State of Florida

Department of Transportation

CADD Manual

In Reference to the Plans Preparation Manual (PPM)

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PRODUCTION SUPPORT OFFICE - CADD

TALLAHASSEE, FLORIDA

http://www.fdot.gov/cadd/

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Chapter 1

INTRODUCTION

1.1 PURPOSE

The ***CADD Manual*** addresses the requirement to utilize Computer Aided Design and Drafting (CADD) for production and delivery of digital project data for the Florida Department of Transportation (Department). In addition to software and configuration requirements, it identifies tools, techniques, applications, standards and procedures that are used to produce a consistent and quality CADD product for the Department.

The ***CADD Manual*** establishes *minimum* CADD standards to ensure a consistent, predicable and repeatable CADD data set for Department's projects. The ***CADD Manual*** also serves to provide professional services administrators, project managers, consultants, in-house designers, and others a procedure to be incorporated by reference into scopes and other contract documents for services.

1.2 AUTHORITY

Subsection 20.23(3) (a), Florida Statutes (F.S.)

Section 334.048(3) Legislative Intent to Department Management Accountability and Monitoring Systems, Florida Statutes (F.S.)

1.3 SCOPE

The ***CADD Manual*** is to be used by all personnel producing projects utilizing CADD for the Department. It is to be referenced in contracts requiring engineering plans and 3D Models preparation utilizing CADD. This manual affects all offices of the Department and all consultants, contractors and others who utilize CADD applications. The Districts are monitored for critical requirement to meet the Department's CADD Quality Assurance objectives.

1.4 DEFINITIONS

CADD - (Acronym for Computer Aided Design and Drafting) Software and methods used to design and represent objects graphically on the computer. CADD facilitates the visual presentation of Engineering Data.

Statewide CADD Coordinator – Individual in the Central Office responsible for coordinating amongst the Districts to implement a uniform policy and standards for CADD operations for the Department.

CADD Manager - The CADD Manager is responsible for (1) support of the core CADD software products in the work units and (2) a variety of engineering data services functions including but not limited to the receipt, acceptance, and management of digital deliveries of project data.

CADD Support - The technical and operational activity necessary to ensure that a production environment is maintained, which includes:

a) Selection, development and distribution of production CADD software, related procedures, criteria and standard operating instructions,

b) Provision of training opportunities for CADD users,

c) Management of design data produced with the CADD software,

d) Statewide procurement of: CADD software, training services, and software development assistance.

CADD TAC - (Acronym for Technical Advisory Committee) A discipline-based group sanctioned by the Statewide CADD Coordinator consisting of District and Central Office representatives charged to meet and work on statewide technical issues dealing with CADD applications, procedures, testing, training, and implementation.

Engineering Data - Those digital files which support or represent the intent of the engineering design.

1.5 ORGANIZATION

The Department's Production Support CADD Office, with input from the districts and industry, will develop and maintain procedures and standards for the Department's CADD production and related activities.

The following chapters are included:

Chapter 1 **Introduction***:* Describes and implements the *CADD Manual*.

Chapter 2 **Computer Systems**: Establishes the minimum requirements for procurement, maintenance and technical support of the Department's CADD systems.

Chapter 3 **CADD Production Standards**: Defines the critical CADD Production Standards to be used in the production of the Department's CADD projects.

Chapter 4 **CADD Production Procedures**: Establishes minimum requirements for the production of the Department's CADD projects in accordance with the Department's plans preparation procedures and practices.

Chapter 5 **Delivery Procedure**: Establishes the minimum requirements and functions necessary for the Department's CADD delivery, describing how electronic data is to be delivered, archived and made available to customers.

Chapter 6 **Support**: Establishes the primary components of the Department's CADD support structure and services, including the statewide training, and defines applications and tools supported by the CADD.

Chapter 7 **Software Development and Distribution**: Establishes how the Department's CADD software is developed, tested, approved and distributed.

Chapter 8 **Quality Assurance**: Establishes the bases for Quality Assurance (QA) monitoring of the Department's District CADD functions, including the areas of responsibility, frequency of monitoring and reporting methods.

1.6 REFERENCES

Florida Administrative Code, Chapter 1B-26.003(10)

This document provides standards for record (master) copies of public records which reside in electronic recordkeeping systems.

Information Technology Resource User's Manual, Topic No. 325-000-002

This document contains the standards and guidelines related to information technology resources.

1.7 REVISIONS AND ADDITIONS

CADD Manual holders are encouraged to submit comments and suggestions for improvements to this manual. The Suggestion and Comment sheet at the end of this chapter or the CADD email link listed on the sheet may be used to provide feedback. All proposed revisions and additions, either in draft or final form, must be reviewed by all offices affected by the Manual.

Chapter 1 of this manual is the only chapter subject to the Executive Review Process. This chapter authorizes the development and implementation of the ***CADD Manual***. The remaining chapters will be updated and approved by the Statewide CADD Coordinator with input from the Districts and offices within the Central Office that may be affected. The intent is to be able to make technical revisions to the manual in a timely manner. Substantive revisions that result in policy change must be coordinated with the Executive Committee ***in*** accordance with ***Procedure No. 025-020-002, Standard Operating System***.

All revisions and updates must be coordinated with the Forms and Procedures Office prior to distribution to ensure conformance with and incorporation into the Department's Standard Operating System.

1.7.1 *CADD Manager Responsibility*

District CADD Managers must interface between the users of CADD and the Production Support CADD Office to facilitate input, revisions and additions to this manual. It is the CADD Manager's responsibility to ensure that all offices affected by this manual are informed of the Department's CADD policies, procedures, and standards. The CADD Manager must forward District recommendations for changes to CADD policies, procedures, and standards to the Statewide CADD Coordinator for consideration and processing through the CADD TACs.

1.7.2 *CADD TAC Responsibility*

Disciplines utilizing CADD are represented by a CADD TAC. Each District and the Central Office are represented on the TACs by knowledgeable and proficient CADD users. The purpose of these TACs is to continually improve the CADD procedures, process, standards, and identify users' needs. End User and CADD Manager Input for revisions and additions to the ***CADD Manual*** are processed through the TACs. The chairperson must forward committee recommendations to the Statewide CADD Coordinator and copy the District CADD Manager.

1.8 DISTRIBUTION

The ***CADD Manual*** is distributed in electronic form and may be downloaded from the CADD website:

http://www.fdot.gov/cadd/downloads/publications/publications.shtm

1.9 TRAINING

Training issues and opportunities are identified within the applicable chapters.

1.10 FORMS

Forms required for use with this manual are identified at the end of each chapter where applicable.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
SUGGESTIONS, COMMENTS, OR QUESTIONS
CADD Manual

NAME OF FDOT DEPARTMENT / FIRM & ADDRESS:

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NAME OF PERSON(S) RESPONSIBLE FOR SUGGESTIONS / COMMENTS:

_____

_____

TELEPHONE NO: **( ) _____ - _____**

FAX NO: **( ) _____ - _____**

E-MAIL: _____

SUGGESTION, COMMENT, or QUESTION:

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(Comments or Suggestions may be attached as marked up copies of pages from the manual.)

Submit Comments or Suggestions or Questions to:

E-mail:	cadd.support@dot.state.fl.us
Request CADD Support:	https://fdotservicedesk.dot.state.fl.us/
Mail:	**FLORIDA DEPARTMENT OF TRANSPORTATION** **PRODUCTION SUPPORT CADD OFFICE** **605 SUWANNEE STREET, MS 69** **TALLAHASSEE, FLORIDA 32399-0450**
Phone:	**PRODUCTION SUPPORT CADD OFFICE** **(850) 414-4711**

Chapter 2

COMPUTER SYSTEMS

2.1 PURPOSE

This chapter establishes the minimum requirements for procurement, maintenance and technical support of the Florida Department of Transportation (Department's) Computer Aided Design and Drafting (CADD) systems.

2.2 SCOPE

These requirements apply to all computer technology and services within the responsibility of the Production Support CADD Office (CADD), the CADD Managers of each District, Office of Information Technology (OIT), and Information Technology (IT) personnel assigned to support the CADD program.

2.3 DEFINITIONS

CADD Hardware: The workstations, servers, printers and all other computer equipment used in the Department's design production effort.

CADD Software: Any software procured, developed, distributed and supported by CADD.

OIT Personnel Supporting CADD: OIT personnel assigned to support the CADD program to perform the role of management and related tasks of the Department's IT infrastructure.

2.4 REFERENCES

- **Information Technology Resource User's Manual, Topic No. 325-000-002**

This document contains the standards, guidelines, and requirements related to information technology resources.

2.5 OPTIMAL CADD HARDWARE REQUIREMENTS

- **http://www.fdot.gov/cadd/main/Version/CurrentVersions.shtm**

2.6 PROCUREMENT OF CADD HARDWARE AND SOFTWARE

The CADD Managers and OIT personnel evaluate the needs for computer hardware to provide recommendations for procurement of any of the Department's CADD hardware where appropriate, and do so in accordance with ***Information Technology Resource User's Manual, Topic No. 325-000-002.*** The Production Support CADD Office participates with OIT in the development of the Information Technology Resource Standards and evaluation of hardware to be procured for use in CADD.

The Production Support CADD Office, in conjunction with the Technical Advisory Committees (TACs) and CADD Managers, reviews the statewide CADD software needs to support the Department's production efforts.

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Chapter 3

CADD PRODUCTION STANDARDS

3.1 PURPOSE

This chapter defines the Florida Department of Transportation (Department's) critical Computer Aided Design & Drafting (CADD) Production Standards to be used in the production of the Department's CADD projects.

3.2 SCOPE

These Production Standards apply to all projects produced by and for the Department using CADD in addition to the criteria, standards and procedures of the various disciplines within the Department.

3.3 DEFINITIONS

The following definitions relate to electronically generated project data and deliverables. For the definition of other common terms and acronyms used in this Manual, refer to the respective Chapters.

ByLayer (Civil 3D)– A property that, when turned on, causes the object on a particular layer to retrieve its definition from the Layer Properties of that layer, such as Color, Linetype, and Line weight.

ByLevel (MicroStation)– A setting that, when turned on, causes the element on a particular level to retrieve its definition from the Level Symbology of that layer, such as Color, Line Style, and Line Weight defined by the Level Symbology.

Component – A categorization of design plans as defined in Chapters 2 & 3 of the Department's ***Plans Preparation Manual (PPM)***, Volume 2. The list of plans components for Digital Delivery is comprised of the following:

1. Roadway Plans
2. Signing and Pavement Marking Plans
3. Signalization Plans
4. Intelligent Transportation System (ITS) Plans
5. Lighting Plans
6. Landscape Plans
7. Architectural Plans
8. Structures Plans
9. Toll Facilities Plans

The plans components do not directly correspond to the project's folder structure. For example, drainage files have a \drainage\ folder below the root level project folder, but might be included as part of the Roadway Plans Component.

Design File – An electronic CADD file that conforms to MicroStation® (DGN) or AutoCAD® (DWG) graphics formats.

Drawing Units (Civil 3D) – The real-world units used in a Civil 3D drawing that represents the measurement system used to construct the real-world design, such as US Survey Feet.

Font Library – A file in which text characters styles, symbols, or patterns are stored.

Global Origin (MicroStation) – Origin location of the Cartesian coordinate system in the design plane coordinates (UORs) for MicroStation files. When design plane positions are specified or reported in working units, they are relative to the global origin.

Layer Symbology (Civil 3D) – The definition of the properties an object inherits when placed on a layer using the "ByLayer" property. The layer definition contains properties such as Color, Linetype, and Line weight.

Level / Layer – Data in the design file segregated into drawing levels or layers.

Level Symbology (MicroStation) – The definition of the symbology an element inherits when placed on a level using the "ByLevel" setting. The level definition contains symbology such as Color, Line Style, and Line Weight

Line Style (MicroStation) – Part of the symbology of an element: for example, whether a line is represented a solid or continuous, composed of dashes, dots and dashes, and so on. Each element has its own line style.

Line Weight (MicroStation) – An index that designates the thickness of the lines used to draw or print a graphic element. Each element has its own line weight.

Linetype (Civil 3D) – Part of the property of an object: for example, whether a line is represented by a continuous line or a series of dots and/or dashes and spaces.

Line weight (Civil 3D) – The thickness of a line used for display or print purposes defined in millimeters.

Master Units (MicroStation) – The largest unit in common use in a design file, usually represented in US Survey Feet for most of the Department's seed files.

Project Folder – The parent or "root" folder for a project containing all of the project's subfolders and files.

Properties (Civil 3D) – The settings applied to an element for visualization/printing purposes, such as Color, Linetype, Line weight, Transparency, etcetera.

Supporting CADD Files – Any file, including Resource Files (such as fonts, line styles, pen tables, cell / block libraries, etcetera.) required to produce the printable sheet images of a plan set.

Symbol – A character placed from a TrueType font, MicroStation font library, or AutoCAD font file.

Symbology (MicroStation) – The settings applied to an element for visualization/printing purposes, such as Color, Line Style, Line Weight, Transparency, etcetera.

Text Attributes / Properties – The color, weight, font, height and width of text.

Text Element / Objects – Text in (MicroStation / AutoCAD) design files as a distinct type of element.

Units of Resolution (UORs) (MicroStation) – The distance between adjacent points in a MicroStation design plane. There are a very large number of fixed discrete positions or UORs along each coordinate axis that are defined as real world coordinates by master units and sub-units (collectively, working units).

Working Area (MicroStation) – Size, in working units square, of design plane.

Working Units (MicroStation) – The real-world units in MicroStation that the design plane is configured to, such as US Survey Feet.

3.4 REFERENCES

Plans Preparation Manual Volume 1 & 2, Topic Nos. 625-000-007 / 625-000-008

This manual provides engineering criteria and guidelines to be used in the development of Roadway designs and plans preparation for roads on the State Highway System.

Design Standards (Topic No. 625-010-003)

These indexes provide standard drawings to support the various engineering obligations for designing, specifying, estimating, constructing, inspecting, testing, accepting, operating, maintaining and monitoring the roads on the State Highway System including Standard Abbreviations.

Standard Plans

Standard Plans issued by the Office of Design are available from FY18-19 to Present. *Released November 2017*.

Structures Manual (Topic No. 625-020-018)

This manual provides the structures personnel with guidelines for the development of uniform structural design and plans preparation.

3.5 CADD RESOURCE AND SUPPORT FILES

The Department develops CADD Standards for the production of Florida transportation facility plans to be delivered with the aid of the CADD Software Suite. The Production Support CADD Office manages and coordinates these CADD Standards through customizations within the Department's approved CADD software platforms and the tools contained in the CADD Software Suite.

The Department's CADD Software Suite includes standard design libraries / templates to propagate the CADD Standards definitions of levels / layers and symbology (color, line styles / linetypes, weights), multi-line styles, text styles, dimension styles, cells, element templates, menu customizations, customized tools, tool boxes, and tasks for both the MicroStation and Civil 3D platforms.

Projects will be maintained and updated with the latest available and supported software versions published on the Production Support CADD Office listed below. Exceptions must be approved by the Department's Project Manager and must be documented and delivered as part of the project.

http://www.fdot.gov/cadd/main/Version/CurrentVersions.shtm

The Department's standard resources definitions for CADD drawings are consistent between the MicroStation and AutoCAD platforms. The following are examples of platform conventions:

MicroStation	AutoCAD equivalent
File name	File name
Level name	Layer name
Cell Library	Block Drawing
Cell name	Block name
Line Style	Linetype
Line Weight	Line weight
Color	Color
Seed file	Template file

3.5.1 *Supporting Database Resources*

For MicroStation projects the Department's CADD Software Suite includes a GEOPAK Design and Computation (D&C) Manager database file, *FDOTXXX.ddb*, located at *\FDOTXXX\geopak\databases\ folder*. This database is set up specifically to create drawing elements and attach pay item data according to the Department's CADD Standards. Likewise, for AutoCAD Civil 3D projects, the *AECMerge.xml* file is delivered with the FDOTXXXX.C3D State Kit and serves a similar function. *AECMerge.xml* is located in the \FDOTXXXX.C3D\Data\PayItemData\ folder.

Note 'XXX' or 'XXXX' represent the versioning of the Department's CADD Software Suite.

These resources may need to be modified for project specific items or to comply with District standards. If the GEOPAK D&C Manager *FDOTXXX.ddb* database is customized, the user must save a copy of this custom database into the project folder in the *\symb* project sub-folder. Saving the database to the project folder is important to ensure the modified database will be delivered with the project; likewise, a modified copy of the Civil 3D *AECMerge.XML* file must be saved to the *\symb* project sub-folder.

When modifying project specific database resources, the following naming convention must be used:

Project Financial Project Identification Number[Discipline Designation].ddb

Where *Discipline Designation* would be one of the following:

dr	(drainage)
it	(intelligent transportation system)
ld	(landscape)
lt	(lighting)
rd	(roadway)
sg	(signalization)
sp	(signing and pavement markings)
ut	(utilities)

Example: A modified standard DDB for signalization, ***19728125201sg.ddb*** would be stored in ***\19728125201\symb*** subfolder of the aforementioned project.

3.5.2 *Standard Libraries & Template Files*

3.5.2.1 MicroStation Seed Files

MicroStation uses "seed" files to create all design files. Working units and global origin are two of the most important settings in the seed file. Working units are expressed as master units and sub-units. All standard seed files for MicroStation have been defined based on a master unit of "Survey Feet" with a sub unit of "Survey Inches." The global origin is located at the center of the design plane for all seed files.

The resolution in MicroStation files is defined per the master unit and determines the size (working area) of the design plane, which must encompass an area large enough for any State Plane coordinate zone in Florida. The resolution is set to 304800 units of resolution (UORs) per Survey Foot.

Set the geographic coordinate system to the appropriate Florida State Plane Zone in production drawings derived from the seed files.

- ***The Department's CADD Standard Seed Files for MicroStation***
  - fdotseed2d.dgn
  - fdotseed3d.dgn
  - fdotseedkeymap.dgn
  - fdotseedxs.dgn
  - rwseed2d.dgn
  - structuresseed.dgn
  - structuresseed3d.dgn

3.5.2.2 *Design Libraries*

CADD Standard design library (dgnlib) files have been customized containing data that is shared throughout files and amoung users. These shared resources consist of, but not limited to, the Department's standard Cells, Levels, Styles, and Features.

- ***The Department's CADD Standard Design Libraries for MicroStation***

Type	Design Library Name (DGNLIB)
Civil_Cells	FDOT_Approach.dgnlib
Civil_Cells	FDOT_BusTurnOut.dgnlib
Civil_Cells	FDOT_Circulatory.dgnlib
Civil_Cells	FDOT_CurbGutterMaker.dgnlib
Civil_Cells	FDOT_CurbTransitions.dgnlib
Civil_Cells	FDOT_Driveways.dgnlib
Civil_Cells	FDOT_Intersections.dgnlib
Civil_Cells	FDOT_Ponds.dgnlib
Civil_Cells	FDOT_RampTerminals.dgnlib
Civil_Cells	FDOT_SidewalkCurbRamps.dgnlib
Civil_Cells	FDOT_Templates.dgnlib
Features	FDOT_CivilFeatures_RD.dgnlib
Features	FDOT_CivilFeatures_RW.dgnlib
Features	FDOT_CivilFeatures_TC.dgnlib
Features	FDOT_CivilFeatures_TP.dgnlib
Features	FDOT_CivilFeatures_UT.dgnlib
Features	FDOT_ElementTemplates.dgnlib
Features	FDOT_SUE_Drainage.dgnlib

Type	Design Library Name (DGNLIB)
Features	FDOT_SUE_Utilities.dgnlib
Features	FDOT_SurveyFeatures_RD.dgnlib
Features	FDOT_SurveyFeatures_RW.dgnlib
General	CivilCommands.dgnlib
General	FDOT_DesignGeometricsCriteria.dgnlib
General	FDOTtoolboxes.dgnlib
General	GeoTech.dgnlib
Levels	countymappinglevels.dgnlib
Levels	fdot_common_levels.dgnlib
Levels	fdot_v8_levels.dgnlib
Levels	Photogrammetry_levels.dgnlib
Levels	rwlevels.dgnlib
Levels	strlevels.dgnlib
Levels	survey_levels.dgnlib
Levels	v7_levels.dgnlib
Styles	FDOT_PrintStyles.dgnlib
Styles	FDOT_Styles.dgnlib
Styles	rwstyles.dgnlib

3.5.2.3 *AutoCAD Template Files*

AutoCAD also uses "template" files to create design files. Drawing units are also US Survey Feet and the geographic coordinate system for production drawings derived from templates must be set for the project's State Plane Zone. Templates are style based AutoCAD drawings.

- ***The Department's CADD Standard Design Templates for Civil 3D***

Template	Description
fdotmaster.dwt	Master Template
keysht.dwt	Key Sheets
planrd.dwt	Sheet Border for Details, Typical Sections & Summary Boxes
rwdtrd.dwt	Right of Way Detail for Roadway
rweng10.dwt	Right of Way
spst10.dwt	Structures
StructuresTemplateDetail.dwt	Structural Details
StructuresTemplatePlan.dwt	Structural Plans
survey.dwt	Survey Development Model
toporw.dwt	Existing Topography for Right of Way
TypSectionPkg.dwt	Typical Section Package
utadrd.dwt	Utilities Adjustment
utprrd.dwt	Utilities Proposed

- ***The Department's CADD Standard Sheet Templates for Civil 3D***

The FDOT Standard Sheet Borders used for plan production for all disciplines are listed below. The user accesses these files when using any of the Civil 3D Create Sheets wizard. Upon selection of the appropriate sheet template, a drawing scale is selected. Each Sheet Template file contains sheet layouts at designated scales along with fields in the border that can be automatically updated with project information, such as Sheet Title, Sheet Number, County, Etc. The Cross Section sheet templates update with the appropriate material volume when sections sheets are created based on the material list selected in Civil 3D.

Template	Description
CTLSRD.dwt	Reference Points Horizontal Vertical Control Sheet Border
SHDrainMap.dwt	FDOT Drainage Map Sheet Border
SHPLAN.dwt	FDOT Sheet Border
SHPlanDual.dwt	FDOT Dual Plan View Sheet Border
SHPlanDual-Top.dwt	FDOT Dual Plan View Sheet Border
SHPlanProfOpt.dwt	FDOT Plan Profile Optional Sheet Border
SHPlanProfOpt-Intersection.dwt	FDOT Plan Profile Optional Intersection Sheet Border
SHPlanProfStd.dwt	FDOT Plan Profile Standard Sheet Border
SHProfDual.dwt	FDOT Dual Profile Sheet Border
SHProfDualOpt.dwt	FDOT Dual Profile Optional Sheet Border
SHProfile.dwt	FDOT Profile Sheet Border
SHProfOpt.dwt	FDOT Profile Optional Sheet Border
SHXSC.dwt	FDOT Cross Section 2' Grid Sheet Border
SHXSC1EW2.dwt	FDOT Cross Section 2 Material Sheet Border
SHXSC1EW3.dwt	FDOT Cross Section 3 Material Sheet Border
SHXSC1EW3-Overbuild.dwt	FDOT Cross Section 2 Material with Overbuild Sheet Border
SHXSC2EW2.dwt	FDOT Dual Vertical Cross Section 2 Material Sheet Border
SHXSG.dwt	FDOT Cross Section 1' Grid Sheet Border
SHXSG1EW2.dwt	FDOT Cross Section 1' Grid 2 Material Sheet Border
SHXSG1EW3.dwt	FDOT Cross Section 1' Grid 3 Material Sheet Border
SHXSG2EW2.dwt	FDOT Dual Vertical Cross Section 1' Grid 2 Material Sheet Border

3.6 CADD STANDARD RULES

The Department's level / symbology standards for projects define standard Level / Layer names with specific "ByLevel" Color, Style / Linetype and Weight Symbology for graphic elements for both the Bentley and Autodesk platforms. In nearly every instance, the names for Level / Layer, Color, Line Style / Linetype, etc. are the same between the platforms for consistency. These level / symbology CADD standards are grouped to define specific CADD standard "rules" which are associated with each of the Department's CADD standard filenames. These rules are defined related to a given discipline, or purpose for the file.

Note The individual Discipline sections found in Chapter 4 of this manual provide comprehensive listings of respective CADD standard filenames with the associated CADD standard rule.

These CADD standard rules facilitate the Quality Control (QC) software to check each of the standard project's design files for compliancy to the specification found in these rules.

- ***The Department's CADD Standard Rules & Descriptions***

Note Appendix A has a comprehensive listing of the Department's CADD standard rules and the associated CADD standard levels and symbology.

For Current Updates see CADD Manual in Reference to FDM

Standard Rule	Description
algnrd	Alignment Design
autosp	AutoTURN
cliprd	Clip Border
drdtrd	Drainage Detail
drexrd	Drainage Existing
drmprd	Drainage Map
drprrd	Drainage Proposed
drxsrd	Drainage Cross Section
dsgnld	Landscaping Design
dsgnlt	Lighting Design
dsgnrd	Roadway Design
dsgnsg	Signalization Design
dsgnsp	Signing & Pavement Marking Design
dtmrd	Digital Terrain (Proposed)
gdtmrd	Digital Terrain (Existing)
geotech	Geotechnical
gswksp	GuidSIGN
irrgld	Irrigation
itssp	Intelligent Transportation System
keysht	Key Sheets
msarsp	Mast Arm Details
open	All Levels and Symbology Accepted
pdxsrd	Pond Cross Section
planrd	Roadway Plan Sheet
plprrd	Roadway Plan / Profile Sheet
qtdsrd	Quantity Computation
rdxsrd	Roadway Cross Section
rdxssp	Signing & Pavement Cross Section
rwdtrd	Right of Way Detail for Roadway
rweng10	Right of Way
spst10	Structural
survrd	Survey Development Model
tcdsrd	Traffic Control
topord	Existing Topography for Roadway
typdrd	Typical Section Data
utadrd	Utilities Adjustment
utexrd	Utilities Existing

Standard Rule	Description
utprrd	Utilities Proposed

3.7 LEVELS / LAYERS AND SYMBOLOGY

The Department's CADD Software Suite includes standard design libraries / templates to propagate the CADD standards definitions of levels / layers and symbology (color, line styles / linetypes, weights). The libraries for MicroStation are located in the \FDOTXXX\RESOURCES\dgnlibs\ folder and the templates for Civil 3D are located in the FDOTXXXX.C3D\Data\Templates\ folder.

The Department's CADD Software Suite also includes a Microsoft Excel *MasterStandards.xlsx* file documenting these CADD Standards which is also used by the productivity tools for both MicroStation and Civil 3D platforms, such as *QCInspector* (QC checking of design files during the Department's plans preparation process).

3.7.1 *Levels and Layers*

The Department's standard design libraries / templates define standard Level / Layer names. Designers must use these standard Levels / Layers in the Department's plans production of all CADD standard design files. The following describes the Department's basic level / layer naming convention:

The format of the Level / Layer Name convention is: ***object_sv*** *(maximum of 18 characters)*

Where: (***object*** = element type)_(***s*** = state)(***v*** = view)

(S)tate Designations	**(V)iew Designations**
p (Proposed)	**p** (Plan)
d (Drafting element)	**r** (Profile)
e (Existing)	**x** (Cross Section)
	m (Model)

Note Level / layer names with no "_sv" suffix on the name are assumed to be _pp (Proposed state & Plan view). Example: With this one can determine the following about the example Level / Layer names below:

gas	- Proposed state & Plan view elements for "gas" related items
gas_ep	- Existing state & Plan view elements for "gas" related items
gas_px	- Proposed state & Cross Section view elements for "gas" related items

The Department's CADD standard Levels / Layers are also classified as either *Critical* or *Non-Critical* for purposes of the QC processes to verify compliancy of design files. *Non-Critical* Levels / Layers are only checked in the QC process for compliancy with valid standard Level / Layer names only. *Critical* Levels that are relied upon and used by downstream applications (or other disciplines) are checked in the QC process for compliancy with both valid standard level names along with "ByLevel" / "ByLayer" settings for symbology (Color, Line Style, and Weight).

The CADD standard rules, documented in the *MasterStandards.xlsx* resource file and in *Appendix A*, contain a *Critical Level* column that defines each level with the following designations:

- ***[blank]*** Denotes Non-Critical Levels where ONLY valid Standard Level Name is checked in the QC process.
- ***X*** Denotes Critical Levels where valid Standard Level Name and ByLevel setting for Symbology (color, line style, and weight) are checked in the QC process.
- ***3 digit string*** Denotes Critical Level with partial checking in the QC process on whether to check (1= true) or not to check (0=false) specific symbology components: (Color, Line Style, Weight)

(***1st digit*** = Color, ***2nd digit*** = Line Style, ***3rd digit*** = Weight)
Example: 100 – Denotes to check only color (common for structures files)
010 – Denotes to check only line style
101 – Denotes check both color & weight, but not line style

The Department's standard Design Files are also classified as either *Critical* or *Non-Critical* for the purpose of verifying the compliance threshold. *Non-critical* Design Files must meet a minimum 80% compliance threshold for CADD Standard Levels / Layers. *Critical* Design Files must meet a minimum 95% compliance threshold for CADD Standard Levels / Layers. If critical files do not meet threshold requirements, a written variance from the Department's Project Manager with supporting documentation must be included within the Project Journal.

Note The threshold percentage is calculated as the number of graphical elements in the design file on the prescribed level symbology divided by the total number of elements in that design file.

The Department provides Standard Rules which define the prescribed level symbology for each Standard design file. Exceptions are a deviation from those Standard Rules for any given project folder. For example, if a municipality required a special symbology for an element not covered in a Standard Rule, that element could be drawn with the special symbology and all occurrences of that symbology would be counted as one exception. The Department allows up to 10 exceptions per design file before the compliance threshold begins to diminish.

3.7.2 *Color*

The Department uses a standard color table (*FDOTColor.tbl*) in MicroStation to visually recognize elements in files and for consistency in color printing. The standard color table is a modified version of the default MicroStation color table (*color.tbl*) which defines 256 colors for CADD elements. The Department's standard color table customizes colors by remapping the RGB values for various MicroStation color index numbers.

In MicroStation, the standard color table (*FDOTColor.tbl*) is preset in the FDOT Workspace variable MS_DEFCTBL and is attached in the standard seed files. AutoCAD uses RGB values shown in the color tables.

Note The discipline sections of Chapter 4 of this Manual define any discipline specific customize color tables. Structures discipline uses the default MicroStation Color Table (*color.tbl*).

MicroStation Color Index	color.tbl *(AutoCAD Index)* RGB Value	FDOTColor.tbl *(AutoCAD Index)* Color RGB Value
0	(7) 255,255,255	(7) 255,255,255
1	(5) 0,0,255	(5) 0,0,255
2	(3) 0,255,0	(3) 0,255,0
3	(1) 255,0,0	(1) 255,0,0
4	(2) 255,255,0	(2) 255,255,0
5	(6) 255, 0,255	(6) 255, 0,255
6	255,127,0	255,165,0
7	(4) 0,255,255	(4) 0,255,255
8	64,64,64	148,0,211
9	192,192,192	140,88,44
10	254,0,96	200,176,125
11	160,224,0	192,192,192
12	0,254,160	255,192,203
13	128,0,160	0,100,0
14	176,176,176	176,176,176
15	0,240,240	0,240,240
16	240,240,240	240,240,240
17	0,0,240	0,0,240
18	0,240,0	0,240,0
19	240,0,0	240,0,0
20	240,240,225	225,225,225
21	240,0,240	240,0,240
22	240,122,0	240,122,0
23	0,240,240	0,240,240
24	240,240,240	240,240,240
25	0,0,240	0,0,240
26	0,240,0	0,240,0

MicroStation Color Index	color.tbl *(AutoCAD Index)* RGB Value	FDOTColor.tbl *(AutoCAD Index)* RGB Value
27	240,0,0	240,0,0
28	240,240,0	240,240,0
29	240,0,240	240,0,240
30	240,122,0	240,122,0
31	0,255,255	0,255,255
32	225,225,225	225,225,225
33	0,0,225	0,0,225
34	225,225,0	225,225,0
35	225,0,0	225,0,0
36	225,225,0	225,225,0
37	225,0,225	225,0,225
38	225,117,0	225,117,0
39	0,225,225	0,225,225
46	225,117,0	225,117,0
55	0,210,210	0,210,210
68	195,195,0	195,195,0
71	0,195,195	0,195,195
84	180,180,0	180,180,0
86	180,102,0	180,102,0
99	165,0,0	165,0,0
100	165,165,0	165,165,0
142	135,87,0	135,87,0
150	120,82,0	120,82,0
152	120,120,120	120,120,120
154	0,120,0	0,120,0
157	120,0,120	120,0,120
255	(250) 0,0,0	(250) 0,0,0

3.7.3 *Line Weight*

Line weight for MicroStation is defined by index value in the range of 0 to 31 that selects the stroke width (or thickness) of the line used to draw and print a graphic element. Each element has its own line weight. The standard line thickness (width) of a printed element is usually in inches on the paper defined by a print driver file.

Printed output from the design file must be of a quality legible on 2nd generation copies. Line weights / thicknesses in the following table are default settings (also set in Department delivered print drivers). These may need to be user-adjusted depending on hardware to produce the required quality of printed documents.

MicroStation / AutoCAD Line Weight Mapping

MS Weight	*MS Plot(inches)*	*AutoCAD (inches)*	*AutoCAD (mm)*
0	0.003	0.004	0.09
1	0.006	0.006	0.15
2	0.009	0.008	0.20
3	0.012	0.012	0.30
4	0.015	0.014	0.35
5	0.018	0.016	0.40
6	0.021	0.021	0.53
7	0.024	0.024	0.60
8	0.027	0.028	0.70
9	0.030	0.031	0.80
10	0.033	0.035	0.90
11	0.036	0.035	0.90
12	0.039	0.039	1.00
13	0.042	0.042	1.06
14	0.045	0.047	1.20
15	0.048	0.047	1.20
16	0.051	0.055	1.40
17	0.054	0.055	1.40
18	0.057	0.055	1.40
19	0.106	0.083	2.11
20	0.105	0.083	2.11
21	0.110	0.083	2.11
22	0.115	0.083	2.11
23	0.120	0.083	2.11
24	0.125	0.083	2.11
25	0.130	0.083	2.11
26	0.135	0.083	2.11
27	0.140	0.083	2.11
28	0.145	0.083	2.11
29	0.150	0.083	2.11
30	0.155	0.083	2.11

Available AutoCAD Line Weights

inches	*mm*
0	0.000
0.002	0.050
0.004	0.090
0.005	0.130
0.006	0.150
0.007	0.180
0.008	0.200
0.01	0.250
0.012	0.300
0.014	0.350
0.016	0.400
0.02	0.500
0.021	0.530
0.024	0.600
0.028	0.700
0.031	0.800
0.035	0.900
0.039	1.000
0.042	1.060
0.047	1.200
0.055	1.400
0.062	1.580
0.079	2.000
0.083	2.110

3.7.4 *Line Styles / Linetypes*

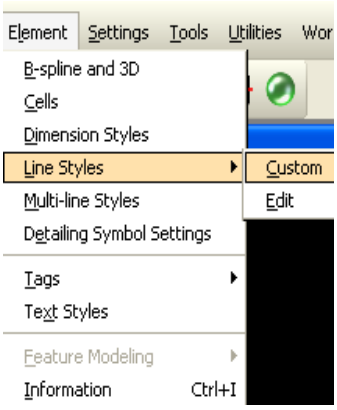
MicroStation Line Style (or AutoCAD Linetype) is part of the symbology of graphic elements, which defines a line's appearance. Each element has its own Line Style / Linetype which can be set to a standard line Style / Linetype or to a Custom Line Style / Linetype.

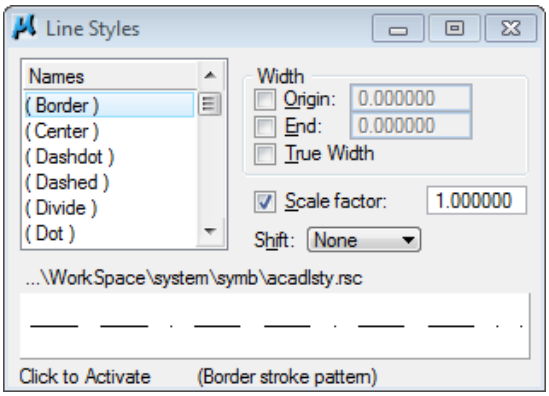
Standard MicroStation Line Styles are based on output device coordinates, therefore are not truly "what you see is what you get". Custom Line Styles should be used instead of MicroStation line patterning.

———— 0	style(0) = continuous
---------- 1	style(1) = (0.02, 0.04), for ACAD - DGN1
- - - - - - 2	style(2) = (0.08, 0.04), for ACAD - DGN2
— — — 3	style(3) = (0.15, 0.05), for ACAD - DGN3
—·—·— 4	style(4) = (0.200, 0.053, 0.03, 0.053), for ACAD – DGN4
- - - - - - 5	style(5) = (0.056, 0.056), for ACAD - DGN5
—··—··— 6	style(6) = (0.32, 0.056, 0.048, 0.056, 0.048,0.056), for ACAD – DGN6
—— —— 7	style(7) = (0.59, 0.053, 0.03, 0.053), for ACAD – DGN7

➢ ***To set custom line style scale, select the MicroStation menu option:***

Element > Line Styles > Custom:





In most instances the MicroStation Custom Line Style name will match the AutoCAD Linetypes, which are defined for AutoCAD in the file *FDOT.lin* located in the *\FDOTXXX.C3D\Support\linetype* folder.

MicroStation Line Style	AutoCAD Linetype
0	Continuous
1	DGN1
2	DGN2
3	DGN3
4	DGN4
5	DGN5
6	DGN6
7	DGN7

The Department includes Standard Custom Line Style / Linetype resource files in both the CADD Software Suite for Bentley and the FDOT State Kit for Autodesk.

FDOT Custom Line Style Resource Files for MicroStation
FDOT_3D.rsc
FDOT_MOT.rsc
FDOT_Rdwy.rsc
FDOT_Road.rsc
FDOT_ROW.rsc
FDOT_Striping.rsc
FDOT_Utilities.rsc

FDOT Custom Linetype Resource Files for AutoCAD
FDOT.LIN

The Department's Standard Custom Line Style / Linetypes can be complex and contain arrangements of line segments and / or symbols. Users must not modify the Department's Standard Custom Line Style / Linetypes resource files.

If Non-Standard Custom Line Style / Linetypes are required for a design, other resource files are allowed to be user-defined, but they must be delivered in the \symb\ sub-folder of the FDOT Project folder structure, or the Non-Standard Custom Line Style / Linetype definitions must be embedded in the design file.

Note The user must not create conflicting custom line styles / linetypes with the same name as a Department Standard Line Style / Linetype. User created resource files must be unique in both name and appearance.

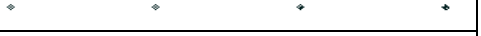
3.7.4.1 Standard Symbols

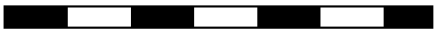
- Index 002 Design Standards FY 2017-18

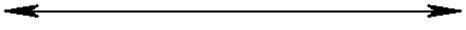
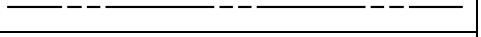
3.7.4.2 Custom Line Styles

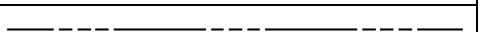
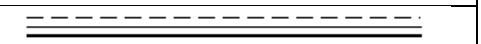
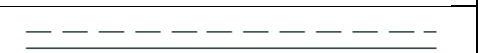
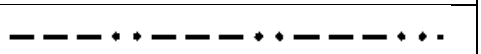
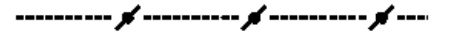
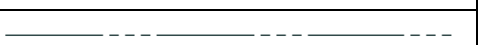
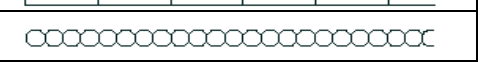
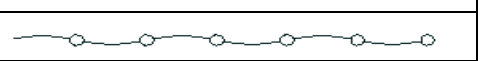
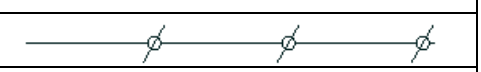
Some MicroStation Line Styles shown below containing leaders and some complex markings and striping needed to be place to scale are not created as AutoCAD Linetypes for the FDOT State Kit for Civil 3D. Tools such as *Entity Manager*, *Place Block Group* and the *Pavement Marking* tool can create these types of additional striping for AutoCAD.

