Chapter 12 - Drainage Standards

CADD Production Criteria Handbook

12.1 GENERAL

The purpose of this chapter is to clarify the development of a Computer Aided Design and Drafting (CADD) project generated by Roadway Design and Drainage Design. (See also Chapter 13) The intent is to provide electronic files that are shareable in a format that the Roadway and Drainage disciplines can use productively.

12.2 STANDARD FILE NAMES

Florida Department of Transportation (FDOT) utilizes standard naming conventions for all of its files. Some of the automation implemented in various tools provided by FDOT depends on naming conventions being met. More importantly, the naming convention confers information to the downstream customer of the data.

Standard file names should follow this format: ***AAAABB##.ext***
Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation,* ## =S*equence number.*

Note: Please see CADD Production Criteria Handbook (CPCH) Chapter 4 for more information.

The following table defines the Drainage File Name Standards in regards to FDOT Projects with the understanding the each file name will include sequence numbering. For other standard file names refer to the Roadway Chapter. Since most Drainage files are shared with Roadway, the two groups must coordinate the creation and ownership of these files.

Standard model names are provided in the following table. However, it is not mandatory to use more than the default model, with the exception of those listed in this table.

CAUTION: When searching design files for elements, GEOPAK searches across all models. For example, if there are pattern lines in more than one model, GEOPAK locates all of them.

File Type	File Name	Model Name	File Description	Rule File	Seed File	Critical File
Borders & Sheets	BDDMRD.dgn	Default	Border Sheet Reference File for Drainage Map Sheet	planrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Drainage	DRDTRD.dgn	Default	Drainage Details Sheet	drdtrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Drainage	DREXRD.dgn	Default	Drainage Structures - Existing	drexrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	X
Drainage	DRFLRD.dgn	Default	Drainage Flood Data Form	drprrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Drainage	DRMPRD.dgn	Default	Drainage Map	drmprd.rul	$(MX_SEEDIR)fdotseed2d.dgn	

File Type	File Name	Model Name	File Description	Rule File	Seed File	Critical File
Drainage	DROMRD.dgn	Default	Drainage Optional Materials Tabulation	planrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Drainage	DRPRRD.dgn	Default	Drainage Structures - Proposed	drprrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	X
Cross Sections	DRXSRD.dgn	Rdxsrd	Drainage Structure Cross Section	drxsrd.rul	$(MX_SEEDIR)fdotseedxs.dgn	X
		Pattrd	Drainage Structure Pattern Lines			
		Xsshrd	Drainage Structure Shapes			
		Rdxsrd_shg	Drainage Structure Cross Section Sheets			
Proposed Design	PDPLRD.dgn	Default	Pond Design	drprrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Cross Sections	PDXSRD.dgn	Rdxsrd	Pond Cross Sections	pdxsrd.rul	$(MX_SEEDIR)fdotseedxs.dgn	X
		Pattrd	Pond Pattern Lines			
		Xsshrd	Pond Shapes			
		Rdxsrd_shg	Pond Cross Section Sheets			
Proposed Design	RWDTRD.dgn	Default	Right of Way Details for Drainage	dsgnrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Summary Boxes / Tables	SUMDRD.dgn	Default	Summary of Drainage Structures	planrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	
Proposed Design	WETLRD.dgn	Default	Wetlands Delineation Survey for Drainage	planrd.rul	$(MX_SEEDIR)fdotseed2d.dgn	

12.2.1 File Sharing and Merging

Every project utilizes the standard directory structure regardless of the project requirements. Data for each discipline is maintained in its sub-directory and stored on the TIMS server (In-House). **If a discipline requires information from another discipline, the needed file(s) shall be referenced from the original directory, not copied**.

File sharing among the Roadway and Drainage groups shall be as noted below.

	Roadway Files			Drainage Files		
	Read	Write	Create	Read	Write	Create
Roadway Designer	Y	Y	Y	Y	N	N
Drainage Designer	Y	N	N	Y	Y	Y

12.3 RESOURCE FILES

ECSO provides software resources for CADD Drainage Plans on CD, using MicroStation and GEOPAK for production of drainage plans. GEOPAK Drainage is delivered with the GEOPAK software and uses support files specific to GEOPAK Drainage developed by ECSO. Also, used by some districts for Drainage design, is ASAD (Automated Storm Sewer Analysis and Design). This software is purchased at the district level and is available from Hiteshew Engineering Systems, Inc. Both GEOPAK Drainage and ASAD produce drainage databases that should be delivered with the project upon completion. This information shall be delivered in accordance with Section 12.4.

12.4 ENGINEERING DATA

The Drainage discipline directory contains an additional sub-directory named **\eng_data.** This sub-directory was designated to contain the following:

- PostScript image files of the plan sheets for the drainage design
- Quality Control Reports
- ASCII Engineering Data output files
- Drainage Reports, including the drainage databases used in the development of the reports
- All computer input and output files (Postscript and Native File Formats) used in the structural design of culvert structures
- All supplemental hand calculations (scanned and saved in PDF and PostScript Formats)
- Other data pertinent to the overall drainage design

12.5 PROFESSIONALS' ELECTRONIC DATA DELIVERY SYSTEM (PEDDS)

PEDDS shall be used to Secure and Authenticate project data. When projects are received, the FDOT authenticates the data on the delivered CD. Each time data is transmitted to or received by FDOT the data shall be secured and authenticated. PEDDS shall also be used to authenticate any project specific data received as part of a delivery from an outside source or discipline. For example, an electronic delivery to Roadway from Survey or EMO should be secured and authenticated. Roadway shall electronically secure all files for delivery.

