AUTODESK **UNIVERSITY** 2015

UT10043

Exchange That Data—AutoCAD Map 3D to AutoCAD Utility Design and Back

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Learning Objectives

- Discover AutoCAD Utility Design Data Exchange (DX)
- Discover how to configure DX mappings
- Discover how data is imported and validated
- Discover how data is exported

Description

This class will discuss and demonstrate the concepts of using AutoCAD Utility Design software's Data Exchange (DX) functionality. Using DX, we can attach to feature data object (FDO) and industry model geographic information system (GIS) data stores to pull as-built data into an AutoCAD Utility Design project to be used as the basis for that design. DX enables us to create mappings between our external data store and the internal AutoCAD Utility Design industry model and this mapping is used when importing and exporting data. During this class we will connect to a job-enabled AutoCAD Map 3D software electric industry model, map its feature classes to our AutoCAD Utility Design feature classes, and import data. We will then edit some of those features, remove some of those features, and create new AutoCAD Utility Design features and export that data back into an AutoCAD Map 3D software job. Finally, we will look at the imported data in AutoCAD Map 3D software.

Your AU Experts

This is Andy's 14th year presenting at Autodesk University! Andy is an Implementation Consultant in the Global Services, Americas Utilities and Telecom Consulting group at Autodesk®. He has more than 15 years of programming, customization, configuration, integration and management experience in the Autodesk® reseller, training, and developer communities. Prior to working in the GIS and CAD consulting fields, Andy worked in the civil, environmental, and geotechnical industry as a project engineer, and was involved in all phases of field data collection and design. He earned a bachelor's degree in geology and master's degree in geologic engineering, and is a registered civil engineer.

Discover AutoCAD Utility Design Data Exchange (DX)

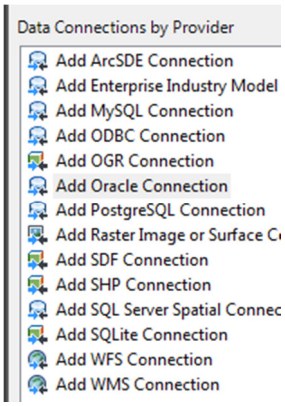

Figure 1 - Some FDO Providers

Data Exchange (DX) is an out-of-the-box component built into AutoCAD Utility Design (AUD) since release 2014. It allows for the exchange of data from a GIS system to AUD using the standard AutoCAD Map 3D Feature Data Object (FDO) data providers. FDO is also available and used in all other AutoCAD Infrastructure products such as Civil 3D and Autodesk Infrastructure Map Server. There are FDO data providers available for many types of GIS data – please see the adjacent figure for FDO providers that come with Autodesk Infrastructure products.

Using an intuitive user interface, DX allows for data mappings between the AUD Industry Model schema and the GIS schema enabling the data to be moved back and forth between the systems. This includes the ability to utilize domain tables. Data mappings between feature classes can be 1:M but attribute mappings must be 1:1 within a given feature class.

Please note that DX does not allow for any data transformation capabilities out-of-the-box

Figure 2 - The AUD Data Exchange Architecture

Discover How to Use Data Exchange

The following sections in this document will discuss the following design/as-built example workflow:

1. How to initiate a job in Map 3D that will be used to export from and import to
2. How to configure AUD to import data
3. How to import (extract) data into AUD
4. How to make changes to the design in the AUD drawing
5. How to export (merge) the design data from AUD to Map 3D
6. How to view, modify and complete the job in Map 3D

