OpenRoads Designer User Manual

U.S. Department of Transportation
Federal Highway Administration

Chapter 1

INTRODUCTION TO OPENROADS DESIGNER

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Chapter 1 Introduction to OpenRoads Designer

This chapter discusses basic operation of OpenRoads Designer (ORD).

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1A – ORD FILE TYPES AND OPENING THE SOFTWARE

ORD Files have a ".dgn" file extension.

The name of an ORD File signifies the type, purpose, and function the ORD File. Each FLH Division has their own Naming Convention for ORD Files. For FLH Naming Convention information, see *3C - ORD File Naming Conventions*.

A FLH Project will use many ORD Files to create a plan set. Each ORD File has a specific function relating to survey, design, quantity calculations, or plan sheet production. In a broad sense, ORD Files can be categorized into three types:

Survey ORD Files: Survey ORD Files contain the Existing Ground Terrain Model (which show the Existing Ground contours) and surveyed linework for existing features (i.e., existing edge of road, existing culverts, existing utilities, existing Right-of-Way boundaries).

> ***NOTE:*** For typical projects, there is a **single** Survey ORD File that contains all survey data. However, some projects may separate survey data into **multiple** Survey ORD Files. For larger projects, the Existing Ground Terrain Model may be placed in dedicated Survey ORD File and the survey planimetric linework in a different file.
>
> ***NOTE:*** Typically, existing or proposed Right-of-Way and property boundaries linework is placed in a dedicated ORD File.

Design ORD Files: Design ORD Files are used to draw proposed features and create civil models (i.e., road corridor models, approach road models, retaining wall models, and bridge models). A typical project contains many Design ORD Files. Create a Design ORD File for each design feature and/or discipline. Some common Design ORD File are:

- **Mainline Alignment ORD File:** Used to draw the Alignment and Profile for the mainline road.
- **Mainline Corridor ORD File:** Used to model the proposed road Corridor.

  > ***TIP:*** Open the **Mainline Corridor ORD File** to review the overall design for a project. Typically, all other Design ORD Files are referenced into and displayed in the Mainline Corridor ORD File. In the Mainline Corridor ORD File, the design can be reviewed from a 2-dimensional, 3-dimensional, and cross-sectional perspective. See *1A.3 Navigate a Design ORD File*.
- **Superelevation ORD File:** Used to create Superelevation elements that work in conjunction with a road Corridor.
- **Earthwork and Quantities ORD Files:** Automated quantities calculations are performed in a dedicated ORD File. Quantities are generated from civil models (i.e., proposed road Corridor).
- **Culvert and Hydraulics ORD Files:** Used to model culverts and other hydraulic features.
- **Proposed Traffic Control ORD File:** Used to draw pavement markings and place signage.
- **Bridge Design ORD File:** Used to draw and model bridge features.
- **Erosion Control ORD File:** Used to draw Soil Erosion and Sediment Control features.

BEST PRACTICE: Create separate Design ORD Files for each design feature and discipline. For example, perform all Bridge design in a dedicated ORD File. Create separate Design ORD Files for the mainline corridor and approach roads (do NOT place these features in the same Design ORD File).

WARNING: Do NOT place Plan Sheets (*Sheet Models*) in a Design ORD File.

Plan Sheet ORD Files: Plan Sheet ORD Files are used to create and print sheets. Each sheet in a plan set has a corresponding *Sheet Model* . A Plan Sheet ORD File may contain multiple *Sheet Models* . A Plan Sheet ORD File is created for each plan sheet type or Section in the Plan Set. For example, all Erosion Control sheets are created in a single Plan Sheet ORD File. However, do NOT draw the Erosion Control features within the Plan Sheet ORD File. Instead, draw them in a dedicated Design ORD File – which is later referenced into the Plan Sheet ORD File.

For more information on the organization and data federation of ORD Files used on a project, see *2F – Project Organization and Data Federation Best Practices*.

1A.1 Opening the Software and WorkSpace/WorkSet Selection Menu

The **WorkSpace/WorkSet Selection Menu** is shown when the software is opened directly from the Windows Start Menu or Desktop. The **WorkSpace/WorkSet Selection Menu** is NOT shown when an ORD File is opened directly from the Windows Explorer.

NOTE: The **WorkSpace/WorkSet Selection Menu** is NOT shown when an ORD File is opened directly from ProjectWise using the Managed WorkSpace configuration. The appropriate WorkSpace and WorkSet is automatically loaded when accessing ORD Files from ProjectWise.

Before an ORD File is opened, the **FLH WorkSpace** and the project-specific **WorkSet** must be selected.

FLH WorkSpace contains drafting resources that were created by FLH. The FLH WorkSpace must be loaded in order to create plan sets that meet FLH Drafting Standards. For FLH projects, all ORD Files must use the FLH WorkSpace.

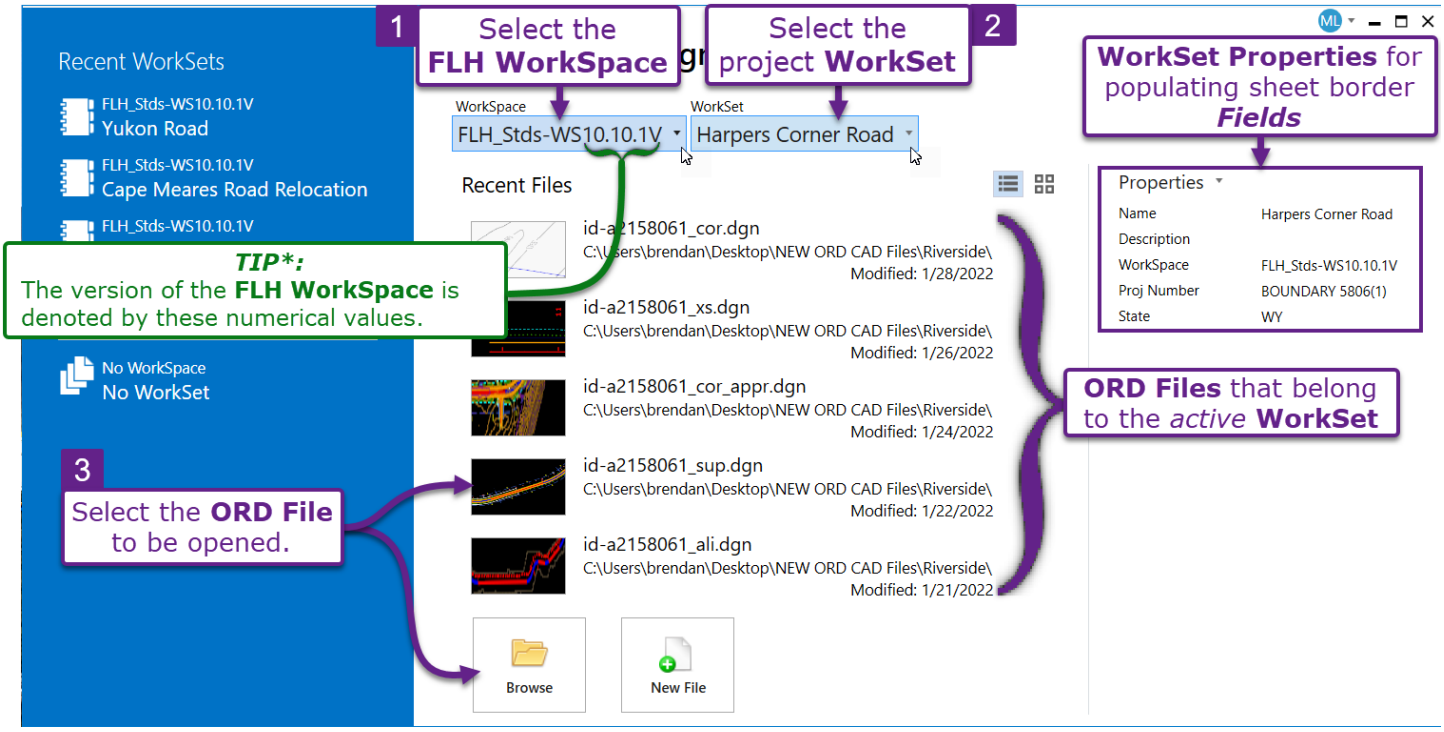
> ***TIP*:** Before using the ORD Software, ensure that the current version of the FLH WorkSpace is installed. Verify the WorkSpace installation with your Engineering System Manager. The current FLH WorkSpace is available from: https://highways.dot.gov/federal-lands/cadd-support/downloads

WorkSet is a collection of ORD Files that belong to the same project. Each project requires a WorkSet. Also, the WorkSet contains properties that automatically populate *Field* text found in the sheet border.

> ***TIP:*** For more information on the **FLH WorkSpace** and **WorkSets**, see *2B – Introduction to the WorkSpace and WorkSet*.

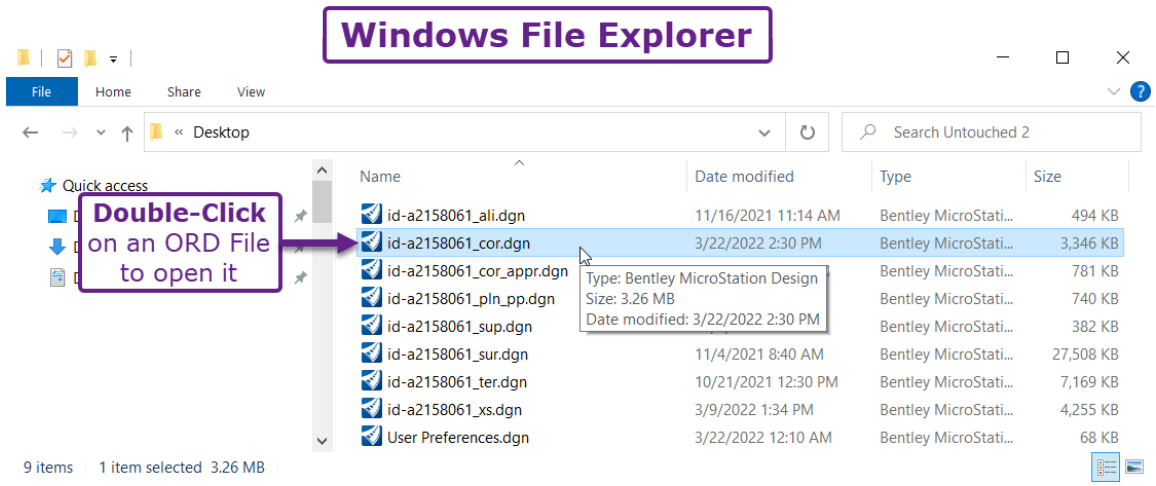
> ***TIP:*** For the creation of a WorkSet at the beginning of a project, see *2D – Create a Project WorkSet – Non-ProjectWise Users*. For **WFLHD Project-Wise Users**, the WorkSet is setup by the ProjectWise Administrator. See *2C – Working In and Outside of ProjectWise*.

The graphic below shows the **WorkSpace/WorkSet Selection Menu**. The procedure for *activating* the FLH WorkSpace and project WorkSet is as follows:



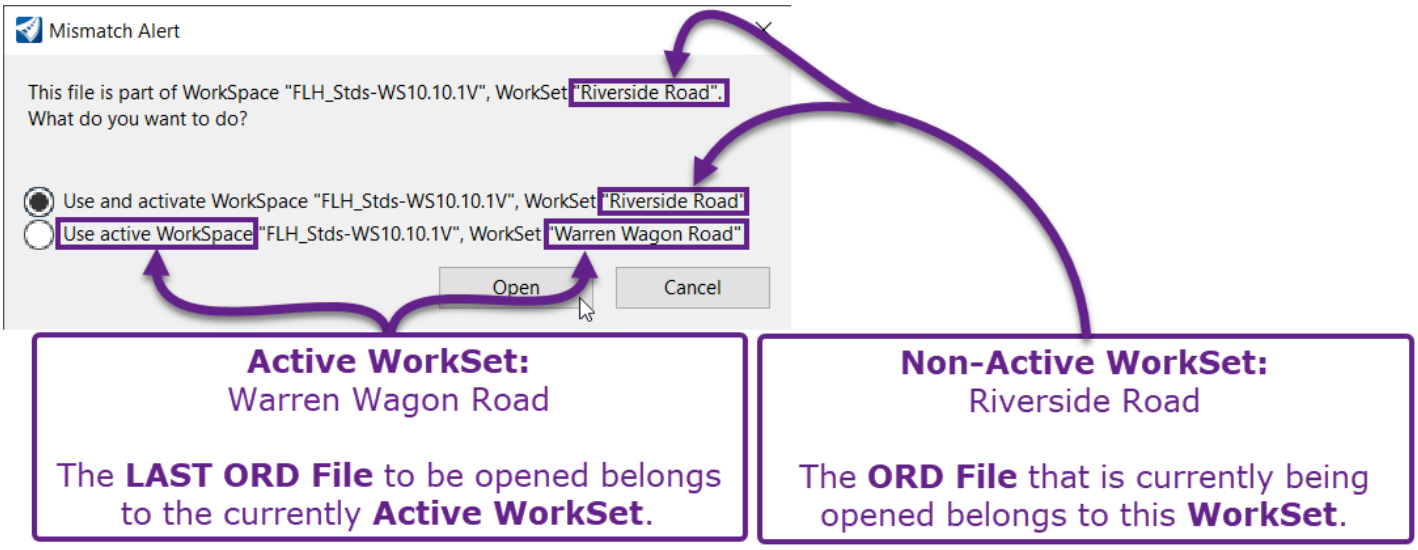
1A.1.a Mismatch Alert when Opening ORD Files

ORD Files can be opened by double-clicking an ORD File in the Windows File Explorer. However, the **WorkSpace/WorkSet Selection Menu** is NOT shown when opening an ORD File from the Windows File Explorer.



IMPORTANT: When a WorkSpace and WorkSet is used, it becomes **Active**. The **Active WorkSpace** and **WorkSet** is remembered after the software is closed. The current or last WorkSpace opened is active.

If an ORD File belongs to a non-active WorkSpace/WorkSet is opened, then the **Mismatch Alert** is shown:



In the graphic shown above, the LAST ORD File that was opened belongs to the "Warren Wagon Road" WorkSet. The "Warren Wagon Road" WorkSet is currently active. The ORD File that is currently being opened belongs to the "Riverside Road" WorkSet – which is NOT active.

If the first option: 'Use and activate WorkSpace "FLH_Stds-WS10.10.1V", WorkSet "**Riverside Road**"' is used, then the non-active WorkSet (Riverside Road) is loaded and becomes active.

If the second option: 'Use active WorkSpace "FLH_Stds-WS10.10.1V", WorkSet "**Warren Wagon Road**"' is used, then the current ORD File is transferred from the "Riverside Road" WorkSet to the "Warren Wagon Road" WorkSet.

IMPORTANT: An ORD File can ONLY belong to one WorkSet at a time.

1A.2 Mouse Operations

This section discusses actions that are performed with the computer mouse.

1A.2.a Mouse Commands: Data Point, Reset, and Accept

The terms **Data Point**, **Reset**, and **Accept** are commonly shown in the *Prompt* bar during the operation of a tool.

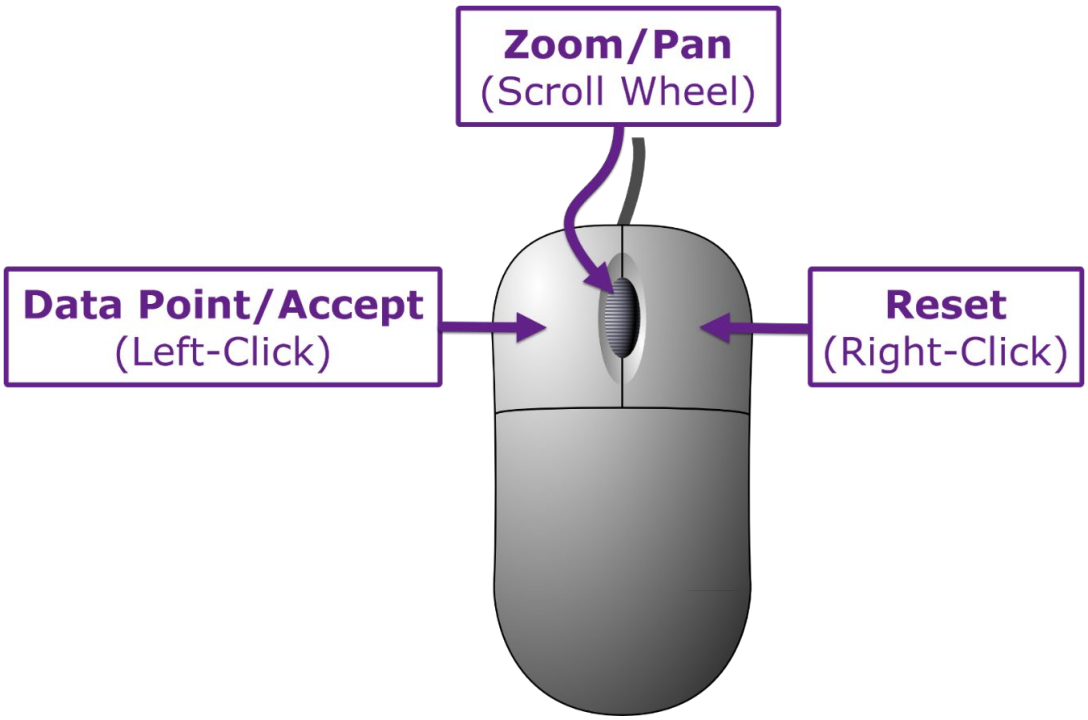
> ***NOTE:*** The *Prompt* bar is discussed in *1B.3 The Dialogue Box and Prompts*.

Data Point: A "Data Point" is performed by Left-Clicking at any point location in the *View* window. A Data Point specifies a point location. Also, the term Data Point is used to accept a tool operation. When the term "Data Point" is shown in the *Prompt* bar, Left-Click in the current *View* window to proceed with the action.

Accept: When the term "Accept" is shown in the *Prompt* bar, Left-Click in the current *View* window to proceed with the action. Left-Clicking will "Accept" or proceed with an action or operation.

Reset: A Reset is performed by Right-Clicking. Typically, right-clicking will restart/abort the operation of the current tool. However, some tools require a **Reset** (Right-Click) to complete the operation of the current tool. For example, the *SmartLine* tool is used to draw a series of connected line segments. After the desired number of line segments is drawn, Reset (Right-Click) to finalize placement of the line segments.

Scroll Wheel: Scrolling the wheel up/down will zoom in/out of the *View*. Pushing and holding the Mouse Scroll Wheel will pan around the *View*. ***TIP:*** In the *3D Design Model* , hold down the Shift button and the Scroll Wheel to rotate/orbit the *View* orientation.

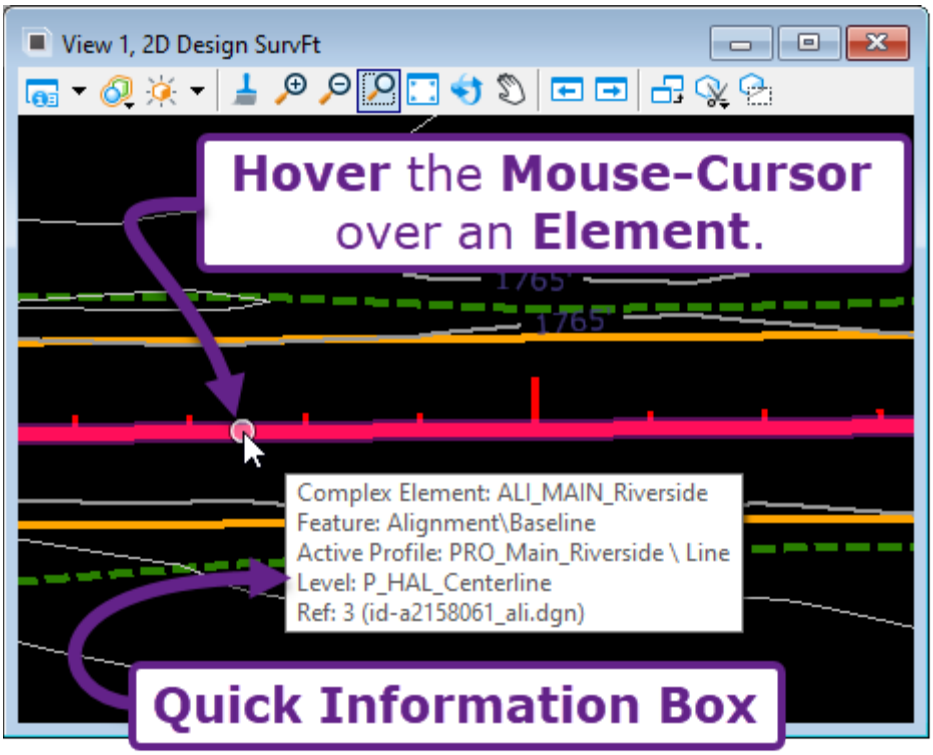


TIP: Shown above are the default button assignments. The mouse button assignments can be customized as desired. Similarly, mouses with extra buttons can be mapped for a specific tool or operation. **Button Assignments** are customized in the **Settings** tab found under the **File Menu**.

1A.2.b Quick Information Box

The Quick Information Box is a convenient way to display important Properties for an element without selecting it.

To reveal the Quick Information Box, hover the mouse-cursor over an element.



TIP: The Quick Information Box shows the assigned Level, Feature Definition, Element Type, and whether the element has an Active Profile.

TIP: The Quick Information Box shows the Reference ORD File which an element belongs to.

1A.2.c Pop-Up Icon Menu

The *Pop-Up Icon Menu* is a convenient location for accessing tools. The *Pop-Up Icon Menu* ONLY shows tools that are commonly used with the selected element type.

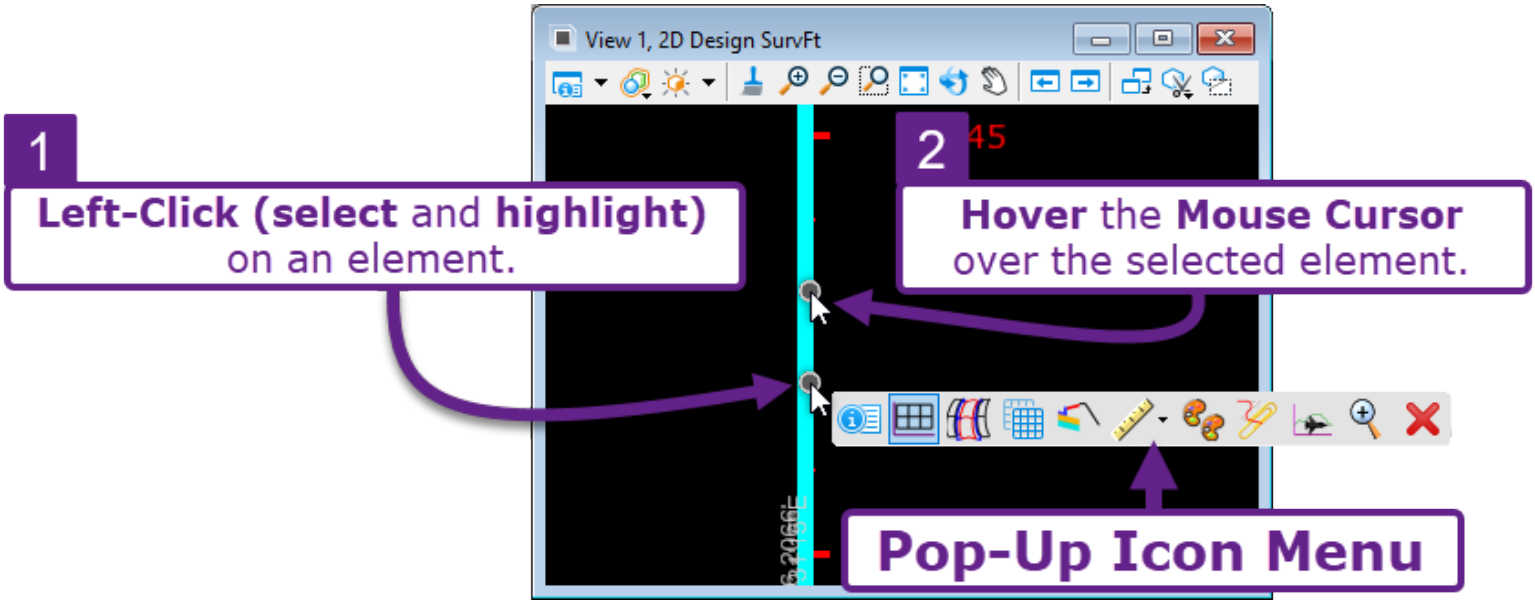
> ***NOTE:*** All tools shown in the *Pop-Up Icon Menu* can be found in the Ribbon or through the Search Bar. The *Pop-Up Icon Menu* simply shows tools that are most relevant for the selected element type.

The *Pop-Up Icon Menu* is summoned by selecting an element and hovering the mouse-cursor over the element for approximately one second.

To summon the *Pop-Up Icon Menu*:

1	Select an element.
2	With the element selected, hover the mouse cursor over the selected element until the *Pop-Up Icon Menu* appears.

TIP: If the *Pop-Up Icon* does NOT show up, then deselect the element and try again.



NOTE: The tools shown in the *Pop-Up Icon Menu* depends on the element type. For example, an Alignment (Complex Element) displays different tools than a SmartLine element. In the graphic above, an Alignment (Complex Element) is selected.

NOTE: For Referenced elements, only the Properties tool is accessible through the *Pop-Up Icon Menu*. Referenced elements can NOT be edited from the current ORD File.

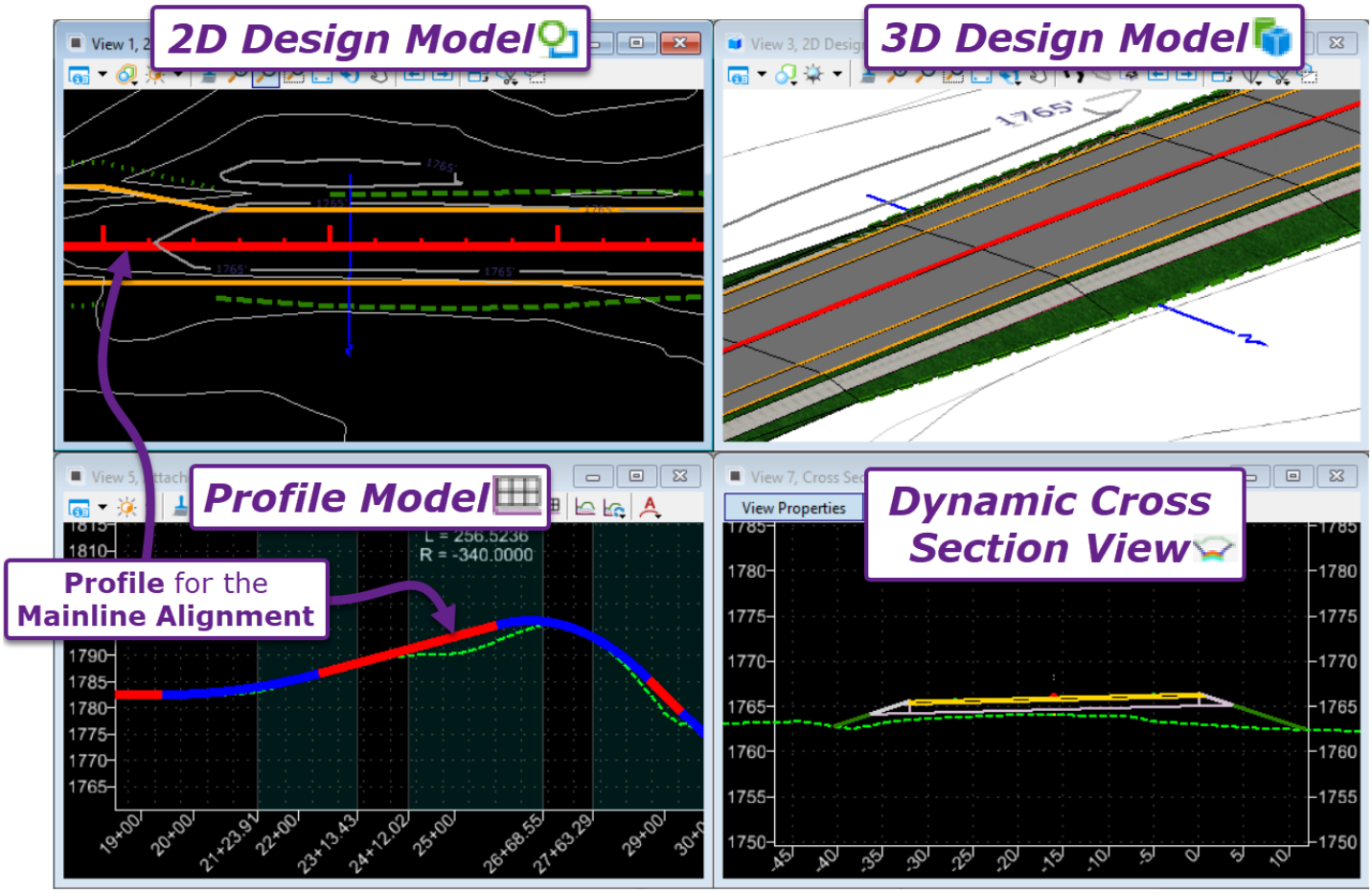
1A.3 Navigate a Design ORD File

This section shows the basic navigation of a Design ORD File for review of a road model.

TIP: The overall design for a roadway project is often reviewed from the **Corridor ORD File.**

A Design ORD File contains the following **Models:**

- ***2D Design Model*** (plan view): Used to view the design from a horizontal or 2D point of view.
- ***3D Design Model*** (3D view): Used to view the design from an isometric or 3D point of view.
- **Dynamic Cross Section Views: ** Used to view the Cross Sections of a Corridor. The cross-sectional view is opened by selecting a Corridor Handle element.
- **Profile Models: ** Each element drawn in the *2D Design Model* has a corresponding Profile view. The Profile view shows the 2D element from an elevation perspective.



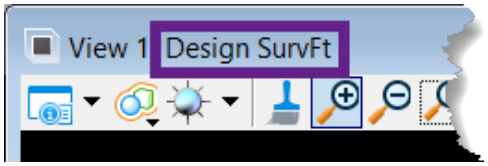
For more information on accessing **Models** found in the ORD Software, see *1C - Views and Models* and *1D – Model Types*.

IMPORTANT: The *2D Design Model* and *3D Design Model* are opened from the **Models** menu (which is shown on the next page).

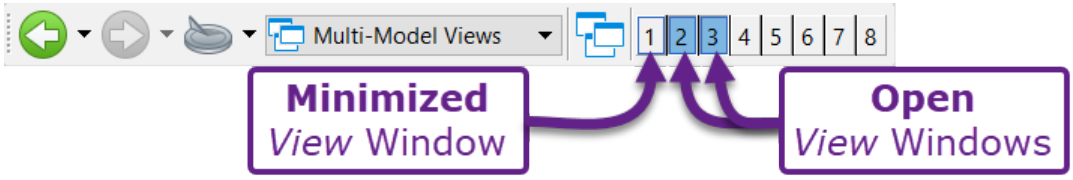
Profile Models and *Dynamic Cross Section Views* are NOT shown in the Models menu.

1A.3.a Navigate the 2D Design Model (Plan View)

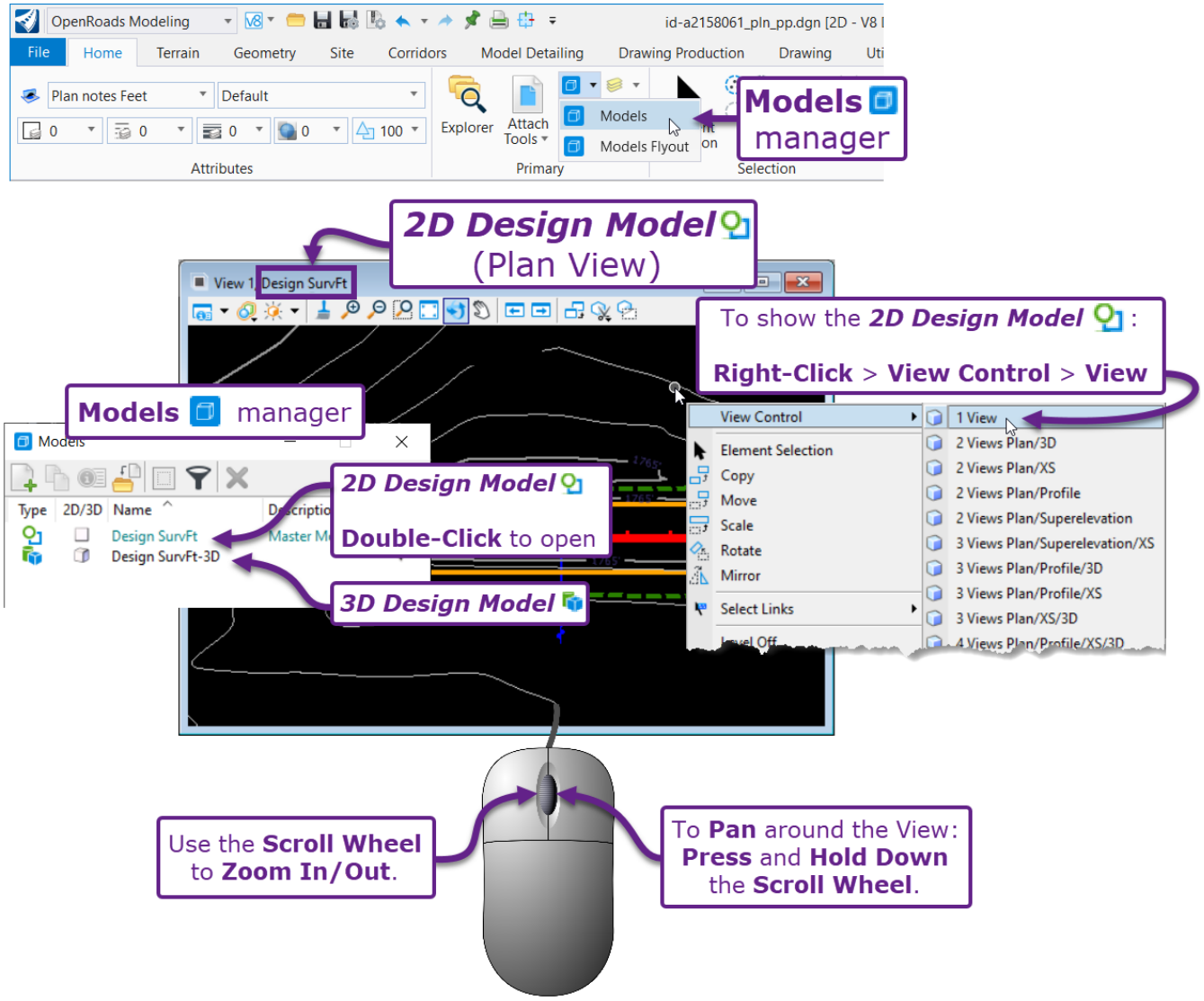
When an ORD File is initially opened, typically the ***2D Design Model*** (plan view) is shown. The *2D Design Model* is identified by the term "Design SurvFt" or "Design IntlFt" shown in the *View* window title bar.



NOTE: If the *2D Design Model* is NOT initially shown, it may be minimized or untoggled in the **View Toggles** toolbar. The **View Toggles** toolbar is found in the bottom-left corner of the software window.



Also, the *2D Design Model* can be opened through the **Models** manager by double-clicking on it. Alternatively, right-click in any *View* window and select **View Control** → **1 View**.



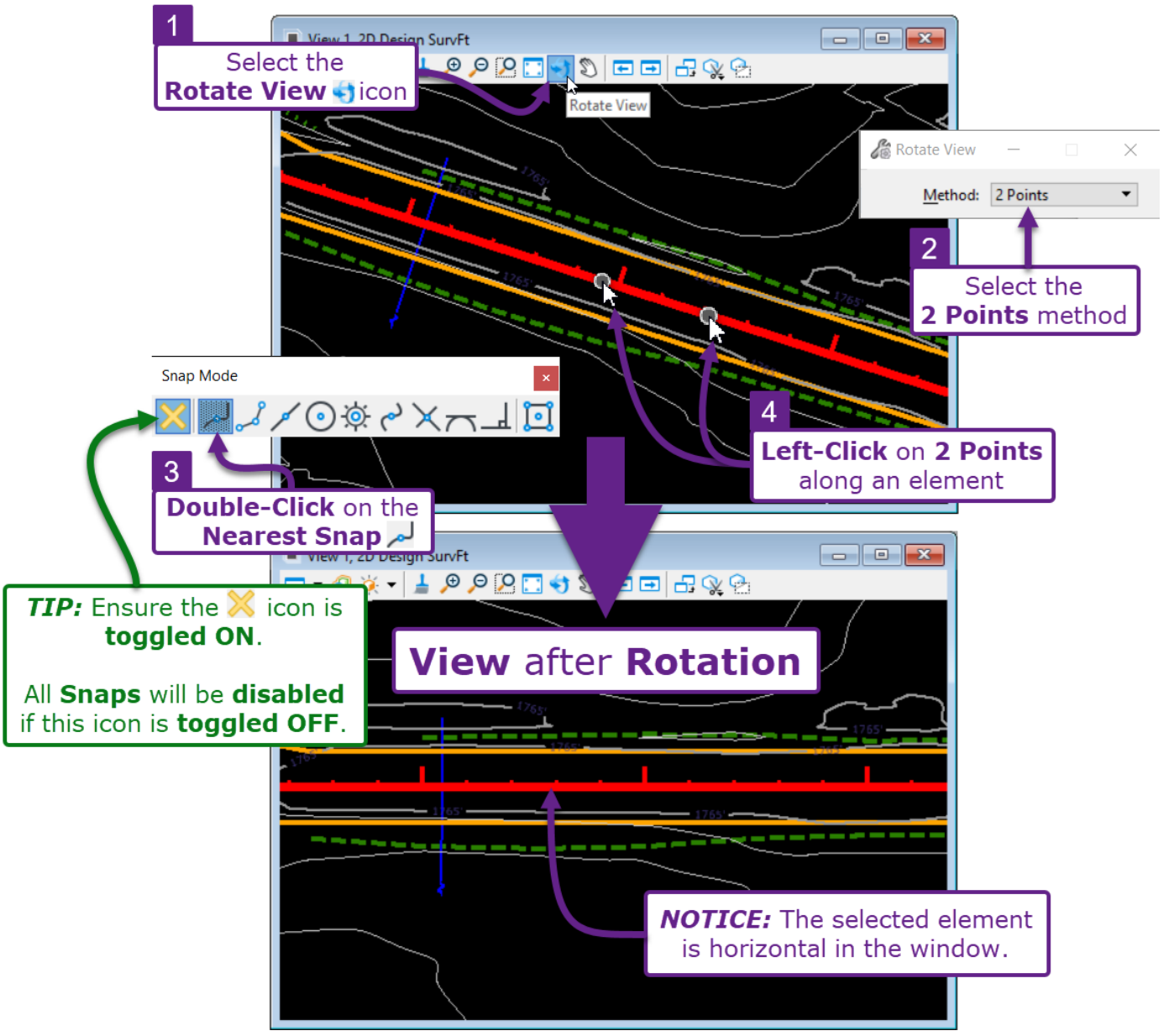
1A.3.a.i Rotate the 2D Design Model

The *Rotate View* icon is used to rotate the orientation of the graphics.

TIP: Use the **2 Point** method to rotate the *View* window. Choose 2-point locations along an element. When the *View* rotates, the element will be shown horizontally.

> ***NOTE:*** The order which the 2-points location are picked affects how the *View* is rotated. If the 2-point locations are picked from left-to-right, then first point will be located on the left-side of the *View*. If picked right-to-left, then the *View* is rotated an additional 180°.

TIP: Toggle ON the **Nearest Snap** to click exactly along the element. Double click on the icon to toggle ON the **Nearest Snap**.



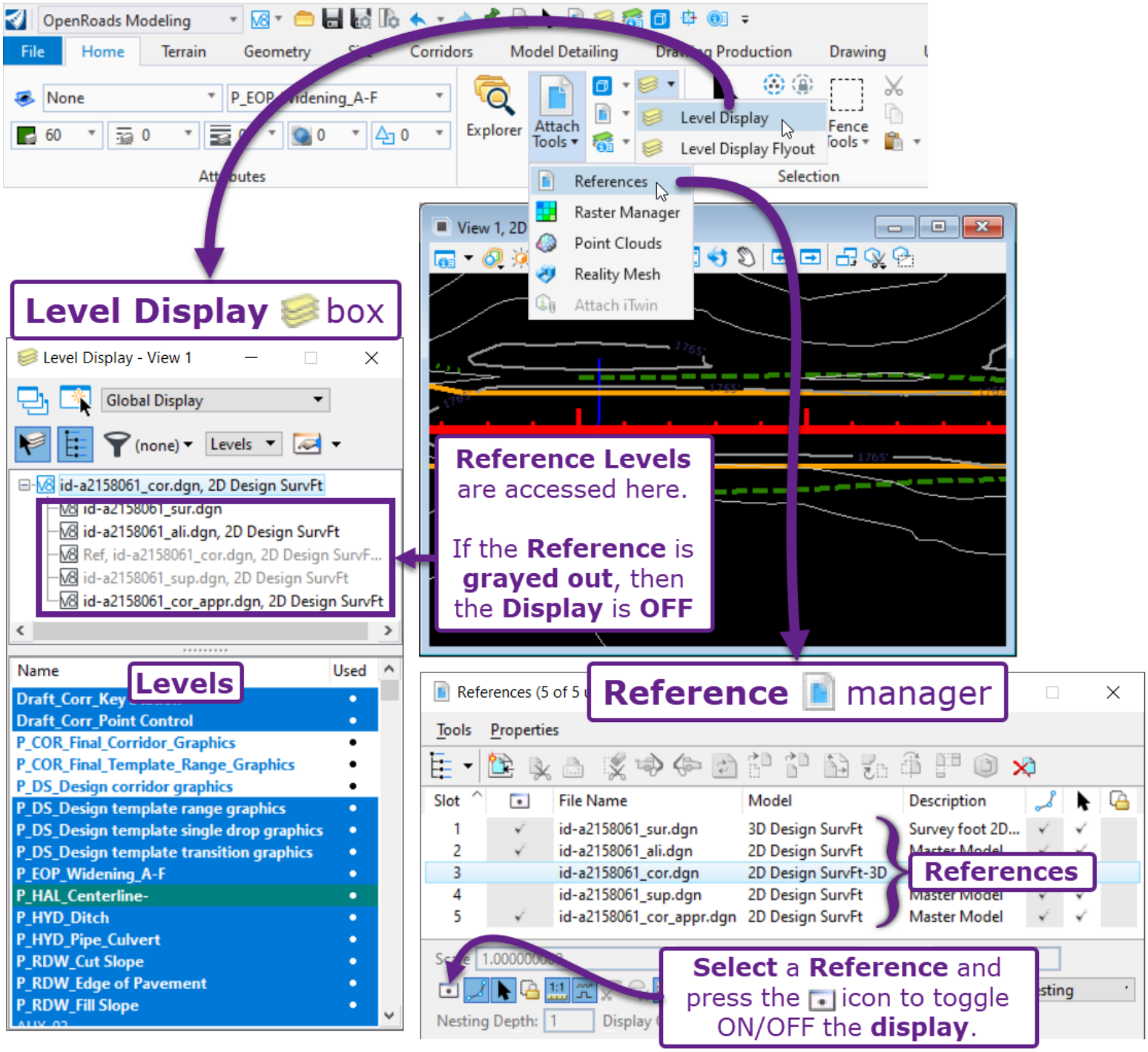
NOTE: Typically, **Snap** icons are shown at the bottom of the software window. If the Snap icons are NOT shown, then type, "Snap Mode" into the **Search Bar** to open the Snaps toolbar.

Snaps are discussed in greater detail in *7B.1 AccuSnap Settings*.

1A.3.a.ii Levels and References in the 2D Design Model

Each element is assigned to a **Level**. If the *2D Design Model* appears cluttered with elements, toggle OFF Levels in the **Level Display** box.

The *2D Design Model* also contains **References** to other ORD Files. **Reference Levels** can be toggled ON/OFF in the **Level Display** box. Similarly, the display of all elements contained in a **Reference** can be toggled ON/OFF in the **References** manager.



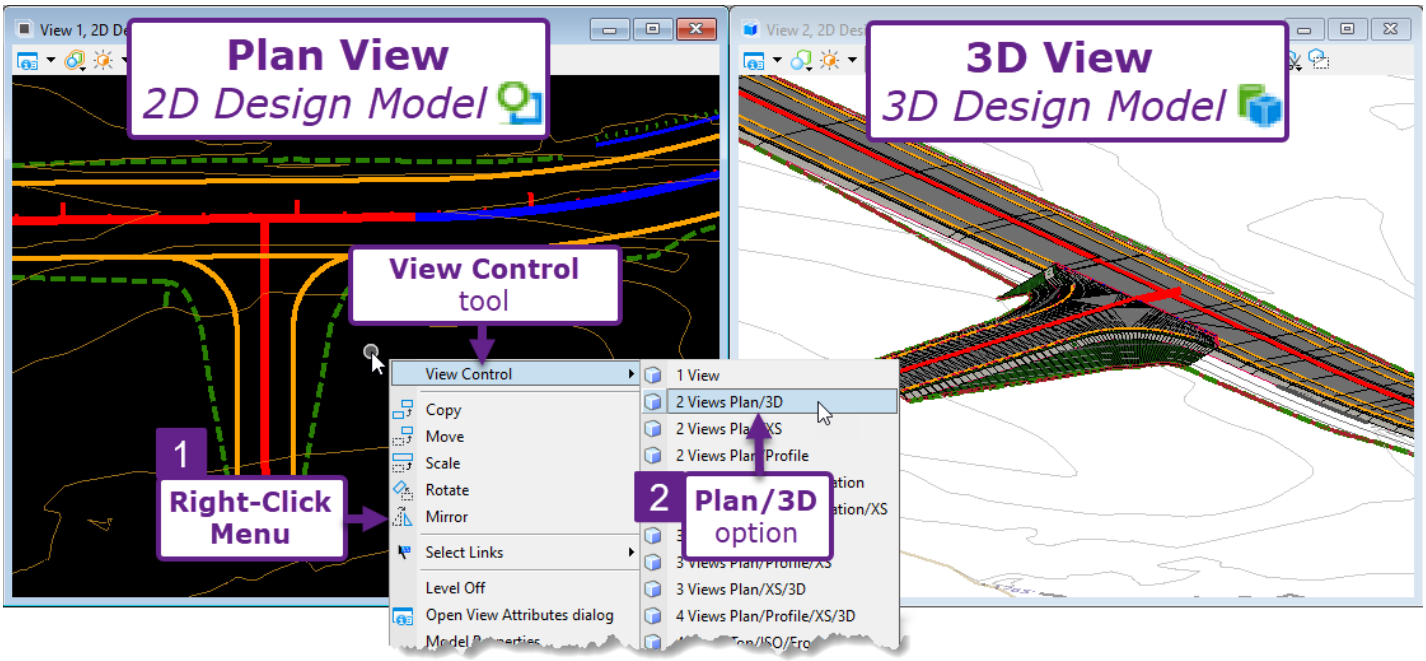
For more information on References, see *1E – References*.

For more information on Levels, see *1G – Levels*.

1A.3.b Open and Navigate the 3D Design Model

To open the *3D Design Model*:

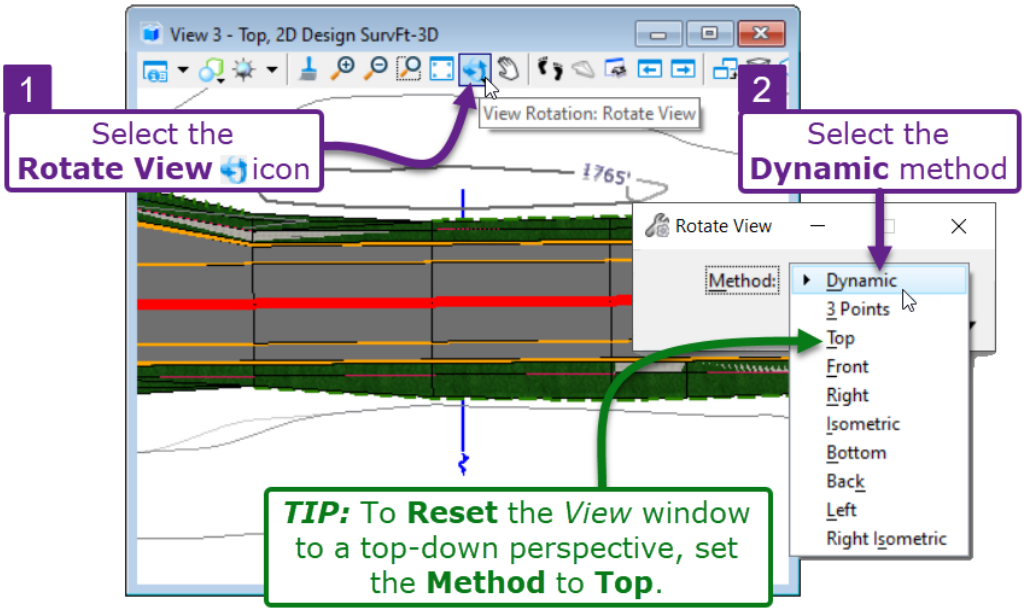
1	Open the **Right-Click Menu** by right-clicking anywhere in the *View* window.
2	Select **View Control** → **2 Views Plan/3D**



1A.3.b.i Move Around and Orbit in the 3D Design Model

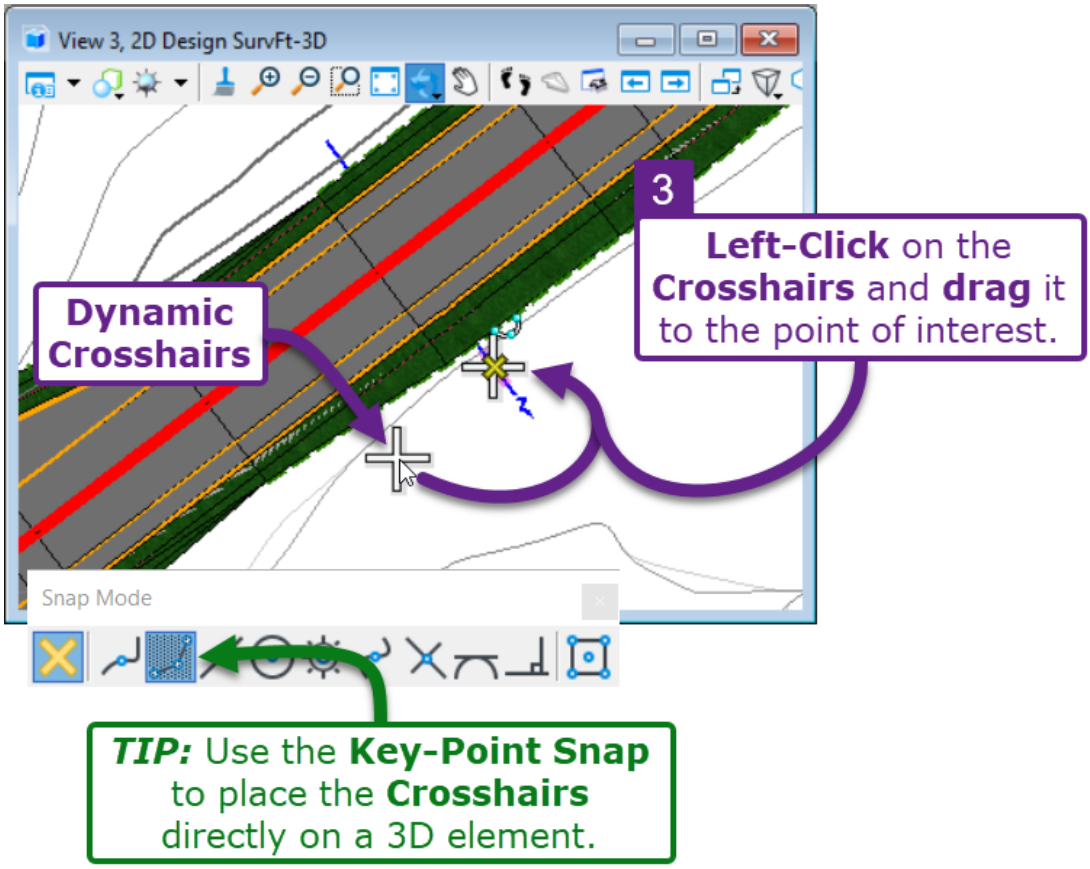
Similar to the *2D Design Model* the Mouse Scroll Wheel is used to **Zoom In/Out** and **Pan (shift)**.

In the *3D Design Model*, it is also necessary to **orbit** the *View* window to display the model at the desired isometric orientation. The easiest method for orbiting is with the *Rotate View* tool and the method set to **Dynamic**.

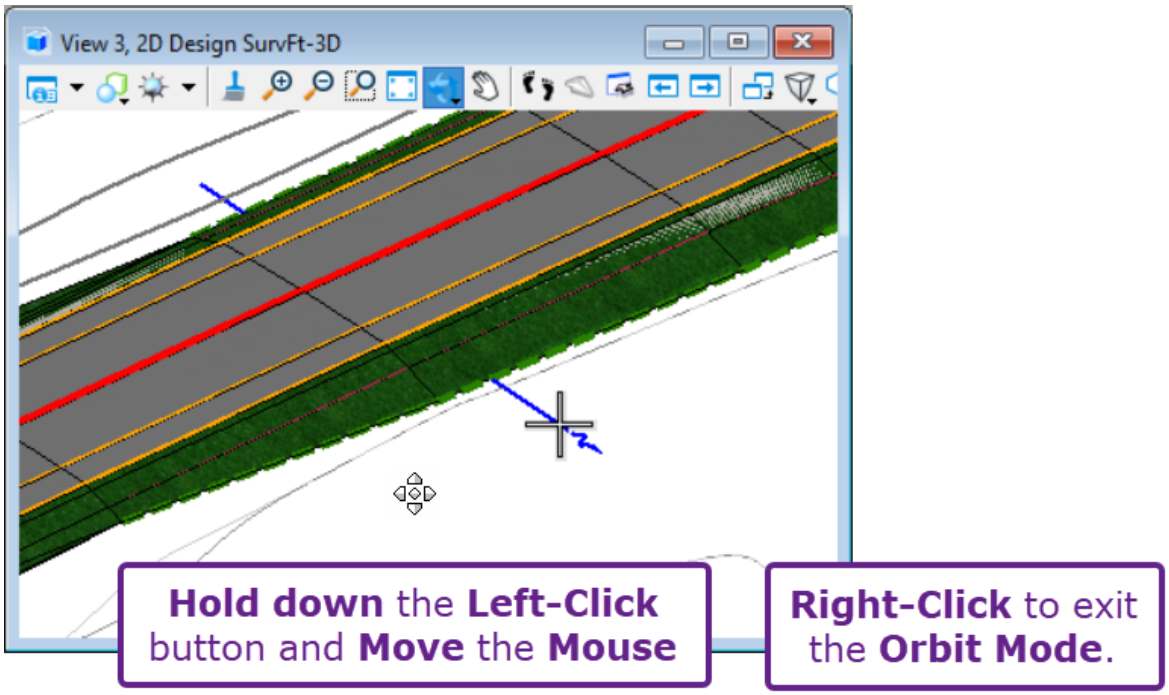


When the *Rotate View* tool is engaged (and the method is set to Dynamic), a crosshair is shown in the middle of the *View* window. The crosshair is the focal point when orbiting the *View*.

The crosshair (focal point) can be **dragged** and **snapped** to any location. Place the crosshair on the point of interest. In this case, the cross hair will be dragged and snapped to the outlet of the culvert.



With the crosshairs placed on the point of interest, **hold down** the **left-click** button and **move the mouse** to orbit the view.



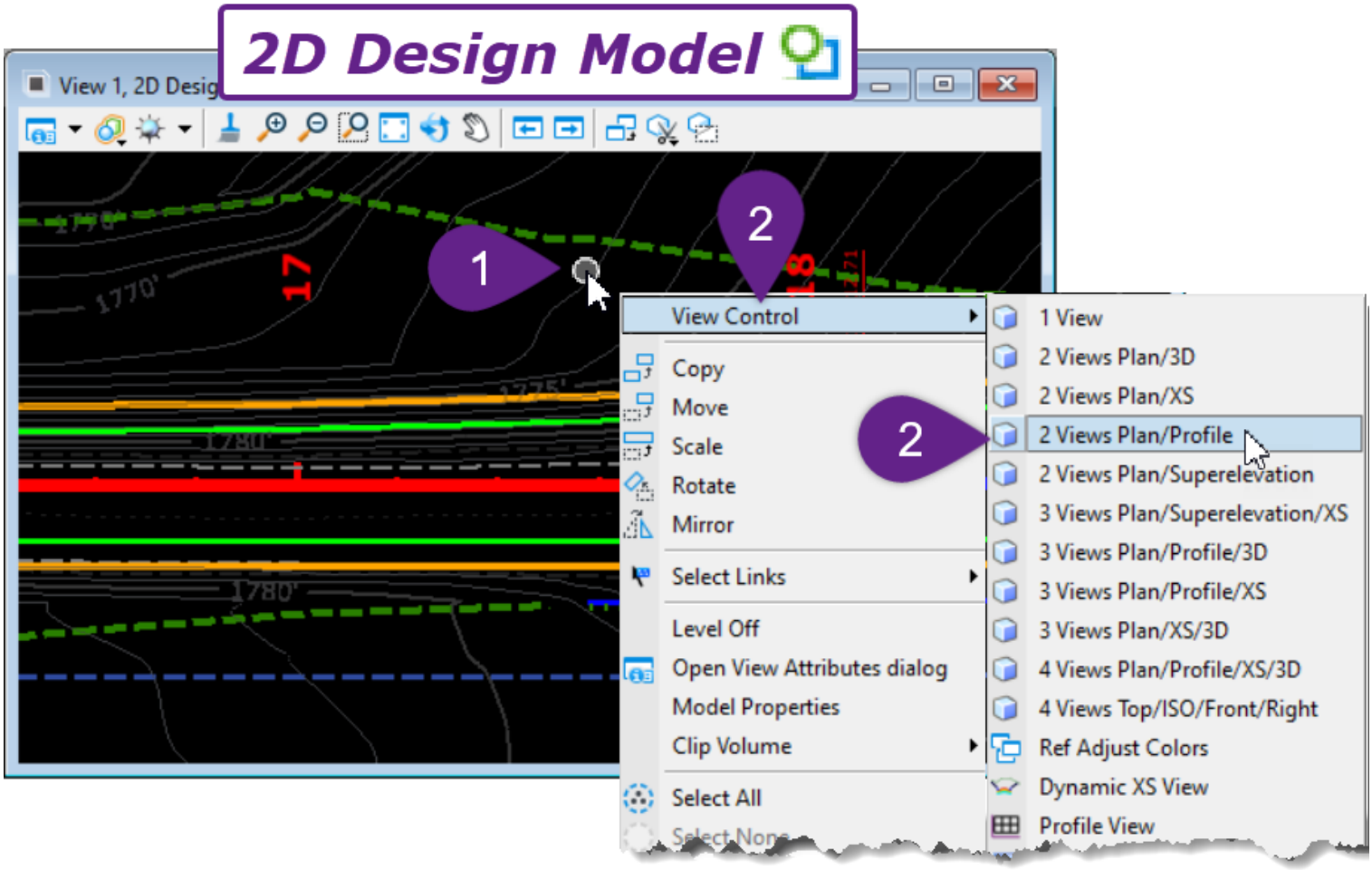
1A.3.c Open a *Profile Model*

Every element found in the *2D Design Model* has a corresponding *Profile Model*.

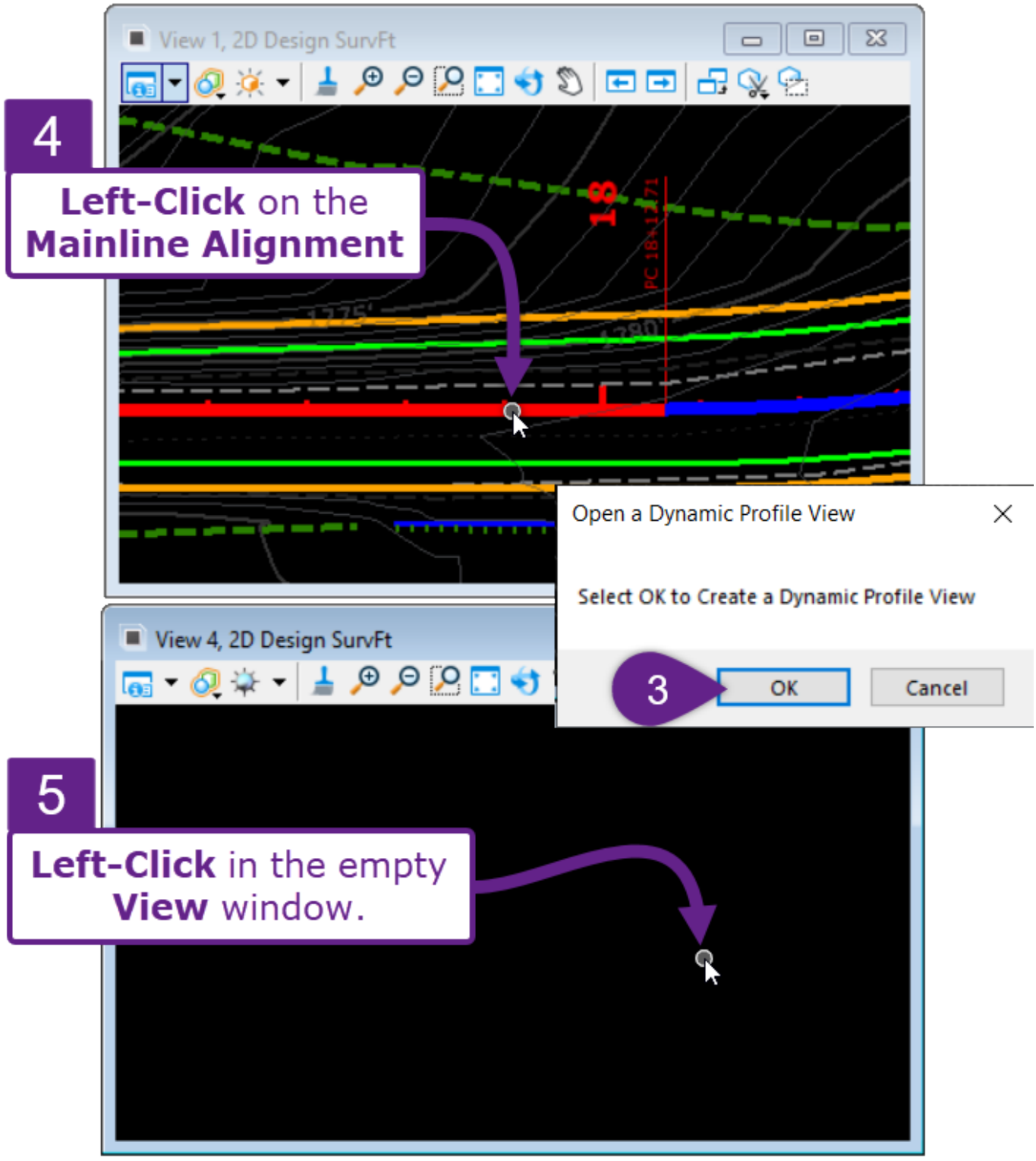
In this situation, the *Profile Model* for the Mainline Alignment is opened. However, this procedure works for any element found in *2D Design Model*.

> ***NOTE:*** Alternatively, the *Profile Model* for an element can be accessed through the *Pop-Up Icon Menu*. This procedure for opening the *Profile Model* is shown in *7F.1.a Accessing a Profile Model*.

1	Right-Click anywhere in a *View* window that shows the *2D Design Model*.
2	Select **View Control** → **2 Views Plan/Profile**.



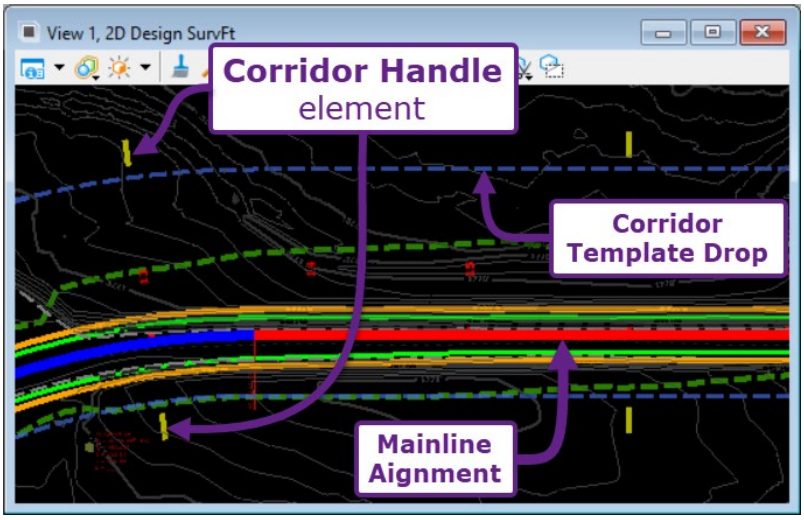
3	After the *View Control* tool is initiated, the **Open a Dynamic Profile View** message box is shown and an additional *View* window is automatically opened. Select **OK** in the message box.
4	*Prompt: Locate Plan Element* - Left-Click on the Alignment. In this case, the Mainline Alignment is clicked on.
5	*Prompt: Select or Open View* - Left-Click within the empty *View* window. After the *View* is selected, the *Profile Model* will be shown.



1A.3.d Open Corridor Cross Sections (Road Cross Sections)

To display the design from a cross-sectional orientation, an Alignment or Corridor must be selected.

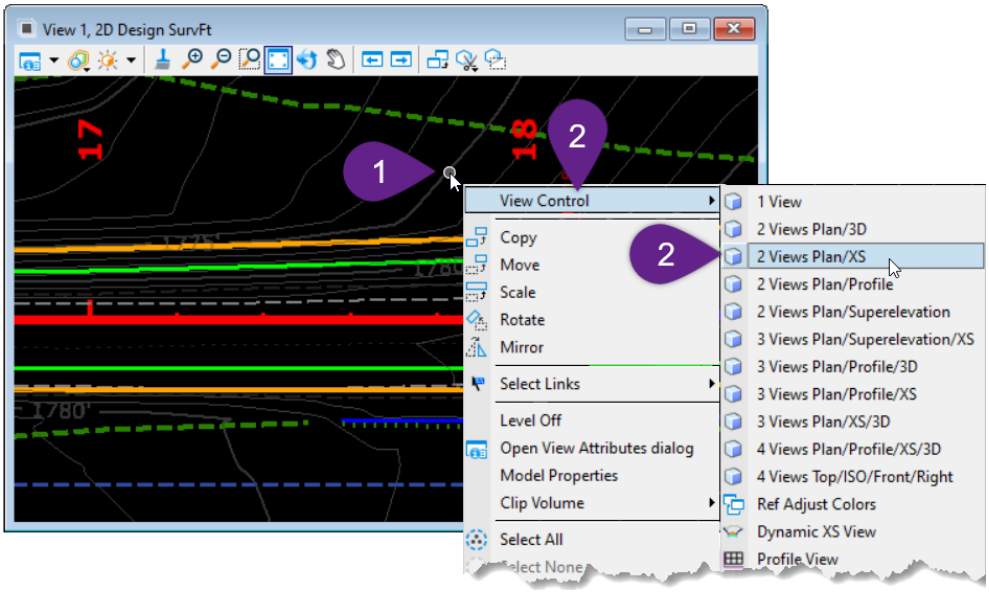
NOTE: Corridors and Linear Templates contain a **Handle** element. The **Handle** element does NOT represent a real-world feature (i.e., edge of road, cut slope). Instead, the **Handle** element is used to control settings for the Corridor or Linear Template. The **Handle** appears as red or yellow tick shown on both sides of the Corridor graphics. ***TIP:*** If the Corridor Handle is NOT shown, then its Level may be toggled OFF. The Corridor Handle is placed on the "P_COR_Design Corridor Graphics" or "P_COR_Final Corridor Graphics" Level.



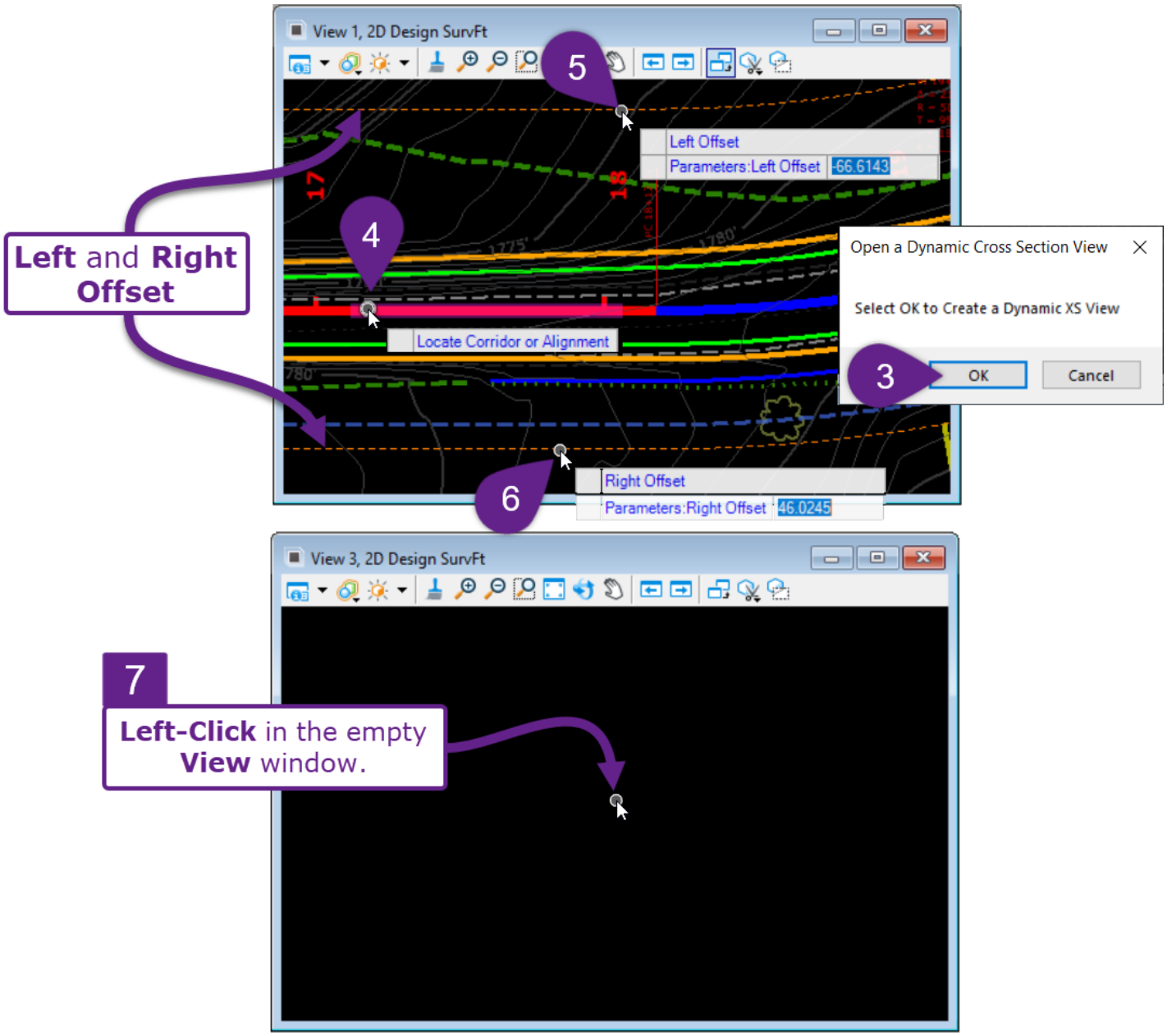
In the processes shown below, the **Mainline Alignment** is selected for the basis of the Dynamic Cross Section View. However, this process also works by directly selecting the **Corridor Handle** element.

> ***NOTE:*** Alternatively, Cross Sections can be accessed by selecting the **Corridor Handle** element and summoning the *Pop-Up Icon Menu*. This procedure for opening Cross Sections is shown in *9F.1 Accessing the Dynamic Cross Section Viewer*.

1	Right-Click anywhere in a *View* window that shows the *2D Design Model* .
2	Select **View Control** → **2 Views Plan/XS**.



3	After the *View Control* tool is initiated, the **Open a Dynamic XS View** message box is shown and an additional *View* window is opened. Select **OK** in the message box.
4	*Prompt: Locate Corridor or Alignment* - In this case, the Mainline Alignment is clicked on. ***ALTERNATIVELY:*** Left-Click on the Corridor Handle. If the Corridor Handle is selected, then steps 5 and 6 are NOT shown.
5	*Prompt: Left Offset* – The **Left Offset** determines the left extent of the cross-section graphics, relative to the selected Alignment. Ensure the **Left Offset** extends past Proposed Cut/Fill Lines to display the entire design.
6	*Prompt: Right Offset* – Set the **Right Offset**.
7	*Prompt: Select or Open View* - Left-Click within the empty *View* window. After the *View* is selected, the *Profile Model* will be shown.



1A.4 Navigate a Plan Sheet ORD File

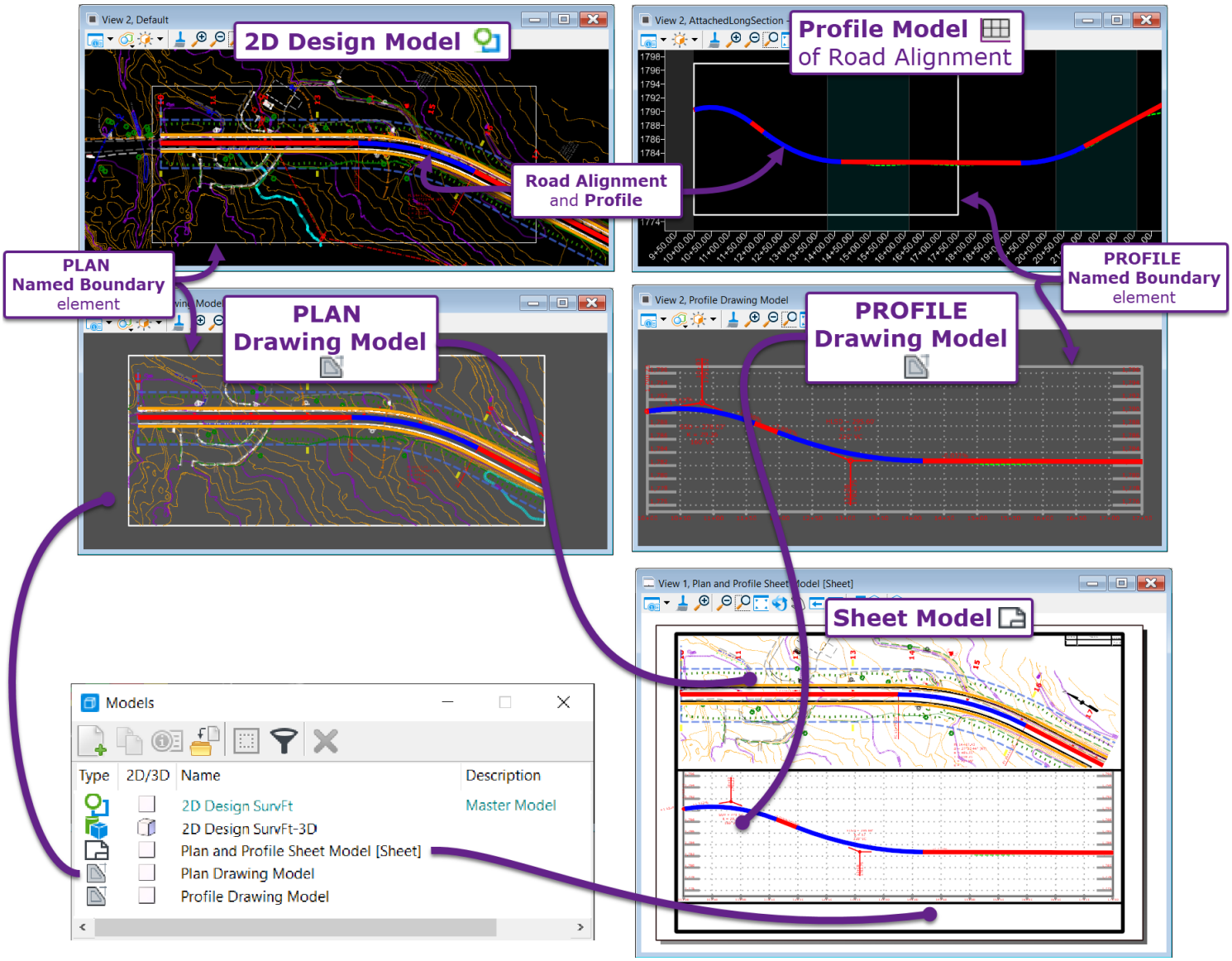
This section describes how to navigate and review a Plan Sheet ORD File.

A Plan Sheet ORD File typically contains the following **Models:**

- ***2D Design Model*** (plan view)
- ***Drawing Models*****:** A *Drawing Model* is a clipped and framed portion of a Design Model. There are three types of *Drawing Models*: PLAN, PROFILE, and CROSS SECTION. To display design graphics, *Drawing Models* are referenced into *Sheet Models*.
- ***Sheet Models*****:** A *Sheet Model* represents a single plan sheet. A *Sheet Model* contains a sheet border – which typically measures to 0.9167-feet (11-inches) by 1.4167-feet (17-inches).

Drawing Models and *Sheet Models* are accessed from the **Models** manager. *Drawing Models* and *Sheet Models* are discussed in *1D.3 Drawing Models* and *1D.4 Sheet Models*.

NOTE: *Profile Models* and the *3D Design Model* are accessible in Plan Sheet ORD Files. However, these models do NOT need to be accessed to review Plan Sheets.

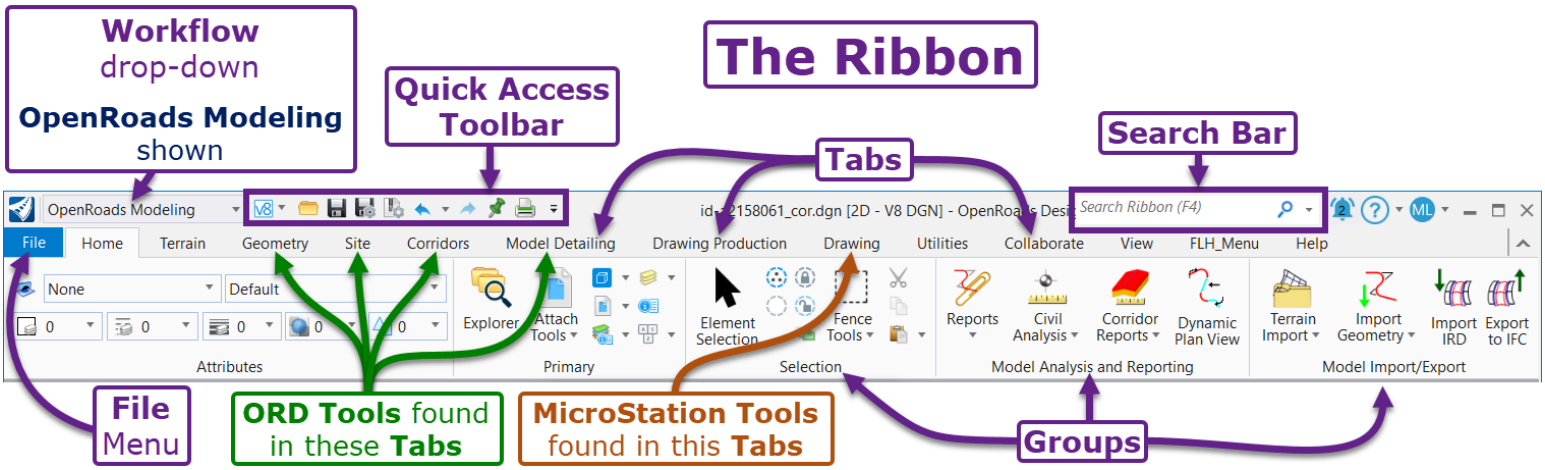


1B – OVERVIEW OF THE ORD INTERFACE

1B.1 The Ribbon and Tools

The Ribbon occupies the top portion of the ORD Interface. The Ribbon is used to select tools. Different tools are displayed depending on the currently selected **Workflow** and **Tab**.

> ***TIP:*** The Ribbon and Quick Access Toolbar can be customized to add or remove tools. Add commonly used tools to convenient locations – which is shown in *4B – Customize the Ribbon and Quick Access Toolbar*.



1B.1.a ORD Tools and MicroStation Tools

The **OpenRoads Modeling** Workflow is shown in the graphic above. This is the default Workflow. Most tools used in design, drafting, and sheet production are found in this Workflow.

There are two types of tools for creating geometrical elements: **ORD Tools** and **MicroStation Tools**.

1. **ORD Tools:** These tools create **ORD Elements**. ORD Elements contain *Feature Definitions* and *Names*. ORD Tools are used to create civil features, such as Alignments, Profiles, Terrain Models, and Corridors. If an element is being drawn for civil modeling purposes, then use an ORD Tool. Tools for creating geometry with ORD Tools are found in the **Geometry** tab.
2. **MicroStation Tools:** These tools create **MicroStation Elements**. MicroStation Elements are simple and have less functionality than ORD Elements. Use MicroStation Tools to draft basic 2D linework. Tools for creating geometry with MicroStation tool are found in the **Drawing** tab.

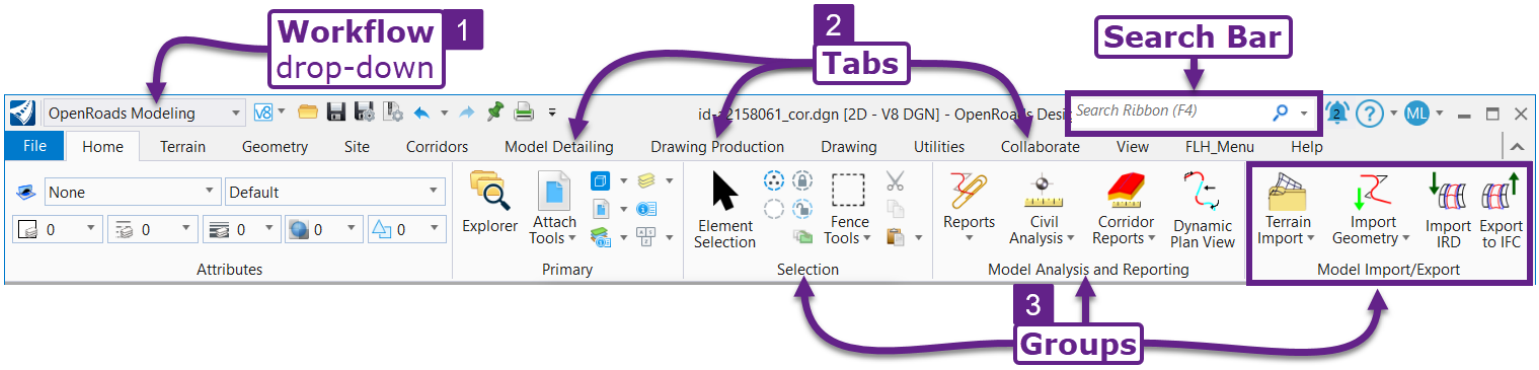
IMPORTANT: Geometrical elements (i.e., lines and curves) can be drawn with either **ORD Tools** or **MicroStation Tools**. When drafting Alignments and Profiles, use **ORD Tools**. Alignment and Profile drafting tools are found in the **Geometry** tab. Use **MicroStation Tools** found in the **Drawing** tab for basic, 2D drafting tasks. See *7A.3 Using ORD Elements or MicroStation Elements – Best Practices*.

To determine an element's type, select it and view its Properties. ORD Elements will have the **Feature Drop-Down** shown in the Properties. MicroStation elements do NOT contain this drop-down. For the location of the Feature drop-down, see *1F.1 Properties Box Overview*.

1B.1.b Workflows, Tabs, and Groups

Tools within the Ribbon are sorted into **Workflows**, **Tabs**, and **Groups**. Switching the **Tab** or the **Workflow** presents a different set of tools.

1	**Workflows**	There are several Workflows available from the drop-down. Each Workflow corresponds with a specific functional area of the software. By switching the Workflow, a new set of **Tabs** and tools are presented. See the table below for a description of each Workflow available. ***TIP:*** **OpenRoads Modeling** and **Drawing** are the most commonly used Workflows.
2	**Tabs**	A Tab is a collection and/or category of tools found in a Workflow.
3	**Groups**	Tools found under a Tab are arranged into Groups. A Group is a collection of similar or complimentary tools.



NOTE: Commonly used tools, such as the *Element Selection* and *Properties* tools, are located at multiple locations in the Ribbon.

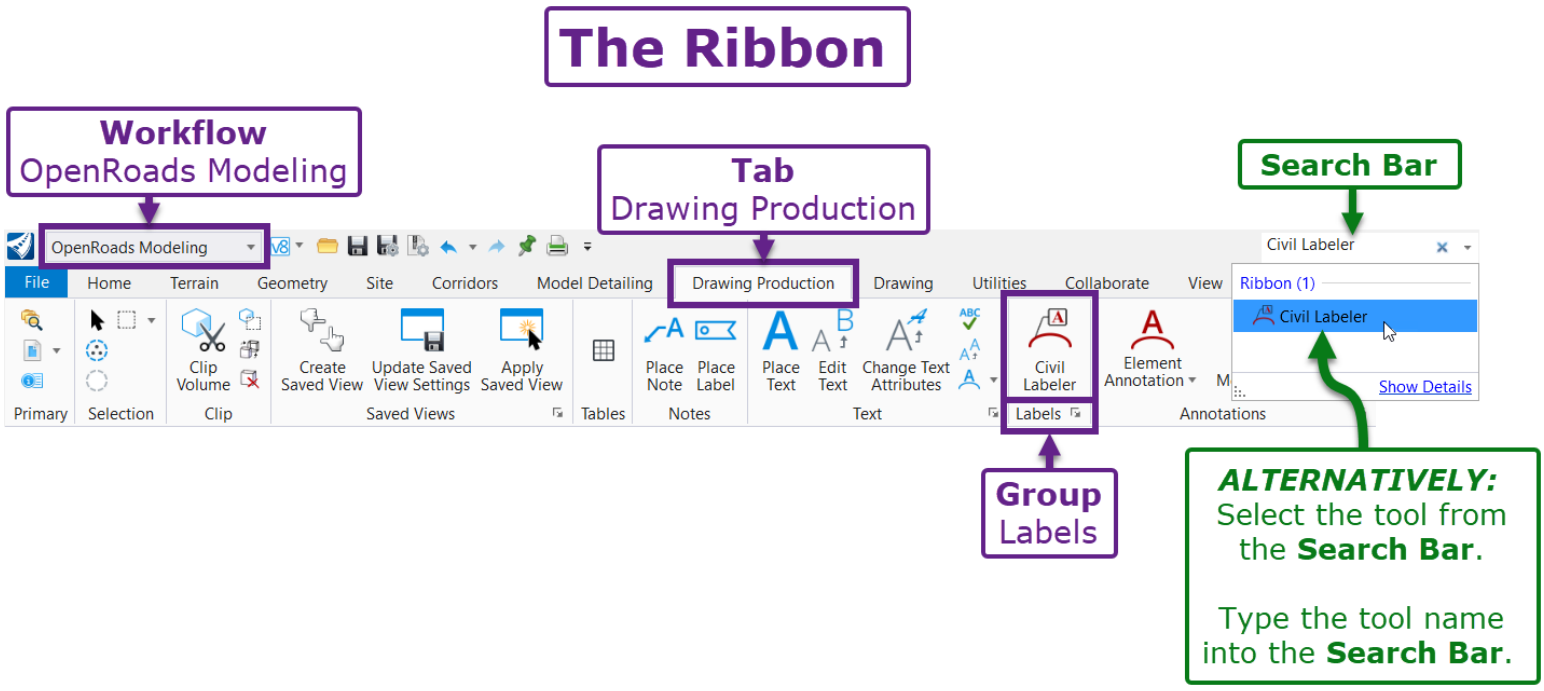
Ribbon Workflows	
Workflow:	**Description:**
OpenRoads Modeling	This is the **default workflow**. For an overview of this workflow, see *1B.1.d OpenRoads Modeling Workflow – Overview*. Contains **ORD Tools** for drawing Alignments and Profiles for civil features (i.e., mainline road alignment, culvert, guardrail, edge of asphalt parking lot). Contains Corridor, Superelevation, and Civil Modeling tools. Contains tools for sheet creation. Contains **MicroStation Tools** for simply linework drafting.
OpenRoads Drawing Production	Contains tools for sheet creation. ***NOTE:*** All tools found in this Workflow are also found under **OpenRoads Modeling**.
Survey	Contains tools for processing survey data.
Geotechnical	Contains tools to model different geotechnical layers and strata in the Existing Ground.
Reality Modeling	Contains tools to render 3D elements and meshes into realistic graphics.
Drawing	Contains drafting tools for creating miscellaneous geometry. Contains annotation and dimensioning tools.
Drainage and Utilities	A suite of tools for utility and drainage modeling and calculations. These tools can be used to model and analyze culverts, storm sewer systems, and dry utilities.

In this manual, the Ribbon location is used to describe the location of a tool. The format used to describe a tool location is shown below:

1	From the Ribbon, select the *Civil Labeler* tool: [***OpenRoads Modeling*** → ***Drawing Production*** → ***Labels***].

For example, to locate the *Civil Labeler* tool, go to the following location in the Ribbon.

Workflow: OpenRoads Modeling | **Tab:** Drawing Production | **Group:** Labels



1B.1.c The Search Bar

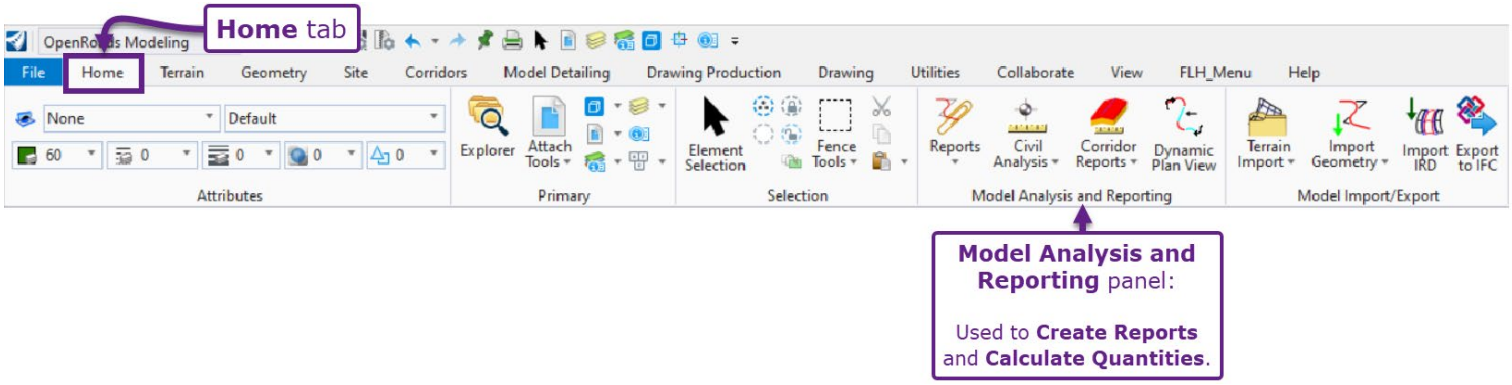
Instead of selecting tools through the Ribbon, use the Search Bar to find a tool. The name of the tool must be known in order to find it through the Search Bar. The location of the Search Bar is shown above.

TIP: To avoid excessive clicking/navigation through the Ribbon, use the Search Bar to find a tool.

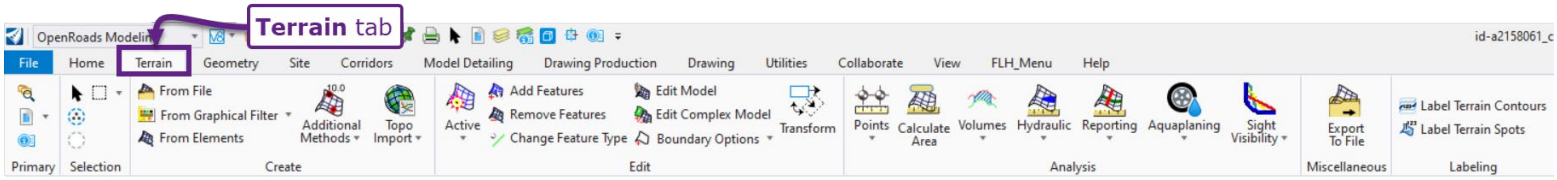
1B.1.d OpenRoads Modeling Workflow – Overview

The OpenRoads Modeling workflow contains 12 tabs. Each tab contains a collection of complimentary tools.

Home: This tab contains basic tools (i.e., Reference Manager, Properties, Level Display, Element Selection). However, this tab also contains **Model Analysis and Reporting** tools – which are used to create reports and calculate quantities from civil modeling features.

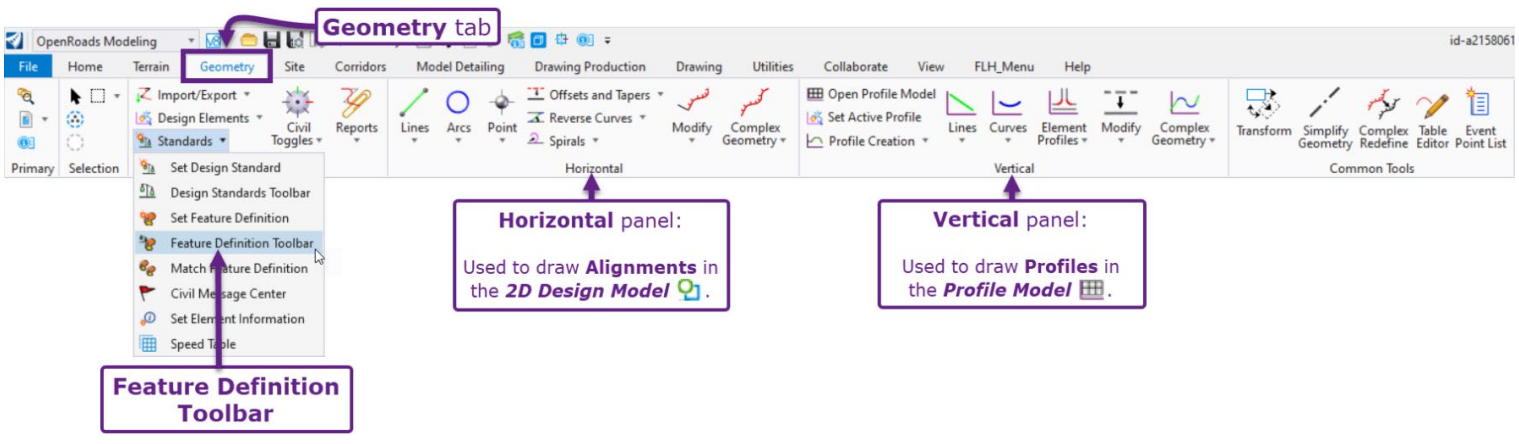


Terrain: This tab contains tools for creating, editing, and analyzing Terrain Models. This tab is commonly used to create Proposed Terrain Models for use in Surface Template modeling. Also, this tab is used to create Finished Grade and Sub-Grade Terrain Models from the Corridor. Terrain tools are discussed in *Chapter 11 – Site Modeling* and *Chapter 22 – Proposed Terrain Model Creation*.

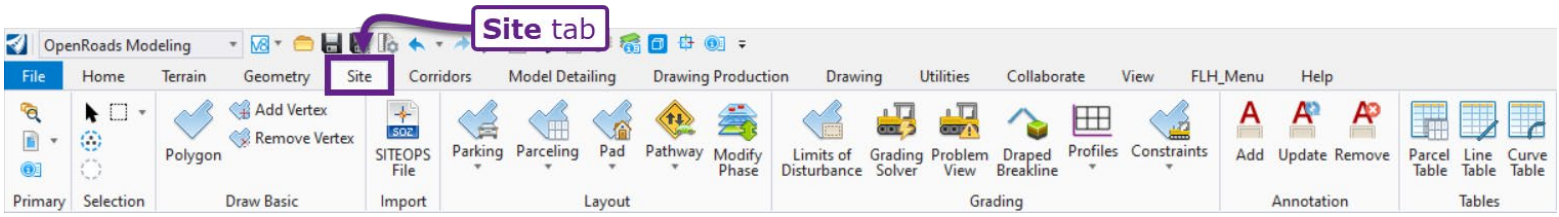


Geometry: This tab contains tools for drawing Alignments and Profiles. The tools found in this tab are considered **ORD Tools** and should be used for civil modeling purposes. Geometry tools are discussed in *Chapter 7 – Geometry*.

> ***TIP:*** The **Feature Definition Toolbar** is found under the *Standards* drop-down. This toolbar contains the *Persist Snap* toggle and is also used to set the appropriate Feature Definition when drawing Alignments/Profiles. It is recommended that this toolbar is opened when drawing Alignments and Profiles.

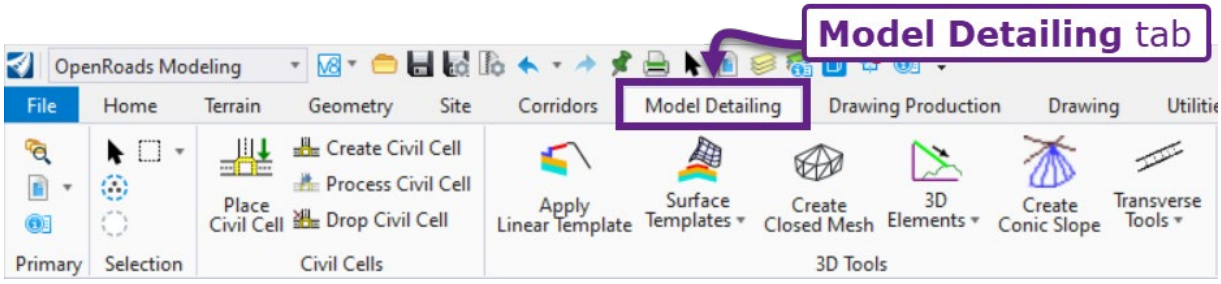


Site: This tab contains tools for the design and automated grading of non-linear site features (i.e., a parking lot, building pad). ***WARNING:*** Tools in this tab are NOT covered in this manual. It is recommended that site features are drawn with **Geometry** tab tools.

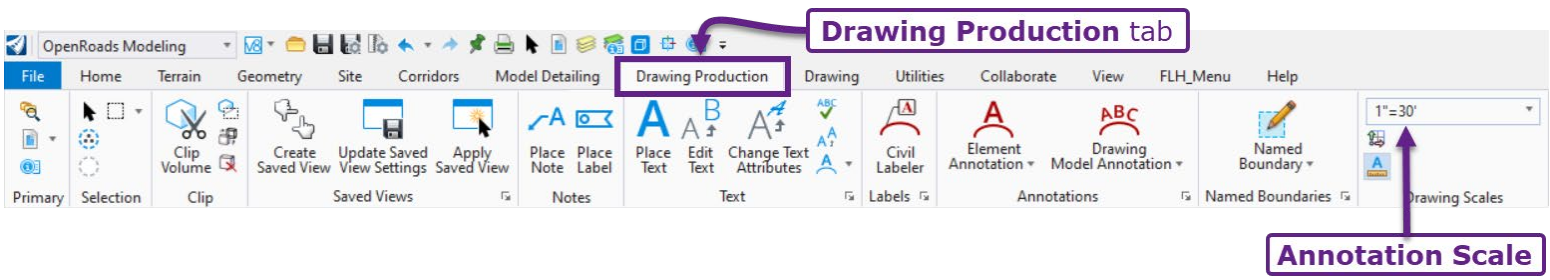


Corridors: This tab contains tools for creating/editing Corridors, Templates, and Superelevation. Templates are discussed in *Chapter 8 – Template Library*. Corridors are discussed in *Chapter 9 – Corridors*. Superelevation is discussed in *Chapter 10 – Superelevation*.

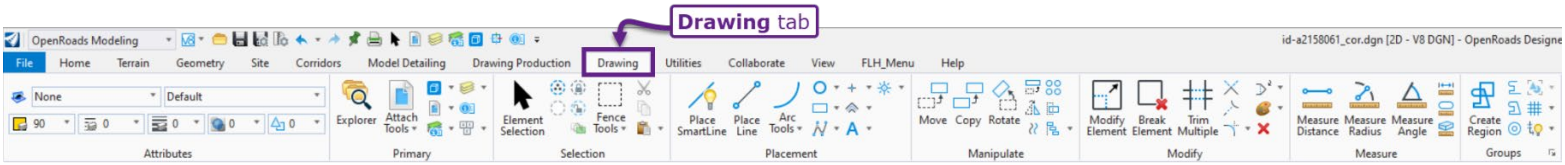
Model Detailing: This tab contains tools for creating Civil Cells, Linear Templates, and Surface Templates. These tools are commonly used for modeling approach roads, driveways, and parking lots. Model Detailing tools are discussed in *Chapter 11 – Site Modeling*. Civil Cells are discussed in *Chapter 12 – Civil Cells*.



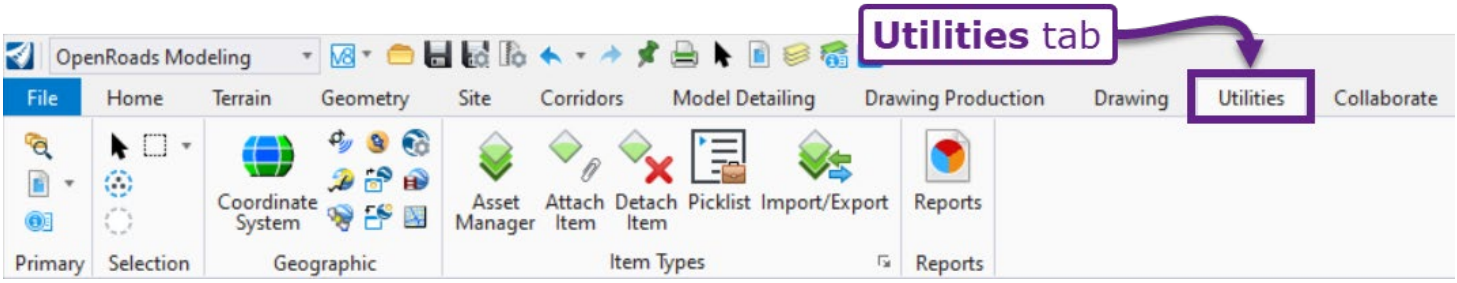
Drawing Production: This tab contains tools for creating plan sheets and cross section sheets. Also, this tab contains tools for creating text/annotation elements. For example, the *Element Annotation* tool is used to create stationing annotations for an Alignment. This tab also contains the **Annotation Scale** – which controls the size of text elements in the *2D Design Model* . Drawing Production tools are discussed in *Chapter 14 – Plan Sheet Production* and *Chapter 15 – Stationing, Annotations, and Dimensioning*.



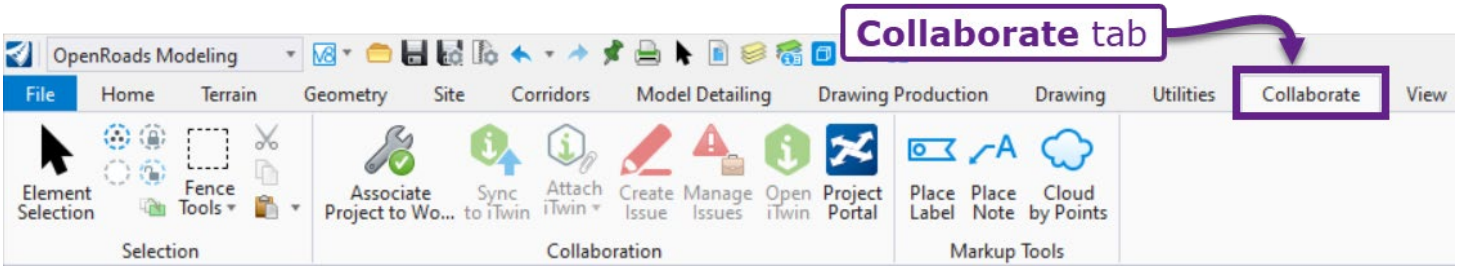
Drawing: This tab contains tools for basic drafting and measuring tasks. The tools found here are **MicroStation Tools** and should NOT be used for civil modeling tasks. Drawing tools are discussed in *Chapter 6 – Drawing Tools*.



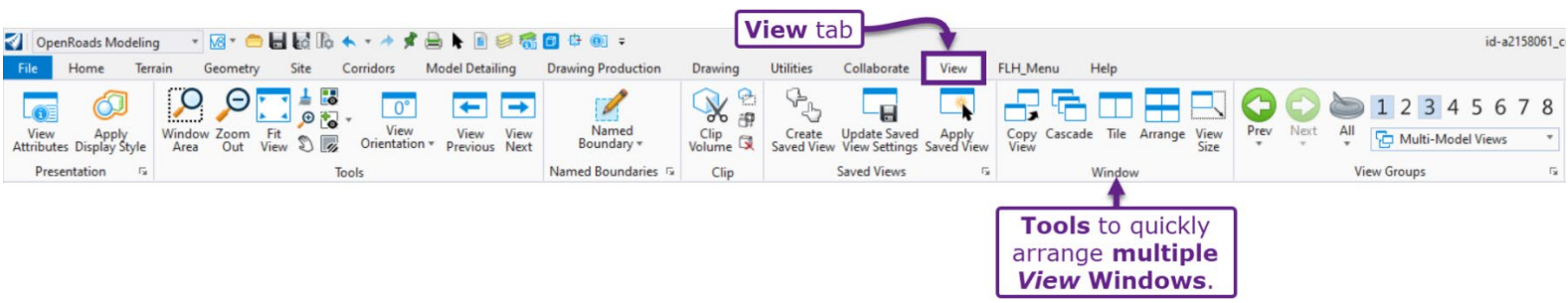
Utilities: This tab contains the *Coordinate System* tool – which is used to set the coordinate system for the ORD File. See *3D.1 Set the Coordinate System*. Also contained in this tab are Google Earth utilities – which can be used to import aerials. See *3E.1 Import a Google Earth Aerial*. Also, the *Export Google Earth File* tool is used convert the design graphics to a KML File to display the design within Google Earth. See *24D – Create a Google Earth KMZ from an ORD File*. ***NOTE:*** The Asset Manager and Report *tool* are NOT discussed in this manual.



Collaborate: This tab contains tools for creating markups. ***NOTE:*** Tools in this tab are NOT covered in this manual.



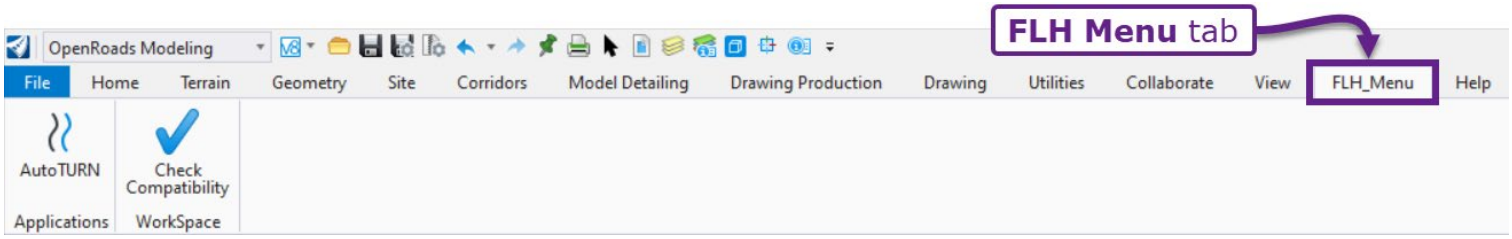
View: This tab contains tools for manipulating, switching between, and arranging *View* windows.



FLH Menu: This tab contains add-on tools specifically utilized by in-house FLH employees.

WARNING: Tool add-ons such as *AutoTurn* and *Guide Sign* are NOT included with a standard ORD license. These tools require a purchased subscription. Check with your Engineering System Manager to confirm if your agency or organization has access to these tools.

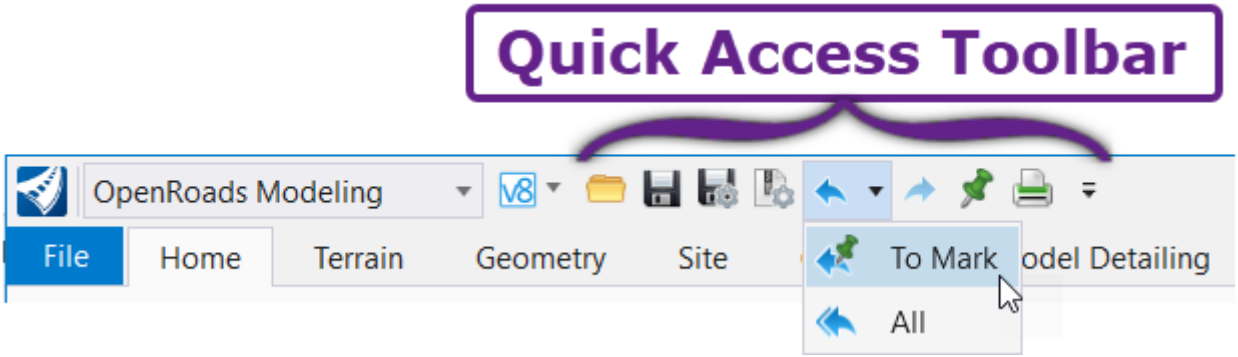
The *Check Compatibility* tool is NOT a purchased add-on. This tool checks to see if the current WorkSpace is compatible with the installed version of OpenRoads.



1B.1.e Quick Access Toolbar

The **Quick Access Toolbar** contains basic operation tools.

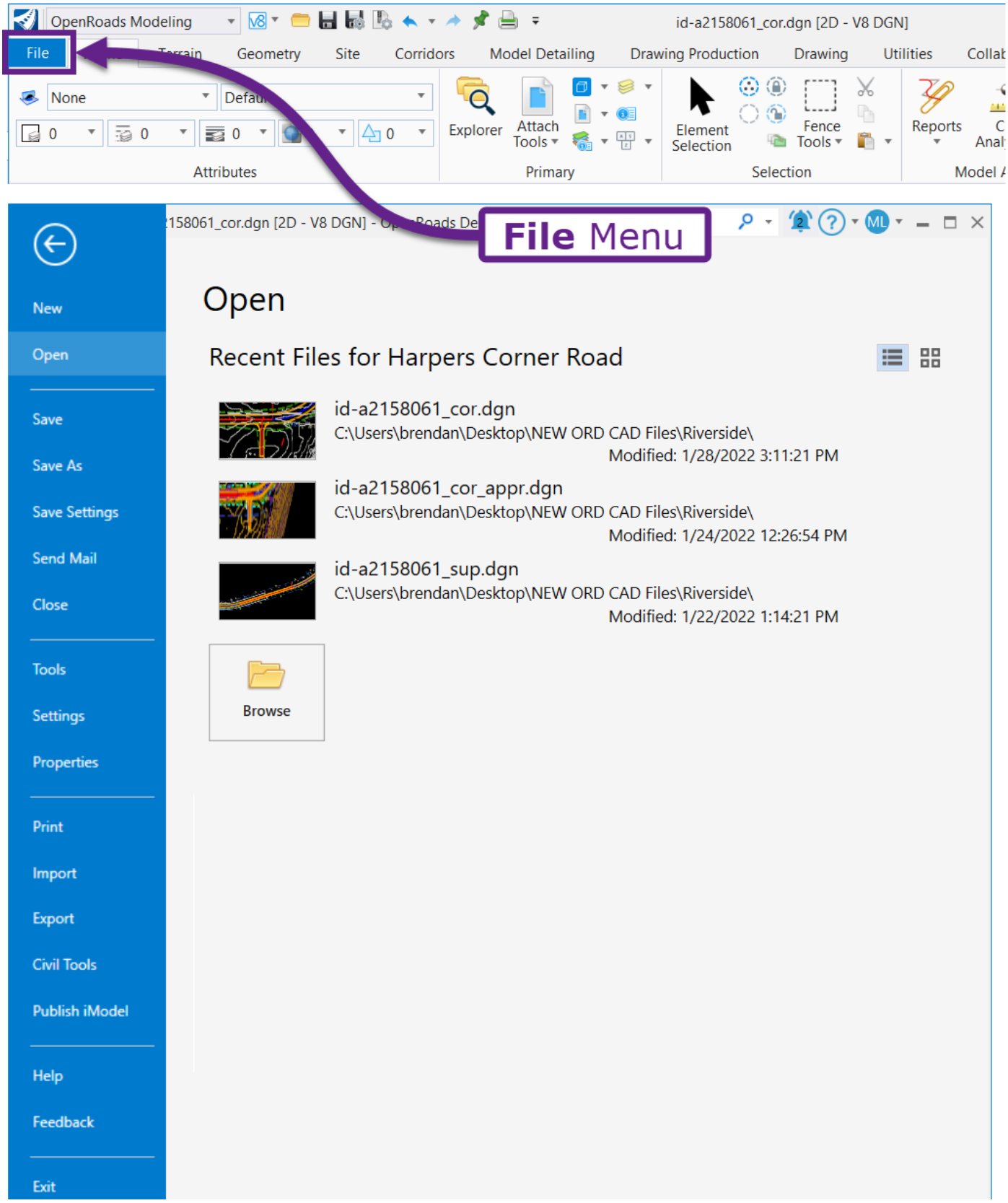
TIP: The Quick Access Toolbar can be customized. Add commonly used tools to the Quick Access Toolbar – which is shown in *4B.3 Customize the Quick Access Toolbar*.



	Open	Opens a different ORD File.
	Save	Saves the current ORD File. ***NOTE:*** The ORD Software performs an auto-save when there is 2 seconds of inactivity from the User.
	Save Settings	Saves the current configuration of Levels and the perspective of the current *View* windows. ***WARNING:*** The **Save Settings** button must be used to remember which Levels are toggled ON/OFF when the ORD File is accessed in the future. The *Save Settings* and its effect on Levels is discussed in *1G - Levels*.
	Compress Options	Reduces the file size of the ORD File by deleting and purging unused items and data.
	Undo	Undo the last action.
	Undo to Mark	This tool is found in the drop-down arrow adjacent to the Undo button. This tool works in conjunction with the **Set Mark** tool. See below.
	Undo All	This tool is found in the drop-down arrow adjacent to the Undo button. This tool undoes all actions performed since opening the ORD File.
	Redo	Redo the last action that has be undone.
	Set Mark	Works in conjunction with the **Undo to Mark** button. When this button is pressed, a Mark is set. All actions performed after the Mark is set are undone when the **Undo to Mark** button is pushed.
	Print	Opens the Print dialogue. For information on printing, see *Chapter 19 – Printing*.
	Customization Drop-Down	Used to customize the Quick Access Toolbar and toggle ON/OFF buttons.

1B.1.f File Menu

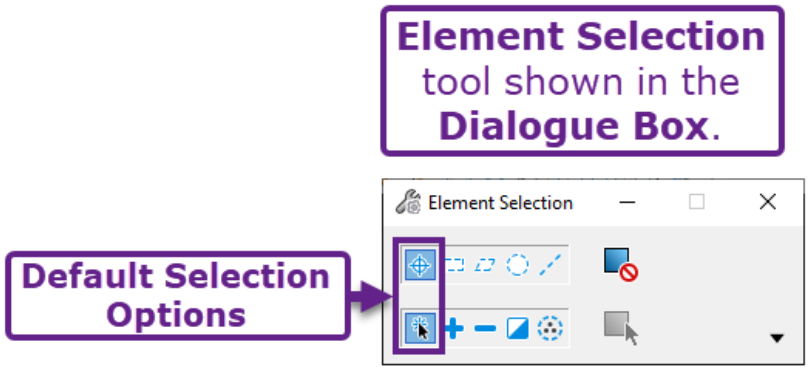
The **File** menu is accessed through the Ribbon. The **File** menu is generally used to create a New ORD File or open an ORD File. Also, the **File** menu is used to access backstage settings used to customize the operation of the ORD Software. The options found in the File Menu are discussed on the next page.



New	Creates a new ORD File. The procedure for creating a new ORD File is shown in *Chapter 3 – File Creation*.
Open	Opens a different ORD File.
Save	Saves the current ORD File. ***NOTE:*** The ORD Software performs an auto-save when there is 2 seconds of inactivity.
Save As	Create as "Save As" copy of the ORD File.
Save Settings	This function is also found in the Quick Access Toolbar. For an explanation of this function, see *1B.1.e Quick Access Toolbar* and *1G - Levels*.
Send Mail	Opens a new Microsoft Outlook email with the current ORD File attached.
Close	The current ORD File is closed and the User is returned to the **WorkSpace/WorkSet Selection Menu**.
Tools	Various tools for compressing and packaging the current ORD File.
Settings	Contains a wide variety of settings related to the current ORD File and general operation of the ORD Software. In the Settings, there are a plethora of User Preferences that customize the user-interaction and display of the software. For more information about useful Settings and User Preferences, see *4D – User Settings and Preferences*.
Properties	Opens the Properties box and shows the Properties for the current ORD File.
Print	Contains tools related to printing. For more information on printing, see *Chapter 19 – Printing*.
Import	This tool is used to import a variety of different image and CAD file types. Some common file types that can be imported include: AutoCAD Files (.dwg), Imodel Files (.imodel), Shapefiles (.shp), and image files (.jpg, .png, .tif, etc…).
Export	This tool is used to export the current ORD File as a different fiile type. Some common export file types include: AutoCAD File (.dwg), Sketchup File (.skp), and Google Earth File (.kml).
Civil Tools	These tools are used to downgrade ORD Files for compatibility with a previous version of the OpenRoads software. The *Downgrade Dgn* tool will downgrade the current ORD File. The *Civil File Manager* can downgrade a set of ORD Files. The *Civil Feature Remapper* is used to remap *Feature Definitions* and Levels for an external ORD File. Typically, this tool is used by CAD Administrators in WorkSpace setup.
Publish iModel	Used to convert the current ORD File into an iModel File.
Help	Access to Bentley's Help documentation and other product support information.
Feedback	Used to provide comments and feedback to Bentley regarding the ORD software.
Exit	Close the current ORD File and exit the ORD Software.

1B.2 Element Selection tool

When no tool is in use, the *Element Selection* tool is shown in the Dialogue Box. The *Element Selection* tool must be shown in the Dialogue Box to select elements.

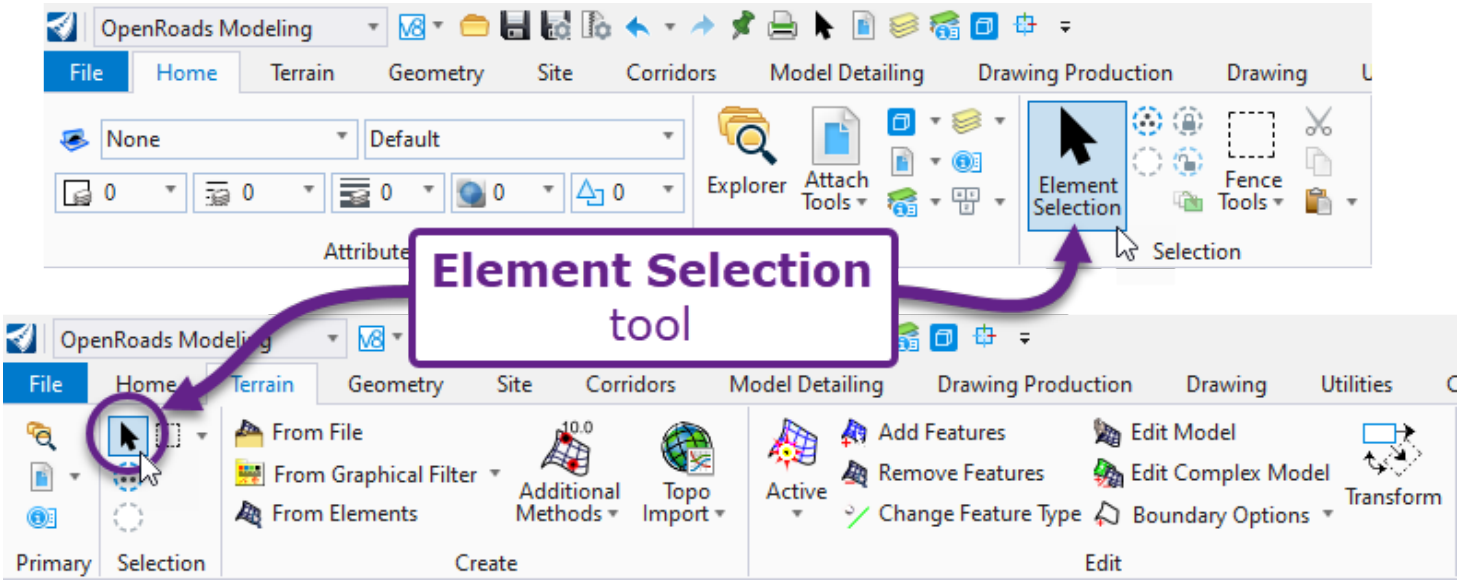


NOTE: The *Element Selection* tool is the default state of the Dialogue Box. However, the Dialogue Box is dynamic, depending on which tool is currently in operation. When another tool is in operation, it is NOT possible to select elements. To return to element selection mode, click on the *Element Selection* tool in the Ribbon. For more information on the Dialogue Box, see *1B.3 The Dialogue Box and Prompts*.

TIP: For most selection operations, toggle ON the **Individual** and **New** icons. These are the default selection options. If elements are NOT selecting in a normal manner, then it is likely because one of these options has become un-toggled.

TIP: Hold down the CTRL key to select multiple elements without clearing the selection set. To de-select an element, click on a selected element with the CTRL key held down.

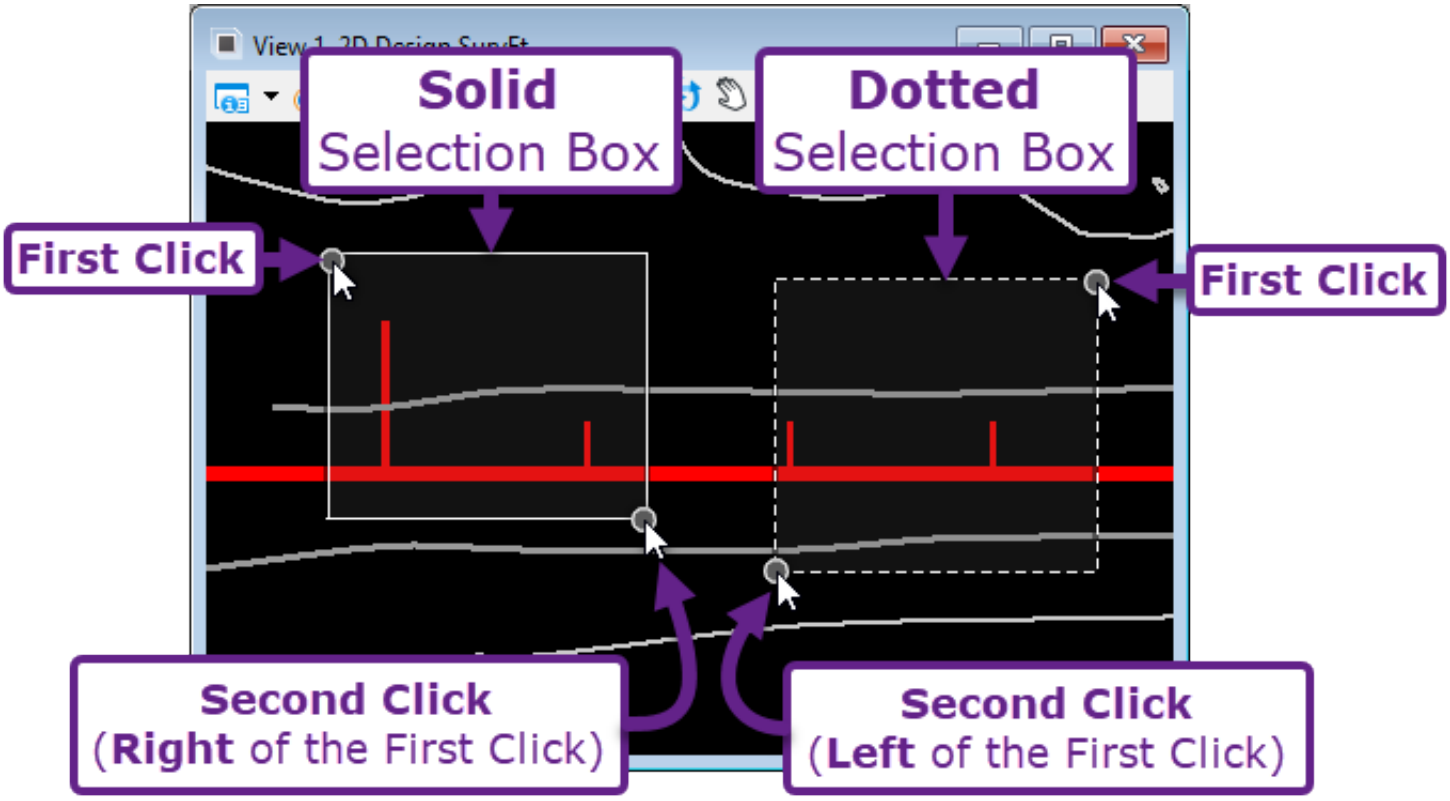
The *Element Selection* tool is found in ALL Tabs found in the Ribbon. Typically, the *Element Selection* button is found on the far left-side of the ribbon.



To select multiple elements, a **Selection Box** is created by holding down the left-click button and dragging the mouse. The direction which the mouse is dragged dictates whether a **Solid** or **Dotted** Selection box is created.

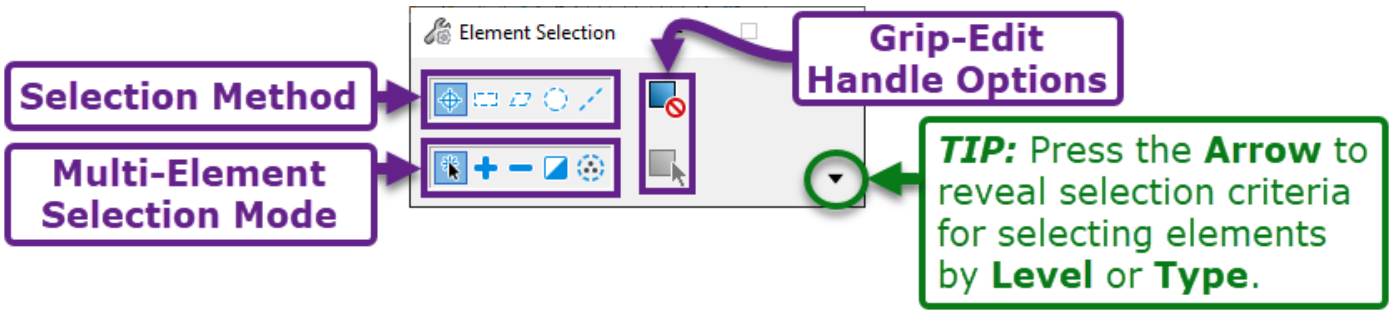
If the mouse is dragged to the **RIGHT**, then a **Solid Selection Box** is created. Only elements that are completely circumscribed by the Solid Selection Box are selected.

If the mouse is dragged to the **LEFT**, then a **Dotted Selection Box** is created. Elements within or intersecting the Dotted Selection Box are selected.



1B.2.a Element Selection – Options Overview

The options presented in the *Element Selection* dialogue box are shown and described below:



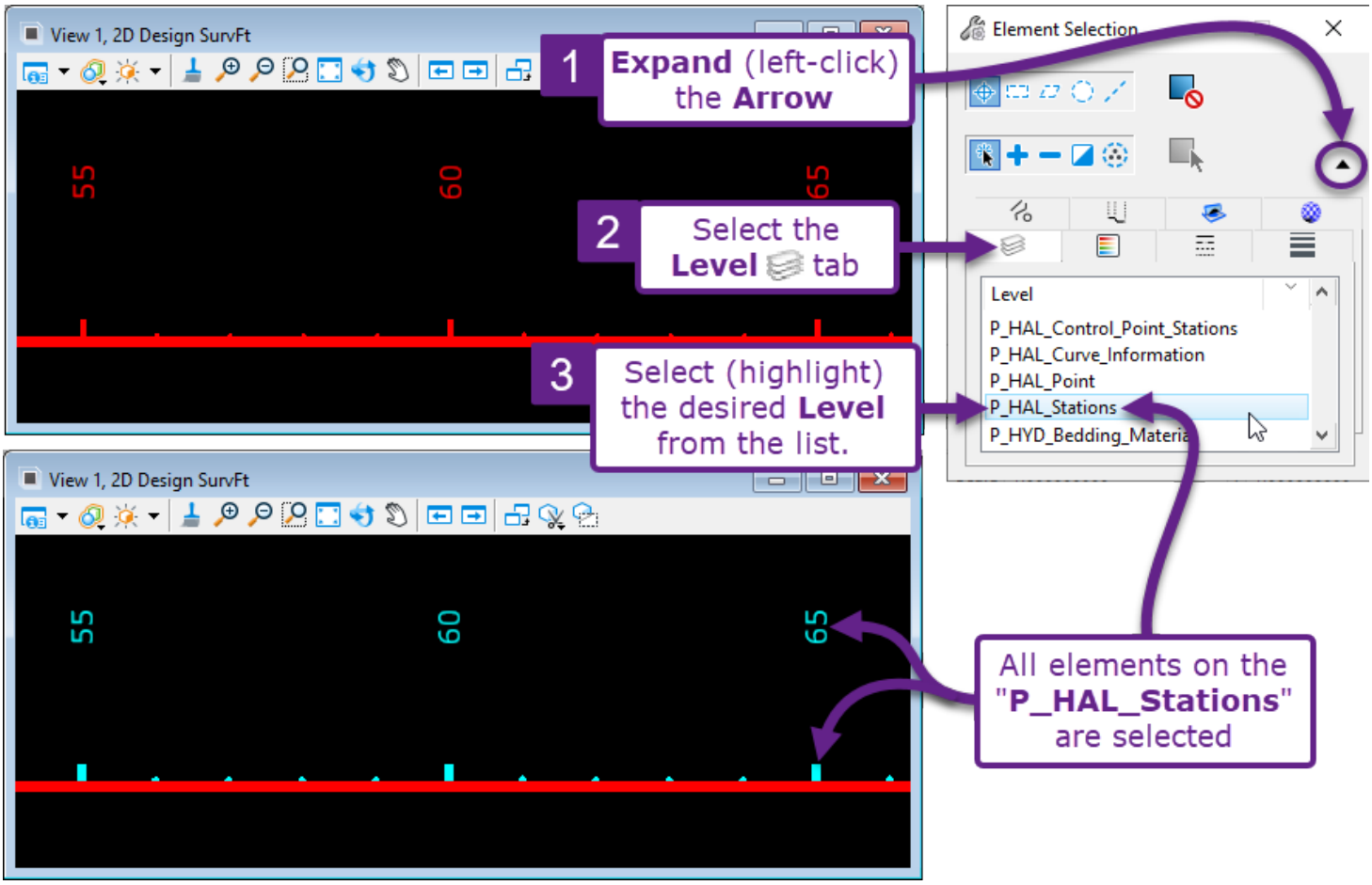
Selection Method		
	Individual	Elements are selected by directly clicking on them. **DEFAULT SELECTION MODE**.
	Block	A rectangular selection box is created. Any element inside or intersected by the box is selected.
	Shape	A polygon shaped selection box is created. Any element inside or intersected by the polygon shape is selected.
	Circle	A polygon shaped selection box is created. Any element inside or intersected by the circle is selected.
	Line	A selection line is created. Any element intersected by the line is selected.

Multi-Element Selection Mode		
	New	Click on an element to select it. If a new element is clicked on OR a blank space is clicked on, then the previously-selected elements are cleared from the selection set. If the CTRL key is held down, then multiple elements can be selected. **DEFAULT SELECTION MODE**.
	Add	When this mode is toggled ON, each element that is clicked on is added to the selection set.
	Subtract	When this mode is toggled ON, elements that are currently selected will be removed when clicked on. ***NOTE:*** Elements CANNOT be selected when this mode is on. Elements can only be removed from the selection set.
	Invert	This is a combination of the **Add** and **Subtract** modes. If an unselected element is clicked on, then it is added to the selection set. If a selected element is clicked on, then it is removed from the selection set
	Select All	Click on this icon to select ALL elements in the current Model. ***NOTE:*** Reference elements are NOT selected when this icon is clicked.

Grip-Edit Handle Options		
	Disable Handles	If this option is toggled ON (shown in blue), then grip-edit handles will NOT be shown on the selected elements.
	Select Handles	When multiple elements are selected at once, grip-edit handles will NOT be shown. Press this icon to reveal grip-edit handles for all elements selected.

1B.2.b Select all Elements on the Same Level

In the *Element Selection* dialogue box, expand the **Arrow** and select the icon to reveal a list of **Levels**. When a Level from this list is selected (highlight) all elements assigned to the Level are added to the selection set.



1B.2.c Select Overlapping Elements

It is very common for multiple elements to be directly on top of each other (overlapping).

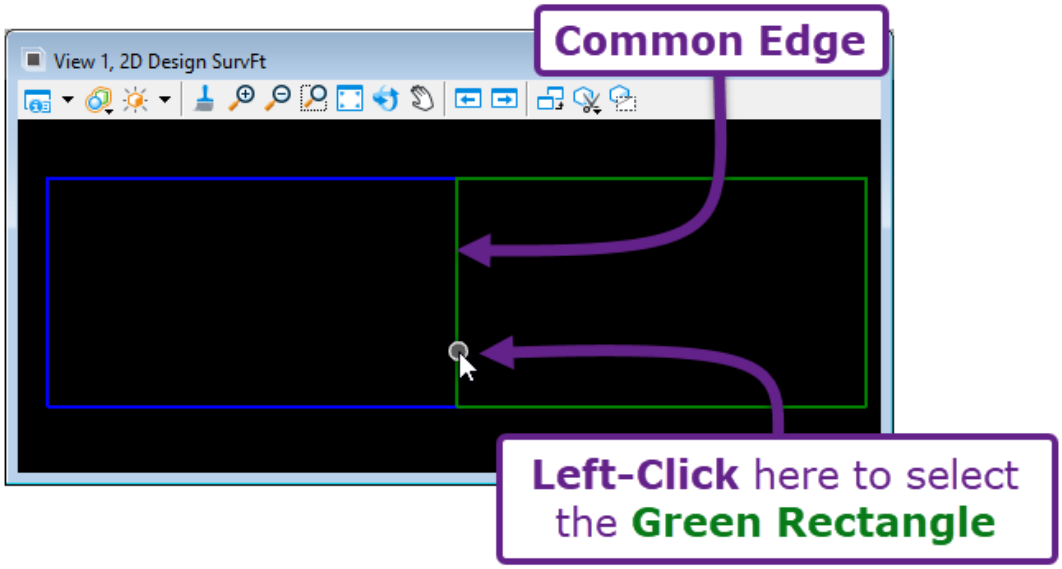
When a simple Left-Click is used on overlapping elements, the element placed on top (which is always the last element drawn) is selected.

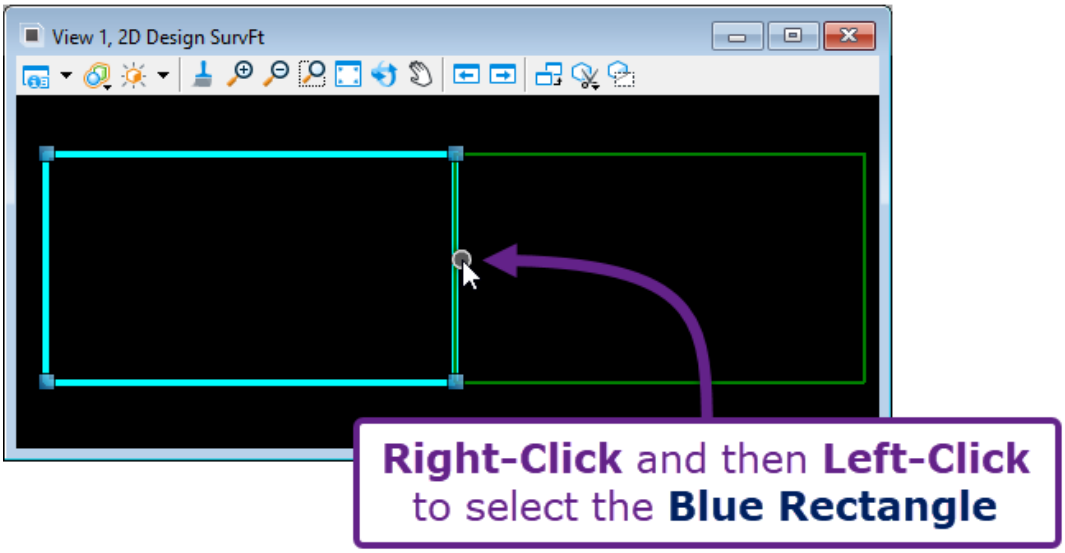
To select an underlying element: **Right-Click** and then **Left-Click** in quick succession.

For example, shown below are two rectangles that share a common edge. The **green rectangle** was drawn last, so it is placed above the **blue rectangle**.

Left-Click on the common edge to select the **green rectangle**.

Right-Click, then quickly Left-Click to select the **blue rectangle**.





TIP: If three or more elements are overlapping, then **Right-Click** multiple times to cycle between the overlapping element. When the desired element is highlighted, left-click to select it.

1B.3 The Dialogue Box and Prompts

When a tool is executed, the operation of the tool and tool settings are shown in three locations:

Prompts: Specifies the action to be taken for each step of the tool operating process. Prompt messages are shown in the bottom-left corner of the software window.

> ***IMPORTANT:*** Pay close attention to the **Prompt** bar when operating ANY tool or action.
>
> ***TIP:*** Expand the **Prompt** bar to ensure that the entire message is visible.

Dialogue Box: Used to configure parameters and input data related to the active tool.

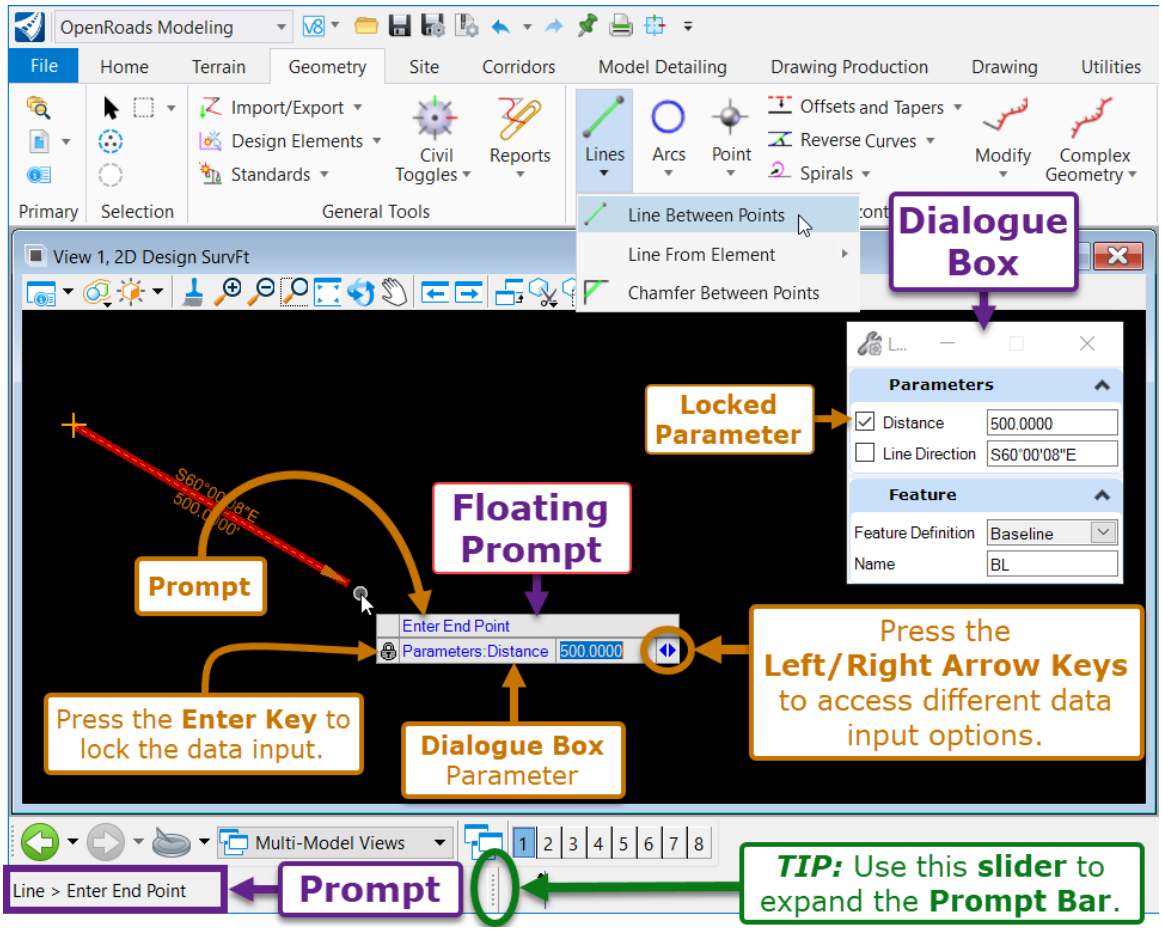
> ***NOTE:*** When there is no tool currently in operation, the *Element Selection* tool is shown in the Dialogue Box.
>
> ***BEST PRACTICE:*** Do NOT dock, minimize, or pin the **Dialogue Box**. The **Dialogue Box** shows important settings and information relating to the operation of the active tool.

Floating Prompts: Shows tool information and allow for data input from a box near Mouse-Cursor. Floating Prompts combine **Prompt** information and **Dialogue Box** data input.

> ***NOTE:*** Some tools do NOT show Floating Prompts.

The graphic below shows a particular step for the *Line Between Points* tool. Parameter data can be keyed-in to the **Floating Prompt** box or entered into the **Dialogue Box**.

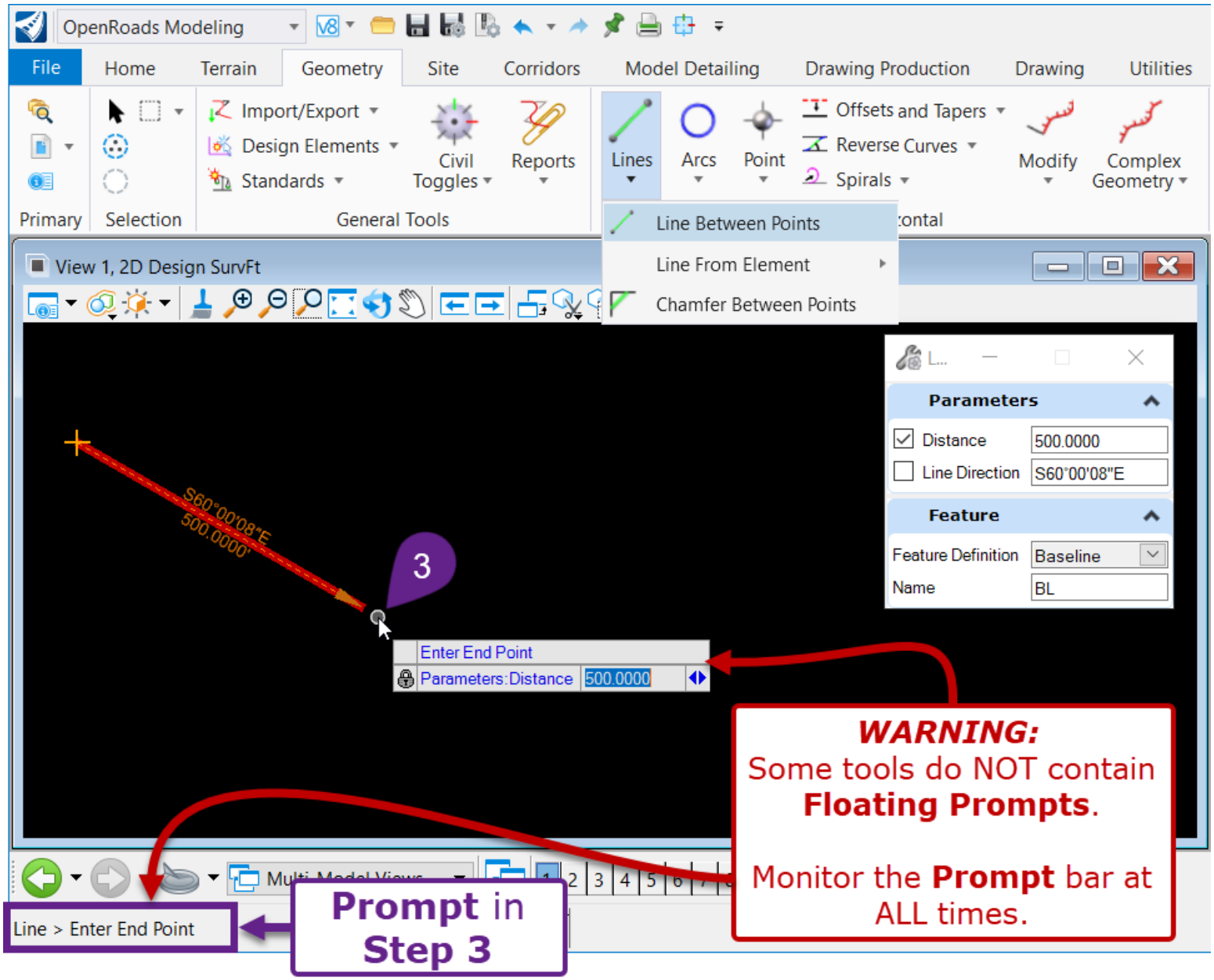
Tool operation information is shown in the **Prompt** and duplicated in the top-half of the **Floating Prompt**.



In this manual, a purple step symbol 3 is provided for each unique **Prompt** shown in the operation of a tool. The exact **Prompt** text is provided next to the purple step symbol. For example:

3	*Prompt: Line > Enter End Point* – Left-Click at the desired End Point OR specify the End Point position through *Dialogue Box* inputs. Left-Click in the *View* to complete the command and place the line.

The beginning italicized text shown above (*Prompt: Line > Enter End Point*) EXACTLY matches the **Prompt** shown in the graphic below. The remaining, unitalicized text describes how to carry out the Prompt.

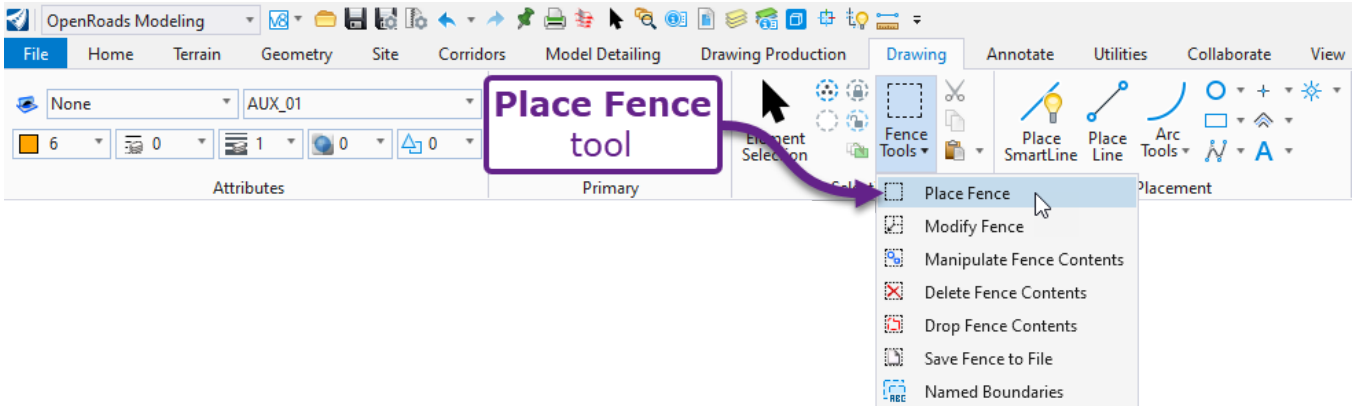


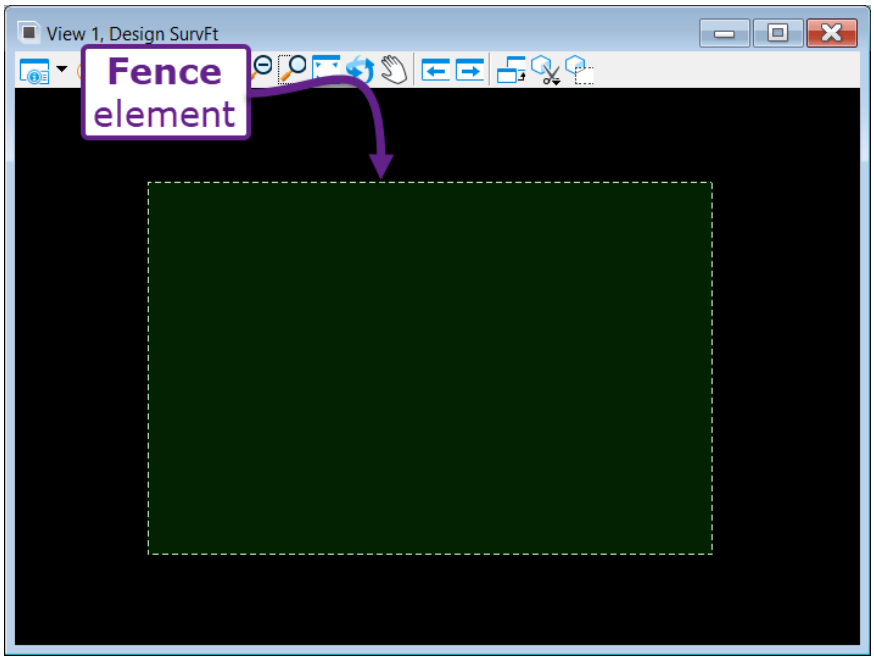
IMPORTANT: Pay close attention to the **Prompt** bar when operating ANY tool or action. Each **Prompt** represents a step in the sequence of a tool operation.

NOTE: The **Prompt** bar CANNOT accept input data. It ONLY shows the current status of the tool operation. Input data must be entered into the **Floating Prompt** box or **Dialogue Box**.

1B.4 Place Fence Tool

A Fence is a temporary selection box or shape.





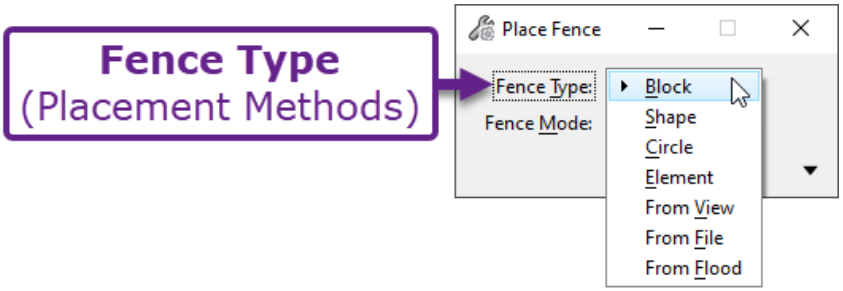
There are many uses for Fences. Some common Fence workflows are as follow:

- Select elements for editing operations by placing a Fence around them.
- Select an area of a Reference to be clipped or masked by placing a Fence around it.
- Select a specific area to be printing by placing a Fence around it.

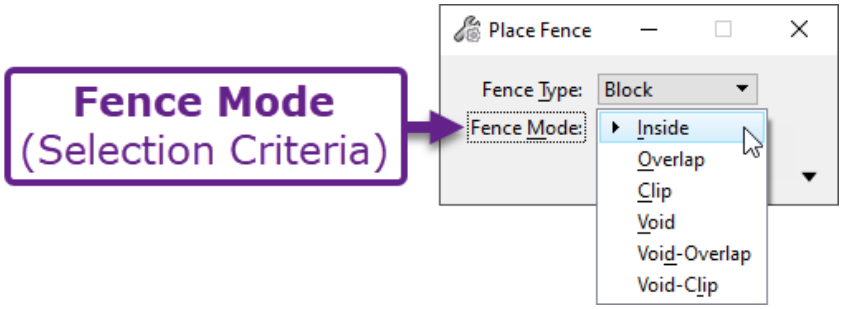
An *active* Fence is the currently-placed Fence. Only one Fence can be placed at a time. When a new Fence is placed, the previous Fence disappears. Also, a Fence will disappear when an element is selected with the *Element Selection* tool.

IMPORTANT: Snaps are disabled when placing a Fence. To snap the Fence to a vertex of an element, a **Tentative Snap** must be used. A Tentative Snap operation is performed by placing the mouse cursor over the desired snapping location and pressing both the Right-Click and Left-Click buttons simultaneously.

NOTE: Right and Left-Clicking simultaneously is the default mouse operation for performing a Tentative Snap. However, the Tentative Snap and other mouse operations can be changed remapped for a custom configuration. **Button Assignments** (mouse operations) are customized in the **Settings** tab found under the **File Menu**.



Fence Type Options	
Fence Type:	**Description:**
Block	The Fence is placed as a rectangle. The rectangle is always parallel to the current rotation of the *View* window.
Shape	The Fence is placed as a polygon shape.
Circle	The Fence is placed as a Circle.
Element	An element is selected. The Fence is automatically fitted around the selected element.
From View	The Fence is automatically fitted around the current zoom limits of the *View* window.
From File	The Fence is automatically fitted around ALL elements in the ORD File.
From Flood	The Fence is automatically fitted around the enclosed area formed by multiple elements.



Fence Mode Options	
Fence Mode:	**Description:**
Inside	ONLY elements that are completely INSIDE of the Fence are selected for manipulation.
Overlap	In addition to elements that are INSIDE of the Fence, elements that INTERSECT with the boundary of the Fence are also selected for manipulation.
Clip	If an element INTERSECTS the boundary of the Fence, ONLY the portion of the element that is INSIDE the Fence limits is selected for manipulation. The portion of the element that OUTSIDE of the Fence is NOT affected.
Void	Elements that are completely OUTSIDE the Fence limits are selected for manipulation. Elements that INTERSECT or are INSIDE the Fence are NOT affected.
Void-Overlap	Elements that are OUTSIDE the Fence limits or INTERSECT the Fence are selected for manipulation. Elements that are completely INSIDE the Fence are NOT affected.
Void-Clip	Elements that are completely OUTSIDE the Fence limits are selected for manipulation. Additionally, if an element INTERSECTS with the boundary of the Fence, the portion of the element that is OUTSIDE of the Fence limits is selected for manipulation. The portion of the element that is INSIDE the Fence limits is NOT affected.

NOTE: For Reference Clipping and Printing operations, use the **Inside** Fence Mode option.

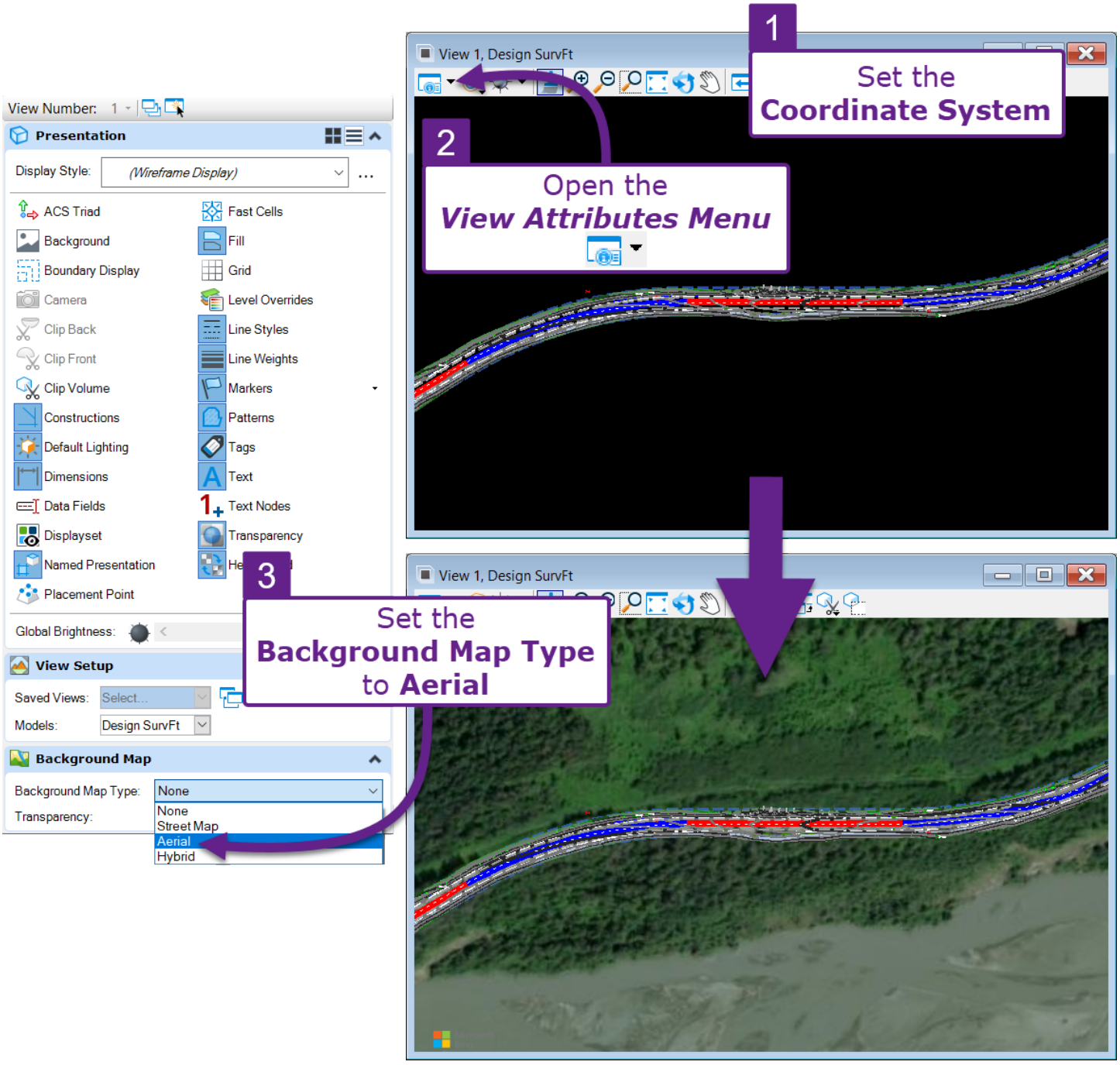
1B.5 The Background Map

After the Coordinate System has been set in the ORD File, an aerial map can be turned ON with the **Background Map** option shown in the *View Attributes* menu.

To set a Coordinate System in the ORD File, see *3D.1 Set the Coordinate System*. The Background Map drop-down will NOT be shown in the *View Attributes* menu if a Coordinate System is NOT set.

NOTE: The background map aerial imagery is provided by Microsoft Bing Maps. An internet connection is necessary to access the Bing Maps server. The resolution of the Background Map will vary depending on the project location.

TIP: The Background Map CANNOT be printed. However, a procedure for using a Bing Map in printing and sheet production is shown in *24C – Use a Bing Map for Sheet Production and Printing*.



1C – VIEWS AND MODELS

An ORD File is a container of **Models**. An ORD File may contain any number of Models. Each Model is a distinct 2D or 3D space. Within an ORD File, each **Model** behaves much like a separate ORD File. There are many different types of Models. For more information on Models, see *1D – Model Types*.

TIP: The **Models** manager shows all Models found in the ORD File.

A **View** window displays a **Model**. The specific **Model** shown in a **View** window can be changed. Multiple **View** windows can be open, each **View** window displaying a different **Model**.

There are 8 **View** windows that can be opened at a given time. The **View Toggles** toolbar (shown in the graphic below) is used to open and close View windows. In the **View Toggles** toolbar, left-click (toggle) on a numbered button to open an additional *View*.

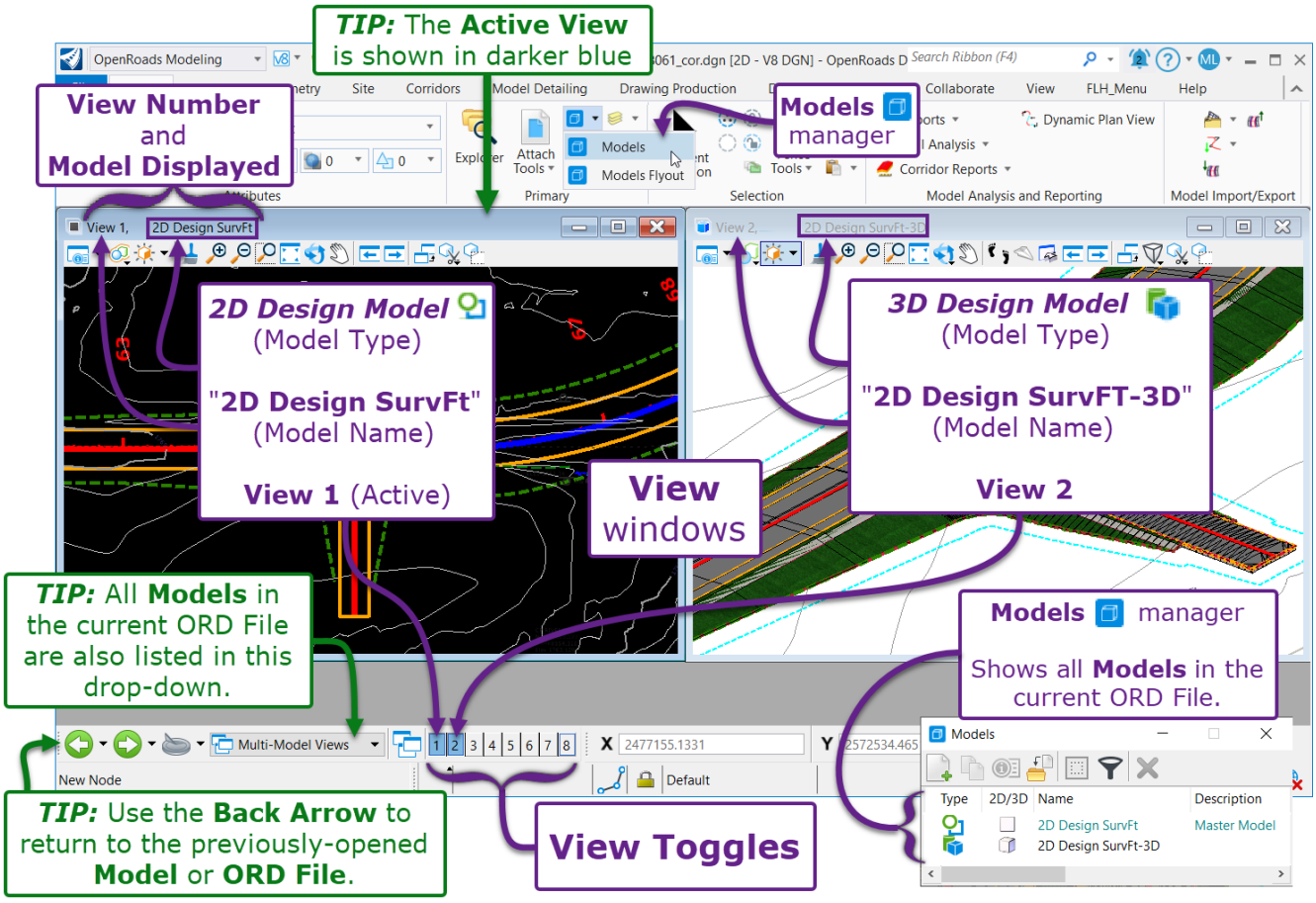
The **View** number and **Model** being displayed is shown in the View window title bar.

1C.1 Active View

At a given time ONLY one **View** window is **Active**. Left-Click in a **View** window to make it the **Active View**. In the graphic below, **Active View** is **View 1** and displays the **Model** called "2D Design SurvFT".

TIP: The title bar of the **Active View** is shown in a slightly darker color of blue than the other *Views*. In the graphic below, the *View* window on the left is Active.

TIP: Information shown in the References manager and Level menus is unique to the **Model** shown in the **Active View**. Other *Models* in the ORD File may contain an entirely different set of References and Level configurations.



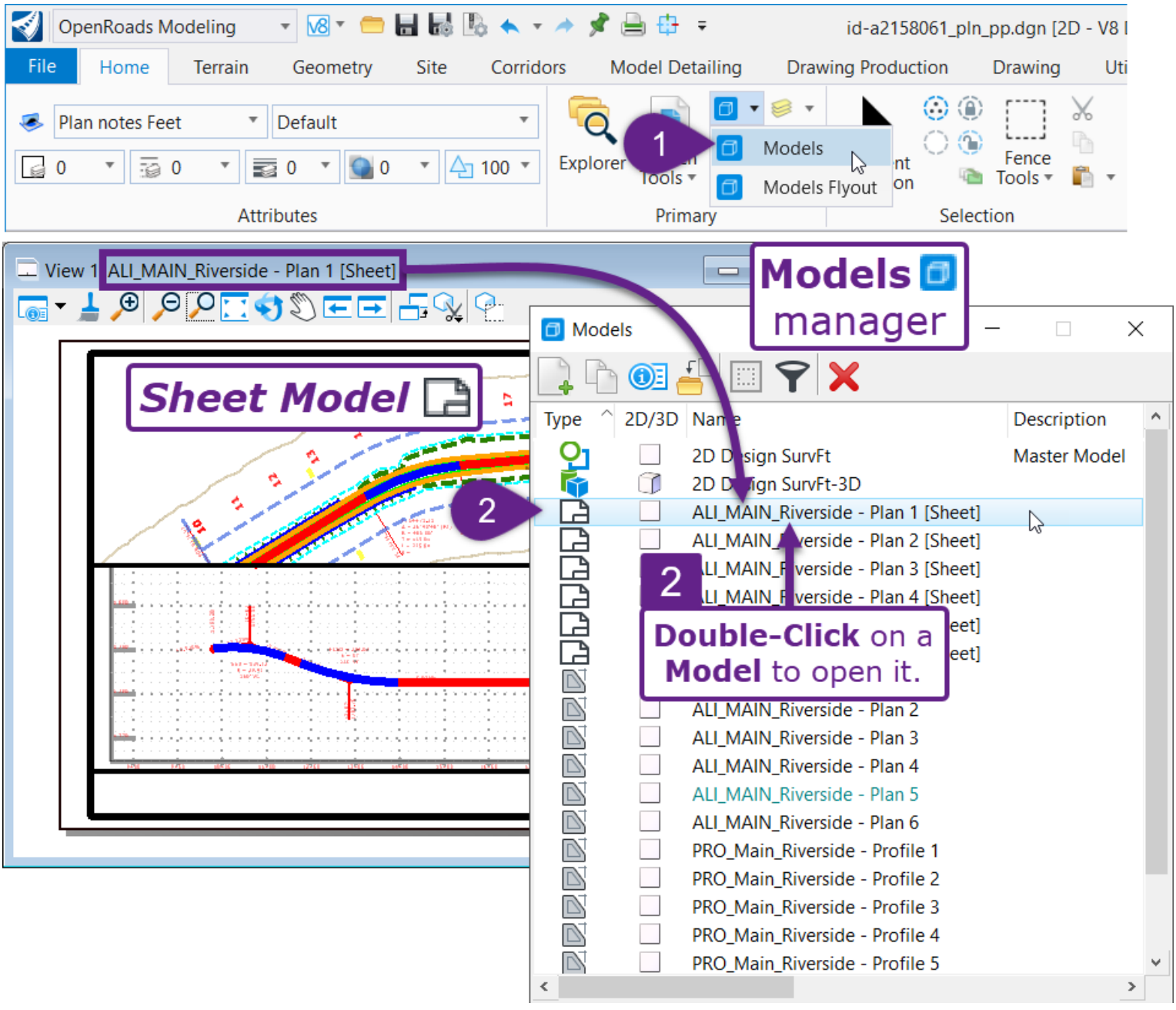
1C.2 Open a Model through the Model Manager

Double-click on a Model that is listed in the *Models* manager to open it.

> ***TIP:*** The *View Control* tool, which is found by right-clicking in a *View* window, can also be used to open Models. See *1A.3 Navigate a Design ORD File*.

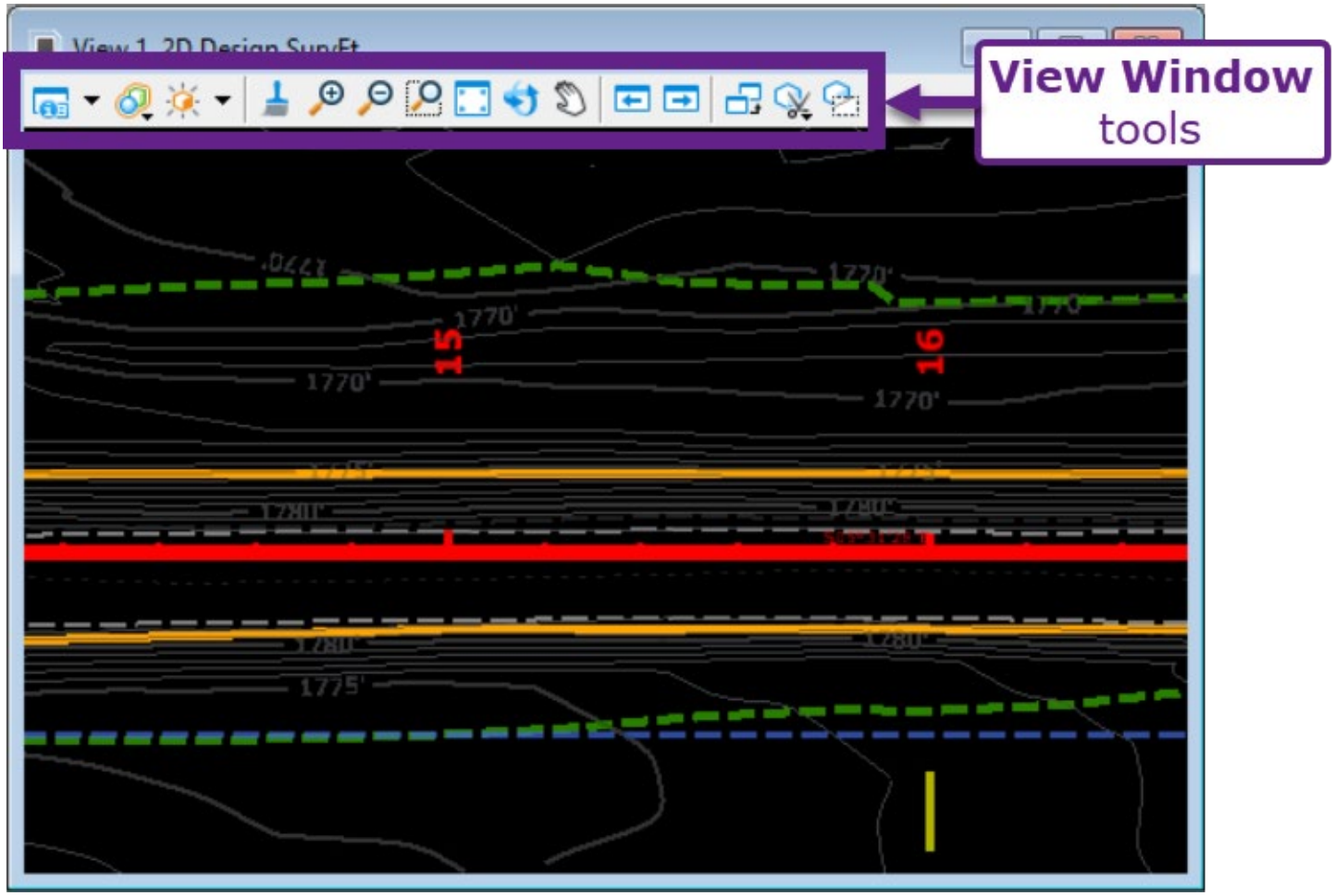
In this workflow, a *Sheet Model* is opened through the Model Manager.

1	From the Ribbon, select the *Models* tool: [***OpenRoads Modeling*** → ***Home*** → ***Primary***].
2	Double-Click on the desired Model. In this case, a *Sheet Model* is opened.



1C.3 View Window Tools

The top portion of *View* window contains tools for navigating and manipulating the display of the *View*.



View Attributes		Click this button to access the *View Attributes* menu. The *View Attributes* menu is discussed in the next section, *1C.4 View Attributes Menu*.
Display Styles		Preset Display Styles found in this drop-down are used to change the color and lighting scheme for a *View* window. Also, the Display Style controls whether solid objects are displayed as a wireframe or as realistic solid shapes. ***TIP:*** Typically, the *2D Design Model* is set to the *Wireframe* Display Style. Typically, the *3D Design Model* is set to *Illustration: Ignore Lighting* for a "realistic" appearance.
Adjust View Brightness		Adjust the brightness of elements in the *View* window. ***NOTE:*** This tool only affects Views shown in *3D Design Model*. **Display Styles** that are labeled "…Ignore Lighting" are NOT affected by this tool. UNCHECK the "Default Lightening" box to unlock the Brightness slider.
Update View		Used to refresh the *View* window. ***NOTE:*** This tool is obsolete. The *View* window will automatically refresh when zooming in/out, panning, creating, and editing elements. Typically, there is NO need to use this tool.

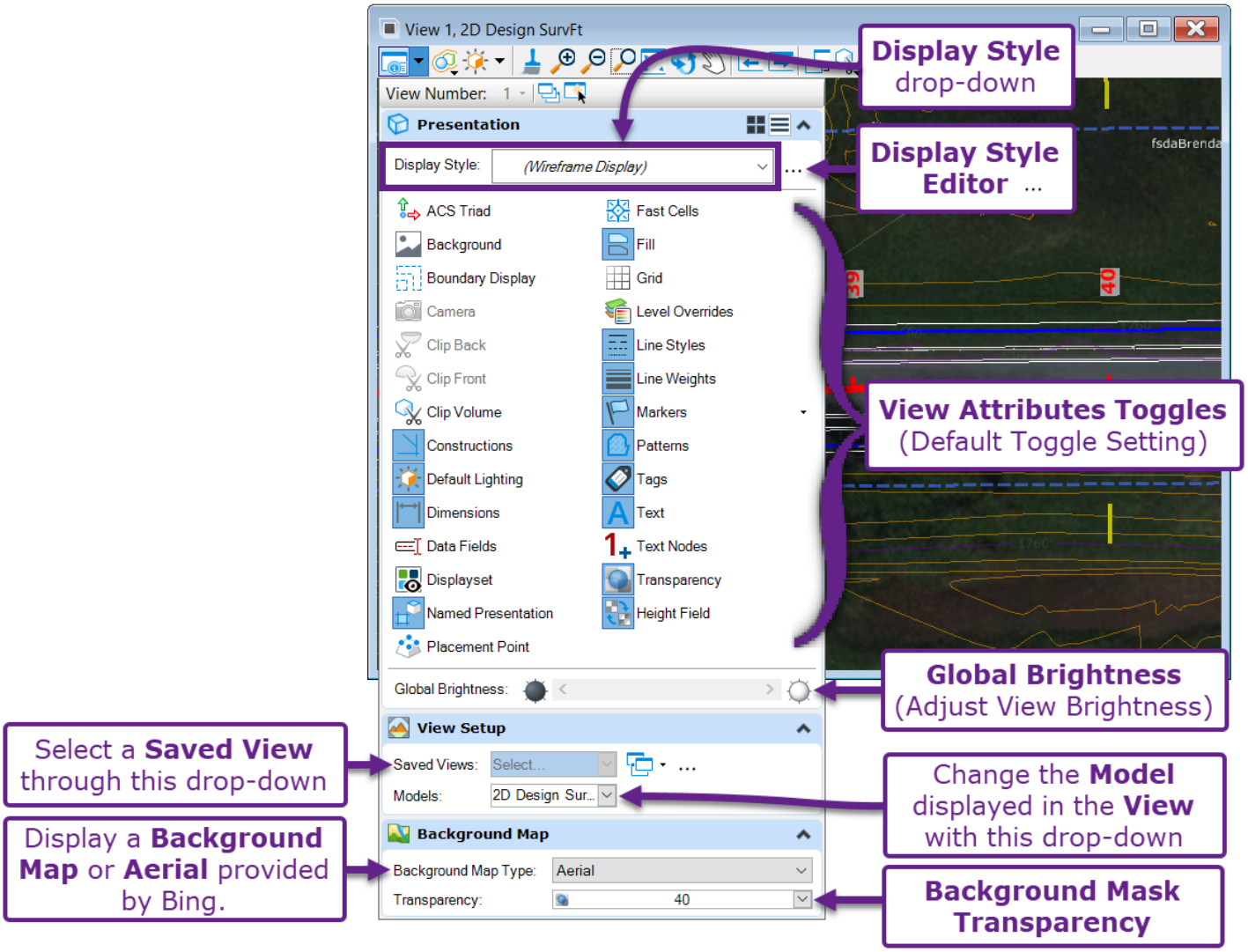
Zoom In/Out		Used to Zoom In and Out of the *View* window.
Window Area		A rectangle is drawn. Then, the *View* window is zoomed into to the limits of the rectangle.
Fit View		Zooms and repositions the *View* window to show ALL elements displayed in the *View*. ***TIP:*** Quickly, press the Mouse Scroll Wheel in twice to perform this action.
Rotate View		Rotates the orientation of the *View* window. This tool is demonstrated in *1A.3.a.i Rotate the 2D Design Model* and *1A.3.b.i Move Around and Orbit in the 3D Design Model*.
Pan View		Pans (repositions) the *View* window. ***TIP:*** Alternatively, hold down the Mouse Scroll Wheel to perform this action.
View Previous		Push this button to undo the last zoom, pan, view rotate, or Display Style operation performed in the *View* window. Also, push this button to undo the toggling ON/OFF of Levels. For example, if a Level is toggled OFF, then push this button to toggle the Level back ON.
View Next		Used in conjunction with the *View Previous*  tool. Push this button to redo a zoom, pan, view rotate, Display Style, or Level operation.
Copy View		This tool duplicates the current Model and *View* settings into a different *View* window.
Clip Volume		Use to clip a portion of the *View*. Elements outside of the clipping shape will NOT be displayed. ***TIP:*** To remove the clip, open the *View Attributes Menu* and toggle OFF the *Clip Volume*  icon.
Clip Mask		Used to place a clipping mask in the *View*. Elements inside of the clipping mask shape will NOT be shown. ***TIP:*** To remove the mask, open the *View Attributes Menu* and toggle OFF the *Clip Volume*  icon.

1C.4 View Attributes Menu

The *View Attributes* menu is used to manipulate the display of a *View* window and toggle OFF elements based on their Class and Type.

The default toggle state for the *View Attributes Toggles* is shown in the graphic below.

WARNING: Toggling OFF elements with the *View Attributes Toggles* is NOT recommended. The next User to open the ORD File may NOT realize that certain toggles have been changed. Instead, turn off the display of elements through the Level Display box. See *1G – Levels*.



Display Style: Preset Display Styles found in this drop-down are used to change the color and lighting scheme for a *View* window. Also, the Display Style controls whether solid objects are displayed as a wireframe or as a realistic solid shape.

> ***TIP:*** Typically, the *2D Design Model* is set to the *Wireframe* Display Style. Typically, the *3D Design Model* is set to *Illustration: Ignore Lighting* for a "realistic" appearance.

View Setup: This drop-down is used to select a *Saved View* or change the *Model* shown in the *View* window.

Background Map: This drop-down is ONLY shown if a Coordinate System is set in the ORD File. Once a Coordinate System is set, use this drop-down to automatically display maps and aerials provided by Bing.

View Attributes Toggles: These icons toggle ON/OFF the display of elements by type or Class.

ACS Triad		Always toggle this icon ON to display the ACS compass. ***NOTE:*** ACS stands for Auxiliary Coordinate System. ACS is used in conjunction with AccuDraw. For more information on ACS and AccuDraw, see *Chapter 6 – Drawing Tools*.
Background		Toggles ON/OFF a background image that fills the entire *View* window. This tool is obsolete and is NOT used in FLH workflows.
Boundary Display		Always toggle this icon ON to display the Boundaries of Reference Files.
Camera		This icon is automatically toggled ON when the *Place Camera* tool is used. Toggle this icon OFF to exit the Camera view. The *Camera* tool is used in the *3D Design Model* to visualize the design from a particular point.
Clip Back		This icon is automatically toggled ON when the *Clip Back* tool is used. If this icon is toggled OFF, then the clipped area of the *View* is restored. ***NOTE:*** This icon and the *Clip Back* tool can ONLY be used in the *3D Design Model*
Clip Front		This icon is automatically toggled ON when the *Clip Front* tool is used. If this icon is toggled OFF, then the clipped area of the *View* is restored. ***NOTE:*** This icon and the *Clip Front* tool can ONLY be used in the *3D Design Model*
Clip Volume		This icon is automatically toggled ON when the *Clip Volume* or *Clip Mask* tool is used. If this icon is toggled OFF, then clipped area of the *View* is restored. ***NOTE:*** The *Clip Volume* and *Clip Mask* tools are used to clip a portion of the *View*. These tools are found in the View Window tool bar. See *1C.3 View Window Tools*.
Constructions Default Toggled ON		Toggles ON/OFF the display of elements assigned to the **Construction** class. ***NOTE:*** Ancillary elements used in Corridor modeling (i.e., the Corridor Handle, Template Drop sections, and Corridor Object graphics) are automatically assigned to the **Construction** class. The Class of an element is shown in the Properties menu. See *1F.1 Properties Box Overview*.
Default Lighting Default Toggled ON		Toggles ON/OFF the default lighting for *3D Design Model* Views. This icon works in conjunction with the *Adjust View Brightness* tool.
Dimensions Default Toggled ON		Toggles ON/OFF the display of the display of Dimension and Note elements. ***WARNING:*** Do NOT toggle this icon OFF. Instead, turn off the display of Dimension and Note elements by toggling OFF the corresponding Levels in the Level Display box.

Data Fields		A **Data Field** is a series of underscores that serves as a place holder for data entry. Toggle this icon ON/OFF to display the Data Field underscores.
Displayset		This icon is automatically toggled ON when a **Displayset** is created. Select elements and use the *Displayset* tool to isolate the display of the selected elements. Toggle this icon OFF to un-isolate the Displayset.
Named Presentation Default Toggled ON		Used in conjunction with the *Named Presentation* tool to show ONLY elements included in the *Named Presentation* set.
Placement Point		Used in conjunction with the *Named Presentation* tool to define the origin point of a Named Presentation set.
Fast Cells		If toggled ON, Cell elements display as outlines. Turning this toggle ON can decrease the view processing time of Cell elements.
Fill Default Toggled ON		Toggles ON/OFF the display of Fill. Closed Shapes elements can be Filled with a solid or opaque color.
Grid		Toggles ON/OFF the display of a reference grid.
Levels Override		If toggled ON, then overrides made to an element's Color, Line Style, or Line Weight are NOT shown. If toggled ON, then all elements are shown according to the "By Level" symbology set in the Levels Manager. If toggled OFF, then overrides made to element's symbology is shown.
Line Styles Default Toggled ON		This icon effects elements that have Custom Line Styles. An example of a Custom Line Style is a Utility or Right-of-Way Line Style. Example Custom Line Stye:  If toggled OFF, then ALL Custom Line Styles appear as a solid line (0). If toggled ON, then Custom Line Styles displayed in their intended configuration. Toggling this ICON off may increase processing times for an ORD File.
Line Weights Default Toggled ON		If toggled OFF, then ALL elements are displayed with the narrowest Line Weight (0). If toggled ON, then elements are displayed with the assigned Line Weight.
Markers Default Toggled ON		Toggles ON/OFF the display of Markers.
Patterns Default Toggled ON		Toggles ON/OFF the display of Patterns. A Pattern is custom hatch or repeating linework used to infill an enclosed space. For example, an "Aggregate" pattern may be used to graphically show base material in a typical section drawing.
Tags Default Toggled ON		Toggles ON/OFF the display of Tags. Tags are a set of attributes assigned to an element.
Text Default Toggled ON		Toggles ON/OFF the display of Text elements.

Text Nodes		Places a cross hair symbol of Text Node elements. ***NOTE:*** Text Nodes are typically NOT used.
Transparency Default Toggled ON		This icon effects elements that have a Transparency value set in their Properties. If toggled ON, then elements are shown with the assigned Transparency value. If toggled OFF, then elements are NOT shown as Transparent.
Height Field		Used in conjunction with the *Named Presentation* tool to show the height of a defined view.

1D – MODEL TYPES

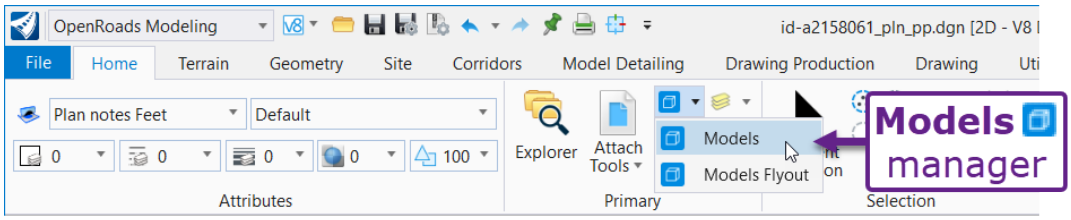
There are many different Model types found in the ORD Software. The **Models** manager shows all Models found in the ORD File.

The **Models** manager is found in many locations in the Ribbon. The two most common Ribbon locations are:

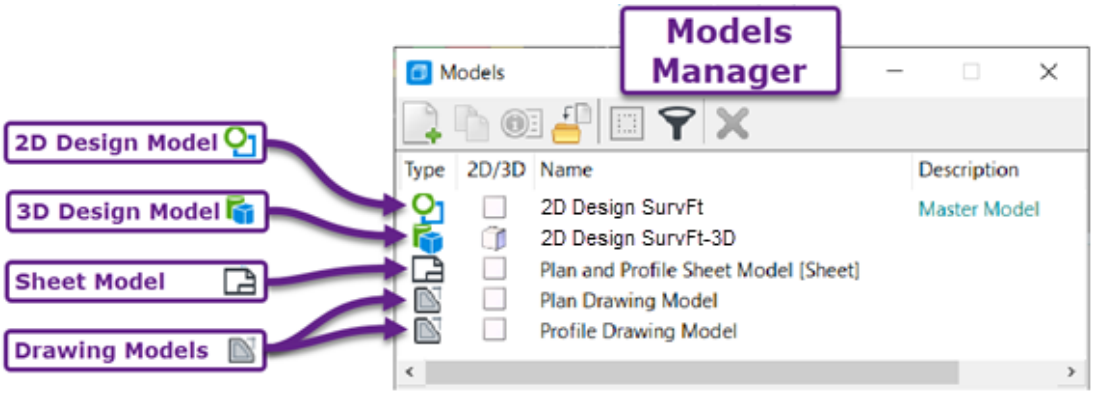
OpenRoads Modeling workflow → **Home** tab → **Primary** group

OR

Drawing workflow → **Home** tab → **Primary** group



Model types are organized into three categories: **Design Models**, **Dynamic Views**, and **Drawing Models**, and **Sheet Models**.

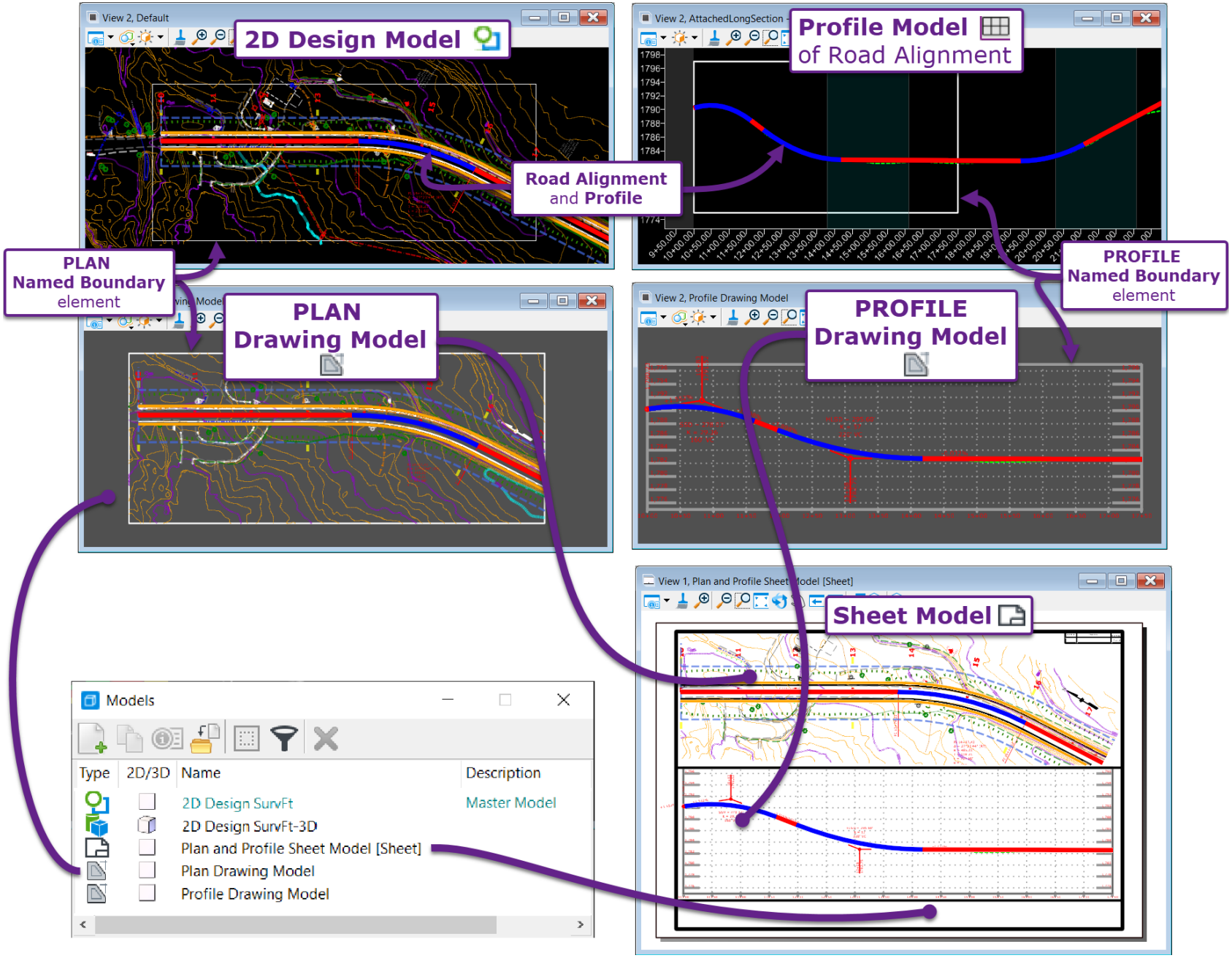


NOTE: Dynamic Models are NOT shown in the Models manager.

The typical sequence for creating Models is as follows:

- ***2D Design Model*** – By default, this Model is available when a new ORD File is created. Typically, a new ORD File will ONLY contain the *2D Design Model*
- ***3D Design Model*** **-** This Model is created by *Activating* the Existing Ground Terrain Model. See *3D.3 Activate the Existing Ground Terrain Model*. ***TIP:*** The *3D Design Model* is generally used for visualization purposes. Typically, elements are NOT directly drawn in the *3D Design Model*.
- ***Profile Models*** **-** *Profile Models* are considered Dynamic Views. These Models are available after an element or Alignment is drawn in the *2D Design Model*. Every 2D element has a corresponding *Profile Model*. After a Profile element is drawn and *Activated*, a 3D Linear Element is created in the *3D Design Model*.
- ***Drawing Models*** **–** These Models are used in the creation of plan sheets. A *Drawing Model* is a clipped portion of a Design Model or *Profile Model*. *Drawing Models* re referenced into *Sheet Models* to display design graphics. There are three types of *Drawing Models*: PLAN, PROFILE, and CROSS SECTION.
- ***Sheet Models*** **-** A *Sheet Model* represents a single plan sheet.

The graphic below shows the relationship between the *2D Design Model*, *Profile Model*, *Drawing Models*, and *Sheet Models* in the context of a Road Plan and Profile sheet.



1D.1 Design Models

1D.1.a The 2D Design Model

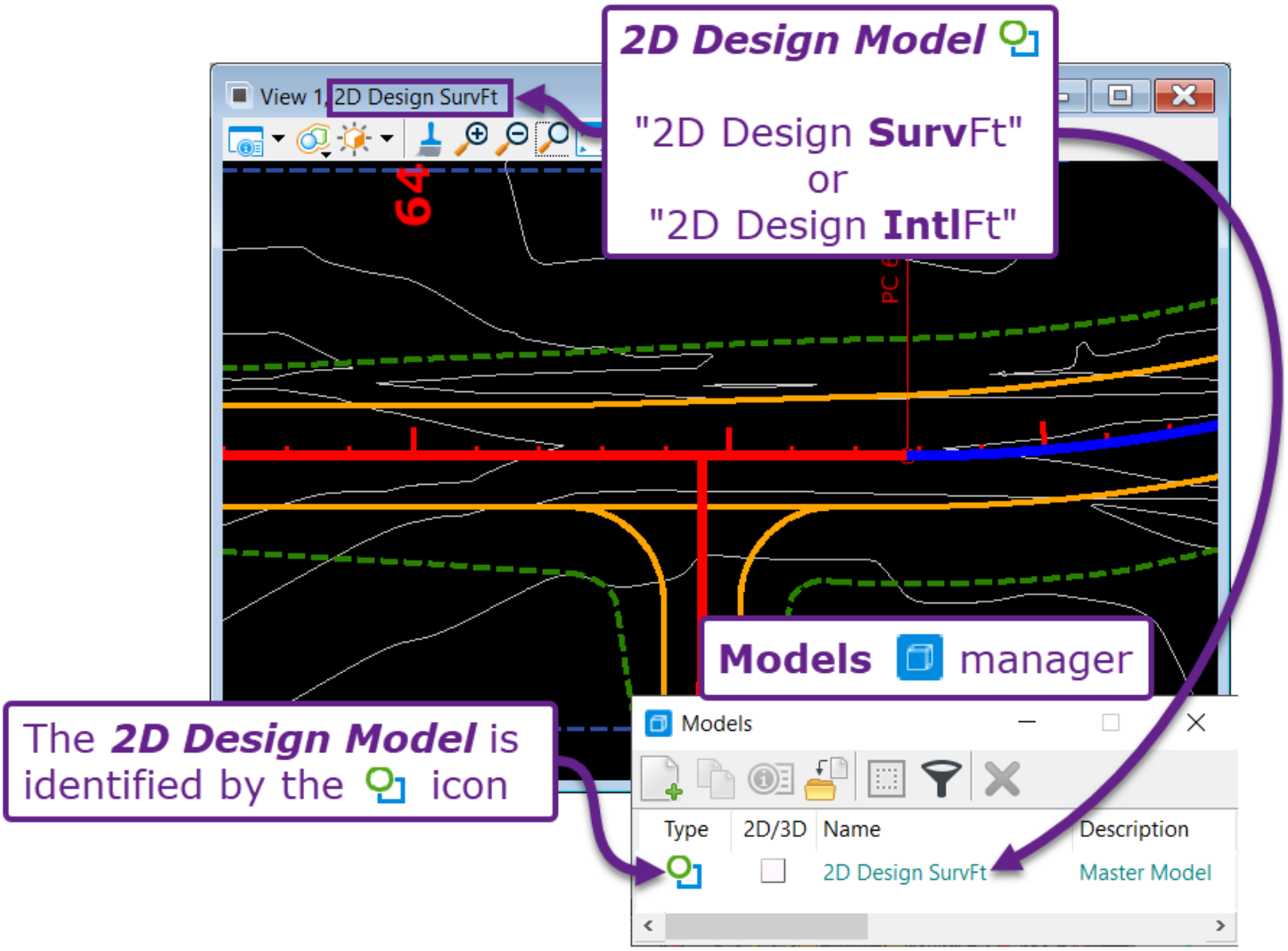
When a new ORD File is created, it will only contain the *2D Design Model*. See the ***EXCEPTION*** below.

The *2D Design Model* is a "real-world", two-dimensional space. The X-axis represents Longitude (Easting coordinates). The Y-axis represents Latitude (Northing coordinates).

WARNING: The *2D Design Model* MUST be set to the appropriate Coordinate System for linework and graphical elements to geographically align with the project location. See *3D.1 Set the Coordinate System*.

The *2D Design Model* is used to draw and display graphical elements **HORIZONTALLY** or from a "plan" perspective.

In the Models manager, the *2D Design Model* is named "2D Design **Surv**Ft" if the project is in **Survey Foot** units. For **International Feet** units projects, it will be named "2D Design **Intl**Ft".



EXCEPTION: Optionally, a new ORD File can be created with a *3D Design Model* - instead of a *2D Design Model*. This is accomplished by using a *3D Seed File*. However, the *3D Seed File* is generally only used for a few specific ORD Files – such as Proposed Terrain Model files. The *2D Seed File* and *2D Design Model* is used for the vast majority of ORD Files. See *3B.3 The Seed File*.

1D.1.b The 3D Design Model

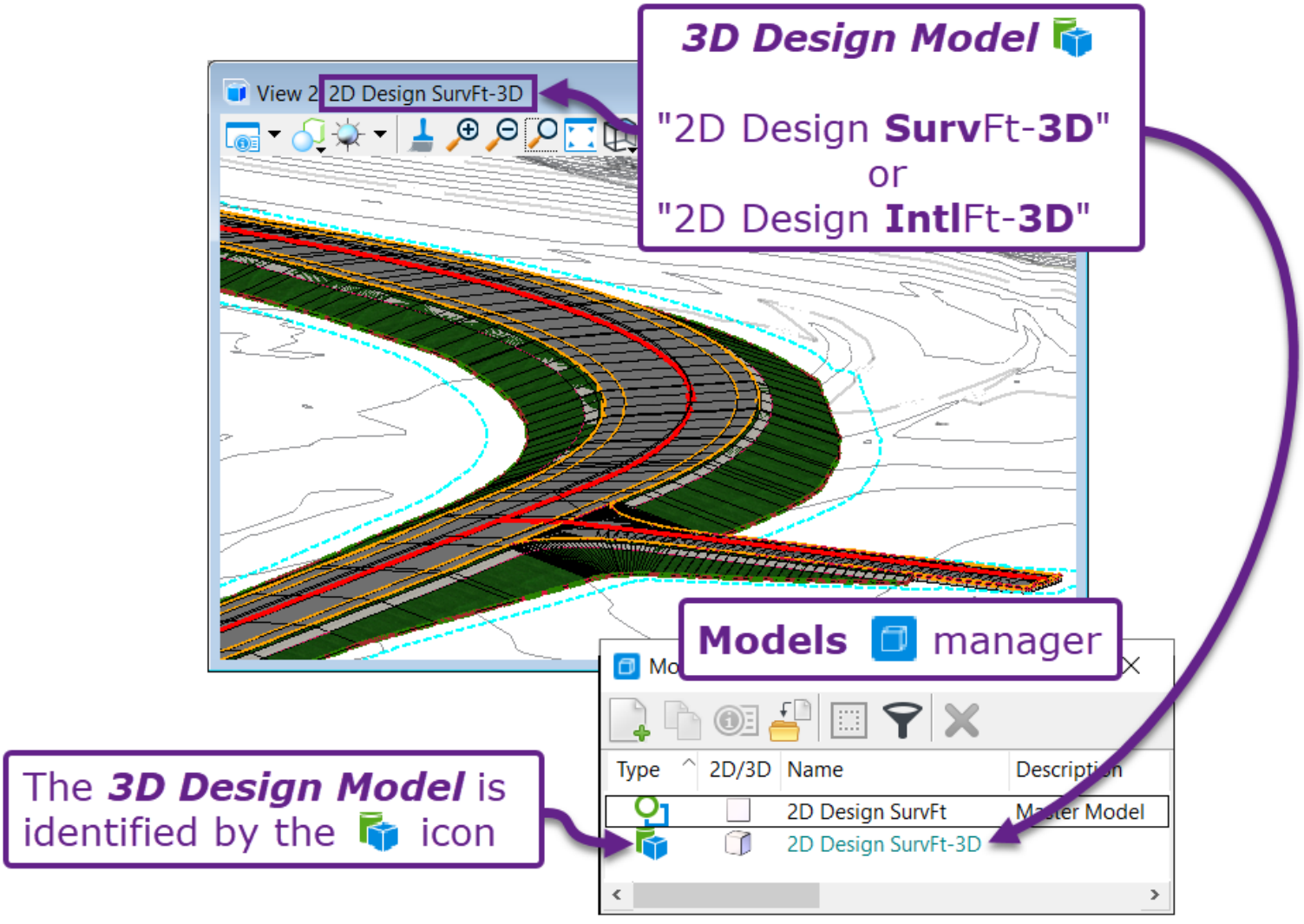
The *3D Design Model* is a true 3-dimensional space. The *3D Design Model* is mainly used to visualize the design from an isometric perspective. Typically, the User does NOT directly place elements in the *3D Design Model*.

The *3D Design Model* is a repository for 3D elements – such as Terrain Models and Corridors. However, 3D elements are projected or "flattened" into the *2D Design Model* through **referencing**.

IMPORTANT: When an ORD File is initially created, it will NOT contain a *3D Design Model*. When the Existing Ground Terrain Model is *Activated*, then a *3D Design Model* is **automatically** created. For more information on *Activating* the Existing Ground Terrain Model, see *3D.3.a Creation of the 3D Design Model after Terrain Model Activation*.

The *3D Design Model* interacts with the *2D Design Model* to create 3D elements. In conventional civil design, an Alignment is drawn out horizontally (from the *2D Design Model* perspective). Then, a Profile is drawn from the elevation view (from the *Profile Model*). The combined Alignment and Profile geometry forms a 3D element – which is stored and displayed in the *3D Design Model*.

In the Models manager, the *3D Design Model* is named "2D Design **Surv**Ft-**3D**" if the project is in **Survey Foot** units. For **International Feet** units projects, it will be named "2D Design **Intl**Ft-**3D**".



1D.2 Dynamic Views

There are two types of Dynamic Views: *Profile Models* and *Dynamic Cross Section Views*.

Dynamic Views are NOT traditional Models, but they appear and behave like Models. Dynamic Views are the *3D Design Model* shown from different perspectives. Dynamic Views are essential a "slice" of the *3D Design Model*.

IMPORTANT: Dynamic Views are NOT displayed in the Models manager.

IMPORTANT: Dynamic Views CANNOT be referenced through the References manager.

1D.2.a Profile Models

All graphical elements and alignments created in the 2D Design Model have a corresponding *Profile Model*.

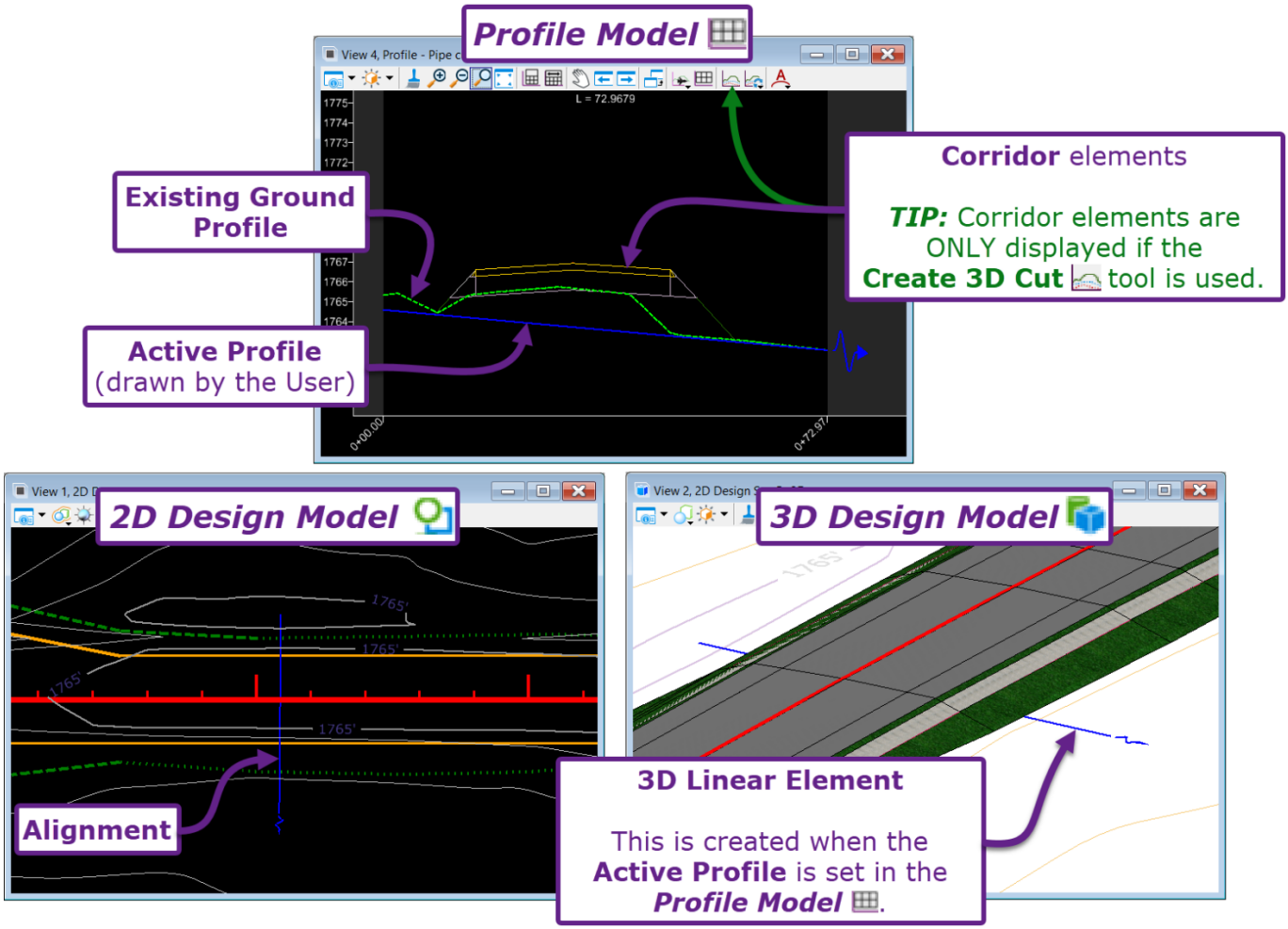
> ***IMPORTANT:*** *Profile Models* are NOT listed or accessed through the Models manager. To access a *Profile Model* for a particular 2D-element, see *1A.3.c Open a Profile Model* or *7F.1.a Accessing a Profile Model*.

Profile Models shows the *3D Design Model* from the elevation perspective along a 2D element. The X-axis represents stations along the 2D-element and the Y-axis represents elevation.

> ***TIP:*** By default, the Vertical Exaggeration of a *Profile Model* is set to 10V:1H. However, this value can be changed as desired. See *7F.1.b Changing the Vertical Exaggeration of a Profile Model*.

The *Profile Model* is generally used to draw a proposed Profile element for an Alignment. After drawing a Profile element, use the *Set Active Profile* tool to associate the 2D Alignment with the Profile to create a 3D Linear Element. For more information on creating Profiles, see *7F – Create Vertical ORD Elements*.

> ***NOTE:*** Any number of Profile elements can be drawn in the *Profile Model*. However, only ONE Profile element can be *Active* at a time.

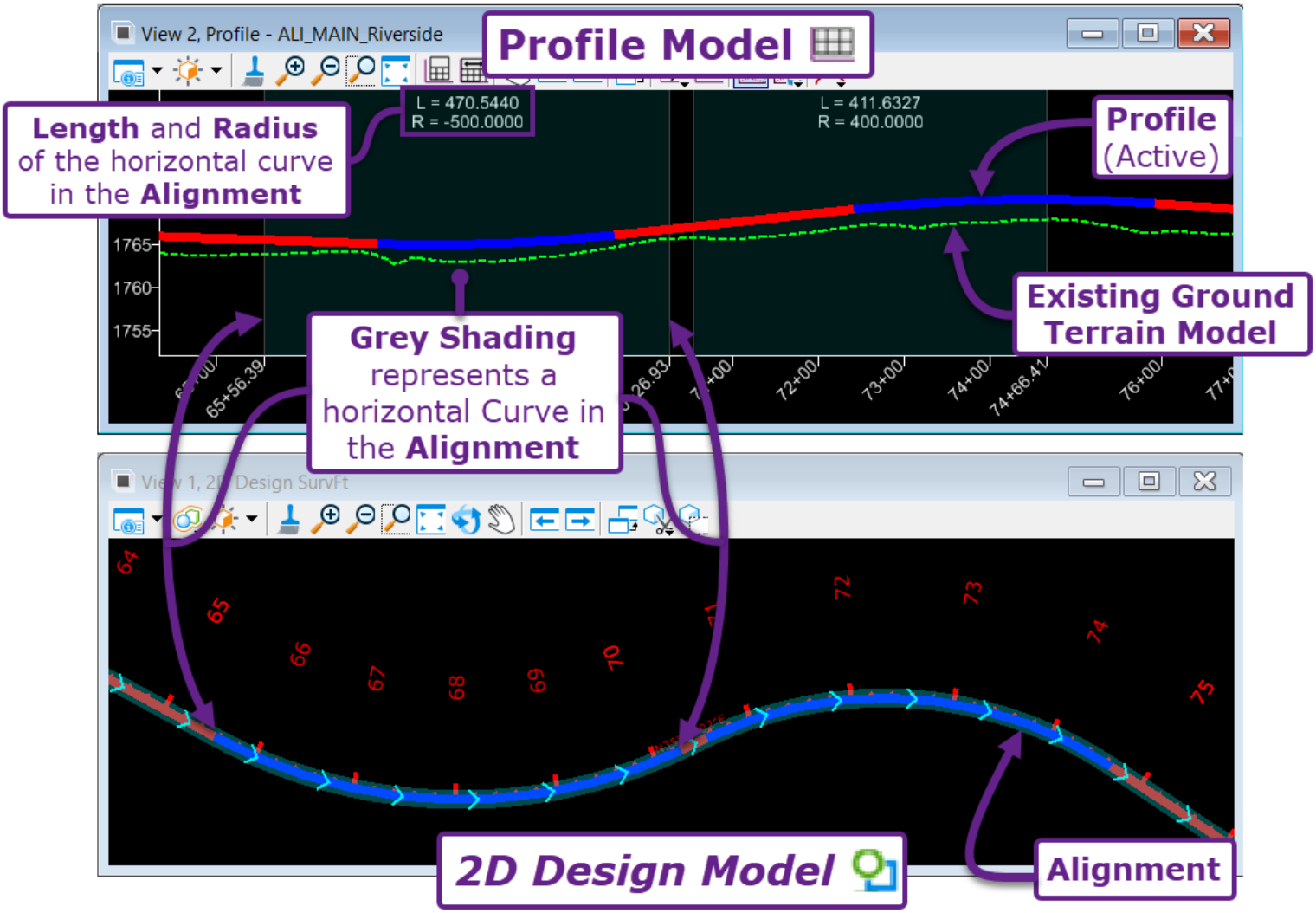


NOTE: The Existing Ground Terrain Model must be *Activated* to display the existing ground profile in the *Profile Model*. To activate the Existing Ground Terrain Model, see *3D.3 Activate the Existing Ground Terrain Model*.

TIP: By default, only the existing ground profile and elements manually drawn by the User (i.e., the *Active* Profile) are shown in the *Profile Model*. To display other 3D modeling elements (i.e., Corridors, Surface Templates, and Linear Templates), use the *Create 3D Cut* tool with the "Full Profile" method. ***NOTE:*** If the Alignment or Corridor is edited, then the *Refresh 3D Cut* tool must be used to refresh the 3D modeling elements displayed in the *Profile Model*. See *7F.1.e Show Corridor and 3D Elements in a Profile Model with Create 3D Cut*.

IMPORTANT: Do NOT create Profile Annotations (i.e., Vertical Curve Data, VPI Elevation/Station, Slopes, K-Values) in the *Profile Model*. The *Profile Model* is for graphical design and drawing ONLY. Create Profile Annotations in the PROFILE *Drawing Model*. To create Profile Annotations and PROFILE *Drawing Models*, see *Chapter 14 – Plan Sheet Production*.

TIP: When the *Profile Model* View is **Active**, blue arrows representing the alignment direction will appear along the 2D-element (in the *2D Design Model*).



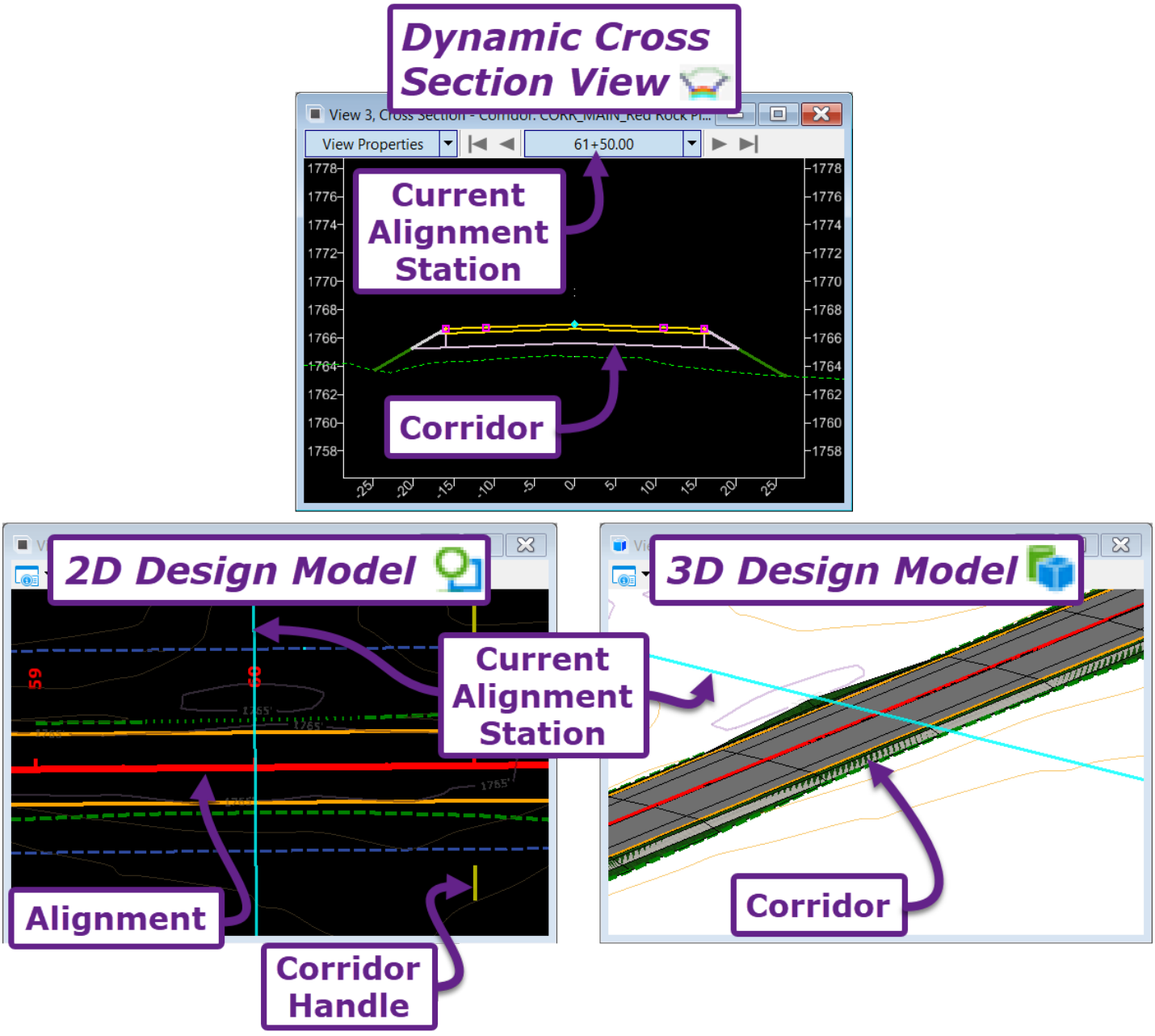
TIP: As shown above, draw a road Profile element using the "Baseline" Feature Definition. Profiles drawn with the "Baseline" Feature Definition will show line segments in Red and curve segments in Blue.

1D.2.b Dynamic Cross Section Views

A *Dynamic Cross Section View* shows the *3D Design Model* at station intervals along the Alignment for a Corridor or Linear Template.

Each Corridor or Linear Template has a corresponding *Dynamic Cross Section View*.

IMPORTANT: *Dynamic Cross Section Views* are NOT listed or accessed through the Models manager. To access a *Dynamic Cross Section View* for a particular Corridor or Linear Template, see *1A.3.d Open Corridor Cross Sections (Road Cross Sections)* or *9F – Dynamic Cross Section Viewer*.



1D.3 Drawing Models

A *Drawing Model* is a clipped and framed portion of a Design Model. *Drawing Models* are NOT scaled or "shrunk". There are three types of *Drawing Models*. Each type of *Drawing Model* shows the design from a different perspective.

1. **PLAN *Drawing Models*** - A clipped and framed portion of the *2D Design Model*. Used to show plan graphics on a *Sheet Model*.
2. **PROFILE *Drawing Models*** - A clipped and framed portion of the *Profile Model*. Used to show profile graphics on a *Sheet Model*.
3. **CROSS SECTION *Drawing Models*** - A "slice" of the *3D Design Model*. Used to show road cross-section graphics on a *Sheet Model*.

Drawing Models are used to automatically create Civil Annotations. For example, the creation of Profile Annotations (i.e., Vertical Curve Data, VPI Elevation/Station, Slopes, K-Values) is accomplished from the PROFILE *Drawing Model* with the *Annotate Drawing Model* tool.

A ***Named Boundary*** element is placed to determine the extents and create *Drawing Models*.

TIP: The creation of **Named Boundary** elements and *Drawing Models* is discussed in *Chapter 14 – Plan Sheet Production*.

> ***WARNING:*** Do NOT create *Drawing Models* and *Sheet Models* within a **Design ORD File**. Create a new ORD File that is dedicated to plan sheet production.

1D.4 Sheet Models

A *Sheet Model* is a single piece of paper. A *Sheet Model* contains a sheet border – which typically measures to 0.9167-feet (11-inches) by 1.4167-feet (17-inches). Through referencing, "real-world" sized design graphics are scaled or "shrunk" to fit into a *Sheet Model*.

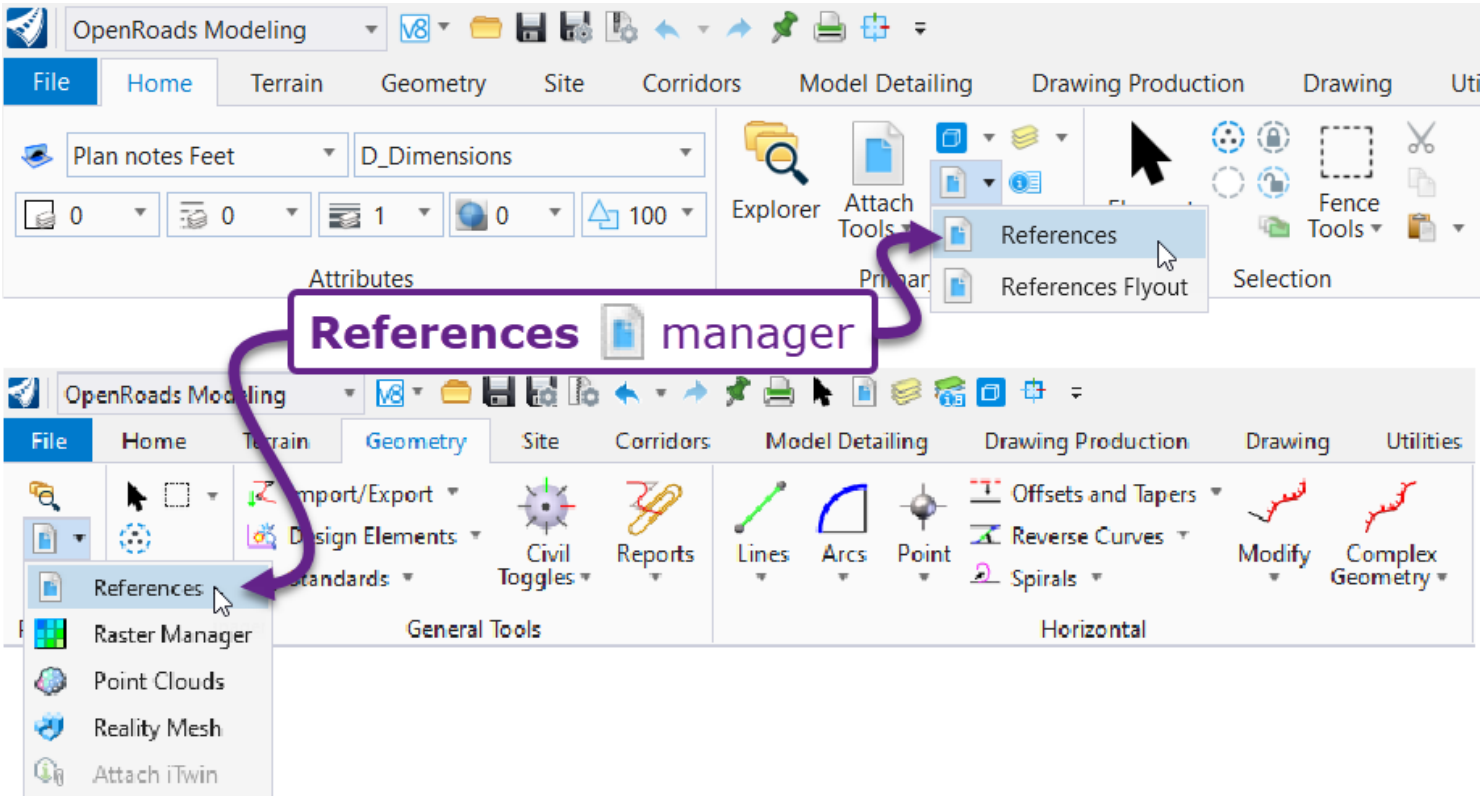
Commonly, plan notes and text are created and placed in *Sheet Models*.

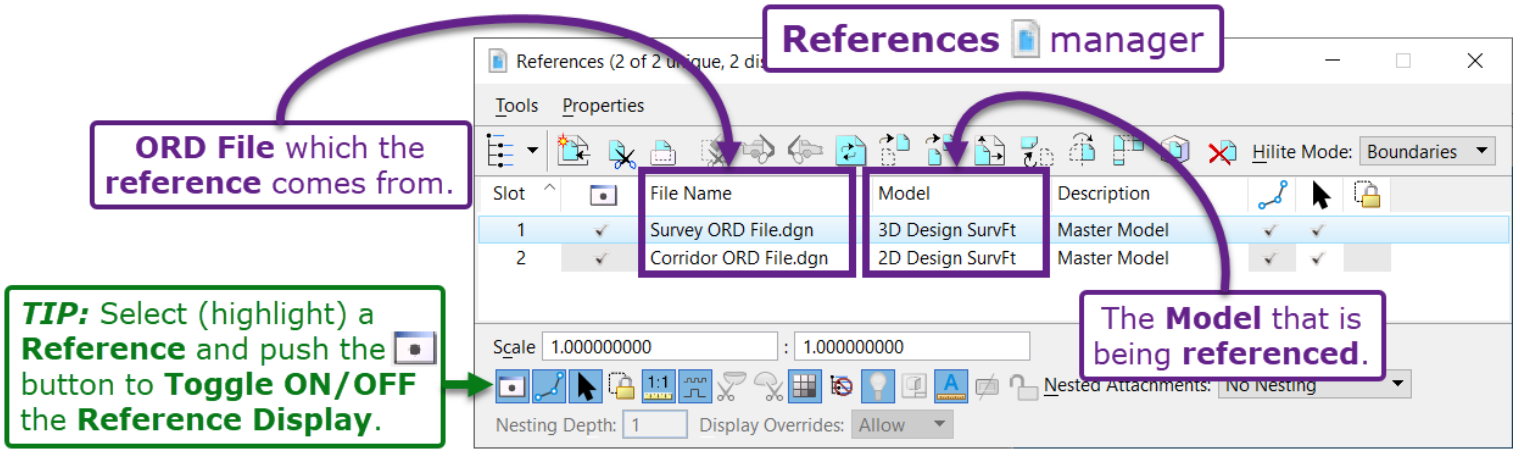
TIP: The creation of *Sheet Models* is discussed in *Chapter 14 – Plan Sheet Production*.

1E – REFERENCES

References are created, displayed, and manipulated from the **References** manager. References are used to display graphics from a different Model into the current Model. In the most common workflow, references are used to display graphics from an external ORD File into the current ORD File – which is shown in *1E.1 Create a Reference - Workflow*.

The References manager tool is found in most Tabs in the Ribbon. Typically, the References manager tool is found on the far left-side of the Ribbon.





BEST PRACTICE: Always keep the **References** manager displayed and visible.

WARNING: When working with the ORD Software, a common misconception is to assume that References are formed between **ORD Files**. References are actually formed between **Models**. The Referenced Model may be found in an external ORD File or the Model may be contained in the same ORD File (internal referencing):

> In the case of *Drawing Models* and *Sheet Models*, a series of **internal** refences is automatically established between **Models** contained in the same **ORD File**. This configuration is referred to as a Nested Attachment. Internal referencing and Nested Attachments are discussed in *1E.4 Nested Attachments in Drawing Models and Sheet Models*.
>
> Another common case of internal referencing occurs when the Existing Ground Terrain Model is *Activated*. When the Existing Ground Terrain Model is *activated*, then a *3D Design Model* is automatically created. The software will automatically reference the newly-created *3D Design Model* into the *2D Design Model*.

IMPORTANT: When an ORD File contains multiple Models, then the References shown in the References manager are only applicable to the Model shown in the **Active View**. The References shown in the References manager will change depending on the **Model** shown in the **Active View**. See *1C.1 – Active View*.

1E.1 Create a Reference – Workflow

There are a many options and settings that are presented when creating a Reference. However, this workflow demonstrates the **recommended settings configuration** for a typical referencing operation.

In this workflow, the Survey ORD File is referenced into a newly-created 2D Design ORD File.

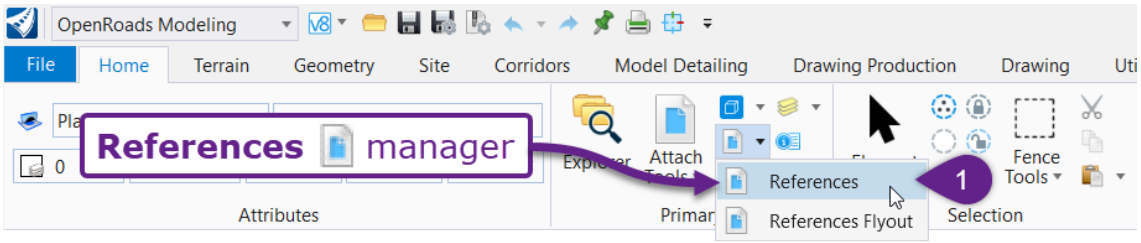
WARNING: Before creating a reference in a new ORD File, set the Coordinate System. See *3D.1 Set the Coordinate System*.

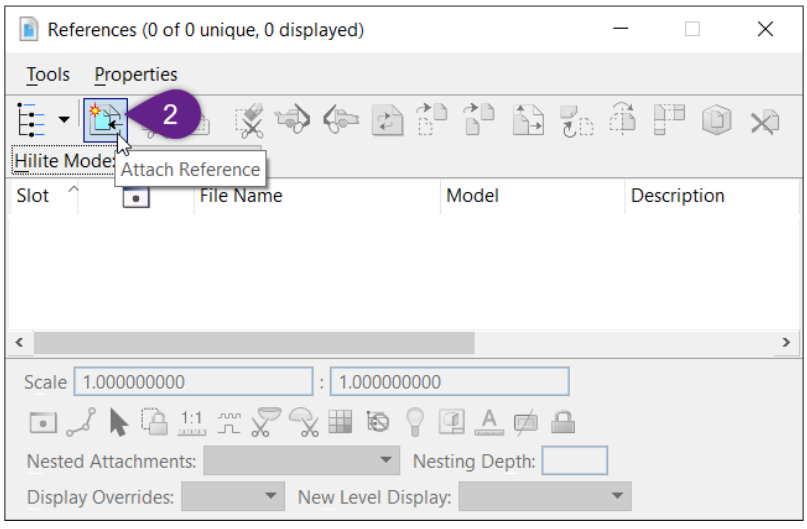
NOTE: The order which ORD Files are referenced determines the initial **Update Sequence**. The Update Sequence determines how References are visually stacked/layered on top of each other. Generally, Reference ORD Files in the following order to achieve the recommended Update Sequence:

1. Existing Terrain ORD File (reference this file first)
2. Existing Survey ORD File
3. Existing Right-of-Way ORD File
4. Mainline Corridor ORD File
5. Alignment ORD File
6. Other Design ORD Files

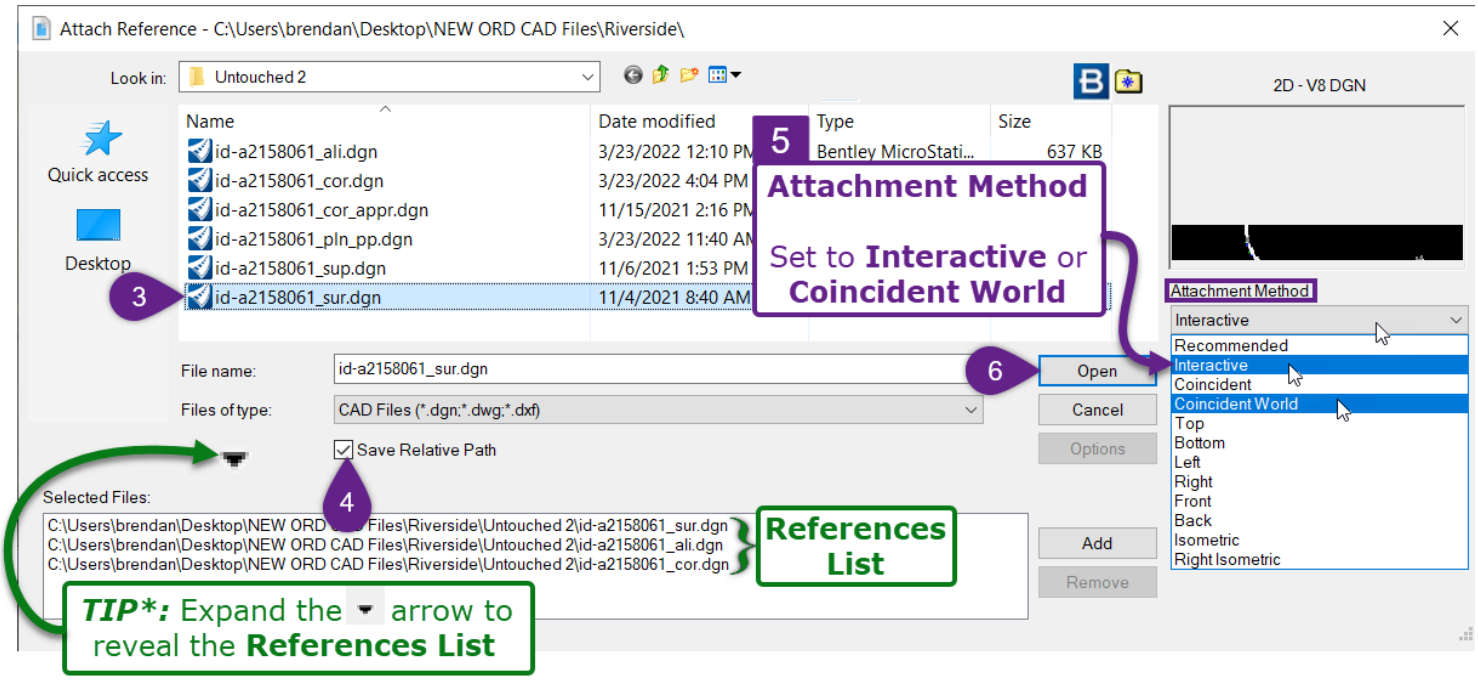
To edit the Update Sequence after initial referencing, see *1E.7.b Update Sequence (Reference Layering)*.

1	From the Ribbon, select the *References* tool to open the References manager: [***OpenRoads Modeling*** → ***Home*** → ***Primary***].
2	In the References manager, select the **Attach Reference** button.





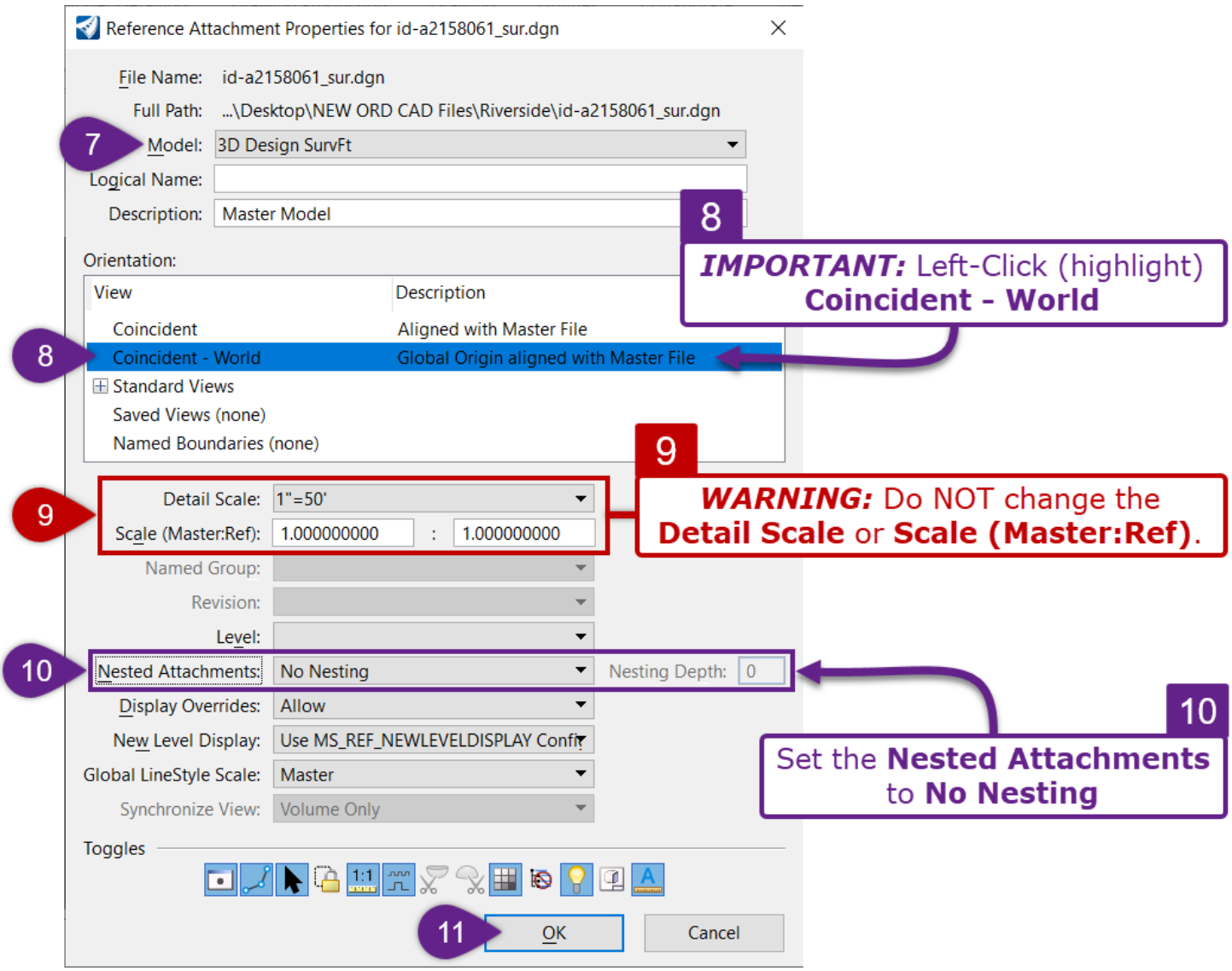
3	Locate and select (highlight) the desired ORD File to reference. ***TIP:*** Use the CTRL key to highlight multiple ORD Files. This technique can be used to reference multiple ORD Files in a single operation. However, the ORD Files must be located in the same folder. ***TIP*:*** Alternatively, expand the ▾ arrow to reveal the References List. Select an ORD File and push the Add button to move it to the References List. This technique can be used to reference ORD Files found in different folders.
4	Ensure that the **Save Relative Path** box is CHECKED. This option ensures that the reference file is found even if the name of the Folder or Folder location is changed. ***IMPORTANT:*** This box needs to be CHECKED so that references remain valid even when ORD Files are transferred to different organizations/clients. If this box is UNCHECKED, then the reference file is searched by the exact Full File Path name.
5	Set the **Attachment Method** to either *Interactive* or *Coincident World*. **Interactive:** When this method is used, the *Reference Attachment Properties* box is presented. Within the *Attachment Properties*, the Orientation must be set to **Coincident World**. If this process is used, proceed to step 7. **Coincident World:** The *Reference Attachment Properties* box is NOT presented and the reference process is completed after **Open** is pressed. This method is acceptable because the *Attachment Properties* can be accessed later through the References manager.
6	Push the **Open** button.



IMPORTANT: If the **Coincident World** method is used, then the reference is automatically placed without proceeding to the **Reference Attachment Properties**.

1E.1.a Reference Attachment Properties – Preferred Settings

The recommended settings for *Reference Attachment Properties* are shown below. Most of the settings are pre-configured for appropriate reference display. There are only a few settings to check or configure in a typical Referencing workflow:



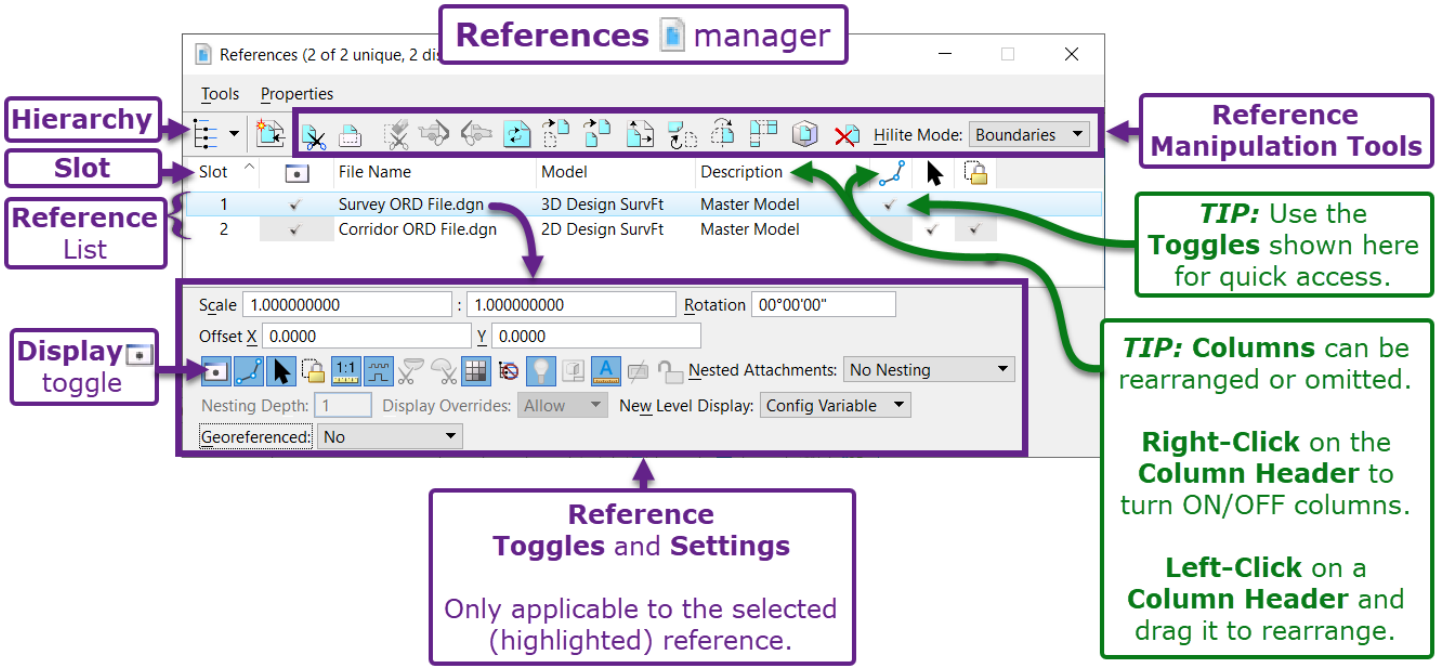
7	**Model**	Typically, ORD Files contain multiple **Models**. Select which Model is to be referenced in.
8	**Orientation**	Left-Click (highlight) the **Coincident – World** option. This setting ensures the reference is placed in the correct geographic location.
9	**Detail Scale** and **Scale (Master:Ref)**	**Do NOT change these values.** If these values are changed, the entire reference will be shrunk or enlarged in size.
10	**Nested Attachments**	Use of Nested Attachments is discouraged for typical Referencing workflows. Ensure that the Nested Attachments property is set to **No Nesting**.
11	When all *Reference Attachment Properties* are shown appropriately, press **OK** to complete the reference process.	

For descriptions of the remaining settings and Toggles, see *1E.3 Reference Toggles and Settings*.

1E.2 Reference Manager – Overview

The References manager is generally used to manipulate the display, positioning, or to clip a Reference.

IMPORTANT: Double-Click on a Reference to show the Attachment Properties menu.



Reference Manipulation tools: References CANNOT be manipulated with conventional tools found in the Ribbon (i.e., Copy, Move, and Rotate tools). Reference must be manipulated with the tools found in the References manager. The most used Reference Manipulation Tools are:

Clip Reference		Used to clip out a portion of the Reference. The clipping shape can be an **Active Fence** or a closed shape element (i.e., a Smart Line). Use the **Delete Clip** tool to remove the Clip.
Mask Reference		Used to mask out a portion of the Reference. The masing shape must be an **Active Fence**. Use the **Delete Clip** tool to remove the Mask.
Move Reference		Used to move a Reference from its original position.
Rotate Reference		Used to Rotate a Reference from its original orientation.
Scale Reference		Used to enlarge or shrink (scale) the size of a Reference.

Reference Toggles and Settings: Typically, do NOT alter these toggles and settings. The exception is the **Display** toggle – which turns the Reference display ON/OFF. See *1E.3 Reference Toggles and Settings*.

Slot: Every Reference is assigned a unique Slot number. The Slot number determines the order References are shown in the Level Display box. ***TIP:*** Slowly doubly-click on a Slot number to change its value. If the double-click is too fast, then the Attachment Properties menu is shown.

Hierarchy: Displays the **Nested Attachments** configuration for the current Model.

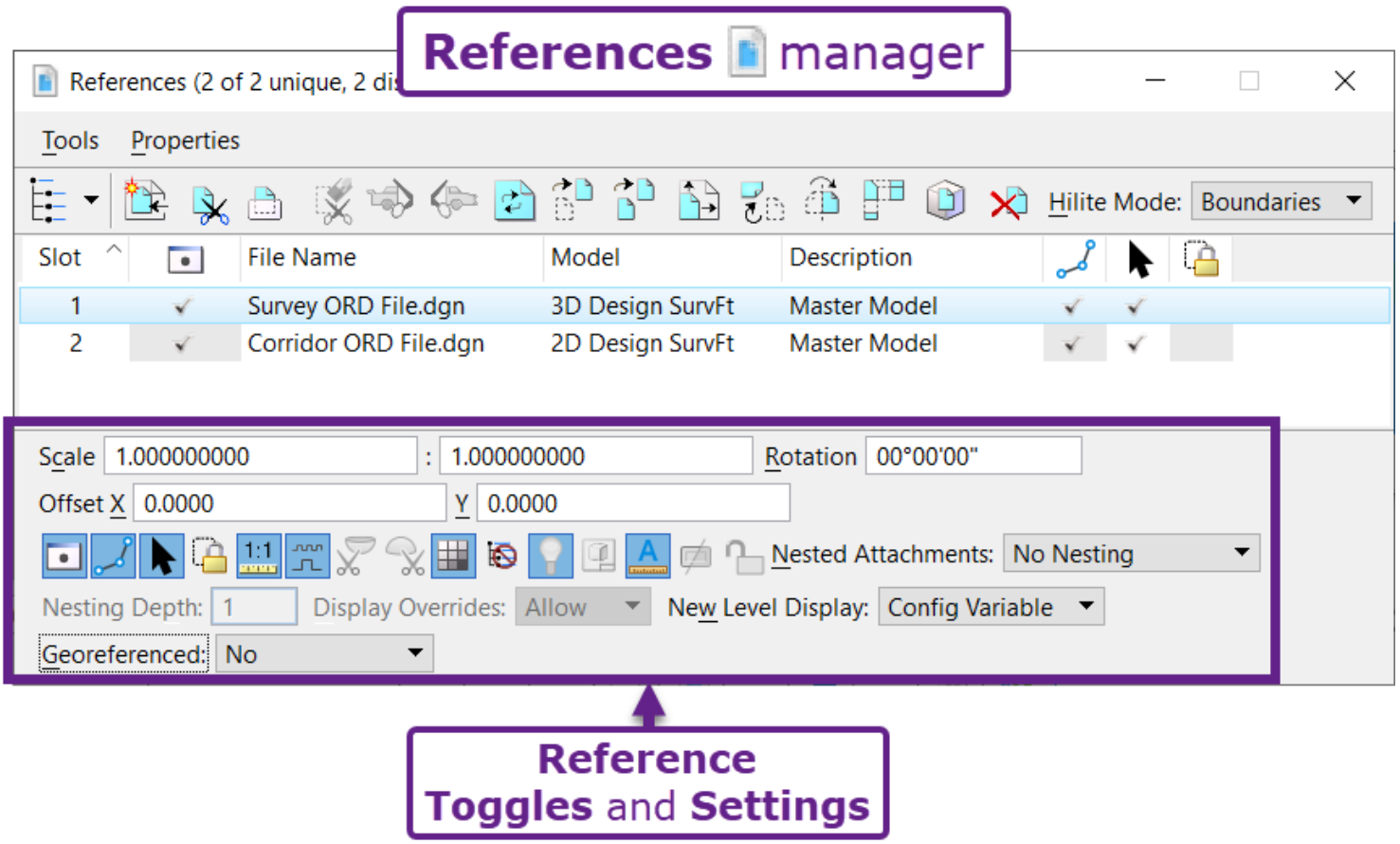
1E.3 Reference Toggles and Settings

When a Reference is selected (highlighted), then the toggles and settings in the bottom portion of the References manager can be manipulated.

BEST PRACTICE: The following toggles are commonly manipulated:

Display		If this icon is toggled ON, then the Reference is displayed. If this icon is toggled OFF, then the referenced is NOT displayed.
Snap		If this icon is toggled ON, then the elements in the Reference can be **Snapped** onto.
Locate		If this icon is toggled ON, then the elements in the Reference can be **Selected**.
Scale Line Styles by Reference Scale		This toggle only affects elements that are set to Custom Line Styles – such as utility or waterway linework elements. ***TIP:*** If a Custom Line Style appears continuous in the *Sheet Model*, then toggle OFF this icon. Example Custom Line Stye:

However, the remaining toggles and settings are generally NOT to be altered.



Scale		The Scale will shrink or enlarge the Reference. Unless working within a *Sheet Model*, set this value to 1.0000 : 1:0000 – which means NO scale factor is applied. If the Scale is set to **2.0000 : 1.0000**, then the Reference will be TWICE as **large**. If the Scale is set to **1.0000 : 2.0000**, then the Reference will be TWICE as **small**. ***NOTE:*** The Reference is scaled about the 0,0 coordinate. This means that scaled References, will be shifted into a different geographical location.
Rotation		Used to rotate the Reference by a specified angle value. ***TIP:*** The *Rotate Reference* tool can be used to rotate a Reference graphically.
Offset X and Y		Used to shift the X and Y position of a Reference. Always set this value to 0.
Treat Attachment as Element for Manipulation		If this icon is toggled ON, then the conventional Copy, Rotate, Scale, and Move tools can be used directly to the Reference.
True Scale		This toggle is only consequential if the units in the Reference and Current ORD File are different. For example, if a Reference was set to Inches units and the Current ORD File is set to Survey Feet units, then the Reference would be scaled to Survey Feet units to align with the current ORD File.
Clip Back		Sets the back clipping plane of a 3D reference. 3D elements behind the clipping plane are NOT displayed.
Clip Front		Sets the front Clipping plane of a 3D reference. 3D elements in front of the clipping plane are NOT displayed.
Display Raster References		If the Reference contains a Raster (i.e., an aerial image), then this icon is use to toggle ON/OFF the raster.
Ignore Attachment when Live Nesting		When using Nested Attachments, the Reference File is NOT included. ***TIP:*** Always keep this button toggled OFF.
Use Lights		If the Reference uses a lighting scheme in the Display Style, then it will carry over in the current ORD File. ***NOTE:*** Setting is only applicable to References in the *3D Design Model*.
Use Active Annotation Scale		When this icon is toggled ON, then the annotative elements in the Reference are sensitive to the Annotation Scale set in the current Model. ***TIP:*** Always keep this button toggled ON. For more information on the Annotation Scale, see *15A.2 Annotation Scale*.

Nesting Attachments	If set to **Live Nesting**, then a series of Nested Attachments are created behind the Reference File. Nested Attachments are References made to the selected Reference. The arrangement of a Nested Attachment series is as follows: Current ORD File ← Reference ORD File ← Reference ORD File (Nested Attachment) For example: the Alignment ORD File is referenced into the Current ORD File. The Survey ORD File (Nested Attachment) is referenced into the Alignment ORD File. The Survey File is considered a Nested Attachment to the Current ORD File. [Current ORD File] ← [Alignment ORD File] ← [Survey ORD File (Nested Attachment)] If set the **No Nesting**, then Nested Attachments are NOT used. In the example above, the Survey File does NOT come in as a Nested Attachment, if the **No Nesting** setting is used: [Current ORD File] ← [Alignment ORD File] ***BEST PRACTICE:*** Set this drop-down to **No Nesting** – unless working within *Drawing Model* and *Sheet Model* references. For more information on Nested Attachments in *Drawing Models* and *Sheet Models*, see *1E.4 Nested Attachments in Drawing Models and Sheet Models*.
Nesting Depth	This setting is only applicable if Nested Attachments is set to **Live Nesting**. Determines how long the Nested Attachments series is: If Nesting Depth is set to 1, then the Nested Attachment series would be as follows: Current ORD File ← Reference ← Reference (Nested Attachment; Depth 1) If Nesting Depth is set to 2, then Nested Attachment series would be as follows: Current ORD File ← Reference ← Reference (Nested Attachment; Depth 1) ← Reference (Nested Attachment; Depth 2) ***NOTE:*** Each Nesting Depth creates another tier in the Reference Hierarchy.
Display Overrides	This determines if the display style for Nested Attachments can be altered in the *Level Manager*.
New Level Display	If a new Level is created in a Reference and then referenced into the current ORD File, then this setting controls if the new Level is toggled ON. ***TIP:*** Keep this option set to **Config Variable**.
Georefernced	Set this setting to NO unless the reference ORD File is assigned to a different Coordinate System than the current ORD File. ***NOTE:*** If set to NO, the ORD File is still geo-referenced, if a Coordinate System is set.

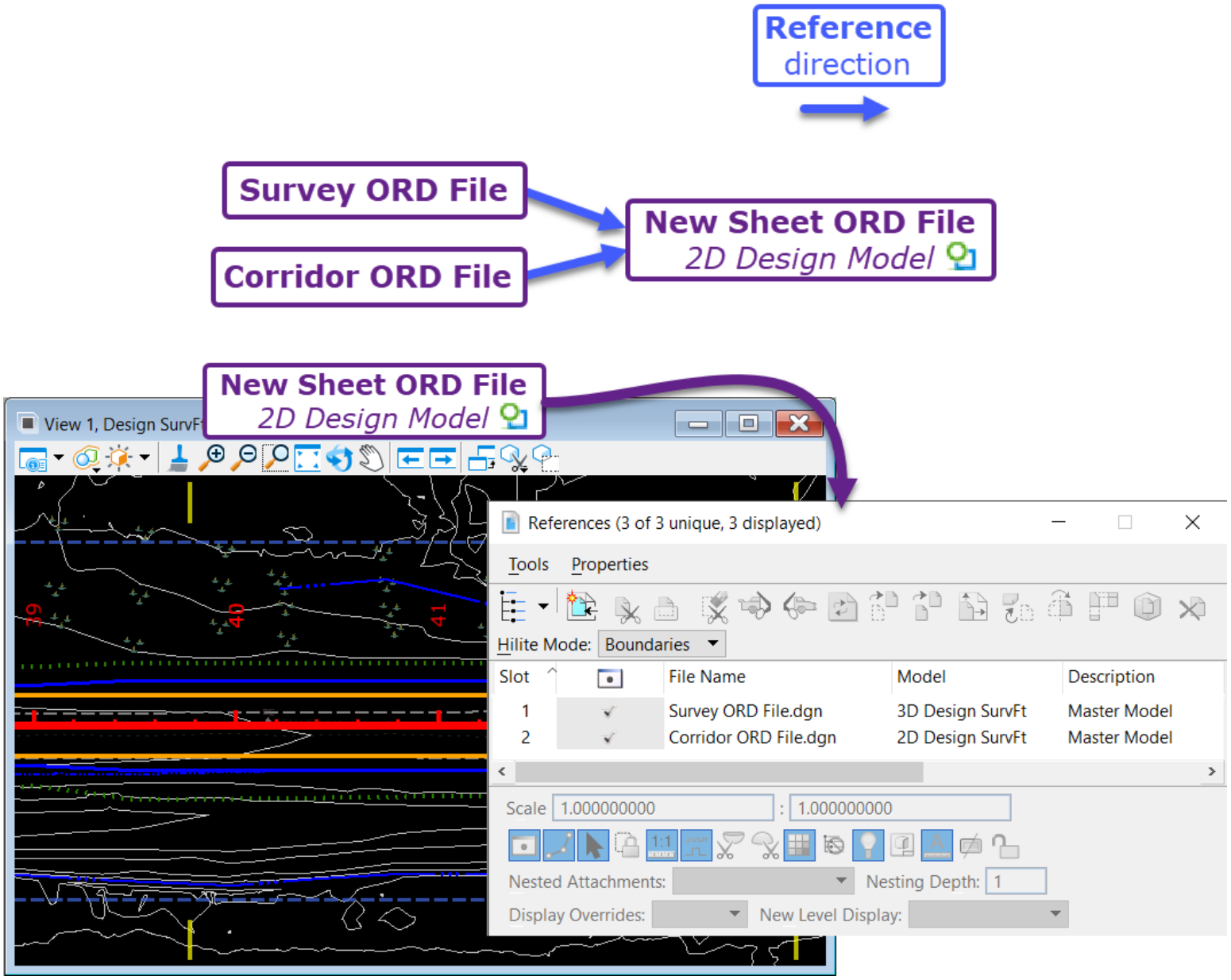
1E.4 Nested Attachments in Drawing Models and Sheet Models

Nested Attachments are a series of references.

WARNING: Nested Attachments are STRONGLY DISCOURAGED when manually creating **External References** – such as shown in *1E.1 Create a Reference – Workflow*. Nested Attachments result in additional tiers shown in Reference Hierarchy, making it more difficult to locate the desired Reference. Also, since Nested Attachments are hidden in the Reference Hierarchy tiers, it is more likely that duplicate References are created.

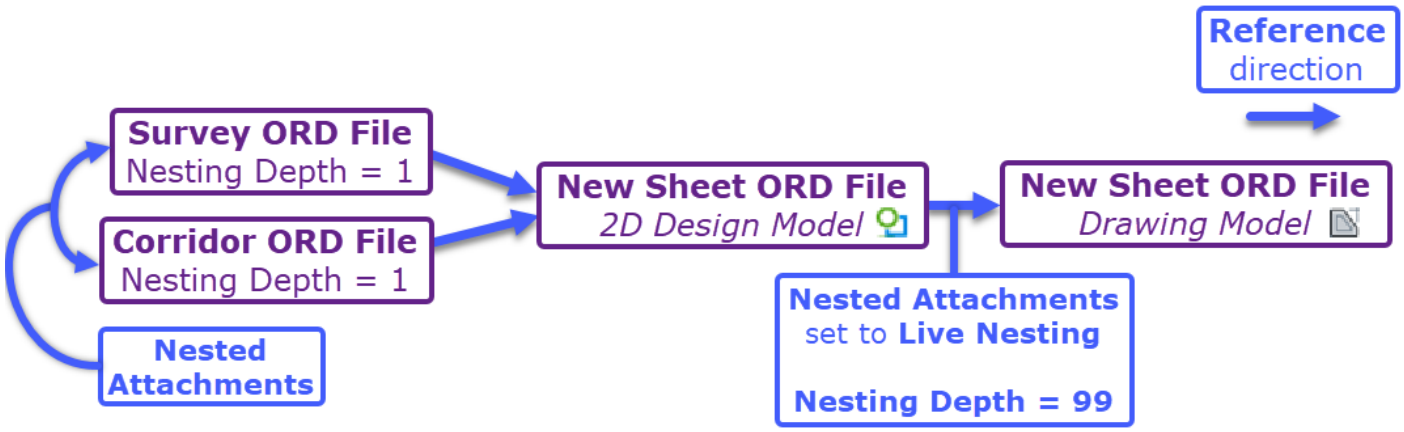
However, in the creation of *Drawing Models* and *Sheet Models*, a series of **Internal References** are automatically established using Nested Attachments.

To begin this example, a New Sheet ORD File is created. The Survey ORD File and Corridor ORD File are referenced into the ***2D Design Model*** **of the new Sheet ORD File**.



Next, *Drawing Models* and *Sheet Models* are created.

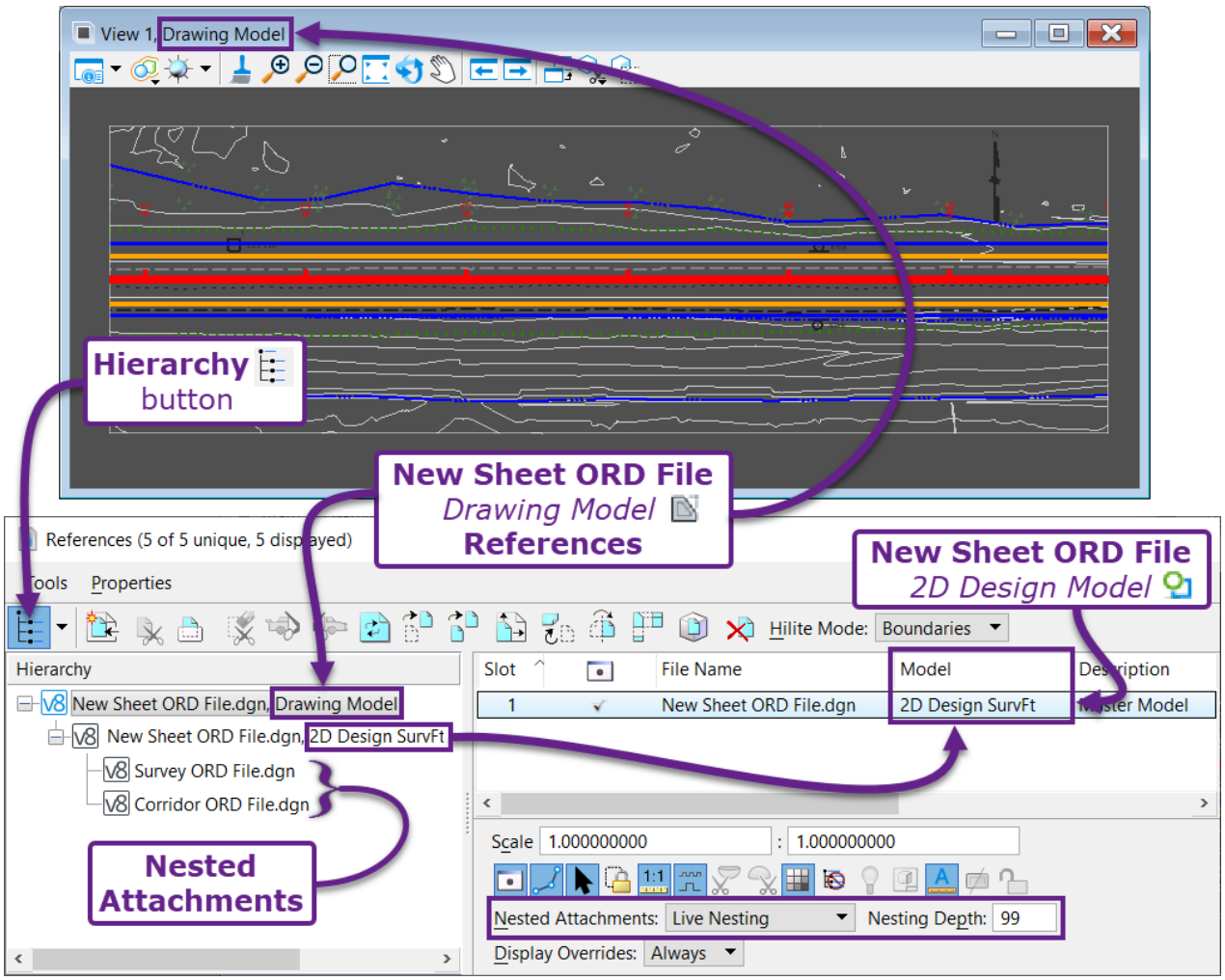
Illustrated below is the Nested Attachment schematic shown in the References manager of the ***Drawing Model***.



The *2D Design Model* is directly referenced into the *Drawing Model*. The Survey ORD File and Corridor ORD File are shown in the *Drawing Model* as **Nested Attachments**.

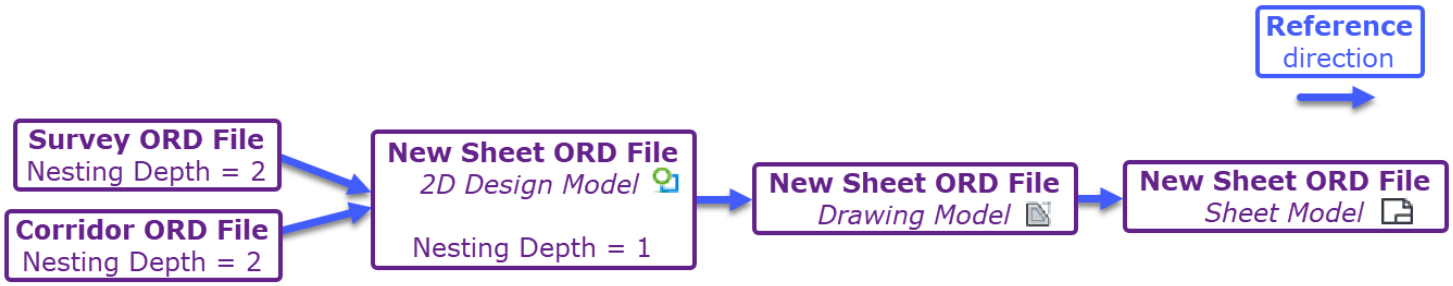
IMPORTANT: The Survey ORD File and Corridor File are at **Nesting Depth** of 1. This means that they are the first series of **Nested Attachments** to the *Drawing Model*.

As shown below, the Nested Attachment arrangement is when the *Hierarchy* button is pushed:



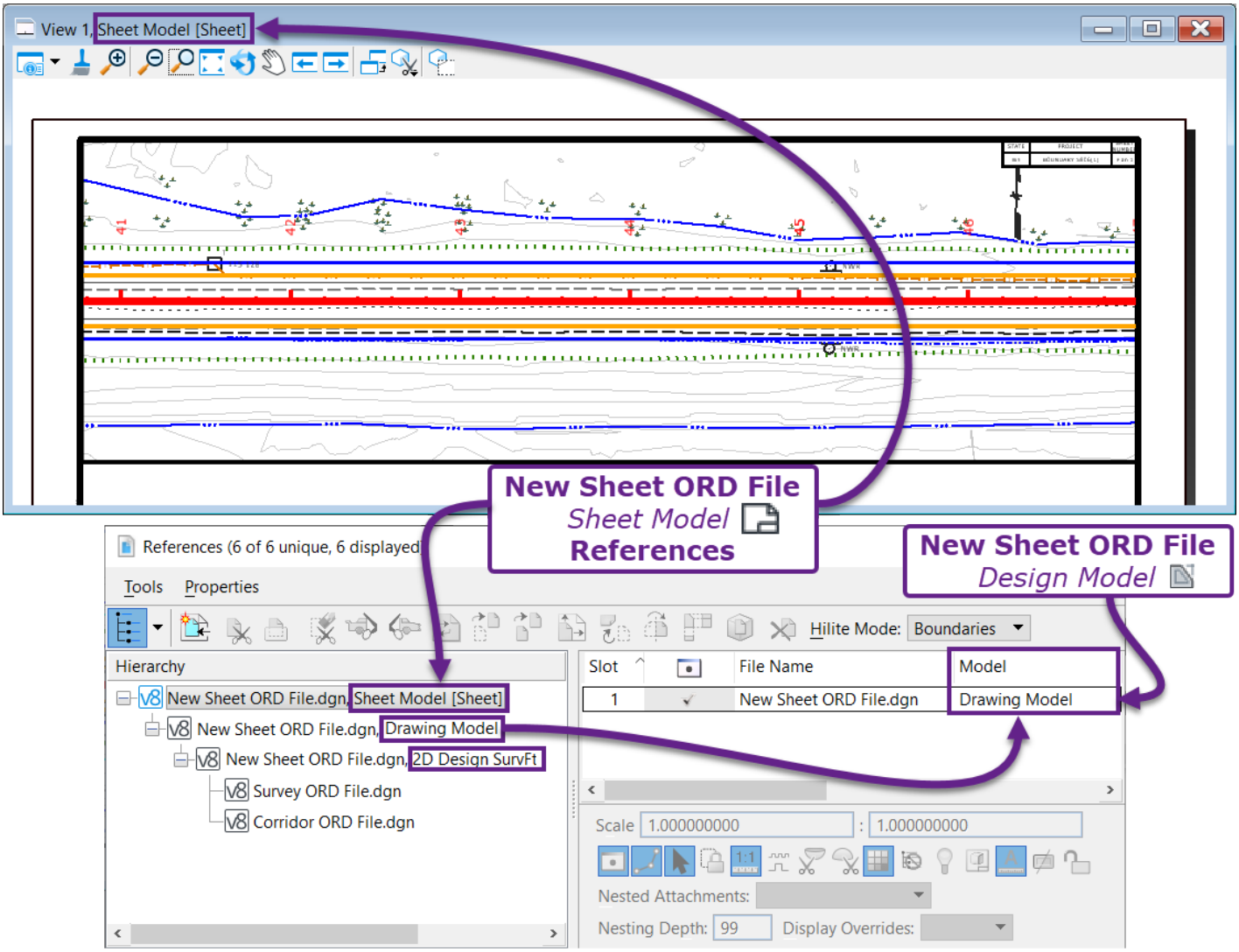
Illustrated below is the Nested Attachment schematic shown in the References manager of the ***Sheet Model***.

The *Drawing Model* is automatically referenced into the *Sheet Model* - which creates another tier in the Nested Attachments hierarchy.



The *2D Design Model* becomes a Nested Attachment because it is NOT directly referenced into the *Sheet Model*. The *2D Design Model* is at a Nesting Depth of 1, relative to the *Sheet Model*.

The Survey ORD File and Corridor ORD File is pushed back to a Nesting Depth of 2, relative to the *Sheet Model*.



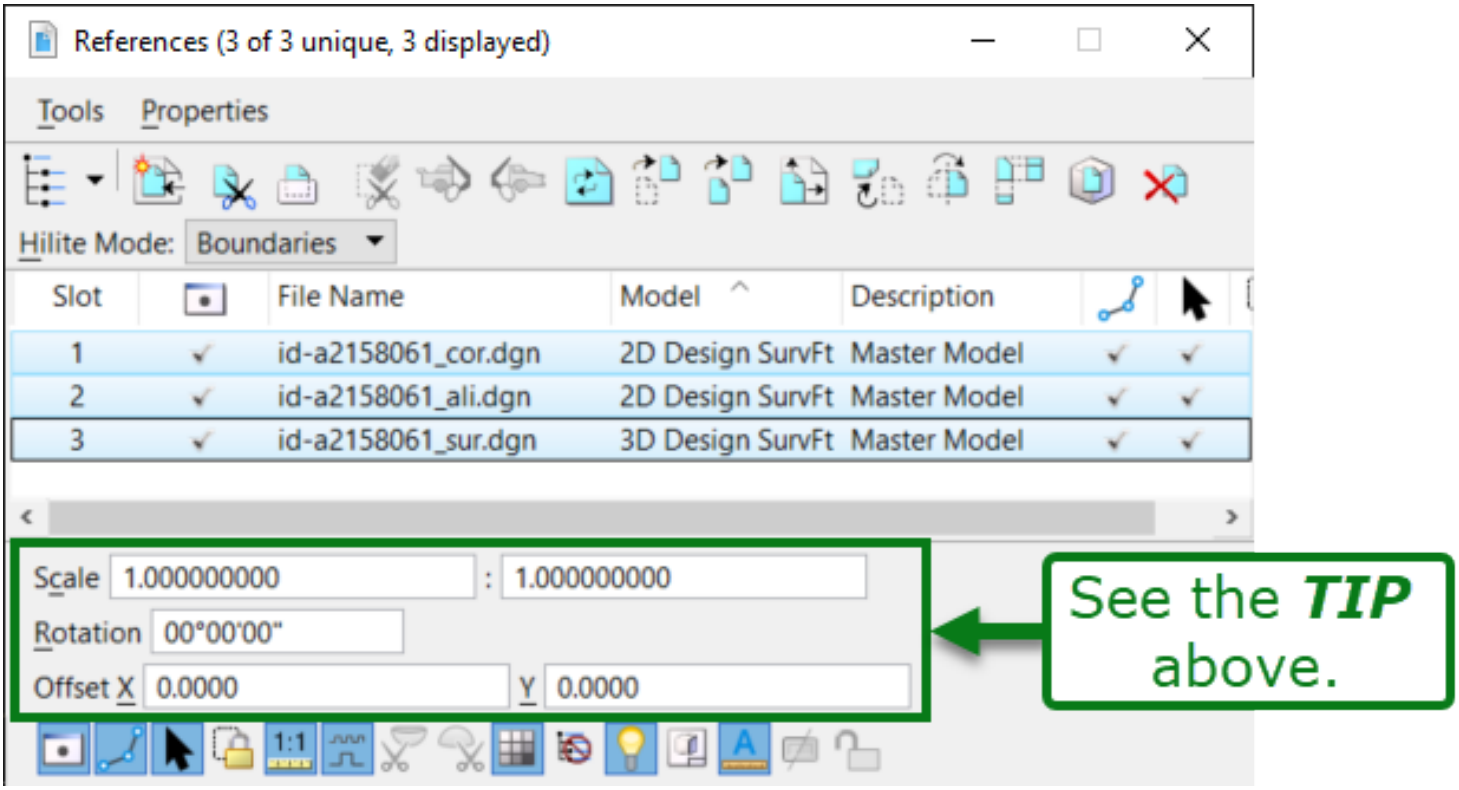
NOTE: The Nesting Depth is set to 99 by default. If the Nesting Depth was changed to 1, then the Survey ORD File and Corridor ORD File would NOT be shown in the *Sheet Model*.

1E.5 Manipulating References (Move, Rotate, and Scale)

If references must be manipulated, use tools found in the References manager. This section demonstrates the most common Reference manipulation tools.

WARNING: Do NOT manipulate the position of references in the *2D Design Model*. If references are located in the wrong geographical position, it is likely due to disagreeing Coordinate Systems or Survey Unit settings. For example, if a Reference that uses Survey Feet units is referenced into an ORD File that uses International Feet units, then the references and current ORD File will NOT align.

TIP: For references in the *2D Design Model*, always set the *Offset X/Y* values and *Rotation* values to 0 for correct geographic positioning. Similarly, set the *Scale* value to 1:1 for these types of References. By moving, rotating, or scaling a Reference, these values will change.

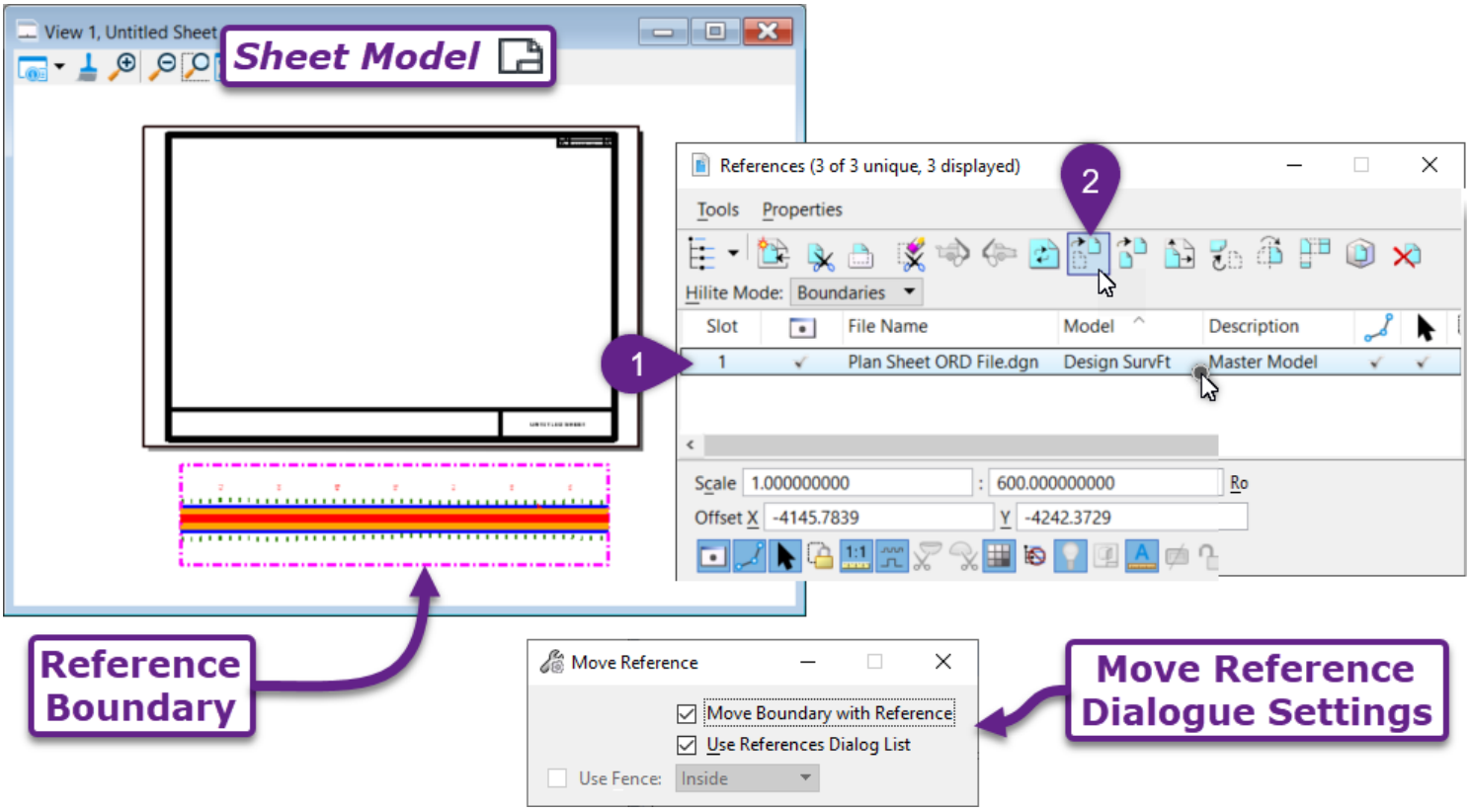


1E.5.a Move a Reference

The *Move Reference* tool is used to shift or move the position of a Reference.

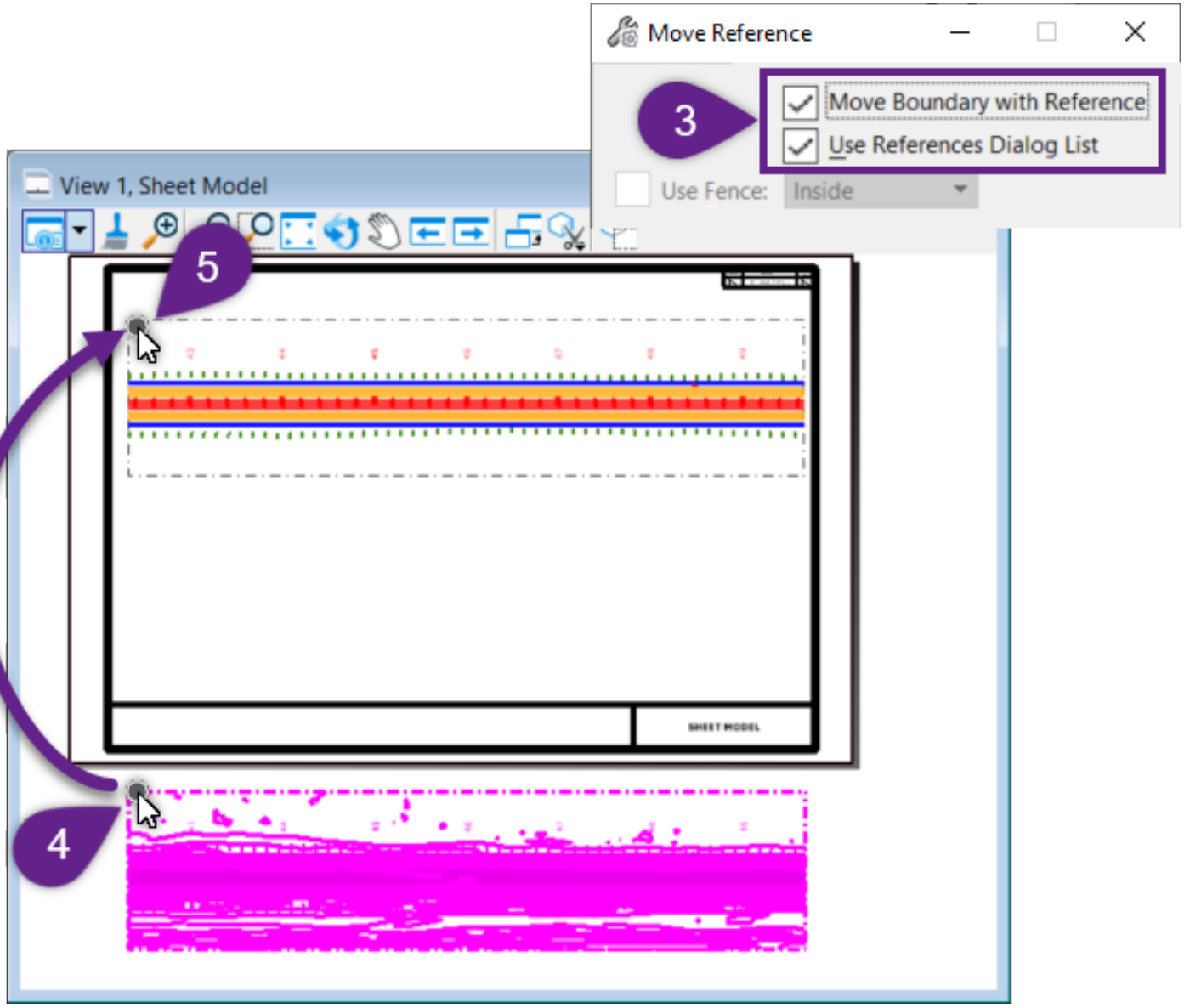
As shown in the workflow below, this tool is commonly used to reposition References located in a *Sheet Model* .

1	In the References manager, select (highlight) the Reference to be moved.
2	Select the *Move Reference* button.



After the *Move Reference* tool is initiated, the *Move Reference* dialogue settings are shown:

Move Reference Dialogue Settings	
Setting:	**Description:**
Move Boundary with Reference	If this box is CHECKED, then the **Reference Boundary** or **Clipped Boundary** is moved with the Reference. The graphics shown inside of the Reference Boundary do NOT change. If this box is UNCHECKED, then the **Reference Boundary** or **Clipped Boundary** remains stationary. The graphics shown inside of Reference Boundary are panned.
Use References Dialog List	This setting is only relevant when multiple References are selected (highlighted) in the References manager. If this box is CHECKED, then ALL selected References are rotated. If this box is UNCHECKED, then the Prompt: "Select Element" is shown. Select an element contained in the desired Reference. Only the Reference that contains the selected element is moved.
Use Fence	If a Fence is currently placed, then ALL References that intersect the *Fence* will be moved.



3	Configure the *Move Reference* dialogue settings as desired. Typically, the **Move Boundary with Reference** and **Use References Dialog List** boxes are CHECKED.
4	*Prompt: Move Reference > Enter point to move from* – Select a base point for moving the reference.
5	*Prompt: Move Reference > Enter point to move to* – Left-Click at the desired move location.

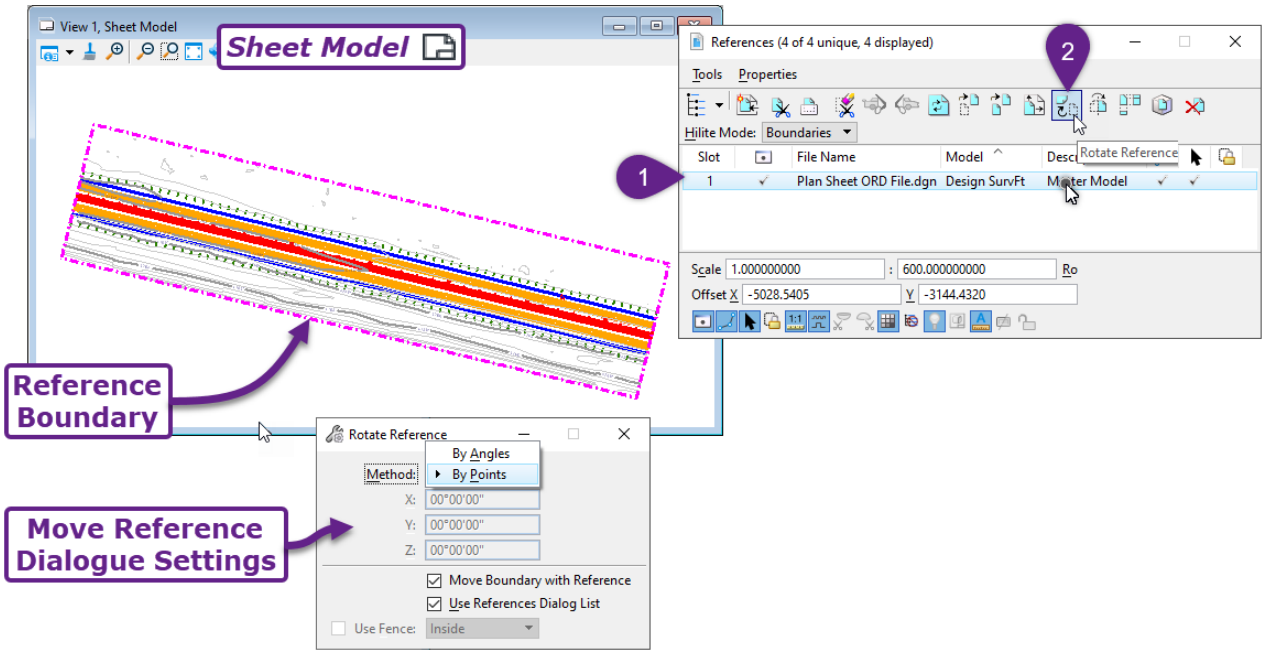
1E.5.b Rotate a Reference

The *Rotate Reference* tool is used to rotate position of a Reference.

As shown in the workflow below, this tool is commonly used to rotate References from within a *Sheet Model*.

1	In the References manager, select (highlight) the Reference to be moved.
2	Select the *Rotate Reference* button.

After the *Move Reference* tool is initiated, the *Rotate Reference* dialogue settings are shown:

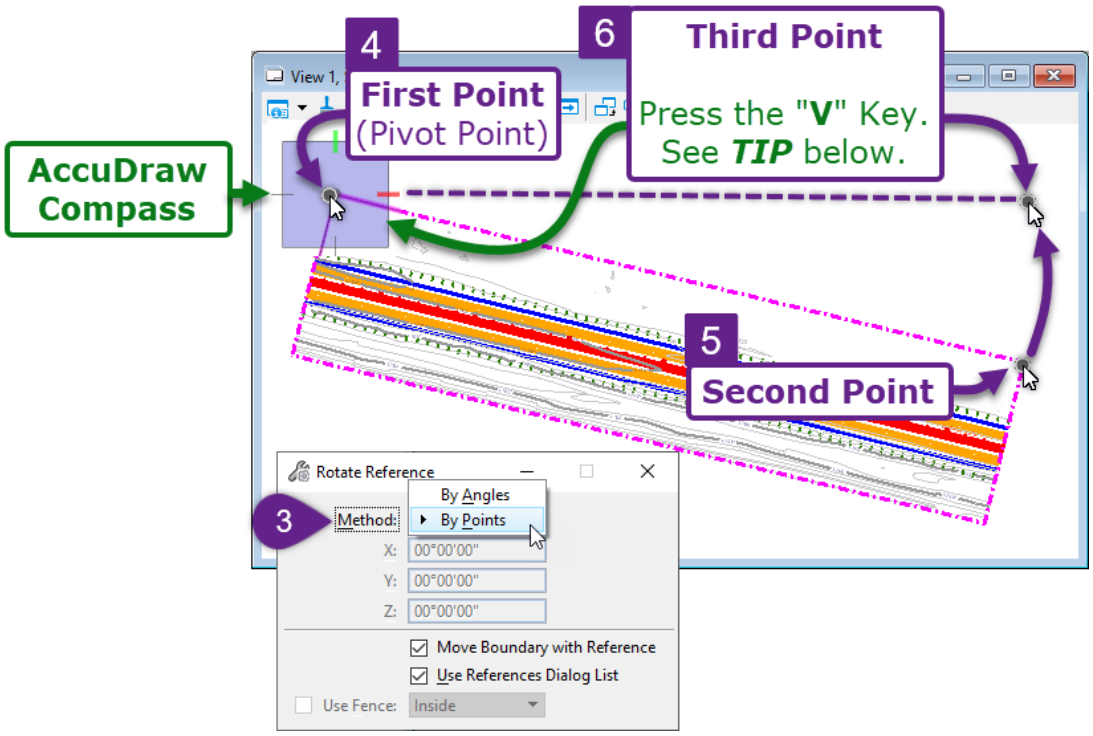


Move Reference Dialogue Settings	
Setting:	**Description:**
Method: By Angles	With this method, an angle value is specified for rotation (i.e., 45°). Enter the desired angle value into the Z: box.
Method: By Points	With this method, the reference is rotated by clicking in three locations. This method is demonstrated on the next page.
Move Boundary with Reference	If this box is CHECKED, then the Reference Boundary or Clipped Boundary is rotate with the Reference. The graphics inside of the Reference Boundary do NOT change. If this box is UNCHECKED, then the Reference Boundary or Clipped Boundary remains stationary. The graphics shown inside of Reference Boundary are rotated.
Use References Dialog List	This setting is only relevant when multiple References are selected (highlighted) in the References manager. If this box is CHECKED, then ALL selected References are rotated. If this box is UNCHECKED, then the Prompt: "Select Element" is shown. Select an element contained in the desired Reference. Only the Reference that contains the selected element is rotated.
Use Fence	If a *Fence* is currently placed, then ALL References that overlap with the *Fence* will be rotated.

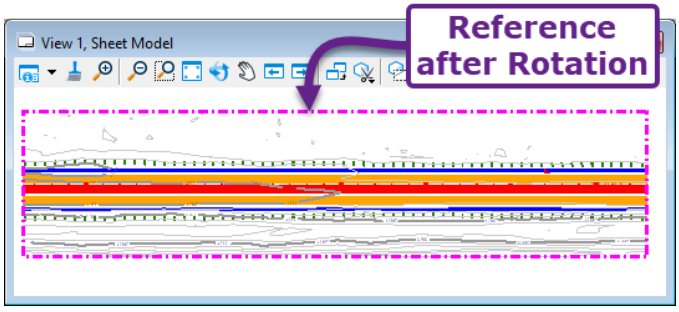
In this workflow, the reference will be rotated and positioned horizontally using the **By Points** method.

The procedure shown requires **AccuDraw** to be toggled ON to ensure the Reference is rotated exactly to the horizontal axis. For more information on AccuDraw, see *6B - AccuDraw*.

TIP: For the FIRST POINT, select a corner of the Reference Boundary to serve as the pivot point. For the SECOND POINT, select the adjacent corner of the Reference Boundary. For the THIRD POINT, select a point that is exactly horizontal to the pivot point (FIRST POINT).

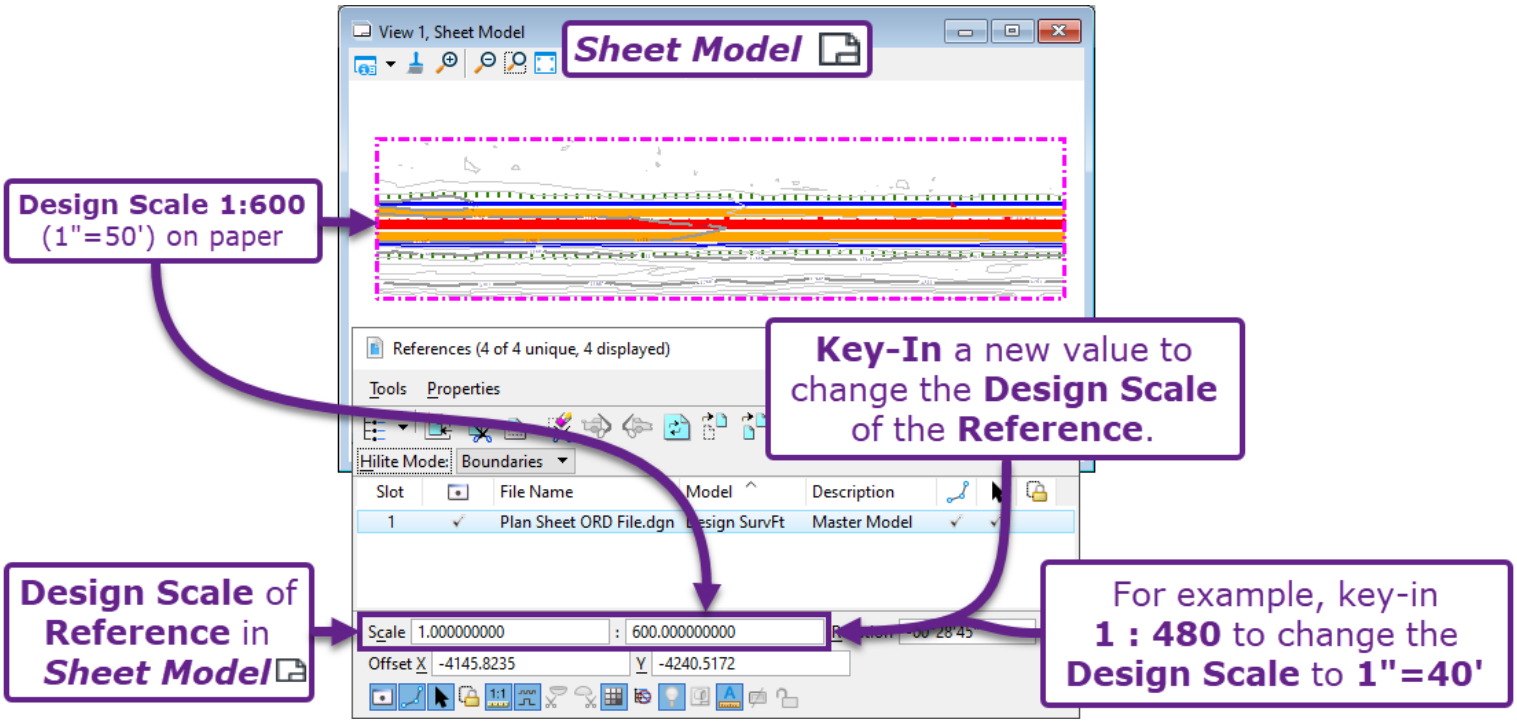


3	Configure the *Rotate Reference* dialogue settings as desired. Typically, the **Move Boundary with Reference** and **Use References Dialog List** boxes are CHECKED. In this workflow, the **By Points** method is selected.
4	*Prompt: Rotate Reference > Enter pivot point for reference rotation* – Select a pivot point for the rotation (FIRST point).
5	*Prompt: Rotate Reference > Enter point to define start of rotation* – Select a point to serve as the rotation "handle" (SECOND point).
6	*Prompt: Rotate Reference > Enter point to define amount of rotation* – Select a THIRD point to rotate to. The line determined by the FIRST and SECOND points will be rotated to the line between the FIRST and THIRD point. ***TIP:*** If AccuDraw is turned ON, press the V key before selecting the THIRD point. By pressing the V key, the AccuDraw compass is rotated to horizontally align with the *View* window.



1E.5.c Scale a Reference

In addition to the *Scale Reference* tool, the scale of a reference can be changed directly in the References manager.



WARNING: Typically, do NOT scale references in the *2D Design Model*, (i.e., keep Scale 1:1).

References in the *Sheet Model* must be scaled to show design graphics at the appropriate size and at a conventional **Design Scale** (i.e., 1”=10’, 1”=50’, 1”=100’ etc…) when printed on paper.

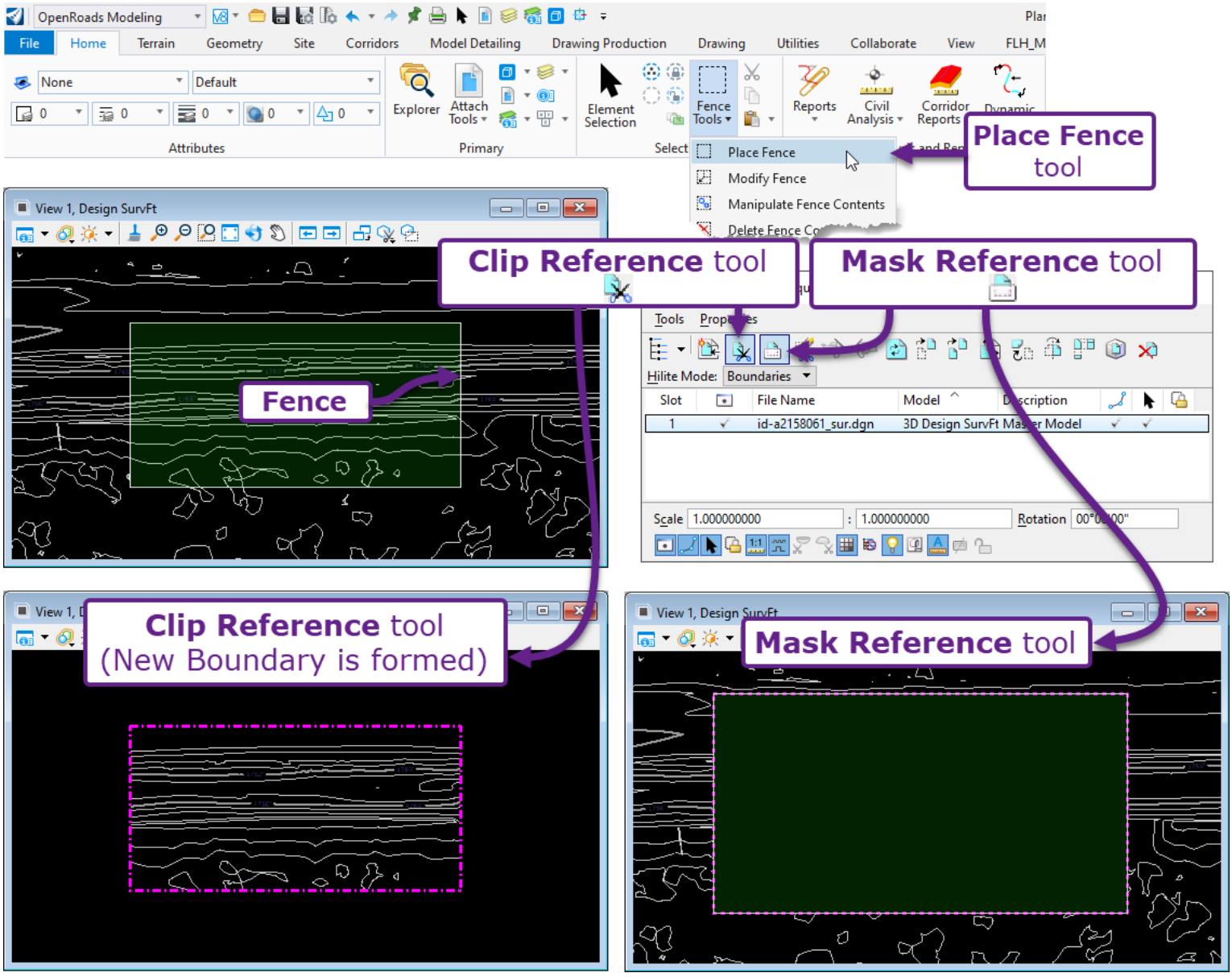
IMPORTANT: *Sheet Models* are in feet units. However, Design Scales are conventionally discussed in terms of paper inches (1”) to design feet (50’). Since *Sheet Models* are in feet units, a conversion factor of 12 has to be applied to achieve the appropriate Design Scale. For example, the reference shown above will print at a Design Scale of 1”=50’. To achieve this configuration, the Scale value in the References manager is set to 1 : 600 - which equals to [50 x 12 = 600].

The table below shows the appropriate Reference Scale value for common Design Scales. This table is intended for References located in *Sheet Models* ONLY.

Scale Factor in Sheets Models	
Design Scale	**Reference Scale**
1” = 10’	**1 : 120**
1” = 20’	**1 : 240**
1” = 40’	**1 : 480**
1” = 50’	**1 : 600**
1” = 60’	**1 : 720**
1” = 100’	**1 : 1200**
1” = 200’	**1 : 2400**

1E.6 Clip and Mask References

Clips and Masks are used to cut out a portion of a Reference. Before clipping, a *Fence* or closed shape element* needs to be set to determine the clipping boundary. For more information on *Fences*, see *1B.4 Place Fence tool*.



***NOTE*:** The *Clip Reference* tool can be used with either a *Fence* or closed shape element. However, the *Clip Mask* tool is only compatible with *Fences*.

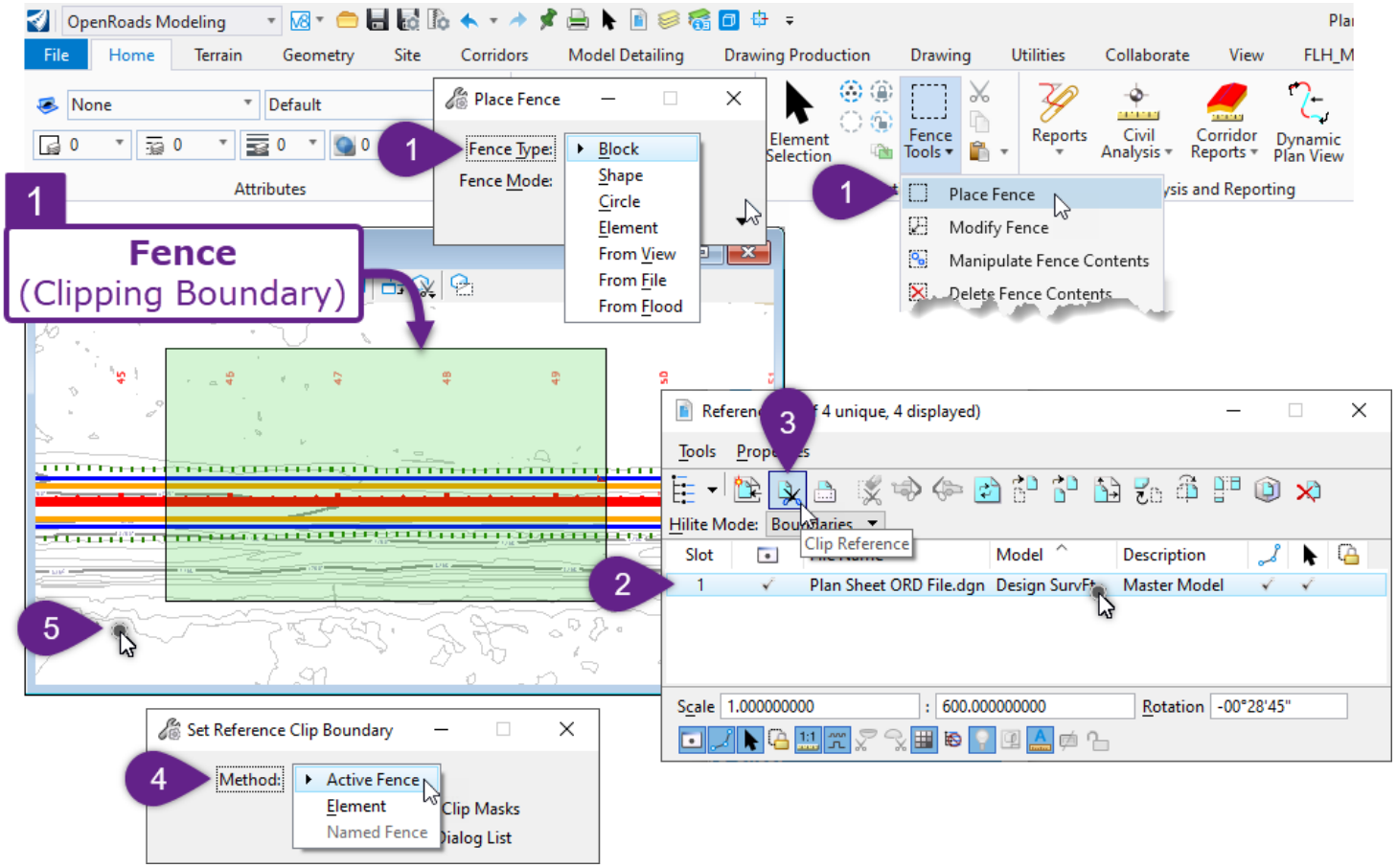
TIP: The *Delete Clip* tool is used to remove a Clip Boundary or Clip Mask from a Reference.

NOTE: If the selected Reference contains Nested Attachments, then the Nested Attachments will also be clipped or masked.

1E.6.a Clip Reference tool (Set a new Reference Boundary)

The *Clip Reference* tool is used to establish a new boundary for a Reference.

TIP: After clipping, the new boundary can be edited. See *1E.6.c Adjust a Clip Boundary or Mask after Placement*.

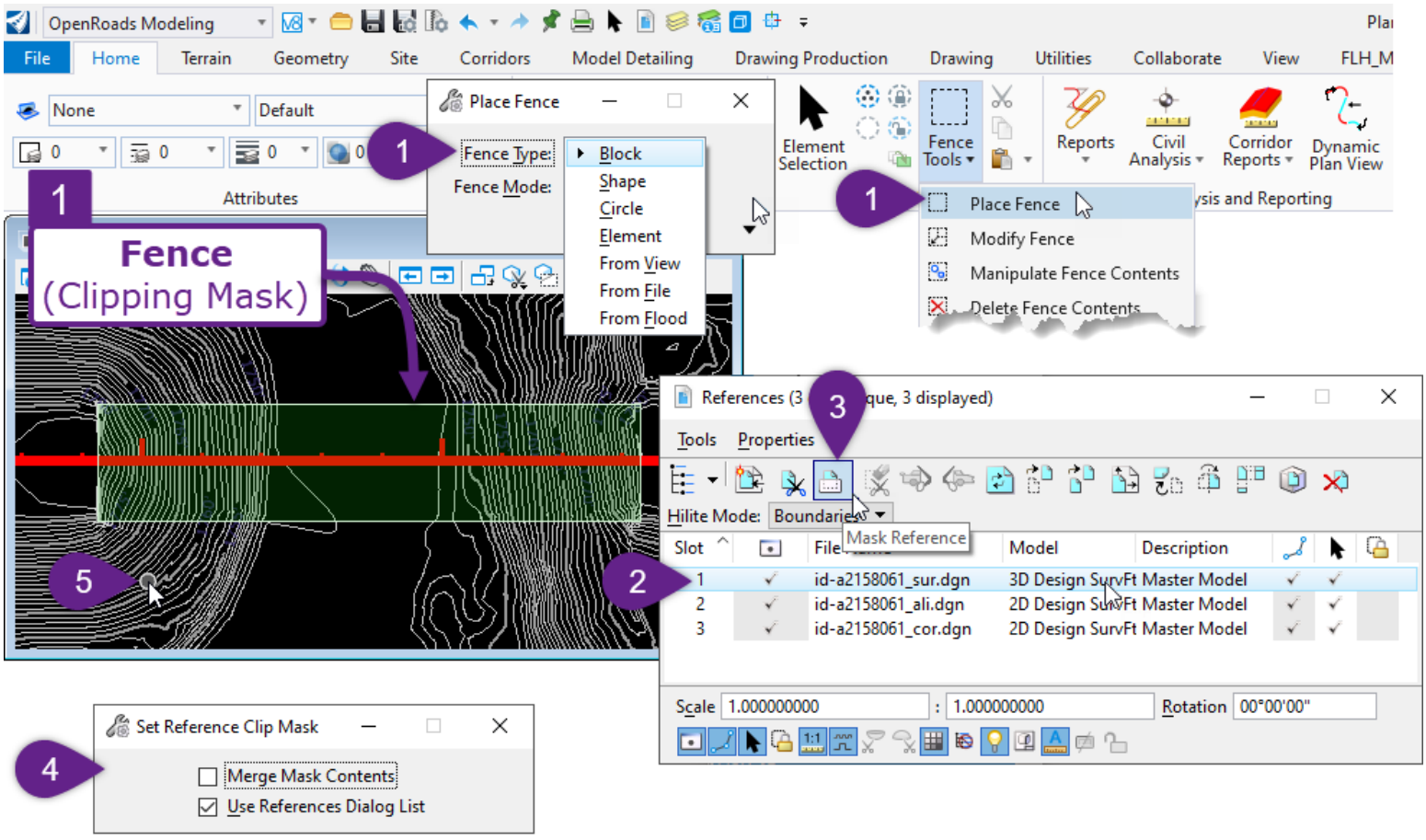


1	Place a *Fence*. For more information about placing *Fences*, see *1B.4 Place Fence tool*. ***TIP:*** Use the **Block** method to place a rectangular Fence. Use the **Shape** method to create a polygon shaped Fence. ***TIP:*** Create a custom shape with a SmartLine, Complex Shape, or Region. Use the **Element** Fence Type to place a Fence around the custom shape.
2	In the References manager, select (highlight) the Reference to be Clipped.
3	Select the *Clip Reference* button.
4	Configure the *Set Reference Clip Boundary* dialogue settings as desired. In this example, the **Method** is set to *Active Fence* to clip out the Fence area. However, the *Element* method can be used to clip a closed shape element (i.e., closed SmartLine, Complex Shape, Region)
5	*Prompt: Set Reference Clip Boundary > Accept/Reject Fence Clip Boundary* – Left-Click in the *View* window to place the clipping boundary.

1E.6.b Mask Reference tool

The *Clip Mask* tool is used to clip an interior portion of a Reference using a *Fence* element.

TIP: After clipping, the new Mask can be edited. See *1E.6.c Adjust a Clip Boundary or Mask after Placement*.

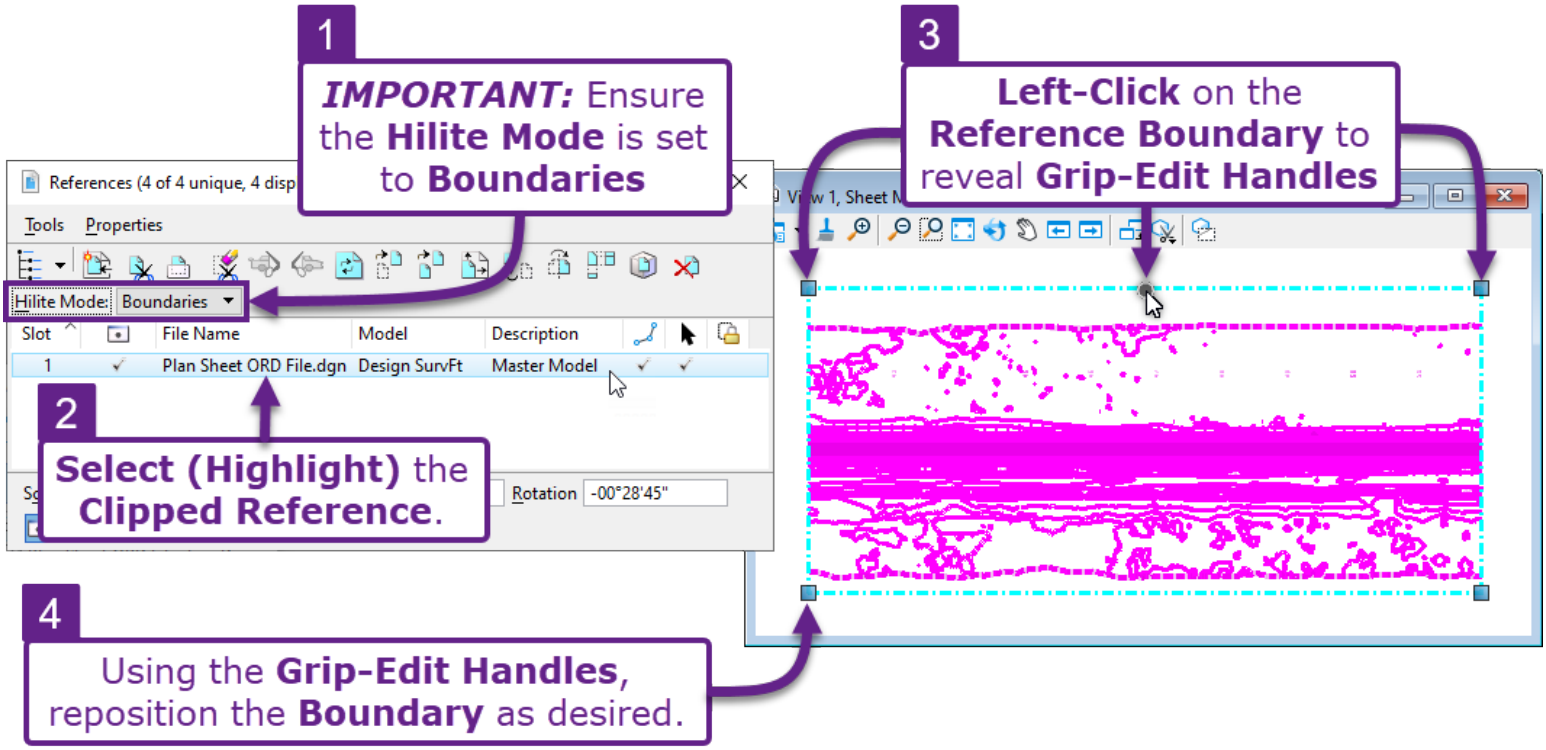


1	Place a *Fence*. For more information about placing *Fences*, see *1B.4 Place Fence tool*. ***TIP:*** Use the **Block** Fence Type to place a rectangular Fence. Use the **Shape** Fence Type to create a polygon shaped Fence. ***TIP:*** Create a custom shape with a SmartLine, Complex Shape, or Region. Use the **Element** Fence Type to place a Fence around the custom shape.
2	In the References manager, select (highlight) the Reference to be Masked.
3	Select the *Clip Mask* button.
4	***NOTE:*** If the **Merge Mask Contents** box is CHECKED, then the reference elements within the mask will be copied into the current ORD File. This is similar to the **Merge into Master** tool discussed in *1E.7.a Merge Into Master tool (Import Reference into Current ORD File)*.
5	*Prompt: Set Reference Clip Boundary > Accept/Reject Fence Clip Mask* – Left-Click in the *View* window to place the clipping mask.

1E.6.c Adjust a Clip Boundary or Mask after Placement

The procedure below demonstrates how to adjust the boundary of a Clipped or Masked Reference.

NOTE: If a closed shape element was used as the clipping shape, then modifying the shape element will adjust the boundary of the Clipped or Masked Reference.



1	In the References manager, ensure the **Hilite Mode** is set to **Boundaries**.
2	In the References manager, select (highlight) the Clipped Reference.
3	Left-Click at any location along the **Reference Boundary** to real Grip-Edit Handles.
4	Re-position the **Grip-Edit Handles** as desired.

1E.7 Referencing Tips and Tricks

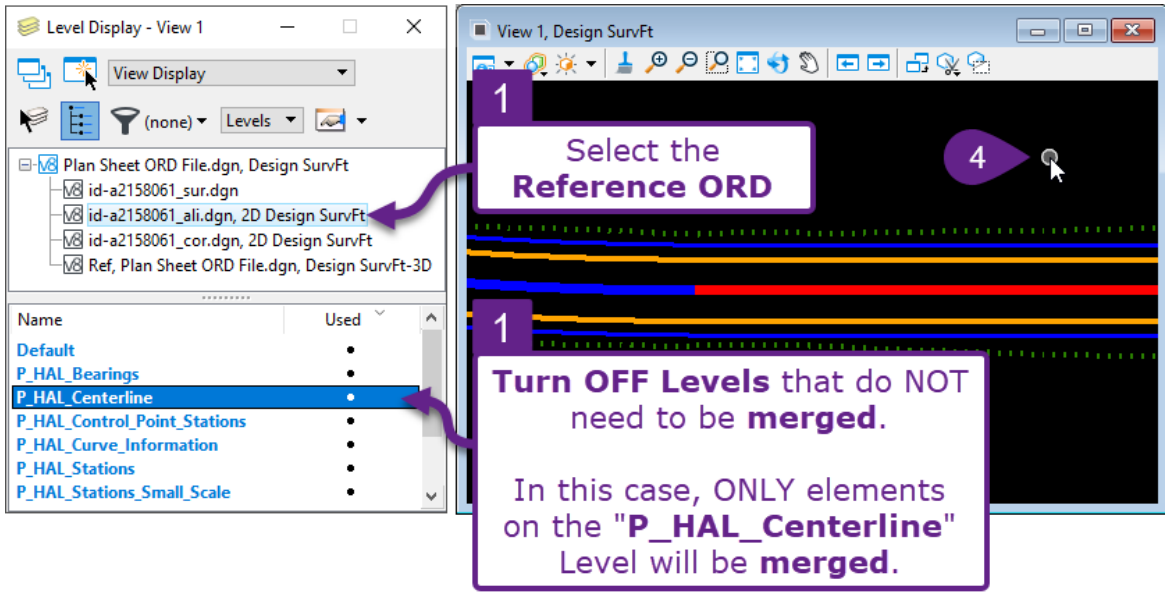
1E.7.a Merge Into Master tool (Import Reference into Current ORD File)

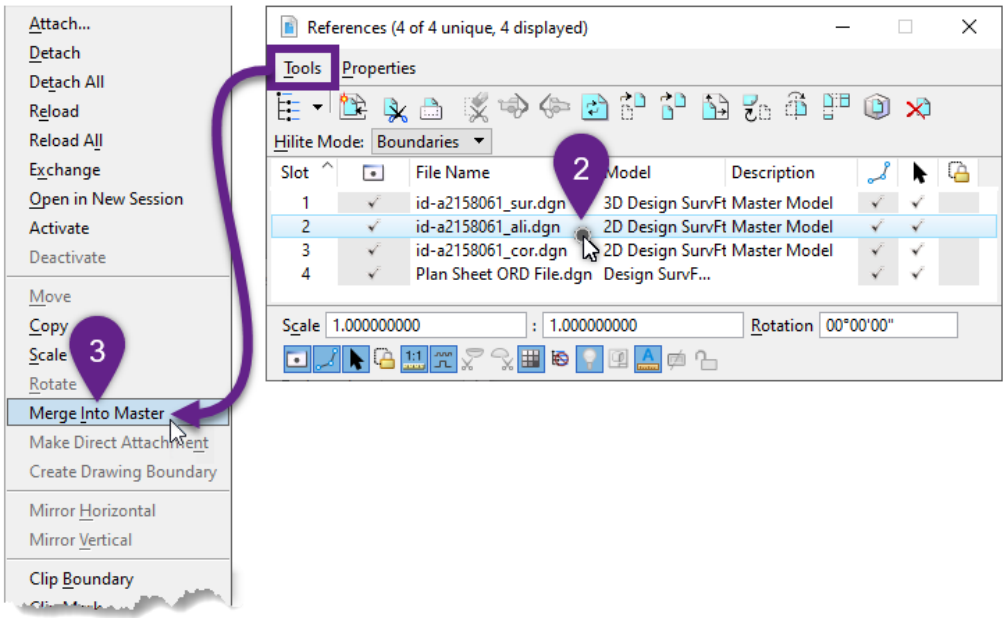
The *Merge into Master* tool will import the selected Reference directly into the current ORD File. Reference elements are directly transferred to the current ORD File. This tool is useful if the desire is to edit or interact with reference elements from within the current ORD File.

Before using the *Merge into Master* tool, turn OFF the Reference Levels that should NOT be imported into current ORD File. ONLY Levels that are tuned ON will be imported into the current ORD File.

> ***WARNING:*** ORD Elements types do NOT retain their element types and functionality if merged into the current ORD File. For example, Complex Elements (Alignments) and Corridors will be converted to *Cell* elements when merged.

> ***TIP:*** If a Terrain Model is merged into a *2D Design Model* of an ORD File, then it will be converted into a *Cell* element. If a Terrain Model is merged into a ***3D Design Model*** of an ORD File, then it will remain a Terrain Model (no conversion to a *Cell* element).



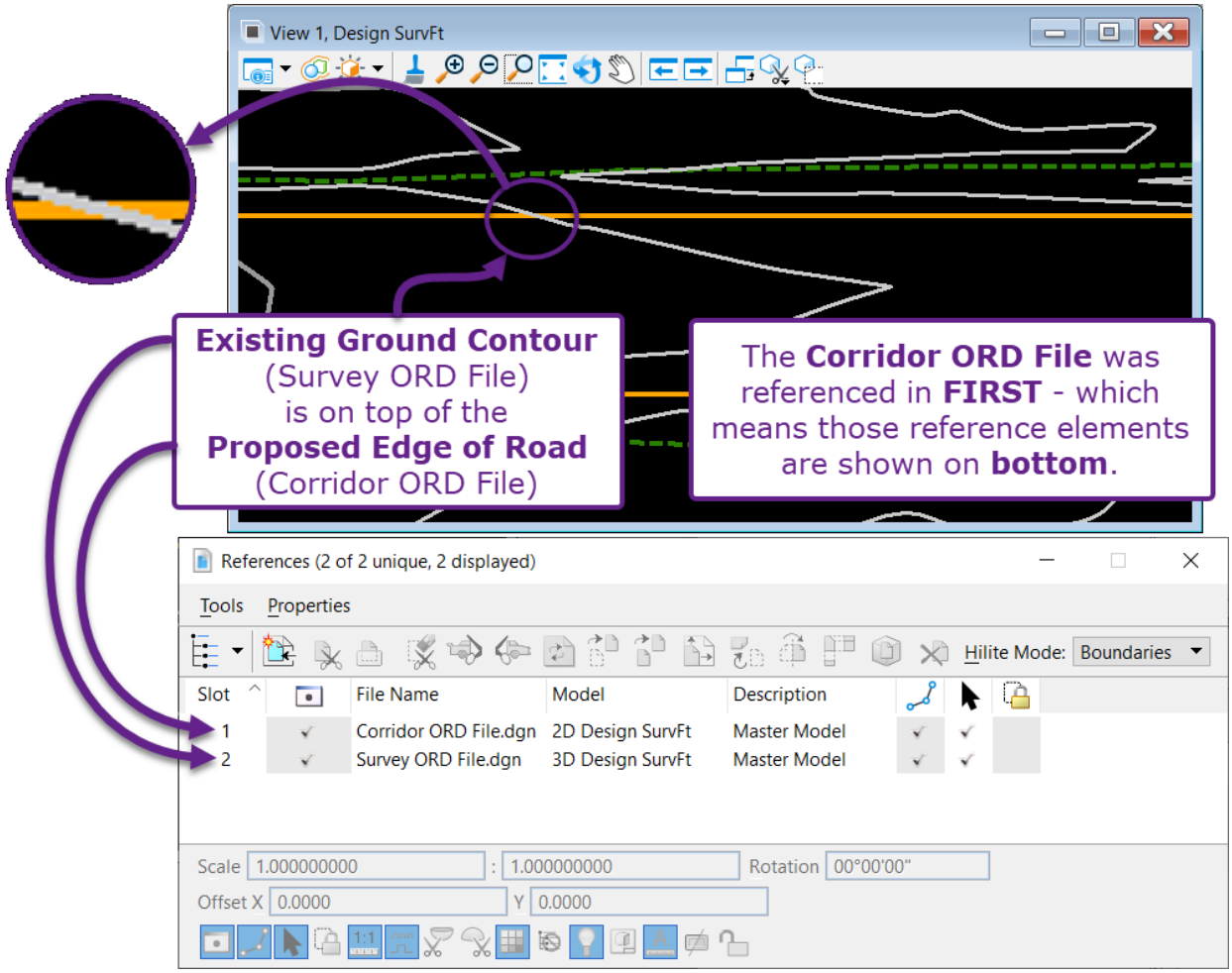


1	In the **Levels Display** box, select the reference that will be imported (merged) into the current ORD File. Turn OFF Levels that do NOT need to be merged into the current ORD File.
2	In the References  manager, select (highlight) which reference is to be copied (merged) into the current ORD File.
3	From the **Tools** drop-down, select the *Merge Into Master* tool.
4	*Prompt: Select View for Merge* – Left-Click in the desired *View* window to perform the merge.

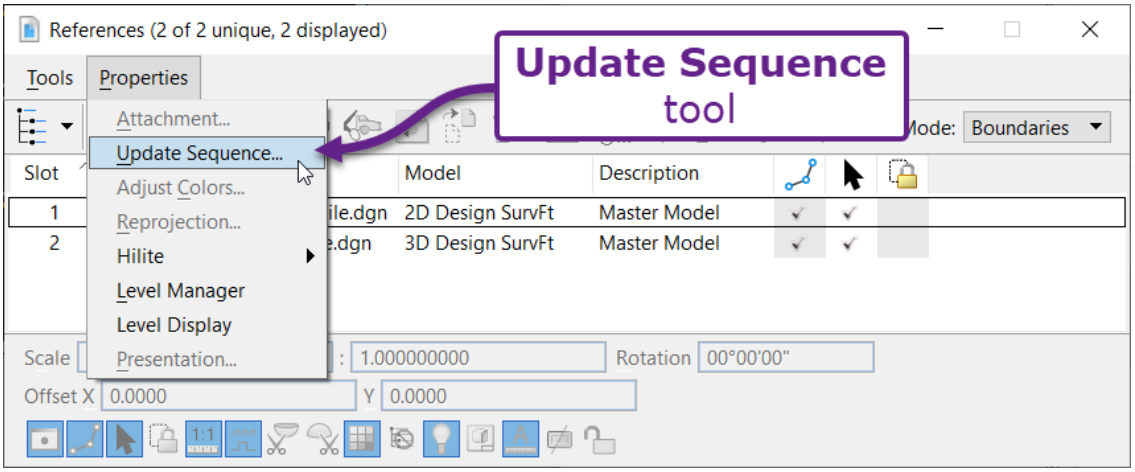
1E.7.b Update Sequence (Reference Layering)

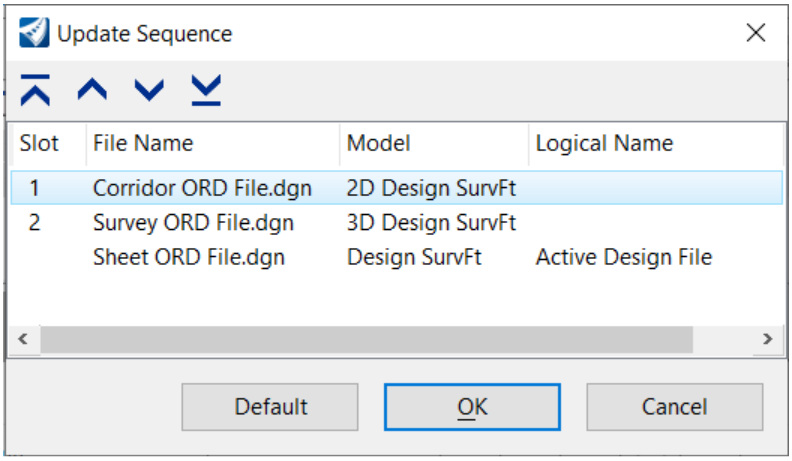
The order in which References were made in the current ORD File affects how reference elements are initially layered or stacked upon each other.

As shown below, the **Corridor ORD File** reference was created before the **Survey ORD File**. The Existing Ground Contours (from the **Survey ORD File**) are shown on top of the Edge of Road (from the **Corridor ORD File**) due to the order in which references were made:



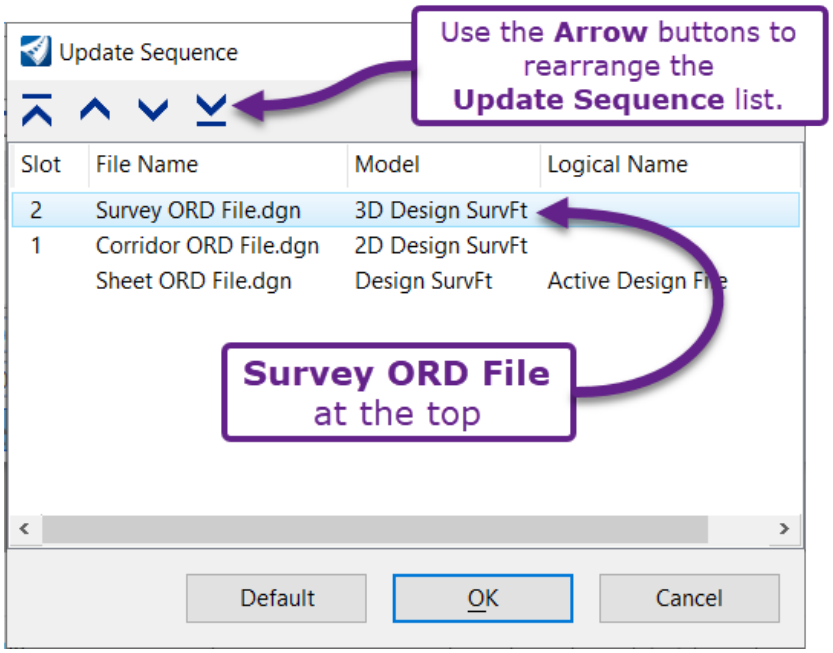
The **Update Sequence** tool is used to rearrange how References are layered or stacked on top of each other after initial referencing. This tool is found under the Properties drop-down.





For the above configuration, the **Corridor ORD File** elements will be on bottom. **Survey ORD File** elements will be in the middle. Elements drawn in the **Current ORD File** (Sheet ORD File) will be on top.

To show **Survey ORD File** elements underneath all other elements, the **Survey ORD File** Reference must be moved to the **top** of the **Update Sequence** list.

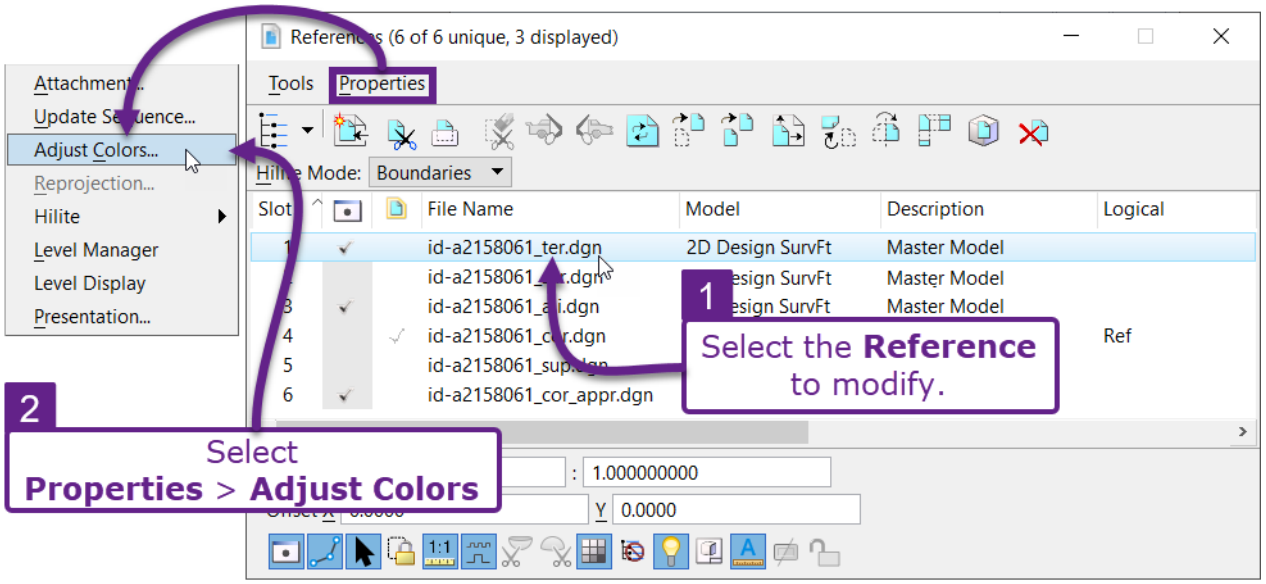


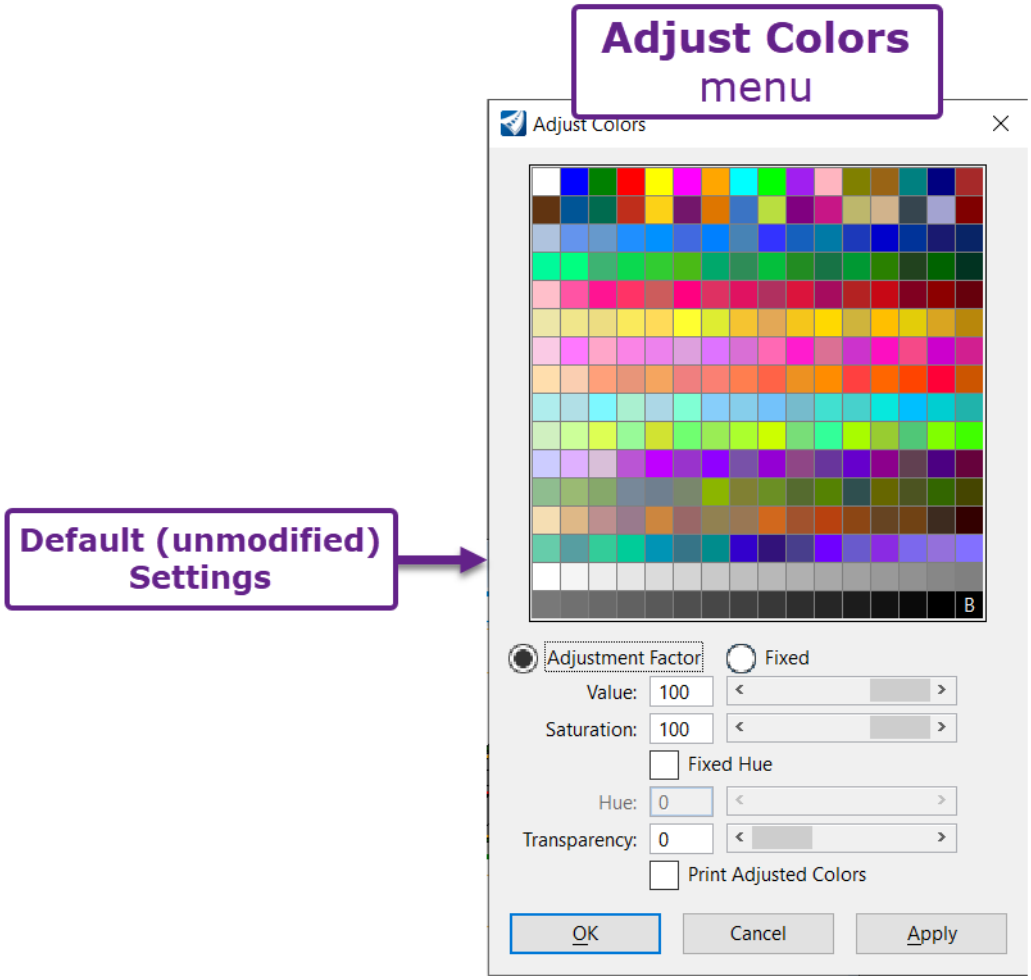
RECOMMENDED UPDATE SEQUENCE: The following list shows the recommended Update Sequence order for References.

1. Existing Terrain ORD File (top of the Update Sequence list)
2. Existing Survey ORD File
3. Existing Right-of-Way ORD File
4. Mainline Corridor ORD File
5. Alignment ORD File
6. Other Design ORD Files
7. Current ORD File (bottom of the Update Sequence list)

1E.7.c Adjust Brightness and Colors of a Reference (Adjust Colors tool)

The entire appearance of a Reference can be manipulated with the *Adjust Colors* tool. This tool is found under the Properties drop-down.



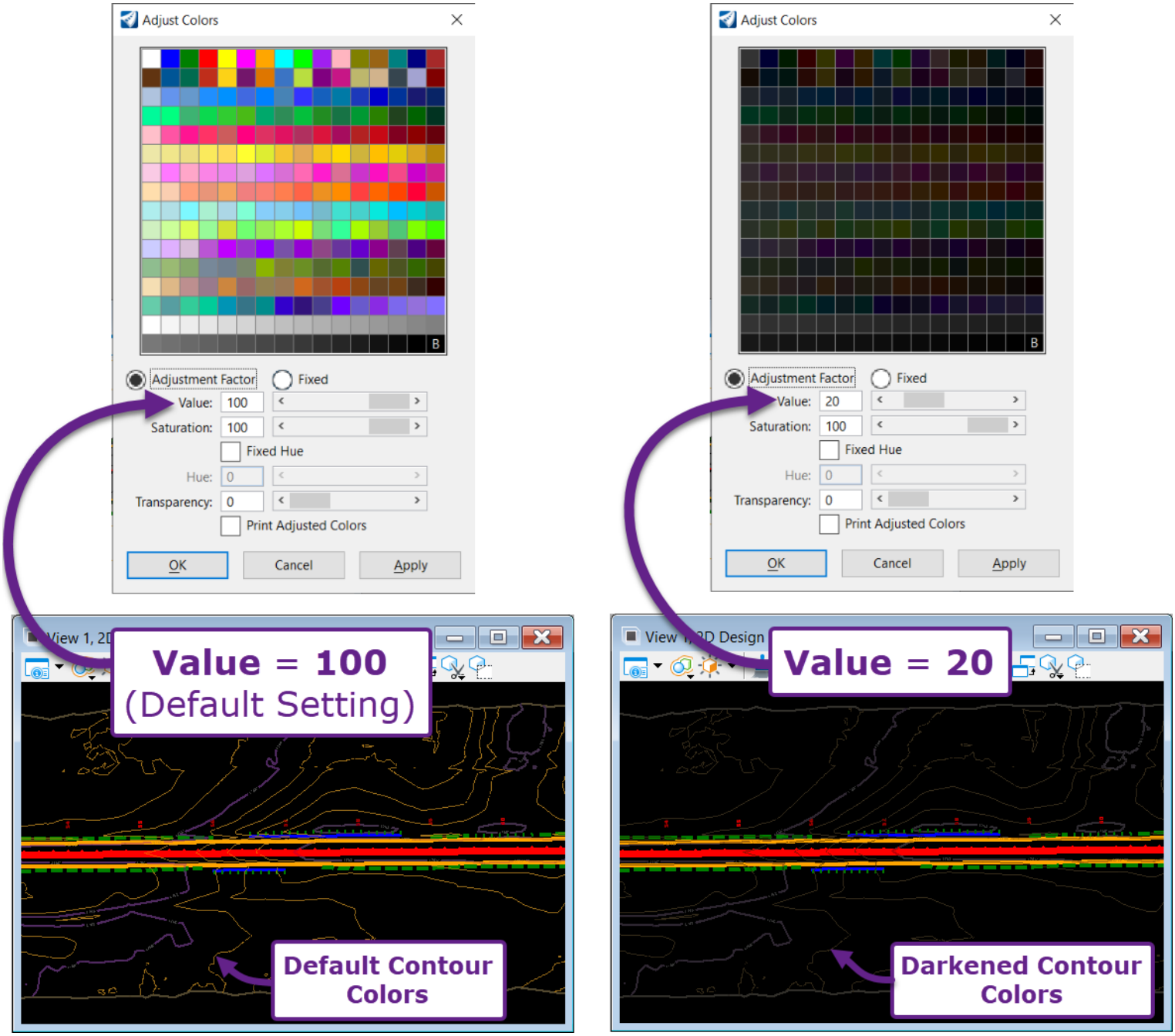


NOTE: The *Adjust Colors* tool modifies the appearance of ALL elements contained in the Reference file. Use the Level Manager to change the appearance of a single, Reference Level. See *1G.5.b Manipulate Symbology Attributes for Referenced Levels*.

Darken Colors in Reference: The **Value** setting is used to darken the colors of a Reference.

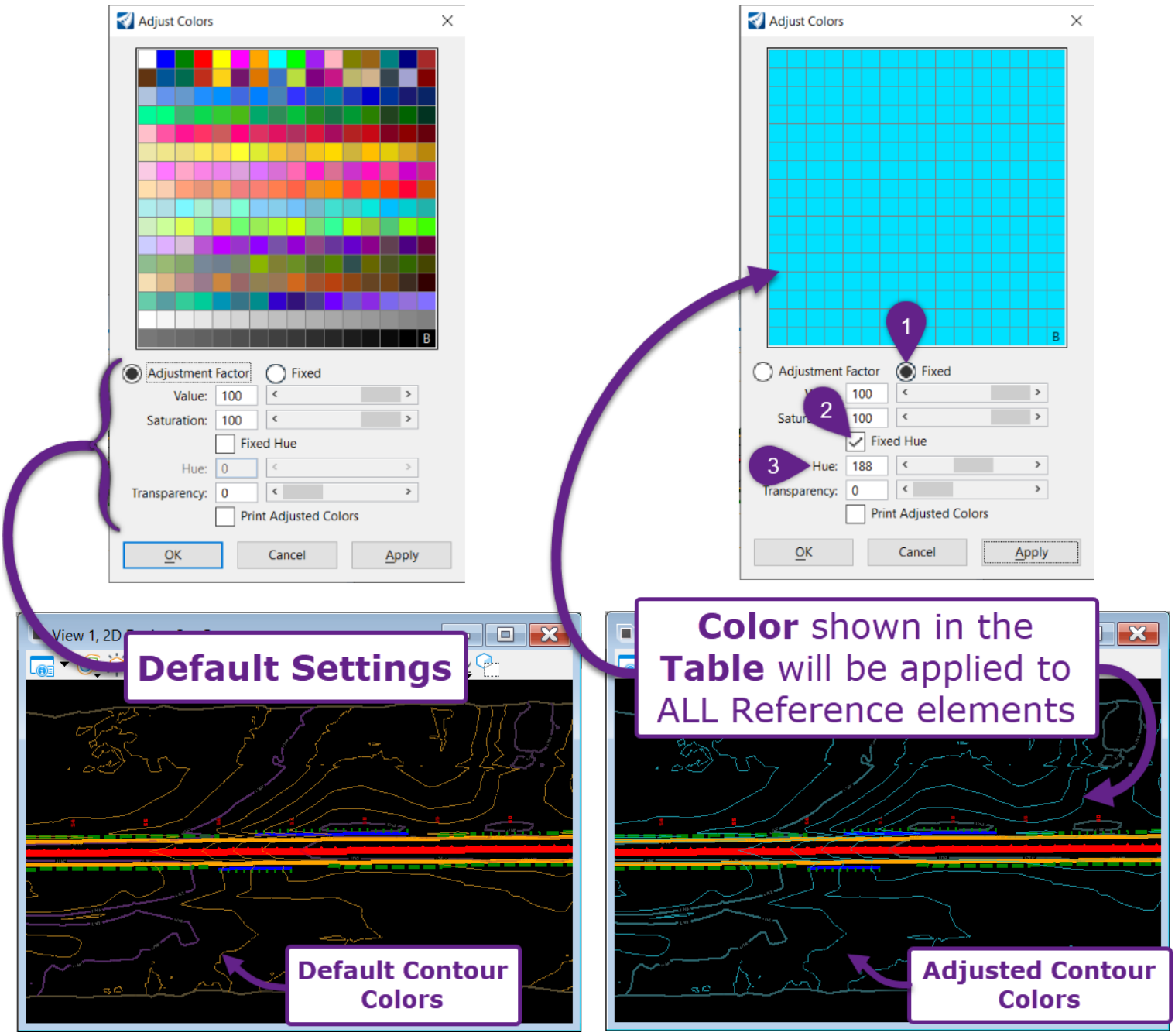
As shown below, decreasing the **Value** setting causes all elements in the Reference to darken.

The graphic below shows the Terrain Model ORD File (Reference) darkened by changing the **Value** setting.



Change all elements in a Reference to a single color: All elements in a Reference can be changed to a uniform color. Shown below, all elements in the Terrain Model ORD File are changed to blue.

1	Select the **Fixed** option.
2	CHECK the **Fixed Hue** box.
3	Adjust the **Hue** slider until the desired color is shown in the color table above.



1E.7.d Directly Edit Elements in a Reference (Activate tool)

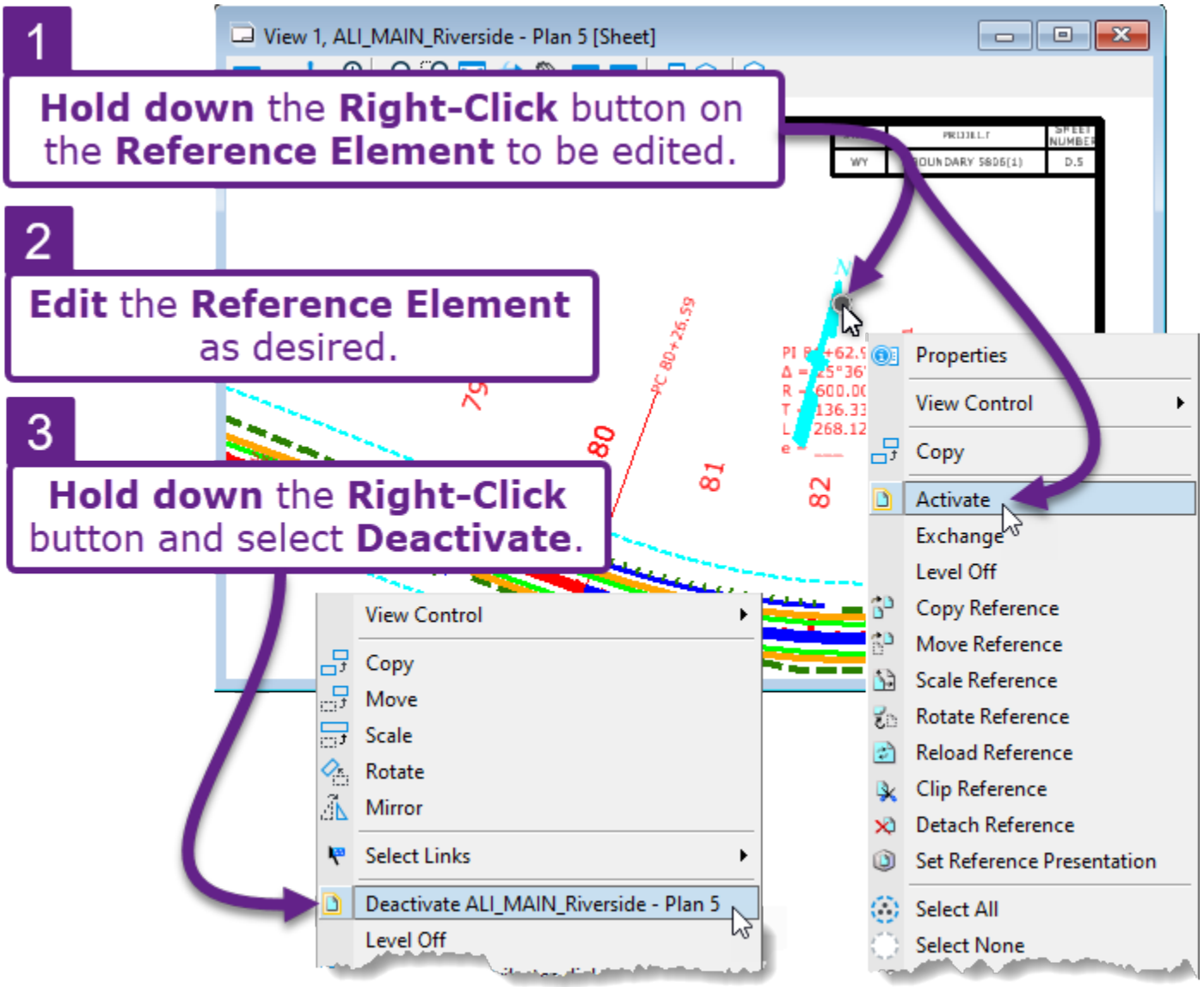
With the *Activate* tool, elements contained inside a Reference Model can be directly edited from the current Model.

> ***NOTE:*** When the *Activate* tool is used, the Reference ORD File is temporarily opened until the *Deactivate* tool is used. The Current ORD is suspended for editing operations. ONLY elements in the Reference ORD File can be edited when the *Activate* tool is in operation.
>
> ***WARNING:*** If the Reference ORD File is opened by a different User, than the *Activate* tool CANNOT be used and an error message is displayed.

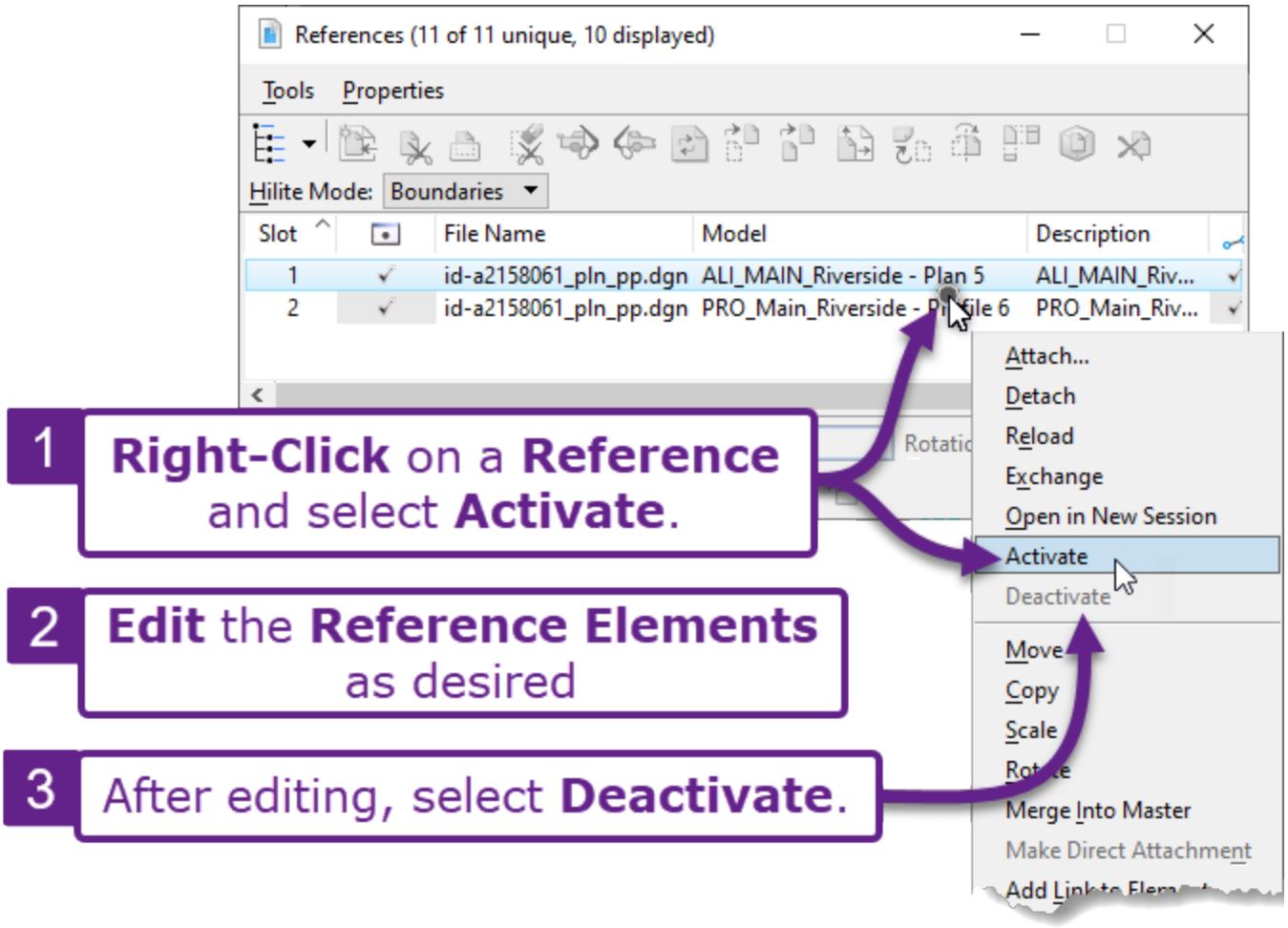
As shown below, the *Activate* tool is useful for moving the North Arrow (which is contained in the *Drawing Model* reference), from the perspective of the *Sheet Model*. This can also be used to move the Curve Data (contained in the Alignment ORD File reference) from the perspective of the *Sheet Model*.

There are two methods to *Activate* a Reference Model:

Method 1 - Right-Click and Hold on a Reference Element:



Method 2 – Activate the Reference Model from the References Manager:



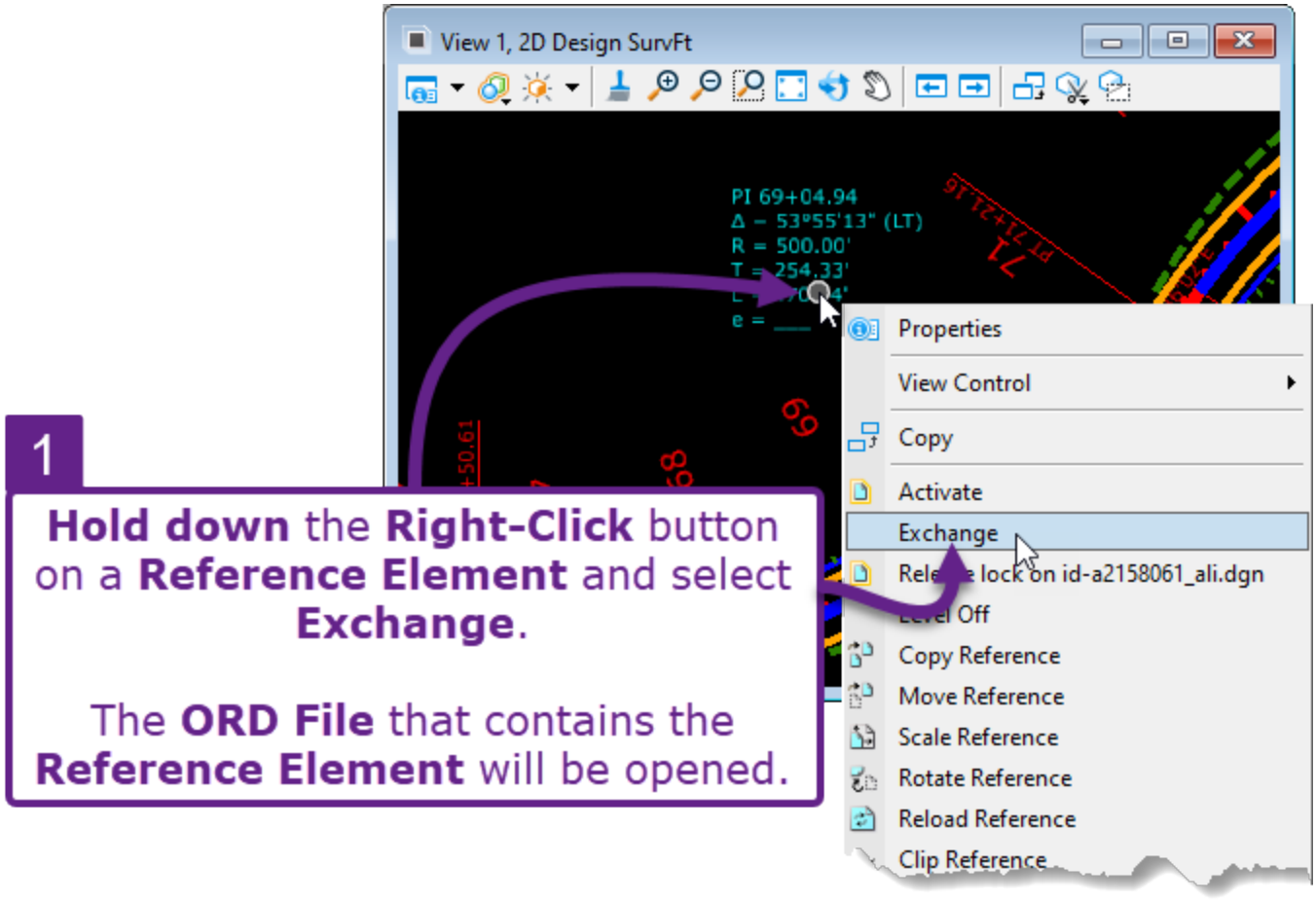
1E.7.e Quickly open a Reference (Exchange tool)

With the *Exchange* tool, a Reference ORD File can be quickly opened.

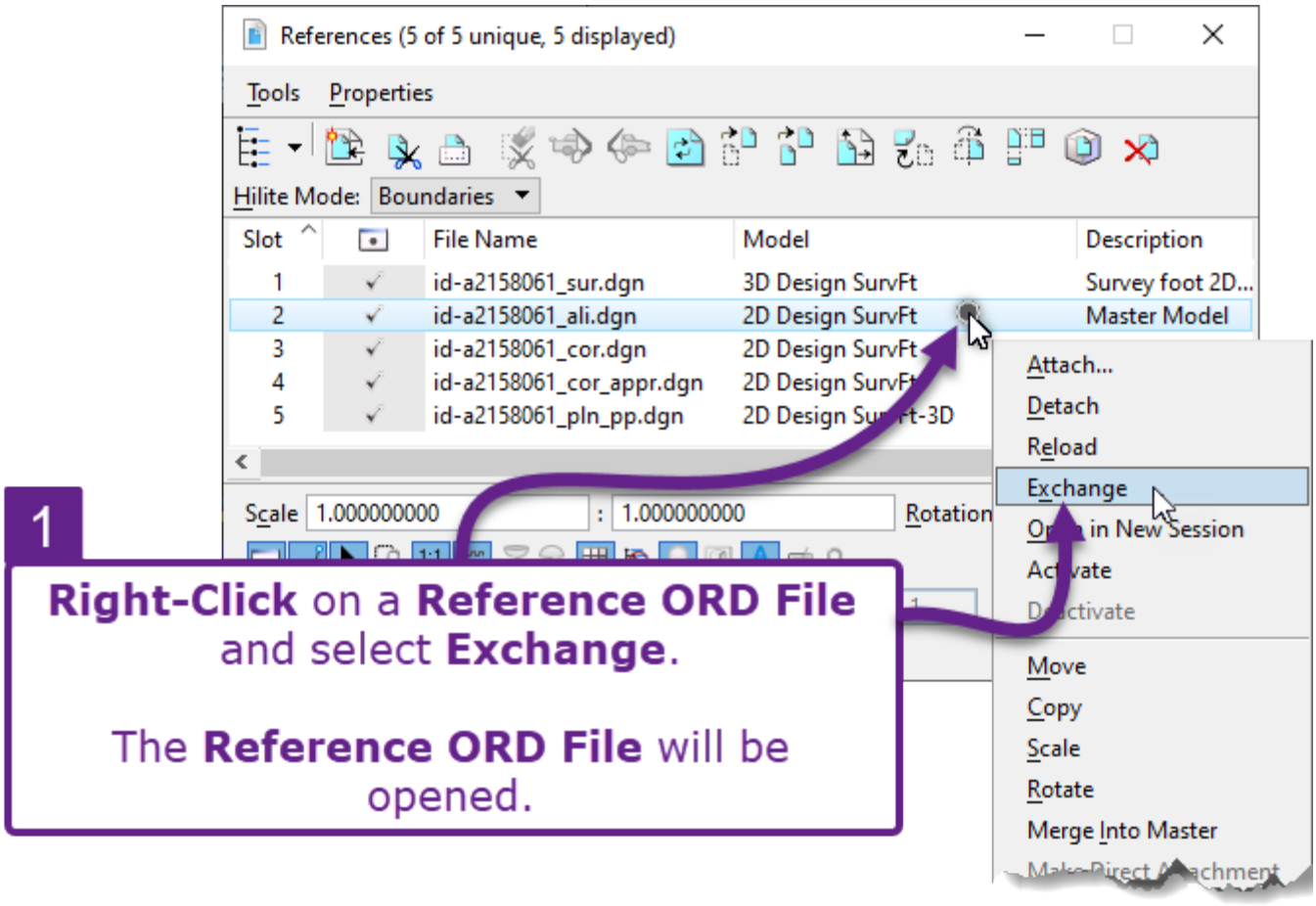
> ***NOTE:*** When the *Exchange* tool is used, the current ORD File is closed and the Reference ORD File is opened.
>
> ***WARNING:*** If the Reference ORD File is opened by a different User, than the *Exchange* tool CANNOT be used and an error message is displayed.
>
> ***WARNING:*** For ProjectWise Users, the current ORD File should be Checked In to the ProjectWise server before using the *Exchange* tool. Failure to Check IN the current ORD File may result in a loss of data and other Users will be unable to access the ORD File.

There are two methods for using the *Exchange* tool to open a Reference ORD File:

Method 1 - Right-Click and Hold on a Reference Element:



Method 2 – Open the Reference ORD File from the References Manager:

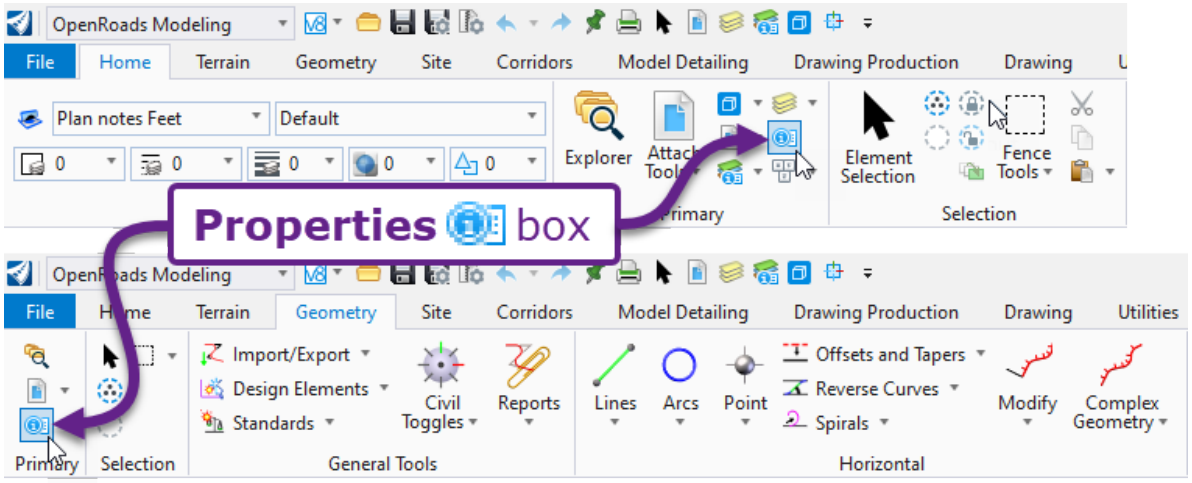


1F – PROPERTIES

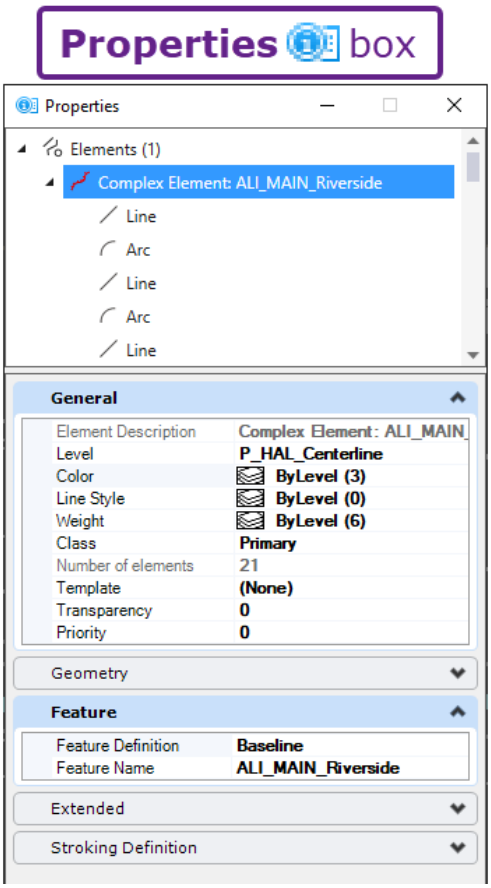
Each element contains attributes and settings that are shown in the **Properties** box.

The Properties tool is located in most Tabs found in the Ribbon. Typically, the Properties tool is found on the far left-side of the Ribbon. However, two other common locations are:

OpenRoads Modeling workflow → **Home** tab → **Primary** group
OR
Drawing workflow → **Home** tab → **Primary** group



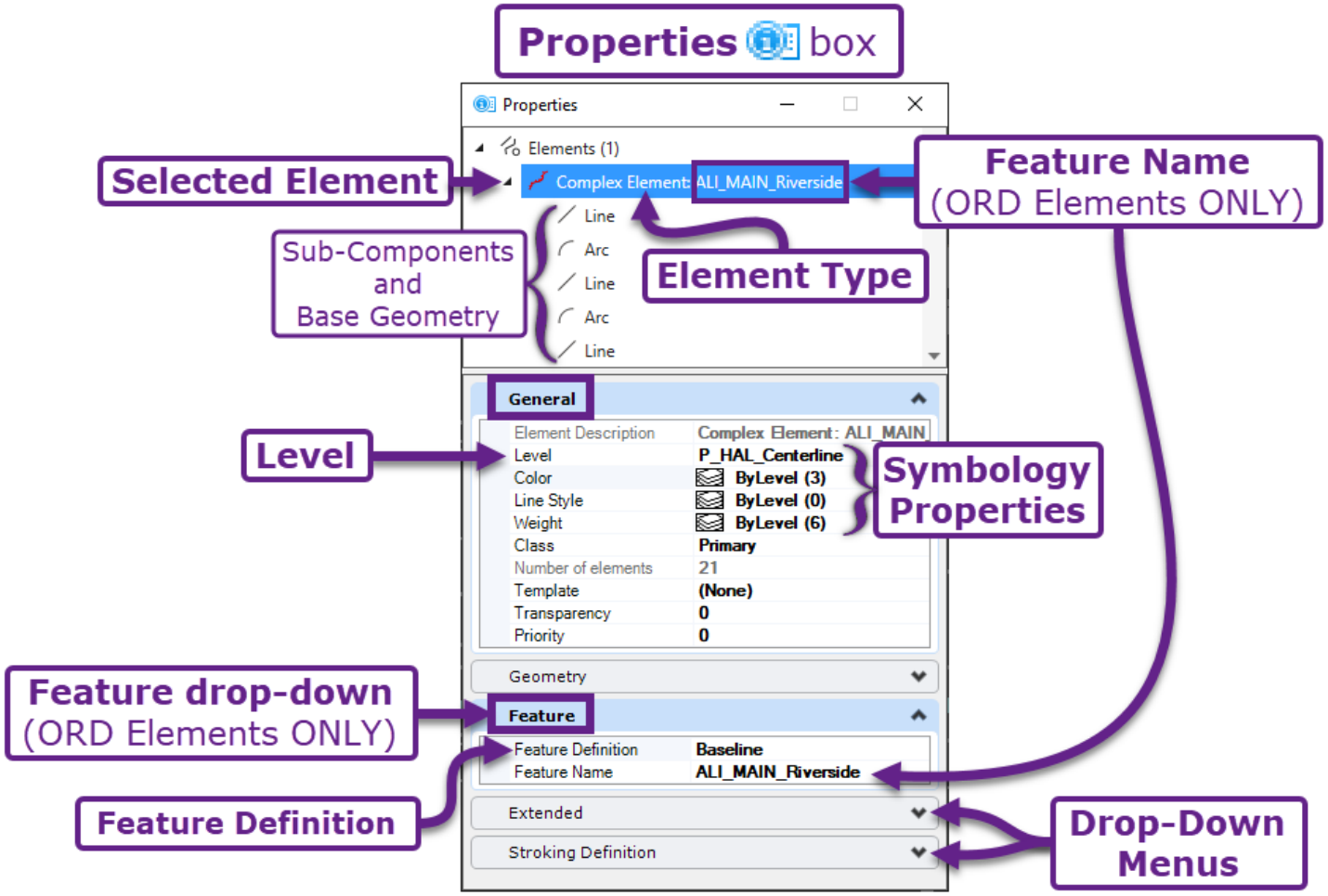
WARNING: When working in large ORD Files, close the **Properties** box when NOT in use. The Properties box occasionally processes ALL elements contained in the ORD Files, which slows down large ORD Files.



1F.1 Properties Box Overview

The top portion of the Properties box shows the selected element(s) and the **Element Type**. Shown below, a *Complex Element* (Alignment) is selected. For ORD Elements, the *Feature Name* is also displayed.

TIP: An element may contain sub-components or base geometry that is shown by expanding the arrow next to the selected element. Each sub-component has a set of properties. However, sub-component Properties are typically greyed out and CANNOT be edited.



The bottom portion of the Properties box is organized into drop-down menus. Each **Element Type** contains a different set of drop-down menus. However, the **General** drop-down is common for every type of element.

General drop-down: Contains the **Level** and other properties relating to the visual appearance of the selected element.

> ***NOTE:*** In this manual, the term "symbology" refers to the Level, Color, Line Style, and Weight of an element.

Each **Level** has a default **Color**, **Line Style**, and **Weight** that is initially set by the FLH WorkSpace. When these properties are set to **By Level**, they are in their default configuration. Elements that show something different than **By Level** are overridden.

> ***TIP:*** In the **Levels Manager** , the default **By Level** settings for a Level be changed for the current ORD File only. However, changing **By Level** symbology settings does NOT affect overridden elements.

Element Description	Provides a basic description for the selected element. The **Element Type** and **Name** is shown in the description.
Level	Use to organize elements by their type or function. For more information on Levels, see *1G - Levels*.
Color	Sets the Color for the selected element.
Line Style	Sets the Line Style for the selected element.
Weight	Sets the weight or thickness for the selected element.
Class	Class is used to further organize elements. There are two options for class: **Primary** and **Construction**. The **Construction** class is intended for elements that are NOT to be shown in plan sheet graphics. Specifically, ancillary elements used in Corridor modeling (the Corridor Handle, Template Drop sections, and Corridor Object graphics) are automatically assigned to the **Construction** class. Elements assigned to the Construction Class are set to NOT print in the FLH Pen Table. The display of Construction class elements can be toggled ON/OFF through the View Attributes menu. See *1C.4 View Attributes Menu*. The **Primary** class is intended for elements to be shown and printed in the plan sheets.
Number of elements	Shows the number of sub-components or base elements contained within the selected element.
Template	Used to set a number of properties relating to the symbology and text style of an element. Templates are most commonly used for Annotation elements. For more information on Templates in creation of Annotation elements, see *15A.3 Element Templates*.
Transparency	The transparency of an element can be set from a scale of 0-90. If the transparency is set to 0, then the element is completely solid. If the transparency is set to 90, then the element is almost translucent.
Priority	Priority sets how overlapping elements are stacked or layered on top of each other. The Priority scale runs from -500 to +500. Elements with the greater priority value will be shown on top. ***TIP:*** The stacking of Reference elements is also affected by the **Reference Sequence**. See *1E.7.b Update Sequence (Reference Layering)*.

Feature drop-down: The Feature drop-down is shown for ORD Elements ONLY and shows the **Feature Definition** and **Feature Name**.

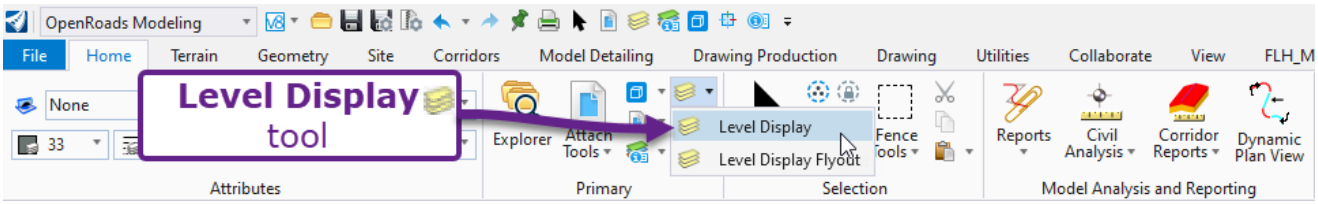
- **Feature Definition:** Represents the design *Feature* that's being drafted. Features represent real-world entities, both existing and proposed. Examples of Feature entities are the proposed road centerline (Baseline), existing curb and gutter, culverts, guardrail, survey control point, or an existing ground surface. FLH Workspace contains a library of predefined Feature Definitions to represent most Features used in roadway design. ***NOTE:*** Feature Definitions have a default Level. Changing the Feature Definition of an element will also change the Level. Feature Definitions are discussed in *Chapter 17 – Feature Definitions*.
- **Feature Name:** All ORD Elements have an associated Name. ***BEST PRACTICE:*** Assign each ORD Element an appropriate Name. Important Features, such as the Road Alignment, must be named according to the FLH Naming Convention. See *3F – Naming Convention for Proposed ORD Features*.

1G – LEVELS

Each element is assigned to a Level. Levels organize elements according to their type, function, and real-world entity that they represent. The display of a Level is toggled ON/OFF in the **Level Display** box.

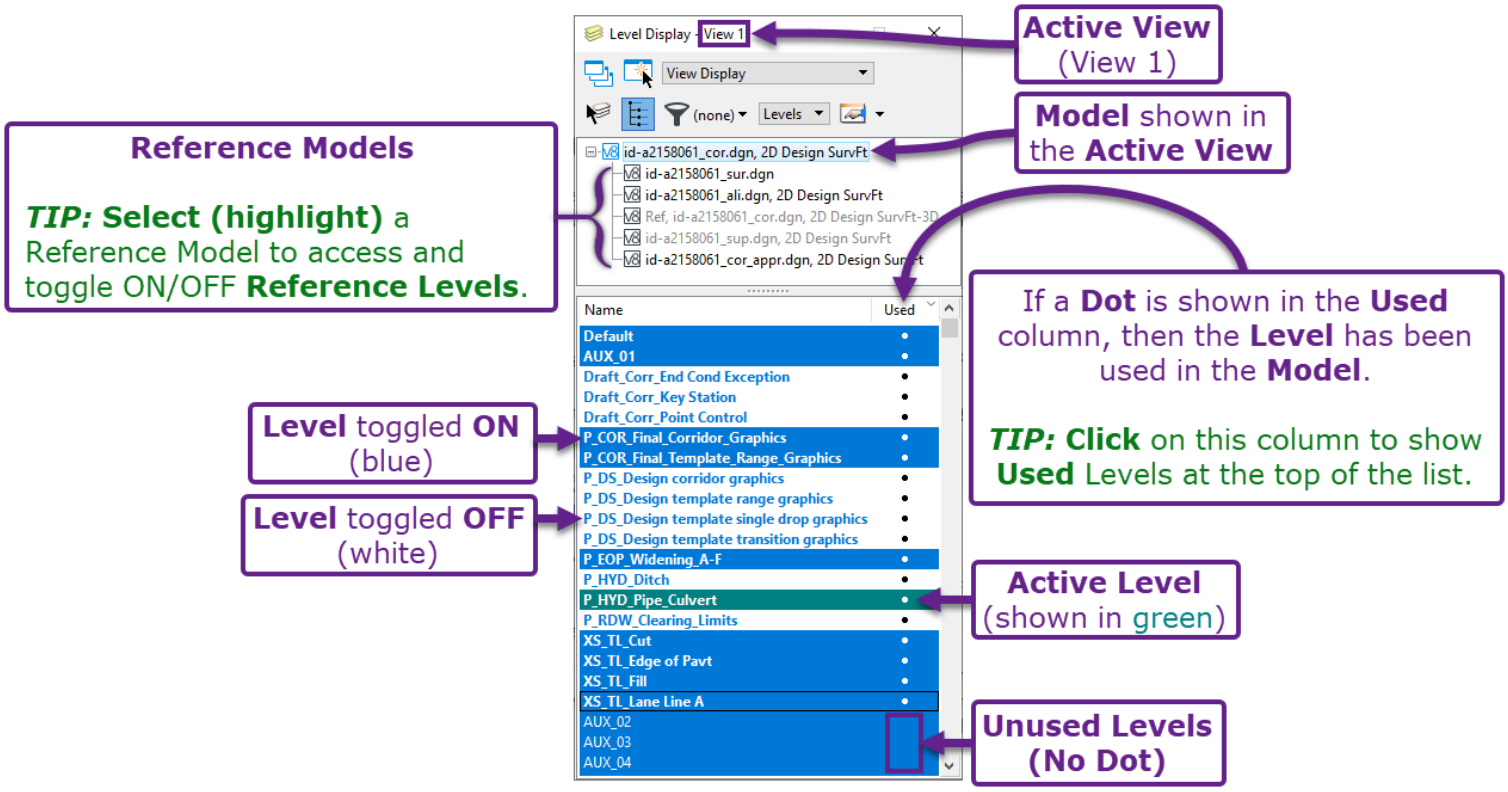
The Level Display tool is found in many locations in the Ribbon. Two common Ribbon locations are:

OpenRoads Modeling workflow → **Home** tab → **Primary** group
OR
Drawing workflow → **Home** tab → **Primary** group



BEST PRACTICE: Always keep the **Level Display** box displayed and visible.

TIP: The Level Display box is also used to make a Level *active*. When a Level is *active*, then the next element to be drawn is assigned to the *active* Level. To make a Level *active,* double-click on it in the Level Display box. The *active* Level is indicated by a green background.



IMPORTANT: The Levels shown in the Level Display box are ONLY applicable to the Model shown in the Active View. If the Active View is changed (i.e., clicking in a different *View* window), then the Levels shown in the Level Display box will change. For more information on the Active View, see *1C.1 – Active View*.

WARNING: The *Save Settings* tool saves the current Level settings (i.e., which Levels are toggled ON/OFF). For example, if the "AUX_01" Level is toggled OFF, then use the *Save Settings* tool to

ensure this Level remains toggled OFF when the ORD File is opened in the future. If the *Save Settings* tool is NOT used, then the "AUX_01" Level will be toggled back ON when the ORD File is opened again. The *Save Settings* tool is found in the Quick Access Toolbar. See *1B.1.e Quick Access Toolbar.*

TIP: In the ORD Preferences, a setting can be enabled which automatically *Saves Settings* when the ORD Software is closed. By default, this setting is NOT used. To enable this setting, see *4D.5 Automatically Save Settings When the ORD File is Closed*.

1G.1 FLH Level Library

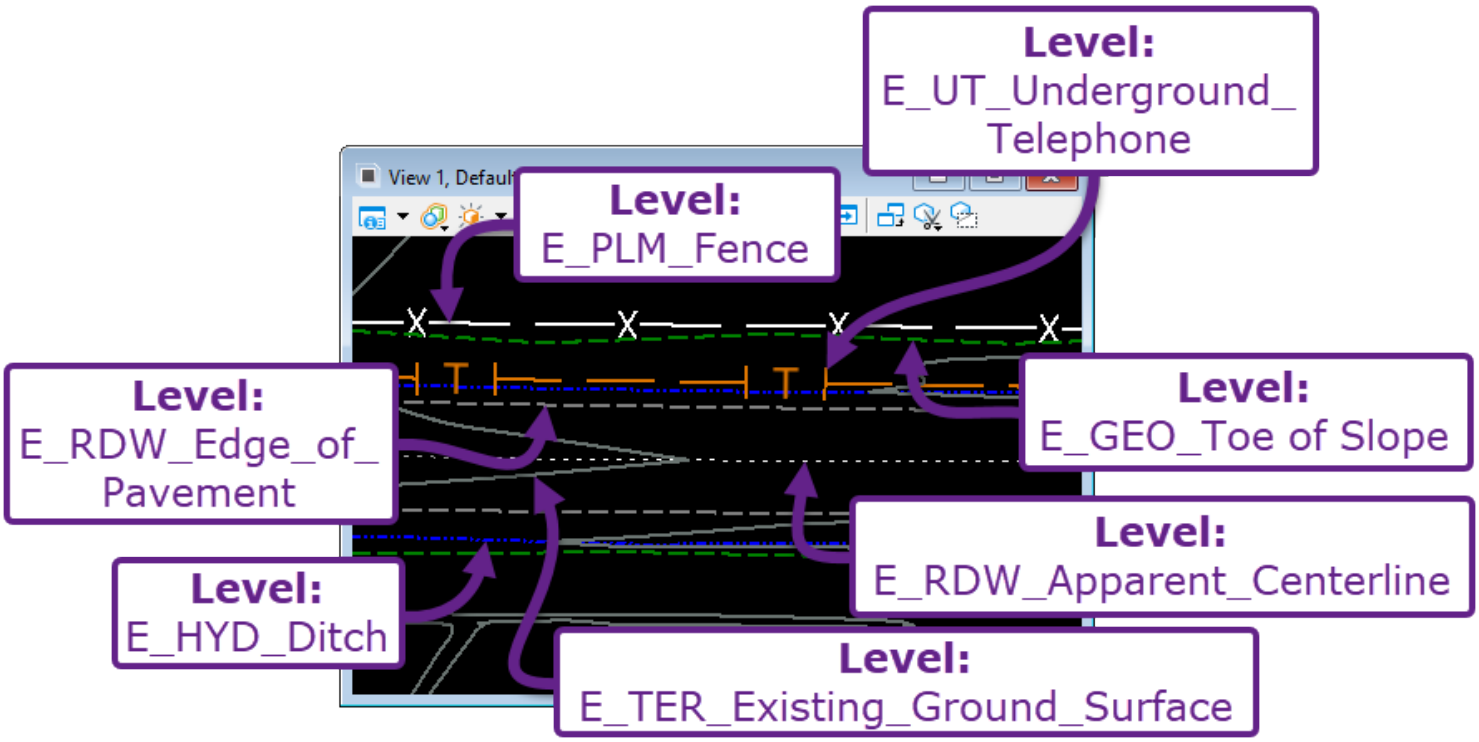
In the FLH WorkSpace, Levels are organized into four general categories. The Level category is indicated in the prefix of the Level name. The four Level categories are:

1. **Existing Levels** (prefix = E_...)
2. **Proposed Levels** (prefix = P_...)
3. **Annotation Levels** (prefix = D_...)
4. **AUX Levels** (prefix = AUX_...)

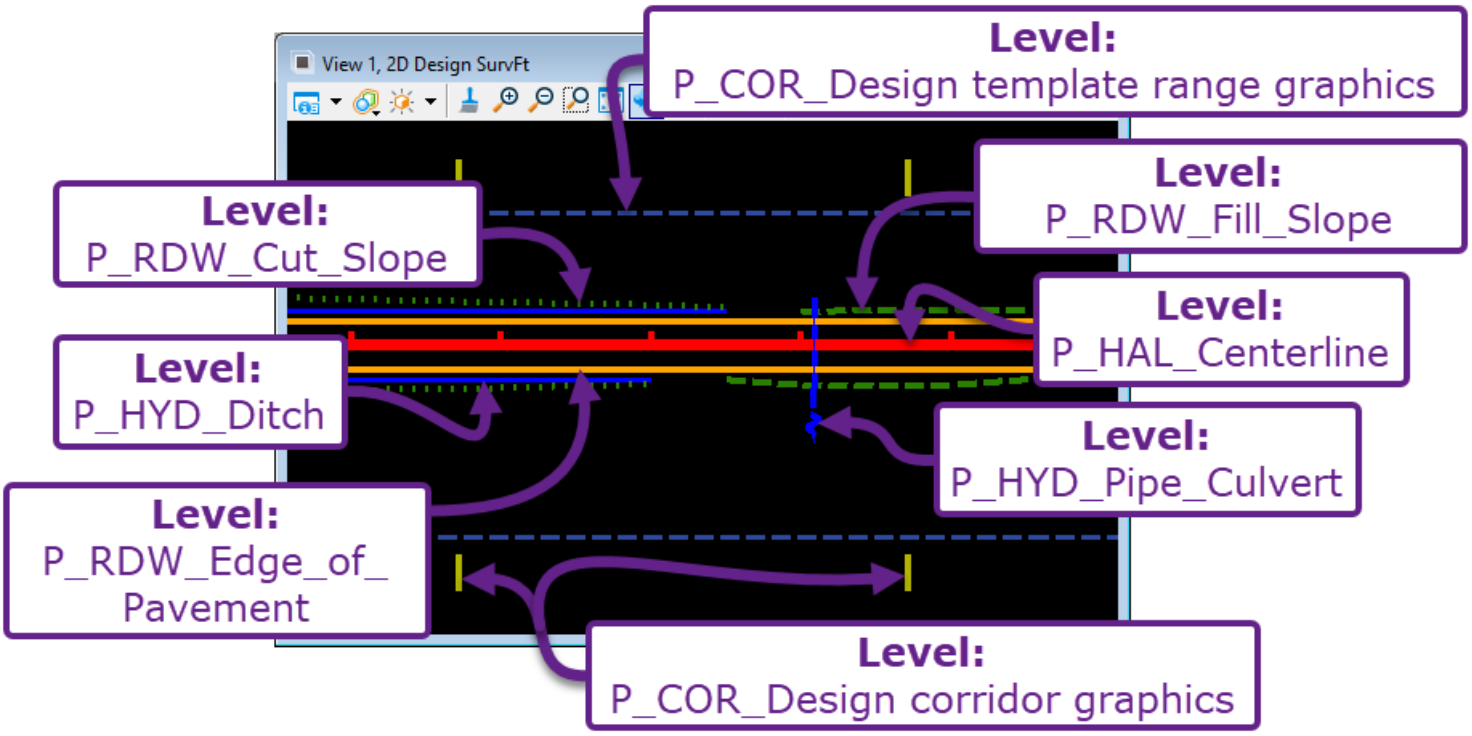
Existing and Proposed Levels also contain a secondary prefix that further classifies the Level according to the type/discipline. For example, "E_RDW_..." signifies an existing roadway Level type. "P_HYD_..." signifies a proposed hydraulics Level type.

> ***WARNING:*** Avoid drawing elements on the "Default" Level. When an ORD File is initially created, the "Default" will be active. Change the active Level before drawing elements.

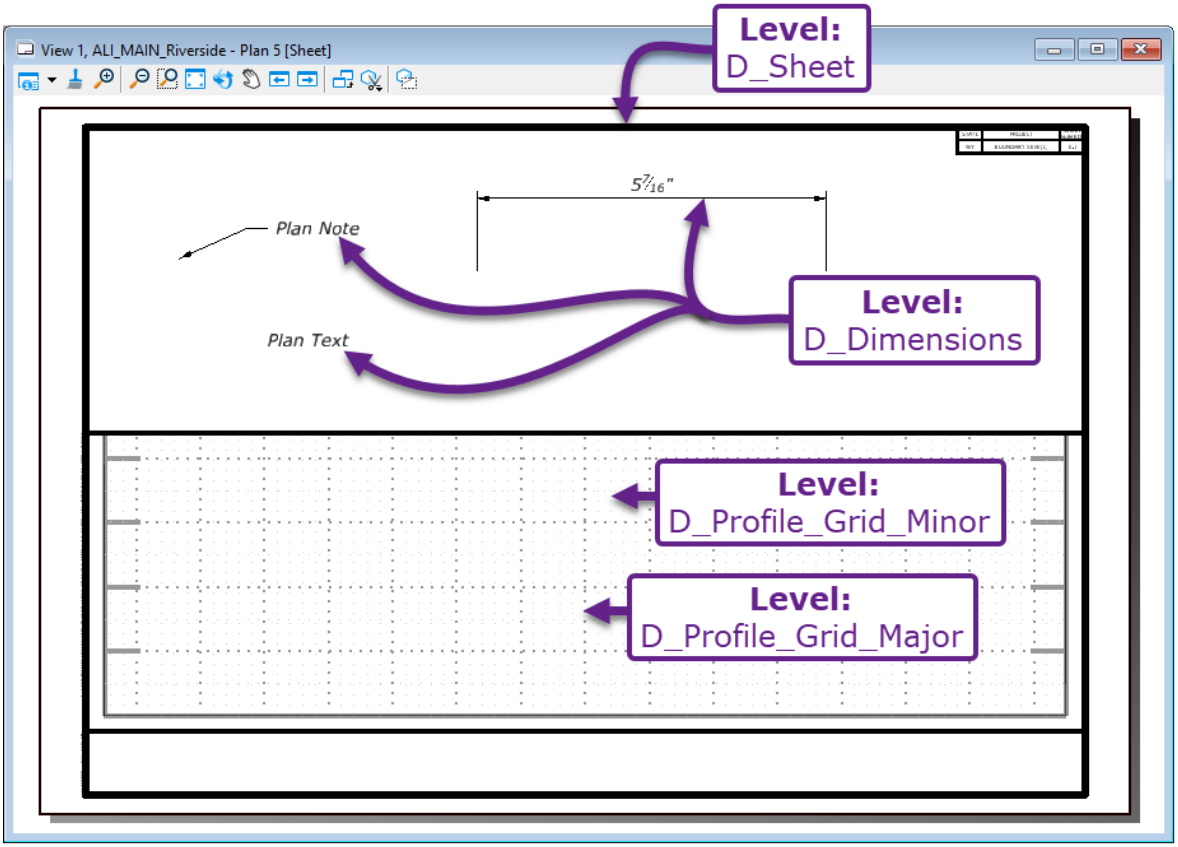
Existing Levels (E_...): Levels that represent existing entities contain an "E_..." prefix. Visually, Existing Levels always appears as dashed or dotted lines. When printed to PDF or on paper, Existing Levels are printed in various shades of grey.



Proposed Levels (P_...): Levels that represent proposed entities contain a "P_..." prefix. Visually, Proposed Levels typically appear as solid lines. When printed, Proposed Levels are printed in solid black.



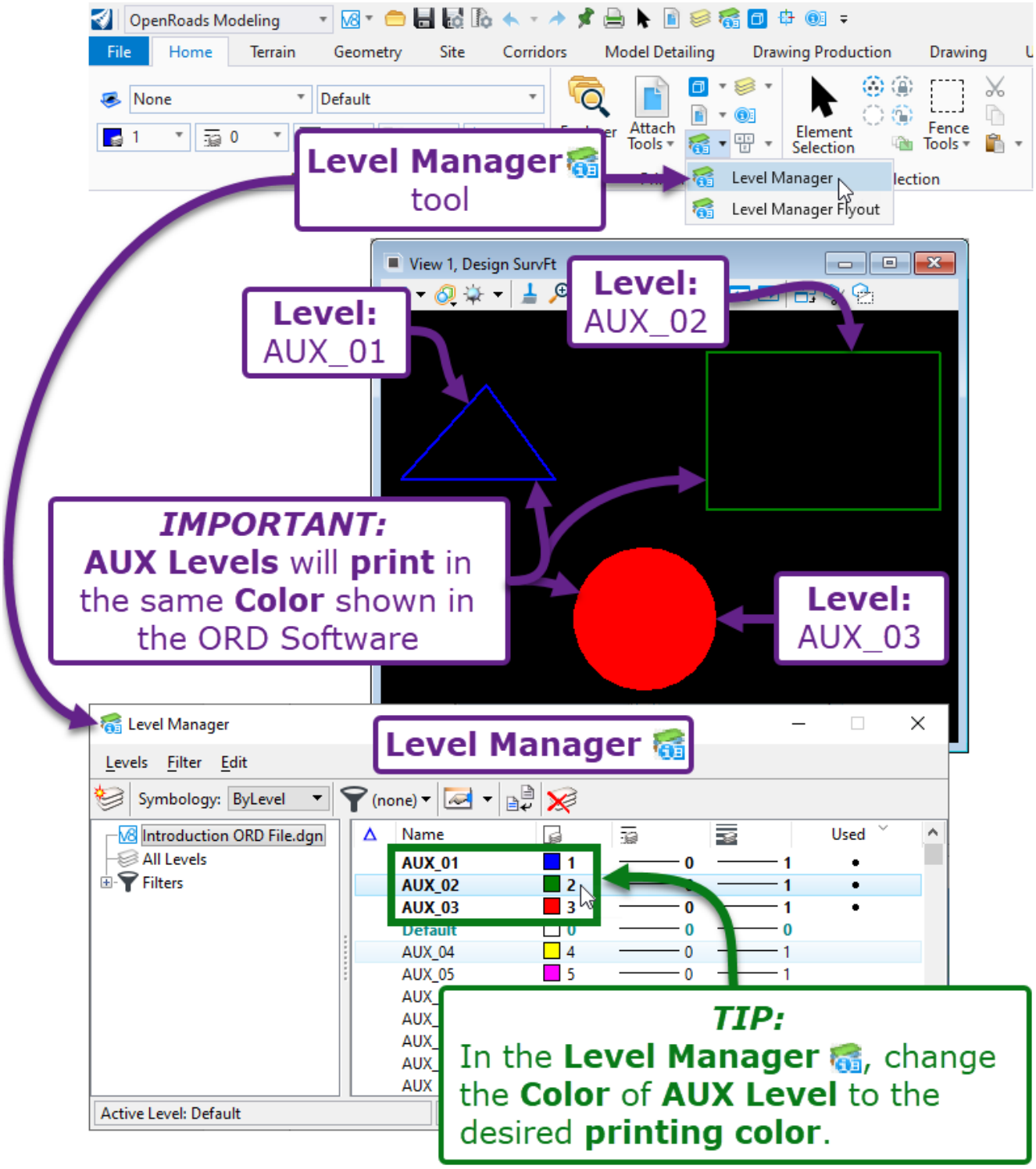
Annotation Levels (D_...): Levels with "D_..." prefixes are intended for drafting, annotations, plan notes, cross section/profile grids, and dimensions.



AUX Levels (AUX_...): AUX Levels are intended for printing in color. AUX Levels are NOT recognized by the FLH Pen Tables. In a PDF or on paper, AUX Levels will print in the same color shown in the ORD Software.

For more information on printing and the AUX Levels, see *19D – The FLH Pen Table, Custom Levels, and AUX Levels*.

TIP: The "By Level" or default **Color** for an AUX Level can be changed in the *Level Manager*. See *1G.5 Level Manager*.



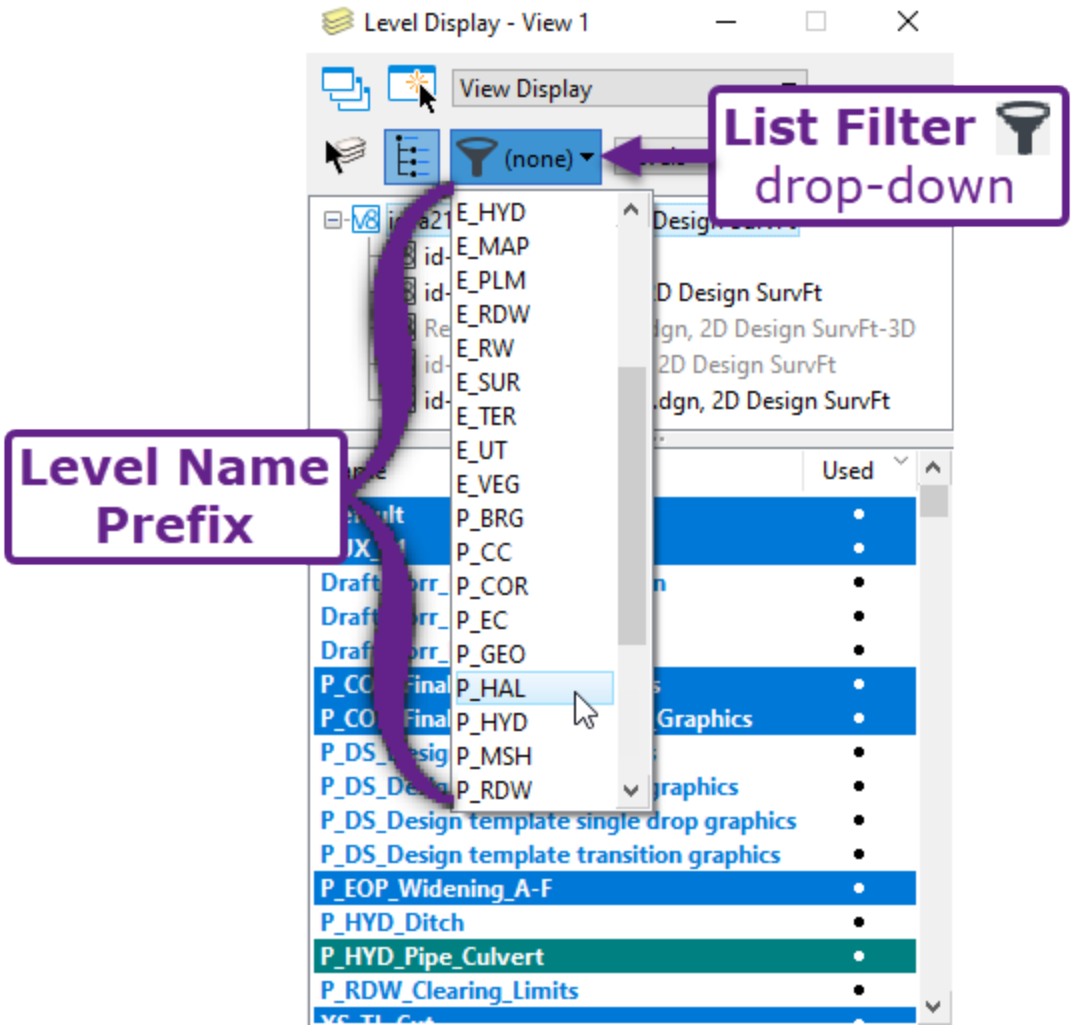
For **Existing** and **Proposed Levels** ("E_..." and "P_..."), the secondary prefix further classifies the entity type. For example, a Level with the prefix "E_RDW…" represents an existing **roadway** feature (i.e., existing edge of road or existing apparent centerline). A Level with the prefix "P_RDW…" represents a proposed **roadway** feature.

Secondary Prefixes for Existing and Proposed Levels			
Secondary Prefix	**Existing or Proposed**	**Description:**	**Example Levels:**
BRG	Both	Bridge	"E_BRG_Timber", "P_BRG_Concrete"
ENV	Both	Environmental	"E_ENV_High_Water", "E_ENV_Wetland_Mitigation"
GEO	Both	Geographical See ***NOTE*** below.	"E_GEO_Index_Contours", "P_GEO_Final_Index_Contours"
HYD	Both	Hydraulics	"E_HYD_Ditch", "P_HYD_Pipe_Culvert"
MAP	Existing ONLY	Mapping	"E_MAP_North_Arrow"
PLM	Existing ONLY	Planimetric	"E_PLM_Bollard"
RDW	Both	Roadway	"E_RDW_Edge_of_Asphalt", "P_RDW_Driveway"
_RW_	Both	Right-of-Way	"E_RW_Parcels", "P_RW_Construction_Easment"
SUR	Both	Survey	"E_SUR_Control_Points", "P_SUR_Staked_Clearing"
TER	Both	Terrain Models See ***NOTE*** below.	"E_TER_Existing_Ground_Surface", "P_TER_Design_Surface"
_UT_	Both	Utilities	"E_UT_Overhead_Power", "P_UT_Underground_Water"
VEG	Existing ONLY	Vegetation	"E_VEG_Tree"
_CC_	Proposed ONLY	Civil Cells	"P_CC_Geom_CCell"
COR	Proposed ONLY	Corridor and Linear Templates	"P_COR_Design_Template_Range_Graphics"
_EC_	Proposed ONLY	Erosion Control	"P_EC_Silt_Fence"
HAL	Proposed ONLY	Horizontal Alignment	"P_HAL_Centerline"
_LA_	Proposed ONLY	Landscape Architecture	"P_LA_Plantings"
MSH	Proposed ONLY	Meshes	"P_MSH_Top", "P_MSH_Bottom"
STR	Proposed ONLY	Structures	"P_STR_Benches"
_TC_	Proposed ONLY	Traffic Control	"P_TC_Markings_Temporary"
VAL	Proposed ONLY	Vertical Alignment (Profiles)	"P_VAL_VPI"
WAL	Proposed ONLY	Walls	"P_WAL_Backfill"

NOTE: Both the **GEO** and **TER** contain Levels relating to Terrain Models. Terrain Models contain a single Master Level and many Sub-Levels. See *11B.5 Level Management for Terrain Models*. For example, the "E_TER_Existing_Ground_Surface" is the Master Level for an Existing Ground Terrain Model. If this Level is turned OFF, then the entire display of the Existing Ground Terrain Model is turned OFF. The

"E_GEO_Index_Contours" is a Sub-Level that controls the display of the Major Contours. If this Level is turned OFF, then ONLY the major contours are turned OFF.

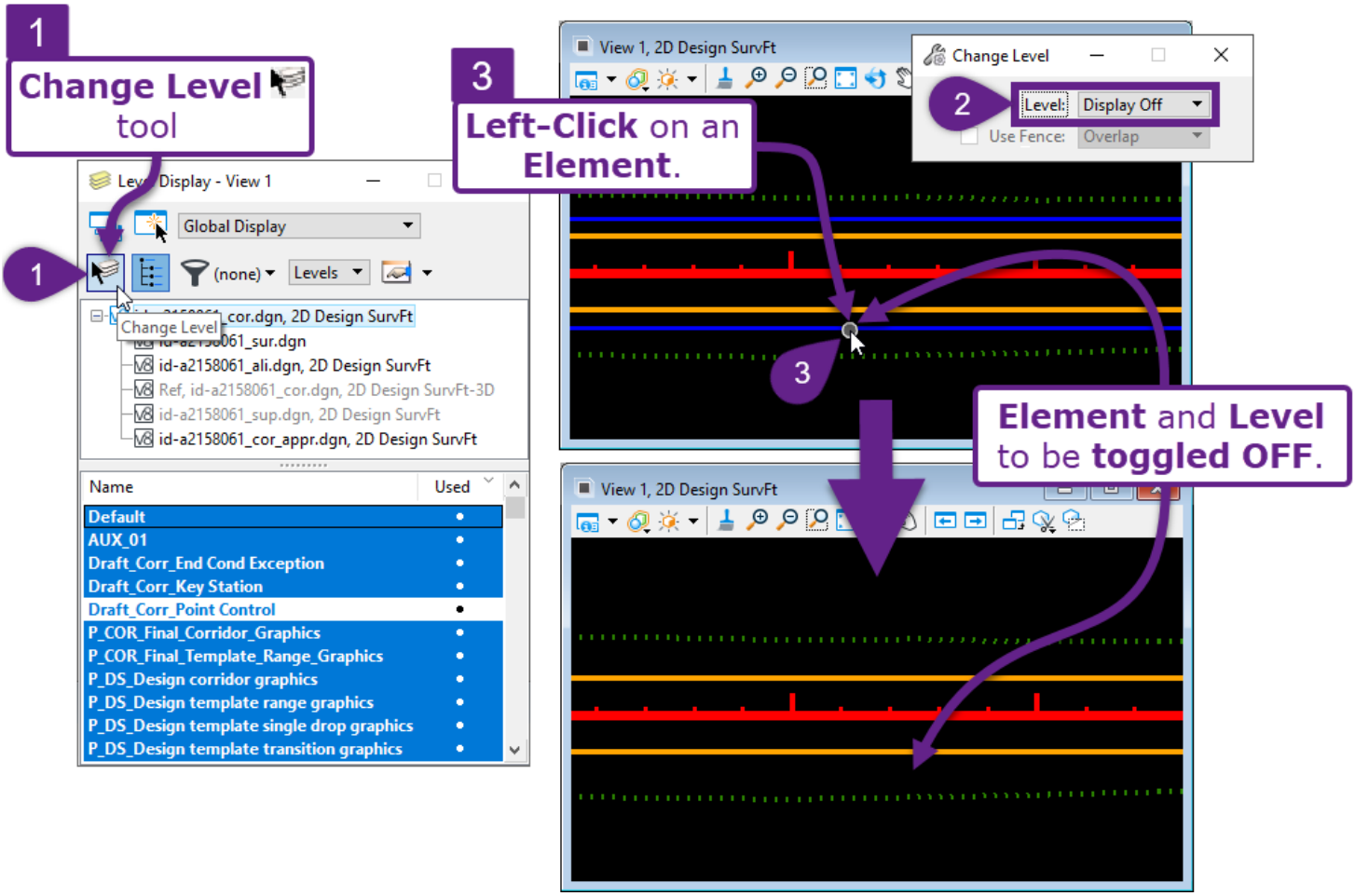
TIP: To quickly locate a Level, the Level Display box can be sorted by prefixes in the Level name. Expand the **List Filter** drop-down to select a set of Levels organized by the prefix.



1G.2 Toggle OFF a Level by Clicking on the Element (Change Level tool)

Using the *Change Level* tool, a Level can be toggled OFF by clicking on an element. This method is typically quicker than locating a specific Level in the list.

1	From the **Level Display** box, select the *Change Level* tool: [***OpenRoads Modeling*** → ***Drawing Production*** → ***Named Boundaries***].
2	In the *Dialogue Box*, ensure **Level** is set to **Display Off**.
3	Left-Click on an element to toggle OFF the Level that it is assigned to.



1G.3 Set the Active Level

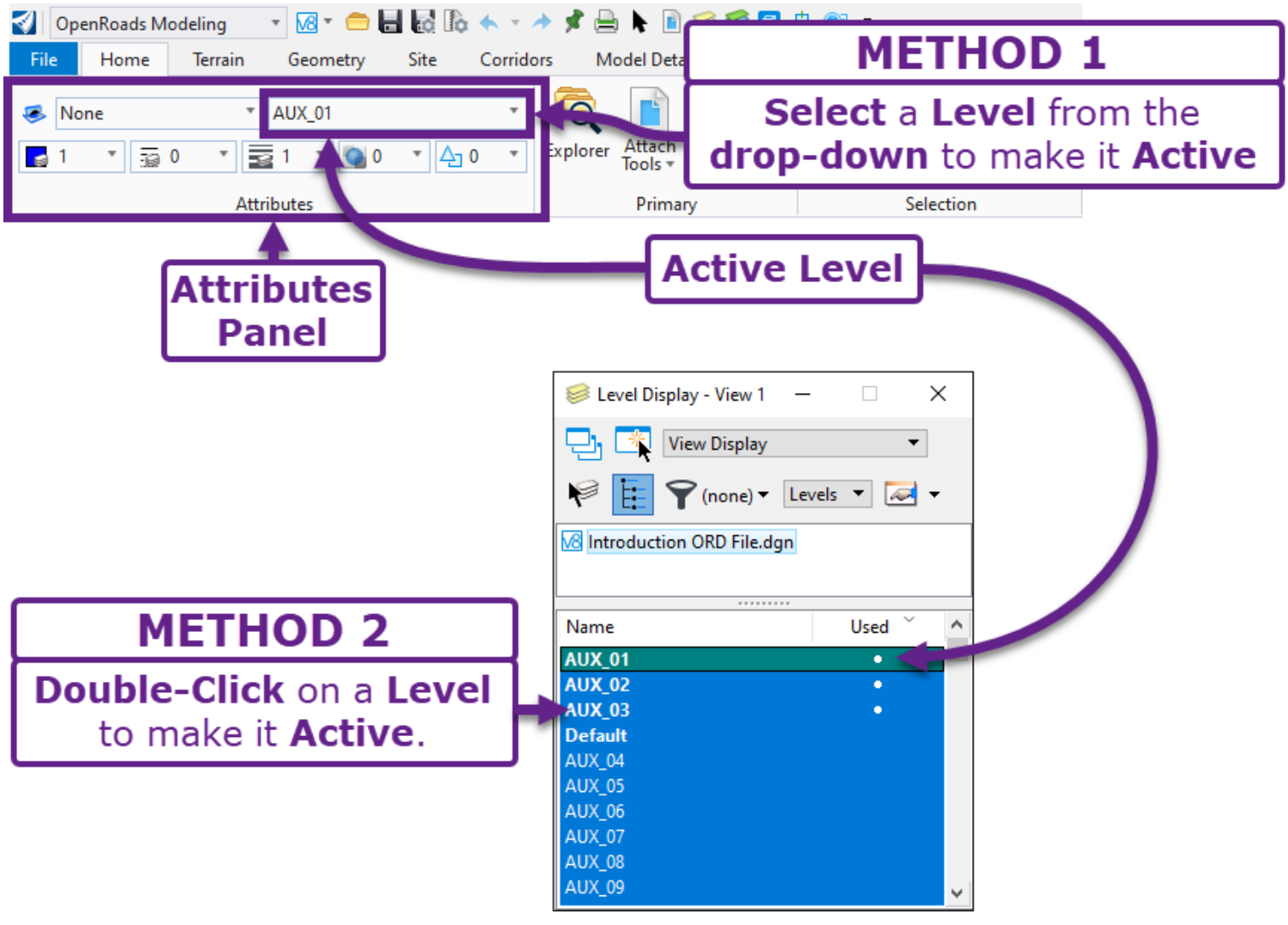
Before drawing an element, determine the appropriate Level and make it *Active*.

There are many different methods for setting the *Active Level*. Shown below, Methods 1 and 2 involve selecting the desired Level from the FLH Level Library list. Methods 3 and 4 use specific tools to match the Active Level to a selected element.

Method 1: Change the Active Level from the Attributes Group

The Active Level is displayed and can be changed from the Attributes Group. The Attributes Group is found in three different Ribbon locations:

OpenRoads Modeling workflow → **Home** tab → **Attributes** group
OR
OpenRoads Modeling workflow → **Drawing** tab → **Attributes** group
OR
Drawing workflow → **Home** tab → **Attributes** group

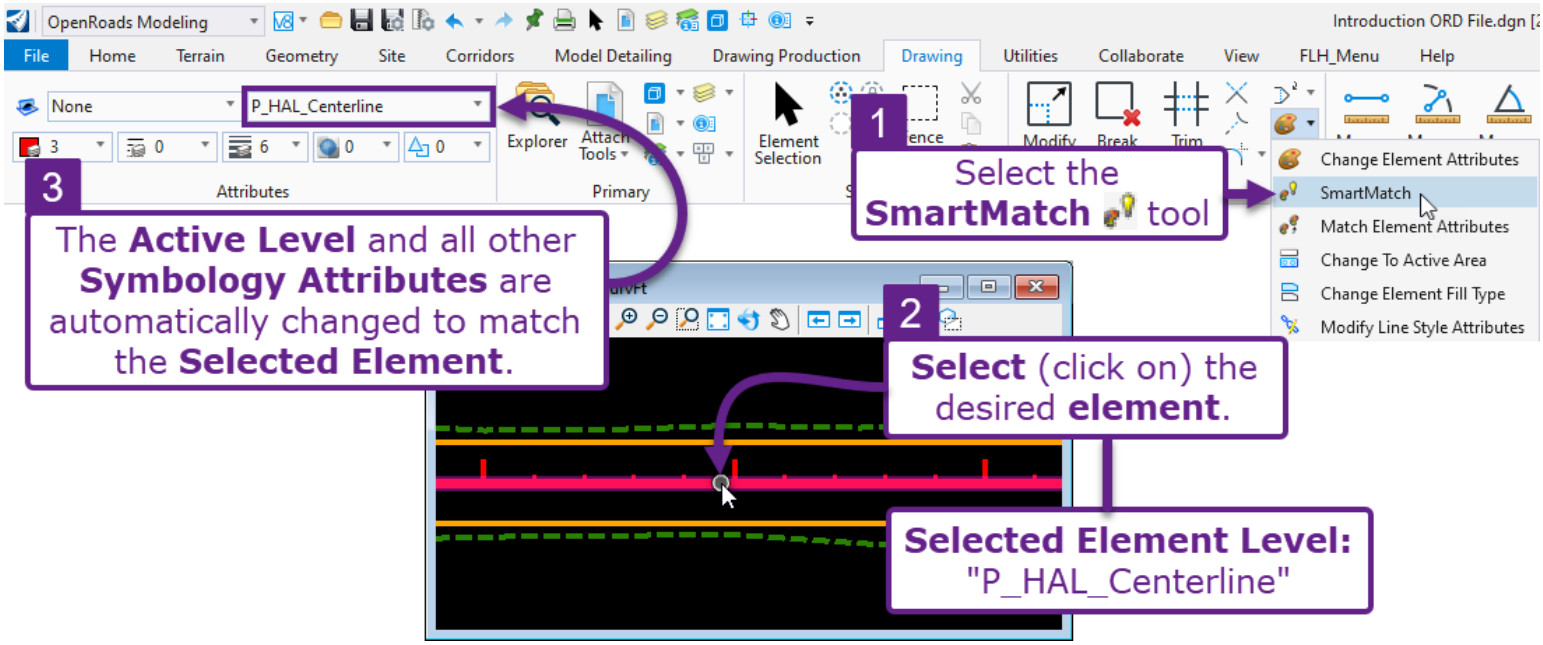


Method 2: Double-Click on a Level in the Level Display

In the Level Display, the currently *Active Level* is shown in green. Double-Click on a different Level to make it Active.

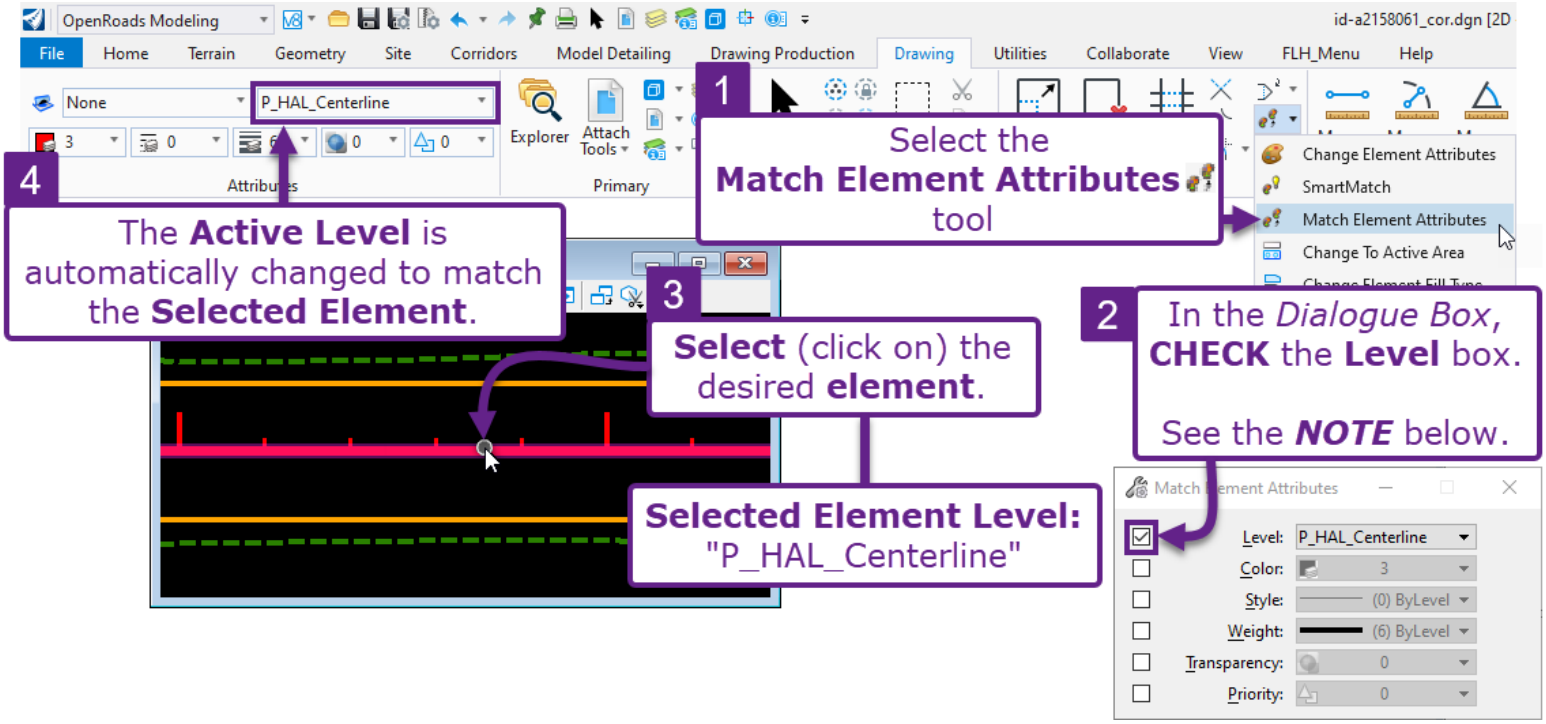
Method 3: Use the SmartMatch tool

The *SmartMatch* tool functions by selecting an element. Then, the *Active Level* and all other symbology *Attributes* are automatically set in the *Attributes Group* to match the selected element.



Method 4: Use the Match Element Attributes tool

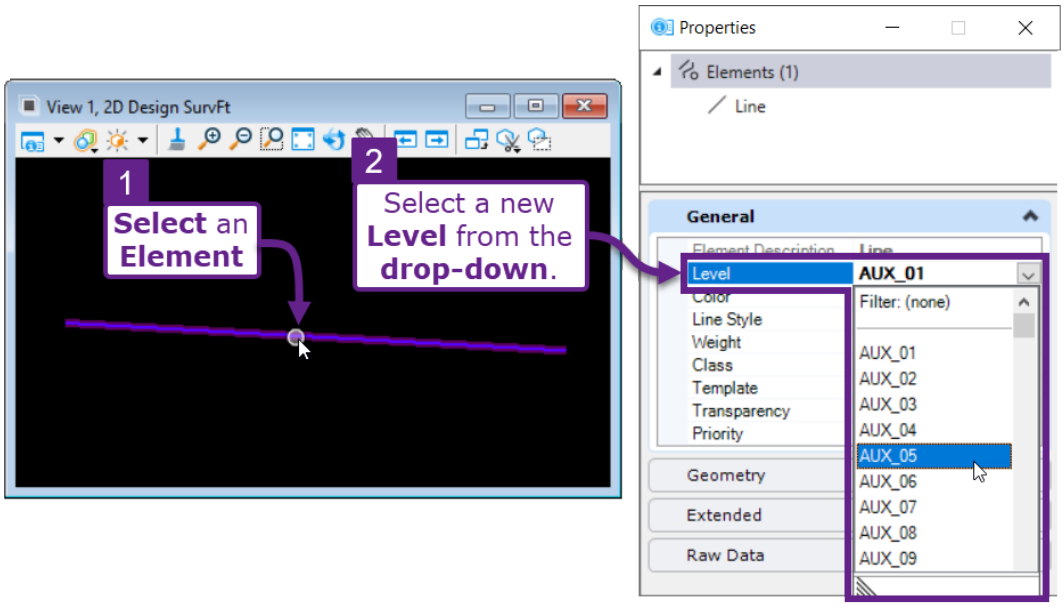
The *Match Element Attributes* tool works very similar to the *SmartMatch* tool shown above. However, the *Match Element Attributes* tool has additional configuration options that determine which symbology *Attributes* are changed.



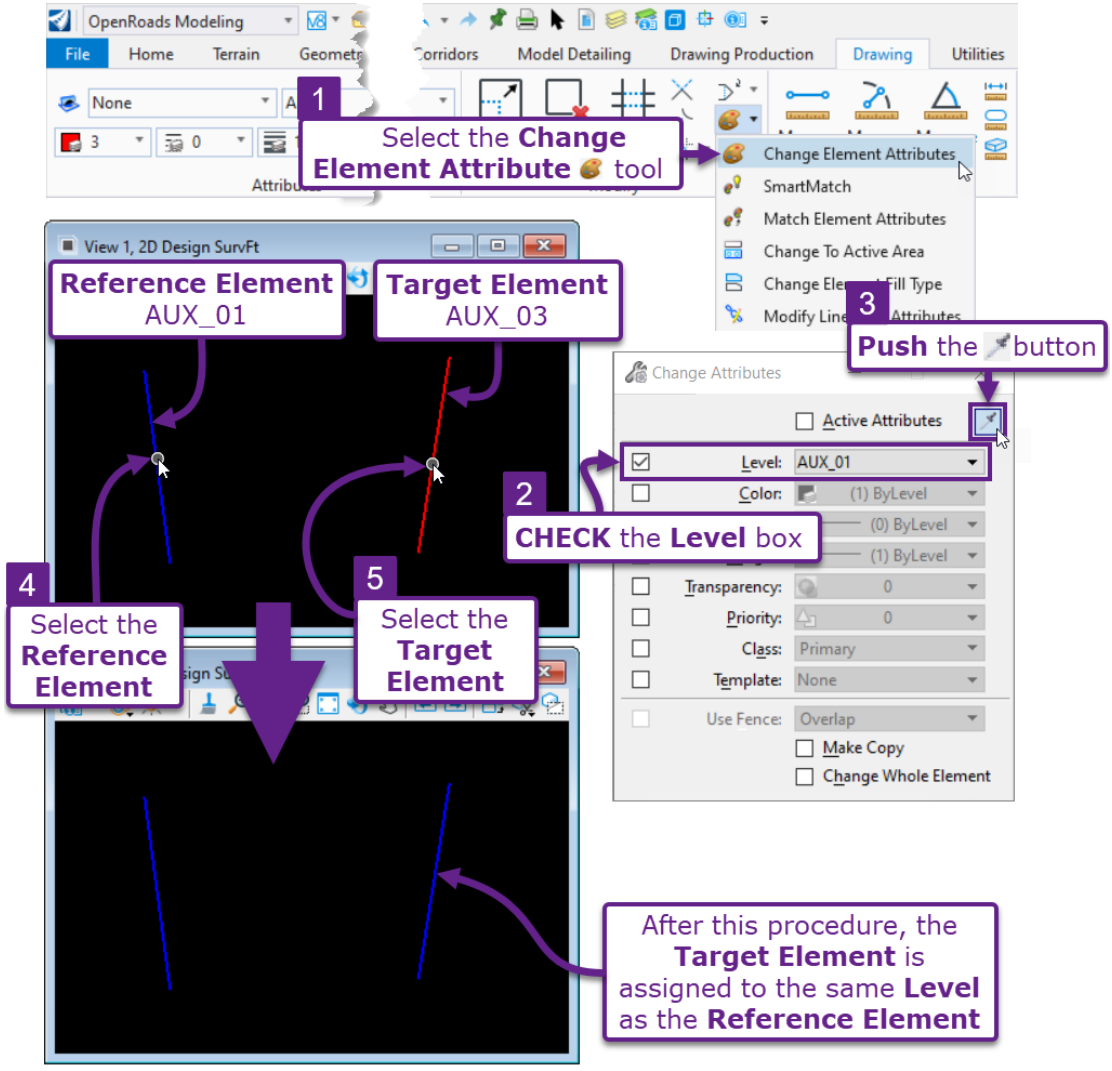
NOTE: For the *Match Element Attributes* tool to have any effect, at least ONE box has to be CHECKED in the *Dialogue Box*. Typically, it is ONLY necessary to check the **Level** box. For future elements to be drawn, the "By Level" (default) symbology attributes will be used.

1G.4 Change the Level of an Element

The Level of an Element can be changed in the Properties box:



The *Change Element Attributes* tool is used to change the Level of a **Target Element** to match the Level of a **Reference Element** .

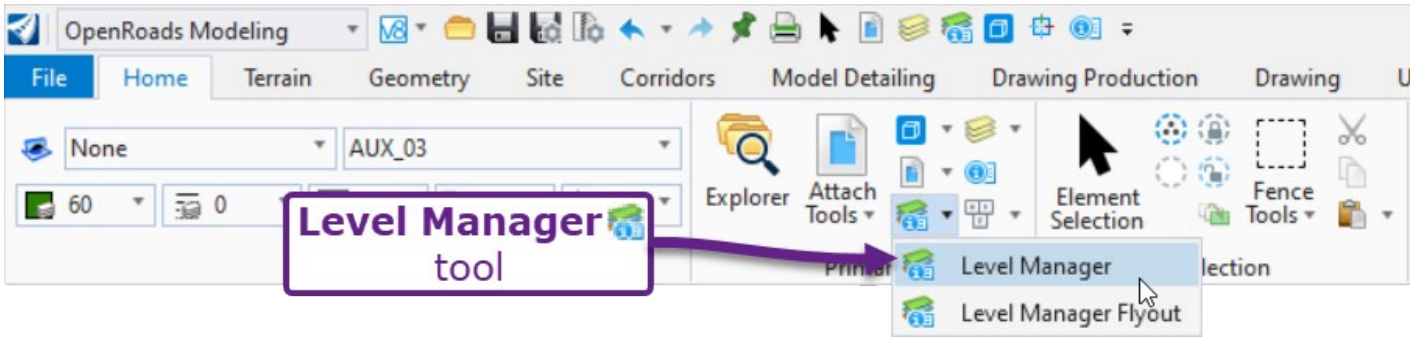


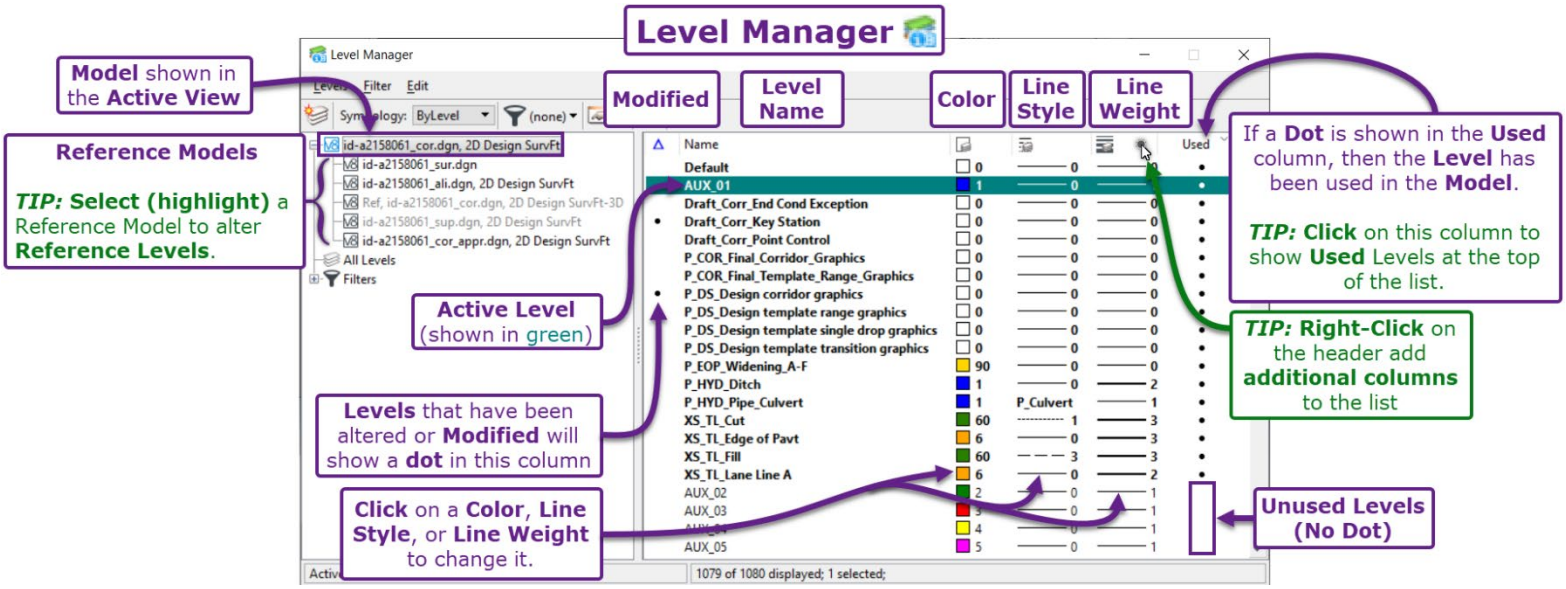
1G.5 Level Manager

The **Level Manager** is used to create new Levels and alter the symbology attributes of a Level.

The Level Manager tool is found in many locations in the Ribbon. Two common Ribbon locations are:

OpenRoads Modeling workflow → **Home** tab → **Primary** group
OR
Drawing workflow → **Home** tab → **Primary** group





IMPORTANT: The Levels shown are ONLY applicable to the Model shown in the Active View. If the Active View is changed (i.e., clicking in a different *View* window), then the Levels shown in the Level Manager will change. For more information on the Active View, see *1C.1 – Active View*.

TIP: The symbology of **referenced** Levels can be altered. For example, the color of an AUX Level can be shown differently for each Model that it is referenced into. On the left-side of the Level Manager, select a Reference Model to access the Reference Levels.

NOTE: The symbology for Nested Reference Levels CANNOT be changed. Only directly Referenced Models are eligible for reference Level manipulation. To show the desired color in the *Sheet Model*, manipulate the color of a reference Level from the *2D Design Model*. It is NOT possible to manipulate reference Levels from the *Sheet Model*.

1G.5.a Create a Custom Level

Creating a new, custom Level is accomplished through the Level Manager .

WARNING: Before creating a new Level, search for an appropriate Level from the FLH Level Library list. To ensure FLH drafting conventions are maintained, avoid creating new Levels when possible.

TIP: The Name given to a custom Level will determine the printing color in the PDF and on paper. If the Name begins with a "P_..." prefix, then the Level will print in solid black. The "P_..." prefix is appropriate for proposed Levels. If the Name begins with an "E_..." prefix, then the Level will print in grey (Existing Level).

TIP: If the Level Name does NOT begin in "P_..." or "E_..." prefix, then the Level will print in the same color set in the Level Manager . For example, a custom Level that is green will print in green – assuming the Name does NOT start with "P_..." or "E_..." prefix.

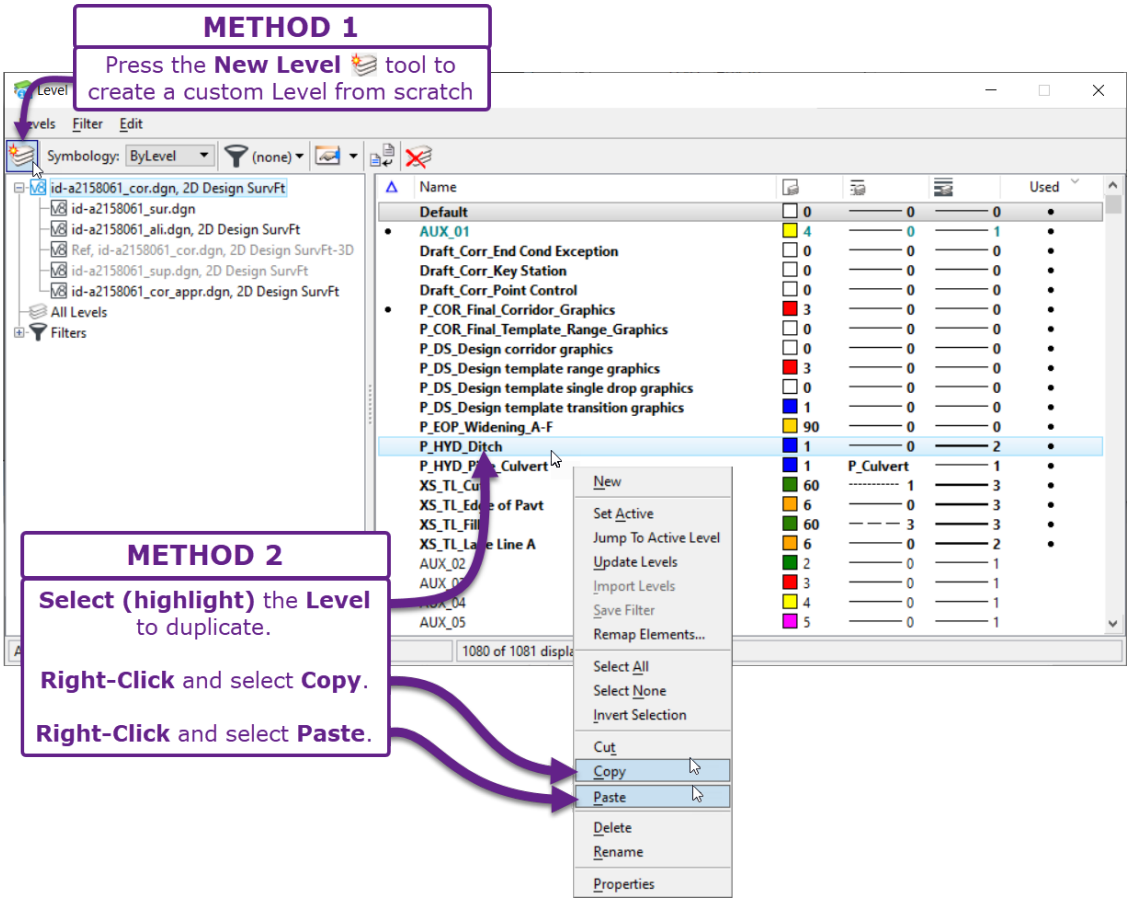
For more information on how Levels are printed, see *19D – The FLH Pen Table, Custom Levels, and AUX Levels*.

There are two methods for creating a custom Level:

Method 1: Use the *New Level* tool to create a Level from scratch. Then, set the Color, Line Style, and Line Weight as desired.

Method 2: Find a standard FLH Level and copy/paste it. This method duplicates a Level. The symbology attributes for the new Level will be the same as the original Level. The new name of the new Level will have "…- Copy-1" tagged to the end of the name of the original Level.

NOTE: After a new Level is created, it may be found further down in the list.

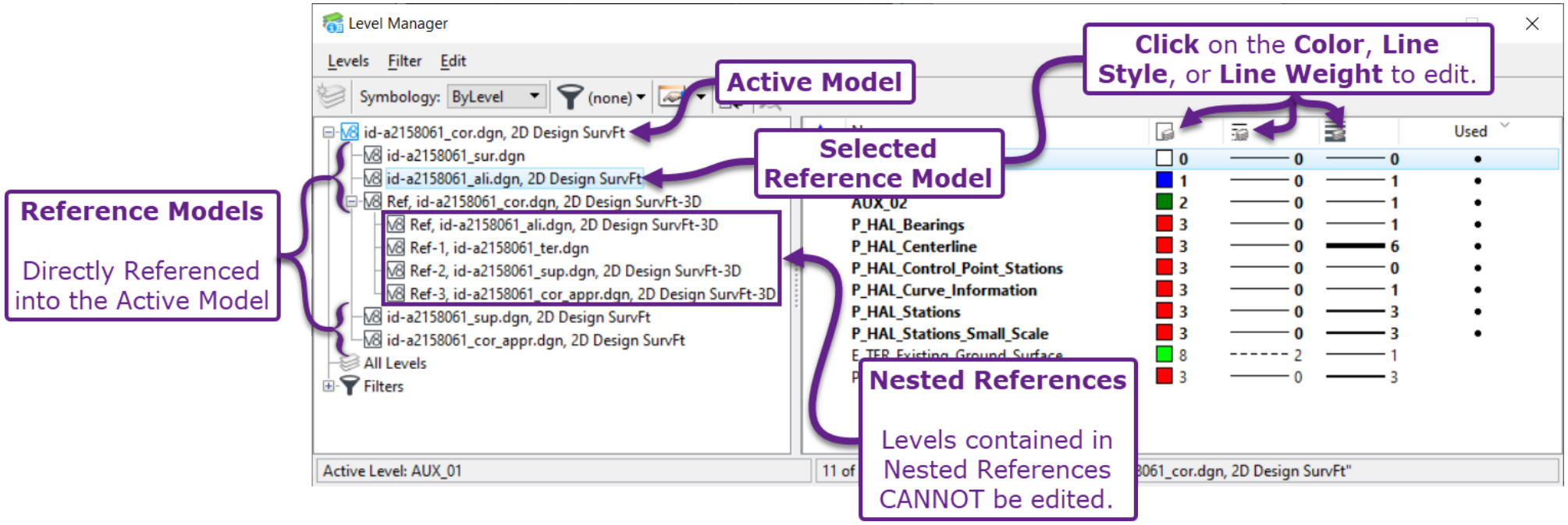


1G.5.b Manipulate Symbology Attributes for Referenced Levels

Referenced Models are shown on the left-side of the Level Manager, underneath the currently opened (active) Model

If the Reference Model is shown in the first tier under the *Active* model, then the Reference Levels can be edited. The first tier consists of Reference Model that are directly referenced into the *Active* model.

If the Reference Model is shown in the second or third tier, then the Reference Levels CANNOT be edited. Reference Models in the second and third tier are **Nested References**.

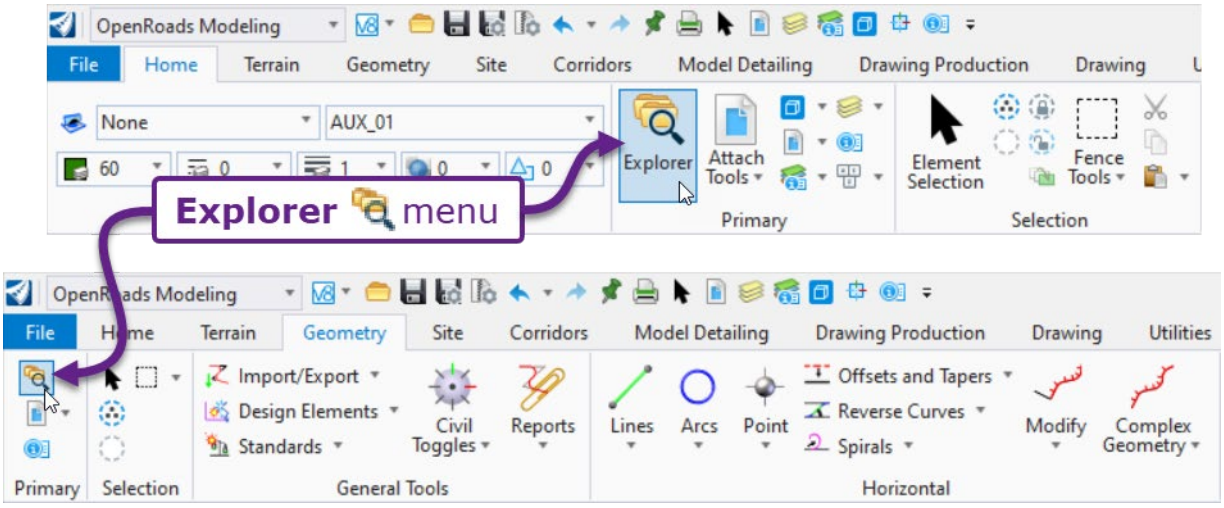


TIP: Edit **Reference Levels** from the *2D Design Model* or from the *3D Design Model*. It is NOT possible to edit Reference Levels from a *Sheet Model*

1H – EXPLORER

The Explorer tool is located in most Tabs found in the Ribbon. Typically, the Explorer tool is found on the far left-side of the Ribbon. However, two other common locations are:

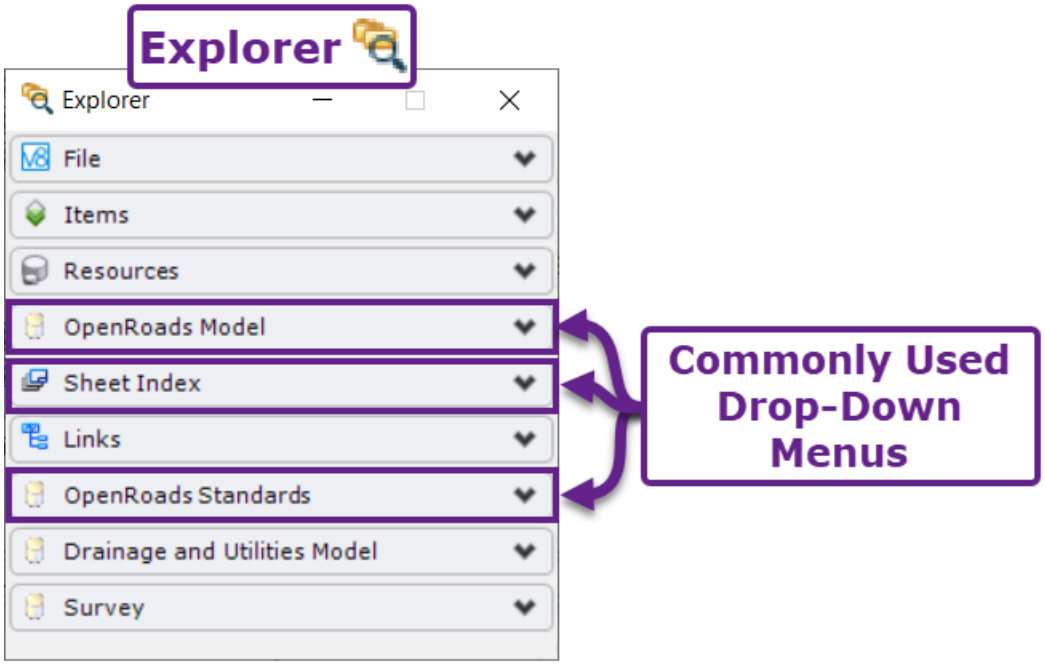
OpenRoads Modeling workflow → **Home** tab → **Primary** group
OR
Drawing workflow → **Home** tab → **Primary** group



The **Explorer** has 9 drop-down menus for various usages. For design and drafting purposes, the most commonly used menus are **OpenRoads Model**, **Sheet Index**, and **OpenRoads Standards**.

> ***TIP:*** The **Survey** drop-down menu is used in processing survey data. The **Drainage and Utilities Model** drop-down menu is used in conjunction with the **Drainage and Utilities** workflow.

Typically, other drop-downs menus are NOT used.

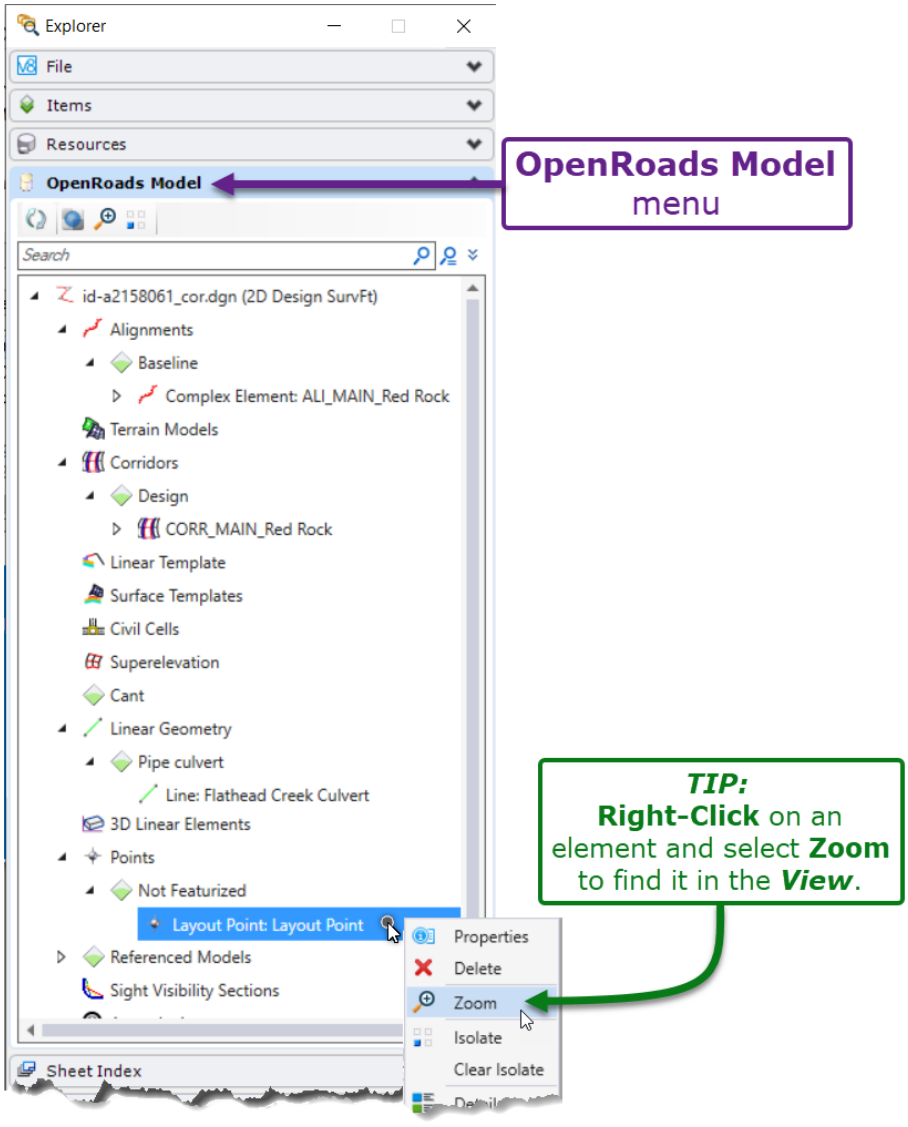


1H.1 OpenRoads Model Menu

The **OpenRoads Model** menu lists and organizes all ORD Elements found in the current ORD File. ***NOTE:*** Only elements with *Feature Definitions* and *Feature Names* are found in this menu.

ORD Elements can be selected and manipulated directly from the **OpenRoads Model** menu.

> ***TIP:*** Some ORD Element types, such as Points and Terrain Models, can be difficult to graphically locate in the *View*. Use the **OpenRoads Model** menu to quickly select difficult to find elements.
>
> ***TIP:*** To locate a "lost" ORD Element, right-click on the element in the **OpenRoads Model** and select *Zoom*. The *View* will be repositioned around the selected ORD Element.
>
> ***TIP:*** Horizontal Geometry created with a "Baseline" Feature Definition is found under the **Alignment** drop-down. Horizontal Geometry created on other Feature Definitions are found under the **Linear Geometry** drop-down.
>
> ***BEST PRACTICE:*** When creating Alignments, Terrain Models, Corridors, Linear Templates, Surface Templates, Linear Geometry, and Points, always give the element an appropriate Feature Definition and Name. If a Name is NOT manually assigned, then a default name is given to the element. It is very difficult to distinguish between elements when the default Name is used.



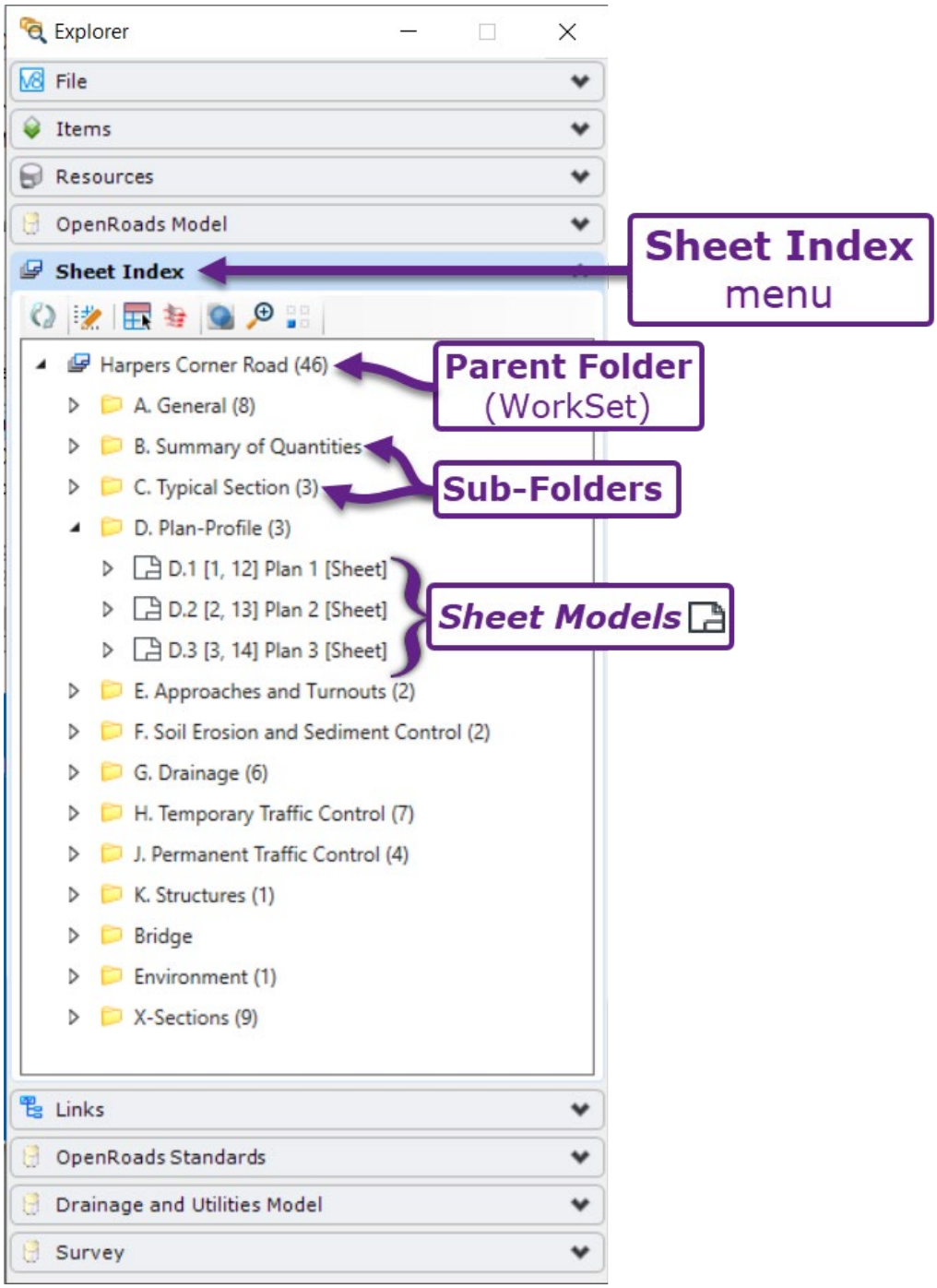
1H.2 Sheet Index

The **Sheet Index** menu is used to organize and print plan sheets within the project. Every project contains a unique WorkSet. Every WorkSet will contain a Sheet Index.

NOTE: The Sheet Index sub-folder structure is pre-created when the WorkSet is created.

The Sheet Index contains sub-folders that represent each section of the plan set. Each plan sheet is represented by a *Sheet Model*. Add *Sheet Models* to the Sub-Folder as appropriate.

Operation and customization of the Sheet Index is discussed in *Chapter 18 – Sheet Index*.



1H.3 OpenRoads Standards

The **OpenRoads Standards** menu is primarily used to customize Feature Definitions and Annotations Groups – which are referred to as Standards.

> ***NOTE:*** Annotation Groups control the automated annotating of Alignments, Profiles, and Cross Sections.

> ***TIP:*** Creating and customizing Feature Definitions is discussed in *Chapter 17 - Feature Definitions*.

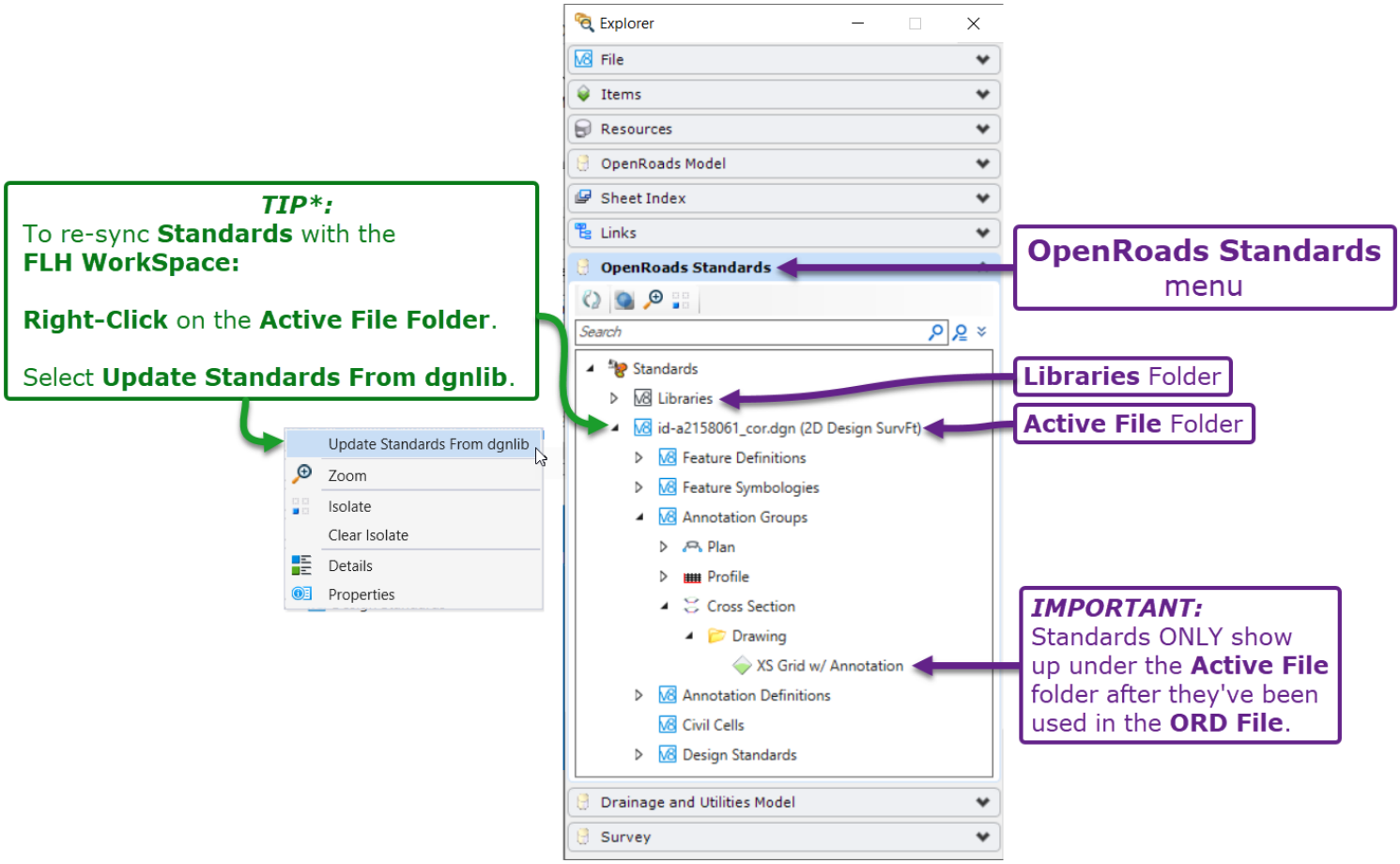
> ***WARNING:*** Standards are pre-configured by the FLH WorkSpace and should generally NOT be edited. However, there are a few situations in which editing Standards is acceptable. See the next page for workflows that involve editing FLH Standards.

> ***TIP*:*** If a new version of the FLH WorkSpace is released in the midst of a project, then it is necessary to re-sync OpenRoads Standards to the current ORD File. This is accomplished by right-clicking on the **Active File** folder and selecting the *Update Standards From dgnlib* tool. See the ***TIP*:*** in the graphic below. This procedure must be done for every ORD File used in the project.

The OpenRoads Standards menu is divided into two main folders: the **Libraries** folder and the **Active File** folder.

> **Libraries:** This folder displays ALL standards found in the FLH WorkSpace. However, the standards found in this folder is LOCKED and cannot be edited.

> **Active File:** This folder has the same name as the currently-opened (active) ORD File. This folder displays ALL standards that have been used in the ORD File. For example, after the "XS Grid w/ Annotation" standard is used to annotate a cross-section, it will be shown in the Active File folder. ONLY Standards found in the Active Folder can be edited.



Workflows that Involve Editing Standards:

There are three workflows that may require the editing of Standards:

1. **Configuring the Cross Section Annotation Group:** It is very likely the Cross Section Annotation Group will require editing to accommodate the Corridor Templates used on the project. For more information see: *16D - Cross Section Annotation Basics* and *16E – Configuring Cross Section Annotations*.
2. **Configuring Modeling (Mesh) Elements for Quantity Calculations:** Each Template Component (Mesh) is assigned to a Feature Definition. The Volume Option is a Mesh Feature Definition setting, and it controls how a Template Component is treated in quantities calculations. For example, change the Volume Option to None to exclude a Template Component (Mesh) Feature Definition from Quantity Calculations. See *20G – Advanced Information: Component Feature Definition and Volume Options*.
3. **Configuring Modeling (Mesh) Elements for Proposed Terrain Model Creation:** The Volume Option setting also controls if a Template Component is included in the Final Ground or Sub-Grade Terrain Model. See *22A.1 Create Terrain Model From Design Meshes tool*.