Design Deliverables for Plans Production

Because OpenRoads Designer does not functionally allow permanent profile graphics to be accessible to the ODOT plans production process other than in a model created by the OpenRoads Designer, the ORD Standards Committee has agreed that the OpenRoads Designer Plans and Profiles file (OPNP) should be created in all projects as a container for the project civil design for inclusion on contract plans. The number and content of the OPNP files should be set by individual project teams in conjunction with the project designers and drafters.

This document provides a glossary of names and locations within ProjectWise. It also provides details in methods of creating the design deliverables so they can be easily used in the plans production process.

This document will also discuss and explain how to create the OpenRoads Cross Section file (XSEC). The XSEC file is an important source of cross section information that can be used by multiple disciplines in the creation of details, sections, and ditch and wall profiles for plans.

ProjectWise Folder Structure

The table below shows part of the structure of the 1_Design sub-folders in the PW_ODOT_PROD datasource. Most civil data resides in 6_Civil_Data. The OPNP file is an exception and is correctly located in 2_Plan_Sheets because it contains sheet models with all graphics displayed for plans, ready for notes to be added and PDFs generated without involving any other files. Having the OPNP file in the same folder as the DGN files reduces navigational steps during manual sheet assembly (referencing) when MicroStation alone is used to create and assemble sheets.

1_Design		Work area for STIP Project Design	Examples of DGN Document Names
	0_Temp	Temporary collaborative work area. The folder will be deleted when STIP project is closed	
	1_Milestone_Submissions	Work area for STIP Project Design Milestones	
	2_Plan_Sheets	CAD files, linked spreadsheets and print sets used to print PDFs for all plan sheets included in the contract plans	R_K#####_pl_##.dgn, TM_K#####_stpl_##.dgn EE_K#####_ecpl_##.dgn, TN_K#####_snps_##.dgn, GE_K#####_rsdt_##.dgn, R_K#####_OPNP_##.dgn
	3_Base_Files	Design content shared with others or used for plan sheet development	R_K#####_nm_cad_##.dgn, R_K#####_cad_##.dgn, R_K#####_bas_##.dgn, TS_K#####_sgd_bas_##.dgn
	6_Civil_Data	**Civil** design content shared with others or used in plan sheet development	S_K#####_TERR_e_bas_CF_##.dgn, R_K#####_GEOM_bas_CF_##.dgn, R_K#####_CORR_bas_CF_##.dgn, R_K#####_XSEC_bas_##.dgn
	Hydraulics	Discipline specific working area for documents and data	H_K#####_GEOM_wrk_##.dgn, H_K#####_DU_wrk_##.dgn, H_K#####_CORR_wrk_##.dgn, H_K#####_TERR_FG_wrk_##.dgn
	Roadway	Discipline specific working area for documents and data	R_K#####_GEOM_pub_##.dgn, R_K#####_CORR_pub_##.dgn, R_K#####_FEAT_##.dgn, R_K#####_TERR_L_FG_pub_##.dgn

Definitions

Civil data – generally considered to be data that is created by Bentley OpenRoads Designer or Bentley InRoads. Common file types are: .alg, .dtm, and .itl. DGN files may contain civil data such as geometry, corridors and ruled terrains. In ProjectWise, civil design content to be shared with others or to be used in plan sheet development is stored in the 6_Civil_Data folder. In order to preserve civil data integrity and associations, "published" civil data being actively modified and stored in the discipline-specific folders, is attached as references to base container files (bas_CF) in the 6_Civil_Data folder.

Non-civil data – basically non-CAD files, like .xlsx and .pdf. DGN files with graphics drawn by MicroStation are considered non-civil data because they do not contain any civil data. In ProjectWise, non-civil design content to be shared with others or used in plan sheet development is stored in the 3_Base_Files folder.

Cut, 11x17 – describes a rectangular shape that bounds an area that when printed to scale would be 11 inches by 17 inches.

Uncut, long – describes a non-rectangular shape that bounds a long area.

