OpenRoads Designer User Manual

U.S. Department of Transportation
Federal Highway Administration

Chapter 19

PRINTING

2021 R2 Update 10 – Version 10.10.21.04 – WorkSpace 10.10.1
December 2025

Chapter 19 Printing

This chapter covers the PDF printing of single sheets, entire plan sets, and other miscellaneous workflows.

TABLE OF CONTENTS

RECORD OF REVISIONS

The following record of revisions to the OpenRoads Designer Manual Chapter 19 is offered as a “quick reference” to determine the latest changes.

DATE	SECTION	REVISION DESCRIPTION
12/2025	General	Updated estimating software reference to Masterworks
4/2025	Section 19F.1	Roll Plot size updates. Inclusion of WFL capability in-house.

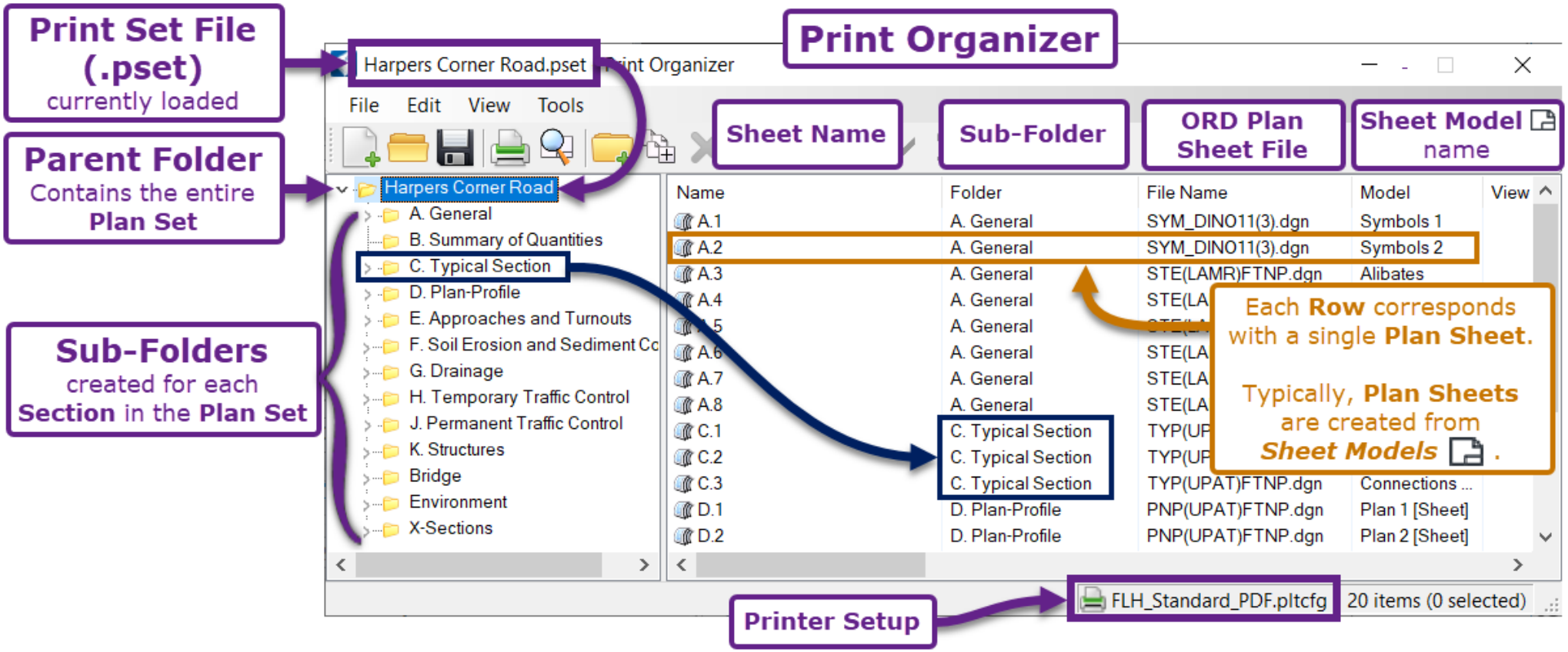
19A – PLAN SET PRINTING (BATCH PRINTING)

Plan Sets are printed from the *Print Organizer* tool. The *Print Organizer* is a batch printing utility for printing multiple sheets into a single PDF.

A *Print Set File* - which contains the file extension ".pset" - is a set of Plan Sheets. There are two approaches for Plan Set printing:

- Create a single *Print Set File* that includes all sheets in the Plan Set (preferred).
- Create a *Print Set File* for each Section in the Plan Set

The graphic below shows a Print Set File that represents an entire Plan Set. Each Section of the Plan Set is organized into Sub-Folders.



BEST PRACTICE: When viewed in PDF Software (i.e., Adobe, Blue-Beam), the resulting PDF will contain bookmarks created from the **Sub-Folders** and **Sheet Names** as arranged in the Print Organizer. Assign **Sub-Folders** and **Sheet Names** logical names that agree with the plan set Sections and numbering scheme.

TIP: To ensure Fields (i.e., Sheet Numbers, Project Information) are up to date before printing, use the *Update Sheet Model Properties* tool found in the Sheet Index (found in the Explorer). All *Sheet Models* must be added to the Sheet Index to use this tool. See *19B.1 Update Text Fields Before Printing (Update Sheet Model Properties tool)*.

The overall process for batch printing through the *Print Organizer* is shown below:

Access the Print Organizer

19A.1 Access The Print Organizer

↓

Create a New Print Set File (.pset)

19A.2 Create a New Print Set File (.pset)

EFL Users: EFL uses a blank Print Set File (.pset) template for plan set printing. Do NOT create a new Print Set File (.pset). Instead, copy the EFL Print Set File (.pset) template to the project folder. Load the blank Print Set File (.pset) template as shown in *19A.3 Load a Print Set File (.pset)*.

↓

Create a Sub Folder for each Section in the Plan Set

19A.4 Create Sub-Folders

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Add Sheets to the Print Set File (.pset)

19A.5 Add Sheets to the Print Set File (.pset)

TIP: External PDFs can be added to the Print Set File (.pset). For example, PDFs generated from Masterorks can be incorporated in the Print Set File. By doing so, it is unnecessary to manually insert external PDFs into final PDF printed from the Print Set File (.pset).

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COLOR PRINTS ONLY: Remove the FLH Pen Table

19A.6 Printing Properties, the FLH Pen Table, and Color Prints

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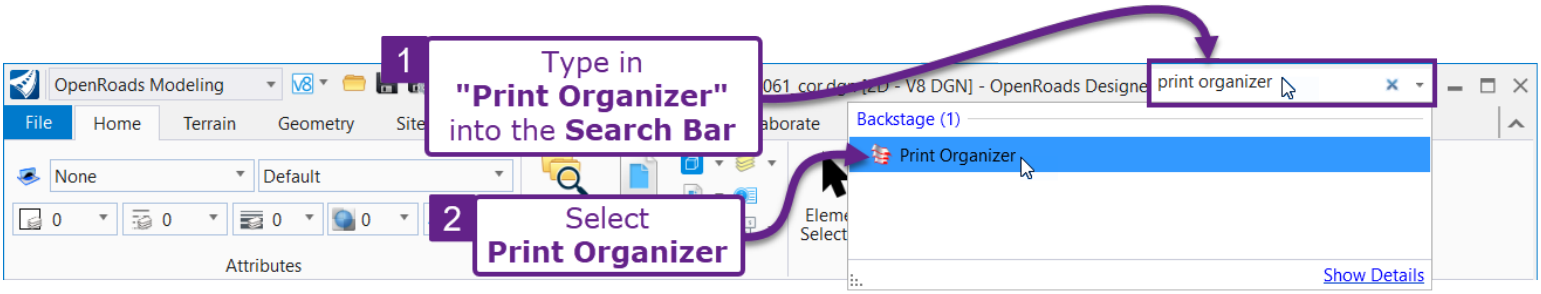
Print the Print Set File (.pset)

19A.7 Print the Print Set File (.pset)

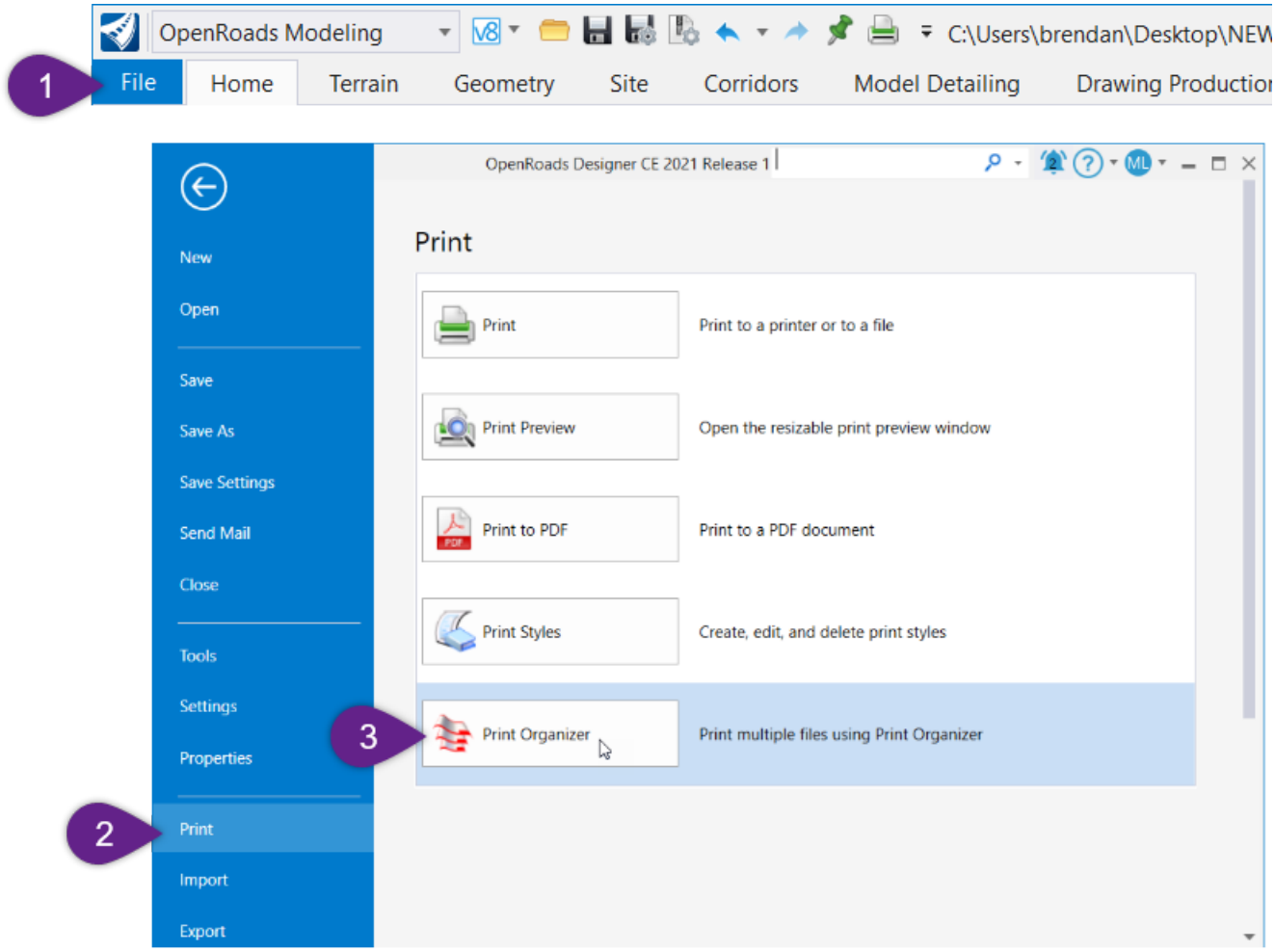
19A.1 Access the Print Organizer

There are two locations for accessing the *Print Organizer*.

LOCATION 1: the *Search Ribbon* Bar, type in "Print Organizer".



LOCATION 2: Go to ***File*** → ***Print*** → ***Print Organizer***



19A.2 Create a New Print Set File (.pset)

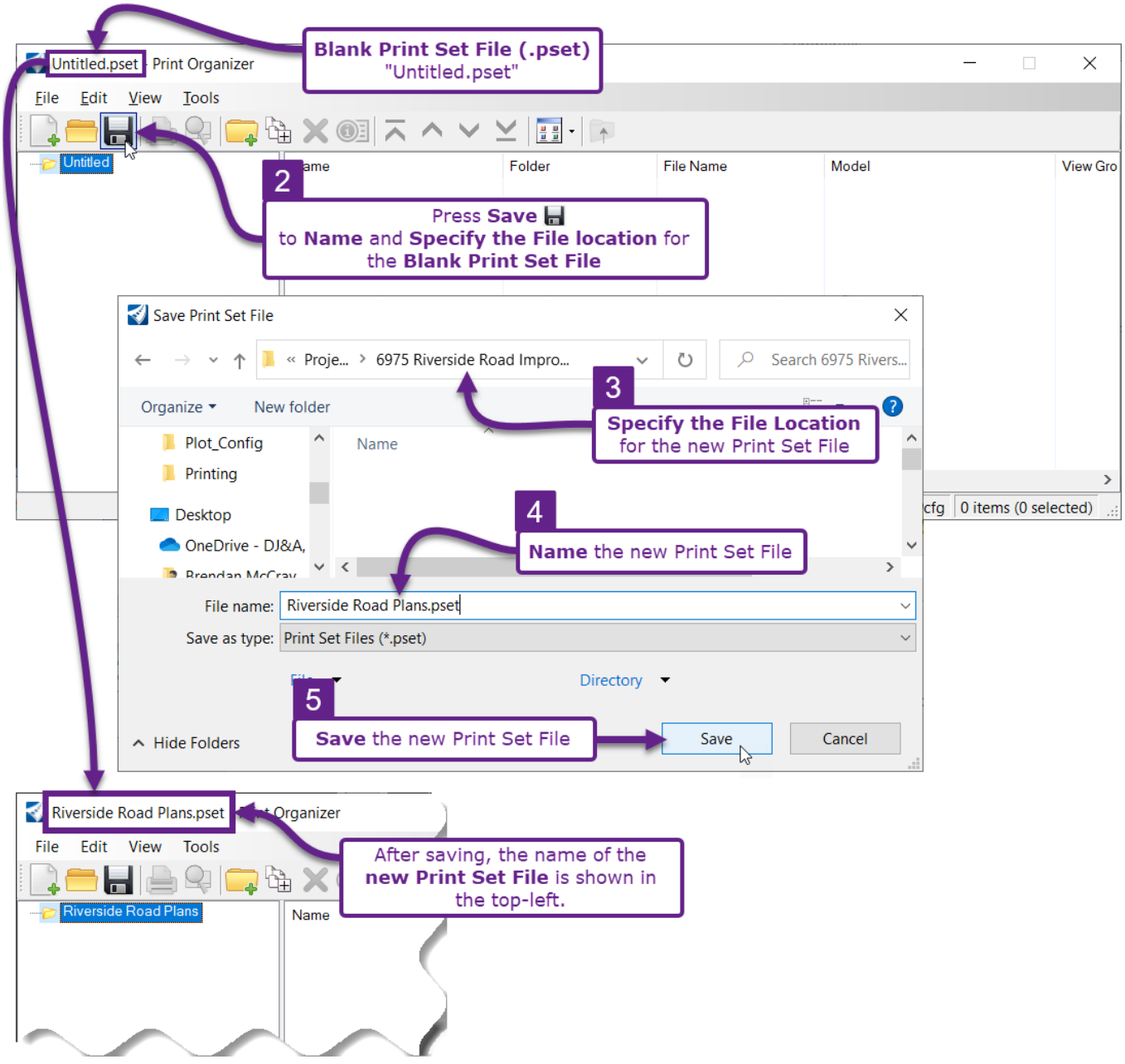
A new Print Set File (.pset) is created directly from the *Print Organizer.*

ALTERNATIVELY: The *Sheet Index* can be used to generate a new Print Set File (.pset). All *Sheet Models* in the Sheet Index are automatically arranged into a Print Set File (.pset). See *19B - Sheet Index Printing*.

> ***EFL Users:*** EFL uses a blank Print Set File (.pset) template for plan set printing. Do NOT create new Print Set File (.pset), Instead, copy the default Print Set File (.pset) to the project folder. Open the copied Print Set File (.pset) – as shown on the next page.

1	Access the Print Organizer. See *19A.1 Access the Print Organizer*.

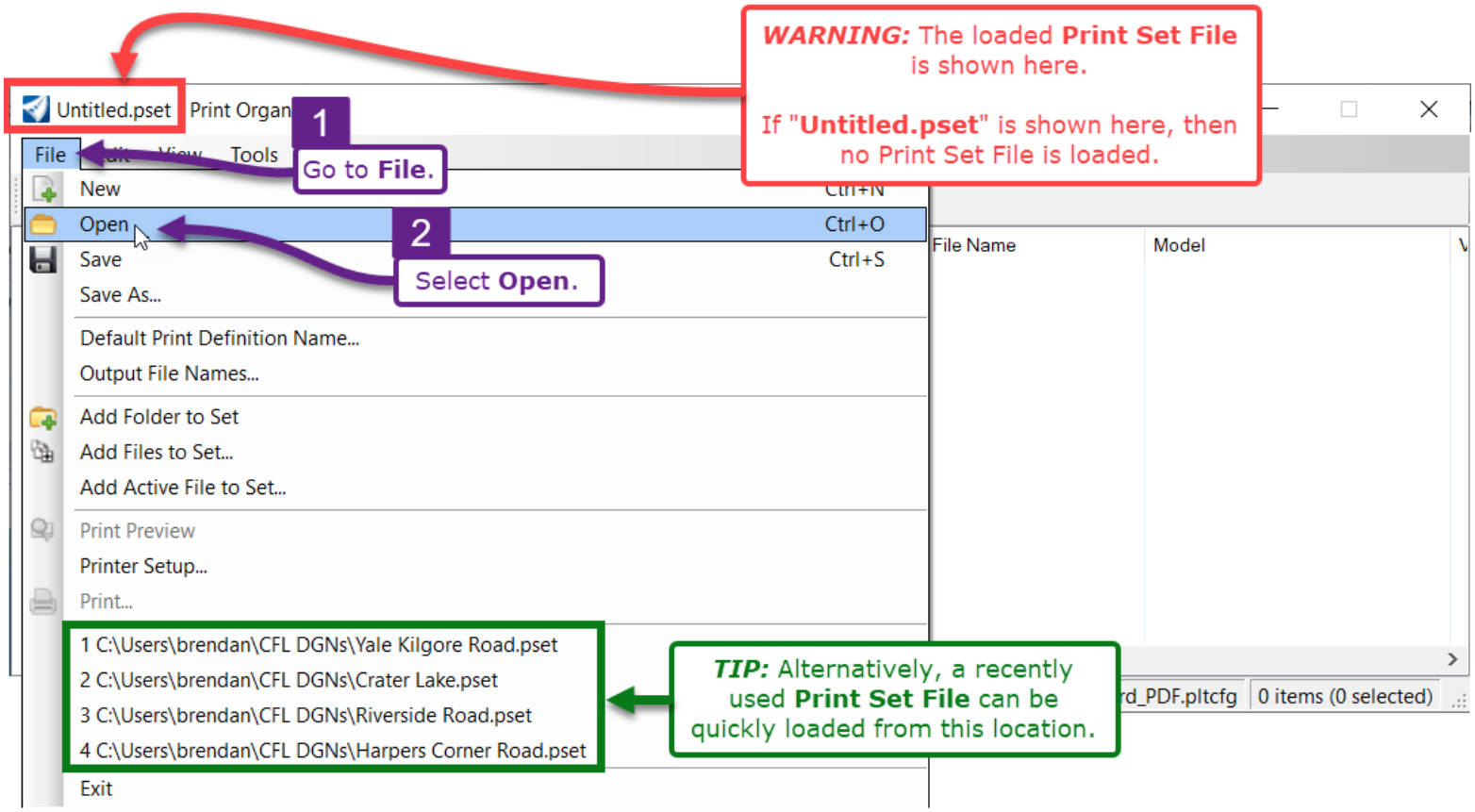
When the Print Organizer is initially opened, a blank Print Set File will be loaded. The blank Print Set File will be named "Untitled.pset". To create a new Print Set File, simply **Save** the blank Print Set File.

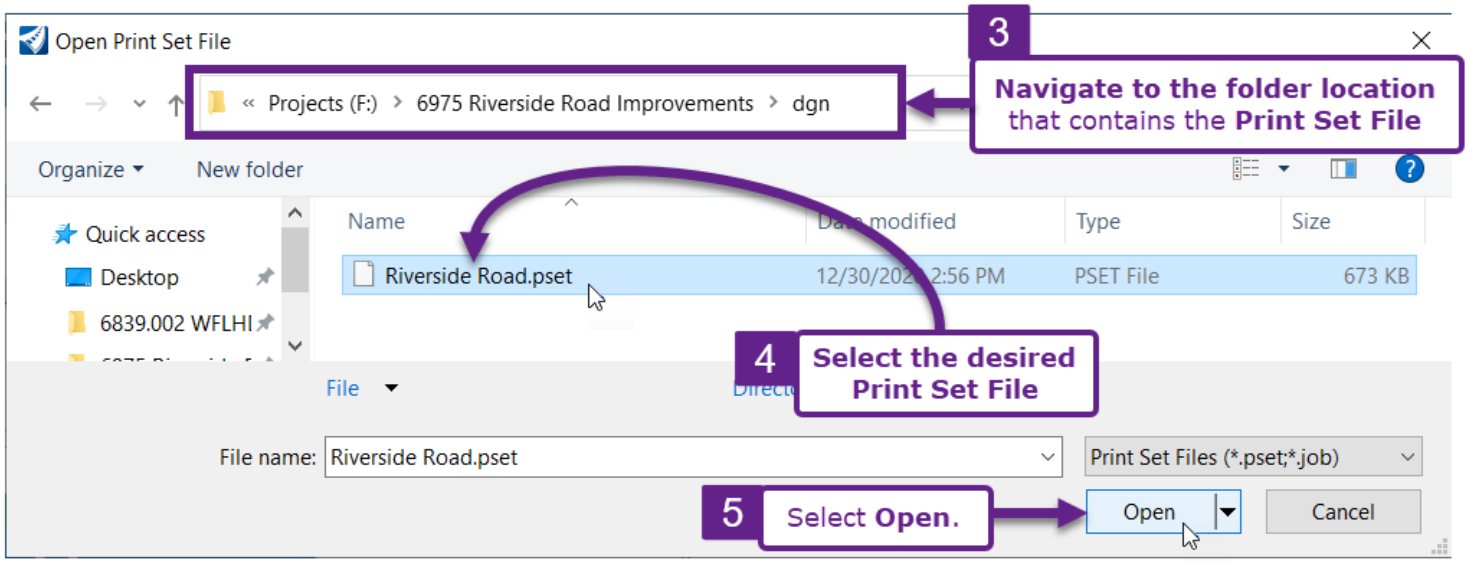


19A.3 Load a Print Set File (.pset)

When the Print Organizer is initially opened, there will be NO Print Set File (.pset) loaded. Go to ***File*** → ***Open*** to load a previously-created Print-Set File (.pset).

TIP: Recently used Print Set Files (.pset) are shown at the bottom of the *File* drop-down (see below). A recently used Print Set File (.pset) can be quickly loaded from this location.

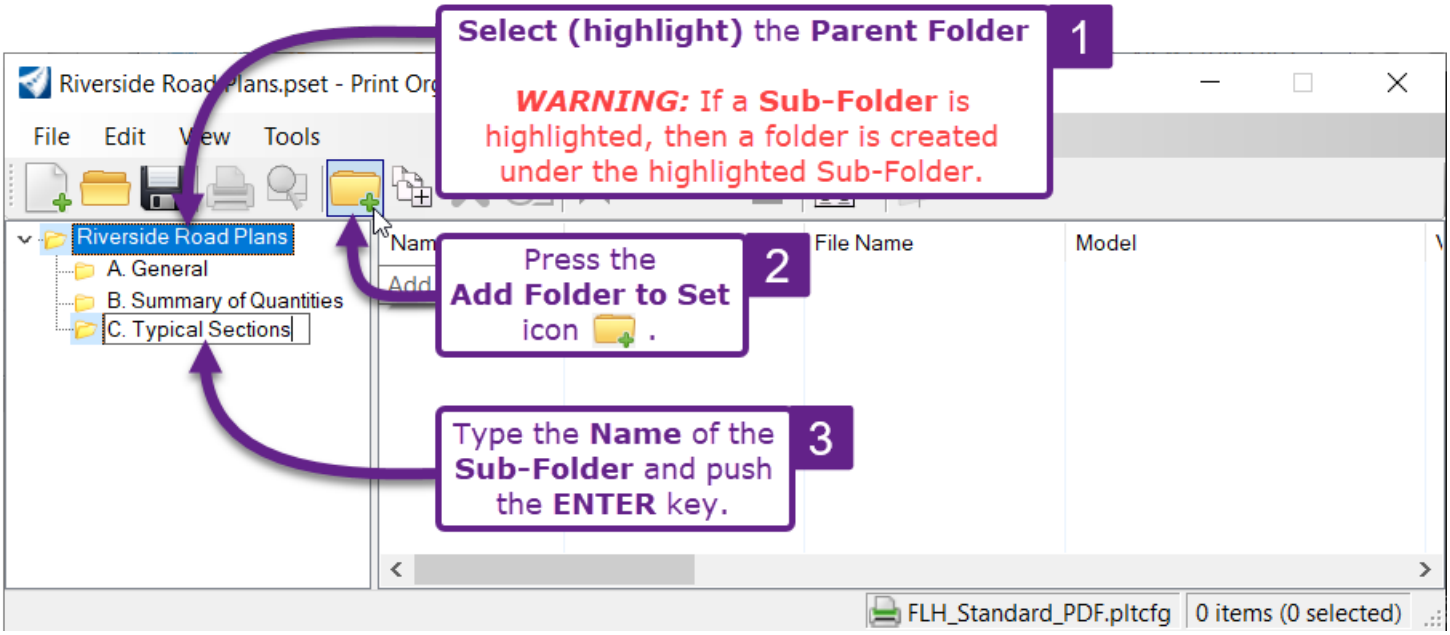


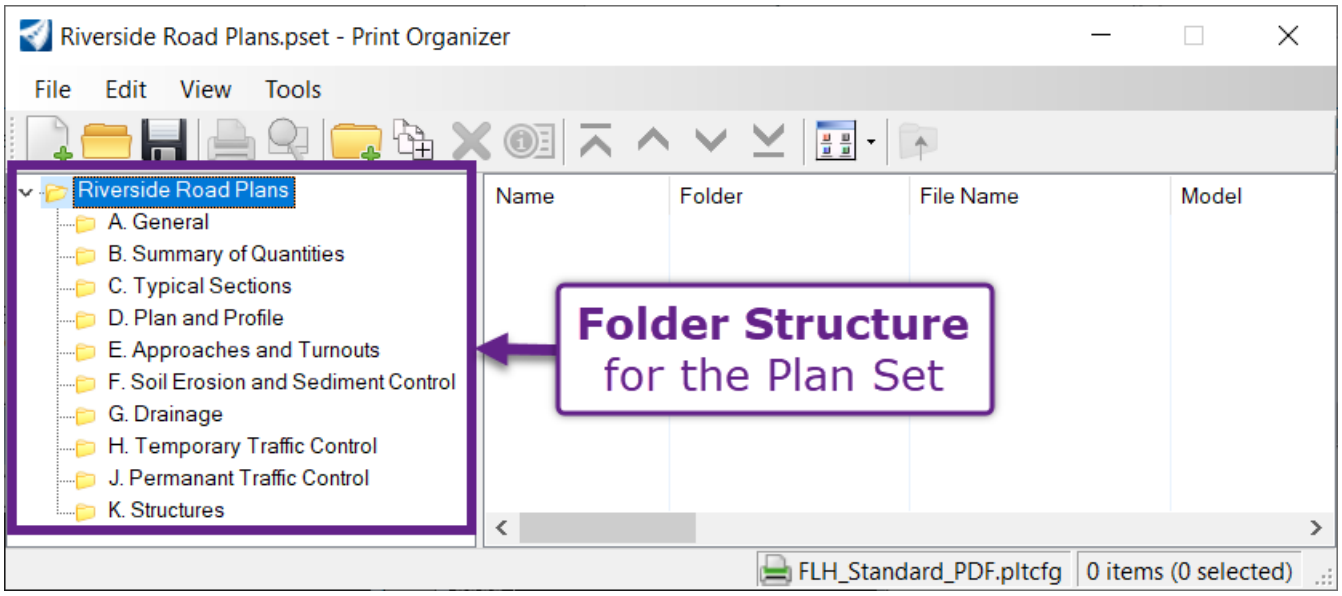


19A.4 Create Sub-Folders

BEST PRACTICE: When setting up a Print Set File (.pset) to print the entire Plan Set, create **Sub-Folders** for each **Section** in the Plan Set. If printing a single section of the Plan Set, then Sub-Folders are NOT necessary.