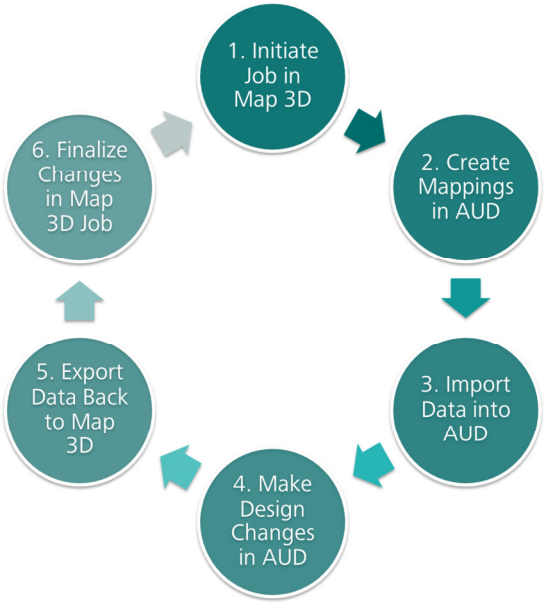

Figure 3 - Our Example Design/As-Built Workflow

Discover How to Initiate a Job in Map 3D

The first step in our workflow is to initiate a job in Map 3D. This step assumes that we are using a job-enabled Industry Model in Map 3D. This job will become the container for all changes to the GIS data once it is exported back into Map 3D from AUD.

To initiate the job, we use the standard Map 3D Job Manager user interface to create a new job. An appropriate job template is chosen for this job and a name it given to it. This name is typically a work order number or similar internal tracking number at your utility.

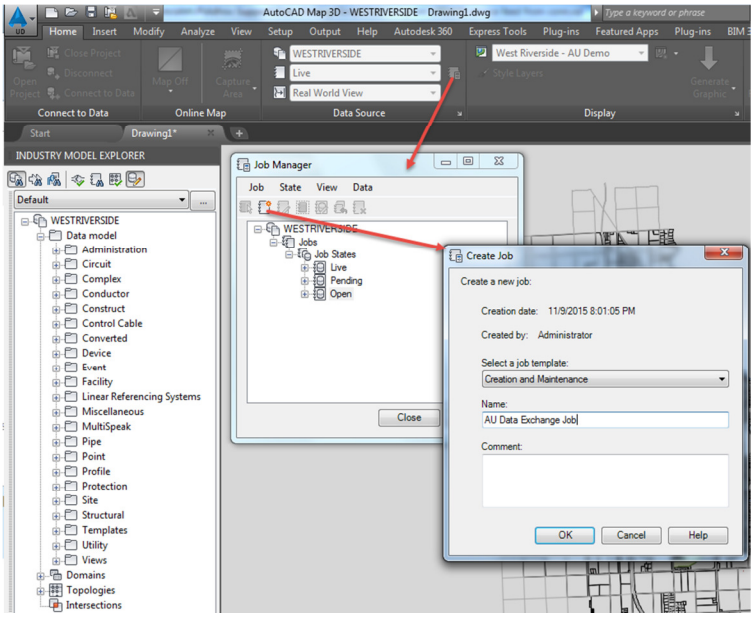

Figure 4 - Initiating a Job in Map 3D

In the job in Map 3D, make any edits that you would like the designer to see only in this job, such as job perimeters. These will be visible in AUD when the import is done.

Discover How to Configure DX Mappings in AUD

This step is usually configured in detail one time with only minor modifications needed later. Once mappings are created, they are generally stored in a drawing template (.DWT) file so that they can be easily reused later.

Mapping configuration is accessed by clicking the Configure Mapping button in the Data container of the Configuration ribbon.

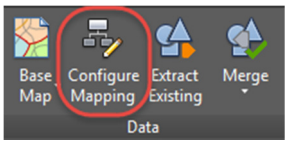

Figure 5 - Configure Mapping Button

When first accessing the Mapping Configurations dialog, the user is prompted to login to any Industry Model connections that are already configured in the mappings.

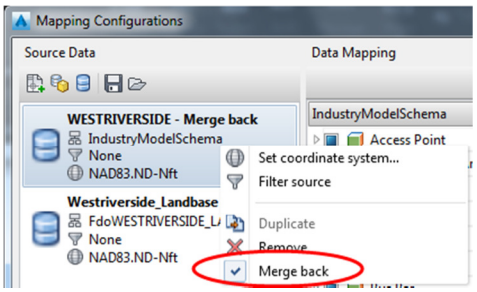

Figure 6- Merge Back Option

The Mapping Configurations dialog displays the available data connections that have been previously connected to in the drawing through mapping configurations. Data connections may be available but have not been selected for Merge Back.

The Data Mapping portion of the dialog shows the mapping between the selected data connection (on the left) and the AUD Industry Model internal to the drawing (on the right). In addition to feature class by feature class mappings, if the feature classes are driven from domain (lookup) tables, then the domain values can also be mapped.

