CDOT Workflow IR 23 - Migrating Survey from InRoads Select Series 2 to OpenRoads Select Series 4

Contents

Overview

This document guides you through the process of migrating survey data for projects which were started in InRoads V8i Select Series 2 into OpenRoads (InRoads V8i Select Series 4). These SS2 surveys may have been completed and shelved (Case 1 below) or may still be in progress (Case 2 below).

Survey Project Status Case 1

Case 1: The survey is finished including delivery of a DTM and DGN files to design.

Option 1: Follow the workflow here exactly which provides all the survey deliverables in OpenRoads format and these deliverables will match the deliverables as though the survey was produced completely in SS4.

The workflow for migrating the data in ***Case 1 Option 1*** follows these steps:

1. Process the SS2 survey data stored in FWD formatted files thru OpenRoads Survey, including, adjusting the processed survey data to correct for changes in linking codes as described in ***Section I. Import FWD Survey Data***.
2. Import SS2 DTM files into OpenRoads terrain models to address terrain inadequacies as described in ***Section II. Import DTMs to Terrain Models***.

Option 2: Do nothing. The project team decides to continue with SS2 to complete their design in order to meet the project schedule and critical dates (such as the AD date). The workflow for migrating the data in ***Case 1 Option 2*** is to ***do nothing.***

Survey Project Status Case 2

Case 2: The survey is only partially complete with some field data processed but other field data unprocessed. Field data is still being collected with old TMOSS codes.

The workflow for migrating the data in ***Case 2*** follows these steps:

1. Reprocess the current state of the FWD file using OpenRoads Survey as described in ***Section I. Import FWD Survey Data***.
2. Process the remaining field data (SDR, TXT, CSV, etc.) using OpenRoads Survey (use the same DGN as the FWD) as described in ***Section I***. This processing will not be different than the OpenRoads Survey training class other than the use of substitution strings shown on page 10.
3. Disregard ***Section II*** – develop the terrain model as part of the survey DGN, as trained in the OpenRoads Survey class.

Statement of Need:

A variety of projects have been started in InRoads V8i Select Series 2 and these projects currently exist in a variety of stages of development. Some surveys are completed and prepared for delivery to design as per deliverables requirements in SS2. Other survey projects are in midstream with some data processed into FWD and some field data still being collected with old TMOSS codes.

What is the process of migrating current InRoads survey data from the Select Series 2 version to the Select Series 4 version and what potential challenges or problems may arise from the migration?

Definitions Used in This Document

DTM – as used in this document designates the legacy terrain model format which normally has a file extension of DTM. After import the DTM data becomes an OpenRoads terrain model element.

FWD – the files used in Select Series 2 for storing of survey data. The FWD files will contain all the edits as performed using SS2 survey software. After import, the FWD data becomes an OpenRoads Survey DGN file.

OpenRoads – Since the migration in question here amounts to migrating files from traditional InRoads technology to OpenRoads technology, in the remainder of this document the term "OpenRoads" is used to designate the Select Series 4 files or technology.

SS2 – This refers to the InRoads V8i Select Series 2 version of the software. In the remainder of this document the term "SS2" is used to designate the InRoads V8i Select Series 2 files or technology.

Terrain Model – The OpenRoads format of terrain models which are stored in DGN files.

Example Datasets

The example dataset used in this document is project 20514 - US 50 Orchard Mesa Resurf.

The workflow shown here requires a specialized seed file named "Seed To Migrate SS2 Survey.dgn". This seed has been added to the standard workspace. The use of this file is explained in Section I.

Additional Information

Please refer to the CDOT Workflow IR 18 – Using InRoads SS2 and SS4 with MicroStation SS4 document for more information on how to set up a MicroStation DGN file so that it will open MicroStation by itself, MicroStation and InRoads SS4, or MicroStation and InRoads SS2, as well as setting up Project Defaults for your project.

Workflow Description and Examples

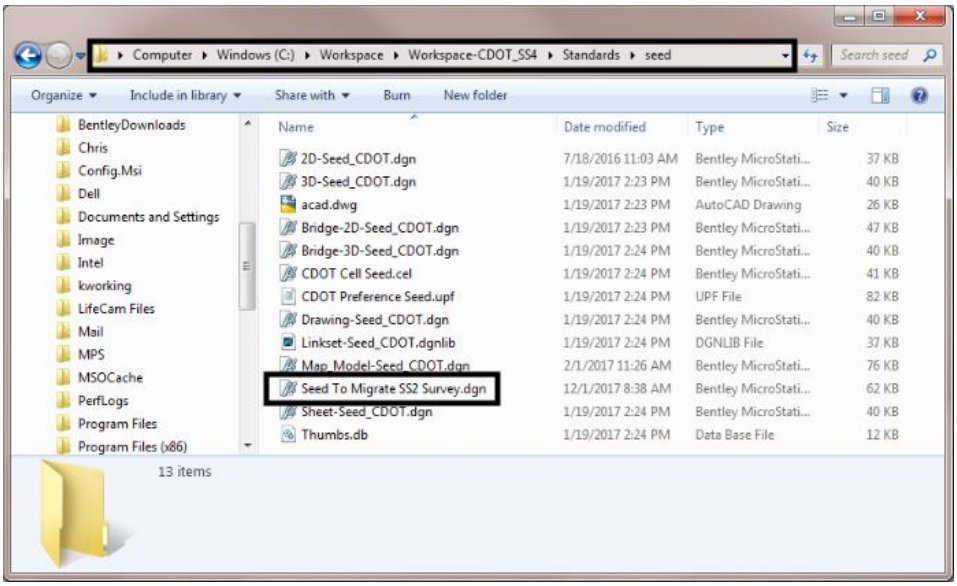
Section I. Import FWD Survey Data (Used for Case 1, Option1 and Case 2)

In this section of the workflow, the DGN file is set up which will contain the topographic data, by importing the FWD file generated in InRoads Survey SS2.

This section uses a special seed file which has been constructed to accommodate the migration of InRoads SS2 survey files into OpenRoads. This seed file is named "***Seed to Migrate SS2 Survey.dgn***". It is pre-populated with unique survey project settings which accommodate the substitution of new SS4 linking codes for the old SS2 linking codes.

In this example, field book "US50SouthAll01.fwd" is imported.

