

# 1:1 PDF Printing with 3rd PlanIt

## Objectives

- Create a full-sized printed diagram of the track plan. This diagram would then be used to transfer the plan to flat material like plywood to make the “cookie-cutter” style subroadbed. **Important note: Assuming you have elevation changes on your layout, using this technique to create your cookie-cutter will NOT yield a true representation of your design because some track segments actually need to have their lengths changed to accommodate the elevation changes.** However, for many layouts, it’s possible that you’ll be close enough. However, to be totally transparent, it is important that you know this going in.
- Minimize the number of pieces of paper I had to tape together.
- Maximize the accuracy of the resulting full-sized printout.

*This document is specific to Windows PC’s.*

## Summary of the Technique

1. Talk with your large format print provider to determine the largest sized document they can produce.
2. Examine your layout in 3rdPlanIt to
  - a. make sure your documents will just the track centerlines or rails and ties
  - b. determine how many composite diagrams you will need
  - c. determine the placement and number of giant diagrams you’ll need for each of your composite diagrams
3. Modify your PC to allow for very large dimensions when using the **Microsoft Print to PDF** printer.
4. Use **Control Panel / Devices and Printers** to create a NEW FORM under your **Microsoft Print to PDF** printer that matches the size of the form you wish to produce.
5. When using the Print function of 3rdPlanIt, specify the **Microsoft Print to PDF** printer and the NEW FORM you created above to produce 1 or more PDF’s of the desired size.
6. Have your PDF’s printed by a third party.
7. Tape together the printed sheets to form your complete diagram.

To provide real-life snapshots of the process, I used my layout, whose complete diagram can fit in a rectangle 9.5 ft X 11.5 ft. The techniques can be used on smaller or larger layouts, or just parts of a layout.

## Step 1: Determine the maximum page size provided by your vendor.

In my case, the local UPS store prints large items on 36” wide paper and can print up to 36” X 125”. To allow for margins, I decided to use a logical page size of 33” X 120” (10 ft). The UPS folks prefer having a PDF file to print from. I’ve heard that some Staples stores also do large format printing. Knowing what the absolute maximum size possible is a key requirement for the rest of this process. Also, your provider must be able to print from a PDF file. Failing that, you will need to convert each page in your generated PDF to the format that your provider accepts.

## Step 2: Examine and Prepare Your Track Plan

### Determine Whether You Want to Print Ties & Rails

When you’re working on your plan, your zoom level may rarely be set so that you would see the rails and ties on the track segments. This is something you control at each layer. When you print 1:1, if you have configured a layer to show rails and ties, those will print. My experience is that this is not desired because the alternative is to have the center track line printed instead. This center track line is easier to use when laying your roadbed or track. So, take time to examine every layer and set this attribute as you desire. To see this attribute:

- Click on: **Action / Modify Layers...**
- For each layer that contains track:
  - Double-click on the layer in the list

- On the **Layer Properties** tab, in the **Track characteristics** section, check or uncheck these options: **Hide Rails and Ties** and **Hide Ties**. You want to check these options to get just track centerlines printed.

## Determine How Many Composite Diagrams You'll Need

In my layout, I have 2 levels and I need one composite diagram (made up of 1 or more giant diagrams taped together) showing the upper level and another showing the lower level because some of the lower level track is obscured by the upper level track when viewed from above.

## Determine How Many Giant Diagrams You'll Need and Their Sizes

*For each giant composite*, you need to determine the size and placement of the giant diagrams that will be taped together to form it. Within 3rdPlanIt, use the rulers on the top and sides to determine how you can best position and size the giant diagrams to make it easiest to construct the composite diagram. Experiment with different sizes and orientations.

In my case, I was able to construct the one composite diagram for the upper level using:

- 4 giant diagrams of this size: 33" X 10 ft., laid horizontally
- 1 giant diagram of this size: 13" X 6 ft., laid horizontally

I was lucky because the lower level composite diagram could be made of just giant diagram of this size: 33" X 10 ft., laid horizontally.

UPS charges by the square foot of actual page size. That means that if your page is 13" X 6 ft, you aren't charged for 36" by 6 ft., even though they print on 36" wide paper.

It's not difficult to figure out the variations by doing a rough hand drawing of your layout with the gross dimensions on a single sheet of paper and then using a ruler to figure out what looks like would be "close enough". Once you've determines the size(s) you'll need, you'll create 1 new "custom" form for each of the giant diagram sizes. To review: in my case I needed 2 separate forms with different sizes. You might get away with only 1.

Within 3rdPlanIt, when you specify you want to print using those custom forms, the program visually shows you exactly the boundaries of each page. One caveat: you cannot mix different forms on a single print request within 3rdPlanIt.

Again, in my case, I figured out that I would need to print PDF's / giant diagrams of these sizes:

33" X 120"  
13" X 72"

It is important that you be pretty close on these dimensions. You can change your mind before you make your final commitment but if you can get it real close the first time, it saves some time.

## Step 3: Modify your PC to allow for the largest possible paper size when using Microsoft Print to PDF

This is the process that can be the most daunting if you're uncomfortable with the Windows OS internals. You will be changing some system files and you must be intentional and precise in changing just what's needed and nothing else. If you take your time, all will be fine. For those who want to dig into the details behind printing, check these out as I used them to develop this process:

<https://franklinheath.co.uk/2015/08/29/custom-page-sizes-for-microsoft-print-to-pdf/>

[https://answers.microsoft.com/en-us/windows/forum/windows\\_10-hardware/microsoft-print-to-pdf-custom-paper-sizes-possible/90ed3d48-1ece-4ca5-8d3b-ff0af24a7b37](https://answers.microsoft.com/en-us/windows/forum/windows_10-hardware/microsoft-print-to-pdf-custom-paper-sizes-possible/90ed3d48-1ece-4ca5-8d3b-ff0af24a7b37)

The second article:

- talks about adding a "custom size" to a printer schema. That step is not needed if you follow the steps below.
- provides some details on calculating the page sizes and the directory structure but that's about all.

Make sure you are logged in to your PC as a user with Administrator privileges.

