Chapter 19
PRINTING
Chapter 19  Printing

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

**TABLE OF CONTENTS**

19A – Plan Set Printing (Batch Printing)  19-2

19A.1 Access the Print Organizer ................................................................. 19-4
19A.2 Create a New Print Set File (.pset) ...................................................... 19-5
19A.3 Load a Print Set File (.pset) ................................................................. 19-6
19A.4 Create Sub-Folders .............................................................................. 19-7
19A.5 Add Sheets to the Print Set File (.pset) ................................................... 19-8
  19A.5.a Add Sheet Models to the Print Set File (.pset) ...................................... 19-9
  19A.5.b Add External PDFs to the Print Set File (.pset) .................................... 19-11
  19A.5.c Add Sheets in the 2D Design Model to the Print Set File .................. 19-12
19A.6 Print Properties, the FLH Pen Table, and Color Prints ........................... 19-15
19A.7 Printing the Print Set File (.pset) ........................................................ 19-17

19B – Sheet Index Printing  19-18

19B.1 Update Fields Before Printing (Update Sheet Model Properties tool) .......... 19-19
19B.2 Create the Print Set File (.pset) from the Sheet Index ............................ 19-20
19B.3 Enable Properties Settings .................................................................... 19-22
19B.4 WARNING: Change the Print Area Setting ............................................ 19-24

19C – Single Sheet Printing  19-25

19C.1 Printing a Sheet Model ......................................................................... 19-25
19C.2 Printing from the 2D Design Model with a Fence ................................. 19-26

19D – The FLH Pen Table, Custom Levels, and AUX Levels  19-28

19E – Color Printing Workflow  19-33

19F – Miscellaneous Printing Workflows  19-37

19F.1 Roll Plots ............................................................................................. 19-37
  19F.1.a Determine the Plot Shape Dimensions .............................................. 19-37
  19F.1.b Draw and Position the Plot Shapes in the 2D Design Model .............. 19-38
  19F.1.c Roll Plot Printing Procedure ............................................................ 19-40
19F.2 Georeferenced Printing for Avenza ..................................................... 19-43
  19F.2.a Print a Georeferenced PDF from a Sheet Model ............................. 19-44
  19F.2.b Batch Printing Georeferenced PDFs from the Print Organizer .......... 19-45
  19F.2.c Print a Large Area Georeferenced PDF from the 2D Design Model .... 19-47
  19F.2.d Load Referenced PDFs into Avenza ............................................... 19-50
19F.3 Create a Custom Paper Size ............................................................... 19-51
19F.4 Update All Fields in an ORD File ....................................................... 19-54

19G – Cross Section Printing Workflow  19-55
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, see 19F.4 *Update All Fields in an ORD File.*

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

1. **Access the Print Organizer**
   - **19A.1 Access The Print Organizer**

2. **Create a New Print Set File (.pset)**
   - **19A.2 Create a New Print Set File (.pset)**
     - **EFLHD Users:** EFLHD uses a blank Print Set File (.pset) template for plan set printing. Do NOT create a new Print Set File (.pset). Instead, copy the default Print Set File (.pset) to the project folder. Load the blank Print Set File (.pset) template as shown in **19A.3 Load a Print Set File (.pset).**

3. **Create a Sub Folder for each Section in the Plan Set**
   - **19A.4 Create Sub-Folders**

4. **Add Sheets to the Print Set File (.pset)**
   - **19A.5 Add Sheets to the Print Set File**
     - **TIP:** External PDFs can be added to the Print Set File (.pset). For example, PDFs generated from EEBACS 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).

5. **COLOR PRINTS ONLY: Remove the FLH Pen Table**
   - **19A.6 Printing Properties, the FLH Pen Table, and Color Prints**

6. **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). See 19B - Sheet Index Printing.

**EFLHD 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 is 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.

**WARNING:** The loaded Print Set File is shown here. If "Untitled.pset" is shown here, then no Print Set File is loaded.