12.6 SYMBOLOGY STANDARDS

CADD standards for the MicroStation elements are defined in the Standard Symbology tables in section 12.6.1. Since Drainage design files meet two indicators that define critical files, files that are shared between disciplines and secondly the elements are used for quantity take-offs, close adherence to the standard symbologies should be maintained.

In the event a specific element symbology or criteria for an entire sheet is needed for the project and not addressed in the CPCH, the discipline specific technical advisory committee (TAC) members shall develop a symbology table with the critical elements listed adjacent to their element symbology. The discipline specific TAC members will consult with Central Office to avoid conflicts with existing symbology criteria.

12.6.1 Symbology Table

Symbology Standards that apply to FDOT Projects are set up under a listing of Standard Level Names with specific ByLevel Color, Style and Weight attributes. These levels are grouped under specific Rule Files which are associated to each valid Standard Filename of each Discipline for the purpose of performing the Quality Control check for FDOT Standard compliancy of each FDOT project design file. Section 12.2 of this chapter provides for the complete Standard File Name listing with associated Rule File.

Note: Refer to Chapter 3 FDOT Resource and Support Files to review the Level names listing for each associated Rule File.

Symbology for existing drainage items is defined in the Survey Chapter, Chapter 11. The symbologies for Drainage Structures in cross section view (drainage structure sheets) are defined in the Roadway Chapter, Chapter 13. Drainage Map files (DRMPRD00.DGN) shall use the same symbology as the Proposed Drainage file (DRPRRD00.DGN).

The following are the basic level naming convention rules to follow to always know what level an element should be placed on:

1) Level Names have 18 maximum characters.
2) The format of the name is: ***object*_*sv***

object (represents element type)_ ***s*** (represents State) ***v*** (represents View)

states	views
p (proposed)	**x** (cross section)
d (drafting element)	**r** (profile)
e (existing)	**p** (plan) (DTM is the same as plan)

Note: Level Names without including the **"_sv"** portion in the name are assumed Proposed Plan view elements.

Example: With this information one can determine the following about the Level names below:

gas	- Proposed Plan view elements for "gas" related items
gas_ep	- Existing Plan view elements
gas_px	- Proposed cross section view elements

12.7 PACKAGING

Some files created by Roadway to be treated as drainage files as:

- Drainage Detail Sheets (DRDTRD00.DGN)
- Drainage Existing Structures (DREXRD00.DGN)
- Flood Data Form (DRFLRD00.DGN)
- Drainage Map (DRMPRD00.DGN) (not usually in a plan set, but kept on the serverThe Drainage Map may be considered as optional to be included in the Final Plans submittal at the discretion of the individual Districts)
- Drainage Proposed Structures (DRPRRD00.DGN)
- Drainage Structure Cross Sections (DRSTRD00.DGN)
- Summary of Drainage Structures (SUMDRD00.DGN)

Note: For further details on packaging plans, see Chapter 4, Section 4.1.

12.7.1 Definitions

- **Roadway Engineer of Record (E.O.R.):**

The responsible engineer in charge of signing and sealing roadway sheets.

- **Drainage Engineer of Record (E.O.R.):**

The responsible engineer in charge of signing and sealing drainage sheets.

12.7.2 Plans Preparation

This handbook and the Plans Preparation Manual (PPM) provide critical guidelines to differentiate between the responsibilities of the Roadway E.O.R. and the Drainage E.O.R.

12.7.3 Production of Plans

Each E.O.R. must provide quality control for their discipline specific plans, CADD files and deliverables. The content and appearance of sheets shall follow all requirements as outlined in the PPM.

12.7.4 Drainage Map and Bridge Hydraulic Recommendation Sheet

The *Drainage E.O.R.* is responsible for the data on these sheets.

12.7.5 Summary of Drainage Structures and Optional Materials Tabulation

The *Drainage E.O.R.* is responsible for the data on these sheets.

12.7.6 Roadway Plan and Roadway Plan-Profile

The *Roadway E.O.R.* is responsible for these sheets.

12.7.7 Drainage Structures and Box Culverts

- **Plan View**
  Proposed cross drain pipes and box culverts shall be indicated in the plan by a symbol and identified by a drainage structure number. Cross drain pipe sizes and lengths shall be shown.

  In accordance with the PPM, the proposed drainage system consists of showing the storm sewer pipes with a single line and drawing the outline of inlets, manholes and junction boxes. The pipe size and length between structures shall be given. Structure numbers shall be provided for inlets, manholes, junction boxes and special structures.

- **Profile View**
  In accordance with the PPM, storm sewer pipe, inlets, manholes and junction boxes along the main line shall be shown. Pipes shall be noted by size. Proposed structures may be shown by structure number only. Flow line elevations shall be shown for all pipes entering and leaving the structure.

  Proposed cross drain pipes and culverts shall be plotted. Cross drains shall be identified by structure number only.

12.7.8 Drainage Structures

The *Drainage E.O.R.* is responsible for the data on these sheets, although Roadway Design may do the CADD work.

12.7.9 Lateral Ditch/Outfalls, Retention/Detention and Mitigation Areas

The *Drainage E.O.R.* is responsible for the data on these sheets.