## Find the **GPD** Folder Associated with **Microsoft Print to PDF**

Microsoft uses a **GPD** (generic printer description) file to define the capabilities of each installed printer. We will modify the **GPD** file associated with **Microsoft Print to PDF** to increase the maximum size of paper that the printer should be allowed to print to.

We must first determine the folder associated with **Microsoft Print to PDF**. To do this, open an administrator command prompt and type:

**regedit**

You will likely get a prompt that asks you if you want to allow the command to make changes to your system. Answer Yes.

When you have **regedit** open, navigate to this node in the tree on the left pane:

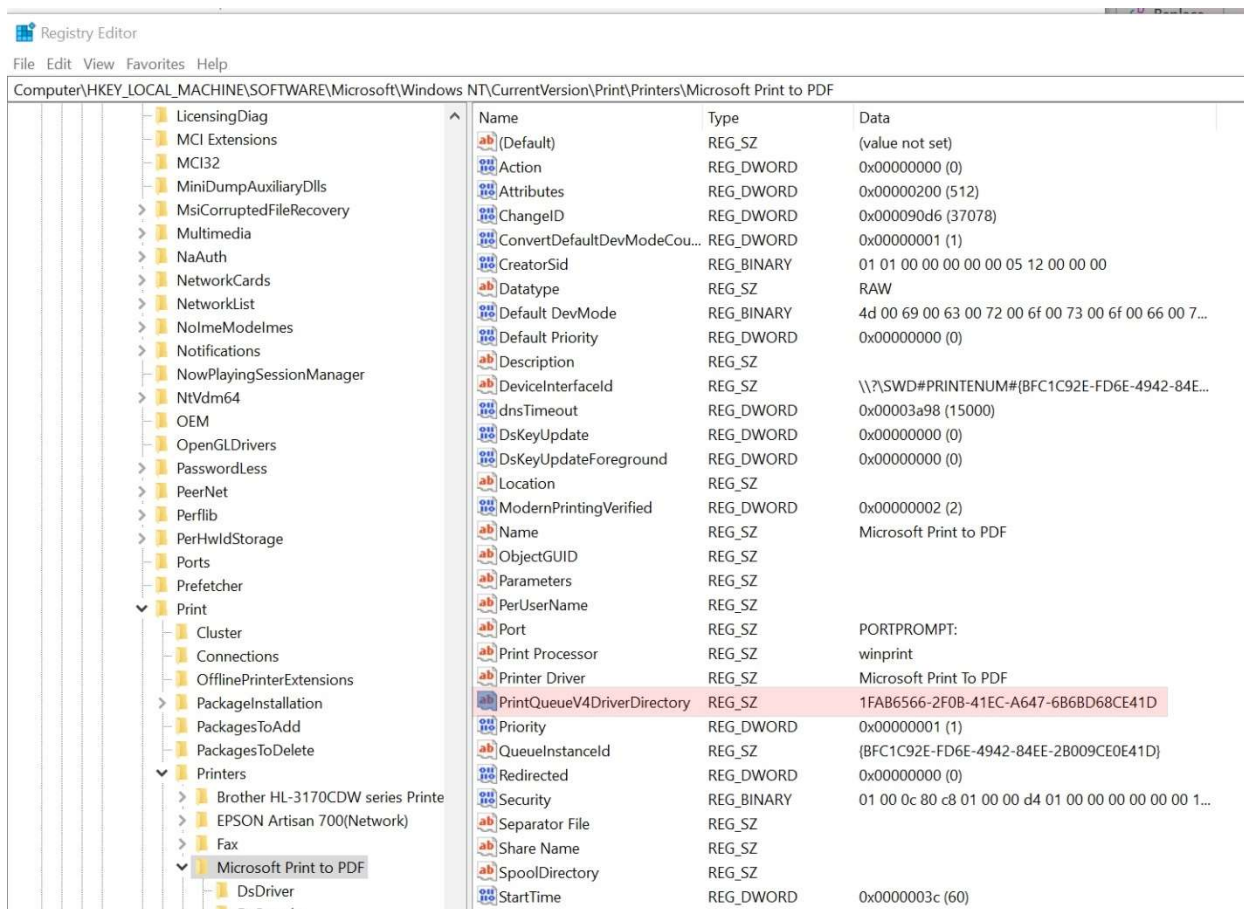
**HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Print\Printers\Microsoft Print to PDF**

In the right pane, find the value for: **PrintQueueV4DriverDirectory**  
It should have a value like this, although not this exact value:

**1FAB6566-2F0B-41EC-A647-6B6BD68CE41D**

Make note of this value.

Here's what I saw in **regedit**:

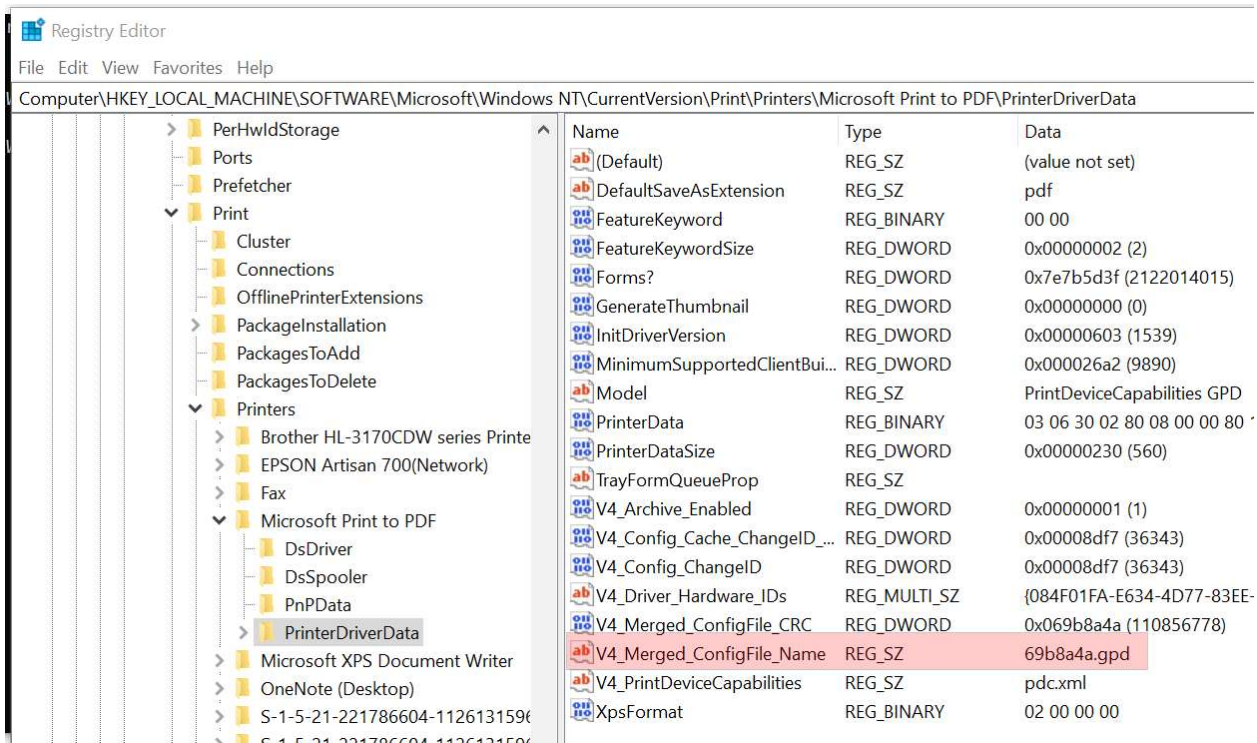


## Find the **GPD** Filename Associated with **Microsoft Print to PDF**

From within **regedit**, navigate to this node in the tree on the left pane:

HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Print\Printers\Microsoft Print to PDF\PrinterDriverData

In the right pane, find the value for: **V4\_Merged\_ConfigFile\_Name**  
It should have a value like this: **69b8a4a.gpd**  
Make a note of this value as well.  
Here's what I saw in **regedit**:



The fully qualified name of the **GPD** file associated with **Microsoft Print to PDF** is going to be:

C:\Windows\System32\spool\V4Dirs\PrintQueueV4DriverDirectory\value\V4\_Merged\_ConfigFile\_Name\value

In my case, here's the fully qualified name for the **GPD** file.

C:\Windows\System32\spool\V4Dirs\1FAB6566-2F0B-41EC-A647-6B6BD68CE41D\69b8a4a.gpd

## Make a Backup Copy of the Current **GPD** File

Using File Explorer, navigate to the correct directory and make a copy of the above **GPD** file. We do this to protect us in case something is done wrong later.

## Determine the **MinSize** and **MaxSize** Values for the Page Sizes You Wish to Support

Before modifying the **GPD** file, you need to calculate the values you will use to specify the width and height of the minimum and maximum page sizes when you later define a custom form. It is not obvious how to do this and the calculations, found in the online references noted earlier, appear quite arbitrary.

To calculate the **MinSize** and **MaxSize** values, do this:

### MinSize

Take the **WIDTH** of the minimumly-sized page, in **CENTIMETERS**, and multiply by 180,000. We'll call this: **MinWidth**.

Take the HEIGHT of the minimumly-sized page, in CENTIMETERS, and multiply by 180,000. We'll call this: **MinHeight**.

The value for **MinSize** will be: (**MinWidth,MinHeight**).

For my use case, I wanted to support a minimum size of 5.2 cm wide X 7.4 cm height. So, my **MinSize**=(936000, 1332000)

## MaxSize

Do the same calculations for the maximum size paper.

Take the WIDTH of the maximumly-sized page, in CENTIMETERS, and multiply by 180,000. We'll call this: **MaxWidth**.

Take the HEIGHT of the maximumly-sized page, in CENTIMETERS, and multiply by 180,000. We'll call this: **MaxHeight**.

The value for **MaxSize** will be: (**MaxWidth,MaxHeight**).

For my use case, I wanted to support a maximum size of 370 cm wide (about 145 in. or just over 12 ft.) X 370 cm height. So, my

**MaxSize**=(66600000,66600000)

## Modify the GPD File to Support the Largest Page Size

Using something like notepad, edit the **GPD** file. You will need to run notepad as Administrator in order to modify the file, since it is considered a system file.

In my case I used notepad to edit this file:

<C:\Windows\System32\spool\V4Dirs\1FAB6566-2F0B-41EC-A647-6B6BD68CE41D\69b8a4a.gpd>

Look for this line in the GPD file:

```
*DefaultOption: LETTER
```

Add these lines after the above line:

```
*Option: CUSTOMSIZE
{
*rcNameID: =USER_DEFINED_SIZE_DISPLAY
*MinSize: PAIR(MinSizeWidth, MinSizeHeight)
*MaxSize: PAIR(MaxSizeWidth, MaxSizeHeight)
*MaxPrintableWidth: MaxSizeHeight
}
```

In my use case, I added these lines:

```
*Option: CUSTOMSIZE
{
*rcNameID: =USER_DEFINED_SIZE_DISPLAY
*MinSize: PAIR(936000, 1332000)
*MaxSize: PAIR(66600000, 66600000)
*MaxPrintableWidth: 66600000
}
```

Here's what the significant part of my **GPD** file looked like before and after the changes:

<pre>... ... *DefaultOption: LETTER *Option: TABLOID { ... ... }</pre>	<pre>... ... *DefaultOption: LETTER *Option: CUSTOMSIZE { *rcNameID: =USER_DEFINED_SIZE_DISPLAY *MinSize: PAIR(936000, 1332000) *MaxSize: PAIR(66600000, 66600000) *MaxPrintableWidth: 66600000 } *Option: TABLOID</pre>
--	--

	{ ... ...}
--	------------------

## Step 4: Create Custom Forms under Microsoft Print to PDF

Open **Control Panel**

Open **Devices and Printers**

Select the printer **Microsoft Print to PDF**

Click **Print server properties** on the ribbon menu

Check the **Create a new form** checkbox

Supply these values:

Print Server Properties

Forms Ports Drivers Security Advanced

Forms on:

- 8.5x13
- 10x11
- 10x14
- 11x17

Form name: 13 in x 6 ft

Create a new form

Define a new form by editing the existing name and measurements. Then click Save Form.

