OpenRoads Designer

Survey Exercise Manual

Bureau of Design and Environment

Technology Policy and Support Group

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Illinois Department of Transportation

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Survey and ROW Exercises Table of Contents

Chapter 1 – QuickStart for Geometry - Road

This chapter is provided by and property of Bentley, therefore pages 2-49 have been removed.
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Roadway Design & Modeling – Fundamentals Learning Path

Chapter 2 – Importing and Editing Survey Data

E2.1	Create a File and Import Data	50
E2.2	Explore and Configure the Drag and Drop Import Process	56
E2.3	Continue Importing Survey into Field Books	60
E2.4	Editing Survey Points and Linear Features	62
	Chapter 2 Review	76

Chapter 3 – Using and Editing Terrain Models

E3.1	Terrain Model Review and Display	77
E3.2	Complex Terrain Models	84
E3.3	Add a Boundary and Modify	88
	Chapter 3 Review	90

Chapter 4 – ROW, Parcels and Plats

E4.1	File Setup, Understanding the Interface, and Extracting Parcels	92
E4.2	Creating Parcels with Geometry Builder	97
E4.3	Create a Single ROW Plat or Plat of Highways	101
E4.4	Labeling the Plat	107
	Chapter 4 Review	118

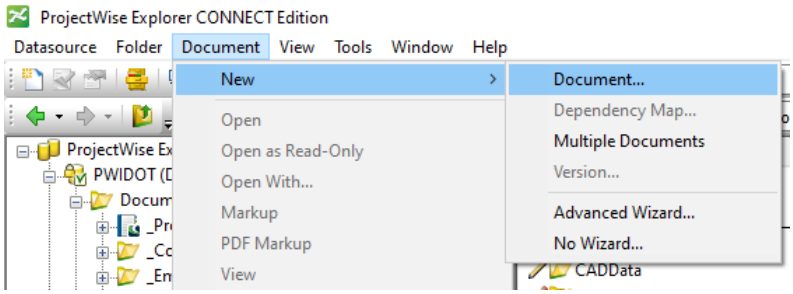
Chapter 5 – Creating a Parcel from Key-In

E5.1	File Setup, Understanding the Interface, and Extracting Parcels	120
E5.2	Creating Parcels with Geometry Builder	124
E5.3	Creating ROW with Geometry Builder	126
E5.4	Creating Temporary Easement with Civil Accudraw (Cogo Replacement)	127
	Chapter 4 Review	131

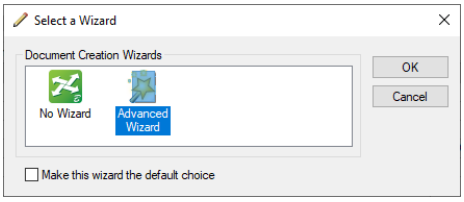
Create a New Document in ProjectWise

How to create a new Document in ProjectWise

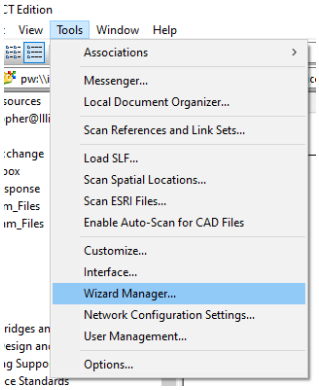
1. Navigate to the folder within ProjectWise that you want to create your document in.
2. From the menu at the top of the ProjectWise window select *Document -> New -> Document*.

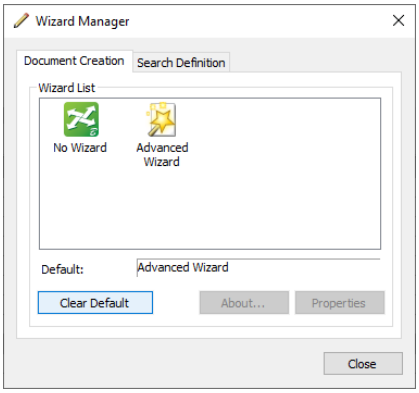


3. In the **Select a Wizard** dialog that opens select the *Advanced Wizard* and then *OK*.

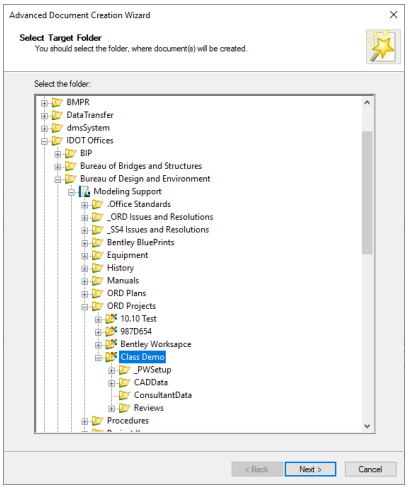


NOTE: If you do not receive the Select a Wizard dialog you will need to go to *Tools -> Wizard Manager* from the top menu bar and reset the **Default** to -- *no default wizard* -- by clicking the *Clear Default* button. Then close the dialog and restart the new document process.



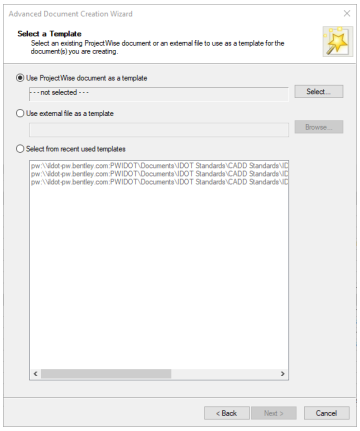


4. In the **Advanced Document Creation Wizard**, select *Next* on the Informational first screen
5. On the **Select Target Folder** screen, the folder that you are currently in within ProjectWise should be selected.
    a. If this is not the folder, you want to create the document in or is not selected then you will need to navigate to the location you want to create the file in.

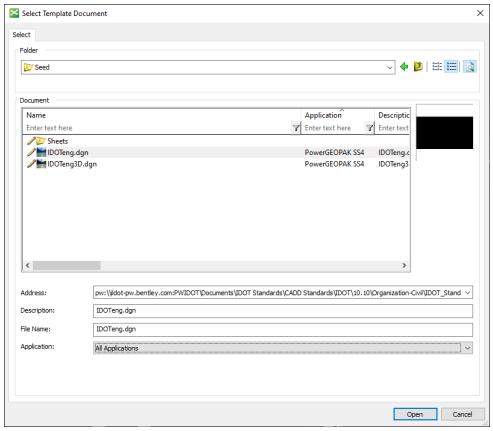


How to create a new Document in ProjectWise

6. Select *Next* to go to the **Select a Template** page. Here you will select the Seed file for the environment that you are using from the Managed Workspace Seed file location.

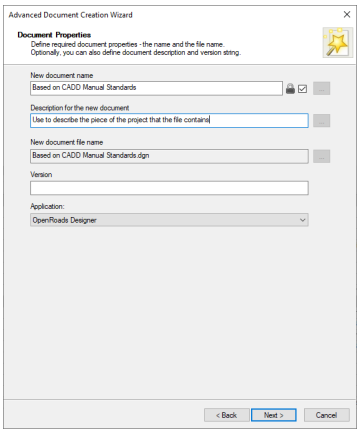


7. Make sure that **"Use ProjectWise document as a template"** is *checked* and the pick *Select* at the end of the line to select the file.
8. In the Select Template Document dialog, navigate to **IDOT Standards\CADD Standards\IDOT*Environment Version*\Organization-Civil\IDOT_Standards\Seed** and select the *Seed file* that you need and click *Open*. Back on the **Select a Template** page select *Next*.



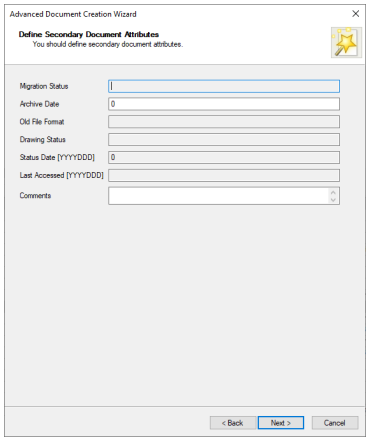
Note: Once you do this one time then the Seed file will be listed in the "Select from recent used templates" area shown in the screenshot above.

9. On the **Document Properties** page set the following information and the select *Next* at the bottom.
    a. **Name**: Make sure and adhere to the standards set in the CADD Manual
    b. **Description**: Will make it easier to understand what piece of the project each file contains
    c. **Application**: *OpenRoads Designer*

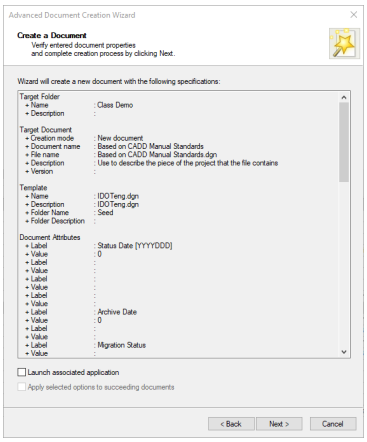


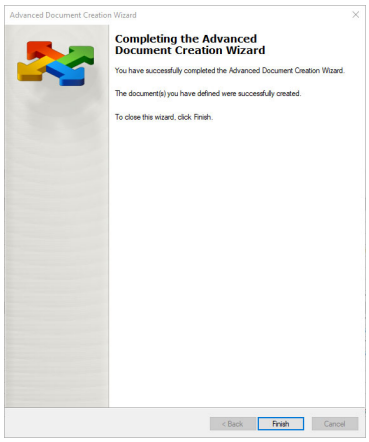
How to create a new Document in ProjectWise

10. On the **Define Secondary Document Attributes**, there is nothing that you need to set at this time. Click *Next* at the bottom.

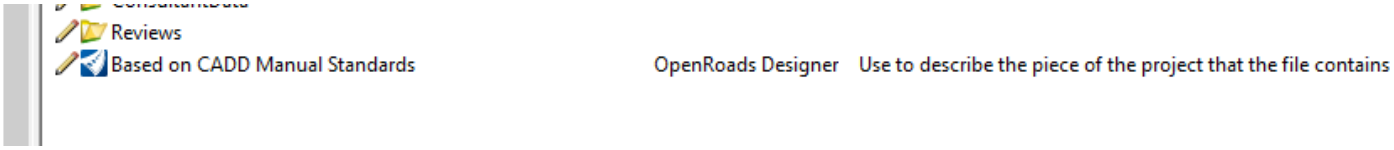


11. On the **Create a Document** page, all the settings that you have selected, or set will be displayed for your review. Select *Next* at the bottom to create your document and then click *Finish* on the **Completing the Advanced Document Creation Wizard** page to close the Wizard.





Your document has now been created in the location that you specified and associated with **OpenRoads Designer**.



Notes:

Chapter 1

REMOVED – Please see TOC Page for Links

QuickStart for Civil Geometry - Road

Chapter 2

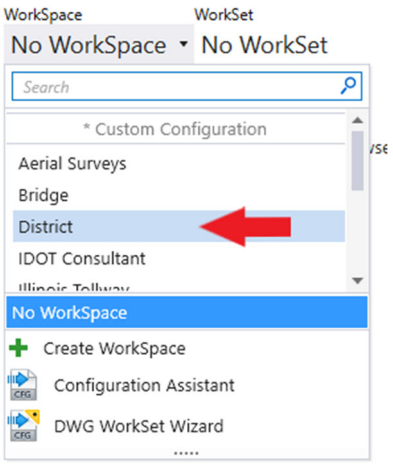
Importing and Editing Survey Data

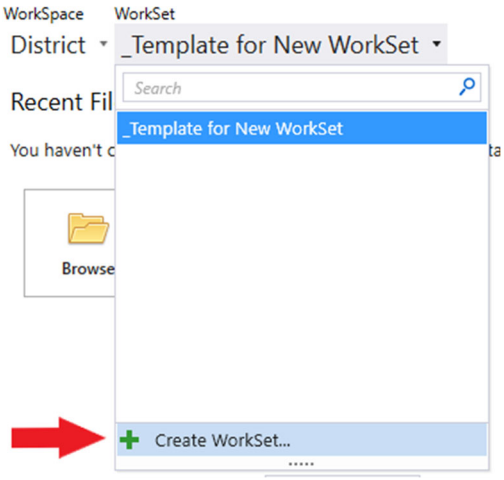
EXERCISES – Chapter 2 – Importing and Editing Survey Data

E2.1 – Create a File and Import Data

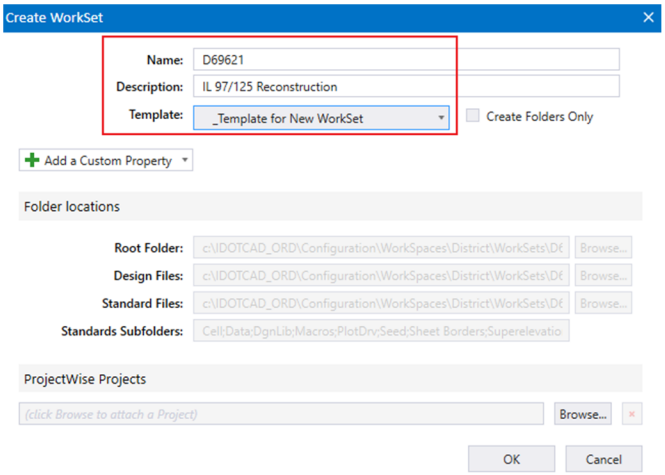
Design File Setup – Outside ProjectWise

1) Start OpenRoads Designer
2) Set the Workspace and Work Set
   - The Workspace and Work Set define standards that are used by the software. The Workspaces are set up during the software installation. In this training we will be using the District WorkSpace, but this could change depending on software and Workspace Standards updates.
   - The following steps will set up the Workset you will be using throughout this training. Internally within IDOT your CADD Manager will take care of setting up the Workset for the project and everyone's use.
3) Select ***District*** from the WorkSpace pulldown menu then select ***Create Workset*** from the WorkSet pulldown menu.



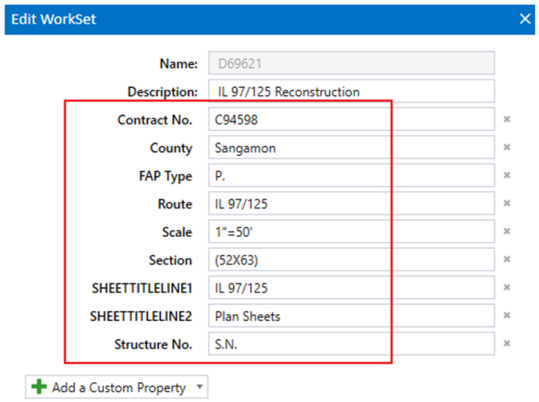


4) The *Create Workset* Dialog Box will open, fill in and select the following:
   - Name: **D69621**
   - Description: **IL 97/125 Reconstruction**
   - From the Template dropdown selection box select: **_Template for New WorkSet** and click **OK** to continue.



5) On the right side of the screen, you will see "***Properties***" select it and then select "***Advanced Properties***". Fill in the Advanced Properties in the *Edit WorkSet* dialog with the following:

- Contract No.: **C94598**
- County: **Sangamon**
- FAP Type: **P.**
- Route: **IL 97/125**
- Scale: **1"=50'**
- Section: **(52X63)**
- SHEETTITLELINE1: **IL 97/125**
- SHEETTITLELINE2: **Plan Sheets**



6) Click ***OK*** to save and exit the *Edit WorkSet* dialog box (not shown). These Properties will automatically fill in the Title Block on all sheets in this project. This is the current workflow, this will be changing with future releases of the software and IDOTCAD Environment, training will be provided at that time.
7) Select New File and navigate to the location where you unzipped the dataset files. Name the new file **PickupSurvey**.**dgn**. Click **Browse** and select the **IDOTeng3d.dgn** Seed file and click **Save** to close the dialog box and open the newly created file.

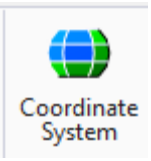
Design File Setup – Inside ProjectWise

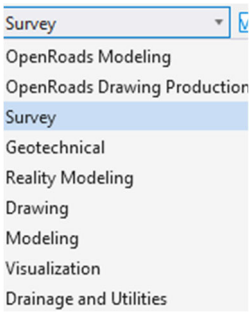
Specific instructions will be presented during class on how to utilize the Managed Workspace within ProjectWise. Your CADD Manager will also have more information if needed as well as be setting up the WorkSet folders for the entire Project.

Set the Geographic Coordinate System

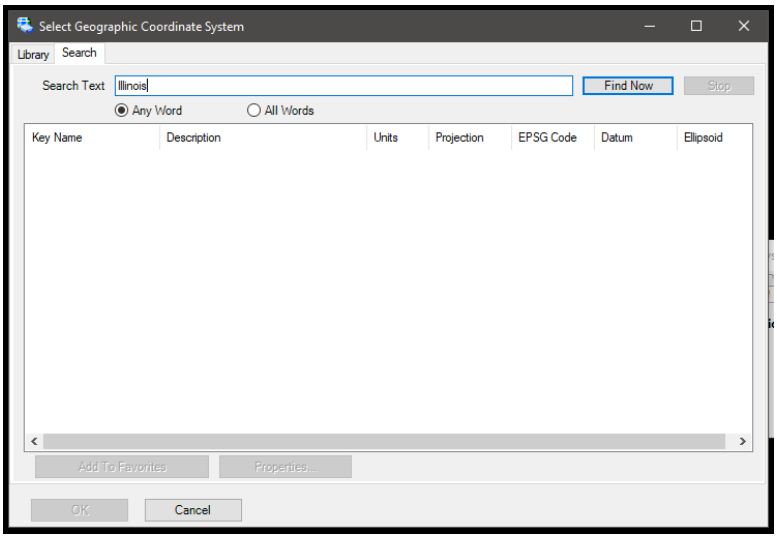
Before we import the Survey data, we need to ensure the Geographic Coordinate System (GCS) is set correctly. This enables the software to make automatic adjustments so data from different systems will mesh seamlessly. Surveyors more than anyone can appreciate the importance of setting the correct Geographic System.

1) Select the **Survey** Workflow from the drop-down menu.
2) Under the Utilities tab, in the Geographic toolset, select the **Coordinate System** tool.

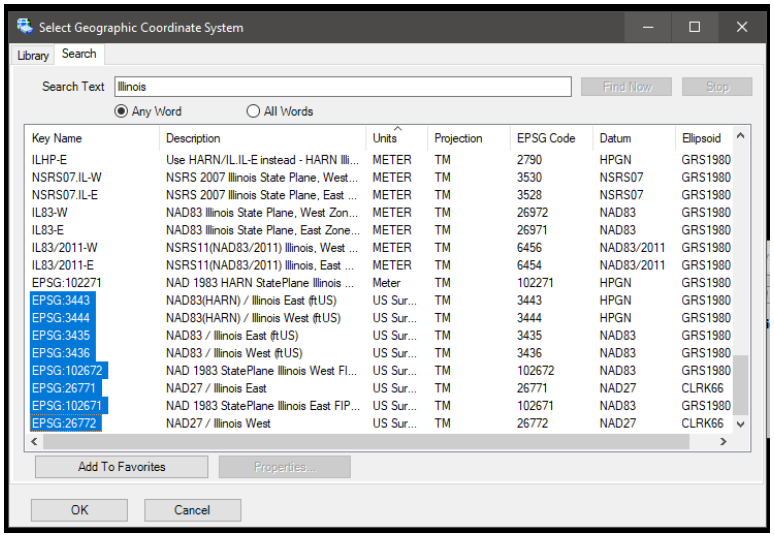




3) Select **From Library** icon.
4) In the Library Dialog click the **Search** tab and type **Illinois** in the "Search Text" and hit **Enter**.

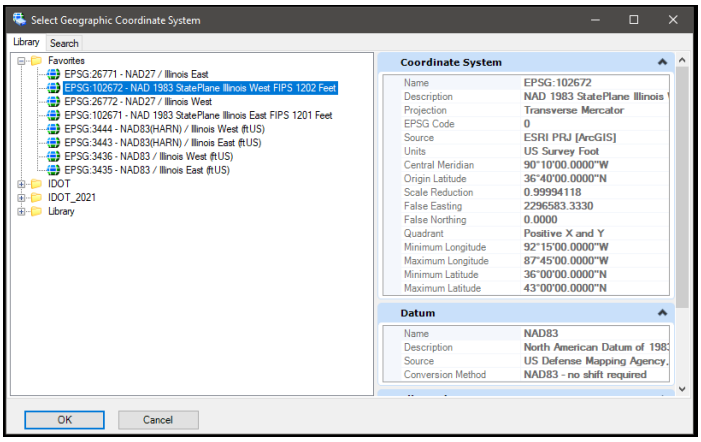


5) Click on the **Units** column header to sort by it.
6) Select all the "Key Name" Coordinate Systems with units of "US Survey Foot" (Shift pick the top and bottom one)



7) Select **Add to Favorites** button at the bottom to add your selection.

8) Select the **Library** tab at the top of the Dialog.
9) If "Favorites" is not expanded, click the plus (**+**) sign next to it to expand. This will show you the coordinate systems that you picked that apply only to Illinois.
   - Also notice that there is an IDOT and IDOT_2021 folder listed with the Favorites folder. The IDOT folder lists the original District 8 LDP zones per county. The IDOT_2021 folder lists the 33 new LDP zones.

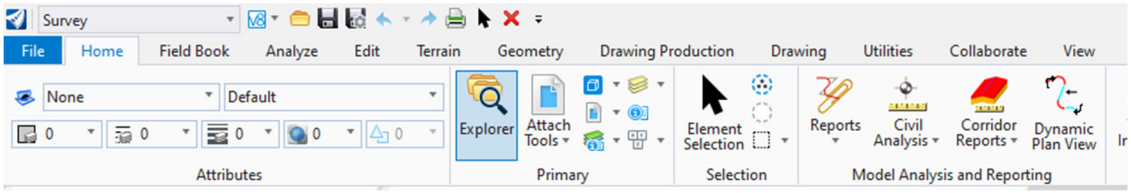


10) Double Click on **EPSG:102672-NAD 1983 StatePlane Illinois West FIPS 1202 Feet** under your Favorites.
11) Close the Geographic Coordinate System Dialog.

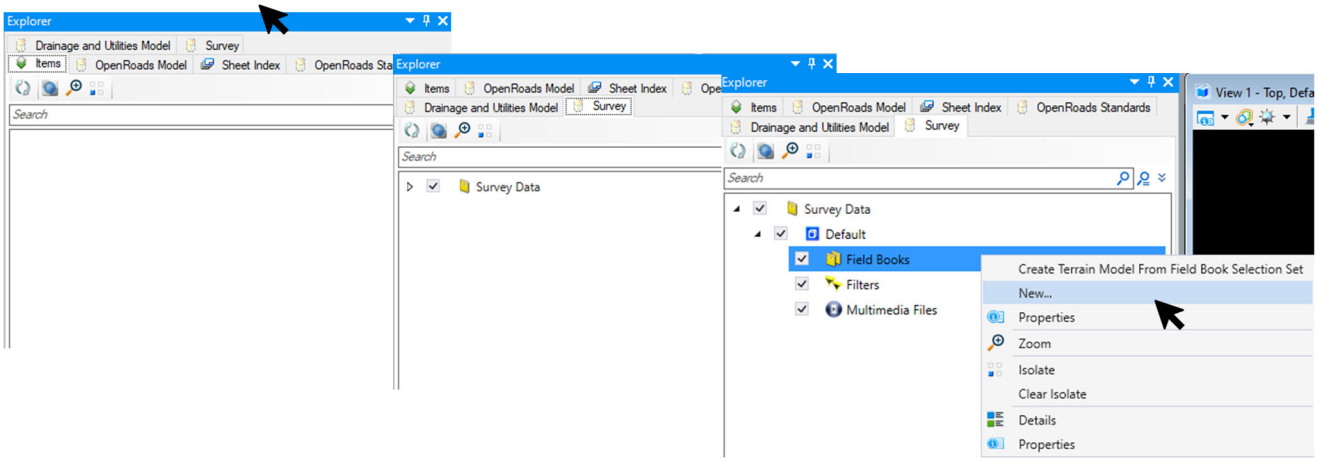
Import the Survey Data

Workflows segment tools into discipline specific groups and streamline the interface. Notice how the tabs change to survey specific categories. Each tab further segments the survey tools into a task-based interface.

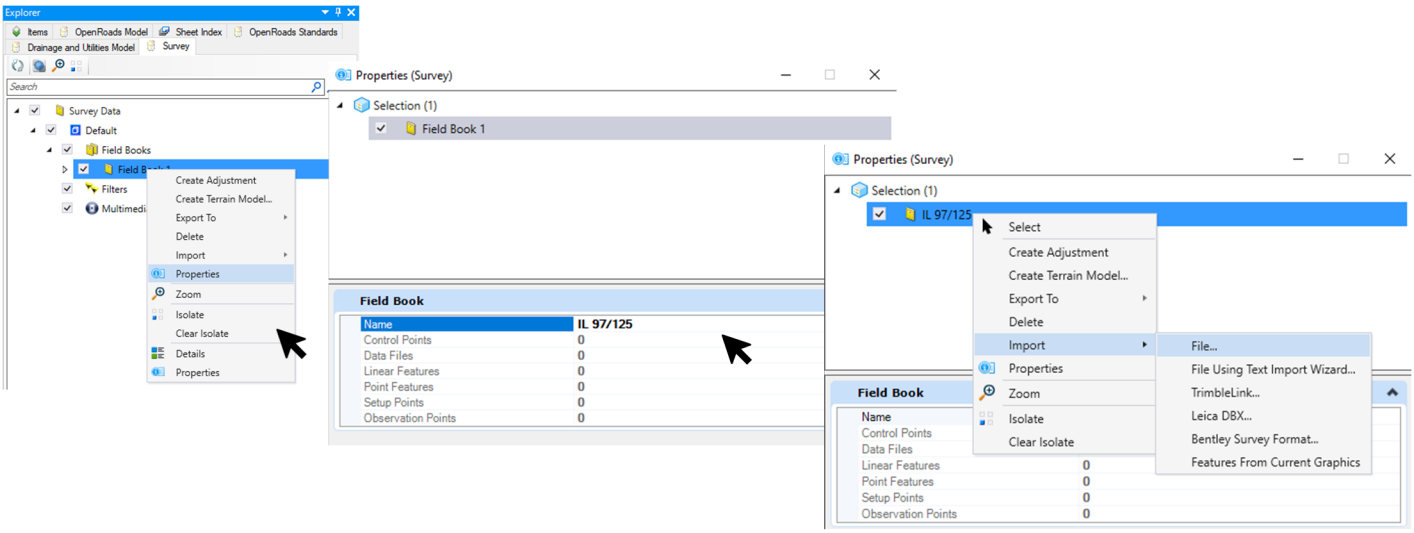
1) Select the **Survey** Workflow from the drop-down menu. The survey tools and commands are in the Survey Workflow.
2) Under the Home tab, in the Primary toolset, select the **Explorer** tool.



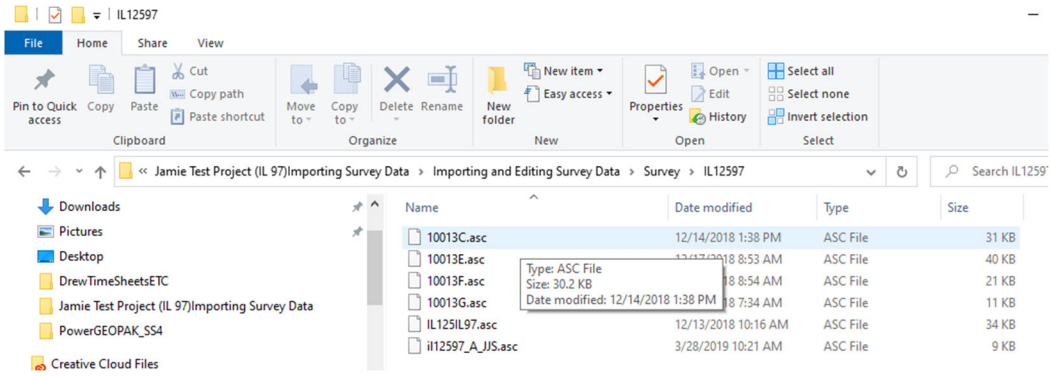
3) Expand the **Survey** pane in Explorer.
   - Note: The Explorer tool is where we can access and organize the survey data directly.
4) Right-click on **Field Books** under Survey Data\Default and select **New**. <u>Once you create a new Field Book this file is now considered a Survey File</u>.



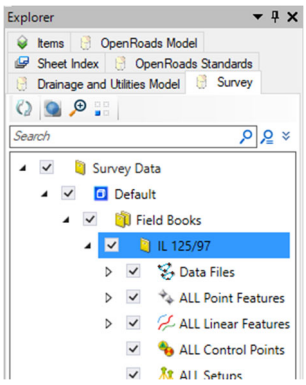
5) Expand **Field Books** and right-click on **Field Book 1** and select **Properties**. Rename **Field Book 1** as ***IL 125/97*** and hit tab to accept the name change.
6) Right-click on the Field Book **IL 125/97** and the select ***Import*** -> ***File***.



7) Navigate to the location where your project is saved and open the *Survey\IL 12597* folder. In that folder locate the "*10013C.asc*" file and click on it, then pick **Open**. Select **IDOT_6** for the Data Format and click **Apply**.



8) In Explorer, left click the arrow next to Survey Data to expand the tree to see other survey data folders.
   - Under Field Books is where the imported survey data is stored.
   - The data structure can be organized to fit your operational needs. i.e. Do you need a single "job" where all the collected field data is stored? Or, do you need to separate each and every collection into its own book? It is up to you to decide what a Field Book contains.
9) View the newly created Field Book.
   - Left click the arrow next to Field Books to expand the Field Books folder to review IL 125/97.

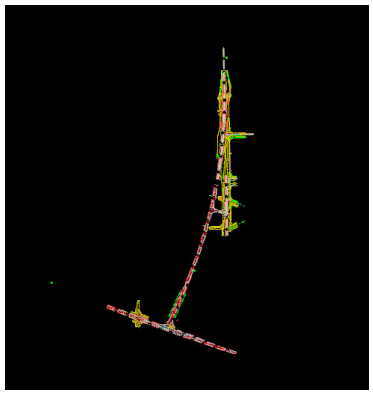


10) Review the imported points and linear features in IL 125/97.
    - Left click the arrow next to All Points Features to review the imported survey points.
    - Left click the arrow next to All Linear Features to review the imported linear features.

Note: If you wish to rename IL 125/97, right click on that Field Book and select **Properties**. Here you can modify the name in the Name field. At this point it is important that all the resulting survey data is now contained within this DGN file. There are no external files and there is no need to ensure synchronization between the "data" and the resulting graphics or terrain. The resulting graphic elements contain the "intelligence" and "know" certain survey properties such as Terrain Model Attributes (Spot, Break Line, Void, None, etc.) and how they should display, as well as other properties that, in the past, were controlled by external files.

Review imported survey data

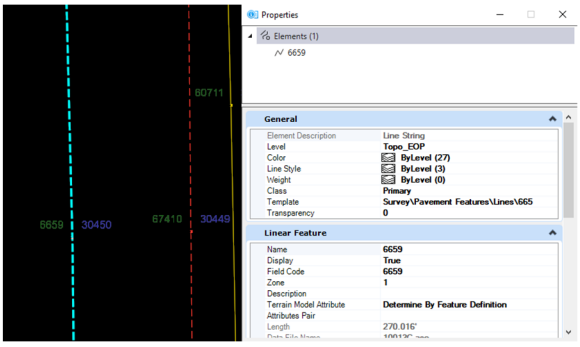
1) Use the Fit View tool to see the resulting elements that were imported.



2) The survey points and linear features are now mapped into the DGN file. For this course, the terrain model is not built automatically as part of the import process. You also have the option of building the terrain model as part of the process, we will discuss this option later.
3) Zoom into the terrain as necessary and select one of the **664** linear features (white dashed lines) using the Element Selection tool.
4) Hover your cursor over the linear feature until the Context Menu appears and then select **Properties** to review the properties of the linear feature.

Note: all the survey attributes assigned to this feature (Name, Field Code, Zone, Terrain Model Attributes, Feature Definition, etc.) The symbology of the survey points and linear features is controlled by the Feature Definition. The Feature Definition also controls how the survey data is defined in the resulting terrain model (i.e., Spot, Break Line, Void, etc.) For example, a field code named 6659 is assigned a Feature Definition called 6659. This Feature Definition sets up the terrain model attribute for this field code and the symbology for how it will be displayed once imported into the DGN file.

Point Feature
Name: 30457
Field Code: 6659
Link Code: None
Zone: 1
Terrain Model Attribute: SpotAndBreak
Easting: 2403152.503'
Northing: 1158083.597'
Elevation: 563.897'
Data File Name: 10013C.asc
Field Book Name: IL 125/97
Feature Definition: Survey\IDOT_Survey\Pavement Features\665
Feature Description: Edge of Road Surface
Cell: SURVEY_SPC \ Line
Level: Topo_Point SPC Cell



E2.2 – Explore and Configure the Drag and Drop Import Process

In the following sections, you will examine how the drag and drop process of survey data functions and how it is configured in the Survey Settings. The first time you witness the drag and drop process you might be mystified as to how it functions. It just processes the file automatically without (apparently) any user interaction. You might find that a bit unnerving as prior workflows required more user input during the processing of data, and you might feel as though this process is out of your hands. This is in fact by design. The drag and drop process was developed with the end user in mind. Once you configured to your workflow/specific file types, it is a simple matter for you to process datasets quickly, efficiently, and most importantly to a consistent standard.

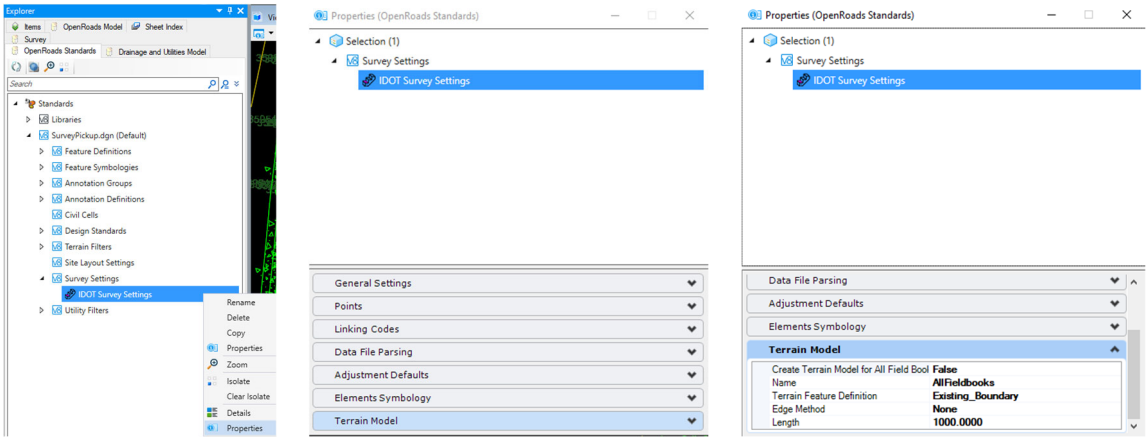
Note: that at NO TIME will any of the survey tools/processes write back to your source data (raw data files).

Review Terrain Model Survey Settings

A Terrain Model can be automatically created as the data is imported and processed. One benefit to this is that the resulting Terrain Model is dynamically linked to the survey elements. Also, if/when additional data is added to the field book the terrain model is automatically processed and updated. While this is very different in its approach to previous workflows it is very powerful and removes any issues with outdated terrain models or syncing the survey data back to a Terrain Model. In this section, you will learn about the Terrain Model Survey Settings.

1) Open / Continue in the PickupSurvey file.
2) Select the Survey Workflow from the drop-down menu. Under the Home tab, in the Primary toolset, select **Explorer** if it is not already open.
3) Navigate to the **OpenRoads Standards** section and expand the **PickupSurvey.dgn** under Standards. Right-click on **Survey Settings** and select **Properties**.
4) Expand the **Survey Settings** in the Properties window to where you see “IDOT Survey Settings” and select it. Select the **Terrain Model** section to expand it and review the options.
   - **Create Terrain Model for All Field Books:** Toggles the automatic Terrain Model Creation on and off.
   - **Name:** Here you can define a default name for the Terrain Model (user configurable).
   - **Terrain Feature Definition:** Define the initial Feature Definition assigned to the Terrain Model.
   - **Edge Method:** Here you can specify the edge method applied to the terrain model.
   - **Length:** Applies if Edge Method is set to Max Triangle Length (user configurable).

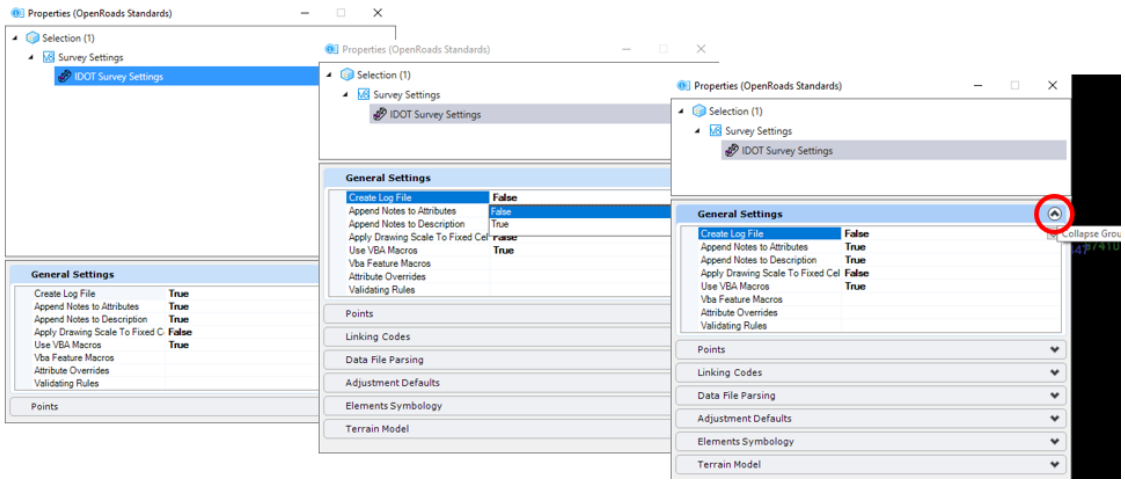
   Recall that when we imported the survey data the terrain model was not created automatically, this happened because the “Create Terrain Model for All Field Books” was set to **False**. If you want the terrain model to be created upon import toggle this option to **True**.
   Also, notice the default name *AllFieldBooks* is set here as well as the default Feature Definition for the terrain model.



Important notes about Survey Settings: In the IDOTCAD_ORD workspace, the Survey Settings are configured in a DGNLIB file (surveysettings.dgnlib).Once survey data is imported these settings are automatically copied from the DGNLIB into the current file. This allows settings to be easily managed across a network.

