

## CI 3907: AIM to Please with Your Transportation Project - Part 1

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**CI 3907:** Learn how Autodesk® Infrastructure Modeler (AIM) can enhance your transportation workflows during the conceptual design phase. Not only can you use AIM to provide eye catching conceptual visuals in record time, but also you can feed this conceptual model to AutoCAD® Civil 3D in order to proceed with your design. This class focuses on employing AIM at the beginning of a transportation project and the interoperability between AIM and Civil 3D. In addition, interoperability options between AIM and other products within the Autodesk® Infrastructure Design Suite Ultimate, such as Autodesk® 3ds Max® Design, will be discussed.

### Learning Objectives

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

- Attach 2D conceptual plans to AIM model
- Create 3D representation from the 2D
- Begin preliminary design decisions with AIM
- Add content to AIM model for visualization/presentation (SKP, FBX, etc.)
- Move 3D conceptual design from AIM to Civil 3D

### About the Speakers

*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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*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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## **AIM Data Types – Existing Conditions**

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 (referenced below) as well as direct connection to databases and mapping services.

Listed below are typical data formats used within AIM for a transportation project:

- 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.

Here are the steps used in the class to attach three geotiff files which represent our 2D plan set:

1. Create a “Raster” connection to these three files on the Data Sources window.
2. After connected, highlight three files, right click, and select “Configure”.
3. Since these tiff files are georeferenced, the coordinate system area requires no work (see screen capture below):

**Data Source Configuration**

Name:  Source: Raster

Description: <Empty> Type: Ground Imagery

Geo Location: Raster

Coordinate System: AR83-NF

**Position**

Coordinate System: <Empty>

Local Origin:

X: <Empty>

Y: <Empty>

Z: <Empty>

**Offset**

X: 0

Y: 0

Z: 0

**Scale**

X: 1

Y: 1

Z: 1

**Rotation**

X: 0

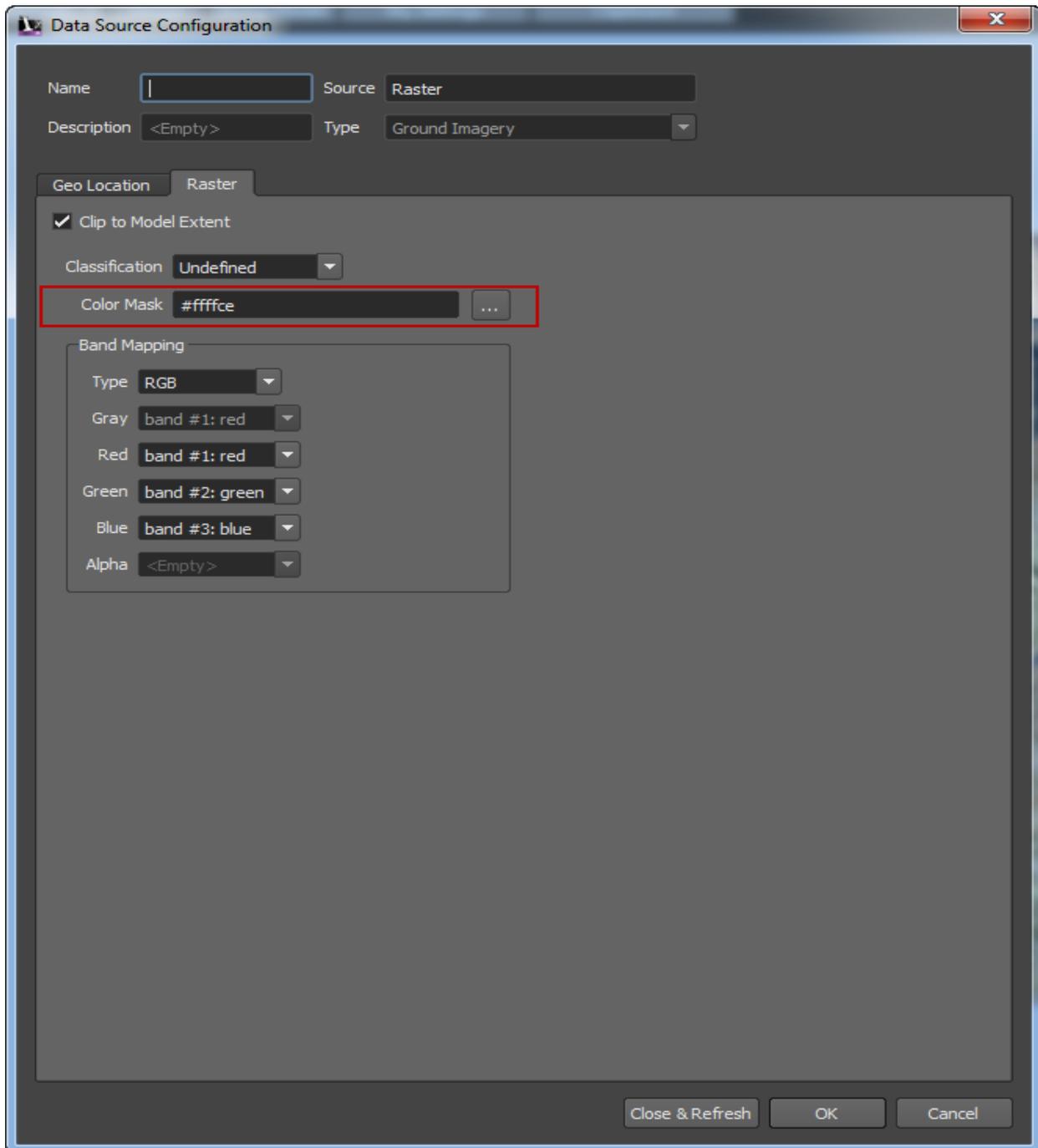
Y: 0

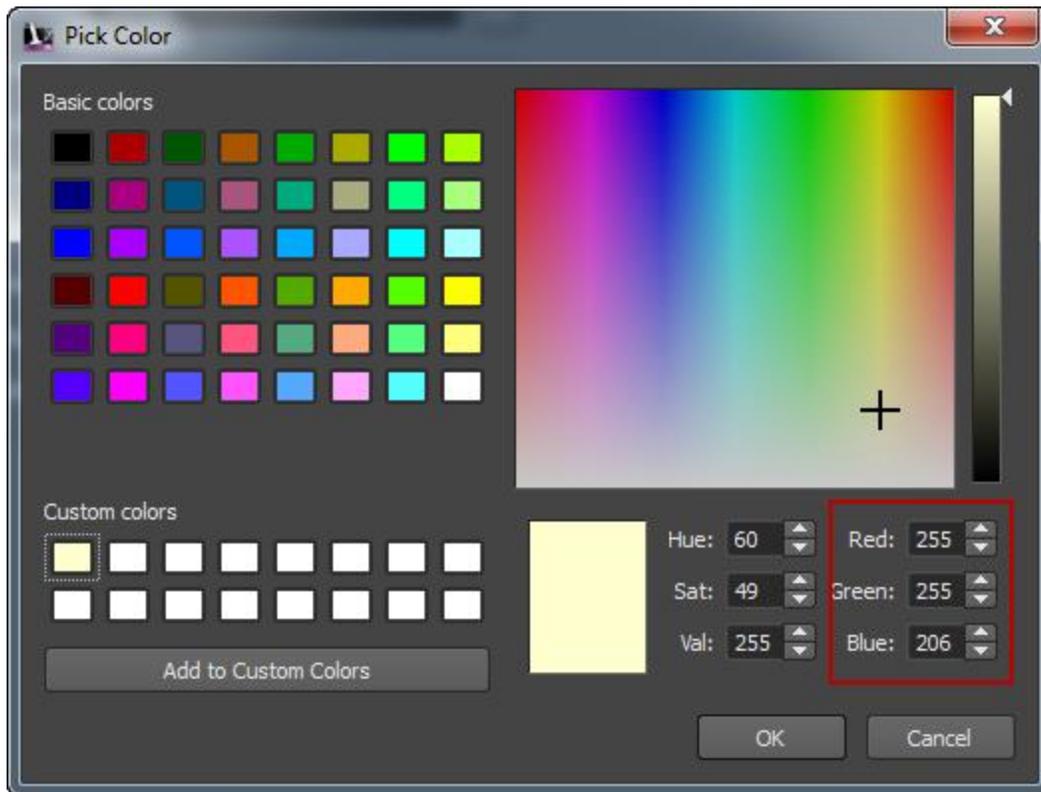
Z: 0

Interactive Placing...