IMPORTANT: When viewed in PDF Software (i.e., Adobe, Blue-Beam), a bookmark is created for each **Sub-Folder**. Assign logical names to **Sub-Folders**. **Sub-Folder** names should agree with the plan set organizational scheme.





19A.5 Add Sheets to the Print Set File (.pset)

The following types of sheets can be added to the Print Set File (.pset):

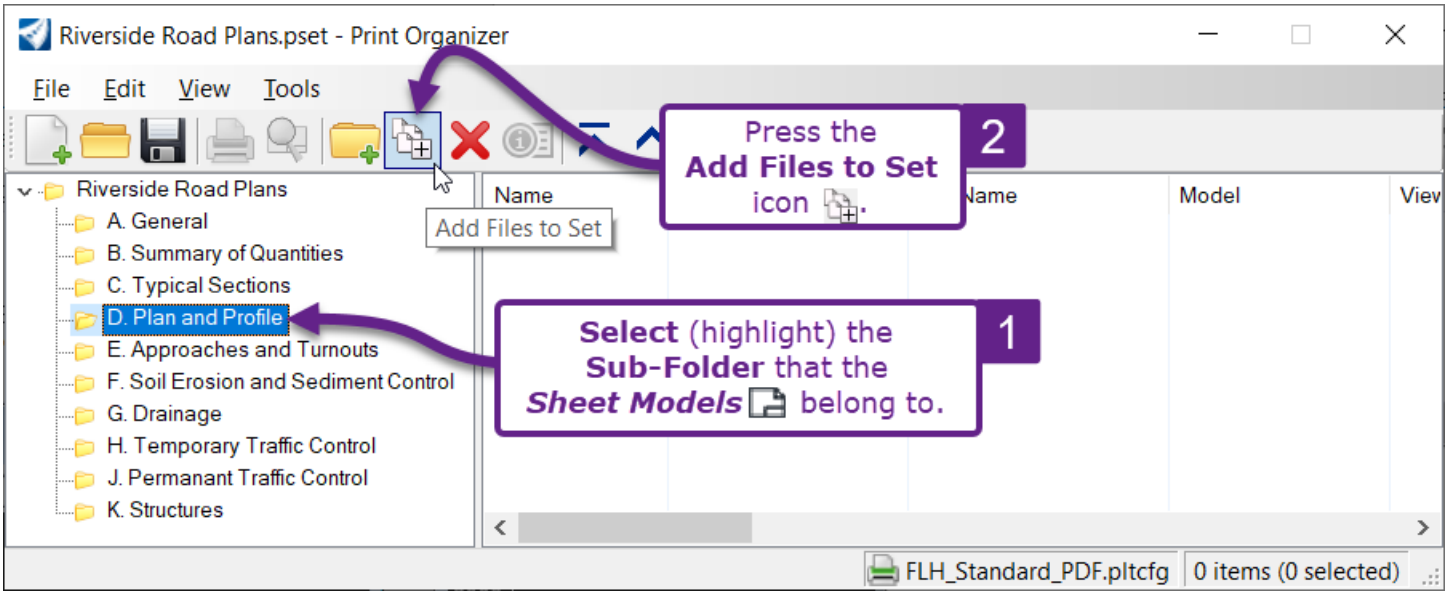
Sheet Models **:** Typically, printing is performed with *Sheet Models*. Each *Sheet Model* corresponds with a sheet in the Plan Set. See *19A.5.a Add Sheet Models to the Print Set File (.pset)*.

PDFs: PDFs that were created from Excel or other software can be incorporated into the Print Set File (.pset). For example, Summary of Quantities PDFs (i.e., B-Sheets generated from Masterworks) can be added to the Print Set File (.pset). By doing so, external PDFs do NOT have to be manually inserted into the Plan Set PDF. See *19A.5.b Add PDFs to the Print Set File (.pset)*.

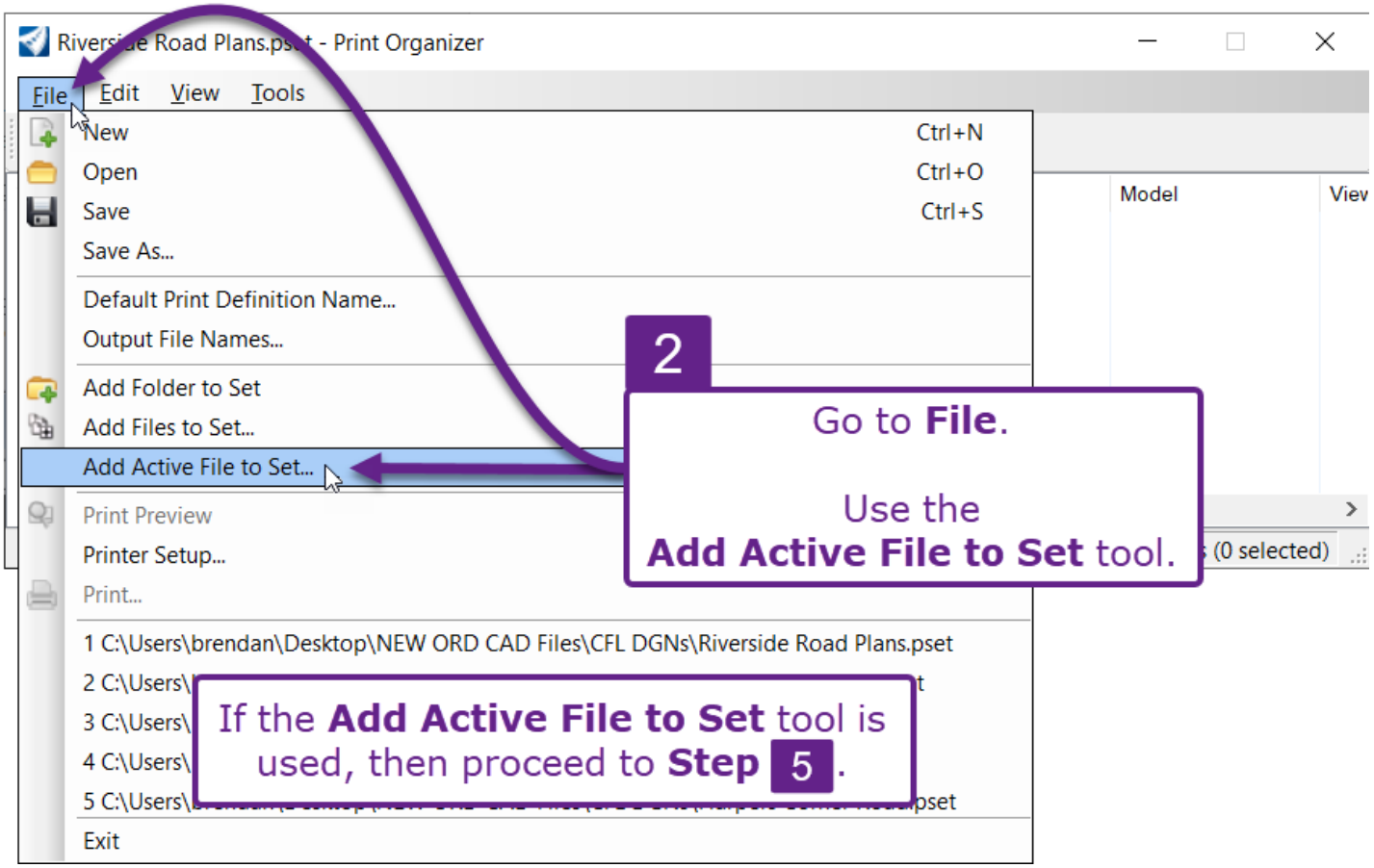
2D Design Model **Sheets:** With Legacy Software, such as GEOPAK and ORD SS4, plan production and printing were performed in the *2D Design Model*. Legacy Detail Files are occasionally encountered and incorporated into plan sets. Legacy Files contain a Plot Shapes and/or Fences to define the printing area for each sheet. See *19A.5.c Add Sheets from the 2D Design model to the Print Set (.pset)*.

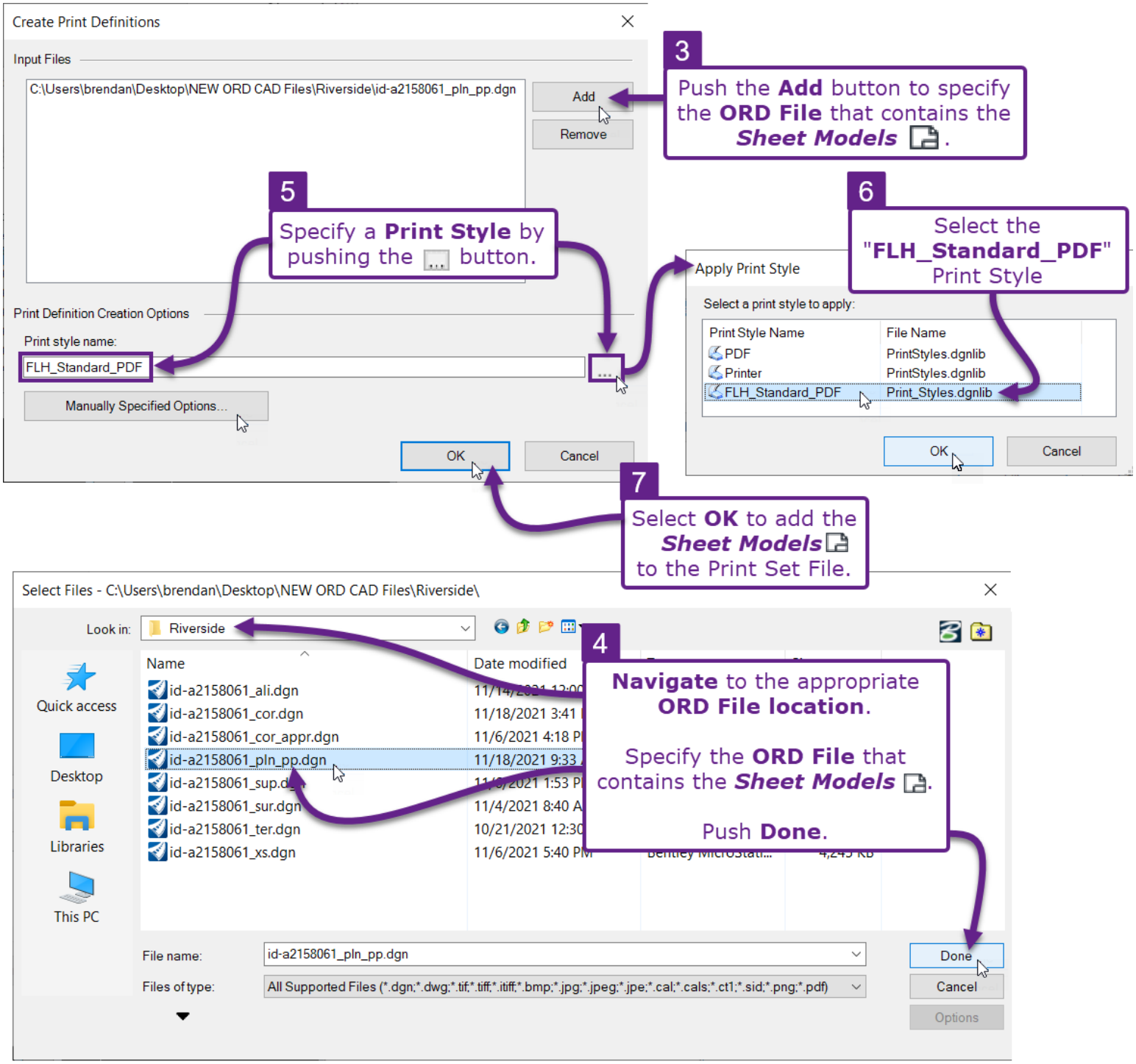
19A.5.a Add Sheet Models to the Print Set File (.pset)

The *Add Files to Set* tool is used to add *Sheet Models* to the current Print Set File (.pset). With this tool, an ORD File is selected and all *Sheet Models* contained in the selected ORD File are added to the Print Set File (.pset).



ALTERNATE TOOL: The *Add Active File to Set* tool will add all *Sheet Models* from the **currently opened ORD File** to the Print Set File (.pset). After this tool is used, proceed to Step 5.

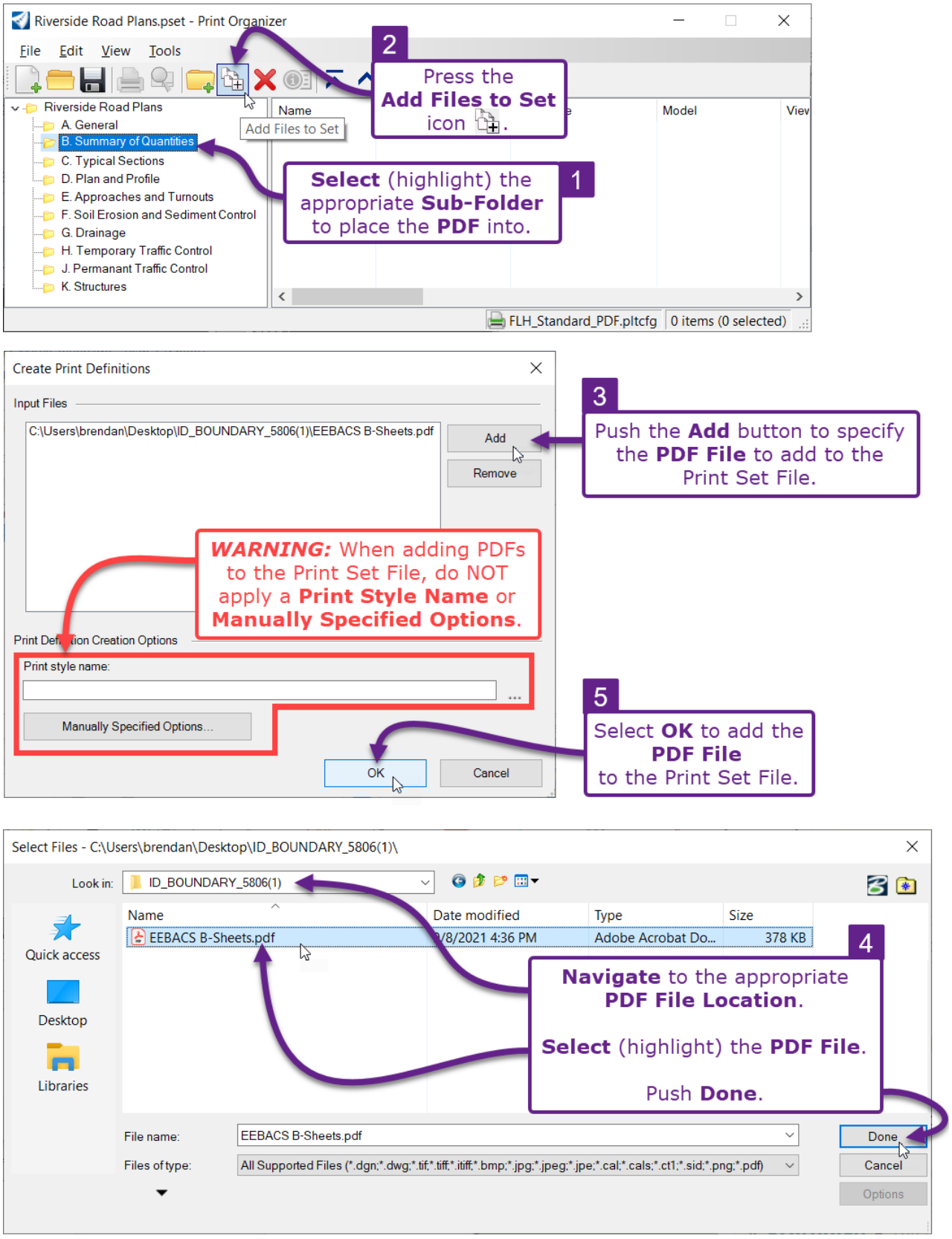



Create Print Definitions
Input Files
C:\Users\brendan\Desktop\NEW ORD CAD Files\Riverside\id-a2158061_pln_pp.dgn
Add
Remove
3
Push the Add button to specify the ORD File that contains the Sheet Models .
5
Specify a Print Style by pushing the ... button.
6
Select the "FLH_Standard_PDF" Print Style
Print Definition Creation Options
Print style name:
FLH_Standard_PDF
Manually Specified Options...
OK
Cancel
Apply Print Style
Select a print style to apply:
Print Style Name
File Name
PDF
PrintStyles.dgnlib
Printer
PrintStyles.dgnlib
FLH_Standard_PDF
Print_Styles.dgnlib
OK
Cancel
7
Select OK to add the Sheet Models to the Print Set File.

Select Files - C:\Users\brendan\Desktop\NEW ORD CAD Files\Riverside\
Look in:
Riverside
4
Navigate to the appropriate ORD File location.
Specify the ORD File that contains the Sheet Models .
Push Done.
Quick access
Desktop
Libraries
This PC
Name
Date modified
id-a2158061_ali.dgn
id-a2158061_cor.dgn
11/18/2021 3:41
id-a2158061_cor_appr.dgn
11/6/2021 4:18
id-a2158061_pln_pp.dgn
11/18/2021 9:33
id-a2158061_sup.dgn
id-a2158061_sur.dgn
11/4/2021 8:40
id-a2158061_ter.dgn
10/21/2021 12:30
id-a2158061_xs.dgn
11/6/2021 5:40 PM
File name:
id-a2158061_pln_pp.dgn
Files of type:
All Supported Files (*.dgn;*.dwg;*.tif;*.tiff;*.itiff;*.bmp;*.jpg;*.jpeg;*.jpe;*.cal;*.cals;*.ct1;*.sid;*.png;*.pdf)
Done
Cancel
Options

19A.5.b Add External PDFs to the Print Set File (.pset)

In this example workflow, the Summary Quantity Sheets (B-sheets) PDFs are added to the Print Set File (.pset). This process is convenient because the Summary Quantity Sheets PDFs do NOT have to be manually inserted into plan set PDF.

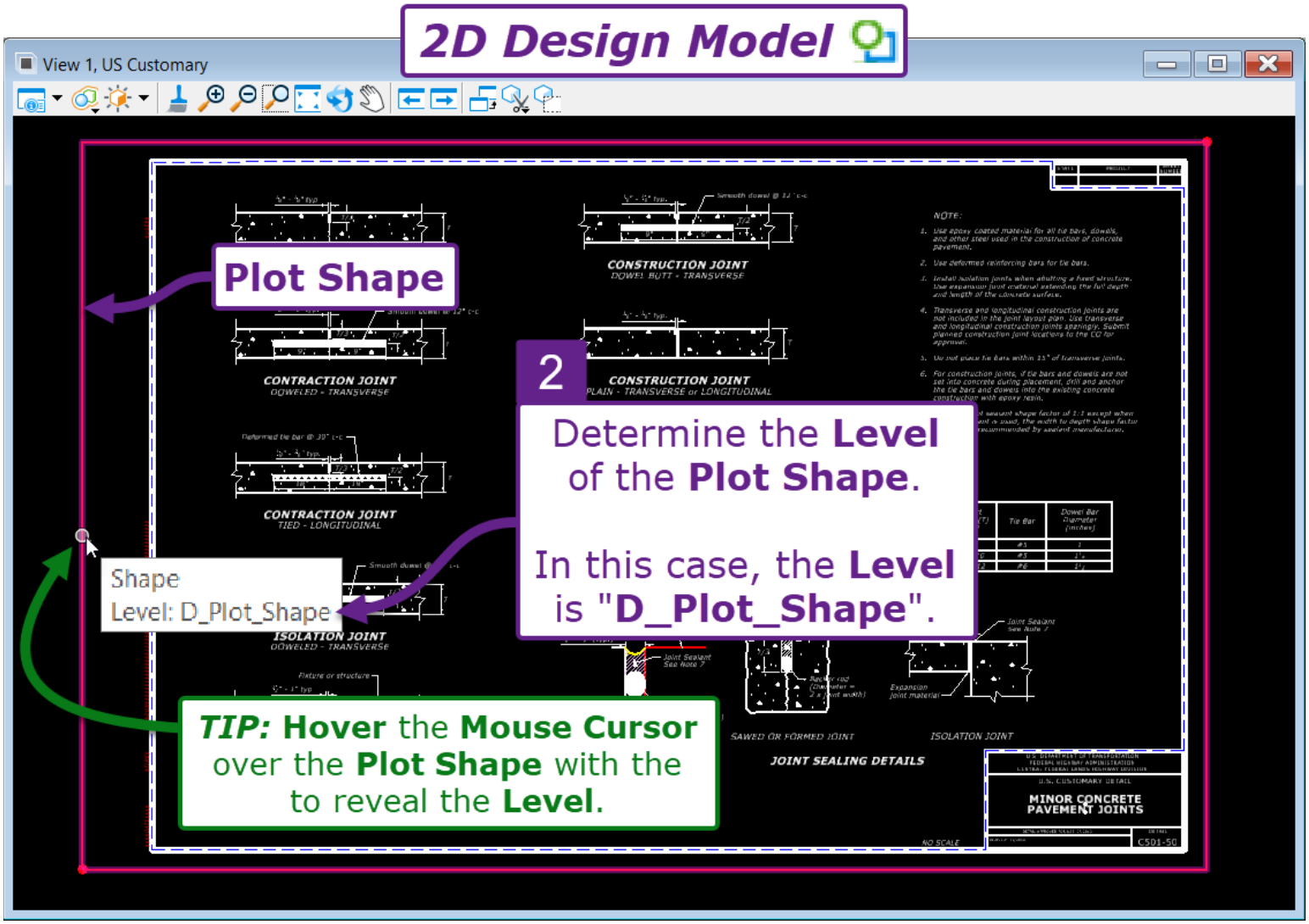


19A.5.c Add Sheets in the 2D Design Model to the Print Set File

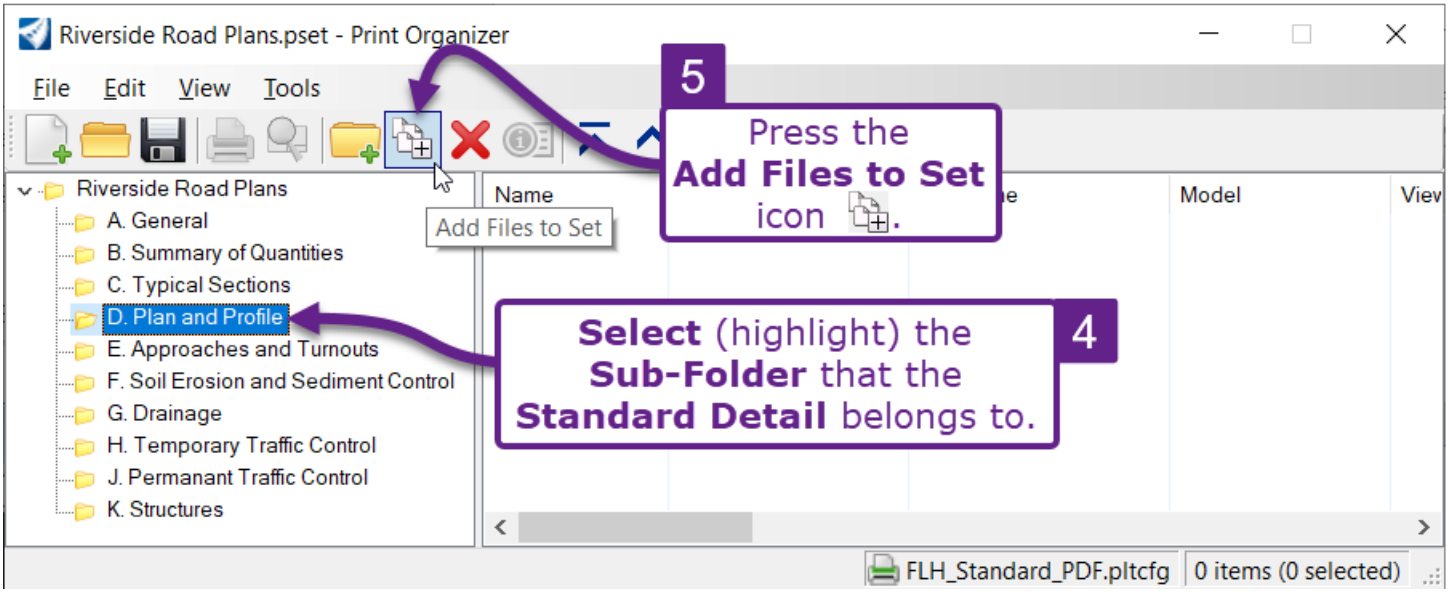
In legacy forms of the software, such as GEOPAK or OpenRoads SS4, printing was performed from *2D Design Models* (this is because *Sheet Models* were yet to be invented). In this workflow, a detail sheet, created with GEOPAK, is added to the Print Set File (.pset).

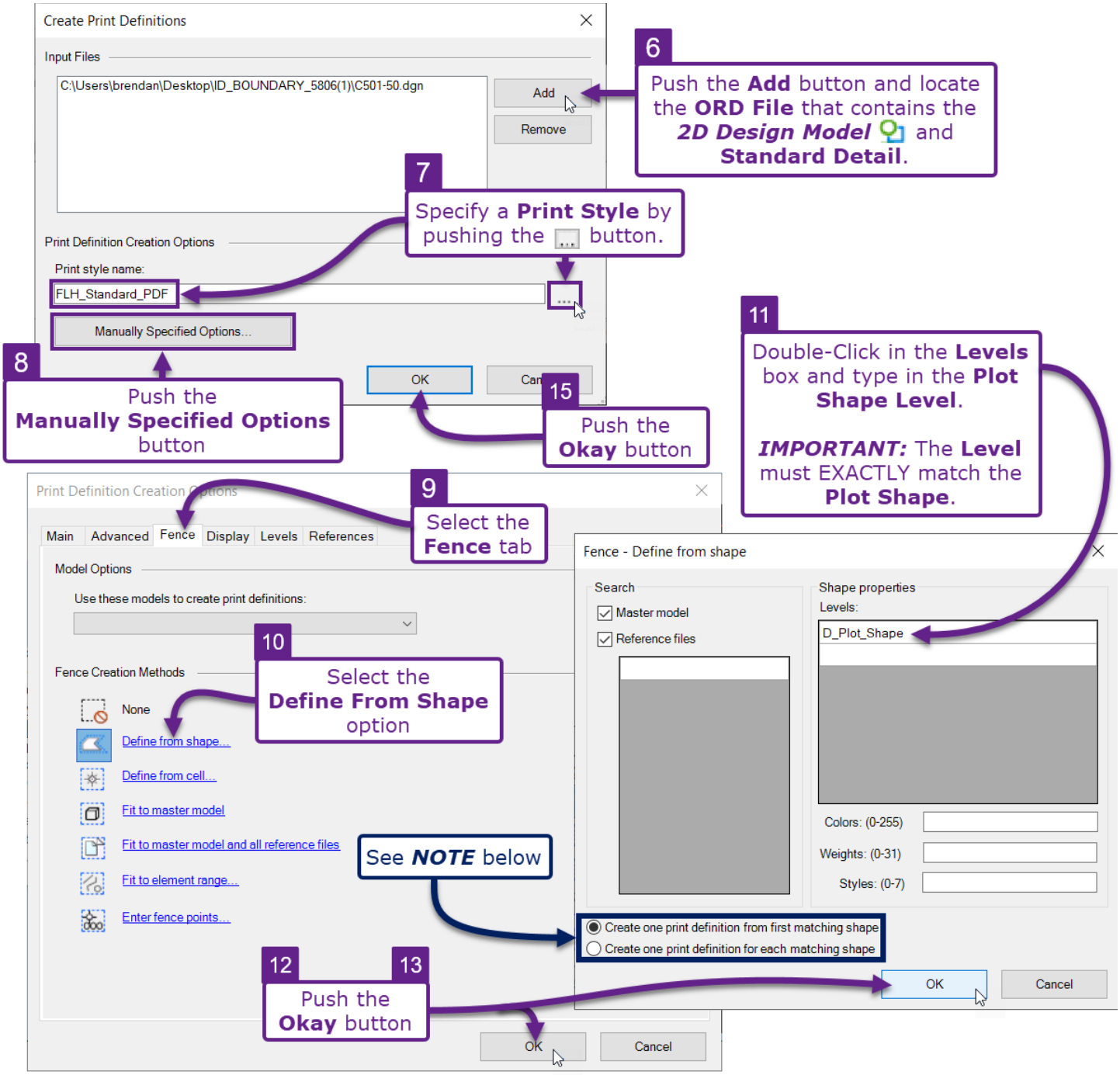
Legacy Files contain a *Plot Shape* element, which designates the area to be printed and represents the total page size.