1. In ProjectWise, navigate to the desired project folder. Typically, this will be the ***\ROW_Survey\Drawings\Reference Files*** folder for the project.
2. Use the seed file **Seed to Migrate SS2 Survey.dgn** to create a new DGN file which will contain the processed survey data. Drag and Drop the seed file into the desired location in ProjectWise. The seed file is located in the following directory: ***C:\Workspace\Workspace-CDOT_SS4\Standards\seed***



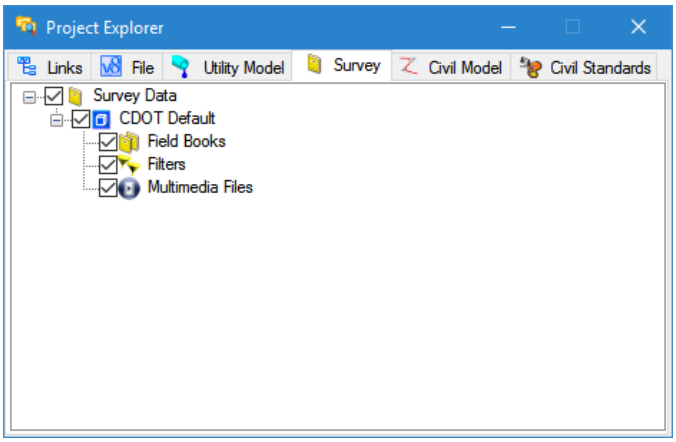
3. Rename the file **Seed to Migrate SS2 Survey**.dgn that was copied into ProjectWise to ***JPC#Survey-Topo.dgn***. In this example, **20514Survey-Topo.dgn** is used.
4. After opening the to ***JPC#Survey-Topo.dgn*** file, set the Annotation Scale to 1"=1'.

5. Assign the appropriate geographic coordinate system. (**Menu: Tools > Geographic > Select Geographic Coordinate System**). See ***CDOT-Setting a Project Geographic Coordinate System.pdf*** located in the project: ***\ROW_Survey\Drawings\Reference_Files\Control_Diagrams*** folder in ProjectWise for more information.

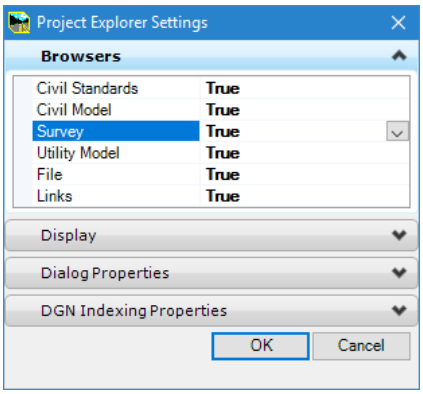
This file will now be used for processing the FWD files produced in InRoads Survey SS2.

6. **Open Project Explorer** from the Primary Tools toolbox docked at top of screen or from Menu bar by selecting **File > Project Explorer**.

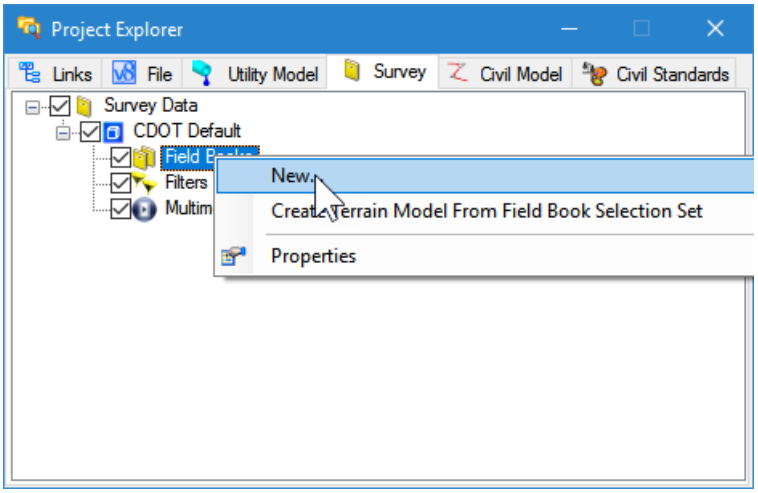
7. Left click on the **Survey** tab in ***Project Explorer*** and expand the model named "**CDOT Default**"



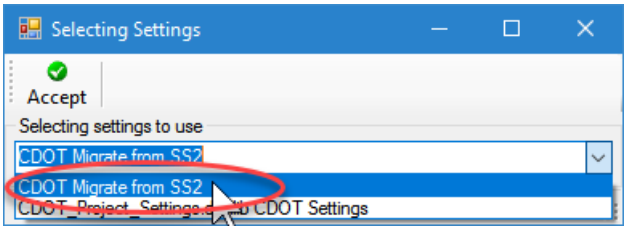
Note: If the **Survey** tab is not shown then go to Menu: **Settings > Project Explorer** and set the entry for ***Survey*** to **True**, then click **OK**.



8. Create a new field book by right-clicking on **"Field Books**" and selecting **New** from the pop-up menu.

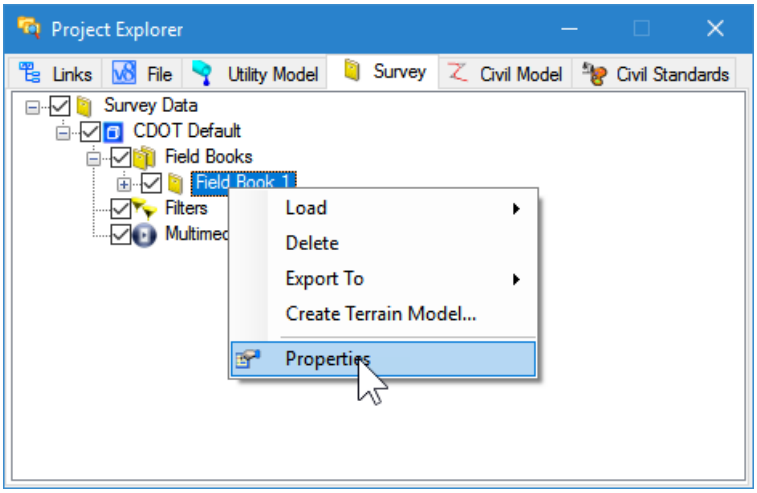


9. In the ***Selecting Settings*** dialog box, select "**CDOT Migrate from SS2**" then left click the **Accept** button.

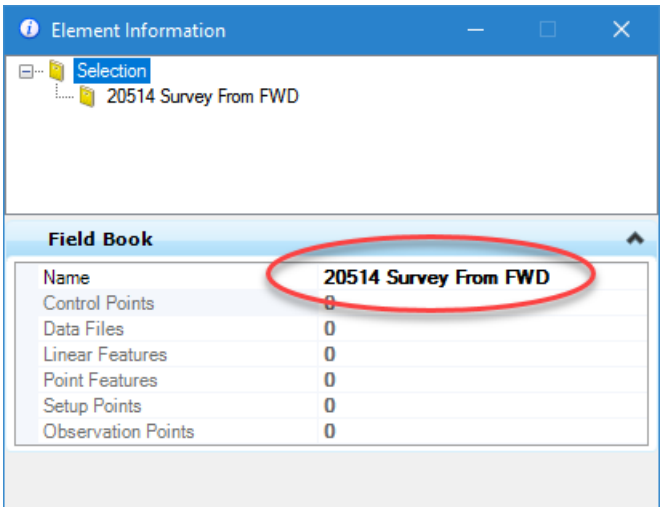


Note: This selection is necessary because the seed file used has special survey settings already embedded which assist in the migration of the SS2 survey data. Thus, OpenRoads finds two settings, one in the active DGN and one in the workspace.