Close & Refresh OK Cancel

4. Now move to the “Raster” tab within the configuration window, click the “color mask” button to add transparency to the tiff files. In this case, an RGB value of 255,255,206 was used to create the desired transparency. See screen captures below for settings:





5. Now select “Close and Refresh” to update the AIM model and display the plans.

### Preliminary Design with AIM

AIM gives the designer or planner the tools needed to conceptualize transportation infrastructure. Of course, the level of preliminary design that can be accomplished in AIM is entirely dependent on the accuracy of the data representing the existing conditions. For example, if the existing ground surface used in AIM is highly accurate, legitimate roadway/railway/corridor grades can be experimented with. Here are a few tips for getting started with roadway/railway layout in AIM:

- Copy standard AIM styles and modify as desired.
- Remember that the digitized point will take on the ground elevation. So when more vertices are needed in areas of bad elevation, first place corridor with good elevation points, then go back and add/move vertices.
- Multiple road/rail styles auto-connect when vertices from these are coincident. Use edit mode to find non-coincident vertices at bad corridor intersections.

## Adding Additional Model Content

The most basic AIM model content is created by using the Create Features command. Just as with road and rail, there is a large library of features to choose from in AIM. Trees, buildings, people, cars, construction equipment, lighting, and utilities are some of the more common examples.

Content created by other Autodesk software, such as the products within the Autodesk Infrastructure Design Suite, works great in AIM. Generally, the Autodesk FBX format is the preferred method for moving this content into AIM.

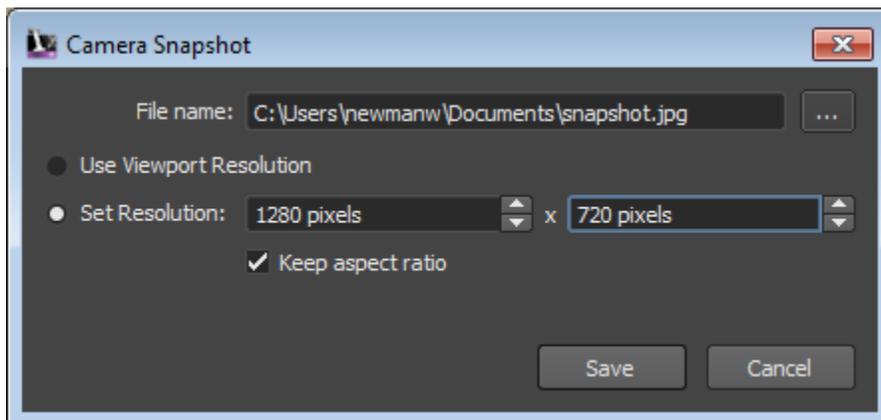
Lastly and thanks to several products within the Autodesk Infrastructure Design Suite, we are able to move Google SketchUp content into AIM. For example, 3ds Max Design and recently Civil 3D can both directly consume these SKP files. At that point, these can be exported as FBX files and brought into an AIM model.

\*Note: The free Google SktechUp plug-in for Civil 3D 2013 can be added to the software by going to the Autodesk Exchange Apps site (click blue X on top-right menu near Help button).