1	Open the ORD File which contains the standard detail.
2	Determine the **Level** which the Plot Shape is assigned to. ***TIP:*** For FLH legacy Files, typically, the Plot Shape **Level** is "D_Plot_Shape". However, the Plot Shape **Level** should always be verified before adding to the Print Set File (.pset). ***NOTE:*** In later steps, the **Level** name will have to be manually typed into an input box. The **Level name must be typed in exactly** to be identified by the Print Organizer.



3	Open the *Print Organizer*. See *19A.1 Access the Print Organizer*.





NOTE: If the legacy file contains multiple Plot Shapes (i.e., multiple sheets in the same legacy file), then select the **Create one print definition for each matching shape** option. This option will seek out all Plot Shapes in the legacy File. With this option, a sheet will be added to the Print Set File (.pset) for each Plot Shape.

Use the default option, **Create one print definition from first matching shape**, if the legacy file contains a single Plot Shape/Sheet.

19A.6 Print Properties, the FLH Pen Table, and Color Prints

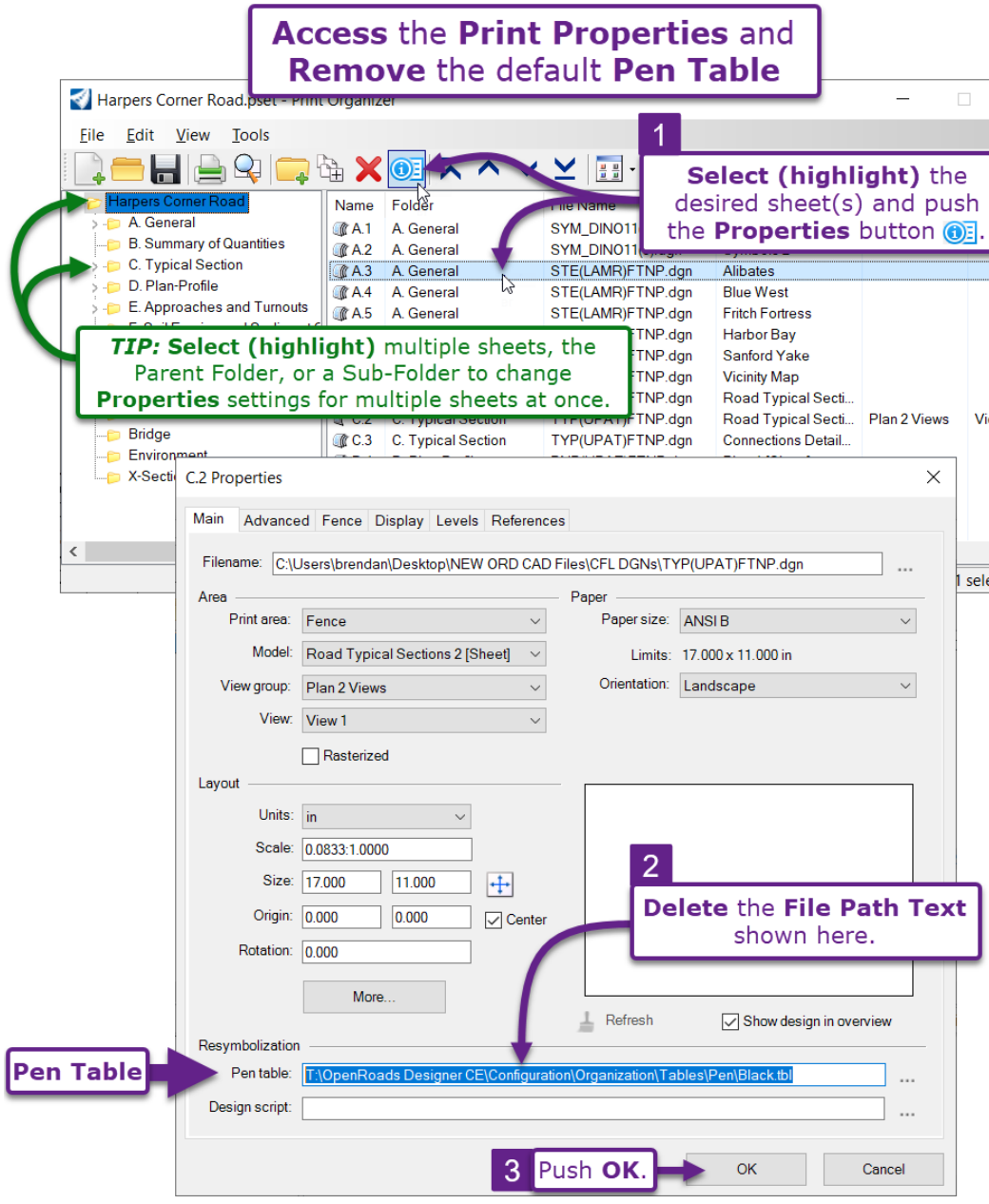
When the "FLH_Standard_PDF" Print Style is applied, NO other Print Properties settings must be configured.

> ***TIP:*** The "FLH_Standard_PDF" Print Style is applied when sheets are added to the Print Set File (.pset). See **STEP 5** in *19A.5.a Add Sheet Models to the Print Set File (.pset)*.

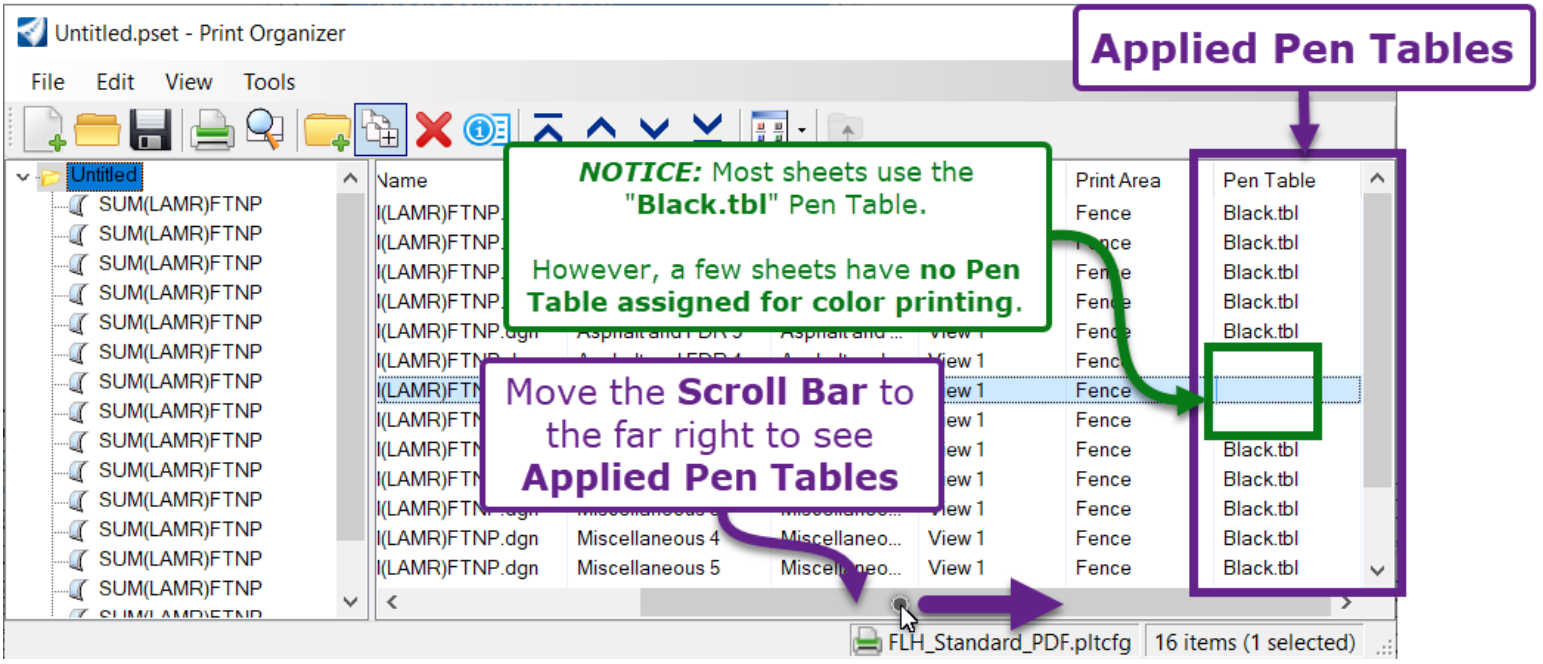
However, **to print a sheet in color, the FLH Pen Table must be removed**. For more information on color printing, see *19E - Color Printing Workflow*.

> ***NOTE:*** Elements on the AUX_01 – AUX_10 Levels are ignored by the FLH Pen Table. The AUX Levels will print in the color shown in the ORD Software. In the Level Manager, manipulate the Color symbology of AUX Level to the desired color for printing. See *19D – The FLH Pen Table, Custom Levels, and the AUX Levels*.

Remove the FLH Pen Table: To remove the default **Pen Table**, select a sheet(s) and push the **Properties** button. Highlight and delete the file path text shown in the **Pen Table** setting box.



TIP: Scroll the Print Organizer window to the far right to see the Pen Table applied to each sheet.

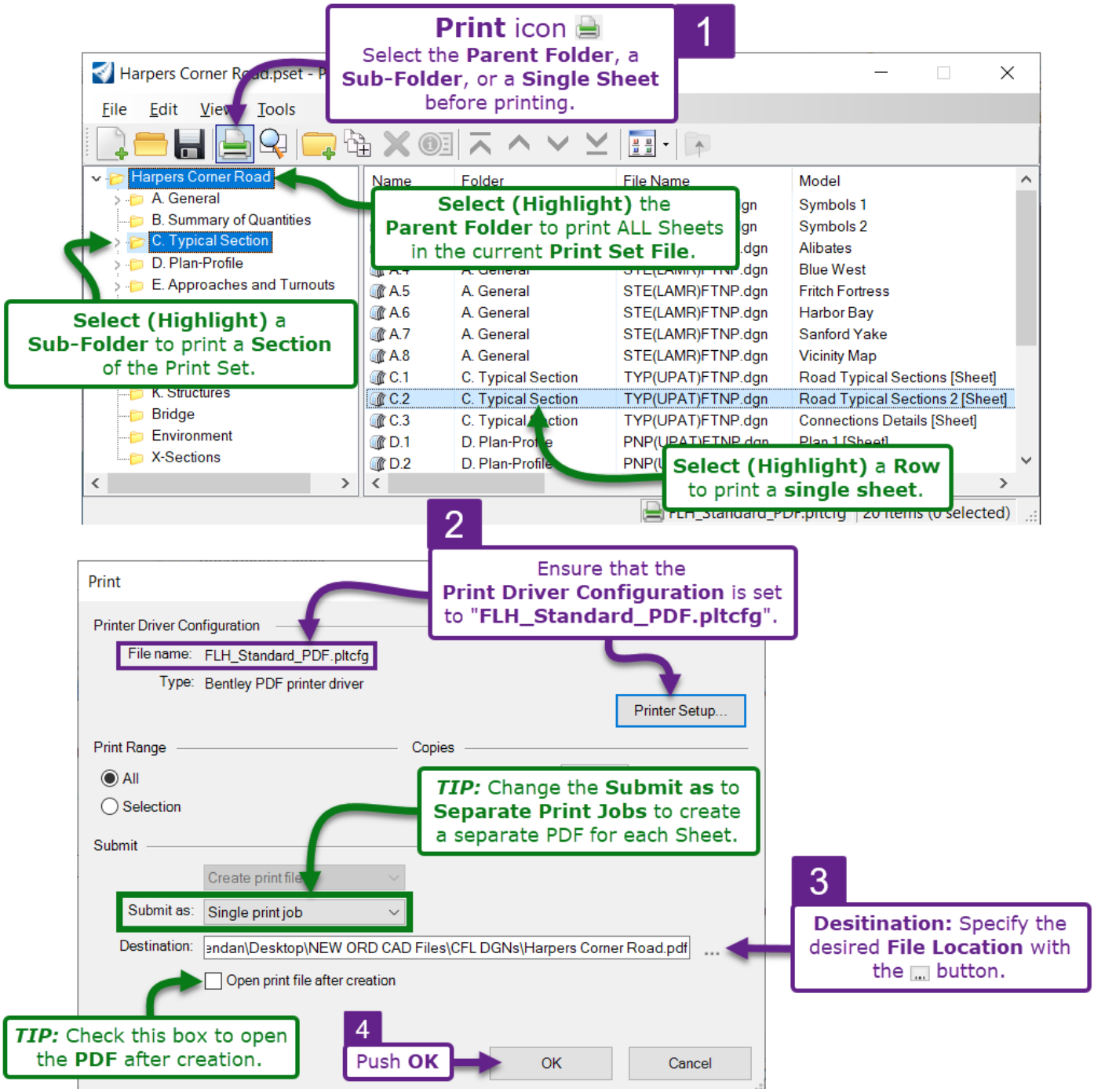


19A.7 Printing the Print Set File (.pset)

Before printing select (highlight) one of the following:

- an individual Plan Sheet,
- a Sub-Folder (prints an individual section)
- the Parent Folder (prints the entire plan set)

Only the selected sheets or folder will be printed.



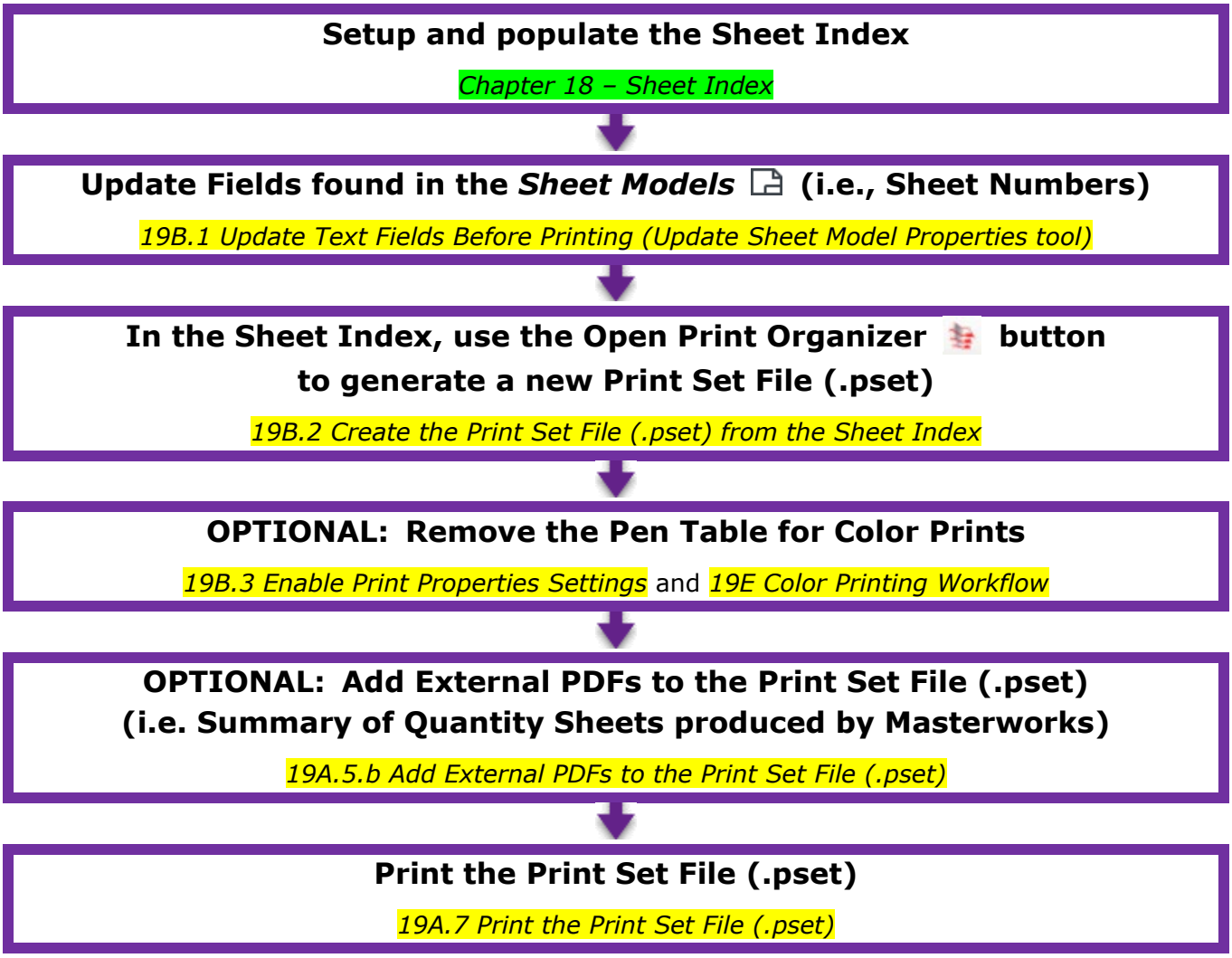
STEP 2: If the **Print Driver Configuration** is NOT set to "FLH_Standard_PDF.pltcfg", then push the *Printer Setup* button and locate it on in the FLH WorkSpace at the following location:

OpenRoads Designer CE 10.10\Configuration\Organization-Civil\FLH_Stds-WS10.10.21.00V\Printing\Plot_Config

19B – SHEET INDEX PRINTING

A Print Set File (.pset) can be generated directly from the Sheet Index.

The overall process for batch printing through the *Sheet Index* is shown below:



WARNING*: A brand-new Print Set File (.pset) is generated each time the *Open Print Organizer* tool is used from the Sheet Index. After initial generation from the Sheet Index, **save** the Print Set File (.pset). For future prints, do NOT go through the Sheet Index. Instead, re-access the Print Set File (.pset) through the Print Organizer as shown in *19.1 Access the Print Organizer* and *19A.3 Load a Print Set File (.pset)*.

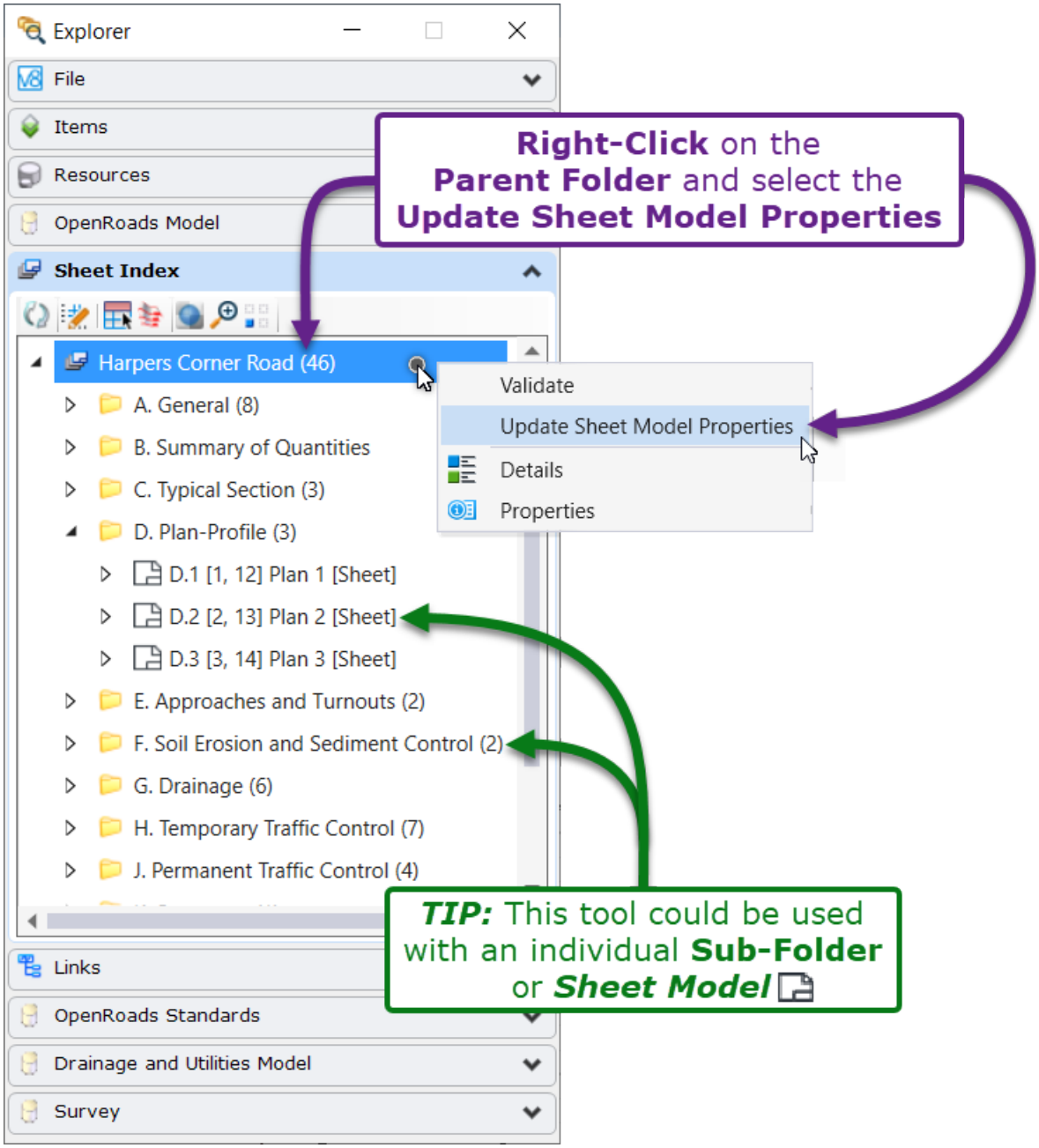
EFL WARNING*: The EFL Agency Print Set File (.pset) template CANNOT be used when printing through the Sheet Index.

19B.1 Update Text Fields Before Printing (Update Sheet Model Properties tool)

The *Update Sheet Model Properties* tool can be used on *Sheet Models* that belong to the Sheet Index. This tool will force all Sheet Numbers and Text Fields in the *Sheet Model* borders to automatically refresh.

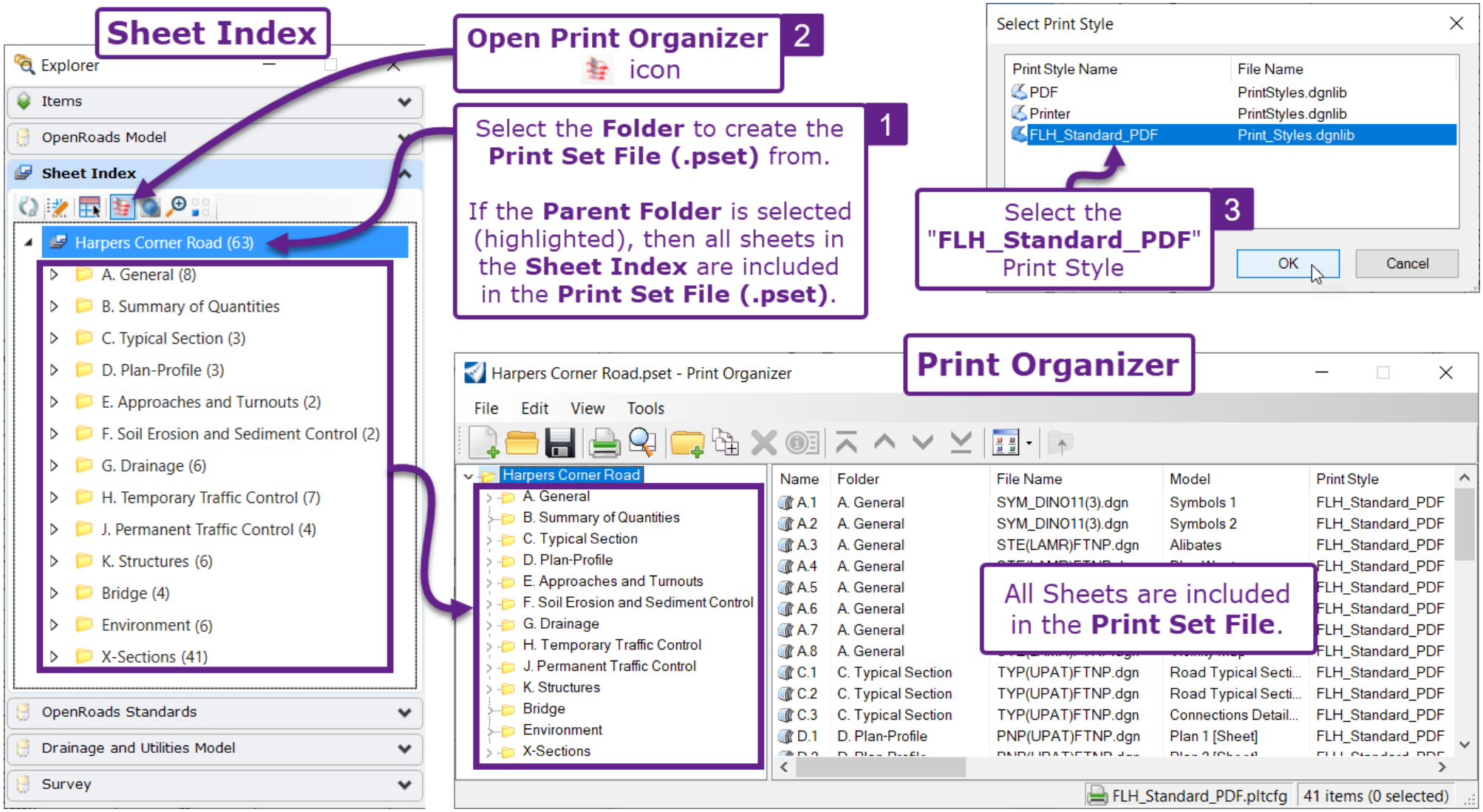
BEST PRACTICE: Always use this this tool before printing from the Sheet Index to ensure Sheet Numbers are up to date. When using this tool, select (highlight) the Parent Folder to update Field information for all *Sheet Models* in the Sheet Index.

WARNING: This tool does NOT update Fields found in the *2D Design Model* or *Drawing Models*. To update Fields found in *2D Design Model* or *Drawing Models*, see *19F.4 Update All Fields in an ORD File*.