10. After the field book is created, right-click on the new **field book** and then click **Properties** in the pop-up menu. This displays the ***Element Information*** dialog box.

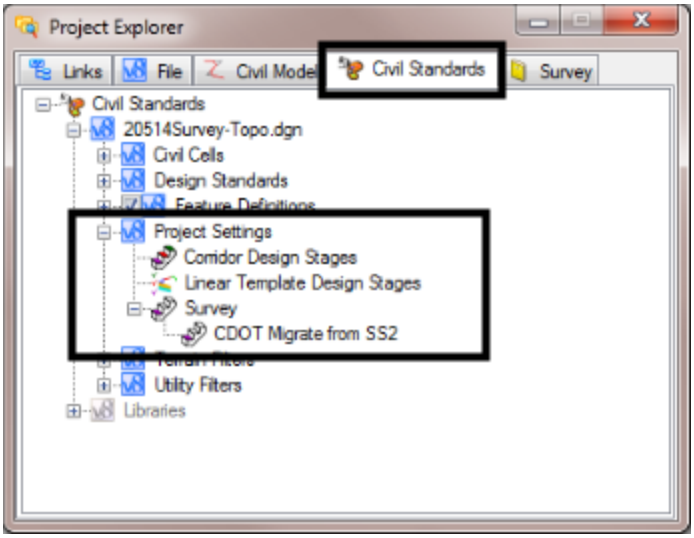


11. In the ***Element Information*** dialog box, change the name of the field book to **JPC# Survey From FWD**. 20514 Survey From FWD is used in this example.

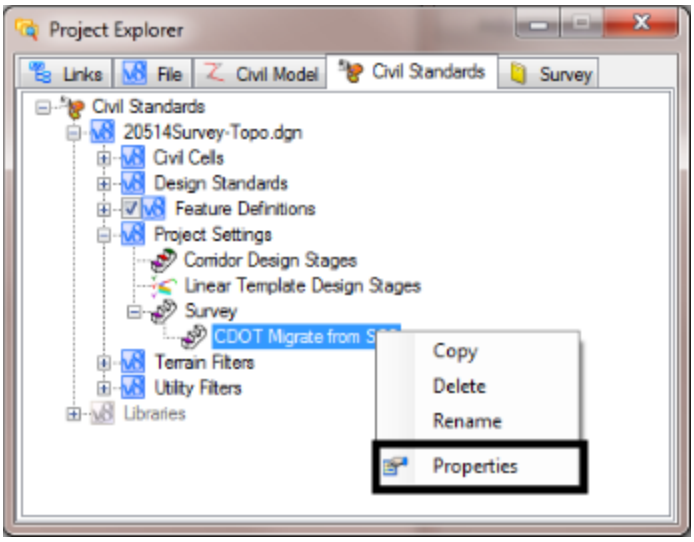


Note: It may be desirable to review the changes in the survey settings in this special seed file.

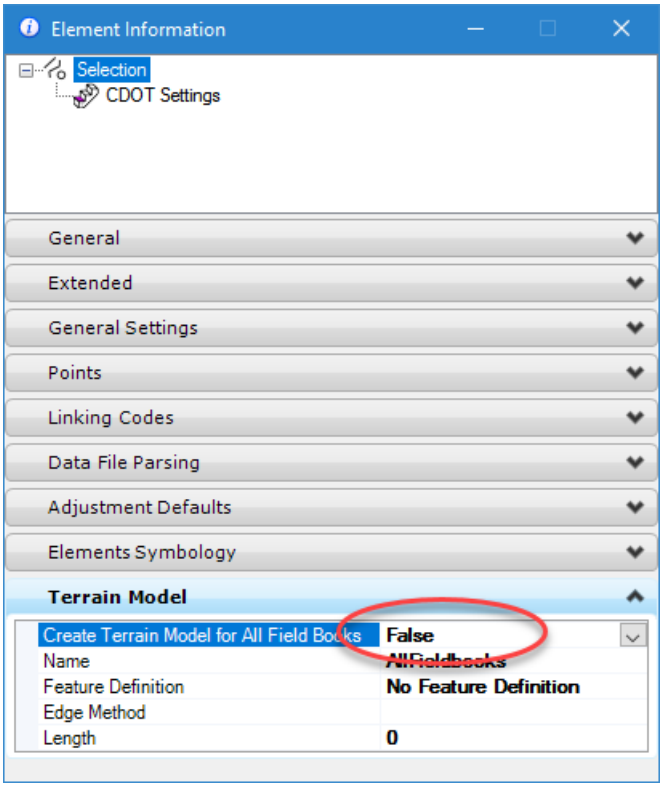
12. Left click the **Civil Standards** tab of project explorer.
13. Expand the branch of the tree labeled **20514Survey-Topo > Project Settings > Survey**.



14. Right click on **CDOT Migrate from SS2** setting and select **Properties** from the popup menu. This displays the ***Element Information*** dialog box.