Form description (measurements)

Units:  Metric  English

Paper size: Width: 13.00in Height: 72.00in

Printer area margins: Left: 0.00in Top: 0.00in Right: 0.00in Bottom: 0.00in

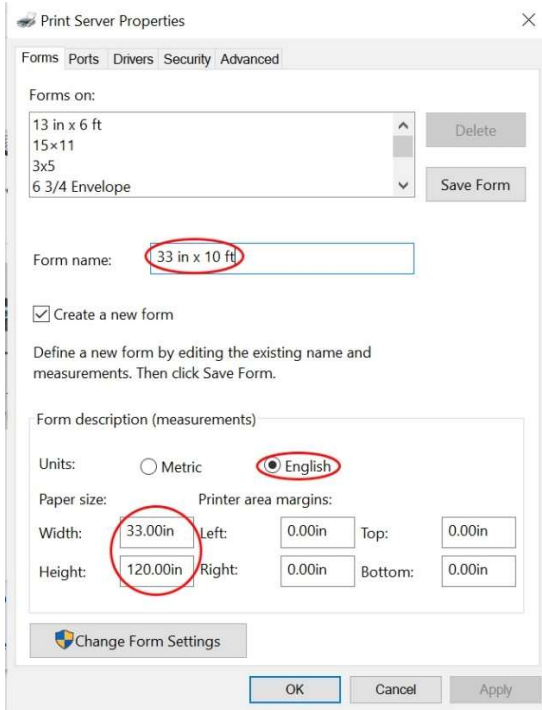
Change Form Settings

OK Cancel Apply

**(Note that there is no space between "13.00" and "in")**

Click the **Save Form** button.

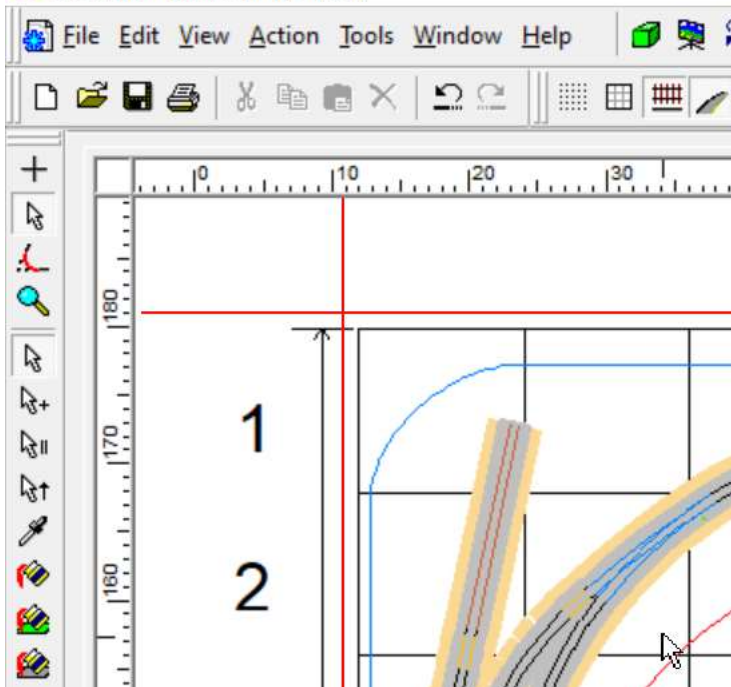
Repeat the same steps to create another form using these values:



## Step 5: Within 3rdPlanIt, Print to the Microsoft Print to PDF Printer, using a Custom Form

First determine the X,Y coordinates of the upper left most page you want to print. Here's an image of my layout with some red lines to show how I determined that my upper left coordinates would be: (11",181")

3rd PlanIt - [Website Test plan]



Click **Ctrl+P** to open the **Page Setup** dialog within 3rdPlanIt.  
Click **Select printer...**

On the **Print** panel, in the **Select Printer** box  
select the **Microsoft Print to PDF** printer  
click the **Preferences** button.

On the **Printing Preferences** panel:

click the desired **Orientation** option (I would choose Landscape for my use case)

click the **Advanced...** button.

On the **Microsoft Print to PDF Advanced Options** panel:

click the down arrow on the **Paper Size** control

choose the NEW FORM you just created a few minutes ago (I would choose **33 in x 10 ft** for my use case)

click the **OK** button

Back now on the **Printing Preferences** panel, click the **OK** button

Back now on the **Print** panel, click **Print**. **Note that this does NOT actually resulting in anything printed yet!**

Back on the **Page setup** panel now:

Select how many rows and columns you wish to print.

Select the **Output Scale** of: **1:1**

Enter the X-Y coordinate of position of the upper left corner of the most upper left most page you wish to print.

I highly recommend clicking these options:

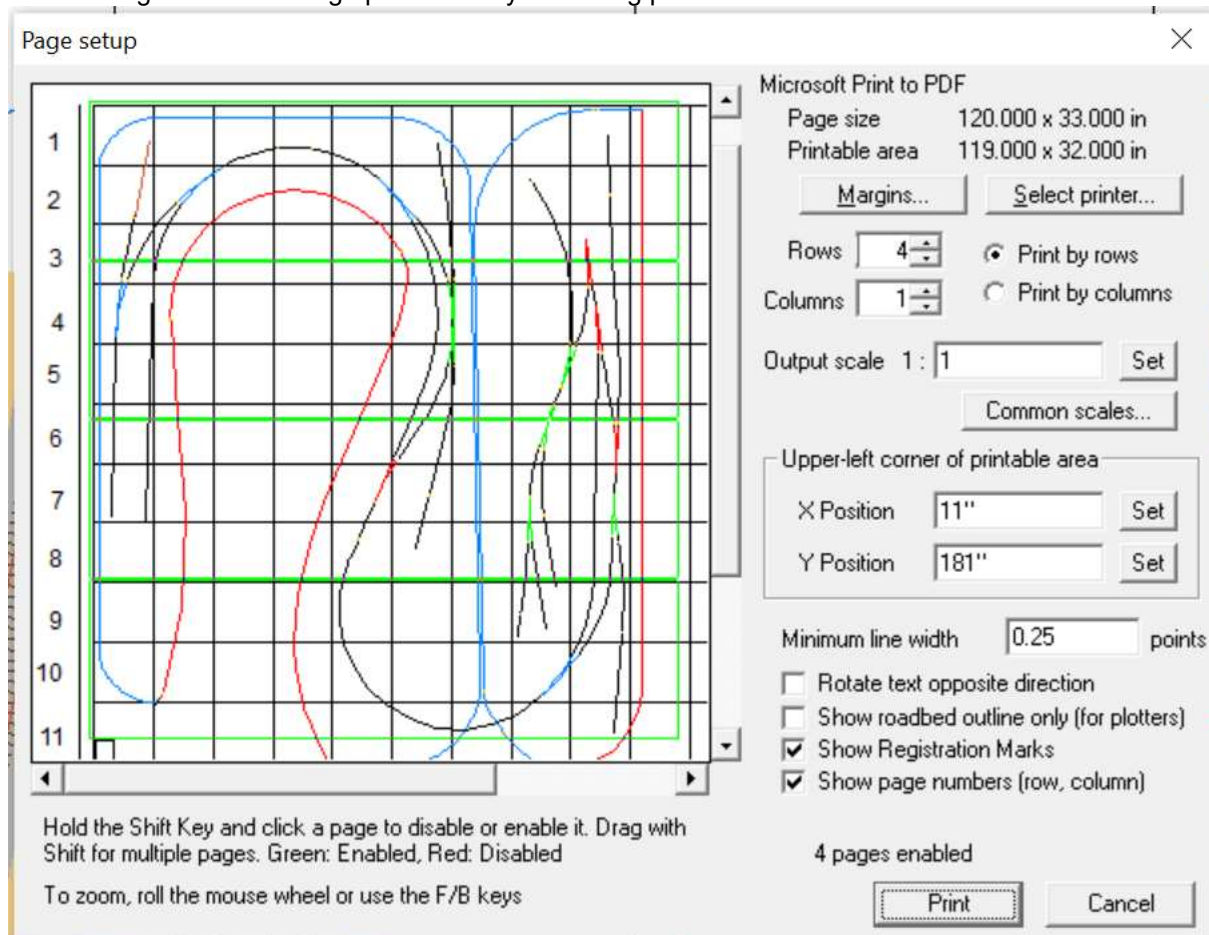
**Show Registration Marks**

**Show page numbers (row,column)**

Click all of the **Set** buttons.

Verify in the diagram in the left pane that you will be printing the desired portions of your layout and that the larger page sizes are being utilized. If you don't see large pages outlined on the diagram, retrace your steps.

Here's what the **Page setup** panel looks like for my layout when printing the 4 large pages. Notice the pages outlined in green in the image presented by the dialog panel.





Click the **Print** button.

You will be prompted for the folder/filename of the output PDF.

As mentioned previously, I will complete my set of giant diagrams by printing a narrower page that covers the bottom portion of my layout. I actually have 2 other choices:

1. Print nothing else. The 4 giant diagrams I've already printed do indeed cover all of the actual track plan. They do not, however, cover all of the backdrop and aisleway boundaries. I might could get away with fashioning those last portions without a precise map, given that most of the backdrop and aisleway boundaries are printed.
2. On the **Page setup** panel above, I could change the number of rows from 4 to 5. The only disadvantage is that it will cost me more to have that fifth giant diagram printed than defining a smaller, though still giant, diagram and printing that.

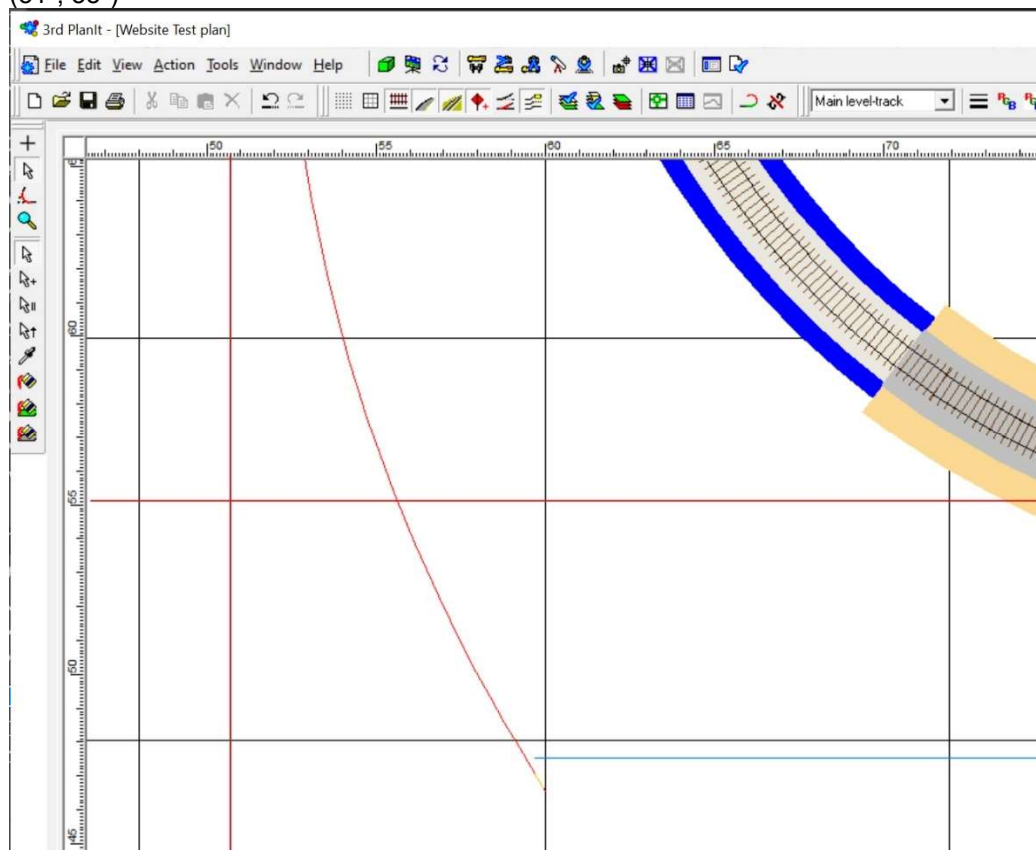
On the assumption that I want to print all aspects and minimize the printing cost, we will proceed with the remaining steps to print the one smaller diagram.