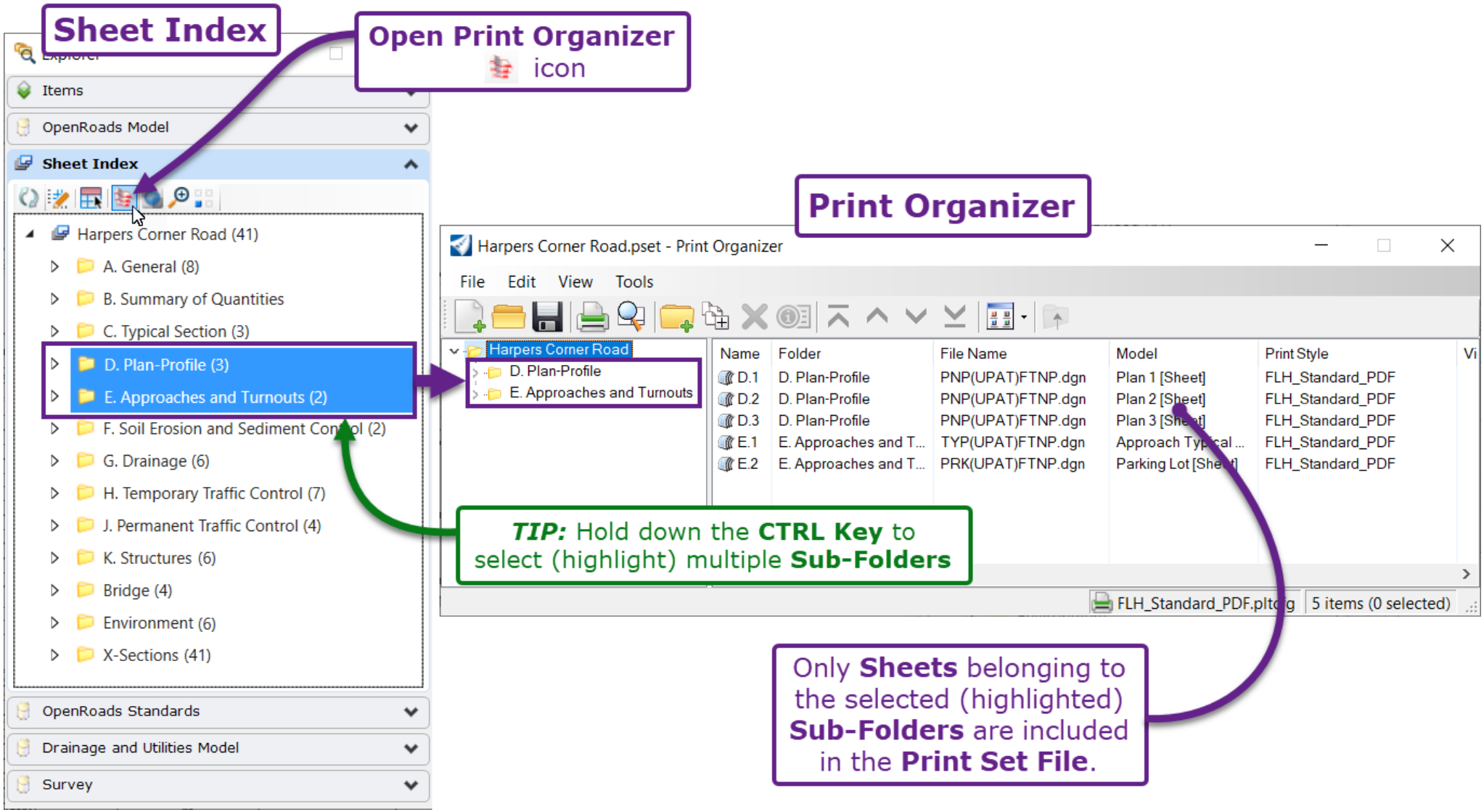
19B.2 Create the Print Set File (.pset) from the Sheet Index

The *Open Print Organizer* icon will create a Print Set File (.pset) from the currently selected/highlighted folder(s) in the Sheet Index. If the Parent folder is Selected then sheets contained within will be added to the Print Set Files (.pset).



***WARNING*:** A brand-new Print Set File (.pset) is generated each time the *Open Print Organizer* tool is used from the Sheet Index. If a project Print Set File (.pset) has already been generated, then print from that. See *19A.3 Load Print Set File (.pset)*.

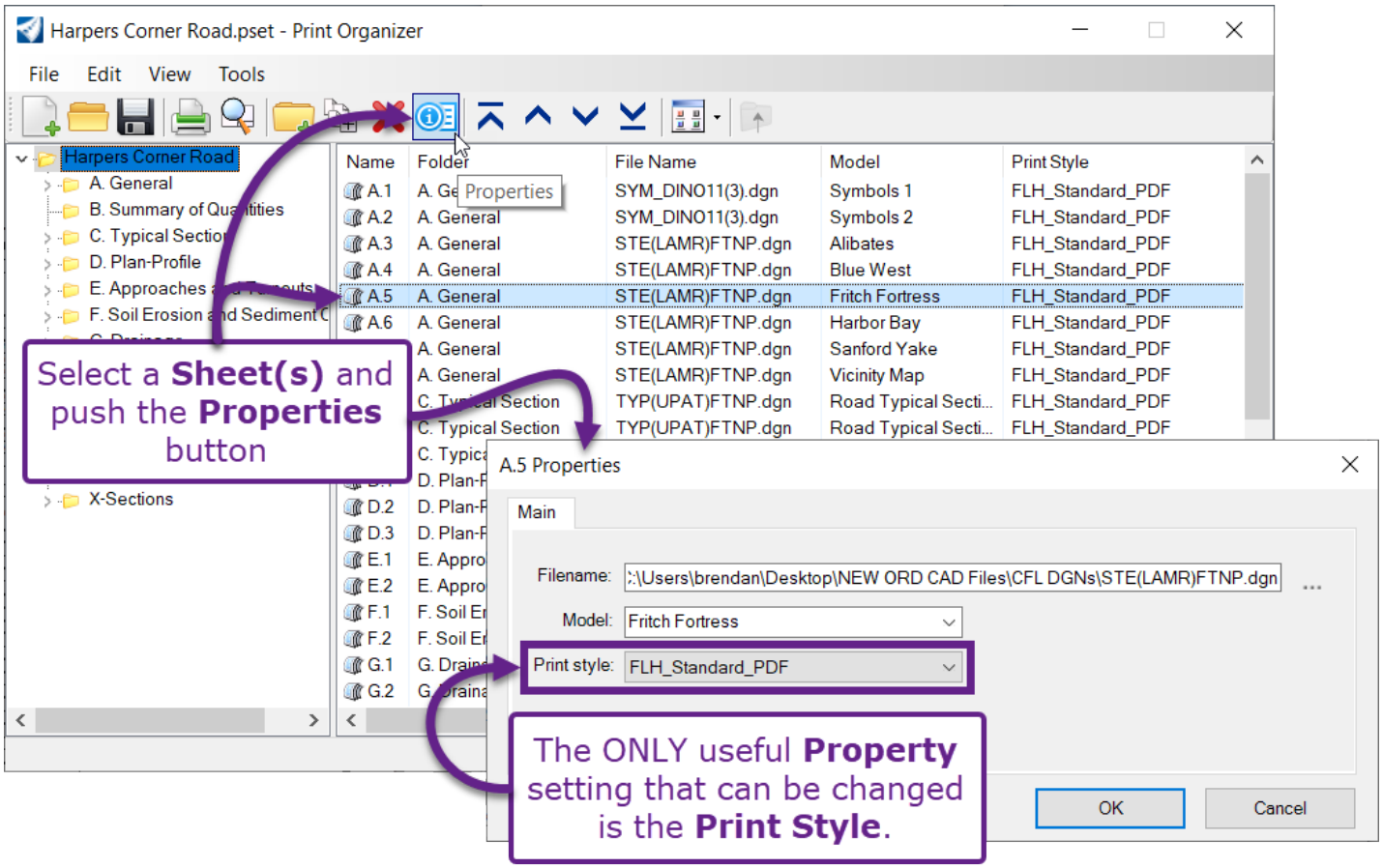
TIP: A Print Set File (.pset) can be created from one or more selected (highlighted) Sub-Folders. Hold down the CTRL key to select multiple Sub-Folders

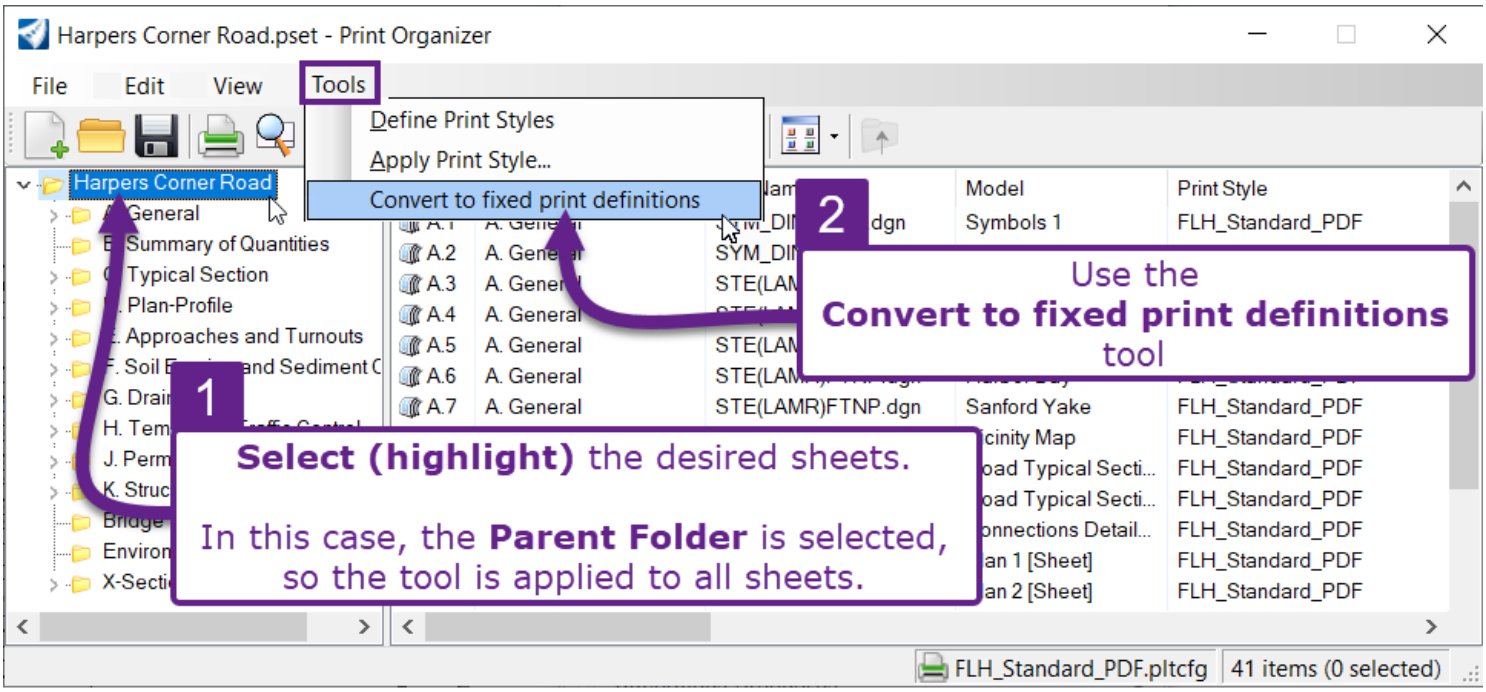


19B.3 Enable Print Properties Settings

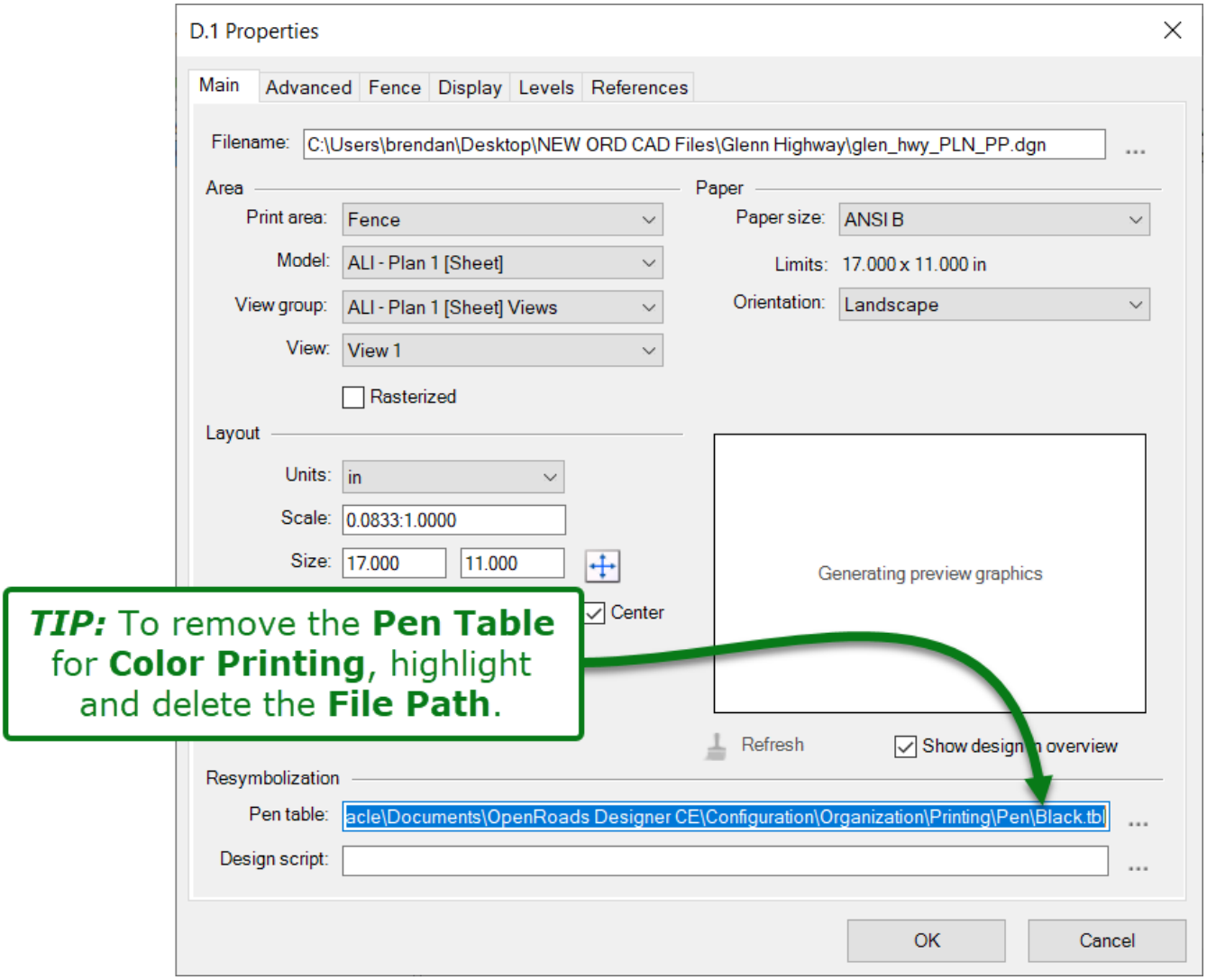
When printing through the Sheet index, initially, the ONLY Print setting available is the **Print Style**. Use the **Convert to fixed print definitions** tool to gain access to the full array of Properties setting.

NOTE: This tool must be used to gain access the **Pen Table** settings for color printing.



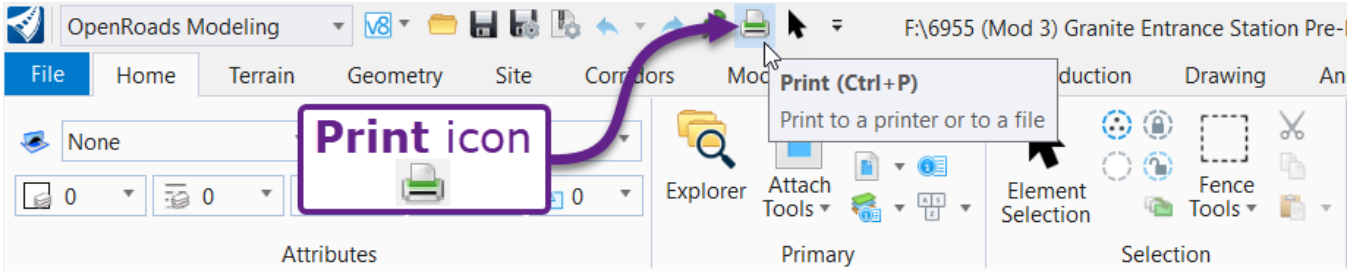


As shown below, after the **Convert to fixed Print definitions** tool is used, the full array of Properties settings is available for manipulation.



19C – SINGLE SHEET PRINTING

Single Sheet Printing is accomplished with the Print icon located in the ORD Software title bar.

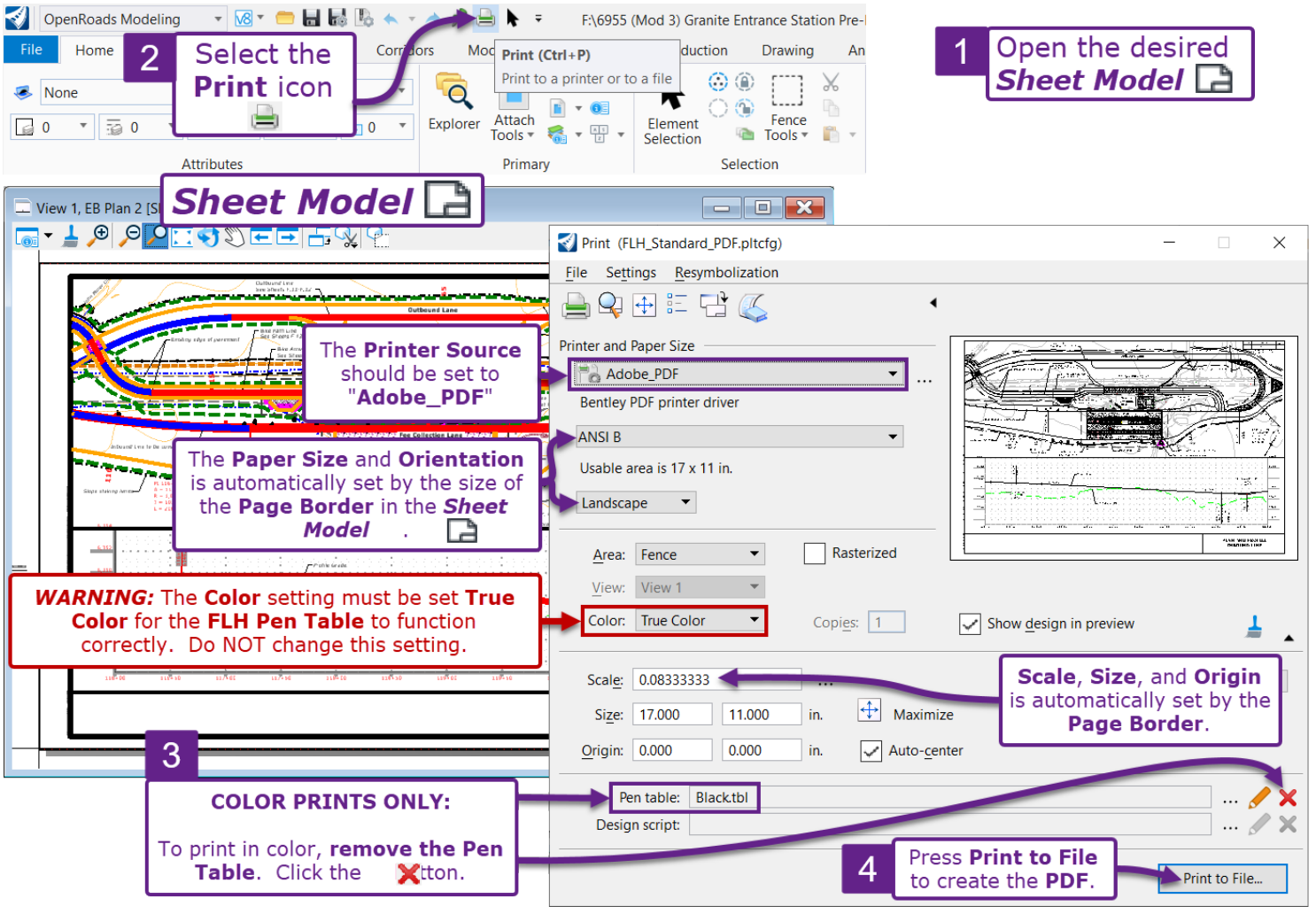


19C.1 Printing a Sheet Model

When printing from *Sheet Model*, **do NOT change any print settings**. All print settings are pre-configured by the FLH WorkSpace.

> ***EXCEPTION:*** For color prints, the **FLH Pen Table** ("Black.tbl") must be removed. To remove the Pen Table, click the button, as shown in the graphic below. For more information on color prints, see *19E – Color Printing Workflow*.

NOTE: Elements on the AUX_01 – AUX_10 Levels are ignored by the Pen Table. By default, the AUX Levels will print in the same color as shown in the ORD Software, unless manipulated. Use the Level Manager to manipulate the Color symbology of AUX Level to the desired printing color. See *19D – The FLH Pen Table, Custom Levels, and AUX Levels*.

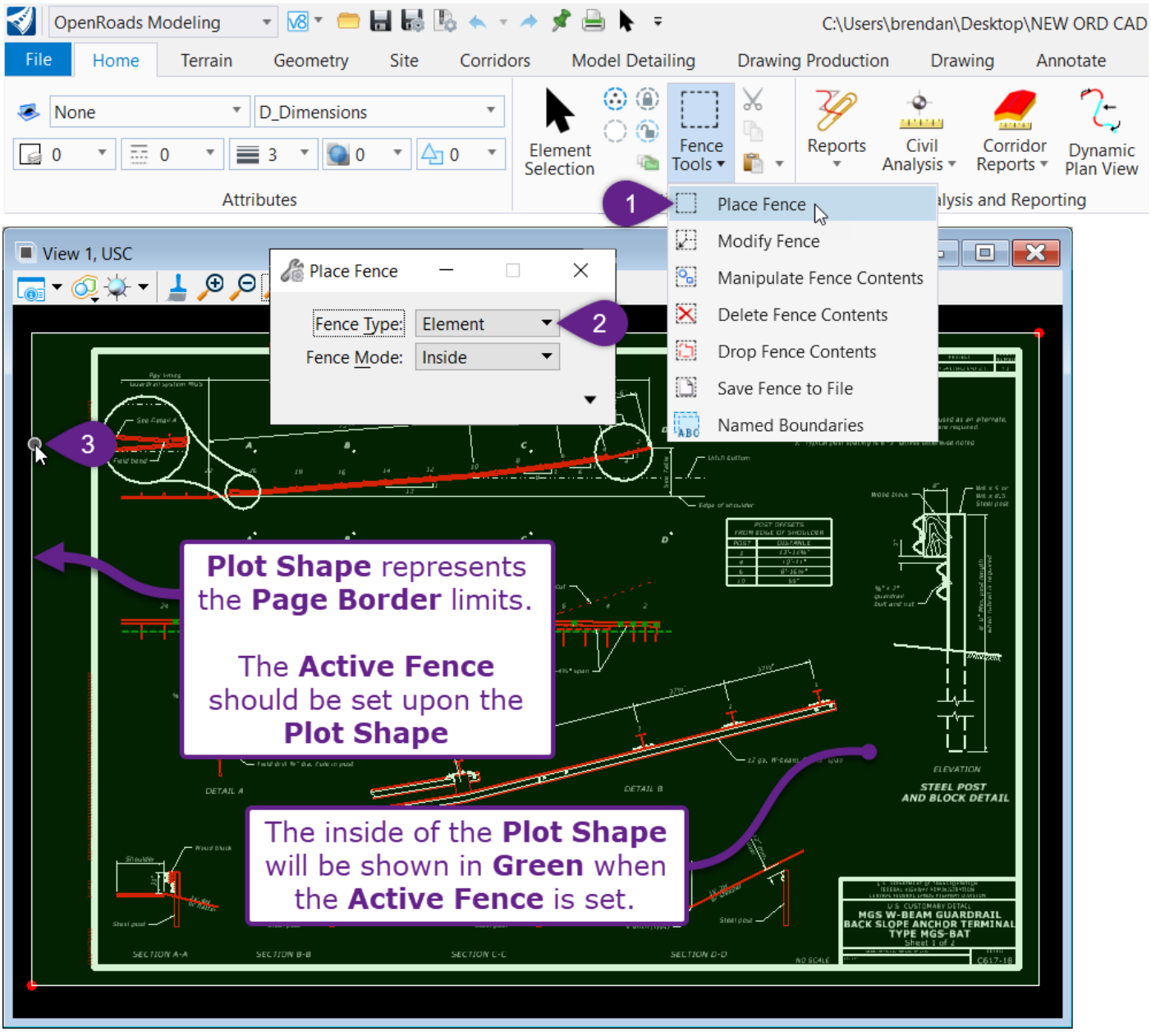


19C.2 Printing from the 2D Design Model with a Fence

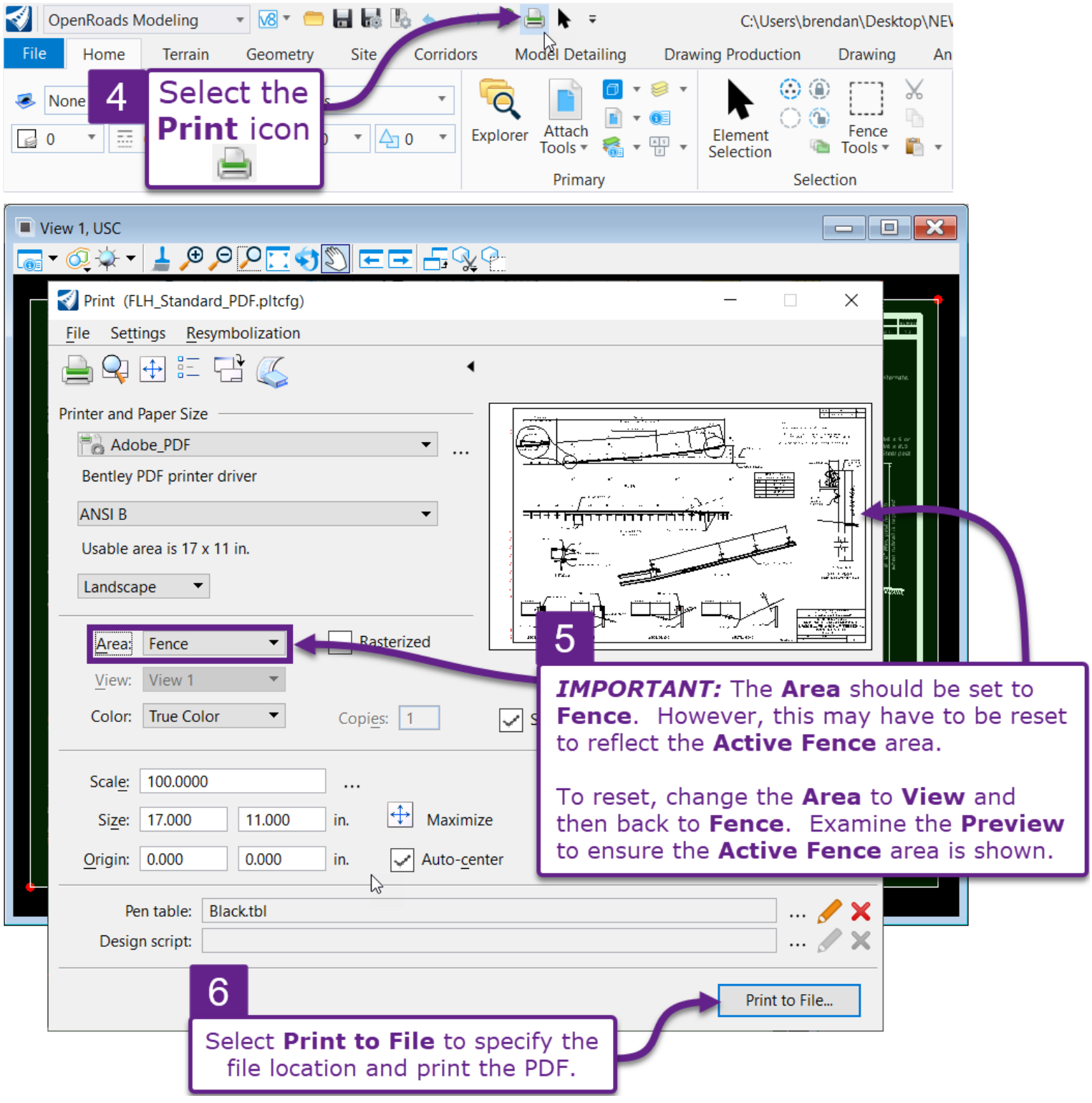
In legacy forms of the software, such as GEOPAK or OpenRoads SS4, printing was performed from *2D Design Models* (this is because *Sheet Models* were yet to be invented). In this workflow, a legacy detail is printed.

To specify the exact area of the *2D Design Model* to be printed, a Fence must be placed. Legacy Files contain a Plot Shape which represents the Page Border. Use the *Place Fence* tool with the *Fence Type* set to **Element** to select the Plot Shape area for printing.