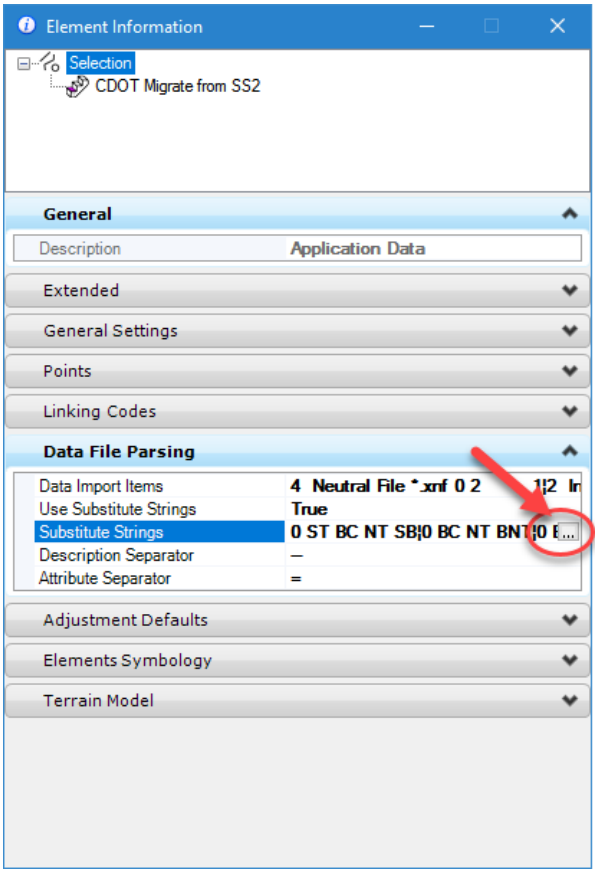


15. In the ***Element Information*** dialog box, notice that ***Create Terrain Model for All Field Books*** is **False**.
    a. If this is a finished survey (**Case 1, Option 1** from above) then leave this as **False.**
    b. If this is an unfinished survey (**Case 2** from above), then change this to **True**.

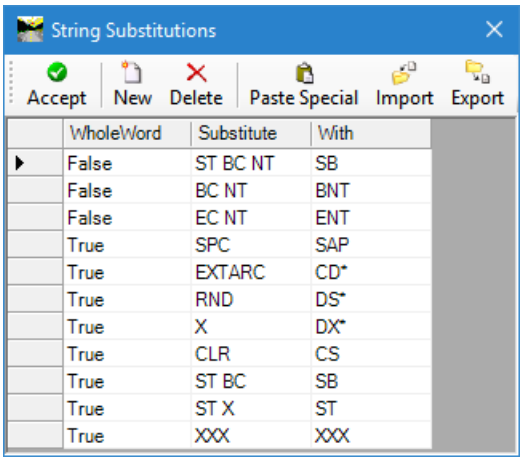


Note: For a finished SS2 survey (Case 1), the terrain model will not be generated from the survey data in the files being processed. The reason for this is that the DTM file generated in SS2 has already been checked, corrected and approved. This approved DTM will be used for the ground surface.

16. Then, in the ***Data File Parsing*** tab, click on the **ellipsis** next to ***Substitution Strings***.



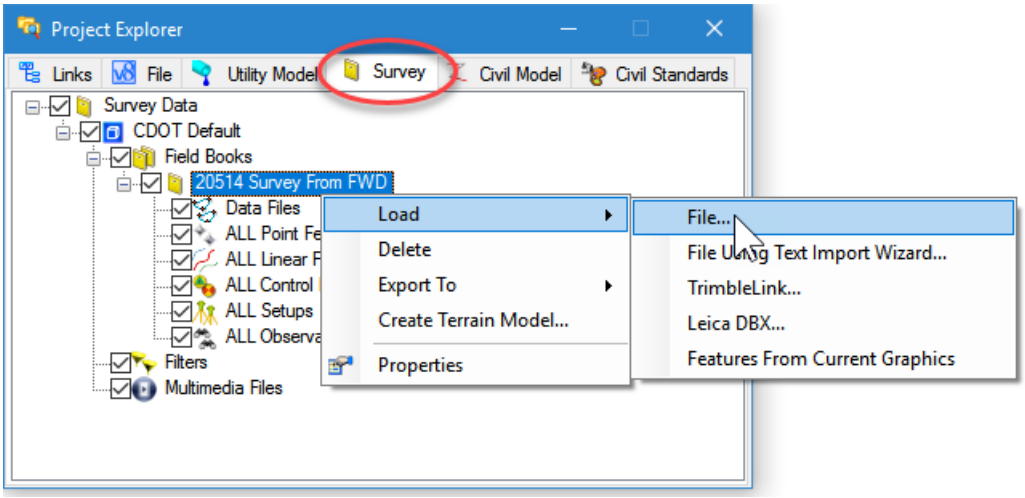
17. In the list which opens, **notice** that the old SS2 linking codes are being replaced with the OpenRoads linking codes.



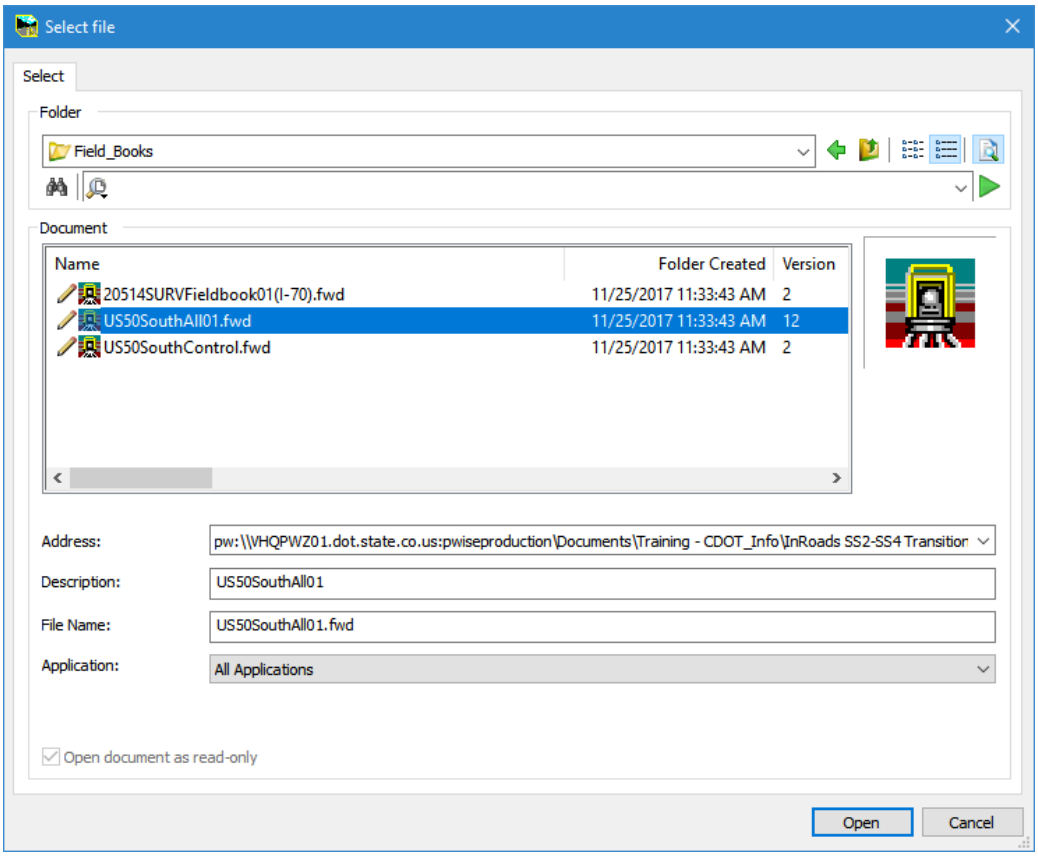
WholeWord	Substitute	With
False	ST BC NT	SB
False	BC NT	BNT
False	EC NT	ENT
True	SPC	SAP
True	EXTARC	CD*
True	RND	DS*
True	X	DX*
True	CLR	CS
True	ST BC	SB
True	ST X	ST
True	XXX	XXX