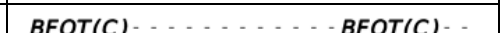
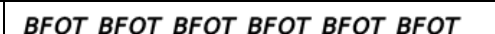
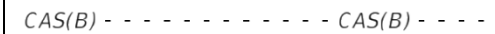
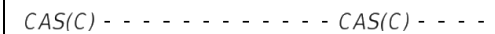
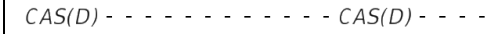
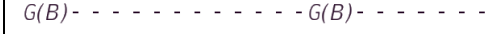
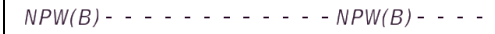
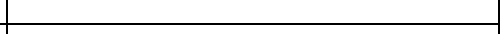
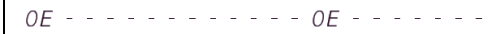
For Current Updates see CADD Manual in Reference to FDM

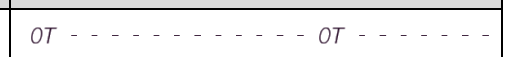
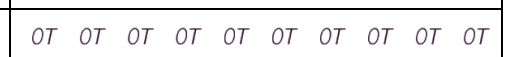
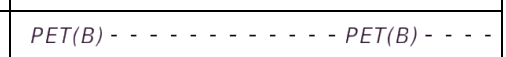
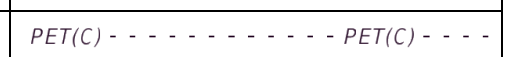
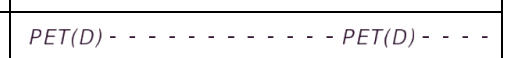
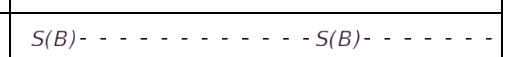
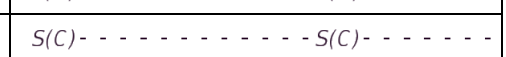
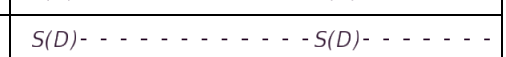
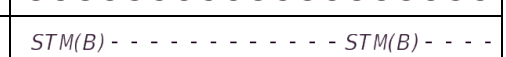
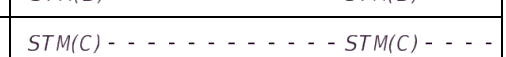
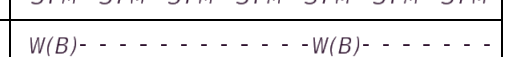
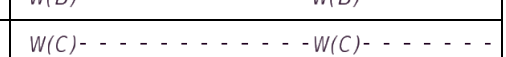
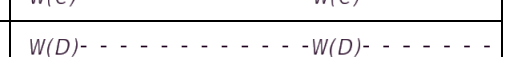
Name	Description	Sample Image
MOT-Attenuator	Attenuator	
MOT-ChannelDevPed	Channelizing Device Pedestrian	
PM-Delineator-300Gap*	Delineator Point 300' Gap	
PM-Delineator-40Gap*	Delineator Point 40' Gap	
PM-RumbleSkip	Rumble Strip Skip	
PM-RumbleSolid	Rumble Strip Solid	
PM-Stripe-10' Crosswalk	Crosswalk 10ft Component	
PM-Stripe-10'_20'Skip	10'/30' Contrast Skip Striping	
PM-strupe-2'_2'Skip	2ft / 2ft / 2ft Contrast Skip	
PM-Stripe-6' Crosswalk	Crosswalk 6ft Component	

Name	Description	Sample Image
PM-Stripe-RumbleStripeLeft	Rumble Striping Left	
PM-Stripe-RumbleStripeRight	Rumble Striping Right	
PM-Stripe-VibratoryLeft	Vibratory Line Left	
PM-Stripe-VibratoryRight	Vibratory Line Right	
PM-Stripe-YieldLarge	Yield Large	
PM-Stripe-YieldSmall	Yield Triangle Component	
RD-CableBarrier	Cable Barrier	
RD-Fence	Fence Line	
RD-FlowLine	Flow Line	
RD-Guardrail-Double	Guardrail Double	
RD-Guardrail-Left	Guardrail Left	
RD-Guardrail-Right	Guardrail Right	
RD-LaneLine-Existing	Lane Line Existing	
RD-PavedShldr 10'	Paved Shoulder Pattern 10’	
RD-PavedShldr 12'	Paved Shoulder Pattern 12’	
RD-PavedShldr 15'	Paved Shoulder Pattern 15’	
RD-PavedShldr 2'	Paved Shoulder Pattern 2’	
RD-PavedShldr 4'	Paved Shoulder Pattern 4’	
RD-PavedShldr 5'	Paved Shoulder Pattern 5’	
RD-PavedShldr 6'	Paved Shoulder Pattern 6’	
RD-PavedShldr 7'	Paved Shoulder Pattern 7’	
RD-PavedShldr 8'	Paved Shoulder Pattern 8’	
RD-Railroad-Existing	Railroad Existing	
RD-Railroad-Proposed	Railroad Proposed	
RD-SelectiveClearingGrubbing	Selective Clearing and Grubbing	
RD-TreeLine	Tree Line	
RD_TreeProctection	Tree Protection	
RD-TreeRootPruning	Tree Root Pruning	
RD-Wetland-Existing	Wetland Existing	
RD-Wetland-Proposed	Wetland Proposed	
RW-ArrowTie*	Dimension Existing	
RW-CityLimit-Type1	City Limit	
RW-CityLimit-Type2	City Limit	

Name	Description	Sample Image
RW-CountyLine	County Line	
RW-Dimension-Type1*	Dimension Type 1	
RW-Dimension-Type2*	Dimension Type 2	
RW-Easement	Easement Stroke	
RW-EasementCL-Existing	Existing Easement Centerline	
RW-Existing	Existing Right of Way	
RW-GrantLine	Government: Grant Line	
RW-Leader*	Arrow	
RW-LeaderLeft*	Begin End Leader Left	
RW-LeaderRight*	Begin End Leader Right	
RW-License	License (Agreement)	
RW-LimitedAccess-Existing	Existing Limited Access	
RW-LimitedAccess-Proposed	Proposed Limited Access	
RW-LimitsofConst	Limits of Construction	
RW-Nat/StPark/Forest-Type1	National or State Forest Park	
RW-Nat/StPark/Forest-Type2	National or State Forest Park Hash	
RW-NonVehicularAccess	Non-Vehicular Access Line	
RW-PerpetualEasement	Perpetual Easement	
RW-PropertyLine	Property Line	
RW-Proposed	Proposed Right of Way	
RW-QuarterSection	Quarter Section	
RW-RailroadBL	RailRoad	
RW-SectionLine	Section Line	
RW-StateLine	Government: State Line	
RW-Subdiv-Double*	Subdivision Boundary Arrows Double	
RW-Subdiv-DoubleLeft*	Subdivision Boundary Arrows Two Left	
RW-Subdiv-DoubleLeftOnly*	Subdivision Boundary Arrows Two Left Only	
RW-Subdiv-DoubleRight*	Subdivision Boundary Arrows Two Right	
RW-Subdiv-DoubleRightOnly*	Subdivision Boundary Arrows Two Right Only	
RW-Subdiv-Single*	Subdivision Boundary Arrows	
RW-Subdiv-SingleLeft*	Subdivision Boundary Arrows Single Left	
RW-Subdiv-SingleRight*	Subdivision Boundary Arrows Single Right	
RW-TemporaryEasement	Easements Temporary	

Name	Description	Sample Image
RW-TIITFMurphyResLine	Safe Upland TIITF - Murphy Reservation	
RW-TownshipRange	Township Range	
RW-WaterMapBoundary	Major Water Mapping Boundary	
SG-Cable	Signal Cable	
SG-Conduit	Signal Conduit	
SG-Conduit-Existing	ConduitLT Exising	
SG-ConduitAG-Proposed	Conduit – Above Ground	
SG-ConduitBM-Proposed	Conduit – Bridge Mount	
SG-ConduitDB-Proposed	Conduit – Directional Bore	
SG-ConduitJB-Proposed	Conduit – Jack & Bore	
SG-ConduitOT-Proposed	Conduit – Open Trench	
SG-InterconCable-Existing	Interconnect Cable Existing	
SG-InterconCable-Proposed	Interconnect Cable Proposed	
SWP-HayBales	Hay Bales	
SWP-InletProt	Inlet Protection	
SWP-SedimentBarrier	Sediment Barrier	
SWP-TurbidityBarrier-Type1	Turbidity Barrier Type 1	
SWP-TurbidityBarrier-Type2	Turbidity Barrier Type 2	
UT-BuriedCable-Existing(B)	Buried Cable TV Existing Type B	BTV(B) - - - - - - - - - - - - BTV(B) - - - -
UT-BuriedCable-Existing(C)	Buried Cable TV Existing Type C	BTV(C) - - - - - - - - - - - - BTV(C) - - - -
UT-BuriedCable-Existing(D)	Buried Cable TV Existing Type D	BTV(D) - - - - - - - - - - - - BTV(D) - - - -
UT-BuriedCable-Proposed	Buried Cable TV Proposed	BTV BTV BTV BTV BTV BTV BTV
UT-BuriedElec-Existing(B)	Buried Electric Existing Type B	BE(B) - - - - - - - - - - - - BE(B) - - - - - -
UT-BuriedElec-Existing(C)	Buried Electric Existing Type C	BE(C) - - - - - - - - - - - - BE(C) - - - - - -
UT-BuriedElec-Existing(D)	Buried Electric Existing Type D	BE(D) - - - - - - - - - - - - BE(D) - - - - - -
UT-BuriedElec-Proposed	Buried Electric Proposed	BE BE BE BE BE BE BE BE BE BE
UT-BuriedFOC(B)-Existing	Buried Fiber Optic Cable Existing Type B	BFOC(B) - - - - - - - - - - - - BFOC(B) - -
UT-BuriedFOC(C)-Existing	Buried Fiber Optic Cable Existing Type C	BFOC(C) - - - - - - - - - - - - BFOC(C) - -
UT-BuriedFOC(D)-Existing	Buried Fiber Optic Cable Existing Type D	BFOC(D) - - - - - - - - - - - - BFOC(D) - -
UT-BuriedFOC-Proposed	Buried Fiber Optic Cable Proposed	BFOC BFOC BFOC BFOC BFOC BFOC
UT-BuriedFOE(B)-Existing	Buried Fiber Optic Electric Existing Type B	BFOE(B) - - - - - - - - - - - - BFOE(B) - -
UT-BuriedFOE(C)-Existing	Buried Fiber Optic Electric Existing Type C	BFOE(C) - - - - - - - - - - - - BFOE(C) - -
UT-BuriedFOE(D)-Existing	Buried Fiber Optic Electric Existing Type D	BFOE(D) - - - - - - - - - - - - BFOE(D) - -

Name	Description	Sample Image
UT-BuriedFOE-Proposed	Buried Fiber Optic Electric Proposed	
UT-BuriedFOT(B)-Existing	Buried Fiber Optic Telephone Existing Type B	
UT-BuriedFOT(B)-Existing	Buried Fiber Optic Telephone Existing Type C	
UT-BuriedFOT(B)-Existing	Buried Fiber Optic Telephone Existing Type D	
UT-BuriedFOT-Proposed	Buried Fiber Optic Telephone-Proposed	
UT-BuriedTel-Existing(B)	Buried Telephone Existing Type B	
UT-BuriedTel-Existing(C)	Buried Telephone Existing Type C	
UT-BuriedTel-Existing(D)	Buried Telephone Existing Type D	
UT-BuriedTel-Proposed	Buried Telephone Proposed	
UT-Casing-Existing(B)	Encasement Existing Type B	
UT-Casing-Existing(C)	Encasement Existing Type C	
UT-Casing-Existing(D)	Encasement Existing Type D	
UT-Casing-Proposed	Encasement Proposed	
UT-Duct-Proposed	Duct Proposed	
UT-Gas-Existing(B)	Gas Existing Type B	
UT-Gas-Existing(C)	Gas Existing Type C	
UT-Gas-Existing(D)	Gas Existing Type D	
UT-Gas-Proposed	Gas Proposed	
UT-NonPotableWater-Existing(B)	Non-Potable Water Existing Type B	
UT-NonPotableWater-Existing(C)	Non-Potable Water Existing Type C	
UT-NonPotableWater-Existing(D)	Non-Potable Water Existing Type D	
UT-NonPotableWater-Proposed	Non-Potable Water Proposed	
UT-OverheadCable-Existing	Overhead Cable TV Existing	
UT-OverheadCable-Proposed	Overhead Cable TV Proposed	
UT-OverheadElec-Existing	Overhead Electric Existing	
UT-OverheadElec-Proposed	Overhead Electric Proposed	
UT-OverheadFOC-Existing	Overhead Fiber Optic Cable Existing	
UT-OverheadFOC-Proposed	Overhead Fiber Optic Cable Proposed	
UT-OverheadFOE-Existing	Overhead Fiber Optic Electric Existing	
UT-OverheadFOE-Proposed	Overhead Fiber Optic Electric Proposed	
UT-OverheadFOT-Existing	Overhead Fiber Optic Telephone Existing	
UT-OverheadFOT-Proposed	Overhead Fiber Optic Telephone Proposed	

Name	Description	Sample Image
UT-OverheadTel-Existing	Overhead Telephone Existing	
UT-OverheadTel-Proposed	Overhead Telephone Proposed	
UT-Petroleum-Existing(B)	Petroleum Existing Type B	
UT-Petroleum-Existing(C)	Petroleum Existing Type C	
UT-Petroleum-Existing(D)	Petroleum Existing Type D	
UT-Petroleum-Proposed	Petroleum Proposed	
UT-Sanitary-Existing(B)	Sanitary Existing Type B	
UT-Sanitary-Existing(C)	Sanitary Existing Type C	
UT-Sanitary-Existing(D)	Sanitary Existing Type D	
UT-Sanitary-Proposed	Sanitary Proposed	
UT-Steam-Existing(B)	Steam Existing Type B	
UT-Steam-Existing(C)	Steam Existing Type C	
UT-Steam-Existing(D)	Steam Existing Type D	
UT-Steam-Proposed	Steam Proposed	
UT-Water-Existing(B)	Water Existing Type B	
UT-Water-Existing(C)	Water Existing Type C	
UT-Water-Existing(D)	Water Existing Type D	
UT-Water-Proposed	Water Proposed	

3.8 CELL LIBRARIES / BLOCK DRAWINGS

Cells / Blocks are frequently used as repeated components of drawings made up of complex symbols, notations, details, or parts of drawings that can be inserted into one or many other drawings. Cells are defined and stored in MicroStation design files called a Cell Libraries with a *.cel* file extension and in AutoCAD are called Blocks Drawings.

Cells / Blocks have been grouped by disciplinary usage into the Department's Standard Cell Libraries delivered with the CADD Software Suite for MicroStation located under the FDOTXXX\RESOURCES\Cell\ subfolder and Block Drawings delivered in the FDOT State Kit for AutoCAD located under the FDOTXXXX.C3D\Data\Blocks\ subfolder.

The Department's Standard Cell Libraries / Block Drawings are listed in the following table. *(Links are available to open complete listings of all cells within each Cell Library.)*

Note AutoCAD Block Drawings can be accessed via AutoCAD's Design Center to access individual blocks.

For Current Updates see CADD Manual in Reference to FDM

MicroStation CELL LIBRARIES	AutoCAD BLOCK DRAWINGS	DESCRIPTION
FDOT Cell Libraries - Master		Master listing of all FDOT Cells
alphabet.cel		Alphabet & Numbers
arrows.cel	arrows.dwg	Distance & GuidSIGN Arrows
Drain_Bottom3D.cel	*(Civil 3D Drainage Parts)*	Drainage Bottom *(3 Dimensional used for SUDA)*
Drain_Curbs3D.cel	*(Civil 3D Drainage Parts)*	Drainage Curbs *(3 Dimensional used for SUDA)*

MicroStation CELL LIBRARIES	AutoCAD BLOCK DRAWINGS	DESCRIPTION
Drain_Grate3D.cel	*(Civil 3D Drainage Parts)*	Drainage Grate *(3 Dimensional used for SUDA)*
Drain_Junction3D.cel	*(Civil 3D Drainage Parts)*	Drainage Junction *(3 Dimensional used for SUDA)*
Drain_Nodes3D_EX.cel	*(Civil 3D Drainage Parts)*	Drainage Nodes *(3 Dimensional used for SUDA)*
Drain_Outlet3D.cel	*(Civil 3D Drainage Parts)*	Drainage Outlet *(3 Dimensional used for SUDA)*
DrainXS.cel	DrainXS.dwg	Drainage Structure Cross Sections
drplan.cel	drplan.dwg	Drainage Proposed
drplan_ex.cel	drplan_ex.dwg	Drainage Existing
ftpsigns.cel	ftpsigns.dwg	Florida Traffic Plans Signs
geotech.cel	geotech.dwg	Geotechnical
its.cel	its.dwg	Intelligent Transportation Systems Signs
Landscape.cel	landscape.dwg	Landscape
Lighting.cel	lighting.dwg	Lighting
Mutcd.cel	mutcd.dwg	Manual on Uniform Traffic Control Devices
PavementMarkings.cel	pavementmarkings.dwg	Pavement Markings
Photogrammetry.cel	Photo.dwg	Photogrammetry
Roadway.cel	Roadway.dwg	Roadway
row.cel	ROW.dwg	Right of Way
rweng.cel	rweng.dwg	Survey Symbols for Right of Way
Seals.cel	Seals.dwg	Professional Seals for Digital Signatories
Signalization.cel	signalization.dwg	Signalization
SignalPoles.cel	signalpoles.dwg	Signal Poles
syeng.cel	syeng.dwg	Survey Symbols for Roadway
TollPlaza.cel	TollPlaza.dwg	Toll Plaza Signs
tplabels.cel	tplabels.dwg	Traffic Plans Labels
TrafficControlPlans.cel	TrafficControlPlans.dwg	Traffic Control Plans
TrafficControlTypicals.cel	TrafficControlTypicals.dwg	Traffic Control Typicals
TTF_StdDataTables.cel	StdDataTables.dwg	Structures Standard Data Tables
TTF_v8structures.cel	Structures.dwg	Structures
TypicalSection.cel	TypicalSections. dwg	Typical Sections
utilities.cel	utilities.dwg	Utilities
Utilities3D.cel	*(Civil 3D Parts)*	Utilities (3 Dimensional)
v8structurespatterns.cel		Patterns for Structures
XMSuperSection.cel		Structures for Super sections
xsections.cel		Cross Sections

AutoCAD DYNAMIC BLOCKS	DESCRIPTION
BoreHOLE.dwg	Bore Holes
Master Table Drawing.dwg	Master of All Summary Tables
Sheet Border.dwg	Sheet Borders
SheetPOR-Consultant.dwg	Professional of Record for Consultants

AutoCAD CIVIL BLOCKS
Bus Bay with Type F Curb.dwg
CurbGutter.dwg
Driveway.dwg
Mast Arm Assemblies.dwg
Tapered TurnLane with Type F Curb.dwg

AutoCAD CIVIL BLOCKS
Traffic Separator with Tapered Median.dwg

3.9 TEXT

The Department delivers a set of True Type Font (TTF) files to ensure text uniformity between applications supporting TTF fonts and legibility of CADD drawings. The Department's CADD Software Suite delivers a set of proportional and uniformed spaced True Type Font files using vertical and slanted characters, the detail of which is reflected in the table below. These font files have additional characters added into the gaps of the Unicode definition, so engineering symbols like: ℄, ℉, ℔, ∆ and fraction combinations are supported in the FDOT fonts directly. The MicroStation based *zdotfont.rsc* and *structuresfont.rsc* resource files are also delivered with the CADD Software to maintain legacy compatibility for older CADD files predating the use of True Type fonts.

Although not recommended, MicroStation can utilize fonts contained within MicroStation RSC, AutoCAD SHX, and True Type Font files. MicroStation will read multiple font resource files according to the paths set by the MS_FONTPATH configuration variable in the selected workspace, and True Types Fonts registered with the Windows operating system. Within a MicroStation design file, font resources are compiled into a list of fonts from all the resource files that are found. The *MstnFontConfig.xml* file located by the MS_FONTCONFIGFILE variable determines if duplicate font names are displayed in font selection and lists how to resolve duplicate font names; likewise, AutoCAD can utilize multiple font sources. It is strongly recommended to use the FDOT True Type fonts exclusively.

3.9.1 *True Type Fonts (TTF)*

The Department's TTF files contain special characters used by designers that are not normally found in standard publishing fonts. (*See the Unicode mapping standard: **http://www.unicode.org/charts/***)

Note If the FDOT TTF files are registered with the Windows operating system, the fonts may be used in any standard Windows program like Word, Excel, or any other applications supporting TTF.

Font	Description
FDOT	Standard slanted proportional spaced font used for most annotations
FDOT Bold	Bold version of the FDOT font
FDOT Heavy	Heavier Bold version of the FDOT font
FDOT Imprint	Chiseled font (*Used mainly within the FDOT sheet border*)
FDOT Imprint Bold	Bold version of FDOTImprint font *(Used mainly within the FDOT sheet border)*
FDOT Mono	Standard mono-spaced font *(Used mainly in tables to keep characters aligned vertically)*
FDOT Mono Bold	Bold version of FDOTMono font
FDOT Mono Heavy	Heavier Bold version of FDOTMono font
FDOT Vert	Non-slanted proportional spaced version of FDOT font *(Used mainly by Right Of Way discipline)*
FDOT Vert Bold	Bold version of FDOTVert font *(Used mainly by ROW)*
FDOT Vert Heavy	Heavier Bold version of FDOTVert font *(Used mainly by ROW)*
FDOT Vert Mono	Mono-spaced version for FDOTVert font *(Used mainly in tables used mainly by ROW)*
FDOT Vert Mono Bold	Bold version of FDOTVertMono font *(Used mainly by ROW)*
FDOT Vert Mono Heavy	Heavier Bold version of FDOTVertMono font *(Used mainly by ROW)*

3.9.2 *Text Size and Spacing*

The Department employs standard text sizes to ensure uniformity and legibility on CADD drawings and for printed output. The appropriate text size is dependent on the plot scale selected. Since the most important issue with text is legibility, the font, weight and text size may vary when necessary. Text line spacing should be, on average, three-fourths of the text height.

The Department's CADD Software Suite provides several Text Levels and Text Styles for designers to choose as a starting point to create text to fit their needs. Text Levels can be identified by the Level / layer naming convention beginning with the string "Text" (i.e. TextBLStation, TextLable, TextNotes).

The following table should be used as a *guideline* for standard text size definitions for plans at given scales.

- ***Text for B-Size Plans (11" x 17" paper)***

Scale	1"=1'	1"=20'	1"=40'	1"=50'	1"=100'	1"=200'	1"=400'	1"=500'
Minimum	0.06	1.2	2.4	3	6	12	24	30
Desired	0.07	1.4	2.8	3.5	7	14	28	35
Maximum	0.125	2	4	5	10	20	40	50

- ***Text for D-Size Maps (24" x 36" paper)***

Scale	1"=1'	1"=20'	1"=40'	1"=50'	1"=100'	1"=200'	1"=400'	1"=500'
Minimum	0.08	1.6	3.2	4	8	16	32	40
Desired	0.10	2	4	5	10	20	40	50

3.9.3 *Standard Abbreviations*

- Index 001 Design Standards FY 2017-18

3.10 FDOT PRINT RESOURCE FILES

3.10.1 *MICROSTATION PRINT RESOURCE FILES*

The Department's CADD Software Suite supplies several MicroStation print configuration example files to generate prints to scale using the sheet cells (also provided with the CADD Software) on those specific printers. All print configuration files supplied have raster printing enabled. These print configuration files are examples due to various site-specific configurations and the types of printers that might be encountered.

The table below lists the print configuration file names and the type of printer on which it was developed / tested. Each printer has its own printable area on the paper for which it can print. For this reason, if a specific printer is not listed below, the print configuration file may require modification by the user to be used for another printer.

PRINT RESOURCE FILES	PRINTER	DESCRIPTION
36x24.pro	N / A	Controls postscript image/print output
Color.plt		Color 11x17 (Raster Capable) Uses FDOT.TBL pen table and PSCRIPT.PRO prolog file.
Color_FDOTPDF.pltcfg	N/A	Creates a color Portable Document Format (PDF) file. (Raster Capable) Uses FDOT.TBL pen table.
Color_Keysheet.pltcfg	ANY	To be used when printing key sheets containing maps with filled shapes.
FDOT.tbl	N/A	Pen table that also enters username, date time, and sheet border path.
FDOT_GrayExisting.tbl	N\A	Pen table that enters username, date time, sheet border path, and applies gray scale to files named like: TOPO*, UTEX*, and DREX*
FDOTbatchplt.spc	N/A	Batch print specification file customized for the Department's print configuration files. (Only used with old Batch Print dialog). This print configuration file is being replaced with Print Styles in MicroStation V8i)
FDOTPDF.plt	N/A	Creates a .PDF file. (Raster Capable) Uses FDOT.TBL pen table.
FDOTprinter.plt	Windows Printer	Copy of Bentley's PRINTER.PLT with weights and styles set to CADD standards. Uses FDOT.TBL pen table.
HP1055.plt	HP 1055 CM	Monochrome 36x24 (Raster Capable) Uses 36x24.PRO prolog file.
HP1055C.plt	HP 1055 CM	Color 36x24 (Raster Capable) Uses 36x24.PRO prolog file.
HP5000.plt	HP 5000 GN	Monochrome 11x17 (Raster Capable) Uses FDOT.TBL pen table and HPTTABL1.PRO prolog file.
HP5000Legal.plt	HP 5000 GN	Monochrome 8.5x14 (Raster Capable) Uses FDOT.TBL pen table and HPTLEGAL.PRO prolog file.
HP5000Letter.plt	HP 5000 GN	Monochrome 8.5x11 (Raster Capable) Uses FDOT.TBL pen table and HPTLETTER.PRO prolog file.
hpglrtl.pltcfg	Large Format	Intended for use when printing large format monochrome sheets. (Raster Capable)
hpglrtl_c.pltcfg	Large Format	Intended for use when printing large format color sheets. (Raster Capable)
PostScript.plt	N/A	Creates postscript image file. (Raster Capable) Uses FDOT.TBL pen table and HPTTABL1.PRO prolog file.

PRINT RESOURCE FILES	PRINTER	DESCRIPTION
Postscript36x24.plt	N/A	Creates postscript image file. (Raster Capable) Uses FDOT.TBL pen table and 36x24.PRO prolog file.
pscript.pro	N/A	Controls postscript image / print output
XeroxN40.plt	XEROX Docuprint N4025	Monochrome 11x17 (Raster Capable) Uses FDOT.TBL pen table and HPTTABL1.PRO prolog file.

3.10.2 *AutoCAD/Civil 3D PRINT RESOURCE FILES*

The Department's CADD Software Suite supplies several AutoCAD print configuration files to generate prints to the Departments print standards.

PRINT RESOURCE FILES	DESCRIPTION
FDOT.stb	Controls the color mapping of display objects to print objects.
FDOTPDF.pc3	Predefined pdf plot settings such as paper size/orientation, margins, plotter name.
FDOTPDF.pmp	Used to define custom paper sizes.

Chapter 4

CADD PRODUCTION PROCEDURES

4.1 PURPOSE

This chapter establishes the minimum requirements for the production of Florida Department of Transportation (Department) Computer Aided Design and Drafting (CADD) projects in accordance with the Department's plans preparation procedures and practices.

4.2 SCOPE

These procedures are applicable to the CADD applications utilized by and for the Department in the production process. They are intended to complement and support the policies, procedures and standards of the Department in accordance with ***Procedure No. 025-020-002, Standard Operating System***.

4.3 ACCOUNTABILITY

These procedures do not exempt the professional from performing responsible engineering, surveying and mapping or architecture. The policies and procedures of the Department and appropriate professional practice take precedence when providing professional services for the Department. The professional must have the final responsibility for the accuracy of all input and output of CADD applications.

4.4 DEFINITIONS

Bid Set: A sub-set of files consisting of data derived from the overall Project Data Set containing only those files needed for the advertisement and letting of a project. The files needed for the Bid Set remain in their source folder structure derived from the Project Data set. For Digital Delivery projects, the data in the Bid Set is usually compiled manually and put in a ZIP file with a naming convention defined later in this chapter.

CADD Production: The development of projects utilizing CADD applications, software and discipline-based processes.

Calculations Folder: Excel files, Portable Document Format (PDF) files and any associated quantity backup data for the plan summary boxes.

DQE: Design Quantities and Estimates System. The Department's program for estimating construction cost for projects.

Digital Delivery: A method to deliver project data which relies upon creating a compressed archive (ZIP file) of project data, PDF files of Plans and Specifications documents, which are signed and sealed with a Digital Signature.

Engineering Data: Those electronic files that represent the critical geometric and quantitative controls or other data supporting the graphical representation (design) of a project.

File Checker: An application to assist with the verification of Quality Control (QC) compliance to Delivery standards, such as folder structure, file naming, etcetera.

Journal: Electronic file(s) that document development, correspondence, decisions made, methodology used, exceptions to standards, or other descriptive information about the project. The Electronic Journal includes details that must give future users insight about the project data.

Letting: The process of advertising, selection, and award of a contract for the construction of a project.

Plans Change: **(*Plans Preparation Manual*** (PPM) Volume 1, Chapter 20 definition) Modification to a set of plans, after Program Management has changed the Control Group, but before the plans are sent to the Department's Central Office.

Project: Projects are identified by the Department through the Financial Project Identification Number (FPID) which becomes the name of the project's root folder. Note that multiple deliveries can occur for a single project, each representing the status of the project at the time of delivery.

Project Component: All electronic files that represent and support a delivery by a discipline as part of a project.

Project Discipline Folder: The data structure and organization of electronic files on the storage media, as a sub-folder of the project's root folder.

Project Data Set: All of the files used or produced during the development of the project and placed in the Project Folder structure.

Project Folder: The parent folder of a project containing all project component Folders and data (see Project Root Folder).

Project Manager: The person responsible for ensuring that the scope of work is accomplished for a project and the receipt, acknowledgment, validation and acceptance of the project data.

Project Root Folder: The file system folder that contains all of the projects' files and folders. The project root folder should not contain files that do not pertain to the project, nor should files that are part of the project reside outside of the project root folder, or one of its sub-folders.

Reference File: A design file or other file type that is attached to and viewed simultaneously with the active design file.

Resolution: The number of addressable points across a given area. For example, printer resolution is measured in lines or dots per inch, while screen resolution is usually given indicating the number of pixels across the width and height of the largest image that can be displayed. MicroStation design files have a user-definable resolution, called Units of Resolution (UORs).

Root Certificate: Cryptographic information installed on a computer that identifies the Certificate Authority and allows the identity of the Signatory to be validated against the identity records held by the Certificate Authority. This process usually requires a connection to the Internet.

Seed File: A predefined settings file used to create a new design files or cell libraries.

Seed Project: A predefined folder structure that contains all folders listed further in this chapter, as well as other project configuration files. The "seed" is the beginning structure of a project which gets populated with data as the project development occurs.

Sheet Navigator: An application which runs within MicroStation, allowing users to browse and open MicroStation files containing sheets for verification or editing. Its purpose is to 'tag' sheets with data that supports later processes for both Indexing and Printing. It is a foundation utility for delivery processes and should be run against every MicroStation design file containing sheets.

Sheet Set Organizer (SSO): An application which runs in conjunction with AutoCAD's Sheet Set Manager. Its purpose is to combine and organize DST files created by Sheet Set Manager. It updates fields in DWG files with data that supports later indexing and printing. It is a foundation utility for subsequent delivery processes using AutoCAD Civil 3D, ensuring sheet data can be extracted properly.

Strung Project: Two or more projects let in the same contract.

Standard Operating Instructions: Instructions for operating CADD applications intended to help guide the user in CADD production activities.

4.5 REFERENCES

Standard Operating System, Topic No. 025-020-002

Plans Preparation Manual Volume 1 & 2, Topic Nos. 625-000-007/625-000-008

4.6 CADD RESOURCES

The ***CADD Manual*** is maintained by Production Support CADD Office (CADD). CADD updates and distributes the ***CADD Manual*** in conjunction with CADD Software releases.

4.7 STANDARD PROJECT FOLDER

The data for each of the Department's projects is organized and delivered using a standard Project Folder structure defined in this chapter. The Project Folder (Project Root Folder) must be named the Department's FPID, using all eleven digits. New projects should be created using tools developed and provided by the CADD and delivered with the CADD Software Suite. The Department provides an application called *CreateProject* can be used to initiate the Project folder structure. The Department also provides an application *FileChecker* to help confirm the Project folder structure during QC processes.

4.7.1 *Create Project*

The *Create Project* application creates the Project Folder structure and prompts the user for additional project specific information. The project folder contains standard sub-folder names for defined disciplines along with support and resource files specific to the project.

Digital Delivery allows unused sub-folders of the project folder to be deleted if they remain empty. Sub-folders have a purpose for the file content they will receive. For example, a cell library developed for a specific project has a dedicated holding sub-folder named \Cell\ in the standard project folder structure.

The _meta_info\ sub-folder is used by the FDOT Workspace to establish the top level of the project folder structure and for other purposes. The _meta_info\ sub-folder is required and must not be removed for delivery.

Note An exception - Specifications Only Projects do not have a _meta_info\ sub-folder. See Section 4.13.17.

4.7.2 *Standard Project Folder Structure*

The Department's standard project folder structure and file naming conventions are based on the anticipated workflow of the Department's projects and the usual separation of work. Digital Delivery allows any unused (empty) sub-folder to be deleted with the ***exception of the _meta_info\ sub-folder***.

The following table displays the standard project folder structure with a descriptive purpose:

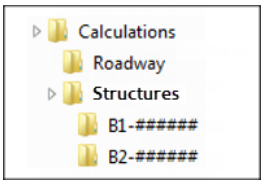
Folder Names	Purpose
Project Name (FPID)	Root Project Folder: contains fpid-PLANS.PDF
_meta_info\	Files used by the FDOT Workspace (Do Not Remove. Required sub-folder.)
_Shortcuts\	Data shortcuts (data for Civil 3D projects only - not used by MicroStation)
\3DDeliverables\	Copies of specific Design Files for Contractor convenience for 3D models, includes LandXML files of critical geometrics and surfaces
\admin\	Administrative documents (email, correspondence, etcetera)
\eng_data\	Typically contain QC reports
\arch\	Architectural design files
\eng_data\	Typically contain QC reports
\brinspect\	Bridge Inspection files
\eng_data\	Typically contain QC reports
\calculations\	Excel files, PDF files and any associated quantity backup data for the Plan Summary Boxes for Roadway and Structures
\Cell\ (or \Block\)	Project specific cell libraries (or project block libraries created for Civil 3D)

Folder Names	Purpose
\concepts\	Various preliminary concepts
\eng_data\	Typically contain QC reports
\const\	Construction files (i.e.: “As-Builts”)
\eng_data\	Typically contain QC reports
\data\	Project data files (i.e. journals, material backgrounds for rendering, pen tables, print configuration files, etcetera)
\drainage\	Drainage design files
\eng_data\	Typically contain QC reports and calculations
\emo\	Environmental Management files
\eng_data\	Typically contain QC reports
\estimates\	Estimates files
\eng_data\	Typically contain QC reports
\geotech\	Geotechnical data files
\eng_data\	Typically contain QC reports
\GIS\	Geographic Information System Deliverables
\ITS\	Intelligent Transportation Systems design files
\eng_data\	Typically contain QC reports
\landscp\	Landscape design files
\eng_data\	Typically contain QC reports
\lighting\	Lighting design files
\eng_data\	Typically contain QC reports
\maint\	Maintenance department (This is not Maintenance of Traffic).
\eng_data\	Typically contain QC reports
\material\	Other Materials data files
\eng_data\	Typically contain QC reports
\out\	Other miscellaneous Output files
\permits\	Permits for various items (i.e.: ponds, driveways, mailboxes, etcetera)
\eng_data\	Typically contain QC reports
\planning\	Planning files
\eng_data\	Typically contain QC reports
\preestim\	Preliminary estimates files
\eng_data\	Typically contain QC reports
\roadway\	Roadway design files
\eng_data\	Typically contain QC reports
\rwmap\	Right of Way Mapping files
\eng_data\	Typically contain QC reports
\seed\	Project specific seed files
\signals\	Signalization design files
\eng_data\	Typically contain QC reports
\signing\	Signing and Pavement Marking design files
\eng_data\	Typically contain QC reports
\specs\	Source files used to create the Specifications Package*
\eng_data\	Typically contain QC reports
\struct\	Structure design files
\eng_data\	Typically contain QC reports
\survey\	Survey database and surveying design files
\eng_data\	Typically contain QC reports
\symb\	Project specific resource files for fonts and custom line styles
\trafops\	Traffic Operations data files
\eng_data\	Typically contain QC reports
\utils\	Utility data and design files
\eng_data\	Typically contain QC reports

4.7.2.1 Calculations Project Folder

This Project sub-folder contains the Excel summary box templates and custom spreadsheets, PDF or TIFF files of hand drawn sketches and calculations, PDF files generated from other programs (i.e. Mathcad), and any associated *quantity backup data* for the Plan Summary Boxes for Roadway and Structures.

Subfolders specific for Roadway and Structures may be created under the \Calculations\ sub-folder to aide in organization of documentation. Under the Project \Calculations\ Structure sub-folder, separate sub-folders may be created for each bridge and/or structure in the project.



4.7.2.2 Discipline Sub-Folders

Discipline sub-folders of a project are generally defined for the division of work and the files they typically would contain. Roadway designers would typically place files they create and "own" under the \Roadway\ sub-folder of the project, Surveyors under the \Survey\ sub-folder, and so forth. In some cases, disciplines may have work that overlaps with other areas of a design. For example, if a Roadway designer develops the drainage sheets, the files produced would, by the above convention, go in the \Roadway\ folder rather than the \Drainage\ folder as the "Roadway" designer is the owner of the work. However, if so desired, those files could have been put in the \Drainage\ sub-folder instead, but file management permissions (for access control systems such as Vault, ProjectWise, Falcon/DMS, and etcetera) must be taken into consideration.

- ***Engineering Data Sub-Folders:***

Each discipline sub-folder contains an additional sub-folder named \eng_data\. These sub-folders are designated to hold the QC reports (produced by the QC tools) and certain other files.

Note Plan sheets are not required to be printed to the \eng_data\ sub-folder, but may instead be printed directly to a multi-sheet PDF of the plans (stored in the root folder of the project). Remember that empty sub-folders can be deleted in Digital Delivery.

- ***Custom Sub-Folders:***

In some cases, it is desirable to create "non-standard" or custom sub-folders for additional segregation of work. This is common when multiple parties work in a single discipline. In these cases, the data must be managed, especially when subdivision of the files into additional sub-folders just makes sense. These additional sub-folders can be created under the discipline standard project sub-folders to accommodate these circumstances, but must not to be created under the root folder for the project. These custom sub-folders must adhere to the restrictions for sub-folder names as defined below:

- Certain special characters are not recognized by some programs for sub-folder names and must be avoided (even if they are valid characters for Windows folder names).
- Alphanumeric characters (a-Z), dashes (-), and underscores (_) are therefore the only permissible characters for sub-folder names.
- Spaces must not to be used in any folder or file name for the Department projects.
- Sub-folder names must not exceed 16 characters. File names may exceed 16 characters, but should be kept as concise as possible to help meet full path length restrictions.

Note Examples of characters that should NEVER be used in sub-folder (or file) names include the characters: &, %, |, $, ?, <, >, !, even if permissible by the Windows Operating System). Some characters represent escape sequences to certain programs and will cause problems.

- Full path lengths are also generally limited to 1024 characters (or less) total by some software. Overall path length (path plus filename) must be taken into account when creating folders (and file) names and may limit the number of sub-folder levels below the project level folder.

Note Remember that the computer (or application) must resolve the full Universal Naming Convention (UNC) path length, even if you have a deep path mapped to a logical drive letter - which could exceed the full path length character limit for some applications. Try to keep your custom folder and file names as concise as possible.

4.8 STANDARD FILE NAMES

This section describes the file naming convention for design files. In the event a particular file name is needed for the project and is not addressed by the schema, consult with either the Project Manager or the District CADD Manager to determine the proper filename to use.

The Department also identifies standard design files as either "critical" or "non-critical." Critical files are frequently used in downstream applications, shared across disciplines, and used in quantifying pay items. These "critical" files must meet a minimum compliancy for CADD symbology. Standard filenames are discipline specific and are detailed within the respective discipline sections later in this manual. Filename special character restrictions have already been introduced.

4.8.1 *Standard Design File Naming Convention*

The Department utilizes standard naming conventions for design files and provides applications that depend on these naming conventions being met. The naming convention also confers information to downstream users about the data contained in the design file.

- ***Standard design file names follow this format: AAAABB##.ext***

  AAAA = Abbreviated File Description, as defined in the Discipline Standards later in **Section 4.13**.

  BB = Discipline *Designation*,

  ## = A file Sequence Number *(a padded integer, i.e. "00", "01", "02" … "99", used to sequence additional files of the same Description + Denotation)*,

  .ext = File extension indicating the type of file.

For Example: The first proposed Roadway cross section file would be named: *rdxsrd01.dgn*

The first six (6) characters of the standard design file naming convention described above are also critical triggers for QC software and symbology filters. If it is necessary to add additional descriptive information in the design filename, this descriptive information should be inserted after the discipline denotation "BB" and preceding the sequence number "##". Doing so should be only on rare occasion.

For Example: *rdxsrd-rampA-01.dgn*, might indicate this proposed cross section file includes Ramp A.

Note Only letters, numbers, dashes, and underscores characters are permitted in file names. Characters and spaces that interfere with operating system path specifications or XML interpretation such as: (/ \ . : ;, < & # >") must be avoided.

Very large projects might also necessitate the need to exceed two-digit sequence numbers (100+); otherwise the sequence should be limited to two digits. The Department delivers a *CreateFiles* application to assist in producing Design files with the standard naming convention.

Note See Discipline Sections 4.13 – 4.28 of this document for comprehensive coverage of design file naming conventions and CADD Standard Rule assignment applicable to each discipline. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

For Current Updates see CADD Manual in Reference to FDM

4.8.2 *Print Image File Naming Convention*

MicroStation projects use the application *Sheet Navigator* to extract the sheet and title block data from design files containing sheets. The source design file name and data extracted from those files yields resulting PDF print file names (and defines the sheet's relationship to the plans component of the project). Sheet Navigator uses the *SheetInfo.xml* control file to determine the component order for sheets in the plans set, mining their location in the project folder structure and the sheet number prefix. The *Sheetinfo.xml* control file defines the standard search criteria to identify sheets in a project and is located in the CADD Software \mdlapps\ sub-folder.

AutoCAD Civil 3D projects use a similar tool called *Sheet Set Organizer (SSO)*. *SSO* also uses the source design file name and data extracted from the sheet layouts in drawings assigned to AutoCAD's Sheet Set Manager (*.dst*) files for names and organizes plans components of the project.

PDF files are the required format for producing an electronic image of Plans for Digital Delivery. Multi-sheet PDF files representing Plans and / or Specifications have been ruled acceptable to the Boards of Professional Regulation and may be signed and sealed with single or multiple digital signatures. Provisions were made to resolve any potential ambiguity regarding who is responsible for content by using a Signature Sheet (see the Department's PPM, Volume 2, Chapter 3) for each file signed with a Digital Signature. If more than one professional must sign any given file, a Signature Sheet must appear in that Plans Set (or Component Set) to bear the appearance of each Signatory and include a definition of the portions of that Set each Signatory is taking responsibility for. Data producers are no longer required to retain or sign single files representing each individual sheet of a Plans set.

4.8.2.1 Sheet Numbers

Sheet numbers used in the title blocks of plan sheets are composed of multiple parts using the syntax: **AAA-####Z.** Example Sheet Numbers: S-001A, S-001B, PNC-01, A-15, A-16, T-1, T-2, and 1, 2, 3, etcetera.

- *AAA* - Represents the sheet number prefix, using multiple alpha characters. Refer to the *Plans Preparation Manual* and *Structures Manual*.
- *####(Z)* - Defines the numeric order of the sheets within the Plans Component. The optional (Z) suffix allows for the insertion of appended sheets after the project has started, such as the case during revisions. A single alpha character suffix, A-Z, is added for each subsequent sheet inserted for a revised sheet.

Note Structures and Architecture disciplines have extended the sheet numbering schema and the respective discipline instructions should be consulted for additional guidance. These are found in their respective sections later in this Manual.

Sheet Navigator uses sheet number prefixes to determine the plans component each sheets belongs to. The following table identifies each sheet number prefix.

Prefix	Component
[No prefix]	Roadway Plans - *(Typical - only an integer is used for most of these sheet numbers)*
CTL	Roadway Plans - Project Control Sheets
GR	Roadway Plans - Soil Survey and Report of Core Borings normally associated with the roadway plans set (including miscellaneous structures but excluding bridges and walls)
PC	Roadway Plans – Project Control
SQ	Roadway Plans - Summary of Quantities
TR	Roadway Plans - Tree Survey Sheets
UTV	Roadway Plans - Verified Utility Locate Sheets
IT	Intelligent Transportation System (ITS) Plans
GI	Intelligent Transportation System (ITS) Plans - Soil Survey and Report of Core Borings
LD	Landscape Plans
L	Lighting Plans
GL	Lighting Plans - Soil Survey and Report of Core Borings
T	Signalization Plans
PTM	Signalization Plans - Portable Traffic Monitoring Site Sheets
GT	Signalization Plans - Soil Survey and Report of Core Borings
S	Signing and Pavement Marking Plans
GS	Signing and Pavement Marking Plans - Soil Survey and Report of Core Borings
Begins with "A"	Architectural Plans
BW	Structures Bridge Walls
Begins with "B"	Structures Plans
BP	Structures Pedestrian Bridge Data Sheets
BQ	Structures - Summary of Structures
Begins with "U"	Utility Work by Highway Contractor Agreement Plans

Roadway plans are typically the primary component of the Department's project plans set containing multiple plan components and can have non-prefixed sheet numbers (1, 2, 3, etcetera). Other disciplines can also be the primary plans component - only in the absence of a Roadway plan component. For example: A Lighting only project may omit the plans component prefix and use the numbering format of 1, 2, 3, etcetera.

4.8.2.2 Print Image File Naming Format

Applications that support printing, such as *Sheet Set Organizer* implement a file naming scheme for PDF files it manages that removes ambiguity about which sheet the file represents (regardless of the sheet-numbering scheme used in the design file) and supports more complex sheet numbering being expected by some disciplines. Digital Delivery does not require individual sheet image files to be delivered, however. If individual sheets are printed to PDF and retained, they must follow the naming convention shown below:

EX: 01_BB1-1A_keysrd01.extension

Plans Component Code Sheet # Parent Drawing File Name

Note Image file extension must be Portable Document files (PDF) and Tagged Image Format files (TIF).

- *Plans Component Code* - [01] The first two numbers represent the Plans Component with zero (0) padding (for file name sorting purposes).

  The Department's Standard Plans Component codes (as corresponding to the PPM Volume 2 Chapter 2) are as follows:

  01 – Roadway

  02 – Signing and Pavement Marking

  03 – Signalization

  04 – Intelligent Transportation Systems (ITS)

  05 – Lighting

  06 – Landscape

  07 – Architectural

  08 – Structures

  09 – Toll Facilities

  10 – Utility Work by Highway Contractor Agreement Plans

  99 – Unknown (used by *Sheet Navigator* if it cannot determine the Plans Component)

- *Sheet #* - After the Plans Component Code, an underscore (_) is inserted as a separator, followed by the actual sheet number (BB1-1A) appearing in the title block of the sheet.
- *Parent Drawing File Name* - After the Sheet #, an underscore (_) is inserted as a separator followed by the name of the source design file (keysrd01).

4.8.3 *Typical File Name Extensions*

Extension	File Description	Saved-in Folder
.3pc	3 Port Criteria Files	Most appropriate discipline folder
.pdf	Files for the PLANS	Root project folder for *fpid*-PLANS.pdf for Digital Delivery.
.pdf	Files for the SPECS	\specs\ sub-folder for *fpid*-SPECS.pdf
.dxf	AutoCAD ASCII Drawing Interchange File	Most appropriate discipline folder
.dwg	AutoCAD Design Files	Most appropriate discipline folder
.dst	AutoCAD Drawing Sheet Set	\eng_data\ sub-folder for the discipline
.dwt	AutoCAD Drawing Template	\seed\ sub-folder of the project
.lin	AutoCAD Linetype	\symb\ sub-folder of the project
.pc3	AutoCAD Printer Configuration	Most appropriate discipline folder or \symb\ sub-folder of the project
.shx	AutoCAD Shape Compiled	\symb\ sub-folder of the project
.shp	AutoCAD Shape Files are ASCII Files	\symb\ sub-folder of the project
.stb	AutoCAD Plot Style Tables	Most appropriate discipline folder or \symb\ sub-folder of the project
.csv	Comma Separated Values	Most appropriate discipline folder
.gpk	Coordinate Geometry Database Files	Most appropriate discipline folder
.alg	Corridor Modeling Alignment Database	Most appropriate discipline folder
.xlp	Corridor Modeling Cross Section Labeling Preference File	Most appropriate discipline folder
.xin	Corridor Modeling Drafting Standards	Most appropriate discipline folder
.rdp	Corridor Modeling Roadway Design Preference File	Most appropriate discipline folder
.ird	Corridor Modeling Roadway Designer Database	Most appropriate discipline folder
.dtm	Corridor Modeling Surface Database	Most appropriate discipline folder
.itl	Corridor Modeling Template Library	Most appropriate discipline folder
.hmr	Descartes Raster Image Files	Most appropriate discipline folder
.gpk	GEOPAK COGO Database	Most appropriate discipline folder
.x	GEOPAK Criteria Files	Most appropriate discipline folder
.ddb	GEOPAK D&C Manager Database Files	Most appropriate discipline folder
.gdf	GEOPAK Drainage File	Most appropriate discipline folder
.dlb	GEOPAK Drainage Library	Most appropriate discipline folder
.inp	GEOPAK Input Files	Most appropriate discipline folder
.prj	GEOPAK Project Manager Project File	Most appropriate discipline folder
.tin	GEOPAK Surface Database	Most appropriate discipline folder
.gif	Graphics Interchange Format	Most appropriate discipline folder
.jpeg,/.jpg	Joint Photographic Experts Group	Most appropriate discipline folder
.log	Log File	Most appropriate discipline folder
.xls(x)	Microsoft Excel Spreadsheets	Most appropriate discipline folder
.doc(x)	Microsoft Word Documents	Most appropriate discipline folder
.rsc	MicroStation & GEOPAK Resource Files	\eng_data\ sub-folder for discipline
.cel	MicroStation Cell Libraries	\cell\ sub-folder of the project folder
.dgn	MicroStation Design Files	Most appropriate discipline folder
.tbl	MicroStation Pen Tables	\eng_data\ sub-folder for discipline
.plt	MicroStation Print Drivers	\eng_data\ sub-folder for discipline
.pset	MicroStation Print Organizer Print Set	Most appropriate discipline folder
.pcf	MicroStation Project Configuration	Project Root folder
.dgnlib	MicroStation Standards Database	\symb\ if copied to local project
.sid	Multi-resolution Seamless Image Database	Most appropriate discipline folder
.ps	Postscript Sheet Image Files	\eng_data\ sub-folder for discipline
.xcp	QC Exception Files	\eng_data\ sub-folder for discipline
.txt	QC Reports, QC "Folder Name"	\eng_data\ sub-folder for discipline
.tif	Tagged Image File	Most appropriate discipline folder
.htm/.html	Web Pages	Project Root folder and \data\ sub-folder
.xml	XML Files	Most appropriate discipline folder

4.8.4 *Duplicate Files*

There must not be duplicate CADD (DGN, DWG, etcetera) design file names within a project folder structure. This is necessary to ensure proper reference attachments in CADD files**.** The *FileChecker* application can be used to help find duplicate filenames within the project folder structure.

Note MicroStation and AutoCAD, as part of their search sequence, will use the first occurrence of a file name found as they traverse a folder structure looking for reference attachments with no paths.

Duplicate file names for source attachments can "corrupt" data references. Always use the "relative path" option, but never "full" or "no path" when attaching references.