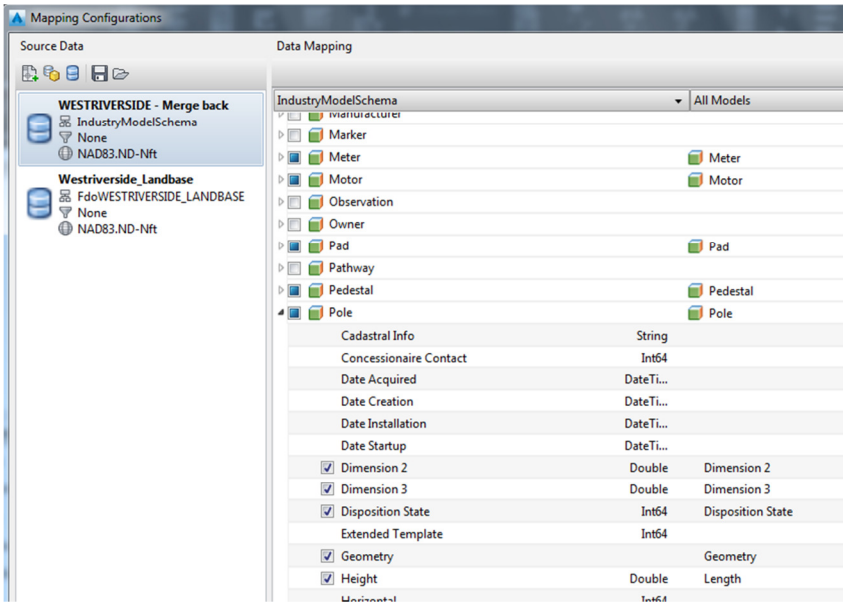

Figure 8 – Feature Class Data Mappings

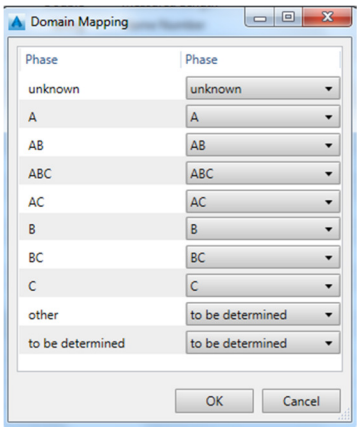

Figure 7 - Domain Mappings

Discover How Data is Imported into AUD from Map 3D

Once mappings have been configured, data can be extracted into the AUD design from the GIS. Extraction is accessed by clicking the Extract Existing button in the Project Area container of the Home ribbon. You will be asked to login to any Industry Models and choose a job from which to extract and merge. You can choose either the Live job or the job you initiated in the first step if there are job specific features that were created in Map 3D that you want to be able to see in the design.

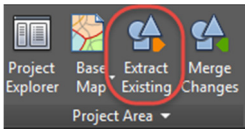

Figure 9 - Extract Existing Button

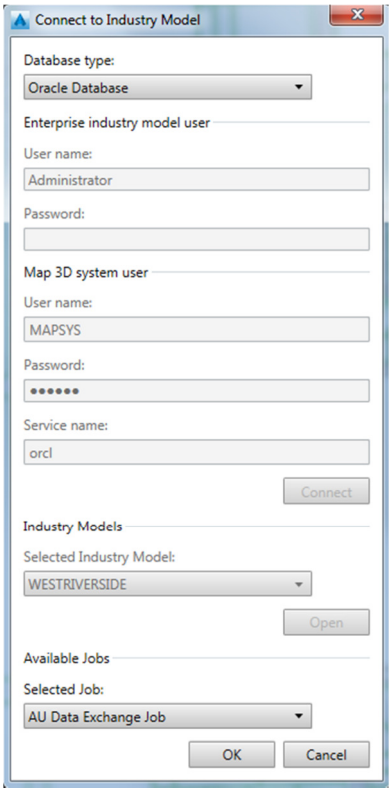

Figure 10 - Connect to Industry Model Dialog

Once you are connected to the Industry Model to extract from, you will be prompted to select a window on the map to spatially constrain the extraction query. The database will then process and display the summary of features to be extracted (if you have that option setup in the mappings)