Review General Settings and Create Survey Log File

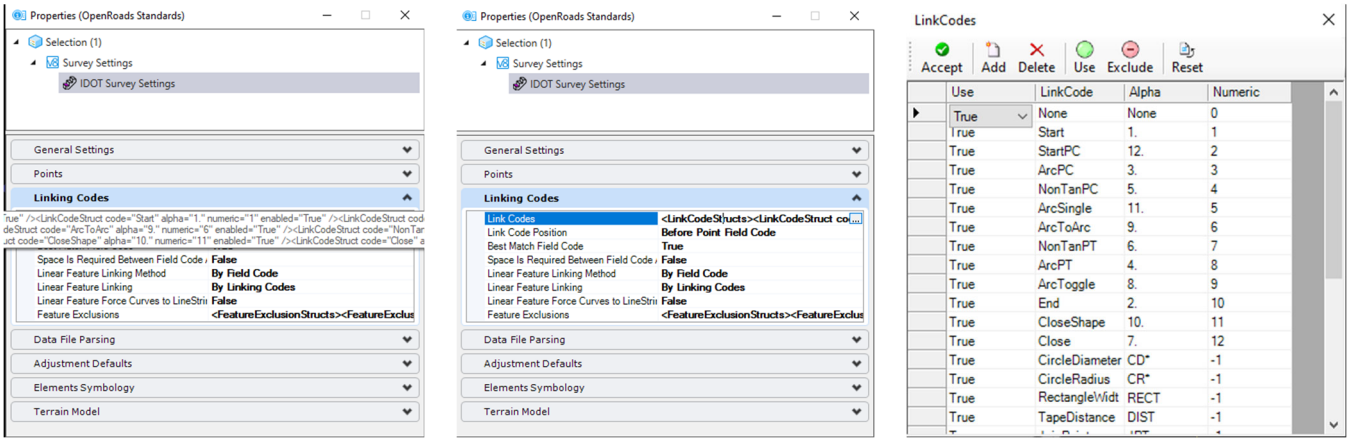
1) In the Properties dialog under *IDOT Survey Settings* expand the **General Settings** section. If the options are greyed out, you are in the State Standards and you need to be in the Properties for the file you are working in.
2) Click on the field next to the Create Log File field and select **TRUE** to enable logging. When set to **TRUE** a log file will be created that tracks changes and edits. The log file is named Default Log and it will be created in the location of the currently opened design file. The log is a simple ascii file and can be reviewed with Notepad.
3) Collapse the General Settings section by clicking the up arrow.



Review Linking Codes

Linking Codes will be discussed at length in a following course. But, for now, it is enough to know they are entered in the field during the collection process and utilized by the software to create Linear Features (formally known as Survey Chains). Since linking codes are very likely to be a section you will want to customize, we will take a closer look.

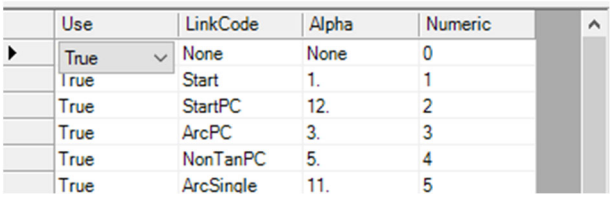
1) Expand the Linking Codes section.
2) Notice as you move the cursor over the field to the right of the Link Codes field. The field expands (in fact it might stretch across the screen).
3) Ignore the pop-up field and left click to edit the field. The field should now show a small icon with three dots to the right. Left click on the icon to open the LinkCodes Editor.



The first thing to notice is the menu bar at the top of the dialog. This is used to Accept, Add, Delete, Use, Exclude or Reset codes in the list.

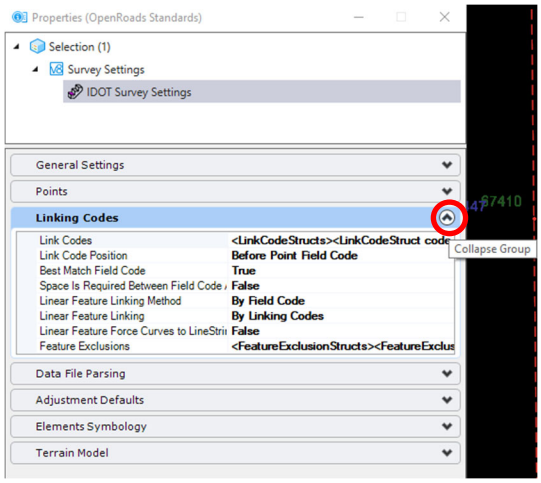
Below the menu bar is the editing field. Each linking code is represented on a line, the columns set the attributes for each linking code.

- **Use:** Determines if the code is processed or ignored.
- **LinkCode:** A pick list to define the attribute applied.
- **Alpha:** A user defined code (alpha) entered in the field.
- **Numeric:** A user defined code (numeric) entered in the field.



Use	LinkCode	Alpha	Numeric
True	None	None	0
True	Start	1.	1
True	StartPC	12.	2
True	ArcPC	3.	3
True	NonTanPC	5.	4
True	ArcSingle	11.	5

4) To edit a field, left click in it. Columns **Use** and **LinkCode** will display a pick list of **Alpha** and **Numeric** and allow manual edits.
5) Close the dialog box by clicking the X. Since the settings are saved to the current drawing, saving the settings will not affect later modules. <u>If you do not click the Green "Accept" check, then any and all changes you have made will be lost.</u>
6) Collapse the Linking Codes section by clicking the Up arrow.



Taking the time to review these settings and tailor them to your specific workflow will be critical for the successful utilization of the software

Review Data File Parsing

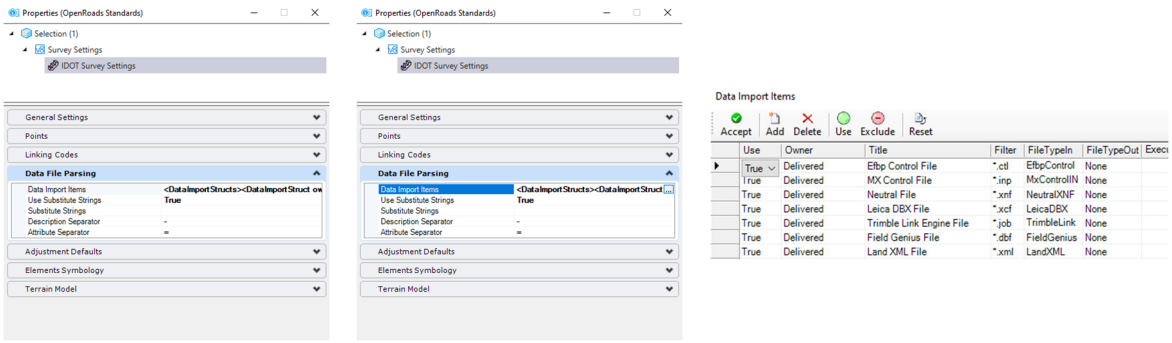
In this section, you will learn how to review the Data File Parsing settings and how they relate to the imported IL12597 file we imported previously. The main advantage of the Drag and Drop process for importing field survey data is the reduced workload to the end user and consistent processing results. The settings under the Data File Parsing section really drive that functionality and merit some attention. This is key to configuring the Drag and Drop functionality for your environment.

When files are processed, the software first looks at the file extension to determine how to process the file. If several definitions (rows) are configured the same (meaning same extension in filter field) then a dialog will popup during processing requesting clarification on how to proceed.

1) Expand the **Data File Parsing** section under Survey Settings for your current file.
2) Left click in the field to the right of the Data Import Items label.
3) Left click on the small icon with three dots to open the Data Import Items Editor
   - The top menu is like the one for previously discussed with Linking Codes in appearance and operation.

   Note: As before, closing the dialog without clicking the Accept button will lose any edits made.

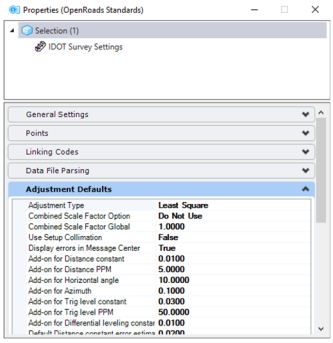
4) Scroll up and down the list to review all the various file formats. Close the Data Import Items dialog.



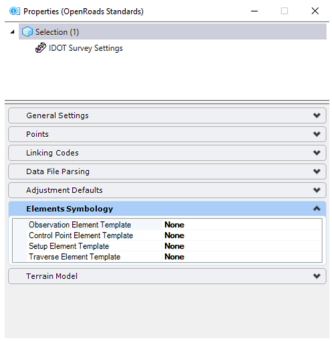
Review Settings for Processing Observation Data

The next two sections deal with settings used to process observation files and define symbology for control elements.

1) Expand the Adjustment Defaults section.
   - Note the options the software offers to process observation files.



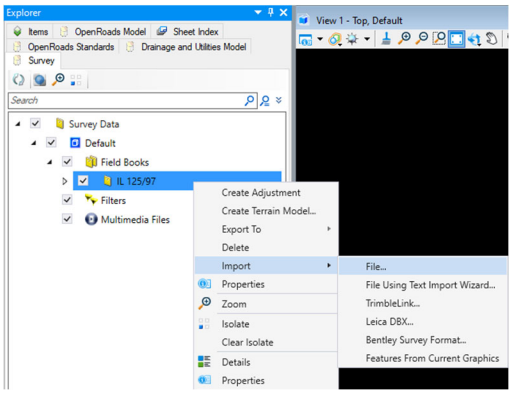
2) Once you are finished reviewing the options, collapse the Adjustment Defaults section.
3) Expand the Elements Symbology section.
   - This section allows you to define the appearance of observation elements using Element Templates.



4) Once you are finished reviewing the options, collapse the section. Depending on your collection process these sections may or may not be applicable to you.

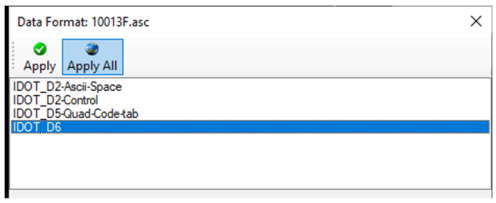
E2.3 – Continue Importing Survey Data into Field Books

1) Let's continue importing the rest of the data into IL125/97 Field Book. Open / Continue in the PickupSurvey.dgn file.
2) Select the Survey Workflow from the drop-down menu. Select Explorer, located on the Home tab in the Primary toolset if it is not already open.
3) In Explorer, under the Survey tab, navigate to Survey Data\Default\Field Books\IL 125/97. Right-click and select ***Import*** -> ***File*** Navigate to the location where your project is saved and open the Survey\IL 12597 folder.

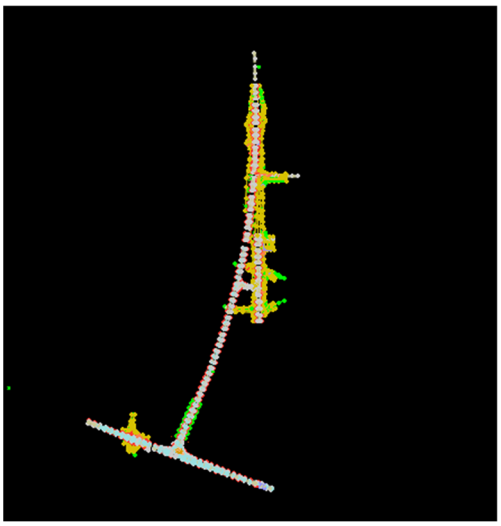


4) Select the files **10013E.asc**, **10013F.asc**, **10013G.asc**, **IL 12IL97.asc** and **IL12597_A_JJS.asc**, and select **Open**.
5) Select **IDOT_D6** in the Data Format box that pops up and select **Apply All**.

NOTE: Files may need to be imported one at a time



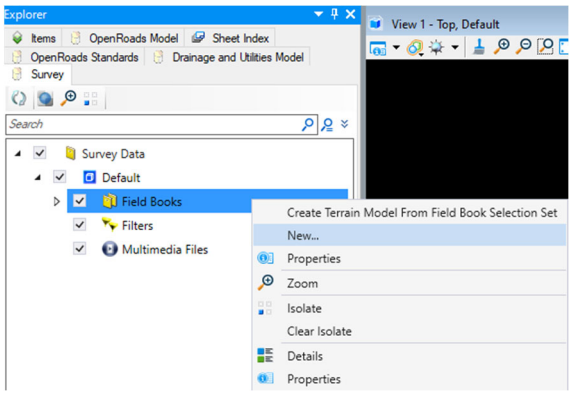
6) After you have imported all the files do a **Fit View** to see the additional data.



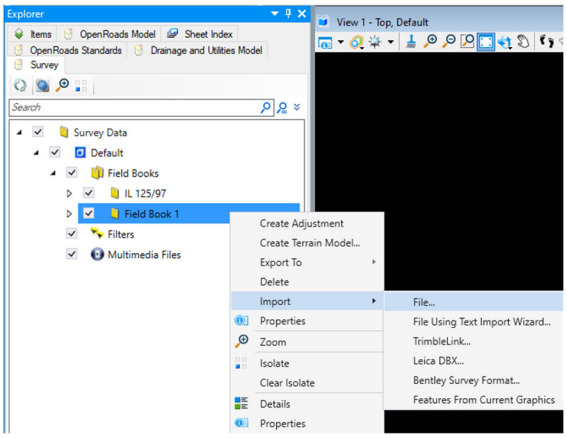
Continue Creating Field Books

In this section you will continue to create a field book. With a pickup survey like this it is better to separate all your data into various field books so that your terrain models will be cleaner.

1) In Explorer navigate to Survey Data\Default\Field Books. Right-click on Field Books and select New.



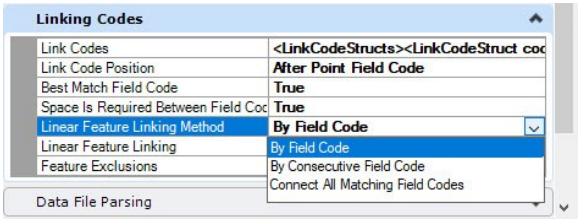
2) Expand the Field Books folder and right-click on **Field Book 1** and select ***Import*** -> ***File*** . Navigate to the location where your project is saved and open the Survey\Field Book 1 folder. Select all the files in this folder and click **Open** to import them.



3) Select **IDOT_6** in the Data Format box that pops up and the select **Apply All**.
4) After you have imported all the files do a **Fit View**.
5) Repeat the steps above to create a new Field Book named **Field Book 2**.
6) Right-click on **Field Book 2** and select ***Import*** -> ***File*** . Navigate to the location where your project is saved and open the Survey\Field Book 2 folder. Select all the files in this folder and click **Open** to import them.
7) Select **IDOT_6** in the Data Format box that pops up and select **Apply All**.
8) After you have imported all the files do a **Fit View**.
9) Continue to create and import **Field Books 3** through **14**.
10) Create two additional Field Books. Right-click on each, select Properties and rename them **Farmingdale Rd** and **Benchmarks and Pipes**. Import the corresponding ".asc" files from the folders with the same names.
    - We also have a field book that we will create and import in the Right of Way section.

E2.4 – Editing Survey Points and Linear Features

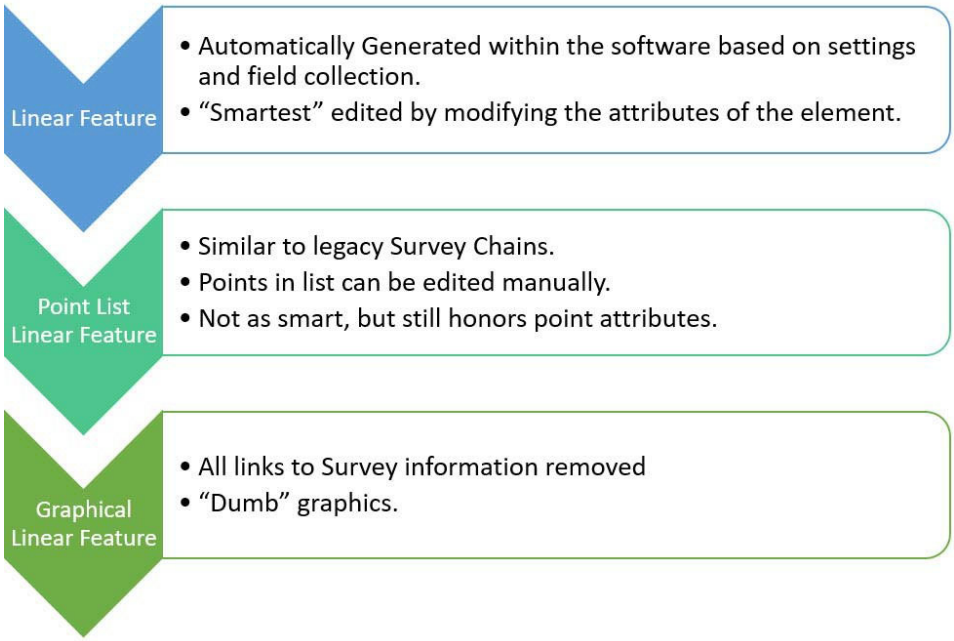
Linear Features are created during the import process based on settings within the Survey Settings under the OpenRoads Standards, specifically the Linking Codes section. When set to By Field Code the software honors those codes entered in the field. Understanding how those codes are processed will give you greater understanding of the end results.



- When field survey data is processed, Point Codes are examined to see if there is a match within the Feature Definitions.
- If there is no match, then the last character is ignored, and the resulting code is compared again to the list. This is referred to as Best Match. If a match is found, all points are coded the same.
- Once the Feature Definition has been established Linking Codes are searched for.
- Linear Features are then generated based on Linking Codes AND the order in which the points are collected in the field.

Three Types of Linear Survey Elements

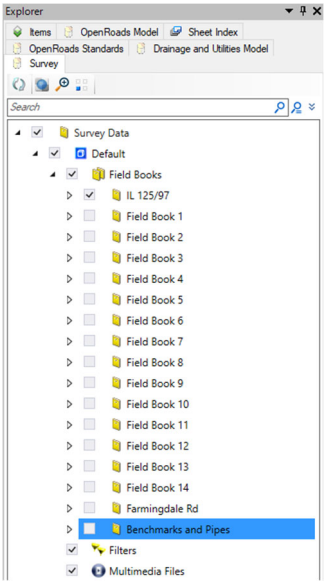
1. **Linear Feature:** These are automatically generated as described above.
2. **Point List Linear Features:** These are lists of points which can be manually edited and rearranged.
3. **Graphical Linear Feature:** This is simply a graphical element. All ties to survey data have been removed. Please note this is a progressive demotion and cannot be reversed (other than by that session's undo process).

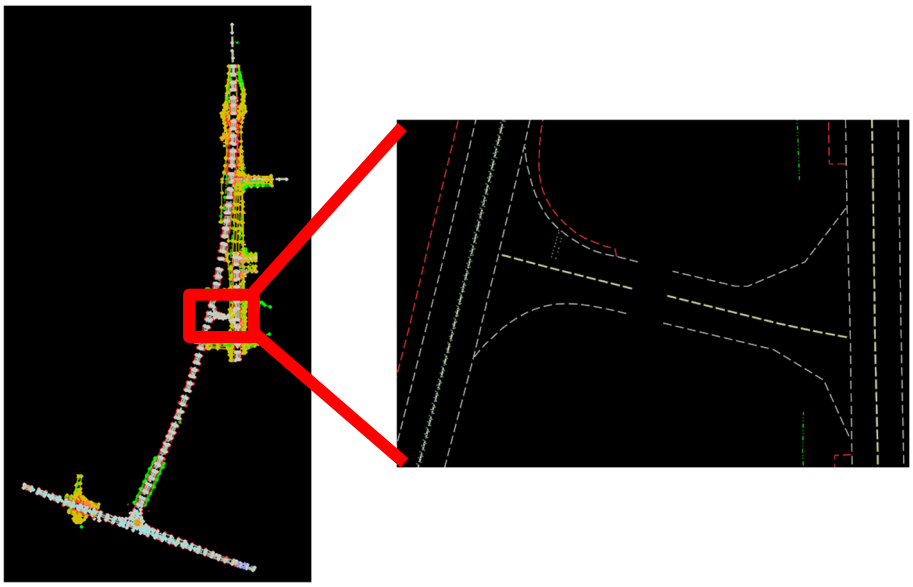


Editing Linear Features

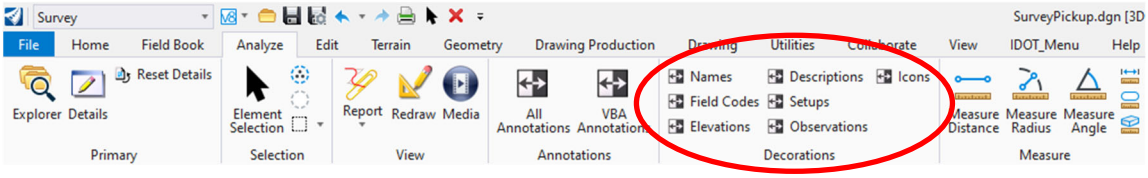
In this section you will examine several ways to edit Linear Features.

1) Continue in file PickupSurvey.dgn.
2) Turn off all field books except for IL125/97 Field Book by selecting the **Check Box** in front of the name.

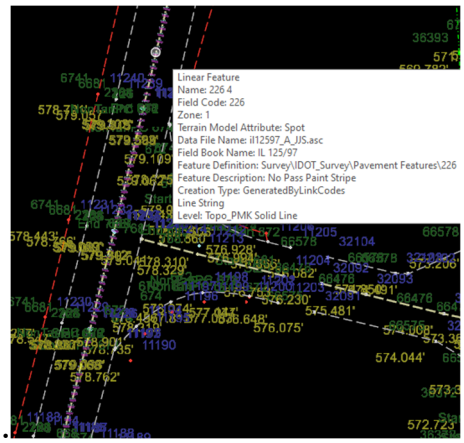


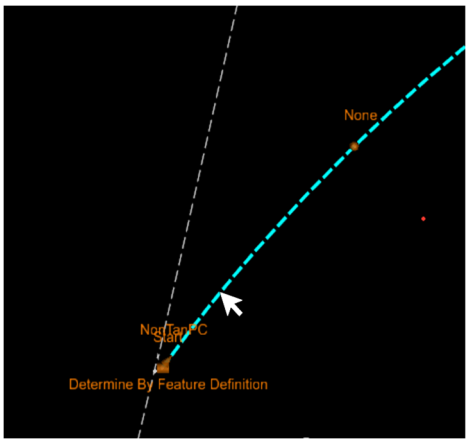


3) Zoom in to examine the Linear Features, notice that some of them are not connected.
4) Under the Analyze Tab in the Decorations Tool Group select Names, Field Code, Elevations and Descriptions to see these decorations. Select each again to turn them on and off in the display.

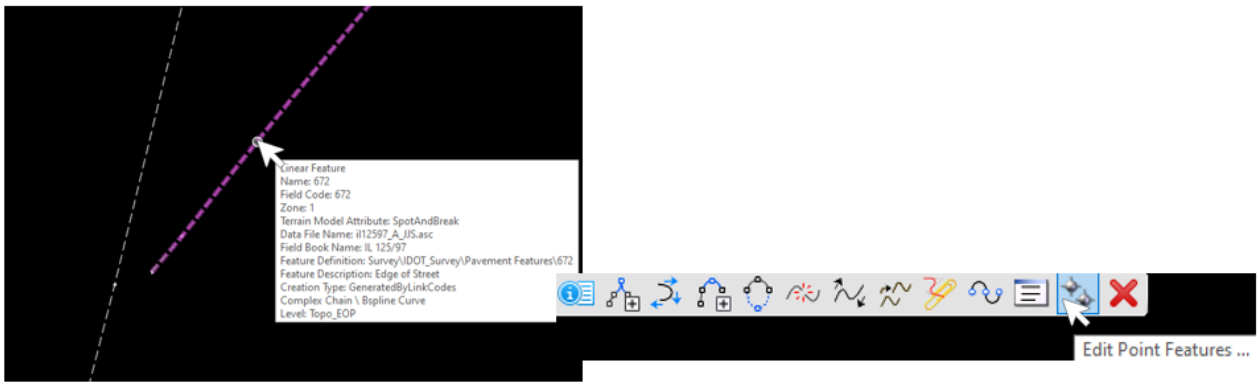


5) Using the Selection tool left click on the Linear Feature to access its properties.
   - The Selection tool replaces several editing tools as it allows you to access the properties of the element being edited. Because the survey information is contained as properties of the element a different mindset is required as we now edit the graphical element which contains the information, instead of editing the data in a separate file and reprocessing graphics.

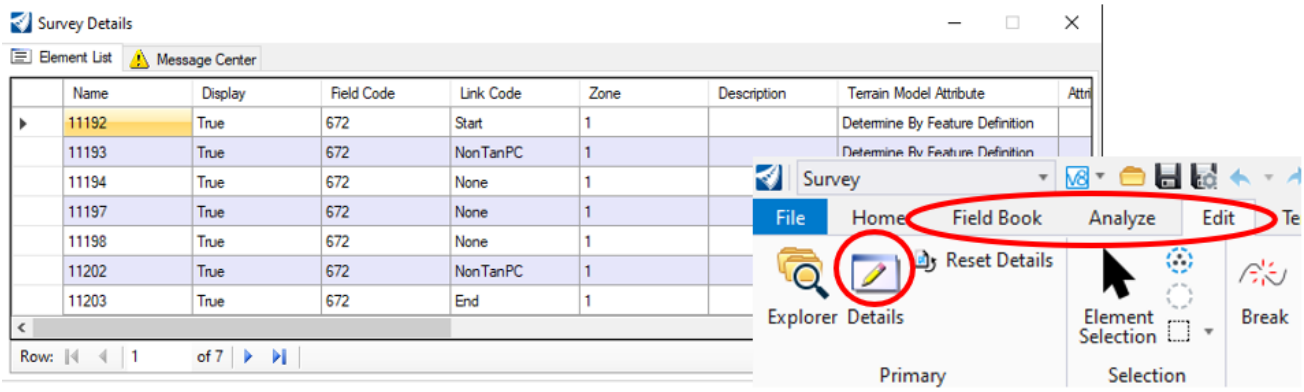




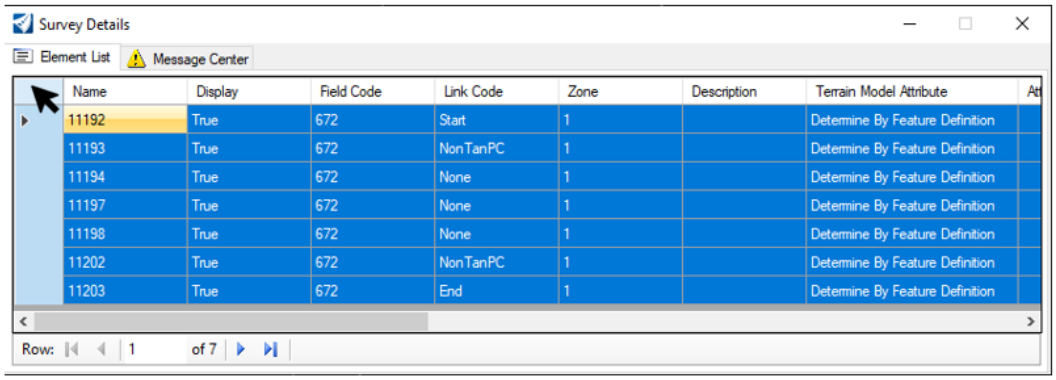
6) Notice that when you selected the Linear Feature text appeared at the points. These are referred to as Handles.
   - If you have the element selected but do not see the handles, zoom out slightly, they should appear. You can also toggle off Decorations if the clutter your view.
   - These handles offer a new way to edit elements. Hovering the cursor over the text Start and see it is the Linking Code entered in the field. Hovering over Determined by Feature Definition indicates the Terrain Attribute of the Linear Feature (whether it is included in the Terrain Model).
7) Left click on the text **Start** and notice the drop-down that appears.
8) Left click on the **Down Arrow** to expand the list and see the various Linking Codes that are available.
   - Most should be self-explanatory; however, one commonly confused pair is CloseShape and Close. Close simply connects the last point to the first. CloseShape will look at the first two points (and the resulting line) then project a point to create a line that is perpendicular to the first.
   - Other useful additions are the NonTanPC (Non-Tangent Point of Curve) and NonTanPT (Non-Tangent Point of Tangency). These are very useful mapping out complex geometry such as curbs with access ramps. They place Linear Features without forcing tangency to prior elements.
9) Select None from the list. Notice how the Linear Feature is removed.
   - This is because without a Linking Code the software will not create the Linear Feature. Again, this may at first seem to be backwards but if you realize the Linear Feature is based off attributes from the point, it makes sense.
   - This is just one example how instead of editing the "Line" you edit the properties of the point that made the line. It also illustrates the point that the graphics are now directly linked to the survey data (if the data is edited the graphics are now directly linked to the survey data (if the data is edited the graphics are updated as well).
10) Click Undo to restore the Linear Feature.
   - It may take a couple of times selecting Undo to restore the Linear Feature because of the underlying processes involved. Take your time and allow the software to process each step in-turn.
   - As you can see, Undo now works with survey operations. If you make a mistake there is no need to re-import your data, simply undo the operation.
   - **Be aware Undo is only available during the current design session. If you close (or compress) the file, your changes cannot be undone.**
11) Edit the Field Code.
   a. Hover over the Linear Feature again and notice the Field Code 672 – Edge of Street.
   b. Left click on and hover your cursor over the linear feature again until the context menu appears. Select the **Edit Point Features** tool.



c. The Survey Details dialog opens, and all points from the currently selected linear feature are populated in the dialog.
   - You can toggle the display of the Survey Details dialog by selecting the icon from the Field Book, Analyze or Edit menu tabs.



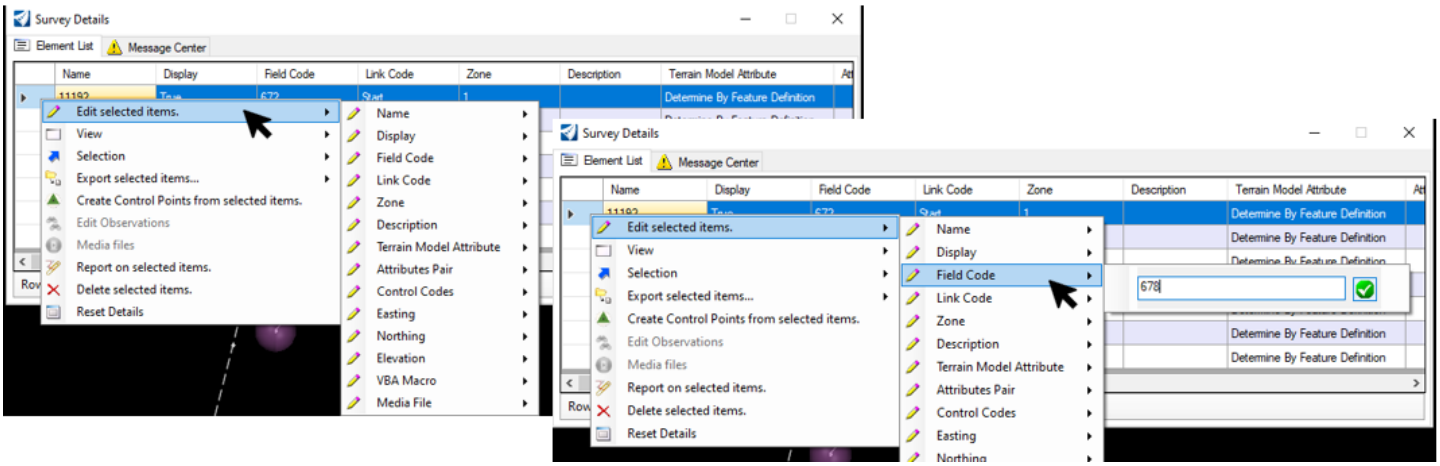
d. Left click in the uppermost left-hand cell. This cell functions as a "select all" button.



e. Right-click in the cell below the "select all" cell to display the menu.

Steps F-G are for information only. THE FEATURE CODE IN THIS CASE SHOULD NOT BE CHANGED. We will run into this later in Field Book 1.

f. Select Edit selected items in the menu. Then select Field Code from the second pop-up menu. A data entry box pops up. Type in 678 then click the green check icon to enter your edits. (***DO NOT CLICK THE GREEN CHECK FOR THIS TRAINING***).



- The Survey Details dialog is one of your most useful to review and edit survey data. The far-left column can be thought of as the selector field and common selection hot keys apply (holding Shift key to select a range, Ctrl key to toggle individual rows).
- You can dock the dialog box at the top or bottom of your window or resize it and the fields within to suit your needs.
- It is worth noting that the fields displayed are a direct link to the information. If you change a value in a field, you are editing the data. **If you need to Undo an operation, give it a few seconds between clicks (there will most likely be quite a bit going on behind the scenes).**

g. Close the Survey Details dialog.
   - As stated before, by design the Linear Feature will inherit the Feature Definition from the points that create it. Thus, if we edit the Field Code for the points, the Linear Feature changes as well (also, if we change the Terrain Attribute, the Terrain Model will automatically update as well).
   - In this section you saw how we use a different methodology for editing field data using Survey. While different, as you become more comfortable, you will see it is more efficient as the graphics and terrain model are dynamically updated. There are no additional steps to update the graphical elements to match the data or rebuild the terrain model due to changes. This also reduces the chance for errors due to the data and graphics falling out of sync.

h. Move to the area in the image below. Notice that our shoulder did not connect and if you zoom in there is a gap in the points.

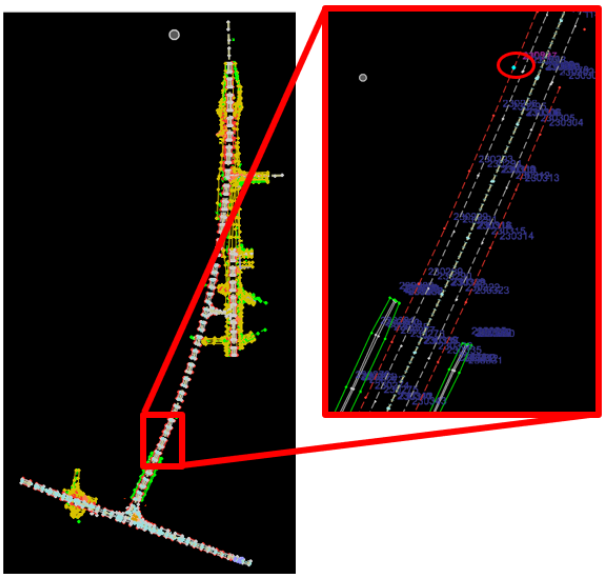
i. Zoom into the area and turn on **Name** on the Decorations tab so we can see the point numbers.

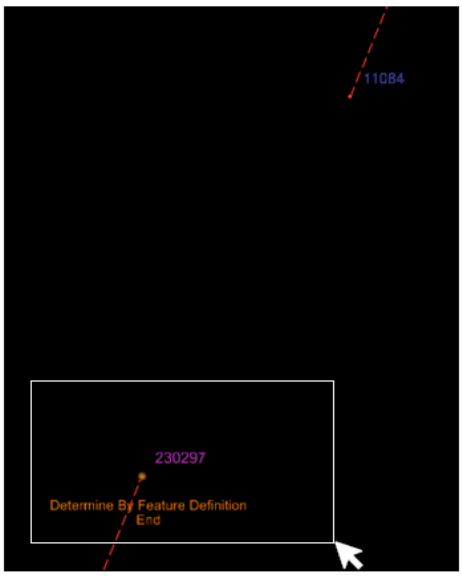
j. We are going to add Control Codes to Points **230297-230302** and then we will fix the shoulder starting at Point **230303**.

k. Zoom into the left side to Points **230297** and **11084**.

l. Using the **Element Selector** tool, place a window to select Point **230297** and open the **Properties** dialog if not already open.

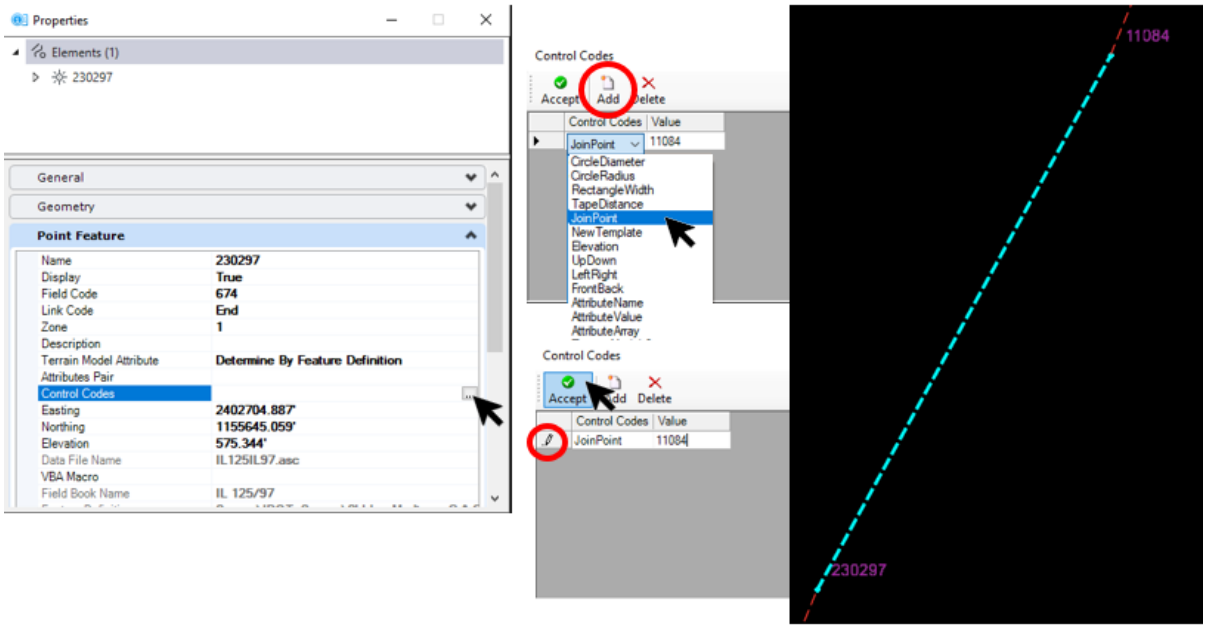
m. In the Properties dialog, locate **Control Codes** under the **Point Feature** section. Click on the 3 dots at the end of the Control Codes line to open the Control Codes dialog box.





n. Click the **Add** icon at the top and under Control Codes, there will be a drop-down menu. Select JoinPoint and enter **11084** under Value. This is the name of the point you will join to point **230297**.