4.9 REFERENCE FILES

A reference file can be many file types, such as a MicroStation design file, an AutoCAD design file, a raster image file (such as a SID, TIF, or HMR), or a PDF. A reference file is attached as a "background file" to an active design file being edited, thus allowing multiple users to share the information in the reference file without the need to copy the reference file(s) into the active design file folder (creating unnecessary and prohibited duplicates), or copy the referenced file's content into the active design file.

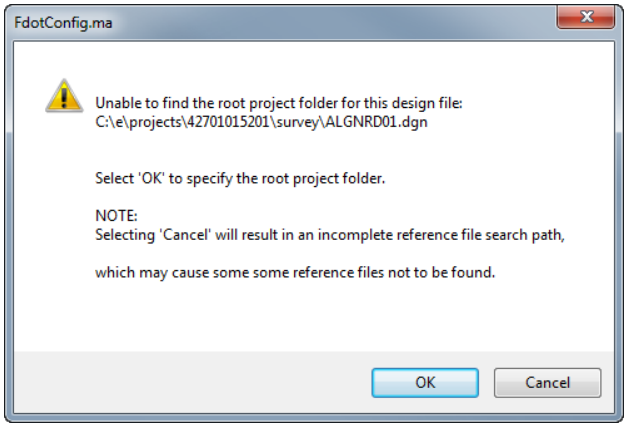
Important Under no circumstances should the "absolute" or "full path" be used when attaching a reference file. Use relative referencing - always! All reference files for the project must reside within the project folder structure.

In MicroStation, reference paths are managed by an application setting (FDOTConfig) that is run at startup of any MicroStation file opened in the FDOT Workspace. This application looks for the _meta_info\ folder and then moves up one folder to set the root folder for the project. It then dynamically sets the MicroStation configuration variable, MS_RFDIR, to search downward from the root folder through all found sub-folders to identify any reference files; therefore, all design files for a project must reside within the Department's standard folder structure or its sub-folders in order to be located as a reference file.

In AutoCAD Civil 3D, there are two types of reference files used:

- X-references (X-Ref) (Design files)
- Data References (D-Ref) (Data shortcut files located in the _shortcuts folder within a project)

If the _meta_info\ subfolder does not exist, when a file is opened in MicroStation in an FDOT Workspace, the user will be prompted to define the parent folder of the project to enable the application to set the search path for reference files. See the following screenshot:



- If Cancel is selected, any reference to the models of files located in different sub-folders will not be displayed because the MS_RFDIR variable could not be populated automatically.
- If OK is selected, the user will be given the opportunity to define the root of the project. The user navigates to the root of the project, named for the Financial Project Identification Number.

Important: If duplicate file names exist in the sub-folders of the project, MicroStation will attach the first matching filename it finds in the path. Therefore, duplicate file names are prohibited!

4.10 SHARING CADD FILES BETWEEN DISCIPLINES

There are times when disciplines share files with other disciplines. If a discipline requires information from another discipline, the needed design file(s) or individual models must be referenced from the original folder, not copied.

For example, the Signing and Pavement Marking design file (*DSGNSP*) references the Roadway design file (*DSGNRD*) and the Topography file (*TOPORD*). These files should not be copied into the Signing and Pavement Marking discipline sub-folder.

> ***Note*** If there is a specific justification to copy a file into another folder, the filename must be modified to reflect the discipline file name usage. For example, topord01.dgn (from the \survey\ sub-folder) would become toposp01.dgn, if copied to the \signing\ sub-folder, or as a minimum the sequence number would change to ensure that there is no doubt the copied file differs from the original source file.

The data producer is always responsible to ensure that up-to-date content of the original files is always reflected in their copies of those design files. Making copies of design files to different locations is strongly discouraged for this reason, as the content now must be managed between the originals and the copies.

4.11 PROJECT JOURNAL

A Project Journal must be produced for all projects to document details on project data, design aspects, processes and decisions made during the development that would communicate important information to a down-stream user of the project data. The Journal must be delivered with the Project in either MS Word (*.doc* or *.docx*), text (.txt), or Acrobat (*.pdf*) formats.

The Project Journal file(s) may be delivered to document the activities for a given discipline (i.e. a Surveyor's Journal), or may be created to document a particular production activity (i.e. creating cross sections). Journal file entries should document alternate methods employed, variant decisions made, problems encountered, setting selected, fixes included or other issues encountered during the production process outside the normal course of operations.

For example: If custom line styles were created, the justification for the custom line style and the resource file name containing the custom line style should be documented in the Journal. Any information that would help in the regeneration of CADD files and / or prints should be recorded. The critical geometry information, database, controlling alignment(s) and profile names, relevant survey and cross section information and the methodology used to obtain the final geometric controls in the CADD product should be recorded.

4.12 PRINTS

All printing will be generated from the native design files. All print images (PDFs) are produced to scale to match the native application.

Note Not all printer hardware will print paper sheets exactly to scale, even if the source design file, or a resulting print image file (PDF) is to scale.

The Department's standard sheet borders are defined for the disciplines. Sample print drivers are also provided to generate "drawn to scale" print images for the printer hardware supported. Standard sheet borders delivered with the CADD software comply with the Department's sheet appearance formats, as defined in the PPM and other controlling procedures.

Print Borders

For MicroStation printing, the Department's standard sheet files have a print border embedded for each sheet. The defined search criteria for constituting a print area on a sheet is illustrated in the table below.

Note *PlotBorder_dp* and *ShtPlotBorder_c* are the current print border level symbology used in the CADD Software. Typical print border dimension for 11x17 plan sheet prints: 16.5" x 10.6".

	Border 1	Border 2	Border 3	Border 4	Border 5
Type	Shape	Shape			Shape
Level	PlotBorder_dp	PlotBorderSht	PlotShape	ShtPlotBorder_c	51
Color	BYLEVEL	BYLEVEL	BYLEVEL	BYLEVEL	3

For AutoCAD printing, the Department prints sheets defined in Layout tabs, no search criteria is required.

4.12.2 *Print Image Files*

The PDF print capability provided by both Bentley and Autodesk is the required print format for plans. When PDF files are produced, the user must ensure that no encryption or other PDF security is embedded in the PDF so those print files may be subsequently manipulated (such as rotation to proper viewing orientation, combining into larger multi-page PDF documents, or digitally signing and sealing later in the production process). Note that once a file is digitally signed and sealed, it cannot be manipulated later without invalidating the signatures already applied.

4.12.3 *Foreign Plan Sheets*

In some cases, designers have no choice but to scan pre-existing hardcopy sheets to create digital sheet files. For example, some plan sheets may already exist as hardcopies and were signed & sealed conventionally by wet ink signature and impression seal at some time in the past. This might occur when either pre-existing plans are incorporated into the current delivery, or some professional discipline does not have legal authority to sign and seal their plans digitally. In such cases, those plan sheets should be scanned at minimum of 300 DPI resolution (or higher if warranted), to PDF, or Group-4 Tagged Image File Format (TIFF), according to Records Management. When scanning, use the lightest contrast setting possible such that reprints from the scans have a minimum of scanned "artifacts" and "speckling," and will read and print legibly.

Note File naming of the scanned sheet files should follow the file naming conventions already described.

If scanning hardcopy plans that bear a raised seal, then the raised seal should be shaded / burnished before scanning so the seal appears clearly in the scanned image. Scanned existing plan sheets already signed and sealed on paper must not be re-signed and sealed with Digital Signature. However, they may be signed-only (not sealed) by a responsible party only to take accountability for their inclusion within a contemporary plan set (using the appropriate qualifiers or exculpatory language).

4.12.4 *Print Drivers*

The example print driver files and the sheet settings provided with the CADD Software are used to generate prints to scale. These driver files are considered "examples," due to the various site-specific configurations and types of printers that may be encountered. The print driver files were tested and work with the printers for which they were developed, so one may have to make adjustments if their equipment varies.

Each printer has its own "printable" area defined for a paper size which may differ slightly from printer model to printer model. It is the sole responsibility of the person performing the prints to ensure hardcopy printing is operating acceptably for their hardware. All MicroStation print driver files supplied by the Department have raster printing enabled. AutoCAD uses Page Setups and Plot Style tables.

> ***Note*** See Section 3.10 of this document for a list of MicroStation print driver files delivered by the Department.

4.12.4.1 MicroStation Half-Toning

The color 20 is used to define half-toning in the Department's MicroStation printer driver files. Half-toning of the minor grid lines on the crosssection sheets, the profile portion of the plan / profile sheet and the profile sheet is shown in the ***PPM, Volume 2 Exhibits***. The Department's Project Manager must approve half-toning of any other graphical elements in the design files.

Some Districts have specified half-toning of certain reference files from one discipline to another. For example, the topography file could be half-toned when referenced to the proposed design. This must be approved on a per District basis. A pen table can be set up to equate any referenced file to color 20, thus half-toning the entire reference file at print time.

4.12.4.2 Quality and Reproduction

Printed output from the design files or plan sheet image file PDF's must be legible and of a quality to be reproducible on 2nd generation copies. Line weights as defined in Chapter 3 are default settings, but may need to be adjusted, depending on printer hardware, to produce the required quality of hard-copy printed documents.

4.12.5 *Professional of Record Note*

For those sheets that are digitally signed and sealed by a Professional Engineer, the following note must be placed legibly on the sheet, typically along the right-hand border of the sheet opposite of the binding location:

Note See the PPM; Volume 1, Section 19.2.2, for further information.

"NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C."

Note For additional information about Professional of Record Note and Signature Sheets also see the PPM; Volume 2, Chapter 3.

The regulatory Board Rule number referenced is determined by the discipline of the professional that is signing and sealing (i.e., for Surveyors and Mappers, the Rule is 5J-17.062, F.A.C. For Geologists, the Rule is 61G16-2.005, F.A.C. For Landscape Architects, the Rule is 61G10-11.011, F.A.C. For Registered Architects, the Rule is 61G1-16.005, F.A.C.).

Sheets that are signed by multiple Signatories of different professional types (such as an Architect and an Engineer) will not bear the note unless it can be combined and fit legibly on the border. In such a case, the note might read:

"NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C., AND RULE 61G1-16.005, F.A.C."

Signatory Sheets have similar notes placed within the body of the sheet within the section for each Signatory, and will not have the note placed along the sheet border. See examples in the PPM, Volume 2 Chapter 3.3.

The Professional of Record Note may be placed on the sheet at any time during the plans production process, however has no force or effect until the sheet is actually signed and sealed.

4.13 DISCIPLINE STANDARDS

4.13.1 *Roadway Standards*

CADD Standards for component plans are defined in their respective chapters. See the Department's PPM Volume 2 for the Sequence of Plans Preparation and the definition of component plans.

4.13.1.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

The following table defines the Roadway File names with each file including sequential numbering. Standard model names are also provided. Since most Drainage files are shared with Roadway, the two groups must coordinate the creation and ownership of these files.

The file types listed in the following table may be used by other disciplines, and the first four characters of the file name are consistent between disciplines, but the fifth and sixth characters vary to reflect the discipline name. Each discipline chapter details their Standard File Names. Standard Model names are also provided in the table; however, it is not mandatory to use more than the default model, with the exception of those listed in this table.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Roadway Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDBRRD##	default	Border Sheet Reference File for Bridge Hydraulic Sheet	planrd	fdotseed2d.dgn	
	Borders & Sheets		BDDMRD##	default	Border Sheet Reference File for Drainage Map Sheet	planrd	fdotseed2d.dgn	
	Borders & Sheets		BDPLRD##	default	Border Sheet Reference File for Plan Sheet	planrd	fdotseed2d.dgn	
	Borders & Sheets		BDPPRD##	default	Border Sheet Reference File for Plan/Profile Sheet	plprrd	fdotseed2d.dgn	
	Borders & Sheets		BDPRRD##	default	Border Sheet Reference File for Profile Sheet	plprrd	fdotseed2d.dgn	
	Borders & Sheets		BDXSRD##	rdxsrd	Border Sheet Reference File for Cross-Section Sheet	rdxsrd	fdotseedxs.dgn	
13	Borders & Sheets		GNNTRD##	default	Project Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
24	Borders & Sheets		LDPRRD##	default	Lateral Ditch Plan / Profile Sheet	plprrd	fdotseed2d.dgn	fdotmaster.dwt
14	Borders & Sheets		PLANRD##	default	Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
12	Borders & Sheets		PLAYRD##	default	Project Layout Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
15	Borders & Sheets		PLPRRD##	default	Plan & Profile Sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
	Borders & Sheets		PRDSRD##	default	Project Profile Layout	plprrd	fdotseed2d.dgn	fdotmaster.dwt
17	Borders & Sheets		PROFRD##	default	Profile Sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
16	Borders & Sheets		TMSSRD##	default	Traffic Monitoring Site Plan Sheets	open	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPRD##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLRD##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Clipping		MTPRRD##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
21	Cross Sections		DRXSRD##	Pattrd Rdxsrd Rdxsrd_shg Xsshrd	Drainage Structure Cross Section Pattern Lines Drainage Structure Cross Sections Drainage Structure Cross Section Sheets Drainage Structure Cross Section Shapes	drxsrd	fdotseedxs.dgn	fdotmaster.dwt
	Cross Sections		GKLNRD##	default	GEOPAK Lines for Existing Features	survrd	fdotseed2d.dgn	
25	Cross Sections	X	LDXSRD##	Pattrd rdxsrd Rdxsrd_shg Xsshrd	Lateral Ditch Cross Section Pattern Lines Lateral Ditch Cross-Sections Lateral Ditch Cross Section Sheets Lateral Ditch Cross Section Shapes	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
29	Cross Sections	X	PDXSRD##	Pattrd Rdxsrd Rdxsrd_shg Xsshrd	Pond Cross Section Pattern Lines Pond Cross Sections Pond Cross Section Sheets Pond Cross Section Shapes	pdxsrd	fdotseedxs.dgn	fdotmaster.dwt
40	Cross Sections	X	RDXSRD##	Pattrd rdxsrd Rdxsrd_shg Xsshrd	Roadway Cross Sections Pattern Lines Roadway Cross-Sections Roadway Cross Sections Sheets Roadway Cross Sections Shapes	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
26	Drainage		DRDTRD##	default	Drainage Detail Sheet	drdtrd	fdotseed2d.dgn	fdotmaster.dwt
	Drainage		DREXRD##	default	Drainage Structures - Existing	drexrd	fdotseed2d.dgn	fdotmaster.dwt
6	Drainage		DRFLRD##	default	Drainage Flood Data Form	drprrd	fdotseed2d.dgn	fdotmaster.dwt
4	Drainage		DRMPRD##	default	Drainage Map	drmprd	fdotseed2d.dgn	fdotmaster.dwt
10	Drainage		DROMRD##	default	Drainage Optional Materials Tabulation	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Drainage	X	DRPRRD##	default	Drainage Structures - Proposed	drprrd	fdotseed2d.dgn	fdotmaster.dwt
21	Drainage	X	DRXSRD##	rdxsrd	Drainage Structure Cross Sections, Pattern Lines and Shapes	drxsrd	fdotseedxs.dgn	fdotmaster.dwt
	Existing DTM		GDTMRD##	default	Digital Terrain Model / TIN Model - 3D	gdtmrd	fdotseed3d.dgn	survey.dwt
	Existing Topography		TOPOEM##	default	Topography-Existing (Locations for Environmental Concerns)	topord	fdotseed2d.dgn	survey.dwt
	Existing Topography	X	TOPORD##	default	Topography-Existing (Utility & Drainage not included)	topord	fdotseed2d.dgn	survey.dwt
32	Existing Topography		TREERD##	default	Tree Survey Sheet	topord	fdotseed2d.dgn	survey.dwt
23	Geotechnical		CLVGEO##	default	Box Culvert Auger & SPT Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
34	Geotechnical		CPTGEO##	default	CPT Soundings	geotech	fdotseed2d.dgn	fdotmaster.dwt
36	Geotechnical		MSEWGEO##	default	MSE Wall SPT Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
51	Geotechnical		MTGEO##	default	Mitigation Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
37	Geotechnical		NWGEO##	default	Noise Wall SPT Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
28	Geotechnical		PGGEO##	default	Pond Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
35	Geotechnical		RDGEO##	default	Augers Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
33	Geotechnical		RDSSGEO##	default	Roadway Soil Survey Sheet	geotech	fdotseed2d.dgn	fdotmaster.dwt
38	Geotechnical		RTWGEO##	default	Retaining Wall SPT Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
39	Geotechnical		SPGEO##	default	Sheet Pile Wall SPT Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
1	Key Sheets		KEYSRD##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
48	Project Control		CTLSRD##	default	Project Control Sheets	planrd	fdotseed2d.dgn	ctlsrd.dwt
	Proposed Design		ALGNRD##	algnrd	Alignment Layout	algnrd	fdotseed2d.dgn	fdotmaster.dwt
18	Proposed Design		BKSWRD##	default	Back of Sidewalk Profiles	plprrd	fdotseed2d.dgn	fdotmaster.dwt
11	Proposed Design		CURCRD##	default	Curve or Coordinate Data Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	DSGNRD##	default	Proposed Design	dsgnrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design		DSPFRD##	default	Proposed Profile	plprrd	fdotseed2d.dgn	fdotmaster.dwt
19	Proposed Design		INTDRD##	default	Intersection/Interchange Details	planrd	fdotseed2d.dgn	fdotmaster.dwt
20	Proposed Design		INTPRD##	default	Intersection/Interchange Profiles	plprrd	fdotseed2d.dgn	fdotmaster.dwt
50	Proposed Design		MITGRD##	default	Mitigation Areas	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	MODLRD##	default	Proposed Design Model	dsgnrd	fdotseed2d.dgn	fdotmaster.dwt
27	Proposed Design		PDPLRD##	default	Pond Design	drprrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	QTDSRD##	default	Quantity Computation Shapes/Calculations	qtdsrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	QUANRD##	default	Quantity Computation Details	qtdsrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design		RWDTRD##	default	Right of Way Details for Roadway	rwdtrd	fdotseed2d.dgn	fdotmaster.dwt
49	Proposed Design		SCGRRD##	default	Selective Clearing & Grubbing Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design		SIGNCB##	default	Signature Sheet Core Borings	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		SIGNPC##	default	Signature Sheet - Project Control	open	fdotseed2d.dgn	digitalsignature.dwt
2	Proposed Design		SIGNRD##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		SIGNVU##	default	Signature Sheet - Verified Utilities	open	fdotseed2d.dgn	digitalsignature.dwt
41	Proposed Design		SWPPRD##	default	Storm Water Pollution Prevention Plan	plprrd	fdotseed2d.dgn	swpprd.dwt
	Proposed Design		TEXTDR##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
	Proposed Design		TEXTRD##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
52	Proposed Design		WETLRD##	default	Wetlands Delineation Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
31	Special Details		CSINRD##	default	Concrete Slab Inventory	planrd	fdotseed2d.dgn	fdotmaster.dwt
30	Special Details		SPDTRD##	default	Special Details Sheet	open	fdotseed2d.dgn	fdotmaster.dwt
5	Summary Boxes / Tables		BRHYRD##	default	Bridge Hydraulics Recommendation Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
22	Summary Boxes / Tables		BXCLRD##	default	Box Culvert Wingwall Design and Special Details	drdtrd	fdotseed2d.dgn	fdotmaster.dwt
3	Summary Boxes / Tables		CESSRD##	default	Summary of Pay Item Sheets	planrd	fdotseed2d.dgn	planrd.dwt
9	Summary Boxes / Tables		SUMDRD##	default	Summary of Drainage Structures	planrd	fdotseed2d.dgn	fdotmaster.dwt
8	Summary Boxes / Tables		SUMQRD##	default	Summary of Quantities Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Traffic Control	X	TCDSRD##	default	Traffic Control Design	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
45	Traffic Control		TCDTRD##	default	Traffic Control Detail Sheet	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
42	Traffic Control		TCGNRD##	default	Traffic Control General Note Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
44	Traffic Control		TCPLRD##	default	Traffic Control Plan Sheets	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
43	Traffic Control		TCTYRD##	default	Traffic Control Typical Section Sheets	open	fdotseed2d.dgn	fdotmaster.dwt
	Typical Sections		TYPDRD##	default	Typical Data Sheet	typdrd	fdotseed2d.dgn	fdotmaster.dwt
7	Typical Sections		TYPSRD##	default	Typical Section Sheets & Details	open	fdotseed2d.dgn	planrd.dwt
46	Utilities		UTADRD##	default	Utility Adjustment Sheets	utadrd	fdotseed2d.dgn	utadrd.dwt
	Utilities	X	UTEXRD##	default	Utilities - Existing	utexrd	fdotseed2d.dgn	survey.dwt
	Utilities	X	UTPRRD##	default	Utilities - Proposed	utprrd	fdotseed2d.dgn	utprrd.dwt
47	Verified Utilities		SBVHRD##	default	Summary of Verified Utilities (2D)	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Verified Utilities		UTVHRD##	default	Survey of Verified Utilities (2D)	utexrd	fdotseed2d.dgn	survey.dwt
	Verified Utilities		UTVHRD##	default	Survey of Verified Utilities (3D version of utexrd.dgn)	utexrd	fdotseed3d.dgn	survey.dwt

4.13.1.2 Engineering Data

The \roadway\ discipline folder contains the sub-folder named \eng_data\ designated to store the following:

- Quality Control Reports.
- Engineering Data output files, including LandXML files of the points, alignments, profiles, sections, surfaces, pipe networks.
- Roadway design reports, including any databases used for report generation.
- All supplemental hand design calculations (scanned and saved in PDF format).
- Other data pertinent to the overall roadway design.

4.13.2 *Signing and Pavement Marking Standards*

Signing and Pavement Marking Plans are usually a component set of plans (see Section 4.17 Roadway Standards). However, if the Signing and Pavement Marking Plans are the lead plan set, then the standards set in Section 4.17 Roadway Standards, pertaining to elements that are specific to the lead plan set, will apply to the Signing and Pavement Marking plan set (i.e., Traffic Control files and elements, preliminary estimate sheets, etcetera).

The Department's projects requiring minor Signing and Pavement Marking construction work may include these features detailed on sheets in the Roadway Plans. If this is the case, the Signing and Pavement Markings element symbology standards apply. However, an exception to the Standard Rules must be created and documented in the Roadway discipline journal file.

When prepared as component plans, Signing and Pavement Parking plans will be assembled as a separate plan set complete with a key sheet, tabulation of quantities and all other relevant Signing and Pavement Marking sheets. The sheets must be numbered consecutively, with sheet numbers prefixed by the letter "S".

4.13.2.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ##* =S*equence number.*

The following table defines the Signing and Pavement Marking File names with each file including sequential numbering. Standard model names are also provided.

The file types listed in the following table may be used by other disciplines, and the first four characters of the file name is consistent between disciplines, but the fifth and sixth characters vary to reflect the discipline name. Each discipline chapter details their Standard File Names. Standard Model names are also provided in the table, however, it is not mandatory to use more than the default model, with the exception of those listed in this table.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Signing Component of Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDPLSP##	default	Border for Plan Sheets when sheet is referenced	planrd	fdotseed2d.dgn	
	Borders & Sheets		BDXSSP##	rdxsrd	Border for Cross Section Sheet when sheet is referenced	rdxssp	fdotseedxs.dgn	
5	Borders & Sheets		GNNTSP##	default	General Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
6	Borders & Sheets		PLANSP##	default	Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPSP##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLSP##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPRSP##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
10	Cross Sections	X	RDXSSP##	rdxsrd	Cross-Sections	rdxssp	fdotseedxs.dgn	fdotmaster.dwt
	Existing Topography		TOPOSP##	default	Topography - Existing	topord	fdotseed2d.dgn	survey.dwt
11	Geotechnical		SNGEO##	default	Signs Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
1	Key Sheets		KEYSSP##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Proposed Design		AUTOSP##	default	AutoTurn Turning Radius Data	autosp	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	DSGNSP##	default	Proposed Design	dsgnsp	fdotseed2d.dgn	fdotmaster.dwt
12	Proposed Design		SAPMSP##	default	Layout as a Typical Design or Passing Zone	dsgnsp	fdotseed2d.dgn	fdotmaster.dwt
2	Proposed Design		SIGNSP##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		TEXTSP##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
7	Special Details		GSWKSP##	default	Guide Sign Work Sheet & Details	gswksp	fdotseed2d.dgn	fdotmaster.dwt
9	Special Details		MSARSP##	default	Mast Arm Detail for Signing	msarsp	fdotseed2d.dgn	fdotmaster.dwt
13	Special Details		SPDTSP##	default	Special Details - Miscellaneous	open	fdotseed2d.dgn	fdotmaster.dwt
8	Special Details		SPSGSP##	default	Special Sign Details for Overhead	open	fdotseed2d.dgn	fdotmaster.dwt
3	Summary Boxes /Tables		CESSSP##	default	Summary of Pay Item Sheets	planrd	fdotseed2d.dgn	planrd.dwt
4	Summary Boxes /Tables		TABQSP##	default	Tabulation of Quantity Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt

4.13.2.2 Sign Design

The Draw Sign program is a MicroStation application that draws sign panels and posts and determines the corresponding pay item of the assembly based on the wind load and post properties. The Draw Sign program requires use of the GEOPAK and GEOPAK Design and Computation (D&C) Manager database (*FDOTXXX.ddb*) to provide automated pay item association. (*XXX* reflects the current version of database.)

The Department's Signs application (FDOT Signs) included in the State Kit for Civil 3D, provides similar functionality. It requires the project's pay item database (payitemdb.xml), also used by Entity Manager, to provide automated pay item associations.

4.13.2.3 GuidSIGN

GuidSIGN is the standard sign design software used by the Department. However, using GuidSIGN is not required and other sign design programs available in the industry may be used. The Department's Level/Symbology Standards must still be met regardless of the software used.

GuidSIGN is a tool to create sign panels. Sign panel design and creation require two (2) separate files: *GSWKSP##.dgn (DWG)* for sign panel design and the worksheet and the *DSGNSP##.dgn (DWG)* file for sign panel placement on the project. There is no limit in the number of sign panels that can be placed in a file.

In addition to the GuidSIGN worksheet design file, required for all non-standard sign designs by the PPM, a DXF output file of the sign for use by a sign cutting shop must be delivered for the creation of the physical sign panel.

4.13.2.4 AutoTURN

AutoTURN is the standard turn radius design software used by the Department. However, using AutoTURN is not required. Other vehicle wheel path design software available in the industry may be used for designing the turning movements of roadway intersections. The Department also uses Autodesk Vehicle Tracking. The Department's Level/Symbology Standards must still be met regardless of the software used.

4.13.3 *Signalization Standards*

Signalization Plans are usually a component set of plans (see Section 4.17 Roadway Standards). However, if the Signalization Plans are the lead plan set, then the standards set in Section 4.17 Roadway Standards, pertaining to elements that are specific to the lead plan set will apply to the Signalization plan set (i.e., Traffic Control files and elements, preliminary estimate sheets, etcetera)

The Department's projects requiring minor signalization construction work may include these features detailed on sheets in the Roadway Plans. If this is the case, the Signalization Element Level/Symbology Standards within this Section will still apply. However, an exception to the Standard Rules must be created and documented in the Roadway discipline journal file.

When prepared as component plans, Signalization Plans will be assembled as a separate plan set complete with a key sheet, tabulation of quantities and all other relevant signalization sheets. The sheets must be numbered consecutively, with sheet numbers prefixed by the letter "T". The Signalization Plans show the construction details, signal phasing and other relevant data.

4.13.3.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ##* =S*equence number.*

The following table defines the Signalization File names with each file including sequential numbering. Standard model names are also provided.

The file types listed in the following table may be used by other disciplines, and the first four characters of the file name are consistent between disciplines, but the fifth and sixth characters vary to reflect the discipline name. Each discipline chapter details their Standard File Names. Standard Model names are also provided in the table; however, it is not mandatory to use more than the default model, with the exception of those listed in this table.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Signalization Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDPLSG##	default	Border Sheet Reference File for Plan Sheets	planrd	fdotseed2d.dgn	
5	Borders & Sheets		GNNTSG##	default	General Notes Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
6	Borders & Sheets		PLANSG##	default	Plan Sheet	dsgnsg	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPSG##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLSG##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPRSG##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
	Existing Topography		TOPOSG##	default	Topography - Existing	topord	fdotseed2d.dgn	survey.dwt
12	Geotechnical		SGGEO##	default	Signal Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
1	Key Sheets		KEYSSG##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt
	Proposed Design	X	DSGNSG##	default	Proposed Design & Signal information	dsgnsg	fdotseed2d.dgn	fdotmaster.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
2	Proposed Design		SIGNSG##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		TEXTSG##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
7	Special Details		GSWKSG##	default	Guide Sign Work Sheet & Details	gswksp	fdotseed2d.dgn	fdotmaster.dwt
8	Special Details		SSDTSG##	default	Special Details for Signs & Miscellaneous Items	dsgnsg	fdotseed2d.dgn	fdotmaster.dwt
9	Special Details		VHLPSG##	default	Special Loop Details & Instructions	dsgnsg	fdotseed2d.dgn	fdotmaster.dwt
3	Summary Boxes / Tables		CESSSG##	default	Summary of Pay Items	planrd	fdotseed2d.dgn	planrd.dwt
11	Summary Boxes / Tables		MSSGSG##	default	Mast Arm Detail & Tables	dsgnsg	fdotseed2d.dgn	planrd.dwt
10	Summary Boxes / Tables		PLDTSG##	default	Pole Tabulation & Details for All Types	dsgnsg	fdotseed2d.dgn	planrd.dwt
4	Summary Boxes / Tables		TABQSG##	default	Tabulation of Quantity Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt

4.13.4 *Intelligent Transportation Systems Standards*

Intelligent Transportation Systems (ITS) Plans are usually a component set of plans. The Department's Projects with minor ITS involvement may include these features on various applicable sheets in the Roadway plans set. They can also be shown in the Signalization plans set or on applicable Signalization sheets.

4.13.4.1 Standard File Names

The Department utilizes standard naming conventions for all of its files and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

The following table defines the ITS standard file names for Department projects. Each file name must include sequential numbering. Standard model names are also provided; however, it is not mandatory to use more than the default model, with the exception of those listed in this table.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the ITS Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDPLIT##	default	Border Sheet Reference Model for Plan Sheet	planrd	fdotseed2d.dgn	
	Borders & Sheets		BDXSIT##	rdxsrd	Border Cross-Section Sheet when Referenced	rdxsrd	fdotseedxs.dgn	
5	Borders & Sheets		GNNTIT##	default	General Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
7	Borders & Sheets		PLANIT##	default	Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
6	Borders & Sheets		PLAYIT##	default	Plan Layout Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
14	Borders & Sheets		SPLYIT##	default	Splice Layout Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPIT##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLIT##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPRIT##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
19	Cross Sections	X	SSXSIT##	rdxsrd	Sign Support Cross-Sections	rdxssp	fdotseedxs.dgn	fdotmaster.dwt
1	Key Sheets		KEYSIT##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt
	Proposed Design	X	DSGNIT##	default	Proposed Signalization Design & information	itssp	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	DSLTIT##	default	Proposed Lighting Design	itssp	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design	X	DSPMIT##	default	Proposed Signing & Pavement Marking Design	itssp	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design		INTDIT##	default	Intersection / Interchange Details	planrd	fdotseed2d.dgn	fdotmaster.dwt
2	Proposed Design		SIGNIT##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		TEXTIT##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
16	Special Details		GSWKIT##	default	Guide Sign Work Sheet & Details	gswksp	fdotseed2d.dgn	fdotmaster.dwt
10	Special Details		JCDTIT##	default	Jacking Detail Sheet	open	fdotseed2d.dgn	fdotmaster.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
23	Special Details		LUDTIT##	default	Luminaire Detail Sheet (All Types)	open	fdotseed2d.dgn	fdotmaster.dwt
11	Special Details		NWDTIT##	default	Communications Network Details	open	fdotseed2d.dgn	fdotmaster.dwt
12	Special Details		NWLYIT##	default	Communications Network Layout/Block diagram	open	fdotseed2d.dgn	fdotmaster.dwt
20	Special Details		SGDTIT##	default	Special Signal Details	open	fdotseed2d.dgn	fdotmaster.dwt
13	Special Details		SPDTIT##	default	Splice Diagrams	open	fdotseed2d.dgn	fdotmaster.dwt
18	Special Details		SPSGIT##	default	Dynamic Message Sign Detail for Overhead Signs	open	fdotseed2d.dgn	fdotmaster.dwt
15	Special Details		SRPTIT##	default	Service Point Detail Sheets	itssp	fdotseed2d.dgn	fdotmaster.dwt
17	Special Details		SSDTIT##	default	Special Sign Details & Miscellaneous Details	planrd	fdotseed2d.dgn	fdotmaster.dwt
9	Special Details		VHDTIT##	default	Vehicle Detector Details & Instructions	itssp	fdotseed2d.dgn	fdotmaster.dwt
3	Summary Boxes / Tables		CESSIT##	default	Summary of Pay Items	planrd	fdotseed2d.dgn	planrd.dwt
22	Summary Boxes / Tables	X	MSSGIT##	default	Mast Arm Detail and Tables	itssp	fdotseed2d.dgn	fdotmaster.dwt
8	Summary Boxes / Tables		PLDTIT##	default	Pole Tabulation & Details for All Types	open	fdotseed2d.dgn	planrd.dwt
21	Summary Boxes / Tables		SLBRIT##	default	Soil Borings for Poles & Overhead Structures	geotech	fdotseed2d.dgn	fdotmaster.dwt
4	Summary Boxes / Tables		TABQIT##	default	Tabulation Quantity Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
24	Traffic Control		TCDTIT##	default	Traffic Control Design Sheet	itssp	fdotseed2d.dgn	fdotmaster.dwt
25	Utilities		UTADIT##	default	Utility Adjustment Sheets	utadrd	fdotseed2d.dgn	utadrd.dwt

4.13.5 *Lighting Standards*

Highway Lighting Plans are usually a component set of plans (see Section 4.17 Roadway Standards). However, if the Highway Lighting Plans are the lead plan set, then the standards set in Section 4.17, Roadway Standards, pertaining to elements that are specific to the lead plan set will apply to the Highway Lighting plan set (i.e., Traffic Control files and elements, preliminary estimate sheets, etcetera).

When prepared as component plans, Highway Lighting Plans will be assembled as a separate plan set complete with a key sheet, tabulation of quantities and all other relevant lighting sheets. The sheets must be numbered consecutively, with sheet numbers prefixed by the letter "L".

4.13.5.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

The following table defines the Highway Lighting File names with each file including sequential numbering. Standard model names are also provided.

The file types listed in the following table may be used by other disciplines, and the first four characters of the file name are consistent between disciplines, but the fifth and sixth characters vary to reflect the discipline name. Each discipline chapter details their Standard File Names. Standard Model names are also provided in the table; however, it is not mandatory to use more than the default model, with the exception of those listed in this table.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Lighting Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDPLLT##	default	Border Sheet Plan	planrd	fdotseed2d.dgn	
5	Borders & Sheets		GNNTLT##	default	General Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
7	Borders & Sheets		PLANLT##	default	Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPLT##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLLT##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPRLT##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
	Existing Topography		TOPOLT##	default	Topography - Existing	topord	fdotseed2d.dgn	survey.dwt
12	Geotechnical		LTGEO##	default	Lighting Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
1	Key Sheets		KEYSLT##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt
	Proposed Design	X	DSGNLT##	default	Proposed Design	dsgnlt	fdotseed2d.dgn	fdotmaster.dwt
2	Proposed Design		SIGNLT##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		TEXTLT##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
8	Special Details		CNPLLT##	default	Special Pole Detail Sheets (All Types)	dsgnlt	fdotseed2d.dgn	fdotmaster.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
11	Special Details		JCDTLT##	default	Jacking Detail Sheet	open	fdotseed2d.dgn	fdotmaster.dwt
9	Special Details		LUDTLT##	default	Luminaire & Foundation Detail Sheet (All Types)	dsgnlt	fdotseed2d.dgn	fdotmaster.dwt
10	Special Details		SRPTLT##	default	Service Point Detail Sheets	open	fdotseed2d.dgn	fdotmaster.dwt
3	Summary Boxes / Tables		CESSLT##	default	Summary of Pay Item Sheets	planrd	fdotseed2d.dgn	planrd.dwt
6	Summary Boxes / Tables		PLDTLT##	default	Pole Data Sheets	open	fdotseed2d.dgn	planrd.dwt
4	Summary Boxes / Tables		TABQLT##	default	Tabulation of Quantity Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt

4.13.5.2 AGI32 Lighting Software

AGI32 Lighting Software is the standard Lighting Design software used by the Department. However, using AGI32 is not required. Other Lighting design software available in the industry may be used for the Lighting Design. If AGI32 is not used, the Department's Level/Symbology Standards must still be met to be compliant with CADD Standard Rules and Digital Delivery.

4.13.6 *Landscape Standards*

Landscape means any vegetation, mulches, irrigation systems and any site amenities, such as, street furniture, decorative paving, fences and lighting (excluding public utility streets and area lighting). Landscape plans may be a component set of plans (see Section 4.17 Roadway Standards), or be prepared independently.

The Department's Projects with minor Landscaping may include landscaping features on separate sheets in the Roadway Plans set or landscaping features may be detailed on the Roadway plans sheets.

When prepared as component plans, Landscape Plans will be assembled as a separate plan set complete with a key sheet, tabulation of quantities and all other relevant Landscape sheets. The sheets must be numbered consecutively with the sheet numbers prefixed by the letters "LD".

A complete set of Landscape plans may include the following:

1. Key Sheet
2. Tabulation of Quantities
3. Planting Sheets
4. Irrigation Layout
5. Details Sheet
6. Other relevant plan sheets as required Pay Items Notes, General Notes or Maintenance Notes and Schedules.

These sub-components should be listed on the Landscape Plans Key Sheet under the "Components of Contract Plan Sets" heading.

4.13.6.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ##* =*Sequence number.*

The following table defines the Landscaping File names with each file including sequential numbering. Standard model names are also provided.

The file types listed in the following table may be used by other disciplines, and the first four characters of the file name are consistent between disciplines, but the fifth and sixth characters vary to reflect the discipline name. Each discipline chapter details their Standard File Names. Standard Model names are also provided in the table; however, it is not mandatory to use more than the default model, with the exception of those listed in this table.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Landscape Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDPLLD##	default	Border Referencing for Sheet Plan	planrd	fdotseed2d.dgn	
7	Borders & Sheets		GNNTLD##	default	General Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
8	Borders & Sheets		PLANLD##	default	Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
6	Borders & Sheets		PLAYLD##	default	Project Layout Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPLD##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLLD##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPRLD##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
	Existing Topography		TOPOLD##	default	Topography - Existing	topord	fdotseed2d.dgn	survey.dwt
1	Key Sheets		KEYSLD##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt
	Proposed Design	X	DSGNLD##	default	Proposed Landscape (Planting) Design	dsgnld	fdotseed2d.dgn	fdotmaster.dwt
10	Proposed Design		HSDTLD##	default	Hardscape details	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Proposed Design		IRRGLD##	default	Proposed Irrigation Design	irrgld	fdotseed2d.dgn	fdotmaster.dwt
2	Proposed Design		SIGNLD##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
5	Proposed Design		TMOTLD##	default	Technical Maintenance Plan	dsgnld	fdotseed2d.dgn	fdotmaster.dwt
9	Special Details		DETLLD##	default	Details	open	fdotseed2d.dgn	fdotmaster.dwt
11	Special Details		GRDTLD##	default	Proposed Grading	planrd	fdotseed2d.dgn	fdotmaster.dwt
3	Summary Boxes / Tables		CESSLD##	default	Summary of Pay Items	planrd	fdotseed2d.dgn	planrd.dwt
4	Summary Boxes / Tables		TABQLD##	default	Tabulation of Quantity Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt

Note Hardscape Design files must use the same symbology standards as the Landscape Design file.

4.13.7 *Architectural Standards*

Architectural plans consist of all sheets pertaining to Architectural (Building) design, and their component plans. These plans may be comprised of any/all of:

- General Plans
- Hazardous Materials Plans
- Survey Plans (Following the Survey CADD Standards)
- Geotechnical Plans (Following the Geotechnical CADD Standards)
- Civil Plans (Following the Roadway CADD Standards)
- Landscape Plans (Following the Landscape CADD Standards)
- Structural Plans
- Architectural Plans
- Interior Plans
- Fire Protection Plans
- Plumbing Plans
- Mechanical Plans
- Electrical Plans

The bullets above represent an Architectural plan set on a Department Project where the building is the focal point of the project. Architectural (often referred to as "Building") projects within the Right of Way typically do not include Survey, Civil, Geotechnical, or Landscape plans. These disciplines are normally included in the Roadway Plans. However, when present in the Architectural plans, the Department's CADD Standards of the appropriate discipline must be used.

Bascule Bridge Control House Architectural plans are to be prepared using the Department's Structures CADD Standards.

4.13.7.1 Adopted CADD File Format

The Department has adopted AutoCAD as the Standard platform format for Architectural projects. All CADD files for Architectural plan sets, including those disciplines within the building (i.e. plumbing, mechanical, electrical and structural) will be submitted in AutoCAD (*.dwg)* format. Plans outside the building envelope must follow the Department's CADD Standard format for the discipline as defined in their respective Sections.

4.13.7.2 Adopted CADD Standards

The Department has adopted the National CAD Standards as the standard format for Building Projects. This Section is a synopsis of the National CAD Standards. More information can be found at:

National CAD Standard
National Institute of Building Sciences
1090 Vermont Ave., NW, Suite 700
Washington, D.C. 20005-4905
(202) 289-7800
Website: http://www.nationalcadstandard.org/ncs6/

National Cad Standard also includes chapters from the following organizations:

U.S.CADD/GIS Technology Center
US Army Engineer Research and Development Center
Attn: CEERD-ID (S. Spangler)
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
Website: http://www.erdc.usace.army.mil/

CAD Layer Guidelines
American Institute of Architects (AIA)
1735 New York Ave, NW
Washington, D.C. 20006
Website: www.aia.org

Uniform Drawing System (UDS)
Construction Specifications Institute
601 Madison Street
Alexandria, Va. 22314-1791
800-689-2900
Website**:** http://www.csinet.org

4.13.7.3 Architectural Projects

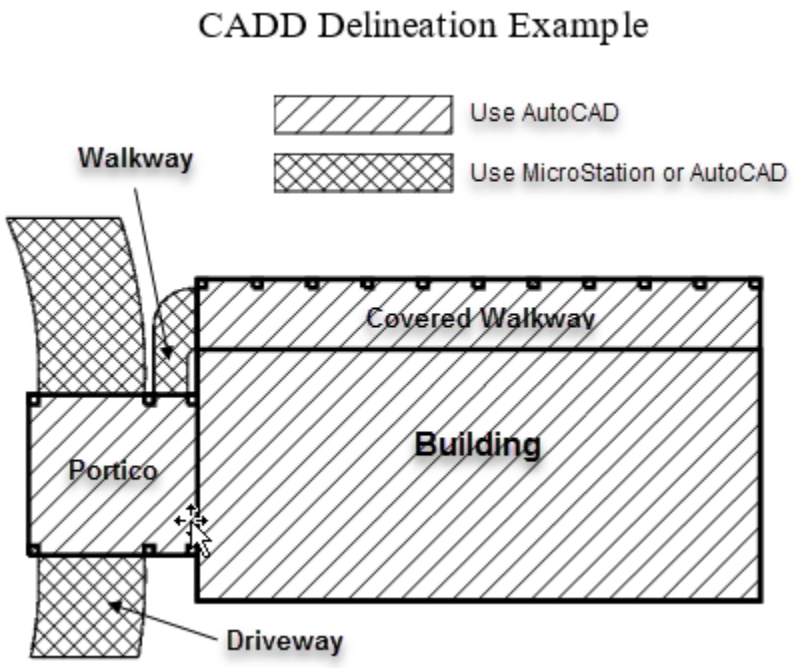
Architectural standards apply to the building and building related disciplines outlined in the following list of project types.

- **Building Projects:**
  - Work Program Projects
    - Rest Areas
    - Weigh Stations
  - Fixed-Capital Outlay (FCO) Projects
    - Office Buildings
    - Construction & Maintenance Facilities
    - Other 'Off Right of Way (ROW)' Facilities

4.13.7.4 Delineation between Architectural & Engineering Plans

- **Delineation Line at 'foot print' of Building:**
  - Face of Exterior Wall
  - Area enclosed by buildings Columns and/or Walls; i.e. Porticos, Carports, covered Walkways and Covered Patios
  - Roof and Building Overhangs

Use AutoCAD *inside* the Delineation Line. Items inside the Delineation Line Includes 'Building-Oriented' Facilities & Equipment that are typically designed by an Architect, including but not limited to, picnic shelters, planters which are part of the building and site furniture in covered areas.



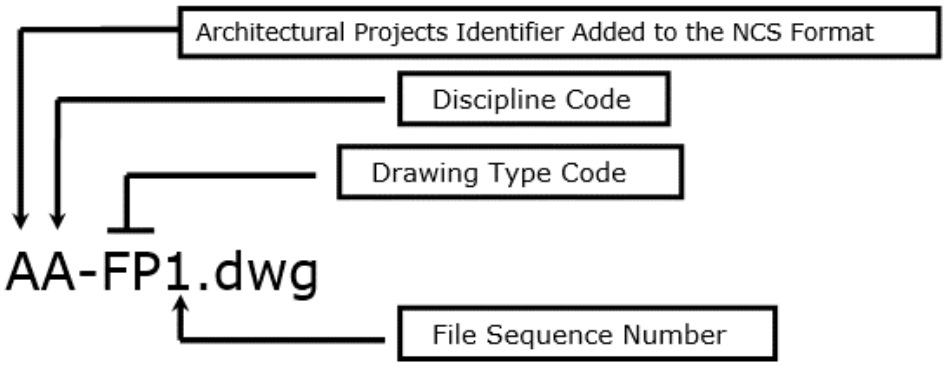
Items outside the delineation or "foot print" of Building must be produced and submitted following the CADD standards for their discipline as defined in their respective chapters, including but not limited to:

- Pavement
  - Driveways, Parking, Sidewalks
- Landscape Plans
- Site Utilities
  - Electrical, Water, Sanitary Sewer, Storm Sewer, Drainage
- Site Fencing and Walls

4.13.7.5 Standard File Names

AutoCAD files are 3D for large plans, elevations or sections that contain the physical building components (walls, doors, water piping, beams…). These files are drawn in Model Space at full scale. These files are referenced in whole or part into sheet files where text and dimensions are added, then printed.