Glossary of Acronyms or Abbreviations for Files Created with OpenRoads Designer

Acronym or Abbreviation	Meaning	Usage Example	Folder in ProjectWise
CORR	***Corr***idor or roadway model	R_K#####_CORR_pub_##.dgn	Roadway
GEOM	***Geom***etry or alignments, both horizontal and vertical	R_K#####_GEOM_pub_##.dgn	Roadway
OPNP	***O***penRoads Designer ***P***lans a***n***d ***P***rofiles	R_K#####_OPNP_##.dgn	2_Plan_Sheets
TERR	***Terr***ain model	S_K#####_TERR_e_pub_##.dgn	Survey
XSEC	OpenRoads Designer Cross ***Sec***tions	R_K#####_XSEC_bas_##.dgn	6_Civil_Data
CF	***C***ontainer ***F***ile – a DGN file with few elements and reference attachments	S_K#####_TERR_e_bas_CF_##.dgn; R_K#####_GEOM_bas_CF_##.dgn	6_Civil_Data

Glossary of Acronyms or Abbreviations for Files Created with MicroStation

Acronym or Abbreviation	Meaning	Usage Example	
DT	***Det***ail Sheets	R_K#####_dt_##.dgn	2_Plan_Sheets
PF	***Prof***ile Sheets	R_K#####_pf_##.dgn	2_Plan_Sheets
PL	**Pl**an Sheets	R_K#####_pl_##.dgn	2_Plan_Sheets
PP	***P***lan and ***P***rofile Sheets	R_K#####_pp_##.dgn	2_Plan_Sheets
CAD	***CAD*** Base File	R_K#####_cad_##.dgn	3_Base_Files
Profile Base	***Profile Base*** File	R_K#####_pf_bas_##.dgn	3_Base_Files

The OpenRoads Designer Plans and Profiles File (OPNP)

Displaying a design in drawing and sheet models in an OpenRoads Designer Plans and Profiles (OPNP) file is the only method that OpenRoads Designer provides for expressing the horizontal and vertical design with ***permanent*** graphics that can be used to produce contract plans. Whatever is displayed in the Default model of the OPNP file will be displayed in the drawing and sheet models that are generated. Models that are created in the OPNP file may be attached as references to other files in order to assemble plans.

It takes very little time to create a sheet layout with OpenRoads Designer and can save hours of sheet assembly time for any discipline using the OPNP file to produce plans using only MicroStation. Named boundaries placed early on with OpenRoads Designer can easily be adjusted later, and new drawing and sheet models created in only minutes. Named boundaries may be created along a path in a CAD Base file using MicroStation, and those non-civil named boundaries  may be attached as a reference to the OPNP file; then OpenRoads Designer may be used to place civil plan named boundaries  in the OPNP file that can be adjusted to the locations provided from the CAD Base file. In this fashion, a person using only MicroStation can provide information to a person using OpenRoads Designer about preferred plan layouts.

1-OPNP .dgn Creation and Setup (References)

