OpenBridge Modeler Drafting Workflow

Bridge Design Section
Bridge Division
V. 10.12   June 2024

Texas Department of Transportation

Contents

1. Introduction

For any project starting on or after June 1, 2022, a bridge model created in OpenBridge Modeler (OBM) is required. Bridge Division uses the bridge model to create detail sheets. The bridge model can be used to create more than the Bridge Layout.

This document outlines the standard operating procedures for drafting projects in the Design Section at TxDOT Bridge Division. The steps contained in this document are in-house policy and should be adhered to in Bridge Division unless permission is granted to deviate on a case-by-case basis. Consultants may use the following procedures, but it is not required.

The main objectives of this document:

- Describe use of TxDOT ProjectWise environment in coordination with creating projects

- Establish the procedures for creating MicroStation Working Files and Plan Sheet Files

- Describe steps to create models within MicroStation Working Files

- Outline the naming convention for Working Files and Plan Sheet Files

- Outline the naming convention for Detail Models.

Disclaimers:

- This document assumes the user is familiar with the TxDOT OBM Training Manual and the TxDOT Detailing Guide.

- This document will establish steps to be used to create Drawing and Sheet files in a uniform and consistent way.

- This document will not answer the "How-to" questions but will focus on the "What" and "Where" questions.

2. Folders

2.1 Workspace Folders [Any Datasource - _Resources – ClientWorkspace - TxDOT – TxDOTConnect1012 – Organization Civil – TxDOT - _Bridge – OpenBridge Modeler]

This folder contains the seed files, and print drivers amongst other configuration settings automatically applied to all dgns such as text styles, and dimension styles.

2.1.1. Seed Files [OpenBridge Modeler - Seed]

In the workspace there are 4 seed files provided. When using OBM the default seed file is set to the 3D Bridge seed file below. When using MicroStation the user will need to navigate and select the desired seed file to create a model or file.

- TxDOT_BridgeDrawingSeed2d.dgn

  This seed file is used to create Drawing models when additional blank drawing models are needed. The drawing models are used for general detailing that does not involve creating a 3D Bridge Model.

- TxDOT_BridgeSheetSeed2d.dgn

  This seed file is used to create Sheet models when additional blank sheet models are needed. The sheet models are used to reference the details created in drawing models and to reference the borders for final printing.

- TxDOT_BridgeSeed2d.dgn

  This seed file is used to create 2D Design models when additional blank 2D design models are needed. The 2D design models when OBM starts supporting the 2D/3D workflow, this seed file should not be used until the version of OBM that supports 2D seed files is released.

- TxDOT_BridgeSeed3d.dgn

  This seed file is used to create 3D Design models, this is the main seed file used by OBM at this moment, all OBM files should be created using this seed file.

2.1.2. Print Driver Files [OpenBridge Modeler - Pltcfg]

Standard Bridge Print drivers are stored in this folder. 2 print drivers are provided. When using OBM for detailing and bridge modeling the print drivers are selected automatically; however, when using MicroStation the user will need to search and attach the print drivers manually at least once to make it available in the print driver history.

- brg-pdf-bw.pltcfg

This print driver is used to create PDF files in black and white. The print drivers support "grayscale" colors set in the 80, 96, 112, or 128 colors in MicroStation or OBM.

- brg-pdf-clr.pltcfg

This print driver is used to create PDF files in color.

2.2. Border Files [District – CSJ – 4. Design – Bridge – Borders]

Border files have been provided to be used with Bridge Details and Bridge Layouts. The borders need preparation such as the placement of Preliminary and Final seals, filling out the Title Block information, and to verify that the Title Block tags are updated with the correct project information.

2.3. Working Directory [District – CSJ – 4. Design – Bridge – Bridge Name]

Bridge Division has write access to this folder. The Working Folder is where the Bridge Project Folder and border file reside. All the details are drawn in working files located in the Bridge Project Folder. The working files contain drawing notes that may not be on the sheet.

<u>Multiple Bridges in One Project</u>

For a project with multiple bridges, each bridge would have a bridge project folder under the Working Folder [District - CSJ - 4. Design – Bridge]. Each bridge has its own abutment sheet, bent sheet, etc.