- ***Naming Components:***
  - Architectural Projects Identifier
  - Discipline Codes
  - Drawing Type Codes (General and Discipline related)
  - File Sequence Number



Note Architectural Projects Identifier: A _-_ _ _.dwg
Add "A" before Discipline Code as published in National CAD Standards. This distinguishes Building drawings from Roadway and Structures Plans.

Examples: Project Identifiers, Codes and File Sequence Numbers. For more detailed information refer to National CAD Standards.

- **Architectural Project Identifier**

  A _-_ _ _.dwg Architectural, this differentiates architectural building projects from bridges and roadway projects.

- **Discipline Code**

  _A-_ _ _.dwg ..... Architectural
  _C-_ _ _.dwg Civil
  _Z-_ _ _.dwg ..... Contractor/Shop Drawings
  _Q-_ _ _.dwg ..... Equipment
  _ E-_ _ _.dwg ..... Electrical
  _A-_ _ _.dwg ..... Architectural
  _C-_ _ _.dwg Civil
  _Z-_ _ _.dwg ..... Contractor/Shop Drawings
  _Q-_ _ _.dwg ..... Equipment
  _ M-_ _ _.dwg ..... Mechanical
  _ X-_ _ _.dwg ..... Other Disciplines
  _ P-_ _ _.dwg ..... Plumbing
  _ D-_ _ _.dwg ..... Process
  _ R-_ _ _.dwg ..... Resources
  _ S-_ _ _.dwg ..... Structural
  _ T-_ _ _.dwg ..... Telecommunications

- **Drawing Type Code** *(general and discipline related)*

_ _-FP _.dwg ..... Floor Plan
_ _-SP _.dwg ..... Site Plan
_ _-DP _.dwg ..... Dimension Plan
_ _ -XP _.dwg ..... Existing Plan
_ _-EL _.dwg ..... Elevation
_ _-SC _.dwg ..... Section
_ _-DT _.dwg ..... Detail
_ _-CP _.dwg ..... Ceiling Plan
_ _-EP _.dwg ..... Enlarged Plan
_ _-NP _.dwg ..... Finish Plan
_ _-RP _.dwg ..... Furniture Plan
_ _-SH _.dwg ..... Schedules
_ _-3D _.dwg Isometric/3D
_ _-DG _.dwg ..... Diagrams

- **File Sequence Number**

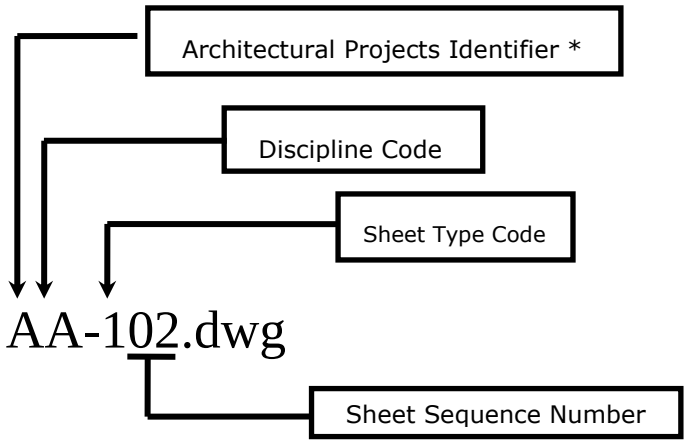
_ _-_ _ 1.dwg ..... 1st drawing file in sequence
_ _-_ _ 2.dwg ..... 2nd drawing file in sequence
_ _-_ _ 3.dwg ..... 3rd drawing file in sequence

4.13.7.6 Standard Sheet File Names

A sheet file is a border sheet with dimensions and/or text added to a portion of a referenced model space file. Plotted sheet files make up the plans set.

➢ ***Naming Components***

- Architectural Projects Identifier
- Discipline Code
- Sheet Type Code
- Sheet Sequence Number



Examples: Project Identifiers, Codes and Sheet File Sequence Numbers. For more detailed information refer to National CAD Standards.

- **Architectural Project Identifier**

A _-_ _ _.dwg.. Architectural, this differentiates Architectural building projects from bridges and Roadway projects.

- **Discipline Code**

_A-_ _ _.dwg ..... Architectural
_C-_ _ _.dwg Civil
_Z-_ _ _.dwg ..... Contractor/Shop Drawings
_Q-_ _ _.dwg ..... Equipment
_ E-_ _ _.dwg ..... Electrical
_ F-_ _ _.dwg ..... Fire Protection
_ G-_ _ _.dwg ..... General
_ B-_ _ _.dwg ..... Geotechnical
_ H-_ _ _.dwg ..... Hazardous Materials
_ I-_ _ _.dwg ..... Interiors
_ M-_ _ _.dwg ..... Mechanical
_ X-_ _ _.dwg ..... Other Disciplines
_ P-_ _ _.dwg ..... Plumbing
_ D-_ _ _.dwg ..... Process
_ R-_ _ _.dwg ..... Resources
_ S-_ _ _.dwg ..... Structural
_ T-_ _ _.dwg ..... Telecommunications

- **Drawing Type Code** *(general and discipline related)*

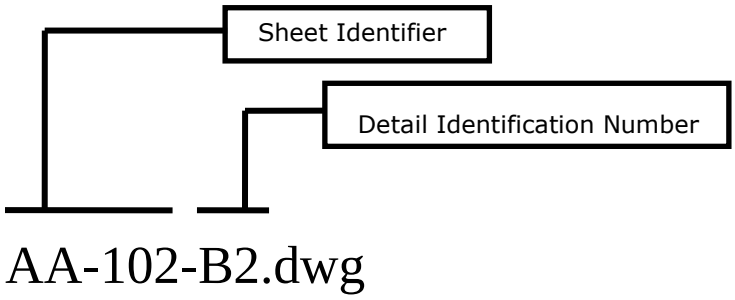
_ _-0 _ _.dwg ..... General (symbols, legend, notes…)
_ _-1 _ _.dwg ..... Floor Plan
_ _-2 _ _.dwg ..... Elevation
_ _-3 _ _.dwg ..... Sections
_ _-4 _ _.dwg ..... Large Scale
_ _-5 _ _.dwg ..... Details
_ _-6 _ _.dwg ..... Schedules and Diagrams
_ _-7 _ _.dwg ..... User Defined
_ _-8 _ _.dwg ..... User Defined
_ _-9 _ _.dwg ..... 3D Views (isometrics, perspectives…)

- **File Sequence Number**

_ _-_ 01.dwg ..... 1st sheet in sequence
_ _-_ 02.dwg ..... 2nd sheet in sequence
_ _-_ 03.dwg ..... 3rd sheet in sequence

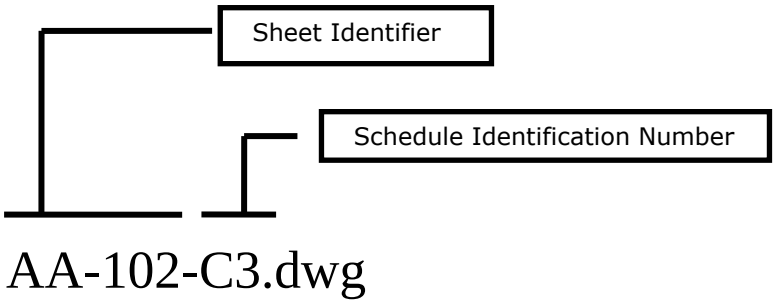
- ***Detail File Name Format***

The Detail File Name includes the sheet identifier and the detail identification number. Sheet Identifier is the sheet file that the detail is placed in. The detail identification number represents the location of the detail within the sheet file border.



- ***Schedule File Name Format***

The Schedule File Name includes the sheet identifier and the schedule identification number. Sheet Identifier is the sheet file that the detail is placed in. The detail identification number represents the location of the schedule within the sheet file border.



4.13.7.7 Engineering Data

The Architectural discipline folder contains an additional sub-folder named **\eng_data**. This sub-folder is designated to contain the sheet image files (PDF's) of the plan sheets for the Architecture design, quality control reports, ASCII Engineering Data output files and other data pertinent to the overall design.

4.13.7.8 Layers and Symbology

Refer to the National CAD Standards and Layer Symbology produced by the U.S.CADD/GIS Technology Center, US Army Engineer Research and Development Center for Symbology standards. These standards include space file names, sheet file names, detail file names, schedule file names, abbreviations, symbols, layers, linetypes, and text styles.

All drawings must be drawn at Full Scale 1:1 in Modelspace using Architectural Units. Text and dimensions should be added in Modelspace. The Titleblock Sheet should be in Paperspace and viewport scaled for scalable printing.

4.13.7.9 Architectural Scale Chart

The following chart is intended to aid the user in determining the appropriate scale for placing the border and text on a drawing based on the actual size of the drawing. Calculations are based on a 9 1/2" x 15 1/2" drawing area inside the border.

Drawing Scales for Sheets			
Note: Sheet files must be assembled in paper space & printed at 1:1			
Architectural Scales		**Engineering Scales**	
Drawing Scale	**Plot Scale**	**Drawing Scale**	**Plot Scale**
Full size	1	1” = 5’	60
6” = 1’-0”	2	1” = 10’	120
3” = 1’-0”	4	1” = 20’	240
1 ½” = 1’-0”	8	1” = 30’	360
1” = 1’-0”	12	1” = 40’	480
¾” = 1’-0”	16	1” = 50’	600
½” = 1’-0”	24	1” = 100’	1200
3/8” = 1’-0”	32	1” = 200’	2400
¼” = 1’-0”	48	1” = 500’	6000
3/16" = 1'-0"	64	1” = 1000’	12000
1/8” = 1’-0”	96	1” = 1250’	15000
3/32" = 1'-0"	128	1” = 2500’	30000
1/16” = 1’-0”	192	1” = 5000’	60000

- **FORMULAS:**

  AS = 12 x Drawing Scale, Ex. 1" = 10', then 12 x 10 = 120, Therefore AS = 120.

4.13.7.10 Text Type, Size and Line Weight

Use the following table to determine the appropriate line weight for each text height. Text line weights are applicable for text places in model and sheet files. Text heights in this chart are used for text in sheet files that are places in paper space.

Text Type	Line Weight (In) All Scales	Height (In) 1:1 Scale
Special Small/Revisions	0.007 in	3/32”
Annotation	0.010 in	1/8”
View/Sheet/Sect Titles	0.014 in	5/32”
Large	0.020 in	3/16”

Note Sizes shown are a 1:1 ratio.

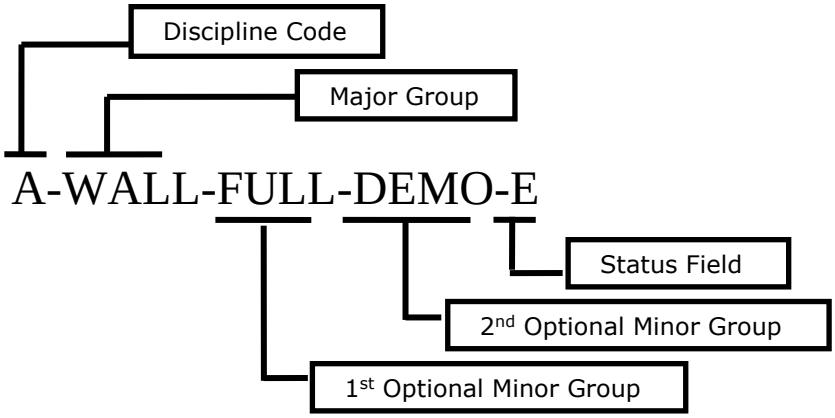
The following charts are intended to aid the user in determining the appropriate text size when placing common text. Scale for placing the border and text on a drawing based on the actual size of the drawing. Calculations are based on a 9 1/2" x 15 1/2" drawing area inside the border.

Text Size for Sheets Using Architectural Scales				
Note For text placed in model files, text in paper space at 1:1				
Drawing Scale	**Text Size**			
	3/32"	1/8"	5/32"	3/16"
Full size	3/32"	1/8"	5/32"	3/16"
6” = 1’-0”	3/16"	1/4"	5/16"	3/8"
3” = 1’-0”	3/8"	1/2"	5/8"	3/4"
1 ½” = 1’-0”	3/4"	1"	1 1/4"	1 1/2"
1” = 1’-0”	1 1/8"	1 1/2"	1 7/8"	2 1/4"
¾” = 1’-0”	1 1/2"	2"	2 1/2"	3"
½” = 1’-0”	2 1/4"	3"	3 3/4"	4 1/2"
3/8” = 1’-0”	3"	4"	5"	6"
¼” = 1’-0”	4 1/2"	6"	7 1/2"	9"
3/16" = 1'-0"	6"	8"	10"	1'
1/8” = 1’-0”	9"	1'-0"	1-3"	1'-6"
3/32" = 1'-0"	1'	1-4"	1'-8"	2'
1/16” = 1’-0”	1'-6"	2'	2'-6"	3'

Text Size for Sheets Using Engineering Scales				
Note For text placed in model files, text in paper space at 1:1				
Drawing Scale	**Text Size**			
	3/32"	1/8"	5/32"	3/16"
1” = 5’	5 5/8"	7 1/2"	9 3/8"	11 1/4"
1” = 10’	11 1/4"	1'-3"	1'-6 3/4"	1'-10 1/2"
1” = 20’	1'-10 1/2"	2'-6"	3'-1 1/2"	3'-9"
1” = 30’	2'-9 3/4"	3'-9"	4'-8 1/4"	5'-7 1/2"
1” = 40’	3'-9 1/2"	5'	6'-3"	7'-6"
1” = 50’	4'-8 1/4"	6'-3"	7'-9 3/4"	9'-4 1/2"
1” = 100’	9'-4 1/2"	12'-6"	15'-7 1/2"	18'-9"
1” = 200’	18'-9"	25'	31'3"	37'-6"
1” = 500’	46'-10 1/2"	62'-6"	78'-1 1/2"	93'-9"
1” = 1000’	93'-9"	125'	156'-3"	187'-6"
1” = 1250’	117'-2 1/4"	156'-3"	195'-3 3/4"	234'-4 1/2"
1” = 2500’	234'-4 1/2"	306'-6"	390'-7 1/2"	468'-9"
1” = 5000’	468'-9"	625'	781'-3"	937'-6"

4.13.7.11 Layer Names

All layer names must follow the format detailed in the National CAD Standards. Below is a brief description of the layer naming convention.



➢ ***Examples: Codes, Groups and Fields***

- **Discipline Code**

A-_ _ _ _-_ _ _ _-	Architectural
E-_ _ _ _-_ _ _ _-	Electrical
F-_ _ _ _-_ _ _ _-	Fire Protection
M-_ _ _ _-_ _ _ _-	Mechanical

ETC.

- **Major Group**

-WALL- _ _ _-	Walls
-DOOR- _ _ _-	Doors
-LITE- _ _ _-	Lighting fixtures
-COLS- _ _ _-	Columns

ETC.

- **1st Optional Minor Group**

_-_ _ _ _-FULL-	Full height
_-_ _ _ _-DIMS-	Dimension

ETC.

- **2nd Optional Minor Group**

_-_ _ _ _-_ _ _ _-IDEN-	Identification
_-_ _ _ _-_ _ _ _-PATT-	Pattern

ETC.

- **Status Field**

_-_ _ _ _-_ _ _ _-N	New work
_-_ _ _ _-_ _ _ _-D	Demolition
_-_ _ _ _-_ _ _ _-T	Temporary work
_-_ _ _ _-_ _ _ _-F	Future work

ETC.

4.13.7.12 File Structure

The DOT uses a specific folder structure for all digital submittals. (See Section 4.7.4)

4.13.7.13 Signing and Sealing

The Florida Department of Business and Professional Regulation (BPR) approved Architects to electronically sign and seal Plans and Specifications. Architects must use Digital Signature. See Chapter 5 for more information.

Helpful link: Florida Statutes Part 1 ELECTRONIC SIGNATURES Chapters 668.001-668.006

4.13.7.14 Submittal

As-Built Project CD shall include all files in the latest native version of CADD software the drawings were produced in along with a PDF set of prints and a complete set in AutoCAD DWG files.

Example: If the project CD was produced using Revit, the submittal will include all files in Revit RVT, AutoCAD DWG and a complete set of PDF files.

4.13.8 *Structures Standards*

The use and generation of CADD files by Structures in regards to the Department's Projects must be in accordance with the general standards for all disciplines, unless superseded by instructions contained within this section.

The following table defines the resource files and features used for the FDOT Structures Workspace.

Feature	Bentley	Autodesk
Color Table	Color.tbl	*Not Applicable*
Font Files	FDOT*.ttf	FDOT*.ttf
Level Definitions	Strslevels.dgnlib	StructuresTemplateDetail.dwt StructuresTemplatePlan.dwt
Main Cell/Block Library	TTF_V8Structures.cel	Structures.dwg
Models Allowed	Yes	*Not Applicable*
QC Rule	Spst10	Spst10
Seed/Template Files	StructuresSeed.dgn StructuresSeed3d.dgn	StructuresTemplateDetail.dwt StructuresTemplatePlan.dwt
Text / Dimension Styles Definitions	Strslevels.dgnlib	StructuresTemplateDetail.dwt StructuresTemplatePlan.dwt

4.13.8.1 Standard File Names

The Department utilizes standard naming conventions for all of its CADD files and provides automated tools that depend on this naming convention. The naming convention confers data and information to the downstream customer.

- ***Standard file names for Bridges should follow this format: B#AAAA…##.[ext]***

Where: **B#** = *Bridge Plans Sequence Number*, **AAAA…** = *Abbreviated File Description*, **##** = *Sequence Number*.

For Example: First EndBent sheet of Bridge 1 in a plan set would be named *B1EndBent01.dgn*

Files created by Structures remain in the \struct\ discipline folder, the sheet numbers must be prefixed with the target discipline's sheet prefixes.

http://www.fdot.gov/structures/StructuresManual/CurrentRelease/StructuresManual.shtm

The Department delivers the **Create File/Project** applications within the CADD Software Suite to ensure files are named to Department CADD Standards.

Files containing Data Table cells (previously semi-standards) should be named *B#DataTable##.dgn* and should be placed in the plans with the corresponding component detail sheet. Files marked as Geotech are listed to show the order of placement within the Structures plans component only. All Geotech files should be located in the \Geotech\ discipline folder and should follow Geotechnical Standards listed in Section 4.13.13 of this document.

The table below defines the Department's Structures standard file names; each must include sequence numbering. Sheet Order is the default, but is modifiable to suit project specific requirements.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule. See ***Structures Detailing Manual*** Volume 2, Chapter 3 for complete details on sheet numbering instructions.

Sheet Order reflects placement within the Structures Component of the Contract Plan Set.

Structures Plans Naming Convention and Numbering Convention						
Sheet Order	**File Name**	**File Title / Description**	**Control File**	**File Group**	**Sheet Prefix**	**Drawing Prefix**
* - Design Format ** - Lead or Component Key Sheet *** - Optional ## - Sheet Sequence Number						
1	KeySheet*	Bridge Key Sheet **	STRUCTURES	PLAN SHEETS		
2	SIGNST*	Signature Sheet	STRUCTURES	PLAN SHEETS		
3	B#Index*	Index of Sheets	STRUCTURES	PLAN SHEETS	B-##	***
4	B#SumOfPayItems*	Summary of Pay Items Sheet *(For Structures as Lead Component Only Projects)*	STRUCTURES	PLAN SHEETS	B-##, …	***
5	B#SumOfQuantities*	Summary of Structures Quantities	STRUCTURES	PLAN SHEETS	B#-##	***
6	B#GeneralNotes*	General Notes	STRUCTURES	PLAN SHEETS	B#-##	***
7	B#SurfaceFinishDet*	Surface Finish Details	STRUCTURES	PLAN SHEETS	B1-##,B2-##, …	***
8	B#PlanElev*	Plan and Elevation	STRUCTURES	PLAN SHEETS	B1-##,B2-##, …	***
9	B#VertCurveSuperEL*	Profile Grade and Superelevation Transition	STRUCTURES	PLAN SHEETS	B1-##,B2-##, …	***
10	B#BridgeHydro*	Bridge Hydraulic Recommendations	STRUCTURES	PLAN SHEETS	B1-##,B2-##, …	***
11	B#Boring*	Report of Core Borings	GEOTECH	GEOTECHNICAL FOR STRUCTURES (DGN)	B1-##,B2-##, …	***
12	B#CPTGeo*	Cone Penetration Test (CPT) Soundings	GEOTECH	GEOTECHNICAL FOR STRUCTURES (DGN)	B1-##,B2-##, …	***
13	B#ConstNotes*	Construction Notes	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
14	B#ConstDet*	Construction Details	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
15	B#ConstSeq*	Construction Sequence	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
16	B#ConstAcc*	Construction Access	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
17	B#RemoveExist*	Removal of Existing Structures	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
18	B#BridgeSection*	Section Through Bridge	STRUCTURES	MISCELLANEOUS	B1-##,B2-##, …	***
19	B#RiprapRubble*	Rubble Riprap	STRUCTURES	EROSION PROTECTION	B1-##,B2-##, …	***
20	B#RiprapSand*	Sand Cement Riprap	STRUCTURES	EROSION PROTECTION	B1-##,B2-##, …	***
21	B#SlopePavementConcrete*	Concrete Slope Pavement	STRUCTURES	EROSION PROTECTION	B1-##,B2-##, …	***
22	B#ScourPlan*	Plan View of Scour Protection	STRUCTURES	SCOUR PROTECTION PLAN	B1-##,B2-##, …	SP-##
23	B#ScourProf*	Profile of Scour Protection	STRUCTURES	SCOUR PROTECTION PLAN	B1-##,B2-##, …	SP-##
24	B#BotContourMap*	Bottom Contour Map	STRUCTURES	SCOUR PROTECTION PLAN	B1-##,B2-##, …	SP-##

Structures Plans Naming Convention and Numbering Convention						
Sheet Order	**File Name**	**File Title / Description**	**Control File**	**File Group**	**Sheet Prefix**	**Drawing Prefix**
* - Design Format ** - Lead or Component Key Sheet *** - Optional ## - Sheet Sequence Number						
25	B#ScourDetail*	Scour Protection Details	STRUCTURES	SCOUR PROTECTION PLAN	B1-##,B2-##, …	SP-##
26	B#FoundLay*	Foundation Layout	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
27	B#PileData*	Pile Data Table	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
28	B#PileDet*	Pile Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
29	B#DrillShaft*	Drilled Shaft Data Table	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
30	B#DrillShaftDet*	Drilled Shaft Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
31	B#EndBent*	End Bent	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
32	B#EndBentDet*	End Bent Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
33	B#IntBent*	Intermediate Bent	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
34	B#IntBentDet*	Intermediate Bent Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
35	B#Footing*	Footing	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
36	B#FootingDet*	Footing Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
37	B#Pier*	Pier	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
38	B#PierDet*	Pier Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
39	B#PrecastPierDet*	Precast Pier Details	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
40	B#PierCapSegDim*	Pier Cap Segment Dimensions	STRUCTURES	SUBSTRUCTURE	B1-##,B2-##, …	***
41	B#PTPierDet*	Pier Post-Tensioning (PT) Details	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
42	B#BearingPads*	Neoprene Bearing Pads	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
43	B#BearingPlates*	Beveled Bearing Plates	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
44	B#PotBearingDet*	Pot Bearing Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
45	B#DiscBearingDet*	Disc Bearing Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
46	B#BearingDet*	Bearing Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
47	B#BeamLay*	Beam Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
48	B#BeamLayAASHTO*	AASHTO Beam Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
49	B#BeamLayFIB*	Florida-I Beam (FIB) Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
50	B#BeamLayFSB*	Florida Slab Beam (FSB) Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
51	B#BeamLayBTB*	Bulb-T Beam Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
52	B#BeamLayFUB*	Florida-U Beam (FUB) Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
53	B#BeamLayITB*	Inverted T Beam Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***

Structures Plans Naming Convention and Numbering Convention						
Sheet Order	**File Name**	**File Title / Description**	**Control File**	**File Group**	**Sheet Prefix**	**Drawing Prefix**
* - Design Format ** - Lead or Component Key Sheet *** - Optional ## - Sheet Sequence Number						
54	B#BeamLayTB*	T Beam Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
55	B#PrestSlab*	Prestressed Slab Units	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
56	B#DataTableBeams*	*(Beam Name)*Table of Beam Variables	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
57	B#TypicalSection*	Typical Section Through Bridge Deck	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
58	B#FramingPlan*	Framing Plan	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
59	B#SteelGirder*	Steel Girder	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
60	B#SteelDet*	Steel Girder Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
61	B#DiaphragmSteelDet*	Diaphragm Details *(w/ steel beams/girders)*	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
62	B#CrossFrameDet*	Cross Frame Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
63	B#Stiffener*	Stiffener Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
64	B#FieldSplice*	Bolted Field Splice	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
65	B#FieldSpliceDet*	Bolted Field Splice Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
66	B#FloorBeam*	Floor Beams	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
67	B#Camber*	Camber Diagrams	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
68	B#Superst*	Superstructure	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
69	B#SuperstDet*	Superstructure Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
70	B#ClosureJointDet*	Closure Joint Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
71	B#DiaphragmConcDet*	Diaphragm Details *(w/ concrete beams/girders)*	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
72	B#SegLayout*	Segment Layout	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
73	B#SegJointCoord*	Segment Joint Coordinates	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
74	B#TypSegDim*	Typical Segment Dimensions	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
75	B#TypSegDet*	Typical Segment Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
76	B#TypSegReinf*	Typical Segment Reinforcing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
77	B#DevSegDim*	Deviation Segment Dimensions	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
78	B#DevSegDet*	Deviation Segment Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
79	B#DevSegReinf*	Deviation Segment Reinforcing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
80	B#PierSegDim*	Pier Segment Dimensions	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
81	B#PierSegDet*	Pier Segment Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
82	B#PierSegReinf*	Pier Segment Reinforcing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***

Structures Plans Naming Convention and Numbering Convention						
Sheet Order	**File Name**	**File Title / Description**	**Control File**	**File Group**	**Sheet Prefix**	**Drawing Prefix**
* - Design Format ** - Lead or Component Key Sheet *** - Optional ## - Sheet Sequence Number						
83	B#AbutSegDim*	Abutment Segment Dimensions	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
84	B#AbutSegDet*	Abutment Segment Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
85	B#AbutSegReinf*	Abutment Segment Reinforcing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
86	B#ExpJointSegDim*	Expansion Joint Segment Dimensions	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
87	B#ExpJointSegDet*	Expansion Joint Segment Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
88	B#ExpJointSegReinf*	Expansion Joint Segment Reinforcing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
89	B#ClosurePourDet*	Closure Pour Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
90	B#ClosurePourReinf*	Closure Pour Reinforcing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
91	B#PTTendLayLong*	Longitudinal Post-Tensioning (PT) Tendon Layout	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
92	B#PTTendLayCont*	Continuity Post-Tensioning (PT) Tendon Layout	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
93	B#PTTendLayFuture*	Future Post-Tensioning (PT) Tendon Layout	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
94	B#PTDet*	Post-Tensioning (PT) Details	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
95	B#PTTransPierSegDet*	Pier Segment Transverse Post-Tensioning (PT) Details	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
96	B#PTTransAbutSegDet*	Abutment Segment Transverse Post-Tensioning (PT) Details	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
97	B#PTTransExpJtSegDet*	Expansion Joint Segment Transverse Post-Tensioning (PT) Details	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
98	B#PTTransDet*	Transverse Post-Tensioning (PT) Details	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
99	B#PTConstSeq*	Construction Sequence Post-Tensioning (PT)	STRUCTURES	POST-TENSIONING	B1-##,B2-##, …	***
100	B#ErectSeq*	Erection Sequence	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
101	B#ErectProced*	Erection Procedure for Launching Girder	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
102	B#AccessHatch*	Access Hatch Assembly	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
103	B#AccessDoor*	Access Door Assembly	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
104	B#MaintLight*	Maintenance Lighting Plan	STRUCTURES	LIGHTING	B1-##,B2-##, …	***
105	B#MaintLightDet*	Maintenance Lighting Details	STRUCTURES	LIGHTING	B1-##,B2-##, …	***
106	B#FinishGrEL*	Finish Grade Elevations	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
107	B#ExpJointDet*	Expansion Joint Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
108	B#DrainDet*	Drain Details	STRUCTURES	DETAILS	B1-##,B2-##, …	***
109	B#SidewalkDet*	Sidewalk Details	STRUCTURES	DETAILS	B1-##,B2-##, …	***
110	B#TrafficRailing*	Traffic Railing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
111	B#PedRailing*	Pedestrian Railing	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***

Structures Plans Naming Convention and Numbering Convention						
Sheet Order	**File Name**	**File Title / Description**	**Control File**	**File Group**	**Sheet Prefix**	**Drawing Prefix**
* - Design Format ** - Lead or Component Key Sheet *** - Optional ## - Sheet Sequence Number						
112	B#SlidingPlate*	Traffic / Pedestrian Railing Sliding Plate Assembly	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
113	B#ConduitDet*	Conduit Details	STRUCTURES	DETAILS	B1-##,B2-##, …	***
114	B#JunctBoxDet*	Junction Box Details	STRUCTURES	DETAILS	B1-##,B2-##, …	***
115	B#LadderDet*	Ladder Details	STRUCTURES	DETAILS	B1-##,B2-##, …	***
116	B#JackingDet*	Jacking Details	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
117	B#MiscDet*	Miscellaneous Details	STRUCTURES	DETAILS	B1-##,B2-##, …	***
118	B#FenderSystem*	Fender System	STRUCTURES	FENDERS	B1-##,B2-##, …	***
119	B#FenderDet*	Fender System Details	STRUCTURES	FENDERS	B1-##,B2-##, …	***
120	B#ApproachSlab*	Approach Slab	STRUCTURES	SUPERSTRUCTURE	B1-##,B2-##, …	***
121	B#TempDetourPlanElev*	Temporary Detour Bridge Plan and Elevation	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
122	B#TempDetourFoundLay*	Temporary Detour Bridge Foundation Layout	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
123	B#TempDetourPileData*	Temporary Detour Bridge Pile Data Table	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
124	B#TempDetourPileDet*	Temporary Detour Bridge Pile Details	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
125	B#TempDetourEndBent*	Temporary Detour Bridge End Bent	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
126	B#TempDetourEndBentDet*	Temporary Detour Bridge End Bent Details	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
127	B#TempDetourIntBent*	Temporary Detour Bridge Intermediate Bent	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
128	B#TempDetourIntBentDet*	Temporary Detour Bridge Intermediate Bent Details	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
129	B#TempDetourDet*	Temporary Detour Bridge Details	STRUCTURES	TEMPORARY DETOUR	B1-##,B2-##, …	***
130	B#LTPileProgSum*	Pile Load Test Program Summary	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
131	B#LTDrillShaftSum*	Drilled Shaft Load Test Program Summary	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
132	B#LTLateralProgSum*	Lateral Load Test Program Summary	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
133	B#LTPileDet*	Pile Load Test Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
134	B#LTDrillShaftDet*	Drilled Shaft Load Test Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
135	B#LTOsterbergCellDet*	Osterberg Cell Load Test Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
136	B#LTLateralDet*	Lateral Load Test Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
137	B#LTDet*	Load Test Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
138	B#InstruDet*	Instrumentation Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	***
139	B#CompTestSetup*	Compression Test Setup	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	***
140	B#TensionTestSetup*	Tension Test Setup	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##

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141	B#LTFrame*	Load Test Frame Configuration	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
142	B#LTGirderBraceDet*	Load Test Reaction Girder Bracing Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
143	B#LTGirderDet*	Load Test Reaction Girder Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
144	B#PlatformDet*	Service Platform Deck and Frame Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	***
145	B#LTStatnamicDet*	Statnamic Load Test Details	STRUCTURES	LOAD TESTING	B1-##,B2-##, …	LT-##
146	B#BP-Notes*	Bascule Pier Notes	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
147	B#BL-Elevation*	Bascule Span Elevation	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BP-##
148	B#BP-PlanViewsX*	Bascule Pier X - AA (X = Pier Number) (*AA = Footing Level Plan, Pit Level Plan, Machinery Level Plan, Trunnion Level Plan, Roadway Level Plan)*	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
149	B#BP-ElevationsX*	Bascule Pier X - BB *(X = Pier Number)(BB = East Elevation, West Elevation, North Elevation, South Elevation)*	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
150	B#BP-FinishGradeX*	Bascule Pier X Finish Grade Elevations (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
151	B#BP-TransSectX*	Bascule Pier X Transverse Sections *(X = Pier Number)*	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
152	B#BP-LongSectX*	Bascule Pier X Longitudinal Sections *(X = Pier Number)*	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
153	B#BP-ClearDiagramX*	Bascule Pier X Clearance Diagram (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
154	B#BP-RailDetX*	Bascule Pier X Railing Details (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
155	B#BP-StairDetX*	Bascule Pier X Stair Details (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
156	B#BP-PierDetX*	Bascule Pier X Details (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
157	B#BP-ReinfPlansX*	Bascule Pier X Reinforcing - AA (X = Pier Number)(AA = Footing Level Plan, Pit Level Plan, Machinery Level Plan, Trunnion Level Plan, Roadway Level Plan)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
158	B#BP-ReinfElevationsX*	Bascule Pier X Reinforcing - BB (X = Pier Number)*(BB = East Elevation, West Elevation, North Elevation, South Elevation)*	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
159	B#BP-ReinfTransSectX*	Bascule Pier X Reinforcing Transverse Sections (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
160	B#BP-ReinfLongSectX*	Bascule Pier X Reinforcing Longitudinal Sections (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
161	B#BP-ReinfDetX*	Bascule Pier X Reinforcing Details (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
162	B#BP-RebarListX*	Bascule Pier X Reinforcing Bar List (X = Pier Number)	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Pier	B1-##,B2-##, …	BP-##
163	B#BT-Notes*	Control House Notes	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
164	B#BT-PlanViews*	Control House - AA *(AA = Foundation Level Plan and Reinforcement ,*	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##

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		Trunnion Level Plan and Reinforcement, Entry Level Plan and Reinforcement, Tender Level Plan and Reinforcement, Roof Level and Framing Plan)				
165	B#BT-Elevations*	Control House - BB *(BB = East Elevation and Reinforcement, West Elevation and Reinforcement, North Elevation and Reinforcement, South Elevation and Reinforcement)*	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
166	B#BT-Sections*	Control House Sections and Reinforcement	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
167	B#BT-Details*	Control House Details	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
168	B#BT-StairDet*	Control House Stair Details	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
169	B#BT-HVACPlumb*	Control House Heating, Ventilation & Air Conditioning (HVAC) and Plumbing Floor Plans	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
170	B#BT-PlumbSchem*	Control House Plumbing Schematic	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
171	B#BT-HVACSchem*	Control House Heating, Ventilation & Air Conditioning (HVAC) Schematic	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
172	B#BT-HVACPlumbDet*	Control House Heating, Ventilation & Air Conditioning (HVAC) and Plumbing Details	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
173	B#BT-RebarList*	Control House Reinforcing Bar List	MECHELEC	MOVABLE BRIDGE - ARCHITECTURAL	B1-##,B2-##, …	BT-##
174	B#BL-Notes*	Bascule Span Notes	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
175	B#BL-FramingPlan*	Bascule Span Framing Plan	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
176	B#BL-TransSect*	Bascule Span Transverse Sections	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
177	B#BL-GirderElev*	Bascule Span Main Girder Elevation	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
178	B#BL-GirderSectDet*	Bascule Span Main Girder Sections and Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
179	B#BL-WebGeoCamberDet*	Bascule Span Web Geometry and Camber Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
180	B#BL-ForceDiag*	Bascule Span Force Diagrams	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
181	B#BL-FloorBeamDet*	Bascule Span Floor Beam Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
182	B#BL-CountBoxDet*	Bascule Span Counterweight Box Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
183	B#BL-CountPlan*	Bascule Span Counterweight Plan	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
184	B#BL-CountSections*	Bascule Span Counterweight Sections	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
185	B#BL-LatBracPlan*	Bascule Span Lateral Bracing Plan	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
186	B#BL-LatBracDet*	Bascule Span Lateral Bracing Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
187	B#BL-DeckPanelLay*	Bascule Span Deck Panel Layout	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
188	B#BL-DeckPanelDet*	Bascule Span Deck Panel Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
189	B#BL-DeckPlan*	Bascule Span Deck Plan	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
190	B#BL-DeckSectDet*	Bascule Span Deck Sections and Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##

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191	B#BL-ArmJointLay*	Bascule Span Armored Joint Plan Layout	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
192	B#BL-ArmJointDet*	Bascule Span Armored Joint Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
193	B#BL-LLShoeAssem*	Bascule Span Live Load (LL) Shoe Assembly	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
194	B#BL-CentDev*	Bascule Span Centering Device	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
195	B#BL-LockBarHseDet*	Bascule Span Lock Bar Housing Details	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
196	B#BL-BalPlan*	Bascule Span Balance Plan	MECHELEC	MOVABLE BRIDGE – STRUCTURAL – Bascular Span	B1-##,B2-##, …	BL-##
197	B#Mech-Notes*	Machinery Notes	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
198	B#Mech-BLMachSys*	Bascule Span Machinery Systems	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
199	B#Mech-SDMachPlan*	Span Drive Machinery Plan	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
200	B#Mech-SDMachElev*	Span Drive Machinery Elevation	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
201	B#Mech-SDMachElevDet*	Span Drive Machinery Elevation Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
202	B#Mech-SDMachTable*	Span Drive Machinery Tables	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
203	B#Mech-DiffLock*	Differential Lock Out Mechanism Assembly and Floating Shaft	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
204	B#Mech-DiffLockDet*	Differential Lock Out Mechanism Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
205	B#Mech-SDMachSuppDet*	Span Drive Machinery Support Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
206	B#Mech-RackPinion*	Rack/Pinion and Trunnion Assembly	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
207	B#Mech-RackDet*	Rack Assembly Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
208	B#Mech-PinionDet*	Pinion Assembly Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
209	B#Mech-TrunAssemDet*	Trunnion Assembly Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
210	B#Mech-SLimSwitchDet*	Span Limit Switch Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
211	B#Mech-SLockAssemb*	Span Lock Assembly	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
212	B#Mech-SLockDet*	Span Lock Details	MECHELEC	MOVABLE BRIDGE - MECHANICAL	B1-##,B2-##, …	BM-##
213	B#Elec-Notes*	Electrical Notes	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
214	B#Elec-PlanElev*	Electrical Plan and Elevation	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
215	B#Elec-Abbrev*	Electrical Abbreviations	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
216	B#Elec-Legend*	Electrical Legend	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
217	B#Elec-OneLineDia*	One Line Diagram	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
218	B#Elec-LightPanSched*	Lighting Panel Schedule	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
219	B#Elec-LightPanCirc*	Lighting Panel Circuits	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##

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220	B#Elec-BTFloorPlan*	Control House Floor Plans	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
221	B#Elec-BPElectLay*	Bascule Pier Electrical Layout	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
222	B#Elec-BPRefCeilPlan*	Bascule Pier Reflected Ceiling Plans	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
223	B#Elec-MCCLay*	Motor Control Center (MCC) Layout	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
224	B#Elec-DriveCabDet*	Drive Cabinet Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
225	B#Elec-CtlDeskLay*	Control Desk Layout	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
226	B#Elec-CtlDeskDet*	Control Desk Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
227	B#Elec-CtlCabDet*	Control Cabinet Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
228	B#Elec-CtlSysArchDi*	Control System Architectural Diagram	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
229	B#Elec-OperSeqFlow*	Operating Sequence Flowchart	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
230	B#Elec-CtlSchem*	Control Schematics	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
231	B#Elec-NavLight*	Navigational Lighting	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
232	B#Elec-TrafficConDet*	Traffic Control Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
233	B#Elec-FireAlarm*	Fire Alarm System	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
234	B#Elec-CCTVSys*	Closed Circuit Television (CCTV) System	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
235	B#Elec-CommSys*	Communication System	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
236	B#Elec-LighProtSyst*	Lightning Protection System	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
237	B#Elec-GeneratorDet*	Generator Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
238	B#Elec-SubCondDet*	Submarine Conduit Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
239	B#Elec-FlexCableDet*	Flexible Cable Details	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
240	B#Elec-CondSchem*	Conduit Schematic	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
241	B#Elec-CondConductSched*	Conduit and Conductor Schedule	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
242	B#Elec-BTReflCeil*	Control House Reflected Ceiling Plans	MECHELEC	MOVABLE BRIDGE - ELECTRICAL	B1-##,B2-##, …	BE-##
243	B#PedBridgeDataTable*	Pedestrian Bridge Data	STRUCTURES	TABLES	BP-1, BP-2, BP-##	***
244	B#RebarList*	Reinforcing Bar List	STRUCTURES	CONSTRUCTION	B1-##,B2-##, …	***
245	B#DataTableLoadRating*	Load Rating Summary Table	STRUCTURES	TABLES	B1-##,B2-##, …	***
246	B#WallControl*	Wall Control Drawing	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
247	B#Bulkhead*	Bulkhead	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
248	B#BulkheadDet*	Bulkhead Details	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …

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249	B#SheetPileWallAnchSteel*	Anchored Steel Sheet Pile Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
250	B#SheetPileWallAnchConc*	Anchored Concrete Sheet Pile Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
251	B#SheetPileWallCantSteel*	Cantilever Steel Sheet Pile Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
252	B#SheetPileWallCantConc*	Cantilever Concrete Sheet Pile Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
253	B#SheetPileWall*	Sheet Pile Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
254	B#MSEwall*	Mechanically Stabilized Earth (MSE) Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
255	B#RetainingWall*	Retaining Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
256	B#MSEWallGEO*	Mechanically Stabilized Earth (MSE) Wall Standard Penetration Test (SPT) Borings	GEOTECH	GEOTECHNICAL FOR STRUCTURES (DGN)	BW-##	W1-##,W2-##, …
257	B#RetainingWallGEO*	Retaining Wall Standard Penetration Test (SPT) Borings	GEOTECH	GEOTECHNICAL FOR STRUCTURES (DGN)	BW-##	W1-##,W2-##, …
258	B#SheetPileWallGEO*	Sheet Pile Wall Standard Penetration Test (SPT) Borings	GEOTECH	GEOTECHNICAL FOR STRUCTURES (DGN)	BW-##	W1-##,W2-##, …
259	B#NoiseWall*	Noise Wall	STRUCTURES	WALLS	BW#-##	SB1-##, SB2-##, ...
260	B#NoiseWallGEO*	Noise Wall Standard Penetration Test (SPT) Borings	GEOTECH	GEOTECHNICAL FOR STRUCTURES (DGN)	BW#-##	SB1-##, SB2-##, ...
261	B#CrashWall*	Crash Wall	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
262	B#RebarListWall*	Reinforcing Bar List *(Wall/bulkhead related)*	STRUCTURES	WALLS	BW-##	W1-##,W2-##, …
263	B#MiscStr*	Miscellaneous Structure	STRUCTURES	MISCELLANEOUS	B#-##	***
264	B#MiscStrClvt*	Box Culvert	STRUCTURES	MISCELLANEOUS	B#-##	***
	StrBorder*	Referencing Structures Borders	STRUCTURES	PLAN SHEETS		

- ***Non-Bridge Related Filenames:***

Create the following non-bridge related files in the Structures workspace using Structures seed files. Include mast arm and overhead sign structure sheets in the Roadway plans. Include the sheets for all other listed items in the Roadway plans when no Structures plans are present.

Sheet Order	File Name	File Title / Description	Control File	File Group	Sheet Prefix	Drawing Prefix
a1	WallControl*	Wall Control Drawing *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a2	Bulkhead*	Bulkhead *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a3	BulkheadDet*	Bulkhead Details *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a4	SheetPileWallAnchSteel*	Anchored Steel Sheet Pile Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a5	SheetPileWallAnchConc*	Anchored Concrete Sheet Pile Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a6	SheetPileWallCantSteel*	Cantilever Steel Sheet Pile Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a7	SheetPileWallCantConc*	Cantilever Concrete Sheet Pile Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a8	SheetPileWall*	Sheet Pile Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a9	MSEwall*	Mechanically Stabilized Earth (MSE) Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a10	RetainingWall*	Retaining Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a11	MSEWallGEO*	Mechanically Stabilized Earth (MSE) Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	GEOTECH	GEOTECHNICAL *(Non-Bridge Related)*	None	W1-##,W2-##, …
a12	RetainingWallGEO*	Retaining Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	GEOTECH	GEOTECHNICAL *(Non-Bridge Related)*	None	W1-##,W2-##, …
a13	SheetPileWallGEO*	Sheet Pile Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	GEOTECH	GEOTECHNICAL *(Non-Bridge Related)*	None	W1-##,W2-##, …
a14	NoiseWall*	Noise Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	SB1-##, SB2-##, ...
a15	NoiseWallGEO*	Noise Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	GEOTECH	GEOTECHNICAL *(Non-Bridge Related)*	None	SB1-##, SB2-##, ...
A16	ConePTGEO*	Cone Penetration Test (CPT) Soundings (Non-Bridge Related)	GEOTECH	GEOTECHNICAL *(Non-Bridge Related)*	None	SB1-##, SB2-##, ...
a17	CrashWall*	Crash Wall *(Non-Bridge Related)*	STRUCTURES	WALLS *(Non-Bridge Related)*	None	W1-##,W2-##, …
a18	RebarList*	Reinforcing Bar List *(Non-Bridge Related)*	STRUCTURES	CONSTRUCTION *(Non-Bridge Related)*	None	W1-##,W2-##, …
a19	MiscStr*	Miscellaneous Structure *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a20	MiscStrClvt*	Culvert *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a21	StandardMastArmDataTable*	Standard Mast Arm Assemblies Data Table *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a22	SpecialMastArmDataTable*	Special Mast Arm Assemblies Data Table *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a23	MastArmTab*	Mast Arm Tabulation *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a24	MiscStrMastArm*	Mast Arm Assemblies *(Non-standard)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a25	MiscStrHighMast*	High Mast Light Poles *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a26	SignStructCant*	Cantilever Sign Structures Data Table *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a27	SignStructSpan*	Span Sign Structures Data Table *(Non-Bridge Related)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		
a28	MiscStrOHSign*	Overhead Sign Structures *(Non-standard)*	STRUCTURES	MISCELLANEOUS *(Non-Bridge Related)*		

4.13.8.2 Resource Files

Files created for the Structures discipline must use the resource files included with the Department's CADD Software packages. All files created for Structures Plans sheets must be created from the supplied Structures Seed or Template files. The Structures Seed/Template files for the FDOT Structures Workspace differs from other Seed files in both working units and unit labeling.

The *StrLevels.dgnlib* library file contains the definitions for Levels, Text, & Dimension styles in MicroStation.