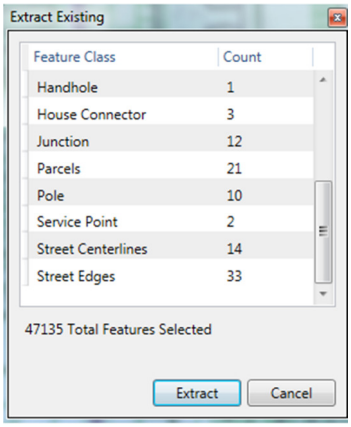

Figure 11 - Extract Existing Feature Summary

The data will then be processed and post-processed and displayed in AUD. When this happens, information is populated for each feature from 2 places: 1) From Map 3D feature attributes, and 2) from automatic assignment of attributes in AUD from model attributes or rules. For instance, in the example shown below, the pole model WP453 came from Map 3D but the model attributes were set in AUD based on the Industry Model parameters for that given model. In addition, features are stylized according to the stylization rules that have been configured in the AUD Industry Model in your design template. All features that are extracted have their status set to "existing" which will be used later during merge back.

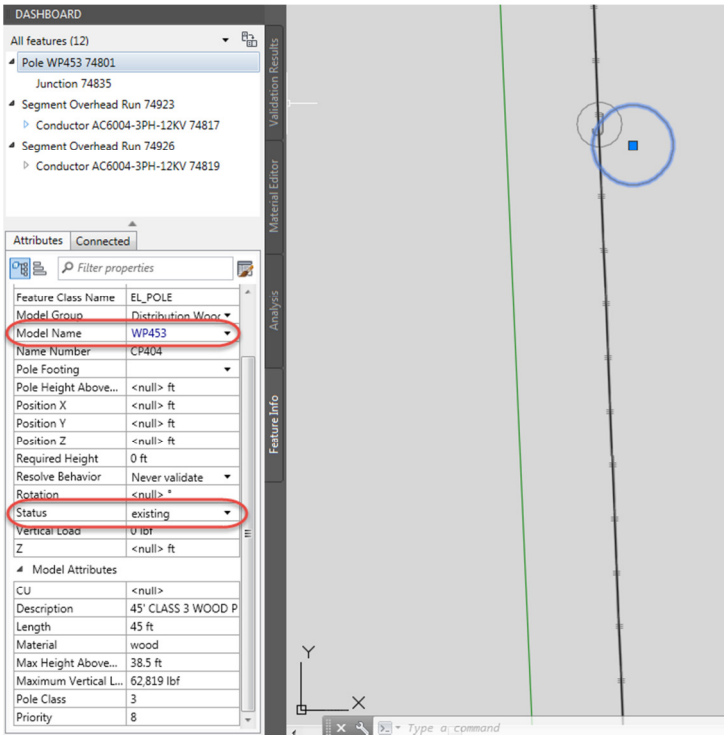

Figure 12 - AUD Pole Feature Info

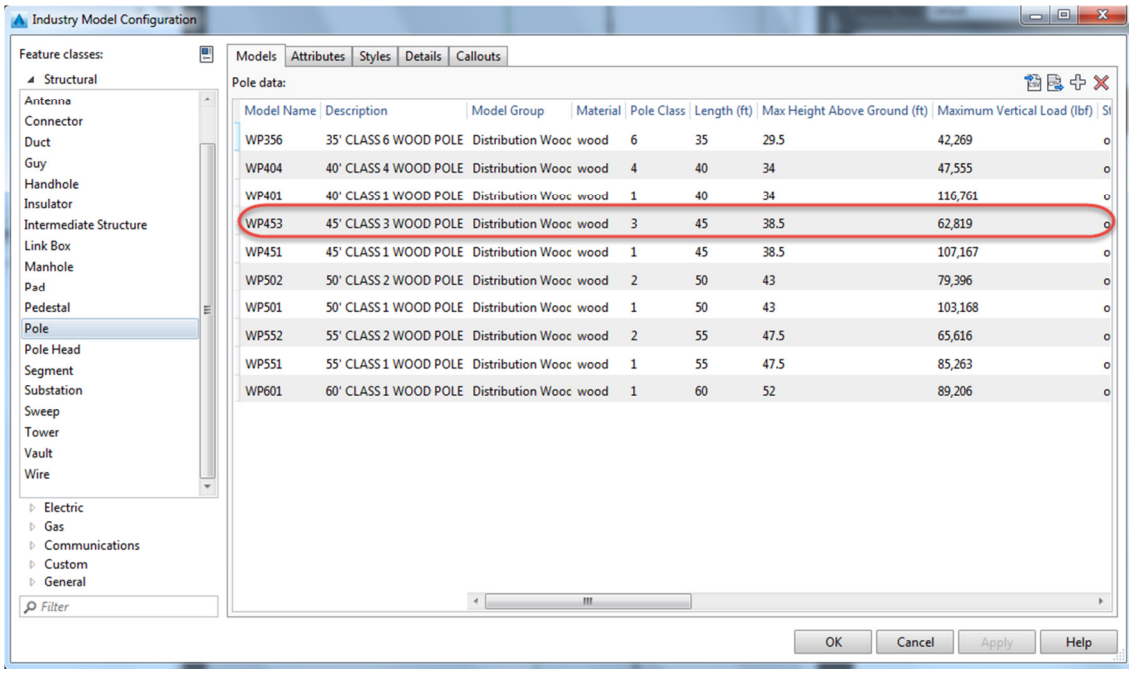

Figure 13 - AUD Industry Model. Pole Model Attributes.

Discover How to Make Changes to the Design in AUD

At this stage in the workflow, the designer makes changes to the design using their standard practices. In this example, we are creating a lateral takeoff from an existing pole to provide distribution to the new residential development to the west.