2.4. Plan Set Folder [District – CSJ – 4. Design – Plan Set – 7. Bridge]

The Plan Set Folder is where the final plan sheet dgns reside. Details from the Working Folder are referenced into the dgns in the Plan Set Folder. File name in the title block needs to be the file name of the sheet in the Plan Set folder. Any printing of sheets should be done from this folder.

3. Workflow

STEP 1

Open each of the Border files and verify the tags in the title block auto populate the CSJ and other information from the CSJ project properties. **Fill out the "date", and the Bridge Name portion of the border file title block using the data fields. This should always be done in the border file because this information is consistent throughout the project. If there are multiple bridges in the project, copy the provided title block data block and place it in a separate level that represents the bridge name and fill out the information.** The same border is used for all bridges in the project so the title block information will be turned on and off using the levels.

Copy Preliminary Seal into the Border file. If there are multiple engineers on the project, put seals on different levels that reflect the engineer's initials.

STEP 2

Create or locate the Bridge Model. The bridge model should be created when the Bridge task gets assigned before any other task is done. The bridge model will be used to create the Bridge Layout, and all the Bridge Detail Sheets. To create the Bridge Model, follow the steps in the TxDOT OBM Training Manual using the Bridge wizard or step-by-step process to create a bridge model.

STEP 3

Create the initial drawing models and sheet models following the steps in the TxDOT OBM Training Manual. These drawing models are the Plan, Profile and Transverse views used for the layout; the Plan and Transverse views used for the span sheets; and the elevations views used for the substructure details. Every new drawing model file created using the Plan Production process shall be named in accordance with Appendix B. A new sheet model file created shall be named in accordance with Appendix C. The drawing and sheet models themselves should be named in accordance with Appendix D and shall be created using the detail scale listed in the same appendix.

STEP 4

Using the previously created files and drawings, create the additional views needed. These include but they are not limited to the Section, Plan, Additional Elevations, and closed-up details for each of the drawings needed. Follow the steps in the Plan Production section of the TxDOT OBM Training Manual. Any additional drawing created manually will need to be referenced manually to the sheet model file. The drawing should be named in accordance with Appendix D and shall be created using the detail scale listed in the same appendix. Blank models are required to be created to place the Notes, Axiom tables and Rebar details.

- To create detail models based on another existing drawing model (i.e. Plan View using the Elevation view or Section View using the Elevation view) follow the Plan Production steps in the TxDOT OBM Training Manual.

- To create blank/empty models, open the Models dialog box.

- In the Models dialog box, press the **Create New Model** icon.
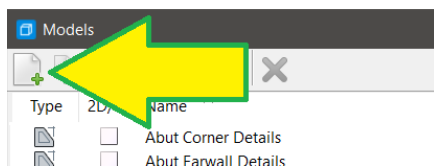
- Change the Type to **Drawing from Seed**. If working in OBM the seed file will be selected; if working in MicroStation the user will need to navigate to the seed file located in the folder mentioned before. Provide the model name, and model description in accordance with Appendix D. Set the annotation scale to match the scale defined in the description.
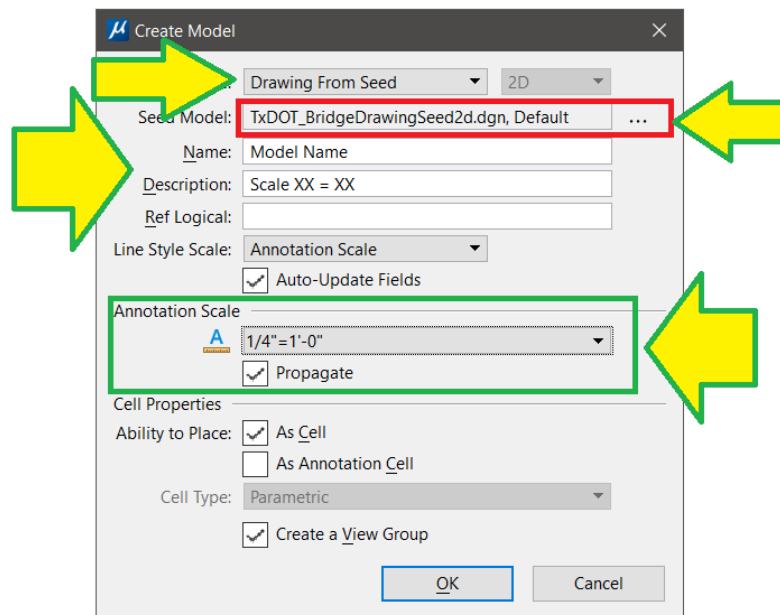
- Please consult the TxDOT Bridge Detailing Guide for the recommended scales for different details.

