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Chapter 1 - INTRODUCTION

CADD Production Criteria Handbook

1.1 PURPOSE

The electronic files created during the process of developing a Computer Aided Design and Drafting (CADD) project for Florida Department of Transportation (FDOT) are shared and referenced by many different individuals and disciplines, and therefore must satisfy diverse needs. Electronic files must be in formats that most parties can utilize and share. Therefore, processes, standards and requirements have been established for many disciplines involved in the CADD development workflow. This ***CADD Production Criteria Handbook (CPCH)*** is a companion to the ***FDOT CADD Manual (Topic Number 625-050-001)*** that outlines minimum standards necessary to ensure a usable, consistent and predicable CADD data set for the project and provides the information necessary to accomplish this task(s).

1.2 SCOPE

This CPCH provides supplemental requirements to the ***FDOT CADD Manual***. The material presented herein is monitored as a critical requirement to meet FDOT CADD Quality Assurance objectives.

1.3 GENERAL

[Chapter 334 of the Florida Statutes](#), known as the ***Florida Transportation Code*** (Code), establishes the responsibilities of the State, Counties, and Municipalities for planning and developing transportation systems which serve the people of Florida. The Code's purpose is to protect the safety and general welfare of the people of Florida and preserve and improve Florida's transportation facilities. Code Section 334.044(2) sets forth the powers and duties of the Department of Transportation to develop and adopt uniform minimum standards and criteria for the design, construction, maintenance, and operation of public roads.

The guidelines in this CPCH and the CADD Manual represent the minimum requirements that must be met for FDOT CADD projects. While the guidelines contained herein provide a basis for uniform CADD practices for FDOT projects, situations will exist where these standards may not apply. If variances from the ***CADD Manual*** or CPCH are required for a project, they must be approved in writing by the FDOT Project Manager and documented in the Project Journal as defined in Chapter 5.

The effective version of this document is the latest version released and published on the FDOT Engineering / CADD Systems Office (ECSO) website listed in section 1.4 following.

1.4 DISTRIBUTION

The FDOT CPCH is available in electronic format on the ECSO Internet Website:

<http://www.dot.state.fl.us/ecso/downloads/publications/CriteriaHandBook/>

The **FDOT CADD Manual** is available on the ECSO Internet Website:

<http://www.dot.state.fl.us/ecso/downloads/publications/Manual/default.shtm>

1.5 PROCEDURE FOR REVISIONS AND UPDATES

Users of the CPCH are encouraged to send comments and suggestions for changes or improvements for any CADD processes or documentation. Major changes are reviewed and approved by the Technical Advisory Committees (TACs) of the appropriate discipline and the State CADD Coordinator. As such, revisions are implemented into this document and published on the ECSO website at the internet address listed in Section 1.4.

Users may utilize the form provided below and submit change requests via:

- By Email: ECSO Support: ecso.support@dot.state.fl.us
 - Statewide CADD Coordinator, Bruce Dana, PE: bruce.dana@dot.state.fl.us
 - Support Coordinator, Jimmie Prow: jimmie.prow@dot.state.fl.us
 - Development Coordinator, Ray L'Amoreaux: ray.lamoreaux@dot.state.fl.us
- In Person: FDOT Engineering / CADD Systems Office
 - Koger Executive Center - Atkins Building, Suite 300
 - 1320 Executive Center Drive
 - Tallahassee, FL 32301
- By FAX: (850) 245-1601
- By Mail: FDOT Engineering / CADD Systems Office
 - 605 Suwannee Street, MS 69
 - Tallahassee, FL 32399-0450

1.6 GLOSSARY OF TERMS

In the application of the criteria in this handbook, the following definitions are assigned for consistency of understanding and interpretation.

Authentication For Electronic Signature (as with Professional's Electronic Data Delivery System (PEDDS)) it's the process of comparing the message digests (SHA-1 Hash Codes generated by the PEDDS application) of the PEDDS Manifest file (Manifest.XML) and PEDDS Signature files to those appearing on the signed Manifest Document (paper) or Signatory Documents (paper).

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

Authorization For Electronic Signature (as with Professional's Electronic Data Delivery System (PEDDS)) it's the process of comparing the message digests (SHA-1 Hash Codes generated by the PEDDS application) of the PEDDS Manifest file (Manifest.XML) and PEDDS Signature files to those appearing on the signed Manifest Document (paper) or Signatory Documents (paper).