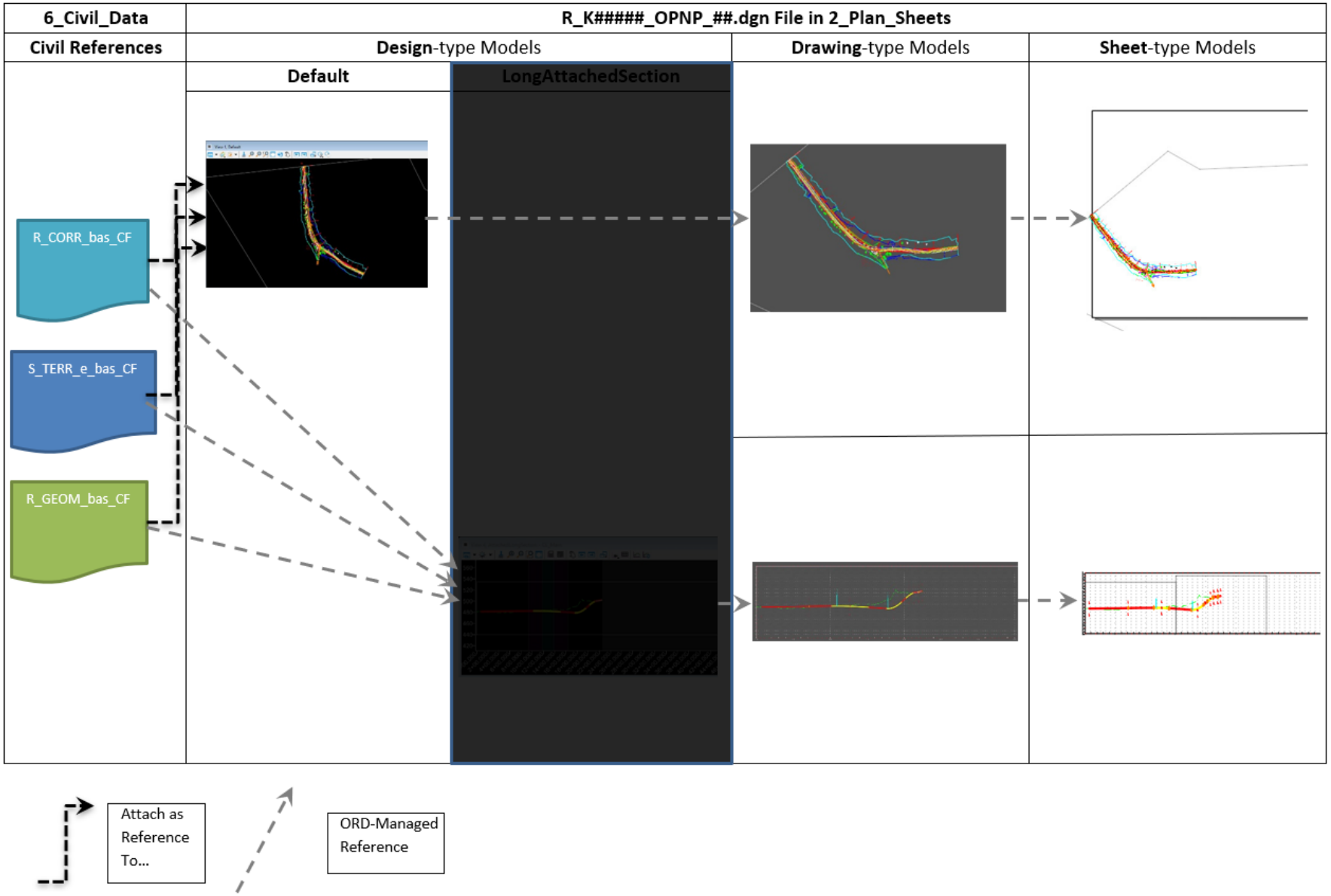
The OPNP file(s) are created in the 2_Plan_Sheets folder in ProjectWise from the Seed2D.dgn template. From the Default model, attach references to civil data (existing ground, proposed alignments and corridor design) from the 6_Civil_Data folder, and any non-civil data from the 3_Base_Files folder. When referencing container files, use Live Nesting with a depth of 1 in order to display the design graphics. Be aware that when a container file has reference attachments to the discipline-specific folder (working files) that updates to the data in the working file will be dynamically displayed in an assembled plan sheet.

2-Create Cut, 11x17 Models

Annotate the geometry elements in the Default design model. (This will display the annotation in the drawing and sheet models and not disturb drawing model annotations). Place Civil Plan  and Civil Profile  named boundaries using “Plan Inch 100” or “Profile Inch 100” drawing boundary seeds. Using methods that are detailed in ODOT training or EAST website documentation, generate drawing- and sheet-type models using the Named Boundary Manager. Add civil annotations to the plan drawing models. Annotate profile elements in the profile drawing models.

The image below shows the structure of the OPNP file beginning with the references to the civil data at the left, to the columns showing the drawing models being referenced into the sheet models at the right. Notice that the drawing models are oriented so that they align with the named boundaries. Annotations placed in the drawing-type models are easy to align with the sheet orientation and the annotations are seen immediately in the sheet-type models because of the referencing. Each cut, 11x17 sheet model contains several cells: Border_B_Size_Sheet, Borderfull, and ODOTTblk_DP. The cut, 11x17 sheet models could be edited in the OPNP file to add project information into the title block cell, add notes and quickly print to PDF. Alternatively, the models in the OPNP file can be attached as references to other PL, PF, or DT files to allow for a variety of levels to be toggled on/off and to allow for different discipline annotations in the other files.

