



Right of Way Fundamentals

*This course is for the **2022 Release 2** version of:*

OpenSite Designer CONNECT Edition

OpenRoads Designer CONNECT Edition

OpenRail Designer CONNECT Edition

About this Practice Workbook...

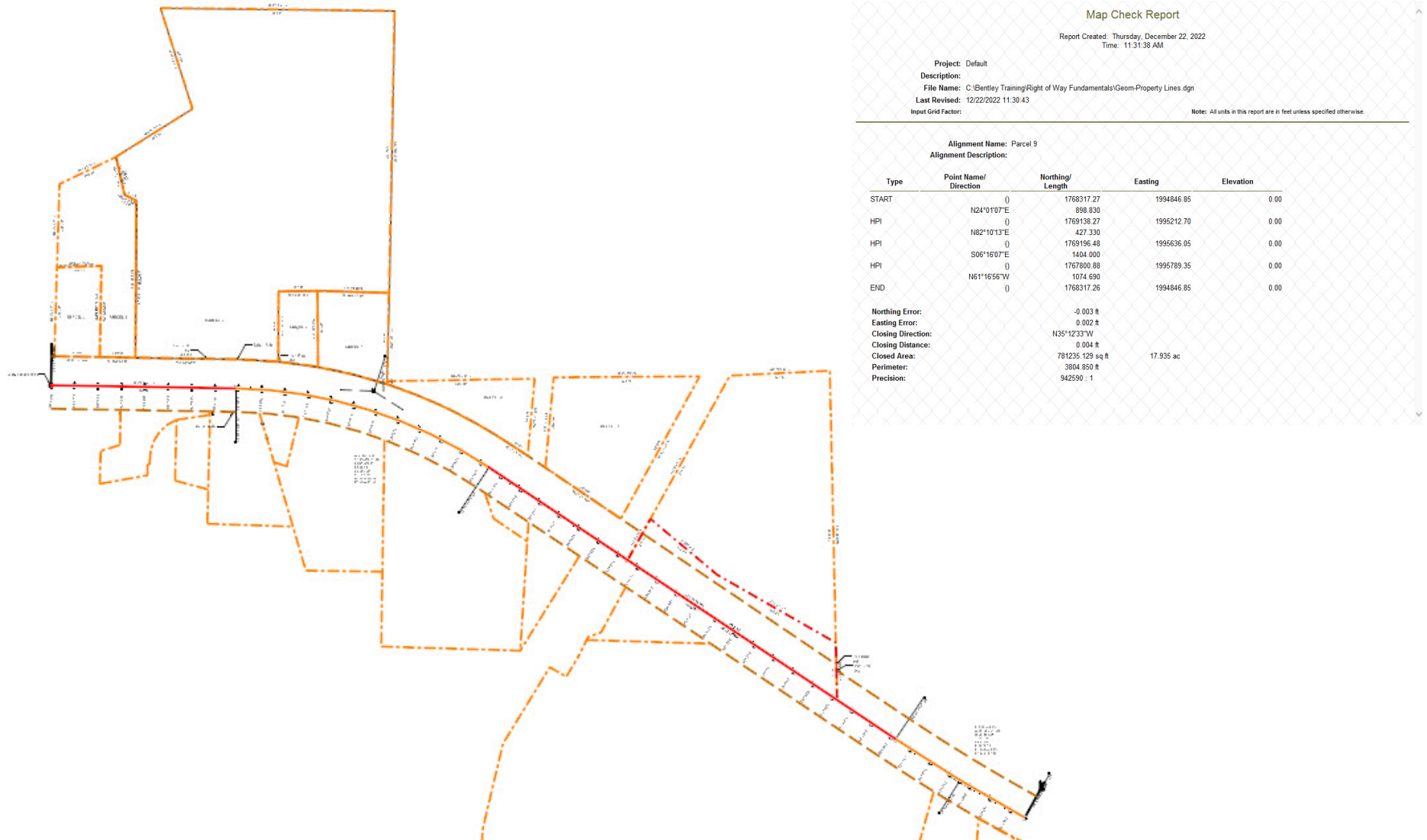
- This workbook is designed for use in Live instructor-led training and for OnDemand self study. OnDemand videos for this course are available on learning.bentley.com
- This PDF file includes bookmarks providing an overview of the document. Click on a bookmark to quickly jump to any section in the file.
- Both Imperial and Metric files are included in the dataset. Throughout this practice workbook Imperial values are specified first and the metric values second with the metric values enclosed in square brackets. For example: *12.0' [3.4m]*.
- This course workbook uses the *Training and Examples* WorkSpace and the *Training-Imperial* or *Training-Metric* WorkSet delivered with the software.
- The terms “Left-click”, “Click”, “Select” and “Data” are used interchangeably to represent pressing the left mouse button. The terms “Right-click” and “Reset” are also used interchangeably to represent pressing the right mouse button. If your mouse buttons are assigned differently, such as for left-handed use, you will need to adjust accordingly.

Have a Question? Need Help?

If you have questions while taking this course, you can submit questions to the [Civil Design Forum](#) on Bentley Communities where peers and Bentley subject matter experts are available to help.

Course Overview

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 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.



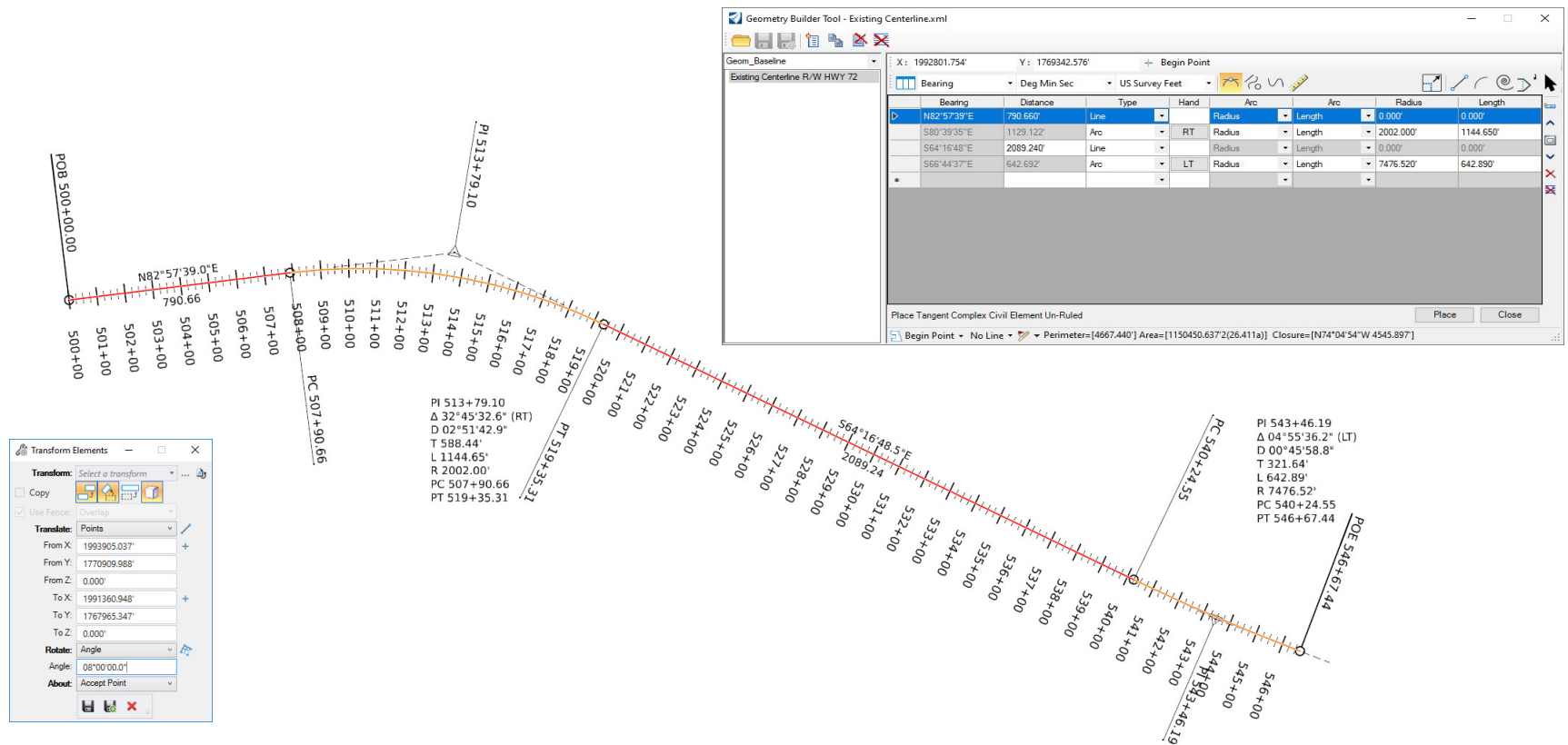
Exercise 1: Create the Existing Right of Way Centerline

Description

In this exercise you will learn how to create the existing right of way centerline for HWY 72 from historical record data. You will create the existing right of way centerline using the record geometric data and then move and rotate it to line up with survey data found in the field.

Skills Taught

- Create the Existing Right of Way Centerline using the *Geometry Builder* tool
- Move and Rotate Geometry Using the *Transform Elements* tool



Open an Existing File

In this section, you will open an existing design file named **Geom-HWY 72.dgn**. The working units and Geographic Coordinate System have already been defined in the file and the survey basemap has already been attached as a reference file.

1. Start the software.
2. Set the WorkSpace and WorkSet.

The WorkSpace and WorkSet define standards that are used by the software, and the ones used for this training are installed during the software installation.

Typically, the WorkSpace contains organizational standards and the WorkSet contains project standards.

- a. Select **Training and Examples** from the *WorkSpace* drop-down menu.
- b. Select **Training-Imperial [Training-Metric]** from the *WorkSet* drop-down menu.

3. Open an existing file.

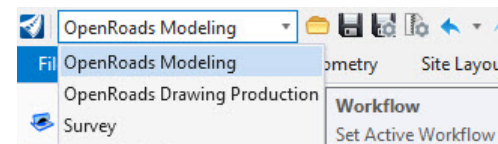
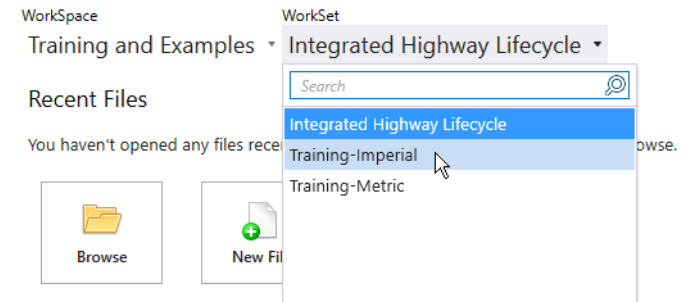


- a. Select **Browse**.
- b. Browse to *C:\Bentley Training\Right of Way Fundamentals* or other folder where you unzipped the dataset files and select the file **Geom-HWY 72.dgn [Metric-Geom-HWY 72.dgn]**

Note: If you get a message stating “Incompatible Civil Data”, this is because the training files are “aligned” to OpenSite Designer. Clicking **Yes** will align the file to the software you are using (OpenRoads or OpenRail Designer). This will have zero impact for training. Note that in production, upgrading the file will make the file read-only in OpenSite Designer. Full information is available at [Bentley Communities - Product Realignment](#).

- c. After the file opens, Select the **OpenRoads Modeling** workflow.

OpenRoads Designer CE



Create the Existing Right of Way Centerline

Existing centerline monuments have been found in the field. In this section, you will learn to re-create the existing right of way centerline from historical data and then move and rotate the existing centerline to the location of the existing monuments.

To create the existing centerline geometry we will use the *Geometry Builder* tool. *Geometry Builder* allows you to quickly and easily define geometric data in a tabular format.

 **Geometry Builder**

 Quickly Define or Edit Geometry

 Surveyor Friendly Tabular Input

 Edit Existing Geometry and Graphics

 Archive Geometry to XML Files

 Compute Closure

 Generate Reports

Geometry Builder Tool - Existing Centerline.xml

Geom_Baseline

Existing Centerline R/W HWY 72

X: 1992801.754' Y: 1769342.576' Begin Point

Bearing Deg Min Sec US Survey Feet

Bearing	Distance	Type	Hand	Arc	Arc	Radius	Length
N82°57'39"E	790.660'	Line		Radius	Length	0.000'	0.000'
S80°39'35"E	1129.122'	Arc	RT	Radius	Length	2002.000'	1144.650'
S64°16'48"E	2089.240'	Line		Radius	Length	0.000'	0.000'
S66°44'37"E	642.692'	Arc	LT	Radius	Length	7476.520'	642.890'

Place Tangent Complex Civil Element Un-Ruled

Begin Point No Line Perimeter=[4667.440'] Area=[1150450.6372(26.411a)] Closure=[N74°04'54"W 4545.897']

Geometry Builder is typically used for creating existing geometry from record plans and creating existing and proposed parcels. Data is entered in a surveyor friendly tabular format which allows the user to quickly define and edit geometry. Once the geometry has been entered into the table it can be saved to an **.xml** file and recalled at anytime to make changes. The tool also has the ability to compute closure and generate reports.

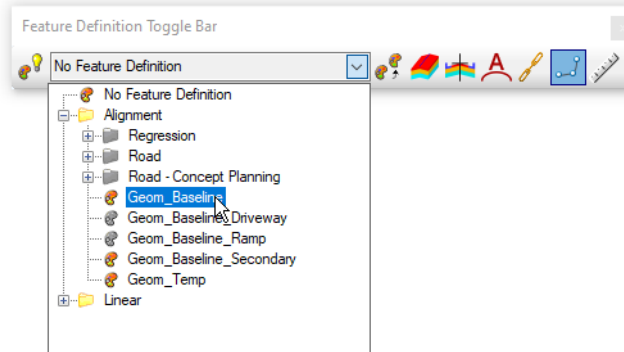
1. Create the right of way centerline for HWY 72 using the *Geometry Builder* tool.

a. Select *Geometry > Horizontal > Complex Geometry > Geometry Builder*

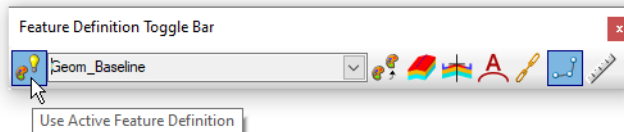
b. Select **Add New Geometry**

c. If not already open, open the **Feature Definition Toolbar** (*Geometry > General Tools > Standards*)

d. In the Feature Definition Toggle Bar, set the feature definition to *Alignment > Geom_Baseline*

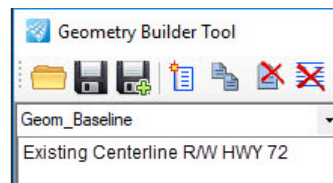


e. Toggle on **Use Active Feature Definition**



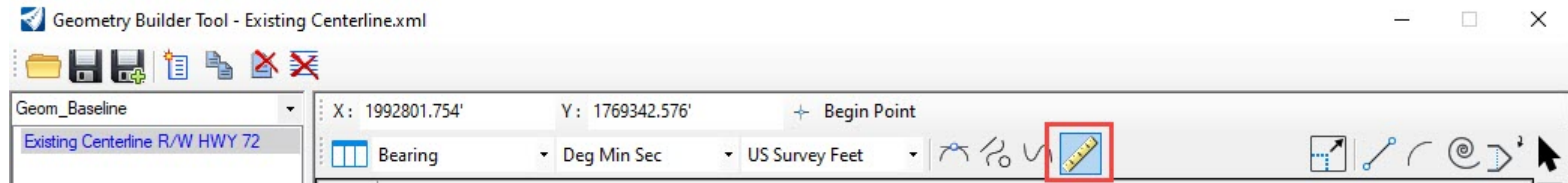
The name of the geometry will be created as *NewGeometry1*. We will need to change that name to something more realistic.

f. Left click on the *NewGeometry1* name and change it to **Existing Centerline R/W HWY 72**





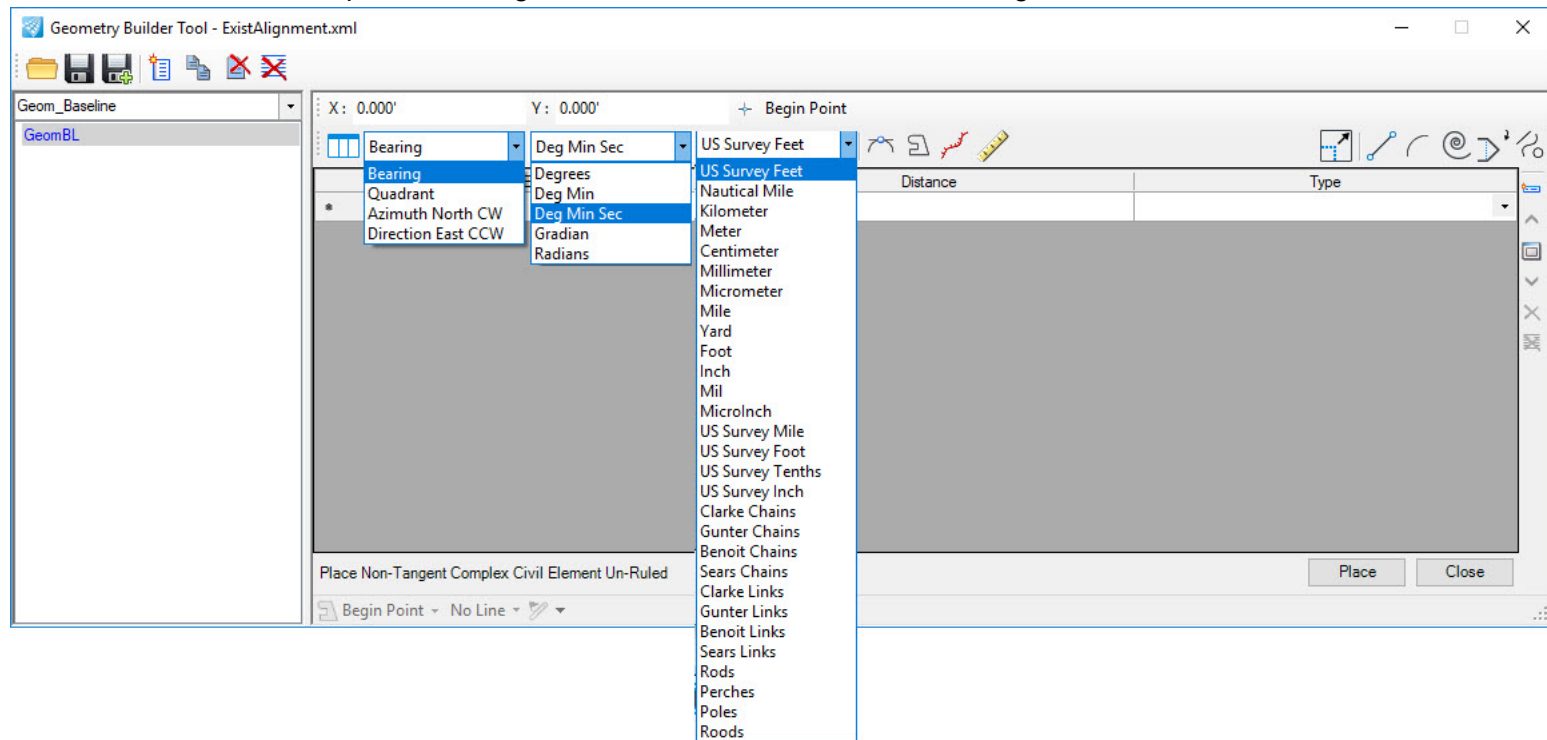
g. Toggle **ON** *Create ruled civil elements* (this will be used to create intelligent civil geometry elements).



h. If a warning message appears, click **OK**

2. Now that the *Feature Definition* and *Name* have been defined let's explore the dialog and set the formatting for the geometric data that will be input into the *Geometry Builder* dialog.