The *StructuresTemplateDetail.dwt* and *StructuresTemplatePlan.dwt* template files contain the definitions Levels, Text, & Dimension Styles in AutoCAD.

Note For V8 format MicroStation files, working units DO NOT define design plane size, only the method of measurement. Therefore, the design plane is the same size for all seed files.

4.13.8.3 Engineering Data

Engineering Data to be delivered with each project must be located in the *\eng_data* folder and include:

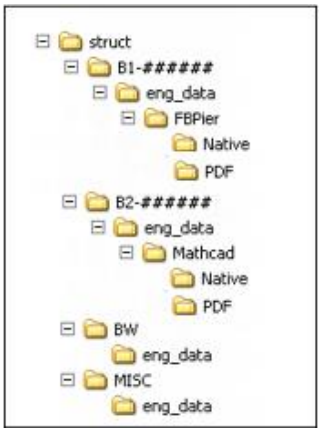
- ASCII files containing Q/C reports
- All computer input and output files used in the design (in native file formats for the software used and printed to PDF format)
- All supplemental design hand design calculations (scanned and saved in PDF or TIFF file formats)

Under the project \struct\ folder, create separate sub-folders for each bridge and/or structure in the project. Name these sub-folders using the sheet prefix and bridge numbers (when applicable) and locate the MicroStation design files for each bridge under these sub-folders. (e.g...*\struct\B\; \struct\B1-######*)

Under each bridge and/or structure sub-folder, create an *\eng_data* sub-folder for the Engineering Data related to the design of the project. (e.g...*\struct\B\eng_data\; \struct\B1-######\eng_data*). Computer input and output files include files used for all aspects of bridge, retaining wall, and/or miscellaneous structures design. These include, but are not limited to, files generated from the following computer programs:

- FDOT Structural Software
- GTStrudl
- STADD
- RISA
- Mathcad Spreadsheets
- Excel Spreadsheets
- FBPier
- LEAP Software
- BD2
- MDX
- BC
- Adapt

Under each of the \eng_data\ sub-folders for each bridge and/or structure in the project, create subfolders for the applicable programs with two sub-folders: \PDF\ and \Native\. Place the appropriate input and output files in each sub-folder. Only sign and seal these PDF files when required by Contract.



Note For quantity calculations see Section 4.7.2.1.

4.13.8.4 Level and Symbology Standards

For the MicroStation FDOT Structures Workspace, element Level/Symbology Standards are defined in the *StrLevels.dgnlib* Structures Level Library and must be selected from the MicroStation level picker. Each level contains a defined color, line weight, line style, and print property. Color must remain set to BYLEVEL ***(except where indicated with ** in the table below)***, line weight & line style may be modified as needed.

For AutoCAD, FDOT Structures object Layer Property Standards are defined in the *StructuresTemplateDetail.dwt* and *StructuresTemplatePlan.dwt* template files and must be selected from the AutoCAD layer selector. Each layer contains a defined color, line weight, linetype, and print property. Color must remain set to ByLayer ***(except where indicated with ** in the table below)***, line weight & line style may be modified as needed. User created Levels ARE NOT acceptable. If additional Levels/Layers are needed, contact the Structures Design Office. The Level named "Default" (in MicroStation) or Layer 0 (in AutoCAD) is not QC compliant and is not to be used for drawing elements. If a discrepancy occurs, the *StrLevels.dgnlib* Structures Level Library or StructuresTemplate file supersedes the symbology table on the following pages.

4.13.8.5 Borders and Scales

- ***Borders:***

Draw all elements at "Full Size" completely before placing text or dimensions. Sheets that reside in the Structures Component of the plan set must use the Structures Border cell "Sheet-Border". Sheets requiring Structures design that reside within other discipline components of the plan set (Roadway, Lighting, etcetera) must use the Border Roadway w/Initials cell "Sheet-Rdwy".

Show the scale of the drawing and related details inside the display area of the file, but outside of the Sheet Border area. This is helpful to all users who work on the file.

- ***Scales:***

The following chart is intended to aid the user in determining the appropriate scale for placing the border and text on a drawing based on the actual size of the drawing. Calculations are based on a 9.60" x 15.40" drawing area inside the border.

- Architect's Scales

Drawing Scale	Active Scale (AS)	Height (FT.)	Width (FT.)
1/16" = 1'	192	153.59	246.39
3/32" = 1'	128	102.40	164.26
1/8" = 1'	96	76.80	123.20
3/16" = 1'	64	51.20	82.13
1/4" = 1'	48	38.40	61.60
3/8" = 1'	32	25.60	41.07
½" = 1'	24	19.20	30.80
3/4" = 1'	16	12.80	20.53
1" = 1'	12	9.60	15.40
1 ½" = 1'	8	6.40	10.27
3" = 1'	4	3.20	5.13
6" = 1'	2	1.60	2.57
1 = 1	1	.80	1.28

- FORMULAS: Architect's Scale:

AS = 12 / Drawing Scale *(Ex. 1/4" = .25in., then 12/.25 = 48, Therefore AS = 48)*

W = Sheet Width (in.) / Drawing Scale *(Ex. 1/4" = .25in., then 15.36/.25 = 61.44, Therefore W = 61.44)*

H = Sheet Height (in.) / Drawing Scale *(Ex. 1/4" = .25in., then 9.72/.25 = 38.88, Therefore H = 38.88)*

- Engineer's Scales

Drawing Scale	Active Scale (AS)	Height (FT.)	Width (FT.)
1" = 500'	6000	4799.81	7699.69
1" = 400'	4800	3839.85	6159.75
1" = 300'	3600	2879.88	4619.82
1" = 250'	3000	2399.90	3849.85
1" = 200'	2400	1919.92	3079.88
1" = 150'	1800	1439.94	2309.91
1" = 120'	1440	1161.95	1847.93
1" = 100'	1200	959.96	1539.94
1" = 80'	960	767.97	1231.95
1" = 60'	720	575.98	923.96
1" = 50'	600	479.98	769.97
1" = 40'	480	383.98	615.98
1" = 30'	360	287.99	461.98
1" = 20'	240	191.99	307.99
1" = 15'	180	143.99	230.99
1" = 10'	120	96.00	153.99

- FORMULAS: Engineer's Scale:

AS = 12 x Drawing Scale *(Ex. 1"=500', then 12 x 500 = 6000, Therefore AS = 6000)*

W = Sheet Width (in.) x Drawing Scale *(Ex. 1"=500', then 15.36 x 500 = 7680, Therefore W = 7680)*

H = Sheet Height (in.) x Drawing Scale *(Ex. 1"=500', then 9.72 x 500 = 4860, Therefore H = 4860)*

4.13.8.6 Text Sizes and Weights

The standard annotation text size for structures drawings is .0063' on a printed sheet. Standard text sizes are provided as custom text styles delivered either via the StrsLevels.dgnlib (MicroStation) or Structures Template (AutoCAD) files.

TITLE	FONT	SIZE (Ft)
Revisions	FDOT	.0050
Initials	FDOT	.0058
Annotation/Table Data	FDOT	.0063
View/Sheet/Sect Titles	FDOTBold	.0080
Large	FDOTBold	.0084
Larger	FDOTBold	.0100

The automatic Annotation Scaling service provided by both CADD platforms should be used for all annotations where possible. The Structures Design Office (SDO) uses special, custom fonts in its drawings and CADD programs; specifically, the FDOT and FDOTMono true type fonts (ttf). These fonts are stored in the *FDOT.ttf* and *FDOTMono.ttf* files supplied with the Department's CADD Software.

The *zDOTFont.rsc* and *StructuresFont.rsc* resource files are delivered in the MicroStation CADD Software Suite providing support for legacy MicroStation fonts 168, 169, 68, and 69. Legacy MicroStation fonts should not be used for new production work.

4.13.8.7 Colors

Colors depend on the color table attached to the design file. Therefore, it is important that "*color.tbl*" provided by Bentley (shipped with MicroStation) is attached to all structures design files.

4.13.8.8 Special Symbols

Special symbol characters are provided in the Department's true type font files. These characters may be accessed via the Insert Symbol tool provided in the MicroStation Text Editor/Word Processor or AutoCAD MText editor dialog.

These characters include, but are not limited to: fractions, mathematical symbols, survey symbols, boring symbols, Greek letters, Super/Sub Scripts.

4.13.8.9 Dimension Settings

Dimension styles are defined in the *strslevels.dgnlib (MicroStation)* or Structures Template files (AutoCAD). Styles are provided for Dimensioning and Notes for various terminators and leaders. Make every effort to use automatic dimensioning with element association enabled.

4.13.8.10 Reference Files

Information from other disciplines, such as Roadway, and Utilities, should not be copied into Structures design files, as they will be flagged as invalid by the QC Software and adversely affect the Standards Compliance Report.

When it is necessary to use or present this type of information, reference it into the Structures design file using relative paths.

4.13.8.11 Existing Bridge Plans

Existing Bridge plan sheets must be submitted in PDF format, not DGN, and manually inserted into the plans using sheet numbers. The January 2017 *Structures Manual Volume 2 - Structures Detailing Manual* Section 3.1 B states the following:

> *"….At the end of the plan set, place all existing bridge sheets for each bridge in one PDF file named "B1ExistingPlans.pdf" for the first bridge (number sheets sequentially "BX1-1", "BX1-2", etc.) and "B2ExistingPlans.pdf" for the second bridge, etc."*

Traditionally existing Bridge Plans have been made as a part of the contract documents and therefore should be made part of the plans set; likewise, the PDF file(s) representing the existing Bridge Plans would reside in the \struct\ project folder.

Note The person responsible for assembling the plan set including existing bridge plans may wish to apply a stamp on each existing bridge plan sheet that indicates "FOR INFORMATION ONLY" and the current contract FPID being designed.

4.13.9 *Toll Facilities Standards*

As per the ***Plans Preparation Manual***, Volume 2, Chapter 2, Toll Facility Plans should be prepared in accordance with the Florida's Turnpike Enterprise current ***General Tolling Requirements (GTR)*** found at the following link: http://www.floridasturnpike.com/design.html

4.13.10 *Utility Standards*

This chapter defines guidelines for sharing data between the District Offices and the Utility Agency/Owner (UAO).

4.13.10.1 Utility File Coordination Options

There are three options available for the UAO to share files with the Department:

- Exchange of design files (DGN or DWG) – the preferred option
- Create American Standard Code for Information Interchange (ASCII) files
- Import of Geographic Information System (GIS) data

➢ ***Sharing of Design Files***

Design files are created to the Department's CADD Standards and returned to the District for review. The UAO will use these files as references to create the existing or proposed utility files. These files (existing or proposed) would also be submitted back to the District. It is the District's responsibility to coordinate with the UAO for delivery of design files. For AutoCAD DWG files, all line work for utilities should be preferably in 3D and saved as polylines or feature line objects.

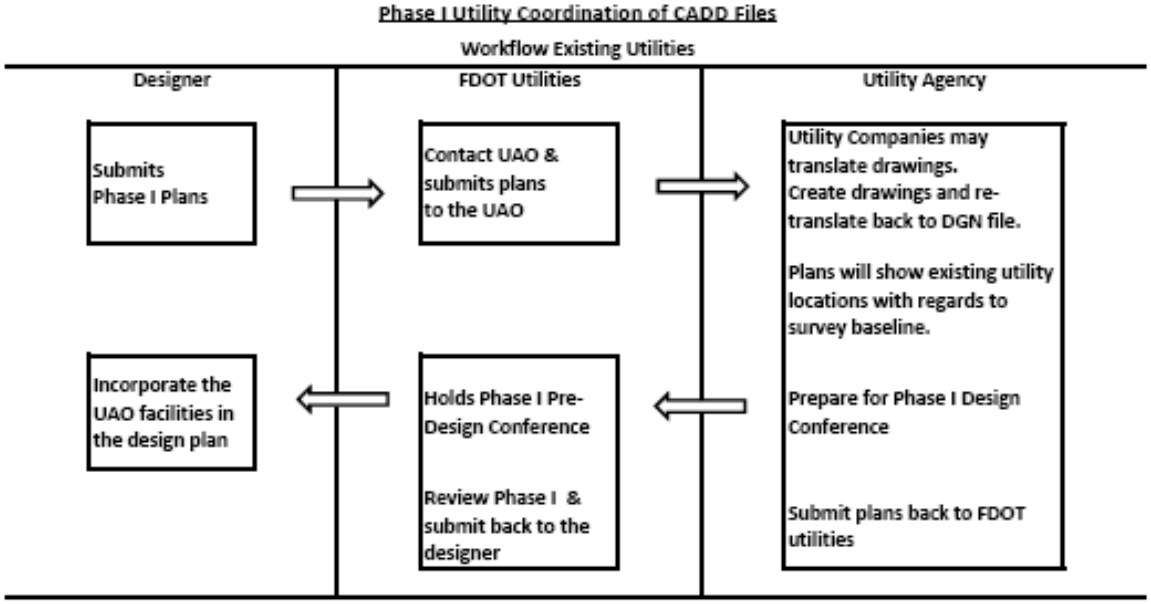
➢ ***ASCII Input File***

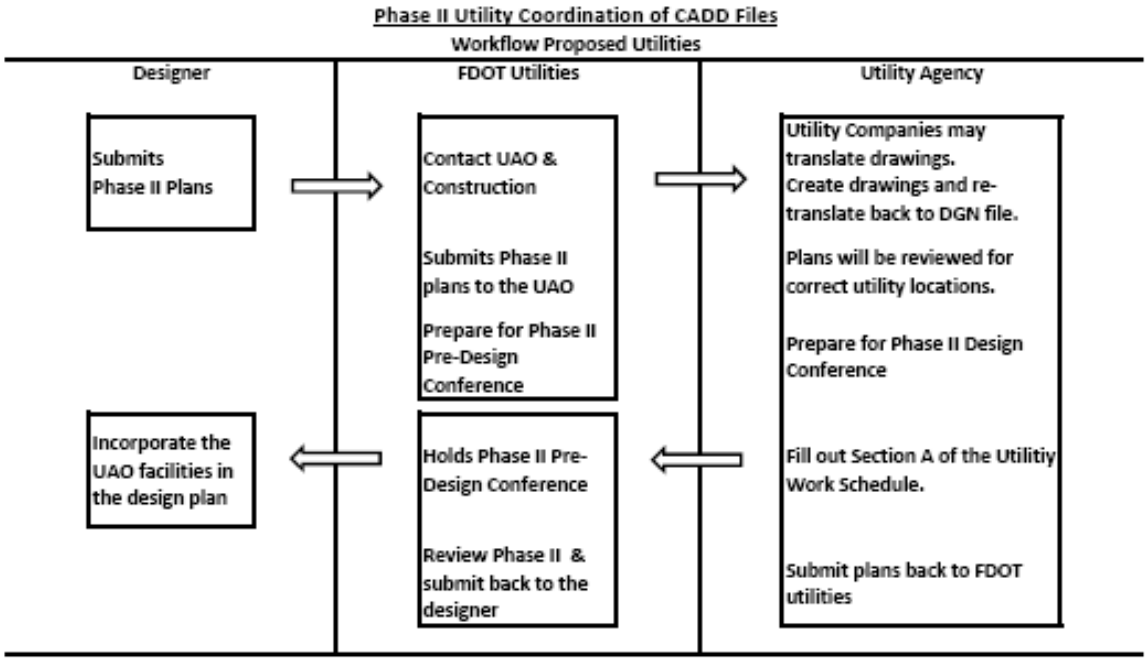
The second option is the ASCII file that can be created from existing or proposed utilities. The ASCII file format will be either LandXML or GEOPAK input format for Station/Offset/Elevation or Northing/Easting/Elevation (State Plane coordinates). These files must contain information pertinent to the location of the utility, as well as the type of utility and where it is located referenced to the (survey baseline) alignment or state plane coordinates.

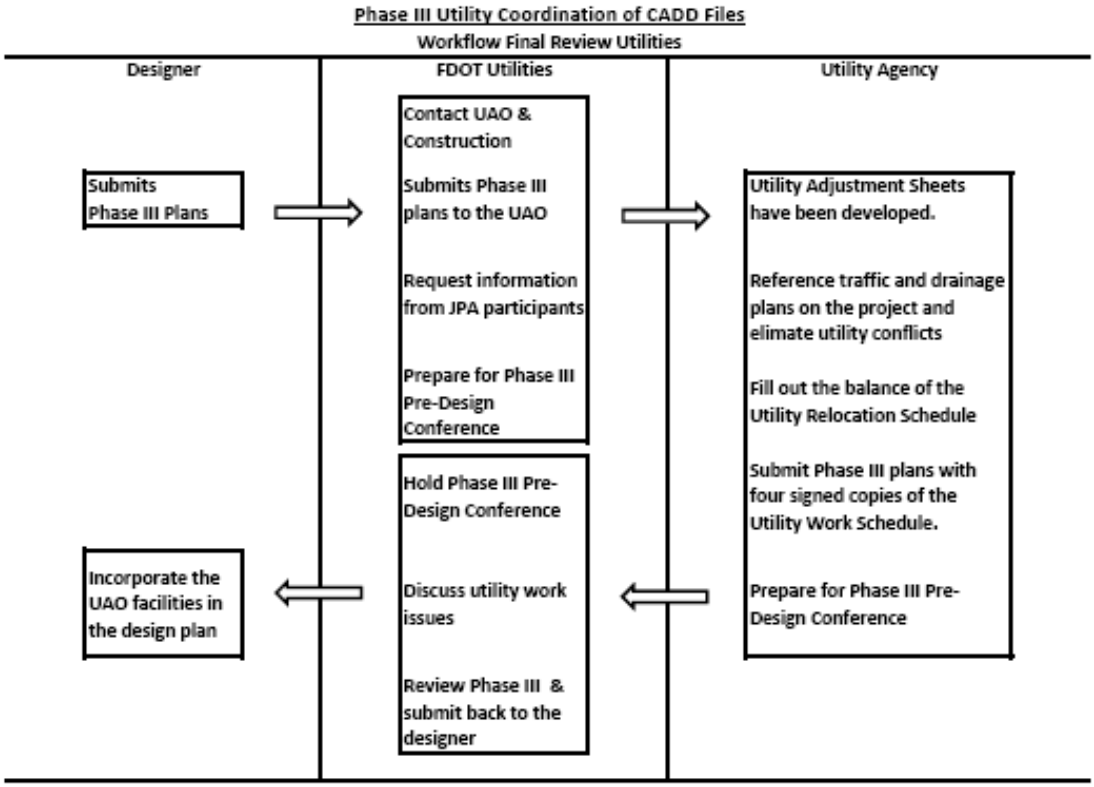
➢ ***Geographic Information System (GIS) File***

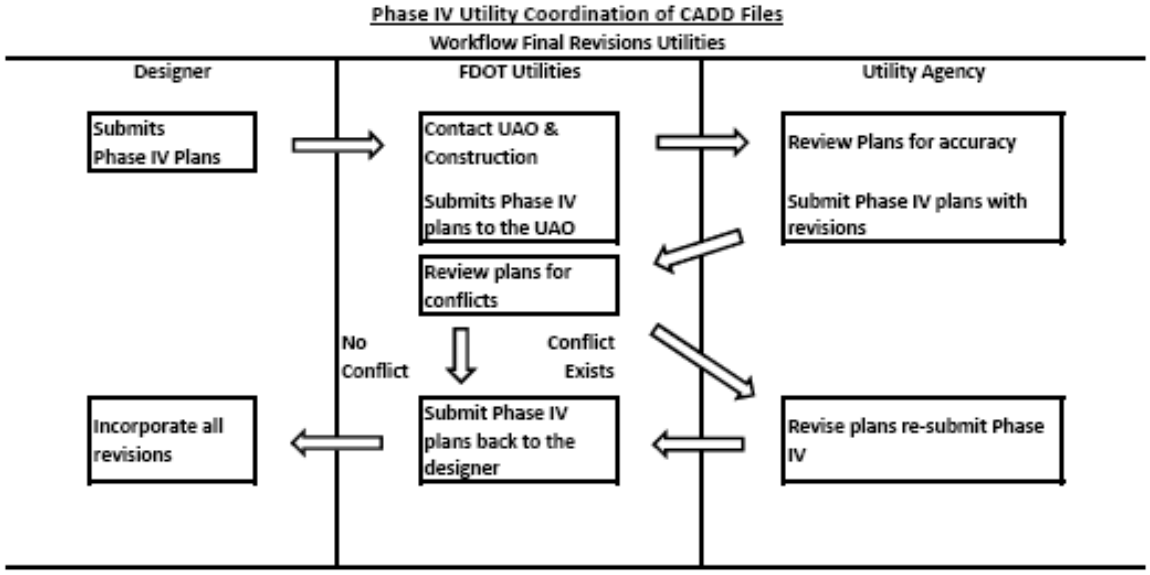
In the event that a UAO maintains a GIS database of utility data, that data may be exchanged in GIS shape files.

4.13.10.2 Utility Coordination









Exchange of Design Files

After the Department's District Utilities Office (via Utility Coordinator) has received the current phase submittal from the Designer, they must contact the involved utilities and notify them of the phase submittal. The UAO will then receive the phase documents from the Department that must contain the Roadway Plans, the necessary CADD files and any Utility Relocation Agreements and Schedules. The required electronic files include the proposed roadway design; the existing topography, the existing and proposed R/W and the existing utilities gathered from the survey and previously supplied data.

No editing of any files provided by the Department will be accepted. The UAO will be placing data into newly created files. File naming standards must be maintained at all times.

4.13.10.4 Standard File Names

The Department utilizes standard naming conventions for all of its files and provides automated tools that depend on this naming convention. The naming convention confers data information to the downstream customer of the files.

- ***Standard file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ##* =*Sequence number.*

If the Utility work is accomplished by a Highway Contractor as a separate contract (UWHC plans), the discipline designation for the file name is "UW".

For example, a MicroStation design file for utility adjustment would be named: *utad**uw**01.dgn*.

If the Utility adjustments are included in the Roadway Plan set the discipline designation for the file name is "RD". For example, a utility adjustment file name would be *utad**rd**01.dgn*. See Section 4.17 Roadway Standards for the Utilities Standard File Names defined for use by Roadway Design.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Utilities Component of the Contract Plan Set.

The following table defines the Utility File Names with each file including sequential numbering. Standard model names are also provided.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDPLUW##	default	UWHC Border Sheet Reference File for Plan Sheets	planrd	fdotseed2d.dgn	
5	Borders & Sheets		GNNTUW##	default	UWHC General Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
7	Borders & Sheets		PLANUW##	default	UWHC Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
9	Borders & Sheets		PLPRUW## (UTEXRD##)	default	UWHC Plan & Profile Sheet	plprrd	fdotseed2d.dgn	fdotmaster.dwt
10	Borders & Sheets		PROFUW##	default	UWHC Profile Sheet	plprrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		CLIPUW##	default	UWHC Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPLUW##	default	UWHC Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Clipping		MTPRUW##	default	UWHC Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
	Existing Topography		TOPOUW##	default	UWHC Topography - Existing (No Utilities or Drainage included)	topord	fdotseed2d.dgn	survey.dwt
1	Key Sheets		KEYSUW##	default	UWHC Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt
	Proposed Design		DSPFUW##	default	UWHC Proposed Profile	plprrd	fdotseed2d.dgn	fdotmaster.dwt
2	Proposed Design		SIGNUW##	default	UWHC Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
	Proposed Design		TEXTUW##	default	UWHC Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
3	Summary Boxes - Tables		CESSUW##	default	UWHC Summary of Pay Items Sheets	planrd	fdotseed2d.dgn	planrd.dwt
4	Summary Boxes - Tables		TABQUW##	default	UWHC Tabulation of Quantity Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
8	Utilities		UTADUW## (UTADRD##)	default	UWHC Utility Adjustment Sheet	utadrd	fdotseed2d.dgn	utadrd.dwt
11	Utilities		UTDTUW##	default	UWHC Special Details	open	fdotseed2d.dgn	fdotmaster.dwt
	Utilities	X	UTEXUW## (UTEXRD##)	default	UWHC Utilities – Existing	utexrd	fdotseed2d.dgn	survey.dwt

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Utilities	X	UTPRUW## (UTPRRD##)	default	UWHC Utilities – Proposed	utprrd	fdotseed2d.dgn	utprrd.dwt
6	Verified Utilities		SBVHUW##	default	UWHC Summary of Verified Utilities (2D)	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Verified Utilities	X	UTVHUW##	default	UWHC Survey of Verified Utilities (3D version of UTEXRD.dgn)	utexrd	fdotseed3d.dgn	survey.dwt

4.13.10.5 Utility Work by Highway Contractor Agreement Plans

Major highway construction elements such as pavement areas, bridges, drainage structures, right of way, lane widths, control of access limits and highway-straight-line numbers should appear in the Utility Work by Highway Contractor Agreement Plans.

The Department's plans marked by the UAO will use the following color code:

- ***Red:*** Existing utilities either (a) To be removed or relocated horizontally or (b) to be placed out-of-service (deactivated) but left in place.
- ***Green:*** Existing utilities to remain in place with no adjustment.
- ***Brown:*** Either (a) Existing utilities to be adjusted vertically but to remain in the same horizontal alignment, or (b) Completely new utilities to be installed.

One set of the plans should be returned to the Department with each copy of the Utility Agreement.

4.13.10.6 ASCII Files of Utility Data

ASCII Files of utility data are to be exchanged in the LandXML format which is ubiquitous with most civil design and GIS software. Information about LandXML can be found at: http://www.LandXML.org.

➢ ***The File Naming Convention for this ASCII files must be:***

- *utilex##.xml* for Existing Utilities
- *utilpr##.xml* for Proposed Utilities

➢ ***Alternately, ASCII files of Utility Data File Naming Convention must be:***

- *utilex##.inp* for Existing Utilities. Note the *inp* extension for GEOPAK input
- *utilpr##.inp* for Proposed Utilities. Note the *inp* extension for GEOPAK input

Where ## will be a sequencing number (01, 02, 03, etcetera).

Each electronic ASCII report file must be stored on media according to the Department's CADD Deliverable Standards. If the provider does not have capability to deliver in LandXML format, a GEOPAK Input format file will also be an acceptable substitute. When delivery is made in GEOPAK Input format, the ASCII report must be accompanied by a printed hardcopy.

4.13.10.7 Utility Scanned Images

If the Utilities are handled through a Joint Utility Agreement and electronic files are not provided to the District for the Utility plans, the paper plans must be scanned. The format must be a published format with a minimum resolution of 300DPI. The required formats are PDF or Group 4 TIFF.

4.13.11 *Drainage Standards*

The purpose of this chapter is to provide CADD Standards for the Department's projects generated by Roadway Design and Drainage Design. (See also Section 4.18 of this Chapter for Roadway Standards)

4.13.11.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

The following table defines the Drainage File names with each file including sequential numbering. Standard model names are also provided. Since most Drainage files are shared with Roadway, the two groups must coordinate the creation and ownership of these files.

See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule. Sheet Order reflects placement within the Roadway Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Borders & Sheets		BDDMRD##	default	Border Sheet Reference File for Drainage Map Sheet	planrd	fdotseed2d.dgn	
25	Borders & Sheets		LDPRRD##	default	Lateral Ditch Plan / Profile Sheet	plprrd	fdotseed2d.dgn	fdotmaster.dwt
22	Cross Sections	X	DRXSRD##	rdxsrd Pattrd Xsshrd Rdxsrd_shg	Drainage Structure Cross Sections Drainage Structure Pattern Lines Drainage Structure Shapes Drainage Structure Cross Section Sheets	drxsrd	fdotseedxs.dgn	fdotmaster.dwt
26	Cross Sections	X	LDXSRD##	Rdxsrd Pattrd Xsshrd Rdxsrd_shg	Lateral Ditch XSections, Pattern Line & Shapes Lateral Ditch Pattern Lines Lateral Ditch Shapes Lateral Ditch Cross Section Sheets	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
30	Cross Sections	X	PDXSRD##	rdxsrd Pattrd Xsshrd Rdxsrd_shg	Pond Cross Sections Pond Pattern Lines Pond Shapes Pond Cross Section Sheets	pdxsrd	fdotseedxs.dgn	fdotmaster.dwt
27	Drainage		DRDTRD##	default	Drainage Detail Sheet	drdtrd	fdotseed2d.dgn	fdotmaster.dwt
	Drainage		DREXRD##	default	Drainage Structures - Existing	drexrd	fdotseed2d.dgn	fdotmaster.dwt
6	Drainage		DRFLRD##	default	Drainage Flood Data Form	drprrd	fdotseed2d.dgn	fdotmaster.dwt
4	Drainage		DRMPRD##	default	Drainage Map	drmprd	fdotseed2d.dgn	fdotmaster.dwt
10	Drainage		DROMRD##	default	Drainage Optional Materials Tabulation	planrd	fdotseed2d.dgn	fdotmaster.dwt
	Drainage	X	DRPRRD##	default	Drainage Structures - Proposed	drprrd	fdotseed2d.dgn	fdotmaster.dwt
28	Proposed Design		PDPLRD##	default	Pond Design	drprrd	fdotseed2d.dgn	fdotmaster.dwt
41	Proposed Design		SWPPRD##	default	Storm Water Pollution Prevention Plan	plprrd	fdotseed2d.dgn	swpprd.dwt
	Proposed Design		TEXTDR##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
52	Proposed Design		WETLRD##	default	Wetlands Delineation for Drainage	planrd	fdotseed2d.dgn	fdotmaster.dwt
5	Summary Boxes /Tables		BRHYRD##	default	Bridge Hydraulics Recommendation Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
23	Summary Boxes /Tables		BXCLRD##	default	Box Culvert Wing wall Design and Special Details	drdtrd	fdotseed2d.dgn	fdotmaster.dwt
9	Summary Boxes /Tables		SUMDRD##	default	Summary of Drainage Structures	planrd	fdotseed2d.dgn	fdotmaster.dwt

4.13.11.2 File Sharing and Merging

Every project utilizes the standard folder structure regardless of the project requirements. Data for each discipline is maintained in its sub-folder. If a discipline requires information from another discipline, the needed file(s) must be referenced from the original folder, not copied.

4.13.11.3 Resource Files

CADD provides software resources for Drainage plans preparation using GEOPAK and Civil 3D. Some Districts utilize other Drainage analysis and design applications, such as Automated Storm Sewer Analysis and Design (ASAD). The Drainage databases produced by drainage design applications must be delivered with the project.

4.13.11.4 Engineering Data

The Drainage discipline folder contains the additional sub-folder named \eng_data\ designated to contain the following:

- Image files of the plan sheets for the drainage design, if applicable
- Quality Control Reports
- Engineering Data output files including Drainage network(s) LandXML as applicable
- Drainage Reports, including drainage databases used for reports
- All supplemental hand calculations (scanned and saved in PDF format)
- Other data pertinent to the overall drainage design

4.13.11.5 Packaging

Listed below are files created by Roadway that are to be treated as Drainage files:

- **DRDTRD##.DGN -** Drainage Detail Sheets
- **DREXRD##.DGN -** Drainage Existing Structures
- **DRFLRD##.DGN -** Flood Data Form
- **DRMPRD##.DGN -** Drainage Map, if required in the PPM) included in the final submittal
- **DRPRRD##.DGN -** Drainage Proposed Structures
- **DRXSRD##.DGN -** Drainage Structure Cross Sections
- **SUMDRD##.DGN -** Summary of Drainage Structures

4.13.12 *Survey Standards*

This chapter describes the minimum CADD requirements for Survey CADD operations.

4.13.12.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

The following table defines the Survey file names with each file including sequential numbering. Standard model names are also provided; however, it is not mandatory to use more than the default model.

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Roadway Component of the Contract Plan Set.

Sheet Order	File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Drainage	X	DREXRD##	default	Drainage Structures - Existing	drexrd	fdotseed2d.dgn	fdotmaster.dwt
	Existing DTM		GDTMRD##	default	Digital Terrain Model / TIN Model - 3D	gdtmrd	fdotseed3d.dgn	survey.dwt
	Existing Topography	X	TOPORD##	default	Topography - Existing	topord	fdotseed2d.dgn	survey.dwt
32	Existing Topography		TREERD##	default	Tree Survey Sheet	topord	fdotseed2d.dgn	survey.dwt
	Existing Utilities	X	UTEXRD##	default	Utilities - Existing	utexrd	fdotseed2d.dgn	survey.dwt
48	Project Control		CTLSRD##	default	Project Control Sheets	planrd	fdotseed2d.dgn	ctlsrd.dwt
	Survey Development	See note below	SURVRD##	default	Survey Development Model for 3D Design	survrd	fdotseed3d.dgn	survey.dwt
	Verified Utilities	X	UTVHRD##	default	Survey of Verified Utilities (3D version of UTEXRD.dgn)	utexrd	fdotseed3d.dgn	survey.dwt

Note The SURVRD file is a critical file for MicroStation SS4 Corridor Modeling (3D) projects only.

4.13.12.2 Level/Layer and Symbology Standards

Symbology Standards that apply to the Department's 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 Standard Rules which are associated to each valid Standard Filename of each Discipline for the purpose of performing the Quality Control check for the Department's Standards compliancy of each Project design file. Appendix A provides a listing of all Department CADD Standard Rules with associated Levels and Symbology.

4.13.12.3 FDOT Standard Field Survey Zones for Points & Linear Features / Figures

Zone	Points / Chains	Description
Zone 1	Topo/DTM	Pavement, Sidewalks, Trees, Fences, Buildings, Signs, etc.
Zone 2	Drainage	Drainage Structures, Culverts, Inlets, End Walls, etc.
Zone 3	Utilities	Poles, Service Cabinets, Man Holes, Aerial and Underground Utilities, etc.
Zone 4	Aerial Structure	Superstructures, Bridges and Railroad Overpasses
Zone 5	Primary-Secondary Control Baseline Control (BLC)	Horizontal and Vertical Project Control, Traverse Line and Points
Zone 6	Monumentation Reference Lines, Baseline Survey Field (BL)	Alignment, Property and Boundary Ties (Found or Set)
Zone 7	Cross Section	Check Cross Section Point and Chains to verify DTM
Zone 8	*[User Defined]*	
Zone 9	Mapping Features	Featurized Mapping Elements (Points or Chains)

4.13.12.4 Utility Quality Levels

Chapter 556, F.S. incorporate locates as described in the 1999 Utility Accommodation Manual (UAM), Section 11.3 Locates. These are no longer described in the UAM.

The following identifies the level of utility locates in ascending order:

- Level “D” -Existing Records
- Level “C” -Surface Visible Feature Survey
- Level “B” -Designating
- Level “A” –Locating

Level “D” locates are information obtained solely from a review of utility records. The comprehensiveness and accuracy of such information is highly limited. Even when existing information for a utility in a particular area is accurate, there are often other underground systems that are not shown on any records. Level “D” may be appropriate for use early in the development of a project to determine the presence of utilities.

Level “C” locates are information obtained to augment Level “D” information. This involves topographic surveying of visible, above ground utility features such as poles, hydrants, valve boxes, circuit breakers, etc. Level “C” may be appropriately used early in the development of a project and will provide better data than Level “D” information alone. Designers can not be sure their design is appropriate nor can construction proceed without caution when using information for underground utilities that is based only on Level “D” and “C” locates.

Level “B” locates are information obtained through the use of designating technologies (e.g. geophysical prospecting technologies). This is an application using scanning technologies, most of which have very specific capabilities and limitations that vary with site conditions. Applying a variety of techniques is essential to the process of preparing a comprehensive horizontal map of utilities and other underground structures on the site. Designating technologies are capable of providing reasonable horizontal information but provide limited vertical information.

Level “A” locates provide the highest level of accuracy of utility locations in three dimensions. This level may apply manual, mechanical or nondestructive (e.g., vacuum excavation) methods to physically expose utilities for measurement and data recording. Levels “B”, “C”, and “D” locates are incorporated in Level “A” locates. The designer should obtain Level “A” locates at highway/utility conflict points where verified information is necessary.

4.13.12.5 FDOT Standard Survey Feature Codes

Features are not limited to one * *Field Survey Zone*.

Survey Feature Codes – Link to an Excel spreadsheet for your use.

For Current Updates see CADD Manual in Reference to FDM

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
L	AC	1	PavtAsphaltCrown_ep	Asphalt Pavement Crown
L	AGF	1	AgricultField_ep	Agricultural Field or Farmland (Not Groves or Orchards)
L	AGV	3	VaultsAG_ep	Vaults Above Grade
L	AP	1	PavtAsphalt_ep	Asphalt Pavement Edge
L	APRS	1	Bridge_ep	Bridge Approaches and Slabs
L	ARST	1	ArchSite_ep	Archeological Site
L	ATTN	1	Attenuator_ep	Attenuation Systems
L	BARW	1	WallBarrier_ep	Barrier Wall Dividing Traffic (All Types)
L	BAS	2	Basins_ep	Sediment Basin, Retention Ponds
L	BCATVA	3	CATVBurB_ep	Cable TV Line Quality Level A Locate (Buried)
L	BCATVB	3	CATVBurB_ep	Cable TV Line Quality Level B Locate (Buried)
L	BCATVC	3	CATVBurC_ep	Cable TV Line Quality Level C Locate (Buried)
L	BCATVD	3	CATVBurD_ep	Cable TV Line Quality Level D Locate (Buried)
L	BGV	3	VaultsBG_ep	Vaults Below Grade
L	BL	6	BLSurveyField_ep	Baseline Survey Field (Calculated from BLC)
L	BLC	5	BLSurveyCntrl_ep	Baseline Survey Control
L	BLDG	1	Building_ep	Buildings
L	BNK	1	BankMent_ep	Embankment (Manmade, Top or Bottom)
L	BOH	1	BuildingOH_ep	Building Roof Overhang (Encroachments)
L	BPWRA	3	ElecBurB_ep	Electrical Quality Level A Locate (Buried)
L	BPWRB	3	ElecBurB_ep	Electrical Quality Level B Locate (Buried)
L	BPWRC	3	ElecBurC_ep	Electrical Quality Level C Locate (Buried)
L	BPWRD	3	ElecBurD_ep	Electrical Quality Level D Locate (Buried)
L	BRCK	1	PavtBrick_ep	Brick Pavement Edge (Roadways and Sidewalks)
L	BRDG	4	BridgeEle_ep	Bridge Elements
L	BSECA	3	ElecBurSecB_ep	Conductor (Secondary Distribution) Quality Level A Locate (Buried)
L	BSECB	3	ElecBurSecB_ep	Conductor (Secondary Distribution) Quality Level B Locate (Buried)
L	BSECC	3	ElecBurSecC_ep	Conductor (Secondary Distribution) Quality Level C Locate (Buried)
L	BSECD	3	ElecBurSecD_ep	Conductor (Secondary Distribution) Quality Level D Locate (Buried)
L	BSTP	1	BusStop_ep	Bus Stop (Chain for Larger Structures)
L	BTA	3	TeleBurB_ep	Telephone (All Sizes) Quality Level A Locate (Buried)
L	BTB	3	TeleBurB_ep	Telephone (All Sizes) Quality Level B Locate (Buried)
L	BTC	3	TeleBurC_ep	Telephone (All Sizes) Quality Level C Locate (Buried)
L	BTD	3	TeleBurD_ep	Telephone (All Sizes) Quality Level D Locate (Buried)
L	BTDA	3	TeleBurDB_ep	Telephone, DUCT (All Sizes) Quality Level A Locate (Buried)
L	BTDB	3	TeleBurDB_ep	Telephone, DUCT (All Sizes) Quality Level B Locate (Buried)

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
L	BTDC	3	TeleBurDC_ep	Telephone, DUCT (All Sizes) Quality Level C Locate (Buried)
L	BTDD	3	TeleBurDD_ep	Telephone, DUCT (All Sizes) Quality Level D Locate (Buried)
L	BTTA	3	TeleBurTB_ep	Telephone, TOLL (All Sizes) Quality Level A Locate (Buried)
L	BTTB	3	TeleBurTB_ep	Telephone, TOLL (All Sizes) Quality Level B Locate (Buried)
L	BTTC	3	TeleBurTC_ep	Telephone, TOLL (All Sizes) Quality Level C Locate (Buried)
L	BTTD	3	TeleBurTD_ep	Telephone, TOLL (All Sizes) Quality Level D Locate (Buried)
L	BXC	2	BoxCulvert_ep	Box Culverts
L	CAN	1	Canal_ep	Canal, Lock
L	CAPA	3	ElecCAPA_ep	Capacitors (Aerial)
L	CAPB	3	ElecCAPB_ep	Capacitors (Buried)
L	CATV	3	CATVAer_ep	Cable TV Line (Aerial)
L	CATVCA	3	CATVCondBurB_ep	Cable TV Conduit System Quality Level A Locate (Buried)
L	CATVCB	3	CATVCondBurB_ep	Cable TV Conduit System Quality Level B Locate (Buried)
L	CATVCC	3	CATVCondBurC_ep	Cable TV Conduit System Quality Level C Locate (Buried)
L	CATVCD	3	CATVCondBurD_ep	Cable TV Conduit System Quality Level D Locate (Buried)
L	CB	2	CatchBasin_ep	Catch Basins
L	CBR	1	CableBarrier_ep	Cable Barrier
L	CCR	1	CurbRamp_ep	Curb Cut Ramp
L	CEM	1	Cemetery_ep	Cemetery, Grave Outlines
L	CG	1	CGep_ep	Curb / Curb and Gutter (at EP & FL)
L	CGB	1	CGBack_ep	Curb and Gutter (Back)
L	CGF	1	CGFace_ep	Curb and Gutter (Face)
L	CINL	2	InletCurb_ep	Curb Inlets
L	CLC	6	CLConst_dp	Centerline (Proposed Construction)
L	CNPY	1	Canopy_ep	Shelters of All Kinds (Gas Station, Toll Plaza, Etc.)
L	COE	1	WetlandCOE_ep	Unitied States Army Corps of Engineers (COE) Wetlands (Marsh or Swamp)
L	COL	9	GovCountyLine_ep	Government: County Line
L	CONV	1	Conveyor_ep	Conveyor Belt Systems (All Types) (Industrial, Agricultural, etc.)
L	CPVC	1	PavtConcreteCrown_ep	Concrete Pavement (Crown)
L	CPVJ	1	PavtConcJoints_ep	Concrete Pavement (Joints)
L	CPVT	1	PavtConcrete_ep	Concrete Pavement (Edges)
L	CRW	1	CurbRampWarning_ep	Detectable Warnings on Curb Ramps
L	CSL	1	ConcSlabs_ep	Concrete Slabs
L	CYL	9	GovCityLimitLine_ep	Government: City Limit Line
L	DECK	1	Deck_ep	Deck / Porch
L	DEP	1	WetlandDEP_ep	Water Management Districts (WMD) & Florida Department of Environmental Protection (DEP) Wetlands
L	DFL	2	FlowLine_ep	Ditch Flow Line Direction (Ditches, Swells, etc.)
L	DOCK	1	Docks_ep	Docks and Wharfs
L	DRIP	1	TreeDripLine_ep	Tree Drip Line for Delineating Root Systems
L	DRNB	2	InletBottom_ep	Drainage Structure Bottoms
L	DRNP	2	DrainPipes_ep	Drainage Pipes and Spouts

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
L	DTCH	2	Ditch_ep	Ditch (Top, Bottom and Flow Lines)
L	DTCHI	2	InletDBI_ep	Ditch Bottom Inlet
L	DTCHP	2	DitchPavt_ep	Ditch Pavement
L	DUCTA	3	ConduitB_ep	Utility Conduit & Encasements Quality Level A Locate
L	DUCTB	3	ConduitB_ep	Utility Conduit & Encasements Quality Level B Locate
L	DUCTC	3	ConduitC_ep	Utility Conduit & Encasements Quality Level C Locate
L	DUCTD	3	ConduitD_ep	Utility Conduit & Encasements Quality Level D Locate
L	DUMB	1	DummyChains_ep	Dummy Chains
L	DWY	1	Driveway_ep	Driveway (Drive, Lane, Turnouts)
L	ECP	3	ElecMultiCtrl_ep	Electric Control Panel (Large Panels with Multiple Controls)
L	ELECS	3	ElecServBox_ep	Electrical Service Box (Large)
L	EM	1	WetlandEM_ep	Edge of Mangrove
L	ESL	1	EndangeredL_ep	Endangered Species Line
L	ESMT	9	EaseLine_ep	Easement Lines
L	EXIST	1	DTMBoundary_ep	Digital Terrain Model (DTM) Boundary
L	FES	2	EndTreatFES_ep	Flared End Section
L	FMA	3	SanitaryFM_B_ep	Sanitary Force Main (All Sizes) Quality Level A Locate
L	FMB	3	SanitaryFM_B_ep	Sanitary Force Main (All Sizes) Quality Level B Locate
L	FMC	3	SanitaryFM_C_ep	Sanitary Force Main (All Sizes) Quality Level C Locate
L	FMD	3	SanitaryFM_D_ep	Sanitary Force Main (All Sizes) Quality Level D Locate
L	FNC	1	Fence_ep	Fence (All Types)
L	FO	3	FOTAer_ep	Fiber Optics Telephone (Aerial) (Size Unknown)
L	FOC	3	FOCAer_ep	Fiber Optics Cable (Aerial)
L	FOCUA	3	FOCBurB_ep	Fiber Optics Cable Quality Level A Locate (Buried)
L	FOCUB	3	FOCBurB_ep	Fiber Optics Cable Quality Level B Locate (Buried)
L	FOCUC	3	FOCBurC_ep	Fiber Optics Cable Quality Level C Locate (Buried)
L	FOCUD	3	FOCBurD_ep	Fiber Optics Cable Quality Level D Locate (Buried)
L	FOP	3	FOEAer_ep	Fiber Optics Electrical (Aerial)
L	FOPUA	3	FOEBurB_ep	Fiber Optics Electrical Quality Level A Locate (Buried)
L	FOPUB	3	FOEBurB_ep	Fiber Optics Electrical Quality Level B Locate (Buried)
L	FOPUC	3	FOEBurC_ep	Fiber Optics Electrical Quality Level C Locate (Buried)
L	FOPUD	3	FOEBurD_ep	Fiber Optics Electrical Quality Level D Locate (Buried)
L	FOTVUA	3	FOTVBurB_ep	Fiber Optics Television Quality Level A Locate (Buried)
L	FOTVUB	3	FOTVBurB_ep	Fiber Optics Television Quality Level B Locate (Buried)
L	FOTVUC	3	FOTVBurC_ep	Fiber Optics Television Quality Level C Locate (Buried)
L	FOTVUD	3	FOTVBurD_ep	Fiber Optics Television Quality Level D Locate (Buried)
L	FOUA	3	FOTBurB_ep	Fiber Optics Telephone Quality Level A Locate (Buried) (Size Unknown)
L	FOUB	3	FOTBurB_ep	Fiber Optics Telephone Quality Level B Locate (Buried) (Size Unknown)
L	FOUC	3	FOTBurC_ep	Fiber Optics Telephone Quality Level C Locate (Buried) (Size Unknown)
L	FOUD	3	FOTBurD_ep	Fiber Optics Telephone Quality Level D Locate (Buried) (Size Unknown)
L	FUSE	3	ElecFuse_ep	Fuses