1	From the Ribbon, select the *Place Fence* tool: [***OpenRoads Modeling*** → ***Home*** → ***Selection***].
2	In the *Place Fence* dialogue box, set the *Fence Type* to **Element**.
3	Left-Click on the Plot Shape/Page Border to set the active Fence.



WARNING: In the Print dialogue, it is possible that the Print Preview is displaying the wrong area. To display the correct area, change the **Area** to View and then change it back to **Fence**. Examine the Print Preview to ensure the correct area is displayed.



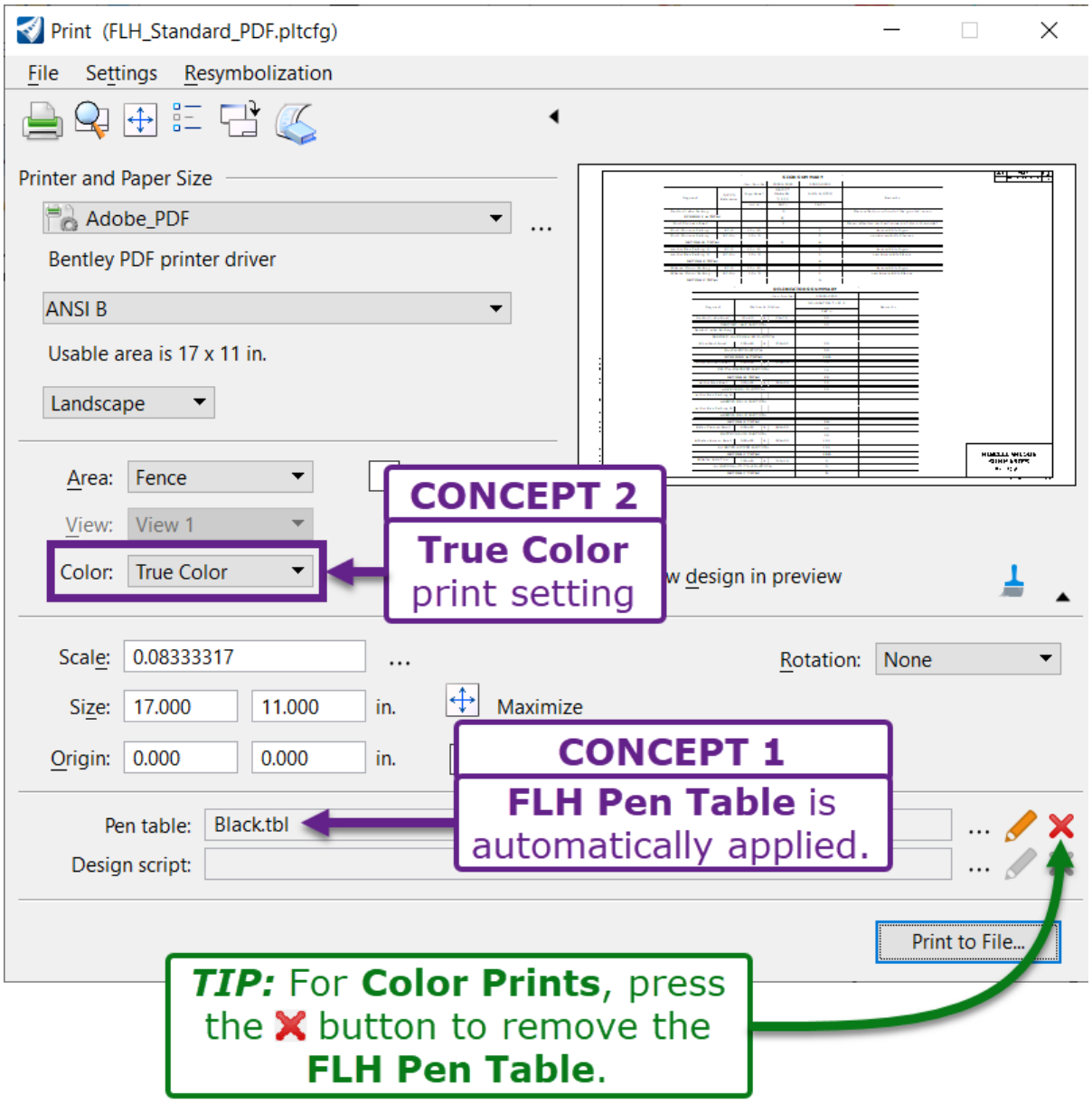
19D – THE FLH PEN TABLE, CUSTOM LEVELS, AND AUX LEVELS

A **Pen Table** works by reading the **Level** assigned to a geometrical or annotation element. In the background printing process, the Pen Table manipulates the element's **Color** for appropriate display in the printed PDF.

For plan set printing, FLH has a default Pen Table, which is named "Black.tbl". This Pen Table is used for black, white, and grey-scale printing. The following **CONCEPTS** explain how the FLH Pen Table functions:

CONCEPT 1: The FLH Pen Table ("Black.tbl) is automatically applied in the Print Properties. For conventional black and white printing, it is NOT necessary to manually apply the FLH Pen Table before printing.

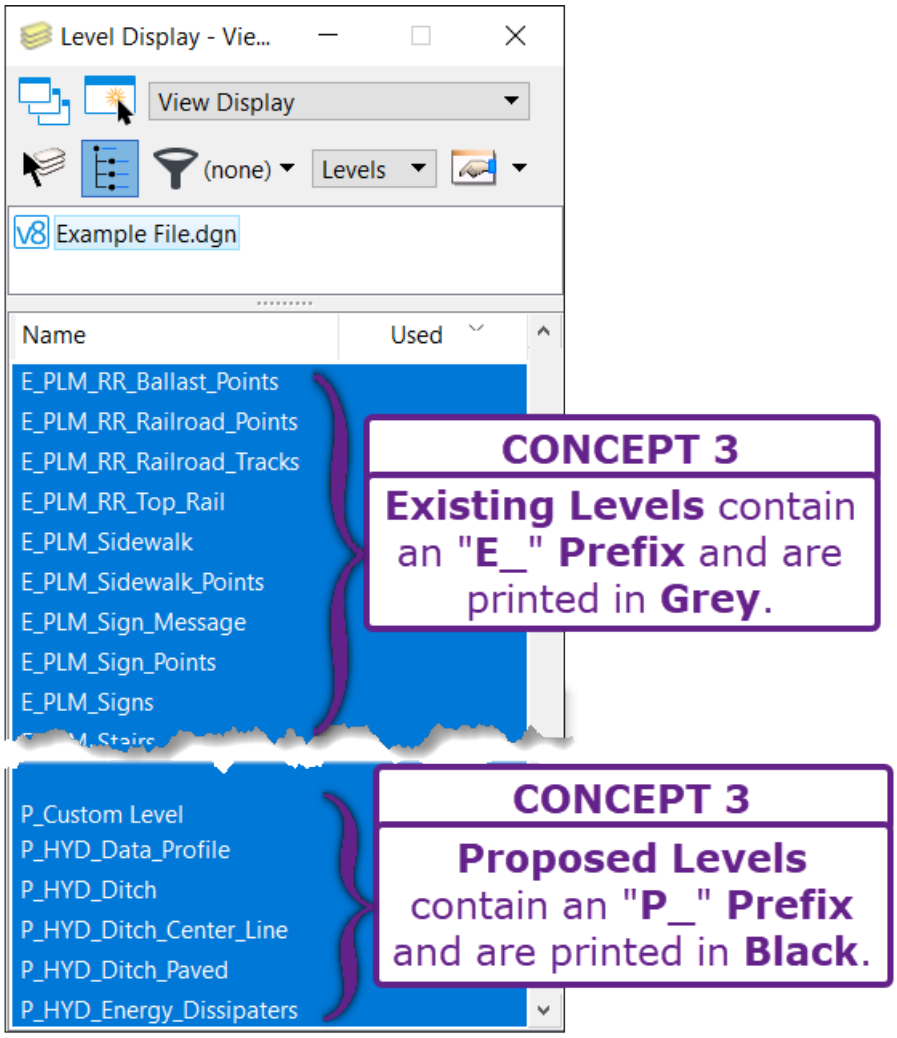
CONCEPT 2: The FLH Pen Table is designed to work with **True Color** print setting. The **True Color** option is set by default and should NOT be changed. With this setting, Levels that are NOT recognized by the FLH Pen Table are printed in the color shown in the ORD Software. Similarly, if the FLH Pen Table is removed, then ALL Levels will print in the color shown in the *Sheet Model* .



CONCEPT 3: The FLH Pen Table reads the **Prefix** in the **Level Name**. The **Level Name Prefix** determines the Level's color in the printed PDF:

Existing Levels (E_...): Levels that begin with an "**E_**...." prefix will print in a **shade of grey**. For example, the "**E_**PLM_Sidewalk" Level will print in grey.

Proposed Levels (P_...): Levels that begin with a "**P_**...." prefix will print in **black**. For example, the "**P_**HYD_Ditch" Level will print in black.

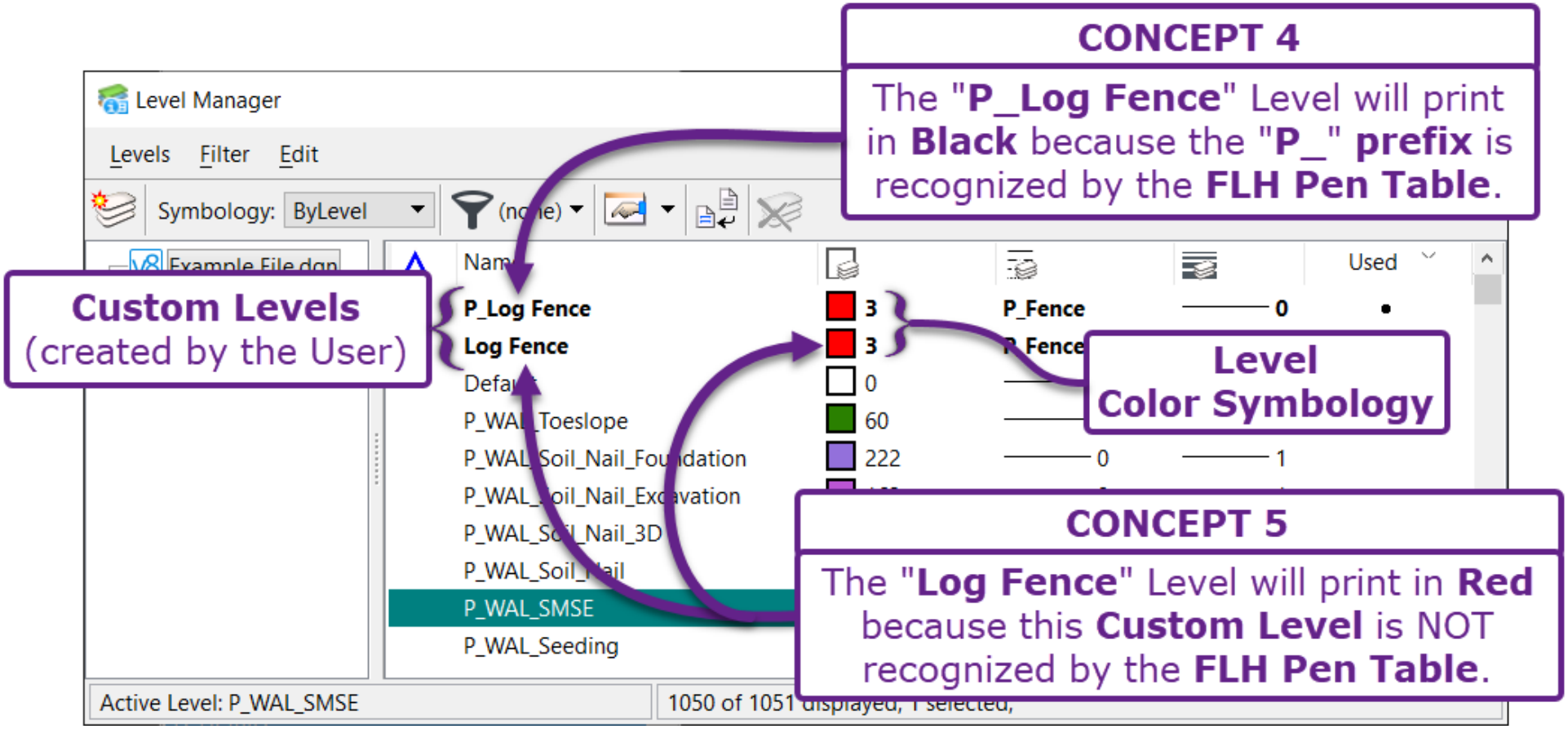


CONCEPT 4: Occasionally, a **Custom Level** must be created to accurately describe an atypical design feature. A **Custom Level** needs to be named with the appropriate **Prefix** to be recognized by the FLH Pen Table.

For example, a **Custom Level** that is named "**P_**Log Fence" would be recognized by the FLH Pen Table and printed in black.

CONCEPT 5: If a **Custom Levels** is NOT recognized by the FLH Pen Table, then it will be printed in the same color shown in the ORD Software.

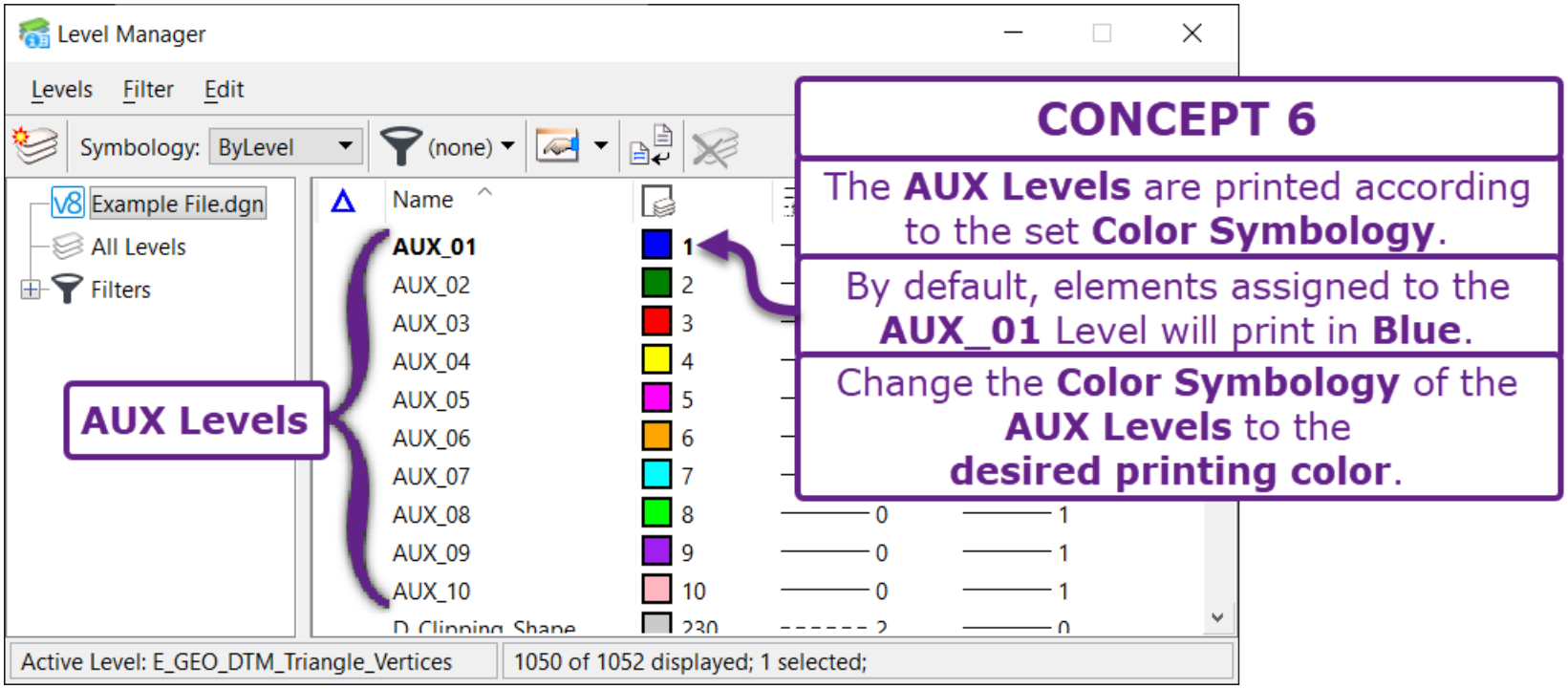
For example, a **Custom Level** that is named "Log Fence" would NOT be recognized by the FLH Pen Table and would print according to the **Color Symbology** set in the Level Manager.



BEST PRACTICE: When creating a **Custom Level**, either name it with an appropriate **Prefix** (i.e., E_ or P_) or set the **Color Symbology** to the desired printing color.

CONCEPT 6: The **AUX_01** – **AUX_10** Levels are intended for custom printing applications. By design, **AUX Levels are NOT recognized by the FLH Pen Table**. The **AUX Levels** will print according to their set **Color Symbology**. When using the **AUX Level**, override the Color Symbology to the desired printing color.

For example, the default **Color Symbology** for the AUX_01 Level is blue. In the printed PDF, elements assigned to the AUX_10 Level will be blue – unless the Level is overridden in the Level Manager.



IMPORTANT: When using AUX Levels, change the default Color Symbology to the desired printing color.

TIP: Use the **Color 0** to print elements on the AUX Level in **Black**.

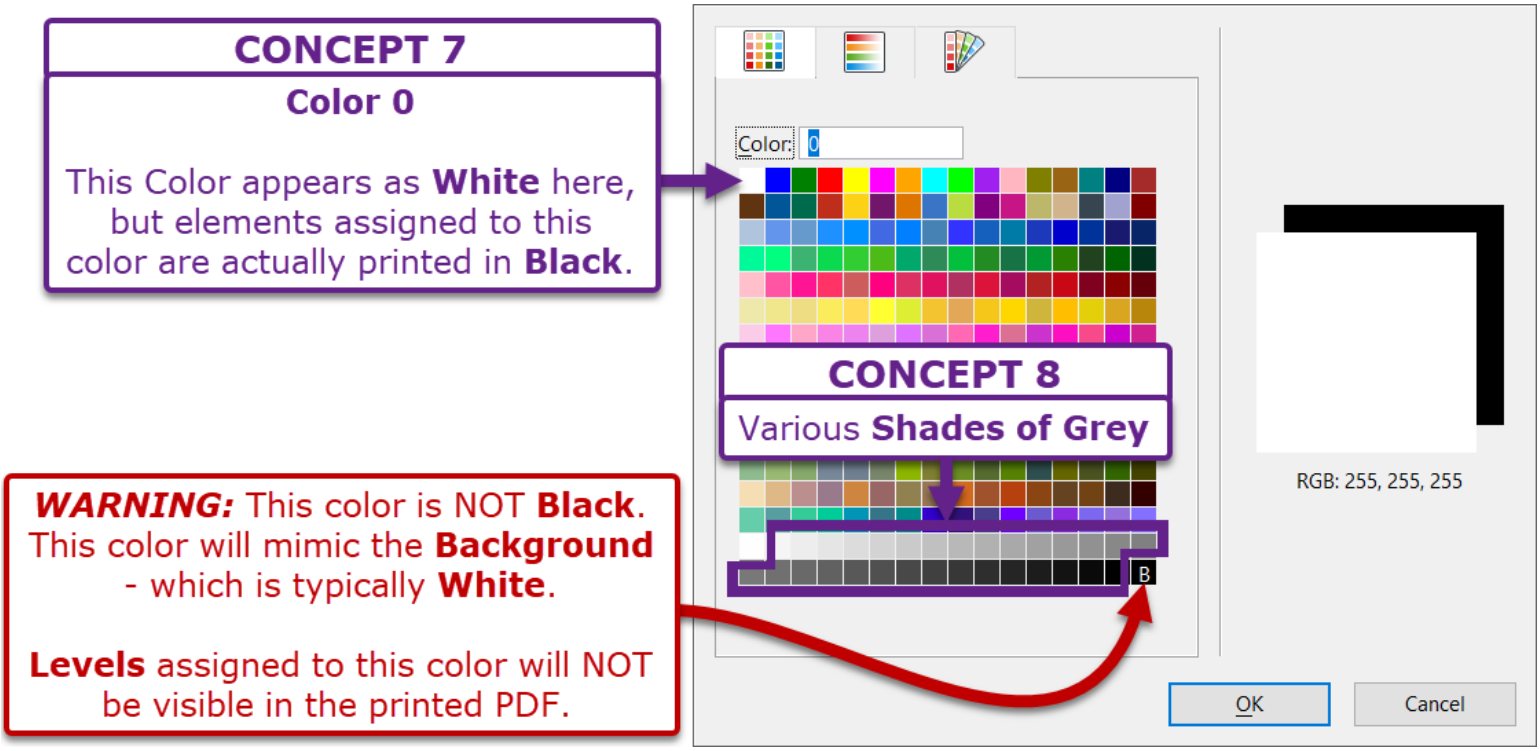
TIP: For exhibits and other color prints, create elements to be shown in color on the AUX Levels. Change the Color Symbology of the AUX Level to the desired printing color.

CONCEPT 7: To print Custom Levels and AUX Levels in **Black**, set the **Color Symbology** to **Color 0**.

Although this color appears as white in the color palate, Level's assigned to this **Color 0** will print in **Black**.

WARNING: The color B will NOT print in black. This color mimics the **Background Color** of the sheet. Levels assigned to this color will NOT be visible in the printed PDF.

CONCEPT 8: To print **Custom Levels** and **AUX Levels** in **Grey**, use the colors shown below.



CONCEPT 9: Color Symbology for Custom Levels or AUX Levels are initially set in the original **Design ORD File**. However, the **Color Symbology** can be **overridden** within an individual **Plan Sheet ORD File**.

Design ORD File: The **Color Symbology** set in the **Design ORD File** will carry over to all **Plan Sheet ORD Files**. Setting the desired **Color Symbology** in the **Design ORD File** ensures that the Level is printed in the desired color for all sheets in the plan set. ***BEST PRACTICE:*** For Custom Levels and AUX Levels, set the desired in the Design ORD File.

Plan Sheet ORD File (color override): The **Color Symbology** can be overridden for an individual **Plan Sheet ORD File**. An override could be used to show a Custom Level or AUX Level differently for an individual sheet. The override process is commonly used to create custom Color Prints. The process for overriding a Level's Color Symbology is shown in *19E – Color Printing Workflow*.

NOTE: If the FLH Pen Table is applied and a Level is recognized, then the Color Symbology is inconsequential. **Color Symbology overrides ONLY take affect if NO Pen Table is applied or the Level is unrecognized by the Pen Table**.

19E – COLOR PRINTING WORKFLOW

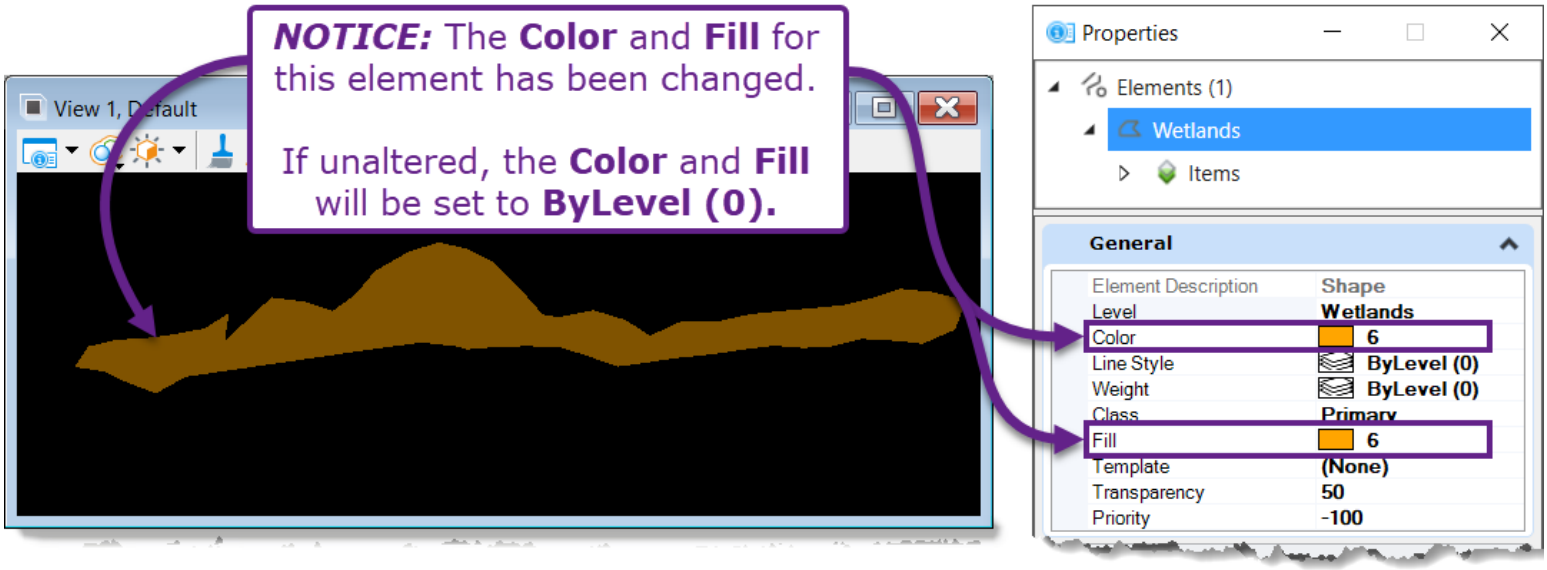
This section demonstrates how to print exhibits and other miscellaneous sheets in color.

IMPORTANT: Before continuing, review the **CONCEPTS** presented in *19D – The FLH Pen Table, Custom Levels, and AUX Levels*.