## Create visualizations with ease (still and animated)

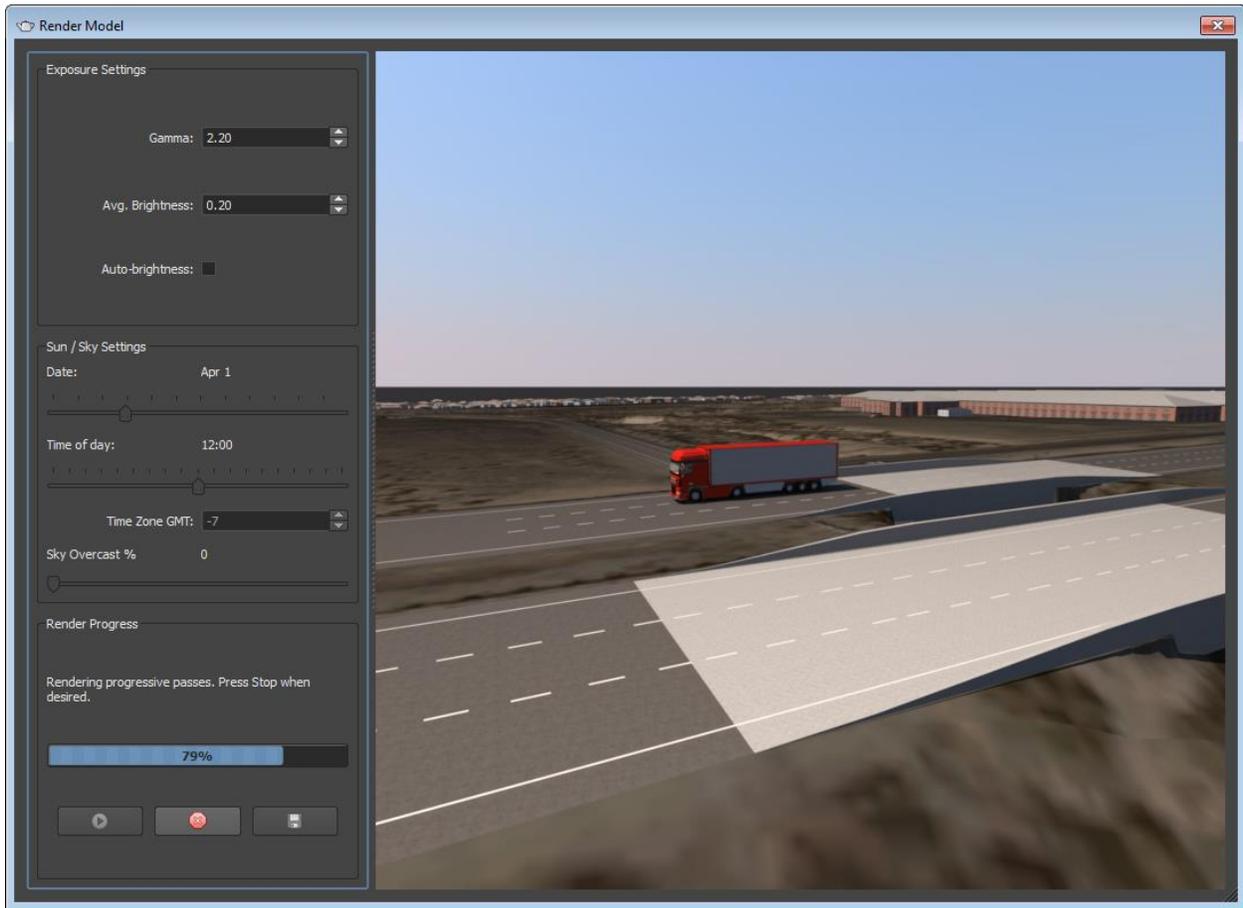
Visualizations are one of the major components of AIM. The ease of use and rapid creation of videos and stills makes AIM an ideal tool for those with limited visualization experience.