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

Bid Set A file set consisting of a data sub-set derived from the project data set (Project CD) containing only those files needed for advertisement and letting. Note that the files needed for this set remain in their source folders in the project data set. All empty discipline folders are deleted for the Bid Set. The SetMaker application can be used to create the Bid Set from the project data set for Classical Electronic Delivery projects. For Digital Delivery projects, the data delivered is compiled manually.

By-Level A term for Level Symbology.

CADD Computer Aided Design and Drafting.

Cell A complex element composed of a group of other complex elements that is stored in a cell library for repeated replacement.

Cell Library A file that is used to store cells. To access cell in a cell library, the library must be attached.

Centerline The axis along the middle of a road or other facility from which features can be conveniently measured.

Certificate Authority The 3rd party entity that issues the Digital Certificate to the professional signatory and who has validated the identity of the signatory.

CES Cost Estimating System. FDOT's program for estimating construction cost for projects.

Change Report For Classical Electronic Delivery projects where an Index is produced, this is an HTML report created by the Project 'Delta' application containing information about sheet-specific differences between a secured project data set and a revised project data set. It is a comparison between the indexes (ProjectIndex.XML) of an earlier delivery of a project and a contemporary delivery of a project. Also see Revision Report. For Digital Delivery projects, this report is not produced.

Classical Electronic Delivery The original method of Electronic Delivery specified prior to the 2013 release of the CPCH. This delivery methodology involved printing each plan sheet as a separate file, creating an index of those sheets, signing and sealing each sheet separately (typically with PEDDS), and producing several files associated with that index.

Compliance Certification Worksheet A document that contains the data producers' assurances that items required by the Florida Department of Transportation (FDOT) Computer Aided Drafting and Design (CADD) Manual and this Handbook are included in the delivered project data and that certain Quality Control functions were performed.

Composite PDF A document containing all plan sheet images in index order. This document must be in Adobe Portable Document Format (PDF) format and reside in the project's root directory.

For Classical Electronic Delivery projects, it is named 'Project.pdf' - for an original delivery. For Digital Delivery projects, it is named *fpid*-PLANS[-].PDF (where *fpid* is the projects' Financial Project Identification Number and [-] is any additional naming specific to the project).

For Classical Electronic Delivery projects, the Composite PDF is not usually signed, or signed and sealed. For Digital Delivery projects, the Composite PDF of the plans are signed and sealed with a certificate based Digital Signatures.

For Classical Electronic Delivery projects during revisions, a second PDF is produced for the contractor called Revision#.pdf, a subset of Project#.pdf containing those sheets revised for that revision number. For Digital Delivery projects, this file is named *fpid*-PLANS-REV##[-].pdf.

Component A categorization of design plans as defined in Chapters 2 & 3 of the FDOT Plans Preparation Manual, Vol. 2. The list of plans components for Electronic 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. Utility Work by Highway Contractor Agreement Plans

The plans components do not directly correspond to the project directory structure. For example, Drainage files have a \drainage folder at the root level of the project, but may be included as part of the Roadway Plans component.

Delivery A set of electronic files secured by PEDDS, plus additional project metadata.

Delivery Key The message digest (SHA-1 hash code) used to reference the delivery. The delivery key is the hash code of the Manifest file produced by the PEDDS software.

- Design File** MicroStation or AutoCAD document file. The open (active) design file can be manipulated. Design files can be attached to the open design file as reference files for viewing and construction purposes.
- 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 FDOT design work must meet the Federal Governments' Access Certificates for Electronic Services (ACES) program.
- Digital Delivery** A contemporary method of Electronic Delivery that relies further upon the Composite PDF being produced and delivered by more direct means, no production of an index (nor the associated files or reports), and Digital Signature as the principal means to secure the Composite PDF 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.
- Document Image File** An electronic file from which a hard copy of a project document could be produced. For Classical Electronic Delivery these would represent the individual plot files of each sheet of the plans set which would also be Signed and Sealed with PEDDS. For Digital Delivery these files are not required, and only the Composite PDF of the whole plans set, or any necessary subdivision of that Composite is required. In Digital Delivery the Composite is Digitally Signed with a Digital Signature.
- DXF** A drawing interchange file format supported by most CAD packages. MicroStation design files can be saved in DXF format, and DXF files can be imported into MicroStation design files.
- Electronic Delivery Indexer (EDI)** An application used to build an index for a set of plans for Classical Electronic Delivery projects. EDI also helps develop the project Journals, and helps produce printed document image files of the plans sheets.
- Electronic Journal** Electronic file(s) that document development, correspondence, decisions made, methodology used, exceptions to standards, and other descriptive information about the project. The Electronic Journal includes details that will give future users insight about the project data.
- Electronic Signature** The process of associating a wet-ink signed document with an electronic file, and involves the production of a Signature Document securing the electronic file and any data referenced by either the Signature Document or the file. By signing the Signature Document, the Signatory is electronically signing all files listed in the signature file.
- Engineering Data** Those electronic files that represent the critical geometric and quantitative controls or other engineering calculations supporting the graphical representation of a project.
- Extension** Characters optionally separated from the main part of a filename by a period (".") character. Traditionally, these have been used to designate the type of file. For example, .dgn, .cel, .ucm are commonly used to represent a design file, a cell library, and a user command, respectively.