Sheets should not be assembled in the working directory. Only the sheet model files in the final plan set directory should have the details referenced into the sheet models.

STEP 5

Add dimensions, labels, and annotations in accordance with the Bridge Detailing Guide – Chapter 4. Use Engineering Regular in lieu of FDOT, Engineering Bold in lieu of FDOT Bold, Engineering Mono in lieu of FDOT Mono and Engineering Mono Bold in lieu of FDOT Mono Bold. All Text Styles and Dimension styles provided in the workspace will match all text sizes as shown in the TxDOT Bridge Detailing Guide. Do not change the text size. All dimensions and labels should be associated to the element being annotated.

STEP 6

In the sheet files stored in the plan set directory, reference and organize all details created in the drawing models stored in the working directory. There should be no detailing done in the sheet models. Other than the sheet number, file path, saved date, and scale (for layouts) nothing else should be placed in the sheet models. Sometimes additional sheets need to be created manually.

- To create blank/empty sheet models, open the Models dialog box.
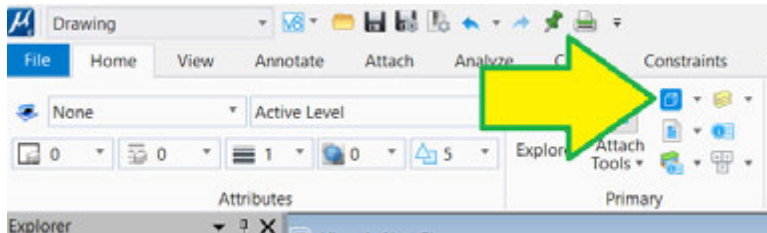
- In the Models dialog box, press the **Create New Model** icon.

- Change the Type to **Sheet from Seed**. If working in OBM the seed file will be selected; if working in MicroStation the user will need to navigate to the seed file located in the folder mentioned before. Provide the model name in accordance with Appendix D. Set the annotation scale to be Full Size.
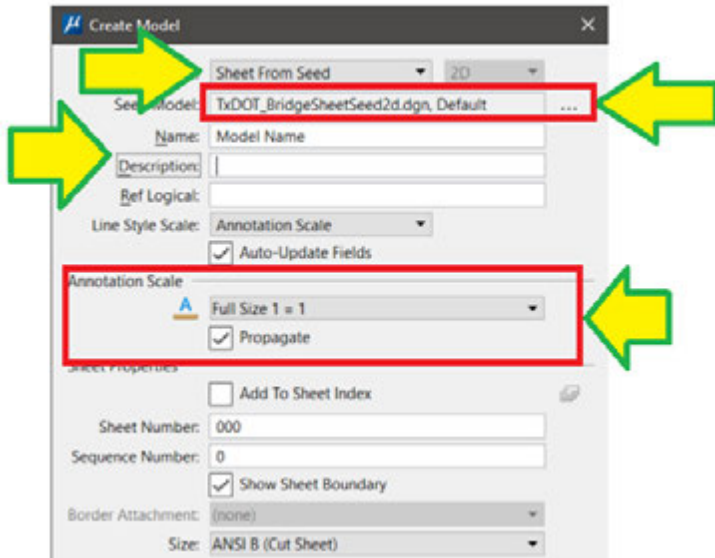
- The Border file is automatically attached to the new sheet model.

