OpenRoads Design: Right-of-Way

Right-of-Way Basemap Design Files

ODOT's CADD Standards detail the use of basemap design files to draw plan, profile, and cross section information for your project in real world dimensions. These drawings are then referenced into sheet design files to produce the plan sheets for the project.

Several basemap files may be used depending on the project complexity. The ODOT CADD Standards allow for multiple basemap design files for each unique discipline (drainage, lighting, mot, right-of-way, roadway, signals, etc.)

The **OHDOT Create Design Files** application is used to create new design files using the seed files for the project.

Right-of-Way information can be placed in a single design file, or multiple depending on the size of the project and the number of people needing access to edit the information. For most projects, as a minimum, the use of two right-of-way basemap design files is recommended:

File Name	Purpose
400-Engineering\RW\Basemaps\######_BR001.dgn	Existing right-of-way information
400-Engineering\RW\Basemaps\######_BR002.dgn	Proposed right-of-way information

See the **ODOT CADD Engineering Standards Manual (OHDOT)**, **Section 300 File Management** for more details.

The right-of-way information is often generated by ODOT's survey personnel. Note that that all right-of-way information is stored in the 400-Engineering\RW\Basemaps\ folder regardless of who generates the information.

Right-of-Way Feature Definitions

The OHDOT WorkSpace contains several feature definitions intended for right-of-way areas, such as the parent tract area, or taking areas, as well as features for the right-of-way lines that are shown on the right-of-way plans.

Point Features

Several features are available for storing right-of-way points in the **\Points\Control Points and Monuments** folder.

These features are used with the **Geometry > Point** commands, selected from the **OpenRoads Modeling** or the **Survey** Workflow.
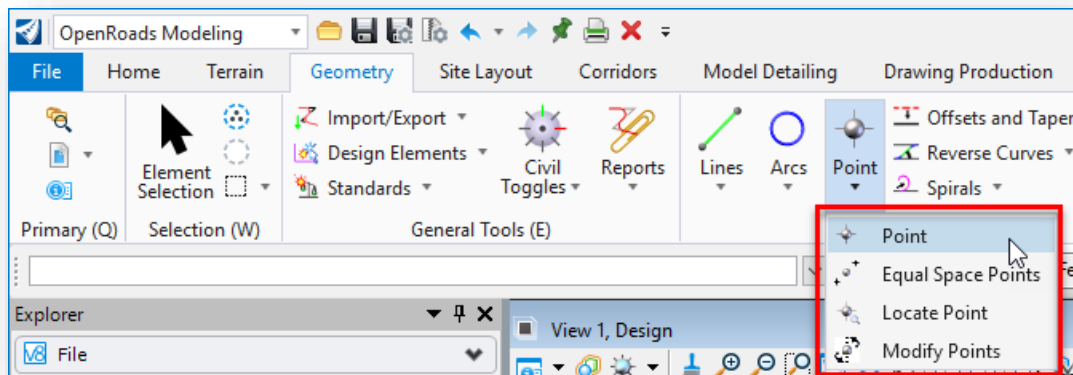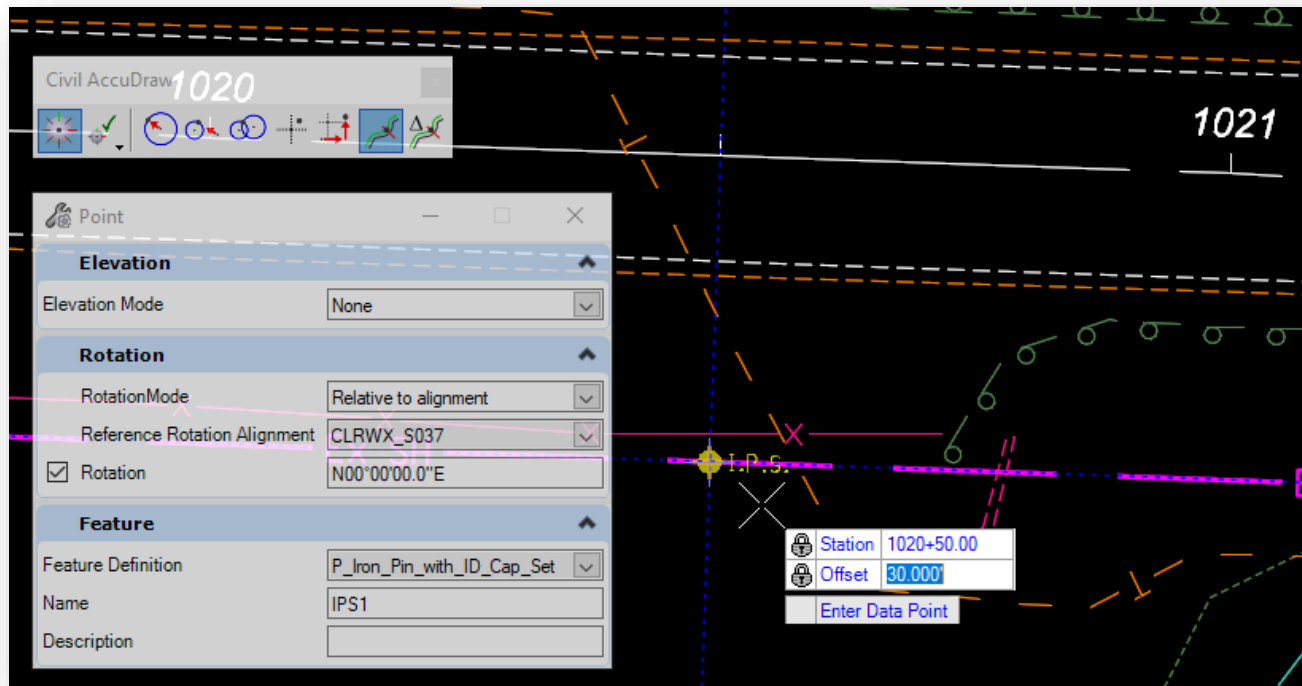

Civil Accudraw is used to place points at specific coordinates or at a station and offset location from a selected OpenRoads Alignment.
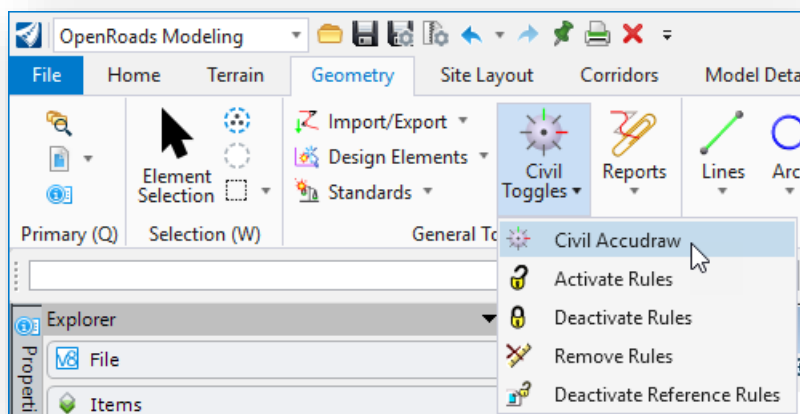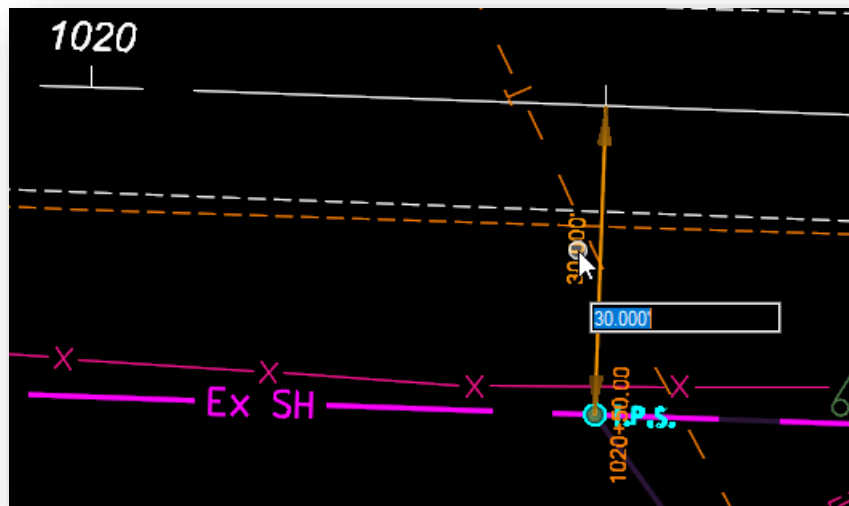

See the ***OHDOT_ORD_Design_303_CivilAccudraw*** guide for more information using Civil Accudraw.

An example placing an Iron Pin with Civil Accudraw is shown on below.

The point element is placed with rules for the station and offset value. The rules can be edited by selecting the element and then clicking on one of the rules as shown below.

The rules for the selected point can also be edited in the **Point Constraints** section of the *Properties* dialog.

Parcel Area Features

The parcel area features are used when defining the closed geometry that makes up a specific area, such as an easement or taking area. The graphics drawn for these areas are not intended to be shown on the final plans. Areas created using these features are intended to be used for computation purposes. These features are in the **\Linear\Parcel Areas** folder in the OHDOT Standards.