18. Close the **Substitution Strings** and **Element Information** dialog boxes.
19. Left click the **Survey** tab in Project Explorer.

20. Then right click on the field book and then click **Load > File** from the popup menu. 20514 Survey From FWD is used in this example.

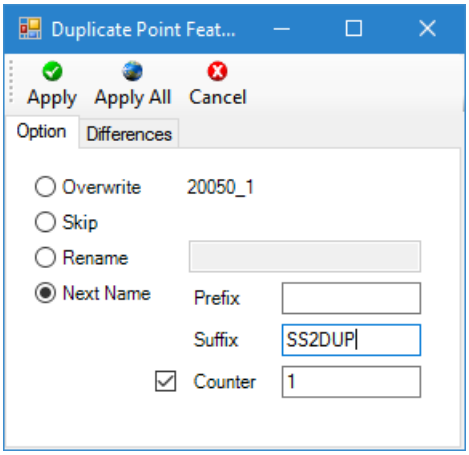


21. Highlight the desired fieldbook file and left click the **Open** button. For this example **US50SouthAll01.fwd** is selected.

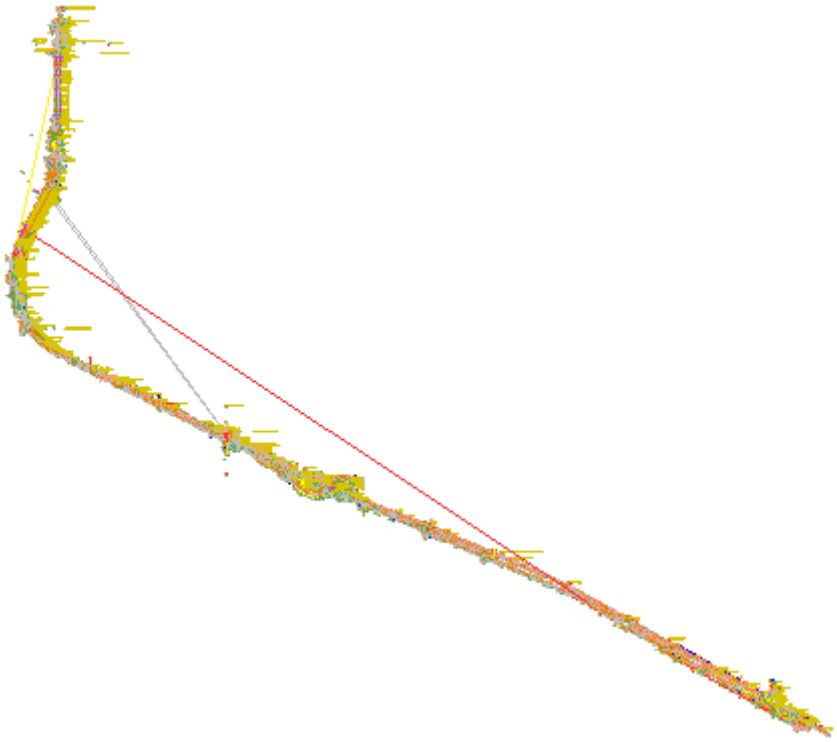


Note: Occasionally, (not in this dataset, however) it will be found that the FWD file contains points which have already been duplicated during the SS2 processing. The following image shows an example from a different dataset which exhibits this behavior.

What has happened is the original survey processing created a duplicate of point 20050 and named the duplicate 20050_1. This duplicate is not in the same location as the original point. Now, OpenRoads is processing the data and sees that 20050 is dual coded and creates point 20050_1 from the dual code. Later, when the SS2 point 20050_1 is encountered this warning comes up. The best way to handle this is to add a suffix to the SS2 point as shown below.

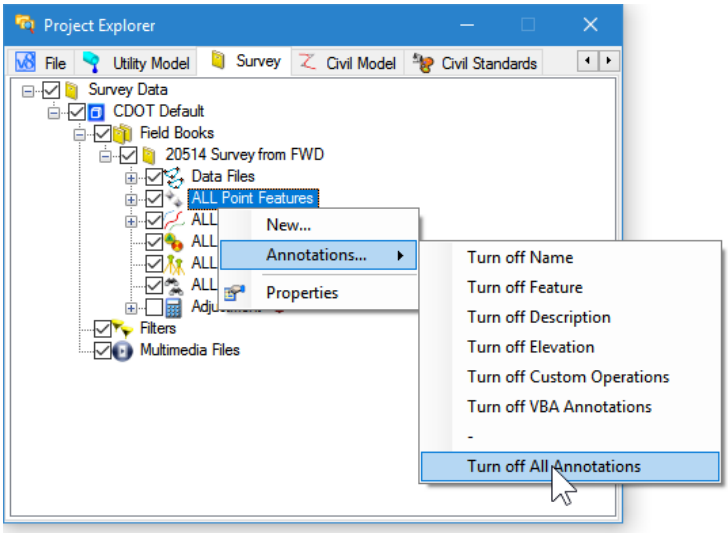


The data will be processed and drawn into the DGN file



The steps below illustrate the method for correct some point code errors in the survey data found in the example data.

