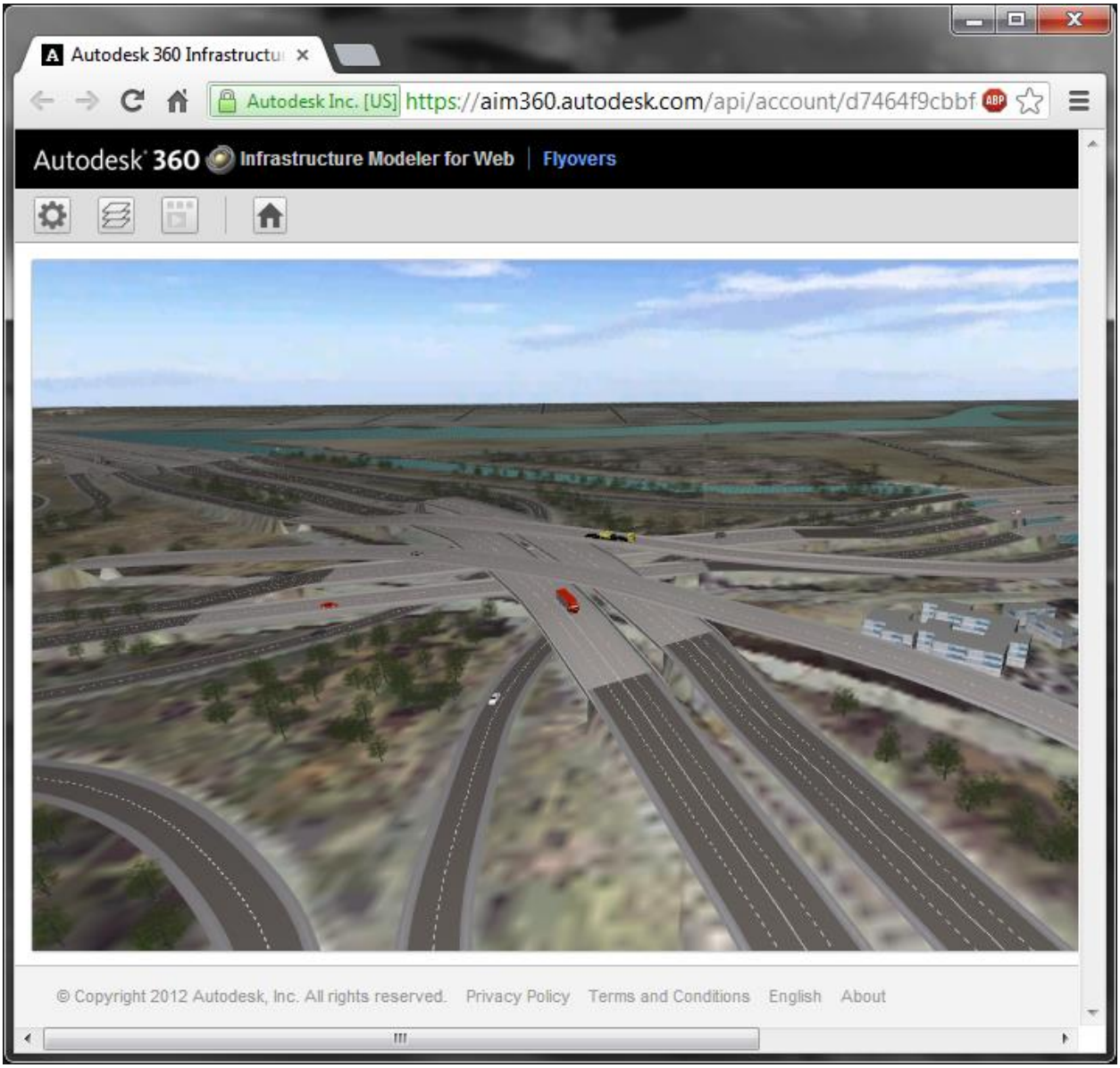
Multiple Files
Set Location...
Feature Type
File Name
Ground
C:\Users\newmanw\Documents\ground.fbx
City Furniture
C:\Users\newmanw\Documents\city_furniture.fbx
Export Materials/Textures
Export
Cancel

Another alternate approach to consuming AIM data is to connect directly to SQLite database from Map 3D or Civil 3D. The AIM database acts as a self-contained GIS database where you can extract much of the model.



The final method of sharing data is to use Autodesk 360 Infrastructure Modeler. This cloud based service allows you to upload a scenario. From there you can view the scenario using multiple tools including Autodesk 360 Infrastructure Modeler for Web and Autodesk 360 Infrastructure Modeler for Mobile. This allows other to view your model without having to have AIM installed.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