Note the three columns at the top of the dialog. These define the direction mode, angular format and units.



a. If not set, set the columns as follows:

- Set first column to **Bearing**
- Set the second column to **Deg Min Sec**
- Set the third column to **US Survey Feet**

Notice, the **X** and **Y** fields at the top of the dialog. These can be used to define the starting coordinates of the geometry. Geometry entered in the dialog will begin at the **X** and **Y** coordinates. You can use the **Begin Point** command to populate the **X** and **Y** coordinates by graphically picking a point in the design file. Once the geometry has been entered into the dialog it can be placed into the design file at the defined **X** and **Y** coordinates using the **Place** command at the bottom of the dialog.

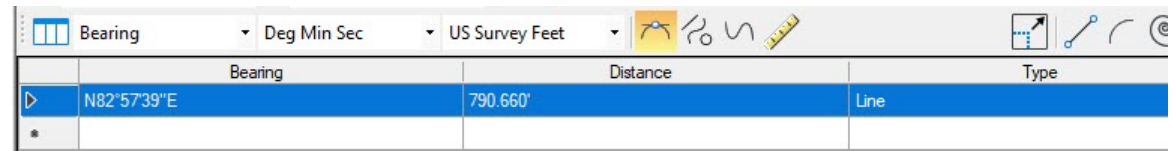
3. Create the first tangent line.

a. **Left Click** on the first row.

b. In the **Type** column choose **Line**

c. In the **Bearing** column enter: **N 82 57 39 E**

d. In the **Distance** column enter: **790.66 [241]**



	Bearing	Distance	Type
▶	N82°57'39"E	790.660'	Line
*			

4. Create the first horizontal curve



a. Click the **Force Tangent Restriction** icon (this will force the curve to be placed tangent to the previous element). If a warning message appears, click **YES**.

- If you don't toggle this option **ON** the curve would have to be defined using the chord bearing.

b. **Left Click** in the second row. **TIP:** **Left click**, **Tab** or **Enter** can be used to create a new row.

c. Set the **Type** column to **Arc**

d. Toggle the **Hand** column to **RT** (This sets the direction of the curve clockwise).

e. In the **Radius** column enter: **2002 [610]**

f. In the **Length** column enter: **1144.65** [348]

	Bearing	Distance	Type	Hand	Arc	Arc	Arc	Radius	Arc Length
	N82°57'39"E	790.660'	Line			Radius	Arc Length	0.000'	0.000'
▶	S80°39'35"E	1129.122'	Arc	RT	ARC	Radius	Arc Length	2002.000'	1144.650'
*									

5. Create the second tangent line

a. **Left Click** on the third row.

The bearing field will auto-populate based on the curve data of the first curve. The value will be locked since the **Force Tangent Restriction** lock is still toggled ON.

	Bearing	Distance	Type	Hand	Arc	Arc	Arc	Radius	Arc Length
	N82°57'39"E	790.660'	Line			Radius	Arc Length	0.000'	0.000'
	S80°39'35"E	1129.122'	Arc	RT	ARC	Radius	Arc Length	2002.000'	1144.650'
▶	S64°16'48"E	2089.240'	Line			Radius	Arc Length	0.000'	0.000'
*									

b. In the **Type** column choose **Line**

c. In the **Distance** column enter: **2089.24** [636]

6. Create the second horizontal curve (this will be the last piece of geometry).

a. **Left Click** in the fourth row.

b. Set the **Type** column to **Arc**

c. Toggle the **Hand** column to **LT** (This sets the direction of the curve counterclockwise).

d. In the **Radius** column enter: **7476.52** [2278]

e. In the **Length** column enter: **642.89** [196]

	Bearing	Distance	Type	Hand	Arc	Arc	Arc	Radius	Arc Length
	N82°57'39"E	790.660'	Line			Radius	Arc Length	0.000'	0.000'
	S80°39'35"E	1129.122'	Arc	RT	ARC	Radius	Arc Length	2002.000'	1144.650'
	S64°16'48"E	2089.240'	Line			Radius	Arc Length	0.000'	0.000'
▶	S66°44'37"E	642.692'	Arc	LT	ARC	Radius	Arc Length	7476.520'	642.890'
*									

7. Save the geometry data.



a. Select **Save File**

b. Browse to the training folder and save the file as **Existing Centerline.xml**

The geometry data in the table will be saved to the **.xml** file and can be recalled at a later time if changes need to be made.

8. Place the geometry into the design file.



- Select **Begin Point**, the geometry will be attached to your cursor.
- Place the geometry to the north of the field survey (once placed the graphics are just temporary until you select the **Place** command).
- Review the geometry and make sure the distances and bearings are correct based on the entries you made in the table.
- Select **Place**. The centerline geometry will now be placed as civil geometry elements into the design file.
- Close the **Geometry Builder** tool.
- When prompted to **Save changes to file** select **Yes**.



9. Define the stationing for the existing centerline.

- Select **Geometry > Horizontal > Modify > Start Station**
- Locate Element**: Select the centerline.
- Start Distance**: **0**
- Press **<ENTER>** to lock the value.
- Start Station**: **500+00 [15+240]**
- Left click to accept.

10. Annotate the centerline.



- Select **Drawing Production > Annotations > Element Annotation > Annotate Element**
- Locate Elements - Reset To Complete**: Select the existing centerline.
- Right click to complete.

11. Change the Annotation Scale to **1\"=50' [1:500]**

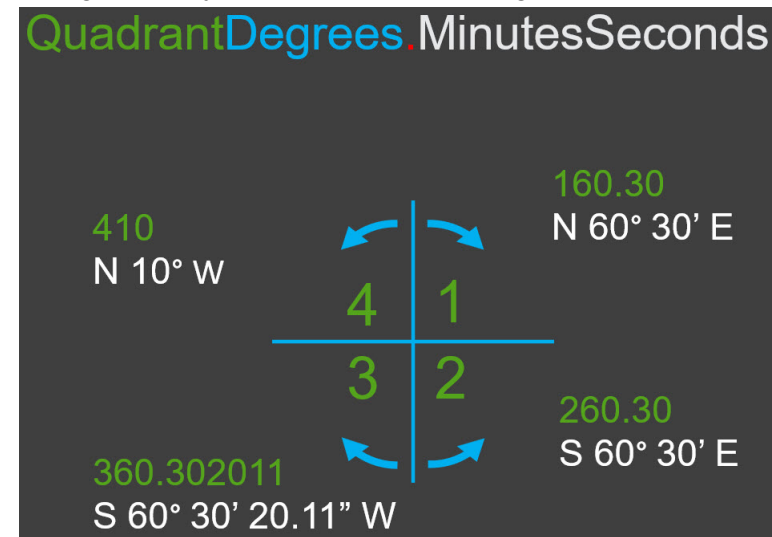
a. Select *Drawing Production > Drawing Scales > 1"=50' [1:500]*

- The centerline annotation and curve data text will re-resize to the new scale.
- The annotation is defined by the *Annotation Group* that is setup within the *Feature Definition*.
- If you need to remove the Annotation, select *Drawing Production > Annotations > Element Annotation > Remove Element Annotations*

Geometry Builder Notes

The angular separator can be input as a **Space**, **^ ' "** or **Decimal**. Quadrant angular entry is as shown in the image below.

Input Separator	Angle Format	
	Degrees	Deg Min Sec
Space	North 60 30 East	
	N 60 30 E	
	n60 30e	
^ ' "	North 60^30' East	
	N 60^ 30' East	
Decimal	N 60.30 E	North 60.30 East
	interprets to N 60° 18' East	N 60.30 E
		N60.30e



Simple single evaluations can be done using typical mathematical operators (+, -, x, /)

Simple single evaluations

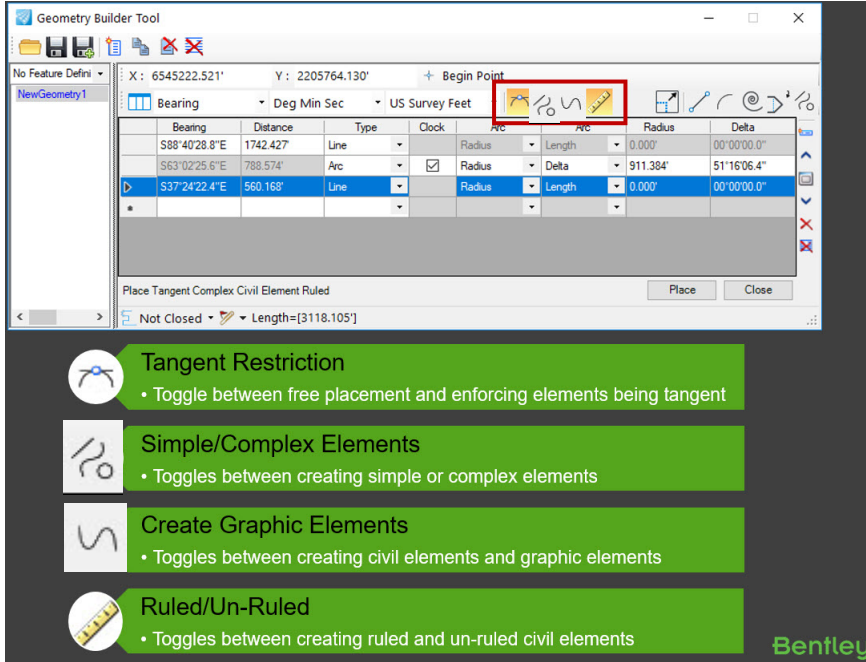
Bearing, Angle and Distance Fields

+ **-** **x** **/**

Positive angle is counterclockwise

Geometry Builder Notes

Locks can be turned on or off for when more complex geometry operations are needed. Interactive and Graphical Edits are also available.



Tangent Restriction

- Toggle between free placement and enforcing elements being tangent

Simple/Complex Elements

- Toggles between creating simple or complex elements

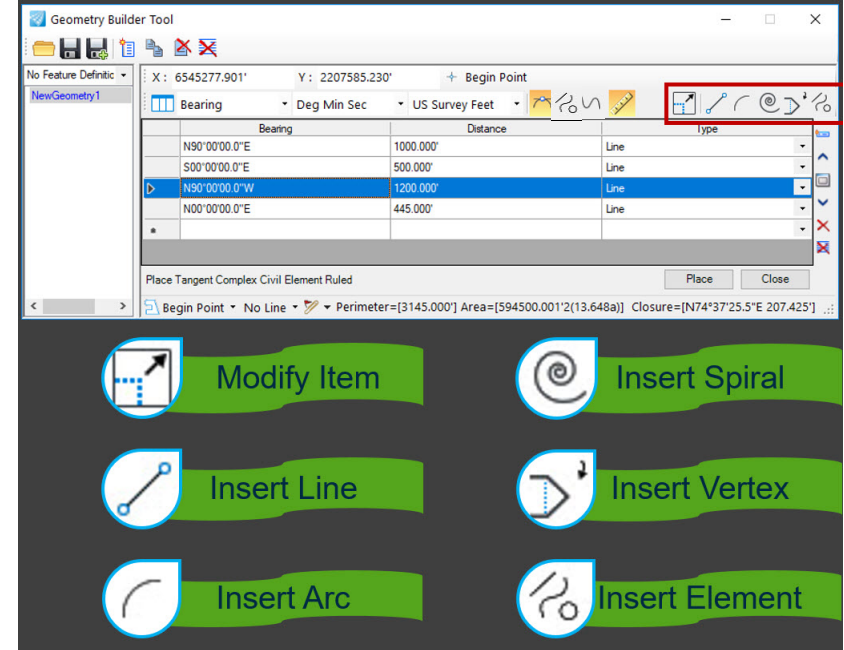
Create Graphic Elements

- Toggles between creating civil elements and graphic elements

Ruled/Un-Ruled

- Toggles between creating ruled and un-ruled civil elements

Bentley



Modify Item

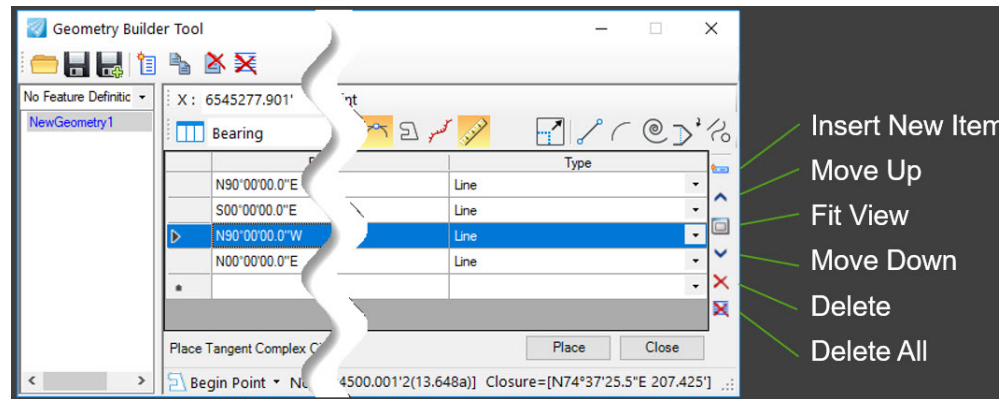
Insert Spiral

Insert Line

Insert Vertex

Insert Arc

Insert Element



Insert New Item

Move Up

Fit View

Move Down

Delete

Delete All

Move and Rotate Elements

The next thing we want to do is move the centerline to the location of the existing monument and then rotate it to match up with the field survey data. We will use the *Transform Elements* command to do this.

1. Move the geometry to the location of the existing monument. Change *Workflow* > **Survey**

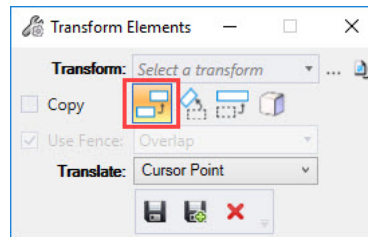


- a. Select *Edit* > *Edit Linear* > *Transform Tools* > **Transform Elements**

- b. If a warning message appears, click **YES**.



- c. Select the **Move** icon on the *Transform Elements* toolbox. Be sure all other buttons are toggled off.

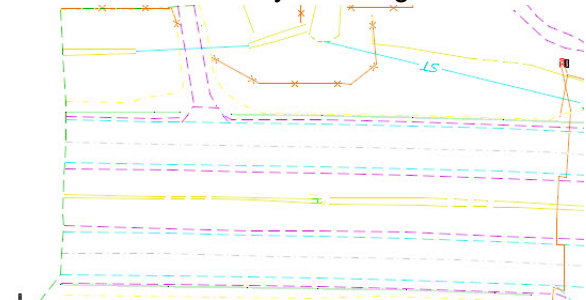
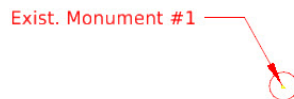


- d. Set the *Translate* option to **Cursor Point**.



- e. **Key point Snap** to the beginning point of the existing centerline and left click to accept. The centerline will attach to your cursor.

- f. Move the centerline to the existing right of way monument located to the west of where the field survey data begins.



- g. Select **Origin Snap** to snap to the origin point of the existing right of way monument to place the centerline.

Note: If you know the coordinates of the existing right of way monument then you can input them into the **Geometry Builder** tool as the *Begin Point*. In this example, we choose not to do that so we can show how to move and rotate elements using the *Transform* tool.

There is another existing monument that was found in the field which relates to the PT of the existing centerline. You will now learn how to rotate the centerline to line up with the existing monument.

2. Rotate the centerline.



a. Continuing in the *Transform Elements* toolbox, toggle **OFF** the move element button and toggle **ON** the Rotate button.

b. Set the *Rotate* option to **Angle** and click on the button to the right to activate *Angle By Four Points* mode. We will define the rotation angle by picking points in the design file.

c. Follow the prompts at the lower left corner of the screen:

- *Select from point one:* **Key Point Snap** to the beginning point of the centerline or the first existing right of way monument
- *Select from point two:* **Key Point Snap** to the end point of the centerline
- *Select to point one:* **Key Point Snap** to the beginning point of the centerline or the first existing right of way monument
- *Select to point two:* **Origin Point Snap** to the origin point of the second existing monument

The rotation angle will now be calculated and displayed in the *Angle* input field.

d. Set the *About* option to **Fixed Point**

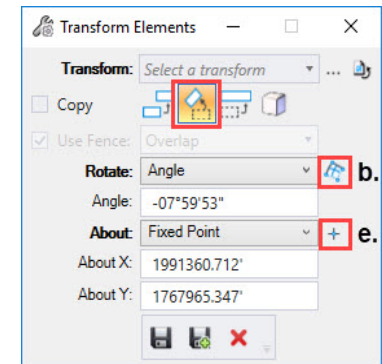
e. Select the *Select Point* button to scale or rotate about button next to **Fixed Point**.