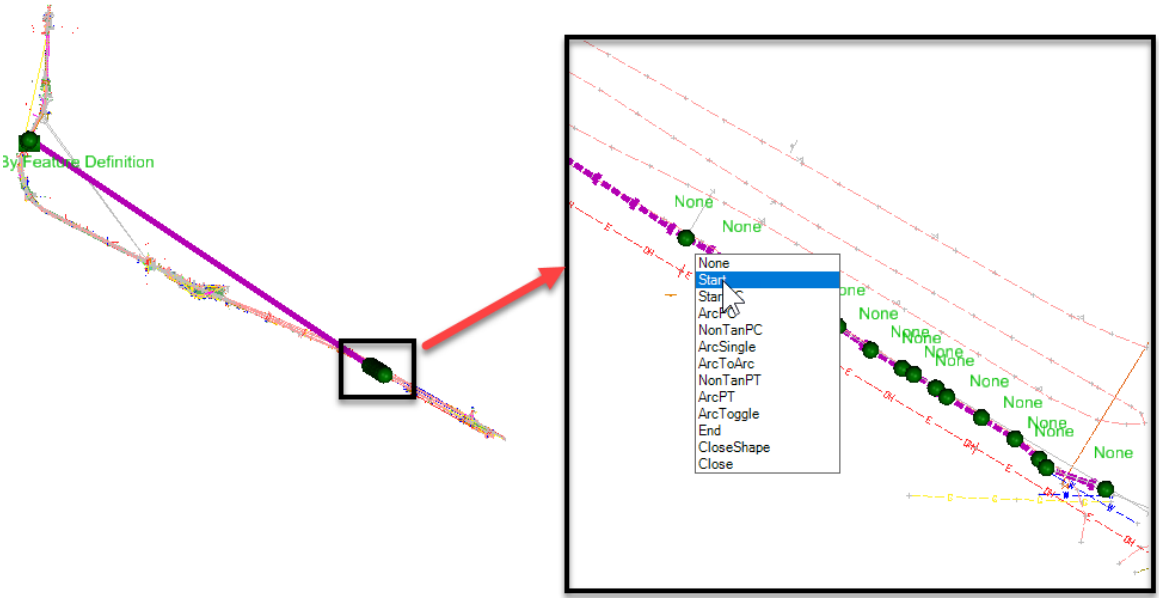
22. It will be useful for the remainder of this section to turn off the point annotations. right click on **All Point Features** and choose **Annotations > Turn Off All Annotations** from the popup menu.



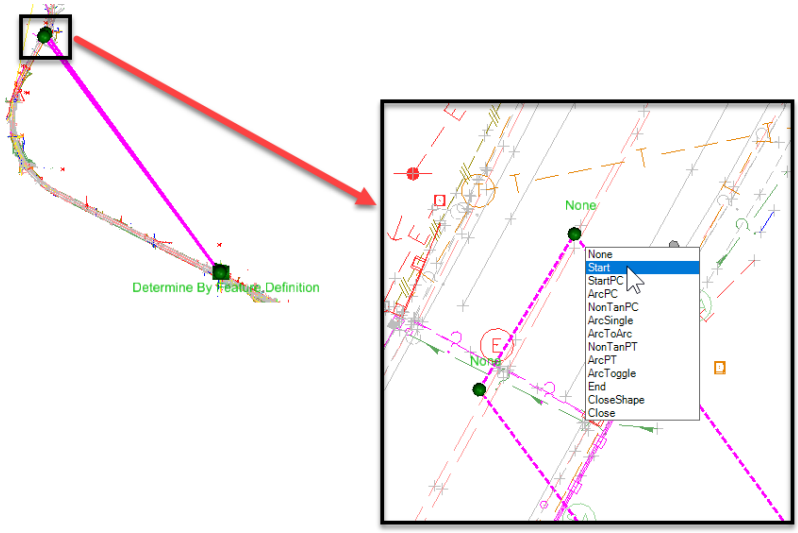
There will be 3 linking errors found, which appear to be errors which were never corrected in the original survey processing.

There is an electric line which jumps across the project. This is caused by a missing start code at point 29951

23. . **Adjust the start code** as shown below.



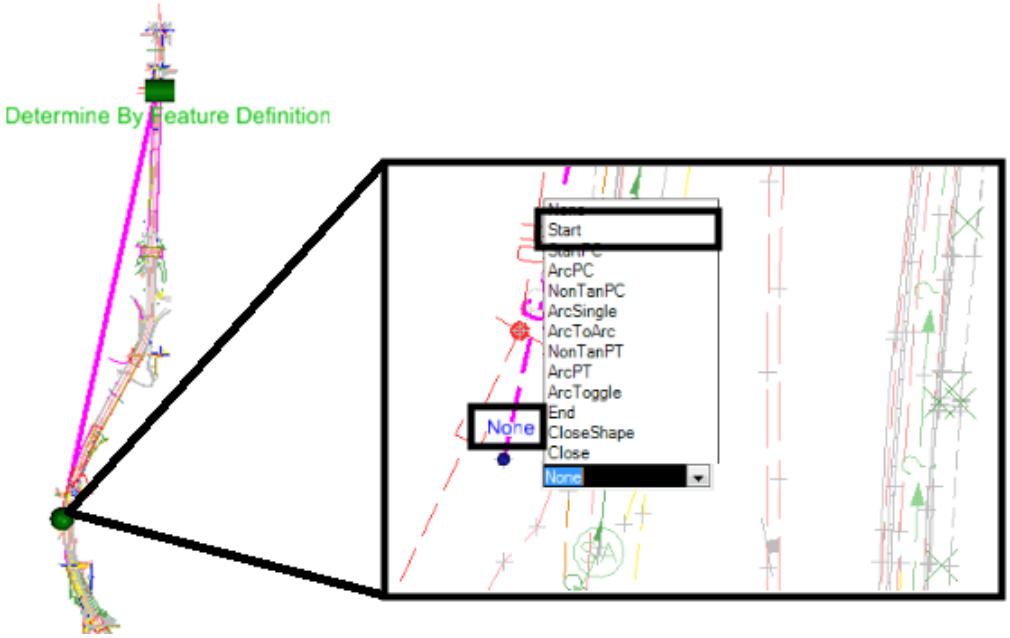
There is a line coded 3110 which is missing a start code at point 29877.



24. Correct this error by **adjust the start code** as shown above.

    There is an error in a gas line near the north end of the project. This appears to be an aborted start at a new gas line.

25. To correct the error, change the code on southernmost point (point 29341) to "Start". In this case, it would be best to review this gas line with the original surveyor to confirm the change.



Once the corrections have been made, the FWD conversion to OpenRoads is complete.

26. If this is a completed survey (***Case 1, Option 1***) and the FWD file processed above constitutes the entire survey then proceed to **Section II**.

If this is an unfinished survey (***Case 2*** from above):

27. Return to step 19 and process any remaining field data files (SDR, CSV, etc.) which have been collected in the field with the old TMOSS codes. The processing of these files will continue in an iterative fashion until all survey data has been processed and edited as described above.
28. Deliver the DGN file, including the terrain model produced in the survey processing to Design.