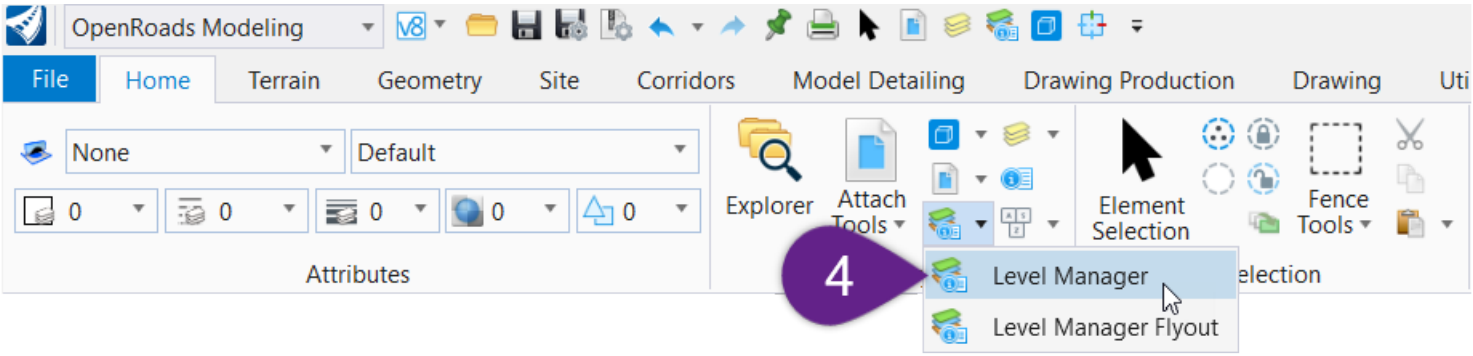
There are two main processes for creating color prints:

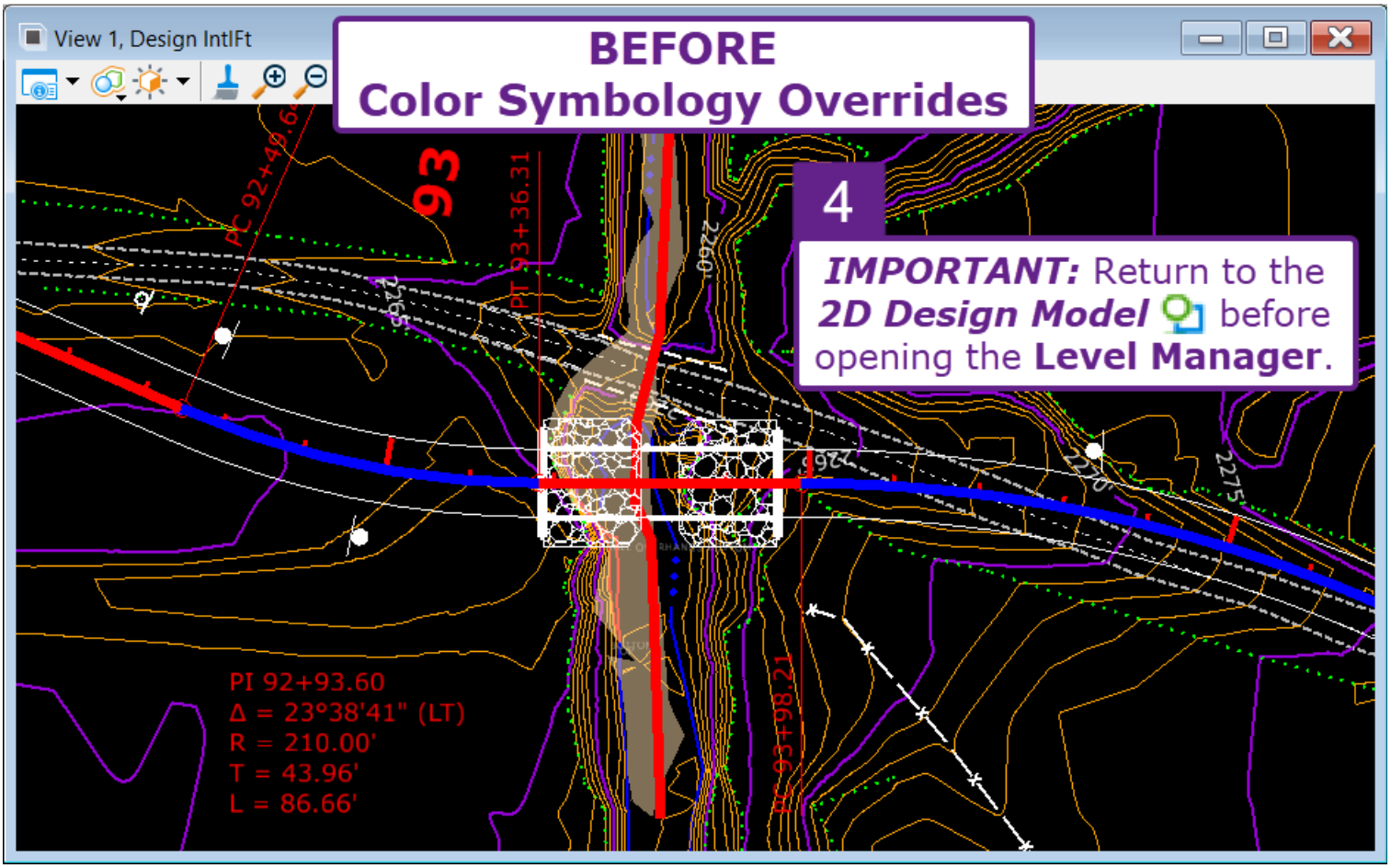
- **Override the Color Symbology for ALL Levels referenced into the Plan Sheet ORD File**. In the *Level Manager*, change the Color Symbology for all Levels. Since the FLH Pen Table is NOT used, the colors in the printed PDF will exactly reflect the colors shown in the *Sheet Model*.
- **Remove the FLH Pen Table before printing.**

WARNING: Color Symbology overrides through the Level Manager have no effect on elements that have been overridden through the Properties box. For example, if an element's color is NOT set to *By Level*, then overriding Color Symbology through the Level Manager is inconsequential.

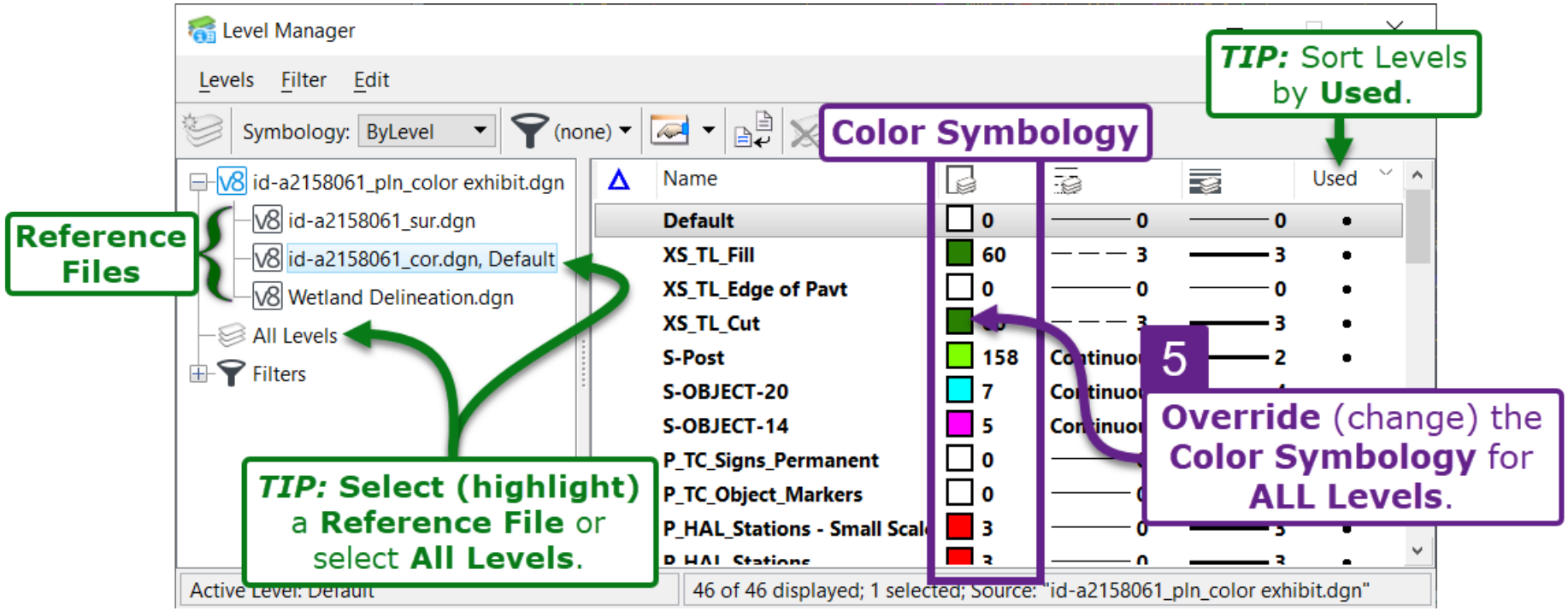


1	Create a new Plan Sheet ORD File. See *3B – Create a New ORD File*.
2	In the new Plan Sheet ORD File, **reference** in all required Design ORD Files and Existing Survey ORD Files.
3	Create a *Sheet Model* for the color print. See *Chapter 14 – Plan Sheet Production*.
4	***IMPORTANT:*** Return to the *2D Design Model* of the Plan Sheet ORD File. Open the Level Manager. [***OpenRoads Modeling*** → ***Home*** → ***Primary***]



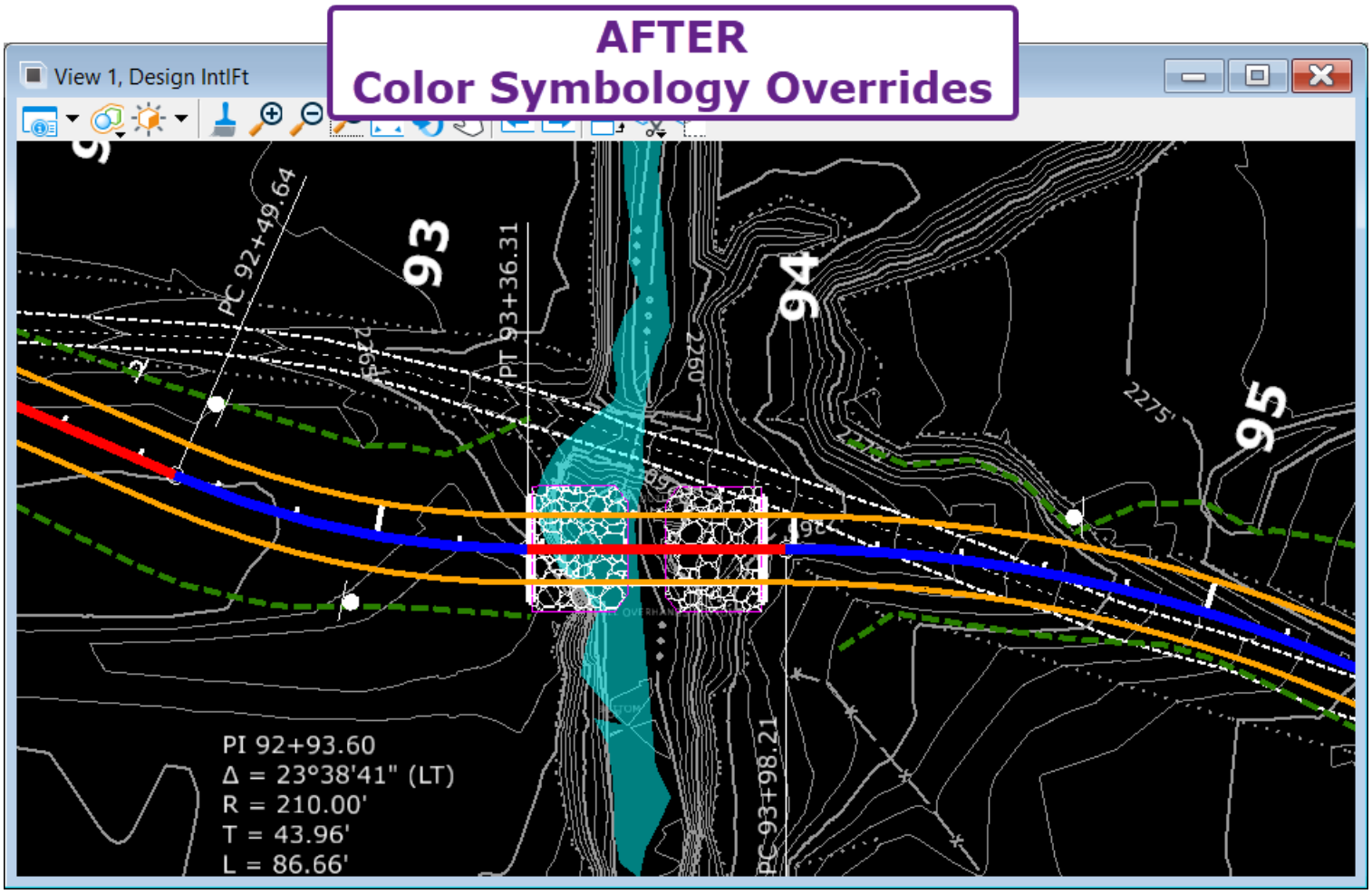


5	In the Level Manager, set each Level to the desired **Color Symbology** for the printed PDF.



TIP: Select (highlight) a Reference File to ONLY view Levels contained in that Reference File. Select *All Levels* to view every Level referenced in the current ORD File.

TIP: Sort the Level Manager list by the **Used** column. If a Level is utilized in an ORD File, then a dot will appear next to the Level in the **Used** column.



After performing Color Symbology overrides, proceed with the printing process. ***IMPORTANT:*** Remove the FLH Pen Table before printing.

Color Printing from the *Sheet Model*: Printing from the *Sheet Model* is demonstrated in *19C.1 Printing a Sheet*. Step 3 in that workflow shows how to remove the FLH Pen Table when printing from a *Sheet Model*.

Color Printing from the Print Organizer and Print Set Files (.pset): To remove the FLH Pen Table from a sheet in a Print Set File (.pset), see *19A.6 Print Properties, the FLH Pen Table, and Color Prints*.

Color Printing from the Sheet Index: To remove the FLH Pen Table from sheets generated by the Sheet Index, first the process shown in *19B.3 Enable Print Properties Settings* must be performed. Then remove the FLH Pen Table as shown in *19A.6 Print Properties, the FLH Pen Table, and Color Prints*.

19F – MISCELLANEOUS PRINTING WORKFLOWS

19F.1 Roll Plots

Roll Plots are printed from large plotter paper rolls and intended to show long stretches of roadways. Plotter paper rolls come in a variety of widths. The most common plotter paper widths are 22-inch, 34-inch, 36-inch, 40-inch, and 42-inch.

This workflow shows how to create a roll plot for 34-inch wide paper. However, this workflow could be applied to other common plotter paper sizes.

In the *2D Design Model*  , a Plot Shape element must be manually drawn for each sheet in the Roll Plot.

> ***WFL Users:*** Current in-house plotter can print 22-inch wide and 34-inch wide. All other sizes will have to printed offsite

19F.1.a Determine the Plot Shape Dimensions

The dimensions of the user-created Plot Shape element depend on two factors:

> **Plotter Paper Width Size:** Before continuing with this workflow, confirm the paper width capability of the plotter that will be used for printing. The plotter paper width will determine the **REQUIRED Plot Shape Width**.
>
> **Design Scale for the Roll Plot sheets:** The Roll Plots should be created at a conventional Design Scale (i.e., 1”=40’) so that scaled measurements can be made with rulers on the printed Roll Plot sheet. If unsure of an appropriate Design Scale, start with 1”=40’ or 1”=50’.

Use the chart below to determine the dimensions of the Plot Shape based on the selected Design Scale and appropriate plotter paper width:

Plot Shape Dimensions for Common Paper Sizes and Design Scales					
Design Scale	REQUIRED Plot Shape Width				Maximum Plot Shape Length*
	34-Inch Paper	36-Inch Paper	40-Inch Paper	42-Inch Paper	
1” = 10’	340 feet	360 feet	400 feet	420 feet	2,000 feet
1” = 20’	680 feet	720 feet	800 feet	840 feet	4,000 feet
1” = 30’	1,020 feet	1,080 feet	1,200 feet	1,260 feet	6,000 feet
1” = 40’	1,360 feet	1,440 feet	1,600 feet	1,680 feet	8,000 feet
1” = 50’	1,700 feet	1,800 feet	2,000 feet	2,100 feet	10,000 feet
1” = 60’	2,040 feet	2,160 feet	2,400 feet	2,520 feet	12,000 feet
1” = 80’	2,720 feet	2,880 feet	3,200 feet	3,360 feet	16,000 feet
1” = 100’	3,400 feet	3,600 feet	4,000 feet	4,200 feet	20,000 feet

IMPORTANT*: The **Length** of each Plot Shape depends on curves and meanders in the road alignment. However, do NOT exceed the maximum length shown in the chart.

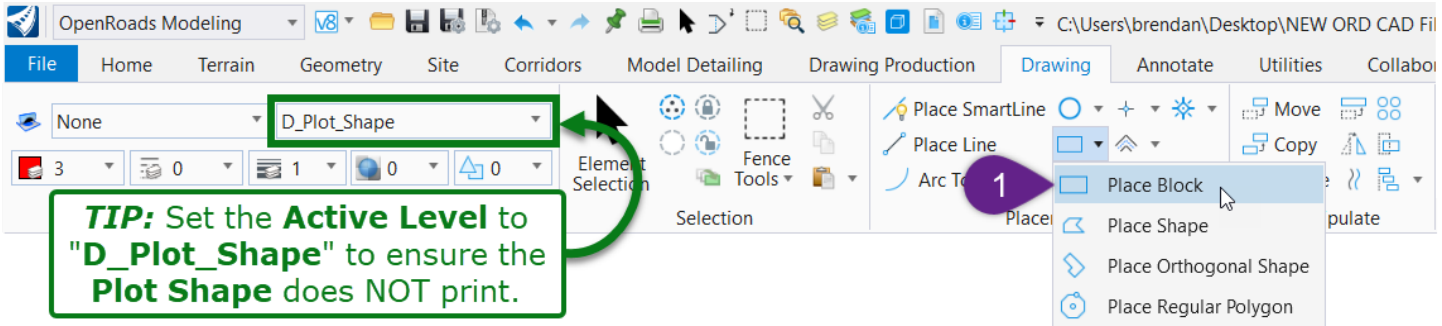
In this example, a **34-Inch Roll Plot Width** and **1" =50' Design Scale** is used. This configuration necessitates a **REQUIRED Plot Shape Width** of 1,700 feet and a **Maximum Plot Shape Length** of 10,000 feet.

19F.1.b Draw and Position the Plot Shapes in the 2D Design Model

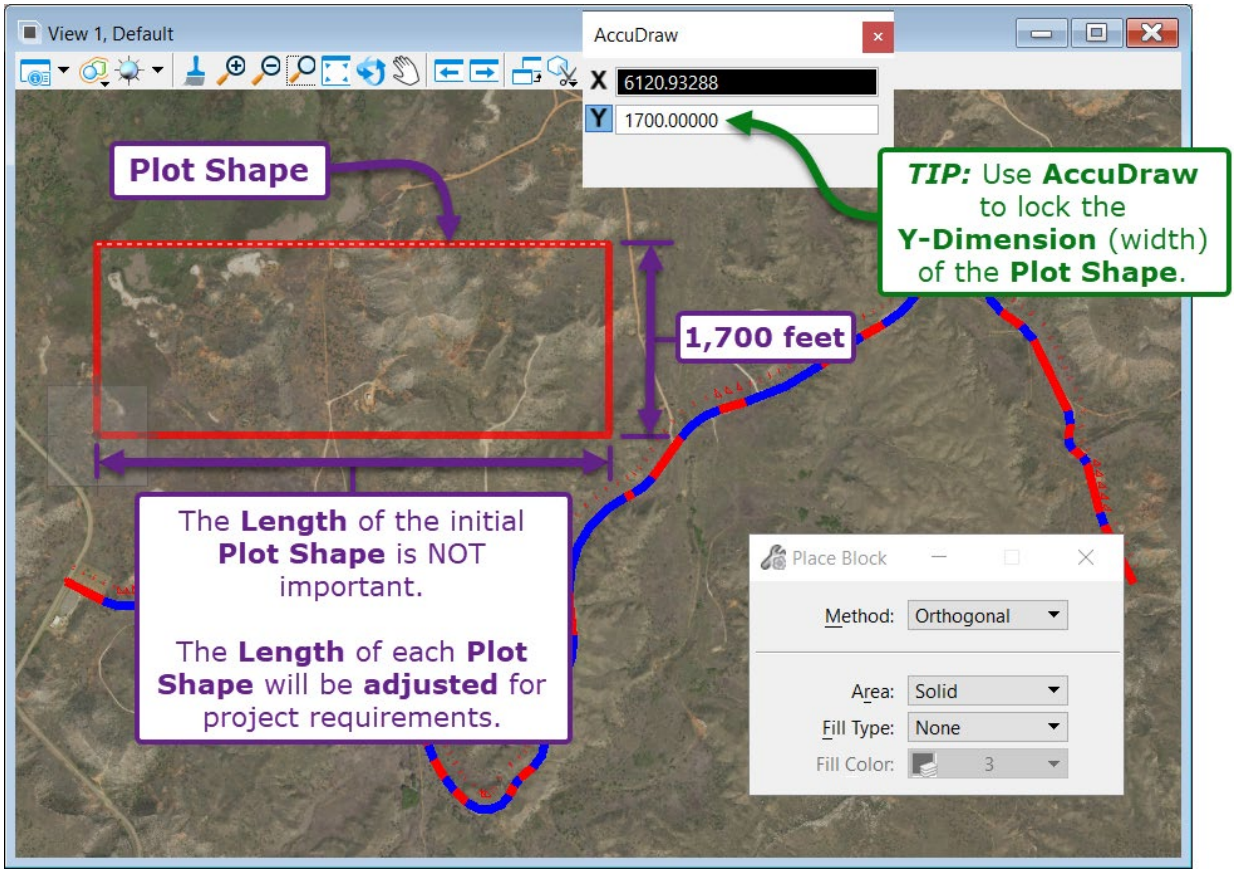
Using the *Place Block* tool, draw the Plot Shape element to the dimensions determined from the chart on the previous page.

TIP: Assign the custom Plot Shape to the "D_Plot_Shape" Level. This Level is configured to NOT print.

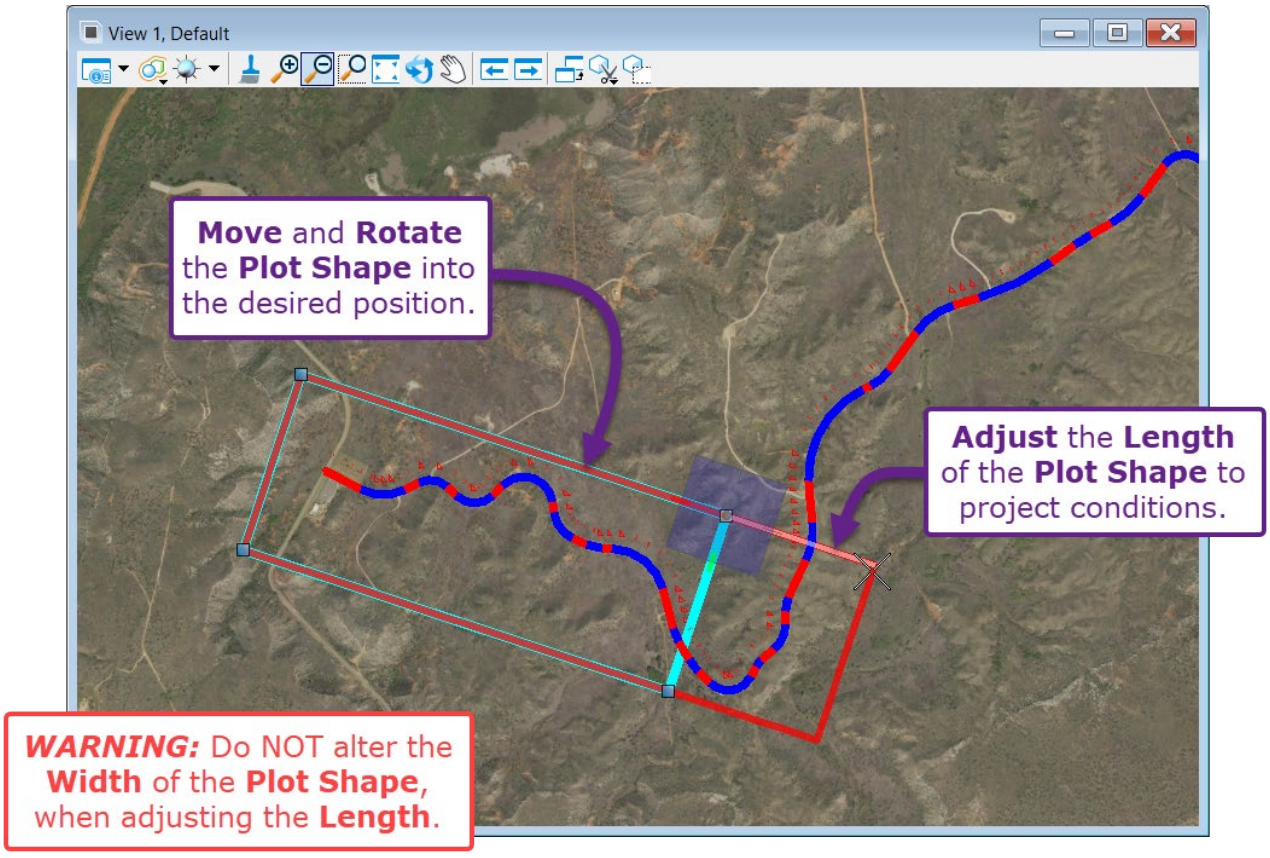
1	From the Ribbon, select the *Place Block* tool: [***OpenRoads Modeling*** → ***Drawing*** → ***Placement***].



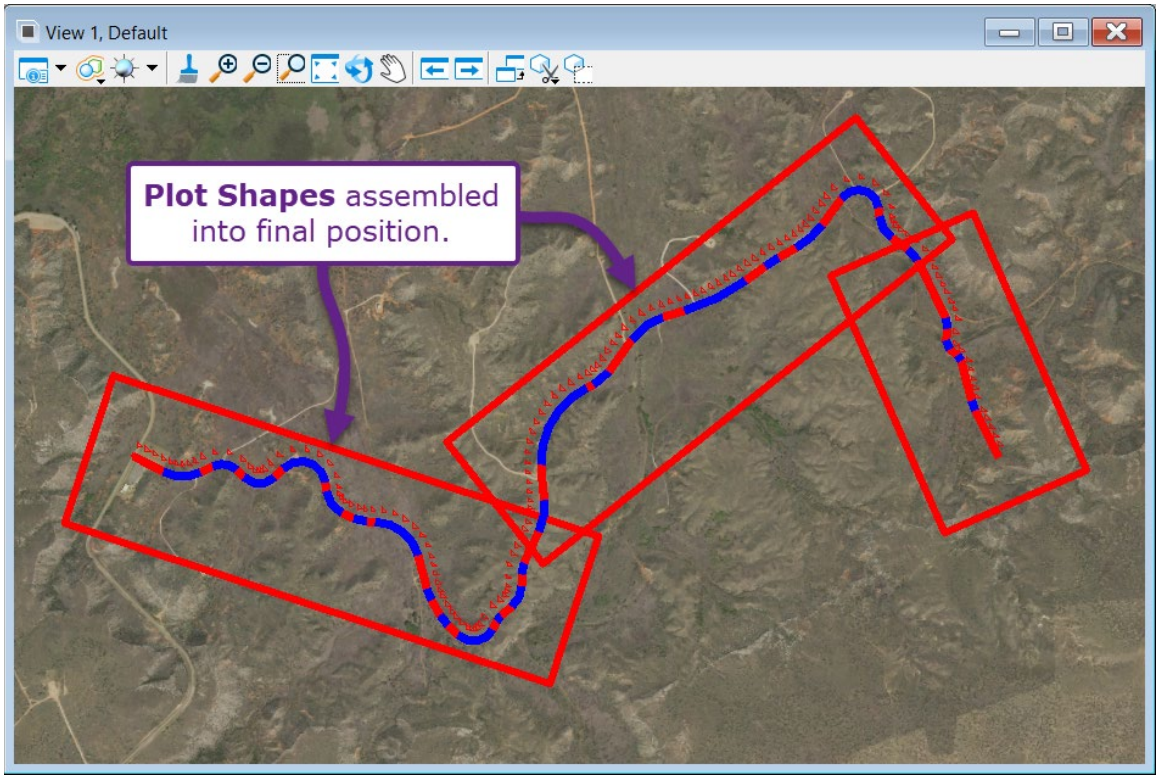
Draw the custom Plot Shape using the appropriate dimensions. In this case (34-inch wide paper size and 1"=50 design scale), the **REQUIRED Plot Shape Width** is 1,700 feet and the **Maximum Plot Shape Length** is 10,000 feet. However, the Plot Shape length can be adjusted as needed.



Next, the Plot Shape is *Moved*, *Rotated*, and the **Length** is adjusted to fit the project roadway.



Copy the initial Plot Shape element and position/adjust the copied Plot Shape to encompass the desired print area. Repeat this process for the remainder of the project.