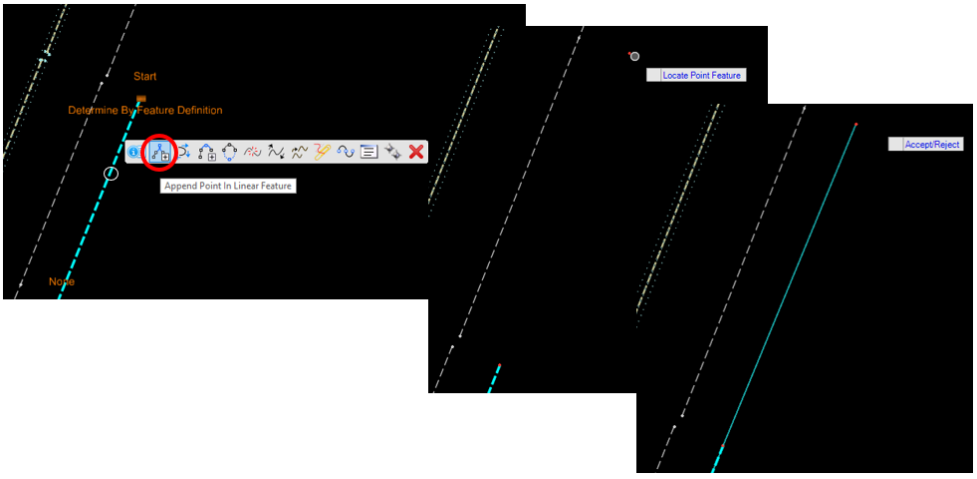
o. Click on the pencil icon on the far left and then click **Accept**. Point **230297** should now be joined to point **11084**.



p. Repeat these steps to connect point **230298** to point **230302**.

12) Left-click on the **674**-Shoulder Feature Line and hover over it until the context menu pops up.

13) Select the **Append Point in Linear Feature** tool and left click on the next point, **11091**. Left click again to accept the edit. The shoulder line will extend to the next point.



14) Continue appending points to the Linear Feature by selecting the Linear Feature then the next point, as directed by the pop-up prompts. Continue until all points are connected for the shoulder.

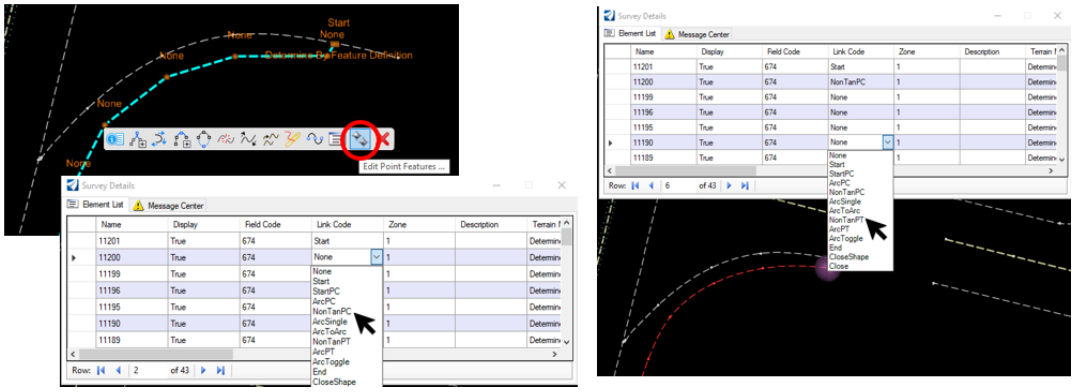
15) Notice the shoulder around the curve at the entrance is made up of lines rather than a smooth arc. We will now fix this.

a. Select the **Linear Feature Edge of Shoulder** and hover on the line until the context menu appears.

b. Select **Edit Point Features** in the menu.

c. The Survey Details dialog box opens. Locate Point **11200** and click twice in the **Link Code** column. Click on the drop-down menu arrow that appears and select **NonTanPC.**

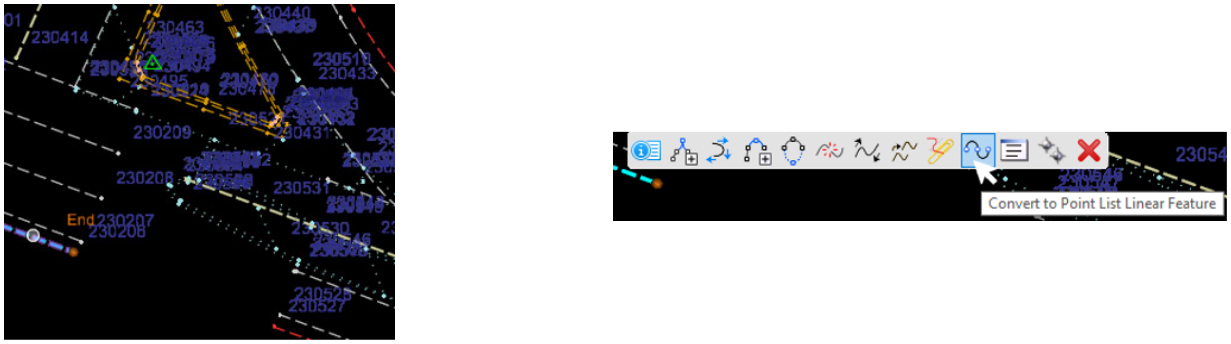
d. Locate Point **11190** and click twice in the **Link Code** column. In the drop-down menu select **NonTanPT**.



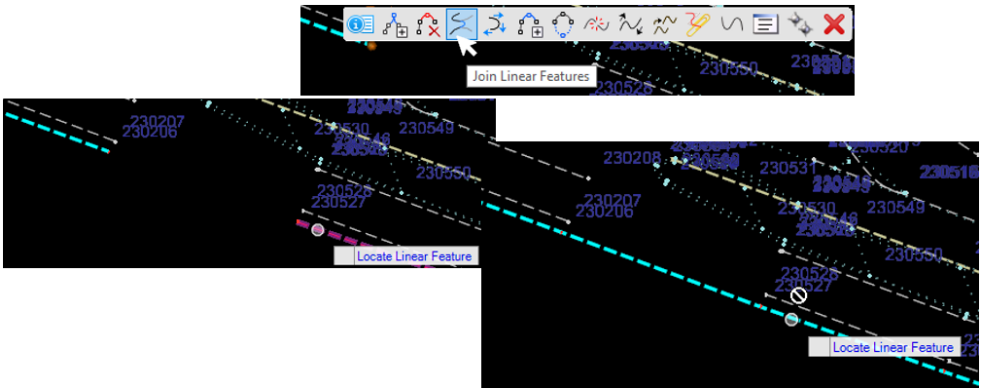
e. Close the Survey Details dialog and notice that the shoulder is now a smooth curve.

16) Zoom to the intersection of IL 125 and IL 97, we are going to use another type of editing so you will have three types in your toolbox.

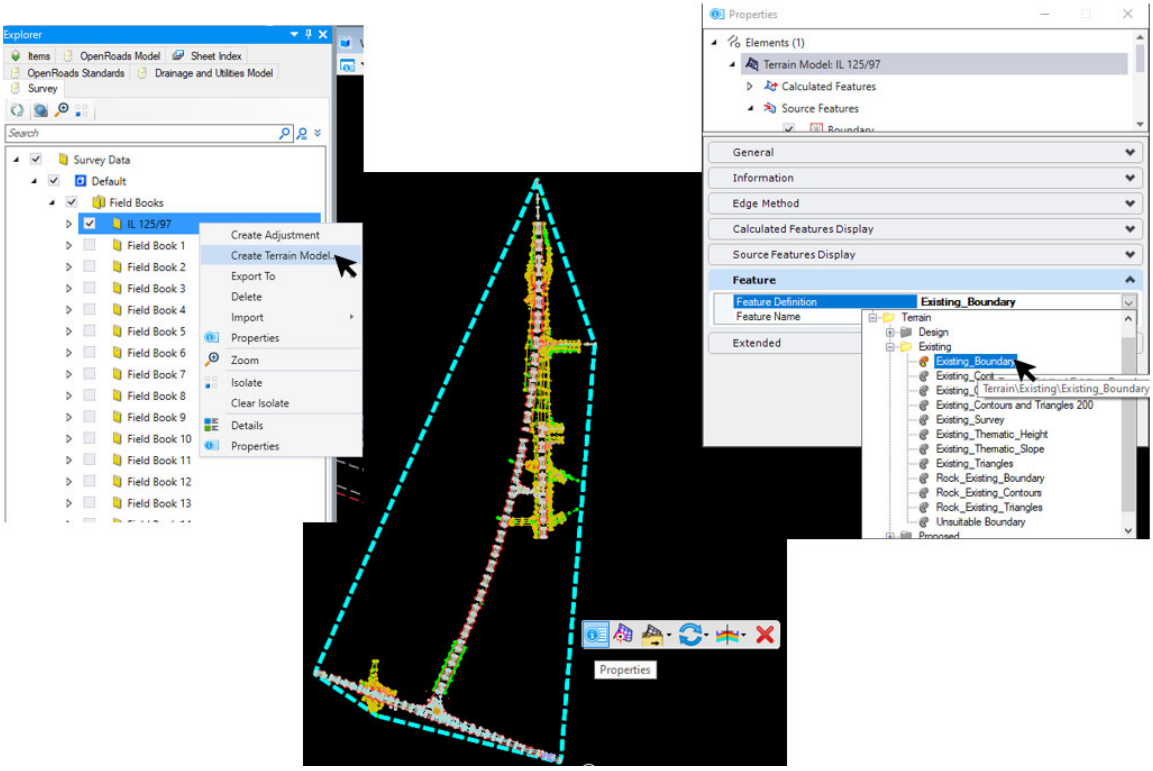
17) Using the Element Selector, select Linear Feature **6741**-Edge of Should. Hover over the line until the context menu pops up and select the **Convert to Point List Linear Feature** tool. Repeat on each Linear Feature in the vicinity that needs to be connected to another.



18) Select the Edge of Shoulder and hover over it until the context menu pops up and select the **Join Linear Feature** tool. Select the Linear Feature to connect to, as prompted. The Edge of Shoulder line should now be connected with no gap. By dropping the features to Point List you allowed the features to be joined. Continue to connect all the Linear Features in the vicinity.



19) When you have completed all the edits to Field Book IL 125/97, right click on the field book in Explorer and select **Create Terrain Model**.
20) Left click on the **Boundary** of the newly created Terrain Model and hover over it until the context menu pops up and select the **Properties** tool if it is not already open.
21) In the **Properties** dialog box, in the **Feature** section, left click on the drop-down menu arrow next to **Feature Definition** and select **TM_Ex_Boundary**.

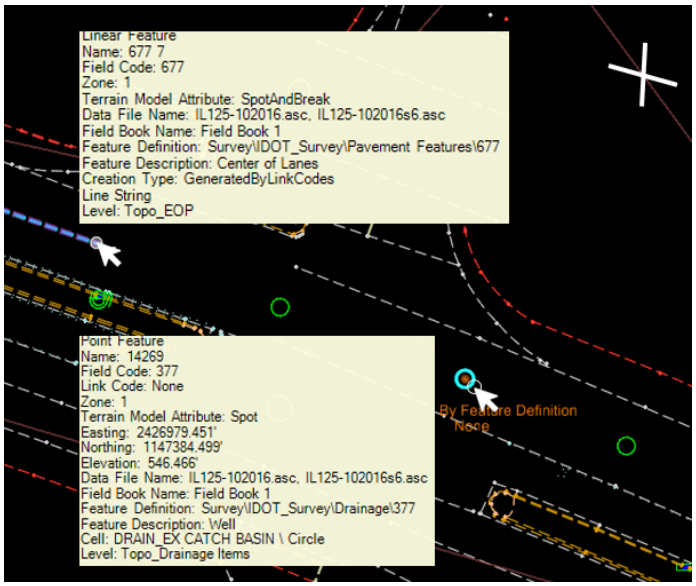


Continue to turn on and Edit Field Books

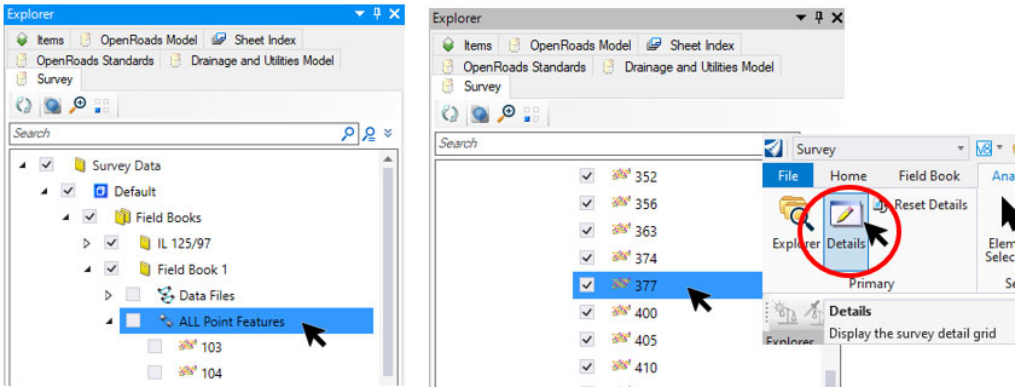
1) In Explorer, turn on Field Book 1 and **Zoom** in to the beginning of the job.

Note 1: All the concrete shots are linked together. We can delete the linear feature (the purple line).
Note 2: Notice the green circles near the beginning of the project. Left click on one and hover over it to see its information.

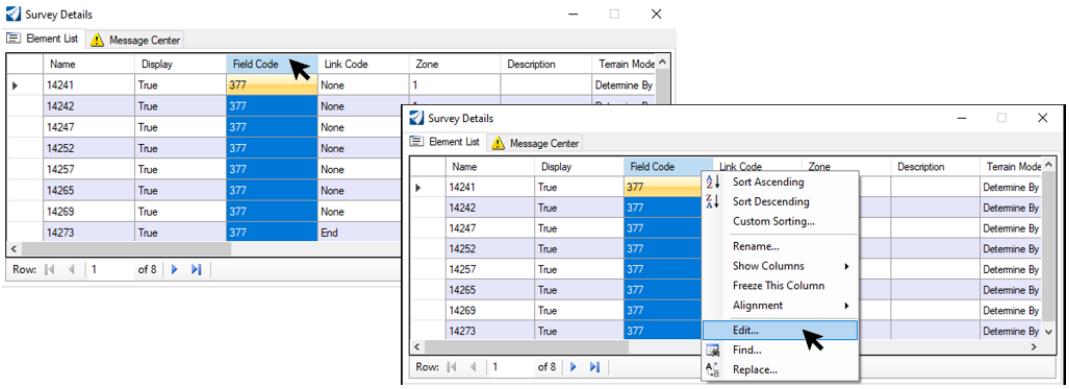
2) The green circles have a field code of **377-Well**.
3) Select the **White Line** and hover over it to see its information.
4) The white line has a field code of **677-Center of Lanes**, obviously, the field code is not coded correctly.



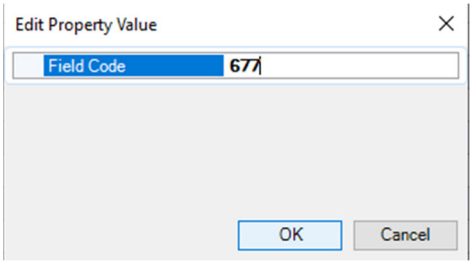
5) In Explorer, navigate to **Field Book 1 -> All Point Features**.
6) Select Point **377**. Under the Analyze tab, in the Primary toolset, select **Details**.



7) As an alternative to edit the points' field codes, as outline previously in these exercises, work through the following steps.
   a. In the Survey Details dialog, select the column header **Field Code** to highlight the entire column.
   b. Right-click on the **Field Code** header and select **Edit**.

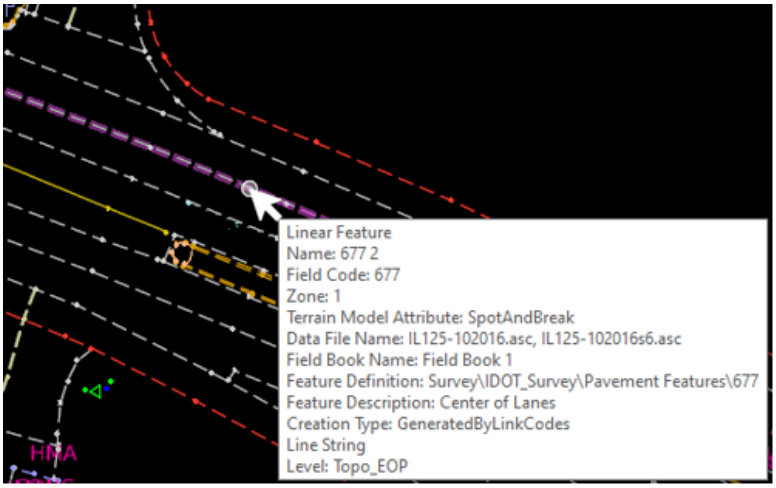


c. In the Edit Property Value box that pops up, change the **Field Code** from **377** to **677** and click **OK**.



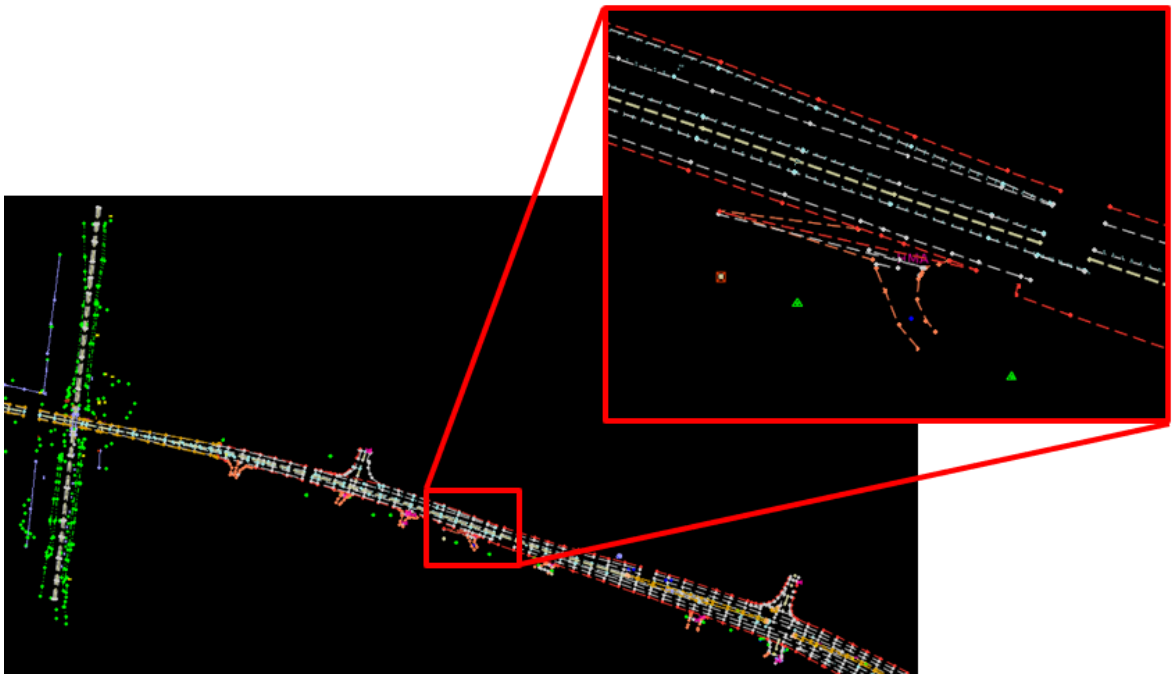
d. Close the Survey Details dialog.

e. Notice the **377-Wells** are now gone and the line is correctly displayed as **Center of Lanes**.

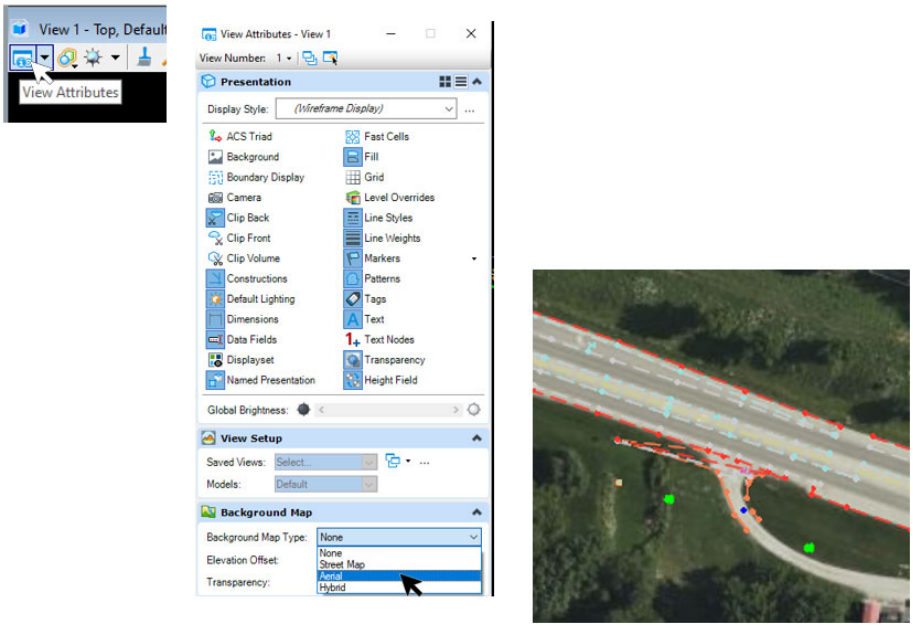


Continue Editing Field Books

1) **Zoom** in to the area shown below. It is obvious that something is wrong here.

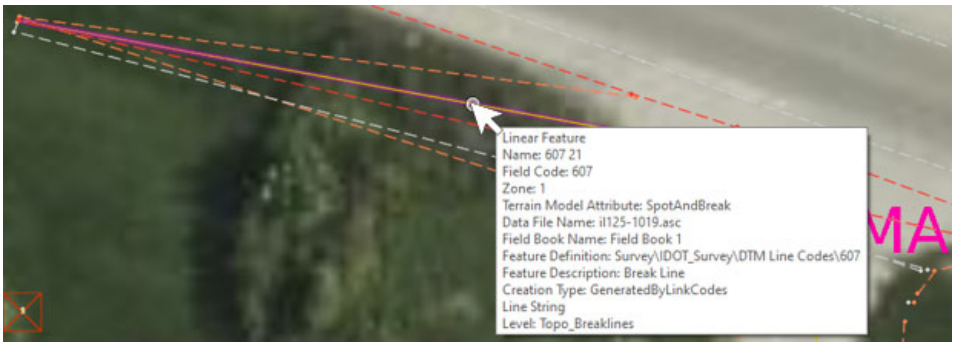


2) Click on **View Attributes** in the upper left of your view window. At the bottom of the View Attributes dialog box, select **Aerial** from the Background Map Type drop-down. **Zoom** in to the entrance in question. It is even more obvious now that the shots at the entrance are wrong.

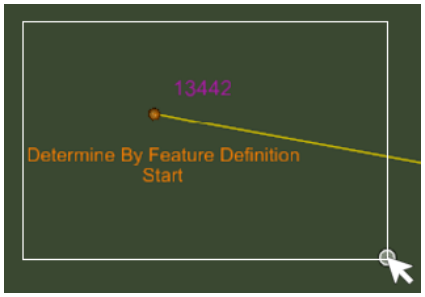


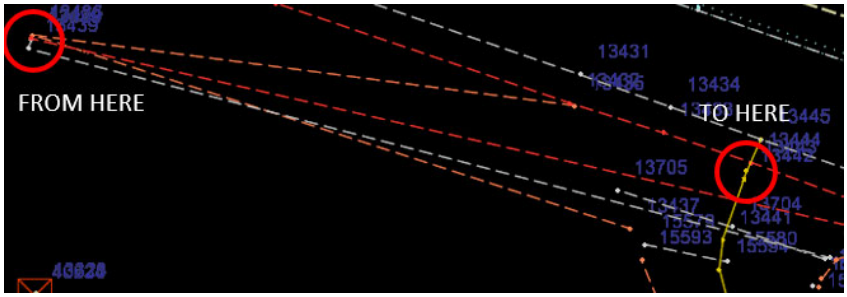
3) Next, we will edit these shots. (**SHOTS SHOULD ONLY BE EDITED BY A LICENSED PROFESSIONAL SURVEYOR OR UNDER HIS/HER DIRECTION**).

4) We will start with the yellow line, which has a feature code of 607-Breakline.



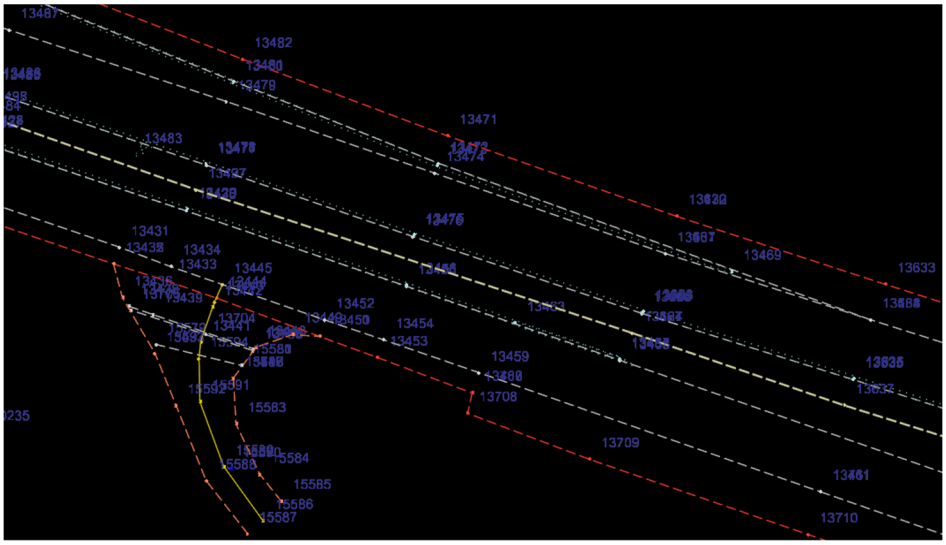
5) **Zoom** in to Point **13442** and using the Element Selection tool, pick Point **13442**. When the point number is highlighted, left click on the point and drag it to the center of the entrance to match the other breakline shots.



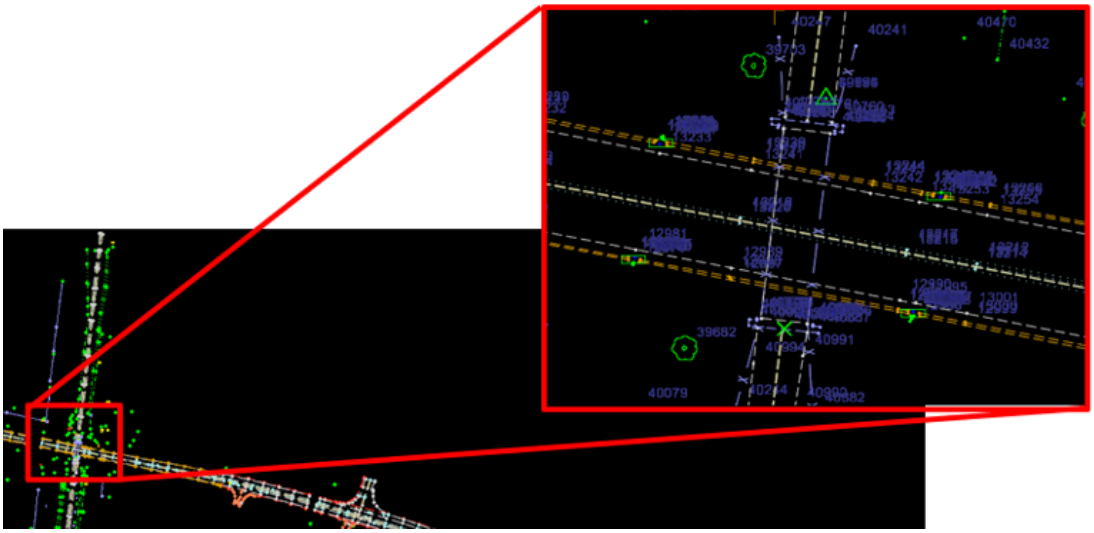


- Repeat for points 674-Shoulder (**13460**), 657-Edge of Private Entrance (**13436**) and 647-Butt Joint (**13438** &**13439**). Move each point to where it should have been shot in the field. The aerial mapping will aid in correct placement.

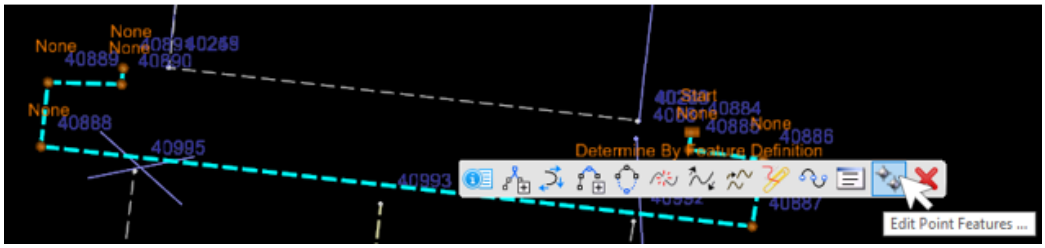
6) Turn off the aerial mapping background in View Attributes.
7) Finish editing the entrance by connecting all lines by selecting and moving points.
8) When all editing is completed, the entrance should look like the image below.



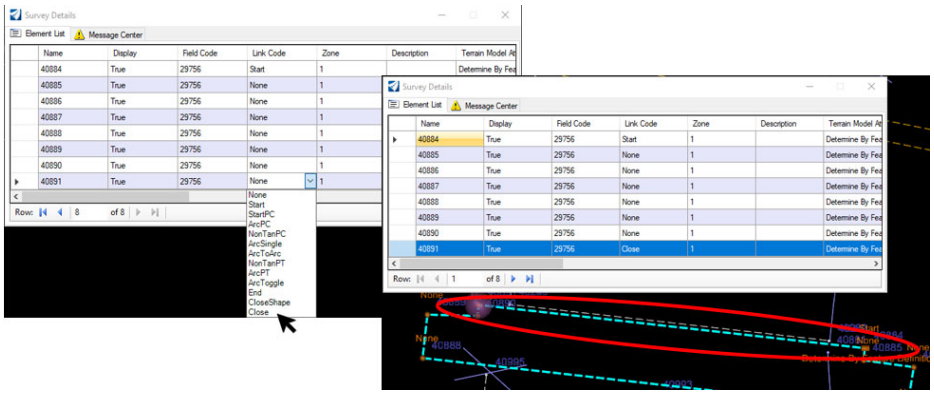
9) The next area of concern is the bike path that crosses the road.
10) **Zoom** in to the bridge along the bike path.
11) As you can see, the road needs to be connected in this area. Also, the bridge abutments need some editing.



12) **Zoom** in to the south abutment, select the abutment line and hover over it until the context menu pops up.
13) Select the **Edit Point Features** tool.

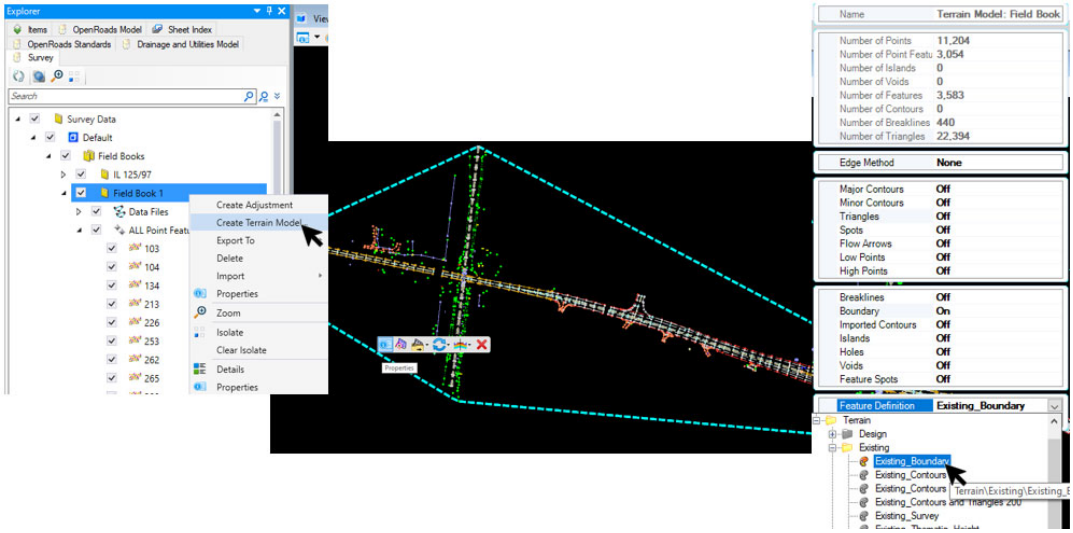


14) In Survey Details dialog left click in the white box to the left of a point. Notice that the point highlights on your screen. Each point you select will highlight.
15) Highlight the last point, **40891**. In the Link Code column, change **None** to **Close**. Notice that the abutment is now a closed shape. Repeat this action for the north abutment, **40256**, and bridge deck, **40260**.



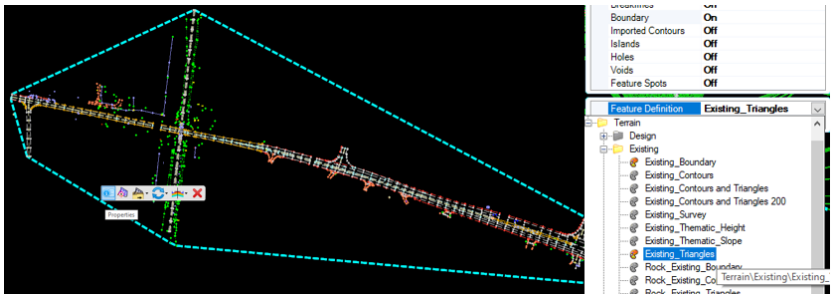
Do not worry about the fence shots going across the road as they are at the same elevation as the bridge deck.

16) Once you close all three shapes, right-click on **Field Book 1** in Explorer and select **Create Terrain Model**.

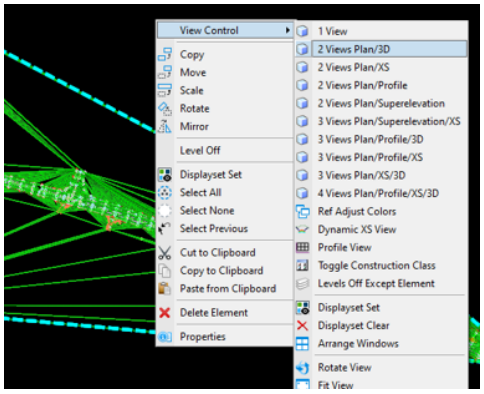


Be sure to change the Feature Definition of the Terrain boundary to **TM_Ex_Boundary** if it isn't already labeled as such.

17) Left click on the Terrain boundary again and select Properties again. This time change the Feature Definition to **TM_Ex_Triangles**.

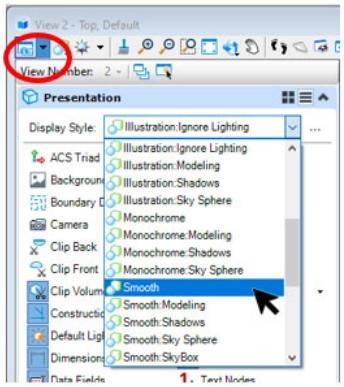


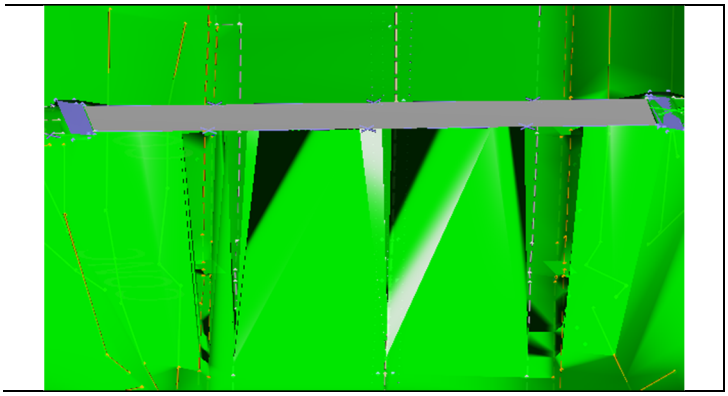
18) Right-click in a blank area in your drawing display and select **View Control -> 2 Views Plan/3D**.



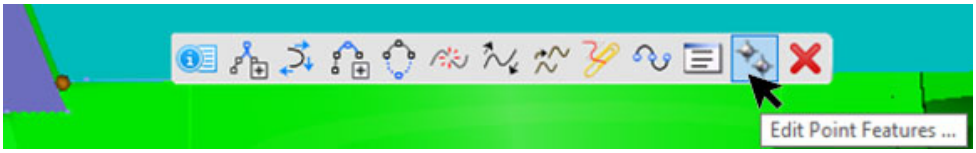
19) In View 2, left click on the **View Attributes** drop-down and under **Presentation**, click on the Display Style drop-down and select **Smooth**.

20) **Zoom** in to the bridge area in View 2. Rotate the view to get a good view of the bridge's profile. As you can see, there are some problems in the terrain at the bridge.



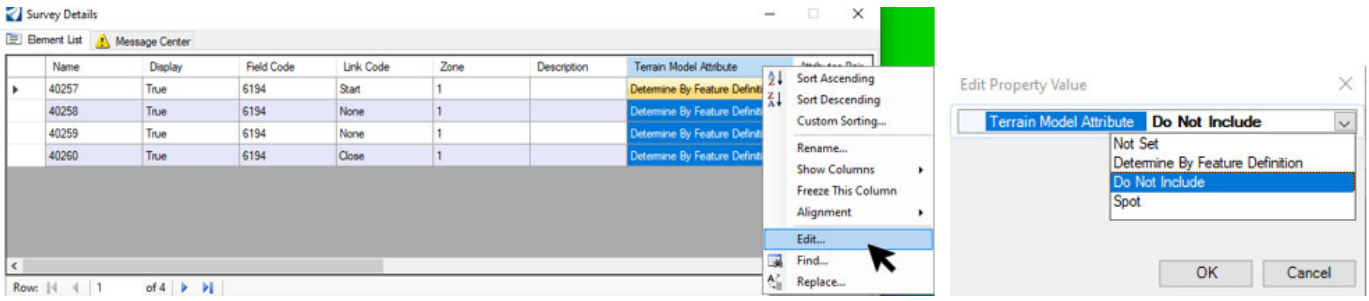


21) Left click on the bridge deck and hover until the context menu pops up. Select the **Edit Point Features** tool.
Note: It is easier to left click on the bridge and fence in the Plan View (View 1).

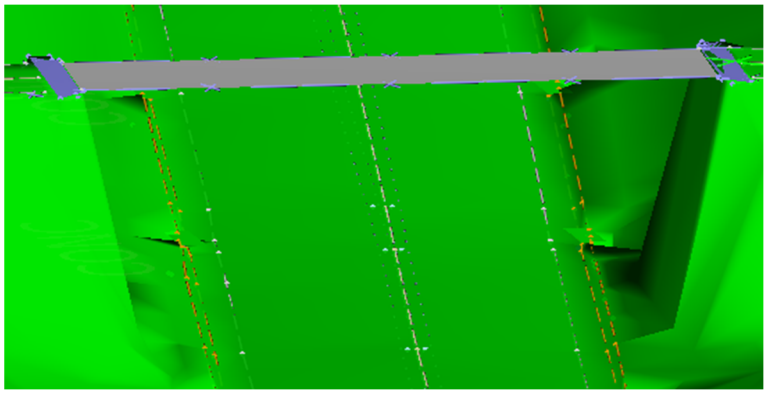


22) Expand the Survey Details dialog box to see the column labeled **Terrain Model Attributes**. Select the column and right-click on it.