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
L	GASA	3	GasB_ep	Gas Line (All Sizes) Quality Level A Locate
L	GASB	3	GasB_ep	Gas Line (All Sizes) Quality Level B Locate
L	GASC	3	GasC_ep	Gas Line (All Sizes) Quality Level C Locate
L	GASD	3	GasD_ep	Gas Line (All Sizes) Quality Level D Locate
L	GBRK	1	GroundBrkLine_ep	Ground Break Line (Not Slopes or Embankments)
L	GI	2	InletGutter_ep	Gutter Inlets (All Types)
L	GOLF	1	Golf_ep	Golf Course Features (All Types)
L	GRDBL	1	GuardrailDbl_ep	Guardrail Double Face
L	GRL	1	GuardrailLt_ep	Guardrail Left
L	GRR	1	GuardrailRt_ep	Guardrail Right
L	GRT	2	DrainGrate_ep	Metal Drainage Grate within Concrete Structure
L	GRTL	9	GovGrantLine_ep	Government: Grant Line
L	GRV	1	TreeLineGrove_ep	Groves & Orchards (Boundary)
L	GS	1	GlareScrn_ep	Glare Screen & Blinds
L	GT	1	Gates_ep	Gates
L	GTM	3	GasTestMisc_ep	Gas Test & Miscellaneous
L	GYS	3	GuyWireSpan_ep	Span Guys
L	HED	1	ShrubHedge_ep	Hedges and Shrubs (Boundary)
L	HNDRL	1	Railing_ep	Railings (All Types); Piperail, Guiderail, Handrail Used for Pedestrian and Bicycles
L	HVL	3	ElecAerHVL_ep	High Voltage Transmission Lines
L	ITFCA	1	ITSFiberCableB_ep	Intelligent Transportation System (ITS) Fiber Cable Quality Level A Locate (Buried)
L	ITFCB	1	ITSFiberCableB_ep	Intelligent Transportation System (ITS) Fiber Cable Quality Level B Locate (Buried)
L	ITFCC	1	ITSFiberCableC_ep	Intelligent Transportation System (ITS) Fiber Cable Quality Level C Locate (Buried)
L	ITFCD	1	ITSFiberCableD_ep	Intelligent Transportation System (ITS) Fiber Cable Quality Level D Locate (Buried)
L	JB	2	DrainJnctBox_ep	Drainage Junction Box
L	LARW	9	LARWLine_ep	Limited Access Right of Way Lines
L	LARWP	9	LARWLine	Limited Access Right of Way Lines
L	LL	1	LaneLine_ep	Lane Lines - Delineates Travel Lanes
L	LMB	4	LowBrdgMemb_ep	Low Members of Bridge
L	LOTLN	9	GovLotLine_ep	Government: Lot Line
L	LV	1	SlopesLevee_ep	Levees, Dikes, or Dams (Top or Bottom)
L	MAINT	9	MaintLine	Maintenance Line
L	MAR	1	WetlandMAR_ep	Edge of Wetlands (Marsh or Swamp)
L	MEDI	2	InletMedian_ep	Median Inlets
L	MEDRL	9	GovMeanderLine_ep	Government: Meander Line
L	MES	2	EndTreatMES_ep	Mitered End Section
L	MHWL	9	MHWL_TIITF_Line	TIITF:Mean / Ordinary High Water Lines
L	MISC	1	TopoMisc_ep	Topography (Miscellaneous)
L	MP	1	PavtMisc_ep	Pavement Parking Lot/Guardrail/Miscellaneous Pavement
L	MS	1	SignMulti_ep	Multi-column Sign (Large Sign)

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
L	MURPHY	9	Murphy_TIITF_Line	TIITF: Upland TIITF:Murphy Reservations Lines
L	NPWLA	3	WaterNP_B_ep	Non-Potable Water Line (All Sizes) Quality Level A Locate
L	NPWLB	3	WaterNP_B_ep	Non-Potable Water Line (All Sizes) Quality Level B Locate
L	NPWLC	3	WaterNP_C_ep	Non-Potable Water Line (All Sizes) Quality Level C Locate
L	NPWLD	3	WaterNP_D_ep	Non-Potable Water Line (All Sizes) Quality Level D Locate
L	NSPF	9	GovParkLine_ep	Government: National or State Park or Forest Line
L	OBSC	1	AreaObscured_ep	Obscured Area
L	PAVBRK	1	PavtBreak_ep	Pavement Slope Break Line
L	PCULV	2	PipeCulvert_ep	Pipe Culvert
L	PE	9	EasePerpLine	Easement Lines (Perpetual)
L	PETROA	3	Oil_B_ep	Oil Line (All Sizes) Quality Level A Locate
L	PETROB	3	Oil_B_ep	Oil Line (All Sizes) Quality Level B Locate
L	PETROC	3	Oil_C_ep	Oil Line (All Sizes) Quality Level C Locate
L	PETROD	3	Oil_D_ep	Oil Line (All Sizes) Quality Level D Locate
L	PILE	1	PilingColumn_ep	Pilings and Columns (All Types)
L	PIPENA	3	PipeEncaseB_ep	Pipe Encasements Quality Level A Locate
L	PIPENB	3	PipeEncaseB_ep	Pipe Encasements Quality Level B Locate
L	PIPENC	3	PipeEncaseC_ep	Pipe Encasements Quality Level C Locate
L	PIPEND	3	PipeEncaseD_ep	Pipe Encasements Quality Level D Locate
L	PLNT	1	LandscapeBordr_ep	Landscape Planter Structures and Areas
L	PMPIS	1	PumpIsland_ep	Pump Island
L	PMRK	1	PMRK_ep	Pavement Markings (Exclude Travel Lanes)
L	POOL	1	Pools_ep	Pools and Fountains (Not Ponds) (All Types)
L	PRI	3	ElecAerPri_ep	Conductors (Primary Distribution) (Aerial)
L	PROP	9	PropertyLine_ep	Property Lines
L	PWR	3	ElecAer_ep	Electrical Conductors (Distribution & Transmission) (Aerial)
L	QQTRS	9	GovQtrQtrLine_ep	Government: Quarter / Quarter Section Line
L	QTRS	9	GovQuarterLine_ep	Government: Quarter Section Line
L	RAMP	1	AccessRamp_ep	Accessible Ramps (Buildings, Docks, Sidewalks, etc.) (Not Curbs)
L	RD	1	Trail_ep	Roadway, Trail (Unpaved)
L	REFL	6	RefPtLine	Survey Reference Point Line / Detail (Miscellaneous)
L	RETW	1	WallRetainEarth_ep	Wall Holding Earth (All)
L	RIP	1	RipRap_ep	Rip Rap, Rubble
L	ROW	9	RWLine_ep	Right of Way Lines
L	ROWP	9	RWLine	Right of Way Lines
L	RR	1	RailroadTracks_ep	Railroad Tracks (Rail, Bed)
L	RRCL	1	RRBaseline	Railroad Center Line
L	RRX	1	RailroadXing_ep	Railroad Crossing (Roadway Platforms), Railroad Signal w/ Gate
L	SCT	1	TreeLineScatter_ep	Scattered Trees (Boundary)
L	SE	3	SanitarySewerEff_ep	Sanitary Effluent (Open Channel)
L	SEAW	1	WallSea_ep	Sea Walls

FDOT Survey Feature Codes				
Point /Line	Feature Code	* Field Survey Zone	Level Name	Level Description
L	SEC	3	ElecAerSec_ep	Conductors (Secondary Distribution) (Aerial)
L	SECT	9	GovSectionLine_ep	Government: Section Lines
L	SEW	2	EndTreatSEW_ep	Straight Endwall
L	SGNT	1	SignTrussOH_ep	Trusses and Cantilevers for Overhead Signs
L	SHLDR	1	ShldrPaved_ep	Shoulder Edge (Paved)
L	SLC	3	LiteCond_ep	Street Lighting Conductors
L	SLP	1	Slopes_ep	Natural Slopes (Top or Bottom)
L	SLV	9	SubVacOrigLotLine	Subdivision Vacated or Original Lot Line
L	SMAE	1	SignalSupportExt_ep	Signal Support Mast Arm Extension
L	SPD	2	DrainSpecial_ep	Special Drainage Feature (Describe)
L	SPEW	2	EndTreatSPEW_ep	Special Endwall
L	SPL	2	DrainSpillway_ep	Spillways, Flumes or Scuppers
L	SSA	3	SanitarySewerB_ep	Sanitary Sewer (All Sizes) Quality Level A Locate
L	SSB	3	SanitarySewerB_ep	Sanitary Sewer (All Sizes) Quality Level B Locate
L	SSC	3	SanitarySewerC_ep	Sanitary Sewer (All Sizes) Quality Level C Locate
L	SSD	3	SanitarySewerD_ep	Sanitary Sewer (All Sizes) Quality Level D Locate
L	SSW	1	SpanWire_ep	Signal / Span Wire
L	STCKP	1	StockPile_ep	Stock Piles (All Types) (Dirt, Gravel, Sand, etc.)
L	STEAMA	3	SteamB_ep	Steam Line Quality Level A Locate
L	STEAMB	3	SteamB_ep	Steam Line Quality Level B Locate
L	STEAMC	3	SteamC_ep	Steam Line Quality Level C Locate
L	STEAMD	3	SteamD_ep	Steam Line Quality Level D Locate
L	STL	9	GovStateLine_ep	Government: State Line
L	STP	1	Stairs_ep	Stairways, Steps
L	STRM	1	StreamEdge_ep	Stream Edge
L	STRMC	1	StreamCtr_ep	Stream Center
L	STS	2	StormSewer_ep	Storm Sewer (All Sizes) (Drain Pipes & Spouts)
L	SUBL	9	SubDivLine	Subdivision Line
L	SUEL	9	SUEL_TIITF_Line	DEP:TIITF:Safe Upland Elevation Lines or Jurisdictional Lines established by DEP methodology
L	SW	3	Switchgear_ep	Switchgear and Appurtenances
L	SWK	1	SidewalkFront_ep	Sidewalk (Fronts)
L	SWKB	1	SidewalkBack_ep	Sidewalk (Backs)
L	TEL	3	TeleAer_ep	Telephone Line (Aerial)
L	TELS	3	TeleServBox_ep	Telephone Service Box (Large)
L	TESMT	9	EaseTempLine_ep	Easement Lines (Temporary)
L	TESMTP	9	EaseTempLine	Easement Lines Temporary (Proposed)
L	TFD	1	SignalLoop_ep	Traffic Detector Loops
L	TFSP	1	TrafSeparator_ep	Traffic Separator
L	TMPW	1	TempBarrier_ep	Temporary Barrier Dividing Traffic (All)
L	TRANSA	3	ElecBurPriB_ep	Conductors (Primary Distribution) Quality Level A Locate (Buried)
L	TRANSB	3	ElecBurPriB_ep	Conductors (Primary Distribution) Quality Level B Locate (Buried)

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
L	TRANSC	3	ElecBurPriC_ep	Conductors (Primary Distribution) Quality Level C Locate (Buried)
L	TRANSD	3	ElecBurPriD_ep	Conductors (Primary Distribution) Quality Level D Locate (Buried)
L	TRD	1	Treadle_ep	Treadle, Axle Sensor
L	TWP	9	GovTwpRgeLine_ep	Government:Township and Range Government Survey Line
L	TX	1	PavtTractorXing_ep	Tractor Crossings
L	UD	2	UnderDrain_ep	Underdrains and Cross Drains
L	UEW	2	EndTreatUEW_ep	U-Type Endwall
L	UMISC	3	UtilMisc_ep	Utility Items (Miscellaneous)
L	UNPS	1	ShldrUnpaved_ep	Shoulders (Unpaved)
L	VOID	1	VoidArea_ep	Void Area (No Locations Collected)
L	WALL	1	Wall_ep	Walls
L	WDL	1	TreeLineWoods_ep	Woods Line
L	WEDG	1	WaterEdge_ep	Edge of Water
L	WEW	2	EndTreatWEW_ep	Winged Endwall
L	WLA	3	WaterB_ep	Water Line (All Sizes) Quality Level A Locate
L	WLB	3	WaterB_ep	Water Line (All Sizes) Quality Level B Locate
L	WLC	3	WaterC_ep	Water Line (All Sizes) Quality Level C Locate
L	WLD	3	WaterD_ep	Water Line (All Sizes) Quality Level D Locate
L	XO	1	PavtXover_ep	Crossovers and Detours (Temporary)
L	XSC	7	XSPatternlines_ep	Cross Section Chain
L	YD	2	YardDrain_ep	Yard Drain
P	ACU	1	AirCondition_ep	Air Conditioning Unit
P	AHEAD	1	PMAHEAD_ep	Pavement Marking Symbol - AHEAD
P	ANT	3	Antenna_ep	Antenna
P	AT	6	MonumentAT_ep	Monuments - Aerial Targets
P	BIKE	1	PMBIKE_ep	Pavement Marking Symbol - Bicycle
P	BKRK	1	BikeRack_ep	Bicycle Rack (All Sizes)
P	BN	3	Beacons_ep	Beacons and Path Illumination
P	BNCH	1	Bench_ep	Bench
P	BOL	1	Bollard_ep	Bollard
P	BUOY	1	Buoy_ep	Buoys
P	BUS	1	PMBUS_ep	Pavement Marking Symbol - BUS
P	CATVS	3	CATVMisc_ep	Cable TV Service Box and Miscelleneous, Pole
P	CGD	1	CattleGuard_ep	Cattle Guard
P	CLMT	3	TowerTrans_ep	Transmission Tower (Single Column)
P	CLNO	3	SanitarySewerCLNO_ep	Sanitary Sewer Cleanout
P	CMON	6	MonumentCC_ep	Monuments - Concrete (Cast)
P	CMPST	1	Campstove_ep	Campstove, Grill, Firepit, BBQ
P	CSH	1	Core_ep	Core Sample or Test Hole
P	DEFAULT	1	PointLocator_ep	Point Locator Symbol
P	DEFAULT _POINT	1	PointLocator_ep	Point Locator Symbol

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
P	DF	1	Dolphins_ep	Dolphins and Fenders
P	DH	6	MonumentDH_ep	Monuments - Drill Hole, Plug (Control Monumentation)
P	DLP	1	DelineatorPost_ep	Delineator Post, Metal and Flexible
P	DMP	1	Trash_ep	Dumpster, Trash Disposal
P	DMPS	3	SanitarySewerDSta_ep	Sanitary Sewer Dump Station
P	DRM	6	MonumentDR_ep	Monuments - Deep Rod Mark
P	ELEO	3	ElecOutlet_ep	Electrical Outlet
P	EOI	3	SU_Interupt_ep	Subsurface Utility (End of Interuption)
P	ESP	1	EndangeredP_ep	Endangered Species Point
P	FAU	3	WaterFct_ep	Faucet
P	FC	1	TankUG_ep	Fill Cap (Buried Tank)
P	FH	3	FireHydrant_ep	Fire Hydrant
P	FLD	3	FloodLight_ep	Flood Light
P	FP	1	FlagPole_ep	Flag Pole
P	GA	3	Gauges_ep	Gauges
P	GND	1	GroundShot_ep	Ground Shot for Digital Terrain Model (DTM) Densification (Hard Bottom Soundings)
P	GYA	3	GuyWireAnchor_ep	Guy Anchor
P	GYP	3	GuyWirePole_ep	Guy Pole (Dead-Man)
P	HML	3	Tower_ep	High Mast Lighting Poles or Towers
P	HNDC	1	PMAccessible_ep	Pavement Marking Symbol - Accessible (Handicap)
P	HOLE	1	Hole_ep	Empty Hole Test Hole
P	HUMP	1	PMHUMP_ep	Pavement Marking Symbol - HUMP
P	INCN	1	Furnace_ep	Incinerator, Boiler, or Furnace
P	INV	2	FlowlineInvert_ep	Flow Line or Invert Elevations
P	IRC	6	MonumentIRC_ep	Monuments - 5/8 Rod and Cap
P	ITCP	1	ITSCamera_ep	Intelligent Transportation System (ITS) Closed Caption TV Camera Pole
P	ITPS	1	ITSPwrSupply_ep	Intelligent Transportation System (ITS) Closed Caption TV Power Supply (Wired, Solar, etc)
P	ITVS	1	ITSVehSensor_ep	Intelligent Transportation System (ITS) Vehicle Sensor (Infared)
P	LANE	1	PMLANE_ep	Pavement Marking Symbol - LANE
P	LP	3	Luminaire_ep	Street Light / Pole
P	MBX	1	Mailbox_ep	Mailbox
P	ME	3	MeterElec_ep	Meter (Electric)
P	MERGE	1	PMMERGE_ep	Pavement Marking Symbol - MERGE
P	MEU	3	MeterElecBur_ep	Meter (Electric) (Buried)
P	MG	3	MeterGas_ep	Meter (Gas)
P	MH	3	ManholeUnknown_ep	Manhole (Unknown)
P	MHCATV	3	ManholeCOMM_ep	Manhole (Communications)
P	MHD	2	ManholeSW_ep	Manhole (Storm Water)
P	MHE	3	ManholeElec_ep	Manhole (Electric)
P	MHG	3	ManholeGas_ep	Manhole (Gas)
P	MHS	3	ManholeSS_ep	Manhole (Sanitary Sewer)

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
P	MHT	3	ManholeTel_ep	Manhole (Telephone)
P	MHW	3	ManholeWater_ep	Manhole (Water)
P	MONW	3	WellMon_ep	Well Monitoring, Taps
P	MU	3	MeterUnk_ep	Meter (Unknown)
P	MW	3	MeterWater_ep	Meter (Water)
P	NL	6	MonumentNL_ep	Monuments - Nail, Spike, Pin (Control Monumentation)
P	NOTE	1	TextSurveyLabel	Text Survey Labels
P	OM	6	MonumentOM_ep	Monuments - Other Marker (Control Monumentation)
P	ONLY	1	PMONLY_ep	Pavement Marking Symbol - ONLY
P	OP	1	ShrubOrnamental_ep	Ornamental Plant (Shrub)
P	PHW	1	HazardWaste_ep	Potential Hazardous Waste Site (Old Gas Stations, Dry Cleaners, etc.)
P	PIL	1	PilingPt_ep	Pilings, Piers, or Columns
P	PIP	6	MonumentPIP_ep	Monuments - Metal Pipe, Rod, Bar (Control)
P	PKGM	1	ParkMeter_ep	Parking Meter
P	PLEQ	1	Playground_ep	Playground Equipment
P	PMON	6	MonumentCP_ep	Monuments - Concrete (Poured)
P	PMP	3	PumpNonPet_ep	Pump (Non Petroleum)
P	PMPF	3	Pump_ep	Pump (Petroleum / Fuel)
P	PMPST	3	SanitarySewerPSta_ep	Pump Station (Sanitary Sewer)
P	POST	1	Post_ep	Post or Pole (Not Monument)
P	PP	3	PoleElec_ep	Electrical Pole
P	PPT	3	PoleElecT_ep	Electrical Pole With Transformer
P	PS	1	PedSignal_ep	Pedestrian Signal Unit, Signage
P	PST	6	MonumentPST_ep	Monuments - Post, Stake, Staub (Control Monumentation)
P	QDEL	3	SU_Delineator_ep	Subsurface Utility (Quality Level Delineator)
P	QLA	3	SU_QLA_ep	Subsurface Utility Quality Level A Locate Point
P	QLB	3	SU_QLB_ep	Subsurface Utility Quality Level B Locate Point
P	QLC	3	SU_QLC_ep	Subsurface Utility Quality Level C Locate Point
P	QLD	3	SU_QLD_ep	Subsurface Utility Quality Level D Locate Point
P	QTREW	6	GovQtrSectCnrEW_ep	Government: 1/4 Section Corner E or W
P	QTRNS	6	GovQtrSectCnrNS_ep	Government: 1/4 Section Corner N or S
P	RG	3	GasReg_ep	Gas Regulator
P	RLS	1	PMRLS_ep	Pavement Marking Symbol - Restricted Lane
P	RRMP	1	RailroadMP_ep	Railroad Milepost
P	RRS	1	RailroadSwitch_ep	Railroad Switch
P	RRWS	1	RailroadWarn_ep	Railroad Warning Sign
P	RXR	1	PMRXR_ep	Pavement Marking Symbol - Railroad Crossing (RXR)
P	SAT	6	MonumentSAT_ep	Monuments - Hub and Tac
P	SATD	3	SateDish_ep	Satellite Dish Antenna
P	SCHOOL	1	PMSCHOOL_ep	Pavement Marking Symbol - SCHOOL
P	SGNC	1	SignColumn_ep	Cantilever Sign Column (Large)

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
P	SHP	3	PoleShared_ep	Shared Pole
P	SHPT	3	PoleSharedT_ep	Shared Pole with Transformer
P	SHR	1	Shrub_ep	Shrub, Bush
P	SHRC	1	ShrubConiferous_ep	Shrub (Coniferous)
P	SHRD	1	ShrubDeciduous_ep	Shrub (Deciduous)
P	SHWM	2	WaterSeasHghMrk_ep	Seasonal High Water Mark (Bridges, Drainage Ponds and Trees as marked by Environmental)
P	SIG	1	Signal_ep	Signal Head
P	SIGC	1	SignalControl_ep	Signal Controller
P	SIGNAL	1	PMSIGNAL_ep	Pavement Marking Symbol - SIGNAL
P	SIGP	1	SignalPedestal_ep	Signal on Pedestal
P	SILO	1	Silo_ep	Silo
P	SILT	1	GroundShotSilt_ep	Top Elevation of Muck or Silt (Soft Bottom Soundings)
P	SLOW	1	PMSLOW_ep	Pavement Marking Symbol - SLOW
P	SMA	1	SignalSupport_ep	Signal Supports (Including Mast Arm)
P	SP	3	WaterStandpipe_ep	Standpipe (Water)
P	SPH	1	Sprinkler_ep	Sprinkler Head
P	SPLE	1	ITSFiberSpliceE_ep	Intelligent Transportation System (ITS) Fiber Spliced Enclosure
P	SPLV	1	ITSFiberSpliceV_ep	Intelligent Transportation System (ITS) Fiber Spliced Vault (Buried)
P	SPR	1	Tributary_ep	Spring (Water Source)
P	SRVC	3	JunctBox_ep	Junction Box / Service Cabinet (Elec/Tel)
P	SSP	1	SpanWireP_ep	Signal / Span Wire Pole
P	SSS	1	SignSingle_ep	Sign (Single Pole Support)
P	STAL	1	PMSTAL_ep	Pavement Marking Symbol - Straight and Turn Arrow Left
P	STAR	1	PMSTAR_ep	Pavement Marking Symbol - Straight and Turn Arrow Right
P	STAROW	1	PMSTAROW_ep	Pavement Marking Symbol - Straight Direction Arrow
P	STM	1	Stump_ep	Stump
P	STMD	6	MonumentSTD_ep	Monuments - Stamped Disk
P	STMP	6	MonumentSTP_ep	Monuments - Stamped Plate
P	STOP	1	PMSTOP_ep	Pavement Marking Symbol - STOP
P	STTK	1	TankStor_ep	Storage Tank
P	SWG	1	RailroadSgnalG_ep	Railroad Signal with Gate
P	TAL	1	PMTAL_ep	Pavement Marking Symbol - Turn Arrow Left
P	TALR	1	PMTALR_ep	Pavement Marking Symbol - Turn Arrow Left and Right
P	TAR	1	PMTAR_ep	Pavement Marking Symbol - Turn Arrow Right
P	TB	3	TeleBooth_ep	Telephone Booth
P	TELP	3	TelePole_ep	Telephone Pole
P	TG	1	StreamGauge_ep	Stream or Tide Gauge
P	THA	3	SU_QLATestHole_ep	Subsurface Utility Test Hole (QLA Only)
P	TPD	3	TelePed_ep	Telephone Pedestal / Service Box
P	TREE	1	Tree_ep	Tree (Unknown)
P	TREEC	1	TreeConiferous_ep	Tree (Coniferous)

FDOT Survey Feature Codes				
Point /Line	**Feature Code**	*** Field Survey Zone**	**Level Name**	**Level Description**
P	TREECI	1	TreeCitrus_ep	Tree (Citrus)
P	TREECY	1	TreeCypress_ep	Tree (Cypress)
P	TREED	1	TreeDeciduous_ep	Tree (Deciduous)
P	TREEOA	1	TreeOak_ep	Tree (Oak)
P	TREEPA	1	TreePalm_ep	Tree (Palm)
P	TREEPC	1	TreePalmCluster_ep	Tree (Palm Cluster)
P	TREEPI	1	TreePine_ep	Tree (Pine)
P	TRNF	3	Transformer_ep	Transformer
P	TURN	1	PMTURN_ep	Pavement Marking Symbol - TURN
P	UDBX	2	UnderDrainBx_ep	Underdrain Box
P	UMKR	3	UtilMarker_ep	Subsurface Utility Marker
P	VB	3	ValveBox_ep	Valve Box (Unknown)
P	VBG	3	ValveBoxGas_ep	Valve Box (Gas)
P	VBNPW	3	ValveBoxWtrNP_ep	Valve Box (Non-Potable Water)
P	VBS	3	ValveBoxSwr_ep	Valve Box (Sanitary Sewer)
P	VBW	3	ValveBoxWtr_ep	Valve Box (Water)
P	VC	3	ValveCover_ep	Valve Cover (Unknown)
P	VCEF	3	ValveCvrEff_ep	Valve Cover (Effluent)
P	VCG	3	ValveCvrGas_ep	Valve Cover (Gas)
P	VCNPW	3	ValveCvrWaterNP_ep	Valve Cover (Non-Potable Water)
P	VCRW	3	ValveCvrWtrRaw_ep	Valve Cover (Raw Water)
P	VCS	3	ValveCvrSewer_ep	Valve Cover (Sanitary Sewer)
P	VCW	3	ValveCvrWater_ep	Valve Cover (Water)
P	VLV	3	Valve_ep	Valve (Unknown)
P	VLVB	3	ValveBFP_ep	Valve, Valve Box (Back Flow Preventer)
P	VLVG	3	ValveGas_ep	Valve, Valve Box (Gas)
P	VLVNPW	3	ValveWaterNP_ep	Valve, Valve Box (Non Potable Water)
P	VLVS	3	ValveSewer_ep	Valve, Valve Box (Sanitary Sewer)
P	VLVW	3	ValveWater_ep	Valve, Valve Box (Water)
P	VNT	3	Vent_ep	Vent (Unknown)
P	VNTG	3	VentGas_ep	Vent (Gas)
P	VNTS	3	VentSewer_ep	Vent (Sanitary Sewer)
P	WELL	3	Well_ep	Well (All Sizes)
P	WIM	1	WindMill_ep	Wind Mill
P	WLPT	1	WetlandSym_ep	Wetland Point
P	WPB	3	PullBox_ep	Wiring Pull Box (Lighting or Signal)
P	XS	7	XSPt_ep	Cross Section Point, Station
P	YIELD	1	PMYIELD_ep	Pavement Marking Symbol - YIELD
P	ZONE	1	PMZONE_ep	Pavement Marking Symbol - ZONE

4.13.12.6 Data Files Created by Survey

Additional geometry input files are also created for delivery to design. For example: files of existing points, profiles, survey chains, alignments, surfaces, etcetera, should be created in LandXML 1.2 format. For information about LandXML see: **http://www.LandXML.org** . All data delivered to the Department should be placed under the \survey\ discipline folder, which the Department's standard folder structure is included for this purpose. Additional sub-folders may be created under the \survey\ discipline folder to segregate and further organize data. For example: the case where a CAiCE project is placed within the project folder structure under the \survey\ discipline folder for delivery.

Note See Section 4.7 for requirements for creating additional sub-folders.

4.13.12.7 Resource Files

CAiCE and GEOPAK use a feature table to look-up appropriate element symbology for given objects, defined by their "feature" found in the survey. AutoCAD Civil 3D uses similar technology.

For CAiCE, the feature table is found in the folder named x:\FDOTSS4\CAiCE\FTB\, where "x" is the workstation drive letter.

The CAiCE feature table correlates the level numbers (200+ through 9xxx) used in CAiCE to the level names corresponding to the MicroStation DGN file, the SMD features used by GEOPAK Survey and the layer names in the description key/figure prefix database used by AutoCAD Civil 3D. This table is placed in the \CAiCE\FTB\ folder.

A corresponding feature table with an *.ftm* extension is also loaded to the x:\FDOTSS4\CAiCE\FTB\ folder to control symbology on alignment chains (Geometry Chains with stationing). This table is used by the **Settings > Object Display > Geometry Chains** command in CAiCE to control the proper symbology of alignment stationing, station tics, and station labels based upon scale.

Note The name of the *.ftm* feature table must match the name of the active *.ftb* feature table in use during a CAiCE session.

- ***CAiCE Tables and Cell Libraries***

CAiCE feature tables and cell libraries are provided for existing topography, utilities and drainage features. The tables and cell libraries included for Roadway Design are:

- FDOT_SS4.FTB - Feature table containing existing features used by Roadway Design.
- FDOT_SS4.FTM - Corresponding table for controlling alignment / chain symbology and bearing / distance chain labeling (attaches automatically when FDOT_SS4.FTB is attached).
- SYENG_SS4.CCL - CAiCE format of the cell library used by Roadway Design.
- FDOT_SS4.TBL – CAiCE format of the Feature Codes used by Roadway Design

- ***SYENG_SS4.CEL - MicroStation format of the cell library used by Roadway Design.Feature List Files***

Feature List files; *FDOTTOPO.lis*, *FDOTDran.lis*, and *FDOTUtil.lis*, are also installed into the x:\FDOTSS4\CAiCE\FTB\ folder to assist the user in creating the CAiCE screen graphics containing the appropriate data for producing the three typical design files required by design, *TOPORD00.dgn*, *DREXRD00.dgn*, and *UTEXRD00.dgn*. These List files are listings of the feature codes that belong in the respective design files. Consult your CAiCE documentation on the use of List files.

Note A Department CAiCE application, Theme Viewer, can accomplish a similar function to using CAiCE list files.

- ***CAiCE Cell Library***

MicroStation Cell libraries cannot be used or attached by CAiCE directly. The MicroStation cell library is translated to CAiCE's own version of a cell library (*.CCL versus MicroStation *.CEL).

➢ ***CAiCE Translation Table***

A CAiCE Translation Table, *Edgntype.tbl*, is another resource file provided for CAiCE that maps CAiCE line styles to MicroStation custom line styles. This table is in the CADD Software Install at the x:\FDOTSS4\CAiCE\DGN\ subfolder.

Note To have compatibility with MicroStation long name cells and levels, two files, DGNCell.TBL and DGNLevel.tbl, must reside under your \CAiCE\DGN\V8\ folder.

➢ ***Additional CAiCE Tables and Cell Libraries***

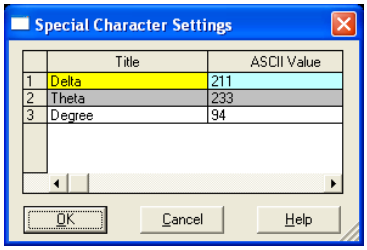
Additional CAiCE feature tables and cell libraries are also provided for existing topography files, created for Right-of-Way mapping purposes. Mapping uses additional consolidation of certain monument symbols and has other symbolization requirements. The tables and cell libraries included are:

- **FDOT_SS4RW.FTB -** Feature table containing the topography features used in ROW Mapping.
- **FDOT_SS4RW.FTM -** Corresponding table for controlling alignment / chain symbology and bearing / distance chain labeling (attaches automatically when FDOT_SS4RW.FTB is attached).
- **RWENG_SS4.CCL -** CAiCE format of the cell library for use in ROW mapping.
- **RWENG_SS4.CEL -** MicroStation format of the topo cell library for use in ROW mapping.

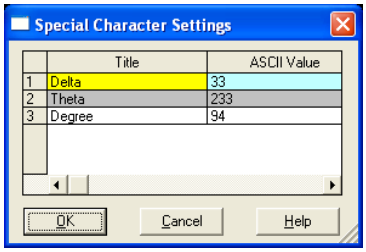
➢ ***CAiCE Special Characters***

CAiCE does not support True Type Fonts. CAiCE Font(s) 48 & 58 will have to be manually replaced by True Type Fonts in MicroStation if the CDG2V8 Macro is used for importing CAiCE data.

- **CAiCE font 48 and translating to MicroStation -** Font 48 does not use the standard ASCII table for all special characters. In particular, the degree symbol (°) for MicroStation requires that CAiCE place the Caret Symbol (^) in CAiCE text strings so MicroStation will look correct when data is translated to MicroStation graphics. To force CAiCE to substitute the (^) for the degree (°), CAiCE needs to be set by selecting the menu options: **Settings > Special Characters** and set the ASCII value of 94 to represent degrees as shown in the figure to the right.



- **Right of Way project font 58 in MicroStation** - If exporting to a Right of Way map, CAiCE needs to be set by selecting the menu items: Settings > Special Characters and set the ASCII value 33 to the Delta symbol as shown in the figure to the right.



4.13.12.8 GEOPAK Survey and Bentley Survey

The GEOPAK Survey application uses a feature table called *fdot_ss4.smd*. This feature table is installed into the x:\FDOTSS4\geopak\databases\ folder by the CADD Software Install routine ('x' is the drive letter where the CADD Software is installed). The *fdot_ss4.smd* should be used when processing field measurement .OBS files, importing CAiCE KCP files, reading GEOPAK Input files and visualizing features with the Survey Display dialogue box or the COGO Navigator. The *fdot_ss4rw.smd* feature table is the Right of Way counterpart feature table and should be used when importing or visualizing Right of Way features or products such as the *TOPORW##.dgn* file.

The Bentley Survey application (formerly known as Data Acquisition) uses a XML version of the GEOPAK SMD files named *Survey_display.xml* and *ROW_Display.xml*. Both feature files can be found in the x:*FDOTSS4\geopak\databases\ folder and are imbedded in the FDOT_SurveyFeatures_RD.dgnlib and FDOT_SurveyFeatures_RW.dgnlib respectively. It is NOT necessary to attach these feature files when working within the FDOT workspace*.

Note AutoCAD Civil 3D DESCRIPTI0N KEYS for translating point objects are found imbedded in the individual templates provided in the Department's Civil 3D State Kit and are not separate resource files. The FIGURE PREFIX DATABASE for translating chains into Civil 3D figures is delivered as part of the Department's State Kit for Civil 3D.

Both GEOPAK and CAiCE use the similar cell libraries for survey graphics. The cell libraries (*syeng.cel* for Roadway design and *rweng.cel* for Right of Way) should be referenced from the x:\FDOTSS4\RESOURCES\Cell\ folder. (x:\FDOT2015.C3D\DATA\BLOCKS\ROW.DWG for AutoCAD)

4.13.12.9 AutoCAD Civil 3D

Standard survey files developed for Autodesk workflows are created by using the FDOT2015.C3D software in conjunction with the Department's standard surveying templates provided by the FDOT2015.C3D software install routine. These standard surveying templates are installed into the x:\FDOT2015.C3D\Data\Templates\ folder by the FDOT2015.C3D software Install routine ('x' is the drive letter where the FDOT2015.C3D software is installed).

The LandXMLGrouper is also provided by the FDOT2015.C3D software install routine. The LandXMLGrouper routine presorts XML files exported from EFB or CAiCE into point and figure groups that can be used for building standard surveying deliverables similar to the CAiCE theme viewer.

Note AutoCAD Civil 3D surveying deliverables must be developed within Civil 3D to be compatible with AutoCAD workflows. Surfaces and Alignments are specific formats within Civil 3D. Point objects and figures (chains) are also specific to Civil 3D. Converting Surveying deliverable MicroStation DGN files to DWG or vice versa will not create an acceptable deliverable in the current workflows for either MicroStation or AutoCAD products.

4.13.12.10 Survey Data

The Department's ***Surveying Procedure***, Topic 550-030-101 and the ***Surveying Handbook*** governs the requirements for survey procedure for the Department's projects. These documents are available at: **http://www.dot.state.fl.us/surveyingandmapping/doc_pubs.shtm**

4.13.12.11 County Mapping

The production of County Maps is an internal function of the Department's Surveying and Mapping Office. This documentation refers to the graphical symbology standards used for the production of those maps. For information regarding file naming conventions and other standards in use during the production of the Department's County maps, contact the Geographic Mapping Office in the Department's Surveying and Mapping Office at (850) 414-4111.

File Type	Description	Color	Line Style	Weight	Cell
All	Adjacent County and State Text				
All	Airport Names				
All	Airport Runways			6	
All	Airports Commercial				cscapt
All	Airports Commercial				cap
All	Airports Landing Strip or Private Airport				cslstp

File Type	Description	Color	Line Style	Weight	Cell
All	Masks for Text				
All	Military Bases	66			
All	Military Bases Text	146			7
All	Narrow Canals		5		
All	Narrow Canals Text				7
All	Narrow River Creek and Branch and Slough	12		1	

File Type	Description	Color	Line Style	Weight	Cell
All	Airports Landing Strip or Private Airport				ldarsp
All	Airports Military				csmfld
All	Airports Military				milffad
All	Backdrop	30			
All	Backdrop	60			
All	Bay				2
All	Bay Text				2
All	Bayou and Harbor, etc.				3
All	Bayou and Harbor, etc. Text				3
All	Boundary Section Lines (hidden)	31			
All	Bridges			0	
All	Bridges			1	
All	Bridges Interstate	1			
All	Bridges and Drawbridges County Highways	4			
All	Bridges and Drawbridges County Highways Text	8			
All	Bridges and Drawbridges Local Roads				
All	Bridges and Drawbridges Local Roads Text	18			
All	Bridges and Drawbridges State Highways	3			
All	Bridges and Drawbridges State Highways Text	7			
All	Bridges and Drawbridges Toll Roads	5			
All	Bridges and Drawbridges Toll Roads Text	5			
All	Bridges and Drawbridges US Highways	2			
All	Bridges and Drawbridges US Highways Text	6			
All	Bridges Interstate Text	4			
All	Cities Incorporated Area			0	
All	Cities Incorporated Linear Boundaries			1	
All	City Streets			1	
All	Coastal Waterway				csicw
All	Coastal Waterway Text				10
All	College or University	71			
All	College or University Text	30			8
All	Communities and Subdivisions Names without Post Office				3
All	Communities Names with Post Office				2
All	Connecting Roads			2	
All	Coordinate ticks Lat Longs				csotic
All	Coordinate ticks State Plane				csstic
All	County Boundary		7	6	
All	County Parks	70			
All	County Parks Text	148			10

File Type	Description	Color	Line Style	Weight	Cell
All	Narrow River Creek and Branch and Slough Text				6
All	National Forest	65			
All	National Forest Text	44			1
All	National Park	69			
All	National Park Text	44			2
All	National Wildlife Refuge and Preserve	75			
All	National Wildlife Refuge and Preserve Text	144			3
All	Ocean and Gulf				1
All	Ocean and Gulf Text				1
All	Other Incorporated Names			2	
All	Other Incorporated Names			3	
All	Other Survey Related Text				3
All	Planning Number Interstates				cssir1
All	Planning Number Interstates				cssir2
All	Planning Number Interstates				cssir3
All	Planning Number US Highways				cssus1
All	Planning Number US Highways				cssus2
All	Planning Number US Highways				cssus3
All	Planning Number US Highways				cssus1
All	Planning Number US Highways				cssus2
All	Planning Number US Highways				cssus3
All	Populations				1
All	Quad Borders				
All	Railroad Stations				csrsta
All	Railroads	3			
All	Railroads Text				
All	Road shields County Roads				cs1crs
All	Road shields County Roads				cs2crs
All	Road shields County Roads				cs3crs
All	Road shields County Roads				cs4crs
All	Road shields Interstates				cs1irs
All	Road shields Interstates				cs2irs
All	Road shields Interstates				cs3irs
All	Road shields State Highways				cs1srs
All	Road shields State Highways				cs2srs
All	Road shields State Highways				cs3srs
All	Road shields Toll roads				cs1trs
All	Road shields Toll roads				cs2trs
All	Road shields Toll roads				cs3trs

File Type	Description	Color	Line Style	Weight	Cell
All	County Roads Related Text				
All	County Route Divided Highway Outline and Fill				
All	County Routes Highway Center Lines			3	
All	County Routes Ramps			2	
All	County Seat				cscose
All	County Seat Names			4	
All	County Seat Names			6	
All	Culture			0	
All	Culture			1	
All	Culture			2	
All	Culture Text				1
All	Cut Border				
All	Extended Township Lines	43	3	2	
All	Forbes Purchase		3	3	
All	Forbes Purchase Section lines		3	0	
All	Forbes Purchase Township and Range Lines		3	2	
All	Geographic Features Text			1	
All	Heliports				csheli
All	Intermittent Ponds				1
All	Intermittent Ponds Text				8
All	Interstate Divided Highway Outline and Fill				
All	Interstate Highway Center Lines			3	
All	Interstate Ramps			2	
All	Interstates Related Text				
All	Islands				
All	Islands Text Coastal (Keys, etc.)			2	
All	Islands Text Inland (Hammocks and Ridges, etc.)				1
All	Lakes and Ponds				
All	Lakes and Ponds Text				9
All	Land Grant Boundaries		4	0	
All	Legend				
All	Local Roads Divided Highway Outline and Fill				
All	Local Roads Improved	11		1	
All	Local Roads Paved	11		2	
All	Local Roads Related Cells				cslgf0
All	Local Roads Related Cells				cslgf1
All	Local Roads Related Cells				cslgf2
All	Local Roads Related Cells				cslgf3
All	Local Roads Related Cells				cslgf4
All	Local Roads Related Cells				csp1

File Type	Description	Color	Line Style	Weight	Cell
All	Road shields Toll roads				cstps
All	Road shields US Highways				cs1urs
All	Road shields US Highways				cs2urs
All	Road shields US Highways				cs3urs
All	Road shields US Highways Alternate				cs1usa
All	Road shields US Highways Alternate				cs2usa
All	Road shields US Highways Alternate				cs3usa
All	Road shields US Highways Business				cs1usb
All	Road shields US Highways Business				cs2usb
All	Road shields US Highways Business				cs3usb
All	Seaplane facility				csseap
All	Section Lines		0	0	
All	Section Numbers				1
All	State Boundary		6	6	
All	State Capital				cscptl
All	State Forest	67			
All	State Forest Text	145			4
All	State Park	14			
All	State Park Text	145			5
All	State Prisons	124			
All	State Prisons Text	124			9
All	State Roads Related Text				
All	State Route Divided Highway Outline and Fill				
All	State Routes Highway Center Lines			3	
All	State Routes Ramps			2	
All	State Survey Lines		1	1	
All	State Wildlife Refuge and Preserve	72			
All	State Wildlife Refuge and Preserve	74			
All	State Wildlife Refuge and Preserve Text	147			6
All	Street Related Text				
All	Strip Mining Area	117			
All	Survey by Others		2	1	
All	Survey Correction Text within map				4
All	Swamps				sw3
All	Swamps	15			
All	Swamps Text	45			
All	Toll Divided Highway Outline and Fill				
All	Toll Highway Center Lines			3	
All	Toll Ramps			2	
All	Toll roads Related Text				

File Type	Description	Color	Line Style	Weight	Cell
All	Local Roads Related Cells				csp2
All	Local Roads Related Cells				cspnf1
All	Local Roads Related Cells				cspnf2
All	Local Roads Related Cells				cspsf1
All	Local Roads Related Cells				cspsf2
All	Local Roads Related Text				
All	Local Roads Unimproved	10		1	
All	Mangroves				mg
All	Mangroves				csman1
All	Mangroves				smg
All	Map Border				
All	Map Border Text and Cells				
All	Map Information Text and Cells				
All	Map Information Text and Cells				
All	Masks for Road Features				

File Type	Description	Color	Line Style	Weight	Cell
All	Town Centers				cscctr
All	Township and Range lines		0	2	
All	Township and Range Tics				csttic
All	Township and Range Text				2
All	Triangulation Station				cstria
All	Triangulation Station				trista
All	Triangulation Station Text	97			2
All	Un-Inventoried Roads and Features				
All	US Highways Related Text				
All	US Route Divided Highway Outline and Fill				
All	US Routes Highway Center Lines			3	
All	US Routes Ramps			2	
All	Wide Rivers and Canals	12		1	4
All	Wide Rivers and Canals Text				5
All	Wildlife Management Area Text	94			11

4.13.13 *Geotechnical Standards*

Geotechnical Plans are included in the Roadway Plan Set as Soil Survey, Soil Boring and Bridge Data Sheets.

4.13.13.1 Standard File Names

The Department utilizes standard naming conventions for all of its files and provides automated tools that depend on this naming convention. The naming convention confers data information to the downstream customer.

- ***Standard file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

Files that are associated with specific bridges must be prepended with a B# prefix corresponding to the appropriate bridge number.

Note See Section 4.8 of this document for more information about Standard File Names. See Section 4.23 Structures Standards of this document for bridge specific filenames & sheet numbering requirements. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

Sheet Order reflects placement within the Lighting, Roadway, Signalization, Signing, & Structure Components of the Contract Plan Set.

The following table defines the Geotechnical Standard File Names for Department projects. Each file name must include sequence numbering. Standard Model names are also provided.