Figure 1. Cut, 11x17 Models in OPNP File



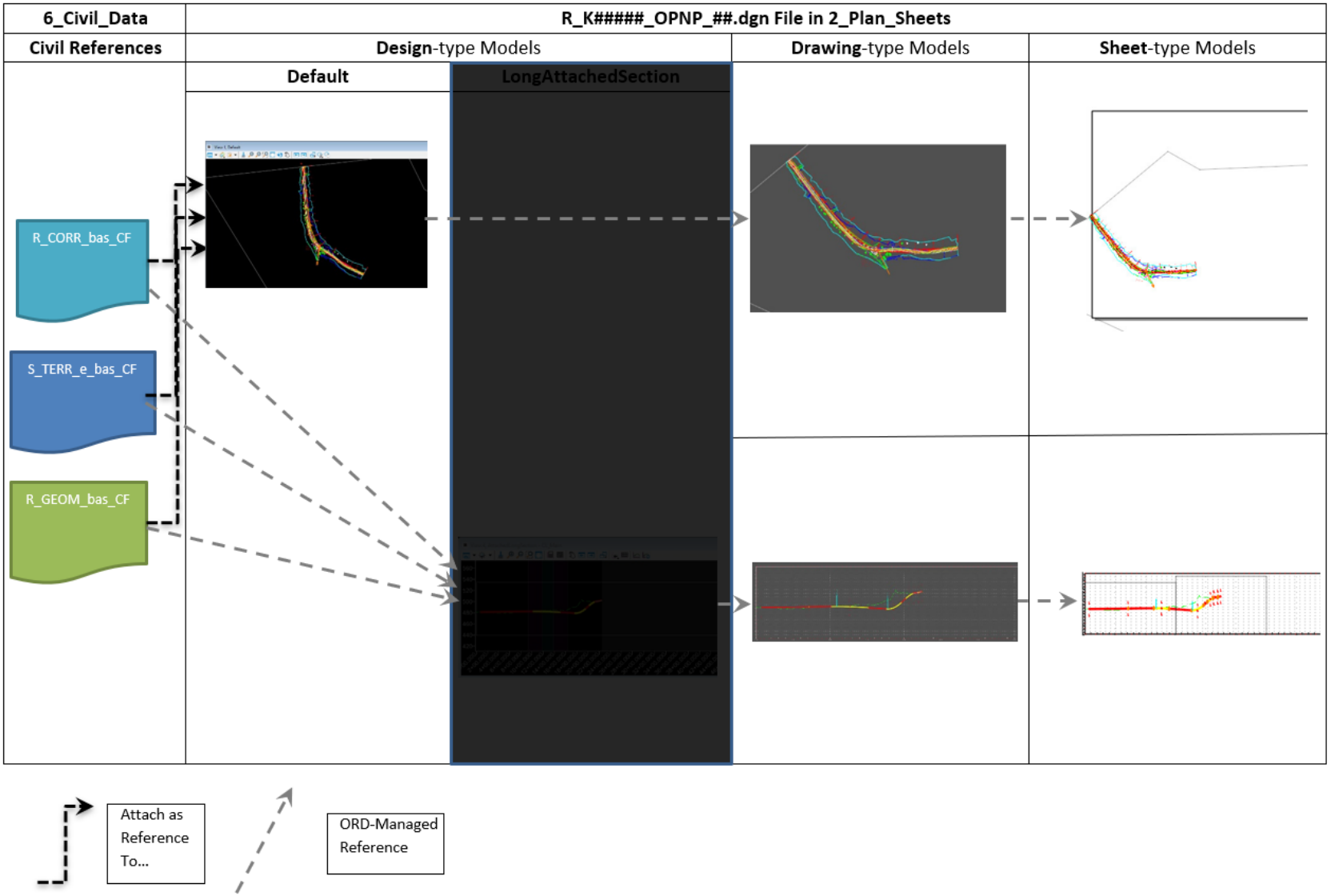
3-Create Uncut, long Models

Place Civil Plan  and Civil Profile  named boundaries in the Default design model using “Plan Long Inch 100” or “Profile Long Inch 100” boundary seeds. Using methods that are detailed in ODOT training or EAST website documentation, generate one drawing- and one sheet-type model for each alignment (geometry) using the Named Boundary Manager. These Uncut, long models will display the entire plan in one drawing-type model

and the entire profile in one drawing-type model. Add civil annotations to the plan drawing model. Annotate profile elements in the profile drawing-type model and the annotations are seen immediately in the sheet-type models because of the referencing. The uncut, long models that are created automatically can be used as references to other files.