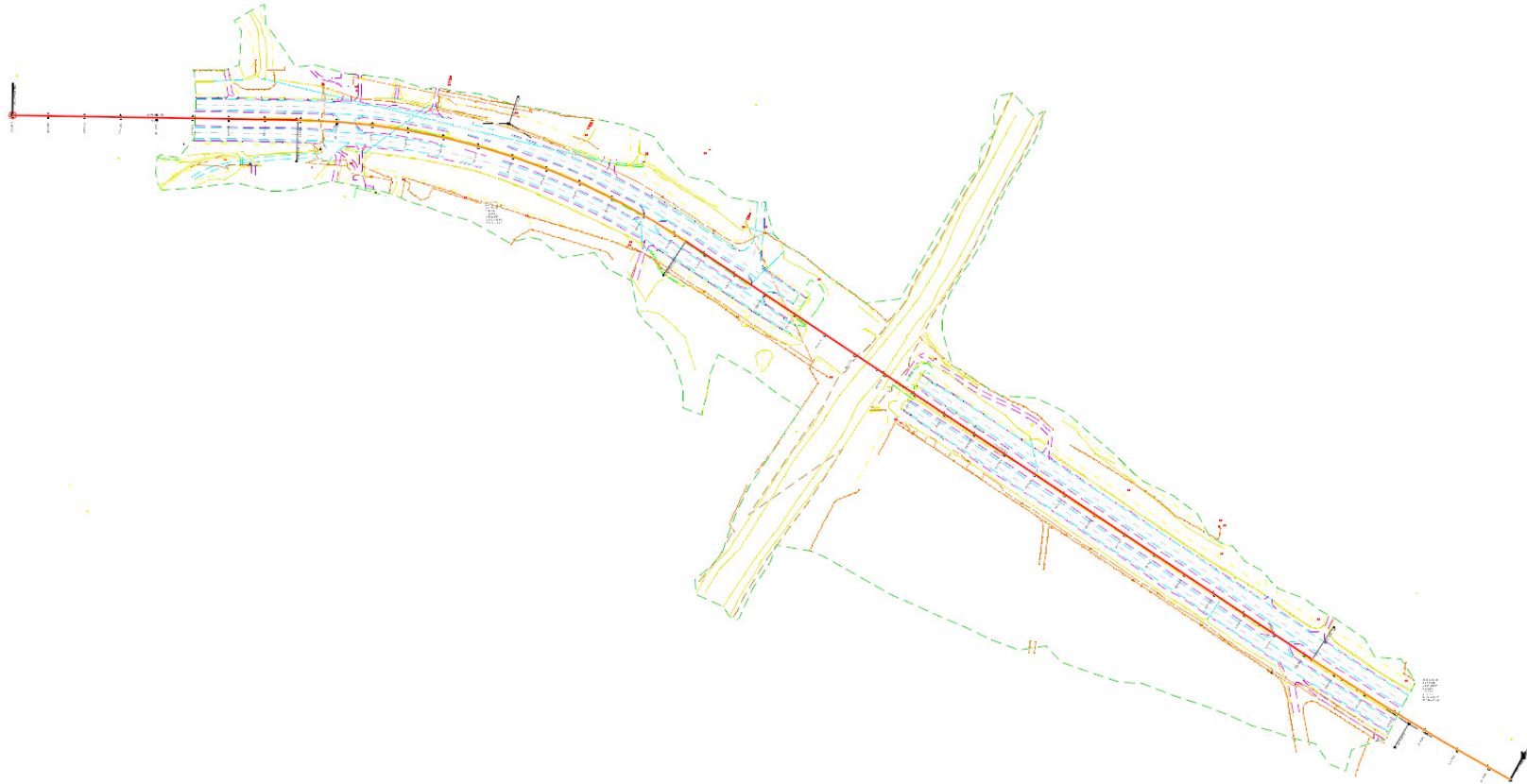
f. **Origin Point Snap** to the origin point of the first existing monument (this will populate the X and Y coordinates to rotate about).

g. *Identify Element:* Select the centerline.

h. Left click to accept.

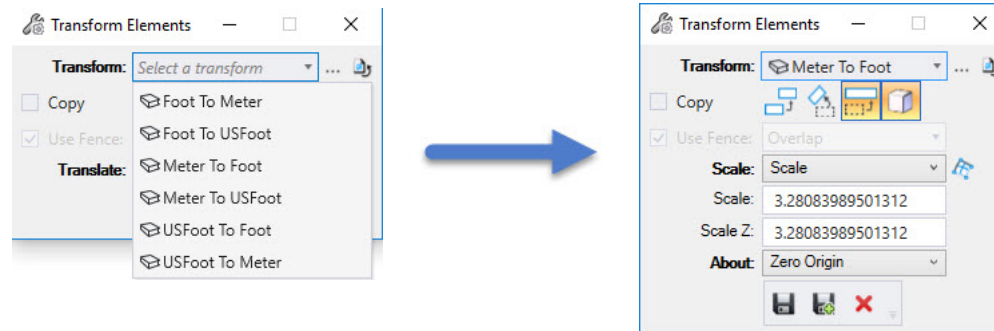


The completed centerline should look like the image below.



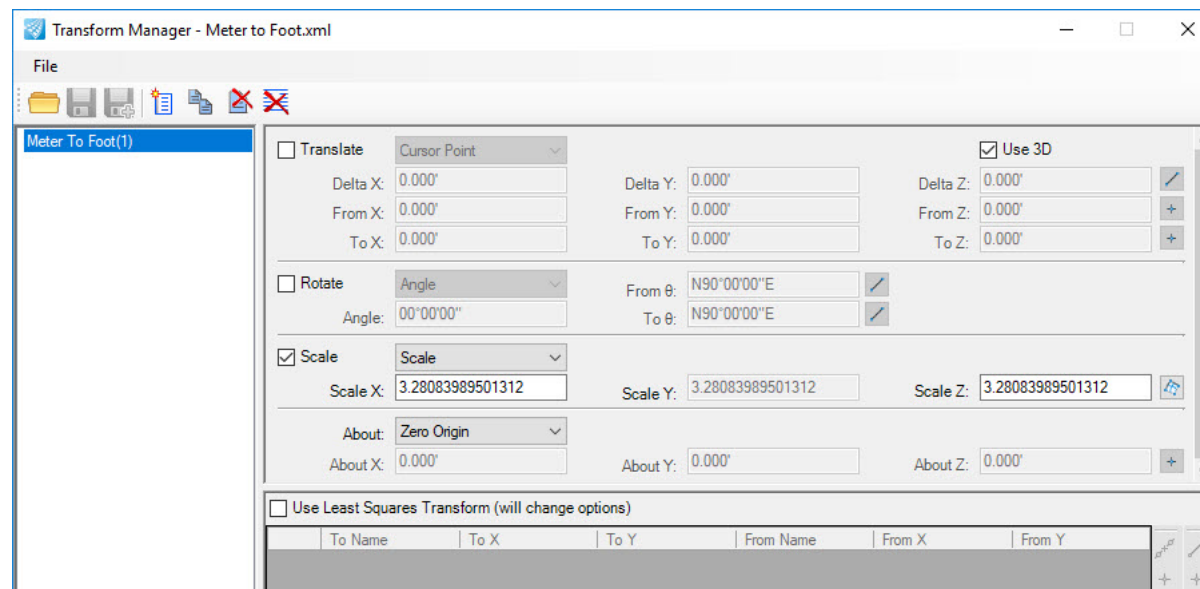
Transform Elements Notes

Common transform settings such as *Foot to Meter*, *Foot to USFoot*, *Meter to Foot*, *Meter to USFoot*, etc. are already setup and delivered with the software. When chosen, the appropriate scale factors will be populated in the toolbox. The tool uses the least squares method of transformation.



The buttons at the bottom of the tool allow you to save transformation settings to an external .xml file so that they can be recalled for later use. The settings can also be duplicated and deleted.

To browse saved transform settings simply select the *Browse Transforms* ... button and the *Transform Manager* will appear displaying the settings of the currently selected transform.



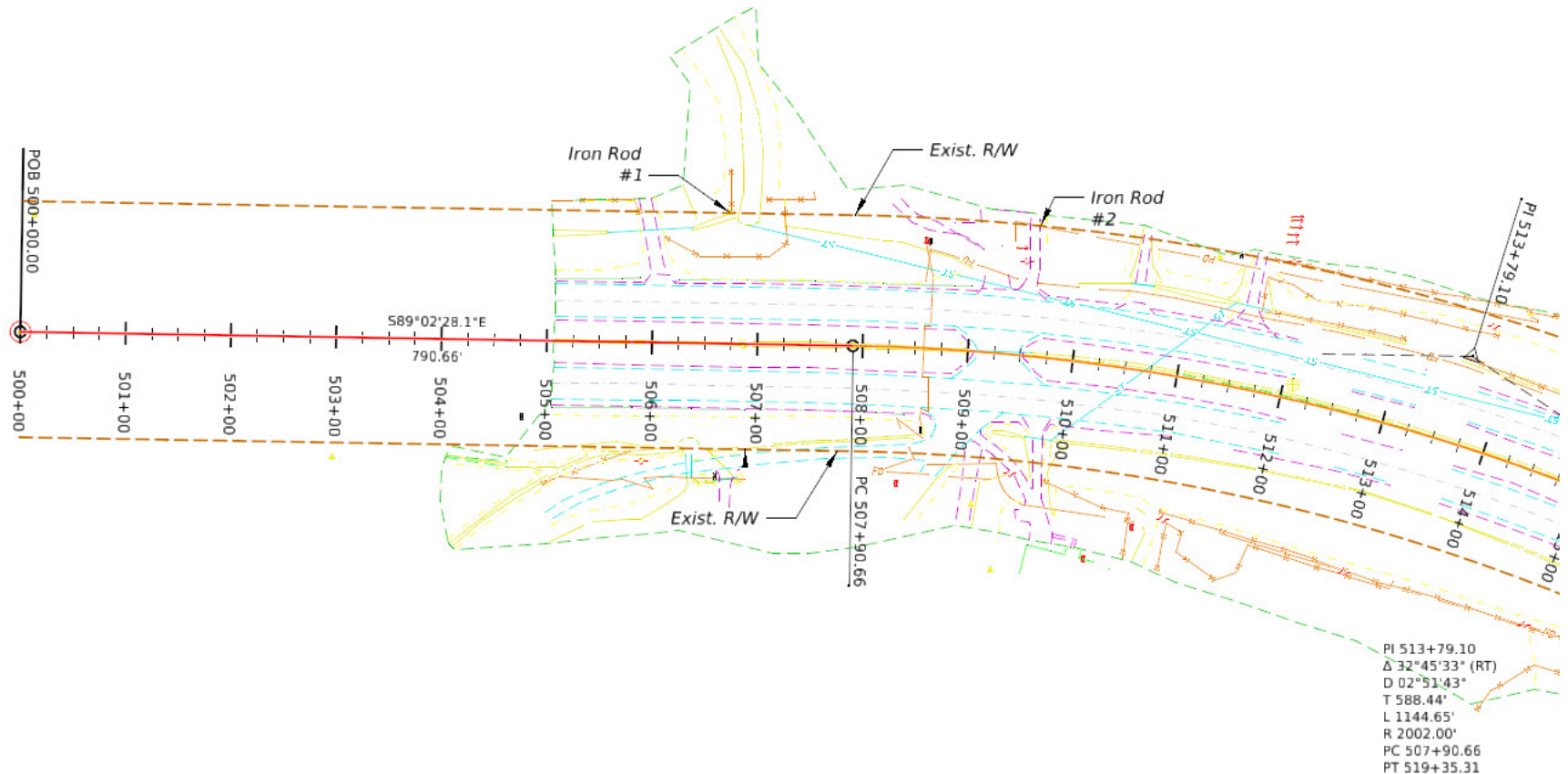
Exercise 2: Create Existing Right of Way Lines

Description

In this exercise you will learn how to create the existing right of way lines along the existing centerline.

Skills Taught

- Create Existing Right of Way Lines



Create the Existing Right of Way Line on the North Side of the Centerline

In this section, you will learn how to create the existing right of way line on the north side of the centerline. Iron Rods have been found along the north side of the centerline. We will use these as a guide along with record plan offsets to create the existing right of way line. The existing right of way for this highway is defined as a standard highway easement.

1. Open the existing right of way file named **Geom-RightOfWay.dgn** *[Metric-Geom-RightOfWay.dgn]*.



- a. Select **Open**
- b. Browse to *C:\Bentley Training\Right of Way Fundamentals* or other folder where you unzipped the dataset files and select the file **Geom-RightOfWay.dgn** *[Metric-Geom-RightOfWay.dgn]*.

2. Using the **References** tool, attach the **Geom-HWY 72.dgn** *[Metric-Geom-RightOfWay.dgn]*.



- a. Select *Home > Primary > Attach Tools > References*
- b. Select *Attach Reference*
- c. Select **Geom-HWY 72.dgn** (if you did not complete exercise 1 successfully, select **Geom-HWY 72 (Exercise 01 Complete).dgn** *[Metric-Geom-HWY 72 (Exercise 01 Complete).dgn]*).
- d. Click **Open**, the *Reference Attachment Properties* dialog will appear.
- e. Be sure the *Orientation* is set to **Concident-World**.
- f. Click **OK** to attach the file.
- g. Close the *References* dialog.

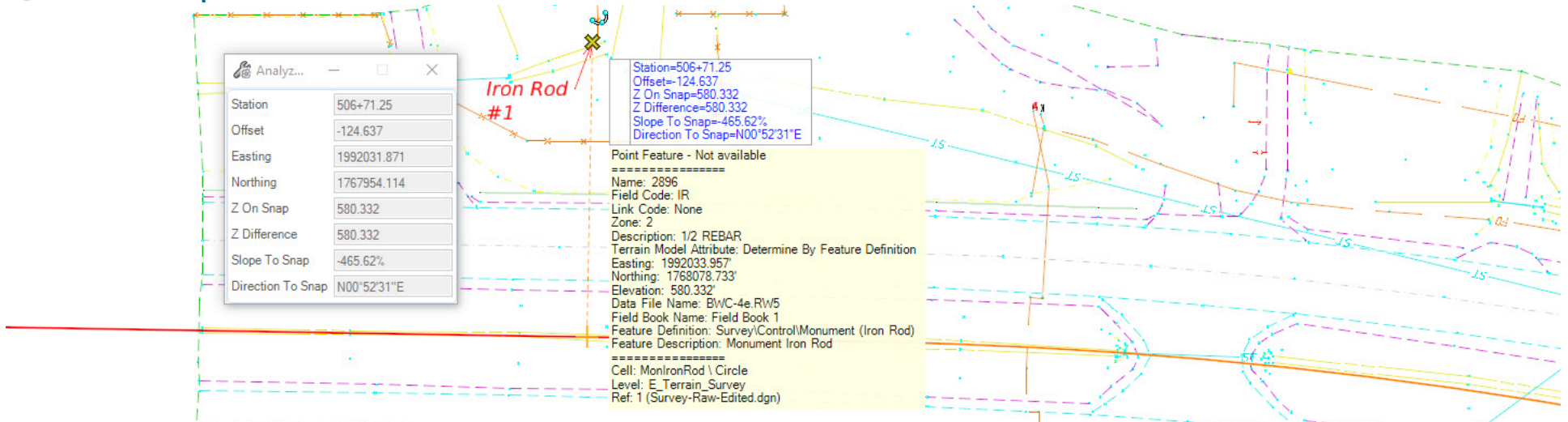
3. Locate and review the station and offset of the first Iron Rod.

a. Select *Home > Model Analysis and Reporting > Civil Analysis > Analyze Point*

b. *Select Element to Analyze Point*: Select the centerline

c. Move your cursor along the centerline and notice the **Station, Offset and Direction** are shown in the heads-up display.

d. **Snap** to Iron Rod #1



4. Note the offset value is **124.637'** [37.989 m], the record plans state that the offset should be **124.00'** [38 m] along this section of the project. For the purposes of this training exercise, we will use **124.00'** [38 m]. Keep in mind a licensed surveyor will determine the best method for establishing the right of way offsets.

5. Use the *Analyze Point* tool again to review the other Iron Rod station and offsets along the north side of the centerline (the Iron Rods are labeled Iron Rod #1, Iron Rod #2, Iron Rod #3, etc.)

6. Create the first leg of the right of way line at **124' [38 m]** to the left of the existing centerline.

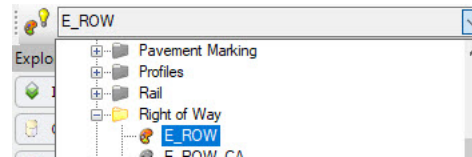


a. If not open, activate the *Feature Definition Toolbar*, select *Geometry > General Tools > Feature Definition Toolbar*.

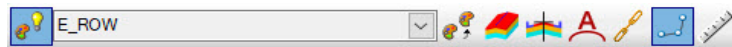
b. Select the drop down arrow to navigate the *Feature Definition* list.



c. Set the *Feature Definition* to *Linear > Right of Way > E_ROW*



d. Select *Use Active Feature Definition*.



- By utilizing the *Use Active Feature Definition* toggle it will not be necessary to define a feature definition within each new tool you launch. Each tool will automatically use the *Active Feature Definition* that is set in the *Feature Definition Toolbar*.
- Also be sure the **Persist Snaps Lock** is enabled  on the *Feature Definition Toolbar*.
 -  Enabled - Snaps are Persisted as Rules.
 -  Disabled - Snaps are not Persisted as Rules.



e. Select *Geometry > Horizontal > Offsets and Tapers > Single Offset Partial*

f. Uncheck any of the check boxes if checked on.

g. Following the heads-up prompts and left click to move to the next prompt:

- *Locate Element <Alt> to Pick element in complex: Select the centerline*
- *Offset: -124 [38], press <Enter> to lock the value*
- *Start Parameters: Press <ALT> to lock to the Start*
- *End Parameters: Move your cursor to the east and snap to Iron Rod #2 (Station 509+57.15 [15+531.74])*
- *Mirror: No*

7. Create the second leg of the right of way line at a variable offset beginning at the Iron Rod #2.



a. Select **Geometry > Horizontal > Offsets and Tapers > Variable Offset Taper**

b. Uncheck any of the check boxes if checked on.

c. Following the heads-up prompts and left click to move to the next prompt:

- **Locate Element <Alt> to Pick element in complex: Select the centerline**
- **Offset: -124 [38], press <Enter> to lock the value**
- **Start Distance: Snap to the end point of the first right of way line**
- **End Offset: Snap to Iron Rod #3**
- **Mirror: No**

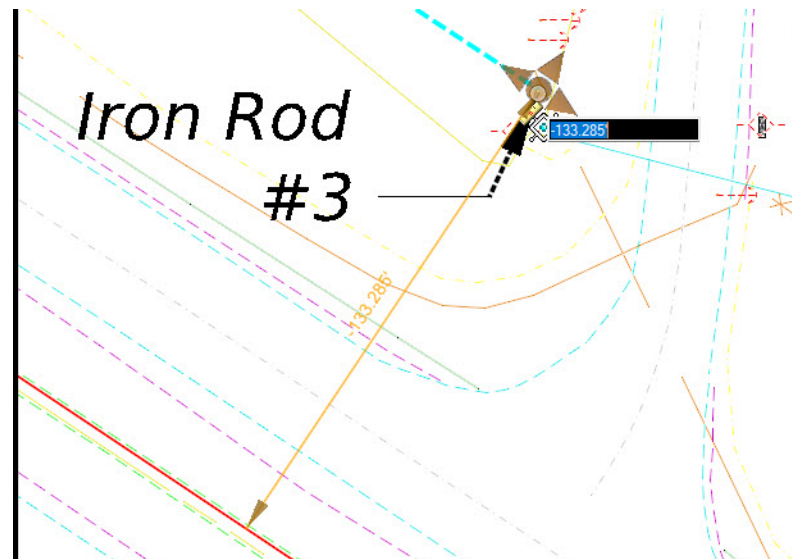
8. Note the ending offset value will be approximately **133.297' [40.629]**. The record plans state the offset should be **133.00' [41]**, you will now learn how to change the offset.



a. Select the right of way line you just created (the dynamic text will appear displaying the station, offset and element manipulators).

b. Select the offset text **-133.297' [40.629]**

c. Key-in a value of **-133 [41]**



9. Continuing with the *Variable Offset Taper* tool, create the fourth leg of the existing right of way beginning at **Iron Rod #3** and ending at **Iron Rod #4**.