Sheet Order	File Type	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
12	Lighting	LTGEO##	default	Lighting Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
24	Roadway	CLVGEO##	default	Box Culvert Auger and Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
34	Roadway	CPTGEO##	default	Cone Penetration Test (CPT) Soundings *(Non-Bridge Related)*	geotech	fdotseed2d.dgn	fdotmaster.dwt
36	Roadway	MSEWGEO##	default	Mechanically Stabilized Earth (MSE) Wall Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
51	Roadway	MTGEO##	default	Mitigation Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
37	Roadway	NWGEO##	default	Noise Wall Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
29	Roadway	PDGEO##	default	Pond Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
35	Roadway	RDGEO##	default	Augers Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
33	Roadway	RDSSGEO##	default	Roadway Soil Survey Sheet	geotech	fdotseed2d.dgn	fdotmaster.dwt
38	Roadway	RTWGEO##	default	Retaining Wall Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
39	Roadway	SPGEO##	default	Sheet Pile Wall Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
12	Signal	SGGEO##	default	Signal Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
11	Signing	SNGEO##	default	Signs Standard Penetration Test (SPT) Borings	geotech	fdotseed2d.dgn	fdotmaster.dwt
13	Structures	B#BORING##	default	Report of Core Borings	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
13	Structures	B#ConePTGEO##	default	CPT Soundings	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
211	Structures	B#MSEWallGEO##	default	MSE Wall SPT Borings	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
216	Structures	B#NoiseWallGEO##	default	Noise Wall SPT Borings	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
210	Structures	B#RetainingWallGEO##	default	Retaining Wall SPT Borings	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
212	Structures	B#SheetPileWallGEO##	default	Sheet Pile Wall SPT Borings	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
	Structures	ConePTGeo*	default	Cone Penetration Test (CPT) Soundings *(Non-Bridge Related)*	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
	Structures	MSEWallGeo*	default	Mechanically Stabilized Earth (MSE) Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt

Sheet Order	File Type	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	Structures	NoiseWallGeo*	default	Noise Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
	Structures	RetainingWallGeo*	default	Retaining Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt
	Structures	SheetPileWallGeo*	default	Sheet Pile Wall Standard Penetration Test (SPT) Borings *(Non-Bridge Related)*	geotech	StructuresSeed.dgn	StructuresTemplatePlan.dwt

4.13.13.2 Engineering Data

Engineering Data delivered with each project must be located in the *\eng_data\ sub-* folder and include:

- ASCII files containing Q/C reports
- All computer input and output files used in the design (in native file formats for the software used and printed to PDF format)
- All supplemental design hand calculations (scanned and saved in PDF or TIFF file formats)
- Soil boring data

The sheet image from the design files and image files of all other output files from the design and/or analysis programs must be in PDF format. The PDF of the plan sheets must follow the conventions of Digital Delivery. Computer input and output files include files used for all aspects of analysis and design. Geotechnical information must also be delivered (CSV format) as shown in the examples below. The Department has adopted the following standard file naming convention for CSV file imports for the Geotechnical Utility in GEOPAK:

- **Borehole** - *Boreholetpk.brh* - Borehole location data, seasonal high water & design high water data.
- **Material -** *Material.mtl* - Strata Data and Core data.

Standard Penetration Test (SPT) boring information may be drawn using the Department's Report a Core Boring Tool.

➢ **Example: Boreholetpk.brh**

Format: *borehole_name,alignment_name,station,offset,water_elev_type,water_elev_0,water_elev_0_date,water_elev_24,water_elev_24_date*

Examples:
Borehole-01,CLCON,78+00.00,15,0,3,8/9/2007,5,8/10/2007
Borehole-02,CLCON,80+00.00,3,0,2,8/20/2007,4,8/21/2007
Borehole-03,CLCON,83+00.00,3,0,3,8/23/2007,5,8/24/2007
Borehole-04,CLCON,85+00.00,4,0,2,8/24/2007,4,8/25/2007

➢ **Example: Material.mtl**

Format: *borehole_name,material_name,doc_or_se,type_of_elev*

Examples:

Borehole-01,1,10,DOC	Borehole-03,2,6,DOC
Borehole-02,1,5,DOC	Borehole-04,1,2,DOC
Borehole-02,2,7,DOC	Borehole-04,2,5,DOC
Borehole-02,3,9,DOC	Borehole-04,3,7,DOC
Borehole-03,1,3,DOC	Borehole-04,4,10,DOC

4.13.13.3 Soil Survey

The plans must include the information about the soil classification on the soil survey sheet and by showing the boring data soil boxes on the cross section sheets.

4.13.13.4 Soil Boring Data

The soil boring data must be provided to the Roadway designer in a format to facilitate the drawing of the data on the cross section sheets.

4.13.14 *Right of Way (R/W) Mapping Standards*

This section will describe the minimum CADD requirements for R / W Mapping operations.

4.13.14.1 Standard File Names

The Department utilizes standard naming conventions for all of its files and provides automated tools that depend on this naming convention. The naming convention confers data information to the downstream customer.

Standard file names should follow this format: AAAABB##.ex*t*

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ## =Sequence number.*

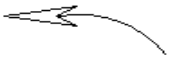
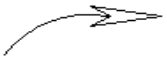
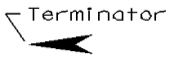
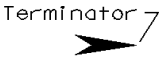
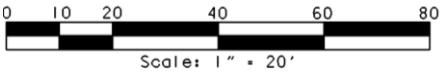
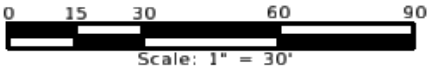
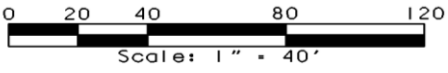
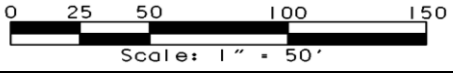
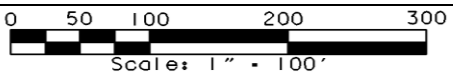
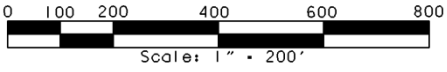
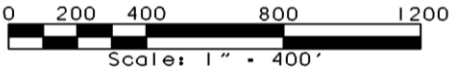
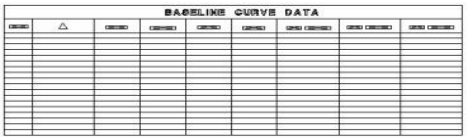
The following table defines the R/W Mapping File Name Standards Name with each file including sequential numbering. Standard Model names are also provided, however, it is not mandatory to use more than the default model.

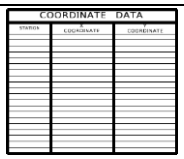
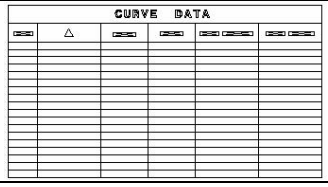
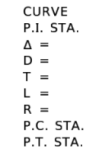
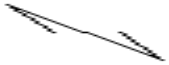
Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level / symbology standards for each applicable CADD Standard Rule.

Critical	File Name	Model	File Description	Rule	MicroStation Seed File	Civil 3D Template File
	CS%%%%%%##	default	Control Survey Master Design File (%...% Enter 7 digit No.)	rweng10	rwseed2d.dgn	rweng10.dwt
X	CSCOVR##	default	Control Survey Cover Sheet	rweng10	rwseed2d.dgn	CSCOVR.dwt
X	CSDETL##	default	Control Survey Detail Sheet	rweng10	rwseed2d.dgn	CSDETL.dwt
X	CSKEYM##	default	Control Survey Key Map Sheet	rweng10	rwseed2d.dgn	CSDETL.dwt
	CTLSRD##	default	Project Control Sheets	open	rwseed2d.dgn	CTLSRD.dwt
	MM%%%%%%##	default	Maintenance Map Master Design File (%...% Enter 7 digit No.)	rweng10	rwseed2d.dgn	rweng10.dwt
X	MMCOVR##	default	Maintenance Map Cover Sheet	rweng10	rwseed2d.dgn	MMCOVR.dwt
X	MMDETL##	default	Maintenance Map Detail Sheet	rweng10	rwseed2d.dgn	MMDETL.dwt
X	MMKEYM##	default	Maintenance Map Key Map Sheet	rweng10	rwseed2d.dgn	MMDETL.dwt
	RW%%%%%%##	default	R / W Master Detail Design File (%...% Enter 7 digit No.)	rweng10	rwseed2d.dgn	rweng10.dwt
X	RWCOVR##	default	R / W Cover Sheet	rweng10	rwseed2d.dgn	RWCOVR.dwt
X	RWDETL##	default	R / W Detail Sheet	rweng10	rwseed2d.dgn	RWDETL.dwt
X	RWFACS##	default	R / W Cover Sheet FA Project	rweng10	rwseed2d.dgn	RWCOVR.dwt
X	RWKEYM##	default	R / W Key Map Sheet	rweng10	rwseed2d.dgn	RWDETL.dwt
X	RWPNCTAB##	default	R / W Project Network Control Tabulation Sheet	rweng10	rwseed2d.dgn	RWDETL.dwt
X	RWPS##	default	R / W Parcel Sketch Sheet	rweng10	rwseed2d.dgn	RWPS.dwt
X	RWSPS##	default	R / W Specific Purpose Survey Sheet	rweng10	rwseed2d.dgn	RWSPS.dwt
X	RWTAB##	default	R / W Tabulation Sheet	rweng10	rwseed2d.dgn	RWTAB.dwt
	SIGNRW##	default	Signature Sheet	rweng10	rwseed2d.dgn	digitalsignature.dwt
	TOPORW##	default	ROW Mapping File Containing Existing Topography for Mapping Purposes Only	open	rwseed2d.dgn	TOPORW.DWT

4.13.14.2 R/W Cell Library

Note R / W cell library is ROW.CEL. R / W cells must be placed with the True Scale toggle set to "ON".

ELEMENT	TYPE	SYMBOL	Macro
ARROW TERMINATOR LEFT (Place on ByLevel of Text Element Relative Toggle "ON")	C = ARRWLG		Place Delineator
ARROW TERMINATOR RIGHT (Place on ByLevel of Text Element Relative Toggle "ON")	C = ARRWRG		Place Delineator
LINE TERMINATOR@POINT G = Graphic type cell	C =ARRLT		Place Delineator
LINE TERMINATOR@POINT G = Graphic type cell	C =ARRRT		Place Delineator
BAR SCALE 1" = 20'	C = BS20		Place Bar Scale
BAR SCALE 1" = 30'	C = BS30		Place Bar Scale
BAR SCALE 1" = 40'	C = BS40		Place Bar Scale
BAR SCALE 1" = 50'	C = BS50		Place Bar Scale
BAR SCALE 1" = 100'	C = BS100		Place Bar Scale
BAR SCALE 1" = 200'	C = BS200		Place Bar Scale
BAR SCALE 1" = 400'	C = BS400		Place Bar Scale
BASELINE CURVE DATA BOX (Used with GEOPAK Table Tutorial)	C = BLBOX		
BASELINE SYMBOL	C = BL		
CENTERLINE SYMBOL	C = CL		
Block Number Double	C= BLOCKNUMBERD		
Block Number Single	C= BLOCKNUMBERS		
CONCRETE MONUMENT OPEN	C = MONSQ		
CONCRETE MONUMENT SOLID	C = MONSQS		

ELEMENT	TYPE	SYMBOL	Macro
CONCRETE R / W MONUMENT (R/W MONUMENTATION MAP)	C = MON		
COORDINATE DATA BOX (Used with GEOPAK Table Tutorial)	C = COORD		
CURVE DATA BOX (Used with GEOPAK Table Tutorial)	C = CURBOX		
CURVE DATA (English) (Used with GEOPAK Table Tutorial)	C = CDATA		
NORTH ARROW	C = NOARR		
PARCEL BUBBLE 100	C = PB100		
PARCEL BUBBLE 700	C = PB700		
PARCEL BUBBLE 800	C = PB800		
PARCEL BUBBLE 900	C = PB900		
PERMANENT R / W MONUMENT (R / W MONUMENTATION MAP)	C = PRWM		
PROPERTY LINE HOOK	C= PLHOOK		
PROPERTY LINE HOOK	C= PLHTOP		
PROPERTY LINE HOOK	C =PLHBOT		
PROPERTY LINE SYMBOL	C = PL		
ROD MONUMENT OPEN	C = MONRD		
ROD MONUMENT SOLID	C = MONRDS		
SEGMENTED CURVE CHORD DIST. / BEARING (Used with GEOPAK Table Tutorial)	C = SEGCUR		
SPRING LINE (Place on Symbology of Assoc. Element)	C=SPRING		Place SpringLine

4.13.14.3 Level / Layer and Symbology Standards

Refer to the Standard Rule Tables in Appendix A for the listing of the R / W (RWENG10) elements and their symbology. The list of elements shown may not contain all of the elements that appear within a R / W map, as this list would be extensive. The elements shown are those that are required for specific types of R / W maps.

All R / W Levels are 'Critical' levels, meaning that the attributes: Level, Color, Style and Weight will all be checked for QC compliancy. The exception is for Text levels, where the Style attribute will be set as Non-Critical and excluded from compliance checking.

Note R/W elements must match the standard symbology for the R/W file they reside in. Non-R/W elements will be drawn in the symbology of their intended file type. For example: edge of pavement drawn in RWDETL01.DGN would be given the symbology as if drawn for DSGNRD01.DGN. All R/W level symbology must use ByLevel settings.

4.13.14.4 R/W Workspace

The Department's CADD Software incorporates features for R/W Mapping Standards compliance to assist R/W Mapping for Department projects. The ***FDOT Right-of-Way Mapping*** training manual is also provided to outline these tools and can be accessed from the CADD website:

http://www.dot.state.fl.us/CADD/downloads/documentation/RightofWayMapping/RightofWayMapping.shtm

Note FDOT State Kit for AutoCAD Civil 3D includes the same content in the R/W templates.

4.13.15 *Construction Standards*

The use and generation of CADD files by Construction must be in accordance with the general standards applied to all disciplines.

4.13.15.1 Standard File Names

The Department utilizes standard naming conventions for all of its files and provides automated tools that depend on this naming convention. The naming convention confers data information to the downstream customer.

- ***Standard file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ##* =S*equence number.*

The standard file names defined by the design discipline must be applied for CADD files generated in Construction, except the portion defining the discipline must be "CN" instead of "RD". Example: *DSGNRD01.DGN* must be *DSGNCN01.DGN*.

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

Note See Section 4.8 of this document for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
Cross Sections	X	PDXSCN##	rdxsrd	Pond Cross Sections	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
Cross Sections	X	RDXSCN##	rdxsrd	Roadway Cross Sections	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
Drainage	X	DREXCN##	default	Drainage Structures - Existing	drexrd	fdotseed2d.dgn	fdotmaster.dwt
Drainage	X	DRPRCN##	default	Drainage Structures - Proposed	drprrd	fdotseed2d.dgn	fdotmaster.dwt
Drainage	X	DRXSCN##	rdxsrd	Drainage Structure Cross Sections	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
Existing Topography		TOPOCN##	default	Topography - Existing	topord	fdotseed2d.dgn	survey.dwt
Proposed Design	X	DSGNCN##	default	Proposed Design	dsgnrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design	X	DSPFCN##	default	Proposed Profile	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		SIGNCN##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
Proposed Design	X	TEXTCN##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
Traffic Control	X	TCDSCN##	default	Traffic Control Design	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
Utilities	X	UTEXCN##	default	Utilities - Existing	utexrd	fdotseed2d.dgn	survey.dwt
Utilities	X	UTPRCN##	default	Utilities - Proposed	utprrd	fdotseed2d.dgn	utprrd.dwt

4.13.16 *Environmental Management Standards*

The Environmental Management Office (EMO) has responsibility for the Project Development and Enfironmental (PD&E) phase. The intent is to give latitude and discretion in performing project analysis, project development, preliminary engineering, public involvement and environmental required tasks while maintaining the necessary level of CADD standards for the products of EMO.

The Project Development and Environmental Clearance process is oriented to presenting the project to the permitting and regulatory agencies, politicians and the general public in a format which is clear and easy to understand. During this process, the production plans should use CADD Standards, where appropriate, for files used in downstream processes (e.g., plan views). After Location and Design Concept Acceptance is obtained, full application of CADD Standard compliance would be implemented to facilitate a seamly transfer of CADD files to the final design team to save time and effort and avoiding re-work hours. The goal is to create a presentation that is useful to the plans development process, but public presentation is the primary concern.

4.13.16.1 Standard File Names

The Department utilizes standard naming conventions and provides automated tools that depend on this naming convention being met. The naming convention confers data information to the downstream customer.

- ***Standard design file names should follow this format: AAAABB##.ext***

Where **AAAA** = *abbreviated file description*, **BB** = *Discipline Denotation, ##* =*Sequence number.*

Note See Section 4.8 for more information about Standard File Names. See Appendix A for the complete listing of level/symbology standards for each applicable CADD Standard Rule.

The following table defines the EMO File Name with each file including sequential numbering. Standard Model names are also provided. Unless otherwise specified, it is not mandatory to use more than the default model.

File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
Borders & Sheets		BDBREM##	default	Border Sheet Reference File for Bridge Hydraulic Sheet	planrd	fdotseed2d.dgn	
Borders & Sheets		BDPLEM##	default	Border Sheet Reference File for Plan Sheet	planrd	fdotseed2d.dgn	
Borders & Sheets		BDPPEM##	default	Border Sheet Reference File for Plan & Profile Sheet	plprrd	fdotseed2d.dgn	
Borders & Sheets		BDPREM##	default	Border Sheet Reference File for Profile Sheet	plprrd	fdotseed2d.dgn	
Borders & Sheets	X	BDXSEM##	rdxsrd	Border Sheet Reference File for Cross-Section Sheet	rdxsrd	fdotseedxs.dgn	
Borders & Sheets		GNNTEM##	default	General Notes	planrd	fdotseed2d.dgn	fdotmaster.dwt
Borders & Sheets		LDPREM##	default	Lateral Ditch Plan / Profile Sheet	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Borders & Sheets		PLANEM##	default	Plan Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
Borders & Sheets		PLAYEM##	default	Project Layout Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
Borders & Sheets		PLPREM##	default	Plan & Profile Sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Borders & Sheets		PRDSEM##	default	Project Profile Layout	planrd	fdotseed2d.dgn	fdotmaster.dwt
Borders & Sheets		PROFEM##	default	Profile Sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Clipping		CLIPEM##	default	Clip Borders	cliprd	fdotseed2d.dgn	fdotmaster.dwt
Clipping		MTPLEM##	default	Motif file for plan sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
Clipping		MTPREM##	default	Motif file for profile sheets	plprrd	fdotseed2d.dgn	fdotmaster.dwt

File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
Cross Sections	X	LDXSEM##	rdxsrd	Lateral Ditch Cross-Sections	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
			Rdxsrd	Lateral Ditch Cross-Sections			
			Pattrd	Lateral Ditch Pattern Lines			
			Xsshrd	Lateral Ditch Shapes			
Cross Sections	X	PDXSEM##	Rdxsrd_shg	Lateral Ditch Cross Section Sheets	pdxsrd	fdotseedxs.dgn	fdotmaster.dwt
			Rdxsrd	Pond Cross-Sections			
			Pattrd	Pond Pattern Lines			
			Xsshrd	Pond Shapes			
Cross Sections	X	RDXSEM##	Rdxsrd_shg	Pond Cross Section Sheets	rdxsrd	fdotseedxs.dgn	fdotmaster.dwt
			Rdxsrd	Roadway Cross-Sections			
			Pattrd	Roadway Pattern Lines			
			Xsshrd	Roadway Shapes			
Existing DTM		GDTMEM##	default	Digital Terrain Model / TIN Model - 3D	gdtmrd	fdotseed3d.dgn	survey.dwt
Existing Topography		TOPOEM##	default	Topography-Existing (Utility & Drainage not included)	topord	fdotseed2d.dgn	survey.dwt
Key Sheets		KEYSEM##	default	Key Sheet	keysht	fdotseedkeymap.dgn	keysht.dwt
Project Network Control		CTLSEM##	default	Project Control Sheets	planrd	fdotseed2d.dgn	ctlsrd.dwt
Proposed Design		ALGNEM##	algnrd	Alignment Layout	algnrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		BKSWEM##	default	Back of Sidewalk Profiles	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		CURCEM##	default	Curve or Coordinate Data Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design	X	DSGNEM##	default	Proposed Design	dsgnrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		DSPFEM##	default	Proposed Profile	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		INTDEM##	default	Intersection/Interchange Details	planrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		INTPEM##	default	Intersection/Interchange Profiles	plprrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		MITGEM##	default	Mitigation Areas	planrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		PDPLEM##	default	Pond Design	drprrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design	X	QTDSEM##	default	Quantity Computation Shapes/Calculations	qtdsrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design	X	QUANEM##	default	Quantity Computation Details	qtdsrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		RWDTEM##	default	R/W Details for Roadway	rwdtrd	fdotseed2d.dgn	rwdtrd.dwt
Proposed Design		SCGREM##	default	Selective Clearing & Grubbing Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		SIGNEM##	default	Signature Sheet	open	fdotseed2d.dgn	digitalsignature.dwt
Proposed Design		SWPPEM##	default	Storm Water Pollution Prevention Plan	planrd	fdotseed2d.dgn	fdotmaster.dwt
Proposed Design		TEXTEM##	default	Text Labels & Miscellaneous Descriptions	planrd	fdotseed2d.dgn	
Proposed Design		WETLEM##	default	Wetlands Delineation Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt

File Type	Critical	File Name	Model Name	File Description	Rule	MicroStation Seed File	Civil 3D Template File
Special Details		SPDTEM##	default	Special Details Sheet	open	fdotseed2d.dgn	fdotmaster.dwt
Summary Boxes / Tables		BRHYEM##	default	Bridge Hydraulics Recommendation Sheet	planrd	fdotseed2d.dgn	fdotmaster.dwt
Summary Boxes / Tables		BXCLEM##	default	Box Culvert Wingwall Design & Special Details	drdtrd	fdotseed2d.dgn	fdotmaster.dwt
Summary Boxes / Tables		CESSEM##	default	Summary of Pay Item Sheets	planrd	fdotseed2d.dgn	planrd.dwt
Summary Boxes / Tables		SUMQEM##	default	Summary of Quantities Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
Traffic Control		TCDSEM##	default	Traffic Control Design	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
Traffic Control		TCDTEM##	default	Traffic Control Detail Sheet	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
Traffic Control		TCGNEM##	default	Traffic Control General Note Sheets	planrd	fdotseed2d.dgn	fdotmaster.dwt
Traffic Control		TCPLEM##	default	Traffic Control Plan Sheets	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
Traffic Control		TCTYEM##	default	Traffic Control Typical Section Sheets	tcdsrd	fdotseed2d.dgn	fdotmaster.dwt
Typical Sections		TYPDEM##	default	Typical Data Sheet	typdrd	fdotseed2d.dgn	fdotmaster.dwt
Typical Sections		TYPSEM##	default	Typical Section Sheets & Details	open	fdotseed2d.dgn	planrd.dwt
Utilities		UTADEM##	default	Utility Adjustment Sheets	utadrd	fdotseed2d.dgn	utadrd.dwt
Utilities		UTEXEM##	default	Utilities - Existing	utexrd	fdotseed2d.dgn	survey.dwt
Utilities	X	UTPREM##	default	Utilities - Proposed	utprrd	fdotseed2d.dgn	utprrd.dwt
Verified Utilities		SBVHEM##	default	Summary of Verified Utilities (2D)	planrd	fdotseed2d.dgn	fdotmaster.dwt
Verified Utilities		UTVHEM##	default	Survey of Verified Utilities (2D)	utexrd	fdotseed2d.dgn	survey.dwt

4.13.17 *Specification Standards*

The Program Management Office develops and provides policies, procedures, training, and guidance to support the design, construction and maintenances of Florida roads and bridges, including Specifications, Estimates, Product Evaluation, Utilities and Local Agency Program. Specifications must be prepared in accordance with those policies and procedures. Documentation can be found on the Program Management website: http://www.dot.state.fl.us/programmanagement/documents.shtm

4.13.17.1 Standard File Names

For Digital Delivery Bid Sets, the Specification files are copied from the \specs\ sub-folder structure for delivery. Specification file naming convention for Digital Delivery submittals is: *fpid*-SPECS[-].pdf:

- ***fpid*** = full (11digit) Financial Project Identification Number without dashes.
- **SPECS** = item description
- **[-]** = any additional naming specific to the project (optional)

Supplement file naming convention for submittals is: *fpid*-SPECS-SUPP##[-].pdf, where:

- ***fpid*** = full (11digit) Financial Project Identification Number without dashes,
- **SPECS** = item description
- **SUPP** = Identifier
- **##** = sequential numbering of the supplements: 01, 02, 03, etcetera
- **[-]** = any additional naming specific to the project (optional)
- **BOE#** = Bases of Estimates – Pay Item number
- **TSP** = Technical Special Provision

Original Delivery	***Supplement1***	***Supplement2***
fpid-SPECS[-].PDF	*fpid*-SPECS-SUPP01[-].PDF	*fpid*-SPECS-SUPP02[-].PDF
fpid-SPECS-TSP[BOE#][-].PDF	*fpid*-SPECS-TSP[BOE#]-SUPP01[-].PDF	*fpid*-SPECS-TSP[BOE#]-SUPP02[-].PDF

For Example: Begin with the *FPID* number, then the item description (SPECS), then supplement number (SUPP##), and finally any naming [-] specific to the project (optional).

This file naming convention allows project files to collate as sorted and combined in a single folder. Text, numbers and dashes are allowed. Characters that interfere with operating system path specifications or XML paths must be excluded, such as underline and spaces and (/ \ . : , < & # >).

4.13.17.2 Resource Files

Statewide implemented specifications files are distributed by the State Specifications Office through the District Specifications Offices.

4.13.17.3 Technical Special Provisions

When the use of a Technical Special Provision (TSP) is authorized by the District Specifications Office, the PDF of the TSP file(s) is individually signed and sealed and also becomes part of the overall project's Specifications package.

For Digital Delivery, certificate based Digital Signature must be used.

The TSP must include the electronic statement incorporated on the TSP cover page. When a TSP is manually signed and sealed, it must be scanned in grey scale for seal visibility and no electronic statement is needed.

When TSPs are combined into the overall Specification package, the Signatory(s) of the TSPs do not have to re-sign the combined documents. Add the image of the seal to the cover page of each TSP. The individual files for each TSP must be digitally signed and sealed.

4.13.17.4 File Structure (Specs Only Projects)

- Specifications Folder Structure
- Supplemental Specifications Folder Structure
- Technical Special Provisions (TSP)*

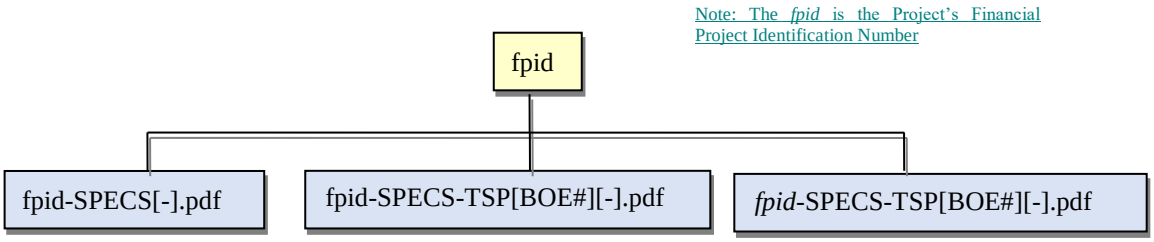
Note If a TSP is applicable to the project, then the folder for TSP(s) would apply to both the Project CD and Bid CD data set. Multiple TSP files may exist in the delivery.

The Specification Package is delivered as fpid-SPECS.pdf. Subsequent TSPs are delivered as fpid-SPECS-TSP[BOE#].pdf as shown in Chapter 5.8.

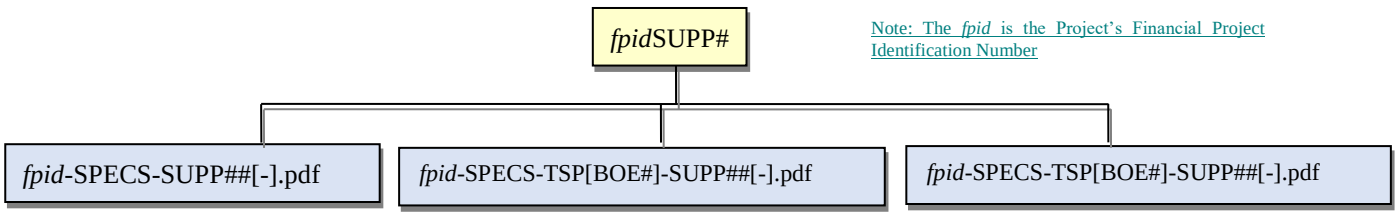
1. Create the project folder using all eleven digits of *fpid* Number. (i.e., 12345678900).
2. Inside the created (project) \FPID\ folder. This is where the Specifications package file (*fpid*-SPECS[-].pdf) is placed.
3. For Supplements, continue to use the ORIGINAL \FPID\ folder created in Step 1.
4. For Supplements. This is where the Supplement package file (*fpid*-SPECS-SUPP##[-].pdf) is placed.
5. Use digital signature to sign and seal the Supplement package file (*fpid*-SPECS-SUPP##[-].pdf).

Note **DO NOT** re-submit the entire Specification package for a Supplemental.

Example of a
Specifications Only Package
Folder Structure



Example of a
Supplemental Specifications Only Package Folder
Structure



Chapter 5

DELIVERY PROCEDURE

5.1 PURPOSE

This chapter establishes the minimum requirements and functions necessary for Florida Department of Transportation (Department) CADD delivery, describing how electronic data is to be delivered and made available to customers.

5.2 SCOPE

This chapter covers the Department's functions to receive, authenticate, integrate, package, and distribute electronic project data including the CADD delivery.

5.3 DEFINITIONS

3D Design: The process of creating 3D Models for a project.

3D Model: A 3D model is a digital graphical representation of proposed facility/site data consisting of X, Y, and Z coordinates for producing objects in three dimensions to communicate design intent useful for visualization, analysis, animation, simulation, plans, specifications, estimates production, and life-cycle asset management. An accurately designed 3D model will be tied to a defined coordinate system.

Authentication: For Digital Signature, Authentication is the process where Digital Signatures are compared with identity data held by the issuer of a Digital Certificate (the Certificate Authority) to validate the identify of a Signatory; and that a document that has been signed with a Digital Signature has not been modified since signing. This is an automated process of the document software (such as with Adobe Reader or Acrobat) that provides feedback to the user that the file being examined is signed, the signatures are valid, and the document is unmodified since the Signatory signed it.

Automated Machine Guidance (AMG): Automated machine guidance is a process in which construction equipment is linked directly to the operation of machinery with a high level of precision, improving the speed and accuracy of construction processes. The AMG can utilize the GPS or robotic total stations for positioning information.

Certificate Authority: The 3rd party entity that issues the Digital Certificate to the professional signatory and validates the identity of the signatory.

Compliance Certification Checklist Report: A document that contains the data producers' written assurances that items required by the Department's Computer Aided Drafting and Design (CADD) Manual are included in the delivered project data and that certain Quality Control functions were performed.

Composite PDF: A document containing all of the plan sheet images composing the plans set in their index order. This document must be in Adobe Portable Document Format (PDF) format and reside in the project's root folder.

Digital Certificate: In cryptography, a digital certificate uses a digital signature to bind together a public key with an identity — information such as the name of a person or an organization, their address, and so forth. The certificate can be used to verify that a public key belongs to an individual. The signatures on a certificate are attestations by the certificate signer that the identity information and the public key belong together.

The type of Digital Certificates used for the Department's design work must meet the Federal Government's Access Certificates for Electronic Services (ACES) program. The Department currently uses IdenTrust (http://www.identrust.com/government/index.html) to provide those digital certificates.

Digital Delivery: The contemporary method of project file delivery that relies upon the composite PDF(s) of the plans and specifications being produced and delivered, a ZIP archive of the CADD and engineering data for the contractor's use, and Digital Signature as the principal means to secure the composite PDFs of the plans and specifications files.

Digital Signature: Cryptographic data applied to an electronic file which is unique to the signatory, and is very difficult to forge. In addition, the digital signature assures that any changes made to the data or electronic file that has been signed cannot go undetected. A Digital Signature is much the same as a conventional handwritten signature that identifies a person signing the document. While traditional signatures are on paper, every digital signature stores information that will identify the person signing. There can also be information about changes made to a digitally signed document since the first signature was applied. In Digital Delivery, Digital Signatures are applied to Signature Sheet(s) in the plans or may be applied to documents that Professional(s) of Records are taking responsibility for.

Digitally Created Seal: An image of a seal created by electronic means and placed in an electronically produced document. In the CADD environment digitally created seals are usually placed by inserting a block / cell resembling an embossed seal. These may also be produced by means of a "stamp tool" in PDF editing software. The digitally created seal is an image to further communicate the idea that the adjoining digital signature appearance is the application of professional license. The digitally created seal is only an image and has no means of validation whatsoever. A digitally created seal is not to be confused with a digital certificate or digital signature. (For engineering seals see Florida Administrative Code (F.A.C.) 61G15-23.002 Seals Acceptable to the Board).

Digital Signature Appearance: A graphical representation that appears on an electronic document indicating that a digital signature has been applied. As a minimum, the appearance must contain the name of the signatory and a date-time stamp at the instant of signature. When a digital signature is used as an application of a professional's signature and seal, specific language must accompany the digital signature appearance. See the Department's ***Plans Preparation Manual*** (PPM), Volume 2, Chapter 3 & Chapter 3 Exhibits for further explanation and examples. When the digital signature is an application of a professional engineer's signature and seal, The Signature Appearance is not proof of authenticity, only that a signature was applied. Authenticity is proven through the Validation process (see Validation definition).

Digital Terrain Model (DTM): A DTM is a digital topographic model of the earth's surface minus objects such as trees, vegetation, and structures that can be manipulated through computer-aided design programs. All elements of the DTM are spatially related to one another in three dimensions.

Early Works: Sheets inserted into the plan set that were prepared early in or prior to the design process. See section 5.10.1.1 below. **Project CD**: Media (CD, DVD, USB, etcetera) containing all data associated with a project. The contents must include the entirety of the Project Folder / Project Data Set.

Revision: Volume 1, Section 20.1.4 of the PPM defines a design revision as a modification to the ***Plans, Specifications & Estimates*** (PS&E) Package/Bid Set after it has been accepted by Central Office Project Review.

Revision Set: The set of files that includes only the changed files from one revision to the next.

Sheet: A single page in a multipage PDF.

Signatory: The person or professional who secures files in a delivery using electronic cryptographic means such as Digital Signature. If the signatory is a professional, signatures will be governed by the rules defined by the Florida Boards of Professional Regulation. A professional may have multiple signatories for a project as needed by the revision process.

Signature Sheet(s): The Digital Delivery process uses a Signature Sheet to define a professional's area of responsibility for those portions of the document being digitally signed. Signature Sheet(s), in the case of a plans set, is one or more sheets following a Key sheet which bears the digital signatures of the Professional(s) of Records.

The Signature Sheet is a convenient location for placing a digital signature appearance when there are multiple individuals signing a plan set. By placing a digital signature on the signature sheet of a plans set, the Professional(s) of Record associates his/her professional signature with the entire plan set (for example: 61G15-23.004); therefore, notation must be provided on the signature sheet for a scope delineating the extent of the Professional's responsibility and an index of the specific sheets in the plan set for which the Professional is accepting responsibility (also 61G15-30.003 Minimum Requirements for Engineering Documents).

(See the Department's PPM, Volume 2, Chapter 3 & Chapter 3 Exhibits for further explanation and examples.)

Signing: Acts of securing a file or set of files by means Digital Signature (see above definition).

Signing and Sealing: Digital Signature relies upon Public Key Infrastructure to embed secure data into a file the Signatory is signing, or signing and sealing. Any restriction upon the scope of responsibility, usability, or reliability of the file being signed must show with the appearance of the digital signature in that document.

Sub-Consultant: A consultant, separate from the primary consultant, who performs work for a project under the hire of a prime consultant.

Sub-Delivery: A delivery of files made by a sub consultant to a consultant, prime consultant or project manager, where that delivery is only a portion of the overall project.

Surface: A surface, in the context of 3D engineered models, represents an element of design such as existing ground, final grading, or pavement in three-dimensional workspace. All elements of the surface are spatially oriented to one another.

Validation: Validation is done in Digital Signature; however, the validating application will compare hashes embedded cryptically within the file against ones calculated "on the fly" to see if a document has changed. The Validation extends to the hosting application verifying the identity of Signatory by using the Root Certificate to make contact with the Certificate Authority over the internet and checking identity records to ascertain the authenticity of the Signatory.

5.4 REFERENCES

Construction Project Administration Manual (CPAM) Topic 700-000-000

Federal Highway Administration - 3D Modeling

Florida Permanent Reference Network (FPRN)

IdenTrust

LandXML

Plans Preparation Manual Volume 1 & 2, Topic Nos. 625-000-007/625-000-008

5.5 RECEIPT AND ACCEPTANCE OF ELECTRONIC DATA

The Project Manager is responsible for ensuring that the terms of the scope of services of a project have been met, including the assurance that the Department's Quality Control requirements were fulfilled during production of the electronic data.

- ***Receipt of Data***

The Project Manager must receive electronic data under a letter of transmittal.

- ***Authentication***

Upon receipt of the delivery media, the Department will validate all digitally signed files.

- ***Acceptance***

The Project Manager ensures that the delivery is checked for completeness and meets the terms, conditions and requirements outlined herein. Once the delivery has been determined to be compliant, a record of acceptance must be made.

5.6 ENGINEERING DATA SERVICES

Engineering Data Services is a *function* (*or functions*) within the Department for handling and re-distributing engineering and CADD data, including consolidation, packaging, archiving, and distribution of data belonging to a project.

- ***Contract Packaging***

Engineering Data Services must coordinate regarding contract packaging requirements for a delivery for a letting found in the Plans Preparation Manual Volume 1 & 2, Topic Nos. 625-000-007/625-000-00**8**

- ***Archive and Security of Data***

Engineering Data Services must insure that prescribed safeguards for the data have been met and the archival package for data includes all electronic data available for a project. The data must be preserved where it can be retrieved at future dates, meeting records retention standards set for such data.

5.7 PUBLICATION AND DISTRIBUTION

Engineering Data Services is responsible for publication and distribution of electronic data in accordance with procedures or requests, including but not limited to publishing electronic data to different media.

5.8 DIGITAL DELIVERY

Digital Signature is defined in ***Florida Statutes 668.003*** and uses a Digital Signature to secure files. Digital Signature is a "paperless" process that relies upon the intrinsic ability of the files themselves to encode cryptographic security features using a Digital Certificate issued to the Professional of Record.

The Digital Delivery comprises two parts:

- One Part that represents the work product of design in the full project directory structure.
- One Part extracted from the full project directory structure that is provided to contractors as defined in 5.8.1 below.

5.8.1 *Production Deliverable Files*

Engineering and CADD data is to be provided to the contractor is to encourage the use of Automated Machine Guidance in Construction and to facilitate more accurate bidding. Advertising projects with both the CADD and Engineering Data is desired (i.e. LandXML of the project geometrics and surfaces).

Project design documentation (like pavement design report, typical section package, exceptions, variations, architectural calculations, drainage calculations, lighting design analysis report, permits, geotechnical reports, structural calculations, toll facility calculations, utility schedules, etcetera) will be delivered per PPM, Volume 1, Chapter 20. Some districts specify these documents be delivered under \admin\ or \calcs\ specific folders.

The Bid Set is made available to contractors for bidding during the advertisement period and generally includes:

- Plans Component PDF file(s) representing the Plans Set
- Specifications PDF file(s)
- Archival native CADD ZIP file
- Automated Machine Guidance files

Plans will be divided by plans components. The Department's Standard Plans Component codes (corresponding to the component order defined in the PPM, Volume 2, Chapter 2 (component description in parenthesis) are as follows:

01 – Roadway Plans

02 – Signing and Pavement Marking Plans

03 – Signalization Plans

04 – Intelligent Transportation System Plans

05 – Lighting Plans

06 – Landscaping Plans

07 – Architectural Plans

08 – Structures Plans

09 – Toll Facilities

10 – Utility Work by Highway Contractor Agreement Plans

5.9 PRE-PRODUCTION

Pre-production activities involve the creation of a "seed" project to provide a framework for meeting the Department's CADD standards and delivery requirements. Activities include the creation of the Project folder structure. The project must begin correctly so the Department's standards for Delivery can be met.

The Department's CADD Software Suite contains a tool to help create a Project folder structure with the appropriate project information. The newly generated Project folder structure and its content are referred to as the "seed project".

For creating a "seed project" the *Create Project* application can be used to enter key financial, administrative and location data into the project as project identification information. This project identification information is contained in an XML file format (*ProjectID.xml*) stored in the _meta_info\ sub-folder of the project.

5.10 PRODUCTION

During the production phase, tasks are performed prior to the creation of the media for delivery of the data meeting the Department's delivery requirements. The Department provides several applications and resources to aid the user to meet the Department's specific requirements.

- ***Tasks Performed During the Production Phase Include:***
  - Follow the folder structure and file naming requirements for Delivery.
  - Produce CADD design files to the Department's CADD Standards, using the workspaces and resources provided.
  - Assemble any non-standard user created CADD resources, such as custom created cell libraries, in appropriate folders and document their use.
  - Document all approved deviations from the Department's CADD Standards in the Project Journal file(s), including important applications, methods and decisions made during design. This is important for downstream users of data to follow in the designer's footsteps.
  - Create required Engineering Data and output files.
  - Generate Quality Control (QC) Reports for all design files using the CADD QC tool provided. These reports indicate compliance to file naming and CADD element symbology standards.
  - Merge any external project files into the project folder structure, including all files from sub-consultants, external reference files, scanned images for sheets (if any) and specifications documents.
  - Bundle any non-standard graphics dependent resource files into the project sub-folders:
    - \symb\ - to include user created fonts, shape files and/or line styles/linetypes
    - \cell\ - to include project specific / user created cell or block libraries
  - Check for any duplication of files and resolve. Remove non-essential file duplication. Remove non-essential "junk" files.
  - Review the project for completeness, accuracy, and compliance with delivery standards. The application *FileChecker* is provided to help assist with this task.
  - Create any files needed to support 3D modeling as required by the scope and to communicate design intention to the contractor.

5.10.1 *Plans Component PDF Files*

Each plan component will be delivered as a separate PDF file. Component file PDFs will have one of the applicable file names from the table below.

fpid-PLANS-01-ROADWAY.PDF	*fpid*-PLANS-06-LANDSCAPE.PDF
fpid-PLANS-02-SIGNINGMARKING.PDF	*fpid*-PLANS-07-ARCHITECHTURAL.PDF
fpid-PLANS-03-SIGNALIZATION.PDF	*fpid*-PLANS-08-STRUCTURES.PDF
fpid-PLANS-04-ITS.PDF	*fpid*-PLANS-09-TOLLFACILITIES.PDF
fpid-PLANS-05-LIGHTING.PDF	*fpid*-PLANS-10-UTILITYWORK.PDF

Each Plans Component PDF will contain all of the sheets in that component set in consecutive order and suitable for inclusion into the overall plan set. The only exception to this requirement is ***Early Work*** sheets discussed in Section 5.10.1.1 below.

Each Plans Component PDF will have its own key sheet. In the event that there is more than one professional of record signing a plan component, a signature sheet(s) will be inserted directly behind the key sheet to contain the digital signatures. If a plan component or an early work sheet has only one professional of record signing, then NO signature sheet will accompany that component or Early Work sheet. In the instance of a single signer the digital signature appearance will be placed on the lead sheet in the set in the same location as a physical wet-ink signature and seal would appear; on the key sheet for a component set or the first sheet for an Early Work sheet set.

Produce Plan Component PDF's and Early Works Sheets in Black and White or Grayscale, unless color PDFs are required. Production of the PDF in color enlarges the file size considerably. All plans sheets must be produced in the PDF in the same reading orientation, preferably Landscape, with the title block displaying at the bottom of the sheet.

Note For strung projects, each "Lead" and "Goes-with" Project dataset and Bid Set data is delivered separately. Each "lead" and "Goes-with" will have its own set of PDFs, *fpid*-CADD.ZIP, etcetera.

5.10.1.1 Early Work Sheets of Plan Sets

Portions, certain Early Works sheets, of a plan set that are delivered early in the project development cycle as per the PPM may be digitally signed at the time of sheet development. In so doing, the professional of record signs said Early Works sheets only once when those sheets are completed, unless subsequent changes are made to the sheets.

Early Works may only be provided in one of four instances; Project Control, Geotechnical Core Borings, Verification of Underground Utilities Survey, or a Tree Survey. Each Early Work set is provided as a separate multi-sheet PDF file. Those PDF files will be named accordingly using the following file naming convention:

Project Control:	<*fpid*>-PLANS-<*component code*>-<*component*>-**PC**.PDF
Geotechnical Core Borings:	<*fpid*>-PLANS-<*component code*>-<*component*>-**COREBORINGS**.PDF
Underground Utilities:	<*fpid*>-PLANS-<*component code*>-<*component*>-**VERIFIEDUTILITIES**.PDF
Tree Survey:	<*fpid*>-PLANS-<*component code*>-<*component*>-**TREESURVEY**.PDF

Typically, these are delivered with the roadway component. An example where the primary plans component is roadway (01-ROADWAY), early works are delivered is shown in the following table:

fpid-PLANS-01-ROADWAY-**PC**.PDF
fpid-PLANS-01-ROADWAY-**COREBORINGS**.PDF
fpid-PLANS-01-ROADWAY-**VERIFIEDUTILITIES**.PDF
fpid-PLANS-01-ROADWAY-**TREESURVEY.PDF**

As another example, if the primary plans component is structures (08-STRUCTURES), then the early work sheets will be named as shown in the following table:

fpid-PLANS-08-STRUCTURES-**PC**.PDF
fpid-PLANS-08-STRUCTURES-**COREBORINGS**.PDF
fpid-PLANS-08-STRUCTURES-**VERIFIEDUTILITIES**.PDF
fpid-PLANS-08-STRUCTURES-**TREESURVEY.PDF**

And likewise other plans components.

5.10.1.2 Plans Component PDF Deviation

In the rare event that the complexity and sheer size of a project dictates that the project be further subdivided than by the means provided by the above file names, an approval may be granted as follows:

- A request to deviate from the required process must be made in writing by the District Plans, Specification & Estimates Engineer to the Central Office, Program Management Office.
- The request must be specific regarding the proposed file structure and delivery method that will be used for the project in question.
- The request should be made as early in the design phase as practical, but no later than Phase III Plans Submittal.
- Central Office, Program Management Office will grant approval if the need for deviation is demonstrated and the proposed process is acceptable.
- An approval granted on one project may not be construed as to extend to other projects regardless of similar circumstances. Approvals are granted on a project by project basis.

5.10.2 *3D Model PDF Files*

All projects modeled in 3D will deliver a separate 3D PDF file. Project file PDFs will have the file name as shown below.

