479641

Bridging the gap between CIM and BIM with BIM 360

David Campbell
Topcon Solutions

Kevin Closson
Topcon Solutions

Learning Objectives

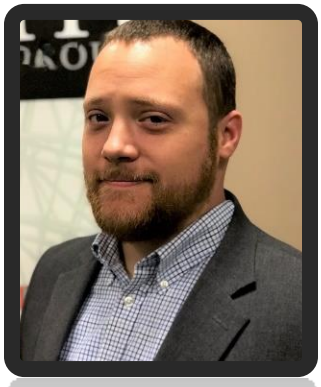
- Learn about the communication gap between CIM and BIM
- Learn to connect CIM data to BIM workflows
- Learn how to enable collaboration with BIM 360
- Evaluate the value of a Common Data Environment and connected workflows

Description

In this course we will be demonstrating the ease of use of merging field captured data and engineering data with our design files in the BIM 360 environment. We will utilize this data for positioning, design, and even layout. We will then show the benefits leveraged downstream such as QA/QC and layout by way of a field controller or BIM 360 itself. We can track all activities, versioning, and even communication. When we can connect remote teams via the cloud, with the most up to date information, the outcomes are revolutionary.

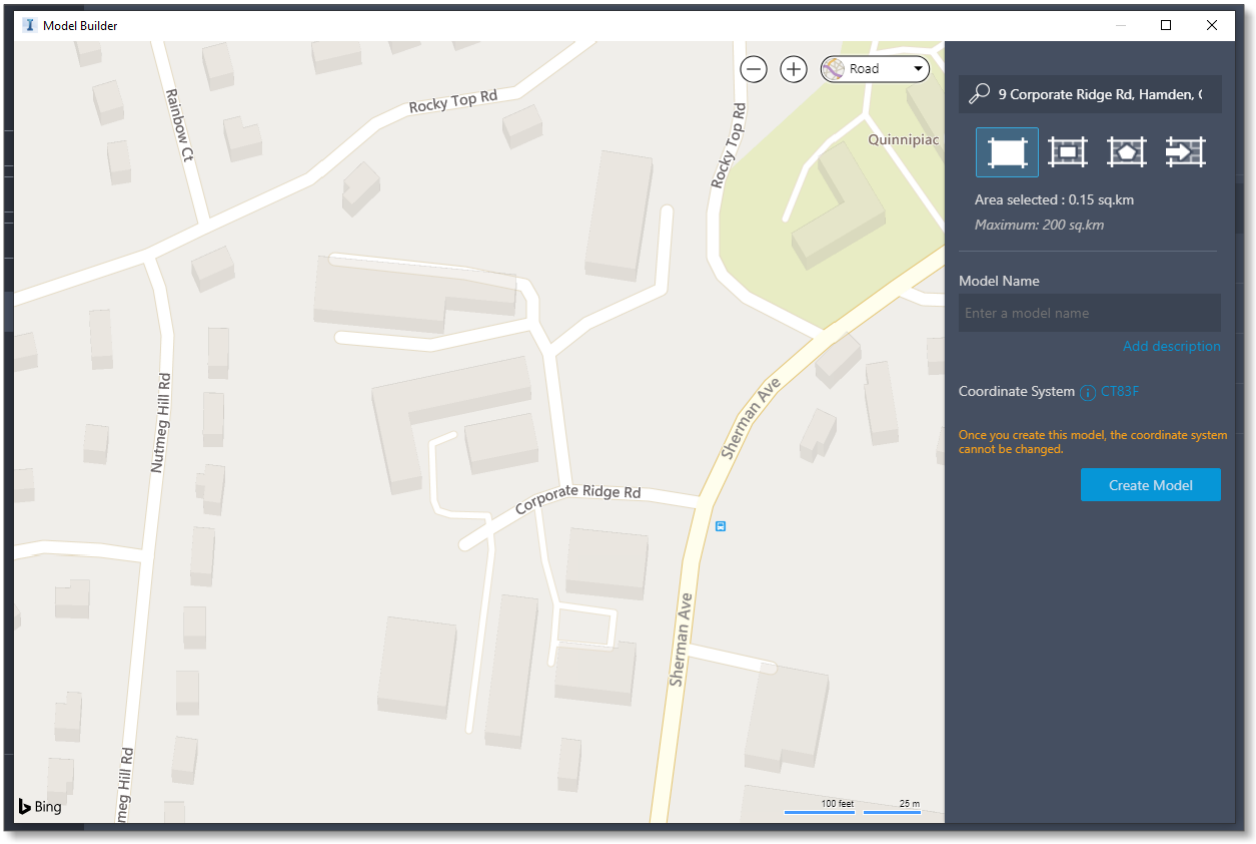
Speaker(s)

David Campbell and Kevin Closson are Application Specialists with Topcon Solutions. They work with many clients of different backgrounds to implement construction technology software. David is a vertical construction specialist, helping to tie workflows between software and hardware in the field, as well as in the office. Kevin is a horizontal construction specialist, helping to tie Civil Information to those who need it in the office and field.



Building a new model with Infraworks

To access Model Builder, from InfraWorks Home, click Model Builder.



