

Plans Production Process for ODOT

This document explains procedures that use the [design deliverables](#) of the OpenRoads Designer Plans and Profiles file (OPNP) and the OpenRoads Cross Section file (XSEC) to produce plan, profile, or detail sheets using MicroStation. It is necessary to use the OPNP and XSEC files in the plans production process because it is only through these files that **permanent** profile and cross section graphics from the OpenRoads Designer are displayed and made available for referencing into 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 high-level information about methods of assembling plans from the [design deliverables](#). These methods can be used by multiple disciplines in the creation of plans, 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_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 is used to create 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#####_cn_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#####_ANNO_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_XXX_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 .its. 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
ANNO	A nnotation of alignment stationing and other annotations.	R_K#####_ANNO_XXX_pub_###.dgn	Roadway and other disciplines
CORR	C orridor or roadway model	R_K#####_CORR_XXX_pub_###.dgn	Roadway and other disciplines
GEOM	G eometry or alignments, both horizontal and vertical	R_K#####_GEOM_XXX_pub_###.dgn	Roadway and other disciplines
OPNP	O penRoads Designer P lans and P rofiles	R_K#####_OPNP_###.dgn	2_Plan_Sheets
TERR	T errain model	S_K#####_TERR_e_pub_###.dgn	Survey
XSEC	OpenRoads Designer Cross S ections	R_K#####_XSEC_bas_###.dgn	6_Civil_Data
CF	C ontainer F ile – a DGN file with few elements and with 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	D etail Sheets	R_K#####_dt_###.dgn	2_Plan_Sheets
PF	P rofile Sheets	R_K#####_pf_###.dgn	2_Plan_Sheets
PL	P lan 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

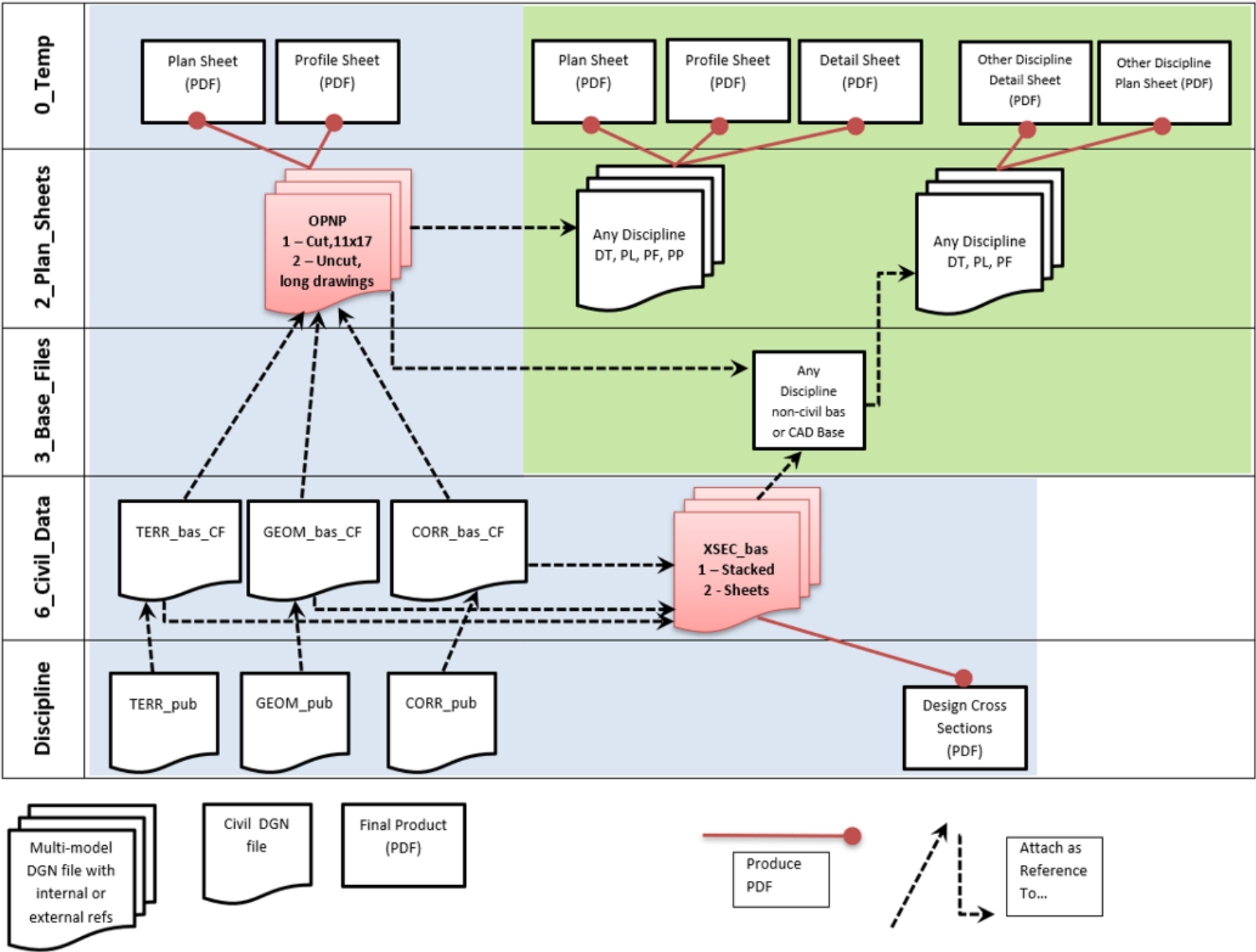
The Plans Production Process Utilizes [Design Deliverables](#)