23) Select **Edit**, and in the **Edit Property Value** box that pops up, select **Do Not Include** from the Terrain Model Attribute drop-down then click **OK**. Close the Survey Details dialog box.



24) Do the same to the fence lines that cross the road. This will clean up the area below the bridge for a cleaner terrain model.



Chapter 2 Review

General Information

- The Terrain "Model"
  - Must be built in a 3D design file along with ALL Survey data. 2D files are not needed from Survey for Design.
  - A physical model, NOT a MicroStation model
  - New Design element (replaces DTM, TIN, etc.)
  - Created by Survey (or from existing files)
  - Holds all known data for the existing terrain model
  - Allows for different display styles (Triangles, Contours, Thematic) in a single package.

New Concepts

- Creating a new WorkSet for each Design file.
- Geographic Coordinate System
  - Take time to verify it is set in each design file throughout the project
- All Survey data is contained within the Design file.
  - No external files to synchronize graphics data with.
  - The graphic elements in the Design file are "intelligent" and "know" certain Survey properties.
  - All edits are done in the Design file.
- Drag and Drop Import Process

Skills Checklist

- Create new WorkSet
- Context Sensitive Toolbar:
  - Making it appear
  - Utilizing the commands
- Understanding / using:
  - Feature Definitions
  - Project Explorer

Notes:

Chapter 3

Using and Editing Terrain Models

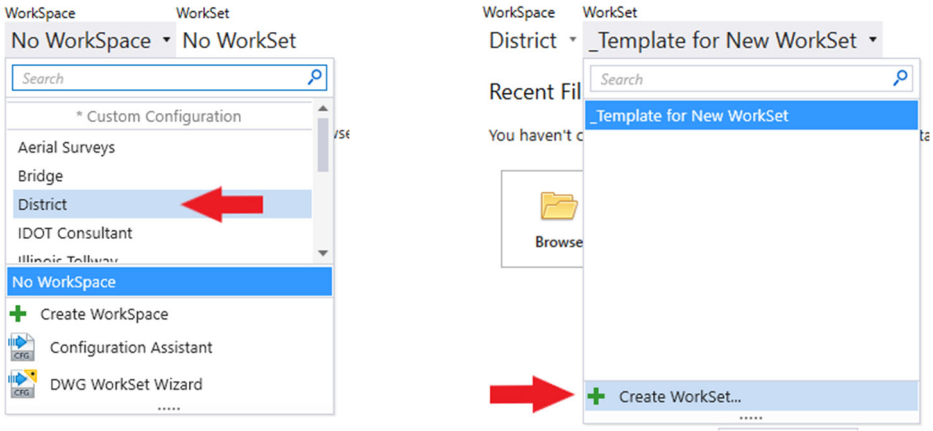
EXERCISES – Chapter 3 – Using and Editing Terrain Models

E3.1 – Terrain Model Review and Display

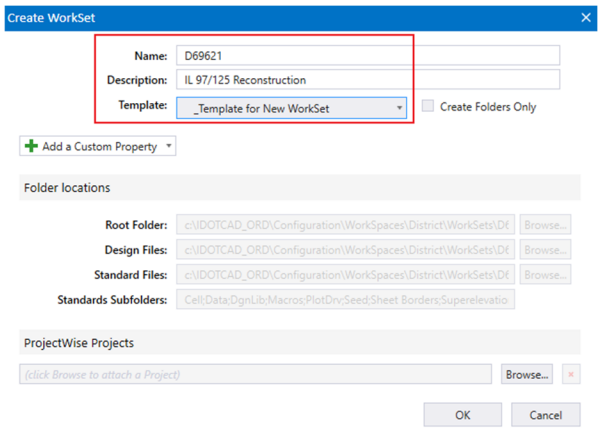
If you have already worked through the Chapter 2 Exercises you can skip the Design File Setup steps 2 through 6 below.

Design File Setup – Outside ProjectWise

1) Start OpenRoads Designer
2) Set the Workspace and Work Set
   - The Workspace and Work Set define standards that are used by the software. The Workspaces are set up during the software installation. In this training we will be using the District WorkSpace, but this could change depending on software and Workspace Standards updates.
   - The following steps will set up the Workset you will be using throughout this training. Internally within IDOT your CADD Manager will take care of setting up the Workset for the project and everyone's use.
3) Select ***District*** from the WorkSpace pulldown menu then select ***Create Workset*** from the WorkSet pulldown menu.

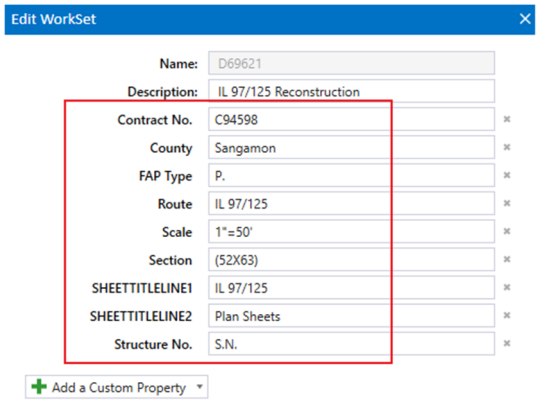


4) The *Create Workset* Dialog Box will open, fill in and select the following:
   - Name: **D69621**
   - Description: **IL 97/125 Reconstruction**
   - From the Template dropdown selection box select: **_Template for New WorkSet** and click **OK** to continue.



5) On the right side of the screen, you will see "***Properties***" select it and then select "***Advanced Properties***". Fill in the Advanced Properties in the *Edit WorkSet* dialog with the following:

- Contract No.: **C94598**
- County: **Sangamon**
- FAP Type: **P.**
- Route: **IL 97/125**
- Scale: **1"=50'**
- Section: **(52X63)**
- SHEETTITLELINE1: **IL 97/125**
- SHEETTITLELINE2: **Plan Sheets**



6) Click ***OK*** to save and exit the *Edit WorkSet* dialog box (not shown). These Properties will automatically fill in the Title Block on all sheets in this project. This is the current workflow, this will be changing with future releases of the software and IDOTCAD Environment, training will be provided at that time.
7) Select New File. Navigate to the location where you unzipped the data set files. Name the new file **d2275TerrainModel.dgn**. Click **Browse** and select the **IDOTeng3d.dgn** Seed file and click **Save** to close the dialog box and open the newly created file.

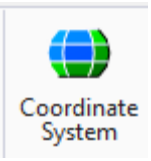
Design File Setup – Inside ProjectWise

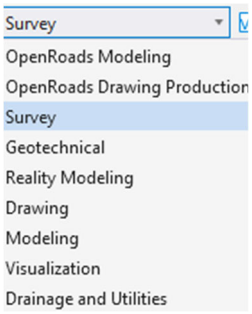
Specific instructions will be presented during class on how to utilize the Managed Workspace within ProjectWise. Your CADD Manager will also have more information if needed as well as be setting up the WorkSet folders for the entire Project.

Set the Geographic Coordinate System

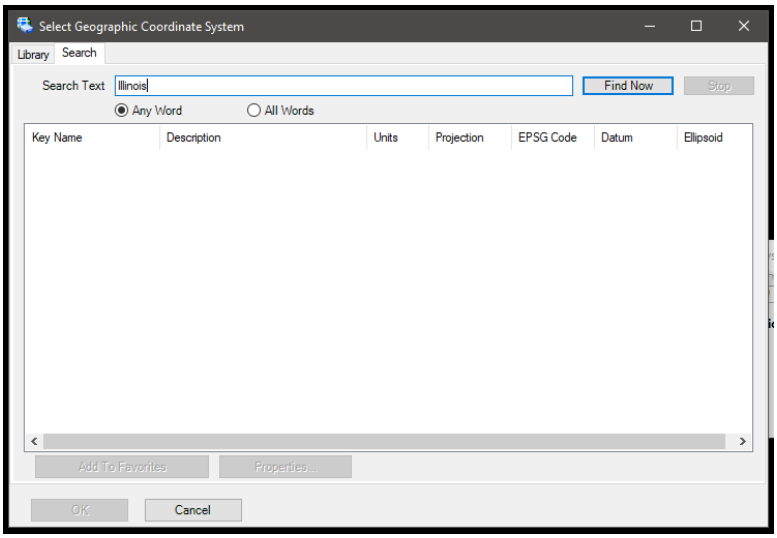
Before we import the Survey data, we need to ensure the Geographic Coordinate System (GCS) is set correctly. This enables the software to make automatic adjustments so data from different systems will mesh seamlessly. Surveyors more than anyone can appreciate the importance of setting the correct Geographic System.

1) Select the **Survey** Workflow from the drop-down menu.
2) Under the Utilities tab, in the Geographic toolset, select the **Coordinate System** tool.

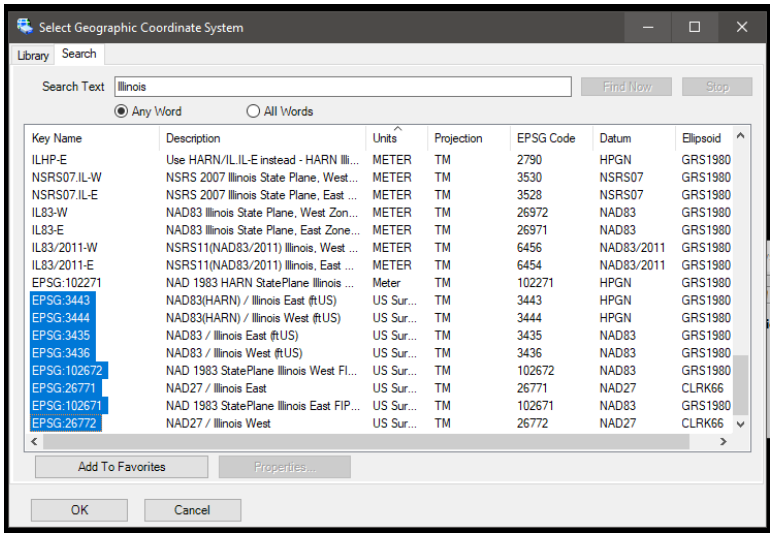




3) Select **From Library** icon.
4) In the Library Dialog click the **Search** tab and type **Illinois** in the "Search Text" and hit **Enter**.

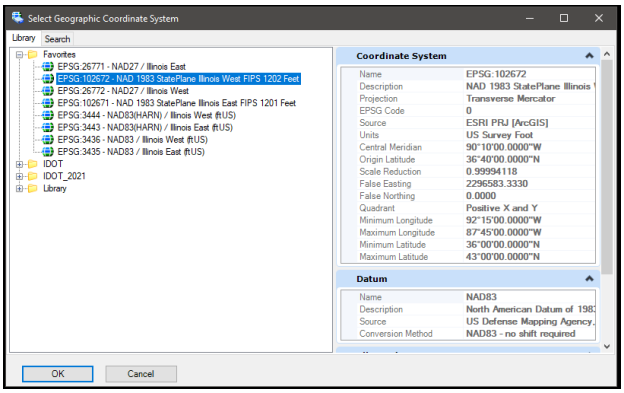


5) Click on the **Units** column header to sort by it.
6) Select all the "Key Name" Coordinate Systems with units of "US Survey Foot" (Shift pick the top and bottom one)



7) Select **Add to Favorites** button at the bottom to add your selection.

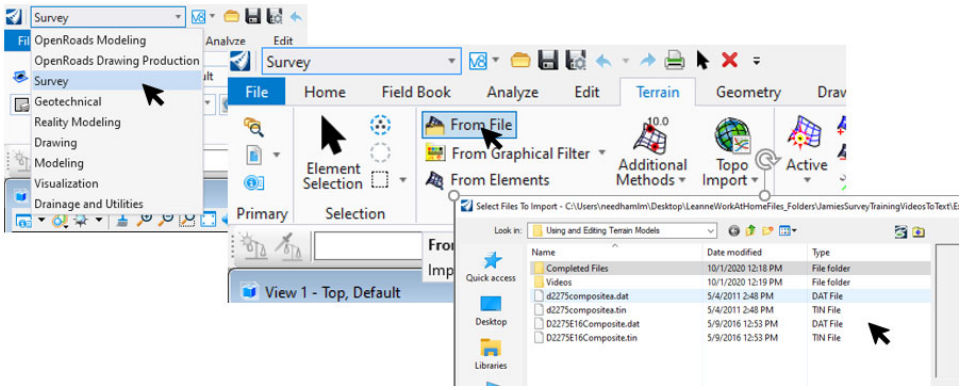
8) Select the **Library** tab at the top of the Dialog.
9) If "Favorites" is not expanded, click the plus (**+**) sign next to it to expand. This will show you the coordinate systems that you picked that apply only to Illinois.
   - Also notice that there is an IDOT and IDOT_2021 folder listed with the Favorites folder. The IDOT folder lists the original District 8 LDP zones per county. The IDOT_2021 folder lists the 33 new LDP zones.



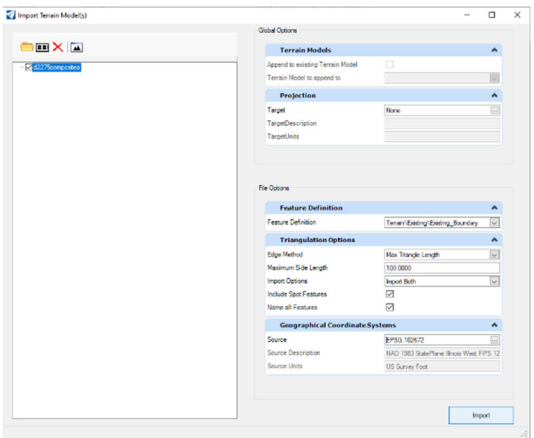
10) Double Click on **EPSG:102672-NAD 1983 StatePlane Illinois West FIPS 1202 Feet** under your Favorites.
11) Close the Geographic Coordinate System Dialog.

Create the Terrain from a ".dat" File

1) Select the **Survey** Workflow from the drop-down menu if it is not already selected
2) Under the Terrain tab, in the Create toolset, select **From File**. Navigate to the location where your project is saved and select the **d2275compositea.dat** file from the Chapter 3 folder and click **Done**.



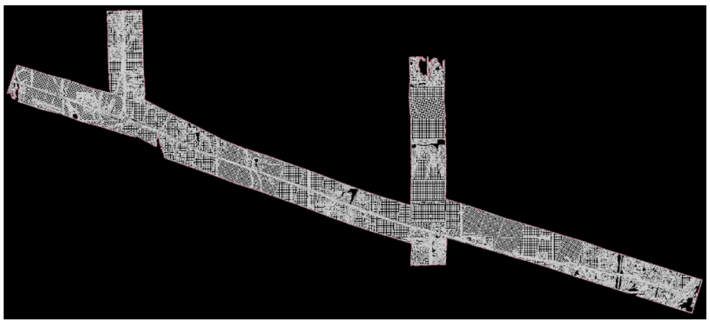
3) In the Import Terrain Model(s) dialog box set the following:



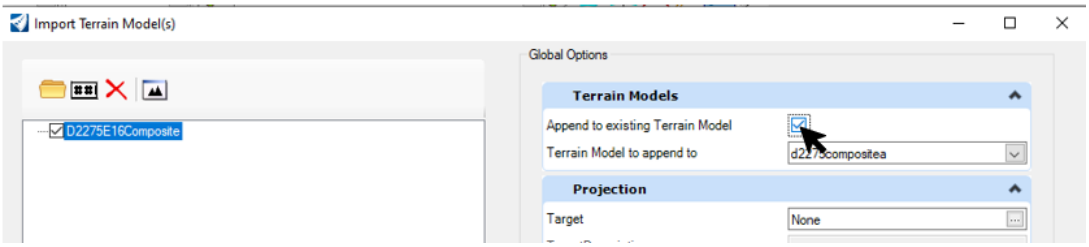
Under File Options:

- **Feature Definition**: Terrain\Existing\ TM_Ex_Boundary
- **Edge Method**: Max Triangle Length
- **Maximum Side Length**: 100.00
- **Input Options**: Both
- **Include Spot Features**: Check On
- **Name all Features**: Check On
- **Geographical Coordinate Systems**: ESPG: 102672

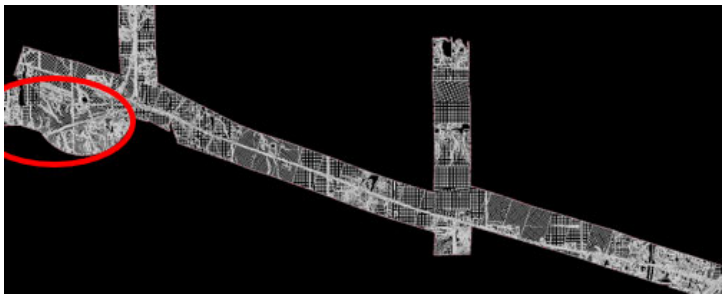
4) Click **Import**. This may take some time to load all the points, breaklines, etc.
5) Click on **Fit View** to see the imported data.



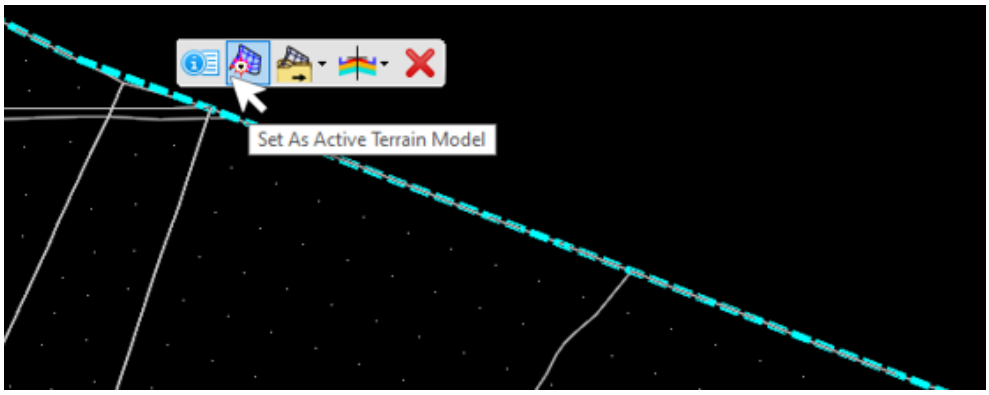
6) Once the first Terrain Model is imported, close the Import Terrain Model(s) dialog, and select **From File** again. Then select the **D2275E16Composite.dat** file. In the Import Terrain Model(s) dialog, use the same settings as before, except this time check the **Append to existing Terrain Model** box.



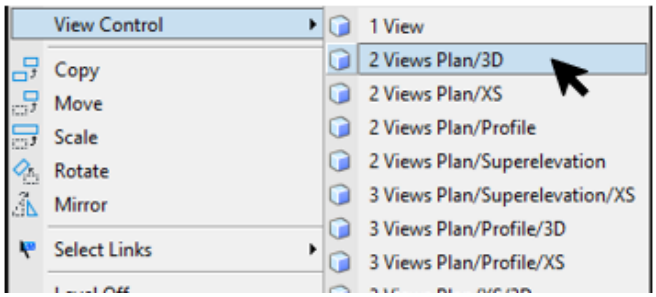
7) Fit the view to see the whole Terrain Model and the Appended portion.



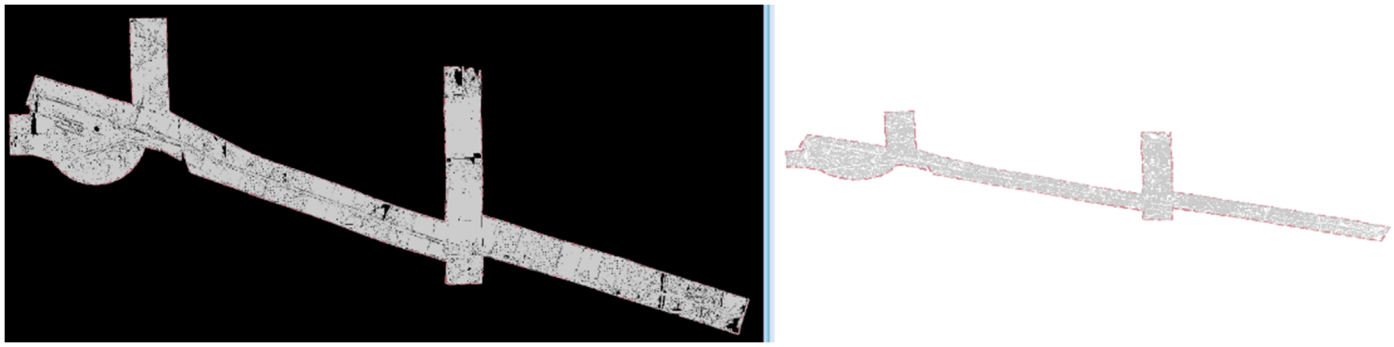
8) Using the Element Selection tool, select the **Terrain Model Boundary** and hover until the context menu pops up, then select **Set as Active Terrain Model**.
   - Setting the terrain model active automatically creates a 3D model and attaches it to the 2D design file as a reference.



9) Right-click and hold in View 1. Select **View Control -> 2 Views Plan/3D** to open the 2D and 3D views side by side.

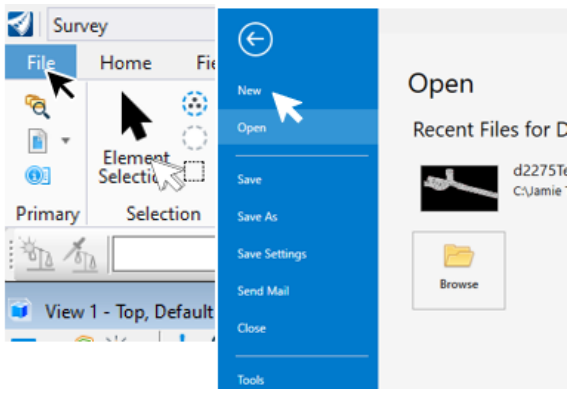


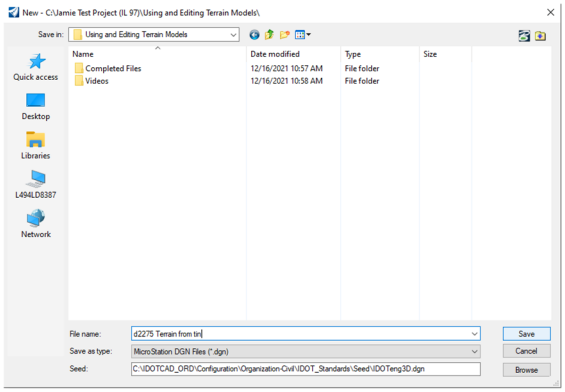
10) Fit both views.



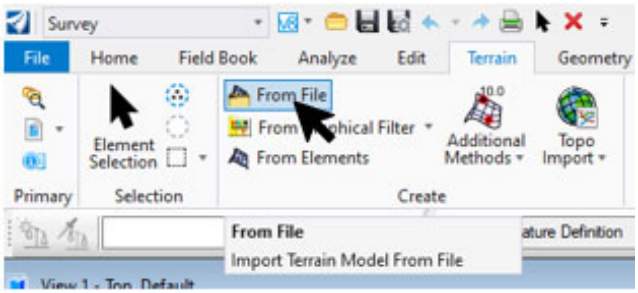
Create Terrain from ".tin" files

1) Select **File** at the top left and create a new 3D file and name it **d2275 Terrain from tin.dgn**.
2) Click **Save** and the newly created .dgn will open.



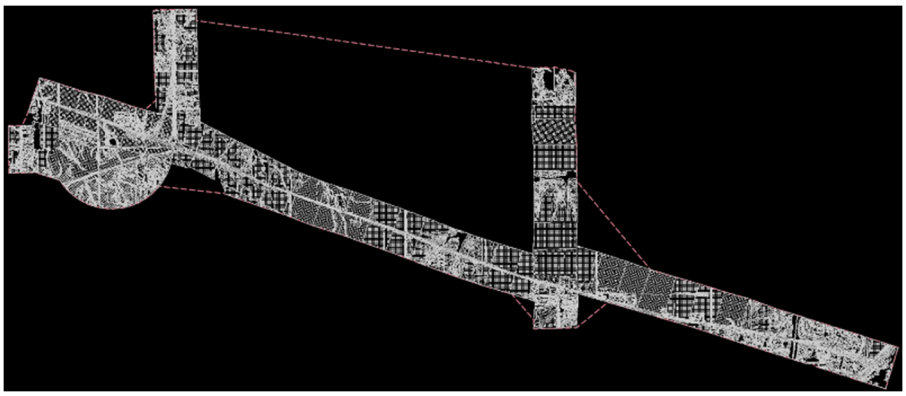


3) Follow the previous steps to set the Geographic Coordinate System in your new file.
4) Under the Terrain tab, in the Create toolset, select **From File**. Navigate to your working folder and select the file **d2275compositea.tin** then click **Done.**



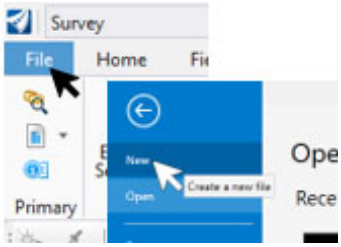
5) The Import Terrain Model(s) dialog box will open.

6) Use the same settings as the first import in the previous exercise and click Import.
   - **Feature Definition**: Terrain\Existing\ TM_Ex_Boundary
   - **Input Options**: Both
   - **Include Spot Features**: Check On
   - **Name all Features**: Check On
   - **Geographical Coordinate Systems**: ESPG: 102672
7) Once the first Terrain Model is imported, close the Import Terrain Model(s) dialog, and select **From File** again. Then select the **D2275E16Composite.tin** file. In the Import Terrain Model(s) dialog, use the same settings as before, except this time check the **Append to existing Terrain Model** box.
8) Select **Fit View** to see the complete Terrain Model.

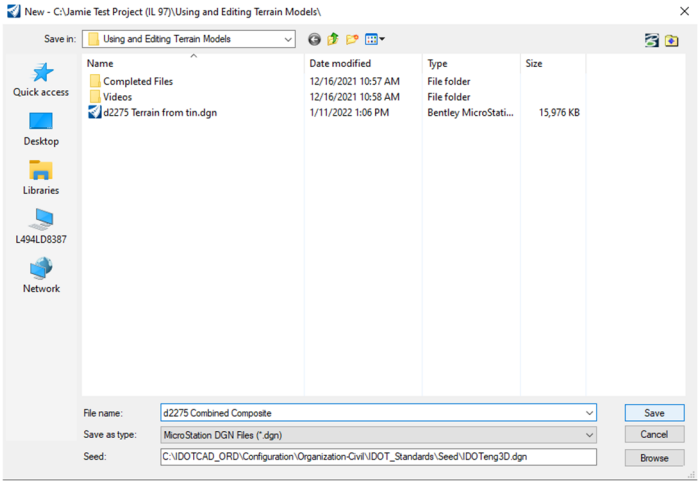


Create a New .dgn

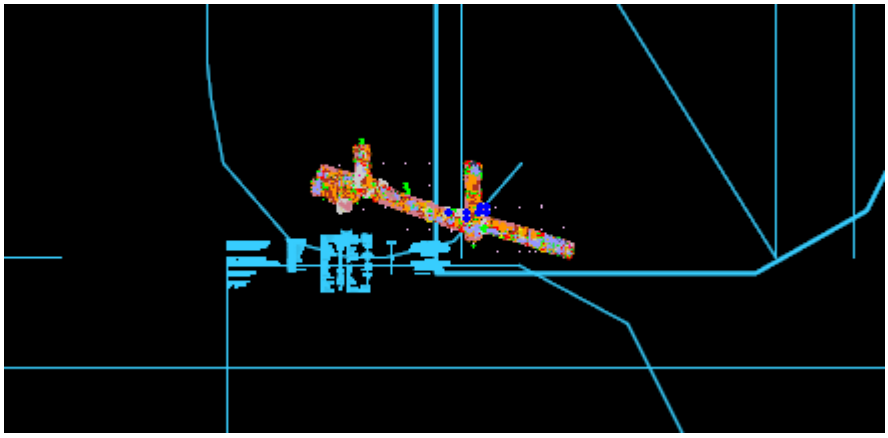
9) Select **File** at the top left and then **New**.



10) Name the file **d2275 Combined Composite.dgn** and make sure you select the proper 3D Seed file and click **Save**.



11) In the upper left corner, select the **Survey** Workflow from the drop-down, if it is not already selected.
12) Under the Home Tab, in the Primary Toolset, select **Attach Tools -> References**.
13) Attach the files **d2275composite.dgn** and **D2275E16Composite.dgn**. Both files can be found in the Chapter 3 folder. These files are topo delivered from Aerial Surveys.

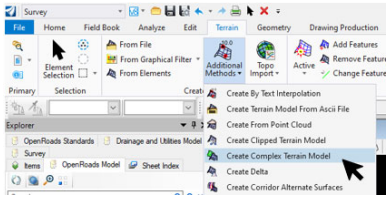


14) How would you fix the Annotation errors that are presented after referencing the files together?

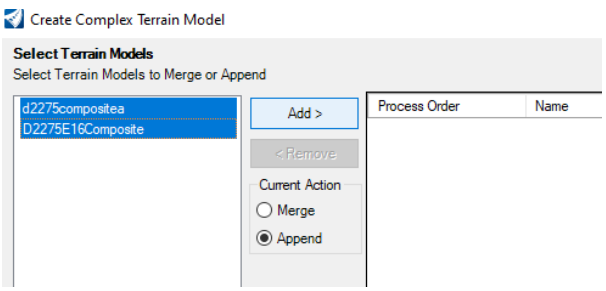
E3.2 – Complex Terrain Models

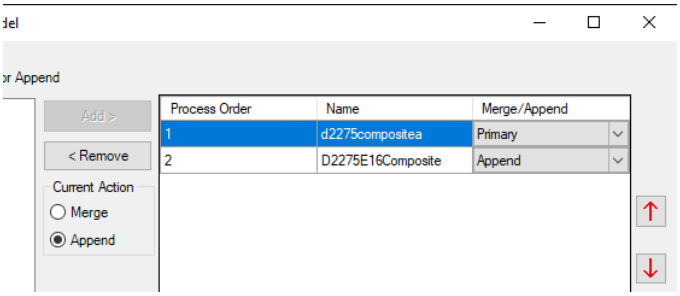
When multiple terrain models need to be combined, the recommended best practice is to reference the terrain models into a blank file and create the new complex terrain model there. This keeps the complex and the source terrain models organized in separate files making it easier to manage your data.

1) Continue in the **d2275 Combined Composite.dgn** file to create a combined Aerial Survey terrain model.
2) Under the **Terrain** tab, in the Create toolset, select **Additional Methods -> Create Complex Terrain Model** tool.

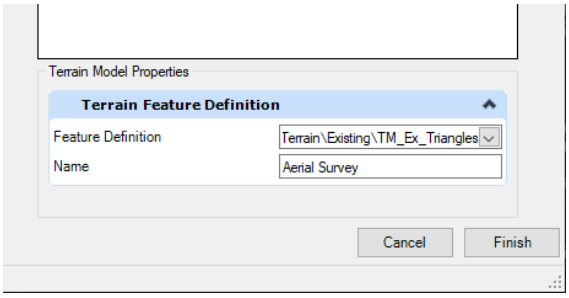


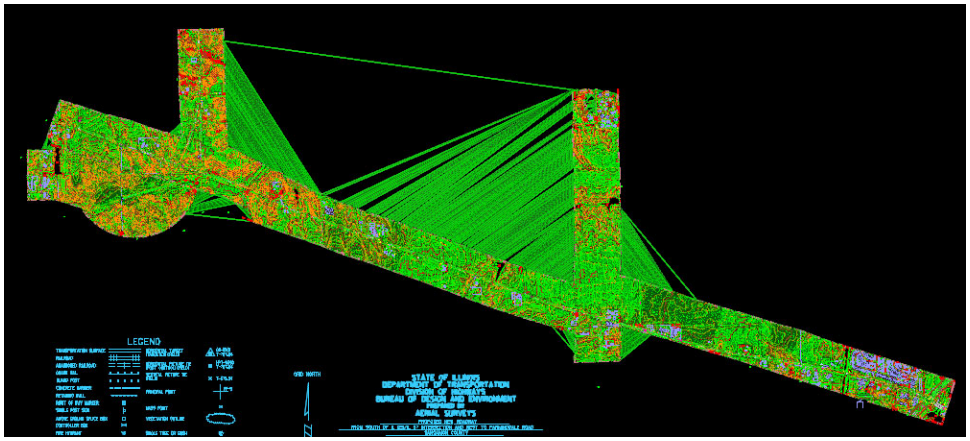
3) Select the **d2275compositea** and **D2275E16Composite** terrain models in the left-hand pane of the Create Complex Terrain Model dialog and click **Add**. You will **Append** the D2275E16Composite to the d2275compositea terrain.





4) Set the Feature Definition to **Terrain\Existing\TM_Ex_Triangles** and name the new terrain **Aerial Survey** and click **Finish** to append the two terrain models into one Aerial Survey terrain model.



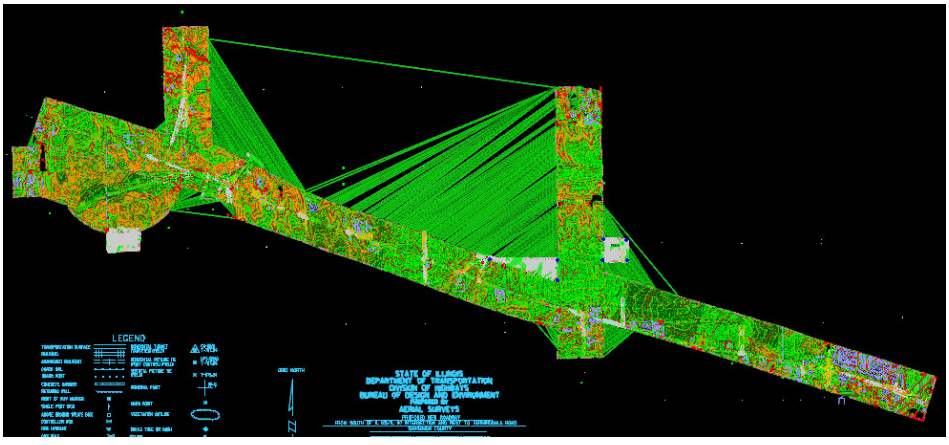


Add the Pickup Surveys to the Complex Terrain Model

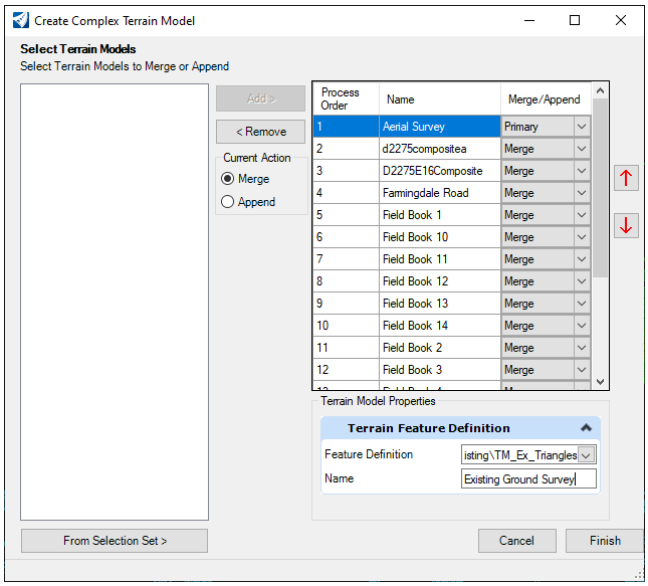
5) At the top left, select **File -> Browse** and navigate to the Chapter 3 folder of your data set and open the blank 3D design file named **Complex Terrain Model.dgn**.
6) Once the file opens go to the **Home** tab on the Survey Workflow. In the Primary toolset, select **Attach Tools -> References**.
7) From the Chapter 3 folder in your data set attach files **Pickup Survey.dgn** and **D2275 Combined Composite.dgn** using the **Coincident World** attachment method.

Note: All Field Books must be checked in Explorer in the PickupSurvey.dgn file for all the terrains to show up when referenced into this file.

8) Select the file **D2275 Combined Composite.dgn** in the References dialog and **Turn On** Live Nesting to a Nesting Depth of 1 and then close the References dialog.
9) Fit the view to see the entire project.



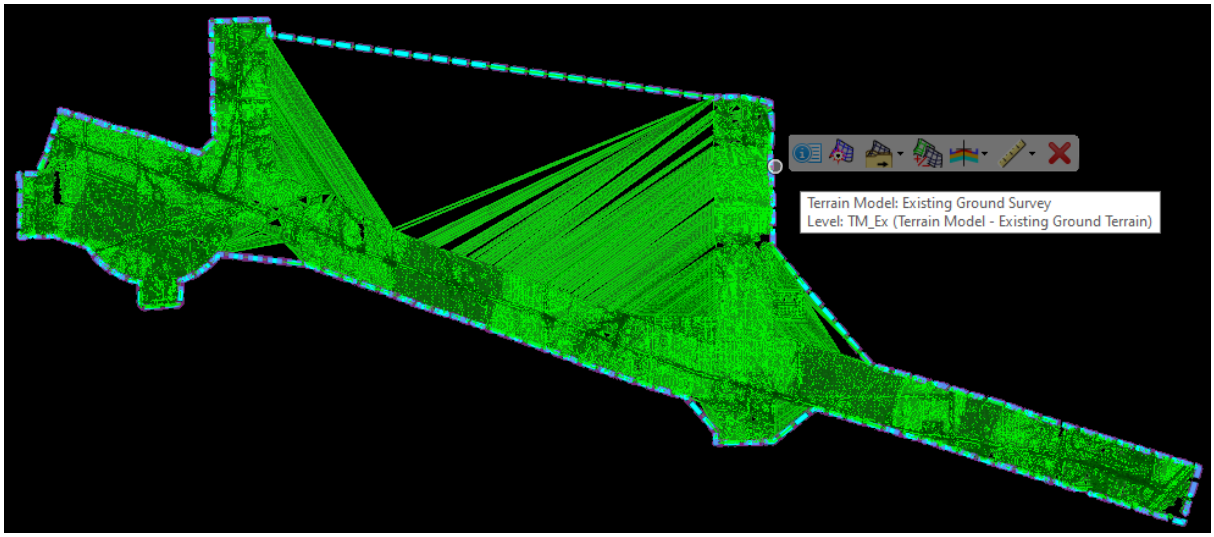
10) Under the **Terrain** tab, in the Create toolset, select **Additional Methods -> Create Complex Terrain Model** tool.
11) Select the **Aerial Survey** terrain model in the left-hand pane and click **Add**. The Aerial Survey terrain model is added as the Primary terrain model.
12) Set the Current Action to **Merge**. The data from the primary terrain model is discarded and replaced with the data from the merge terrain model in the area where the two overlap. The two terrain models must overlap with at least one point.
13) Select **all the other terrain models** in the left-hand pane and click **Add**.
14) Set the Feature Definition to **Terrain\Existing\TM_Ex_Triangles** and the Name to **Existing Ground Survey**.
15) Click **Finish** and a new terrain model named Existing Ground Survey is created.