Model Builder uses the cloud to find data layers and then builds a model for an area you specify.

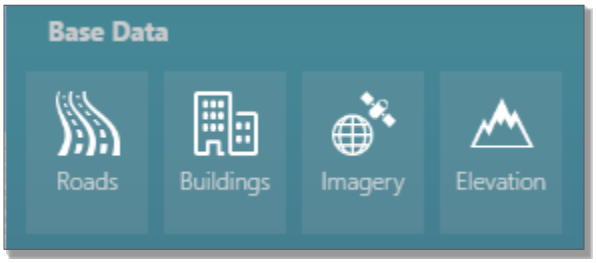
You can use the Model Builder with or without a BIM 360 account.

- If you have a BIM 360 account, you can store your models in the BIM 360 Document Management project folder of your choosing.
- If you do not have a BIM 360 account, you can store your models locally on your system.

  Note: If you create a BIM 360 account after you have created local models, you can then publish your local models to BIM 360 Document Management.

Model Builder Data Sources

Hover your cursor over any of the data sets to view information about the data source.



- **Roads and Railways**

  OpenStreetMap's Highway and Railway data sets are used to create roads and railway features in the model.

- **Buildings**

  Building data is from the OpenStreetMap dataset.

- **Imagery**

  Satellite imagery from Microsoft® Bing Maps is draped over the model terrain.

- **Elevation**

  Global terrain data is available in 10- and 30 meter DEMs depending on the geographic location of your area of interest. Terrain data for the United States and its territories uses USGS 10 meter DEMs from the National Elevation Dataset (NED). Between -60° and +60° latitude we use SRTMGL1 30m DEM data. Between +60° and +83° latitude we use ASTER GDEM v2 30m DEM data.

- **Water**

  Water body data is also from the OpenStreetMap dataset.

Import Point Cloud Data

Import .LAS, .LAZ, .RCS or .RCP files from a 3D laser scan—of an object, a topography, a building, or even an entire town. Indexed data from such a scan is called point cloud data and used as a real-world reference for design work. Adjust point size and density for point cloud data in application options.

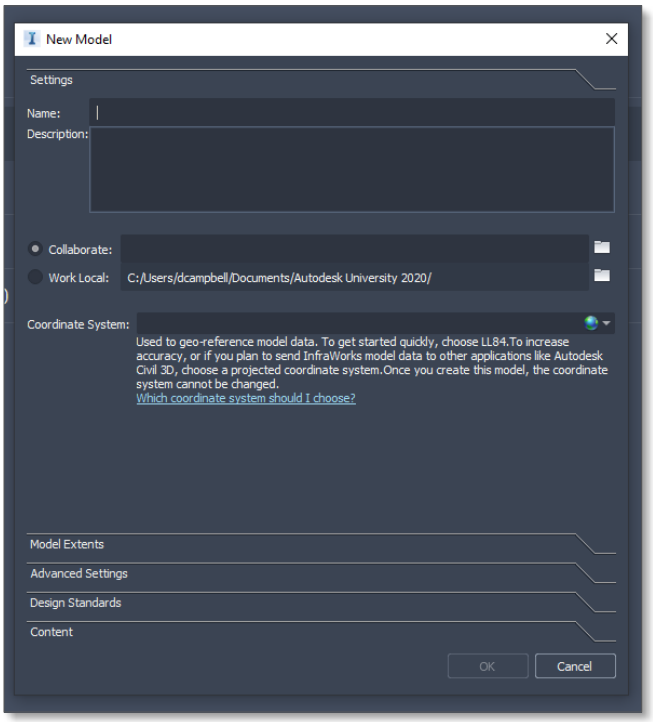
1. Click Manage ➤ Content ➤ 
2. On the Data Sources panel, do the following:
   - Click  (Add File Data Source).
   - Click Point Cloud.
   - Navigate to the folder where files are stored and select the point cloud file.

     InfraWorks supports RCS and RCP files.

     If your point cloud data is stored in LAS format, you can convert it to RCS format. You can use Autodesk ReCap to do this. An RCS file is a single point cloud file that can incorporate multiple scan (LAS) files. There may be an accompanying RCP file (a project file that points to the individual scan files and contains information about them).
   - Click Open.
3. Double-click the new data source to configure it.
4. Do one of the following:
   - Specify the coordinates for the point cloud data location.
   - Click Interactive Placing.

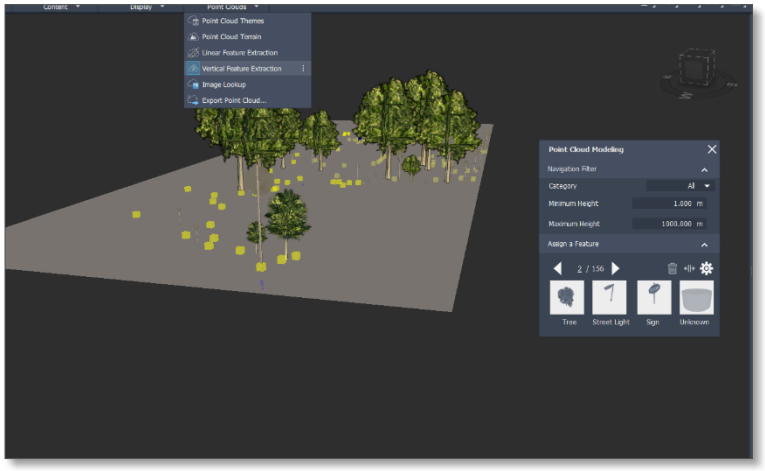
     In the model itself, the point cloud data appears, attached to your cursor. Navigate to the appropriate location and double-click to place it.