- File Checker** An application to assist with the verification of QC compliance to Electronic Delivery standards, such as directory structure, file naming, etcetera.
- Font Library** A file in which text characters styles, symbols, or patterns are stored.
- Global Origin** Location of the origin of the Cartesian coordinate system in the design plane coordinates (UORs). When design plane positions are specified or reported in working units, they are relative to the global origin.
- Graphics Design File** An electronic file that conforms to MicroStation (DGN) or AutoCAD (DWG) graphics formats.
- Hash code** See *Message Digest*.
- Index** An XML file (ProjectIndex.XML) created by EDI or Sheet Set Organizer (SSO) that contains metadata concerning all print image files that have been identified as sheets and the design file from where they were produced. This file resides at the root folder of the project. Note that Digital Delivery projects do not require an Index.
- Journal** See Electronic Journal.
- Letting** The process of advertising, selection, and award of a contract for the construction of a project.
- Letting CD** The compact disk prepared for the letting process consisting of plans, specifications, and a front-end "kiosk" application that offers easy access to bidding documents.
- Level** Data in the design file is segregated into drawing levels. Levels are similar to transparent overlays that can be put together to form a complete drawing. A level can be turned on and off independently in different views.
- Level Symbology** View setting that, when turned on, causes all elements on a particular level to be displayed with the same element symbology.
- Line Style** Part of the symbology of an element: for example, whether a line is solid, continuous dashes, dots and dashes, and so on. In plotting, a line style is an index in the range 0 to 7 that designates a particular sequence of pen up/down pairs to be used when drawing or plotting a graphic element. Each element has its own line style.
- Line Weight** An index in the range 0 to 31 that designates the weight or thickness of the lines used to draw or plot a graphic element. Each element has its own line weight.
- Manifest Document** A wet-ink signed (not sealed) paper document, output by PEDDS, used to secure a PEDDS Manifest file (Manifest.XML) and references the Signature files in a project.
- Manifest File** The XML file (Manifest.XML), used by PEDDS to define and secure the entire contents of the project folder for Electronic Delivery. This file resides in the project's _meta_info sub-folder. The Manifest file lists the projects' files by their relative URL and SHA-1 hash-codes.
- Message Digest** Often referred to as a hash code, is an alphanumeric string of hexadecimal characters (0–9, A–F) that is generated by a one-way cryptographic hashing algorithm (SHA-1) and is used by PEDDS to uniquely identify a file based solely upon the file's contents.
- Master Units** The largest units in common use in a design.