16) Open the **Attach References** dialog and turn **Off** the two reference displays. **Do not** detach the references, just turn the display off.

The result is the single new complex terrain model. The model is currently displaying the triangles based on the assigned feature definition TM_Ex_Triangles, but that display can be changed by changing the feature definition.

Note: The Edge Method set in the primary terrain model is applied to the combined terrain model. If your results differ from the image below, you can go back to the **d2275 Combined Composite.dgn** file and review what edge method was last applied to the Aerial Survey terrain model.

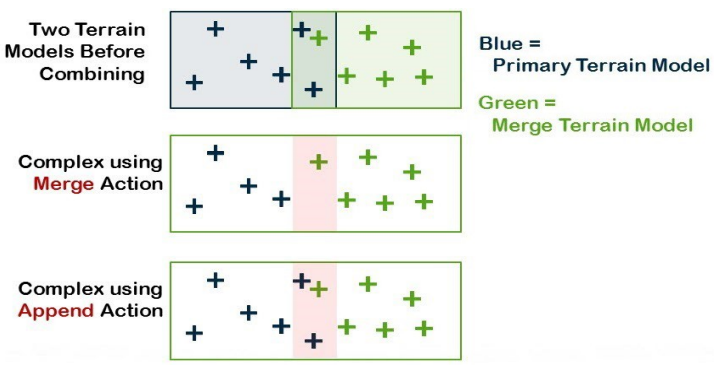


Merge and Append Options

Terrain models can be combined into Complex Terrain models. The complex terrain model is not only a combination of terrain models but a combination that remembers the order in which terrain models are combined and how they are combined. Terrain models can be combined by merging or appending them together.

- **Merge** – The data from the primary terrain model is discarded and replaced with the data from the merged terrain model in the area where the two overlap. The two terrain models must overlap with at least one point.

- **Append** – The combined data from both terrain models is retained in the areas where the terrain models overlap. The two terrain models can overlap or be adjacent to one another.



When the terrain models are combined, the Edge Method of the primary terrain model is applied to the new combined terrain model.

Note: The Edit Complex Terrain Model tool is used to make changes to complex terrain models such as changing the order of the terrain models or the merge/append action. You can also add additional surveys to it later as needed.

E3.3 – Add a Boundary and Modify

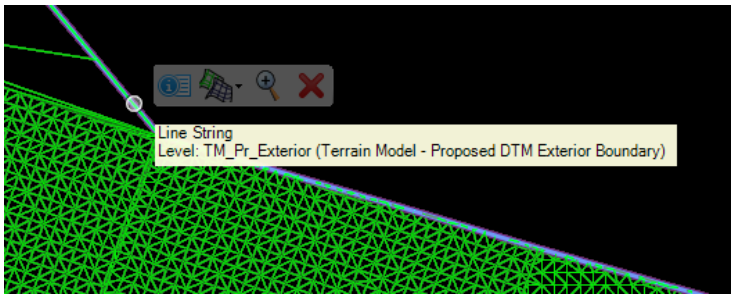
In this section, you will learn how to add a boundary to the terrain model and then modify the boundary feature. The Add Boundary tool extracts the implied or stored boundary from a terrain and adds it to the terrain as the edge method, overriding all other edge methods. The tool options provide the ability to create a 3D graphic of the boundary, add a non-graphical feature to the terrain or add an editable graphical boundary that is ruled to the terrain.

1) Continue in the **Complex Terrain Model.dgn** file.
2) Under the **Terrain** tab, in the Edit toolset, select **Boundary Options -> Add Boundary** and set the following parameters in the dialog box:
    a. **Method**: Add Ruled Boundary
    b. **Feature Definition**: Linear > Terrain_Feature > TM_Exterior
    c. **Name**: Boundary
3) At the Locate a Terrain Model prompt, click the **Terrain Model** to identify it and then click through the options on your cursor that you set in the dialog to accept them and process the command.

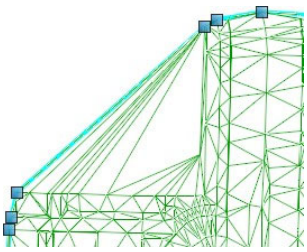
What happened?

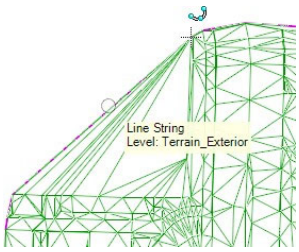
- The boundary was added to the model as an editable boundary that is ruled to the terrain.
- The edge method was set to **From Boundary**.
- The terrain model was processed (triangulated)
    a. **Select** the edge of the terrain to highlight the new boundary graphic and hover over it.
- The line string is on level TM_Pr_Exterior (from the feature definition setting)
- The context sensitive toolbar is available.
- Handles are available on the line string for modifications.

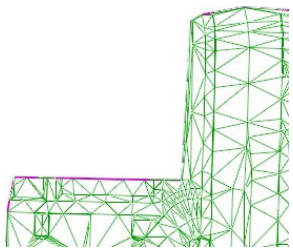
Note: After a boundary has been added to a terrain model, the **Terrain > Edit Model** tools cannot be used to edit the model.



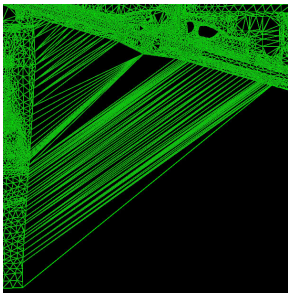
4) Zoom out/in to move your view to the Northwest corner of the complexed terrain model. The boundary graphic may or may not be selected.
5) Under the **Drawing** tab, in the Modify toolset, select **Insert Vertex**. Click on the boundary graphic, then move the cursor and click to identify the location for the new vertex. The boundary graphic and triangles are updated to reflect the change in the boundary.

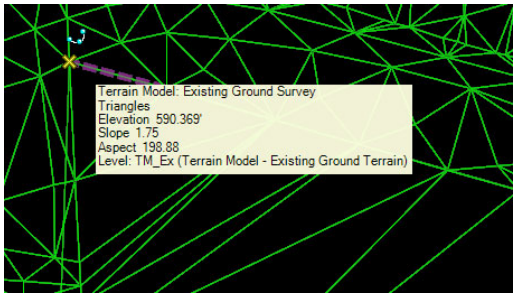


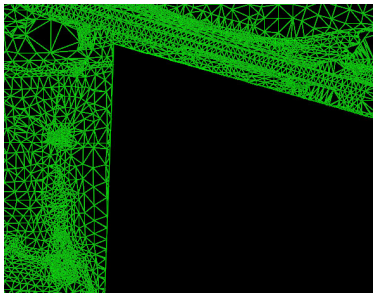




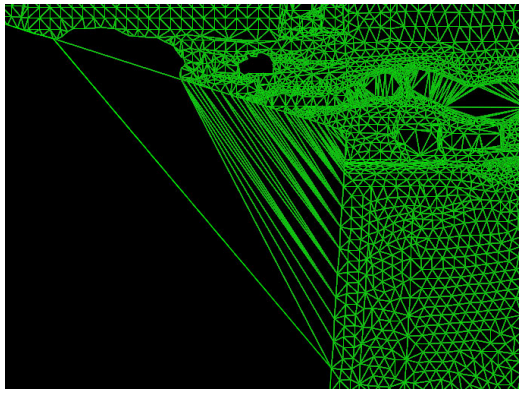
6) Repeat the process in the Southeast corner of the complexed terrain model.



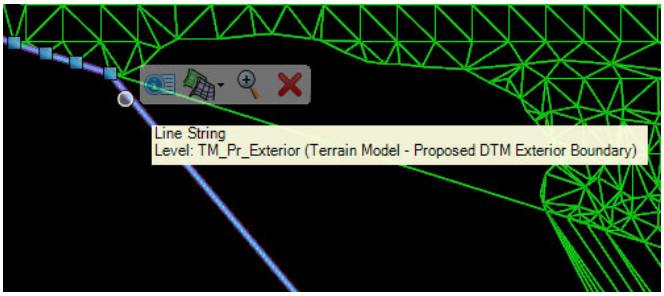


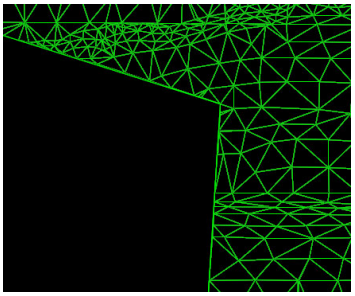


7) Zoom out/in to move to a different corner of the complexed terrain model.

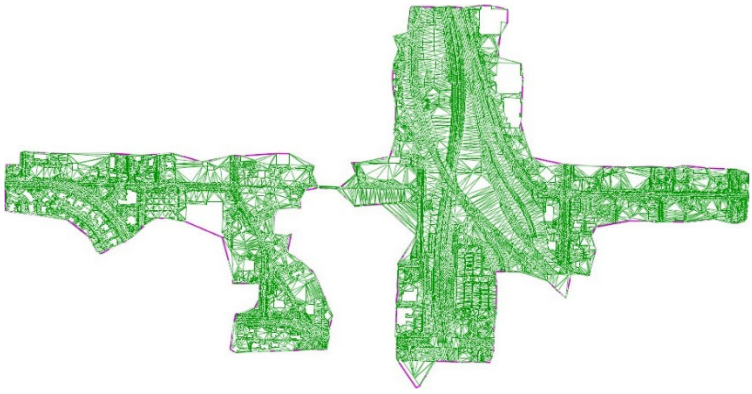


8) Select the border element to highlight the boundary graphic so that the handles are visible.
9) Under the **Drawing** tab, in the Modify toolset, select Modify Element. Select the Border Element near the upper handle and move the vertex to the new location at the intersection as shown.





10) Continue to move around the model boundary and use the Modify tools – **Modify Element, Insert Vertex** and **Delete Vertex** – to modify the boundary graphic to remove undesired edge triangles.



Note: A boundary feature added to a terrain model will control the creation of triangles regardless of future feature edits or reprocessing of the terrain model.

Add Boundary Methods

- **Extract Graphic** – Creates a graphical 3D line string that can be edited. It is just a simple graphic and is not linked to the terrain in any way.

- **Add Boundary** – Extracts the current boundary for the triangulation and creates a non-graphical boundary feature within the terrain model and it overrules all other trimming methods (Sliver, Max Edge Length).

- **Add Ruled Boundary** – Extracts the current boundary for the triangulation and creates an editable graphical boundary that is ruled to the terrain. It overrules all other trimming methods (Sliver, Max Edge Length).

Chapter 3 Review

General Information

- Terrain models:
  - Contains the information known about the surface and uses feature definitions to display that information to the user (triangles, contours, or a simple boarder.)
  - Most often a terrain model is referenced into another design file and the Override Symbology option can be enabled to allow control of their display.
  - The thematic height display provides a color shaded display based on elevation, aspect angle (direction), slope and hill shade.
- There are many methods available to create terrain models.
- After a terrain model is initially created, there may be a need to make additions and revisions to it. If it is created correctly, it will automatically update as the base information is updated.

Skills Checklist

- Be able to create a terrain model directly from graphical elements and from graphical filters and filter groups.
- Be able to modify a terrain model
  - Add features
  - Change feature type
  - Correct crossing break lines
  - Resolve conflicting points
  - Control, add and delete triangles using the Edit Model tools
- Be able to create a complex terrain model from two terrain models
  - Append and merge
  - Add boundary feature

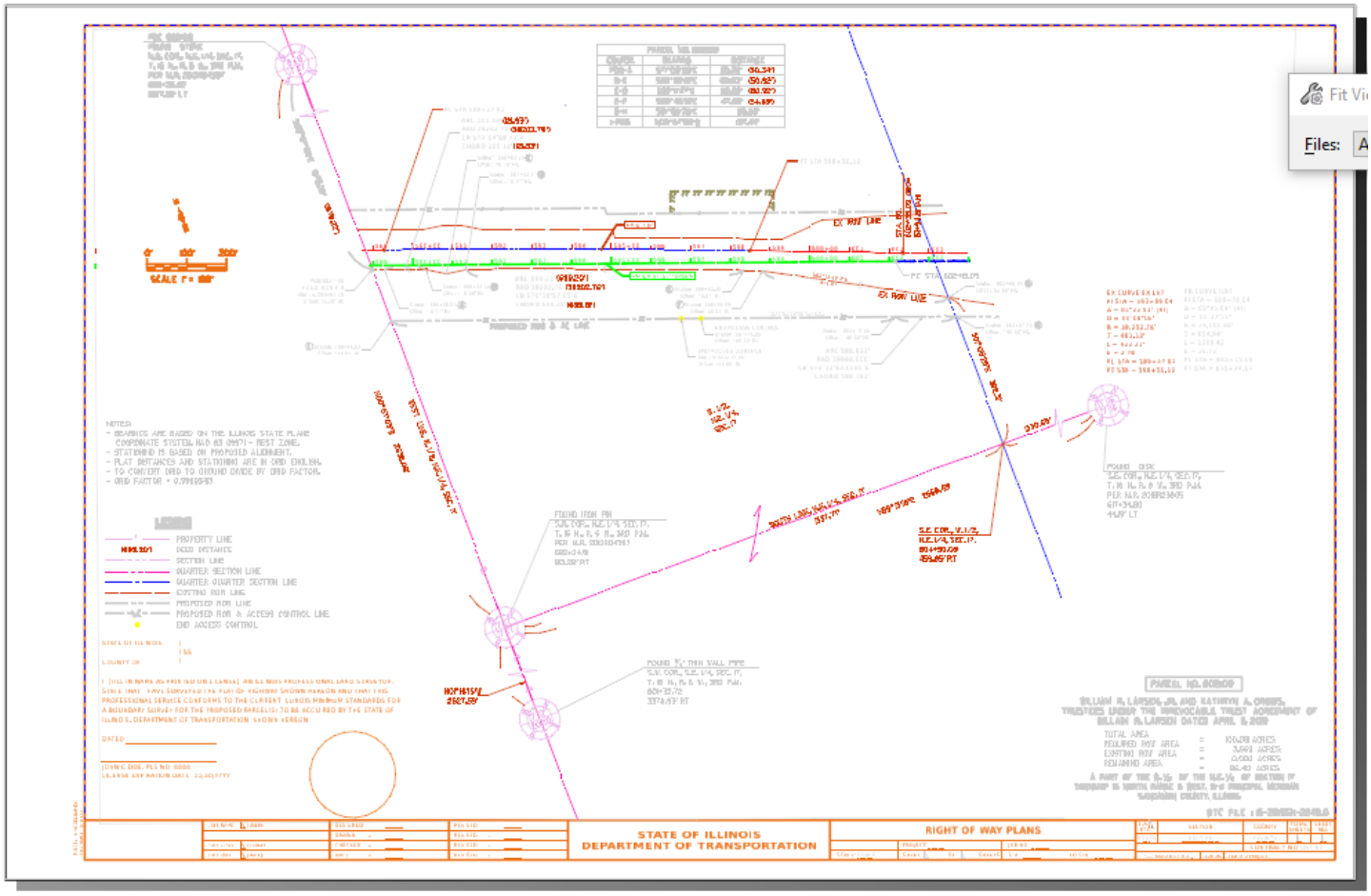
Notes:

Chapter 4

ROW, Parcels and Plats

EXERCISES – Chapter 4 – ROW, Parcels and Plats

The objective of this chapter is to teach tools and techniques that can be used for developing Right of Way Plans on roadway projects. In this chapter you will learn how to establish the existing right of way centerline, how to create the existing right of way lines and how to create an existing property parcel from record data. You will also learn how to create proposed right of way lines, a proposed parcel, and legal description. And lastly, you learn how to create right of way plan sheets and annotation.



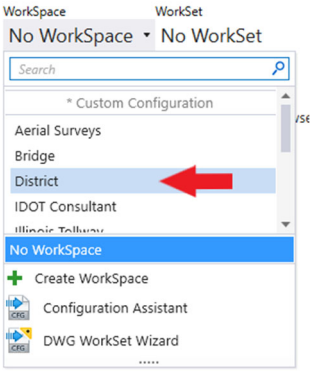
E4.1 – File Setup, Understanding the Interface, and Extracting Parcels

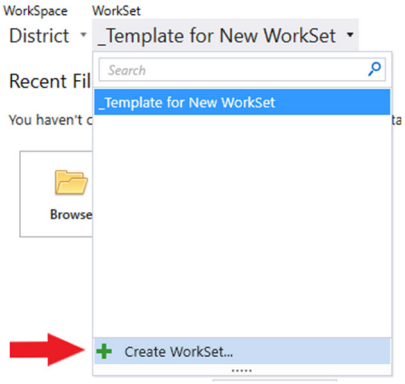
In this exercise, you will learn how to Create a Parcel with Geometry builder. The included Parcels are based on a calculated parcel from PowerGEOPAK SS10.

If you have already worked through the Chapter 2and 3 Exercises you can skip the Design File Setup steps 2 through 6 below.

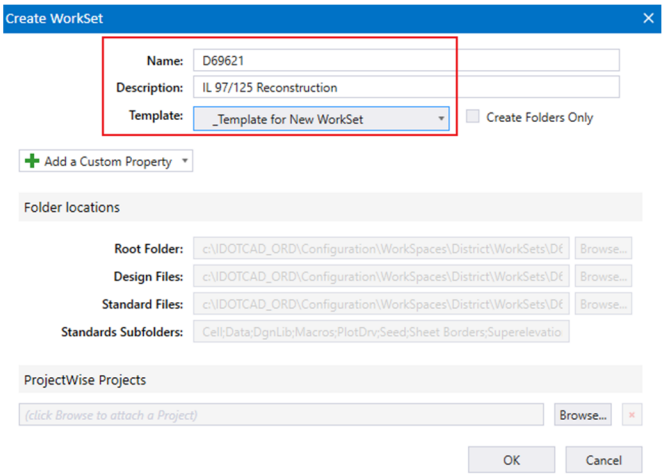
Design File Setup – Outside ProjectWise

1) Start OpenRoads Designer
2) Set the Workspace and Work Set
   - The Workspace and Work Set define standards that are used by the software. The Workspaces are set up during the software installation. In this training we will be using the District WorkSpace, but this could change depending on software and Workspace Standards updates.
   - The following steps will set up the Workset you will be using throughout this training. Internally within IDOT your CADD Manager will take care of setting up the Workset for the project and everyone's use.
3) Select ***District*** from the WorkSpace pulldown menu then select ***Create Workset*** from the WorkSet pulldown menu.



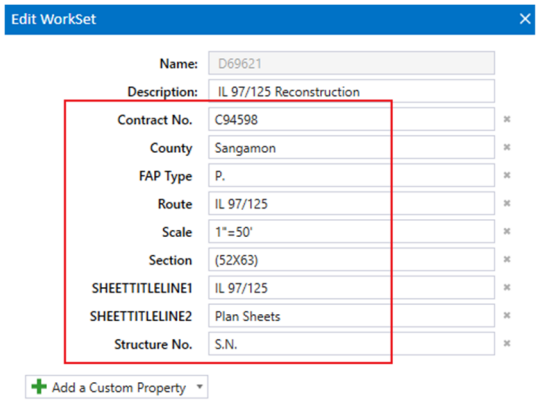


4) The *Create Workset* Dialog Box will open, fill in and select the following:
   - Name: **D69621**
   - Description: **IL 97/125 Reconstruction**
   - From the Template dropdown selection box select: **_Template for New WorkSet** and click **OK** to continue.



5) On the right side of the screen, you will see "***Properties***" select it and then select "***Advanced Properties***". Fill in the Advanced Properties in the *Edit WorkSet* dialog with the following:

- Contract No.: **C94598**
- County: **Sangamon**
- FAP Type: **P.**
- Route: **IL 97/125**
- Scale: **1"=50'**
- Section: **(52X63)**
- SHEETTITLELINE1: **IL 97/125**
- SHEETTITLELINE2: **Plan Sheets**



6) Click ***OK*** to save and exit the *Edit WorkSet* dialog box (not shown). These Properties will automatically fill in the Title Block on all sheets in this project. This is the current workflow, this will be changing with future releases of the software and IDOTCAD Environment, training will be provided at that time.
7) Select **Browse** and navigate to the location where you unzipped the dataset files. Select the file **IL97_125 Parcels.dgn** from the Chapter 4 folder and click **Open.**

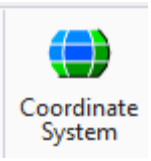
Design File Setup – Inside ProjectWise

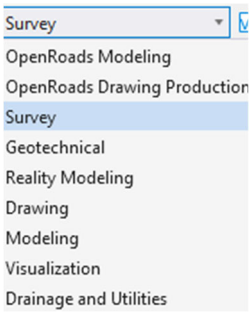
Specific instructions will be presented during class on how to utilize the Managed Workspace within ProjectWise. Your CADD Manager will also have more information if needed as well as be setting up the WorkSet folders for the entire Project.

Set the Geographic Coordinate System

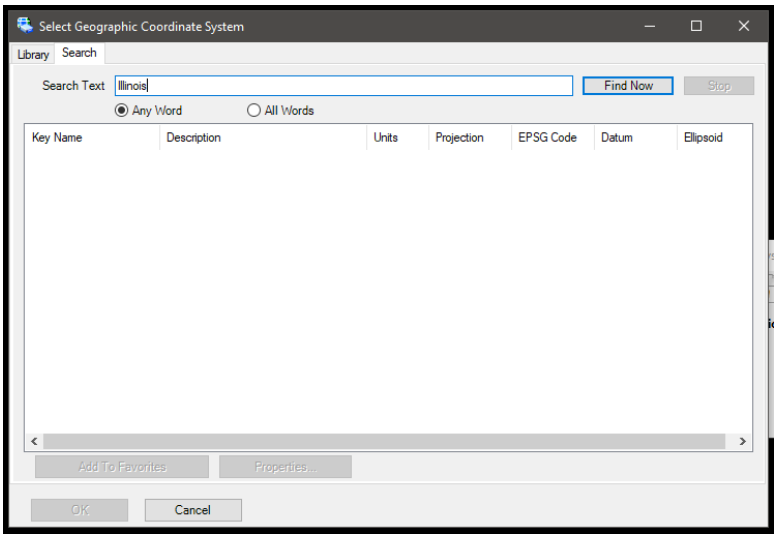
Before we import the Survey data, we need to ensure the Geographic Coordinate System (GCS) is set correctly. This enables the software to make automatic adjustments so data from different systems will mesh seamlessly. Surveyors more than anyone can appreciate the importance of setting the correct Geographic System.

1) Select the **Survey** Workflow from the drop-down menu.
2) Under the Utilities tab, in the Geographic toolset, select the **Coordinate System** tool.

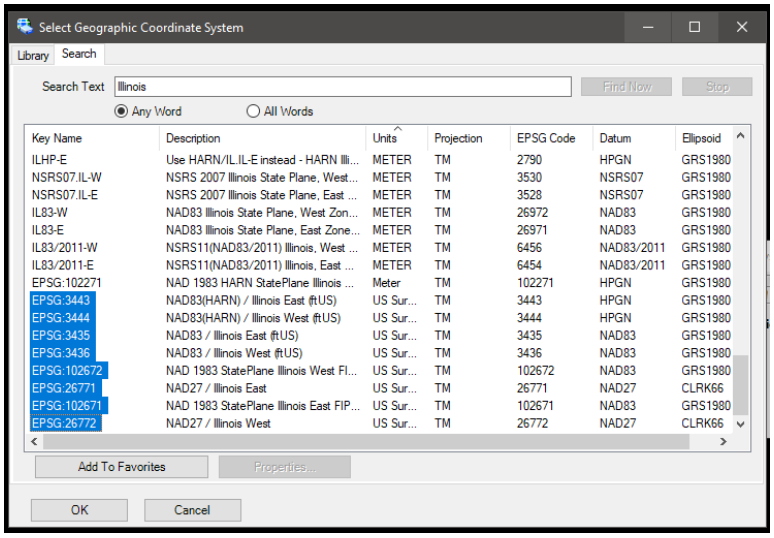




3) Select **From Library** icon.
4) In the Library Dialog click the **Search** tab and type **Illinois** in the "Search Text" and hit **Enter**.

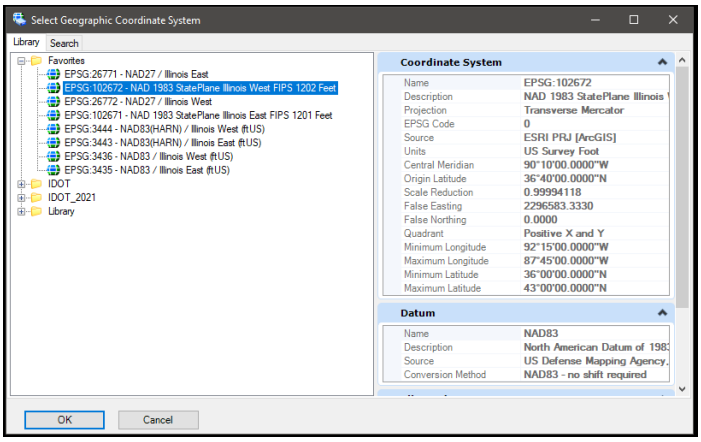


5) Click on the **Units** column header to sort by it.
6) Select all the "Key Name" Coordinate Systems with units of "US Survey Foot" (Shift pick the top and bottom one)



7) Select **Add to Favorites** button at the bottom to add your selection.

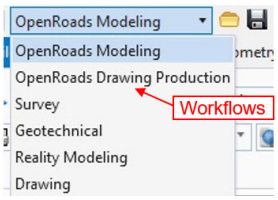
8) Select the **Library** tab at the top of the Dialog.
9) If "Favorites" is not expanded, click the plus (**+**) sign next to it to expand. This will show you the coordinate systems that you picked that apply only to Illinois.
   - Also notice that there is an IDOT and IDOT_2021 folder listed with the Favorites folder. The IDOT folder lists the original District 8 LDP zones per county. The IDOT_2021 folder lists the 33 new LDP zones.

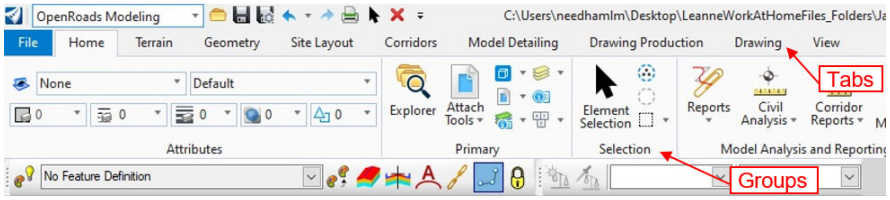


10) Double Click on **EPSG:102672-NAD 1983 StatePlane Illinois West FIPS 1202 Feet** under your Favorites.
11) Close the Geographic Coordinate System Dialog.

Reference Needed information to Current Design

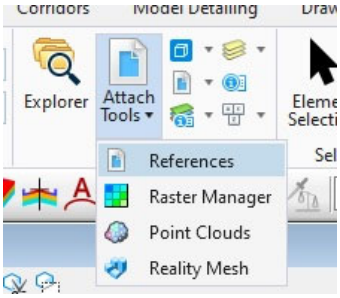
1) Select the **Survey** Workflow from the drop-down menu. Many of the commands you will use in this exercise are in the Survey Workflow.





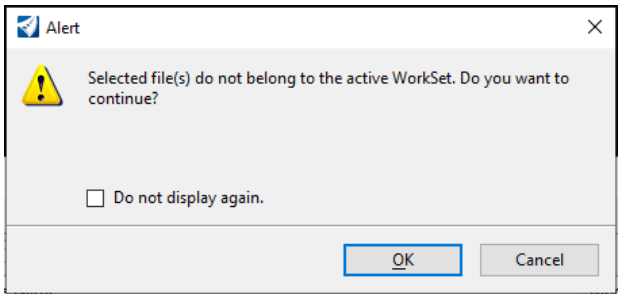
Note: Workflows segment tools into discipline specific groups streamlining the interface. Each Tab Group further segments the Survey tools to a task-based interface.

2) From the Home tab select the **Attach Tools -> References**, located in the Primary Group.

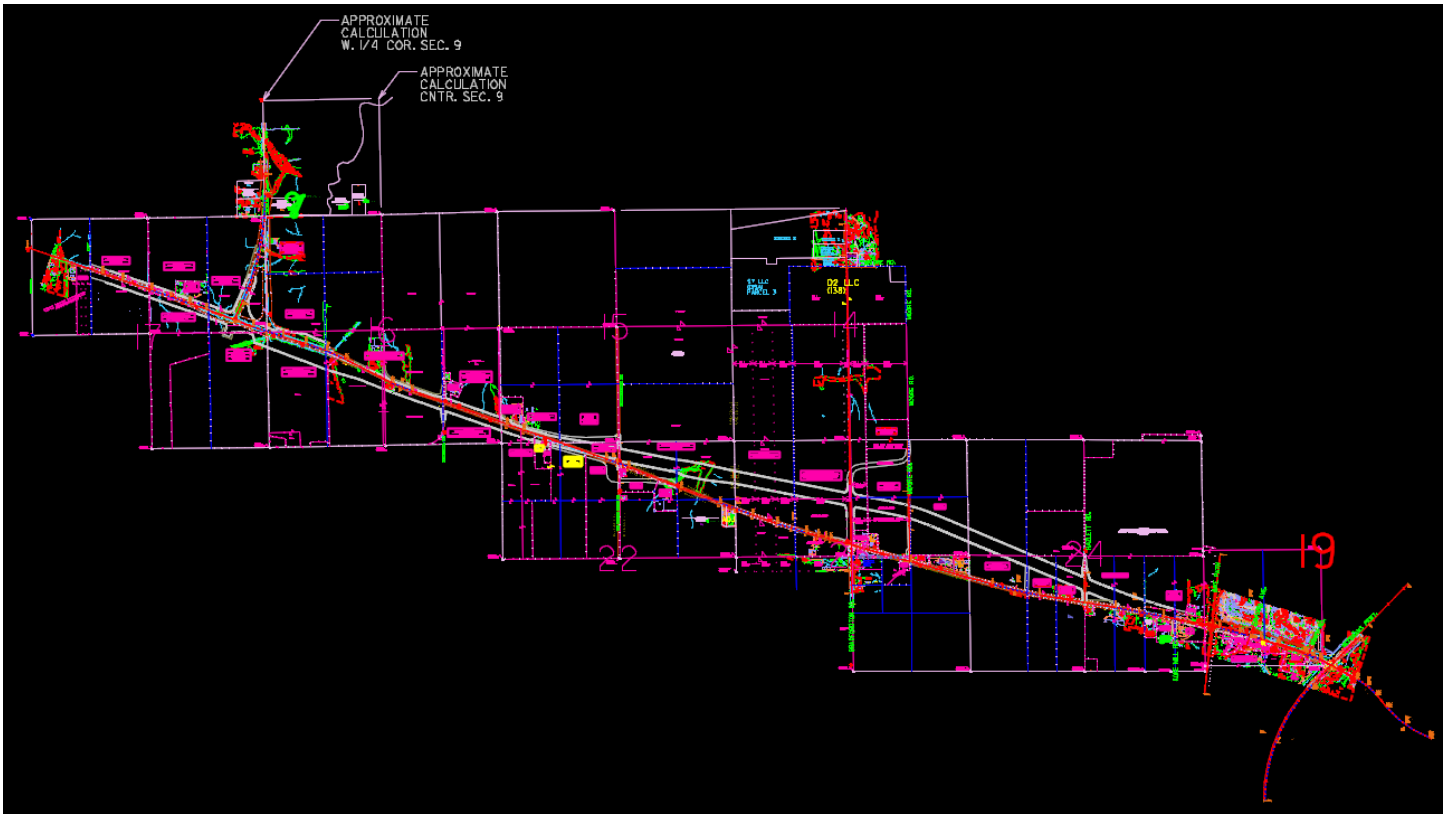


3) In the Reference File Dialog, select **Tools -> Attach** and attach the following files from the Chapter 4 folder. The Section Corners.dgn file is already attached but turned off.
   - **Aerial Topo**
   - **EX_ROW**
   - **PR_ROW**
   - **Existing Alignments** in the Existing Alignments folder
   - **Master PR Alignments** in the Proposed Alignments folder

   Note: A message box will pop up saying the files do not belong to the current WorkSet. This is fine, so just click Ok to continue.

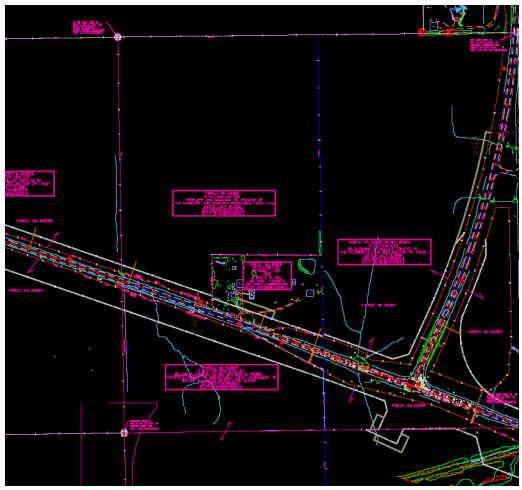


4) Turn on the display of the **Section Corners.dgn** file in the Reference dialog so it shows up with the rest of the references. Close the Reference dialog once all files are displaying.
5) Parcels **6021107**, **6021108**, **6021134** have already been setup along with their temporary easements and ROW takes. In the next section we will learn how to setup our parcels using the Geometry Builder tools.

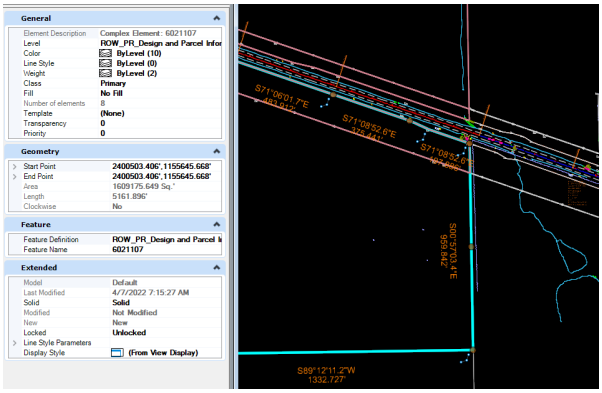


E4.2 – Creating Parcels with Geometry Builder

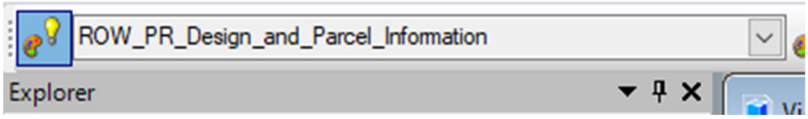
1) Find Parcel **6021109**, **6021110** and **6021111** in the Northwest corner of the project and examine the details for each parcel. We will be setting up a label later for each Parcel.



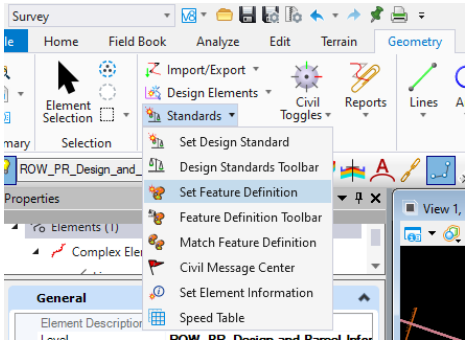
2) As you can see Parcels **6021107**, **6021108**, **6021134** are on a new level. Select one of the parcels and Select properties. After reviewing the properties select again in a blank area to clear your selection set.



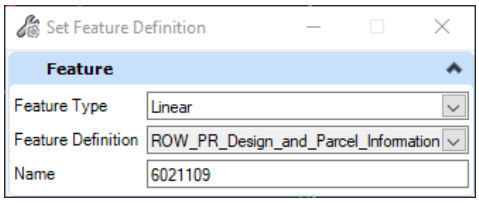
3) In the Feature Definition Toggle Bar, select the **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information** feature definition from the drop-down menu. Toggle on the **Use Active Feature Definition** toggle at the beginning of the toolbar.



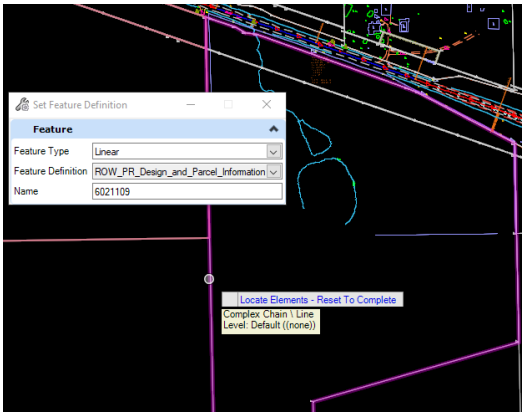
4) In the **Survey** workflow, on the Geometry tab, in the General Tools group, select the arrow next to Standards and select **Set Feature Definition** from the drop-down menu.



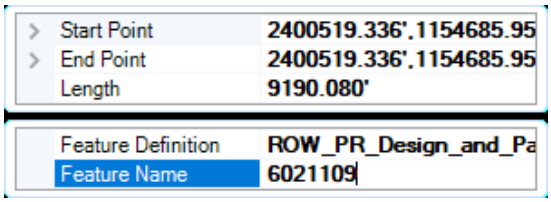
5) In the Tool Settings Dialog set the following properties: **Tip**: hit Enter after keying in the name.
   - Feature Type: **Linear**
   - Feature Definition: **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information**
   - Name: **6021109**



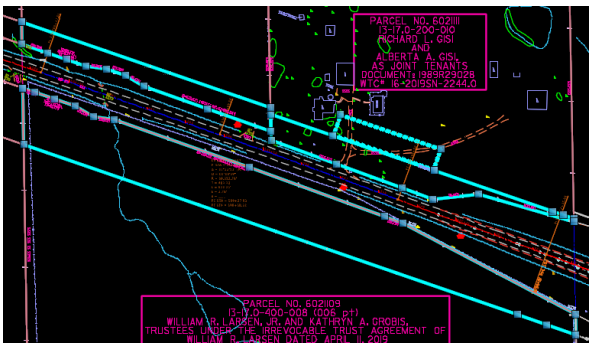
6) Select **Parcel 6021109** and **Right Click** to accept it. You will need to hit **Right Click** again to clear the selection.



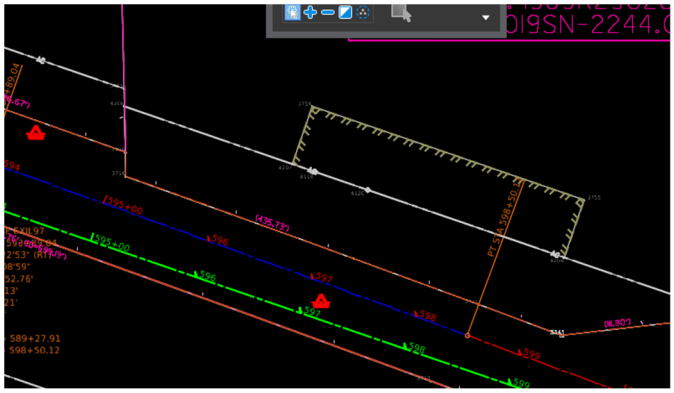
Note: Sometimes it does not hold the name and you will have to select the parcel and go to Quick Properties to change the name. You can avoid this by hitting Enter after typing the name in the Tool Settings Window.