     Note: If the point cloud data includes geopositioning information and a specified coordinate system, it is imported automatically at the correct position.
5. If desired, adjust the scale, rotation, and offset of the point cloud.
6. Click Close & Refresh

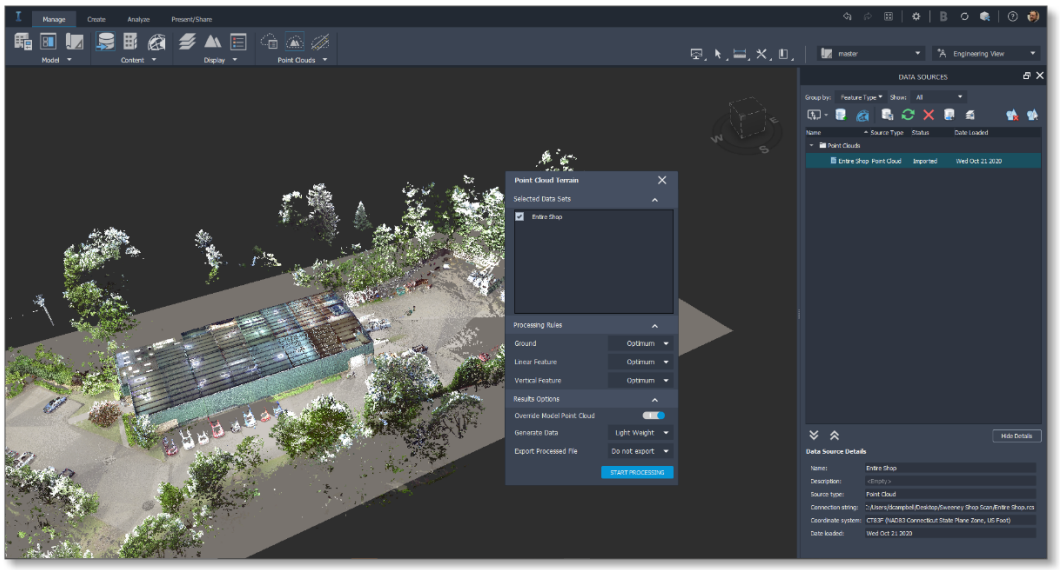


Point Cloud Feature Extraction

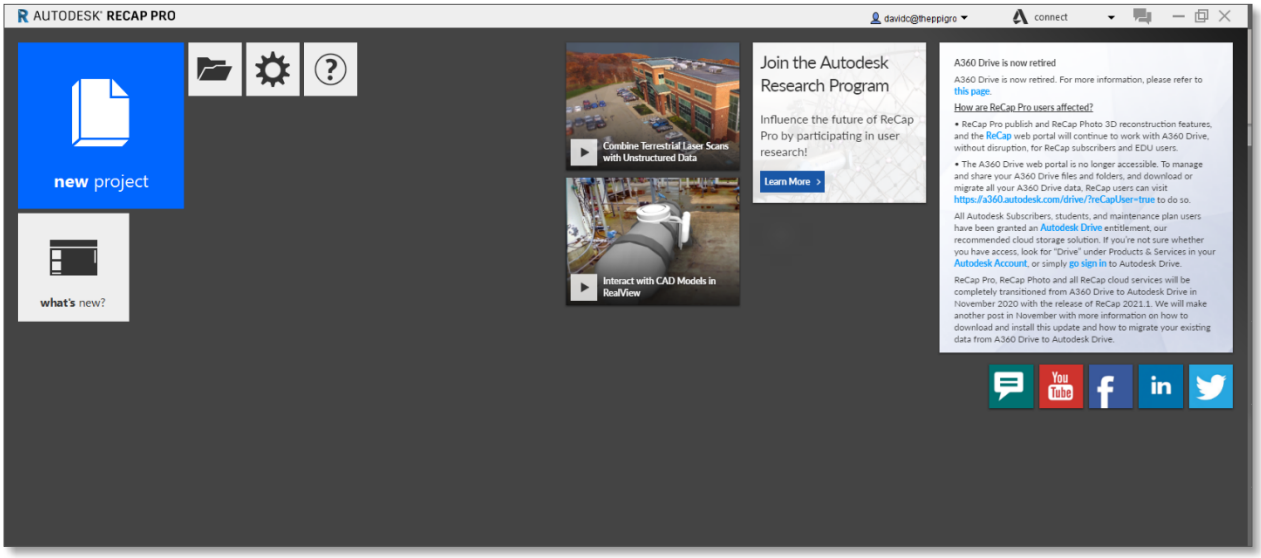
- **Vertical feature Extraction** - Extracts vertical features from point clouds such as trees, street lights, and signs.