## How to Print a Different Size Diagram at a Different "Starting Point"

### Determine the Upper-Left Corner of the Diagram

Using the same method as before, determine the (x,y) coordinate of the upper-left corner for your new page. In my case, looking at the image above we see that the bottom edge of the bottom-most page ends at about the 10'-6" mark from the top of the drawing. Also, the right boundary of the left aisleway looks to start at about 3'-4" from the left edge of the drawing. Using these 2 numbers, we can make a good guess on the upper-left corner.

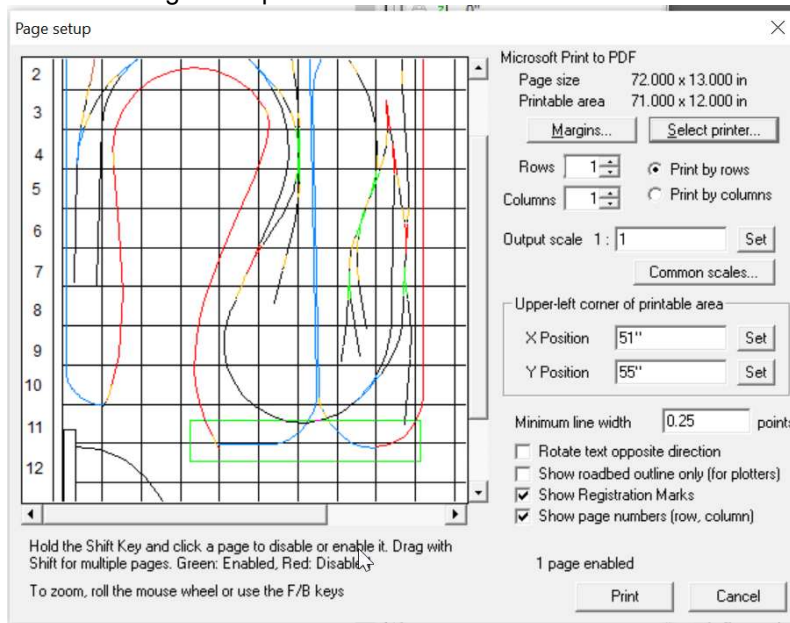
First, zoom in on the area around where these 2 "lines" would intersect and eye-ball where the correct intersection point is. In the image below, we use red lines to see that it looks like a good guess would be: (51", 55")



Now, we repeat the same steps as we did for printing the 4 previous giant diagrams except:

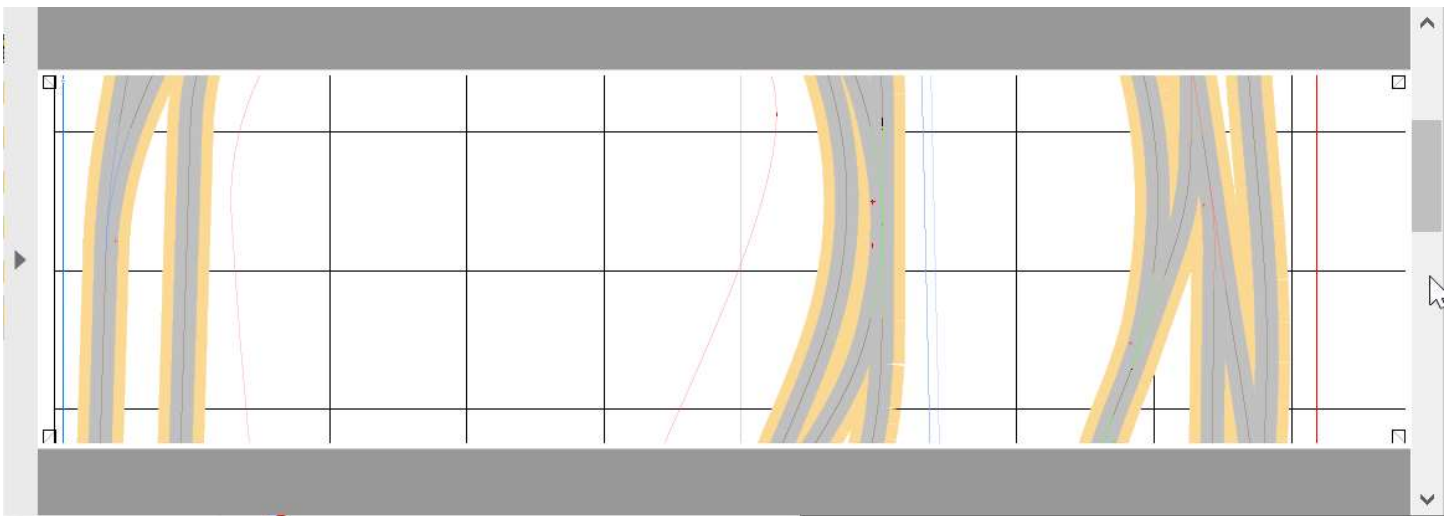
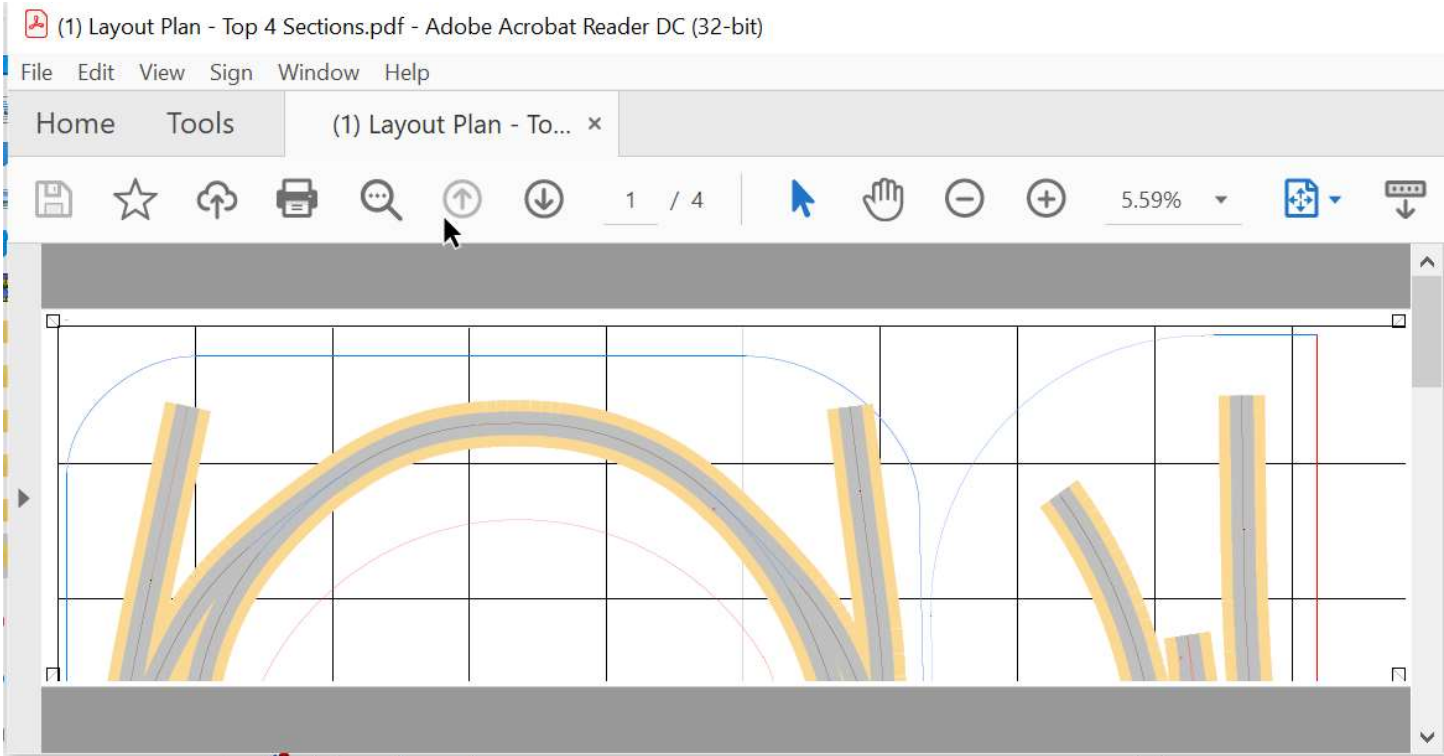
1. The form name we use is: **13 in x 6 ft** This changes the **Page size** and **Printable area** values in the **Page setup** panel.
2. The upper left corner is specified as: 51", 55"
3. We only print 1 row and 1 column