The process of displaying profile and cross section design information on details and plans involves attaching a reference to the appropriate model from one of two key files: the OpenRoads Designer Plans and Profiles (OPNP) file and the OpenRoads Designer Cross Sections (XSEC) file. Displaying a design in drawing and sheet models in an 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. Displaying 3D design in drawing and sheet models in an 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.

The swim lane below shows the location of the OPNP and XSEC files in the ProjectWise folders at the left. It is the OPNP and the XSEC files (shown in red color) that provide the design information for details and plans as reference attachments. Solid red lines leading to rectangles show which files are typically used to create PDFs of plans and details. A blue background indicates the part of the process that may be accomplished with OpenRoads Designer. The area with the white background indicates how MicroStation may be used with the ProjectWise folder structure to assemble plans and details from two main design deliverables attached as references.

While it is most efficient for OpenRoads Designer to be used to create the plan sheet layouts, MicroStation may be used to create non-civil named boundaries showing a preliminary and preferred location for sheet layout and that information attached as a reference to the OPNP file. Typically, the non-civil named boundaries would be stored in a CAD base file and the display of those named boundaries as a reference in the OPNP file can inform the civil layout process performed with OpenRoads Designer. OpenRoads Designer associates civil plan named boundaries with alignment stationing, which may be adjusted after they are initially placed. Then ORD can automatically match the civil profile named boundaries to the final plan stationing used by the civil plan named boundaries. The result is that OpenRoads Designer's Create Drawing tool takes only a few minutes to generate hundreds of sheets that have design data referenced, clipped and rotated into sheet layouts. This document will outline at a high-level several methods of utilizing the design deliverables (OPNP and XSEC) to assemble plans and details.