The image below shows the structure of the OPNP file beginning with the references to the civil data at the left, to the columns showing the drawing models being referenced into the sheet models at the right. It is the uncut, long models that would be referenced into CAD base files so that details may be created using MicroStation drawing boundary seeds.

Figure 2. Uncut, Long Models in OPNP File



The OpenRoads Designer Cross Sections File (XSEC)

Displaying 3D design in drawing and sheet models in an OpenRoads Designer Cross Sections (XSEC) file is the only method that OpenRoads Designer provides for expressing ***permanent*** cross section graphics that can be annotated and used to produce volumes, details or contract plans. Whatever is displayed in the Default-3D model of the XSEC file will be displayed in the drawing and sheet models that are generated. Models that are created in the XSEC file may be attached as references to other files in order to assemble detail drawings or plans.

1-XSEC .dgn Creation and Setup (References)

The XSEC file(s) are created in the 6_Civil_Design folder in ProjectWise from the Seed2D.dgn template. From the Default model, attach references to civil data (existing ground, proposed or existing alignments, 3D linear features, and corridor design) from the 6_Civil_Data folder. Make the existing ground terrain active so that ORD will create the Default-3D model. Set the view control to display 2 Views Plan/3D. From the Default-3D model, attach any non-civil 3D data from the 3_Base_Files folder.

When referencing container files, use Live Nesting with a depth of 1 in order to display the design graphics. Be aware that when a container file has reference attachments to the discipline-specific folder (working files) that updates to the data in the working file will be dynamically displayed in an assembled plan sheet. Basically, what is seen in the 3D model in the XSEC file will show up on the cross sections.