**TIP:** Alternatively, a recently used Print Set File can be quickly loaded from this location.

Navigate to the folder location that contains the Print Set File

Select the desired Print Set File

Select Open.
19A.4 Create Sub-Folders

**BEST PRACTICE:** When setting up a Print Set File (.pset) for 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.

**WARNING:** If a Sub-Folder is highlighted, then a folder is created under the highlighted Sub-Folder.
**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 printed from Excel or other software can be incorporated into the Print Set File. For example, Summary of Quantities PDFs (i.e., B-Sheets generated from EEBACS) can be added to the Print Set File. 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 specified and all Sheet Models found in the 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).
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.

7. Select OK to add the Sheet Models to the Print Set File.

4. Navigate to the appropriate ORD File location.
   - Specify the ORD File that contains the Sheet Models.
   - Push Done.
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.

2 Press the Add Files to Set icon.

1 Select (highlight) the appropriate Sub-Folder to place the PDF into.

3 Push the Add button to specify the PDF File to add to the Print Set File.

5 Select OK to add the PDF File to the Print Set File.

WARNING: When adding PDFs to the Print Set File, do NOT apply a Print Style Name or Manually Specified Options.

4 Navigate to the appropriate PDF File Location.

Select (highlight) the PDF File.

Push Done.
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.

---

**2D Design Model**

**Plot Shape**

Determine the Level of the Plot Shape.

In this case, the Level is "D_Plot_Shape".

**TIP:** Hover the Mouse Cursor over the Plot Shape with the to reveal the Level.
3. Open the Print Organizer. See 19A.1 Access the Print Organizer.

4. Select (highlight) the Sub-Folder that the Standard Detail belongs to.

5. Press the Add Files to Set icon.
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.

**NOTICE:** Most sheets use the "Black.tbl" Pen Table. However, a few sheets have no Pen Table assigned for color printing.

Move the Scroll Bar to the far right to see Applied Pen Tables.
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)

**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-WS10.10.1V\Printing\Plot_Config
A Print Set File (.pset) can be generated directly from the Sheet Index.

**WARNING:** Due to a known software deficiency pertaining the Sheet Index, the Print Area setting must be changed for all sheets before printing. See **19B.4 WARNING: Change the Print Area Setting**.

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

1. **Setup and populate the Sheet Index**
   *Chapter 18 – Sheet Index*

2. **Update Fields found in the Sheet Models (i.e., Sheet Numbers)**
   *19B.1 Update Fields Before Printing (Update Sheet Model Properties tool)*

3. **In the Sheet Index, use the Open Print Organizer button to generate a new Print Set File (.pset)**
   See the **WARNINGS** below
   *19B.2 Create the Print Set File (.pset) from the Sheet Index*

4. **WARNING:** Before printing, the Print Area setting must be changed
   *19B.4 WARNING: Change the Print Area Setting*

   **IMPORTANT:** Use the Convert to fixed print definitions tool to access the Print Area setting.
   *19B.3 Enable Properties Settings*

5. **OPTIONAL:** Remove the Pen Table for Color Prints
   *19A.6 Print Properties and Color Printing*

6. **OPTIONAL:** Add External PDFs to the Print Set File (.pset)
   (i.e. Summary of Quantity Sheets produced by EEBACS)
   *19A.5.b Add External PDFs to the Print Set File (.pset)*

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

**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)**.

**EFLHD WARNING:** The EFLHD Print Set File (.pset) template CANNOT be used when printing through the Sheet Index.
19B.1 Update 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 Fields in the Sheet Model to refresh.

**BEST PRACTICE:** Use this tool before printing from the Sheet Index. 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.

*TIP:* This tool could be used with an individual Sub-Folder or Sheet Model.
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).

1. Select the Folder to create the Print Set File (.pset) from.
   - If the Parent Folder is selected (highlighted), then all sheets in the Sheet Index are included in the Print Set File (.pset).