STEP 7

Reference details not already refenced into the sheet model. Be sure that the detail scale matches the description when attaching a reference. If the description is set to "No Scale" set the detail scale to "Full Scale 1:1".
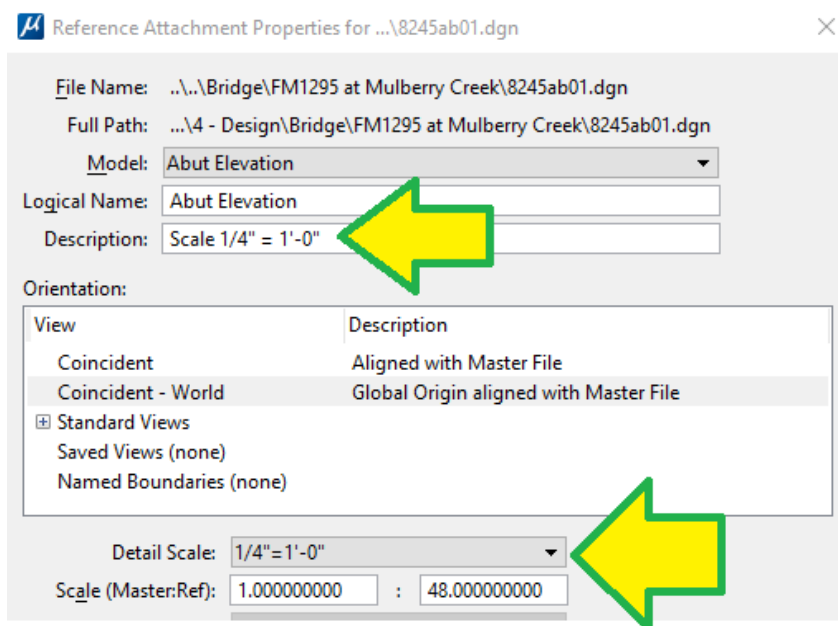
STEP 8

Download all pertaining reference files to the final plan set directory [District – CSJ – 4. Design – Plan Set – 7. Bridge]. Optionally create a folder named "Supporting Standards" in the final plan set directory and download the standard files there. ***Modified standards such as the IGND standard should be downloaded to the working directory and treated as the rest of the details. A new sheet model file in the final plan set directory is required to reference any of the modified standards.***
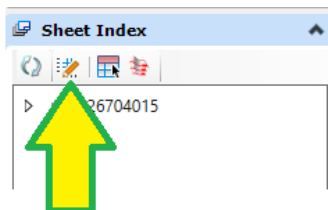
STEP 9

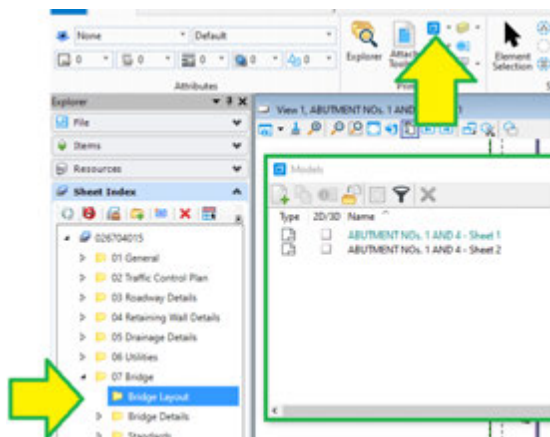Add the sheets to the index of sheets located in the explorer in MicroStation or OBM.