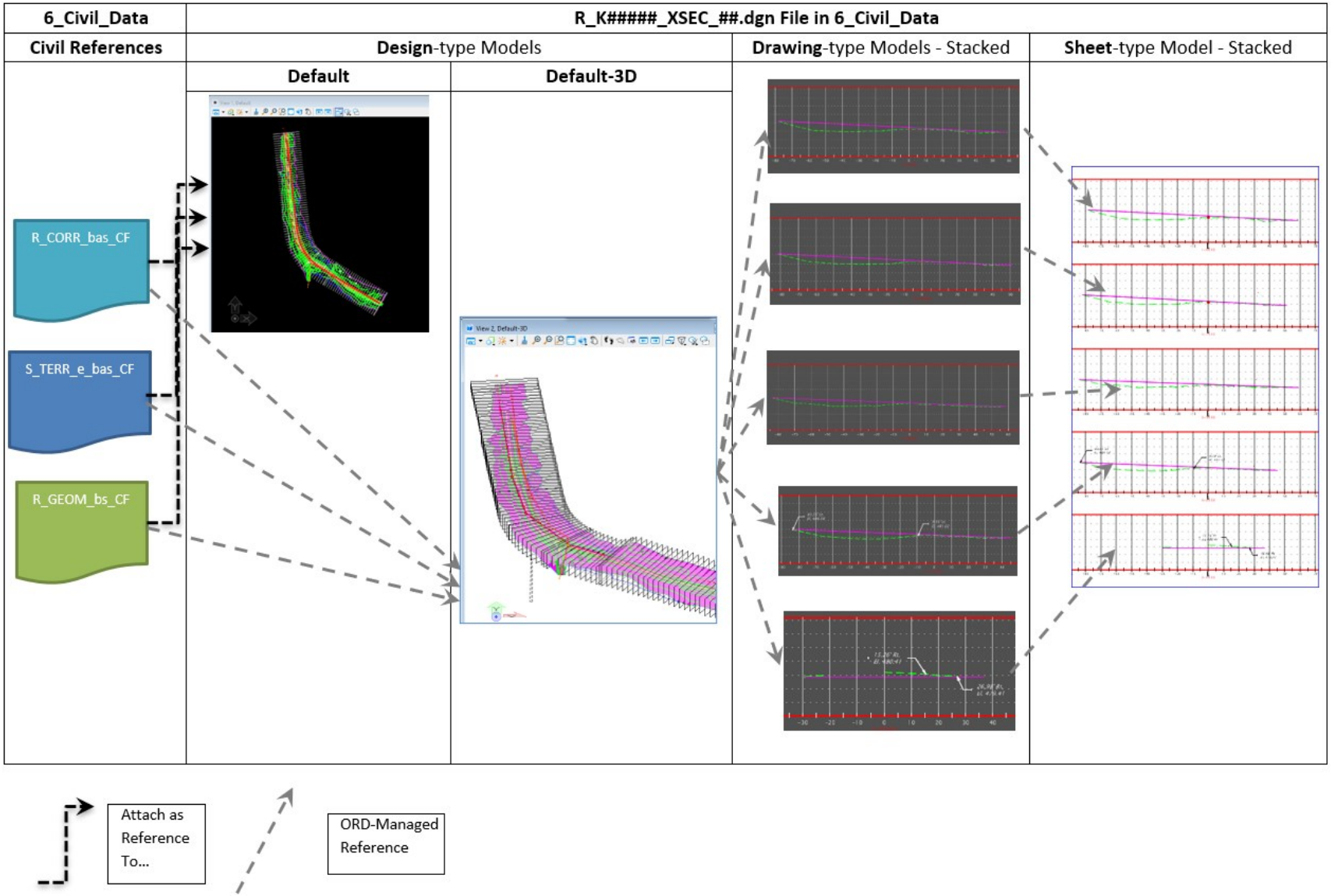
2-Create Stacked Sheets

Place Civil Cross Section  named boundaries using “XS Inch 20 Stacked” drawing boundary seed, set a 25’ interval, and include control points. Generate drawing- and sheet-type models using the Named Boundary Manager. The sections will be annotated in the drawing-type model. Other civil annotations placed in the drawing-type model are seen immediately in the sheet-type model because of the referencing.

The sheet- or drawing-type models can be attached as references to CAD Base files or DT files to allow for a variety of levels to be toggled on/off and to allow for different discipline annotations in the other files.

The image below shows the structure of the XSEC file with a stacked sheet model using “XS Inch 20 Stacked” drawing boundary seed. Drawing-type models are created for each section and all are automatically attached as references into one sheet-type model with stations increasing from the bottom to the top. Civil annotations should be placed in the drawing models and will automatically appear in the sheet model. The Cross Section Navigator can be used to navigate quickly between cross section drawing models.