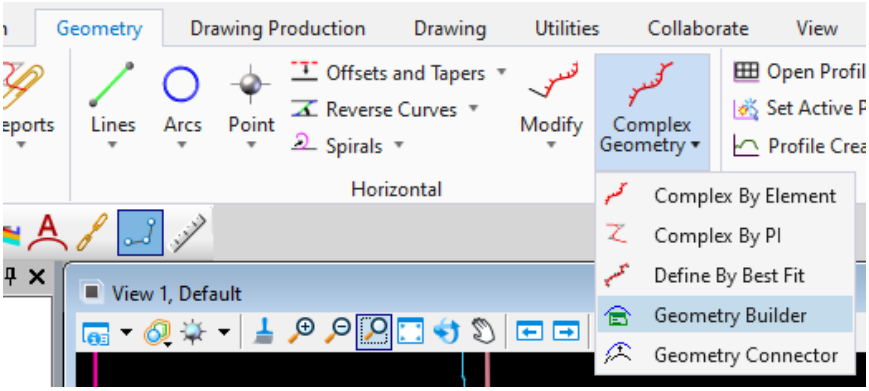
7) Follow the same procedure for Parcel **6021110** and **6021111**.
8) Then we will do the same procedure for the **ROW takes** and the **Temporary Easement**.
   - For the ROW Takes
     i) Feature Definition: **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information**
     ii) Name: **6021109_Take**, **6021110_Take** and **6021111_Take**
   - For the Temporary Easement
     i) Feature Definition: **Linear\Right_of_Way\ ROW_Pr_Temp_Easemt**
     ii) Name: **6021111_Temp_Easemt**



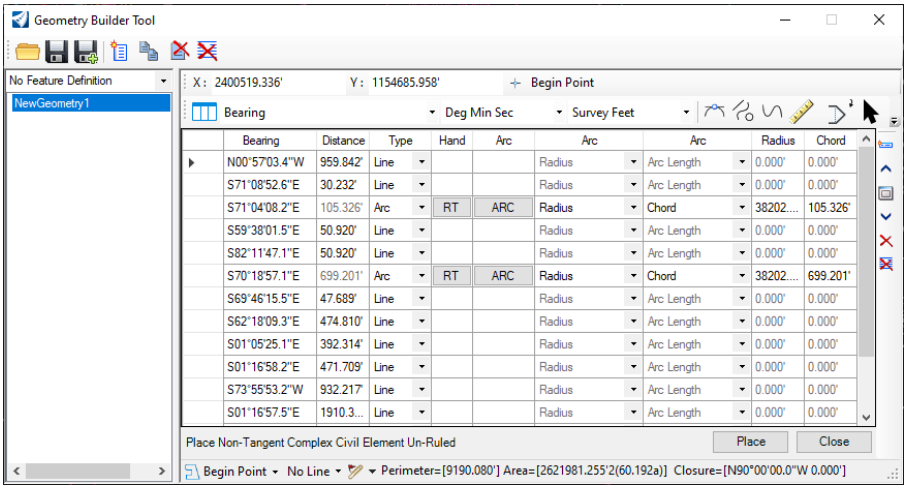
9) Open the Reference dialog and **Turn Off** the **EX_ROW** and **PR_ROW**. You will be able see the SS10 calculated parcel behind it. **Turn On** the references when you are done viewing.



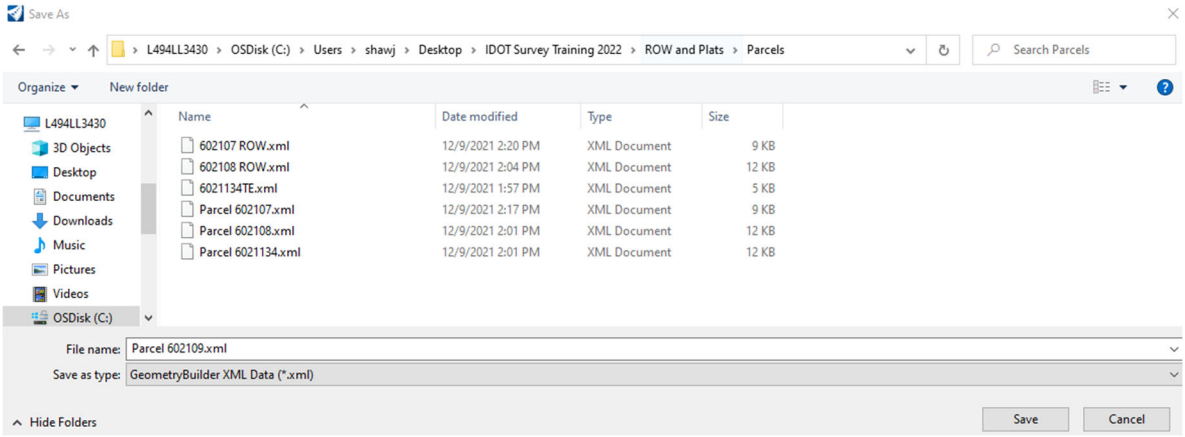
10) In the **Survey** workflow, on the geometry tab, in the Horizontal group, select the arrow next to **Complex Geometry** and select **Geometry Builder** from the drop-down menu.



11) In the Geometry Builder Tool select the fourth tool over, **Add new geometry**.
12) Select the **Element selector** inside the geometry builder tool in the upper right corner.
13) Then select the **6021109** parcel and data point to populate the Geometry Builder tool with the parcel information.
14) In the left pane at the top of the Geometry Builder dialog change the name from NewGeometry1 to **Parcel 6021109**. Right above the name pick the drop down for Feature Definition and set it to **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information.**



15) Click on the **Save As** button at the top of the Geometry Builder dialog and navigate to the **Parcels** folder in your data set and save the file as **Parcel 6021109.xml**.



16) To setup for the next Parcel export, click the last button at the top of the Geometry Builder dialog, Delete All Items. When the dialog appears asking Delete All, click **Yes**.

IMPORTANT NOTE: You must use the **SAVE AS** command within the Geometry Builder dialog to save your XML output. If you mistakenly hit the Save button it will overwrite the XML file that is listed in the Top Bar of the Dialog and force you to go back and recreate your output file.

To clear the settings within the Geometry Builder, so you don't risk overwriting your file, you have to close the Dialog and restart OpenRoads Designer. Otherwise, the file you just created is held as the default Save Name / Location and will be overwritten if you do another Parcel.

*If you are presented with a Dialog box asking you to save to the file when you close the Geometry Builder dialog, click **NO** otherwise you will overwrite the current XML file that you exported*. This is a current limitation of the software, and Bentley is working to fix it in a future release.

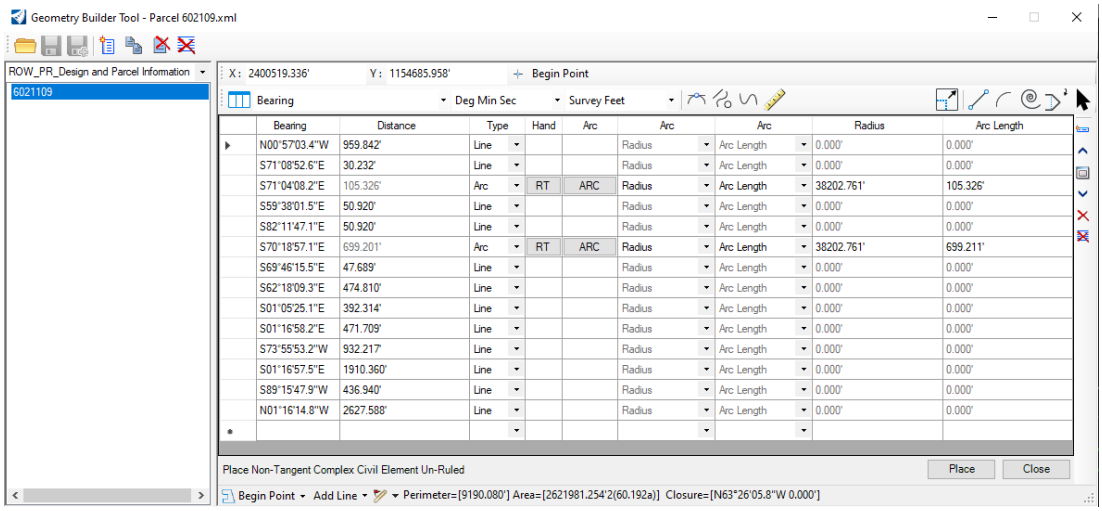
17) Using the steps above, create the other Parent Parcels, ROW takes and Temporary Easements for Parcels **6021109**, **6021110** and **6021111** using the following information.
- For the Parent Parcels
  i) Feature Definition: **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information**
  ii) Name: **Parcel 6021110** and **Parcel 6021111**
- For the ROW Takes
  i) Feature Definition: **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information**
  ii) Name: **6021109 ROW**, **6021110 ROW** and **6021111 ROW**
- For the Temporary Easement
  i) Feature Definition: **Linear\Right_of_Way\ ROW_Pr_Temp_Easemt**
  ii) Name: **6021111 TE**

Note: By Saving your Parcel .xml files you can place all the Parcels in one dgn or if you are creating a Plat for one certain parcel you will be able to only load that Parcel into your dgn.

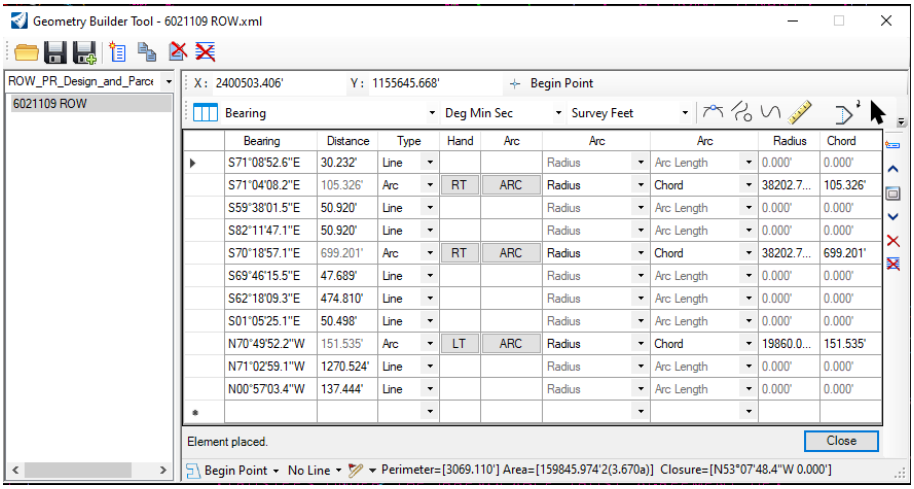
18) **Close** the Geometry Builder dialog after selecting the Delete All button. When prompted to Save Changes to File, select NO, otherwise the current file listed in the Dialog box header row will be overwritten with a blank file.

E4.3 – Create a Single ROW Plat or Plat of Highways

1) Go to **File** then select **New** and create a new 2D file named **Parcel 6021109.dgn** in the Chapter 4 folder.
2) Set the Geographic Coordinate System (GCS) and then attach the following references.
   - **Section Corner**
   - **Aerial Topo**
   - **Existing Alignments** in the Existing Alignments folder
   - **Master PR Alignments** in the Proposed Alignments folder
2) **Close** the Reference dialog box and do a **Fit View** to see all the referenced files.
3) On the **Survey** workflow, in the geometry tab, in the Horizontal group, select the arrow next to Complex Geometry and select **Geometry Builder** from the drop-down menu.
4) If there is anything listed in the Geometry Builder dialog, select the **Delete All Items** button, and select **Yes** in the dialog that pops up.
5) Choose **Open**, if prompted to Save Changes to file select **No**, and navigate to the Parcels folder and select the **Parcel 6021109.xml** file.

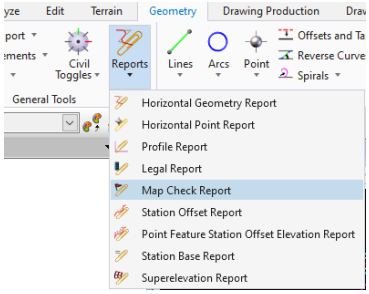


6) Place **Parcel 6021109** in the DGN by selecting the **Place** button in the lower right corner.
7) Continue in Geometry Builder and Open **6021109 ROW.xml** select and place the ROW into the file by selecting the **Place** button.



8) **Close** the Geometry Builder dialog, making sure not to save it to the file if prompted.

9) **Zoom** into the Parcel and ROW for parcel 6021109.
10) Under the Geometry tab, in the General Tools toolset, select the arrow under **Reports** to see the reports available to run.



11) Select the **Map Check Report** from the listing of available reports. Select the parent parcel **6021109** on your screen and then **Right Click** to display the report. At the bottom of the Map Check report, you can see the closure error if there is one. By selecting the Parent parcel or the ROW take you can review the Map Check for each parcel.

Alignment Name: Parcel 6021109
Alignment Description:

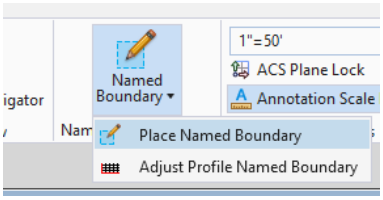
Type	Point Name/ Direction	Northing/ Length	Easting	Elevation
START	()	1154685.958	2400519.336	0.000
	N0.951°W	959.842		
HPI	()	1155645.668	2400503.406	0.000
	S71.148°E	30.232		
PC	()	1155635.899	2400532.017	0.000
	S18.852°W	38202.761		
CC	()	1119482.487	2388187.718	0.000
	S19.010°W	38202.761		
PT	()	1155601.728	2400631.645	0.000
	S59.634°E	50.920		
HPI	()	1155575.987	2400675.580	0.000
	S82.196°E	50.920		
PC	()	1155569.073	2400726.028	0.000
	S19.160°W	38202.761		
CC	()	1119482.487	2388187.718	0.000
	S20.208°W	38202.761		
PT	()	1155333.557	2401384.371	0.000
	S69.771°E	47.689		
HPI	()	1155317.068	2401429.118	0.000
	S62.303°E	474.810		
HPI	()	1155096.375	2401849.522	0.000
	S1.090°E	392.314		
HPI	()	1154704.132	2401856.987	0.000
	S1.283°E	471.709		
HPI	()	1154232.541	2401867.548	0.000
	S73.931°W	932.217		
HPI	()	1153974.515	2400971.752	0.000
	S1.283°E	1910.360		
HPI	()	1152064.634	2401014.514	0.000
	S89.263°W	436.940		
HPI	()	1152059.016	2400577.610	0.000
	N1.271°W	2627.588		
HPI	()	1154685.958	2400519.336	0.000
	N45.000°W	0.000		
END	()	1154685.958	2400519.336	0.000

Northing Error:	0.000 ft	
Easting Error:	0.000 ft	
Closing Direction:	S63.435°E	
Closing Distance:	0.000 ft	
Closed Area:	2621981.254 sq ft	60.192 ac
Perimeter:	9190.080 ft	
Precision:	21521350132397 : 1	

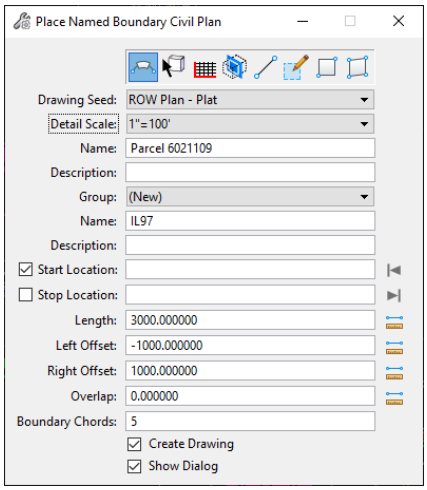
12) After reviewing the Map Check Report, Click on **File -> Save As**, in the next branch of the menu select **Microsoft Word (.doc)** and save the file in the Chapter 4 folder named **Parcel 6021109 Map Check.doc**. Close the Map Check Report dialog box.

Sheeting and Labeling the Parcel / Plat

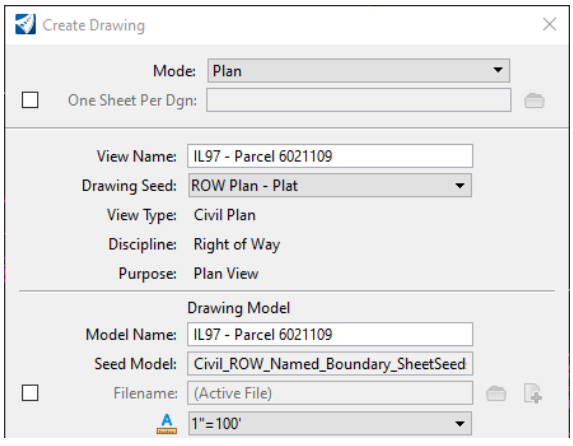
1) Continue in the **Parcel 6021109.dgn** file and go to the **Drawing Production** tab in the Survey Workflow. On the Named Boundaries group select the **Arrow** next to **Named Boundaries** and select **Place Named Boundary** from the drop-down menu.

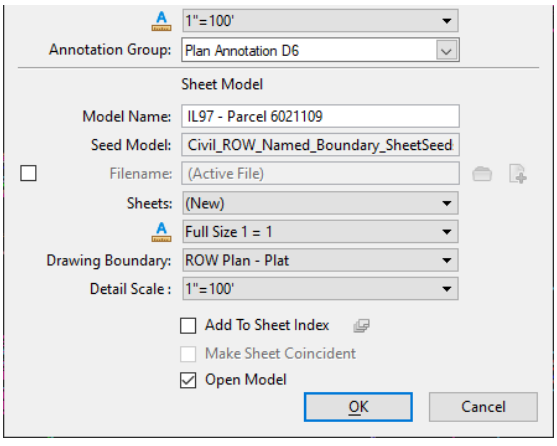


2) In the Place Named Boundary dialog box choose the first icon in the top menu, **Civil Plan** then select **ROW Plans - Plat** from the Drawing Seed drop down box.

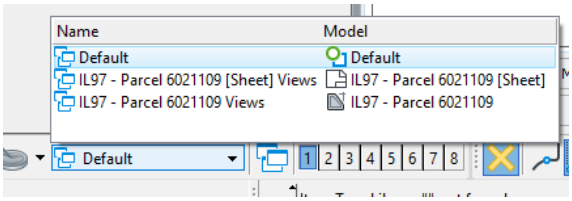


3) In the Name field enter **Parcel 6021109** and hit **Tab**. If you want to put a Description in, then do so.
4) Set the Detail Scale to **1"=100'** from the drop down list.
5) Toggle on **Create Drawing** at the bottom of the dialog.
6) Pick the **Proposed Center Line** Alignment of IL. 97 to select your stationing.
7) Toggle on **Start Location** and key in Start Station of **583+00** and **Data Point** on your screen to accept it. A Boundary will show up.
8) **Pick** near the middle of the sheet boundary to create only one sheet. You will need to **Datapoint two times** and then the Create Drawing Dialog box will open.
9) In the create Drawing Dialog, Under Drawing Model change the Annotation Group to **Plan Annotation D6**. Make sure all the field are as shown below. Make sure that the **Drawing Model Scale** and the **Sheet Model Detail Scale** Match, in this case they both need to be 1"=100'. Pick **OK** and a drawing and sheet model will be setup.

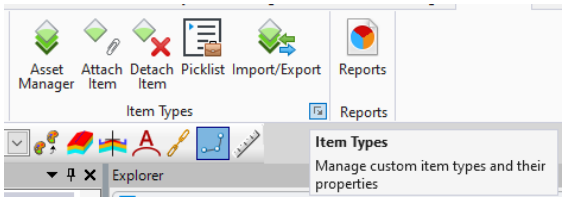




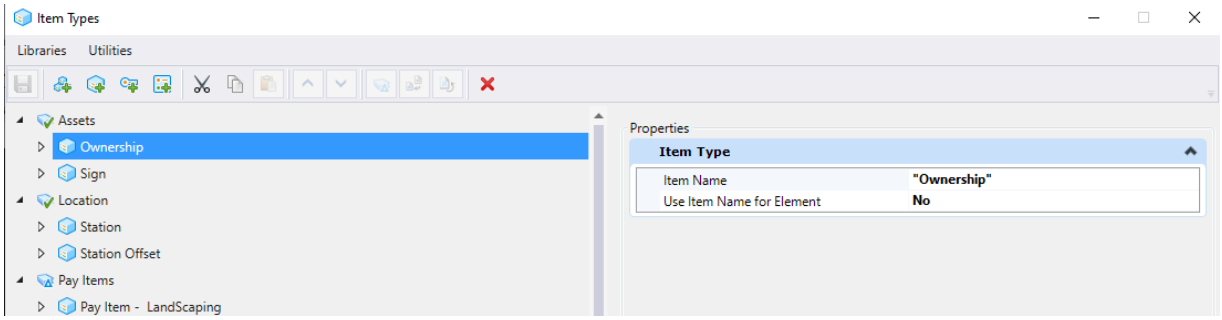
10) Using the Active View Groups selection box in the lower left corner of your screen select Default to go back to your default view.



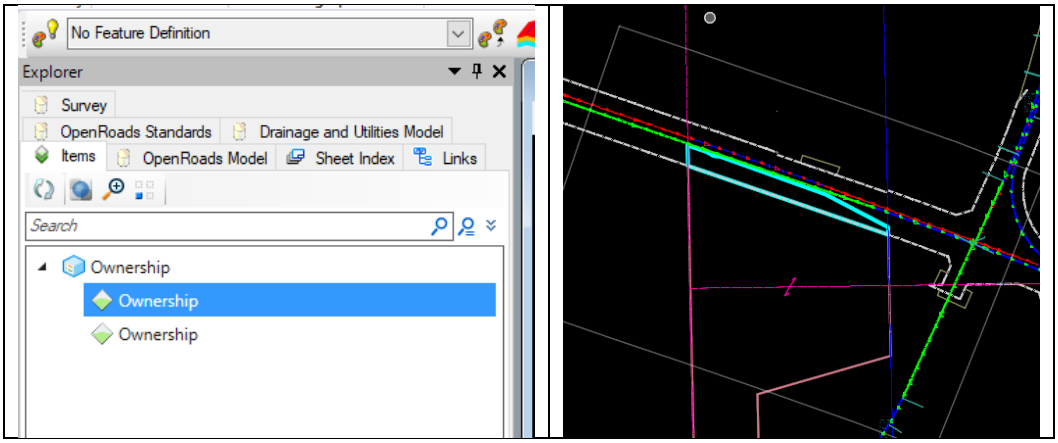
11) On the Explorer tab choose **Open Road Standards**. Click on the **Arrow** next to the **Standards** to see what is listed under it.
12) You will see **Parcel 602109.dgn** right click on it and choose **Update Standards from dgnlib**. This will ensure that all the Item Types are loaded into the current dgn.
13) Then on the Utilities tab in the Item Types section choose the **Micro Icon** in the lower right to open the Item Types manager.



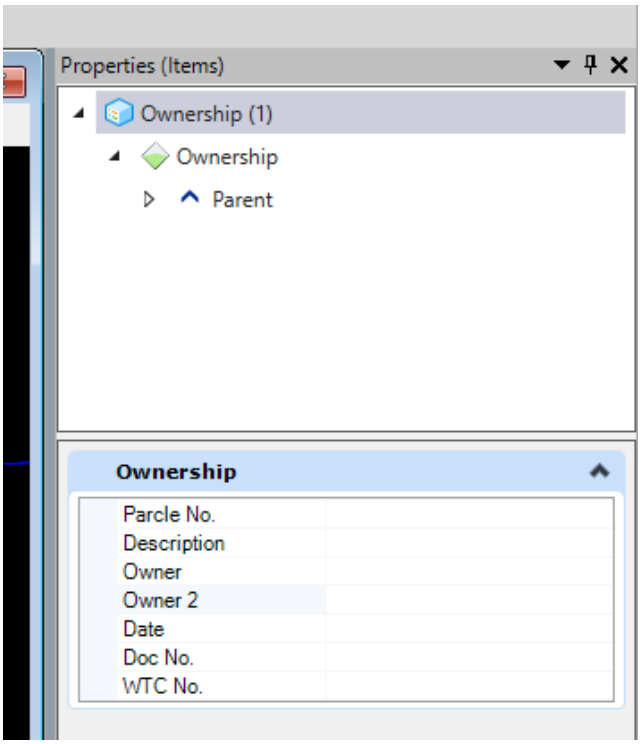
14) In the Item Types Manager under Assets right click on **Ownership** and select **Attach to Element**. Pick the **Parcel** and **ROW Take** to add the Item Type to them.



15) Close the **Item Types Manager** and **Attach Item** dialog boxes.
16) Go to your Explorer and pick on the **Items** Tab and pick on the down arrow next to **Ownership**. When you click each ownership Item type the one you choose will highlight and in the properties box you will be able to fill in all the information for that Parcel.

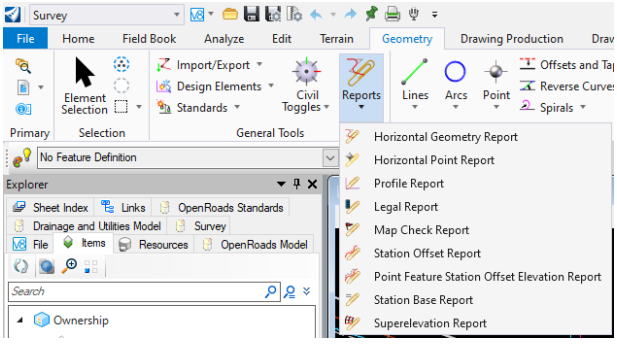


17) Go ahead and fill out the Ownership box in the **Properties Dialog** for the parent parcel with the following information:
    - Parcel No.: **6021109**
    - Description: **13-17.0-400-008 (006 pt)**
    - Owner: **William R. Larsen, JR. and Kathryn A. Grobis**,
    - Owner2: **Trustees Under the Irrevocable Trust Agreement of William R. Larsen**
    - Date: **April 11, 2019**
    - Document: **2019R12124**
    - WTC#: **16-2019SN-2249.0**



Run the Legal Description Report

1) On the **Home** tab under Model Analysis and Reporting. Select the arrow under **Reports** and select **Legal Report** from the drop-down menu.



2) In the lower left it asks you to **Locate First Element**, select the **6021109 ROW**, then **Right Click** to reset.
3) In the lower left the software ask you **Locate Parent** , select **Parcel 6021109**.
4) In the lower left the software asks you **Locate Primary Reference**, select the **Proposed Centerline Alignment**.
5) **Primary Reference Alignment Bandwidth** refers to a point where station offset callouts lose their relevance. Normally you would set to a couple hundred feet off the alignment to pick up all the Station-Offsets.
    - Set **Input Bandwidth** to **250'** and hit **Enter** to lock in the keyed value and **data-point** to accept.
6) In the lower left the software ask to **Locate Secondary Reference**, **Right Click** to reset.

7) The Legal Report will open, it will show the legal description of the Parent Parcel and the Right of way take.

Property Description

Report Created: Tuesday, June 14, 2022
Time: 1:24:19 PM

Project: Default
Description:
File Name: F:\-JAMIE BACKUP FROM LAPTOP 5_10_2022\IDOT Survey Training 2022\ROW and Parcels\Parcel 6021109.dgn
Last Revised: 6/14/2022 12:54:16
Input Grid Factor:

Note: All units in this report are in feet unless specified otherwise.

Alignment Name: Parcel 6021109
Alignment Description:

Beginning at a point 913.285 feet right of IL97 at Station 592+24.513 thence North 00°57'03.405" West a distance of 959.842 feet to a point 10.764 feet right of IL97 at Station 588+97.784 thence South 71°08'52.558" East a distance of 30.232 feet to a point 10.712 feet right of IL97 at Station 589+28.016 thence along an arc 105.326 feet to the right, having a radius of 38202.761 feet, the chord of which is South 71°04'08.220" East for a distance of 105.326 feet, to a point 10.677 feet right of IL97 at Station 590+33.342 thence South 59°38'01.453" East a distance of 50.920 feet to a point 20.756 feet right of IL97 at Station 590+83.255 thence South 82°11'47.076" East a distance of 50.920 feet to a point 10.912 feet right of IL97 at Station 591+33.214 thence along an arc 699.211 feet to the right, having a radius of 38202.761 feet, the chord of which is South 70°18'57.054" East for a distance of 699.201 feet, to a point 19.868 feet right of IL97 at Station 598+32.358 thence South 69°46'15.451" East a distance of 47.689 feet to a point 20.932 feet right of IL97 at Station 598+80.035 thence South 62°18'09.316" East a distance of 474.810 feet to a point 92.686 feet right of IL97 at Station 603+49.949 thence South 01°05'25.068" East a distance of 392.314 feet to a point 459.851 feet right of IL97 at Station 604+90.095 thence South 01°16'58.204" East a distance of 471.709 feet to a point 899.419 feet right of IL97 at Station 606+67.271 thence South 73°55'53.237" West a distance of 932.217 feet to a point 1439.248 feet right of IL97 at Station 598+83.447 thence South 01°16'57.481" East a distance of 1910.360 feet to a point 3228.501 feet right of IL97 at Station 606+07.482 thence South 89°15'47.901" West a distance of 436.940 feet to a point 3378.926 feet right of IL97 at Station 601+32.720 thence North 01°16'14.849" West a distance of 2627.588 feet to a point 913.285 feet right of IL97 at Station 592+24.513 thence North 45°00'00.000" West a distance of 0.000 feet to a point 913.285 feet right of IL97 at Station 592+24.513 and the POINT OF BEGINNING.

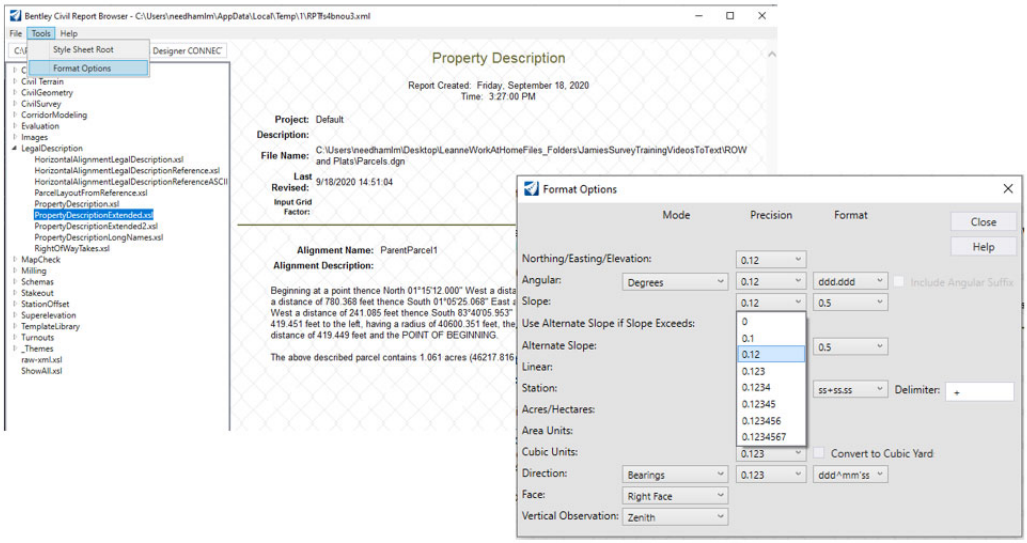
The above described parcel contains 60.19 acres (2621981.25 sq. ft.)

Alignment Name: 6021109 ROW
Alignment Description:

Beginning at a point 10.764 feet right of IL97 at Station 588+97.784 thence South 71°08'52.558" East a distance of 30.232 feet to a point 10.712 feet right of IL97 at Station 589+28.016 thence along an arc 105.326 feet to the right, having a radius of 38202.761 feet, the chord of which is South 71°04'08.220" East for a distance of 105.326 feet, to a point 10.677 feet right of IL97 at Station 590+33.342 thence South 59°38'01.453" East a distance of 50.920 feet to a point 20.756 feet right of IL97 at Station 590+83.255 thence South 82°11'47.076" East a distance of 50.920 feet to a point 10.912 feet right of IL97 at Station 591+33.214 thence along an arc 699.211 feet to the right, having a radius of 38202.761 feet, the chord of which is South 70° 18'57.054" East for a distance of 699.201 feet, to a point 19.868 feet right of IL97 at Station 598+32.358 thence South 69°46'15.451" East a distance of 47.689 feet to a point 20.932 feet right of IL97 at Station 598+80.035 thence South 62°18'09.316" East a distance of 474.810 feet to a point 92.686 feet right of IL97 at Station 603+49.949 thence South 01°05'25.068" East a distance of 50.498 feet to a point 140.000 feet right of IL97 at Station 603+67.698 thence along an arc 151.535 feet to the left, having a radius of 19860.000 feet, the chord of which is North 70°49'52.227" West for a distance of 151.535 feet, to a point 140.000 feet right of IL97 at Station 602+15.094 thence North 71°02'59.145" West a distance of 1270.524 feet to a point 140.000 feet right of IL97 at Station 589+44.570 thence North 00°57'03.405" West a distance of 137.444 feet to a point 10.764 feet right of IL97 at Station 588+97.784 thence North 53°07'48.368" West a distance of 0.000 feet to a point 10.764 feet right of IL97 at Station 588+97.784 and the POINT OF BEGINNING.

The above described parcel contains 3.67 acres (159845.97 sq. ft.)

8) You can see various formatting for the reports by selecting different style sheets in the left pane.
9) Select **Property Description Extended** in the Report Styles list and in the Tools drop down menu select **Format Options**.
10) Under the **Precision** column change all fields that are **three decimal** places to **two decimal** places.
11) Change **Angular** to **ddd^mm'ss"** under the **Format** column.
12) Close the Format Options dialog box. You only have to change the Format options once and the setting will be maintained.

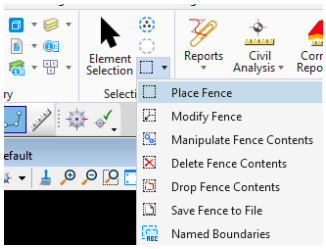


13) Go to **File > Save As** and in the menu branch select **Word Document (.doc)**. Name the file **6021109 Legal Description** and save in the **Chapter 4\Legal Description folder**.
14) You can also print the report as a pdf from this dialog, or open the Word Doc and print it to PDF there.

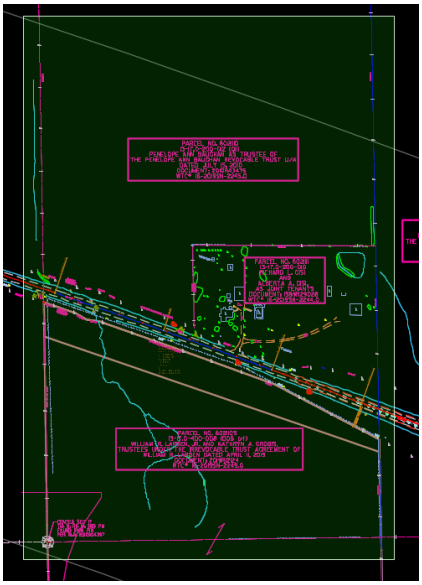
E4.4 – Labeling the Plat

1) Open / Continue in the **Parcel 602109.dgn**
2) Make sure you are in the default model in the drawing and not one of the sheet models.

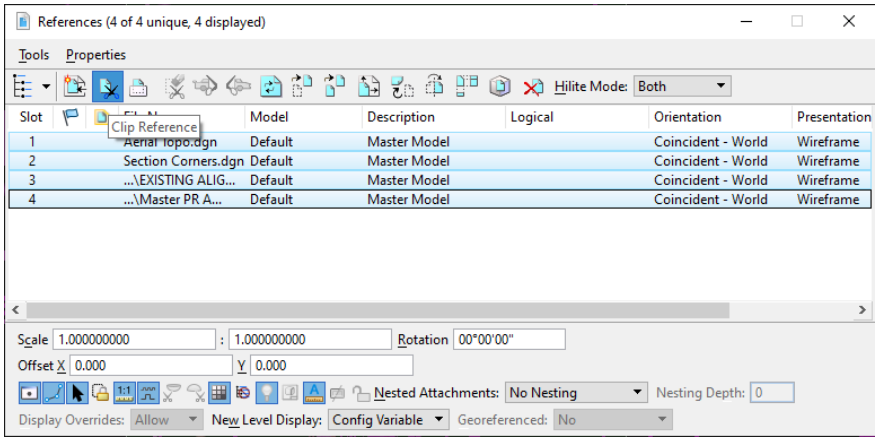
3) Under the Home tab, in the Selection toolset, select the down arrow next to the Fence commands and select Place Fence from the drop-down menu.



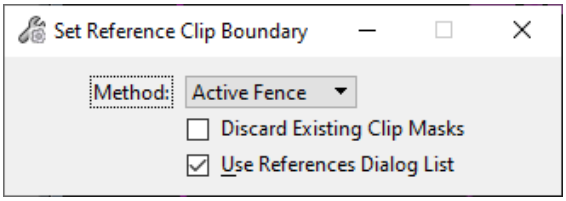
4) In the Place Fence dialog, set your Fence Type to **Shape** and place a rectangular Fence around the Plat as shown with the Green highlighted area.



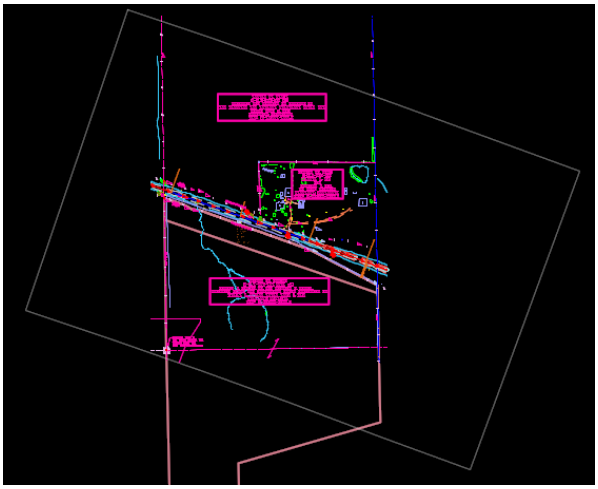
5) Open the Reference Manager dialog and highlight all the References. In the tools across the top of the dialog select the **Clip Reference** tool.



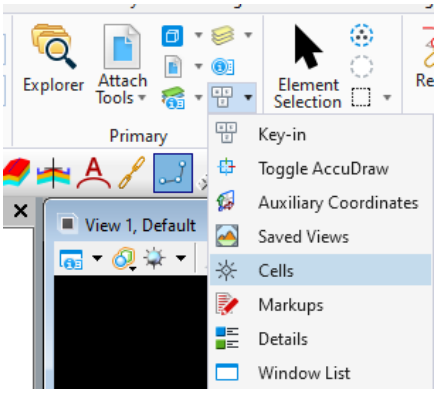
6) In the Set Reference Clip Boundary dialog make sure the Method is set to **Active Fence** and that Use References Dialog List is **checked**. **Data point** in your design plane to Clip all the references around your Plat.