Best Practices – Process Survey

- Keep in mind that the process as shown in this document uses the FWD file for topographic data only. If the FWD file is from a finished SS2 survey, then the QA/QC process will be a little more streamlined. However, it does not mean that the elevations can be completely ignored. Since the survey lines may be used for point controls by the road designer, be sure to make a review of the elevations as well as the 2D data.

Potential Errors and Problems – Process FWD

- Watch for duplicate points.
- Review the imported data to insure there are no uncorrected linking problems. The FWD file should reflect the final state of the finished survey in SS2. However, there could have been mistakes or unfinished work as seen above which still needs to be corrected.

Section II. Import DTMs to Terrain Models (Case 1, Option 1 Only)

If the survey data processing for the project has been completed, then proceeding with this section will produce an OpenRoads terrain model DGN file of the existing ground and other existing surfaces rather than deliver DTM files to design. The OpenRoads terrain models will be separate files from the DGN file which contains the processed survey data.

Workflow – Import DTM

Since the DTM file produced in the original survey has been checked and approved then that terrain model will be imported to OpenRoads, rather than using the terrain model which can be automatically generated by OpenRoads Survey

The importing of DTM files is very simple. It requires only selecting the DTM file and choose an OpenRoads feature definition which is assigned to the imported surface.

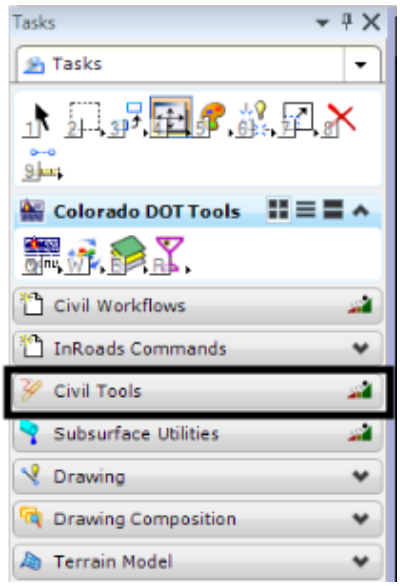
In the following exercise, the primary existing ground DTM will be imported to an OpenRoads terrain model. The import process needs to be repeated for all DTM files which represent exiting surfaces, such as bridge decks. When importing terrain models, it is usually best practice to have only one OpenRoads terrain model per DGN file. If the project contains multiple small terrain models, then it could be acceptable to place several into a single DGN file.

1. In ProjectWise, navigate to the desired project folder. Typically, this will be the ***\ROW_Survey\Drawings\Reference Files*** folder for the project.

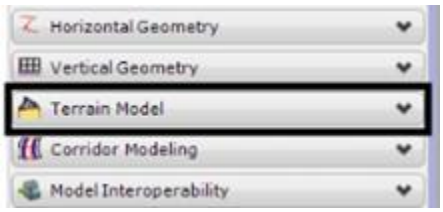
   Use the seed file **3D-Seed_CDOT.dgndgn** to create a new DGN file which will contain the processed survey data.

2. Drag and Drop the seed file into the desired location in ProjectWise. The seed file is located in the following directory: ***C:\Workspace\Workspace-CDOT_SS4\Standards\seed***
3. Reame the file to ***JPC#ExistingTerrainModel.dgn***. In this example, ***20514ExistingTerrainModel.dgn*** is used.
4. Assign the appropriate geographic coordinate system. (**Menu: Tools > Geographic > Select Geographic Coordinate System**). See ***CDOT-Setting a Project Geographic Coordinate System.pdf*** located in the project: ***\ROW_Survey\Drawings\Reference_Files\Control_Diagrams*** folder in ProjectWise for more information.

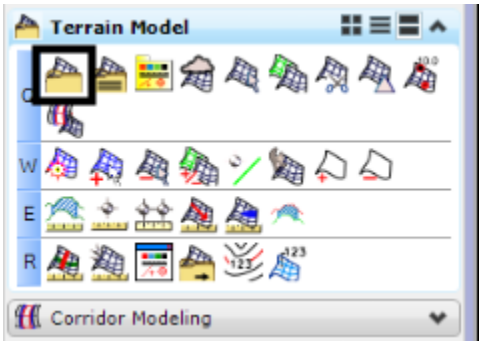
1. From the ***Tasks*** menu, expand the **Civil Tools** task.



2. Under the ***Civil Tools*** task, expand the **Terrain Model** tasks.

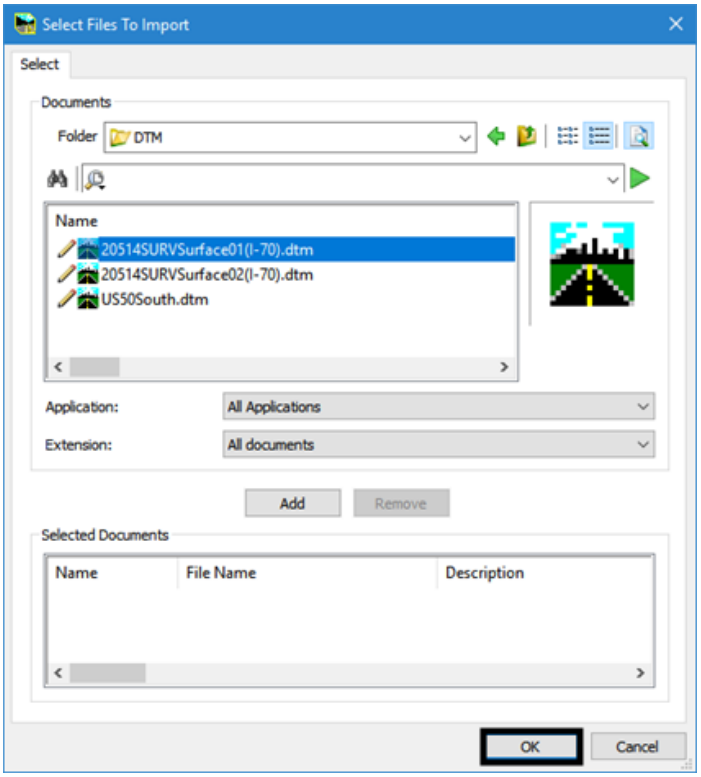


3. In the **Terrain Model** tasks, left click **Create from File** button. This displays the ***Select Files to Import*** dialog box.