2. Open Print Organizer icon

3. Select the "FLH_Standard_PDF" Print Style

All Sheets are included in the Print Set File.
**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.

**TIP:** Hold down the CTRL Key to select (highlight) multiple Sub-Folders.

Only Sheets belonging to the selected (highlighted) Sub-Folders are included in the Print Set File.
19B.3 Enable 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 **Print Area** and **Pen Table** settings.

1. Select (highlight) the desired sheets. In this case, the **Parent Folder** is selected, so the tool is applied to all sheets.

2. Use the **Convert to fixed print definitions** tool.

The ONLY useful **Property** setting that can be changed is the **Print Style**.

Select a Sheet(s) and push the **Properties** button.
After the **Convert to fixed Print definitions** tool is used, the full array of Properties settings is available for manipulation – as shown below.

**WARNING:** When the **Sheet Index** is used to generate the **Print Set File (.pset)**, the **Print Area** may display the wrong area.

Change the **Print Area** from **Fence** to **Sheet** to print the correct area.
19B.4 WARNING: Change the Print Area Setting

**SOFTWARE BUG WARNING:** When using the Sheet Index, the Print Area may display an incorrect area. This commonly happens with Plan and Profile sheets.

**WORKAROUND:** To print the correct area, the Print Area setting must be changed to Sheet. By default, the Print Area setting is set to Fence, which results in a print showing the incorrect area.

**NOTE:** The Covert to print definitions tool must be used to access the Print Area setting. See 19B.2 Enable Properties Settings.

**TIP:** Select all sheets in the Print Set File (.pset) by pushing CTRL + A. Then push the Properties button.

1. Select (highlight) the Parent Folder.
2. Select any sheet and then push CTRL + A to highlight all sheets.
3. Push the Properties button.
4. Set the Print Area to Sheet.
5. Push OK.
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.

![Diagram showing the process of printing from a 2D Design Model with a 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.

1. Select the **Print** icon.

2. Examine the Print Preview to ensure the correct area is displayed.

3. **Important:** The **Area** should be set to **Fence**. However, this may have to be reset to reflect the **Active Fence** area.

4. To reset, change the **Area** to **View** and then back to **Fence**. Examine the **Preview** to ensure the **Active Fence** area is shown.

5. **Select Print to File** to specify the file location and print the PDF.
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**.

---

**TIP:** For **Color Prints**, press the X button to remove the FLH Pen Table.
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 print in white and are NOT visible in the printed PDF.

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

**WARNING:** This color is NOT Black. This color will mimic the Background - which is typically White.

Levels assigned to this color will NOT be visible in the printed PDF.

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 Color Symbology 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.**
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** are 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.

[OpenRoads Modeling → Home → Primary]
In the Level Manager, set each Level to the desired Color Symbology for the printed PDF.

**TIP:** Sort Levels by Used.

**TIP:** Select (highlight) a Reference File or select All Levels.

**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.5 *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 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.

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:

<table>
<thead>
<tr>
<th>Design Scale</th>
<th>REQUIRED Plot Shape Width</th>
<th>Maximum Plot Shape Length*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1” = 10’</td>
<td>340 feet</td>
<td>2,000 feet</td>
</tr>
<tr>
<td>1” = 20’</td>
<td>680 feet</td>
<td>4,000 feet</td>
</tr>
<tr>
<td>1” = 30’</td>
<td>1,020 feet</td>
<td>6,000 feet</td>
</tr>
<tr>
<td>1” = 40’</td>
<td>1,360 feet</td>
<td>8,000 feet</td>
</tr>
<tr>
<td>1” = 50’</td>
<td>1,700 feet</td>
<td>10,000 feet</td>
</tr>
<tr>
<td>1” = 60’</td>
<td>2,040 feet</td>
<td>12,000 feet</td>
</tr>
<tr>
<td>1” = 80’</td>
<td>2,720 feet</td>
<td>16,000 feet</td>
</tr>
<tr>
<td>1” = 100’</td>
<td>3,400 feet</td>
<td>20,000 feet</td>
</tr>
</tbody>
</table>

**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.

From the Ribbon, select the *Place Block* tool:

* [OpenRoads Modeling → Drawing → Placement].