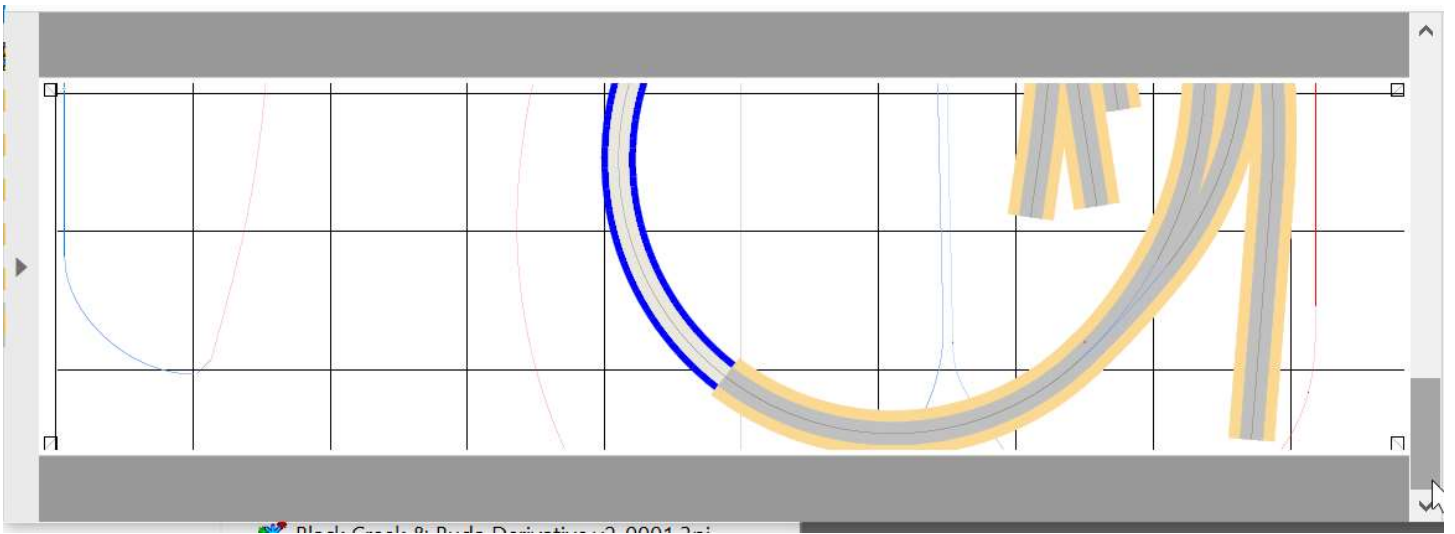
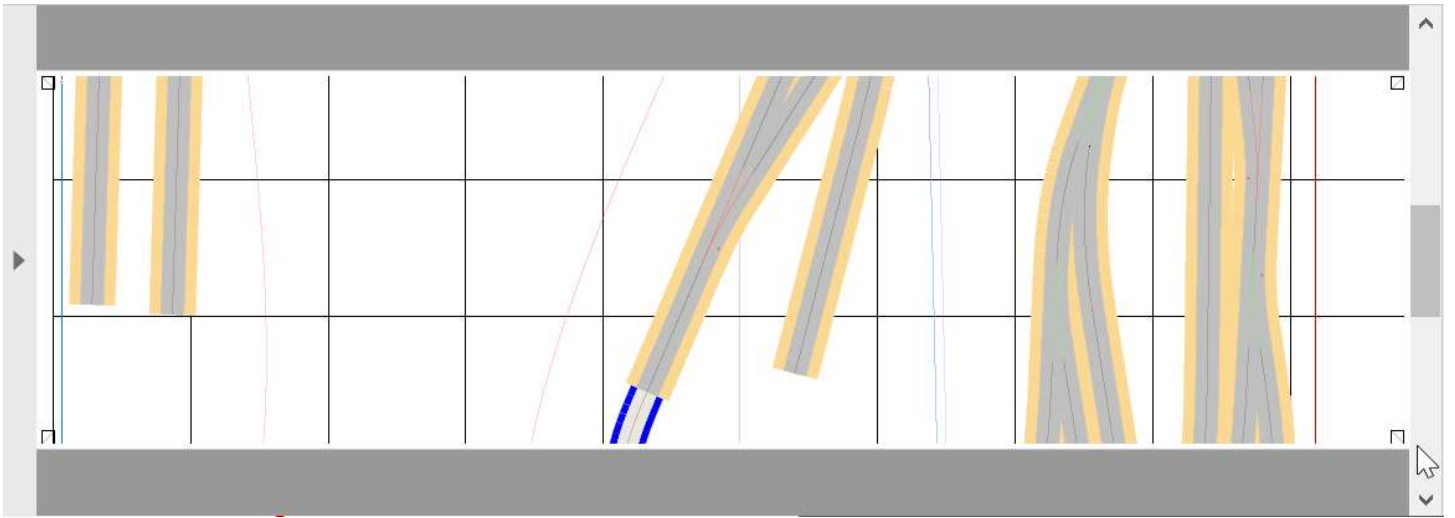
Here's the **Page setup** panel fully populated. Note that there is only 1 green page highlighted and it is a smaller diagram located below the other diagrams. In reality, this smaller "giant" diagram does overlap the bottom-most diagram from the previous set but, because of the presence of the grid lines it should be easy to line the diagrams up.