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

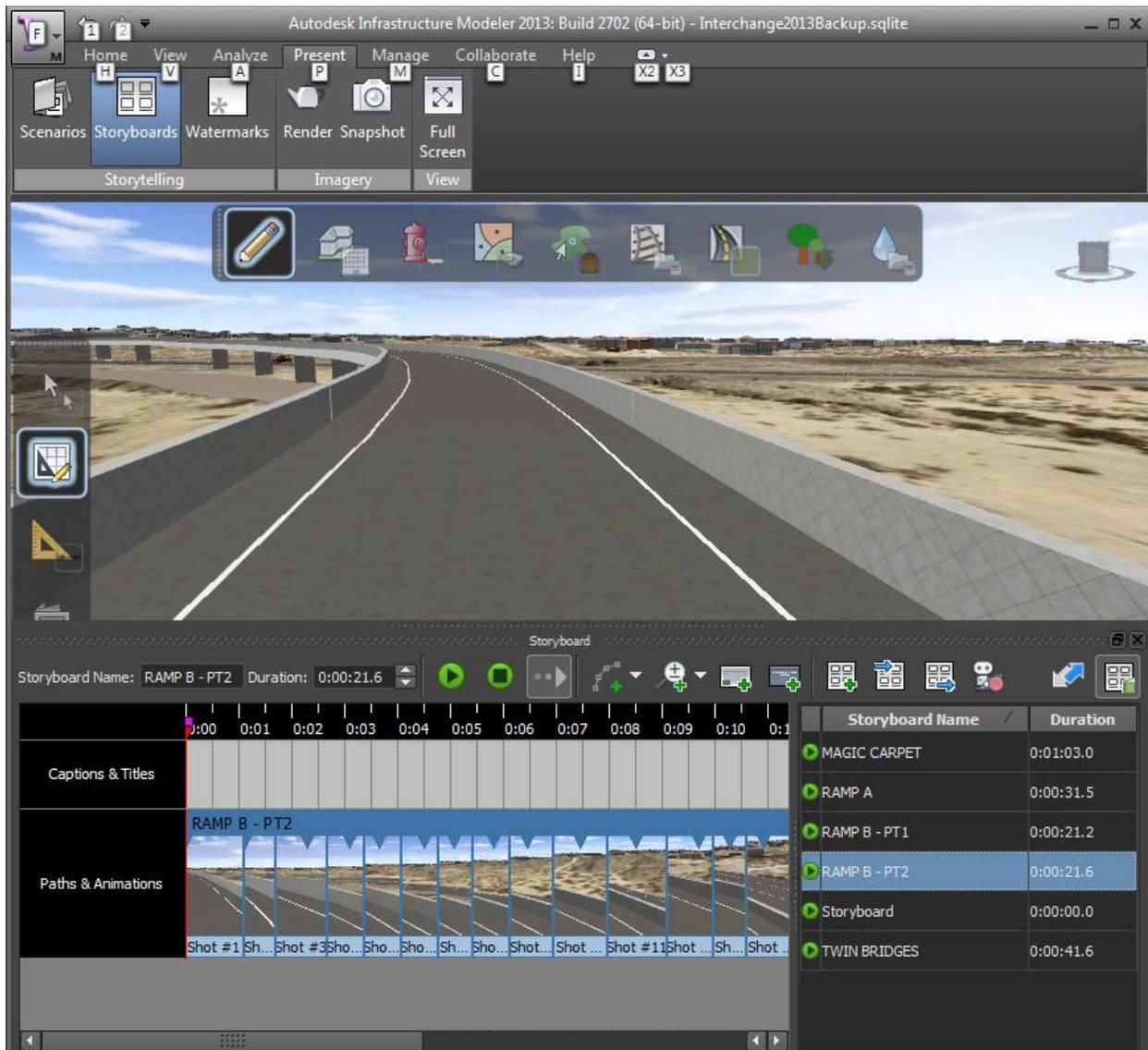


You simply set the resolution and select the File Name. The saved image will look similar to your current view, but bounded by the aspect ratio specified.

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.