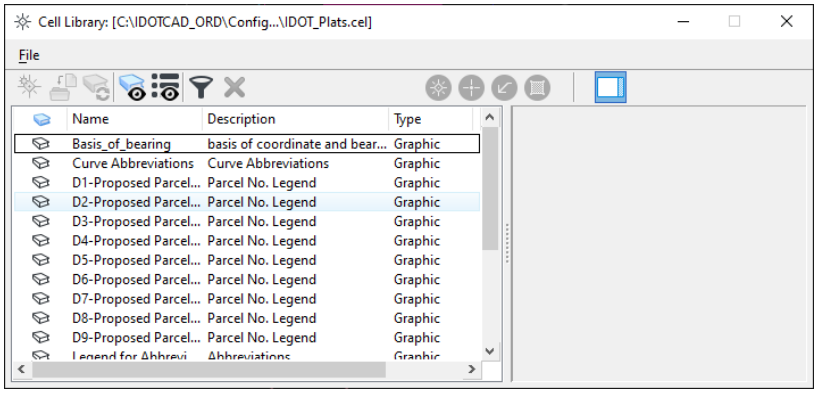
7) Close the Reference Manager dialog and do a Fit View to see everything that is left in the view plane.



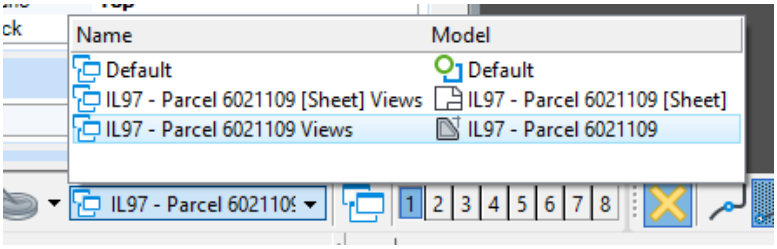
8) Under the Home tab, in the Primary toolset, select the down arrow next to the Key-In command and select Cells from the drop-down menu.



9) In the cell library dialog box select **File -> Attach File**. Navigate to the IDOT_Standards\Cell folder location and select the **IDOT_Plats.cell** to load it. In this library we have access to the common cells that are used with Plats.

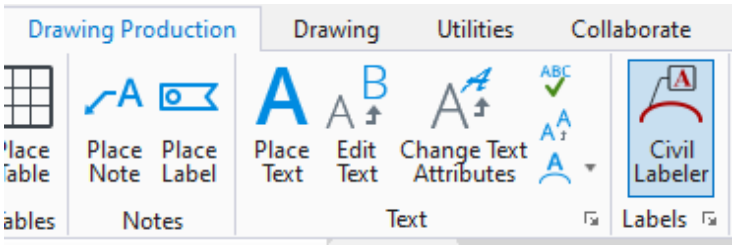


10) Change your model to the **IL97 - Parcel 6021109** model using either the Model Manager dialog, or the Model selector as shown.

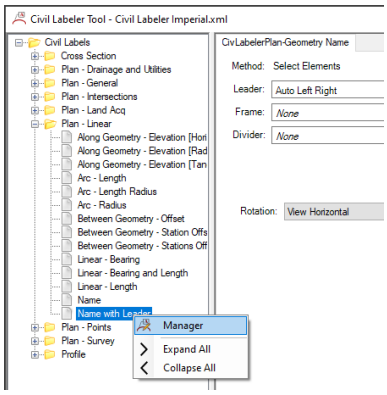


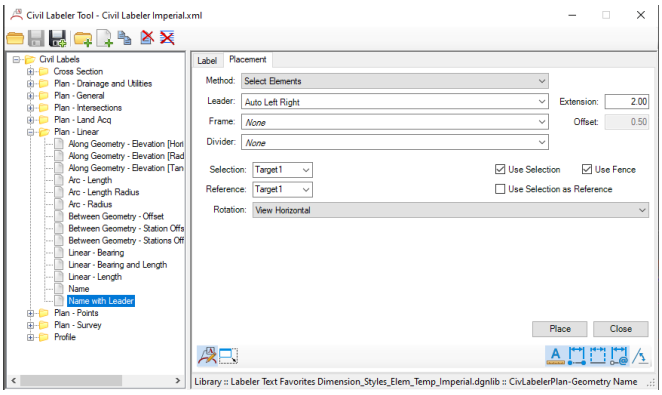
11) Double click on the **Surveyor Statement** to make it the active cell for placement. Place it in the bottom left corner of the drawing model, inside the drawing model named boundary. Repeat for the **Right_of_Way Legend** and place it within the drawing model named boundary.

12) Under the Drawing Production tab, in the Labels toolset, select the **Civil Labeler** command.



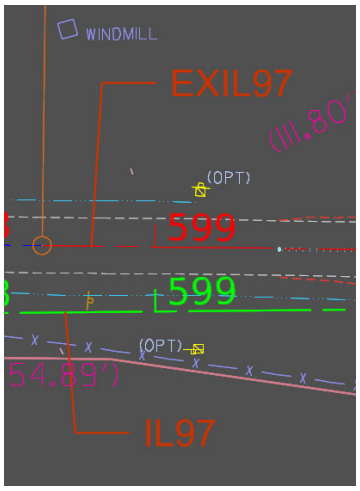
13) In the Civil Labeler toolbox drill down in the left pane to **Plan – Linear -> Name with Leader** and select it. **Right click** on the **Name with Leader** label and select **Manage** to see the Element Template options.



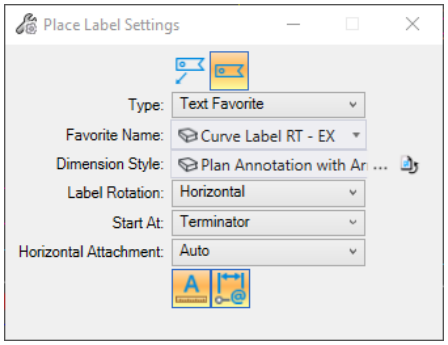


14) On the **Label** tab, set the Element Template to **Civil Labeler ->Plan Annotation without Arrowhead**.
15) On the **Placement** tab, select **Place** in the lower right corner and select the **EX.IL97 centerline** and place the label. Then select the **IL97 centerline** and place the label again. Close the **Civil Labeler Tool** dialog.

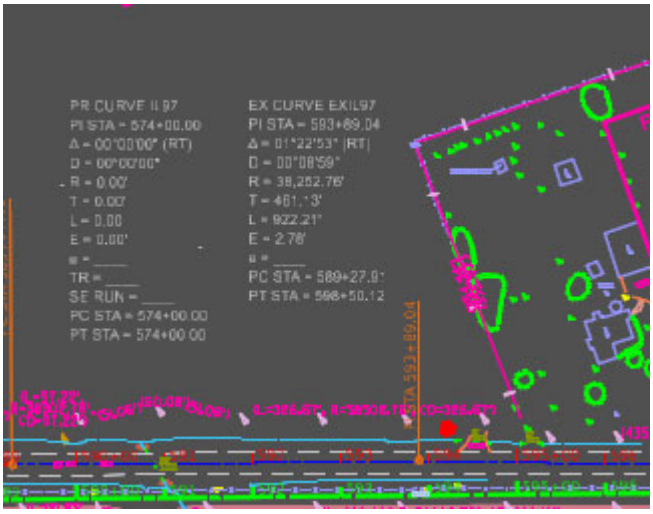
    NOTE: The Civil Labeler names the label according to what the Centerline is named in the Alignment file. So, you can see the importance of naming conventions. You can also edit the text by double clicking on it and adding to the label.



16) To place the Existing Curve Data, Open the **Place Label** command from the Notes toolset. Set the following parameters in the dialog:
    - Select: **Place a Label without a leader**
    - Type: **Text Favorite**
    - Favorite Name: **Curve Label RT – EX**
    - Dimension Style: **Plan Annotation without Arrowhead**



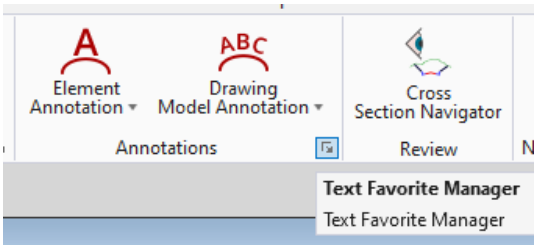
17) Pick the **Blue Curve** on the existing alignment and **Data point** twice in your design plane to place it. You can move it after you initially place it.
18) Follow the same steps for the proposed curve on the **IL97 Proposed Alignment** and place the curve data next to the existing curve data:
    - Select: **Place a Label without a leader**
    - Type: **Text Favorite**
    - Favorite Name: **Curve Label RT – PR**
    - Dimension Style: **Plan Annotation without Arrowhead**



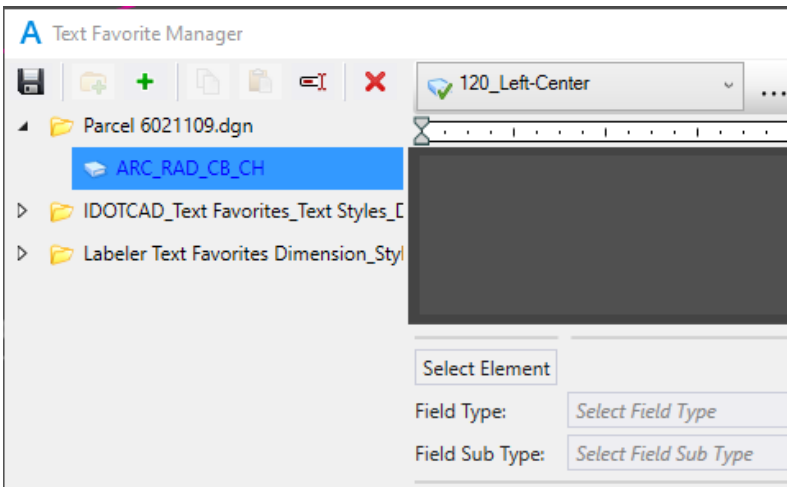
19) Select the **Place Note** tool command from the Notes toolset and place the two individual notes below at their proper location on the plan. Set the Dimension Style to **Plan Annotation without Arrowhead** if it is not set.
    - **PC STA 589+27.92**
    - **PT STA 598+50.12**
20) Go to the **Home** Tab and under the Primary tools select **Level Display**. In the dialog select the file **IL97 – Parcel 6021109, Parcel 6021109.dgn, Default** in the top pane and turn off the **Alignment_PR_Notation** level in the bottom pane.

Setup a Text Favorite

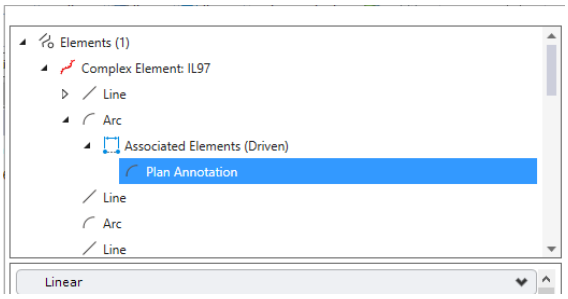
1) Under the Drawing Production tab in the Annotations toolset select the little Arrow next to the Annotations to open the text favorites manger.

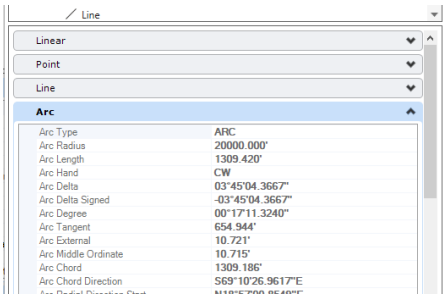


2) The Text Favorite Manager will open. Highlight **Parcel 6021109** and then pick on the **Green Plus Sign** to create a new Text Favorite in this dgn.
3) Name the new text favorite **ARC_RAD_CB_CH** in the left-hand pane by right clicking on it and selecting **Rename**.

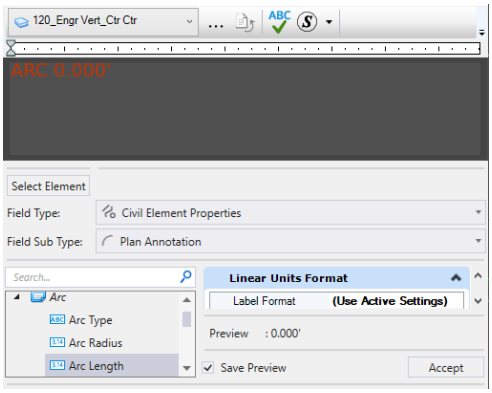


4) Pick **Select Element** under the preview window and then select the **Arc Between Station 589+00 and 590+00** on the **Proposed Alignment**.
5) After selecting the arc a dialog box will open, under **Elements** drill down to Plan Annotation 2 levels under the first **Arc** grouping.
6) Find the Arc Group in the dialog box and then move the dialog so you can access the preview area of the Text Favorites Manager.



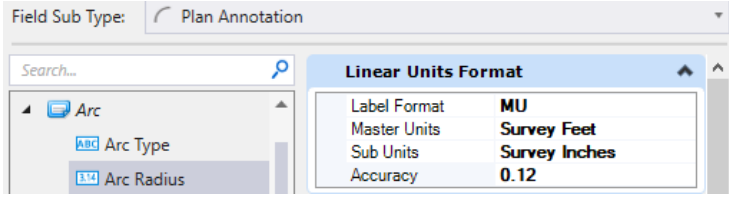


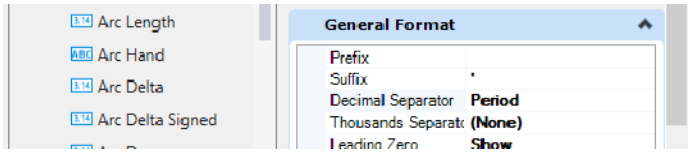
7) In the Preview box of the Text Favorites Manager type **ARC** then a **Space** then choose the **Arc Length** in the Elements box. By selecting the Arc Length in the secondary dialog, it will select it for you in the Elements box within the Text Favorite Manager.



Note: Do not worry if the Preview box does not show the exact number that you pick. Remember you are building the text favorite.

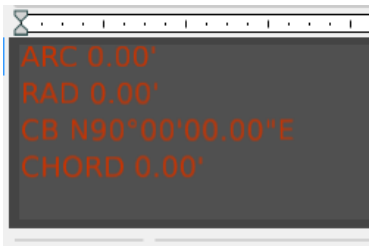
8) On the right side of the Text Favorite dialog under Field Sub Type, there is a scroll bar that you use to see the **Linear Units Format** and **General Format** options of the Favorite you are setting up. If you stretch the Text Favorites dialog down, this section of the dialog will increase in size and be easier to work with.
9) In the **Linear Units Format** section for the Text Favorite set the following options:
   - Label Format: **MU**
   - Master Units: **Survey Feet**
   - Sub Units: **Survey Inches**
   - Accuracy: **0.12**
10) In the General Format section set the following options:
   - Suffix: **'** (Apostrophe / Foot Mark)
   - Decimal Separator: **Period**

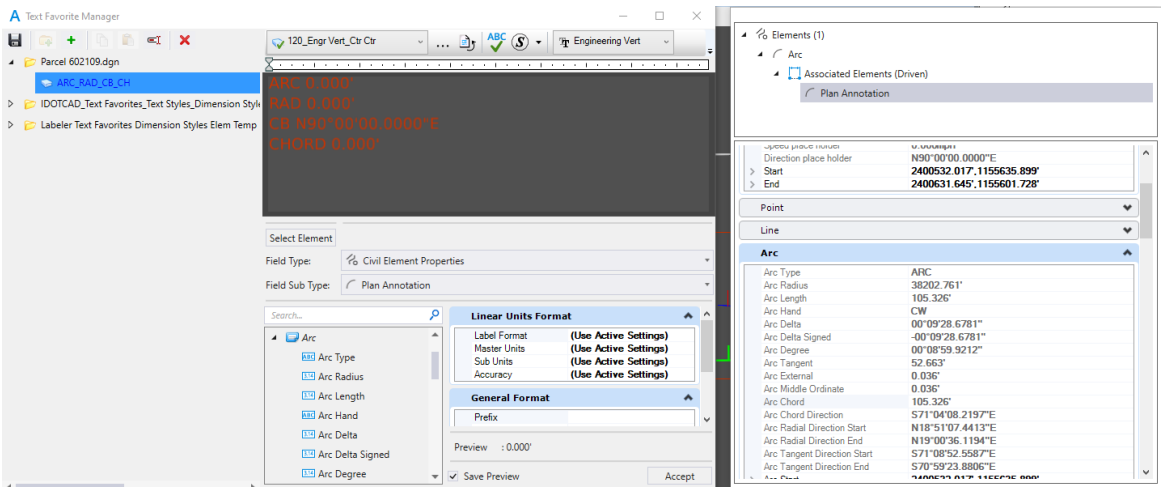




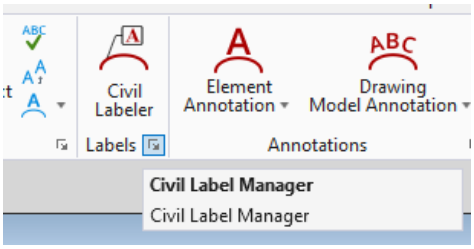
11) Check the **Save Preview** Box and then Pick **Accept**.
12) This puts the Arc Length into the preview box.

13) After you have the Arc Length entered, select the preview window after the end of the text being displayed and hit **Enter** on your Keyboard to start a new line in the Text Favorite.
14) Type **RAD** then a **Space** then choose **Arc Radius** in the Elements box, ensure that **Save Preview** is checked, and then select the **Accept** button.
15) Use the same settings for the Linear Units Format and General Format for the Arc Radius.
16) After you have the **Arc Radius** setup, enter a new line in your Text Favorite and continue the same steps for the Chord Bearing (**CB**), selecting Arc Chord Bearing from the dialog box. and the Chord Length (**CHORD**) selecting the Arc Chord from the dialog.
17) In the **Angle Format** section for the Text Favorite set the following options:
    - Format: **DD MM SS**
    - Mode: **Bearing**
    - Accuracy: **0**
18) In the General Format section set the following options:
    - Suffix: **Blank**
    - Decimal Separator: **Period**
19) When you have completed the steps you text favorite should look like this.

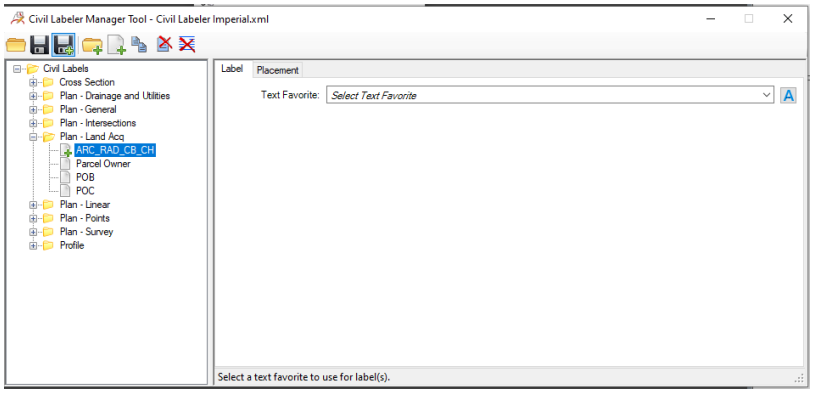




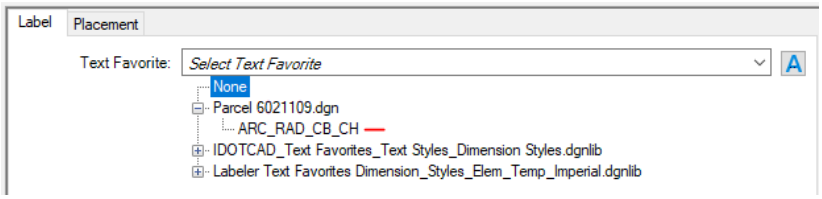
20) Once you have the **ARC_RAD_CB_CH** Text Favorite build click on the **Save** button in the top row of the Text Favorite dialog box and close the Text Favorites Manager.
21) Under the Drawing Production tab in the Labels toolset select the little arrow next to the **Labels** to open the **Civil Labeler Manager** dialog.



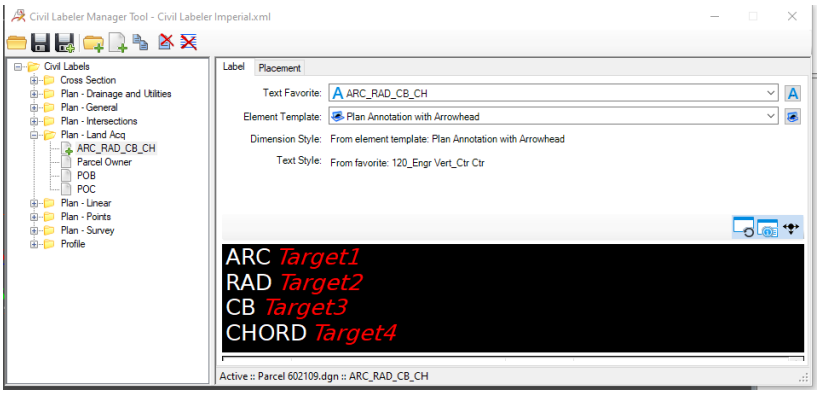
22) In the Civil Labeler Manager **Right Click** on **Plan – Land Acq** and select **New Label**.
23) Rename the new label to **ARC_RAD_CB_CH** by right clicking on it and choosing **Rename**.



24) In the Text Favorite Box select the pulldown and choose the plus next to **Parcel 6021109** and choose **ARC_RAD_CB_CH**.



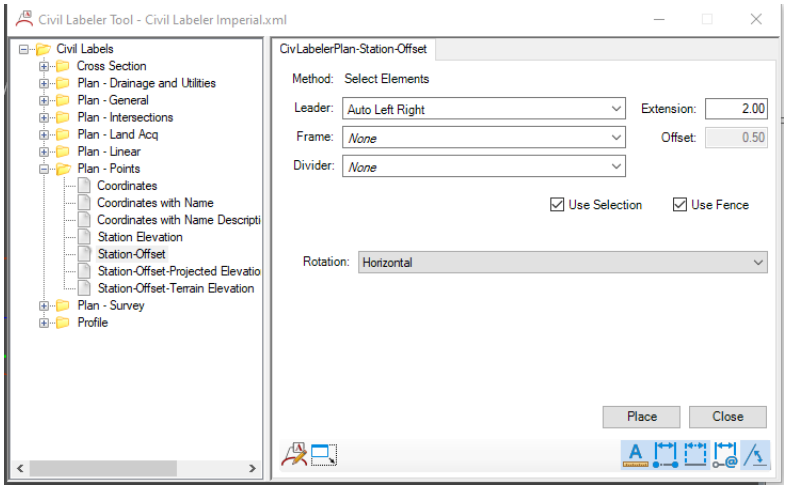
25) In the Element Template Box select the pulldown and choose the plus next to Civil Labeler and choose Plan Annotation with Arrowhead.
26) Click **Save File** from the top toolbar in the Civil Labeler Manager dialog and your Civil Label should look like:



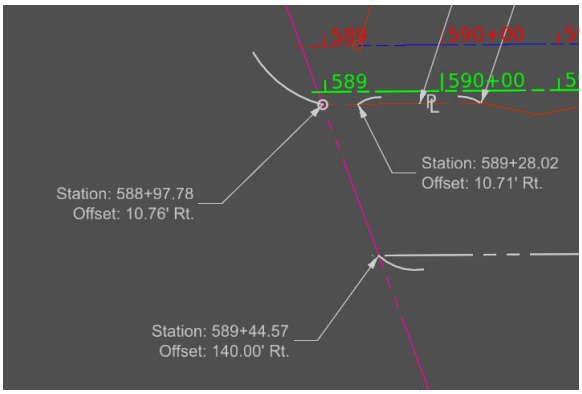
27) Go to the **Placement** tab in the Civil Label Manager and pick **Place** at the bottom of the dialog box, pick the **Arc** between **Station 589+00 to 590+00** drag you label into the position that you want and then **Left Click** to place it.

Note: You will need to play with the leader option and the Rotation to get the label to place how you would like it to place. Once you have the label how you want it to make sure to save it again to keep the settings. You may also have to change the level that the label is placed on.

28) Next, we will use Civil Labeler to label station and offset. Open the Civil Labeler if you closed it. It is located on the Drawing Production tab. Expand **Civil Labels -> Plan – Points** then choose **Station-Offset**.

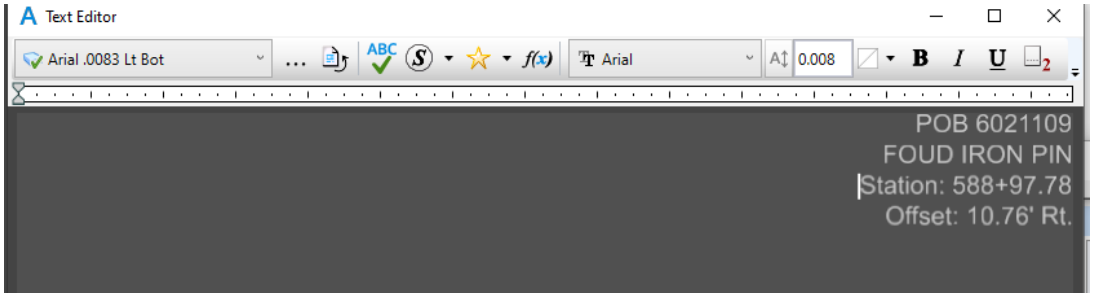


29) Choose Place follow the screen prompts in the lower left corner, identify baseline geometry (**PR IL97**) then Identify elements to label (**POB of Parcel 6021109**) snap to the element and then drag the label into the position you want and data point to place it.

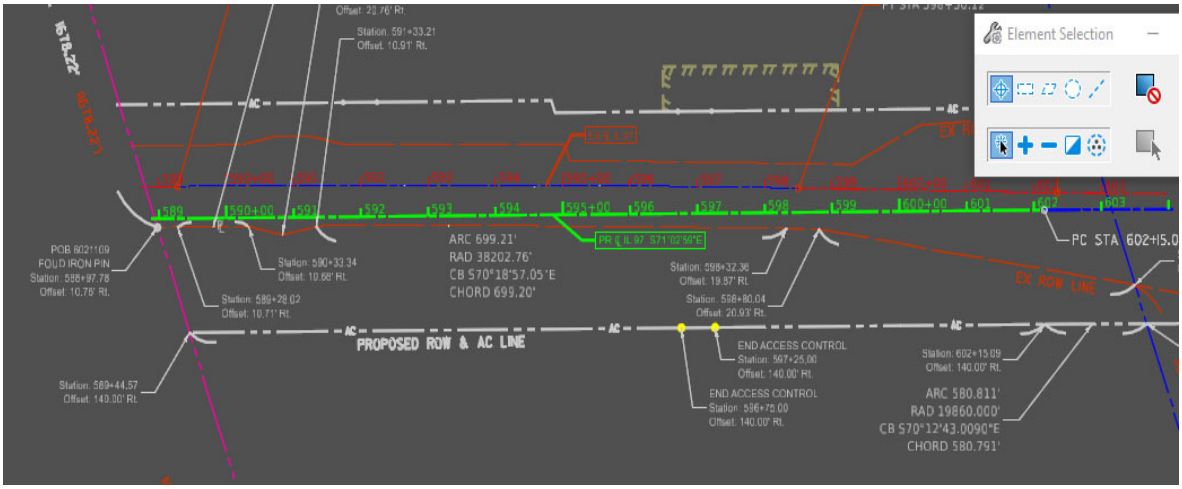


Note: We can either edit the Station and Offset with the Text Editor or Build another Text Favorite and Civil Label to add in other elements to the label.

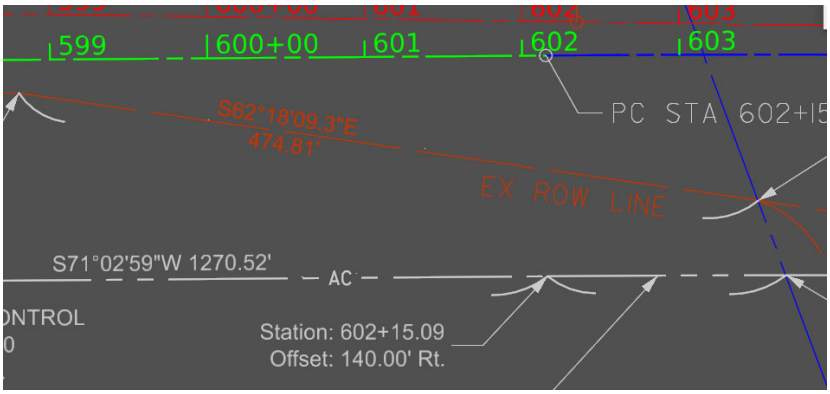
30) Close the Civil Labeler Tool and with the Element Selector tool active, **Double Click** on the **Station Offset Label** representing the Point of Beginning to open it in the Text Editor. You can edit the text just like any other text element.



31) Open the **Civil Labeler** Tool if you closed it earlier and continue using the **Station-Offset** command to place all the Station-Offsets.



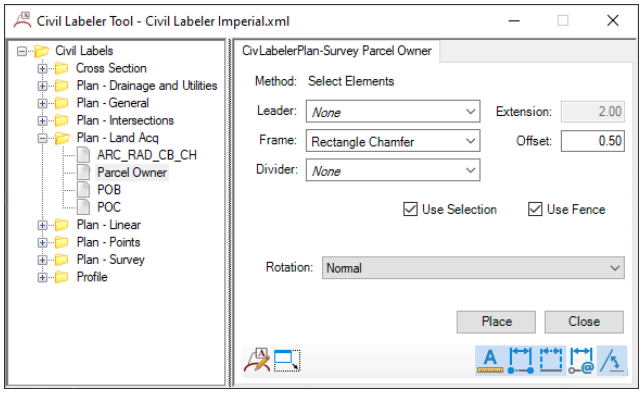
32) Next, we will place all the Bearings-Distances. In the **Civil Labeler** Tool navigate to **Plan - Linear -> Linear – Bearing and Length**. Then click on the Place command, then pick the **EX ROW LINE** near **Station 599+00**.



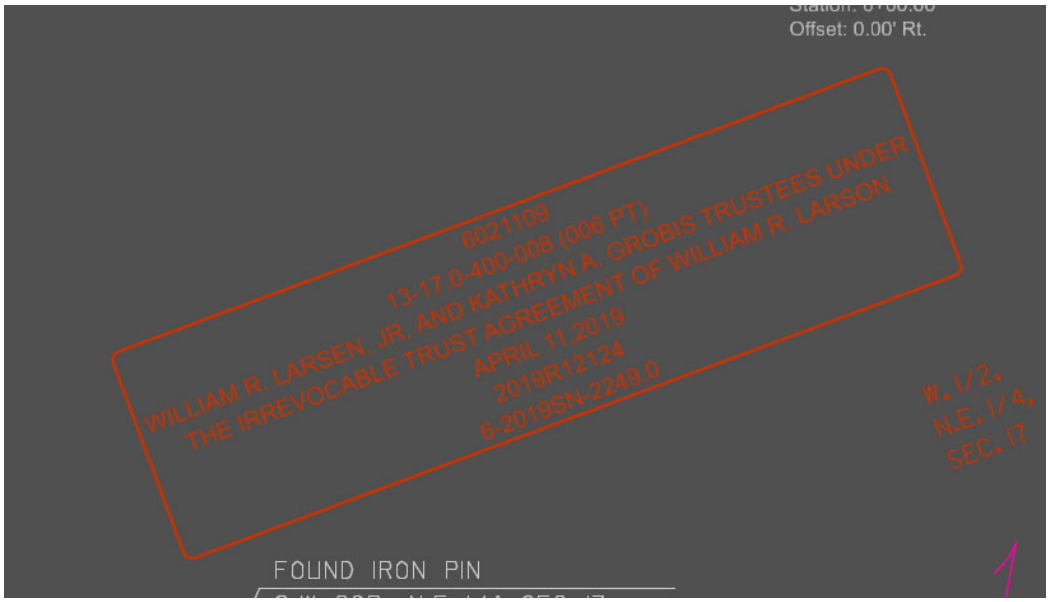
33) You may have to adjust the Distance on the line because it may measure the whole line length because of the clip mask.
34) Because of tight area you may want to create a table for the **Bearing - Length**.

Place the Ownership Label on the Parcel

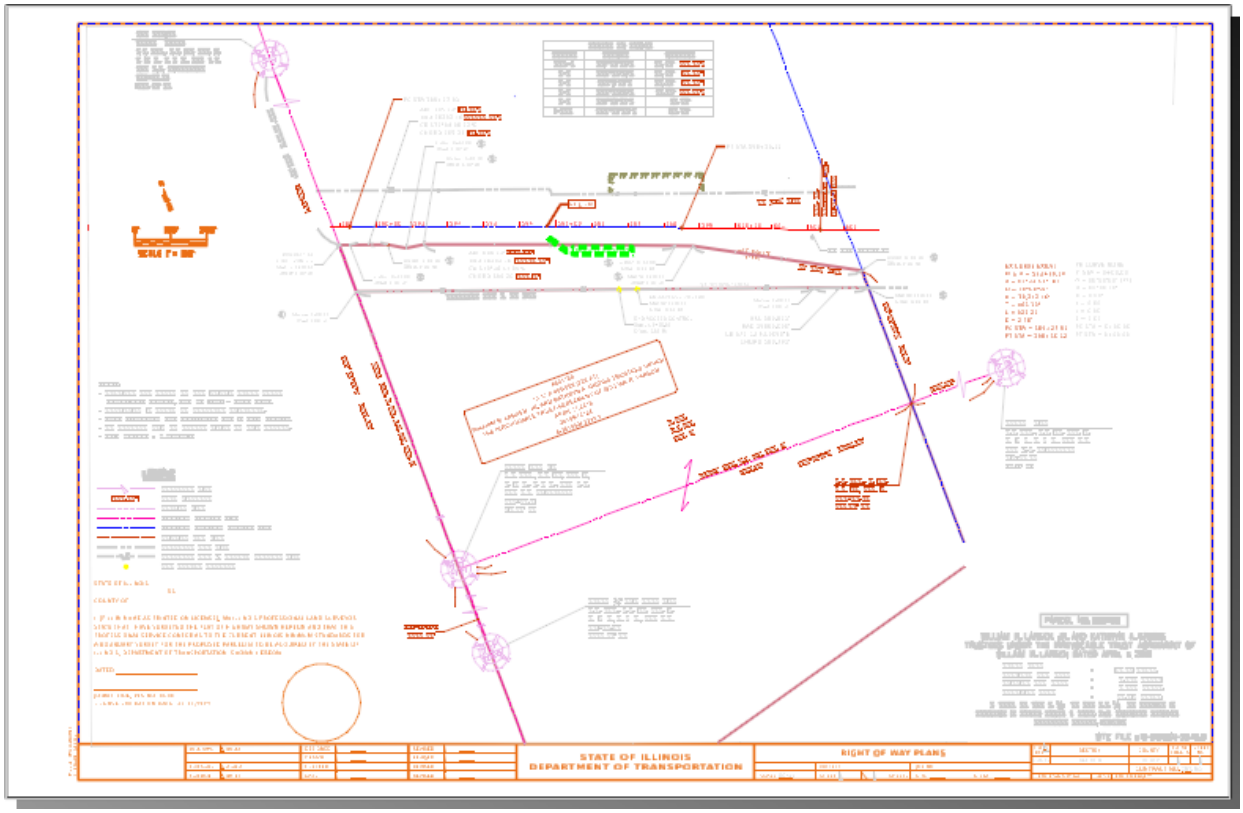
1) Make sure that you are in the **IL97 – Plan 1** (drawing model)
2) If the Civil Labeler is not open, then open it and navigate to **Civil Labels -> Plan – Land Acq** and select the **Parcel Owner** label.
3) In the lower right corner of the dialog box select Place.



4) Select **Parcel 6021109** on the left near the proposed right of way line and then **Data Point** on the parcel line.
5) You can drag the label up near the proposed right of way line.
6) Close Civil Labeler. The label with all the Owner information was typed in earlier in this chapter is shown. You may need to adjust the text in the Ownership Item Type to get it look good in the box.



7) Continue to Label the Plat until you feel most of the labeling is complete. Below is a screen shot of the Plat with all the Labeling that we have covered.



Chapter 4 Review

General Information

- The objective of this course is to teach tools and techniques that can be used for developing Right of Way Plans on roadway projects. In this course you learned how to:
  - Reference the existing Right of Way centerline and proposed Right of Way lines
  - Create an ORD Parcel from stored SS10 parcel data
  - Create a proposed parcel with legal description from stored parcel information from SS10
  - Create right of way plan sheets and annotation.

New Concepts

- Apply feature definitions to elements.
- Use Geometry Builder to convert the SS10 Parcels to ORD Parcels.
- Create Named Boundaries.
- Create ROW PLAT
- Examine the Drawing View
- Placing Annotation in the Drawing View
- Finding the Annotation Tools to Annotate the Plat

Skills Checklist

- Create new WorkSet
- Context Sensitive Toolbar:
  - Making it appear
  - Utilizing the commands
- Understanding / using:
  - Feature Definitions
  - Project Explorer
  - Geometry Editor and Builder
  - Text Favorites
- Create Named Boundaries and sheets

Notes:

Chapter 5

Creating a Parcel from Key-In

EXERCISES – Chapter 5 – Creating a Parcel from Key-In

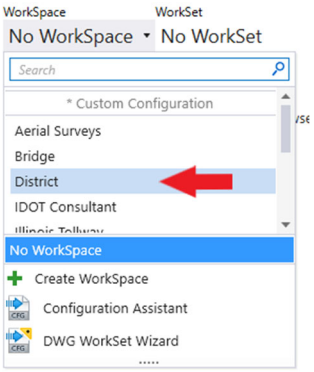
The objective of this course is to teach tools and techniques that can be used for Creating Parcels by keying in the bearing and distance. We will also explore setting points to create Temporary Easements. In this course you will learn how to establish the existing right of way centerline, how to create the existing right of way lines and how to create an existing property parcel from record data.

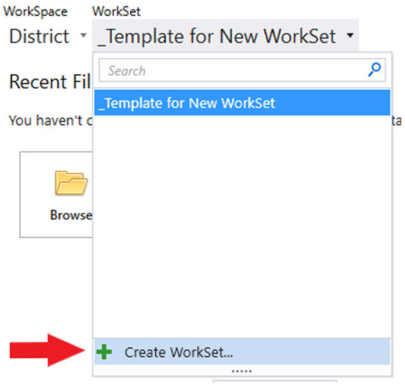
E5.1 – File Setup, Understanding the Interface, and Extracting Parcels

If you have already worked through the Chapter 2and 3 Exercises you can skip the Design File Setup steps 2 through 6 below.