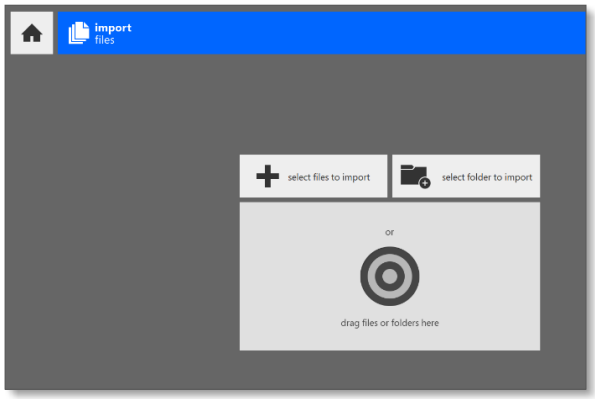
- **Terrain Feature Extraction** – Extracts and creates terrain from point cloud data
- **Linear Feature Extraction** - Extracts linear features from point clouds for road design, such as lane lines and curb lines.

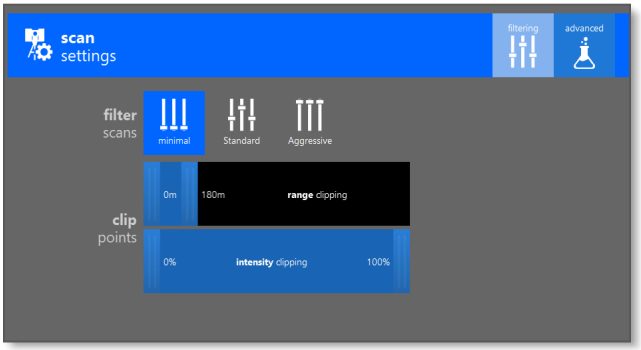


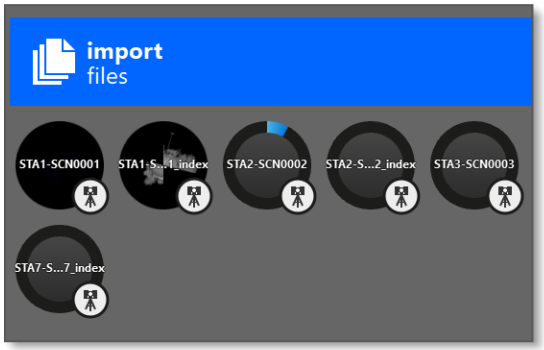
Processing a scan with Recap Pro

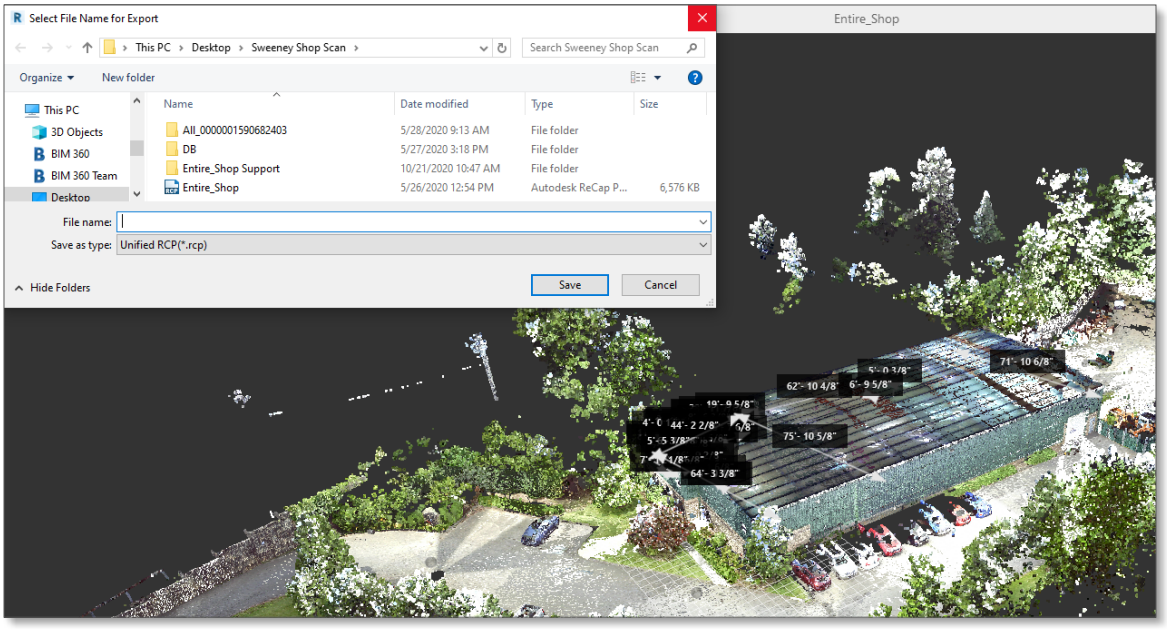


The project creation process differs, depending on whether you are using laser scans or photos as source data.Scan data is imported, indexed, and saved as a ReCap project. ReCap converts the scan files to a proprietary Reality Capture Scan format (RCS) that can be read by other Autodesk programs.At the start of this process, you can adjust the number of points imported by changing settings for noise, distance from the camera, intensity range, and decimation values. Save the indexed scan files in a Reality Capture Project file (RCP) that references, but does not contain, the files. ReCap supports the import of structured scans (including RealViews and registration where applicable) for individual or multi-scan E57 files.