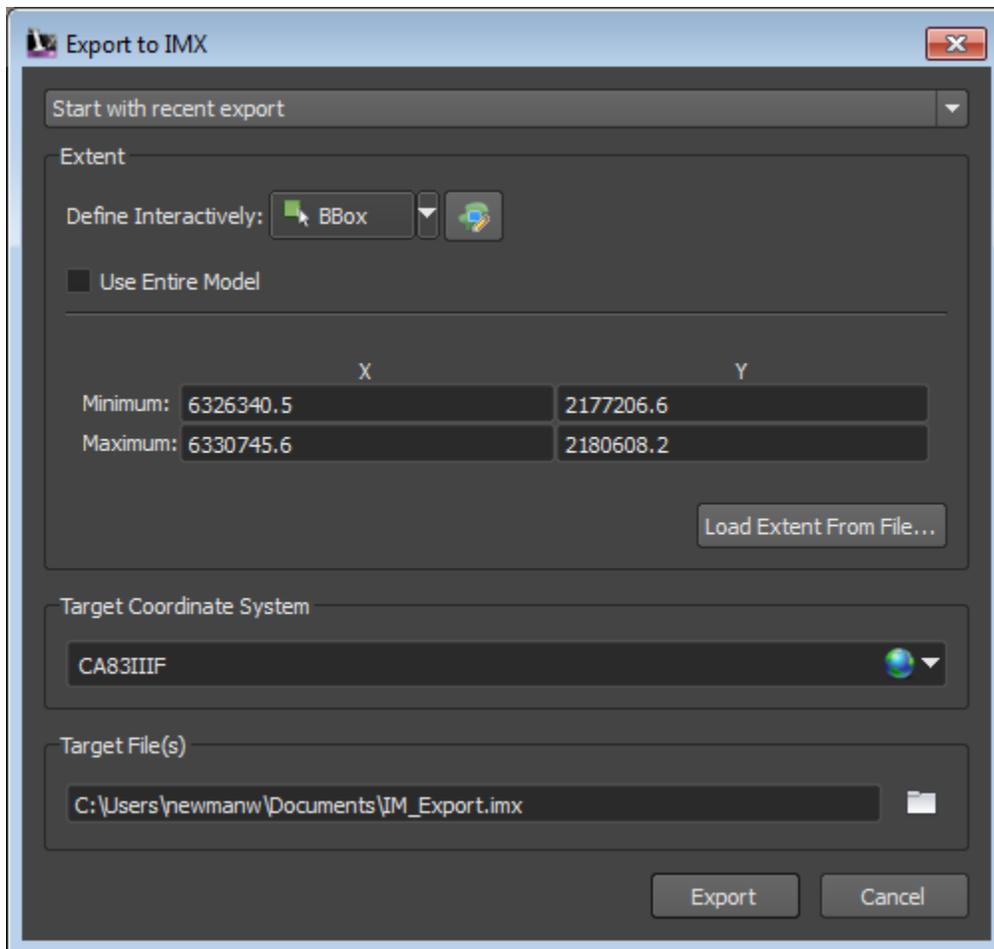
The final and most dynamic visualization is using the Storyboards and Camera Path. Create a new Storyboard, and then add a new camera path animation.