Areas can be placed using the OpenRoads Geometry tools to place lines and arcs. After placing the elements that define the closed area, the Complex Geometry command is used to create the closed shape.

In the example below, the **Geometry > Lines > Line Between Points** command is used to place the lines defining the parcel area by snapping to previously placed geometry points. The MicroStation **Origin** snap is used to snap to the center of the geometry points.
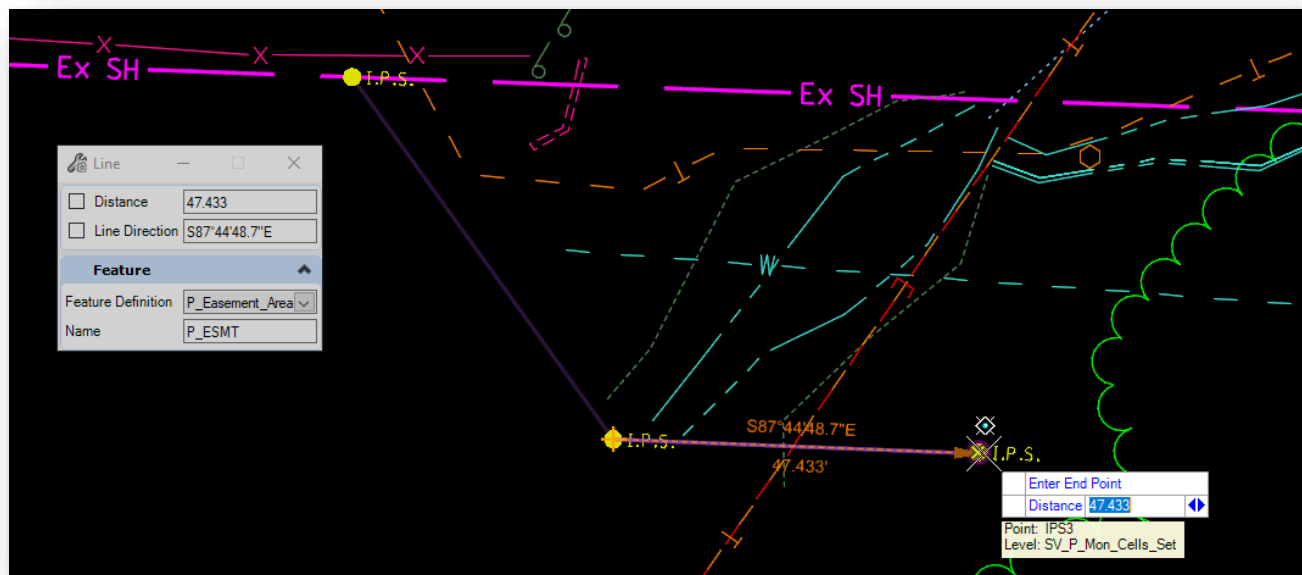
Note: If the **Origin** snap is used to snap to the points when placing the curvilinear elements, the point name is associated with the endpoints of the curvilinear element. The **Properties** dialog shows the name of the points associated with the endpoints of the selected element as shown in the example below.
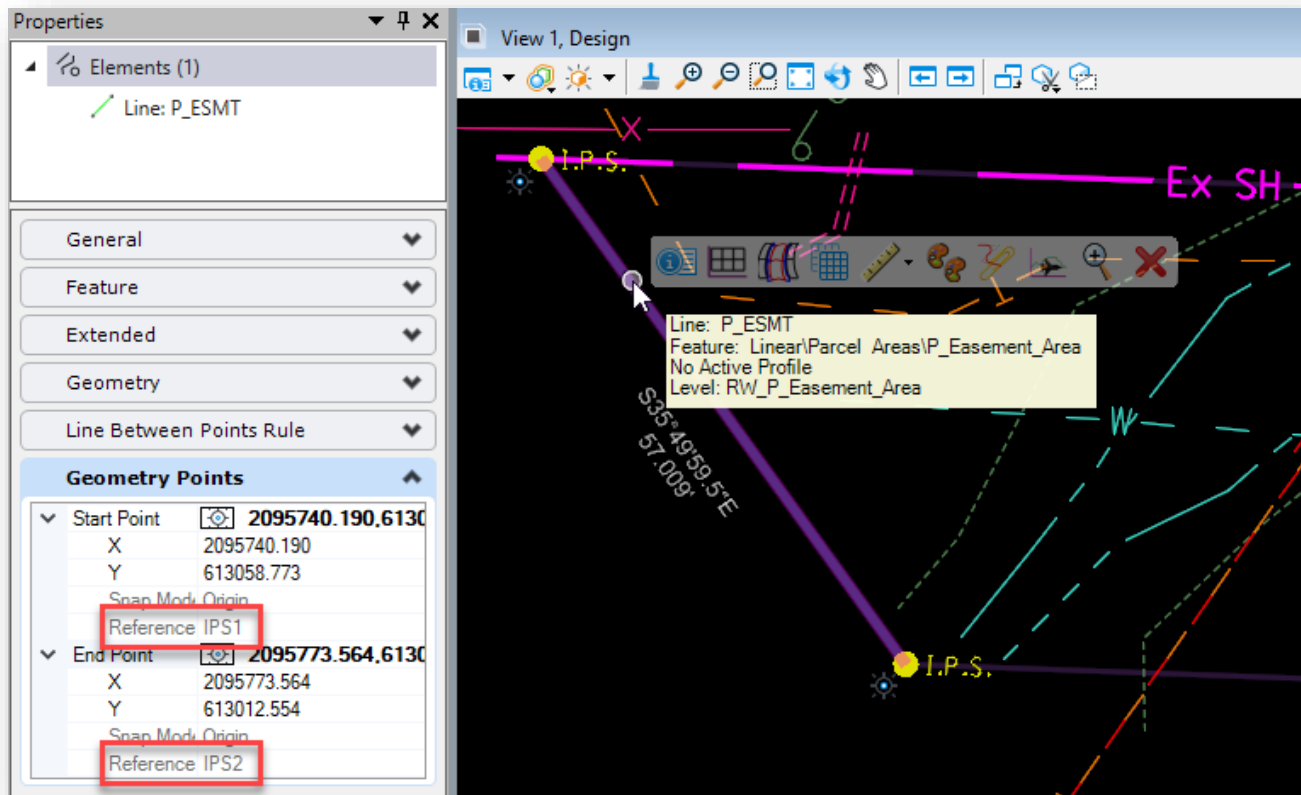
The **Geometry > Complex Geometry > Complex By Element** command is used to create the closed shape for the area. In the example below, an easement area is created. Note that the direction for the closed area, when using the **Automatic Method**, is indicated by the arrow drawn at the end of the first element selected, at the opposite end from the end closest to the location where the element is selected.
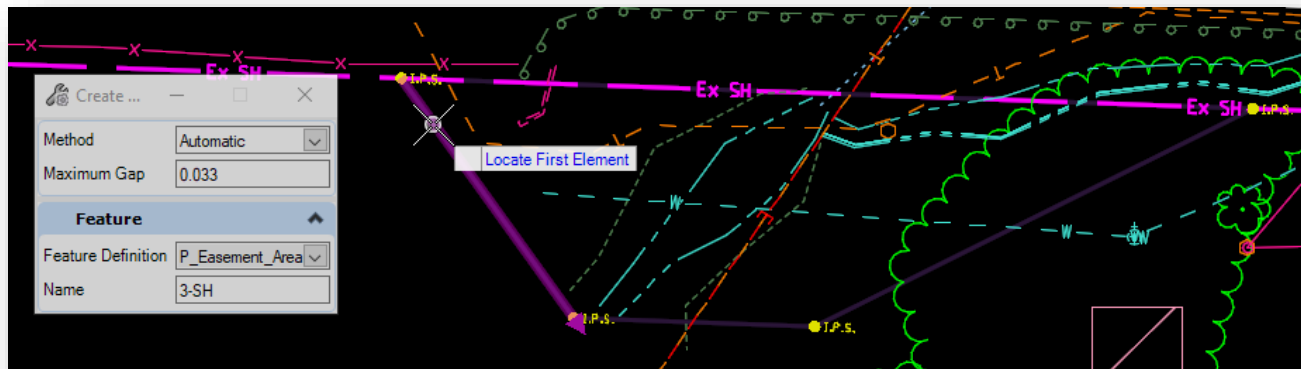
The closed geometry element is intended to be used to generate parcel areas and is not shown on the completed plan. The graphics that are placed when using these Parcel Area feature definitions are placed as construction class elements. These closed areas are useful to generate parcel reports.

Right-of-Way Linear Features

Features for right-of-way and lines are in the **\Linear\Right-of-Way** folder in the ODOT Standards. These features are used to draw the right-of-way lines that will be shown in the right-of-way plans.

The right-of-way lines can be drawn by using the **Origin Snap** to snap to previously placed geometry points or by using the **Keypoint Snap** to snap to the corners of previously placed curvilinear elements used to define a closed parcel area.

If these lines are drawn be snapping to the underlying parcel element or the geometry points, a rule is created to link the lines to the underlying graphics. The right-of-way lines will respond to changes made to the underlying graphics.