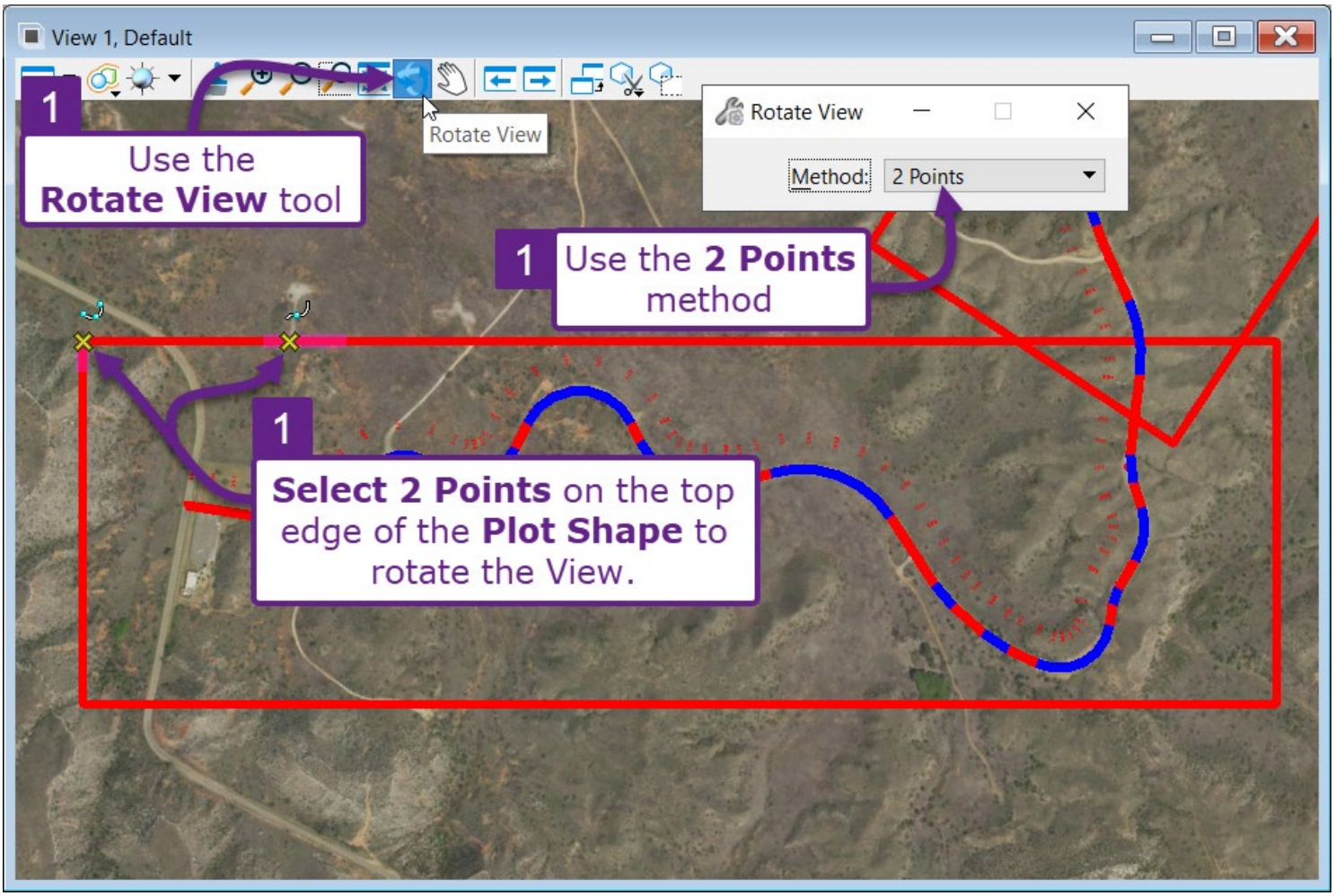


19F.1.c Roll Plot Printing Procedure

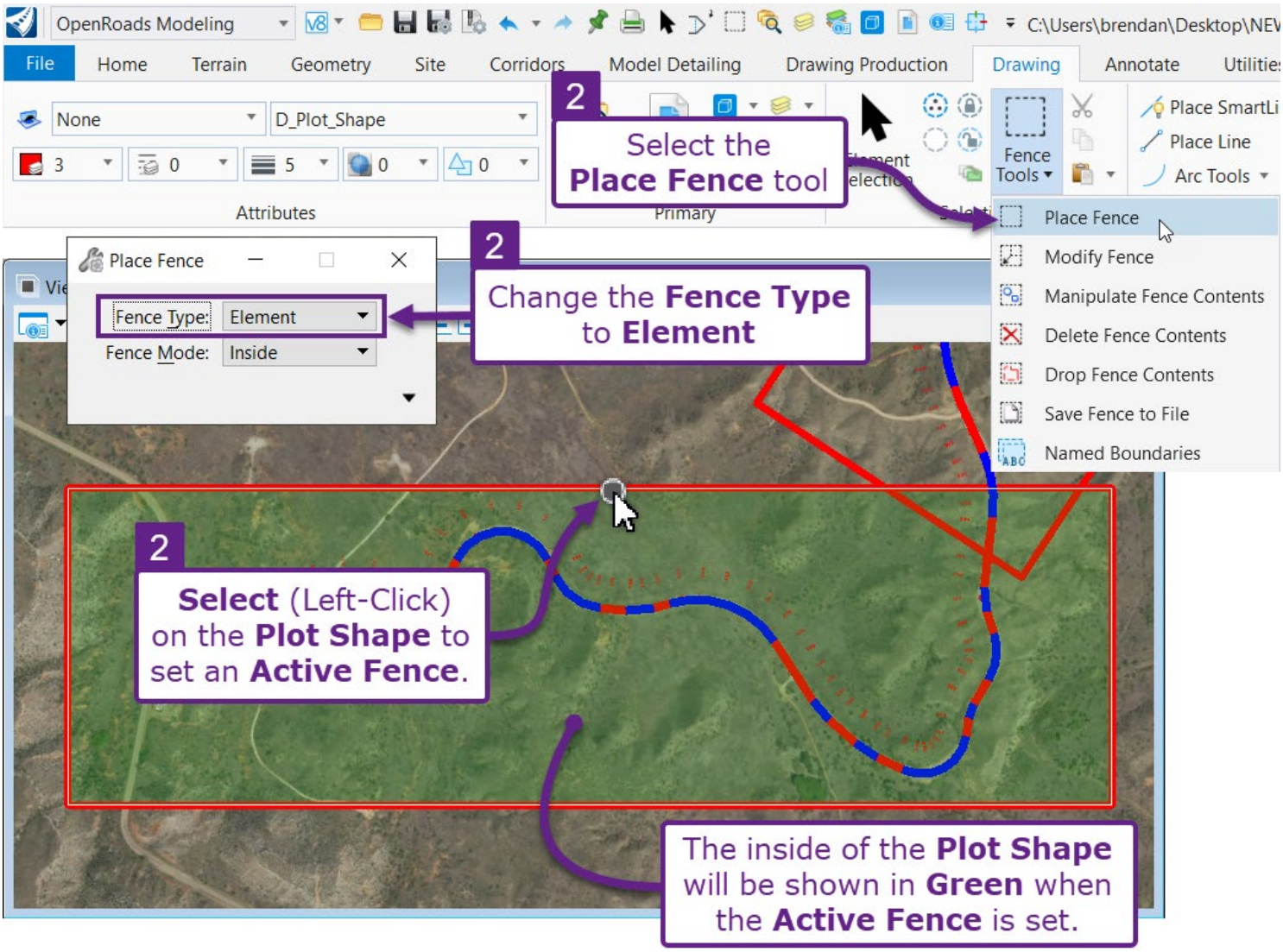
Each Plot Shape is individually printed directly from the *2D Design Model* .

IMPORTANT: The following procedure must be performed for each Plot Shape.

1	Use the *Rotate View* tool to orientate the *View* with Plot Shape. The *View* must be parallel with the Plot Shape for the resulting print to be positioned correctly. Use the **2 Points** method and select 2 points on the top-edge of the **Plot Shape**.



2	To designate the area to be printed, an **Active Fence** must be placed atop the **Plot Shape**. Use the **Place Fence** tool with the **Element** *Fence Type*. Select the **Plot Shape** as the **Element**.

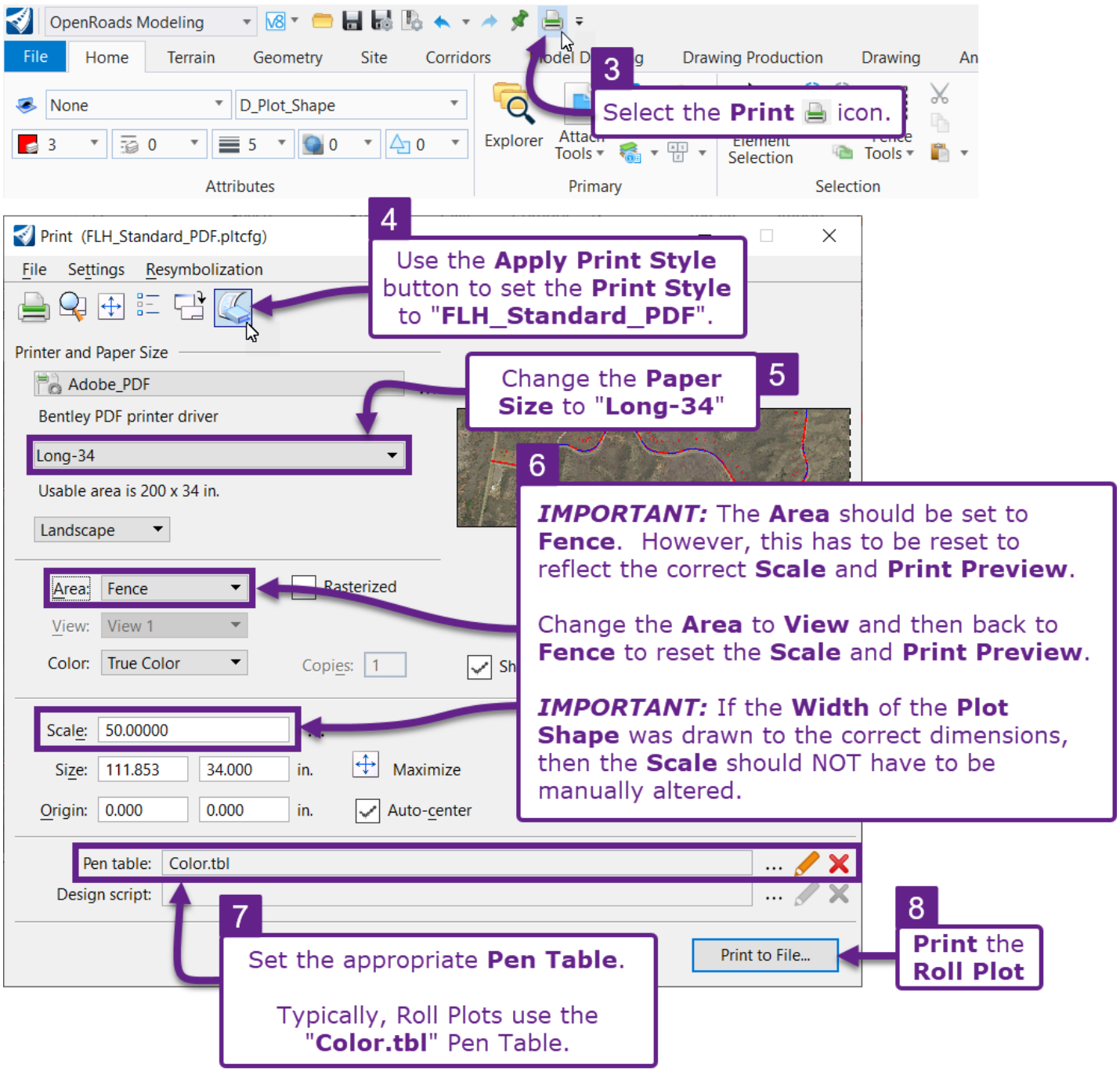


In the following steps, the Print dialogue box is configured.

IMPORTANT: The **Paper Size** (shown in Step 5) must correspond to the plotter paper width.

> ***WARNING:*** The FLH WorkSpace does NOT contain pre-created Paper Sizes for 36-inch, 40-inch, and 42-inch prints. Create a custom Paper Size for these widths using the procedure shown in *19F.3 Create a Custom Paper Size*. Regardless of the plotter paper width, the length should be set to 200-inches. For example, if creating a custom Paper Size for a 40-inch print, set the Width to 40-inches and the Length to 200-inches.

IMPORTANT: It may be necessary to reset the **Area**. If the preview shows an incorrect area, then change the **Area** to **View** and then change it back to **Fence**. See Step 6.



Repeat Steps 1-8 for the remaining Plot Shapes.

19F.2 Georeferenced Printing for Avenza

This section demonstrates how to create georeferenced PDFs for use with the Avenza mapping software.

A georeferenced can be created from a *Sheet Models* or from the *2D Design Model*:

> ***Sheet Model*:** A set of geo-referenced PDFs created from *Sheet Models* can be loaded into Avenza. This method is beneficial because the Profile design and plan annotations can be viewed within the Avenza software. See *19F.2.a Print a Georeferenced PDF from a Sheet Model* and *19F.2.b Batch Printing Georeferenced PDFs from the Print Organizer*.
>
> ***2D Design Model*:** From the *2D Design Model*, the entire project limits can be captured in a single georeferenced PDF. See *19F.C Print a Large Area Georeferenced PDF from the 2D Design Model*.

Whether printing from the *Sheet Model* or the *2D Design Model*, the following requirements must be fulfilled:

- A coordinate system must be set in the *2D Design Model* of the ORD File. Setting the coordinate system of a *2D Design Model* is shown in *3D.1 Set the Coordinate System*.
- In the Print Properties, the *Paper Size* must be set to **Avenza**. Using conventional Paper Sizes (i.e. ANSI B) results in a georeferenced PDF with poor resolution.
- To load correctly in Avenza, a georeferenced PDF must ONLY contain a single page. Multiple PDFs can be loaded into Avenza. However, each PDF must contain a single page. Avenza does NOT recognize PDFs with multiple pages. To print a set of single page PDFs, see *19F.2.b Batch Printing Georeferenced PDFs from the Print Organizer*.
- ***WARNING:*** Plan-Plan Sheets CANNOT be loaded into Avenza because two plan maps are shown per page. Only sheets that show a single plan map (i.e., Plan and Profile Sheets, Plan Sheets) should be loaded into Avenza.

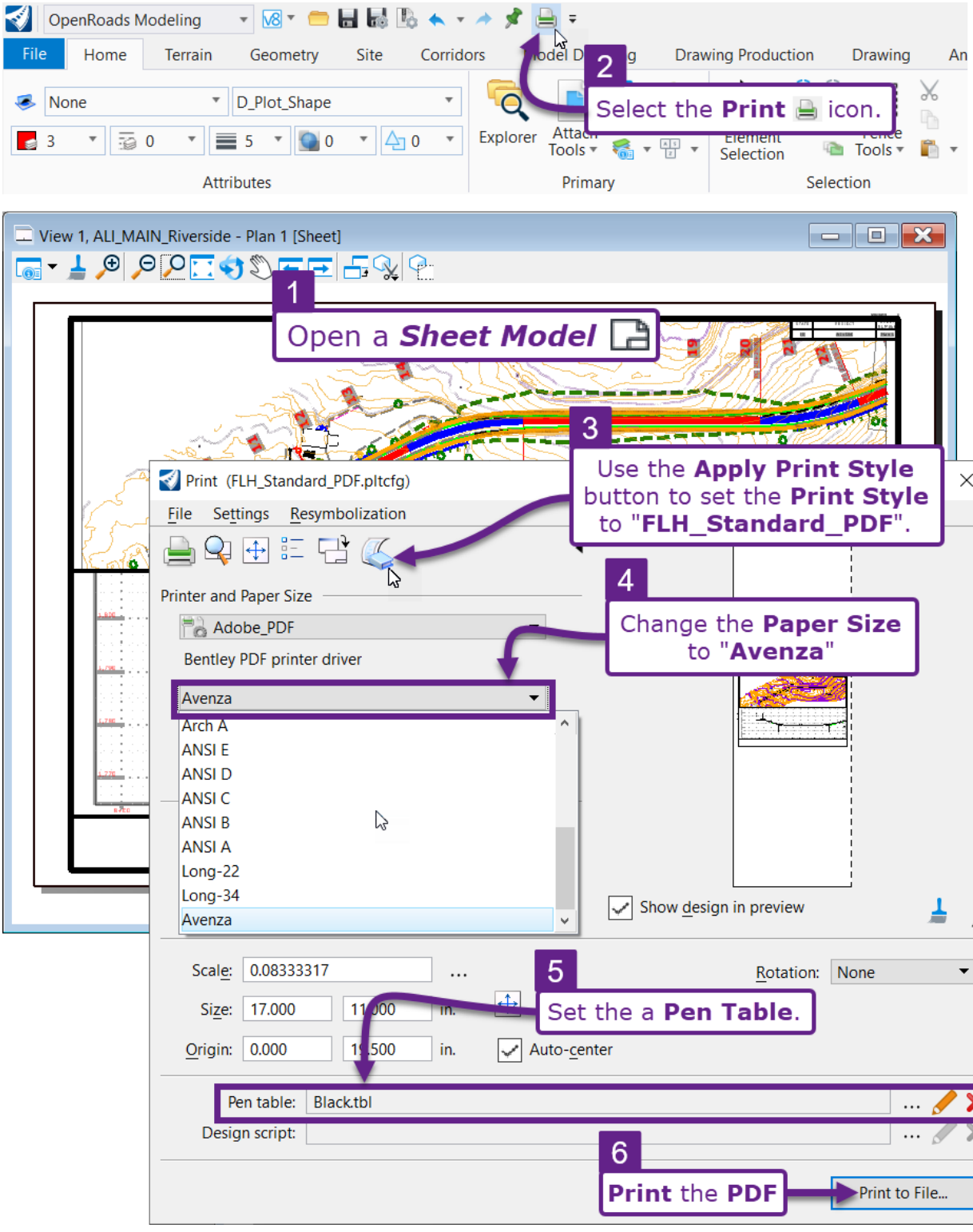
TIP: To verify if a PDF is georeferenced, open the PDF in Adobe. Enable the *Measure* ribbon and select the *Geospatial Location Tool*. Hover the mouse cursor in the plan view area and observe the Latitude and Longitude in the lower-right corner. The Latitude and Longitude value at a given point can be searched in Avenza, Google Earth, or Google Maps to verify the PDF is georeferenced to the correct project location.

19F.2.a Print a Georeferenced PDF from a Sheet Model

Any *Sheet Model*, including Plan and Profile sheets, can be printed as a georeferenced PDF and loaded into Avenza.

WARNING: Before attempting to print georeferenced PDFs, ensure that a coordinate system is set in the *2D Design Model*. See *3D.1 Set the Coordinate System*.

In this workflow, a georeferenced PDF is created from a *Sheet Model*.

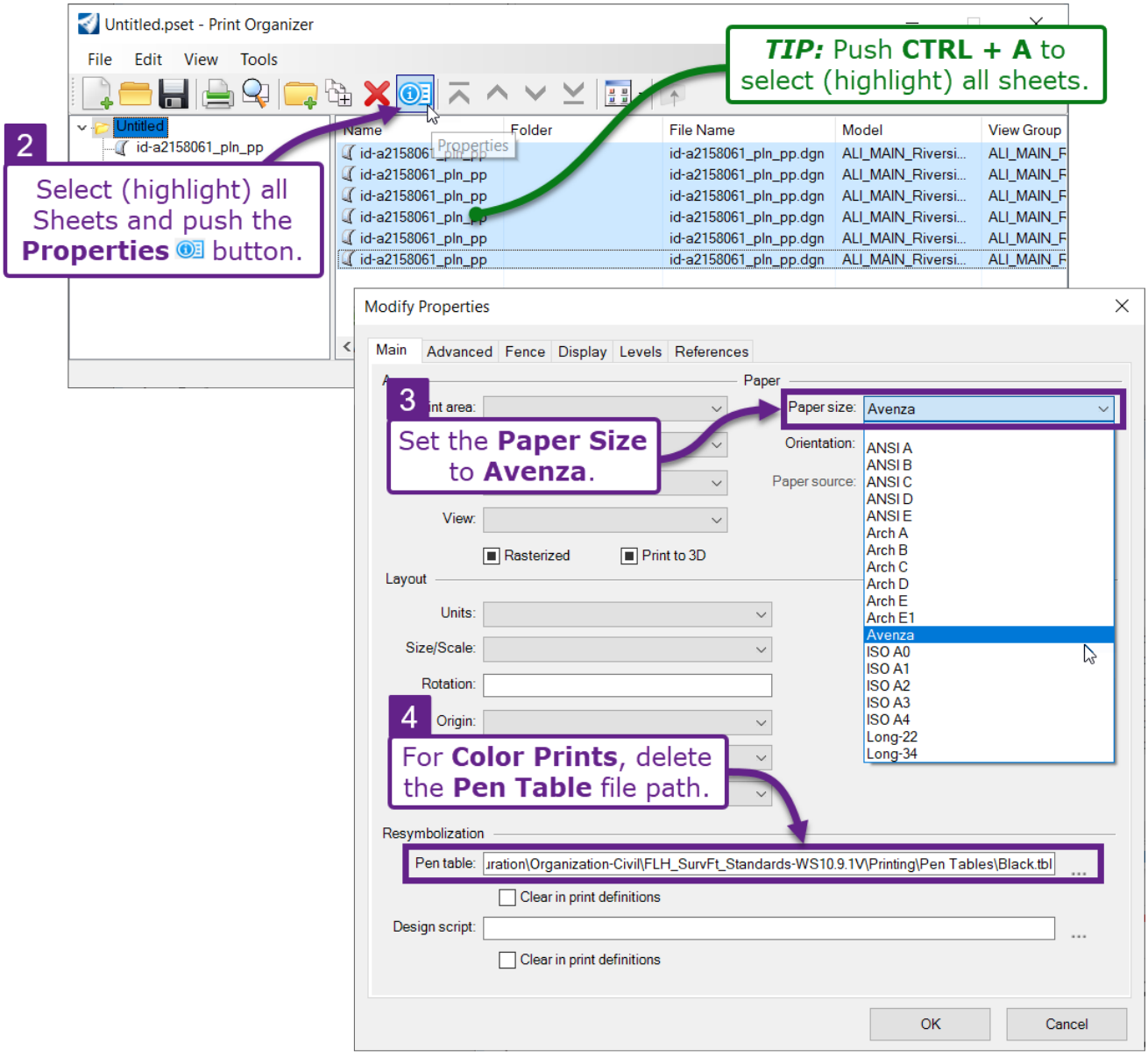


19F.2.b Batch Printing Georeferenced PDFs from the Print Organizer

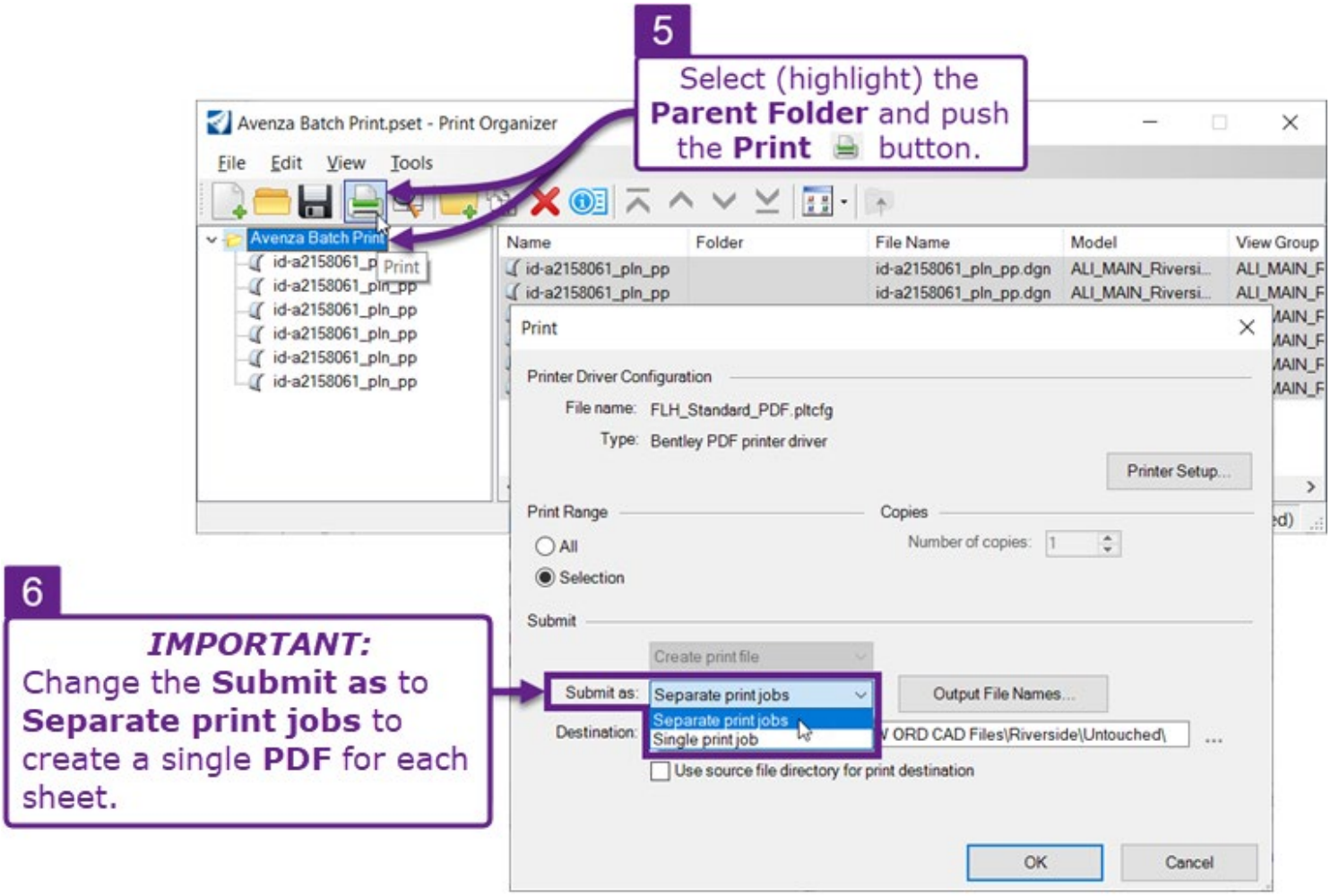
In this workflow, a set of *Sheet Models* are batch printed from the Print Organizer into separated georeferenced PDFs.

IMPORTANT: When printing, change the **Submit As** setting to **Separate Print Jobs**, as shown in step 6.

1	In the Print Organizer, create and populate a new Print Set File (.pset). See *19A – Plan Set Printing (Batch Printing)*. ***IMPORTANT:*** When adding sheets to the Print Organizer, ensure that the "FLH_Standard_PDF" **Print Style** is applied. See *19A.5 Add Sheets to the Print Set File (.pset)*.
2	Select (highlight) all sheets in the Print Organizer and select *Properties* button.
3	In the *Properties* set the **Paper Size** to **Avenza**.
4	**Color Prints**: To print the Roll Plot sheets in color, remove **FLH Pen Table**.



5	Select (highlight) the Parent Folder and push the Print button.
6	Change the **Submit As** setting to **Separate Print Jobs**. This setting ensures that an individual georeferenced PDF is created for each sheet in the Print Set File (.pset). ***IMPORTANT:*** To load correctly in Avenza, each georeferenced PDF must contain a single page.
7	Continue to Print the PDFs as shown in *19A.7 Printing the Print Set File (.pset)*.