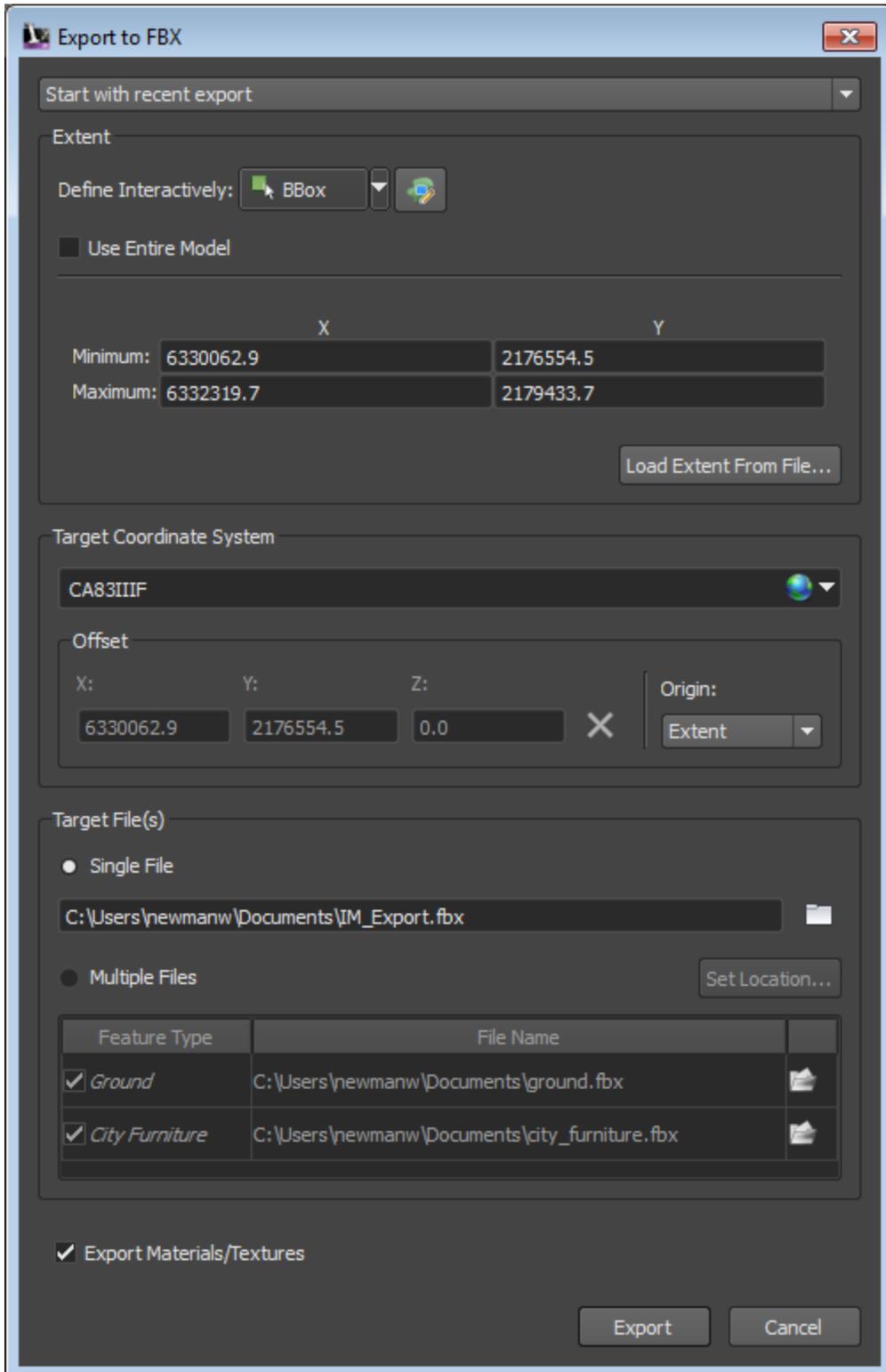


When creating a new camera path your current view is used as the first frame. Simply navigate to your next transition point for your video then add another keyframe, continue add keyframes at critical transitions until you reach the end of your intended visualization. The software will interpolate between 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.