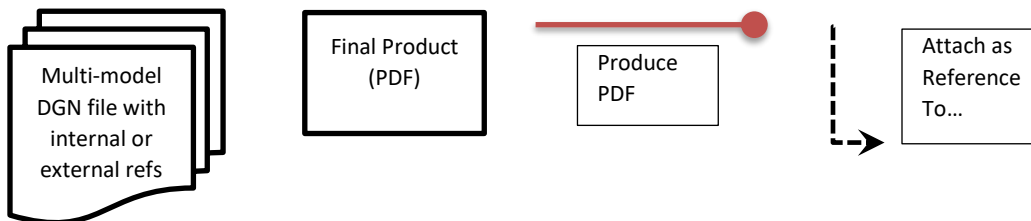
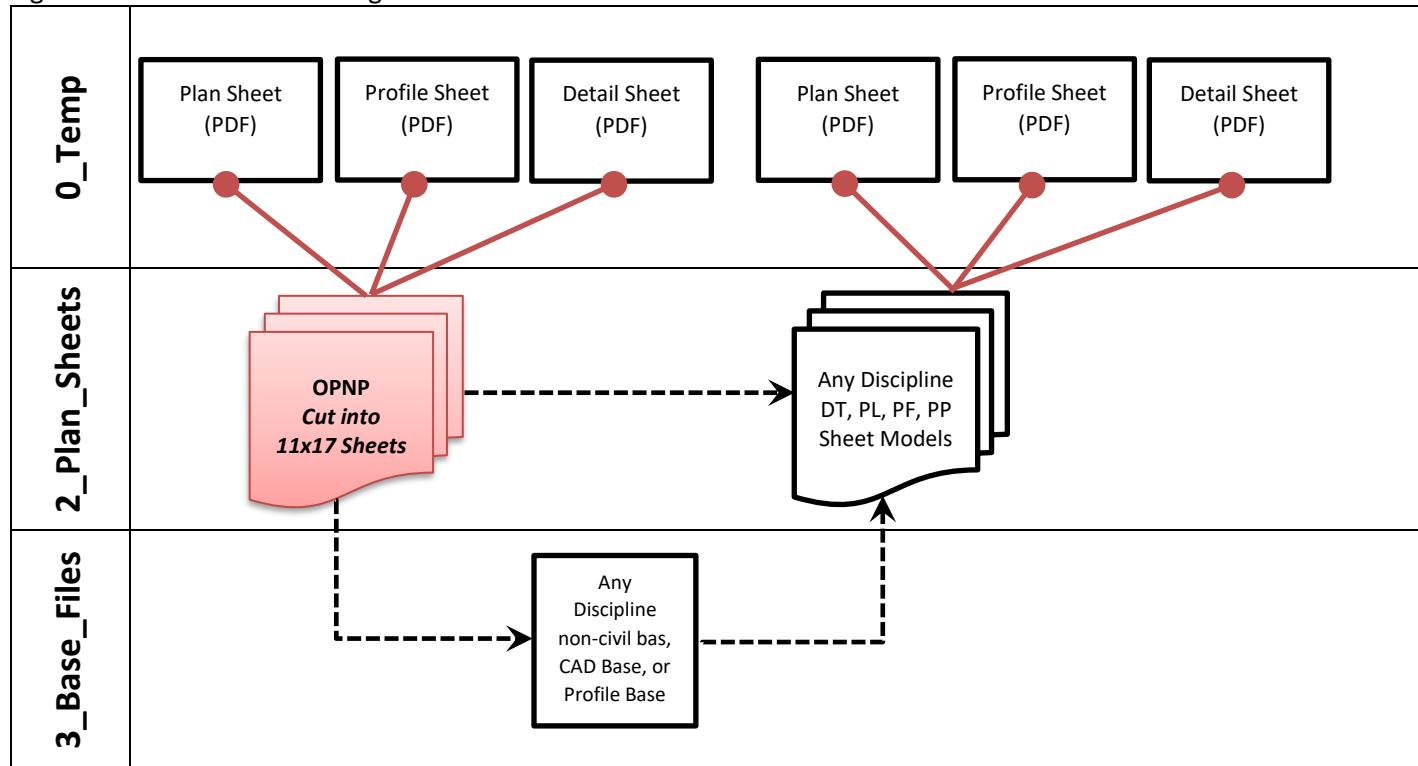
Figure 1. The Plans Production Process utilizing Design Deliverables OPNP and XSEC_bas