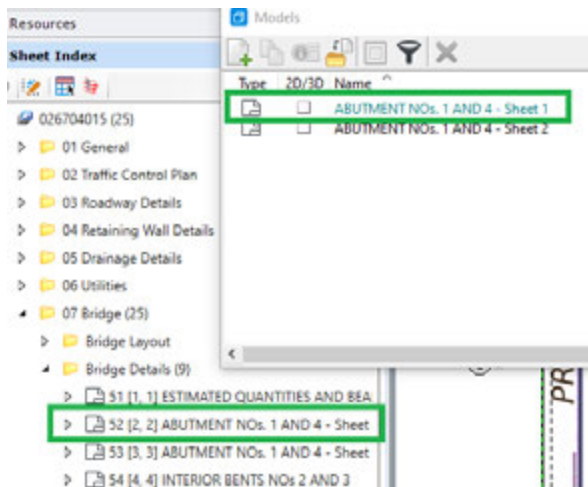• To add files to the index, open the **Sheet Index** tab from the explorer.
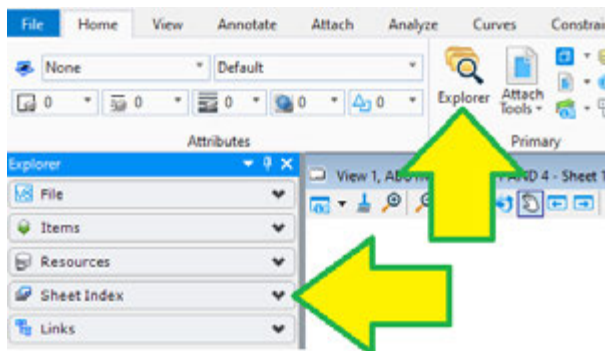
• In the sheet index tab press the **Open Sheet Index for Edit** icon.

• Once the index is editable, expand the folders and navigate to the **07 Bridge** then open the **Models** dialog box.

- Add files to the folders by dragging the models from the model dialog box to the index folders.

- Repeat the steps with all files that need to be added to the index.

STEP 10

Add the sheet numbers to all the sheets using the Sheet Index tab.

- To update the numbers in the index, select the folder containing the sheets and in the properties dialog box change the information for the sheet numbers, prefix, and number of digits.
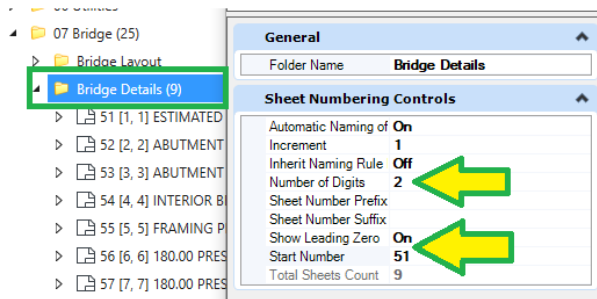
- To push the updated numbers to the sheet files, right click on the folder and select **Update Sheet Model Properties** this will check out all the files and update the sheet number. Be sure to check all files in once the update is complete.
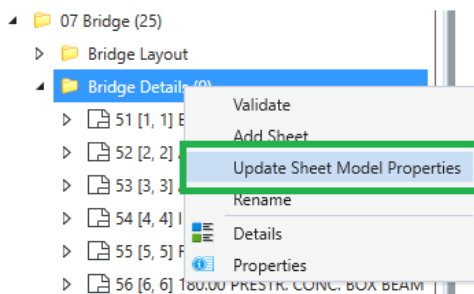
- Repeat these steps if the sheet numbers are changed.

STEP 11

Create the PSET using the Sheet index tab, by pressing the **Open Print Organizer** icon. Save the newly created PSET to the working directory.
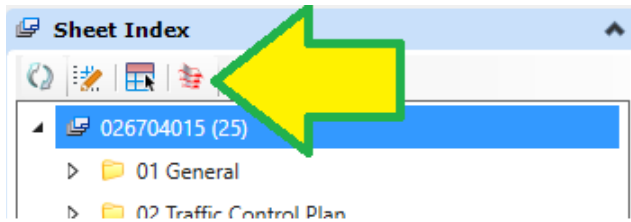
STEP 12

Print the PSET as needed below:

- For any submittal prior to 100%, create a single PDF for all sheets.

- For 100% submittal create one PDF per sheet.

    o All preliminary labels and seals should be removed.

    o Final seals are not required Engineers will sign all sheets electronically.

APPENDIX A

A. ProjectWise Project Folder Structure

In ProjectWise a template was created specifically for CSJ Projects. Each CSJ project has two dedicated folders for Bridge. Working Folder [District -CSJ – 4-Design – Bridge] contains a folder named 'Bridge X'. This folder should be renamed to reflect the name of the Bridge before any files are saved in the folder. The Plan Set Folder [District -CSJ – 4-Design – Plan Set – 7. Bridge] is for the Sheet files.