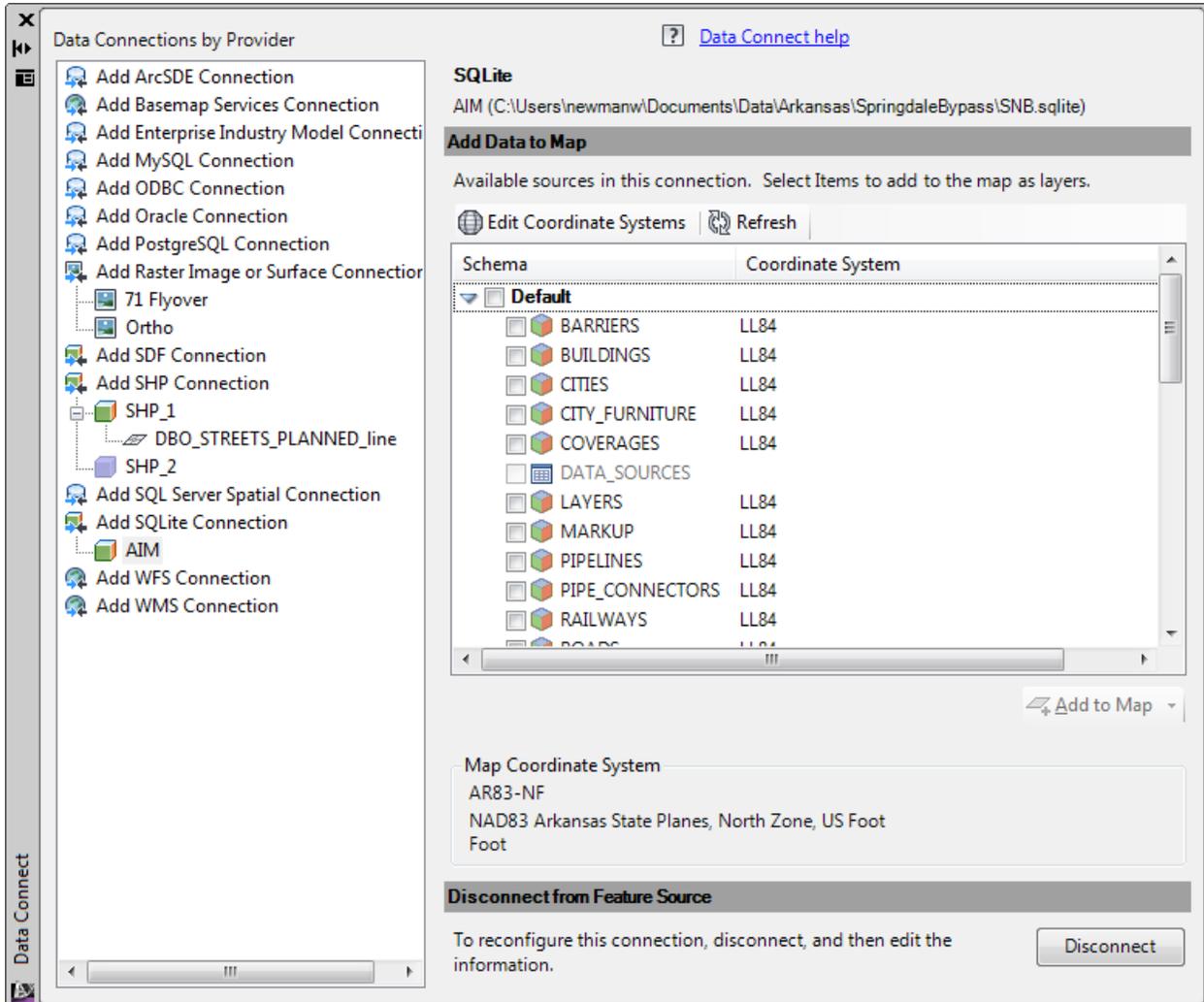
### AIM Model to Civil 3D – Pass to Detailed Design

There are multiple methods for sharing AIM Data/Models with other products in the Infrastructure Design Suite. Two major methods for exporting data are IMX and FBX (see two screen captures below). 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.





Another approach for consuming AIM data is to connect directly to the SQLite database from within Map 3D or Civil 3D. The AIM database acts as a self-contained GIS database where you can extract much of the model. The screen shot below shows the Data Connect dialog in Civil 3D/Map 3D when connecting to an AIM SQLite database. Notice you can choose what part of the AIM model to bring in. \*Civil 3D Users: key in “MAPWSPACE” at the command line to access the Data Connect dialog directly.



The best method will most likely vary depending on the desired result. If you just want a Civil 3D profile view of the proposed corridor and existing ground from the AIM model, then IMX would be appropriate since it is the only method that directly builds Civil 3D objects (alignments and surfaces). On the other hand, if your goal is to use the corridor path from AIM to start building highway or railway geometry, then your best bet is likely to be a connection to the SQLite database and extracting the route’s linework. Then Civil 3D best fit techniques can be used to build the desired geometry.