In the example below, the feature definition **Linear\Right-of-Way\Easaements\RW_P_Standard Highway Easement** was used to draw the easement lines that will be shown on the right-of-way plans. The level for the underlying parcel area element can be turned off.
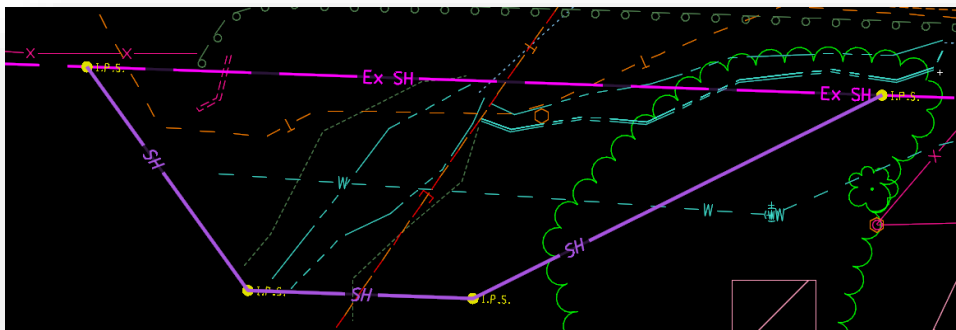
Tip: The **Geometry > Offsets and Tapers > Single Offset Partial** command can also be used to easily draw right-of-way lines along curves like the example below. **Note:** The element is drawn in the direction that the parcel area was stored. In the example below, the area was stored in the counterclockwise direction.
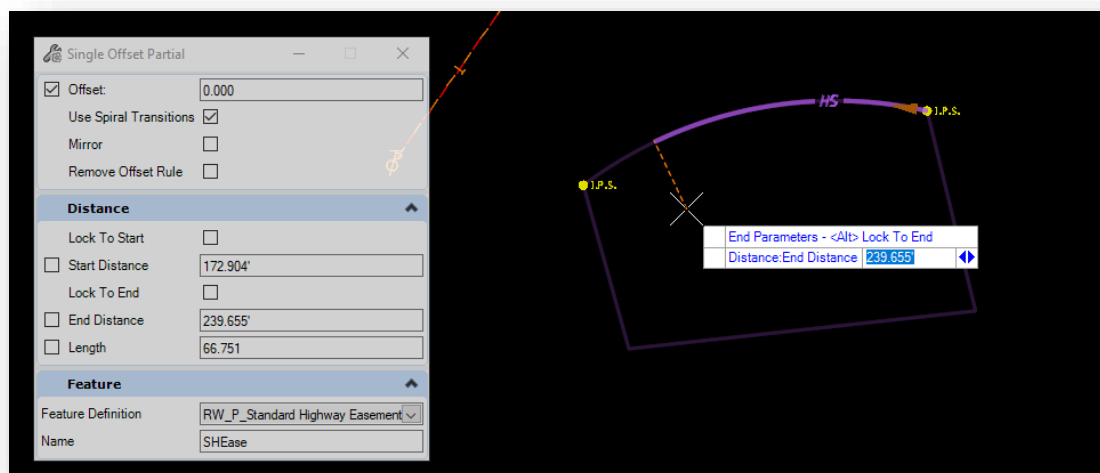
Parcel Annotation

The feature definitions for parcel areas have annotation definitions defined. The **Drawing Production > Element Annotation > Annotate Element** tool is used to annotate selected parcel area elements.

Parcel annotation is typically placed in the drawing model of the sheet design file. The process to clip sheets is detailed in the **OHDOT_Plan_and_Profile_Sheets** document.

In the example below, the closed element representing the easement area was annotated in the drawing model using the **Drawing Production > Element Annotation > Annotate Element** tool. The bearings, lengths, and parcel name is annotated.
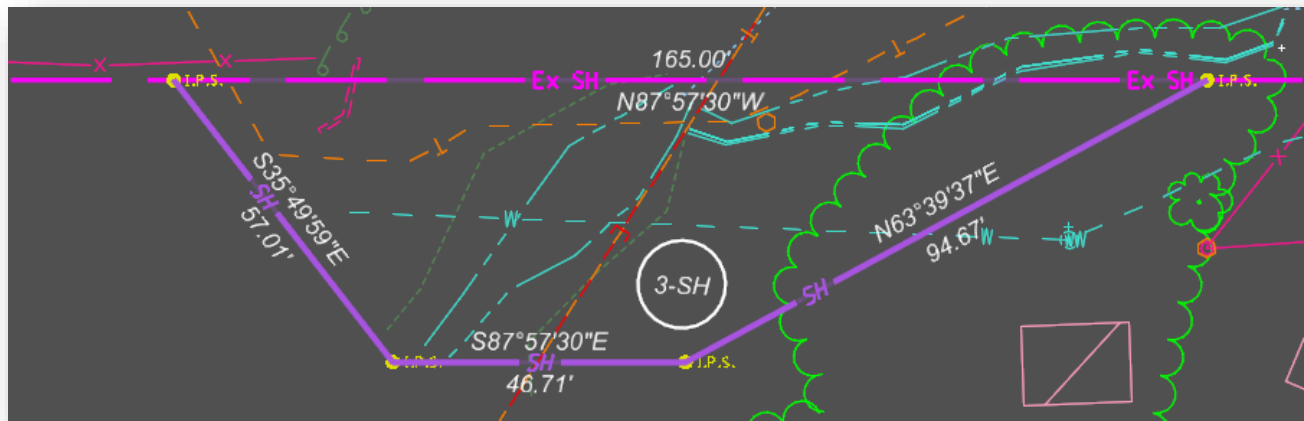
Annotation graphics can be moved or deleted as needed.

Note that if multiple areas adjacent to one another are annotated the bearing and length labels will be placed for each component of the complex element. This will result in overlapping labels that the user can manually delete.

If the parcel area includes an arc element, the radius, length, chord bearing, and chord length are annotated.

If the element is annotated again, previous annotations are left in place. The **Drawing Production > Element Annotation > Remove Element Annotations** command is used to remove previous annotations.

All annotations are drawn using the active Annotation Scale value.

Parcel Labels

ORD supports placing labels that have fields computed from the selected geometry graphic or data point location. The label maintains an association to the element that is being labeled and is automatically updated if changes are made to the element.

Two separate tools that may be used for placing labels are documented below. The new **Civil Labeler** tool was added to the 2021 Release 1 version of ORD, Version 10.10, and is the preferred labeling tool moving forward. The older **Place Label** tool is still valid and may be used if desired.

Civil Labeler

A new annotation tool, **Civil Labeler**, has been added to the 2021 Release 1 version of ORD. As of this writing, the function is in a "tech preview" status as the tool is refined. The Civil Labeler can be accessed from the **OpenRoads Modeling** WorkFlow by selecting **Drawing Production > Labels > Civil Labeler** from the ORD Ribbon menu.
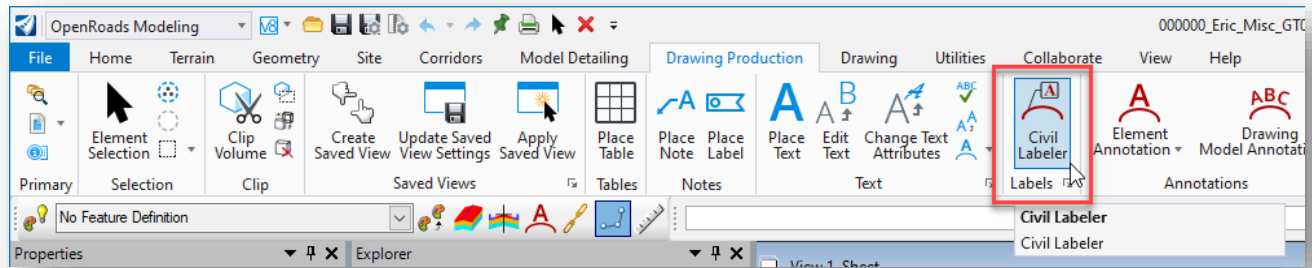
When the command is selected, the **Civil Labeler Tool** dialog is opened with the **OHDOT_Civil_Labeler.xml** file loaded as shown below.

The xml file is configured with multiple folders containing multiple label definitions as shown above. Each folder contains multiple labels. It is beyond the scope of this training guide to document each label option. A few of the common labels will be documented below. Contact the CADD and Mapping Support team with questions or requests to add additional labeling options.

Cross Section and Drainage and Utilities labels will not be covered in this document.

ODOT recommends placing most labels in the various Drawing models for the sheets. Labels should not be placed in the sheet model.