The Border file for Details and Layouts are in the working folder, inside the Borders folder [District -CSJ – 4-Design – Bridge - Borders].

CSJ Project folder should only be created by ProjectWise Power Admins at the District Level. If a CSJ does not exist in the district folder, inform your Lead and a temporary project folder can be created in the Divisions container.

Files should be saved in the following locations:

- Working Folder [District -CSJ – 4-Design – Bridge],

    o OBD file

    o OBM DGN file (Bridge Model)

    o Detail files (cg, ab, ib, etc)

    o PSET Files

    o Pen Tables

    o Excel quantity tables

- Plan Set Folder [District -CSJ – 4-Design – Plan Set – 7. Bridge],

    o Sheet Files

APPENDIX B

B. Working File Naming Convention

BRG Details: XXXXyy##.dgn

where:

XXXX = 4-digit BRG Project ID Number

yy =2-letter Naming Conv. (see below)

= Number (e.g., 01, 02, 03, etc.)

Note: No spaces allowed

Category	Content	Naming Convention
Layouts	Beam Layout (Framing Plan)	BL
	Boring Detail Layout	BD
	Retaining Wall Layout	RL
	Bridge Layouts	LY
	Other Layouts	OL
Abutments	Standard Abutment	AB
	Retaining Wall or Railroad Abutment	RA
	Other Abutments	OA
Interior Bents	Standard Interior Bents	IB
	Single Column Interior Bent	SC
	Inverted T Interior bent	IT
	Straddle Interior Bent	SB
	Cantilever Interior Bent	CB
	Steel Interior Bent	SI
	Trestle Pile Interior Bent	TP
	Other Interior Bents	OB

Superstructures	Box Beam	BB
	U-Beam	UB
	T-Beam	TB
	Concrete Slab Span	CS
	Conc. Slab & Girder (Pan Forms)	CG
	Prestressed Concrete I-Beam	PB
	Post Tensioned Slab	TS
	Steel Rolled Beam	SR
	Steel Plate Girder	SP
	Mixed Span Types (Steel and Concrete)	MS
	Steel Traps	ST
	Erection Plans	EP
	Post Tensioning Details	PT
	Segmental Superstructure Details	SS
	Railroad Superstructure (RR Underpass)	RS
	Other Superstructures	OS
Other	Estimated Quantities (Tabular Tables)	EQ
	Retaining Wall Details	RW
	Modified Standards	MD
	Other Railroad Sheets (RR Misc.)	OR
	Miscellaneous (None of the Above)	MI
	Reference File	RF
	Bridge Model (D Bridge File)	BM

APPENDIX C

C. Plan Sheet File Naming Convention

BRG Details: HHHHHH_BRG_XXXXyy##.dgn

For sheets typically named by the district, use district naming convention.

BRG Boring Logs: HHHHHH_BRG_BORING_XXXXyy##.dgn

BRG Layout: HHHHHH_BRG_LAYOUT_XXXXyy##.dgn

BRG Typical Sections: HHHHHH_BRG_TYP_XXXXyy##.dgn

where: HHHHHH = 6-characters for Highway

XXXX = 4-digit BRG Project ID Number

yy = 2-letter Naming Conv. (see below)

= Number (e.g., 01, 02, 03, etc.)

Note: no spaces allowed

Category	Content	Naming Convention
Layouts	Beam Layout (Framing Plan)	BL
	Boring Detail Layout	BD
	Retaining Wall Layout	RL
	Bridge Layouts	LY
	Other Layouts	OL
Abutments	Standard Abutment	AB
	Retaining Wall or Railroad Abutment	RA
	Other Abutments	OA
Interior Bents	Standard Interior Bents	IB
	Single Column Interior Bent	SC
	Inverted T Interior bent	IT
	Straddle Interior Bent	SB
	Cantilever Interior Bent	CB