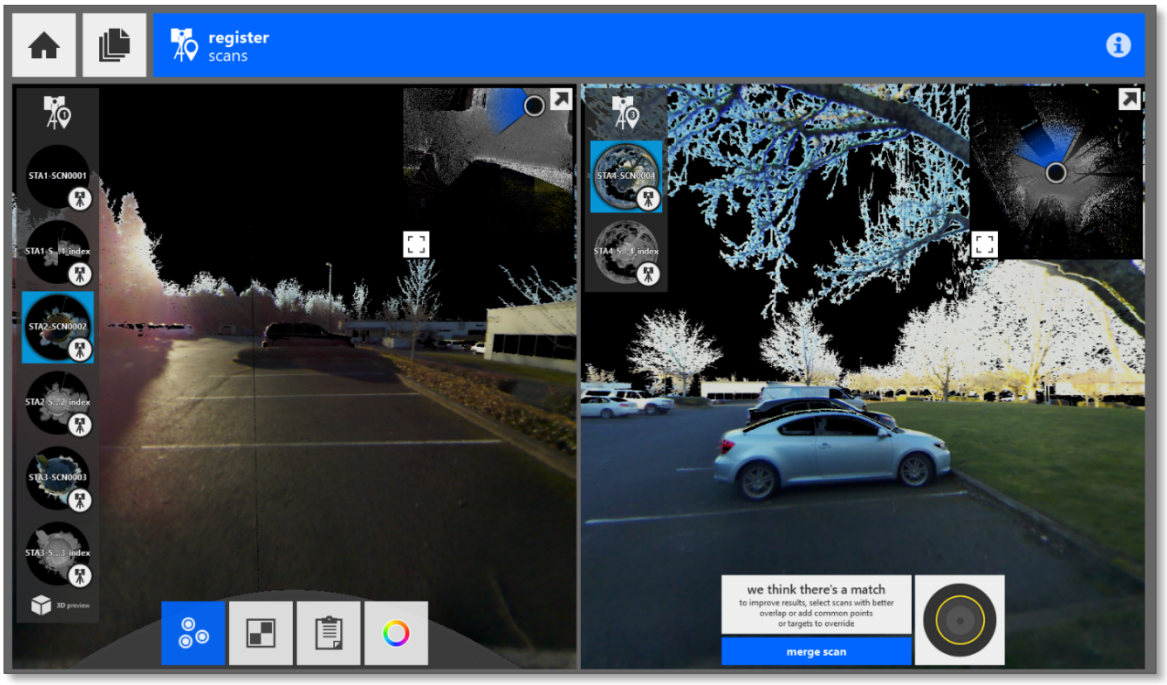








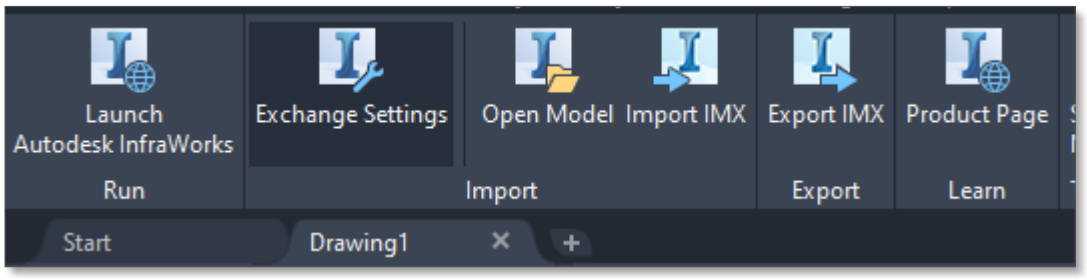
Photogrammatic data consists of digital photos taken from an unmanned aerial vehicle (UAV) or a number of fixed camera positions. The key requirement is that the field of view for each photo overlaps with those of adjacent photos on all sides so that all points around the subject are captured. After you import the photos into ReCap, you can review and edit the set of images, and then start the process of Photo-to-3D stitching or registration, which creates a seamless 3D panoramic scene. Stitching can occur automatically in ReCap, but if you have ReCap Pro, you can manually refine the process by designating survey points, such as precise corners of a building, that are visible in two images.



Once stitching has finished the scan can be unified and exported as an RCS to the desired location. RCS files can be collaborated by sharing them on the BIM 360 Platform or hosted locally.

Note* - If trying to host Point clouds on BIM 360 the RCS file type must be used, BIM 360 will not process an RCP.