When a label is selected, the dialog presents several options to the user like the example below.
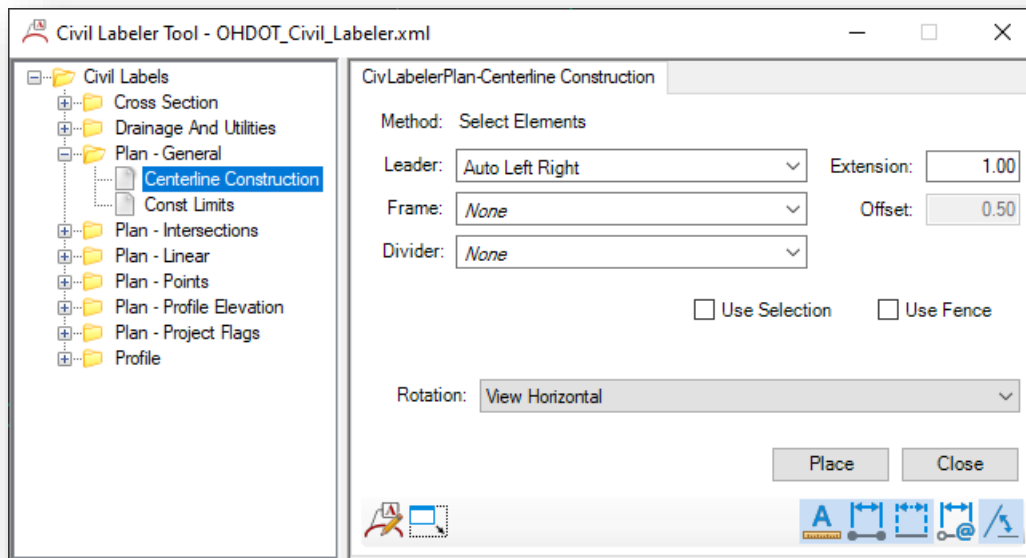
It is beyond the scope of this manual to document every option. The ODOT labels have been configured with the default options most used for each label type. Examples of commonly used labels are included below.

For more information, see the OHDOT_ORD_Design_800_Plan_and_Profile_Sheets training guide.
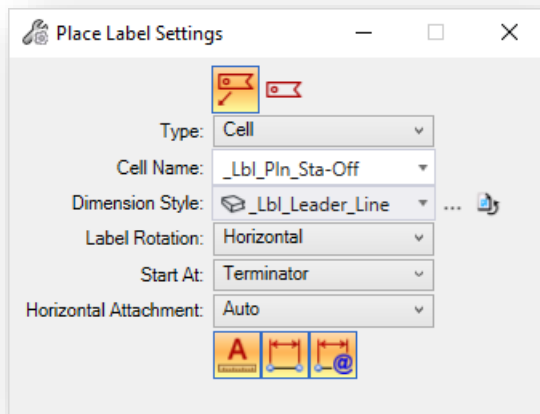
Place Label

With the 2021 Release 1 version of OpenRoads Designer 10.10, ODOT recommends using the new **Civil Labeler** tools. This section is retained in the document for reference.

A label can maintain two types of associations. The first is regular association, in which if you move the element, the label remains at the same place, only the leader line moves along with the element. The second is relative association, in which the label will stay at the same location relative to the original snap point. That is, if you move the element the label will also move with it.

Several labels have been configured in the OHDOT standards for various types of labels. These labels are placed using the **Drawing Production > Notes > Place Label** command.
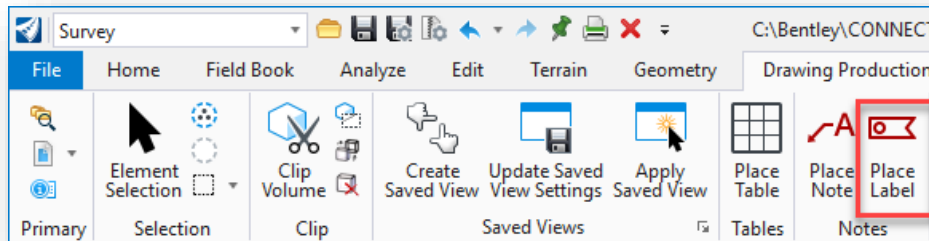
The **Place Label Settings** parameters are displayed in the **Tool Settings** dialog as shown below.

Labels can be placed with or without a leader line by selecting the corresponding icon at the top of the dialog.

The dialog has the following parameters:

Type

> The **Type** option is used to place labels using a **Cell** or a **Text Favorite**. The cell option allows for labels that contain multiple computed annotations. When he cell option is selected, the dialog allows selection of the label from a cell library.
>
> If **Cell** is selected, the **Cell Name** parameter lists all the cells found in the libraries defined by the configuration variable MS_CELLLIST. The labels that have been defined in the OHDOT standards are

named with the prefix **_Lbl** so that they will be listed first in the dialog. A partial list of the cells in the OHDOT WorkSpace that have been defined as labels is shown below.
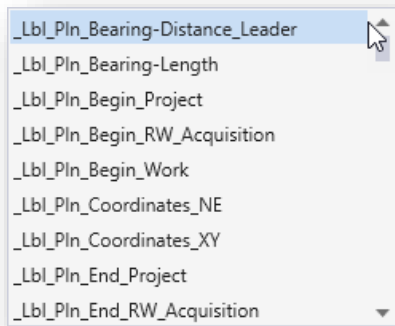
If the **Type** parameter is set to **Text Favorite**, the **Favorite Name** item allows selection of a predefined text favorites.

In general, the **Cell** option is used for placing labels as they have been defined in the OHDOT WorkSpace. The text favorites are used as a component of the Cell labels, or other annotation functions within ORD such as the station annotation or the curve data. There may be occasions when using one of the text favorites directly is desired.

Dimension Style

The **Dimension Style** parameter us used to select a dimension style from the OHDOT standards that will be used to set the symbology settings for leader lines. Two options are provided in the OHDOT Standards that are used for the labeling process:

       _Lbl_Leader_Line

       _Lbl_Leader_Line_With_Terminator

See the online documentation for a description of the remaining parameters.

Station and Offset Labels

Labels that have been defined using a station or offset text favorite require that the alignment is selected before the label is placed.

In the example below, the **_Lbl_Pln_Sta-Off** cell is selected.
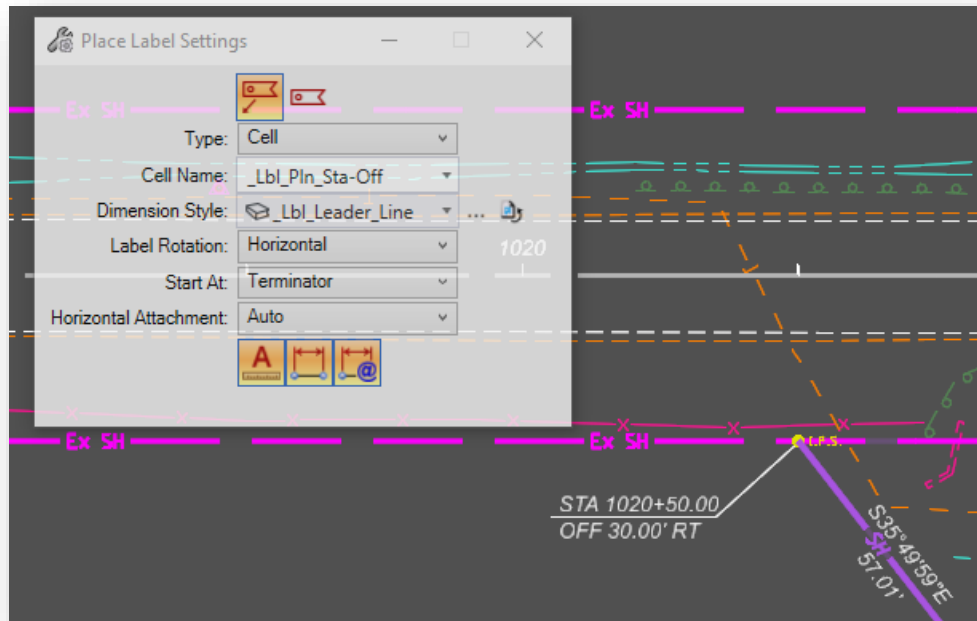
The user is prompted to **Identify Element or Data Point** in the prompt field at the lower left corner of the ORD interface. Take the following steps:

- Select the alignment for the station and offset reference
- Select the location for the label. The **Start At** parameter is set to define whether the data point is at the **Terminator** or the **Placement** point for the label.
- Additional labels can be placed without the need to re-identify the alignment

Additional label types have been defined for Right-of-Way plans. See the **Cell Name** drop-down list to review the available labels. The **_Lbl_Pln_Begin_RW_Acquisition** label is shown below.
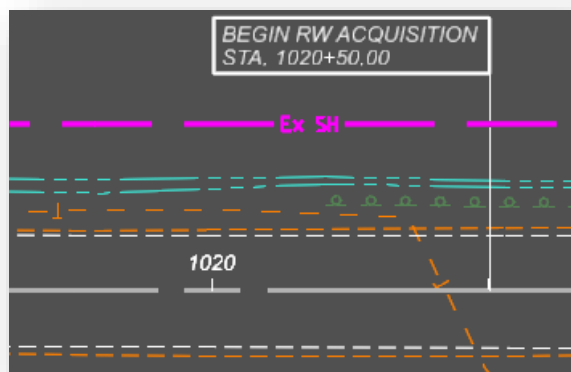
Geometry Builder

There are multiple ways to create a parcel in ORD. The **Geometry Builder** tool is specifically designed for creating and editing parcel elements.