- Select *Geometry > Horizontal > Offsets and Tapers > Variable Offset Taper*
- Uncheck any of the check boxes if checked on.
- Following the heads-up prompts and left click to move to the next prompt:
 - Locate Element <Alt> to Pick element in complex:* **Select the centerline**
 - Offset: -133 [41],* press <Enter> to lock the value
 - Start Distance:* **Snap to the end point of the previously created right of way line**
 - End Offset:* **Snap to Iron Rod #4**
 - Mirror:* **No**

10. The ending offset value will be about **124.407' [37.919]**. The record plans state the offset should be **124.00' [38]**. To change the offset this time, we will use the *Properties* tool.



- Select the right of way line you just created.
- Hover your cursor over the right of way line until the context menu appears



- Select *Properties*.

Length	1589.789'
Length Along	1589.765'
> Start Point	1993394.430',1767665.16
> End Point	1994711.996',1766775.53
Length	1589.789'

Feature Name	E_ROW2
Feature Definition	E_ROW

Method	Variable Offset
Start Distance	520+45.34
Start Offset	-133.000'
End Distance	536+35.11
Length	1589.765'
End Offset	-124.407'
Ratio	1:185.01
Spiralized	No
Type	Base Geometry

> Start Point	☐ 1993394.430,1767665.16
> End Point	☐ 1994711.996,1766775.53

Note that the *Properties* give you access to all of the rules and data associated with the selected element. Any property can be changed by simply keying in a new value or changing an option.

- d. In the *End Offset* field key-in **-124 [38]** to change the end offset value.

Length	1589.791'
Length Along	1589.765'
> Start Point	1993394.430', 1767665.16
> End Point	1994711.770', 1766775.19
Length	1589.791'

Feature Name	E_ROW2
Feature Definition	E_ROW

Method	Variable Offset
Start Distance	520+45.34
Start Offset	-133.000'
End Distance	536+35.11
Length	1589.765'
End Offset	-124.000'
Ratio	1:176.64
Spiralized	No
Type	Base Geometry

> Start Point	☐ 1993394.430, 1767665.16
> End Point	☐ 1994711.770, 1766775.19

11. Locate **Iron Rod #5**, use the *Single Offset Partial* tool create a right of way line beginning at **Iron Rod #5** and ending at the end of the centerline, use an offset value of **-104' [32]**.



- Select *Geometry > Horizontal > Offsets and Tapers > Single Offset Partial*
- Uncheck any of the check boxes if checked on.
- Following the heads-up prompts and left click to move to the next prompt:
 - *Locate Element <Alt> to Pick element in complex:* **Select the centerline**
 - *Offset:* **-104 [32]**, press <Enter> to lock the value
 - *Start Distance:* **Snap to Iron Rod #5**
 - *End Distance:* **Press <ALT> to lock to the end**
 - *End Offset:* **-104**
 - *Mirror:* **No**

12. Create final right of way line between **Iron Rod #4** and **Iron Rod #5**.

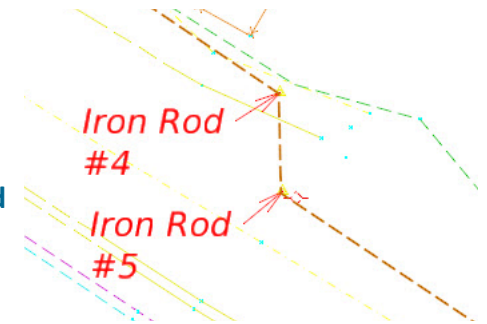
a. Select **Geometry > Horizontal > Lines > Line Between Points**

b. Follow the head-up prompts and left click to accept to move to the next prompt:

- **Enter Start Point:** **Snap** to the end point of the right of way line that ends near **Iron Rod #4**.
- **Enter End Point:** **Snap** to the beginning point of the right of way line that begins near **Iron Rod #5**.

The existing right of way lines are now complete for the north side of HWY 72.

Note that this portion of the right of way line may need to be adjusted later so that it follows the existing property line that will pass through this area. For now we will leave it as is.



13. The next thing we want to do is join all of the right of way elements together to form one continuous right of way line. We will do this by using the **Complex By Element** tool.

a. Zoom in near the first right of way line that was created.

b. Select **Geometry > Horizontal > Complex Geometry > Complex By Element**

c. Set the **Method** to **Automatic**

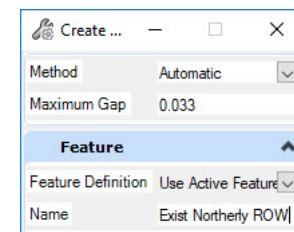
d. Set the **Maximum Gap** to **0.033**

e. If not already defined, set the **Feature Definition** to **E_ROW**

f. Set the **Name** to **Exist Northerly ROW**

g. Follow the heads-up prompts and left click to accept to move to the next prompt:

- **Locate First Element:** Select the first right of way line (select the line closer to the start point). Also, be sure the directional arrow is pointing eastward once selected.
- **Accept Complex:** Left click to accept.



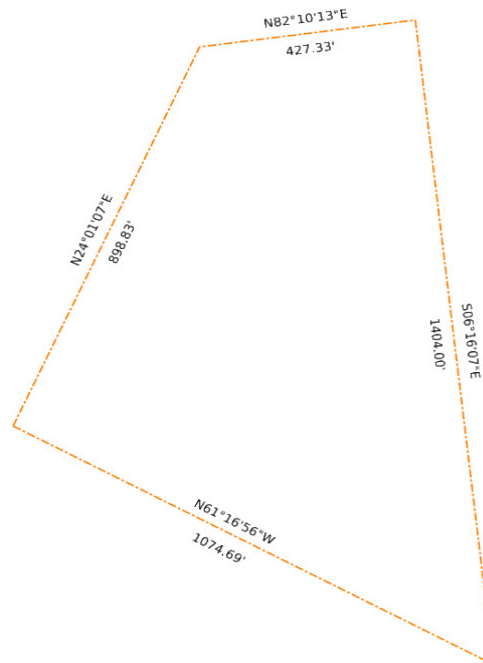
Exercise 3: Create Existing Parcel

Description

In this exercise, you will learn how to create an existing parcel from record property data, how to review and create closure reports, how to edit parcels and also how to create a parcel from CAD graphics.

Skills Taught

- Create an Existing Parcel from record property data using the Geometry Builder tool.
- Create and Review Closure Reports.
- Edit a Parcel with the Geometry Builder Edit tool.
- Create a Parcel from CAD Graphics using the Geometry Builder Edit tool.



Create Existing Parcel from Record Property Data

In this section, you are going to learn how to create an existing parcel from a record property data.

1. Open the existing property line file named **Geom-Property Lines.dgn** [*Metric-Geom-Property Lines.dgn*].



- a. Select **Open**

- b. Browse to *C:\Bentley Training\Right of Way Fundamentals* or other folder where you unzipped the dataset files and select the file **Geom-Property Lines.dgn** [*Metric-Geom-Property Lines.dgn*].

2. Create an existing parcel using the *Geometry Builder*.



- a. Select *Geometry > Horizontal > Complex Geometry > Geometry Builder*



- b. Select **Delete all items** to clear the previous created data from the *Geometry Builder* dialog.

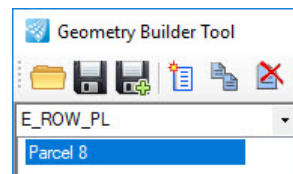


- c. Select **Add New Geometry**

- d. In the Feature Definition Toggle Bar, select the drop down arrow and set the *Feature Definition* to *Linear > Right of Way > E_ROW_PL*

The default name of the geometry will be created as *NewGeometry1* or *GeomBL*. We will need to change that name to **Parcel 8**.

- e. Left click on the name and change it to **Parcel 8**

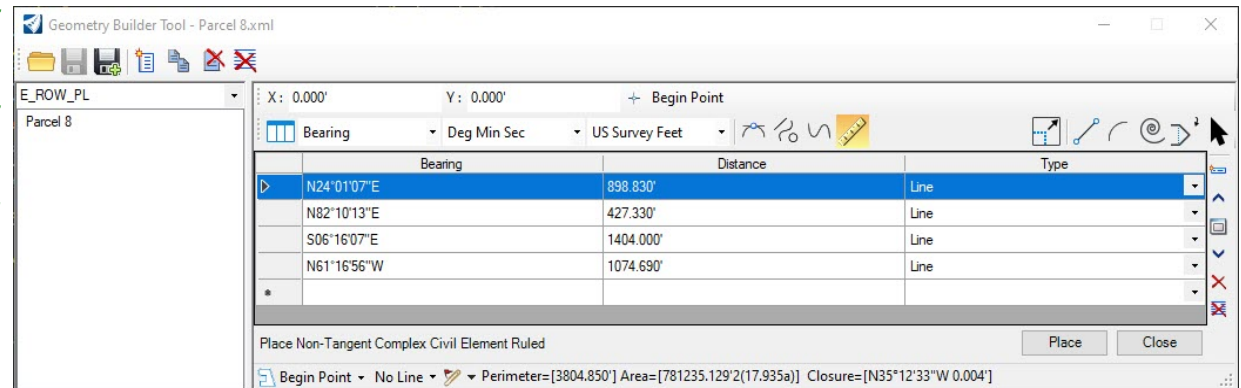


- f. Toggle **ON** *Create ruled civil elements* (this will be used to create intelligent civil geometry elements). If a warning message appears, click **OK**.

- g. Create the existing parcel using the property information from the legal description as shown below:

TIP: Degrees, Minutes and Seconds can be entered by simply using a space between values (i.e **N 90 00 00 E**).

- **Bearing: N 24° 01' 07" E Distance: 898.83' [273.963]**
- **Bearing: N 82° 10' 13" E Distance: 427.33' [130.250]**
- **Bearing: S 06° 16' 07" E Distance: 1404.00' [427.939]**
- **Bearing: N 61° 16' 56" W Distance: 1074.69' [327.569]**



Note the perimeter, area and closure data is computed and displayed at the bottom portion of the dialog.



- h. Select **Begin Point** (the parcel will be attached to your cursor).
- i. Left click in View 1 at a random location north of the survey data. Temporary graphics will be placed in the design file.



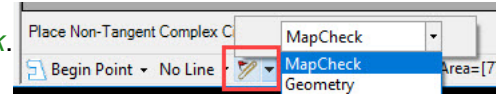
- j. Select **Place**. The parcel graphics will now be created in the design file.
- k. Select **Save File As** to save the parcel geometric data to an **.xml** file named **Parcel 8**.

Notes about this parcel: This parcel extends beyond the existing right of way to the centerline of right of way and a portion of it lies inside of the standard highway easement. The parcel owner still owns the area between the existing right of way and the centerline and the department of transportation has an easement for the roadway. Later in the course we will define a proposed easement whereby the department of transportation is going to take this area and an additional area as a proposed parcel taking.

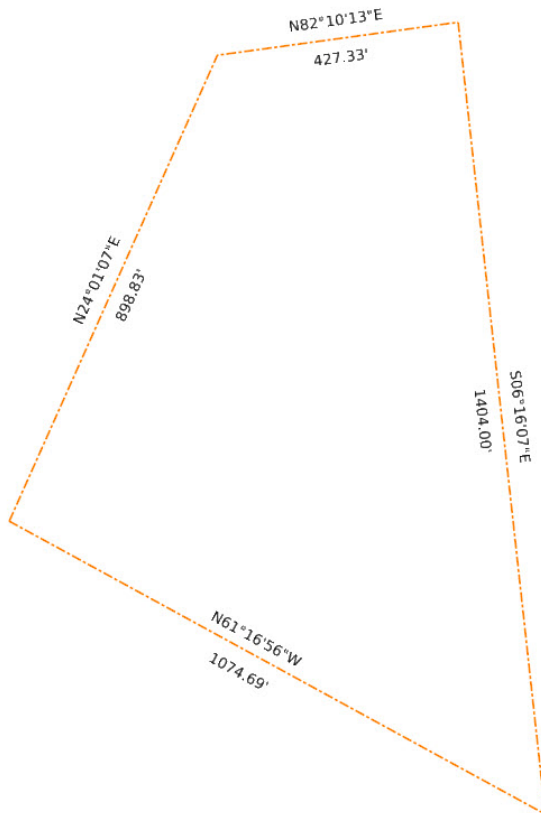
3. Review **Parcel 8** and create the *Map Check Report*.

a. Select the parcel. Notice that it is a closed shape civil rule based element displaying the distances, bearing and graphical manipulators. Simple edits can be made using the graphical manipulators and dynamic text but it is best practice to use the *Geometry Builder* tool to make changes. It's much easier to make changes inside of the **Geometry Builder** and also monitor the closure.

b. In the bottom center of the dialog, set the report option to *Map Check*.



c. Select the report button. The **Map Check Report** will appear.



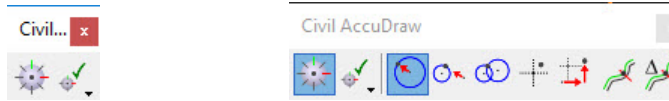
Map Check Report				
Report Created: Thursday, December 22, 2022 Time: 11:31:38 AM				
Project: Default				
Description:				
File Name: C:\Bentley Training\Right of Way Fundamentals\Geom-Property Lines.dgn				
Last Revised: 12/22/2022 11:30:43				
Input Grid Factor:				
Note: All units in this report are in feet unless specified otherwise.				
Alignment Name: Parcel 9				
Alignment Description:				
Type	Point Name/ Direction	Northing/ Length	Easting	Elevation
START	()	1768317.27	1994846.85	0.00
	N24°01'07"E	898.830		
HPI	()	1769138.27	1995212.70	0.00
	N82°10'13"E	427.330		
HPI	()	1769196.48	1995636.05	0.00
	S06°16'07"E	1404.000		
HPI	()	1767800.88	1995789.35	0.00
	N61°16'56"W	1074.690		
END	()	1768317.26	1994846.85	0.00
Northing Error:		-0.003 ft		
Easting Error:		0.002 ft		
Closing Direction:		N35°12'33"W		
Closing Distance:		0.004 ft		
Closed Area:		781235.129 sq ft	17.935 ac	
Perimeter:		3804.850 ft		
Precision:		942590 : 1		

The next thing we need to do is locate the point of beginning for this parcel and then move and rotate it to the proper location.

The legal description for this parcel says that the point of beginning is located along the centerline a distance of **2647.19'** [806.864] from existing monument #1. Now you will learn how to place the point of beginning using *Civil AccuDraw*.

4. Create the point of beginning a distance of **2647.19'** [806.864] from the existing monument #1.

- a. Select **Geometry > General Tools > Civil Toggles > Civil AccuDraw**
- b. Select the **Civil AccuDraw** button to activate it and turn it on (once activated the **Civil AccuDraw** toolbar will expand).



- c. From the **Civil AccuDraw** toolbar, select the **Delta Station-Offset** tool.

- d. Select **Geometry > Horizontal > Point > Point**

- e. Set the **Elevation Mode: None**

- f. Set the **Rotation Mode: None**

- g. Set the **Feature Definition** to **Point > Existing > Right of Way > E_Geom_PropertyCorner**

- h. Set the **Name** to **POB Parcel 8**

- i. In the **Civil AccuDraw** heads-up prompt attached to your cursor, press the letter **O** on your keyboard to define the origin element for the point (this will be the centerline geometry) and the origin point.

- j. Follow the heads-up prompts:

- **Select a reference element or Reset to keep currently selected one:** Select the centerline
- **Select a reference point or Reset to keep currently selected one:** Snap to and select the starting point of the centerline located at station **500+00** [15+240].
- **In the Delta Station field key-in: 2647.19** [806.864]
- Press **<TAB>** or **<ENTER>** to lock the offset value.
- In the **Offset** field key-in: **0**
- Press **<TAB>** or **<ENTER>** to lock the offset value.
- Left click to accept.
- Toggle **OFF Civil AccuDraw**.

Delta Station	2647.19'
Offset	0.00'
Enter Data Point	

- k. After the point has been created zoom in near station **526+50** to verify the point has been placed.

Now that the point of beginning has been placed you need to move the parcel to this location and rotate it into place. The legal description for this parcel defines the point of beginning to be at a point on the existing centerline.

5. Move the parcel.

a. Zoom in near the southwest corner of **Parcel 8**.

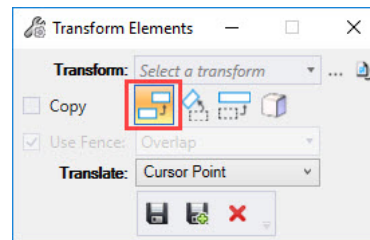


a. Select *Edit > Edit Linear > Transform Tools > Transform Elements*

b. If a warning message appears, click **YES**.



c. Select the **Move** icon on the *Transform Elements* toolbox. Make sure only the **Move** icon is activated as shown in the image below.



d. Set the *Translate* option to **Cursor Point**.



e. **Snap** to the southwest corner of **Parcel 8** and left click to accept. The parcel will attach to your cursor.

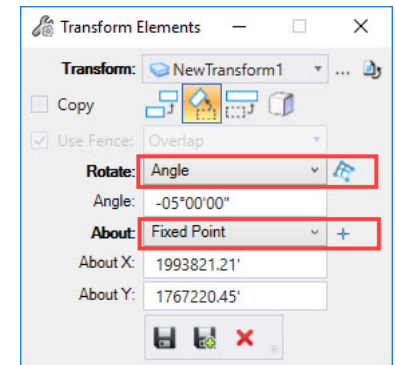


f. Select **Origin Snap** and snap to the origin point of the **POB Parcel 8** point you placed previously.

6. Rotate the parcel.



- Continuing in the *Transform Elements* toolbox, toggle **OFF** the *Move* element button and toggle **ON** the *Rotate* button.
- Set the *Rotate* option to **Angle** and click on the button to the right to activate *Angle By Four Points* mode. We will define the rotation angle by picking points in the design file.
- Follow the prompts at the lower left corner of the screen:
 - Select from point one:* **Key Point Snap** to the southwest corner of the parcel.
 - Select from point two:* **Key Point Snap** to the southeast corner of the parcel.
 - Select to point one:* **Key Point Snap** to the southwest corner of the parcel
 - Select to point two:* **Key Point Snap** to the PC of the last curve on the existing centerline.