- ***fpid*-3DMODEL.PDF**

5.10.3 *Specifications PDF Files*

- ***fpid*-SPECS.PDF** – Specifications PDF format file delivered separate from the project folder structure. This file is signed and sealed with Digital Signature.
- ***fpid*-SPECS-SUPP##.PDF** – Supplemental Specifications file signed and sealed with Digital Signature.

Note Refer to Chapter 4.13.17.3, Specifications Standards - Technical Special Provisions (TSPs) in the Bid Set.

5.10.4 *CAD ZIP Files*

An archive of the Project folder structure containing the CADD files (Native DGN's / DWG's of the platform used to design the project) and supporting data files from which the final plans were developed will be delivered in the format of a ZIP file (*fpid*-CADD.ZIP). This ZIP file is not signed and sealed and is delivered as a separate file outside of the project folder structure. The designer must determine which files should be included inside the *fpid*-CADD.ZIP file to support the plans and facilitate the contractor constructing the project. The folder structure inside fpid-CADD.ZIP closely resembles the Project Folder structure (as a sub-set), where files found in *fpid*-CADD.ZIP would be found at the same path as in the project Folder structure.

As a minimum, the fpid-CADD.ZIP should include:

- CADD Drawing Files (.DGNs, .DWGs, etcetera)
- Engineering Data Files *(described later in this chapter and prior chapters)*
- Summary of Quantity Sheet Backup Drawings *(includes data such as, shapes and area identifications)*
- 3D Deliverable Files *(a culling out of selected CADD and other files from the Project CD specifically for the contractor)*

DO NOT include the following files (and their variants) in the *fpid*-CADD.ZIP:

- *fpid*-PLANS-*<component code>*-*<component>*.PDF
- *fpid*-PLANS-*<component code>*-*<component>*-REV##.PDF
- *fpid*-SPECS[-].PDF
- *fpid*-SPECS-SUPP##.PDF

Note Because *fpid*-CADD.ZIP does not represent the entire Digital Delivery, certain tools, such as *FileChecker,* should not be run against only the contents within *fpid*-CADD.ZIP. *FileChecker* should only be run against the full Project folder structure containing all of the Digital Delivery.

5.10.4.1 Engineering Data

In addition to the delivery of the files produced during the course of development, the Department requires the inclusion of certain Engineering Data files for critical geometrics in the design. These can include the alignments, profiles, cross sections, and surfaces. Critical roadway geometric items, such as the centerlines and profiles of the proposed mainline, side streets, special ditches, and utilities, must be included.

- ***Delivery Standards for Engineering Data***

The required formats for Engineering Data files for a project as part of the Delivery includes LandXML, which covers basic geometry element types, and is readable by the Department's software systems, from both Bentley and Autodesk. In addition, LandXML may be consumed by many software used by the highway construction industry including AGTEK, Trimble, Carlson, and others.

The LandXML format defines data exchange format for basic roadway geometrics including:

Point data
Curve data
Spiral data
Alignments (with station equations)
Cross Sections (surface and design sections)
Profiles
Pipe Newtorks
Terrain Model Surfaces
Survey Data.

Note LandXML is also widely supported by many civil engineering software. Read more about LandXML at: http://www.LandXML.org

- ***Cross Sections***
- ***LandXML defines a specification for the exchange of cross section data. This format includes surface definitions such as existing ground terrain, and bottom of the proposed template, to define materials set forth in the Department's Design Standards Indexes 500 and 505. Quantity Files***

Engineering Data supporting Quantity calculations must be delivered according to the guidelines and formats defined by the ***Construction Project Administration Manual (CPAM) Topic 700-000-000*** found at: http://www.fdot.gov/construction/manuals/cpam/CPAMManual.shtm

5.10.5 *3D Deliverables - Automated Machine Guidance in Construction*

3D Design and Modeling is intended to facilitate Automated Machine Guidance (AMG) in construction. Both Bentley and Autodesk provide 3D Design tools and have been augmented through the Department's workspaces for the Department's projects and help support exporting data usable in AMG processes. AMG technology can reduce time and cost of construction because of greater productivity by equipment operators,

fewer grade checks are needed, greener construction (less fuel and equipment wear), greater safety, less rework, and less survey staking required. Contractors invest in AMG for safety, productivity, and to stay competitive.

The benefits of 3D Design and AMG are well documented on the Federal Highway Administration web pages here: http://www.fhwa.dot.gov/construction/3d/

Some goals in providing the Engineering and CADD data to the contractor is to encourage the use of AMG in Construction and to facilitate more accurate bidding. Other automation is also possible and Building Iformatio Modeling (BIM) processes have demonstrated this automation in other industries. Advertising projects with both the CADD and Engineering Data is desired (i.e. LandXML of the project geometrics and surfaces).

In general, projects characterized by the following are the best candidates for modeling and AMG:

- Projects with large amounts of earthwork or paving, including new road construction or significant reconstruction. Resurfacing, Restoration & Rehabilitation (RRR) projects involving variable cross slope and superelevation correction are also good candidates. When scoping projects, preliminary design and planning should question why 3D Design should not be used, rather than if it should. As a matter of guidance, the designer should consider that if controlled cross sections are going to be needed in the plans to communicate design intent to the contractor, then the project is a good candidate for 3D modeling.
- Projects with a good GPS environment for receiving satellite signals, or enough line of sight for using total station and laser controlled systems. The Department's Florida Permanent Reference Network (FPRN) provides statewide GPS coverage: http://www.fdot.gov/geospatial/FPRN.shtm
- Projects with designs that are based on accurate existing ground Digital Terrain Models (DTM).

3D Design workflow must start at the beginning of the project and create the needed data from survey, and is contingent upon data being tied to an AMG field usable coordinate system. The Department requires projects to be performed on the State Plane coordinate system, and the vertical datum is referenced at time of survey activities. After design, the overall reduction of construction costs by modeling and AMG should be realized. For design, the 3D workflow enables the project development team to visualize potential impacts and promote intense collaboration during the planning and design process. Discovering design errors by inspection of the 3D models will reduce costly change orders during construction.

The use of modeling will eventually require conversion of CADD data and other model data to AMG formats. This conversion is the responsibility of the contractor, as the contractor may have special needs that the designer may not anticipate. However, the formats of data delivered as prescribed by this Manual should enable successful translation by the contractor.

The electronic files delivered with the contract documents are provided as a courtesy to the contractor. The Department's Contracts Administration Office releases this CADD data with accompanying exculpatory language stating the contractor cannot use the data as a basis for claims. Contractors will be completely responsible for any data conversions or information derived from model data provided by designer. Post-design services may employ a designer to convert model data to needed AMG formats, or refine the models to meet contractor specific needs. Since the intention of the Department is to encourage 3D modeling and AMG in construction, requirements for accountability and certification of 3D models will also be forthcoming.

5.10.5.1 Types of Modeling Data Needed

- **Control**

The survey control for the design of the project needs to be clearly transmitted to the contractor, including the coordinate system and datum of that control. This is important because the contractor must calibrate his AMG equipment to that control upon which the design model is tied. The State Surveying and Mapping Office provides instructions for establishment and densification of field survey control, and the State Construction Office's Proposed Specification: **0050700 Control of the Work** has further guidance for AMG operations.

- **Alignments/PGLs**

As described in Section 5.10.2, LandXML file(s) of the controlling alignments and profiles that represent the controlling geometrics of the project will be delivered and can be extracted from other CADD files delivered. These tie all other data provided directly to the contract plans set. The data must be in the coordinate system of the control that can resolve to the field and be in harmony with all the other data that will be provided.

- **Surfaces**

Surfaces created by survey can represent existing conditions and those created during design using CADD software indicate the designer's intent. Surfaces representing existing conditions at the time of the survey used for design (the pre-design existing (Ground) surface), as well as the finished construction (Top) surface are delivered. LandXML Triangular Irregular Network (TIN) surfaces would typically be delivered for most projects and the same surfaces also delivered as 3D design files in their native CADD systems. Surfaces represented by LandXML files can become unwieldy for larger projects (surfaces should be represented in LandXML files of less than 500 MB per surface-file), so it may be necessary to subdivide a project's surface data into logical sections when delivering large LandXML surface files.

For Example: A relatively small TIN surface (i.e. 32,208 points, 63,462 triangles) can be represented as a LandXML file of approximately 5 MB. So a LandXML surface file of approximately 100 times this data content (about 3 million points) could be manageable as LandXML. Since LandXML is text-based, it will also compress significantly when creating a ZIP to deliver the data (for example, a 50 Megabyte LandXML file of a TIN surface will ZIP down to approximately 10 Megabytes for delivery).

Surfaces delivered in MicroStation DGN or AutoCAD DWG 3D design formats (meeting the Department's CADD standards for symbology) are most usable when each surface is separated into their own drawing files. Points and Break lines should be contained in the surface files.

Note If the native to CADD system used to produce those surfaces mentioned above also stores surface data in alternative formats, as such the case with GEOPAK: i.e. a .TIN, a GEOPAK .DAT, or an InROADS / GEOPAK Roadway Modeler .DTM, then those files must also be delivered.

Surfaces may also be needed in more common formats used in software by the contracting industry. Contractors have communicated a preference for AutoCAD 3D design formats (3D DWG and 3D DXF) which are exportable by both MicroStation and AutoCAD tools. Some contractors have also communicated the need for finished top surfaces to be "smoother" and be represented differently than in TIN formats. These finished surfaces can sometimes be exported in alternate 3D representations called "mesh," "grid," or "lattice" surfaces depending upon which design platform is used.

- **Break Lines**

Hard surface breaks must be respected during construction (i.e. edges of pavement, shoulder breaks, etcetera) and need to be provided to enhance the surface data. These aid the field AMG equipment operator during grading and string-less staking operations by preventing the "shaving" that could occur as the equipment transitions the break.

- **Denigrating Geometry**

When finishing drawings, 2D & 3D controlling geometry is to be represented by basic vector geometry types such as lines, arcs, and polylines. This Geometry should not be combined into Blocks or Cells which destroys any attached original design intelligence.

5.10.5.2 *3D Deliverables Supporting AMG for 3D Designed Projects*

The following table describes the file(s) to be provided for construction. Contractors have requested the Department isolate the CADD and LandXML files they would typically need with a consistent name scheme. These files are usually copies of files already produced in the ordinary course of 3D Design CADD work and copied to a convenient Project folder location (**\3DDeliverables**) for the contractor's usage.

Note All 3D Deliverable files should be set to 'READ ONLY'.

3D DELIVERABLES SUPPORTING AMG for 3D PROJECTS	
File Name *(put in \3DDeliverables\)*	**Description**
Design Alignments and Profiles	
AMG-ALGN##.xml	All Alignments and Profiles extracted from the \Roadway\ALGNRD, PROF or model files and \Roadway\DSGNRD or CORRRD files in LandXML format.
2D Proposed Planimetrics Design	
AMG-2DSGN##.dwg/dgn	2D proposed Roadway design extracted from the \Roadway\DSGNRD file. (Production of this file for construction is at the designer's discretion.)
AMG-2DRPR##.dwg/dgn	2D proposed Drainage design extracted from the \Roadway\DRPRRD file. (Production of this file for construction is at the designer's discretion.)
AMG-2PDPL##.dwg/dgn	2D proposed Pond design extracted from the \Roadway\PDPLRD file. (Production of this file for construction is at the designer's discretion.)
2D Existing Survey *(Note: These are being considered to merge into a single survey Planimetrics file)*	
AMG-2TOPO##.dwg/dgn	2D proposed existing Topography extracted from the \Survey\TOPORD file. (Production of this file for construction is at the designer's discretion.)
AMG-2DREX##.dwg/dgn	2D proposed existing Drainage extracted from the \Survey\DREXRD file. (Production of this file for construction is at the designer's discretion.)
AMG-2UTEX##.dwg/dgn	2D proposed existing Utilities extracted from the \Survey\UTEXRD file. (Production of this file for construction is at the designer's discretion.)
3D Existing Survey Surfaces	
AMG-3SURFACEEX##.xml	3D existing terrain surface to be exported from the \Survey\GDTMRD file as LandXML format. (Production of this file for construction is at the designer's discretion. This file will be produced if the 3D Existing Surface dwg/dgn file(s) are not produced.)
AMG-3SURFACEEX##. dwg/dgn	3D existing terrain surface to be exported from the \Survey\GDTMRD file. (Production of this file for construction is at the designer's discretion. This file will be produced if the 3D Existing Surface LandXML file(s) are not produced.)
3D Proposed Surfaces	
AMG-3SURFACEPR##.xml	3D proposed finished (top) surface to be exported as LandXML format from the \Roadway\MODLRD file.
AMG-3SURFACEEW##.xml	3D proposed finished (bottom) surface to be exported as LandXML format from the \Roadway\MODLRD file. This file will be used to generate surface to surface earthwork volumes.
3D Proposed Break Lines	
AMG-3DSGN##.dwg/dgn	3D proposed Roadway design extracted from the \Roadway\DSGNRD file. (Production of this file for construction is at the designer's discretion. This file will be produced if the 3D Proposed Surface(s) LandXML file(s) is not produced. Geometric elements should be in vector.)

Note All LandXML .xml files must use the LandXML 1.2 schema published at http://www.LandXML.org

5.10.5.3 *Maximum Corridor Frequency Interval Spacing for 3D Design*

Design software used by the Department samples the 3D corridor models at user defined intervals in order to create surfaces. To ensure reasonable fidelity in surface models for AMG operations, maximum sampling intervals are described below:

Note The designer may choose to sample more frequently to more accurately represent his design model, although, there is a limiting return (larger files and poorer computer performance) if sampling too frequently. Designers must balance these competing consequences when deciding appropriate sampling frequency for their projects.

Facility	Design Speed < 45 MPH	Design Speed > 45 MPH
Rural Sections	maximum corridor interval	
Tangents	20 feet	20 feet
Curves	10 feet	10 feet
Intersections	5 feet	5 feet
Urban Sections	maximum corridor interval	
Tangents	10 feet	20 feet
Curves	5 feet	10 feet
Intersections	2 feet	5 feet

Additional sampling intervals will normally be needed at critical regions in horizontal geometry stations (i.e. PC's, PT's), superelevation transition locations, and at profile geometry critical locations (i.e. PVC's, PVT's, and profile high/low points). The designer must also add sampling at other critical regions along the corridor, such as changes of typical section, critical drainage locations, approach and interior to intersections, and median crossovers.

5.10.5.4 Quality Control of Corridor Models and Extracted Surface

3D Design for roadways is intended to produce output of a corridor model from which surfaces may be derived. It is incumbent upon the designer to verify these corridor and surface models representing their design intent so the resulting models and data derived from them can be relied upon. The previous Section describes maximum sampling intervals for developing corridor models based upon facility and design speed; however more frequent sampling may be required to achieve the desired accuracy or resolution of the 3D model.

There are several methods that can be used to check the "quality" of the proposed models and surfaces, and many checks rely upon visualization techniques on the data. These can include:

- Visual inspection through examining the models/surfaces using 3D perspective views and orbits. The Z (elevation) can sometimes be exaggerated during these operations to show discontinuity in the surfaces where problems might lie.
- Visual Inspection through examining the models/surfaces using drive through and fly through view manipulations and animations. Other simulation techniques can be employed also.
- Contouring the surface models and examining the resulting contours.
- Surface display by means of rendered/stylized surfaces (and solids). In some software these views can be thematically colored and or shaded, indicating slope or elevation change.
- Cross Section and Profile extraction – Do these extractions corroborate the contract plans? Equally, are plan sections and profiles contemporary with the model?
- "Rain Drop" analysis to see where water distributed over a surface would flow or accumulate if the surface were treated as if it were impervious and perfectly smooth.
- Representing elements in either wire-frame or as solid bodies, where they can be examined for conflict or "interference" relative to neighboring or crossing elements.
- Use of temporary dimensioning and labels to test the models elements for appropriate length, elevation, slope, etcetera.
- Design criteria can also be checked for critical design standards such as sight distance, K-value, rate of curvature, cross slope, and curve widening criteria.

Note Visualization can be embellished with applications of various rendering materials, lighting, and shading.

5.10.6 *Merging External Project Files*

Files must be merged into the main Project folder structure prior to the project delivery. These include CADD system dependency files, and files provided from outside sources, such as those produced by sub-consultants.

- **CADD System Dependency Files:**

Certain CADD references might reside external to the project folder during the production phase. Before delivery to the Department, these files must be placed in the appropriate locations within the Project folder structure. It is strongly recommended that these files be included in the Project folder structure early on in project development and verified that referencing functions work properly.

Note Reference files must also be attached without the "save full path" option, and should be located by their relative paths from the root of the Project folder.

For printing purposes, any user created custom line style/linetype, font resource, and cell / block library files used for the project must be included with the project in the sub-folder \symb\. In addition, any external design files that are referenced, such as sheet border files, must be copied to the project folder. This allows the view or recreation of prints matching the original delivery for future customers of the data.

Note The designer does not need to include the Department's standard CADD resources delivered in the Department's CADD Software (either MicroStation or AutoCAD resources). However, the Department's CADD Software version information must be provided in the Project Journal.

- **Files from Outside Sources:**

Files that come from an outside source include files produced by a sub-consultant. Files from sub-consultants must be delivered to the primary consultant, or the Department's designer, following the same requirements for Delivery.

- **Merging Previously Digitally Signed Documents:**

Once a document is signed using a digital certificate, the document is valid when it is completely unaltered. Merging two or more documents together, even if those documents are signed and completely valid independently, produce a completely new document - thus an altered document. When merging previously signed documents, the PDF editing software will strip off all digital signatures that have been applied.

In situations where it is necessary to merge previously digitally signed documents, retain the original signed documents from which the merged document is produced. If it is necessary for the merged document to be signed, then it must be signed by the original signatories or their successors.

5.10.7 *Reviewing the Project*

A basic Compliance Certification Checklist Report is found in Section 5.10.9 may be employed to help the data producer consider critical items in their QC review for delivery. The Department's CADD Software Suite provides tools (including *QC Inspector* and *FileChecker*) to help ensure quality control which helps enable a successful review. One must use due diligence to make sure all delivery requirements are met.

Note Some of the Department's Districts may have their own supplemental checklists. Contact your District Project Manager for additional District specific supplemental delivery requirements.

- **Example: Some items to review would include:**

  - Take particular care to look for missing sheets, gaps in the sheet numbering, duplicate sheet numbering, etcetera. Check for misspellings in sheet borders and other grammatical errors.
  - Take particular care to find multiple files in the Project folder structure with the same file name, but different content, which must be resolved. Likewise, find files with the same content, but different filenames (which could occur as with the case of the files beginning with "AMG…" as described previously).

- Make certain the Professional of Record Note appears on plan sheets indicating the source of the official record.
- Ascertain whether the Component PDF's and Early Works Sheets contains all sheets, in a properly indexed order, and is scaled and rotated properly.
- Validate the digital signatures of signed files.
- Confirm that the Project Journal(s) are complete and accurate.

The Department's tools mentioned should be used to find and resolve potential issues, but they are only tools to aid the producer in their Delivery. It is the responsibility of the producer to perform a thorough review. This procedure does not prescribe every potential item that might need to be checked.

5.10.8 *Sign and Seal Project Files*

Digital Delivery uses Digital Signature for documents and complies with ***Florida Administrative Code*** governing the specific discipline for the professional signing those documents.

Regulated transactions, such as the development and submission of engineering plans, specifications, reports, and surveys, require high assurance when signing documents. When documents are distributed electronically it is important that recipients can:

- Verify document authenticity – confirming the identity of each person signing the document
- Verify document integrity – confirming that the document has not been altered

Certificate-based signatures provide both of these security services. The Department chose to use certificate-based digital signature infrastructure using third party certificate authorities to provide independent identity validation. Once certificate-based digital IDs are acquired by professional Signatories, PDF software can be used to sign PDF files and validate files received from others. In addition, the Department provides a tool, *XML Signer*, to digitally sign any XML based file with a Digital Certificate. Likewise, any applications that support Digital Signature with public key infrastructure can be used to sign their respective files.

Digital Signature allows one to:

- **Sign Documents:**
  - Sign PDF files using certificate IDs
  - Place a signature box anywhere on the appropriate page or sheet
  - Add multiple signatures to a document or page
  - Add a time stamp to the document
  - Certify a document with a visible (or hidden) signature to enable recipients to verify authenticity with or without seeing a visible signature on the currently viewed page
  - Automatically embed certificate data to support long-term validation
- **Validate Documents:**
  - Validate all signatures, confirming the identity of everyone signing the document
  - Validate document integrity by tracking all previously signed versions of a document to verify changes made during the document's lifecycle
- **Set Privileges and Permissions for Others:**
  - Certify a document while leaving portions available for form filling, additional signatures, or comments
  - Lock a PDF document with a Certificate ID to restrict editing or copying

5.10.8.1 *Digital Certificates*

An Access Certificate for Electronics Services (ACES) digital certificate is used to ensure identity, authenticity and accountability in citizen-to-government, business-to-government, and government-to-government electronic transactions. An ACES digital certificate is an electronic identity issued by a Certification Authority that establishes an individual's identity per the Federal Government Services Administration (GSA) standards when using electronic transactions. There are several 3rd party Certificate Authorities that issue ACES certificates. The Department internally uses ACES certificates issued by IdenTrust: http://www.identrust.com/fdot/index.html. The Department's Office of Information Technology (OIT) has recently adopted additional Certificate Authorities found here:

http://www.dot.state.fl.us/OIS/ApprovedDigitalCertificateAuthorities.shtm

When applying Digital Signatures, many software applications allow the signature to have an "appearance." As a minimum, use an appearance with the text name of the Signatory and the date-time stamp at the instant of signing. (See PPM Volume 2, Section 3.3.2)

- Do not include any additional watermark or overlay.
- Do not include an image of the "wet ink" signature of the Signatory (a violation of Board rules).
- Do not include company logos, or other images within the Digital Signature appearance.

The reason (text) for signing may be placed in a text block within the drawing where more space is available. The image of an impression seal may also be included, but is not part of the Digital Signature itself. For the Department's Plans are provided with the CADD Software Suite that contain images of seals and may be found in the *Seals.cel or Seals.dwg* Cell / Block Library(s).

5.10.8.2 *Managing Digital Certificates*

ACES Digital Certificates uniquely identify an individual. As such, these certificates must be closely guarded against unauthorized usage. Digital Certificates used for signing and sealing must be "Under the sole control of the person using it", as stated in Florida Administrative Code 61G15-23.004and others. Install certificates using "High" security options and disallow exportation of certificates from the primary Professional of Record (POR) workstation. The POR may not "delegate" the use of a digital certificate by sharing a certificate, sharing a password, or otherwise compromising sole possession and use of the certificate.

5.10.8.3 *Multiple Signature Sheets*

In situations where there are multiple signatories for a plan set where there are too many to list on a single signature sheet, multiple signature sheets may be added to the plan set. All signature sheets for a given component must be placed successively after the component Key Sheet.

Please refer to the Department's ***PPM, Volume 2 Section 3.3*** for examples:

http://www.dot.state.fl.us/rddesign/PPMManual/2016/Volume2/V2Chap03.pdf

Note Finished sheets digitally signed and sealed must bear the Professional of Record Note as shown in the Department's ***PPM*** Exhibits. The note must be applied before signing and sealing and final delivery.

5.10.8.4 *Securing the Project for Delivery*

Digitally signed documents have the security key information embedded in the files themselves. Digitally signed files are secured and authenticated using commercially available software (Adobe, Bluebeam, and etcetera).

5.10.9 *Legacy Electronic Signature Projects*

Provenance and uninterrupted legal record of the project data must occur, whether it be by product or management practice. Therefore, it is important that both the data producer and the Department make a sensible effort to ensure the documents supporting the digital signing and sealing of files by a professional signatory and the securing of the delivery be preserved in a manner consistent with those responsibilities under the rules of the Boards of Professional Regulation in Florida.

For projects that were once performed under the old Electronic Delivery process, the Department will maintain the paper copies of tention Signature and Manifest documents until it is determined how these records may be preserved in other media that meets the requirements of the Florida Boards of Professional Regulation.

5.10.10 *Media Requirements for Delivery*

All electronic projects submitted to the Department must be on write protected physical media (CD-ROM or DVD-ROM) unless otherwise approved by the Department's District ***Plans, Specifications & Estimates*** (PS&E) Manager or Program Management Administrator. Use only 1st Class archival quality writable media.

If the project is too large to fit on one CD/DVD, then the process for delivery to the Department's must be reviewed with the Department's Project Manager before splitting the project on multiple CD/DVDs or choosing an alternate media. If approved by the appropriate authority other means of transmission of data, such as File Transfer Protocol (ftp) or File Transfer Appliance (FTA) may be used.

- ***All Physical Project Media Must have a Project Identification Label with the Following:***
  - Financial Project ID Number of Project
  - Project Description *(including County and State Road numbers, local road designation)*
  - Firm or District Performing the Work
  - Name of the Department and Consultant Project Manager(s)
  - Creation Date of the Media
  - Disk (#) of (Total #) *(if multiple ROMs are needed)*
  - Delivery Type Label *(Project CD, Bid CD, etcetera)*
  - Anticipated Letting Date for the Project

With the increase of storage capacity and more cost efficiency of USB removable memory drives (thumb drives), use of this media will grow in popularity for the Department's Deliveries.

If memory drives are used:

- *The physical drive must be labeled with the Project Identification (fpid) number and District as a minimum.*

- A text file must be included on the media's root folder (not Project folder) containing the Project Identification label information and Transmittal Letter containing the same.

5.10.11 *Compliance Certification Checklist Report*

All Department Project deliveries must be provided to the Department's Project Manager, unless an alternate agreement is reached, along with a Compliance Certification Checklist Report (or similar document).

Note Department's Districts may use a more comprehensive form in their QA process than the following example. The Department prefers this or similar documentation of QC compliance be submitted digitally and included in the \admin\ or \data\ project sub-folders.

All electronic data submittals are to be transmitted to the Department's Project Manager. At a minimum, the following questions must be addressed before submittal, and this or a similar checklist given to the Project Manager along with the submittal.

- ☐ 1. Have Project Journal(s) been created containing all necessary project information?
- ☐ 2. Is the listing of the software packages and versions used to create all delivered files included in the journal?
- ☐ 3. Are all the native files generated by the CADD/Design software in checklist item 2 included in the delivery package?
- ☐ 4. Are design files compliant with the Department's CADD Standards for folder structure, file naming, and element symbology?
- ☐ 5. Does the submittal include all user-created CADD System resource files (line styles/linetypes, fonts, etcetera) that may have been used with the project?
- ☐ 6. Has the QC software been run against the design files? Are the resultant QC Reports of compliance included in the delivery submittal? Has FileChecker been run to verify folder structure, file naming standard, etcetera?
- ☐ 7. Have the prescribed engineering data files been created and submitted for the control, alignments, profiles, and surfaces in the formats? Is this information stored in the appropriate directories?
- ☐ 8. Where Multi-line (GEN) general file format files created and included for the surfaces representing the cross sections? Have LandXML files of the critical geometrics and surfaces been produced and delivered?
- ☐ 9. Have images for the plans been checked and included for all sheets in the plan set? PDF format? Checked for sheet size, scale, and rotation/orientation?
- ☐ 10. Are the files representing the plans, referenced by the Department's Plans Preparation Manual, Chapter 19 signed and sealed? Is the Electronic Plan Note on each sheet?
- ☐ 11. Has Digital Signature been applied to the correct files signed with the appropriate Digital Certificate and independently validated?
- ☐ 12. Has the final media for submission been properly labeled and re-checked to make sure the data is readable and can be authenticated?
- ☐ 13. For projects that were scoped for 3D Design deliverables, have the 3D surface models (Ground and Top) been delivered in the formats prescribed?

FPID: _____

Date of Scope: _____

Certified by EOR: _____

5.11 POST-PRODUCTION

The "Post-Production" involves the review and acceptance of a Delivery and making that Delivery available to the Department's internal services for posting. Functions include: receipt and authentication of delivery media and placement of project data into systems for general use.

Upon receipt of the secured Delivery package and the accompanying documents, the Compliance Certification Checklist Report(s) must also be reviewed for completion and the signed files must be opened and authenticated.

Note Following the requirements within this manual does not guarantee an acceptable work product, as this procedure does not address the quality of the engineering or survey work performed.

Once the Delivery is accepted, the electronic project will be imported into the Department's file management systems for subsequent use. *(See the PPM Volume 1 Chapter 20 Section 20.3 Retention of Electronic Documents for information on the Department's file management systems)*. Various stakeholders such as Construction and Maintenance have access to submittals via the Department's file management system.

5.12 REVISIONS

Revisions to the Department's projects require the files that have changed since the previous delivery. Revision files use the original file name with a "-REV##" suffix after the file type; CADD, PLANS, SPECS.

As an example, the first revision to a Roadway Component will be named as follows:

fpid-PLANS -01-ROADWAY-**REV01**.PDF

The first revision to Project Control, Early Work sheets as part of a Roadway Component, for example, will be named as follows:

fpid-PLANS -01-ROADWAY-PNC-**REV01**.PDF

A second revision will have a "REV02" suffix, third revision will have a "REV03" suffix, and so forth.

The designer must deliver:

- Ensure the Department has a complete copy of the original Delivery:
  - The native CADD files delivery *fpid-CADD.ZIP*
  - The plan component PDF files *fpid-PLANS-[component code-component].PDF*
  - The initial specifications document *fpid-SPECS.PDF*
  - The initial Technical Special Provisions *fpid-SPECS-TSP[BOE#].PDF*

- The Revision: (The Bid Set must only contain the changed files in the revision/supplement.)
  - *fpid-CADD-REV01.ZIP*
  - *fpid-PLANS-[component code-component]REV01.PDF*
  - *fpid-SPECS-SUPP01.PDF*
  - *fpid-SPECS-TSP[BOE#]-SUPP01.PDF*.
- The complete Project folder structure with all contemporary files included.

5.13 STRUNG PROJECTS

Digital Delivery requires that each "Lead" and "Goes-with" project to be delivered as separate datasets under their own *fpid*, and never combined or intermingled in their respective project folder structures. Strung projects are delivered in separate folders just as individual projects in the above procedure. These ARE NOT combined under a folder with an ETC suffix.

5.14 RE-LET PROJECTS AND ROLL BACK REVISIONS

In rare cases, the Department must Re-Let a project. If no revisions have occurred to the project set for Re-Letting, the Department will simply re-advertise and Let the project with the submitted Project CD or Bid Set CD data. However, if a revision has been applied to the project set for Re-Letting, then the revision is no longer relevant. The Re-Let project is essentially an original letting all over again. In this case, the data producer may be asked to Roll Back the revision indexing as if the Delivery were an original Delivery. This could involve updating the plan sheets to remove the revision enumerations. The changes to plans that were once identified as a revision are now considered simply a plan change.

5.15 DESIGN BUILD PROJECTS

The Scope of Services between the designer and contractor defines the deliverables to one another. If either party is bound by agreement to make a delivery of data to the Department, then the guidance for Digital Delivery should be applied.

Chapter 6

SUPPORT

6.1 PURPOSE

This chapter establishes the primary components of Florida Department of Transportation (Department) Computer Aided Design and Drafting (CADD) support structure and services, including the statewide training, and defines the applications and tools supported by the Production Support CADD Office (CADD).

6.2 SCOPE

This procedure establishes the hierarchy of CADD-related support roles and responsibilities from the peer level to the statewide level of the CADD, the District CADD support function, and the Technical Advisory Committees (TAC).

6.3 REFERENCES

- **FDOT CADD Customer Support Guide**

6.4 COMPONENTS OF CADD SUPPORT

The Department supports a core group of CADD software products for in-house production as specified herein. Consultant support is generally limited to the Department developed CADD software modules, interfaces, and configurations. The statewide CADD support is coordinated through the Production Support CADD Office. Currently supported versions of CADD software products can be found on the Production Support CADD websites:

- **Supported CADD Software Versions**
- **CADD Software Downloads**
- **CADD Manual for the CADD Software**

Most of the core CADD software products are commercial programs that the Department has purchased a license to use. Note that the Department makes no warranty, expressed or implied, as to the documentation, functionality or performance of these or other Department developed programs described herein.

The primary components of CADD Support structure include:

- Systems Support
- Operational Support
- Training Support

6.4.1 *Systems Support*

The Production Support CADD Office manages and coordinates the testing, selection, procurement, and maintenance of the supported CADD applications with assistance from the district CADD Managers and/or OIT personnel assigned to support CADD.

6.4.2 *Operational Support*

The Production Support CADD Office manages and coordinates the development, enhancement and support of the CADD software applications used by the engineering community to perform the Department's CADD production with assistance from the district CADD Managers and/or OIT personnel assigned to support CADD.

6.4.3 *Training Support*

The Production Support CADD Office manages and coordinates the provision of CADD technical materials and education to assist in maintaining user proficiency with assistance from the district CADD Managers and/or OIT personnel assigned to support CADD.

6.5 HIERARCHY OF CADD SUPPORT

The CADD statewide support structure provides for the handling of support at different levels for each of the support components. Users must seek support at the lowest level before escalating a support request to the next level. The Production Support CADD Office maintains the CADD Customer Support Guide **t**o provide users quick access to detailed product support information and training resources.

6.5.1 *Systems Support*

- **First Level:** The First Level of Systems Support is the District staff. The CADD Manager and/or District CADD IT contact are the primary liaisons with the Production Support CADD Office for addressing CADD systems issues. District CADD systems support activities involving the CADD Manager and/or OIT personnel include the following:
    - Assist with identifying the users' hardware and software needs.
    - Distribute and setup equipment and CADD software.
    - Provide input for the statewide procurement.
    - Provide day-to-day technical support of the computer hardware and CADD software systems used in the District.
- **Second Level:** The Second Level of Systems Support is the OIT staff. The OIT support responsibilities include the following:
    - Manage the budget for procurement of CADD hardware.
    - Procure CADD hardware and maintenance.
    - Provide inventory management associated with the statewide CADD hardware.
    - Provide as-needed technical support of the hardware.

6.5.2 *Operational Support*

- **First Level:** The First Level of Operational Support is through your own Peer Support.

  Second Level: The Second Level of Operational Support is through the Technical Advisory Committee (TAC) Members Support, who represents the districts and disciplines on task teams to communicate and resolve support issues of statewide interest. Contat information can be found on the Production Support CADD Office website: *CADD Technical Advisory Committees (TACs)*

- **Third Level:** The Third Level of Operational Support is District Support Staff, including, but not limited to your: CADD Managers, CADD IT contacts, and engineering services personnel. These support personnel, collectively, are responsible for supporting the core CADD software products for each respective district.

- **Fourth Level:** The Fourth Level of Operational Support is the Production Support CADD Office support staff. The Production Support CADD Office is responsible for the Department's CADD application development, enhancements, and support to provide or procure required vendor services, as necessary, for user assistance.

6.5.3 *Training Support*

The Production Support CADD Office manages and coordinates a statewide CADD Training Plan for the Department's personnel. Training instructors will be pulled from the Department's Central Office Experts or from the augmented Training Support Contracts specifically setup for this training. The CADD Training Plan will cover all Software platforms and will offer three (3) areas of training format opportunities:

- ***CADD Regional Training*** – Full scheduled workflow instructor-led curriculum
- ***CADD Academy Training*** – Full scheduled workflow web-based curriculum set in the Department's statewide Learning Curve system.
- ***District Al la carte Training*** – One (1) Week per district of Project based hands-on training coordinated by each district with the Production Support CADD Office to schedule as needed.

The CADD Training Plan will encompass the core CADD Software and CADD production procedures. The District CADD Managers, District and Unit Training Coordinators, and/or OIT personnel assigned to support CADD are responsible for respective District CADD training coordination.

The Production Support CADD Office maintains the CADD Customer Support Guide to provide users quick access to detailed product support information and training resources, including CADD Links, Events, CADD Support Community, Training Course Guides with datasets, Live & Recorded Webinars, Contact Mail Alert System, FDOT Training YouTube Channel, etcetera.

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Chapter 7

SOFTWARE DEVELOPMENT AND DISTRIBUTION

7.1 PURPOSE

This chapter establishes how Florida Department of Transportation (Department) Computer Aided Design and Drafting (CADD) software is developed, tested, approved and distributed.

7.2 SCOPE

This chapter applies to all of the Department's supported CADD Software products procured or developed to produce the Department's projects and covers the steps used to develop, test, approve and distribute these CADD Software products. This CADD Software is the responsibility of the Production Support CADD Office (CADD) and other designated offices.

7.3 DEFINITIONS

Alpha Testing: Initial testing of CADD software products or enhancements by the development staff and testing by the support staff outside of the development environment.

Beta Testing: Secondary testing of CADD software products performed in a production-like environment by end-users.

Beta Testing Coordinator: An individual responsible for facilitating the beta testing of CADD software.

7.4 DEVELOPMENT

Development encompasses new CADD software applications, enhancements to existing CADD software (added features), and the maintenance releases (bug fixes) of CADD software. Development is based upon needs identification and may include the purchase of commercial software when appropriate.

CADD software needs are communicated to the CADD by user requests or by Technical Advisory Committee(s) (TACs). The CADD also identifies needs based upon experiences with CADD support activities and the evolution of trends in the CADD software industry.

Development request specifications compiled by CADD may be coordinated with the appropriate TAC(s), CADD Managers and OIT personnel assigned to support CADD.

7.4.1 *Development or Acquisition*

The Statewide CADD Coordinator will decide whether to develop CADD software in-house, contract for development services, or purchase a CADD software commodity. The CADD will keep the user community informed as to procurement status (including training and implementation schedules) of major CADD development projects of statewide interest.

7.5 SOFTWARE UPDATES

The Department's Computer Aided Design and Drafting (CADD) Software is upgraded periodically and as needed to issue enhancements and fixes. Updates occur for major releases (generally released when major upgrades to platform CADD software by our vendors becomes available), or when major upgrades to the Department's design standards are implemented. Interim Maintenance Releases and Hot fixes (released as required) are available for download from the CADD internet website. Notification of new releases and updates are posted on the CADD website, via the Department's *Contact Mailer* application, during training sessions, and notified through other venues as appropriate.

The Department supports both Bentley's PowerGEOPAK (or MicroStation and GEOPAK Suite) and Autodesk's AutoCAD Civil 3D as the standard roadway design platforms. Regardless whether Bentley's or Autodesk's design software is used, efforts are made to maintain similar standards and deliverables so the resulting product is consistent, predictable, and repeatable (CPR).

7.6 SOFTWARE TESTING

CADD, or the designated office, performs alpha testing of CADD software products during software development as required. Beta testing is to be performed prior to the general release of CADD software. The CADD will track the progress of Beta testing.

When alpha testing demonstrates CADD software is believed to be in working order for the features intended, the software will be beta tested by end users prior to release. The "beta testing coordinator," from the CADD or the designated office, will facilitate these activities.

The beta testing by any of the Department's disciplines must only be initialized following review and approval by either the CADD Manager or CADD IT contacts.

The request for approval to proceed with beta testing, based on the appropriate recommendation, will be initialized by CADD.

Each major CADD Application has a primary support contact assigned by the CADD. This person, or their delegate, may also serve as the Beta Testing Coordinator.

7.7 TAC REVIEW AND RECOMMENDATION

CADD may coordinate with the TACs seeking recommendation for distribution and production use after conclusion of Beta testing.

7.8 CADD PRODUCT APPROVAL AND DISTRIBUTION

Major CADD Software releases are approved by CADD and notification to the Technology Services and Support Managers are made using the Software Distribution Notification Application (SDNA). CADD may also use other means of notification for CADD Managers, CADD IT Contacts and Consultants.

The CADD Managers and/or CADD IT Contacts are responsible for distributing the approved software for production use to the end users. External distribution will be at the discretion of CADD.

In most cases, users are expected to operate the most contemporary version of the Department's CADD Software release on Department projects, unless otherwise exempted by either the project's Scope of Services or a written exemption by the Department's Project Manager.

Consultants can acquire the Department's CADD Software, fixes and upgrades from the CADD internet website: http://www.fdot.gov/cadd/downloads/software/software.shtm

7.9 MINIMUM SYSTEM REQUIREMENTS

The current Department's CADD Software was developed and tested for the Department's standard workstation configurations. This standard configuration is published in the ***Adopted Information Technology Resource Standards*** and is available from the Department's Office of Information Technology (OIT) intranet website.

The Department's CADD Software is listed on CADD Current Version website:

http://www.fdot.gov/cadd/main/Version/CurrentVersions.shtm**.**

Other software configurations may operate with the Department's CADD Software. Use and support of the Department's CADD Software on other configurations are the sole responsibility of the user.

7.10 TRANSLATION OF FILES

The Department requires MicroStation DGN format (V8 and higher) or AutoCAD .DWG format (2014 or higher) for the delivery of all design files, except as specifically defined in subsequent ***CADD Manual*** chapters for specific disciplines.

The data producer is solely responsible for any translation required for delivery to the Department. The accuracy of translation of the design files and adherence to the standards and specifications contained herein, including the validity of the geometric elements, is the sole responsibility of the person performing the translation.

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Chapter 8

QUALITY ASSURANCE

8.1 PURPOSE

This chapter establishes the basis for Quality Assurance (QA) monitoring of the Florida Department of Transportation (Department) District Computer Aided Design and Drafting (CADD) functions, including the areas of responsibility, frequency of monitoring and reporting methods.

Offices under the direction of the Department's Chief Engineer are responsible for determining the critical QA requirements for their functional areas and develop plans to monitor those requirements. The Production Support CADD Office (CADD) defines the critical Quality requirements for deliverables in this Manual. These include standard file formats and components for data delivery, adherence to a standard Project folder structure, file naming conventions and CADD Standards for electronic files. CADD also establishes a QA monitoring plan for CADD to facilitate compliance with these deliverable requirements.

8.2 AUTHORITY

Section 20.23(3), Florida Statutes (F.S.) states that the Department must ensure quality and monitor implementation of policies and procedures.

Quality Assurance and Quality Control Policy, Topic No. 001-260-001 states that it is the policy of the Department to use a systematic but flexible approach to Quality Assurance (QA) and Quality Control (QC) to monitor work processes to implement laws, rules, procedures, policies and standards. This is intended to ensure compliance and quality performance by the Central Office and District units responsible for the delivery of transportation products, services and information.

8.3 SCOPE

Each central office function has the responsibility of monitoring the implementation of policies, procedures and standards established for their respective processes. This Manual applies to all CADD functions and will be monitored.

8.4 REFERENCES

Section 20.23(3), Florida Statutes (F.S.)

Quality Assurance and Quality Control Policy, Topic No. 001-260-001

8.5 DEFINITIONS

Critical Area: Those steps in the CADD process where significant problems may be introduced unless the production criteria and standards are followed.

Critical Requirement: A decision, standard or process operation that will substantially and negatively affect the quality of the product or results if omitted or not performed to the expected level.

Compliance Indicator: Evidence that the critical requirements which are being applied are producing the desired result.

Monitoring Plan: A QA work plan for CADD developed with District input that identifies what, where, when and how monitoring, reporting, tracking and follow up are to be performed.

Quality Assurance (QA): The planned, coordinated and continued activities performed to measure processes against predetermined critical requirements.

Quality Control (QC): The planned, integrated activities performed during work processes to ensure completeness, accuracy, proper decision making, and conformance with all other valid requirements.

Quality Control (QC) Reports: Reports that must be included with the final project delivery, including the Compliance Certification Checklist Report and all reports listed therein. Some reports are produced by software within the Department's CADD Software Suite.

8.6 QA MONITORING PLAN

The QA Monitoring Plan identifies the critical areas of CADD to be monitored, critical requirements and the criteria to measure process compliance. Compliance indicators will be used by the CADD to determine how well the process is performing.

The monitoring plan provides the method for monitoring CADD processes, the frequency of team visits, the method for reporting and sharing monitored results with the districts, and the method for tracking and eliminating non-compliance issues.

The plan covers the major delivery requirements in this Manual, but users are reminded that quality CADD production is the result of performing many individual CADD activities correctly and in accordance with the current criteria and standards.

The ***CADD Quality Assurance Monitoring Plan*** is published on the Department's SharePoint per Department policy.

8.7 ACCOUNTABILITY

Production units must follow the procedures for preparing plans and maps. Each district must establish quality compliance indicators for all projects and monitor performance and compliance using those indicators. Consultants are agents of the Department and are responsible for the quality of projects they prepare. They must comply with the Department's ***CADD Manual*** and must perform QC activities to ensure the completeness and accuracy of services performed for the Department.

8.8 QUALITY ASSURANCE (QA) REVIEWS

CADD QA Reviews will be conducted per Department requirements. The CADD will report the results of these reviews to the District Secretary. Measuring compliance with the critical requirements as outlined in the ***CADD Quality Assurance Monitoring Plan*** will be the purpose of these reviews.

8.9 QUALITY CONTROL (QC) – DATA PRODUCERS' ROLE

Each district must maintain an established review process to determine and report the quality and compliance levels of project data. Each district is also responsible for having a management plan for quality control of the Delivery with the expectation that quality control plans comply with this Manual.

The Department provides tools to help ensure the creation of a standard Project folder structure, standard file names and the standard level symbology for all design files. The Department provides QC software to check a design file's adherence to the Department's level-symbology standards at any time during the production phase of the project. Tools are listed below:

- **FileChecker** – Provides reporting for certain portions of the Delivery compliance with standards and business rules.
- **QC Software** – The *QC Inspector* contains tools used to check, correct and report the compliancy of elements within any design file against the Department's CADD Standards. All checking and reporting is performed in real time and the results recorded into reporting documents that are saved to the current active project.

8.10 QUALITY ASSURANCE (QA) – CENTRAL OFFICE ROLE

The CADD Quality Assurance Reviews (QAR) is to monitor the districts' individual QC Plans. QA also encourages continuous improvement through sharing both ideas and improved technology advances.

Districts will be expected to ensure that their own Process Management Plan is in place for Delivery and that projects comply with that process.

The QAR of the Districts' will be conducted periodically following the CADD QA monitoring plan. Reports are distributed to the District Secretaries and other affected offices.

Appendix A – CADD Standard Rule Tables

The ***Appendix A*** of the CADD Manual holds the complete set of tables for all of the FDOT CADD Standard Rules used to check compliancy of all design files created for FDOT projects. These tables are expanded listings of all FDOT Standard Levels valid for each FDOT Standard Rule. The ***Appendix A*** document can be access as needed by CADD users from the following link:

CADD Manual - Appendix A - CADD Standard Rule Tables

For Current Updates see CADD Manual in Reference to FDM