Select **Geometry > Complex Geometry > Geometry Builder** from the **OpenRoads Modeling** workflow as shown below.
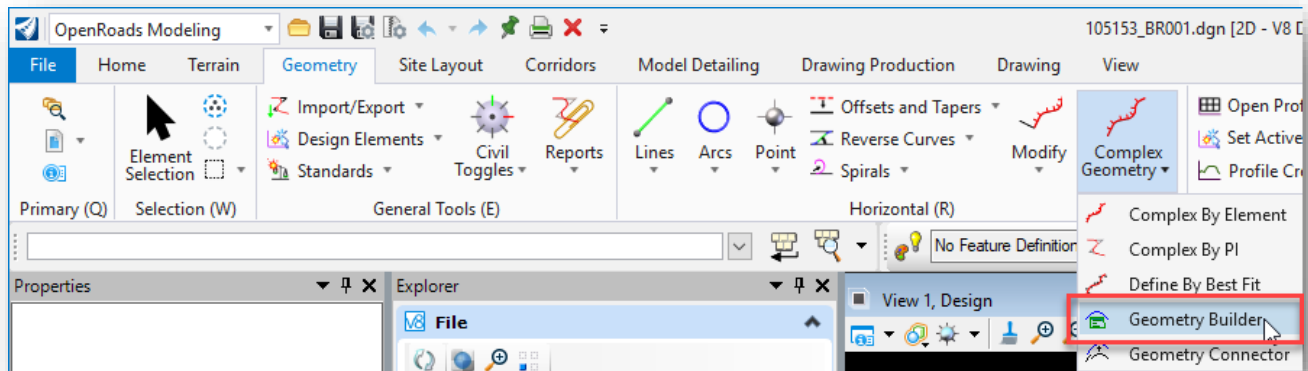
The *Geometry Builder Tool* dialog is opened as shown below.
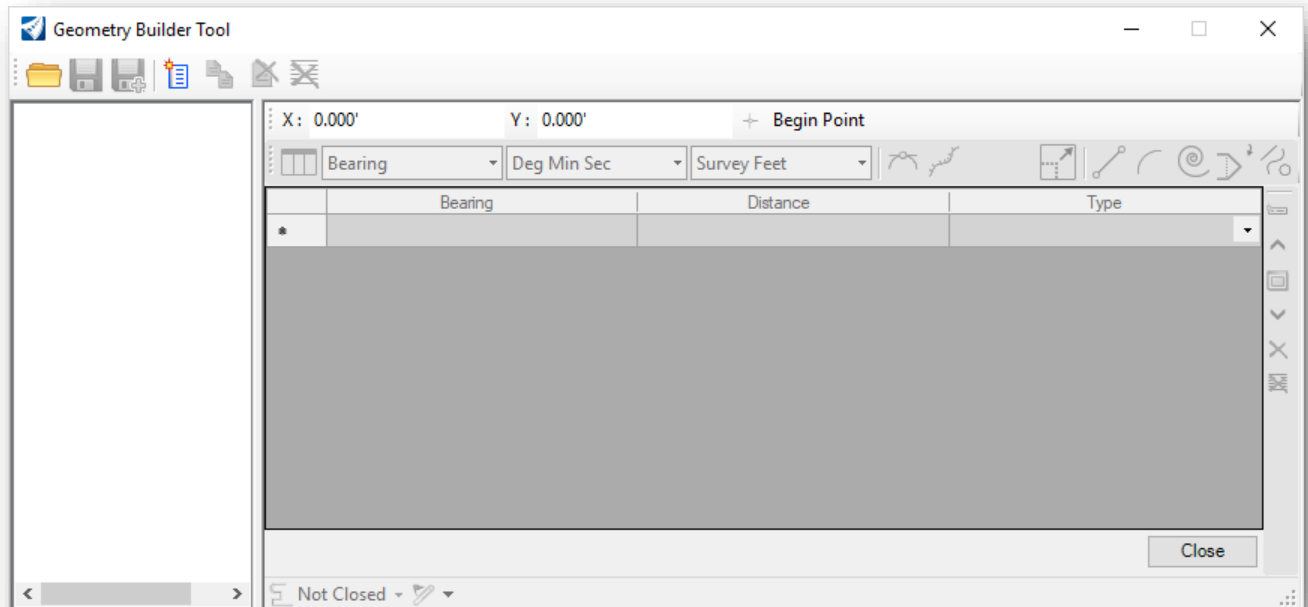
See the Bentley online help for options not covered in this document.

Creating Parcel Elements

The steps to create a closed parcel area are summarized below.

- Select the **Add new geometry** button
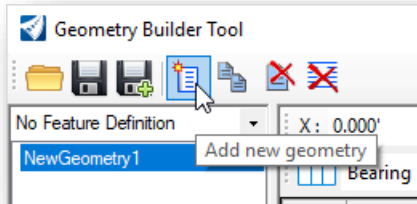
A geometry definition named **NewGeometry1** is created as shown at left.

- Choose the feature definition from the drop-down list. By default, No **Feature Definition** is defined as shown above.
- Edit the name of the geometry element by selecting the name, and then left-clicking on the name a second time once it has been selected.
- Toggle on the **Create ruled civil elements** option
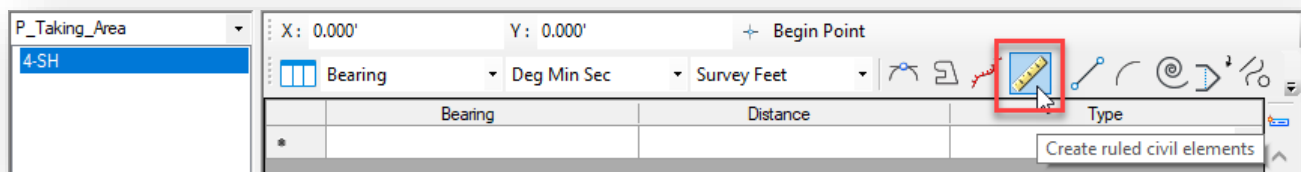
- Enter the data to create the parcel area. An example is shown below.
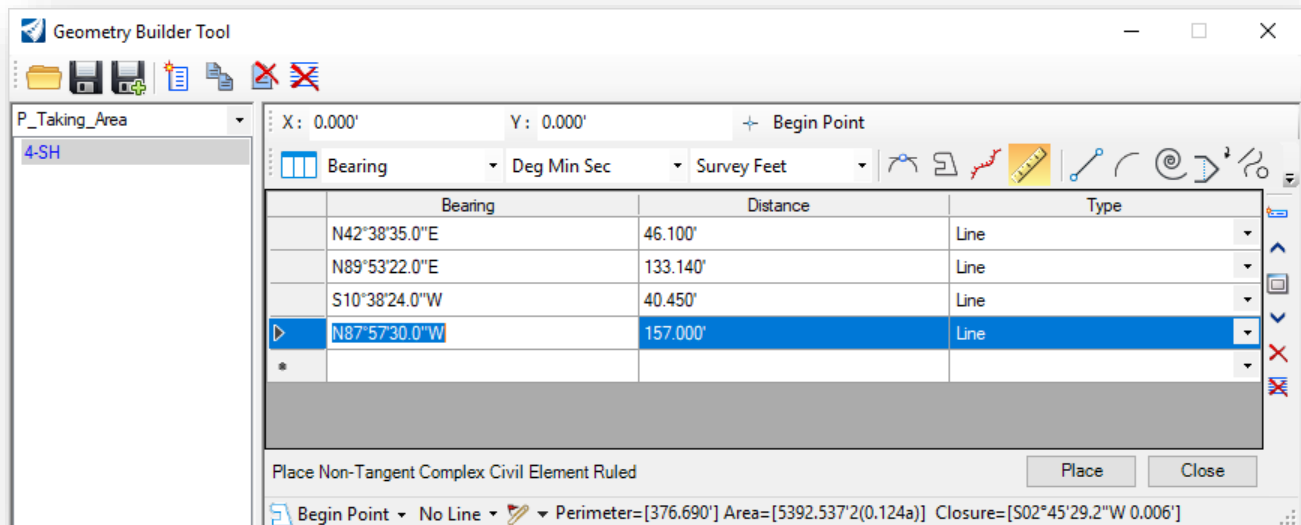
Information about the parcel, such as the perimeter, area, and closure of the shape, is displayed at the bottom of the geometry builder dialog.

- Select the **Begin Point** icon, or key-in the **X,Y** coordinates for the start of the parcel location.

  When the **Begin Point** icon is selected, the parcel graphics will drag on the cursor until a data point location is defined.

  The graphics are displayed in the file as temporary graphics like the example below. Changes to the parcel definition are dynamically reflected in the temporary graphics.
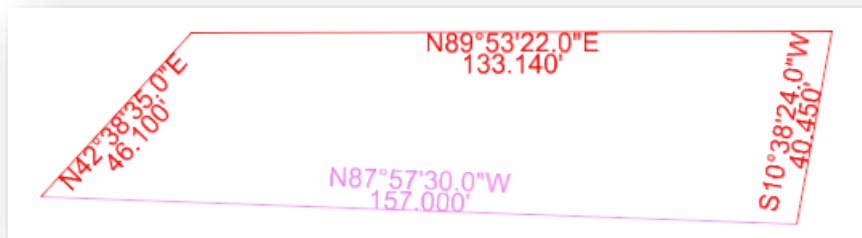
- Select the **Place** button to write the graphics to the design file. The parcel element is placed in the design file using the symbology defined by the selected feature definition.

Saving Parcel Definitions to an XML File

After the geometry has been defined, it is good practice to save an XML file with the geometry data.

- Choose the **Save** icon at the top left of the *Geometry Builder* dialog.

  Note: In this release, the software does not allow saving the file directly in ProjectWise. Save the file to the desktop and then copy the file into ProjectWise in the **\400-Engineering\RW\EngData** folder for the WorkSet.