The rotation angle will now be calculated and displayed in the *Angle* input field.

- Set the *About* option to **Fixed Point**.
- Select the *Select Point* button to scale or rotate about button next to **Fixed Point**.
- Origin Snap** to the origin point of the **POB Parcel 8** point (this will populate the About X and About Y coordinates to rotate about).
- Identify Element:* Select and snap to the southwest corner of the parcel. Be sure you are selecting the parcel.
- Accept Transform:* **Left click** to accept.



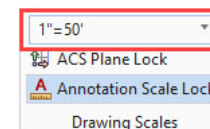
7. Annotate the parcel with bearings and distances.



- Select *Drawing Production > Annotations > Element Annotation > Annotate Element*
- Locate Elements - Reset To Complete:* Select the parcel. **Right click** to complete.

The annotation is defined by the *Annotation Group* that is setup within the *Feature Definition*. The text size is dependent on the Annotation Scale set in the design file.

- In the *Drawing Scales* panel, set the Annotation Scale to **1"=50' [1:500]**



Editing Parcels

Parcels can be edited by loading saved **.xml** files into the **Geometry Builder** tool and making changes in the dialog. There may be cases where **.xml** files do not exist for the parcels or there may be cases where you just have closed shaped elements drawn in the design file and you need to turn them into parcels.

If either of these scenarios apply then you need to use the **Geometry Builder Edit** tool. It is designed to read geometric elements drawn in the design file and load the distances and bearings into a table that is very similar to the **Geometry Builder** tool.

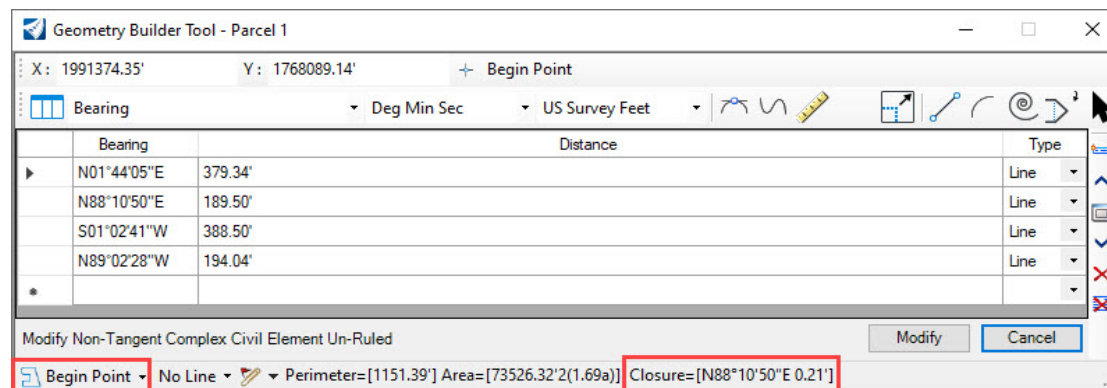
In this section you will learn how to use **Geometry Builder Edit** to edit a parcel.

1. Locate **Parcel 1** near the western part of the project.

This parcel was defined without saving an **.xml** file so the only way to edit it would be by changing the dynamic text values or by using **Geometry Builder Edit**. Closure errors are common with parcel creation so we will use the **Geometry Builder Edit** tool to make changes. Using this tool will allow you to closely monitor the closure of the parcel.

2. Review and Edit Parcel 1 using **Geometry Builder Edit**.
 - a. Select **Parcel 1**
 - b. Select **Geometry > Horizontal > Modify > Geometry Builder Edit**

The **Geometry Builder Edit** window will appear displaying the distances and bearings for this parcel.



Also, note that this parcel does not close. There is an **0.21' [0.065]** closure error in the second leg of the parcel along the bearing **N 88 10 50 E** (If the closure is not shown select the **Begin Point** option in the lower left corner of the dialog).



c. Select **Map Check** to review the *Map Check Report* to see the closure errors.

Map Check Report					
Report Created: Thursday, December 22, 2022 Time: 11:59:49 AM					
Project: Default					
Description:					
File Name: C:\Bentley Training\Right of Way Fundamentals\Geom-Property Lines.dgn					
Last Revised: 12/22/2022 11:44:00					
Input Grid Factor:					
Note: All units in this report are in feet unless specified otherwise.					
Alignment Name: Parcel 7					
Alignment Description:					
Type	Point Name/ Direction	Northing/ Length	Easting	Elevation	
START	()	1768089.14	1991374.35	0.00	
	N01°44'05"E	379.341			
HPI	()	1768468.30	1991385.83	0.00	
	N88°10'50"E	189.500			
HPI	()	1768474.32	1991575.23	0.00	
	S01°02'41"W	388.503			
HPI	()	1768085.88	1991568.15	0.00	
	N89°02'28"W	194.043			
END	()	1768089.13	1991374.14	0.00	
Northing Error:		-0.007 ft			
Easting Error:		-0.212 ft			
Closing Direction:		N88°10'50"E			
Closing Distance:		0.212 ft			
Closed Area:		73526.321 sq ft	1.688 ac		
Perimeter:		1151.387 ft			
Precision:		5418 : 1			

The distance along the second leg of the parcel was not entered correctly, it was entered as **189.50'** [57.759] therefore the closure error is **-0.21** [0.065]. The distance should be **189.71'** [57.824].

d. Close the report.

- e. In the *Geometry Builder Edit* window, select the second row and key-in **189.71** [57.824] in the *Distance* column.
- f. Be sure the closure option at the bottom of the dialog is set to **Begin Point** and **No Line**.

Closure should now read **0.00'**

Bearing	Distance	Type
N01°44'05"E	379.34'	Line
N88°10'50"E	189.71	Line
S01°02'41"W	388.50'	Line
N89°02'28"W	194.04'	Line

Modify Non-Tangent Complex Civil Element Un-Ruled

Begin Point No Line Perimeter=[1151.60] Area=[73605.83'2(1.69a)] Closure=[N88°10'50"E 0.00']

3. Save the parcel.



- a. Select the **Create Rule Civil Elements**, if a warning message appears click **OK**.
- b. Select **Modify**. If a warning message appears click **YES**.
- c. The parcel will now be updated as well as the annotation associated to this parcel.

Geometry Builder Closure Options

A *Map Check* or *Geometry* report can be created by selecting the report button.

The *Add Line* option can be used if you want to automatically close the parcel. *Add Line* will add a closure line forcing the parcel to close.

Place Non-Tangent Complex Civil Element Un-Ruled

Begin Point No Line MapCheck MapCheck Geometry Area=[77]

Closure Options:

- *Not Closed* - Will not compute a closure.
- *Begin Point* - Will close parcel at the defined begin point.
- *Fixed Point* - Will allow you to define closure end point using defined X and Y coordinates.

Not Closed
Begin Point
Fixed Point

Begin Point No Line

Create a Parcel from Graphics

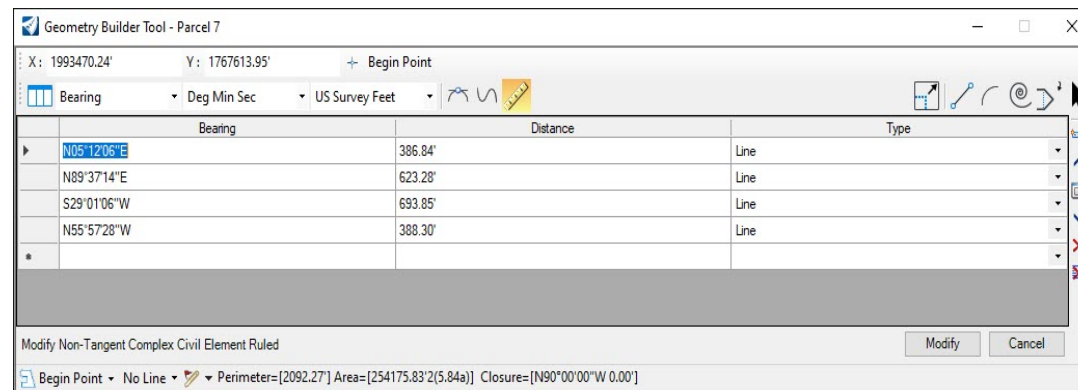
In this section you learn how to create a parcel from existing CAD graphics drawn in the design file.

1. Zoom in to the area where **Parcel 7** is located. **Parcel 7** was drawn using standard drawing commands, it was not drawn using civil geometry. It has not been defined as a parcel and does not have any rules or relationships. It's just a simple closed shape element at this point.
2. In the next series of steps you will learn how to define this closed shape element as a parcel.

a. Using the *Element Selection* tool, select **Parcel 7**

b. Select *Geometry > Horizontal > Modify > Geometry Builder Edit*

The *Geom Builder Edit* window will appear with the bearings and distances listed in the table.



Bearing	Distance	Type
N05°12'06"E	386.84'	Line
N89°37'14"E	623.28'	Line
S29°01'06"W	693.85'	Line
N55°57'28"W	388.30'	Line

Modify Non-Tangent Complex Civil Element Ruled

Begin Point No Line Perimeter=[2092.27'] Area=[254175.83'2(5.84a)] Closure=[N90°00'00"W 0.00']

c. Make sure the closure options at the lower left corner of the dialog are set to *Begin Point* and *No Line*.

d. Verify the closure is **0.00**.

e. Select *Create Civil Elements*.

f. Select *Create ruled civil elements*. This will turn the CAD graphics into ruled civil geometry and you can now define this as a parcel.

g. If a warning message appears, click **OK**.

h. Select **Modify**. The parcel will now be defined as a complex element named *NewGeometry1*.

3. Re-name the parcel to **Parcel 7**.

a. With the parcel still selected, hover your cursor over any line until the context menu appears.



b. Select *Properties*. The *Properties* panel will appear.

> Start Point	1993470.24',1767613.95'
> End Point	1993470.24',1767613.95'
Length	2092.27'
Feature Name	NewGeometry1
Feature Definition	No Feature Definition

c. Set the *Name* to **Parcel 7**

d. Set the *Feature Definition* to *Linear > Right of Way > E_ROW_PL*

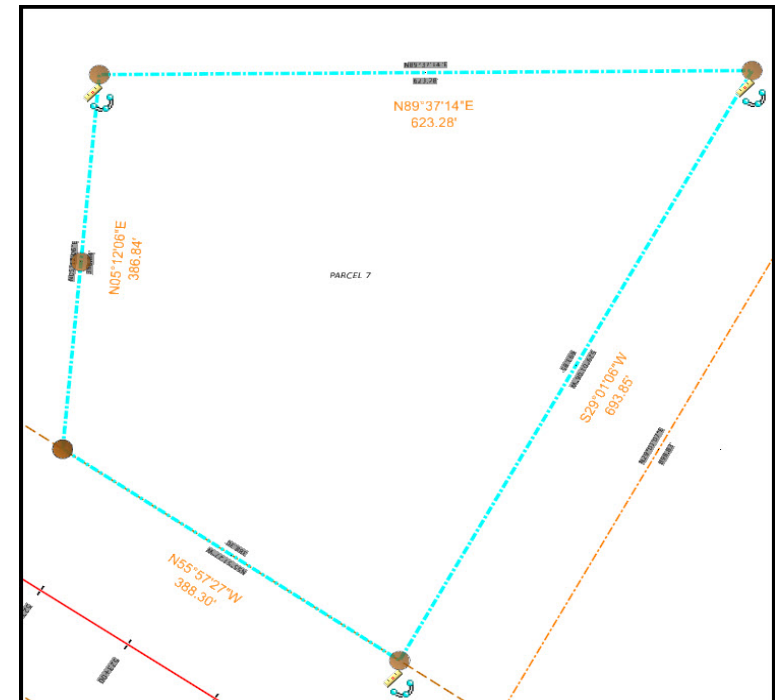
> Start Point	1993470.24',1767613.95'
> End Point	1993470.24',1767613.95'
Length	2092.27'
Feature Name	Parcel 7
Feature Definition	E_ROW_PL

4. Annotate the parcel with bearings and distances.



a. Select *Drawing Production > Annotations > Element Annotation > Annotate Element*

b. *Locate Elements - Reset To Complete*: Select the parcel (if not already selected).



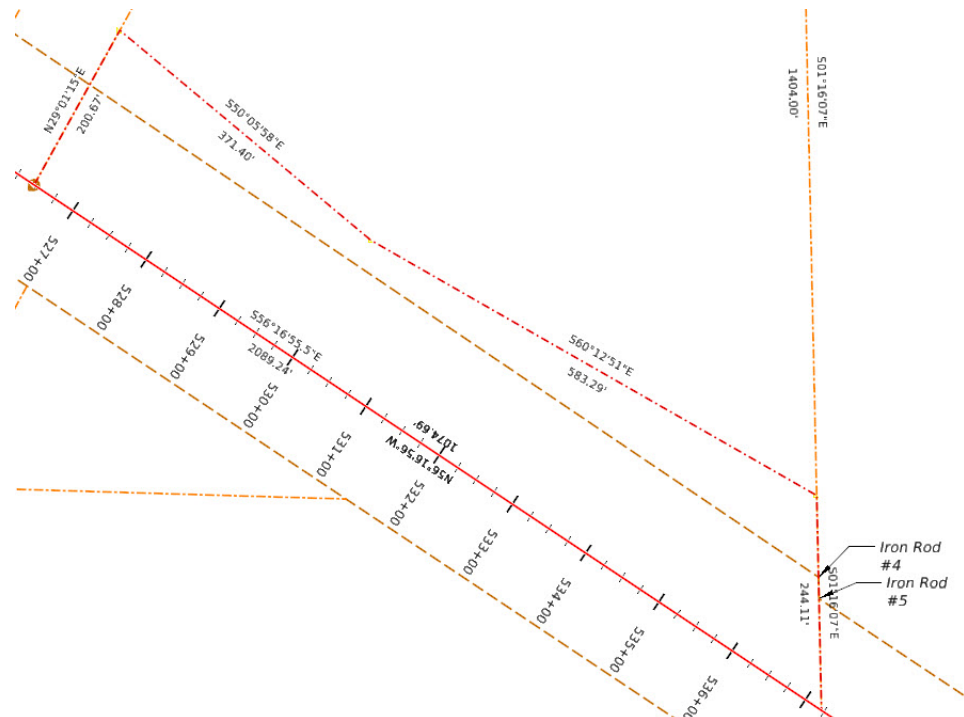
Exercise 4: Create Proposed Right of Way

Description

In this exercise, you will learn how to create proposed right of way lines using *Civil AccuDraw*, how to create the proposed right of way parcel and also how to create the legal description.

Skills Taught

- Create Proposed Right of Way Lines using Civil AccuDraw.
- Create a Proposed Right of Way Parcel
- Create a Legal Description

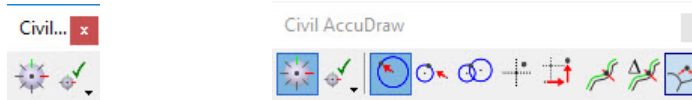


Create Proposed Right of Way Lines

In this section, you are going to learn how to how to create the proposed right of way lines. Typically, proposed right of way lines are placed at even offsets from the centerline and iron pins are set where the proposed right of way intersects the existing property lines or at break points (although this may vary by agency). We will utilize the *Civil AccuDraw* tool along with the place *Point* and *Line Between Points* tools to create the proposed right of way lines.

1. If not activated, activate *Civil AccuDraw*.

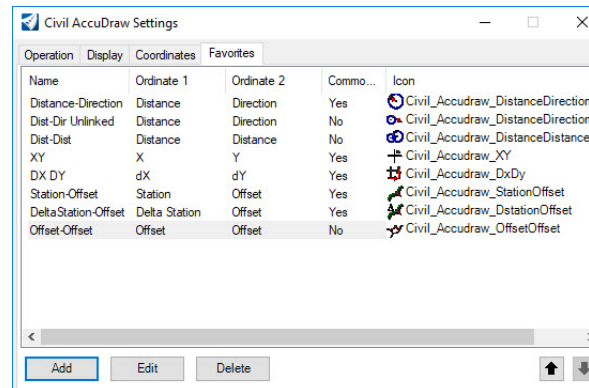
- a. Select *Geometry > General Tools > Civil Toggles > Civil AccuDraw*
- b. Select the *Civil AccuDraw* button to activate it and turn it on (once activated the *Civil AccuDraw* toolbar will expand).



- c. From the *Civil AccuDraw* toolbar, select the **Offset-Offset** tool (this is a custom *Civil AccuDraw* setting used for this course).
- d. If you do not have the **Offset-Offset** tool use the following steps to add it.

2. Create a *Civil AccuDraw* custom setting called **Offset-Offset**

- a. Select *Civil AccuDraw Settings*
- b. Select the *Favorites* tab
- c. Select **Add**
- d. In the *Name* column, key-in **Offset-Offset**
- e. In the *Ordinate 1* column set it to **Offset**
- f. In the *Ordinate 2* column set it to **Offset**
- g. Close *Civil AccuDraw* and then re-open it.



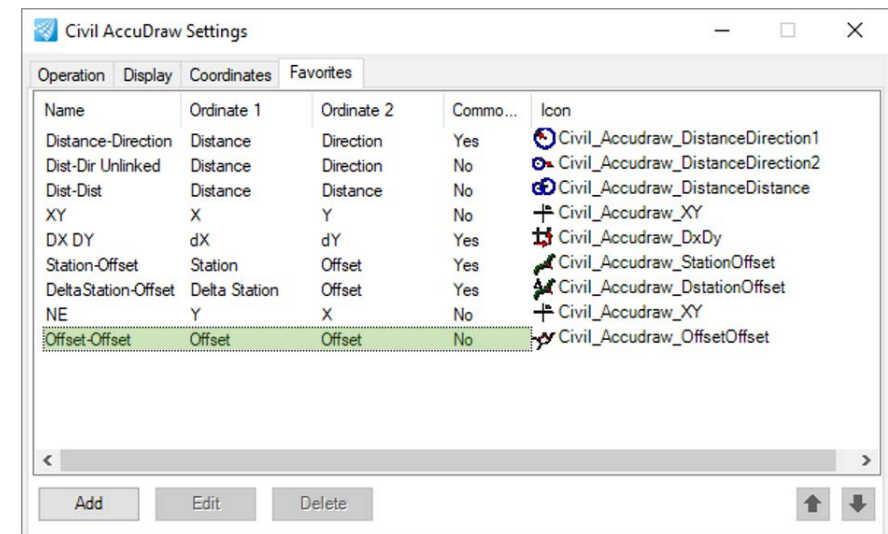
The **Offset-Offset** tool should now appear on the *Civil AccuDraw* toolbar.