Importing Infraworks data into Civil 3D



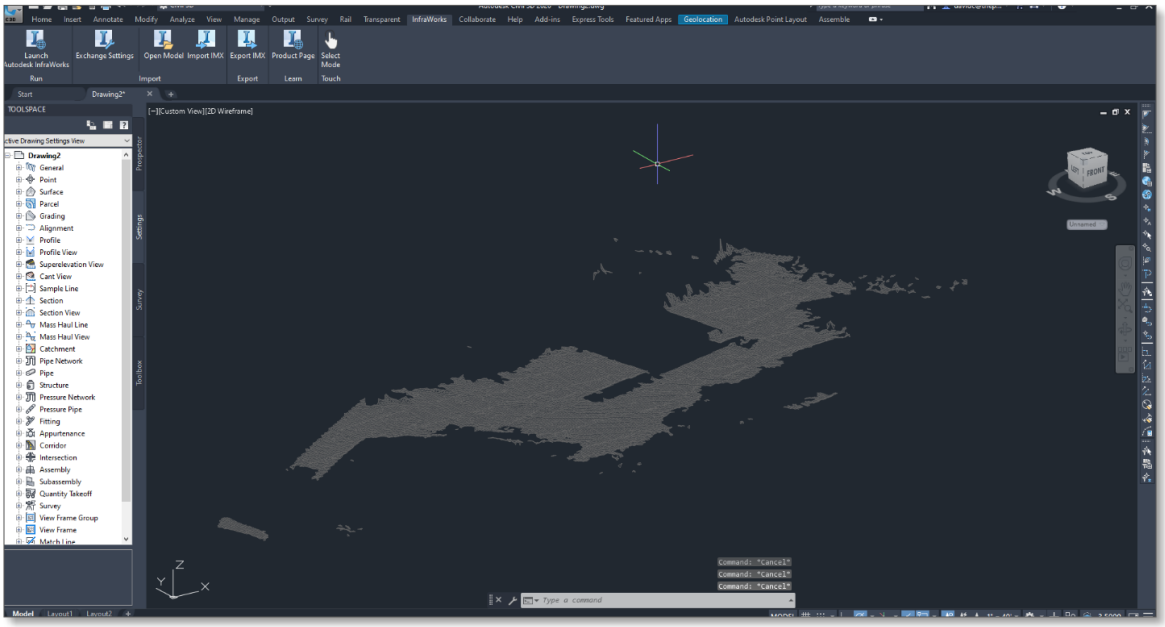
You can bring Autodesk InfraWorks data into AutoCAD Civil 3D by selecting a local model or an IMX file.

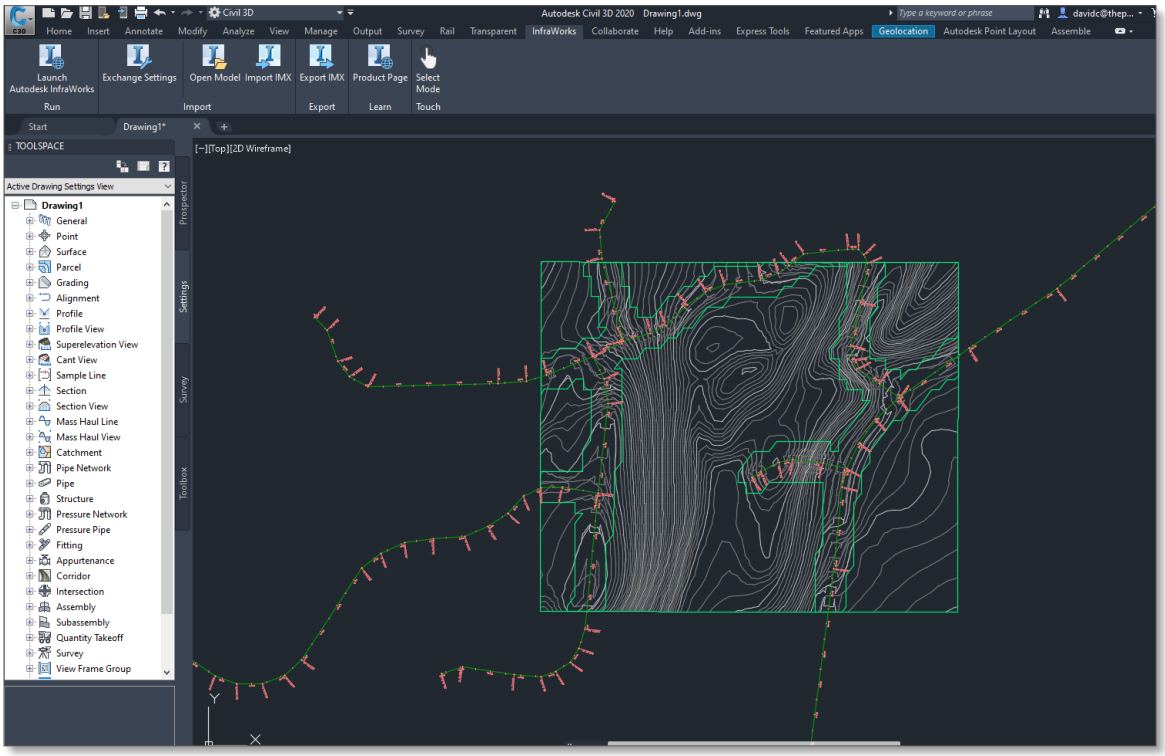
1. Click Insert tab ➤ InfraWorks panel ➤ InfraWorks ➤ Open InfraWorks Model Find.
2. In the Open InfraWorks Model dialog box, specify an InfraWorks model to open. You can select a local InfraWorks model by selecting an SQLITE file, or you can select an IMX file that was exported from InfraWorks.
3. Review the information under Coordinate System, and click Set a Coordinate System if you need to specify or change the coordinate system of the drawing. AutoCAD Civil 3D must have a coordinate system specified in order to bring in InfraWorks data.
4. If you selected an InfraWorks SQLITE file in step 2, you can use one of the following Selection Area options:
   - Click Extents of InfraWorks Model to open the entire model.
   - Click Area of Interest and then click Select Area to select an area. This option turns on the display of online map data in your drawing and enables you to select an area from the map. When you select an area of the map, the rectangle that forms the selection window acts as a boundary for the surfaces that will be brought into AutoCAD Civil 3D. Other objects, such as roads, that are inside or that cross the selection window will be brought into AutoCAD Civil 3D in full.