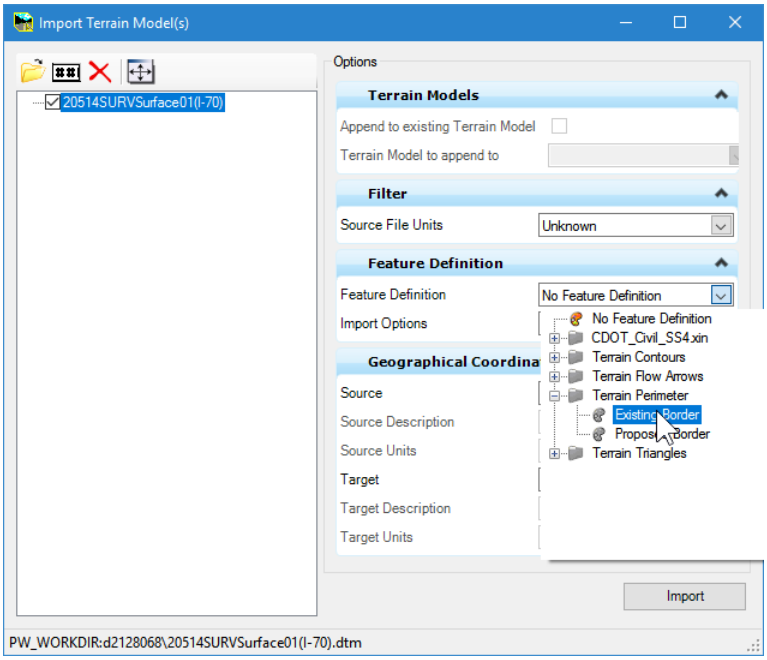


4. In the ***Select Files To Import*** dialog box, navigate to the desired location. Typically, this will be the ***\ROW_Survey\InRoads\DTM*** folder for the project.

5. Highlight the desired DTM file then left click **OK**. This displays the ***Import Terrain Model(s)*** dialog box. In this example, **20514SurvSurface01(I-70).dtm** is selected.



6. In the ***Import Terrain Model(s)*** dialog box, set the ***Feature Definition*** to **Terrain Perimeter > Existing Border**.

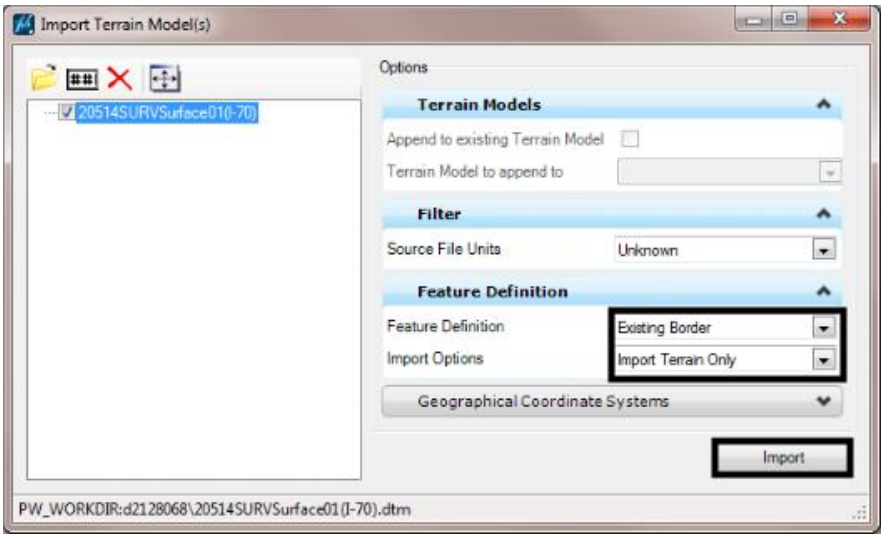


Note: Feature definition of Existing Border is used here because the boundary is very quick to draw on-screen. Contours and triangles can be slow for very large or very dense terrain models. Using Existing Border is a good idea for DTM files. The display can be changed once the terrain element has been imported.

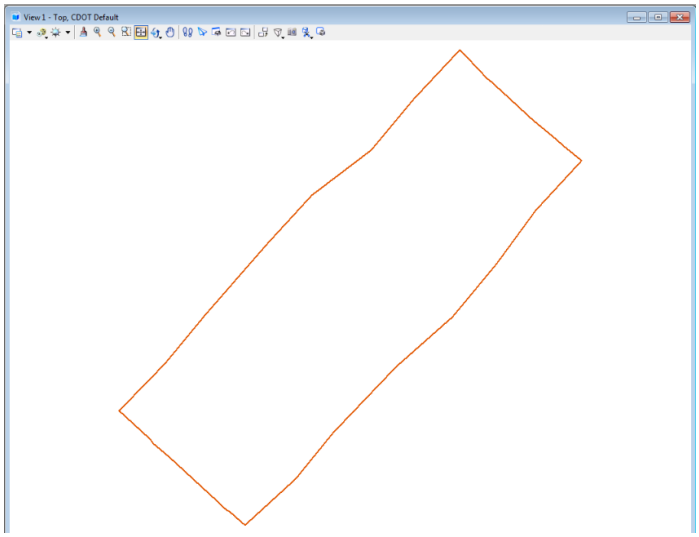
7. Set the ***Import Option*** to **Import Terrain Only**. This imports only the terrain model and not the Features. The features are incorporated in the terrain model.

   Note: Because there are difficulties with features imported from the DTM, such as; the custom line styles are tilted perpendicularly on the slope of the terrain which looks odd and the point features display only as dots, use the JPC#Survey-Topo.dgn to view features.

8. Left click the **Import** button.



9. Once processing is complete, close the ***Import Terrain Model(s)*** dialog box.
10. **Fit View** to see the imported terrain model.



Best Practices – Import DTM

- Use 3D seed files when starting a new DGN that contains a terrain model.
- Generally, store only one terrain model per DGN file, unless they are small. This is for better performance.
- Assign a geographic coordinate system to the DGN file before import the DTM file. This allows transforming the DTM on the fly during the import process, if needed.
- When importing the DTM file, use a feature definition which displays the boundary only to start. Thus, there will be minimal delay in draw time. DTM files which contain very large numbers of triangles or dense contours will take a while to draw if the feature definition shows these by default. After the DTM is imported and the boundary looks OK, then the feature definition can be changed.
- There is usually not a need to import both the terrain model and the features. (step 7 above) Ordinary features, such as triangles and break lines are automatically created as components of the terrain model element.

Potential Errors and Problems – Import DTM

- Picking the wrong feature definition for the terrain model, but this is easily changed in the properties of the terrain model after import.
- Choosing a feature definition at import which displays triangles or contours by default could be slow to draw on screen if the imported DTM is very large.