Civil AccuDraw Notes

Civil AccuDraw is used for:

- **Precision Input**
 - XY/NE Coordinates
 - Station Offset
- **Precision Location**
 - Distance and Direction
 - Distance from two known points
- **Persist Rules** (remembering how an element was placed and maintaining its rules and relationships i.e. *Design Intent*).
- *Civil AccuDraw* is also fully customizable to create custom commands such as:
 - NE
 - Offset-Offset



3. Using the **Point** tool, set an Iron Pin **200' [61 m]** to the left of the centerline that intersects the existing westerly property line.



a. Select **Geometry > Horizontal > Point**

b. Set **Elevation Mode** to **None**

c. Set **Rotation Mode** to **None**

d. Set the **Feature Definition** to **Point > Right of Way > P_ROW_Pin_Set**

e. Set the **Name** to **IPS 1**

Point	
Elevation	
Elevation Mode	None
Rotation	
Rotation Mode	None
Feature	
Feature Definition	P_ROW_Pin_Set
Name	IPS 1
Description	

f. In the **Civil AccuDraw** heads-up prompt attached to your cursor, press the letter **O** on your keyboard to define the origin element for the point (this will be the centerline geometry). Follow the prompts:

- **Select a reference element or Reset to return to command:** Select the centerline
- In the top **Offset** field key-in **-200 [61]** (this will define the point 200' [61 m] to the left of the centerline).

Offset	-200.000'
Offset	0.000'
Enter Data Point	

- Press **<TAB>** or **<ENTER>** to lock the offset value.
- Press the letter **O** on your keyboard again to define existing westerly property line of Parcel 8 as the reference element.
- Select the westerly property line as the reference element.
- Press **<TAB>** to navigate to the bottom **Offset** field.

- In the bottom **Offset** field key-in **0** (zero), this will define the point on the existing property line.

Offset	-200.000'
Offset	0.000'
Enter Data Point	

- Press **<TAB>** or **<ENTER>** to lock the value.

- Left click to accept.

The point is now placed on the westerly property line at an offset of **200' [61]** left of the centerline.

- It's important to note that when using **Civil AccuDraw** to place any type of geometry (points, points, lines, arcs, etc.) Rules and relationships (i.e. Design Intent) are being created.
- The software will remember how you placed this point. In this case, you placed this point by an Offset-Offset.
- Furthermore, since we placed this point with reference to the centerline and westerly property line if either of those reference elements were to move the point would move along with those elements and maintain it's relationship with those elements.

4. Review the Point properties.

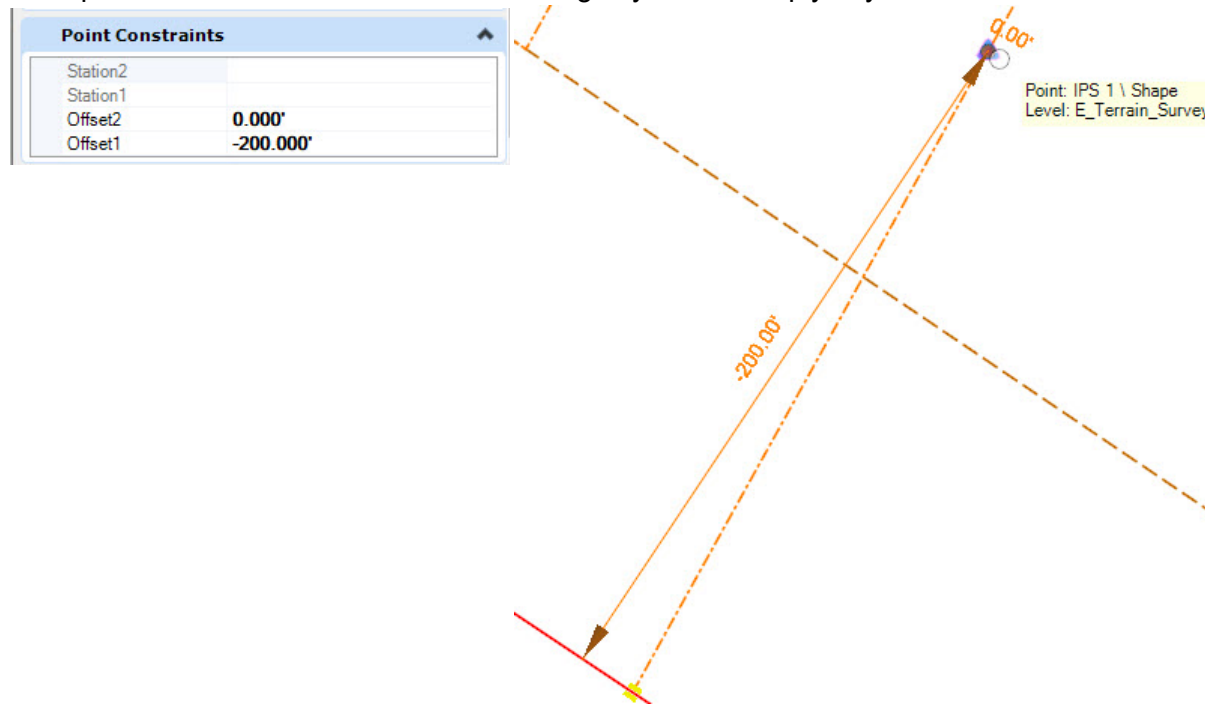
a. Select the *Element Selection* tool.

b. Select the **IPS 1** point

c. Select *Properties*.

d. In the *Properties* panel, expand the *Point Constraints* pane.

The offsets for the point can be seen here. To make changes you can simply key-in a new value in the offset fields.



e. Close the *Properties* panel.

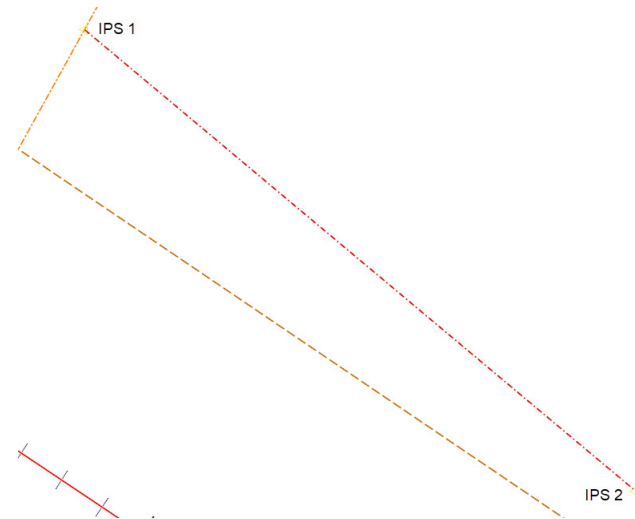
f. Left click in the view to de-select the point.



5. Place an Iron Pin at Station **530+00 [16+154]**, **-160' [x.xxx]** left of the centerline.
 - a. From the *Civil AccuDraw* toolbar, select the **Station-Offset** tool.
 - b. Continuing with the *Point* tool.
 - c. Set the *Feature Definition* to *Point > Right of Way > P_ROW_Pin_Set*
 - d. Set the *Name* to **IPS 2**
 - e. Follow the heads-up prompts attached to your cursor:
 - *Enter Data Point:* Move your cursor into the *Offset* field and press the letter **O** on your keyboard.
 - *Select a reference element or Reset to return to command:* Select the centerline (the centerline stationing will now display in the *Civil AccuDraw* heads-up menu).
 - **Use the <Tab> key to navigate back to the Station field.**
 - Key-in **530+00 [16+154]** in the *Station* field.
 - Press **<Tab>** or **<Enter>** to lock the value and to navigate to the *Offset* field.
 - Key-in **-160 [-49]**, press **<TAB>** or **<Enter>** to lock the value.
 - Left to accept. The point will now be placed.



6. Create the first right of way line between **IPS 1** and **IPS 2**.
 - a. Select *Geometry > Horizontal > Lines > Line Between Points*
 - b. Set the *Feature Definition* to *Linear > Right of Way > P_ROW*
 - c. *Enter Start Point:* Select **Origin Snap** and snap to **IPS 1**.
 - d. *Enter End Point:* Select **Origin Snap** and snap to **IPS 2**.



7. Place an Iron Pin on the existing easterly property line **160'** [49 m] left of the centerline.



a. Select *Geometry > Horizontal > Point*

b. Set the *Feature Definition* to *Point > Right of Way > P_ROW_Pin_Set*

c. Set the *Name* to **IPS 3**



d. Select **Offset-Offset** from the *Civil AccuDraw* toolbar.

e. In the *Civil AccuDraw* heads-up prompt attached to your cursor, move your cursor into the top *Offset* field.

f. Press the letter **O** on your keyboard to define the origin element for the point (this will be the centerline geometry).

g. Follow the prompts:

- *Select a reference element or Reset to return to command:* Select the centerline
- In the top *Offset* field key-in **-160** [49] (this will define the point 160' [49 m] to the left of the centerline).

Offset	-160.000'
Offset	0.000'
Enter Start Point	

- Press **<TAB>** or **<ENTER>** to lock the offset value.
- Press the letter **O** on your keyboard again to define existing easterly property line as the reference element.
- Select the existing easterly property line as the reference element.
- Press **<TAB>** to navigate to the bottom *Offset* field.
- In the bottom *Offset* field key-in **0** (zero), this will define the point on the existing property line.
- Press **<TAB>** or **<ENTER>** to lock the value.
- Left click to accept.

Offset	-160.000'
Offset	0.000'
Enter Start Point	

The iron pin is now set.

h. De-Activate *Civil AccuDraw*.

8. Select the **Line Between Points** command, to place a right of way line between **IPS 2** and **IPS 3**.



- Select **Geometry > Horizontal > Lines > Line Between Points**
- Set the **Feature Definition** to **Linear > Right of Way > P_ROW**



- Enter Start Point:** Select **Origin Snap** and snap to **IPS 2**.



- Enter End Point:** Select **Origin Snap** and snap to **IPS 3**.

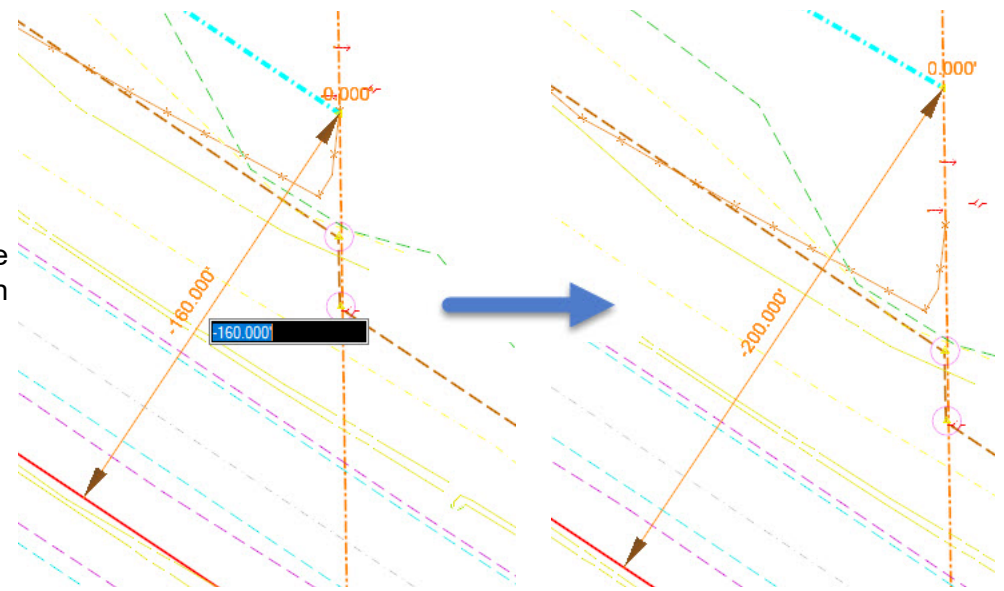
It's important to note that since you snapped to the origin points of the iron pins the start and end points of the right of way line are "ruled" to those locations. If the iron pins move then the right of way line will also move. This is an example of the civil rules also why we enabled the **Persist Snaps Lock** earlier in the course.

9. Change the offset for **IPS 3** to **-200 [61]**.



- Select** point **IPS 3**
- Left click** the dynamic text offset **-160 [49]**.
- Key-in **-200 [61]** and left click to accept.

The right of way line and the iron pin point will move to the new offset. Note the iron pin point is still placed exactly on the easterly property line.



10. Create the remaining right of way lines.

a. Activate the *Chain Commands* tool from the *Feature Definition Toolbar*

b. Set the *Feature Definition* to *Linear > Right of Way > P_ROW*

c. Select the **Line Between Points** command and follow the heads-up prompts:

- *Enter Start Point:* Snap to the origin point of **IPS 3** (be sure to use *Origin Snap*).
- *Enter End Point:* Snap to the end point of the existing easterly property line where it intersects the centerline.
- *Enter End Point:* Snap to the origin point of **POB Parcel 8** point (be sure to use *Origin Snap*).
- *Enter End Point:* Snap to the origin point of **IPS 1** (be sure to use *Origin Snap*).
- Right click to complete.

d. Turn off the *Chain Commands* tool.

11. Turn off the display of existing **Parcel 8**.

a. In *View 1*, right click and hold down the right mouse button, a pop-up menu will appear.

b. Select **Level Off** and select existing **Parcel 8**.

12. Now that all of the right of way line elements have been established for this parcel, you need to create a closed shape from these elements. You will do this by using the *Complex By Element*.

a. Select **Complex By Element**

b. Set the *Mode* to **Automatic**

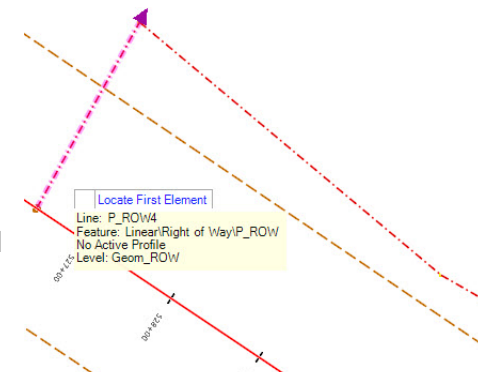
c. Set the *Feature Definition* to *Linear > Right of Way > P_ROW_PE*

d. Set the *Name* to **8-PE**

e. Select the right of way line that lies along the westerly property line (also make sure the directional arrow is pointing to the northeast).

f. *Accept Complex:* Left click to accept.

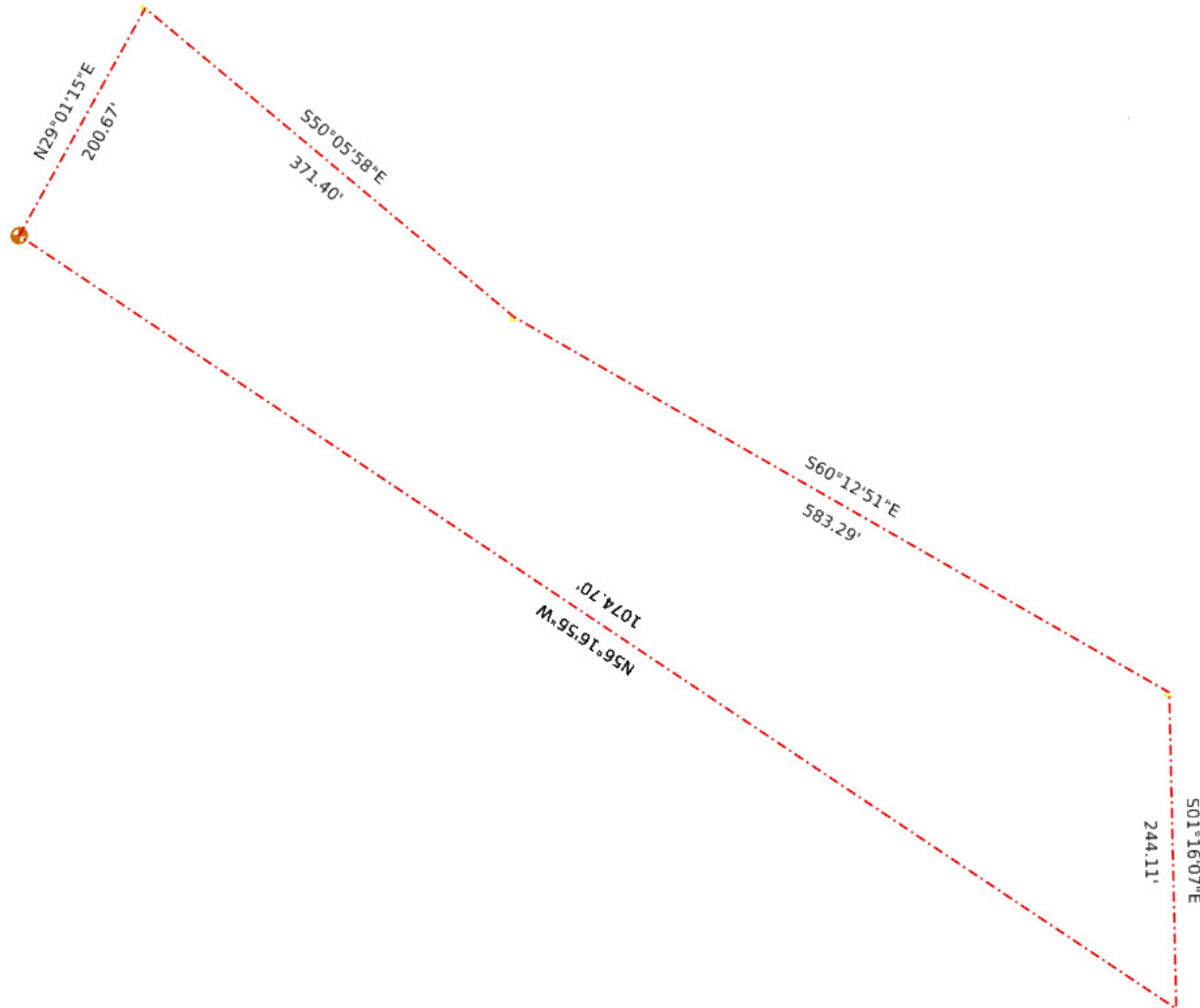
The parcel will now be created. Since the parcel is now a closed shape the take area can be computed and the legal description can be created.



13. Annotate the parcel with bearings and distances.



- a. Select *Drawing Production > Annotations > Element Annotation > Annotate Element*
- b. *Locate Elements - Reset To Complete*: Select the parcel.



TIP: Another tool that is useful for creating parcels is the *Polygon* tool which can be found in the *Site Modeling* workflow under the *Draw Basic* panel.

Create the Legal Description

In this section, you will learn how to create the legal description for the proposed right of way parcel.