     Tip: Using the Area of Interest option to limit the area that is imported may result in a faster processing speed for the command.
5. Specify the object settings file to use by selecting the folder in which it is located and selecting the file to use.

   Pre-defined object settings files are provided in the following folders:
   - C:\ProgramData\Autodesk\C3D 2018\enu\Data\InfraWorks Object Settings\Metric
   - C:\ProgramData\Autodesk\C3D 2018\enu\Data\InfraWorks Object Settings\Imperial
6. Refine the selection set of objects by clicking Refine Selection Set. Use the Refine Selection Set dialog box to refine the object selection and click OK.

7. Click Open Model.





Publishing Civil 3D surfaces to BIM 360

1. In Civil 3D, click Output tab ➤ Export panel ➤ Publish Surfaces to display the Publish Surfaces dialog box.

   Note: The **Publish Surfaces** command is also available on the Collaborate ribbon tab and on the Surfaces contextual ribbon tab in the Extract From Surface drop-down.

2. Select the TIN surfaces that you want to publish.

   Note: Grid surfaces and large surfaces cannot be published using this command and are filtered out of the selection.

3. Under Specify Output File, click the browse button and navigate to the BIM 360\<hub>\<folder>\<subfolder> location.

   Note: The Publish Surfaces command requires that you specify a location within a BIM 360\<hub>\<folder>\<subfolder> location. A connected drive for BIM 360 is indicated by a  icon. An account within the connected drive is indicated by a hub icon  . A folder is created within a hub.

4. Specify a file name and click Save.

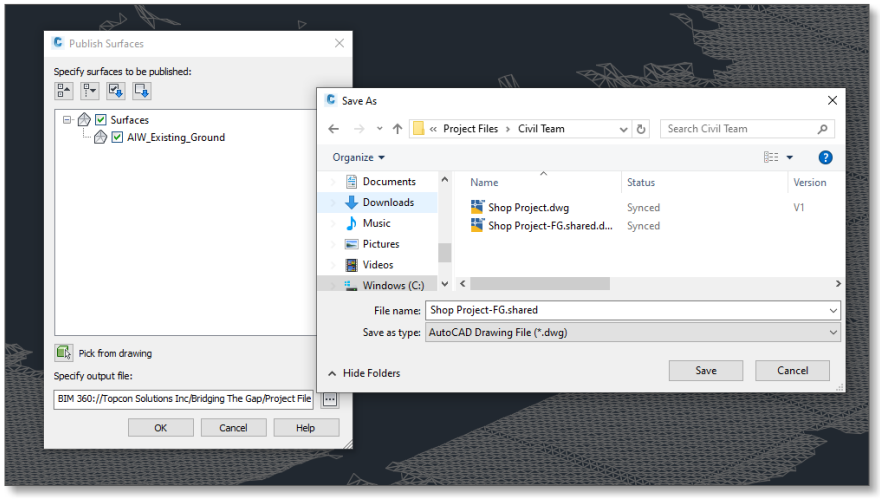
   Note: By default, the file will have the same name as the current drawing name and will be saved with a *.shared.dwg* file name extension. For example, if *drawing1.dwg* is the file name, by default the file will be saved as *drawing1.shared.dwg*. The surfaces that you specify are all saved in the same file. When you link to the topography in Revit, all of the surfaces in the file are linked.

5. Click OK.

   If the surface style settings need to be modified to ensure an accurate surface representation in BIM 360 and Revit, a task dialog box is displayed.

6. Click Publish the Surface with the Updated Style to automatically update the style and to continue the publish operation. The surface style in the current Civil 3D drawing will remain unchanged.

   Note: If you need to repeat the publishing operation using the same file name and location, it is recommended to wait for about one minute before republishing so that the previous process can be completed first. Note that the processing time depends on the size of the surface.