Previously saved XML files can be re-opened for editing using the **Open File** icon.

Locking Right-of-Way Elements

Parcel areas and right-of-way curvilinear elements can be locked by deactivating the rules. The rules for selected elements can be deactivated by selecting the element and choosing the **Deactivate Rules** command from the pop-up menu as shown below.
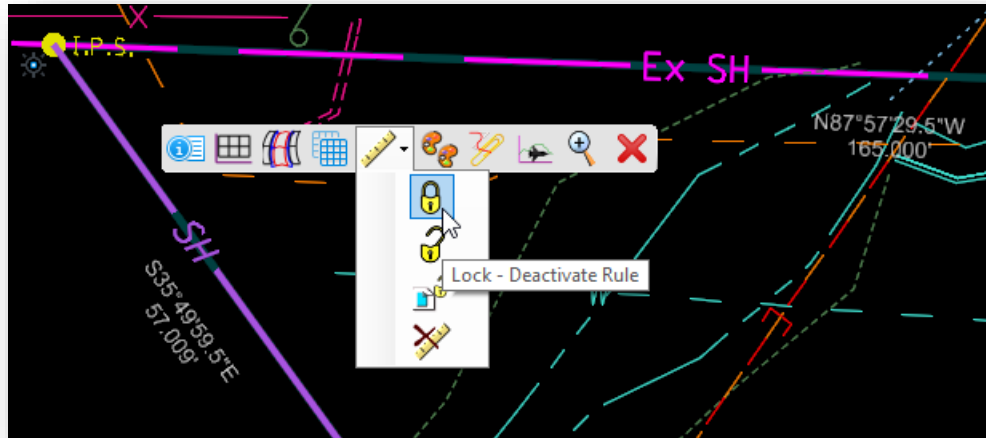

Alternately, the rules can be deactivated by choosing the **Geometry > Civil Toggles > Deactivate Rules** command and then selecting the element(s) to deactivate the rules.

Once deactivated, the element is locked and cannot be edited or deleted. Use the **Activate Rules** command, which can be selected from the pop-up menu or by choosing **Geometry > Civil Toggles > Activate Rules**, to reactivate the rules to allow editing or deleting the element.

Export Right-of-Way Geometry to XML

XML files can be saved with the parcel element definition as a back-up to the parcel data. This is useful to recreate the parcel should the data be inadvertently modified or deleted. To save an XML file for a parcel element, select the **Geometry > Import/Export > Export Geometry** command.
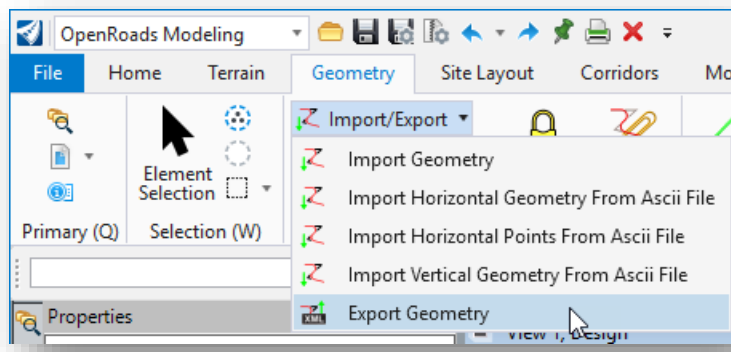
When prompted, choose the element that you wish to export to an XML file.

Save the XML file in the **\400-Engineering\RW\EngData** folder. Name the XML file using the name of the parcel element.

The **Geometry > Import/Export > Import Geometry** command is used to import the XML file if it is necessary to recreate the parcel element.

Reports

Various reports are provided for parcel areas and points.

Horizontal Geometry Report

Select a parcel area and let the cursor rest on the element until the pop-up menu appears. The **Horizontal Geometry Report** option can be used to generate a report for the area.
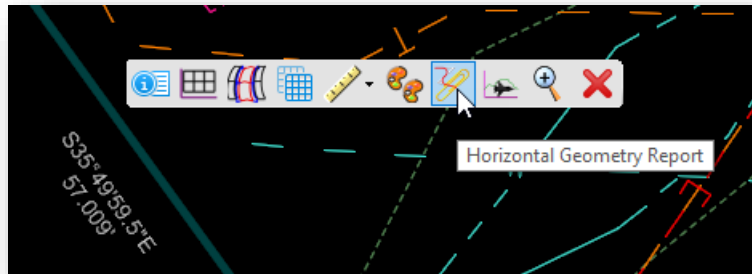
When the report icon is selected from the pop-up menu, the **Report Browser** dialog is opened with the default **Horizontal Alignment Review Report** selected.

In the **Report Browser** dialog, the **LegalDescription** and **Map Check** folders contain various reports for parcel areas.

Depending on the report command that is used to open the **Report Browser** dialog, the selected report may not contain the desired information. For example, if the **Report Browser** dialog is accessed by selecting the **Horizontal Geometry Report** icon as shown above, selecting the **ParcelLayoutFromRefernce** report does not have the necessary information to generate the station and offset data for the report.

When using the **Horizontal Geometry Report**, the **Horizontal Alignment Review** report is the default report as shown below.

Parcel Reports

Various reports applicable to parcels are available on the **Home** tab in the **Reports** group as shown below.
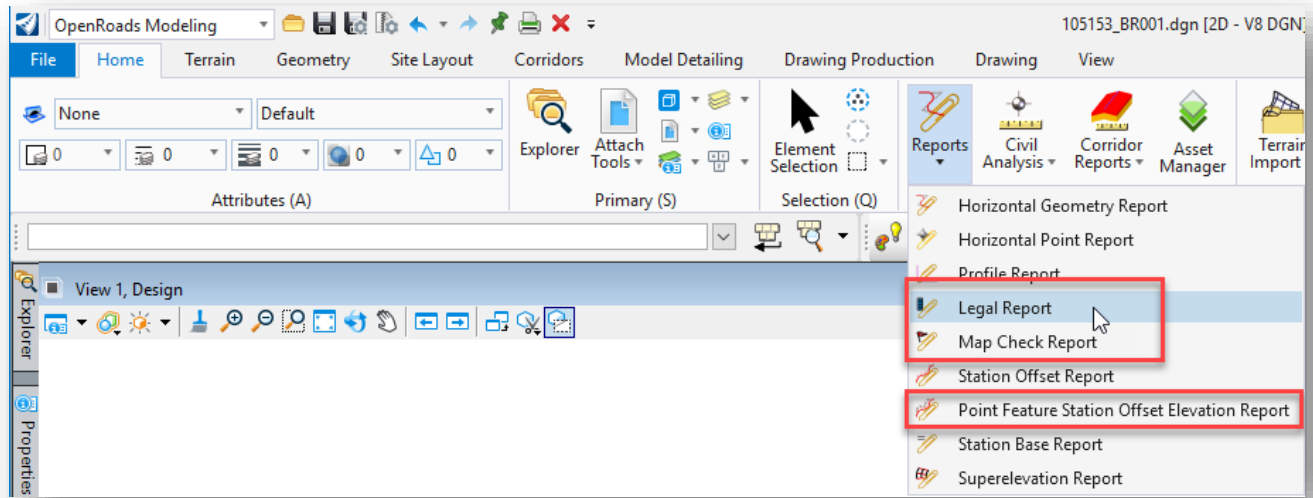
Legal Report

Legal descriptions can be generated by selecting **Reports > Legal Report** from the **Home** tab. When this command is selected, the user is prompted to enter the following information:

- Locate First Element
  - Choose the first parcel element to be included in the report
- Locate Next Element – Reset to Complete
  - Choose additional parcel elements to be included in the report or reset to complete the parcel selection process
- Locate Parent Element – Reset to Skip
  - Choose the parent tract element
- Locate Primary Reference – Reset to Skip
  - Choose the primary alignment for station and offset references
- Primary Reference Alignment: Bandwidth
  - Enter the bandwidth value
- Locate First Secondary Reference Element
  - Choose the secondary reference element for station offset references. Reset to skip this step

After entering the data as prompted, the report is generated. By default, the **LegalDescription HorizontalAlignmentLegalDescription** report is selected. Any of the reports in the **LegalDescription** category can be selected. If a reference element is included in the selection process, the station and offset information is included depending on the selected report.

Map Check Report

The map check report is generated by selecting **Reports > Map Check Report** from the **Home** tab. When this command is selected, the user is prompted to locate the parcel element for the report. An example of the report is shown below.