1. Select *Geometry > General Tools > Reports > Legal Report*

a. Follow the heads-up prompts and left click to move to the next prompt:

- *Locate First Element:* Select the parcel **8-PE**
- *Locate Next Element - Reset to Complete:* **Right click**
- *Locate Parent - Reset to Skip:* **Right click**
- *Locate Primary Reference - Reset to Complete:* **Select the centerline**
- *Primary Reference Alignment:Bandwidth:* Key-in **300'** [100] and press **<Enter>** to lock the value

If primary reference elements are selected but no secondary reference elements are selected, the software checks each point to see if it is within the bandwidth specified. If so, the legal reference information for the primary reference is displayed. If outside the bandwidth, no legal reference information is displayed.

- *Locate First Secondary Reference Element:* **Right click**

The *Horizontal Alignment Legal Description* report will now appear. This is a very basic report that displays the distances, bearings and area of the parcel.

- b. For a more detailed report select the **Property Description** style sheet.

Notice that this report displays the primary reference element information (i.e. station and offsets referenced to the existing centerline).

2. Save the report as a Word document.
 - a. In the *Bentley Civil Report Browser* window, Select **File > Save As**
 - b. Navigate to the Bentley Training folder where the right of way design files are located.
 - c. Set the *Save as type* to (*.doc)
 - d. Set the *File Name* to **8-PE**
3. Explore the other available style sheets such as **RightOfWayTakes.xml** and **ParcelLayoutFromReference.xml**. Remember style sheet (*.xml files) can be customized as needed.

Sometimes it's necessary to create a **Station Offset Report** for all Iron Pins set. This type of report may need to be included in the right of way plans. You also may need to export the iron pin station, offset, northing, easting and elevation values to an external file. You will now learn how to create a **Station Offset** Report and save it to an external file.

4. Create a **Station Offset Report** for Iron Pins set.

a. Select the **Element Selection** tool.

b. While holding down the **<CTRL>** key on your keyboard, select all of the Iron Pins that you set.

c. Select **Geometry > General Tools > Reports > Point Feature Station Offset Elevation Report**

d. **Locate Baseline Element:** Select the existing centerline

e. **Datapoint to Accept Selected Elements:** **Left click**

f. **Station Offset Report** will now appear.

g. Change the style sheet to **Station Offset Northing Easting Report**.

h. Save the report to either a **.doc** or an **.xls** file.

i. Close the **Bentley Civil Report Browser**.

Station Offset Northing Easting Report				
Report Created: Tuesday, August 10, 2021 Time: 12:02:44 PM				
Project: Default				
Description:				
Baseline (Active) Alignment: Existing Centerline R/W HWY 72				
File Name: C:\Bentley Training\Right of Way Fundamentals\Geom-Property Lines.dgn				
Last Revised: 8/10/2021 12:00:41				
Input Grid Factor:				
Note: All units in this report are in feet unless specified otherwise.				
Point	Station	Offset	Northing	Easting
IPS 1	526+30.746	-200.000	1767395.937	1993918.549
POB Parcel 8	526+47.190	0.000	1767220.453	1993821.206
IPS 2	530+00.000	-160.000	1767157.691	1994203.483
IPS 3	535+81.909	-200.000	1766867.942	1994709.708

Exercise 5: Create Right of Way Plan Sheets

Description

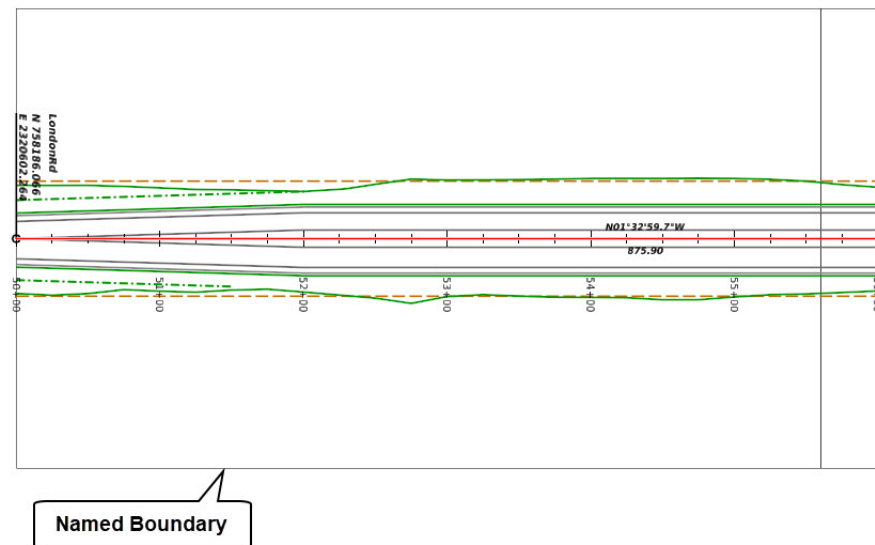
In this exercise, you will learn how to create the right of way plan sheets and how to place station-offset annotation on critical points around the parcel.

Skills Taught

- Create Right of Way Plan Sheets
- Create Station Offset Annotation Labels

Right of Way Plan Sheet Creation Process

1. Plan sheets are live references of 2D models. When the 2D model changes, the plan sheets automatically update so they are always showing the most current information.
2. **Named Boundaries** are defined in a 2D design model. The Named Boundary defines the extent of what is displayed on the sheet. The Named Boundary can be a top view (for the plan portion of a sheet) or a slice through a model (for a profile or cross section).



3. Once the Named Boundaries are defined the Create Drawing tool is used to create **Drawing Models**. One Drawing Model is created for each Named Boundary. The Drawing Model essentially contains a referenced slice of the model in the area defined by the Named Boundary. Depending on the sheet type being created this could be a top down plan view, a profile or a cross section. Being a reference of the model, the contents are automatically updated as the model changes.
4. One or more Drawing Models is then referenced onto a Sheet model. For example, a plan and profile sheet might have two drawing model references, one for the plan and one for the profile. A cross section sheet may have dozens of referenced Drawing Models, one for each cross section.

Create Right of Way Plan Sheets

In this section you will learn how to create the right of way plan sheets.

1. Select **Browse** and browse to the *c:\Bentley Training\Right of Way Fundamentals* or other folder where you unzipped the dataset files and open the file **Right of Way-Plan Sheets.dgn** [*Metric-Right of Way-Plan Sheets.dgn*].

This is actually a blank file that has been setup with the necessary reference files attached (survey, geometry, property lines, corridors, etc). It will be used to create the sheet boundaries and right of way plan sheets.

2. Create Named Boundaries for the plan sheets.

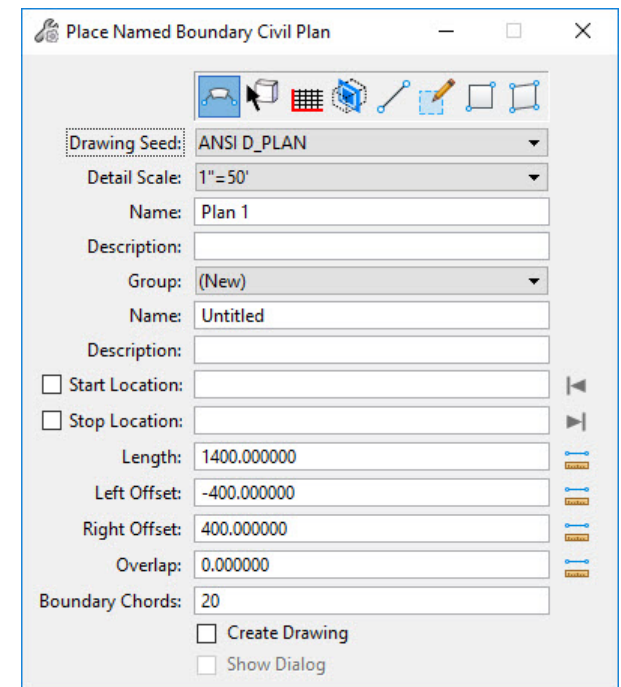


- a. Select *Drawing Production > Named Boundaries > Named Boundary > Place Named Boundary*.
- b. Select the **Civil Plan** mode.
- c. Set *Drawing Seed* to **ANSI D_PLAN** [*A1_PLAN*].

The drawing seed defines default values and other parameters required to create sheets.

- **ANSI D_PLAN** [*A1_PLAN*] - This seed is setup for creating D [*A1*] sized plan sheets.
- d. In the 2D view, select the existing centerline alignment along which the plan named boundaries will be created.
 - e. Set the *Detail Scale* to **1"=50'** [*1:500*].

Tip: In general, you shouldn't change the *Detail Scale*. Most agencies set up their sheet seed definitions for each supported scale needed.



- f. Set **Name** to **Plan 1** (There are two name fields. This is the top field which defines the root name of each named boundary.)

TIP: Including the number 1 at the end of the name keeps the names of the named boundaries and sheets more uniform because the number is included in the first name. Otherwise the incremented numbering begins with the second name as illustrated in the table.

Name Specified in Dialog	Plan	Plan 1
First Named Boundary	Plan	Plan 1
Second Named Boundary	Plan 1	Plan 2
Third Named Boundary	Plan 2	Plan 3

- g. Set the **Group** to **(New)**
- h. Set the **Name** field to **Hwy 72 Right of Way Plans**. (This is the lower name field which defines the name of the named boundary group.)
- i. Set the **Start Location** to **504+00 [15+240]**.
- j. Set the **Stop Location** to the end of the project. The named boundaries are displayed interactively as the cursor moves.
- k. **Enable** the **Create Drawing** option so that the sheets are created as soon as the named boundaries are created.
- l. **Enable** the **Show Dialog** option

This dialog is used to override settings defined by the Drawing Seed. If no settings need to be changed it can be Disabled to immediately create the sheets.

- m. **Follow the prompts** in the lower left corner **left click** to define the named boundaries. *Multiple left clicks are required.*

Two or three clicks are required to (1) accept the Start Location, (2) accept the Stop Location, and (3) create the Named Boundaries. However, if the Start or Stop Location are selected graphically one or more of these clicks has already been completed.

- n. When the **Create Drawing** dialog appears, click **OK** and the sheets will be created.

3. Review the Sheets.



- a. Select the **View Group** tool to view other sheets.

Each sheet has a Drawing and a Sheet Model. The Drawing Model is a direct reference of the named boundary area and is where additional annotations will be defined. The Drawing Model (or models) are then referenced onto the Sheet Model.



= Drawing Models



= Sheet Models

Name	Description	Model
Default	Default viewgroup...	Default
Hwy 72 Right of Way Plans - Plan 1	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 1 [Sheet]
Hwy 72 Right of Way Plans - Plan 1	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 1
Hwy 72 Right of Way Plans - Plan 2	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 2 [Sheet]
Hwy 72 Right of Way Plans - Plan 2	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 2
Hwy 72 Right of Way Plans - Plan 3	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 3 [Sheet]
Hwy 72 Right of Way Plans - Plan 3	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 3
Hwy 72 Right of Way Plans - Plan 4	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 4 [Sheet]
Hwy 72 Right of Way Plans - Plan 4	Default viewgroup...	Hwy 72 Right of Way Plans - Plan 4

- a. Open and review the Drawing Model  for **Hwy 72 Right of Way Plans - Plan 1** by selecting it from the list and then selecting **Apply**.

TIP: You can also double-click on any model in the list to open it as well.

The Drawing Model for Plan 1 will open. Generally, plan view annotation should be done in this model.

- b. Open and review the Sheet Model  for **Hwy 72 Right of Way Plans - Plan1** by selecting **Hwy 72 Right of Way Plans - Plan 1 [Sheet]** and then selecting **Apply**.
- c. Review the remaining Drawing Models and Sheet Models using the same steps described above.

It's important to know how to navigate between the various drawing and sheet models.

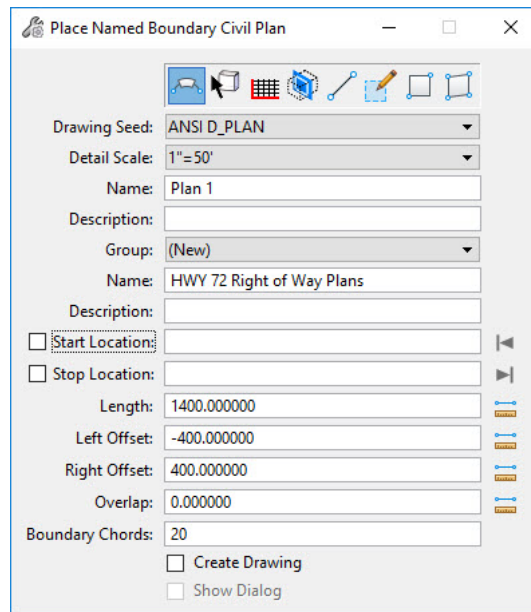
Review Named Boundaries

1. Using the *View Group* pick list at the bottom of the screen, select the **Default** model.

Name	Model
Default	Default
Hwy 72 Right of Way Plans - Plan 1 [Sheet] Views	Hwy 72 Right of Way Plans - Plan 1 [Sheet]
Hwy 72 Right of Way Plans - Plan 1 Views	Hwy 72 Right of Way Plans - Plan 1
Hwy 72 Right of Way Plans - Plan 2 [Sheet] Views	Hwy 72 Right of Way Plans - Plan 2 [Sheet]
Hwy 72 Right of Way Plans - Plan 2 Views	Hwy 72 Right of Way Plans - Plan 2
Hwy 72 Right of Way Plans - Plan 3 [Sheet] Views	Hwy 72 Right of Way Plans - Plan 3 [Sheet]
Hwy 72 Right of Way Plans - Plan 3 Views	Hwy 72 Right of Way Plans - Plan 3
Hwy 72 Right of Way Plans - Plan 4 [Sheet] Views	Hwy 72 Right of Way Plans - Plan 4 [Sheet]

2. Open the *Drawing Production > Named Boundaries > Named Boundaries* dialog.
3. Expand **Plan Groups**.
4. Expand the **HWY 72 Right of Way Plans** group.

The name of the group and the individual named boundaries come from the values defined on the *Place Named Boundary* dialog.



Place Named Boundary Civil Plan

Drawing Seed: ANSI D_PLAN

Detail Scale: 1"=50'

Name: Plan 1

Description:

Group: (New)

Name: HWY 72 Right of Way Plans

Description:

☐ Start Location:

☐ Stop Location:

Length: 1400.000000

Left Offset: -400.000000

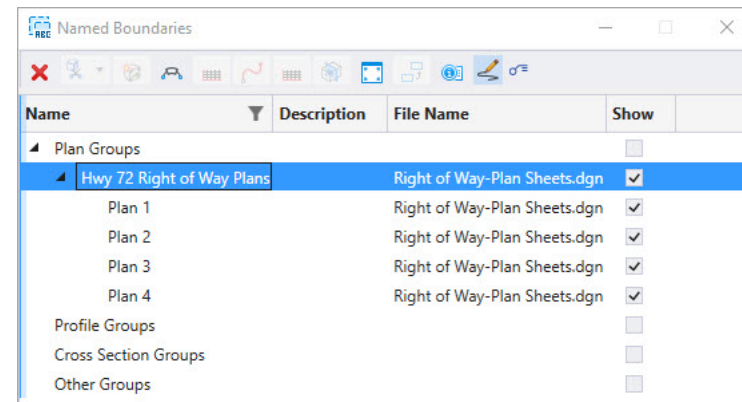
Right Offset: 400.000000

Overlap: 0.000000

Boundary Chords: 20

☐ Create Drawing

☐ Show Dialog



Named Boundaries

Name	Description	File Name	Show
Plan Groups			☐
Hwy 72 Right of Way Plans		Right of Way-Plan Sheets.dgn	☒
Plan 1		Right of Way-Plan Sheets.dgn	☒
Plan 2		Right of Way-Plan Sheets.dgn	☒
Plan 3		Right of Way-Plan Sheets.dgn	☒
Plan 4		Right of Way-Plan Sheets.dgn	☒
Profile Groups			☐
Cross Section Groups			☐
Other Groups			☐

5. Close the *Named Boundaries* dialog.

Exercise 6: Plan Annotation with Civil Labeler

Description

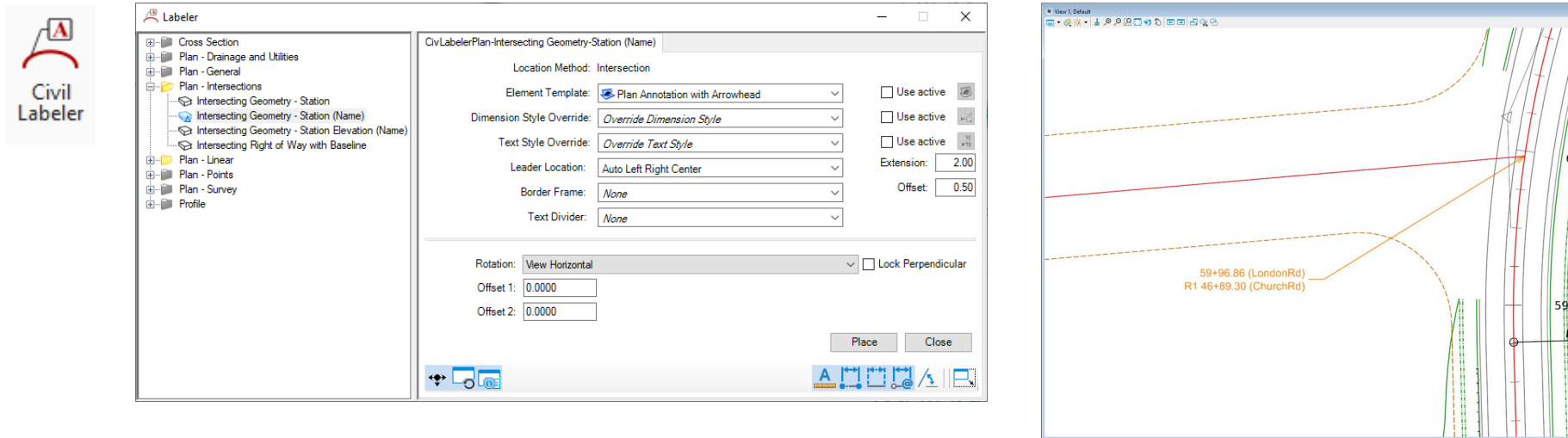
In this exercise, you will learn to annotate geometry and place intelligent labels in your drawings.

Skills Taught

- Place intelligent plan labels with Civil Labeler

Civil Labeler Tool

The Civil Labeler tool provides extensive labeling capabilities made specifically for labeling civil data. The tool creates dynamic and intelligent labels that are easy to customize and can handle almost any label you would need. Labels can be placed for plan, profile, and cross sections objects. Labels such as alignment names, station/offset, intersecting geometry stations, station/offset are some of the example label types that can be placed.



The panel on the left side of dialog contains folders with various types of Plan, Profile and Cross Section labels. The panel on the right side of the dialog contains the settings for each label. Label types are created, stored and managed in a user customizable **.dgnlib**.