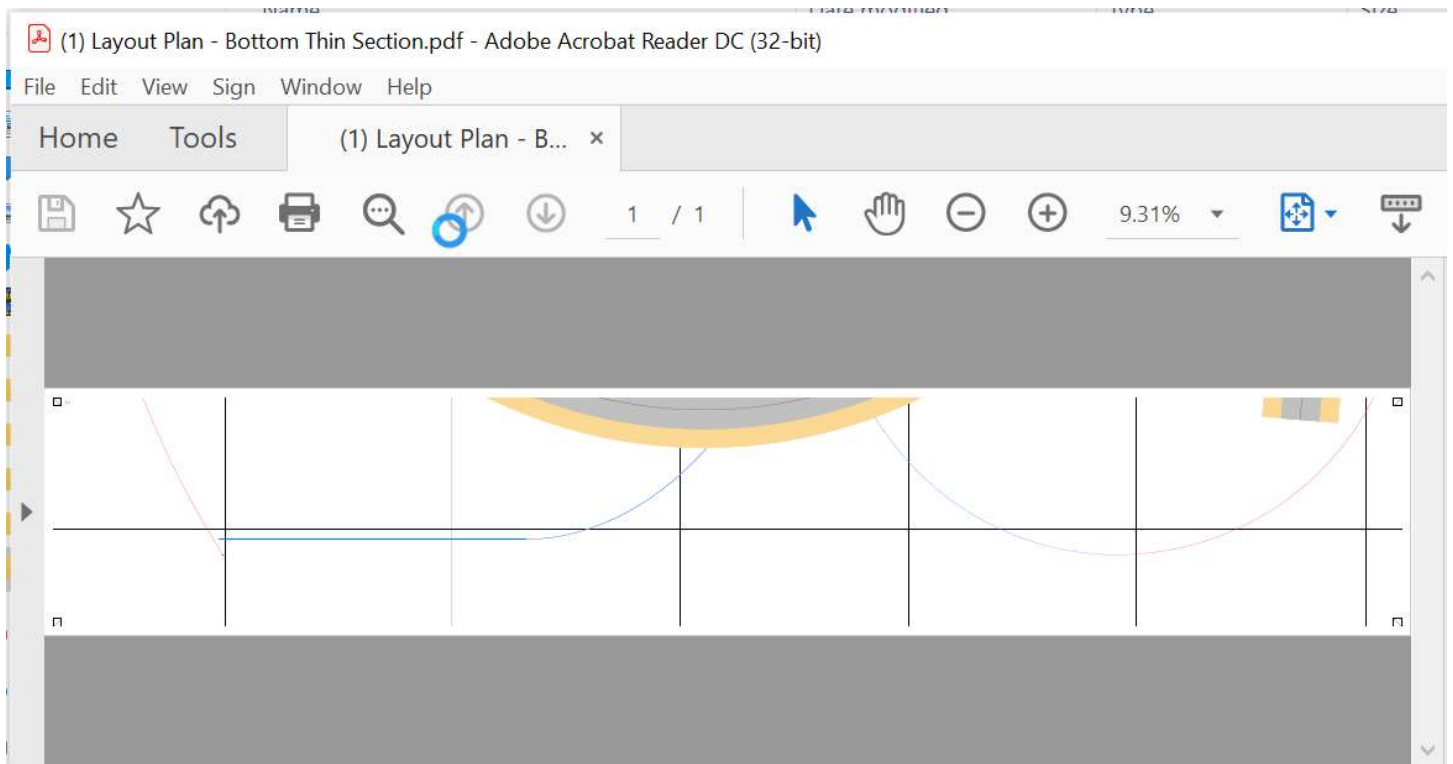
## Step 6: Double Check Your Results

Use your PDF reader to view the generated PDF's. In my case I had 1 4-page PDF with each page being 33 inches by 10 feet, and a second 1-page PDF whose page was 13 inches by 6 ft. Shown below is what they looked like using a PDF viewer. In order for the PDF viewer to show the entire page, note that it had to reduce the overall image to 5.59% for the 4 largest pages. **It's highly recommended that you draw something on your plan (that gets printed) that is exactly 12" by 12"** (I put in 12" gridlines on my drawing). This allows you to double check that the finished product is to the exact correct scale.





Block Graphs By Paul Dawkins © 2004 3rd



## Step 7: Have Your PDF's Printed

Give your PDF files to your printer and explain what you've done. Impress upon them the need to print the document to its exact size. You don't know what software they use so it's hard to know what terms to use but saying something like you don't what it "fit to size" or "shrink to fit" will get the discussion started. Tell them about your 12" x 12" square that you want printed to exactly that size.

## Step 8: Tape the Pieces Together

Use the printed registration marks to line up your pages and use clear tape to make the biggest jigsaw puzzle you've ever seen.