TIP: Set the *Active Level* to "D_Plot_Shape" to ensure the Plot Shape does NOT print.

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.

TIP: Use AccuDraw to lock the Y-Dimension (width) of the Plot Shape.

The Length of the initial Plot Shape is NOT important. The Length of each Plot Shape will be adjusted for project requirements.
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.

**WARNING:** Do NOT alter the **Width** of the Plot Shape, when adjusting the **Length.**
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.

2. Use the *2 Points* method and select 2 points on the top-edge of the Plot Shape.
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**.

2. **Select the Place Fence tool**

2. **Change the Fence Type to Element**

2. **Select** (Left-Click) on the **Plot Shape** to set an **Active Fence**.

The inside of the **Plot Shape** will be shown in **Green** when the **Active Fence** is set.
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.

1. Open a **Sheet Model**.
2. Select the **Print** icon.
3. Use the **Apply Print Style** button to set the **Print Style** to "FLH_Standard_PDF".
4. Change the **Paper Size** to "Avenza".
5. Set the **Pen Table**.
6. Print the **PDF**.
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.

   **TIP:** Push CTRL + A to select (highlight) all sheets.
Select (highlight) the Parent Folder and push the Print button.

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.

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.

In this workflow, an irregular Plot Shape is used – which helps to reduce the final PDF size because unnecessary aerial graphics are excluded from printing.

*TIP:* Set the **Active Level** to "D_Plot_Shape" to ensure the **Plot Shape** does NOT print.
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.

1. Select the **Print** icon.
2. Use the **Apply Print Style** button to set the **Print Style** to “FLH_Standard_PDF”.
3. Change the **Paper Size** to “Avenza”.
4. **IMPORTANT:** The **Area** should be set to **Fence**. However, this may have to be reset to reflect the **Active Fence** area.

5. Set the appropriate **Pen Table**. Typically, Avenza PDFs use the "Color.tbl" Pen Table.

6. **Print the PDF**
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”.
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.

1. Select the **Print** icon
2. From the **File** drop-down, select **Edit Printer Driver Configuration**
3. Select the **General** tab
4. Rename the **Display Label** text
5. Perform a **Save As...** of the **Printer Driver Configuration**

   **Rename** the file.

   Place the **Renamed File** on the 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.
Cross Sections Sheets must be printed through the Sheet Index to contain the appropriate Project Information, Sheet Numbers, and Sheet Number Prefixes.

Before continuing with this printing workflow, the WorkSet Properties and Sheet Index must be properly setup. See 16B.3 Setup Project Information and the Sheet Index.

1. Open the Project Explorer.
2. In the Project Explorer, navigate to the Sheet Index tab.
3. Expand the Parent Folder in the Sheet Index.

**BEST PRACTICE:** Right-Click on the “X-Sections” Sub-Folder and select the Update Sheet Model Properties tool. This tool will refresh all Fields contained in the Cross Section Sheet Models. This ensures that the Project Information and Sheet Number Fields are up to date before printing.

4. Select (highlight) the “X-Sections” Folder and press the Open Print Organizer icon.
5. Select (highlight) the “FLH_Standard_PDF” options and push OK.
In the *Print Organizer*, select (highlight) the "X-Sections" Folder.

Push the *Print* icon.

In the *Print* dialogue box, select the desired File Location for the resulting PDF, by clicking the icon next to the *Destination* box.

In the *Print Dialogue* box, consider checking the *Open print file after creation* box. If this box is CHECKED, then the PDF will be automatically opened after completion of printing.

Select OK to proceed with printing.

**WARNING:** Printing operations may take an extended period of time.