The civil labeler .dgnlib's delivered with the software can be found in the following locations:

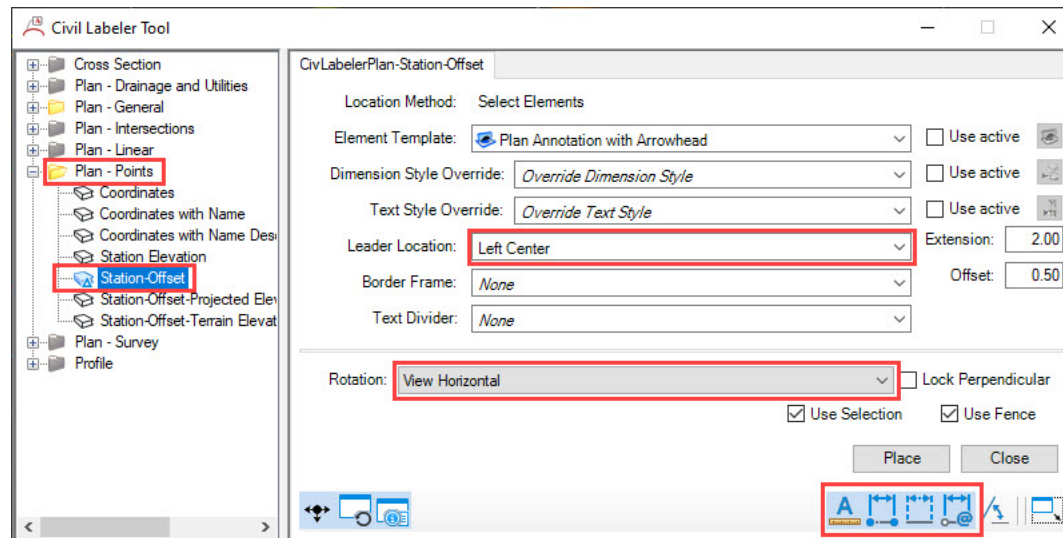
- *C:\ProgramData\Bentley\OpenRoads Designer CE 10.12\Configuration\Organization-Civil\Civil Default Standards - Imperial\Dgnlib\Feature Definitions\Labeler Text Favorites Dimension Styles Elem Temp Imperial.dgnlib*
- *C:\ProgramData\Bentley\OpenRoads Designer CE 10.12\Configuration\Organization-Civil\Civil Default Standards - Metric\Dgnlib\Feature Definitions\Labeler Text Favorites Dimension Styles Elem Temp Metric.dgnlib*

Labels can be placed in *Design* or *Drawing* models, but not *Sheet* models.

Place Labels with the Civil Labeler Tool

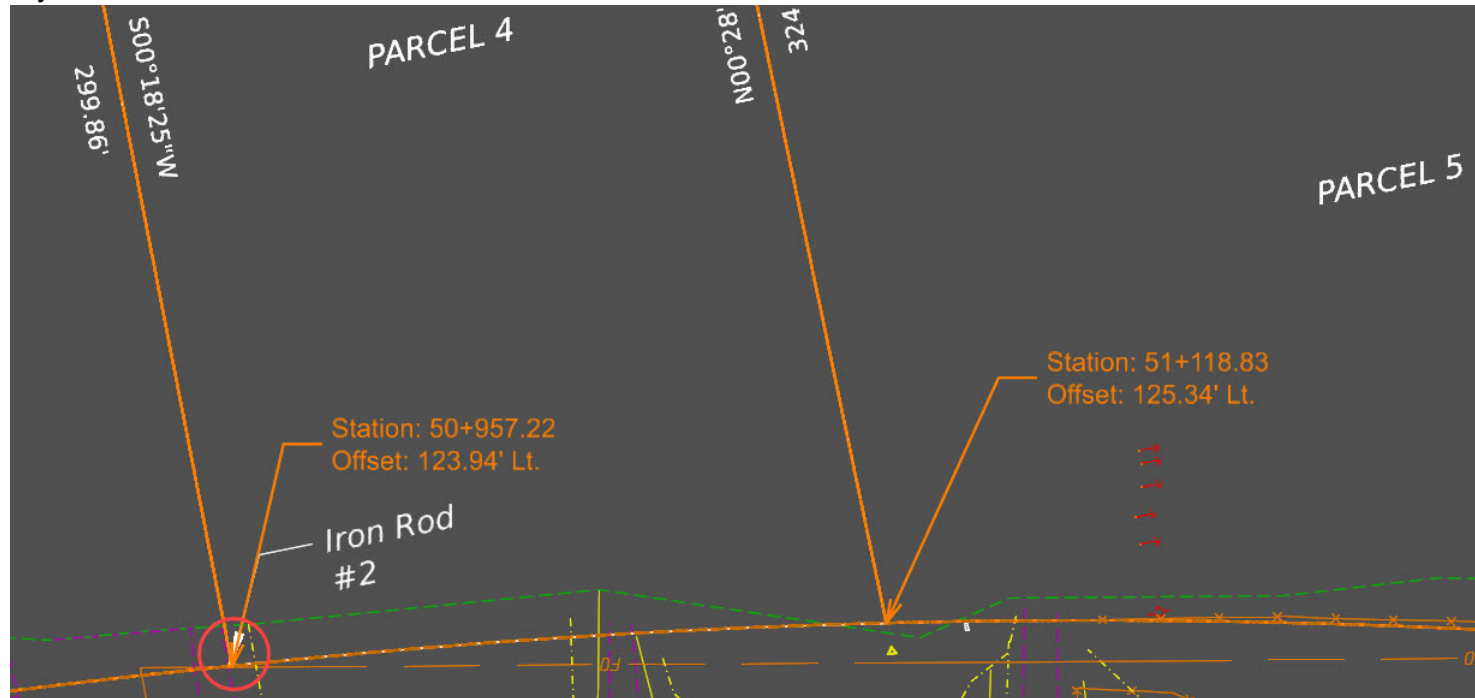
In this section, you will learn how to place labels using the civil labeler tool. For the purposes of this course, you will be placing the labels in a drawing model.

1. Label Station-Offset points with the Civil Labeler tool.
 - a. Use the *View Group* tool to select the **Hwy 72 Right of Way Plans - Plans 1 Drawing** model
 - b. Select *Drawing Production > Labels > Civil Labeler*
 - c. Expand the Civil Labels folder to *Civil Labels > Plan - Points*
 - d. Select the label called **Station-Offset**. This label will place a station-offset label.
 - e. Set the *Rotation* option to **View Horizontal** and set the *Leader Location* to **Left Center**
 - f. Set the association locks as shown in the lower right corner of the dialog.



g. Select **Place** and follow the prompts at the lower left corner of the screen.

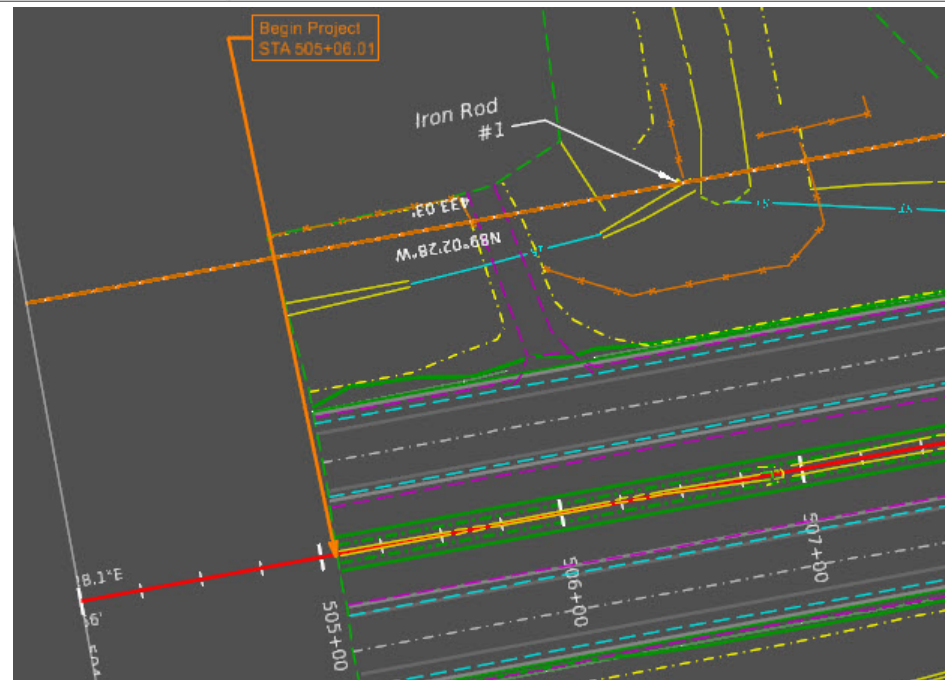
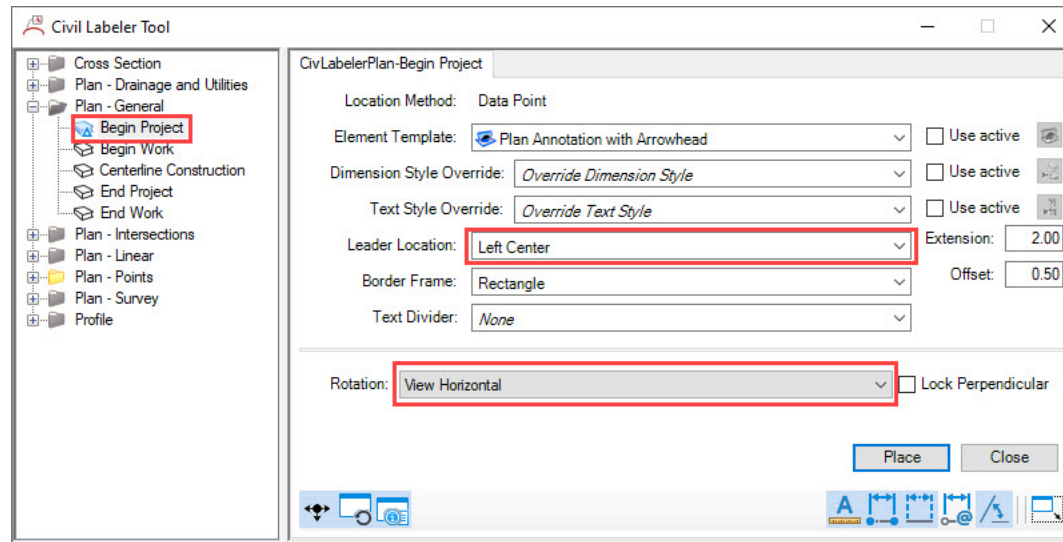
- *Identify baseline geometry*: Select the **Hwy 72** centerline geometry.
- *Identify elements to label*: Using Intersection Snap, select the point where the northerly right of way line intersects the westerly property line of Parcel 4.



2. Practice placing **Station-Offset** labels at other desired right of way point locations.

NOTE: Although we are placing labels in the drawing model for this course. A best practice would be to place the labels in a separate labeling file and reference it into the container file used to create the name boundaries and sheets. This allows for easier updating of labels if the sheets ever need to be re-cut.

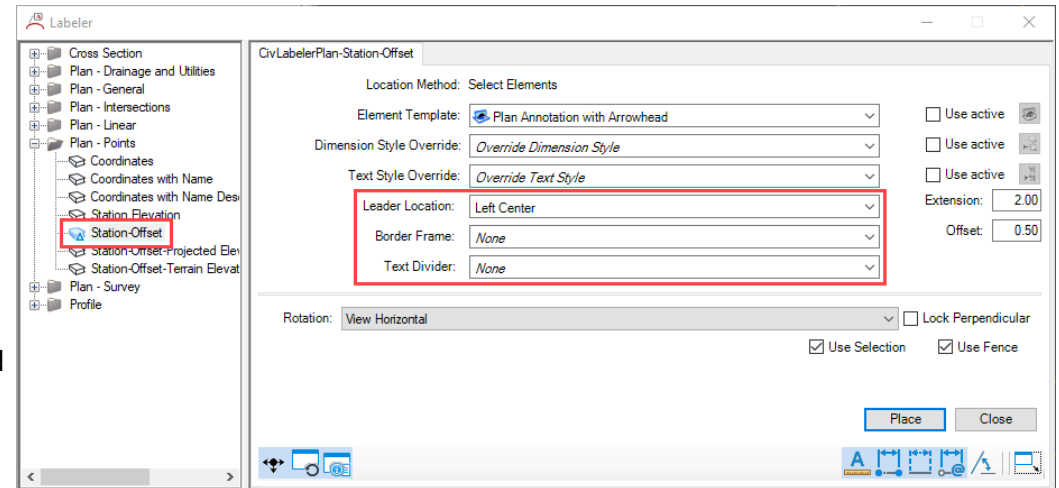
3. Label the beginning of the project. Use the label called **Begin Project**.



Additional Information about the Civil Labeler Tool

A label is made up of 5 parts:

- **Anchor Point** - Origin point of the label used for computing text.
- **Leader** (optional) - Optional line and arrow connecting between the Text and the Anchor Point.
- **Text** - The label content which is made up of text, text fields, and graphics.
- **Frame** (optional) - Shape that can be placed around the civil label.
- **Divider** (optional) - Divider that can be used to split text within a civil label.



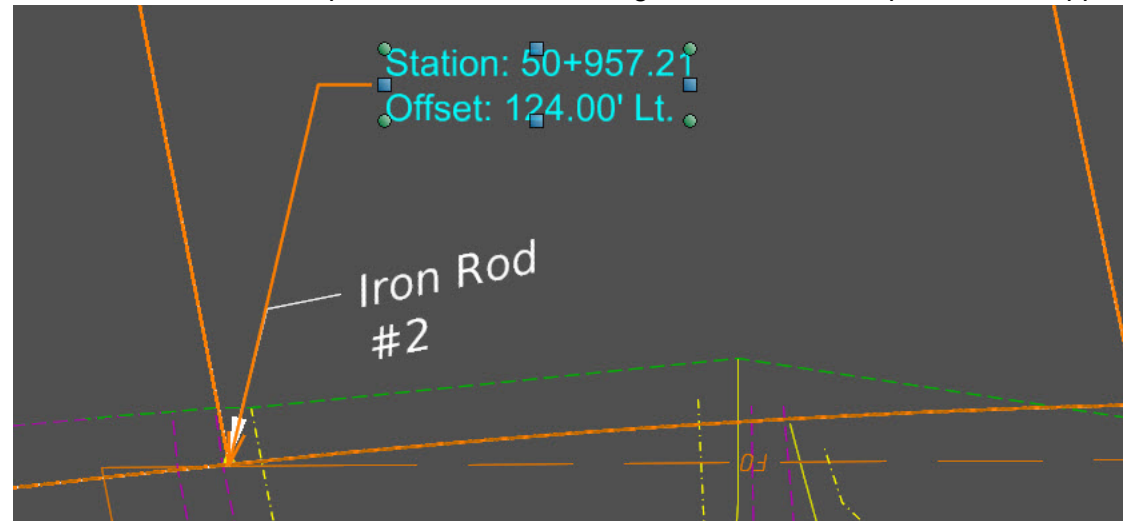
The five icons at the bottom right of the dialog define how the label behaves when the drawing scale is changed or when the referenced element changes.

- **Annotation Scale** - Labels created with this option enabled will scale when the **Annotation Scale** is adjusted.
- **Element Association** - Labels created with this option enabled AND the **Relative Association** option disabled will remain at their placement location when the reference element changes, only the leader line moves.
- **Annotation Association** - Labels created with this option enabled AND Element Association enabled will make the annotation associated to the element when the reference element changes. For example, if the reference element moves the label text will update.
- **Relative Association** - Labels created with this option enabled will remain at their relative location to the reference element when that reference element changes.
- **Rotational Association** - Labels created with this option enabled will ensure that if a reference element changes the label will maintain its relative rotation.
- The icon on the inner lower left activates **Collapse Mode**. When enabled the **Civil Labeler Tool** will collapse automatically after selecting the **Place** button.

Moving a Label

A lot of times, after you place a label you may have to move the text portion of the label. Because the civil label is made up of many parts and has civil intelligence built into it you cannot just simply use the move command to move the text portion of the label. In this section, you will learn how to properly move a civil label.

1. Move a station-offset label.
 - a. Navigate to a drawing model where you placed a station-offset label.
 - b. Using the Element Selection tool, select the text portion of the label. Drag handles and manipulators will appear once selected.



- c. Right click and hold on the text and move it to a new location.
2. Using the steps described above, practice moving other civil labels you have placed.

Skills Assessment

The questions below will test your retention of the skills covered in this course.

1. The Geometry Builder tool is best used to enter existing geometric and parcel data.
 - a. True
 - b. False
2. The geometric information entered in the Geometry Builder tool can be saved to an .xml file.
 - a. True
 - b. False
3. When defining a parcel with the Geometry Builder tool, you can monitor the closure error at the bottom of the dialog box.
 - a. True
 - b. False
4. Parcels can be created from existing CAD graphics using which tool?
 - a. Create Shape
 - b. Create Region
 - c. Geometry Builder Edit
5. Civil AccuDraw can be used to place a point on the centerline that defines the point of beginning for a parcel.
 - a. True
 - b. False
6. Civil AccuDraw is useful for placing points and geometry at specific stations and offsets.
 - a. True
 - b. False

Skills Assessment - Answers

The answers to the skills assessment questions are highlighted below.

1. The Geometry Builder tool is best used to enter existing geometric and parcel data.
 - a. **True**
 - b. False
2. The geometric information entered in the Geometry Builder tool can be saved to an .xml file.
 - a. **True**
 - b. False
3. When defining a parcel with the Geometry Builder tool, you can monitor the closure error at the bottom of the dialog box.
 - a. **True**
 - b. False
4. Parcels can be created from existing CAD graphics using which tool?
 - a. Create Shape
 - b. Create Region
 - c. **Geometry Builder Edit**
5. Civil AccuDraw can be used to place a point on the centerline that defines the point of beginning for a parcel.
 - a. **True**
 - a. False
6. Civil AccuDraw is useful for placing points and geometry at specific stations and offsets.
 - a. **True**
 - b. False

Summary

In this course you have learned some of the tools and techniques that can be used for developing Right of Way Plans on roadway projects.

You have now learned how to:

- Create the Existing Right of Way Centerline using the *Geometry Builder* tool
- Move and Rotate Geometry Using the *Transform Elements* tool.
- Create Existing Right of Way Lines using the *Single Offset Partial* tool.
- Create an Existing Parcel from record property data using the *Geometry Builder* tool.
- Create and Review Closure Reports using the *Map Check* tool.
- Edit a Parcel with the *Geometry Builder Edit* tool.
- Create a Parcel from CAD Graphics using the *Geometry Builder Edit* tool.
- Create Proposed Right of Way Lines using *Civil Geometry* and *Civil AccuDraw*.
- Create a Proposed Right of Way Parcel
- Create a Legal Description
- Create Right of Way Plan Sheets
- Create Station Offset Annotation Labels
- Place Intelligent Plan labels
- Adjust and Edit labels