The **MapCheck** report is the default report for this command as shown above. Reports in other formats can be selected from the list at the left side of the dialog.
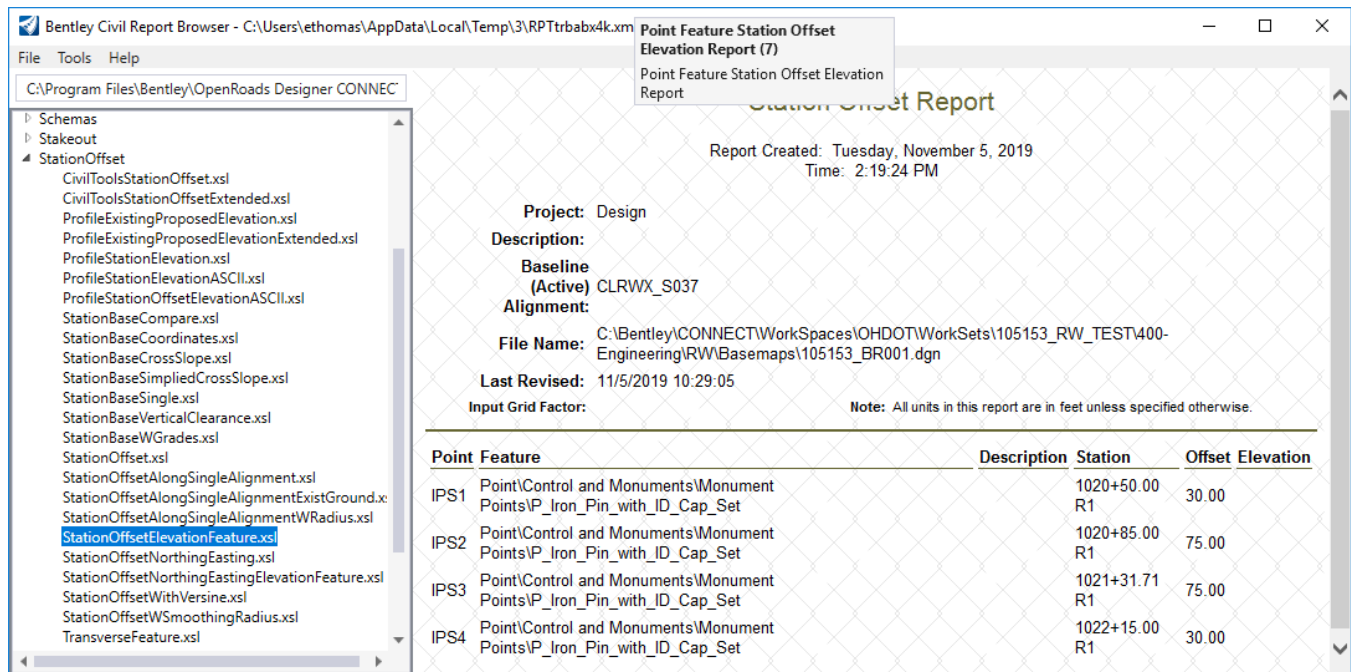
Point Feature Station Offset Elevation Report

This report is generated by selecting **Reports > Point Feature Station Offset Elevation Report** from the **Home** tab. When this command is selected, the user is prompted as follows:

- Locate Baseline Element
  - Select the alignment to be used for station and offset references
- Locate First Offset Element
  - Select the geometry point element to include in the report
- Locate Next Offset Element – Reset To Complete
  - Select additional geometry point elements or reset to complete the selection

An example of the report is shown below.

The **StationOffsetElevationFeature** report is the default report for this command. Note that a few other station and offset report formats are available for selection in the list on the left side of the dialog.

Report Format

The **Report Browser** allows the user to set the output format for the reports by choosing **Tools > Format options.**

The values shown below are recommended for most ODOT applications.

Saving Reports

Reports can be saved by choosing **File > Save As** from the *Report Browser* dialog.

Right-of-Way related reports are typically saved in the **\400-Engineering\RW\EngData** folder.

Displaying Right-of-Way on Cross Sections

The location of the Right-of-Way and Easement lines can be displayed in a dynamic cross-section view and on the cross-section sheets like the example shown below:
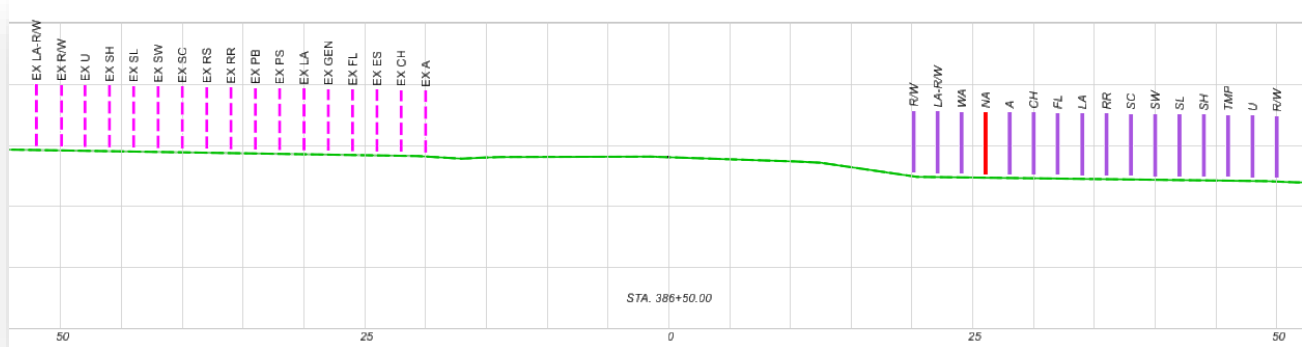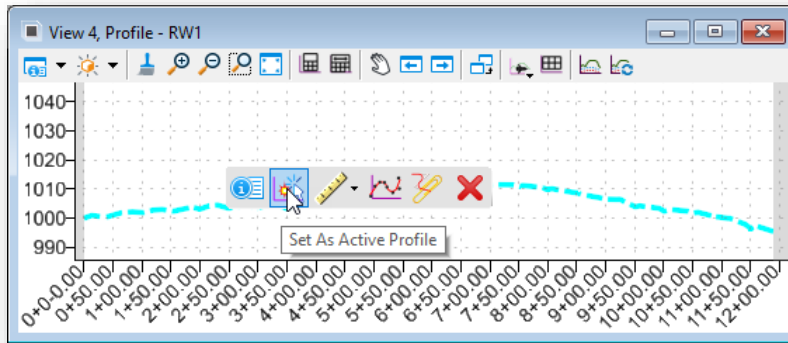

To display the Right-of-Way lines on the cross-sections, each Right-of-Way line must have an profile defined. This is accomplished by opening a profile view for each Right-of-Way line and defining the exiting ground profile as the active profile. When the profile is defined for right-of-way lines, a 3D line string is created in the 3D model for the line.

The workflow to assign a profile to the right-of-way lines is as follows:

- In the right-of-way basemap design file (BR), attach the design file containing the existing terrain

- Set the referenced terrain model as the active terrain by selecting the terrain and choosing the **Set As Active** Terrain option from the pop-up menu
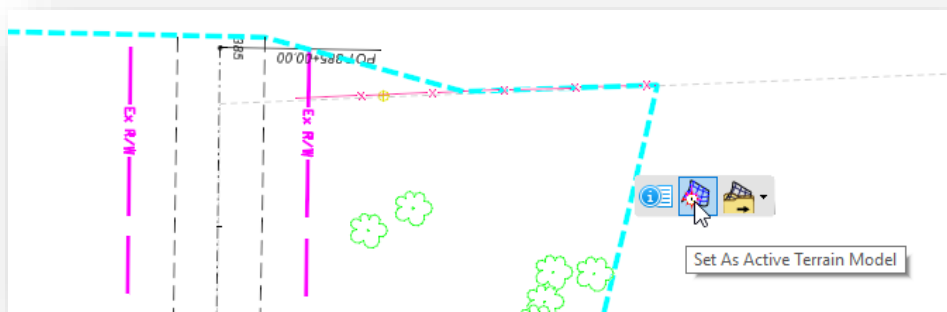
- Open a profile model for each right-of-way line, either by selecting the element and choosing the Open **Profile Model** option, or by holding down the right-mouse button and choosing **View Control > 2 Views Plan/Profile** from the pop-up menu.

- Select the ground line in the profile window and choose the **Set As Active Profile** option from the pop-up menu

A 3D element is generated in the 3D model like the example below.
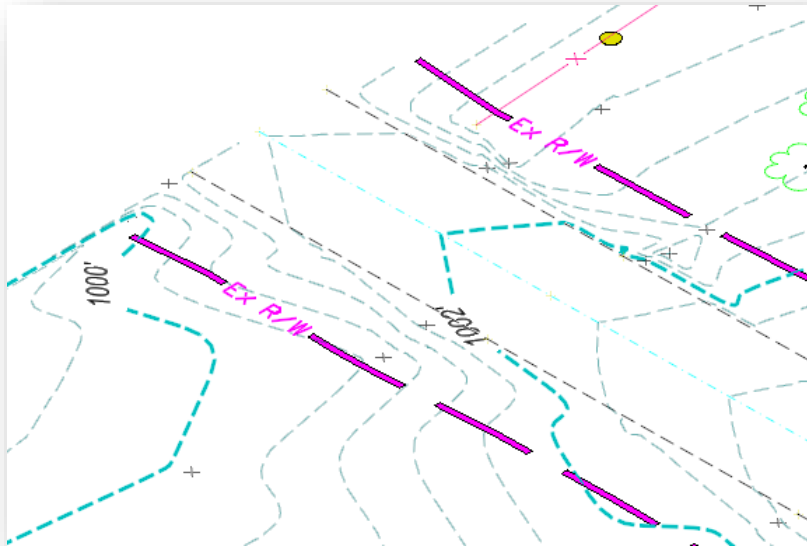
When cross sections are generated, if the cross section intersects a 3D Right-of-Way line in the 3D model, a cell is placed in the cross section at the right-of-way line offset and elevation.

Construction Limits

Construction limits can be generated from the graphics drawn during the 3D modeling process. There may be multiple ways to generate the construction limit lines using the template. This section documents that process that seems to work best for ODOT projects. The process is summarized below:

- Assign the **Feature Name Override** name consistently for the outer tie-down points in the template. This applies to all points in the template that tie to ground for both cut and fill conditions. In the example at right, the name R-TIE is assigned to all the outer tie-down points on the right side of the template.

- Assign the DT_P_Grade_Tie_Line **Feature Definition**, as shown at right, to all the outer tie down points in the template.

- When the template is processed, a continuous element is drawn in the 2D model at the outer tie-down location. This line will connect between different cut and fill transitions if the same **Feature Name Override** is used for all the outer tie-down points. An example is shown below.
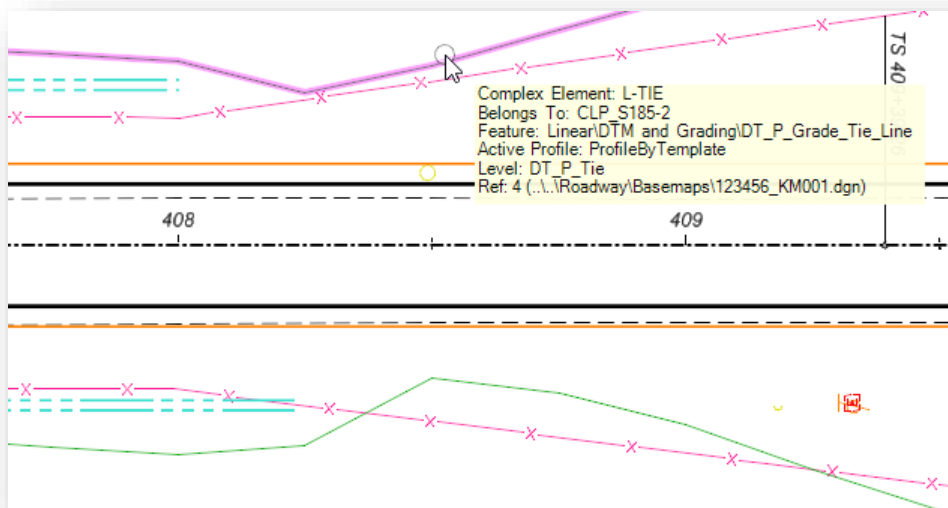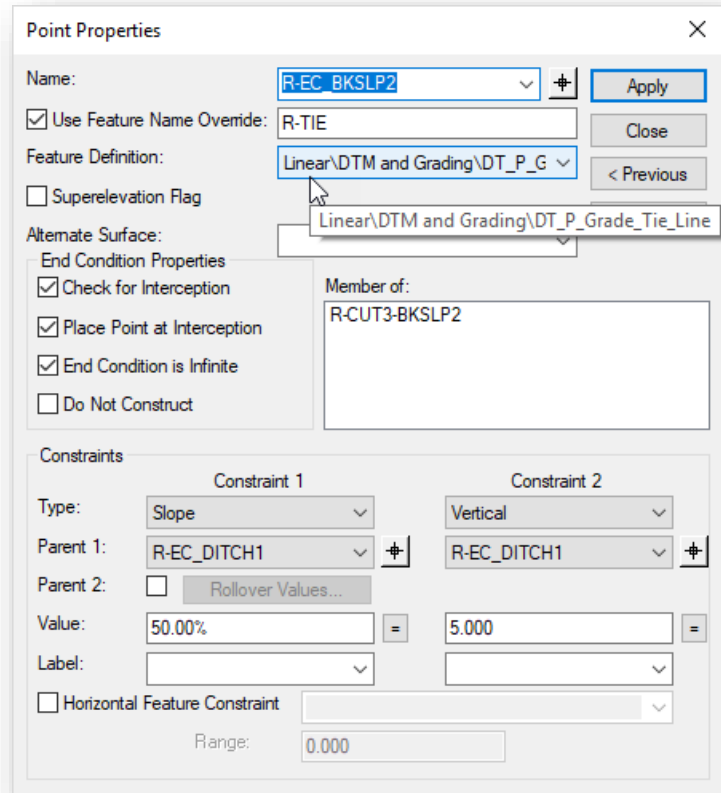
Construction limits can be generated from the outer tie-down lines as follows:

- The construction limits are normally drawn in the right-of-way design file (BR) containing the proposed right-of-way information. Attach the corridor design file (KM) containing the outer tie-down lines as a reference.

- From the **OpenRoads Modeling** Workflow, select **Geometry > Offsets and Tapers > Single Offset Entire Element**
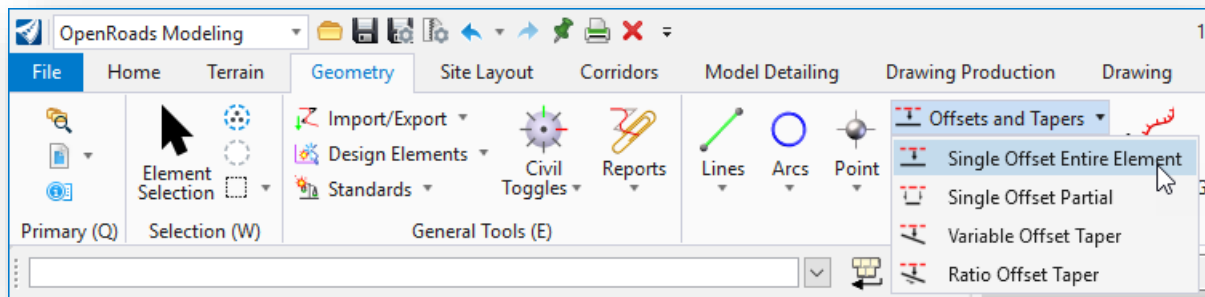

- Enter the desired **Offset** value

- Set the **Feature Definition** to **Linear\Right-of-Way\RW_P_Construction Limits**

- Select the DT_P_Tie element to create the new offset the element. An example is shown below.
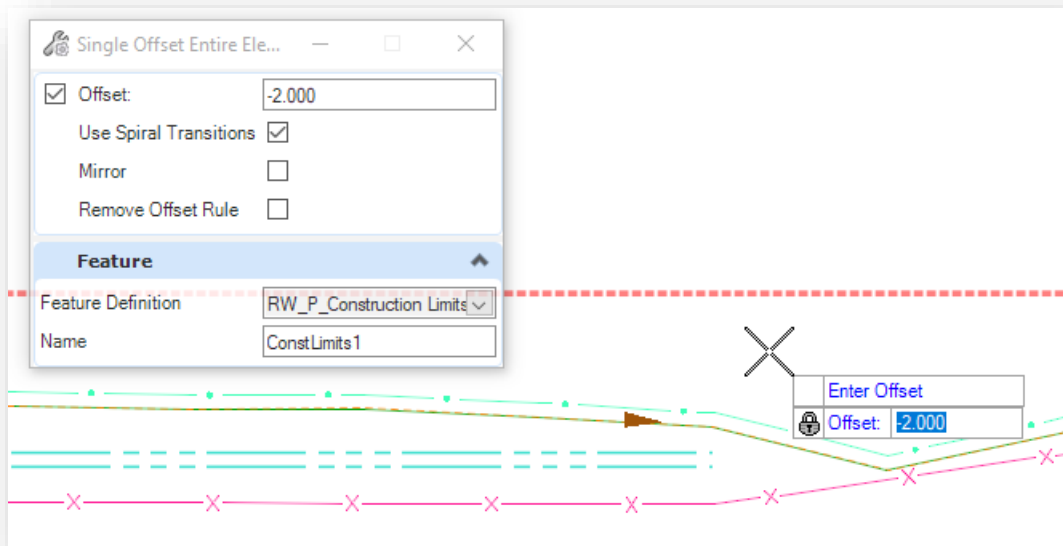
- The newly created construction limit element is a ruled geometry element. To make edits to the element, it is necessary to remove the rules. Use the **Element Selection** tool to select the element and choose the **Remove Rule** option from the pop-up menu as shown below. After removing the rules, the element can be modified as desired using standard MicroStation drawing commands.
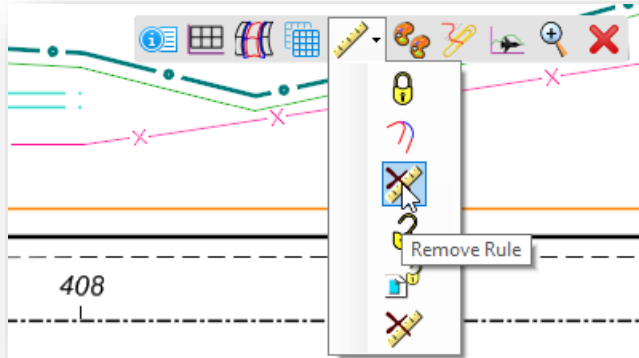
OpenRoads Software Version

This document was prepared using the following software version:

OpenRoads Designer CONNECT Edition – 2021 Release 1 Update 10 – Version 10.10.01.03

Contacts

For any questions, suggestions, or problems with this document please contact the ODOT Office of CADD and Mapping Services by use of the following form on the ODOT website:

https://odot.formstack.com/forms/cadd_servicerequest