The existing pole is automatically guyed based on the validation rules since we manually changed its Resolve Behavior to “Allow auto resolve”.

Figure 14 - New AUD Features

For the purposes of merge back demonstration, we are also going to manually change the take-off pole model and change its status to “existing (modified)”.

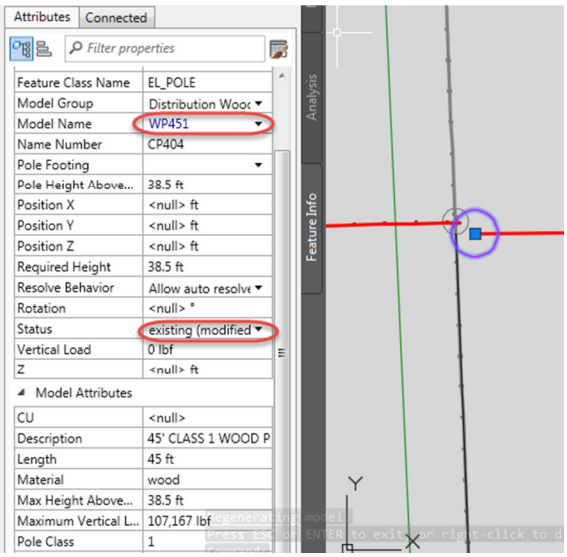

Figure 15 - Modifying Existing Feature in AUD

Also for the purposes of merge back demonstration, we are going to simulate removing the pole just to the south by changing its status to “removal”.

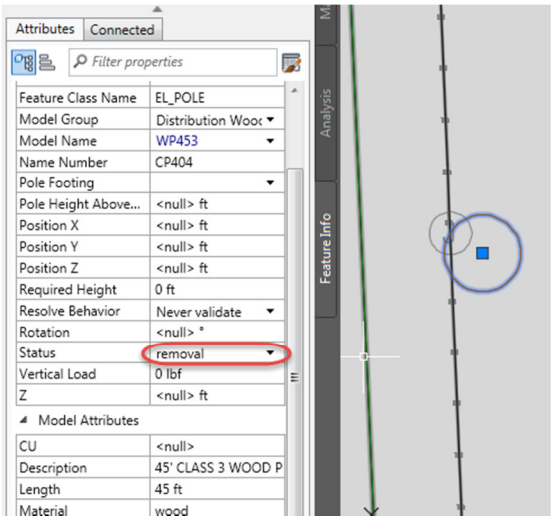

Figure 16 - Deleting Existing Feature in AUD

Discover How Data is Exported from AUD to Map 3D

Once all of our design changes have been made, the construction job has been completed in the field and the workflow dictates that the as-built information needs to be added to and modified in the Map 3D GIS, we need to merge those changes by exporting from AUD to Map 3D. Merging is accessed by clicking the Merge Changes button in the Project