	Steel Interior Bent	SI
	Trestle Pile Interior Bent	TP
	Other Interior Bents	OB
Superstructures	Box Beam	BB
	U-Beam	UB
	T-Beam	TB
	Concrete Slab Span	CS
	Conc. Slab & Girder (Pan Forms)	CG
	Prestressed Concrete I-Beam	PB
	Post Tensioned Slab	TS
	Steel Rolled Beam	SR
	Steel Plate Girder	SP
	Mixed Span Types (Steel and Concrete)	MS
	Steel Traps	ST
	Erection Plans	EP
	Post Tensioning Details	PT
	Segmental Superstructure Details	SS
	Railroad Superstructure (RR Underpass)	RS
	Other Superstructures	OS
Other	Estimated Quantities (Tabular Tables)	EQ
	Retaining Wall Details	RW
	Modified Standards	MD
	Other Railroad Sheets (RR Misc.)	OR
	Miscellaneous (None of the Above)	MI
	Reference File	RF
	Bridge Model (D Bridge File)	BM

APPENDIX D

D. Model Naming Convention and Description

Note: For Descriptions labelled "No Scale," refer to the TxDOT Bridge Detailing Guide for how the detail should be displayed on the sheet.

Table 3-1: Span Sheet Models - Concrete Girders and Beams	
Name	**Description**
XXX.XX' Prestressed Conc. Girder Span Sheet 1	XXX.XX' Prestressed Conc. Girder Span
XXX.XX' Prestressed Conc. Girder Span Sheet X	XXX.XX' Prestressed Conc. Girder Span

Table 3-1: Span Drawing Models - Concrete Girders and Beams	
Name	**Description**
Plan View	Scale = XX
Typical Transverse Section	Scale = XX
Dead Load Deflection Diagram and Table of Section Depths	No Scale
Bar Details	No Scale
Table of Estimated Quantities and circle notes	No Scale
General Notes and Material Notes	No Scale

Table 3-2: Span Sheet Models - Steel Girders and Beams	
Name	**Description**
XXX.XX' Continuous Steel Beam Unit X Sheet 1	XXX.XX' Continuous Steel Beam Unit X
XXX.XX' Continuous Steel Beam Unit X Sheet X	XXX.XX' Continuous Steel Beam Unit X

Table 3-2: Span Drawing Models - Steel Girders and Beams	
Name	**Description**
Plan View	Scale = XX
Typical Transverse or Radial Section	Scale = XX
Concrete Placement Sequence	Scale = XX
Framing Plan	Scale = XX
Beam or Girder Elevation	Scale = XX
Table of Section Depths (for steel beams)	No Scale
Dead Load Deflection Diagram and Web Camber Diagram	No Scale
Bolted Field Splice	Scale = XX
Bar Details	No Scale
Dapped Girder End Details (if needed for steel girders)	Scale = XX
Table of Estimated Quantities, Table of Girder Radii (if needed), and circle notes	No Scale
General Notes, Fabrication Notes, and Material Notes	No Scale

Table 3-3: Abutment Sheet Models

Name	Description
Abutment No. X Sheet 1	Abutment No. X
Abutment No. X Sheet X	Abutment No. X

Table 3-3: Abutment Drawing Models

Name	Description
Plan and Elevation Views	Scale = XX
Cap and Backwall Section	Scale = XX
Wingwall Elevation and Section	Scale = XX
Corner Details (Cap and Backwall)	Scale = XX
Bearing Seat Detail	Scale = XX
Bar Details	No Scale
Table of Estimated Quantities and circle notes	No Scale
General Notes and Material Notes	No Scale

Table 3-4: Bent Sheet Models

Name	Description
Interior Bent No. X Sheet 1	Interior Bent No. X
Interior Bent No. X Sheet X	Interior Bent No. X

Table 3-4: Bent Drawing Models

Name	Description
Plan and Elevation Views (Elevation View includes Column Elevation and Section)	Scale = XX
Cap Section	Scale = XX
Bearing Seat Detail	Scale = XX
Bar Details	No Scale
Table of Cap Quantities, Table of Column Quantities, and circle notes	No Scale
General Notes and Material Notes	No Scale