Figure 3. Stacked Cross Sections in a Sheet model in XSEC File



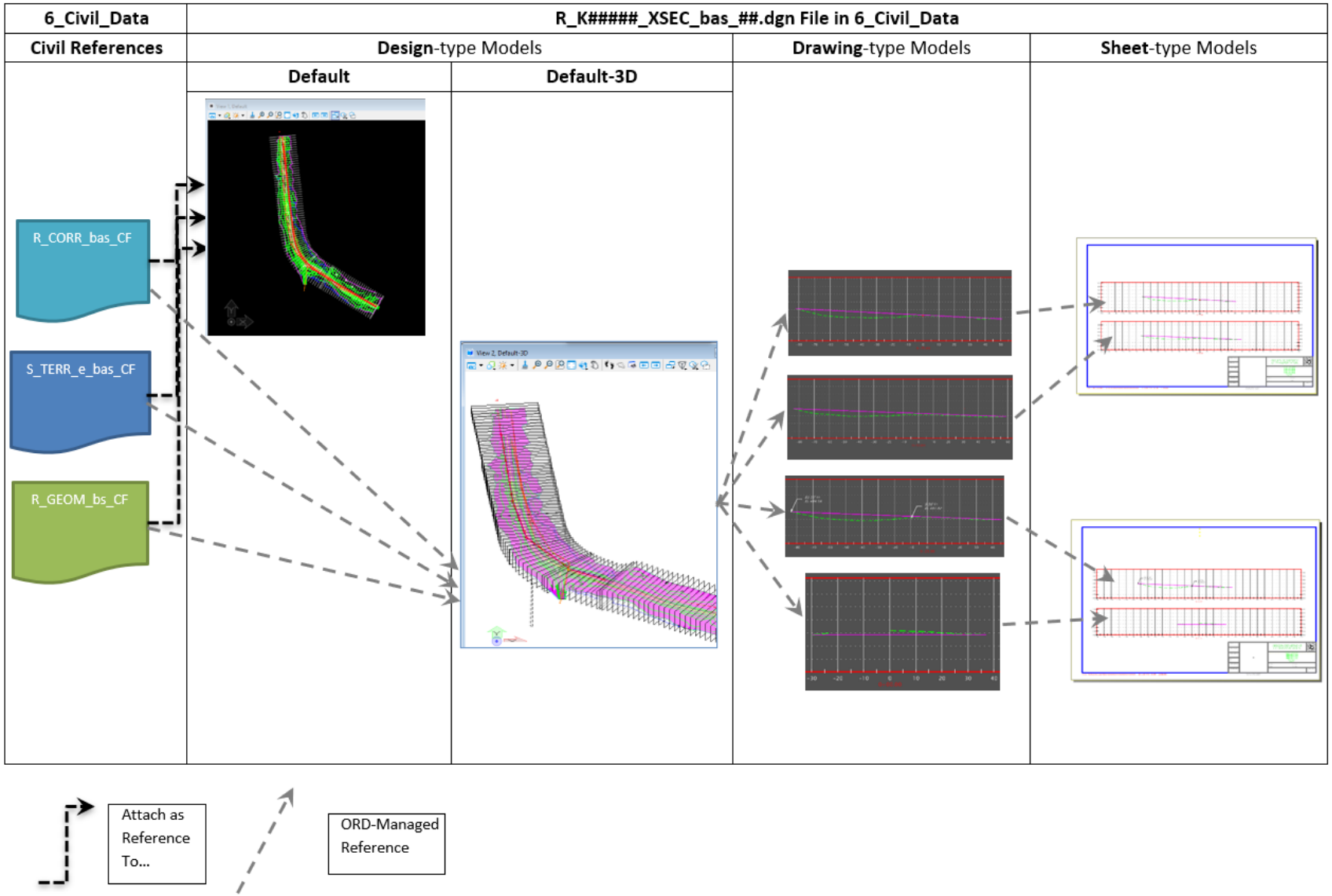
3-Create Cut, 11x17 Sheets

Place Civil Cross Section  named boundaries named boundaries using “XS Inch 20” boundary seed, use a New Group: “Cut Sections”, set a 25’ interval, and include control points. Generate drawing- and sheet-type models using the Named Boundary Manager and add to Sheet Index. The sections will be annotated in the drawing-type models. Other civil annotations placed in the drawing-type models are seen immediately in the sheet-type models because of the referencing.

Open the Print Organizer from the Sheet Index in the Explorer to create a PDF of sheets. Use the command Tools>Convert to Fixed Print Definitions and apply the eBIDSXsections.tbl pen table to the print definition properties. These “sheeted” cross sections may be printed to PDF using the Print command.

The image below shows the structure of the XSEC file with a stacked sheet model using “XS Inch 20” drawing boundary seed. Drawing-type models are created for each section and all are automatically attached as references into multiple sheets.