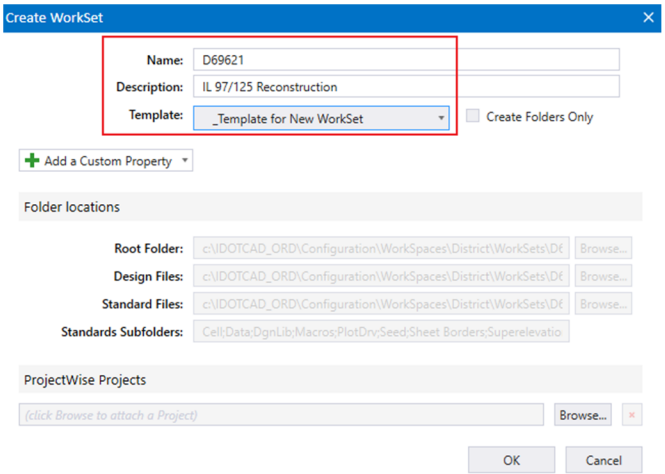
Design File Setup – Outside ProjectWise

1) Start OpenRoads Designer
2) Set the Workspace and Work Set
   - The Workspace and Work Set define standards that are used by the software. The Workspaces are set up during the software installation. In this training we will be using the District WorkSpace, but this could change depending on software and Workspace Standards updates.
   - The following steps will set up the Workset you will be using throughout this training. Internally within IDOT your CADD Manager will take care of setting up the Workset for the project and everyone's use.
3) Select ***District*** from the WorkSpace pulldown menu then select ***Create Workset*** from the WorkSet pulldown menu.



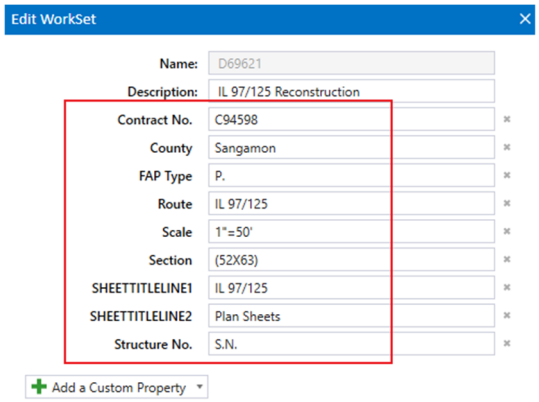


4) The *Create Workset* Dialog Box will open, fill in and select the following:
   - Name: **D69621**
   - Description: **IL 97/125 Reconstruction**
   - From the Template dropdown selection box select: **_Template for New WorkSet** and click **OK** to continue.



5) On the right side of the screen, you will see "***Properties***" select it and then select "***Advanced Properties***". Fill in the Advanced Properties in the *Edit WorkSet* dialog with the following:

- Contract No.: **C94598**
- County: **Sangamon**
- FAP Type: **P.**
- Route: **IL 97/125**
- Scale: **1"=50'**
- Section: **(52X63)**
- SHEETTITLELINE1: **IL 97/125**
- SHEETTITLELINE2: **Plan Sheets**



6) Click ***OK*** to save and exit the *Edit WorkSet* dialog box (not shown). These Properties will automatically fill in the Title Block on all sheets in this project. This is the current workflow, this will be changing with future releases of the software and IDOTCAD Environment, training will be provided at that time.
7) Select **Browse** and navigate to the location where you unzipped the dataset files. Select the file **IL97_125 Parcels.dgn** from the Chapter 5Ta folder and click **Open.**

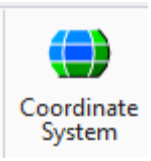
Design File Setup – Inside ProjectWise

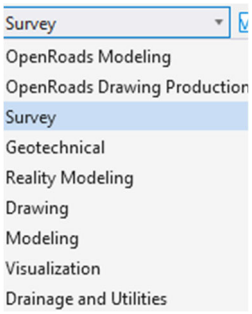
Specific instructions will be presented during class on how to utilize the Managed Workspace within ProjectWise. Your CADD Manager will also have more information if needed as well as be setting up the WorkSet folders for the entire Project.

Set the Geographic Coordinate System

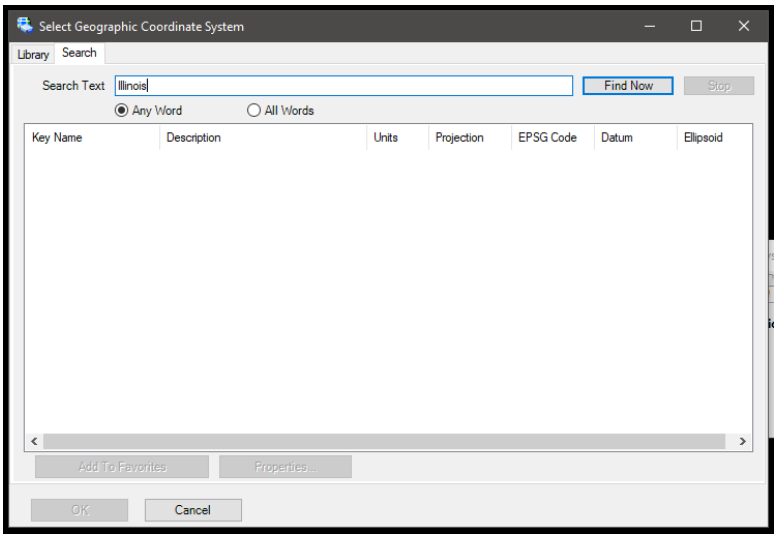
Before we import the Survey data, we need to ensure the Geographic Coordinate System (GCS) is set correctly. This enables the software to make automatic adjustments so data from different systems will mesh seamlessly. Surveyors more than anyone can appreciate the importance of setting the correct Geographic System.

1) Select the **Survey** Workflow from the drop-down menu.
2) Under the Utilities tab, in the Geographic toolset, select the **Coordinate System** tool.

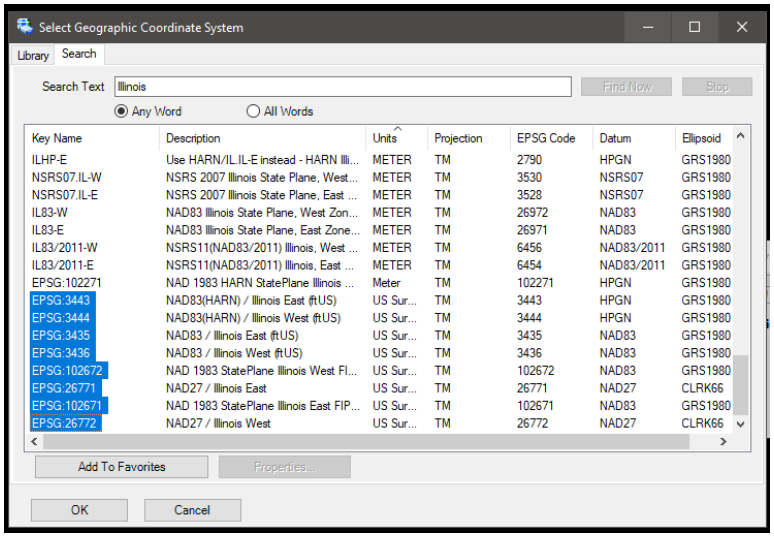




3) Select **From Library** icon.
4) In the Library Dialog click the **Search** tab and type **Illinois** in the "Search Text" and hit **Enter**.

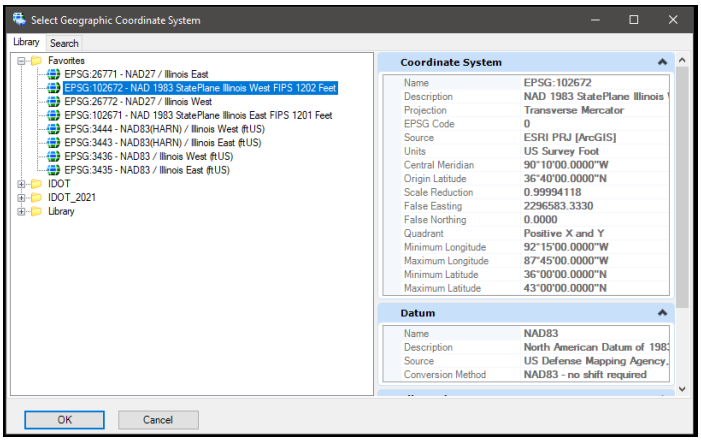


5) Click on the **Units** column header to sort by it.
6) Select all the "Key Name" Coordinate Systems with units of "US Survey Foot" (Shift pick the top and bottom one)



7) Select **Add to Favorites** button at the bottom to add your selection.

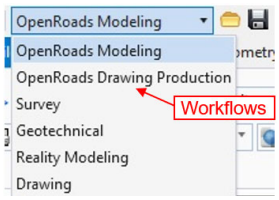
8) Select the **Library** tab at the top of the Dialog.
9) If "Favorites" is not expanded, click the plus (**+**) sign next to it to expand. This will show you the coordinate systems that you picked that apply only to Illinois.
   - Also notice that there is an IDOT and IDOT_2021 folder listed with the Favorites folder. The IDOT folder lists the original District 8 LDP zones per county. The IDOT_2021 folder lists the 33 new LDP zones.

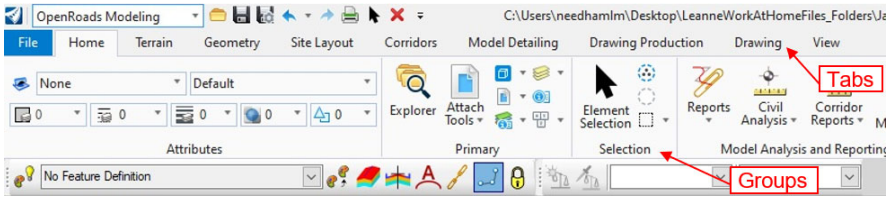


10) Double Click on **EPSG:102672-NAD 1983 StatePlane Illinois West FIPS 1202 Feet** under your Favorites.
11) Close the Geographic Coordinate System Dialog.

Reference Needed information to Current Design

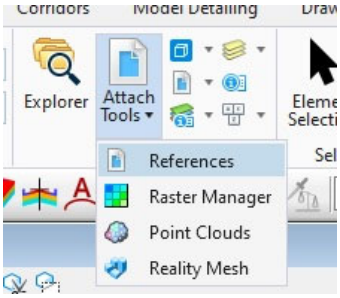
1) Select the **Survey** Workflow from the drop-down menu. Many of the commands you will use in this exercise are in the Survey Workflow.





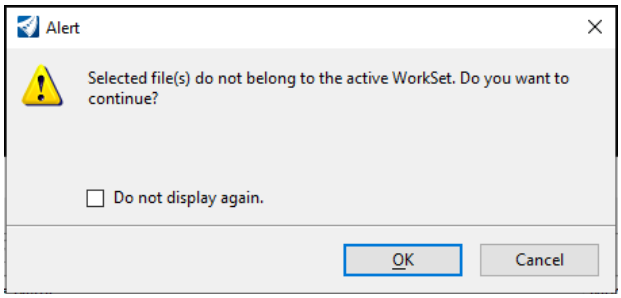
Note: Workflows segment tools into discipline specific groups streamlining the interface. Each Tab Group further segments the Survey tools to a task-based interface.

2) From the Home tab select the **Attach Tools -> References**, located in the Primary Group.



3) In the Reference File Dialog, select **Tools -> Attach** and attach the following files from the Chapter 3 folder. The Section Corners.dgn file is already attached but turned off.
   - **Aerial Topo**
   - **EX_ROW**
   - **PR_ROW**
   - **Existing Alignments** in the Existing Alignments folder
   - **Master PR Alignments** in the Proposed Alignments folder

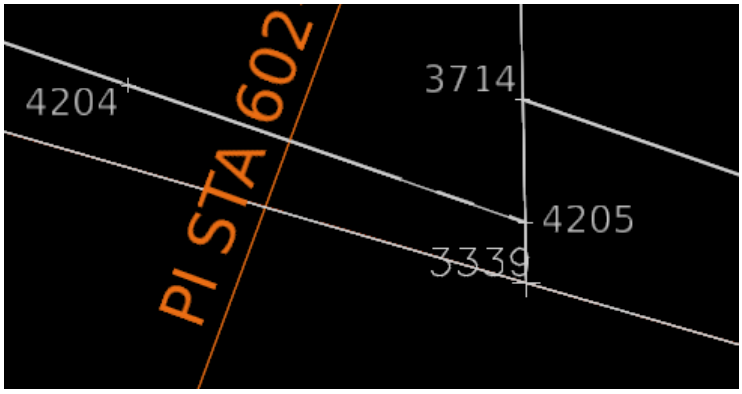
   Note: A message box will pop up saying the files do not belong to the current WorkSet. This is fine, so just click Ok to continue.



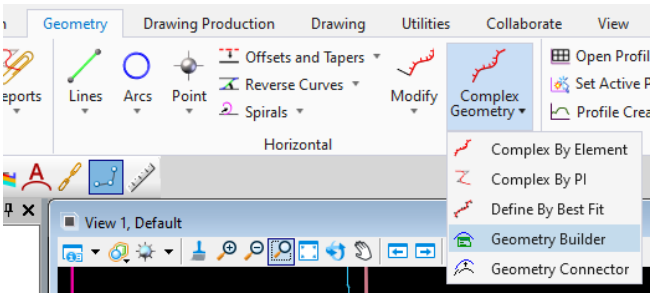
4) Turn on the display of the **Section Corners.dgn** file in the Reference dialog so it shows up with the rest of the references. Close the Reference dialog once all files are displaying.

E5.2 – Creating Parcels with Geometry Builder

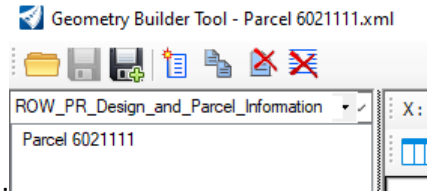
1) Find Parcel **6021111**, it is the smaller of the 3 parcels we worked in Chapter 3 with the farm on it.
2) **Zoom** in to the **Right Corner** of **Parcel 6021111** and find Point **3339.**



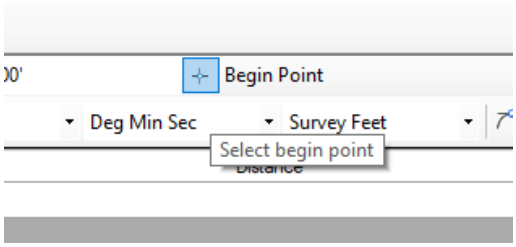
3) In the **Survey** workflow, on the geometry tab, in the Horizontal group, select the arrow next to **Complex Geometry** and select **Geometry Builder** from the drop-down menu.

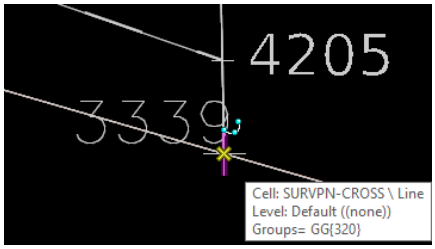


4) In the Geometry Builder Tool select the fourth tool over, **Add new geometry**.
5) In the Tool Settings Dialog select add New Geometry.
   - Feature Definition: **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information**
   - Name: **Parcel 6021111**



6) In the Geometry Build Tool on the top row select **Begin Point** and snap to Point **3339**. Ensure that you snap to the point and not the line.

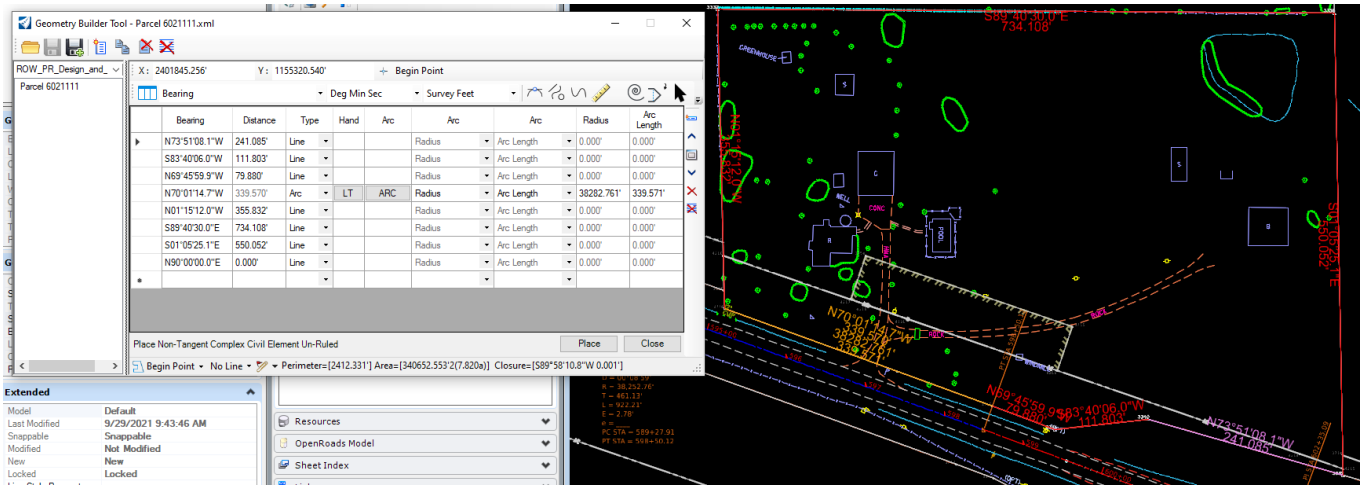




7) In the first line of the Geometry Builder Toolbox select the bearing box it will populate to a Bearing of N90^00’00” E and a Distance of 0.000’ see the table below for the values to enter. **Tab** at each entry to lock in the value and hit **Enter** to go to the next line.
8) Enter the **Points** and **Type Options** listed below. On the 4th line you have need set the Type to **Arc** in order for the **Radius** and **Arc Length** columns to show up.

Line in Dialog	Bearing	Distance	Type	Radius	Arc Length
1	N73^51’08.1” W	241.085’	Line		
2	S83^40’06.0” W	111.803’	Line		
3	N69^45’59.9” W	79.880’	Line		
4	N70^01’14.7” W		Arc	38282.761’	339.571’
5	N01^15’12.0” E	355.832’	Line		
6	S89^40’30.0” W	734.108’	Line		
7	S01^05’25.1” E	550.052’	Line		

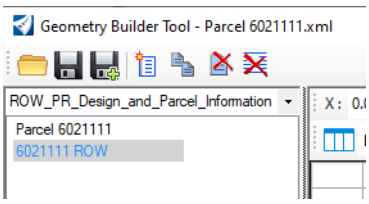
9) Your newly created **Parcel 6021111** should look like:



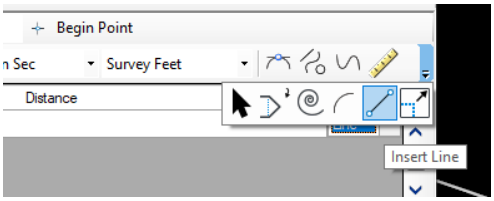
10) Pick the **Save As** button (Green plus sign) and save **Parcel 6021111** in your **Chapter 5\Parcels folder**.

E5.3 – Creating ROW with Geometry Builder

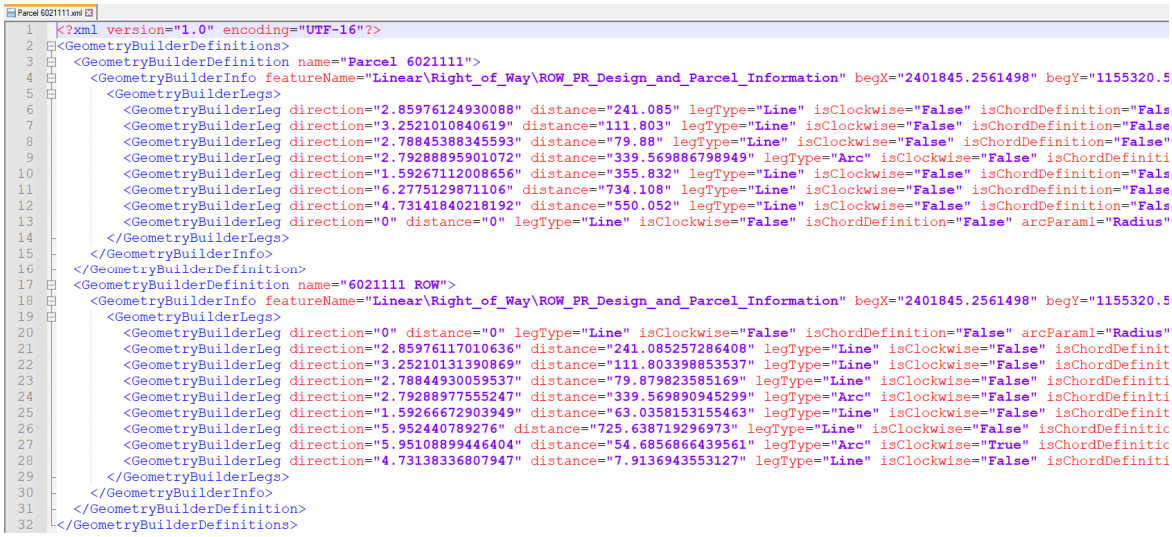
1) Continue in the **IL97_125 Parcels.dgn** and in the Geometry Builder Tool dialog select the **Add new geometry** button.
2) Rename the new geometry **6021111 ROW**.



3) Select **Begin Point** and then select point **3339** to begin the Parcel.
4) In the Top Row of the Geometry Builder tool on the Right side pick the small down arrow and select the **Insert Line** command from the sub-menu.



5) Snap a line from point **3339** to **3340**, the Line command will continue allowing you to select the next points.
   - Snap to Point **3341**.
   - Snap to Point **3715**
6) Change to the **Insert Arc** command in the sub-menu shown above.
   - Snap to Point **3716** you will see an arc glif show up.
   - Snap to the **Midpoint** of the arc between points **3715** and **3716**.
7) Change back to the **Insert Line** command.
   - Snap to Point **4206**.
   - Snap to Point **4204**
8) Change back to the **Insert Arc** command.
   - Snap to Point **4205**.
   - Snap to the **Midpoint** of the arc between points **4204** and **4205**
9) Change back to the **Insert Line** command.
   - Snap to Point **3339** to close the ROW Parcel and **Right Click** to exit the command.
10) Click Save in the Geometry Builder dialog to save the ROW take to the Parcel 6021111.xml file and close the Geometry Builder dialog.



```
<?xml version="1.0" encoding="UTF-16"?>
<GeometryBuilderDefinitions>
  <GeometryBuilderDefinition name="Parcel 6021111">
    <GeometryBuilderInfo featureName="Linear\Right_of_Way\ROW_PR_Design_and_Parcel_Information" begX="2401845.2561498" begY="1155320.5
      <GeometryBuilderLegs>
        <GeometryBuilderLeg direction="2.85976124930088" distance="241.085" legType="Line" isClockwise="False" isChordDefinition="Fals
        <GeometryBuilderLeg direction="3.2521010840619" distance="111.803" legType="Line" isClockwise="False" isChordDefinition="False
        <GeometryBuilderLeg direction="2.78845388345593" distance="79.88" legType="Line" isClockwise="False" isChordDefinition="False"
        <GeometryBuilderLeg direction="2.79288895901072" distance="339.569886798949" legType="Arc" isClockwise="False" isChordDefiniti
        <GeometryBuilderLeg direction="1.59267112008656" distance="355.832" legType="Line" isClockwise="False" isChordDefinition="Fals
        <GeometryBuilderLeg direction="6.2775129871106" distance="734.108" legType="Line" isClockwise="False" isChordDefinition="False
        <GeometryBuilderLeg direction="4.73141840218192" distance="550.052" legType="Line" isClockwise="False" isChordDefinition="Fals
        <GeometryBuilderLeg direction="0" distance="0" legType="Line" isClockwise="False" isChordDefinition="False" arcParam1="Radius"
      </GeometryBuilderLegs>
    </GeometryBuilderInfo>
  </GeometryBuilderDefinition>
  <GeometryBuilderDefinition name="6021111 ROW">
    <GeometryBuilderInfo featureName="Linear\Right_of_Way\ROW_PR_Design_and_Parcel_Information" begX="2401845.2561498" begY="1155320.5
      <GeometryBuilderLegs>
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        <GeometryBuilderLeg direction="2.85976117010636" distance="241.085257286408" legType="Line" isClockwise="False" isChordDefinit
        <GeometryBuilderLeg direction="3.25210131390869" distance="111.803398853537" legType="Line" isClockwise="False" isChordDefinit
        <GeometryBuilderLeg direction="2.78844930059537" distance="79.879823585169" legType="Line" isClockwise="False" isChordDefiniti
        <GeometryBuilderLeg direction="2.79288977555247" distance="339.569890945299" legType="Arc" isClockwise="False" isChordDefiniti
        <GeometryBuilderLeg direction="1.59266672903949" distance="63.0358153155463" legType="Line" isClockwise="False" isChordDefiniti
        <GeometryBuilderLeg direction="5.95240789276" distance="725.638719296973" legType="Line" isClockwise="False" isChordDefinitic
        <GeometryBuilderLeg direction="5.95108899446404" distance="54.6856866439561" legType="Arc" isClockwise="True" isChordDefinitic
        <GeometryBuilderLeg direction="4.73138336807947" distance="7.9136943553127" legType="Line" isClockwise="False" isChordDefiniti
      </GeometryBuilderLegs>
    </GeometryBuilderInfo>
  </GeometryBuilderDefinition>
</GeometryBuilderDefinitions>
```
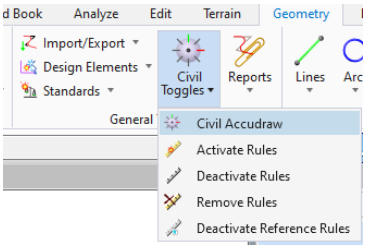
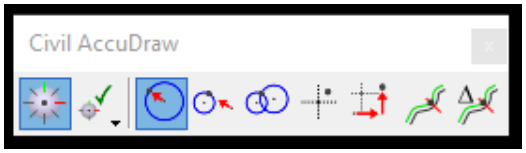

E5.4 – Creating Temporary Easement with Civil Accudraw (Cogo Replacement)

1) Go to **File** then select **New** and create a new 2D file named **Parcel 6021111.dgn** in the Chapter 5 folder.
2) Set the Geographic Coordinate System (GCS) and then attach the following references.
   - **Aerial Topo**
   - **EX_ROW**
   - **IL97_125 Parcels**
   - **PR_ROW**
   - **Section Corners**
   - **Existing Alignments** in the Existing Alignments folder
   - **Master PR Alignments** in the Proposed Alignments folder and turn on **Live Nesting** for this one.
3) **Close** the Reference dialog box and do a **Fit View** to see all the referenced files.
4) Zoom into the area of **Parcel 6021111**.
5) On the **Survey** workflow, in the geometry tab, in the Horizontal group, select the arrow next to Complex Geometry and select **Geometry Builder** from the drop-down menu.
6) If there is anything listed in the Geometry Builder dialog, select the **Delete All Items** button, and select **Yes** in the dialog that pops up.
7) Choose **Open**, if prompted to Save Changes to file select **No**, and navigate to the Chapter 5\Parcels folder and select the **Parcel 6021111.xml** file.
8) Select **Parcel 6021111** in the left-hand pane and then select **Place** in the lower right corner to place the parcel in the DGN.
9) Select **6021111 ROW** in the left-hand pane and then **Place** it in the dgn.
10) **Close** the Geometry Builder dialog, making sure **NOT** to save it to the file if prompted.
11) Under the Geometry tab, in the General Tools toolset, select the arrow under **Civil Toggles** and select **Civil Accudraw**.

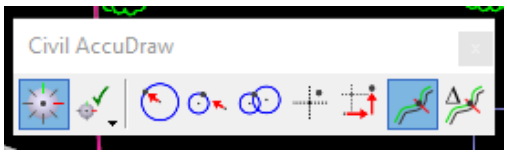


12) The Civil Accudraw toolbox will open on your screen. To activate the tool, select the first icon and the toolbox will expand to show more tools.



Note: Civil Accudraw works with standard tool to allow you place points and geometry with precision and accuracy. This will replace many of the common COGO tools.). Civil Accudraw (CA) is one of the few remaining "Quirky" tools. It can get "out of synch" especially when you are in a 3D file and clicking on views that point to different (2D, 3D) models. Most times simply deactivating and reactivating will reset the tool. Occasionally you will have to close the dialog and reopen it. As you learn to be comfortable with it you will find this minor annoyance is more than made up for by the power of this tool.

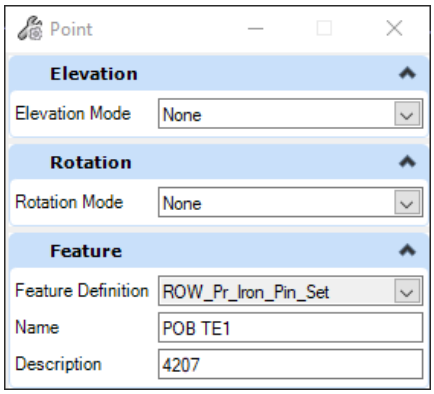
13) Select the **Station-Offset** tool in the Civil AccuDraw toolbar.



14) On the **Survey** workflow, in the Geometry tab, in the Horizontal group, select the arrow next under Point to see the different Point Commands. Select **Point** from the drop-down menu.

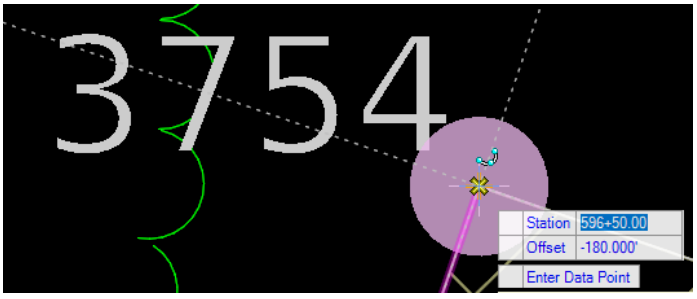
    Note: that the tools **Locate Point** and **Equal Spaced Points** have other methods to locate points not covered by Civil Accudraw. Using a combination of CA and point tools, you should be able to locate any point similar to using COGO tools.

15) In the Point settings dialog set: (Hit **Enter** after keying in the Description to set the values.)
    - Elevation mode: **None**
    - Rotation Mode: **None**
    - Feature Definition: **Point\ROW\ROW_Pr_Iron_Pin_Set**
    - Name: **POB TE1**
    - Description: **4207**



    Note: The station, offset fields are added to the cursor, this is the benefit of CivilAccudraw.

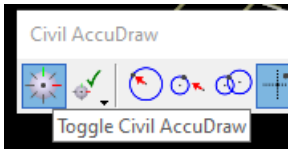
16) Hit **Shift + O,** or tab to the "Offset" field in the Heads up prompt and hit O, on your keyboard, this is the most important thing about Civil Accudraw, **The Big "O"**. Notice how the fields do not change when the cursor is moved. Inexperienced users will be frustrated by this and believe CA does not work. However, that is not the case, the tool needs you to define the Ordinate (or reference element). This keystroke suspends the operation to allow you to define an element by data-pointing of it.
17) Now you can datapoint on the **Proposed Alignment IL97** to set it as the ordinate for the tool. Notice how the fields automatically update the values as the cursor is moved now.
18) In the Station field key-in **596+50.00** hit **Enter** to lock the value and switch to the offset field. Use the TAB key to switch fields if necessary.
19) Set the offset to **125.00** hitting **Enter** to lock the value.
    Note: An important thing to notice is the Offset will switch from positive to negative in relation to where the cursor is located to the Ordinate element (Proposed Alignment) when the enter key is pressed. If set to the wrong value, you can simply edit the value to correct.
20) **Data Point** in your screen to place the point at the corner of the Temporary Easement (Point 4207).
21) In the Point settings dialog set the Name to **IPS 1** and the Description to **3754**.
22) Zoom to the upper left corner of the Temporary Easement and **Snap** to the **Center** of Point **3754** to place the point at that location. Data Point to accept the placement and **Reset** to clear the command.



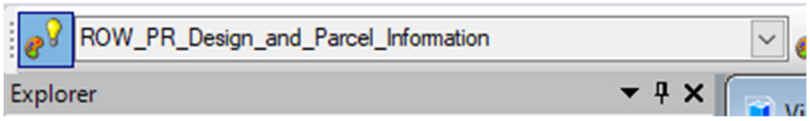
23) Using the Element Selection tool select one of the just placed points. Notice the handles indicating that the values used to place the point are stored within the point. Later if changes are necessary, they can be made using the values and the points do not need to be deleted/recreated. Data point on your screen to clear the point from the selection set.
24) Change the mode in Civil Accudraw to XY.
25) Select the Point command from the Horizontal toolset and in the Point settings dialog set the Name to **IPS 2** and the Description to **3755**.
26) On the Heads Up cursor prompts in the X field enter **2401522.711**, and hit **Enter**. In the Y field **1155497.379**, and hit Enter. This will set the XY values of the third point.
27) **Data point** on your screen to set the third point at the specified XY.
28) For the final point set the Name to **IPS 3** and the Description to **4208** in the Point settings dialog.
29) In the X field enter **2401504.850** and hit **Enter**, in the Y field **1155445.360** and hit **Enter**.
30) **Data point** to set the final point and **Reset** to exit the Point command.

Layout your Parcel using the Placed Points

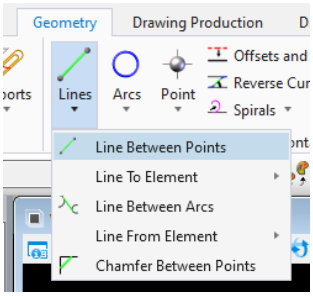
1) We no longer need the assistance of Civil Accudraw, so we can Deactivate it by selecting the **Toggle Civil Accudraw** button at the beginning of the toolbar. Do not make the mistake of simply closing the CA dialog by clicking on the Red X. This will close the dialog, but will **NOT** deactivate CA and you will notice the dashed lines and additional fields attached to the cursor.



2) Ensure that your Feature Definition Toolbar is open and docked. If not then you can find it under **Geometery tab -> General Tools -> Standards -> Feature Definition Toolbar**.
3) In the Feature Definition Toggle Bar, select the **Linear\Right_of_Way\ ROW_PR_Design_and_Parcel_Information** feature definition from the drop-down menu. Toggle on the **Use Active Feature Definition** toggle at the beginning of the toolbar.

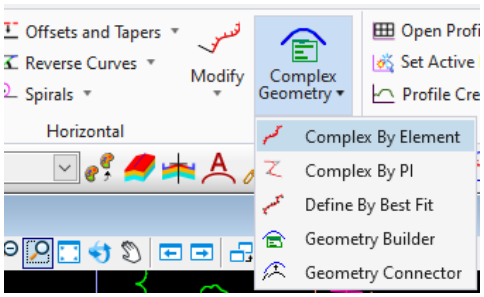


4) In the **Survey** workflow, on the Geometry tab, in the Horizontal group, select the arrow under Lines and select **Line Between Points** tool from the drop-down menu.

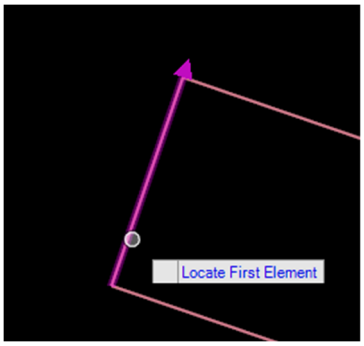


5) In the Line settings dialog enter **6021111 TE** in the Name field, and hit **Enter** to lock the value in.
6) We will start drawing the parcel at the **POB TE1** point (4207). Allow AccuSnap to **Lock** on to the point and **Data-point** to start placing a line.
7) Notice how you could place the Temporary Easement using the cursor menu to enter distance and bearing; **however** we want to define a relationship between the linework and the points.

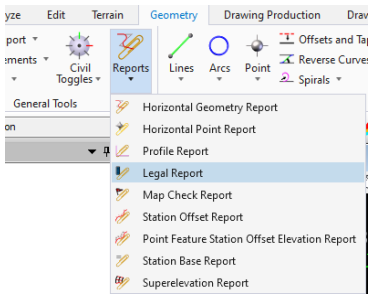
8) Next snap to **IPS 1** (3754) and data-point to place the line between the two points.
9) You will need to reselect the tool at each segment, while this may seem annoying at first, understand we are establishing importing relationships between the line work and points.
10) Repeat the steps as necessary to place lines between:
    - **IPS 1** (3754) and **IPS 2** (3755)
    - **IPS 2** (3755) and **IPS 3** (4208)
    - **IPS 3** (4208)and **POB TE1** (4207).
11) Once you have all 4 lines drawn, hit **Esc** to exit the Line command.
12) Now we will turn the collection of linear segments into an easement using the Complex Geometry tool. In the **Survey** workflow, on the Geometry tab, in the Horizontal group, select the arrow under Complex Geometry and select **Complex by Elements** tool from the drop-down menu.



13) In the tool setting dialog set the **Method** to **Automatic** and **Name** to **6021111 TE**,hit enter to set the values in the dialog.
14) **Hover** the cursor over the first segment but **do not data-point yet**. Hover near the center of the segment and notice how the segment highlights and an arrow appears. The direction of the arrow is dependent on the location of the cursor in relation to the center point of the segment. It is **IMPORTANT** for parcels to have the start point and direction of the arrow follow the order that you want to appear in the report, so take some care during this section.
15) **Select** the first segment near the **POB** so the arrow points **North** (clockwise) **data point** and the entire easement will highlight. Then **Data point** again to confirm the Easement. Hit **Esc** to exit the Complex Geometry command.



16) In the **Survey** workflow, on the Geometry tab, in the General Tools group, select the arrow under Reports and select **Legal Report** from the drop-down menu.



17) **Data-point** (Left-click) on the Easement shape and then **Reset** (Right click) to Complete.
18) When prompted to **Locate the Parent**, data-point on **Parcel 6021111**
19) When prompted to **Locate Primary Reference**, data-point on the **Proposed Alignment** for IL97 .
20) **Primary Reference Alignment Bandwidth** refers to a point where station offset callouts lose their relevance. Normally you would set to a couple hundred feet off the alignment in order to pick up all the Station-Offsets.
    - Set **Input Bandwidth** to **250'** and hit **Enter** to lock in the keyed value and **data-point** to accept.
21) Reset to skip **Locate First Secondary Reference Element** (could be used for station/offset from a second alignment.)
22) The report opens in a separate view/dialog.
    Note: if you select HorizontalAlignmentLegalDescriptionReference.xsl the points we placed are reported as well.

Chapter 5 Review

General Information

- The objective of this course is to teach tools and techniques that can be used for developing Parcels for creating Plats, Plat of Highways or Right or Way Plat. In this course you will learn how to reference in various files for creating the plats. We also how to create an ORD Parcel from stored SS10 parcel data, by following an existing parcel with line and tools in Geometry Builder and we also learned how to create points by Station and Offset, Using Civil Accudraw. We also learned how to set point by coordinates to a field book so that we can stake out later.

New Concepts

- Apply feature definitions to elements.
- Use Geometry Builder to build ORD Parcels.
- Civil Accudraw Station and offset
- Civil Accudraw by coordinates.
- Create a legal description

Notes: