OpenRoads Designer User Manual

U.S. Department of Transportation
Federal Highway Administration

Chapter 23

PHYSICAL DATA AND GOVERNMENT PROVIDED INFORMATION

Chapter 23   Physical Data and Government Provided Information

This chapter covers the creation of ORD Reports, Files, and staking notes for the PE Hold File and FP-14 Section 152 deliverables.

TIP: For creating proposed surfaces, see Chapter 22 - Proposed Terrain Model Creation.
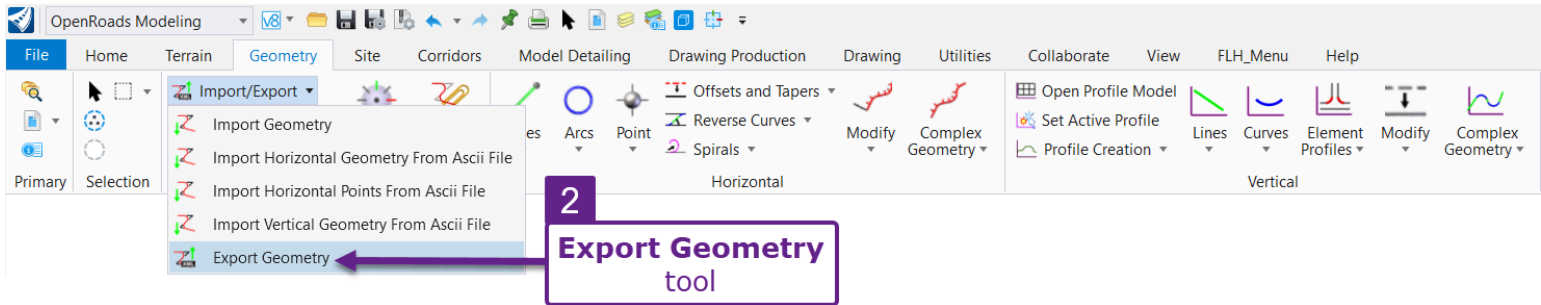

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23A – HORIZONTAL ALIGNMENT AND PROFILES IN LANDXML AND PDF

23A.1 Export an Alignment and Profile to LandXML format

Creating a LandXML (.xml) file for an **Alignment** and **Profile** is accomplished with the *Export Geometry* tool. This tool can be found in the Ribbon in the following location:

OpenRoads Modeling workflow → **Geometry** tab → **General Tools** panel

NOTE: The resulting LandXML file contains coordinate geometry data for both the **Alignment** and the *Active* **Profile**. When using the *Export Geometry* tool, select the **Alignment** for export.

WARNING: Ensure the Alignment has an *Active* **Profile** before exporting.
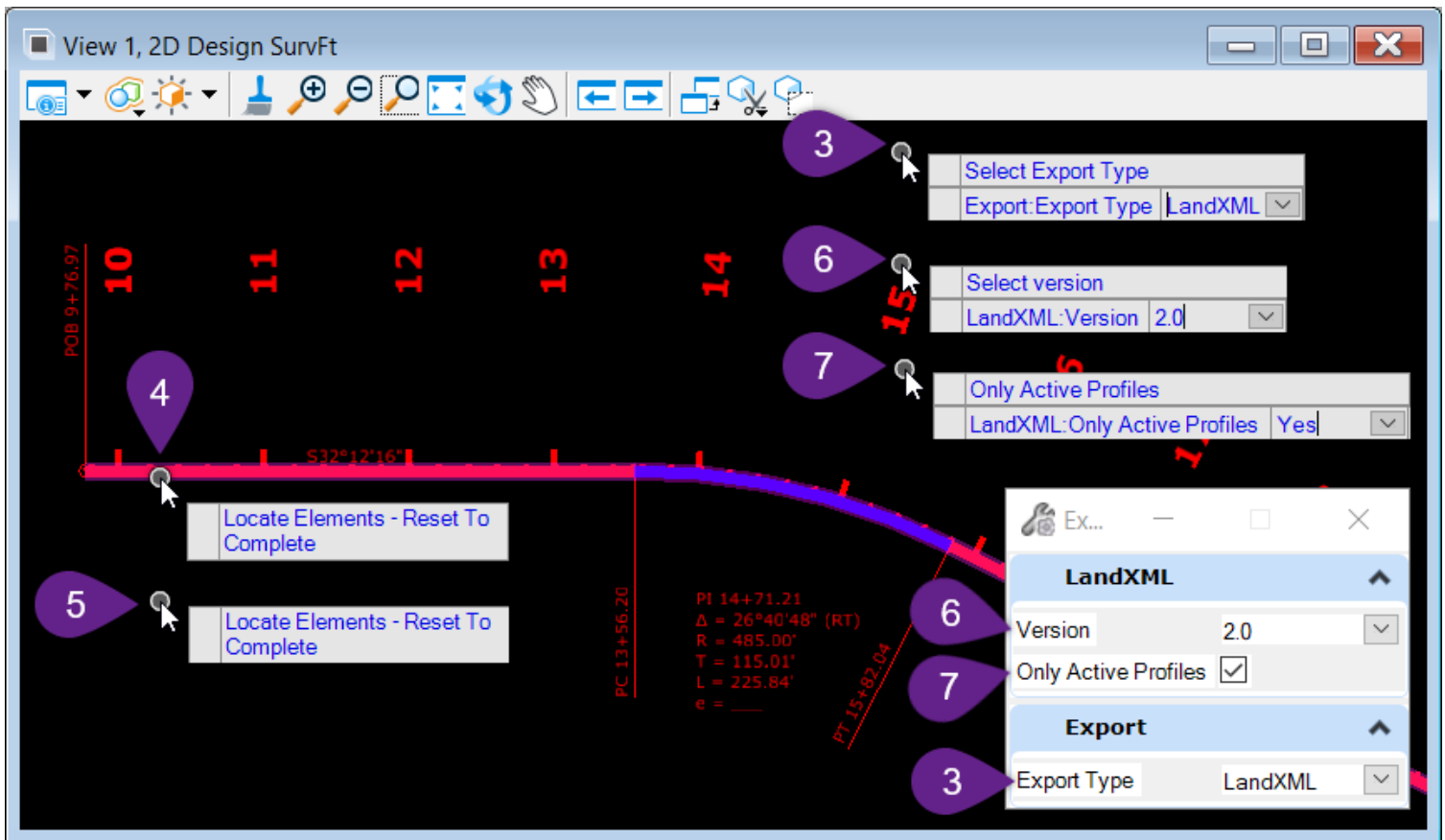
1	Open the ORD File that contains the desired **Alignment/Profile**. **WARNING:** Ensure the Coordinate System has been set for the current ORD File. See 3D.1 Set the Coordinate System.

|	
2	From the Ribbon, select the *Export Geometry* tool: [**OpenRoads Modeling** → **Geometry** → **General Tools** → **Import/Export**].
3	*Prompt: Select Export Type* – Select the **LandXML** option.
4	*Prompt: Locate Elements – Reset to Complete* – Left-Click on the desired **Alignment**.
5	*Prompt: Locate Elements – Reset to Complete* – Right-Click (reset) to advance to the next *Prompt*.
6	*Prompt: Select Version* – Select **Version 2.0**.
7	*Prompt: Only Active Profiles* – Select **Yes**. If **No** is selected, then all Profiles found in the *Profile Model* ⊞ are included in the LandXML export. For example, if NO is selected, then the coordinate geometry data for the Existing Ground profile is included – which is typically NOT necessary.
8	Save the LandXML File in the appropriate file location. **TIP:** Name the Land XML File in accordance with FLH Naming Conventions. See *3F – Naming Convention for Proposed ORD Features*.

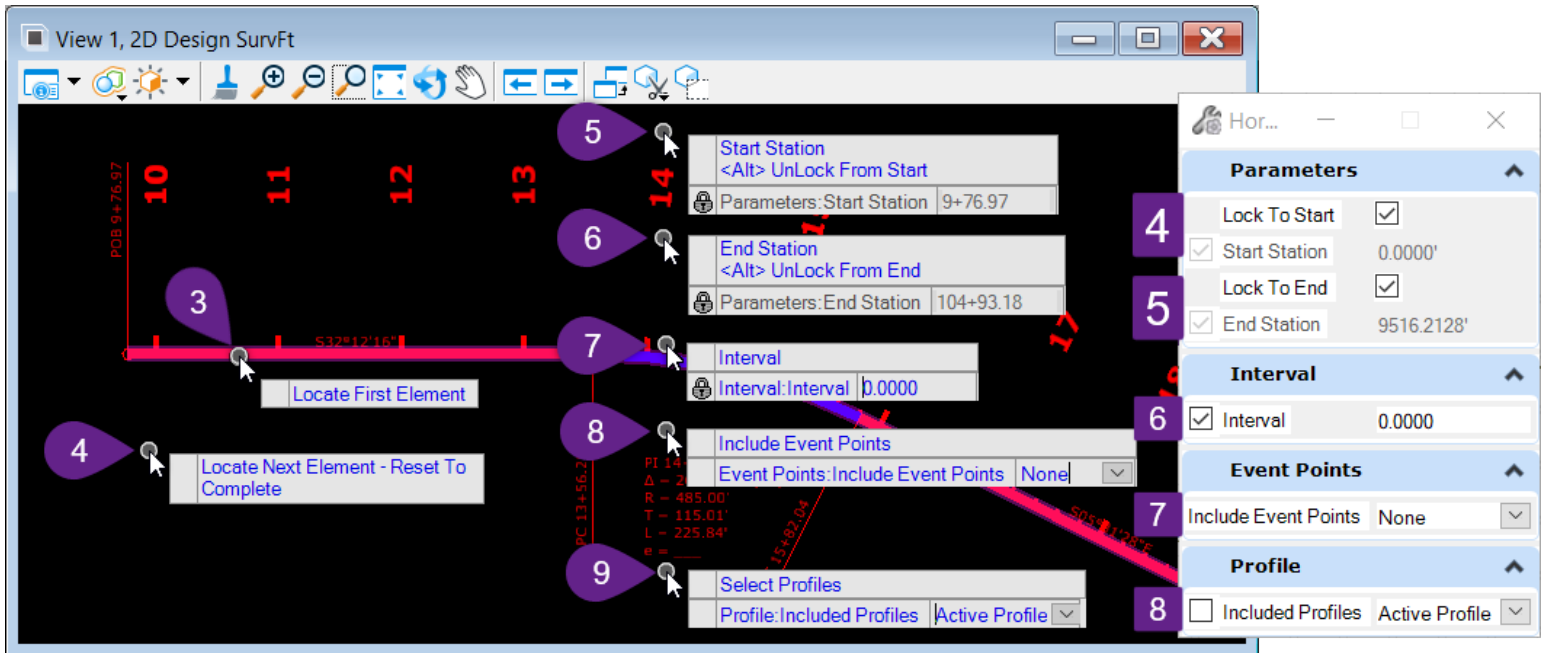## 23A.2　Create PDF Reports for Alignments and Profiles

Creating a PDF Report for an Alignment and corresponding *Active* Profile is accomplished with the *Horizontal Geometry Report* tool.　**NOTE:**　If the **Active Profile** setting is used in Step 8, then a Vertical Profile Report is available by selecting a vertical report style.　See Step 11 to access the Vertical Profile Report.

The *Horizontal Geometry Report* tool can be found in the Ribbon in the following location:

OpenRoads Modeling workflow → **Home** tab → **Model Analysis and Reporting** panel → **Report**
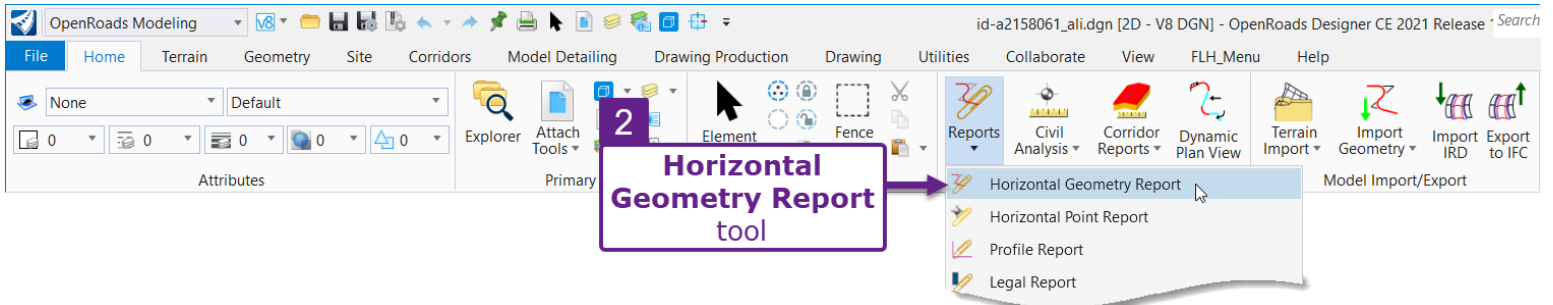
The procedure below demonstrates how to create a PDF Report for both an Alignment and corresponding *Active* Profile:

1	Open the ORD File that contains the desired **Alignment/Profile**. **WARNING:**　Ensure that the ORD File has a set Coordinate System.　See <mark>3D.1 Set the Coordinate System</mark>.
2	From the Ribbon, select the *Horizontal Geometry Report* tool: [**OpenRoads Modeling** → **Home** → **Model Analysis and Reporting** → **Reports**].
3	*Prompt: Locate First Element* – Left-Click on the desired **Alignment**.

4	*Prompt: Locate Elements – Reset to Complete –* Right-Click (reset) to advance to the next *Prompt*.
5	*Prompt: Start Station <Alt> Lock to Start –* Press the **ALT** key to lock to the start station of the *Alignment*. Left-Click in the *View* to advance to the next *Prompt*.
6	*Prompt: End Station <Alt> Lock to End -* Press the **ALT** key to lock to the end station of the *Alignment*. Left-Click in the *View* to advance to the next *Prompt*.
7	*Prompt: Interval –* Key-in a value and Left-Click in the *View* to advance to the next *Prompt*. **NOTE:** For FLH Alignment Reports, the *Interval* is inconsequential. This option will NOT have any effect on the resulting report.
8	*Prompt: Event Point List –* Select the **None** option and Left-Click in the *View* to advance to the next *Prompt*. **NOTE:** *Event Point Lists* are typically NOT used for FLH projects.
9	*Prompt: Select Profiles –* Select the **Active Profile** option. Left-Click in the *View* to generate reports.

Horizontal Alignment Report

TIP:
See the next page to access the **Vertical Profile Report**.

10	Setup and Print (PDF) the Horizontal Alignment Report. See *23K – Formatting, Exporting, and Printing ORD Reports*. At the very minimum, remove the hyperlink (URL) from the bottom footer through the **Page Setup** menu. See *23K.1.a Remove the Hyperlink (URL) from Page Footer*. See the next page to access the Vertical Profile Report.

11	To access the **Vertical Profile Report**. Select the "VerticalAlignmentReview" from the report types listed on the left.
12	Setup and Print (PDF) the Vertical Profile Report.

Vertical Profile Report

Bentley Civil Report Browser - C:\Users\brendan\AppData\Local\Temp\RPTzoddw

File   Tools

Open
Save As
Append
Page Setup
Print
Print Preview
Exit

ength.xsl
eview.xsl
eviewASCII.xsl
eviewWithPI.xsl
ationEquations.xsl
TIW
ew.xsl
le.xsl
oleSimplified.xsl
Z.xsl
ointsNSlews.xsl
HorizontalRegressionPointsReview.xsl
SettingOutTable.xsl
SettingOutTableDeflection.xsl
Traverse.xsl
TraverseCurveASCII.xsl
TraverseCurveASCII2.xsl
TraverseCurveASCII3.xsl
TraverseEditASCII.xsl
TraversePoints.xsl
VerticalAlignmentCheckIntegrity.xsl
VerticalAlignmentIntervalStationElevationGrade.xs
VerticalAlignmentIntervalStationElevationGradeAS
VerticalAlignmentPointsXY.xsl
VerticalAlignmentReview.xsl
VerticalAlignmentReviewASCII.xsl
VerticalAlignmentReviewXY.xsl
VerticalAlignmentSightDistanceReview.xsl
VerticalAlignmentToTIW.xsl
VerticalRegressionLiftsNLowers.xsl
VerticalRegressionPointsReview.xsl

Vertical Profile Report styles

Vertical Alignment Review Report

Report Created: Friday, January 21, 2022
Time: 5:04:00 PM

Project: 2D Design SurvFt
Description:
File Name: C:\Users\brendan\Desktop\NEW ORD CAD Files\Riverside\id-a2158061_ali.dgn
Last Revised: 1/21/2022 13:39:38

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

Horizontal Alignment: ALI_MAIN_Riverside
Horizontal Description:
Horizontal Style: Alignment\Baseline

Vertical Alignment: PRO_Main_Riverside
Vertical Description:
Vertical Style: Alignment\Baseline

	Station	Elevation
	976.970	1790.200
	981.970	1790.276
Tangent Grade:	0.015	
Tangent Length:	5.000	

Element: Symmetrical Parabola

VPC	981.970	1790.276

23-6

23B – CROSS SECTIONS SHEETS IN PDF

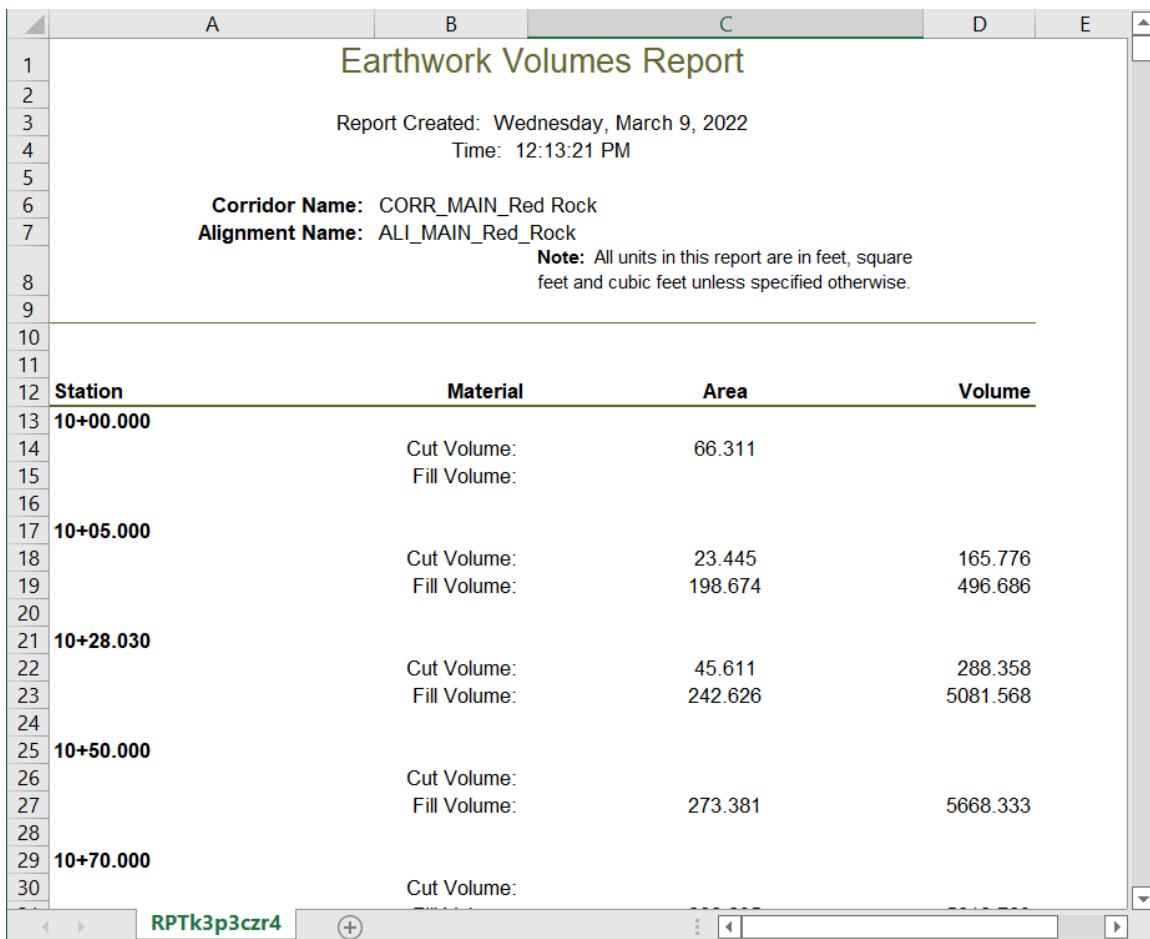The creation and setup of the Cross Section ORD File is discussed in Chapter 16 – Cross Sections.

Printing Cross Sections to PDFs is discussed in 16I – Print Cross Sections.

23C – EARTHWORK VOLUME REPORT

The Earthwork Volume Report lists Cut/Fill areas and volumes at stationing intervals.

The Earthwork Volume report is created with the *Component Quantities* tool in conjunction with the mainline Corridor. Operation of this tool is shown in 20C.1 Component Quantities tool for Corridors.

WARNING: Before creating a report with the *Components Quantity* tool, set the Corridor Feature Definition to **Final**. Setting the Feature Definition to Final reduces the distance between Corridor Template Drops, which makes the Corridor model denser and fine-tunes earthwork calculations. To change the Corridor Feature Definition, see 9D.2 Corridor Feature Definitions: Design and Final.

Earthwork Volumes Report

Report Created: Wednesday, March 9, 2022
Time: 12:13:21 PM

Corridor Name: CORR_MAIN_Red Rock
Alignment Name: ALI_MAIN_Red_Rock

Note: All units in this report are in feet, square feet and cubic feet unless specified otherwise.

Station	Material	Area	Volume
10+00.000			
	Cut Volume:	66.311	
	Fill Volume:		
10+05.000			
	Cut Volume:	23.445	165.776
	Fill Volume:	198.674	496.686
10+28.030			
	Cut Volume:	45.611	288.358
	Fill Volume:	242.626	5081.568
10+50.000			
	Cut Volume:		
	Fill Volume:	273.381	5668.333
10+70.000			
	Cut Volume:		

RPTk3p3czr4

Important Information Regarding the Earthwork Volume Report and Component Quantities tool:

- In addition to Cut and Fill volumes, the *Component Quantities* tool generates quantities for all materials used in the Corridor (i.e., asphalt and aggregate base). The *Component Quantities* report must be exported to Microsoft Excel to remove extraneous material quantities and format the report. To export a report to Excel, see 23K.2 Export a Report to Microsoft Excel (.xlsx).

- The *Component Quantities* tool calculates and lists cut/fill area and volume quantities at EVERY Corridor Template Drop station interval. This means cut/fill quantities will be shown at irregular station intervals (i.e., 10+00, 10+05, 10+28) With the *Component Quantities* tool, it is NOT possible to create a report that lists cut/fill quantities at regular station intervals (i.e., 10+00, 10+50, 11+00).
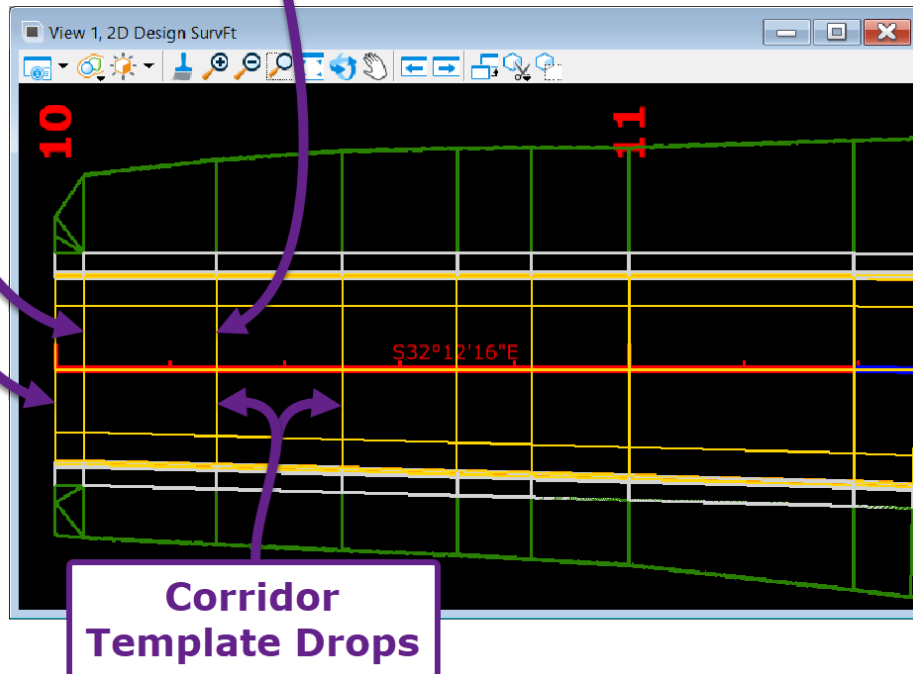

- ***WARNING:*** Do NOT calculate earthwork quantities with the *Component Quantities* tool and/or *Quantity Report By Named Boundary* tool (**Prismatic** calculation methods) and then create a separate Earthwork Volumes Report with the *End Area Volumes Report* tool (**Average End Area** method). The values calculated with the **Prismatic** method and **Average End Area** method will NOT match. For more information on **Prismatic** and **Average End Area** calculations, see 20A.2 *Calculation Methods: Prismatic vs Average End Area Method*.

- Earthwork Volume Reports created with the *Components Quantities* tool do NOT account for the removal of topsoil and/or unsuitable materials.

- The *Components Quantities* tool is ONLY compatible with a single Corridor or Linear Template model. It is NOT possible to select multiple Corridors and/or Linear Templates with the *Component Quantities* tool. Earthwork quantities associated with approach roads and driveway models will NOT be included when the *Component Quantities* tool is used in conjunction with the mainline Corridor model.

- The *Component Quantities* tool is NOT compatible with Surface Templates. It is NOT possible to create an Earthwork Volume Report for parking lots or other site design features that use Surface Templates.

23D – SUPERELEVATION REPORT

Creating a Superelevation Report is accomplished with the *Superelevation Report* tool. This tool can be found in the Ribbon in the following location:

OpenRoads Modeling workflow → **Corridor** tab → **Superelevation** panel
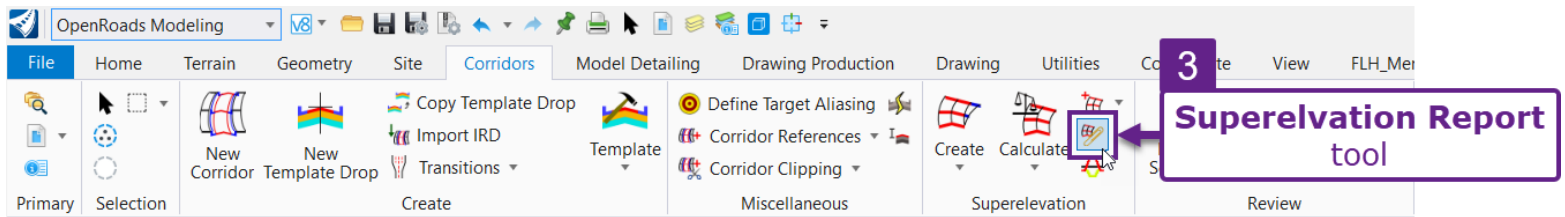

NOTE: To create and decipher the resulting report, familiarity with *Superelevation Sections* and *Superelevation Lanes* is required. See ==10A.2 Superelevation Elements in the 2D Design Model==.

IMPORTANT: The resulting report may need modification to be understood by the construction contractor and field personnel. The report is separated by *Superelevation Sections* and then further sub-divided by *Superelevation Lanes*. *Superelevation Lanes* are automatically named according to the corresponding Road Template Component. It is **BEST PRACTICE** to export the Superelevation Report to the Microsoft Excel and then re-name the *Superelevation Lanes* to logically correspond with the Typical Road Section configuration. See the next page for suggested edits to the report

The *Superelevation Report* tool works by individually selecting **Superelevation Sections** for inclusion in the report.

TIP: For longer projects with numerous Section elements, **select the Superelevation Sections before using the *Superelevation Report* tool**. Isolate the "P_COR_Superelevation" Level for quick selection.

Select all Superelevation elements

TIP: Isolate the **"P_Cor_Superelvation"** Level to easily select **Superelevation Section** elements.
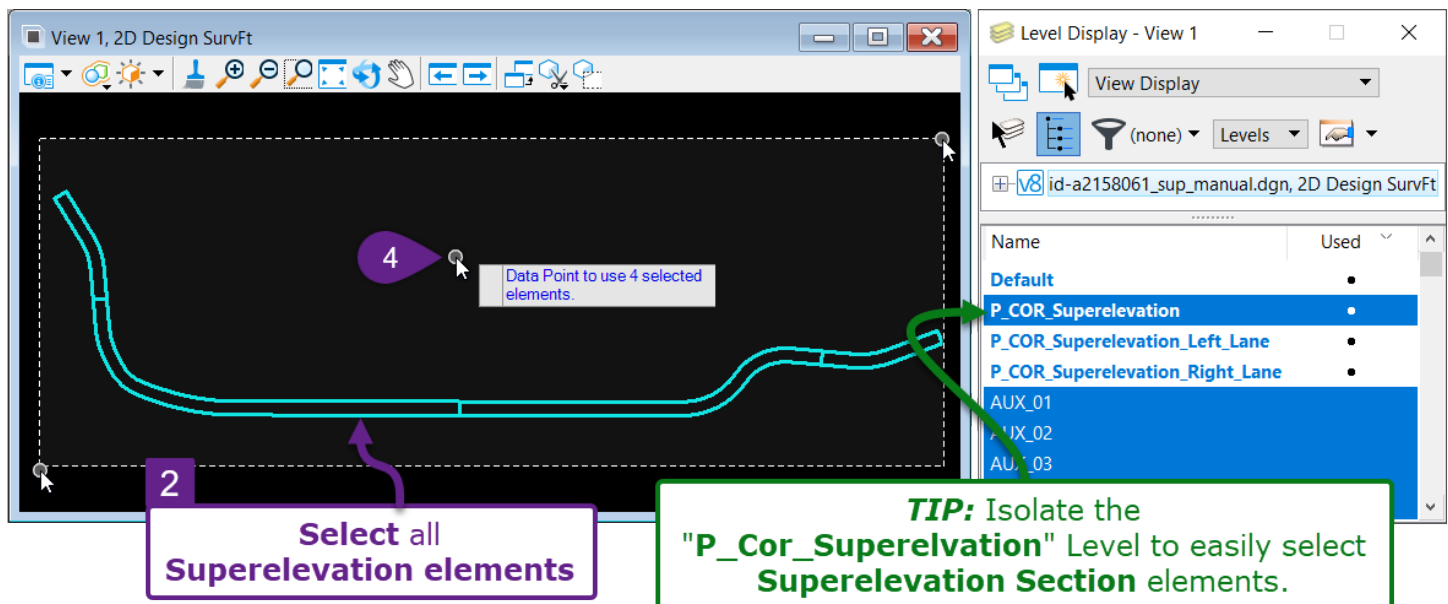
1	Open the **Superelevation ORD File** or the File that contains the desired *Superelevation Sections*.
2	Before using the *Superelevation Report* tool, **select all *Superelevation Sections***.

3	From the Ribbon, select the *Export Geometry* tool: [**OpenRoads Modeling → Corridor → Superelevation**].
4	*Prompt: Data Point to use X selected elements* – Left-Click in the view to generate the report from the selected *Section* elements.

The graphic below shows suggested edits to be made to the Superelevation Report. If edits are NOT required, then proceed to ==23K – *Formatting, Exporting, and Printing ORD Reports*==.

The procedure below shows how to export the Superelevation Report to Microsoft Excel for custom edits.

5	Go to **File → Save As → Microsoft Excel (*.xlsx)**.
6	Save the report in the desired file location. Open the report from the specified file location. Edit the Microsoft Excel File as desired. Print the Microsoft Excel File as a PDF for inclusion in the Physical Data deliverable.

6 Save the report as an **Excel File** to edit names.

Save As > Microsoft Excel (*xslx)

Superelevation Data Report

Report Created: . , January 22, 2022
Time: 3:09:03 PM

File Name:
Input Grid Factor:

Section Name: Section-1

SUGGESTION: Change the **Section Names** to correspond with the **Station Range** of the **Section element**.

Base Horizontal Name: ALI_MAIN_Riverside

Standards Filename: C:\Users\Riverside\AASHTO_

Design Speed: 35

Pivot Method: Crown

E Selection: 6%

L Selection: Speed Table

SUGGESTION: Change the **Superelevation Name** to correspond with **Typical Road Section** and the **Lane Side** (i.e., Lt, Rt).

Superelevation: Pavt_Lane_LayerTop_L - Pavt_EOP_LayerTop_L

Station	Cross Slope	Point Type	Transition Type
976.970	-0.020	Normal Crown	
1200.000	-0.020	Normal Crown	Linear
1245.000	0.000	Level Crown	Linear
1300.000	0.020	Reverse Crown	Linear
1410.000	0.058	Full Super	Linear
1525.000	0.058	Full Super	Linear
1635.000	0.020	Reverse Crown	Linear
1695.000	0.000	Level Crown	Linear
1740.000	-0.020	Normal Crown	Linear
1805.000	-0.020	Normal Crown	Linear

Name of Superelevation Lane

Superelevation: Pavt_CL_LayerTop - Pavt_Lane_LayerTop_L

Station	Cross Slope	Point Type	Transition Type
976.970	-0.020	Normal Crown	
1200.000	-0.020	Normal Crown	Linear
1245.000	0.000	Level Crown	Linear
1300.000	0.020	Reverse Crown	Linear
1410.000	0.058	Full Super	Linear

23E – CONSTRUCTION STAKING NOTES

Construction Staking Notes provide elevation, offset, slope, and coordinate information at a specified stationing interval.

As shown below, **Template Points** from the **Mainline Corridor** are manually selected for inclusion in the Construction Staking Notes.

BEST PRACTICE: As shown below, each inflection point along the sub-grade of the Template must be selected for the Construction Stake Notes report. The location of inflection points may be different for each project/typical section.

Mainline Corridor Template

Pavt_CL_Layer4

Pavt_Shdr_Layer4_L

Pavt_Shdr_Layer4_R

Ditch_R

Slope_Stake_Cut_R

Slope_Stake_Fill_L

Cross Section Gradebook from Centerline

Report Created: Monday, January 24, 2022
Time: 2:00:08 PM

Set Name: ALI_MAIN_Riverside
Alignment Name: ALI_MAIN_Riverside
Input Grid Factor:

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

Construction Staking Notes

Surface: ALI_MAIN_Riverside
Station: 9+76.970

Feature	Slope_Stake_Fill_L	Pavt_Shldr_Layer4_L	Pavt_CL_Layer4	Pavt_Shdr_Layer4_R	Ditch_R	Slope_Stake_Cut_R
Offset	-21.531	-19.598	-0.000	23.940	26.940	33.730
Elevation	1781.630	1782.274	1788.867	1780.651	1779.651	1783.046
Slope	-0.333	0.037		-0.037	-0.333	0.500

Station: 10+00.000

Feature	Slope_Stake_Cut_L	Ditch_L	Pavt_CL_Layer4	Pavt_EOP_Layer4_L	Pavt_Shdr_Layer4_R	Ditch_R	Slope_Stake_Cut_R
Offset	-28.734	-23.256	-0.000	-16.000	20.255	23.255	30.047
Elevation	1790.497	1787.759	1789.164	1788.844	1788.759	1787.759	1791.154
Slope	0.500	-0.333		0.002	-0.002	-0.333	0.500

Station: 10+50.000

Feature	Slope_Stake_Cut_L	Ditch_L				Ditch_R	Slope_Stake_Cut_R
Offset	-29.777	-23				23.255	33.067
Elevation	1791.052	1787				1787.792	1792.698
Slope	0.500	-0				-0.333	0.500

WARNING: Construction Staking Notes reports are created with the *Cross Section Report* tool. ONLY a single Corridor can be analyzed per report. Points from adjacent models (i.e., parking lots, approaches) will NOT be included in the report.

Clearing Limits Discussion: As shown above, the Road Template does NOT include Clearing Limits points. If the Clearing Limits are NOT built into in the Road Template, then create a separate report as shown in *23F – Clearing Limits Report*.

23E.1   Cross Section Report tool

Construction Staking Notes are created with the *Cross Section Report* tool. This tool can be found in the Ribbon in the following location:
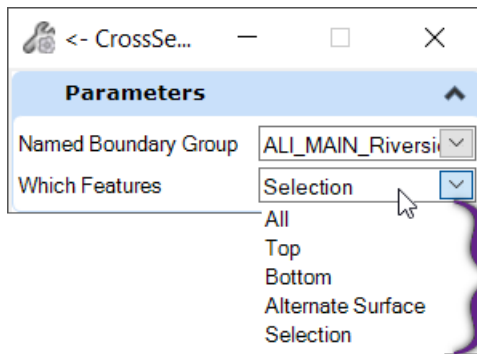
OpenRoads Modeling workflow → **Home** tab → **Model Analysis and Reporting** panel → **Civil Analysis**
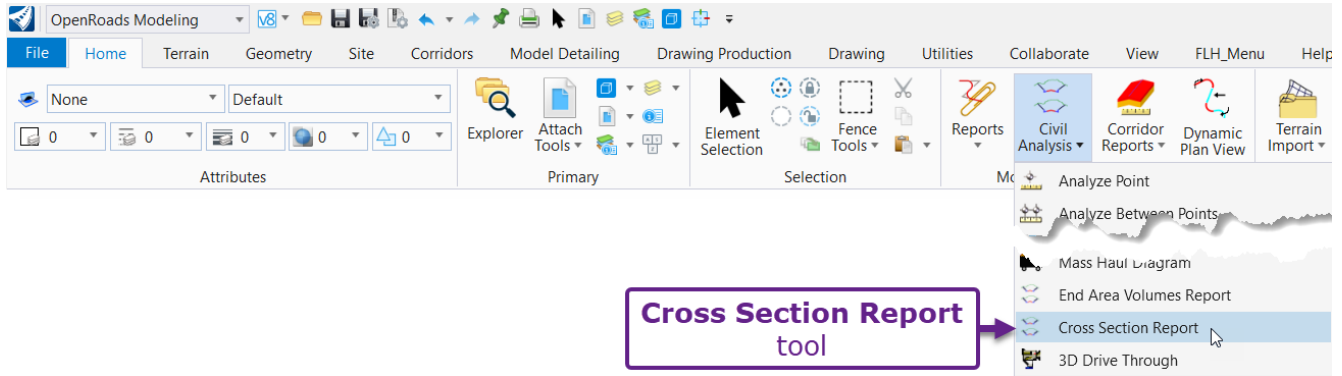
This tool uses **CROSS SECTION** *Named Boundaries* to determine the station interval spacing for report.

> *BEST PRACTICE:* The **Cross Section ORD File** should already contain CROSS SECTION *Named Boundary* elements that are spaced at the appropriate station interval. Use the *Cross Section Report* tool from within the Cross Section ORD File.

The **Which Features** setting determines which **Template Points** are included in the report. There are several methods for automated or manual selection of Template Points:

Cross Section Report tool	
Method:	**Description:**
All	ALL Template Points contained in the Mainline Corridor Templates are included in the report. Do NOT use this option because extraneous data is contained in the Staking Notes.
Top	All Template Points that are positioned on the top surface of the Mainline Corridor Template (finished grade) are included in the report. Do NOT use this option because Construction Staking Notes are typically given for sub-grade points.
Bottom	All Template Points that are positioned on the bottom surface of the Mainline Corridor Template are included in the report. *NOTE:* Slope Stake (Cut/Fill) points are included with this method. *WARNING:* In most situations, there are Template Points positioned on the bottom of the Road Template that are NOT to be included in the Construction Staking Notes.

Cross Section Report tool	
Method:	**Description:**
Alternate Surface	With this method, Template Points that are designated for an Alternate Surface are included in the report. See 8C.4 Alternate Surface and 22B – Alternate Surfaces (Intermediate Layers).
Selection	**PREFERRED METHOD:** This method allows for manual selection of Template Points for inclusion the report. This method is demonstrated in the following workflow.

23E.2   Creating Construction Staking Notes using Selection method

TIP: Before using the *Cross Section Report* tool, select the desired **Template Points** from the *3D Design Model* 🟦. Every Template Point has a corresponding *3D Linear Elements* in the *3D Design Model* 🟦.

TIP: In the *3D Design Model* 🟦, turn OFF all Levels – EXCEPT for the Levels that correspond with the Template Points to be included in the report. Selecting the desired *3D Linear Elements* is extremely difficult when extraneous Levels are ON.

NOTE: Multiple Template Points may be assigned to the same Level. Only select Template Points that should be included in the report.
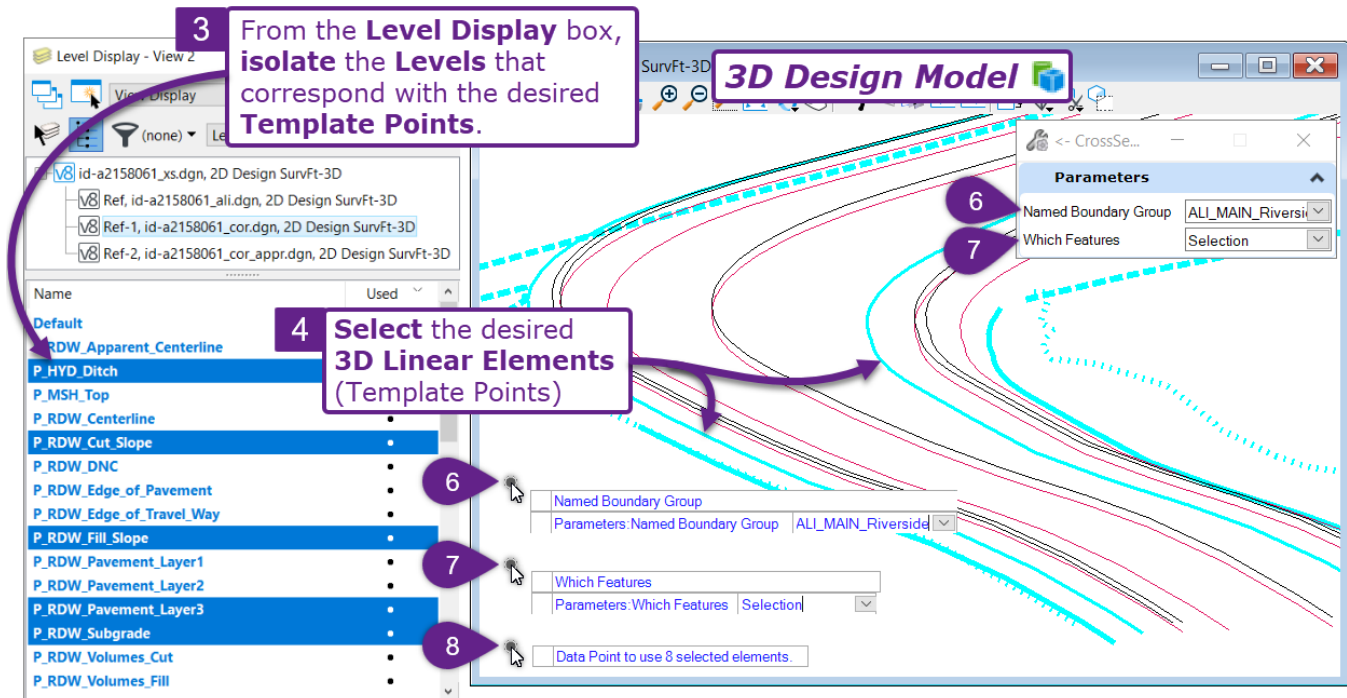
1	Open the **Cross Section ORD File**. This ORD File should already contain CROSS SECTION *Named Boundary* elements that are spaced at the appropriate interval.
2	Access the *3D Design Model* 🟦 view.
3	Turn OFF all Levels – EXCEPT for the Levels that correspond with the desired Template Points.
4	Select the *3D Linear Elements* which correspond with the desired Template Points. *TIP:* Hold down the CTRL key to select multiple elements.

5	From the Ribbon, select the *Cross Section Report* tool: [**OpenRoads Modeling** → **Home** → **Model Analysis and Reporting** → **Civil Analysis**]. See the previous page for Ribbon location for this tool.
6	*Prompt: Named Boundary Group* – Select the **Named Boundary Group** that was used for Cross Section production.
7	*Prompt: Which Features* – Use the **Selection** method. See the previous page for an explanation of the other methods.
8	*Prompt: Data Point to use X selected elements* – Left-Click (Data Point) in the *View* to proceed with the report creation.

IMPORTANT: From the right-side of the report window, select the "CrossSectionGradebookNE" report style.

9	Select the "CrossSectionGradebookNE" report style from the right-side of the report window.
10	Setup and Print (PDF) the Construction Staking Notes report. See ==23K – Formatting, Exporting, and Printing ORD Reports==.

23F – CLEARING LIMITS REPORT

The Clearing Limits Report provides offset distance for the clearing limits, relative to the Mainline Alignment. This workflow is intended to create a report for Clearing Limits linework that were manually created with linework elements (i.e., NOT built into the Mainline Corridor Template).

> **NOTE:** If the Clearing Limits were built into the Mainline Corridor Template, then the Construction Staking Notes can be configured to include Clear Limits information. See ==23E – Construction Staking Notes==.

Creating a Clearing Limits Report is accomplished with the *Station Base Report* tool. This tool can be found in the Ribbon in the following location:

OpenRoads Modeling workflow → **Home** tab → **Model Analysis and Reporting** panel → **Reports**
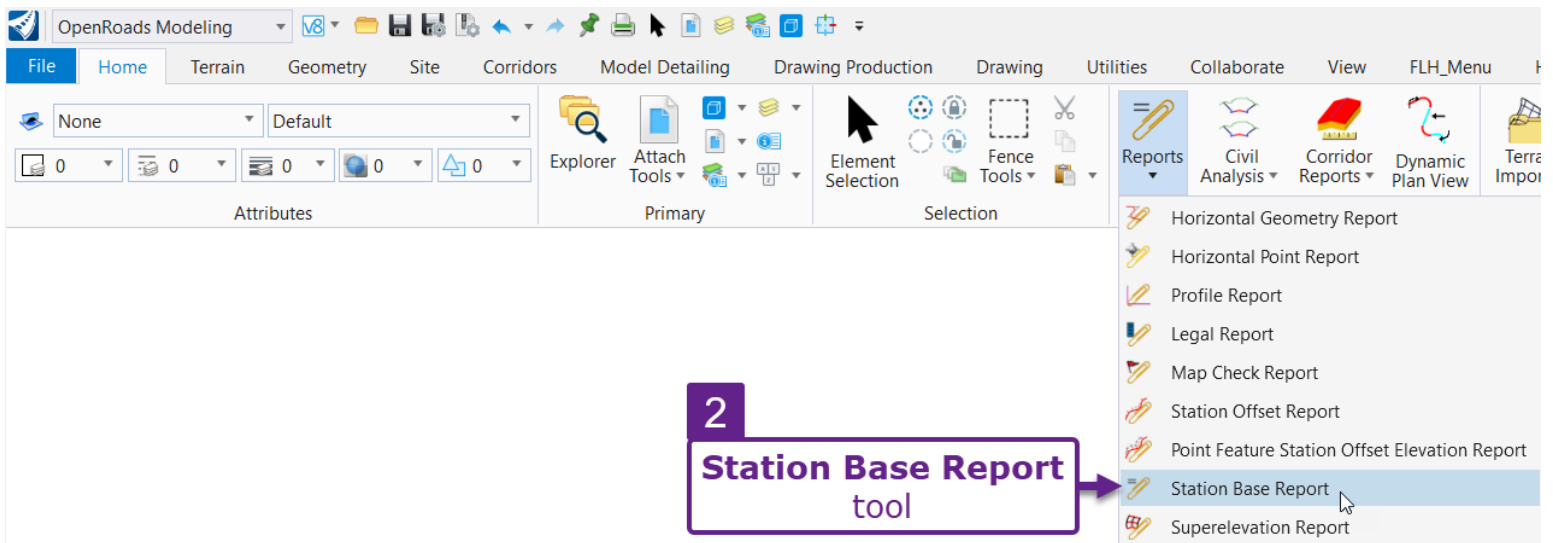
Before creating the Clearing Limits report, consider the following:

- The Clearing Limits linework should be a single element. The Clearing Limits line on the left-side should be a single element. As well as the Clearing Limits line on the right-side.

- The Clearing Limits linework should be running in the same direction as the Mainline Alignment. If the Clearing Limits linework is aligned in the opposite direction, then the resulting report will read backwards.

- In the resulting report, the Clearing Limits line is listed by the **Feature Name**. Before creating the report, assign the Clearing Limits linework logically **Feature Names** (i.e., "Clearing Limits Right"). *TIP:* If the Clearing Limits line does NOT contain a Feature Name, then use the *Set Feature Definition* tool to assign a Name.

1	Open any **ORD File** that displays the Clearing Limits linework and the Mainline Alignment.
2	From the Ribbon, select the *Station Base Report* tool: [**OpenRoads Modeling → Home → Model Analysis and Reporting → Reports**].
3	In the *Dialogue Box*, set the **Interval** spacing. **TIP:** The Interval value should match the Cross Section and Construction Staking Notes interval (i.e., 25' or 50').
4	*Prompt: Locate Element* – Select the **Mainline Alignment**.
5	*Prompt: Locate First Offset Element* – Select a **Clearing Limit** line
6	*Prompt: Locate Next Offset Element – Reset to Complete* – Select the other **Clearing Limit** line.
7	*Prompt: Locate Next Offset Element – Reset to Complete* – Right-Click (reset) to generate the Clearing Limits report.
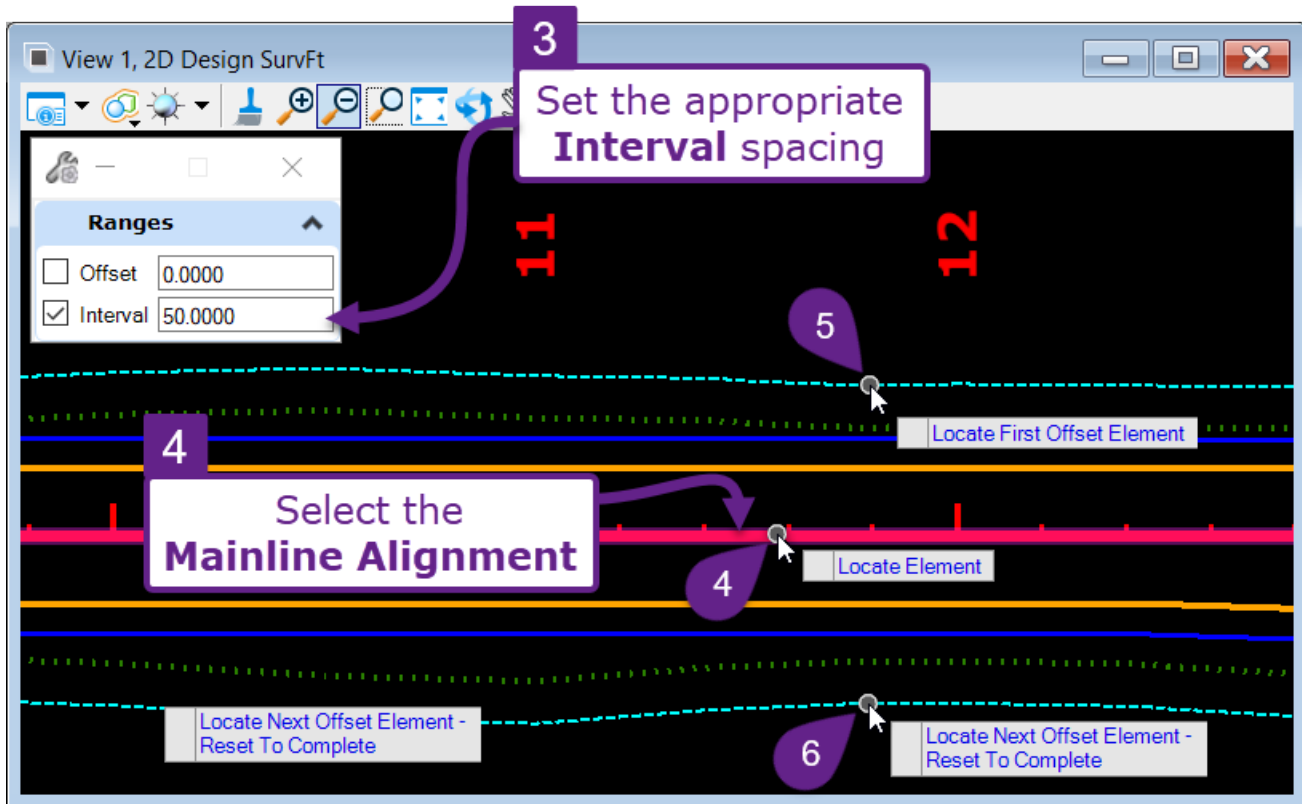
IMPORTANT: From the right-side of the report window, select the "StationOffsetNorthingEasting" report style.

8	Select the "StationOffsetNorthingEasting" report style from the right-side of the report window.
9	Setup and Print (PDF) the Construction Staking Notes report. See ==23K – Formatting, Exporting, and Printing ORD Reports==.

Clearing Limits Report

Bentley Civil Report Browser - C:\Users\brendan\AppData\Local\Temp

File   Tools

Open
Save As
Append
Page Setup
Print
Print Preview
Exit

Station Offset Northing Easting Report

Report Created: Wednesday, February 16, 2022
Time: 3:21:50 PM

Project: 2D Design SurvFt
Description:
Baseline (Active) Alignment: ALI_MAIN_Riverside
File Name: C:\Users\brendan\Desktop\NEW ORD CAD Files\Riverside\id-a2158061_cor.dgn
Last Revised: 2/16/2022 15:17:55
Input Grid Factor: Note: All units in this report are in feet unless specified otherwise.

Offset Alignment (Clearing Limts Left) Point Name	Baseline Alignment (ALI_MAIN_Riverside) Station	Baseline Alignment Offset	Offset Alignment Northing	Offset Alignment Easting
	10+00.000	-38.736	2567546.457	2463965.550
	10+50.000	-39.779	2567504.705	2463993.080
	11+00.000	-38.009	2567461.454	2464018.229
	11+50.000	-36.804	2567418.505	2464043.857
	12+00.000	-36.047	2567375.793	2464069.863
	12+50.000	-35.512	2567333.201	2464096.057
	13+00.000	-35.617	2567290.949	2464122.793
	13+50.000	-31.703	2567246.556	2464146.129
	14+00.000	-38.813	2567203.989	2464178.820
	14+50.000	-31.216	2567151.969	2464193.754
	15+00.000	-52.247	2567106.947	2464230.636

ProfileExistingProposedElevationExtended.xsl
ProfileStationElevation.xsl
ProfileStationElevationASCII.xsl
ProfileStationOffsetElevationASCII.xsl
StationBaseCompare.xsl
StationBaseCoordinates.xsl
StationBaseCrossSlope.xsl
StationBaseSimpliedCrossSlope.xsl
StationBaseSingle.xsl
StationBaseVerticalClearance.xsl
StationBaseWGrades.xsl
StationOffset.xsl
StationOffsetAlongSingleAlignment.xsl
StationOffsetAlongSingleAlignmentExistGround.xs
StationOffsetAlongSingleAlignmentWRadius.xsl
StationOffsetElevationFeature.xsl
StationOffsetNorthingEasting.xsl
StationOffsetNorthingEastingElevationFeature.xsl
StationOffsetWithVersine.xsl
StationOffsetWSmoothingRadius.xsl

23G – X, Y, Z COORDINATES FOR SUB-GRADE AND BASE LAYERS REPORT

Sub-Grade and Base Layers reports provides X, Y, and Z coordinate information for construction staking of sub-grade and base layers.

The creation of this report is the same process shown in 23E – Construction Staking Notes.

The difference between this report and the Construction Staking Notes report is the particular Template Points (*3D Linear Elements*) that are selected for the report. Create a separate report for each sub-grade and base layer used in the typical road section.

For the Sub-Grade and Base Layers Report choose points corresponding the following layers:
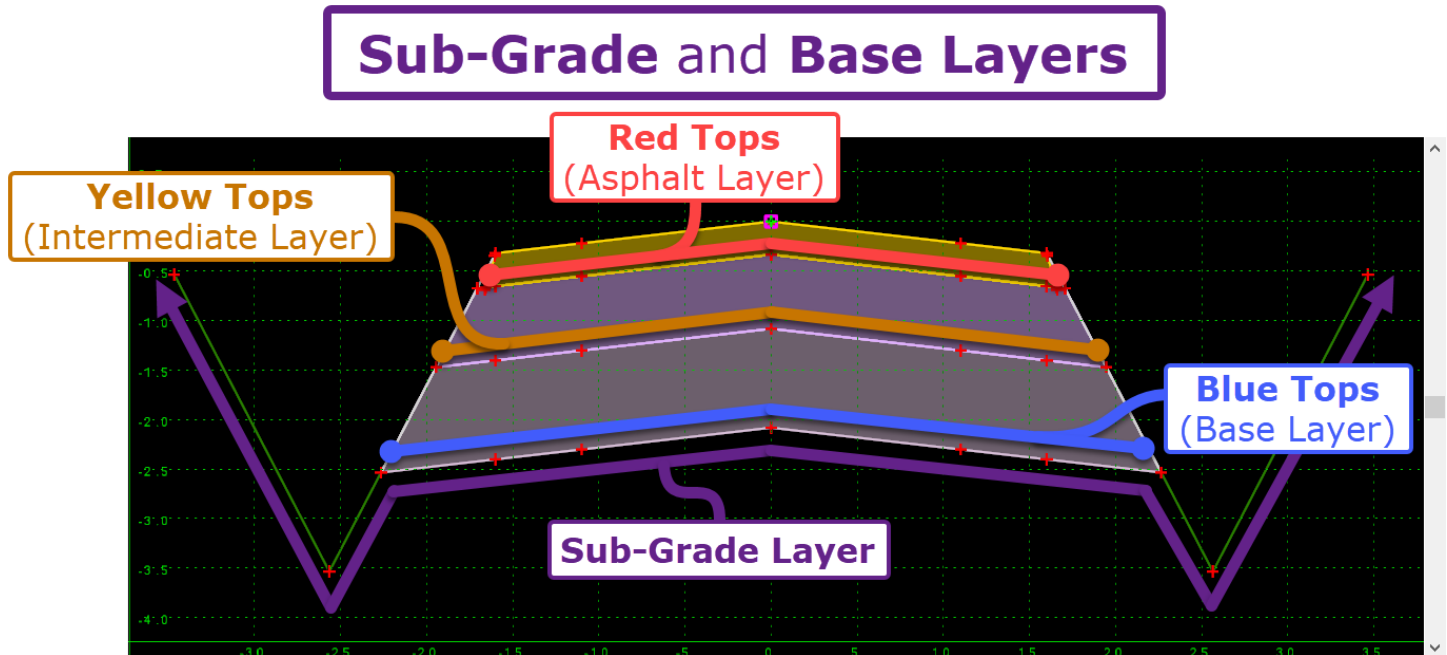
Sub-Grade and Base Layers	
Layer:	**Description:**
Sub-Grade Layer	Includes points that form the bottom layer of the typical road section. **NOTE:** The sub-grade layer includes ditch, cut/fill, and all points outside of the pavement section.
Blue Tops Layer	Includes points that form the bottom of the base layer. **NOTE:** Sub-grade and Blue Tops are similar. However, Ditch and cut/fill points are NOT included in the Blue Tops Layer.
Red Tops Layer	Includes point that form the bottom layer of the asphalt section.
Yellow Tops Layer	Includes points that form the bottom layer of the intermediate section. **NOTE:** If the pavement section is only comprised of a pavement and base layer, then yellow tops is NOT applicable. Yellow Tops is ONLY necessary for pavement sections that

NOTE: Only inflection points need to be included in the Sub-Grade and Base Layers reports.

23H – PROPOSED 3D BREAKLINES IN DXF FILE FORMAT

3D Breaklines are typically generated by Corridors, Linear Templates, and Surface Templates. Each Template Point creates a **3D Breakline** in the *3D Design Model* 📦. In the ORD Software, 3D Breaklines are referred to as *3D Linear Elements*.
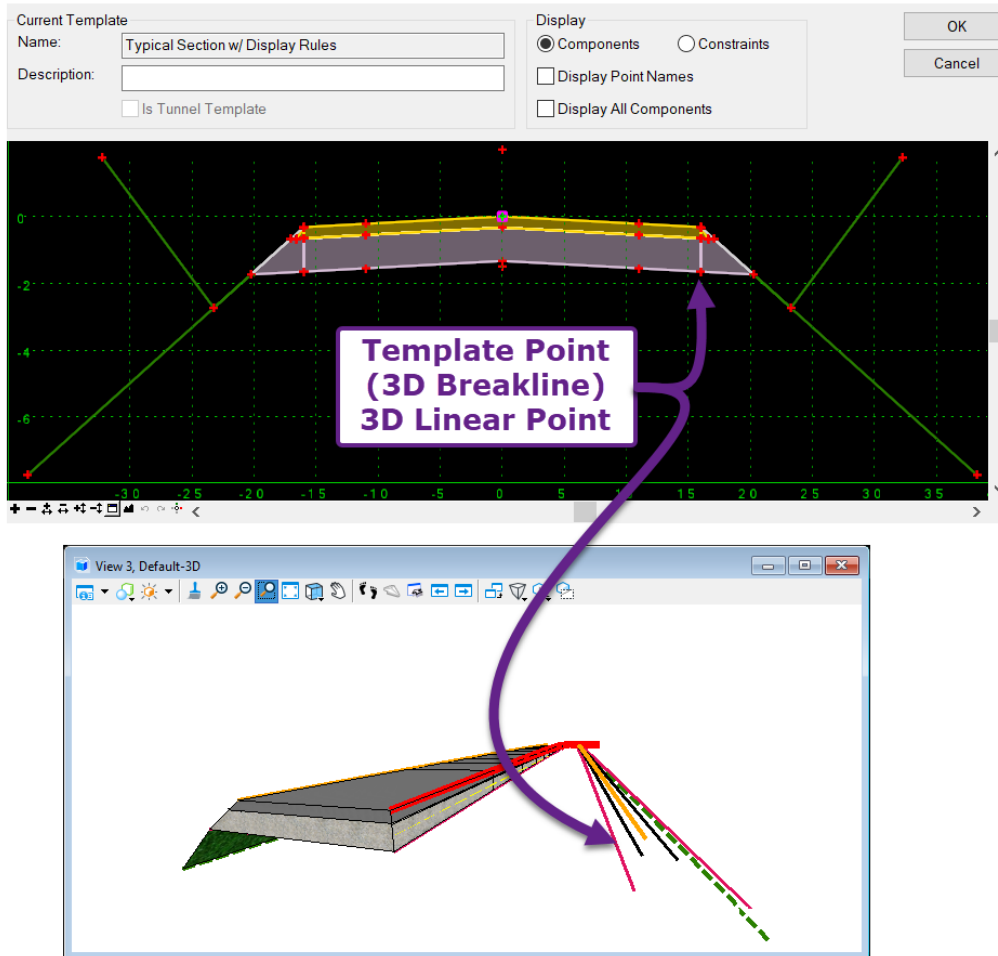
A DXF File (Drawing Exchange File) is a universal file type that is recognized by most Survey and CAD (Computer Aided Drafting) software. An ORD File is converted to a DXF File by performing a **Save As**.

The procedure for creating a DXF File consisting of only proposed 3D Breaklines is as follows:

Create a new ORD File

IMPORTANT: Use a **3D Seed File** when creating the new ORD File.

Reference in Design ORD Files that contain Corridors, Linear Templates, and Surface Templates

---

Turn Off all Levels – except for 3D Breakline Levels

Use the *Merge Into Master* tool to bring Reference Files into the Current ORD File.

Save the ORD File as a DXF File

Create a new ORD File:

1	Create a new ORD File to be eventually converted into a DXF File. **IMPORTANT:** Use a **3D Seed File** when creating the new ORD File. For more information on Seed Files, see *3B.3 The Seed File*. Seed Files are found in the FLH WorkSpace at the following location: …\OpenRoads Designer CE 10.10\Configuration\Organization-Civil\FLH_Stds-WS10.10.1V\Seed
2	In the new ORD File, set the appropriate **Coordinate System**. See *3D.1 Set the Coordinate System*.
3	In the new ORD File, **reference** in Design ORD Files that contain all proposed Corridors, Linear Templates, and Surface Templates used int the project. **IMPORTANT:** When using a **3D Seed File**, reference the **3D Design Model** of the Design ORD File. The *3D Design Model* is selectable through the **Model** drop-down, as shown below.
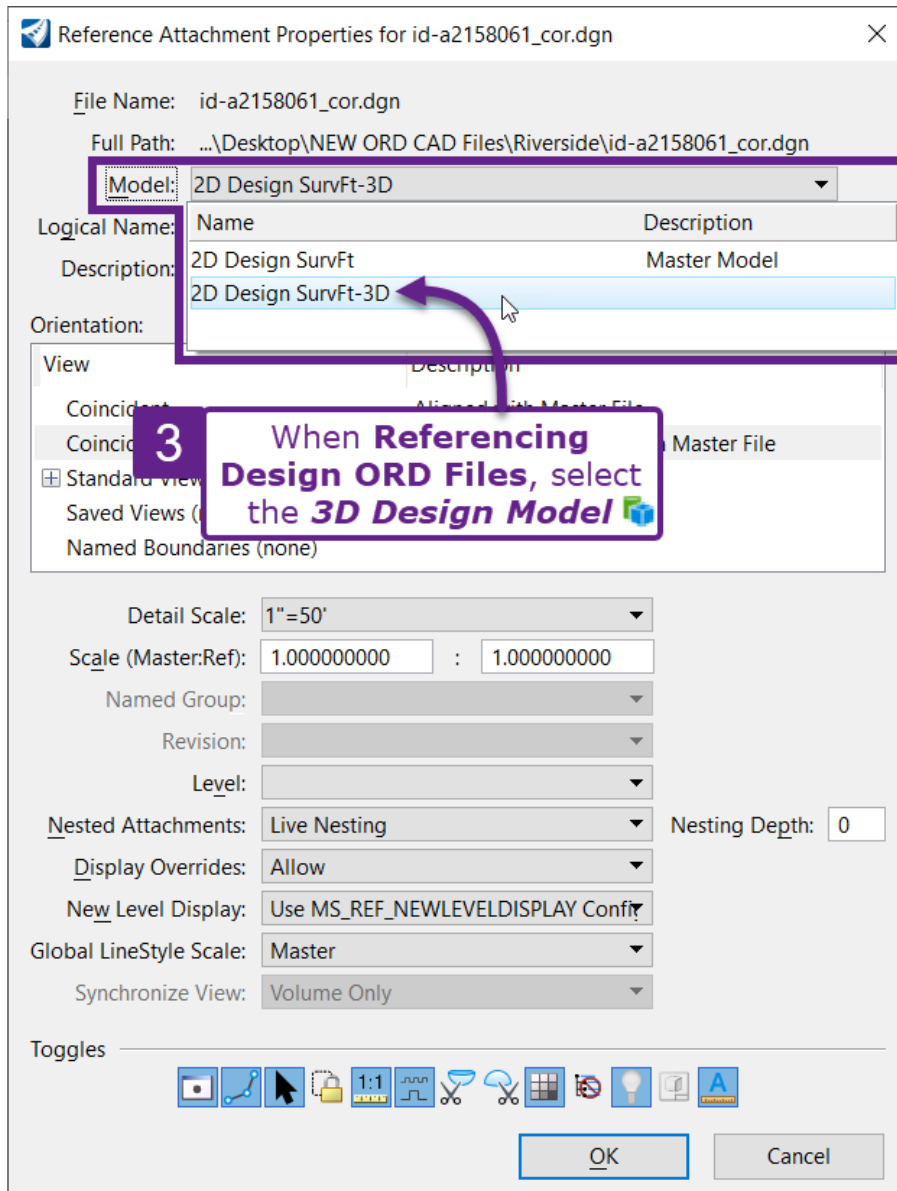
Turn OFF all Levels, except for 3D Breakline Levels

4	Open the **Levels Display** box.
5	Select (highlight) a Design ORD File reference from the top.
6	Turn OFF all Levels, except for the Level's that contain 3D Breaklines. ***TIP:*** Another strategy is to turn OFF all Levels. Scroll through the Level list and toggle ON only Level's that contain 3D Breaklines. To turn OFF all Levels, right-Click and select **All Off**.
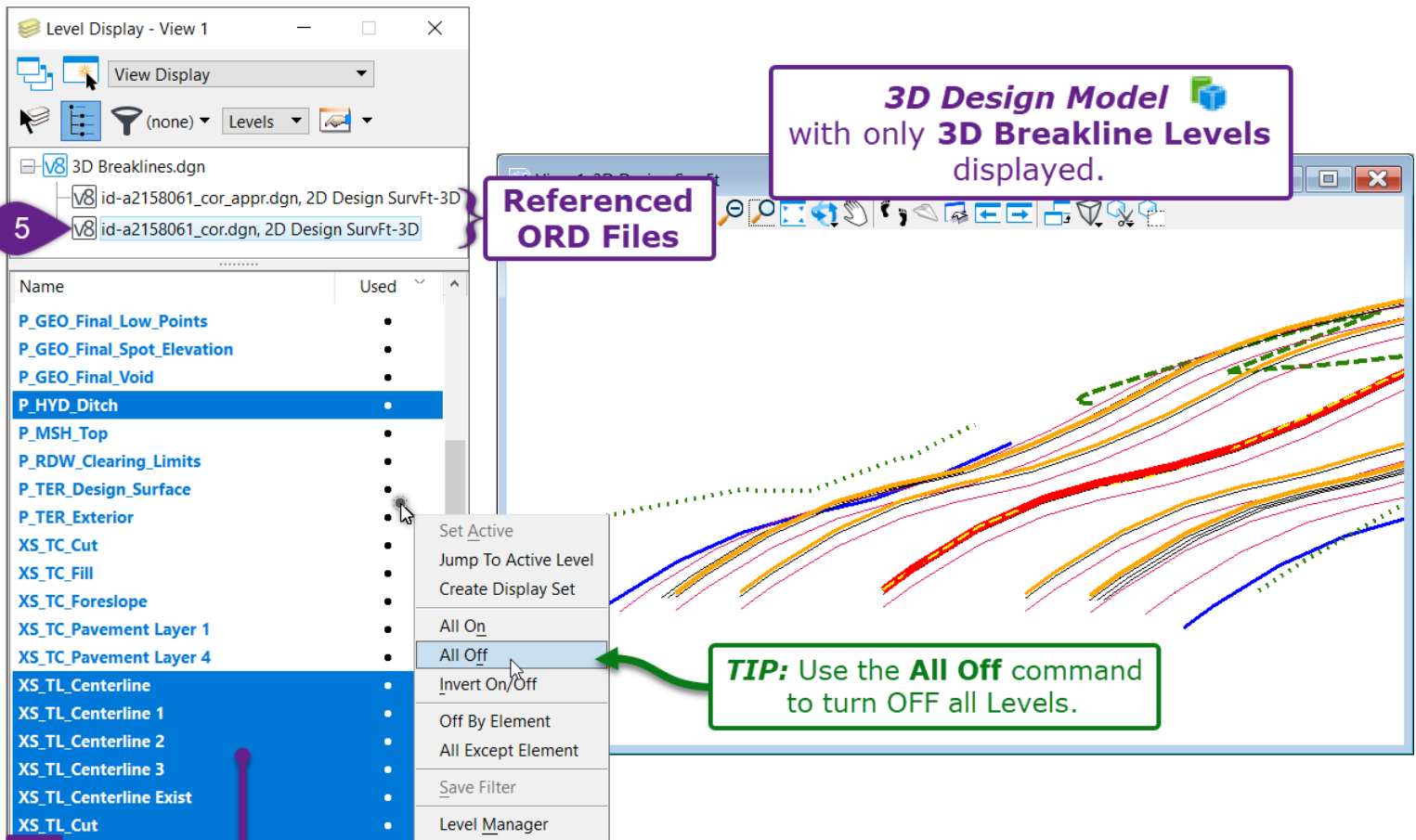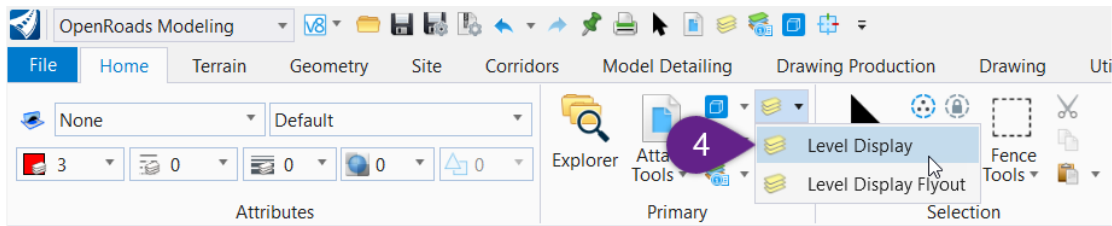
Use the Merge Into Master tool to bring 3D Breaklines into the ORD File:

In this process, the **Merge Into Master** tool is used to transfer the referenced 3D Breaklines into the current ORD File. The **Merge Into Master** tool will only transfer **Levels that are turned ON** into the current ORD File.

7	Open the **References** box.
8	**Right-Click** on a Design ORD File reference and select the **Merge Into Master** tool. For more information on the **Merge Into Master** tool, see *1E.7.a Merge Into Master tool (Import Reference into Current ORD File)*. Repeat this process for all Design ORD Files references in the current ORD File. Before creating the DXF File, there should be NO references in the current ORD File. All references must be merged to the current ORD File.
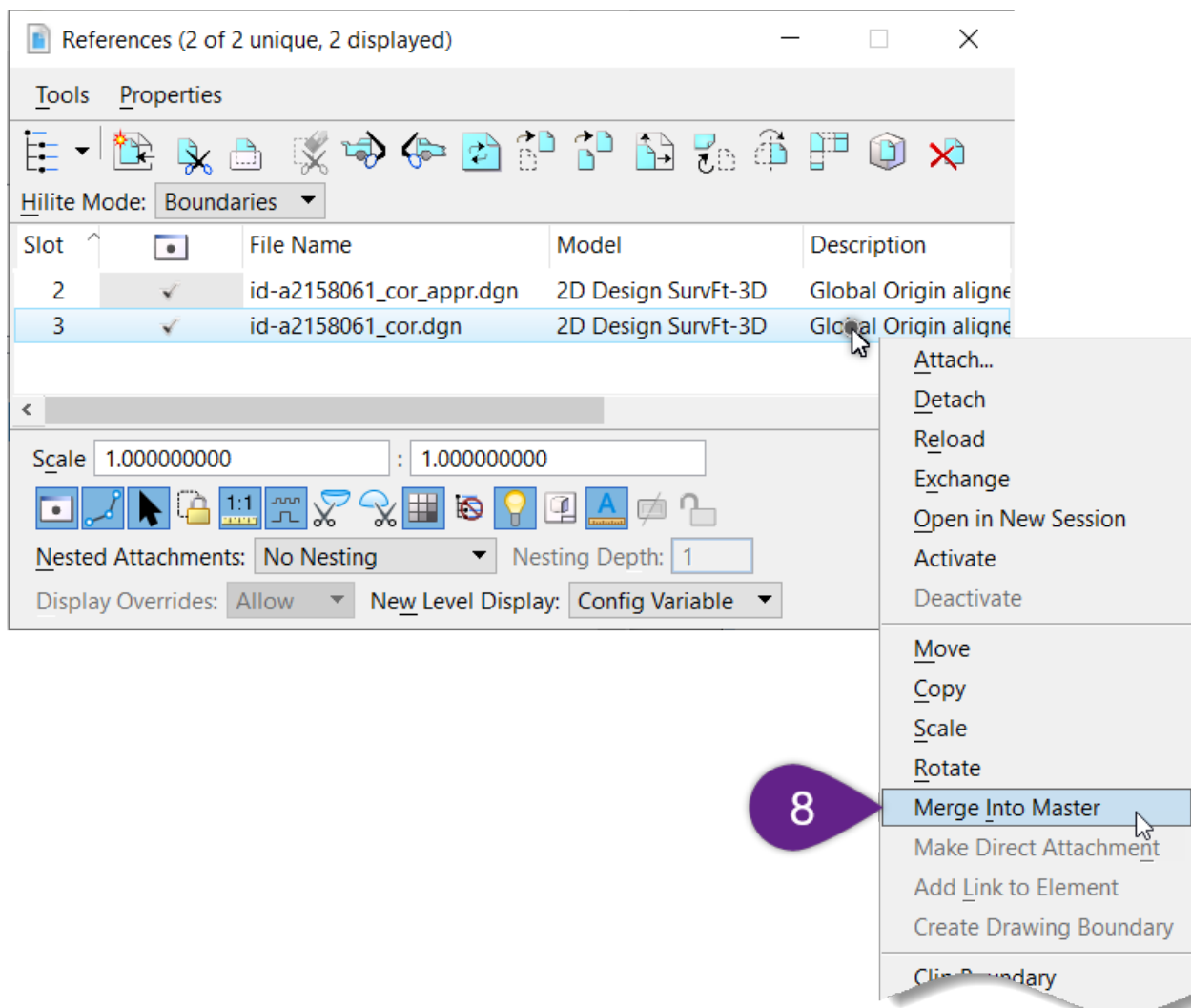
Save the ORD File as a DXF File:

9	Go to **File → Save As**.
10	In the **Save as type** drop-down, change the file type to **Autodesk(R) DXF Files (*dxf)**.

IMPORTANT: Select **Autodesk(R) DXF Files (*dxf)** for the **File Type**.

TIP: To verify the DXF was created correctly, reference the DXF file into a project ORD File and compare the DXF linework to the design linework. **NOTE:** The correct Survey Unit (i.e., Survey Feet or International Feet) must be selected when referencing the DXF file to ensure it is located and oriented correctly within the project ORD File.

TIP: Reference the **DXF File** into a **Project ORD File**.

Set the correct **Survey Units** when referencing.

23I – EXISTING AND PROPOSED SURFACE IN LANDXML (.XML) FORMAT

Creating a LandXML (.xml) file from a **Terrain Model** (surface) is accomplished with the *Export to File* tool. This tool can be found in the Ribbon in the following location:

OpenRoads Modeling workflow → **Terrain** tab → **Miscellaneous** panel
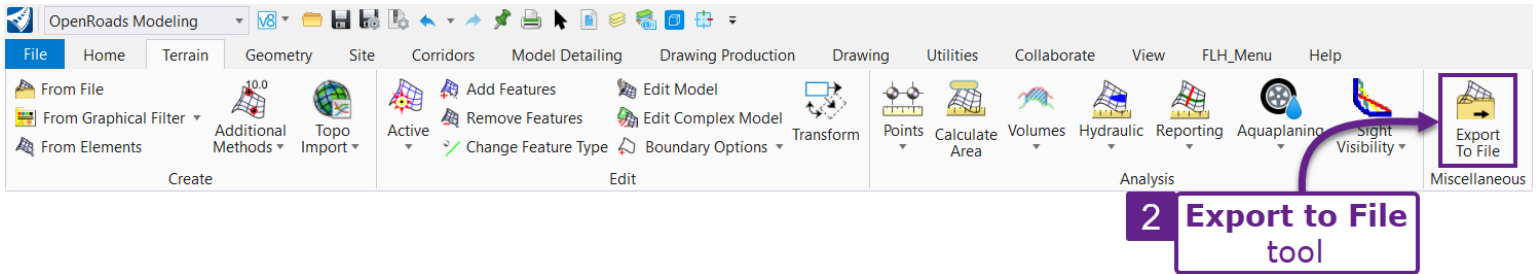
The procedure below demonstrates how to export the Existing Ground Terrain Model as a LandXML (.xml) File. The procedure for exporting the Proposed Terrain Model is identical.

> **Existing Ground Surface:** The Existing Ground Terrain Model is typically located in the Survey File. For older projects, there may be a dedicated ORD File for the Existing Ground Terrain Model.

> **Proposed Surface:** The creation of the Proposed Terrain Model is shown in Chapter 22 – Proposed Terrain Model Creation. The Proposed Terrain Model should be located in a dedicated ORD File.

IMPORTANT: Set the **Export Option** to *Export Triangles Only*. When this option is used, the resulting LandXML only contains surface elevation and coordinate data. **WARNING:** Do NOT use the *Export Features Option*. See Step 7 below.

1	Open the ORD File that contains the desired **Terrain Model**. ***WARNING:*** Ensure that the ORD File has a set Coordinate System. See 3D.1 Set the Coordinate System.
2	From the Ribbon, select the *Export Geometry* tool: [***OpenRoads Modeling*** → ***Terrain*** → ***Miscellaneous Tools***].
3	*Prompt: Select Terrain to Export –* Left-click on the Terrain Model for export.
4	*Prompt: Select Export Format –* Select the **LandXML** option.
5	*Prompt: Project Name –* Type in the appropriate Project Name ***NOTE:*** The Project Name is stored within the resulting LandXML (.xml) file. This name will be displayed when the LandXML is loaded into other software and survey equipment. ***NOTE:*** The name given to the LandXML file is specified in Step 8.
6	*Prompt: Project Description –* If desired, type in a description for the Project. ***NOTE:*** The Project Description is stored within the resulting LandXML (.xml) file. The description will be displayed when the LandXML is loaded into other software and survey equipment.
7	*Prompt: Export Options –* Select the **Export Triangles Only** option. **Export Triangles Only –** The resulting LandXML file ONLY contains surface elevation and coordinate data. The elevation and coordinates of all triangle vertices are listed to define the Terrain Model. **PREFERRED METHOD**. **Export Features Only –** Features refer to the surveyed breaklines used to create and calibrate the Existing Ground Terrain Model. If this option is selected, then the LandXML File consists of information and data relating to survey breaklines. **Do NOT use this option for Physical Data deliverables**. **Export Both –** The resulting LandXML file contains both triangle and feature data.
8	Save the LandXML File in the appropriate file location. ***TIP:*** Name the Land XML File in accordance with FLH Naming Conventions. See 3F – Naming Convention for Proposed ORD Features.

23J – CONTROL POINT COORDINATES IN MICROSOFT EXCEL FORMAT

The Control Point Coordinates report is typically created and compiled by the project surveyor. Request the Microsoft Excel (.xlsx) format version of the Control Point Coordinates file from the project surveyor.

A blank Control Point Sheet template, can be found at the following location:

Very few report formatting options are offered from directly within the ORD software. For extensive formatting operations, **export the report to Microsoft Excel**.

23K.1   Formatting in the ORD Software

From within the ORD Software, there are only two relevant formatting changes to be made:

1	Remove the hyperlink (URL) or file path from the bottom of the page (footer). This procedure should be done as a standard practice. **TIP:** To remove the hyperlink, go to **File → Page Setup**. Set the **Footer** drop-down to **Empty**.
2	Change the format or accuracy (precision) of values in the report. For example, the station values listed in the report below are to the thousandth of a foot (0.123). The station accuracy (precision) should be changed to a hundredth of a foot (0.12). **TIP:** TO change the format or accuracy (precision), go to **Tools → Format Options**

23K.1.a   Remove the Hyperlink (URL) from the Page Footer

As a standard practice, the hyperlink in the page footer should be removed from reports printed directly from ORD.

1	Create a report.
2	Go to *File* → *Page Setup*
3	**Footer:** Locate the Footer drop-down and change the selection to **Empty**.
4	Select **OK**.

23K.1.b   Change the Format or Accuracy of Report Values

Under **Tools** → **Format**, there are a few controls for the units (Mode and Format) and accuracy (Precision) of values found in the report.

1	Create a report.
2	Go to **Tools** → **Format Options**
3	Change the units and accuracy as desired.
4	Select **Close**.

23K.2 Export a Report to Microsoft Excel (.xlsx)

A report can be exported to Microsoft Excel for extensive formatting and manipulation operation. There are two options for exporting the report. In Microsoft Excel, the appearance (format) of the report depends on which option is used.

Option 1: *File → Save As → Microsoft Excel (*.xslx)*. When this option is used, the report appears identically formatted to the ORD Report.

Option 2: *Right-Click → Export to Microsoft Excel*. When this option is used, the report is unformatted. In Microsoft Excel, all report text shown with the same font, font size, and justification.
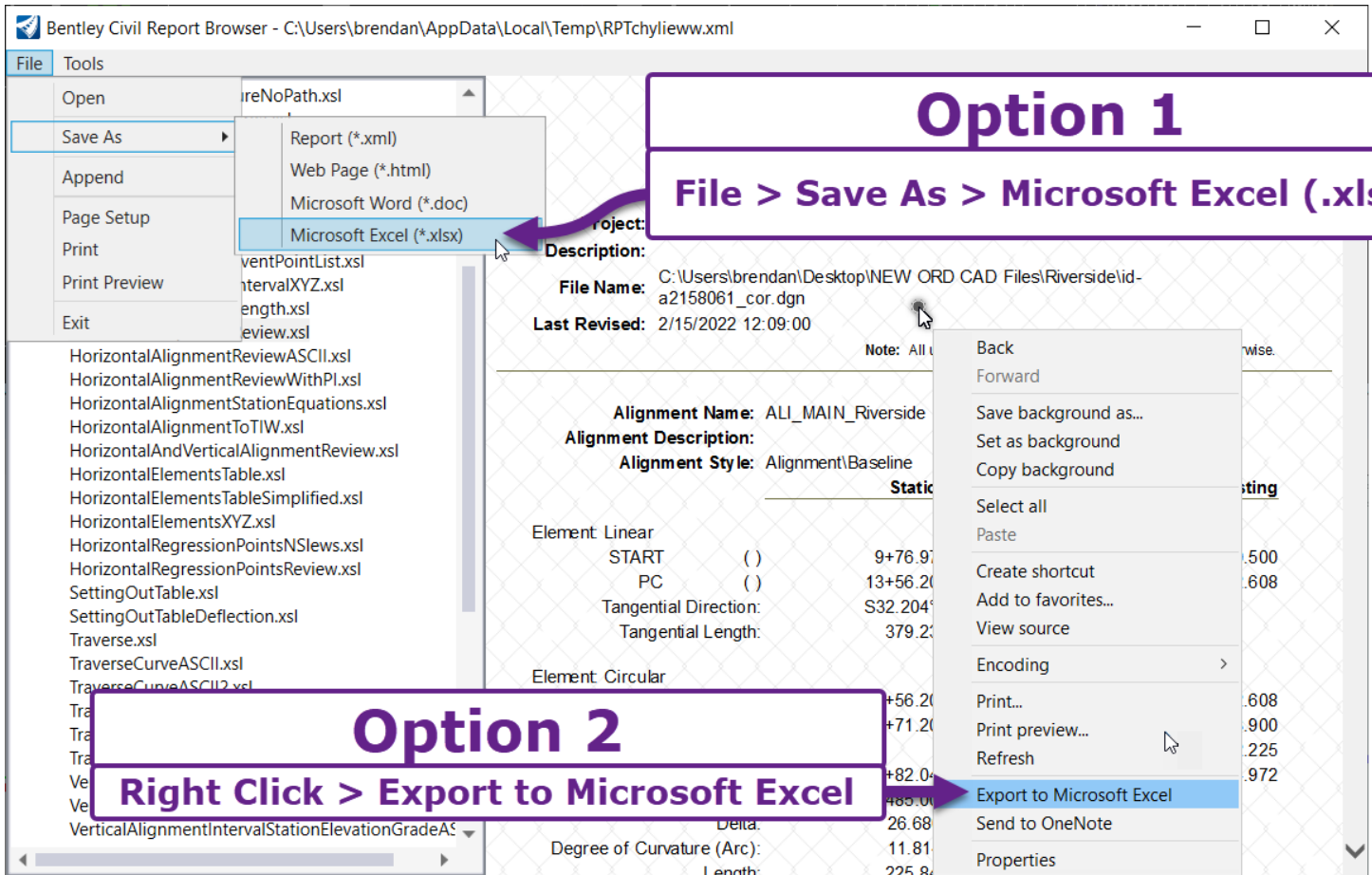
See the next page for a comparison of the two options when viewed in Microsoft Excel.

TIP: After formatting in Microsoft Excel, print the report directly from Microsoft Excel.

The left graphic shows the Microsoft Excel sheet by using **Option 1:** *File* → *Save As* → *Microsoft Excel (*.xslx)*. The report is formatted identical to the ORD Report.

The right graphic shows **Option 2:** *Right-Click* → *Export to Microsoft Excel*. The report is unformatted.

23K.3 Print the Report to PDF

To create a PDF of an ORD Report, go to **File** → **Print** and select a **PDF** print driver.

TIP: Select the **Adobe PDF** or **Bluebeam PDF** printer driver.
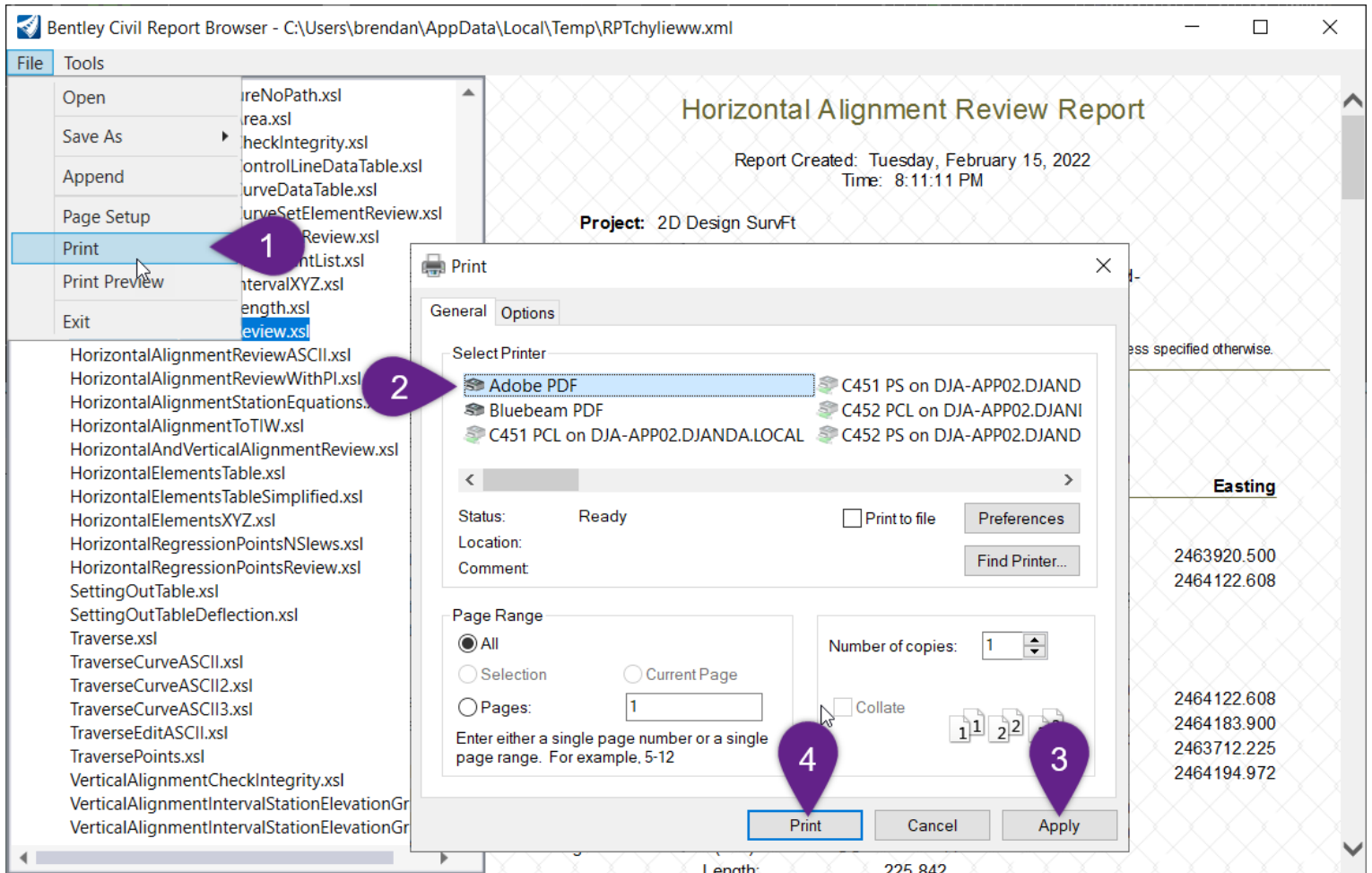
1	Go to **File** → **Print**
2	Select a **PDF** print driver.
3	Push the **Apply** button.
4	Push the **Print** button and specify a file location for the resulting PDF.