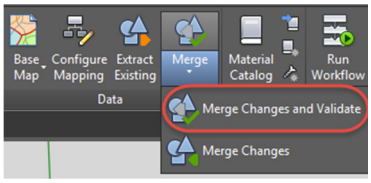

Figure 17 - Merge Changes and Validate Button

Area container of the Home ribbon. However, we recommend that you use the Merge Changes and Validate option on the Data container of the Configuration ribbon tab.

You will be asked to login to any Map 3D Industry Models and choose the proper job to merge changes to.

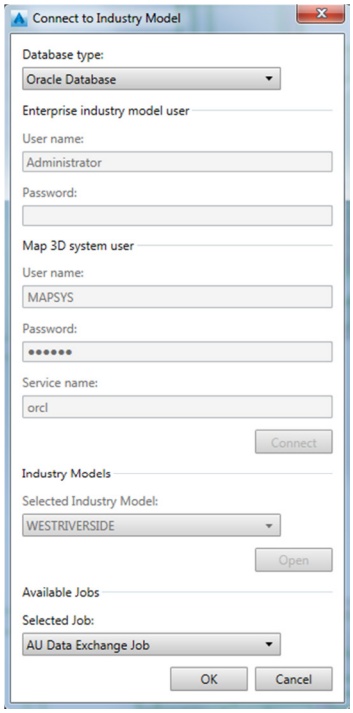

Figure 18 - Connect to Industry Model

Since we are using the Merge Changes and Validate option, we are presented with another dialog that contains all of the features in the design to be merged back to Map 3D and their status (new, modified or deleted). We can change the option from Keep to Skip if there are features that we do not want checked back into the GIS.

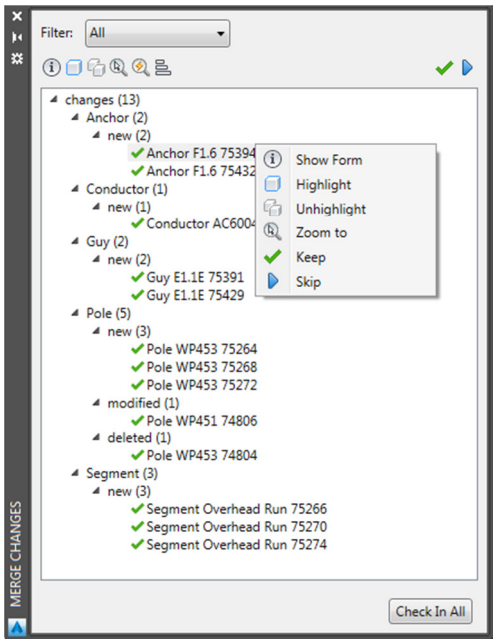

Figure 19 - Merge Changes Summary

Discover How to View, Modify and Complete the Job in Map 3D

In Map 3D, open your Industry Model project and then open the job that you merged data into.