19F.2.c Print a Large Area Georeferenced PDF from the 2D Design Model

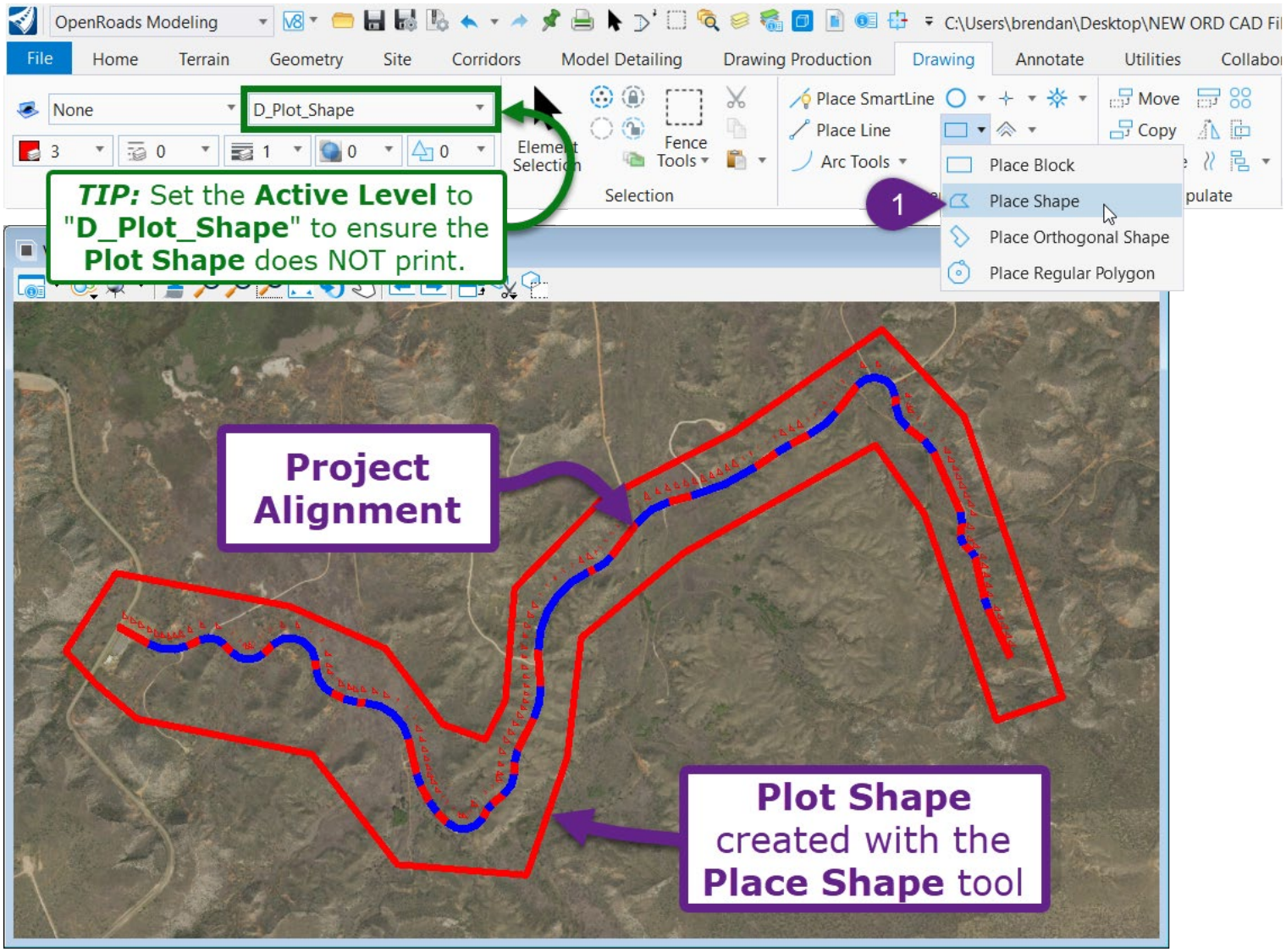
In this workflow, a single georeferenced PDF that encompasses the entire project limits is created.

WARNING: For longer projects, the **Avenza** *Paper Size* must be modified to sharpen the resolution of the resulting georeferenced PDF. If the project is too large and the default **Avenza** *Paper Size* is used, then the resulting georeferenced PDF will have poor resolution, making it difficult to identify design elements. See *19F.2.c.iv Examine the Resolution of the PDF*.

19F.2.c.i Create a Plot Shape in the *2D Design Model*

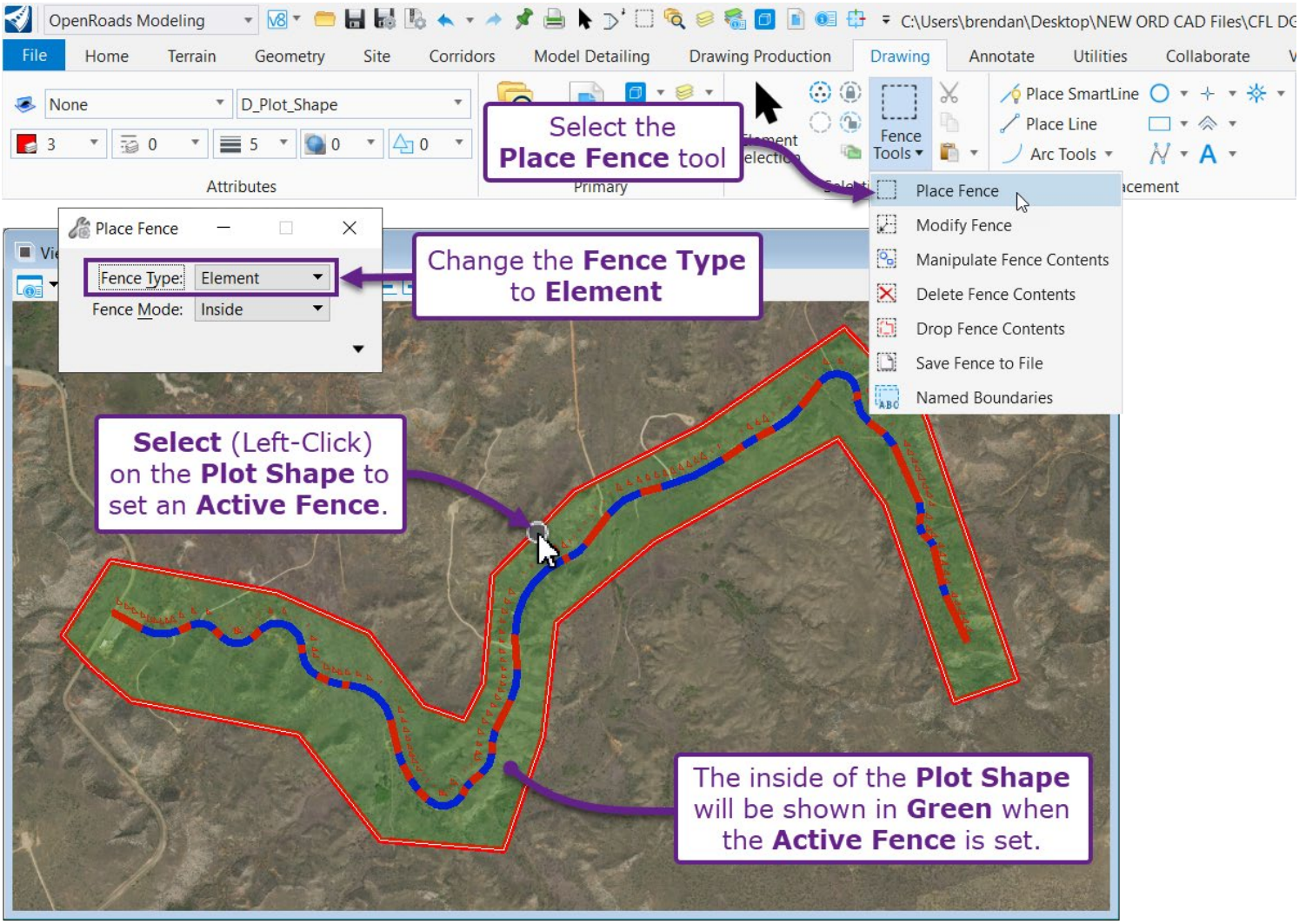
The Plot Shape for this workflow could be rectangular (use the *Place Block* tool) or an irregular enclosed shape created with the *Place Shape* tool.

As shown below, it is recommended that an irregular shape that follows the project Alignment is created. This helps to reduce the final PDF size because unnecessary aerial graphics are excluded from printing.



19F.2.c.ii Set a Fence around the Plot Shape

Select the *Place Fence* tool and change the *Fence Type* to **Element**. Select the Plot Shape created in the previous procedure.

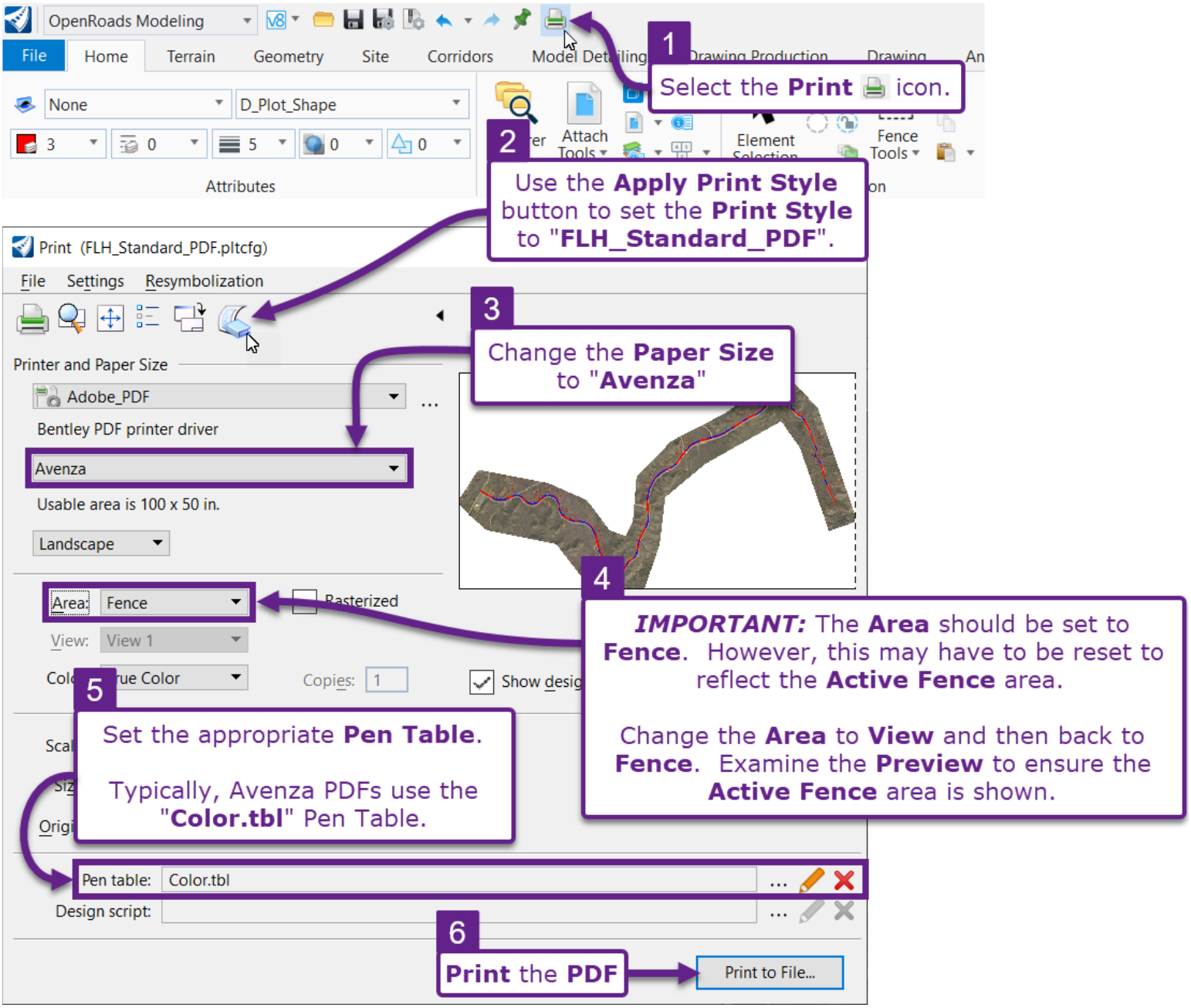


19F.2.c.iii Print the Fence Area using the Avenza Paper Size

In the following steps, the Print dialogue box is configured.

IMPORTANT: Ensure the **Paper Size** is set to "Avenza". See Step 3.

IMPORTANT: It may be necessary to reset the **Area**. If the preview shows the incorrect area, then change the **Area** to **View** and then back to **Fence**. See Step 4.



19F.2.c.iv Examine the Resolution of the PDF

In Adobe or Blue Beam, open the georeferenced PDF and zoom in on a project feature. If the aerial, design elements, or annotations appear too coarse or "grainy", then the **Avenza** Paper Size is inadequate and a custom Paper Size must be created.

NOTE: The **Avenza** Paper Size is 200-inches by 100-inches.

To increase the resolution, create a custom Paper Size that is 400-inches by 200-inches. Re-print the georeferenced PDF using the custom Paper Size. If the resolution is still too coarse, then create another custom Paper size with larger dimensions. Repeat this process until adequate image resolution is achieved.

The process of creating a custom Paper Size is shown in *19F.3 Create a Custom Paper Size*.

19F.2.d Load Referenced PDFs into Avenza

For field reconnaissance, georeferenced PDFs are loaded on to iPads and imported in to Avenza.

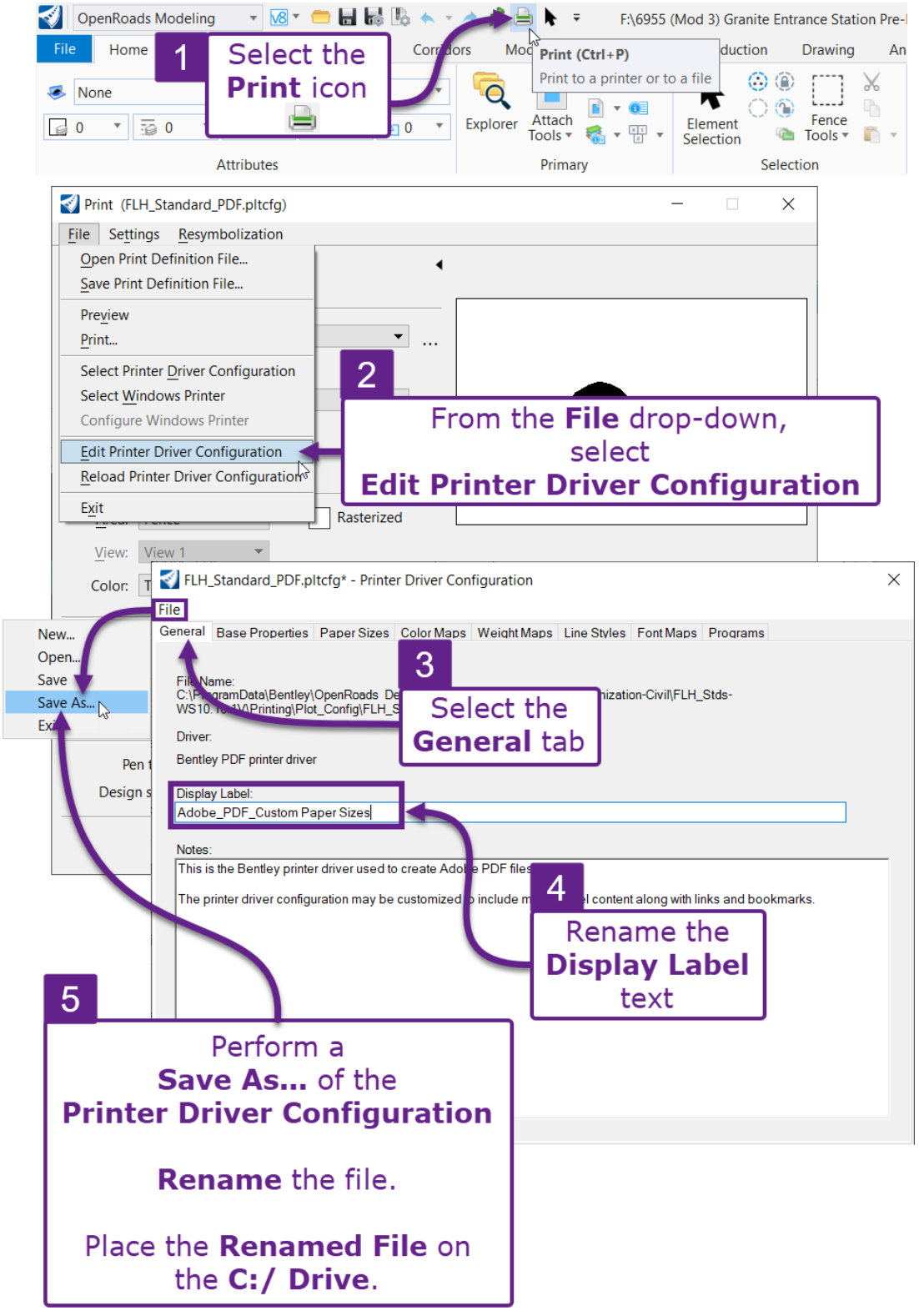
The process of loading georeferenced PDFs onto an iPad is shown in a different tutorial document called: "WFLHD iPad Tutorials.pdf".

19F.3 Create a Custom Paper Size

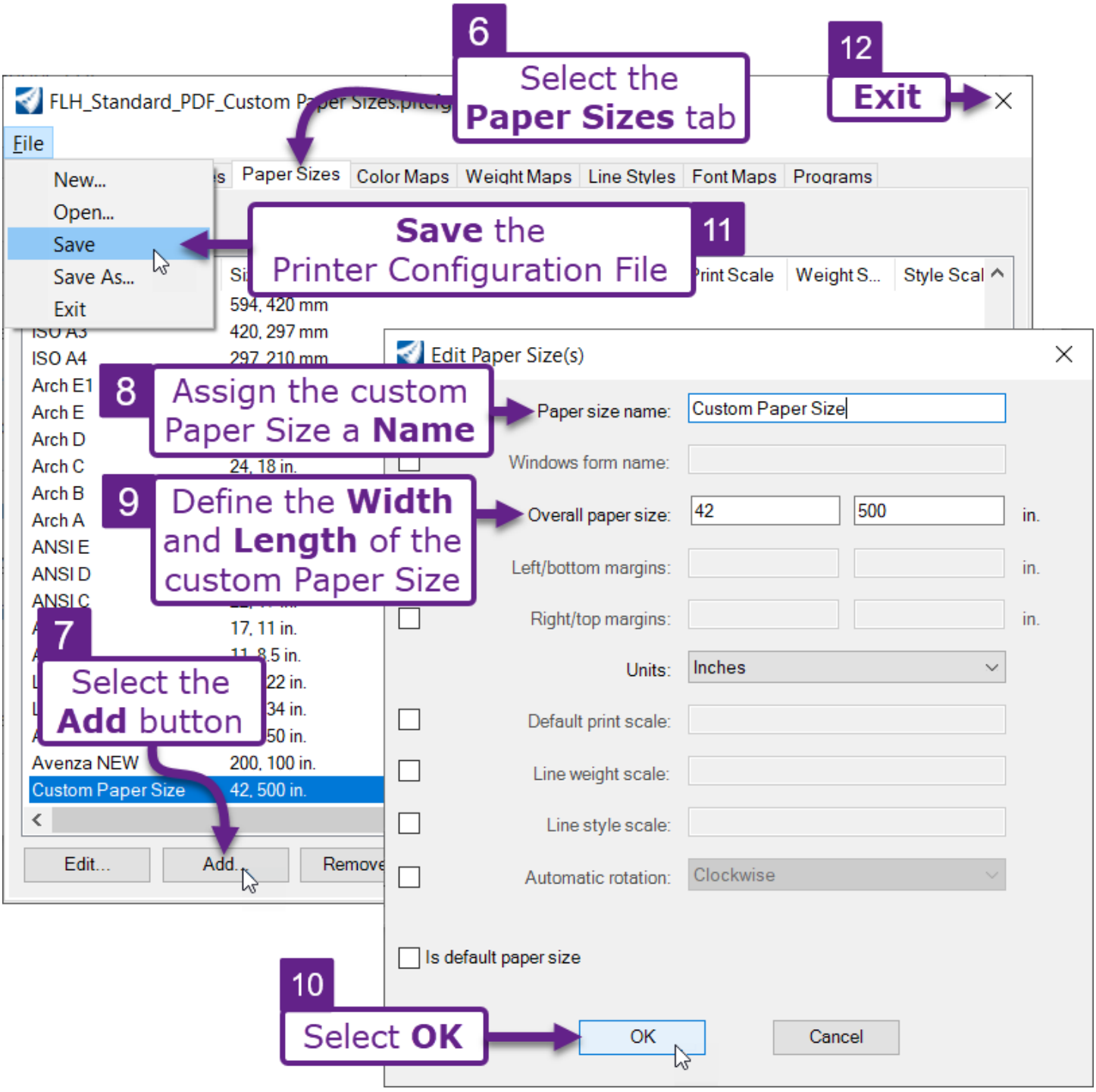
For miscellaneous printing workflows, it may be necessary to create a custom Paper Size.

IMPORTANT: Before a custom Paper Size can be created, perform a **Save As** of the default Printer Configuration File (shown below). Do NOT directly edit the default Printer Configuration File.

Place the **Save As** copy on the local C:/ Drive.



After performing a **Save As** of the Printer Driver Configuration file, select the **Paper Sizes** tab to create a custom Paper Size.

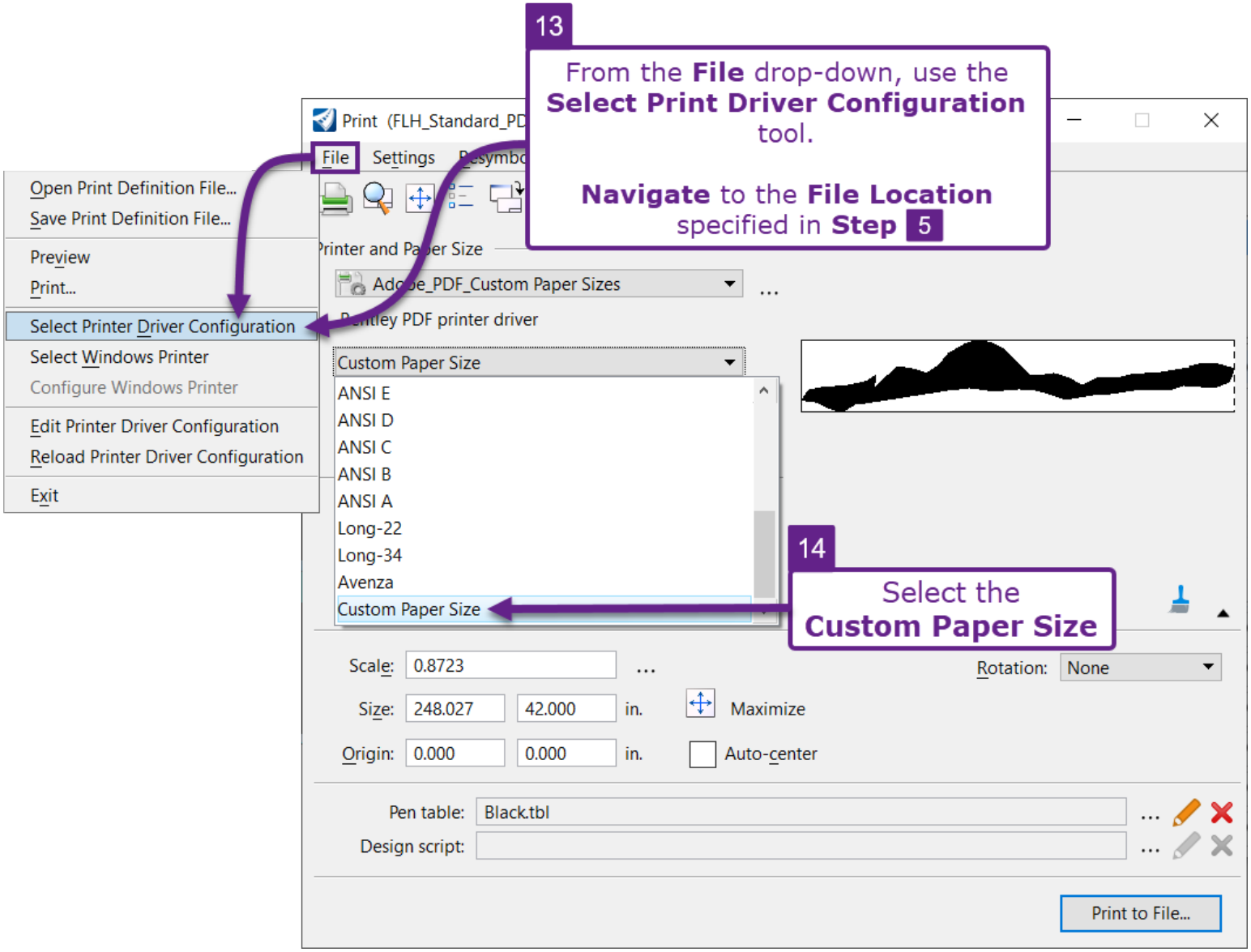


IMPORTANT: Before printing with the custom Paper Size, the Print Configuration File (created on the previous page) must be loaded in the Print settings. Proceed to the next page.

Before printing with the custom Paper Size, the Save As copy of the **Print Configuration File** must be loaded in the Print settings.

From the **File** drop-down, use the **Select Printer Driver Configuration** tool. Navigate to the file location specified in Step 5.

After loading the copied Print Configuration File, the custom Paper Size will be shown in the Paper Size drop-down.

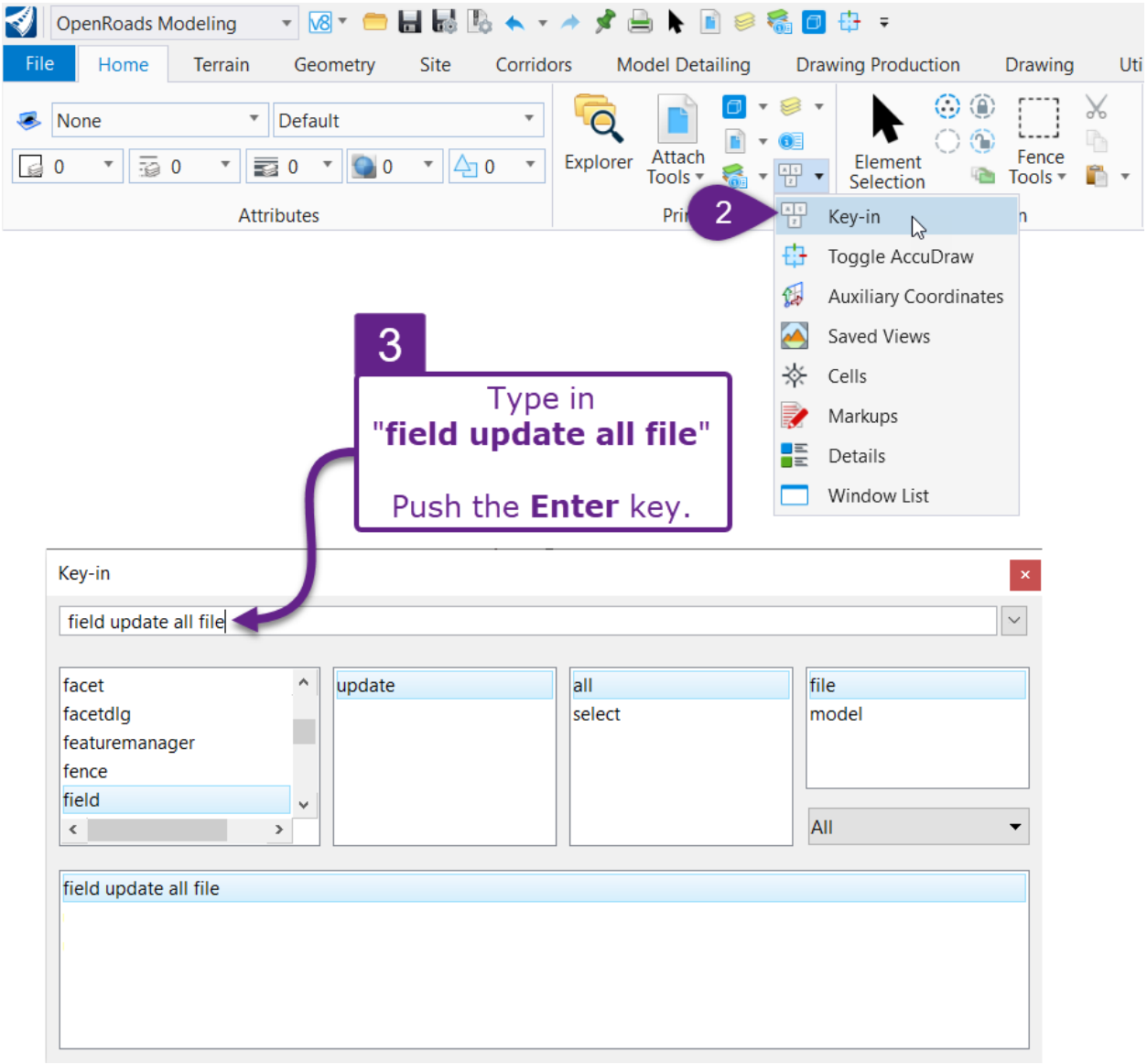


19F.4 Update All Fields in an ORD File

To refresh all Fields found in the **currently opened ORD File** use the following *Key-in*: "field update all file".

> ***NOTE:*** When this *Key-in* is ran, all Fields in the *2D Design Model*, *Drawing Models*, and *Sheet Models* are updated.

1	Open the desired ORD File to update Fields in.
2	From the Ribbon, select the *Key-in* tool: [***OpenRoads Modeling*** → ***Home*** → ***Primary***].
3	In the location shown below, manually type in "field update all file". Then, push the Enter key.



19G – CROSS SECTION PRINTING WORKFLOW

This workflow is shown in *16I – Print Cross Sections*.