Create a link to Civil topography from Revit

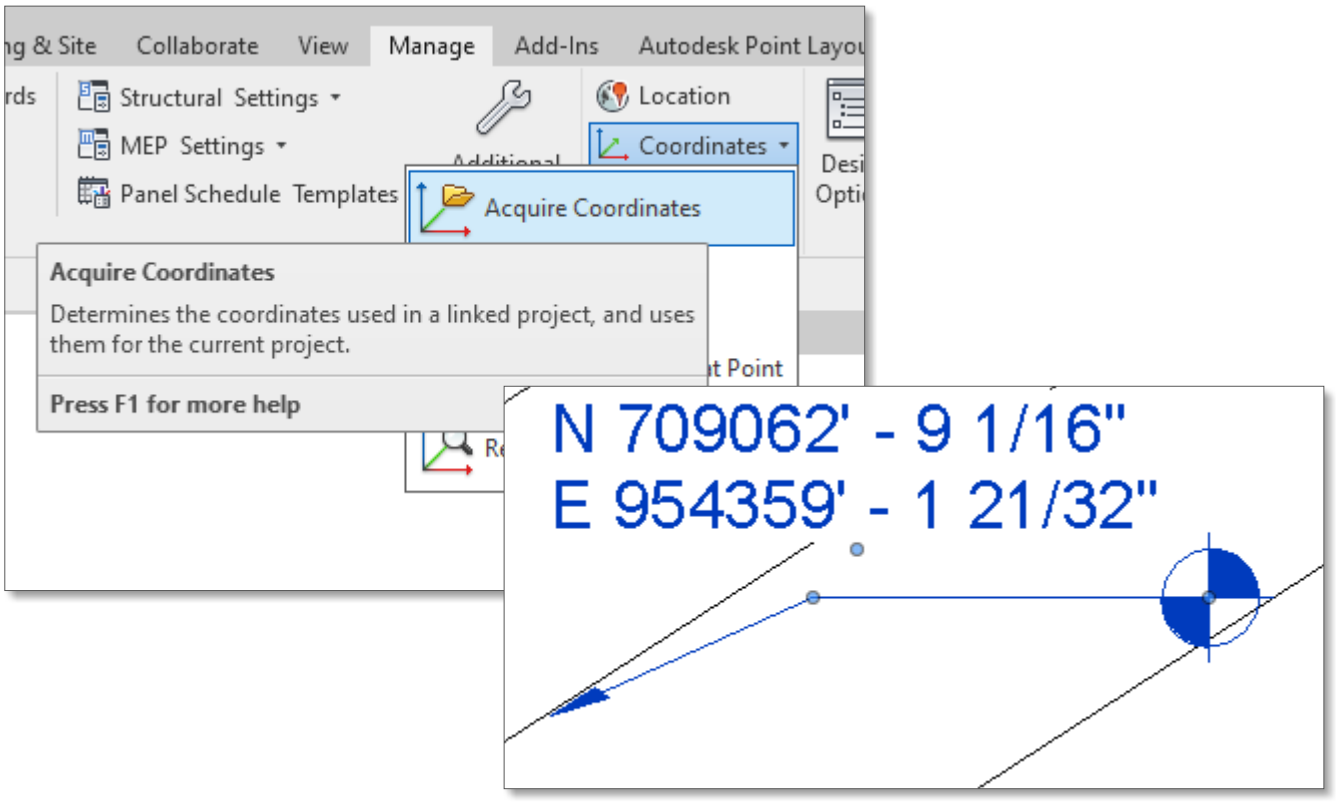
Topography provides context for the building model in Revit. If the civil engineer later updates the topography, you can reload the link to see the changes in the Revit model.

To link topography

1. Prepare Autodesk Desktop Connector.
2. In Civil 3D, prepare the topography as follows:
   1. Create topography for the project.
   2. Publish surfaces to BIM 360.

      The process to publish surfaces can take a few minutes. When ready, the topography data displays in the BIM 360 folder.
3. (Optional) In BIM 360, review the topography.
4. In Revit, link the topography to the current model as follows:
   1. Specify coordinates for the building model. This can be done by acquiring coordinates from the linked toposurface. This strategy ensures accurate positioning of the model on the linked topography.

      If you skip this step, the linked topography is placed center to center with the model, and you must position it manually. See About Positioning Linked Topography.



2. Open a plan view or a 3D view for the building model.

   Use the Visibility/Graphics dialog to make sure that topography will display in the view. For example, the site plan view displays topography by default.

3. Click Insert tab ➤ Link panel ➤ (Link Topography).

4. In the Link Topography dialog, navigate to the topography.

   Select the appropriate BIM 360 project and folder. The dialog lists topography that contains surfaces, indicated by the icon.

5. Select the desired topography, and click Link.

Visibility/graphics: The topography displays in the current view based on its Visibility/Graphics settings. Use the Visibility/Graphics dialog to control the topography display in other views.

Multiple surfaces: If the topography contains multiple surfaces, each surface is treated as a separate element in the link. Press Tab to select an individual surface. See Select Elements in a Linked Model and About Working with Linked Topography.