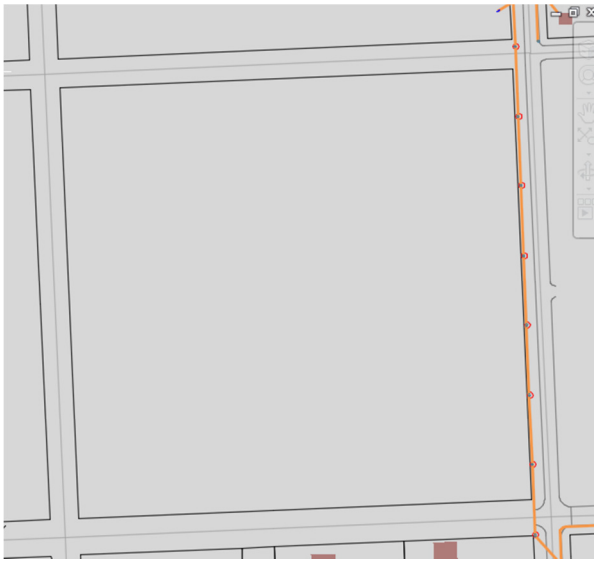

Figure 21 - Map 3D Live Features

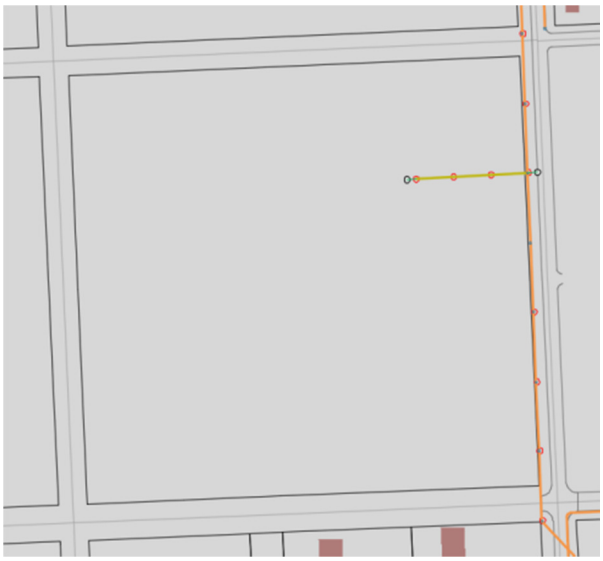

Figure 20 - Map 3D Job Features

Examining the features in the map, we can see that the objects we modified and created in AUD are now in this Map 3D job. For instance, for the pole where we changed the model, you can see the new model name.

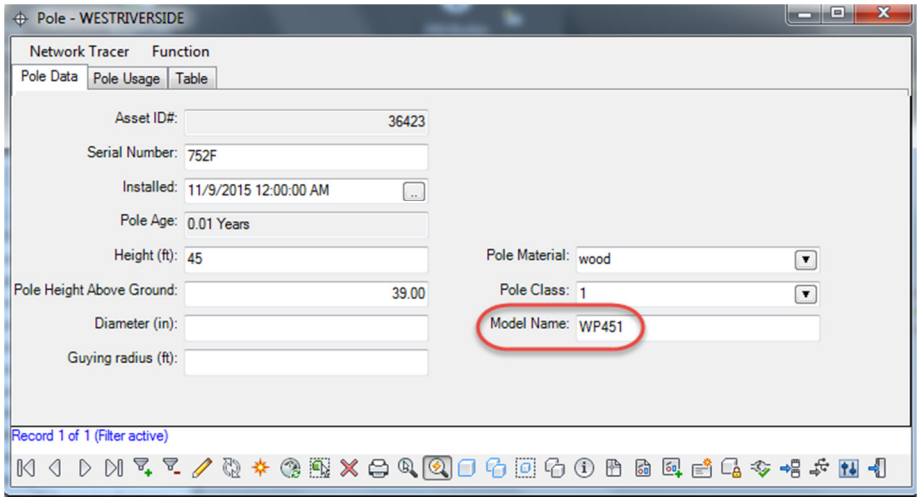

Figure 22 - Map 3D Modified Pole Model

Also, our structural and electrical topology models have been maintained during the exchange. You can see that existing junction is now connected to the new overhead conductor.

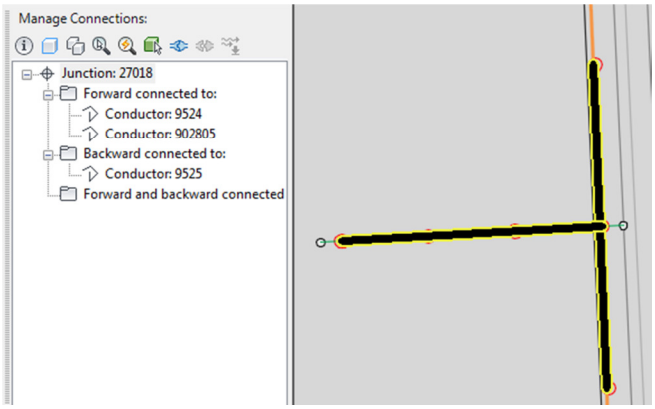

Figure 23 - Map 3D Connections

At this point, the CAD/GIS technician would make the final as-built changes to the data and post the data to Live.

And we are finished with our design workflow!