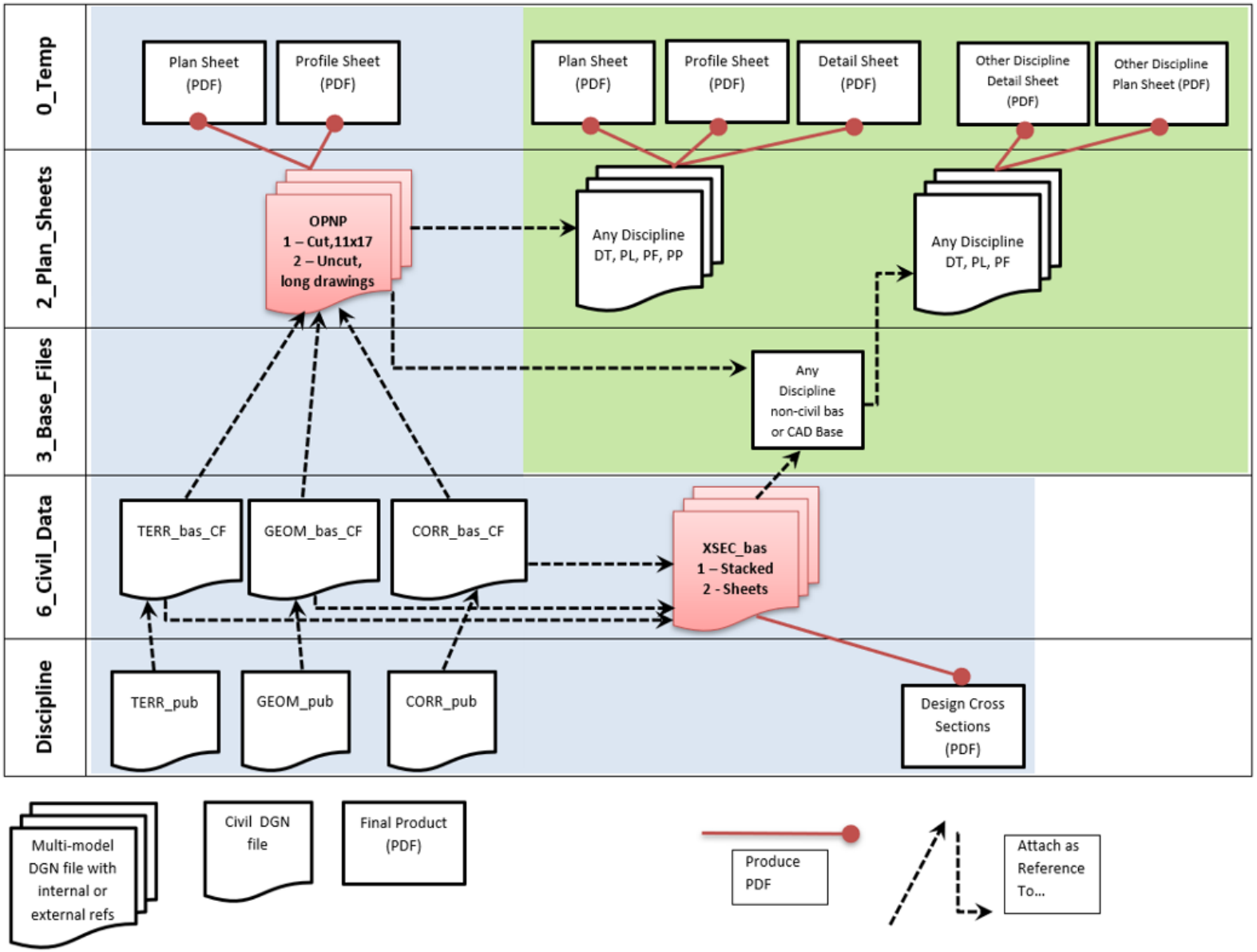
Figure 4. Multiple Sheets of Cross Sections in XSEC File



The Design Deliverables in the Plans Production Process

The method of transferring profile and cross section design information to details and plans involves using OpenRoads Designer to create two key files: the OpenRoads Plans and Profiles (OPNP) file and the OpenRoads Designer Cross Sections (XSEC) file. The image below illustrates the OPNP and XSEC files (red) being created by referencing design data: terrains, alignments, design corridors, and 3D features.

Figure 5. Design Deliverables OPNP and XSEC_bas Utilization in the Plans Production Process



In order to preserve civil data integrity and associations, “working” civil data being actively modified and stored in the discipline-specific folders, may be attached as references to base container files (bas_CF) in the 6_Civil_Data folder. The reference attachments from the OPNP or XSEC file to a container file must use live nesting in order to display the design data. A good practice for separating design options and alternatives stored in a discipline folder from appearing in plans where it is not appropriate is to have those options reside in another working file and have them attached as a reference to the main working file that feeds the container file. Toggle off the display of the referenced options or alternatives in the main working file unless it is appropriate for those options to be seen in the container file and ultimately the plan or detail being produced.

More information about methods for displaying design data in container files may be found on the Engineering Applications Support Team website.