MicroStation Plans Production Deliverables (PDF) From Cut, 11x17 Models

PDF deliverables may be created using MicroStation by referencing the design deliverables: OPNP and XSEC_bas. While the OPNP DGN file *may* be edited directly using MicroStation and the sheet models inside the OPNP prepared for digital prints, it is more common to use profile (PF), plan (PL), detail (DT), or plan and profile (PP) DGN files that are created in 2_Plan_Sheets to produce the PDFs. Plan sheet assembly may be performed by attaching references to the cut, 11x17 models from the OPNP DGN design deliverable. The OPNP file is a container file, so in order to display the civil design data, it will be necessary to use live nesting with depths of 1 or 2. When plan sheet assembly is performed using MicroStation, new sheet-type models (Sheet from Seed) should be created in the DGN file in 2_Plan_Sheets and the reference attachments made directly into the sheet-type models.

Figure 2. Plan Production Using MicroStation and the OPNP Cut into 11x17 Sheets



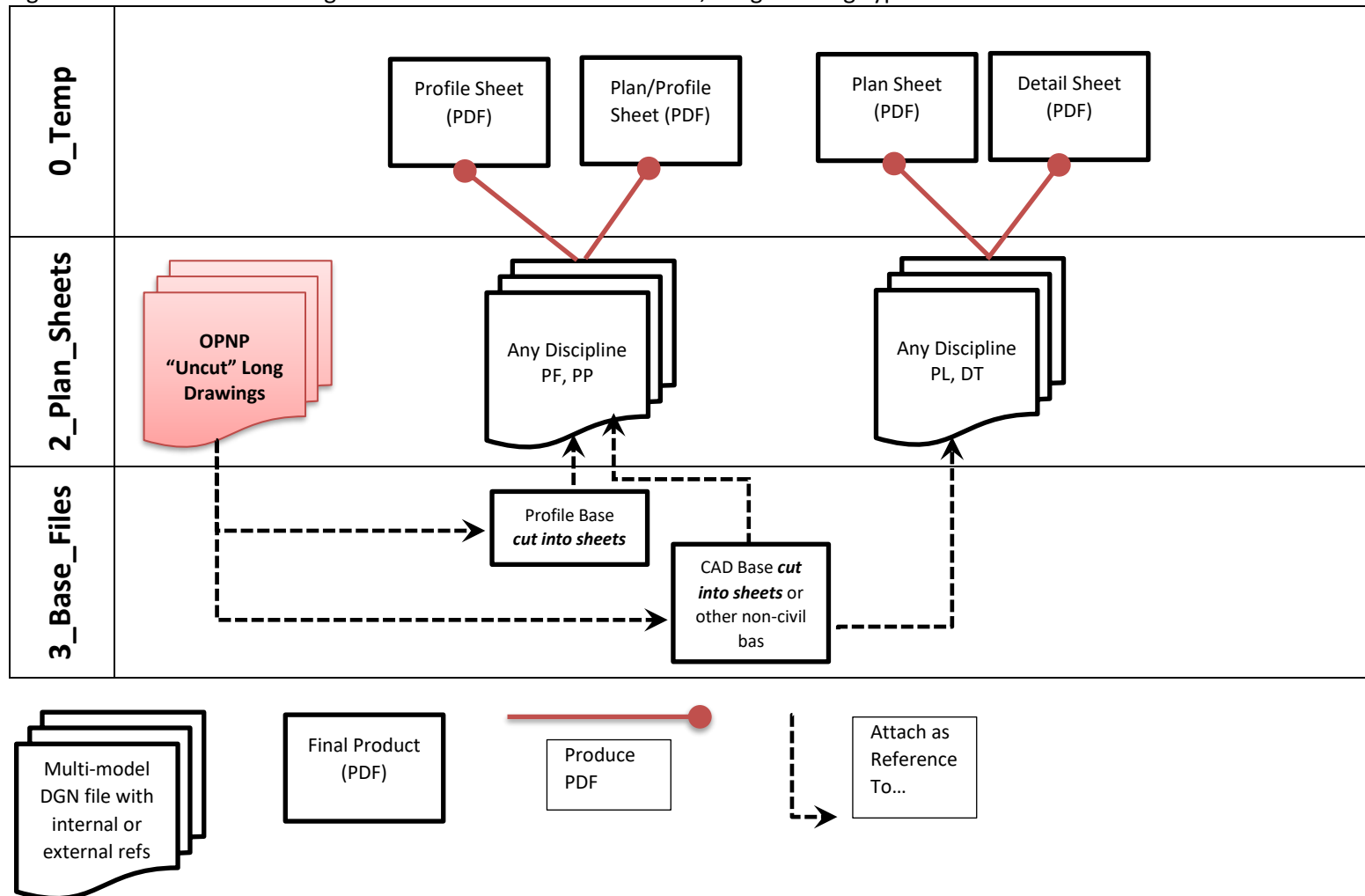
When the choice is to use a Plan, Profile, or Detail file, the most efficient sheet assembly method is to create the PL, PF, or DT files, and new - empty sheet models within; create a sheet model for each sheet. Then perform a ***sheet model to sheet model*** reference attachment (live nested) from the OPNP file. This is most efficient because several cells including the border cell are already placed in the sheet-type model created by OpenRoads Designer in the OPNP file. Add notes and other references to the plan, profile or detail. References may be masked, as well as using level display to adjust the data that is displayed in the final sheet. A plan-plan or plan-profile sheet may also be manually created by making two reference attachments to the OPNP file, and creating a clip boundary and adjusting the final location of the reference in the sheet.

Another, less efficient, method when using PL, PF, or DT files, is to create one new sheet models that contains the border cell and any common references to the project information file. This sheet model can be used as a template and copied and named for each sheet. Finally, into each sheet model, perform a ***sheet model to drawing model*** reference attachment (live nested) from the OPNP file. The data referenced from a drawing-type model will be attached coincident-world and will typically require extra effort to move and rotate the reference into the sheet. As stated earlier, reference attachments may be masked, level displays adjusted, and plan-plan and plan-profile sheets may be manually created using MicroStation and reference attachment to the OPNP file.

MicroStation Plans Production Deliverables (PDF) From Uncut, Long Models

Another alternative using MicroStation, is to use a CAD Base File for References and attach uncut, long models from the OPNP file to the Default model with live nesting. In this alternative, non-civil named boundaries of just about any scale may be laid out individually, in any location for details, or along a path for plans using MicroStation. In this fashion, the MicroStation sheets may be laid out differently than the Roadway sheets appear in the “cut, 11x17” OPNP DGN file design deliverable. MicroStation **Place Named Boundary** tool may be used in a Profile Base file or CAD Base file to automatically create sheet-type models that have design data referenced, clipped and rotated into drawing- and/or sheet-type models.

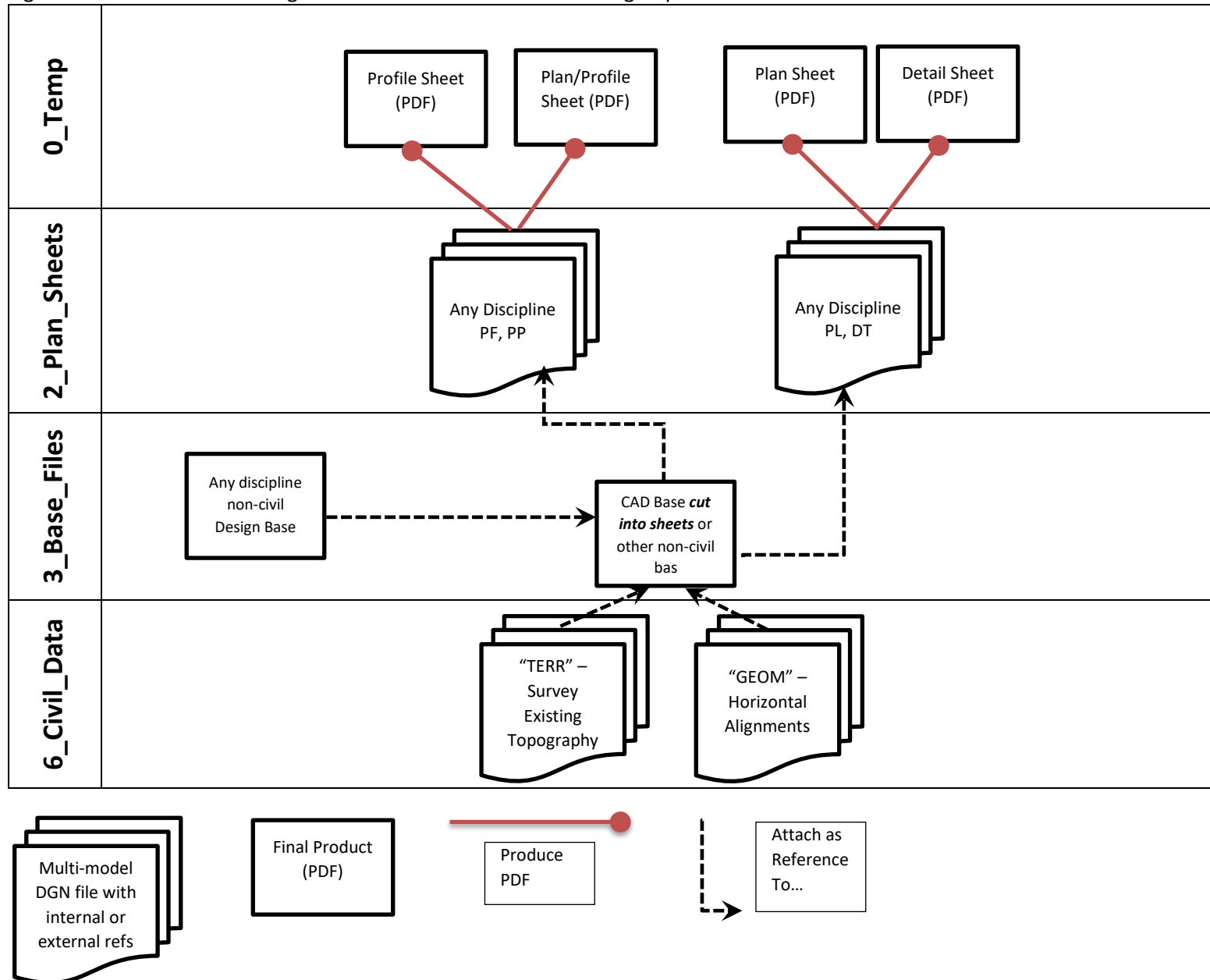
Figure 3. Plan Production Using MicroStation and the OPNP Uncut, Long Drawing-type Models



MicroStation Plans Production Deliverables (PDF) – Plan View Only

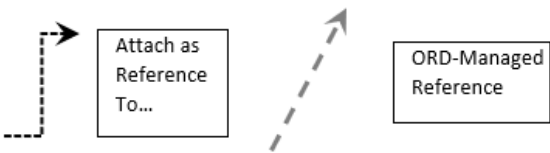
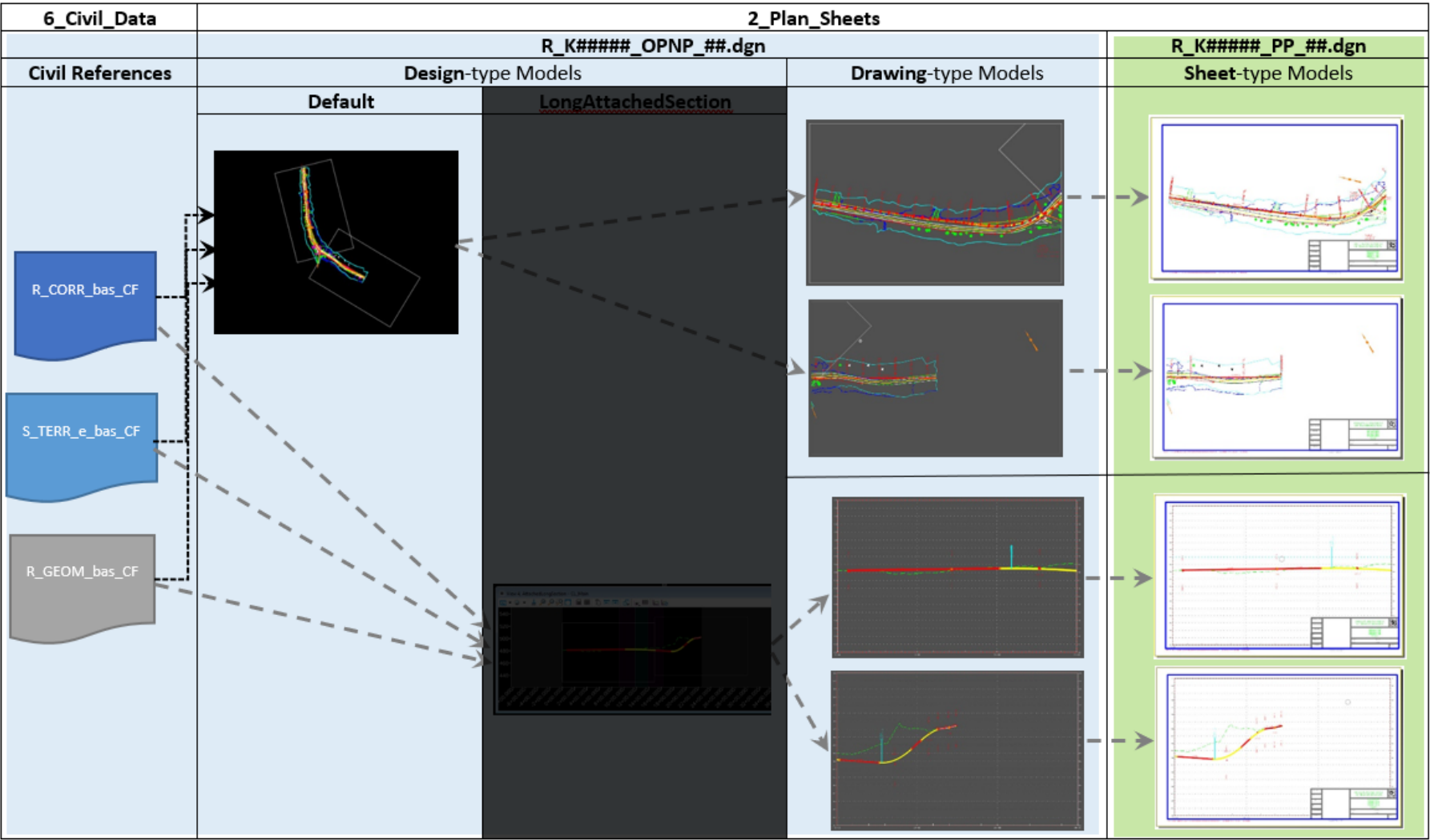
For projects without any modeling or profiles, there may be no “design deliverable” or OPNP file. Sheets can be cut and assembled using MicroStation **Place Named Boundary** tool with direct reference attachments from a CAD Base File for References to Survey and RW civil data from the 6_Civil_Data folder. Direct reference attachments should be made without nesting to the Default model of “TERR” and/or “GEOM” files.

Figure 4. Plan Production Using MicroStation and without modeling or profiles



Appendix - OpenRoads Designer Design Deliverable for Plans Production (OPNP)

The Design Deliverable for the Plans Production process is the R_K#####_OPNP_###.dgn file (<Description> ORD-generated Plan/Profile Sheets) in the 2_Plan_Sheets folder. The OPNP file should include cut, 11x17 drawing- and sheet-type models. The ORD-managed model displaying the dynamic profile cannot be attached as a reference by MicroStation and is blacked out below.



For detail plan sheet assembly and other discipline usage, the OPNP DGN should also contain uncut, long models. The ORD-managed model displaying the dynamic profile cannot be attached as a reference by MicroStation and is blacked out below.