- PDF Portfolio** A PDF portfolio is a container that can hold a variety of files assembled that can be in different formats and created from different applications. PDF portfolios support PDF, JPG, TIFF, GIFF, BMP, PNG, and Text files. These are created by Acrobat editing software like Acrobat®, Bluebeam Revu® and other similar software. Portfolios may be used to include related documents such as Technical Special Provisions along with Specifications in the Specs package (*fpid-SPECS[-].pdf*) for Digital Deliveries.
- PEDDS** The Professionals' Electronic Data Delivery System (PEDDS) is an application used to secure a project or sub-sets of files signed/sealed by a signatory.
- PEDDS Information** The electronic files and paper documents created by PEDDS to secure the delivery and sign / seal selected files within that delivery.
- Plans Change** (*Plans Preparation Manual Chapter 20 definition*) Modification to a set of plans, after the Estimates department has changed the Control Group, but before the plans are sent to the FDOT Central Office.
- Project** Projects are identified by the Department through the Financial Project Identification Number and related project identification information. Multiple deliveries can occur for a single project, each representing the status of the project at the time of delivery.
- Project CD** Media (CD, DVD, etc.) containing all data associated with a project.
- Project Component** The data structure and organization of electronic files on storage media, also referred to a project sub-directory or sub-folder.
- Project Component Directory** The data structure and organization of electronic files on storage media, also referred to a project sub-directory or sub-folder.
- Project Delta** An application used to reveal file changes after revisions and corrections. ProjectDelta reports any differences between the indexes of two different deliveries of the same project. ProjectDelta creates the Revision Report (*Deltandx#.htm*) and Change Report, where # is the revision number. ProjectDelta is not used on Digital Delivery projects.
- Project Directory** The parent directory structure of a project containing all project component directories and ancillary data.
- Project Index File** A file that lists and describes critical files contained in a Classical Electronic Delivery. See Index.
- Project Key** An alphanumeric character string (a Global Unique Identifier or GUID), generated at the time of project creation that uniquely identifies a project. This number is unique across all project deliveries of the same project. This number is printed on the Manifest report.
- Project Root Directory** The file system directory that contains all of the projects' files and folders. The project root directory 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 directory, or one of its sub-folders.
- qSheet** A printing application used to print all or part of an indexed project sheet set. qSheet uses the Project Index (*ProjectIndex.XML*) and Revision Reports (*Deltandx#.htm*) as input. (See Section on Revisions in regards to file naming convention.)
- Quality Control Reports** Reports that must be included with the final project delivery, the Compliance Certification Worksheet and all reports listed therein. These reports are produced by software within the FDOT CADD Software suite.

- Reference File** A design file that is attached to and viewed simultaneously with the active design file. Reference files can be used for constructions in the active design file, but cannot be modified. Elements can be copied from a reference file to a design file.
- Resolution** The number of addressable points across a given area. For example, plotter resolution is measured in lines per inch, while screen resolution is usually given with two numbers indicating the number of pixels across the width and height of the largest image that can be displayed.
- Revision** Section 20.4 of the Plans Preparation Manual defines a design revision as a modification to the PS&E Package/Bid Set after it has been accepted by Central Office Project Review.
- Revision Report** An HTML report created by the 'ProjectDelta' application containing information about sheet-specific file differences between a secured, delivered file set (Project CD) and a new, corrected file set. This report is named 'Deltandx#.htm', where # is the revision number, and is placed in the root folder of the project. This report is a comparison between the indexes (ProjectIndex.XML) of an earlier delivery of a project, and a contemporary delivery of a project. Also see Change Report.
- Revision Reports are not produced on Digital Delivery projects.
- Revision Set** The set of files that denote changes from one delivery to the next, as well as the Revision Report (Deltandx#.htm) that helps define them. For a Digital Delivery project, many of the Classical Electronic Delivery reports and processes are not produced. For these, the Revision Set includes the changes from one revision to the next, absent the Revision Report (Deltandx#.htm).
- 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.
- Securing Files** The act of updating the project's Manifest.XML file with the contemporary listing of project files and SHA-1 hash codes that in turn will allow PEDDS to validate secured files. This process produces the Manifest Document. In Digital Signature, files are Secured when they are Digitally signed.
- Seed File** A template used to create a new design file or cell library. The new file has its settings identical to those of the seed file.
- Seed Project** A seed project is a template folder structure that contains all folders listed in Chapter 5 of this handbook, 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.
- Set maker** An application to extract a project subset from a secure project delivery. This application is not used in Digital Delivery projects, as it relies upon both an index and the source project data set to be Secured by PEDDS.
- SHA-1 Hash Standard** United States Secure Hash Algorithm 1 (SHA-1) is a secure hash standard which produces a unique code representing a data file. The SHA-1 is called "secure" because it is computationally infeasible to find two files of different content which produce the same hash.

- Sheet** Classical Electronic Delivery applications recognize a sheet as a discreet image file representing a page in the plans that is listed in the project index. A sheet must belong to a plans component and also be found in a defined discipline sub-folder of the project.
- For Digital Delivery projects, a sheet is simply a page in a multipage PDF (*fpid-PLANS[-].PDF* for an original delivery or *fpid-PLANS-REV##[-].PDF* for revisions).
- Sheet Index** See Index
- Sheet Index Report** For Classical Electronic Delivery, an HTML report which is derived from the Index (ProjectIndex.XML). The original delivery file name is Sheetndx.htm. The report file is named Sheetndx#.HTM, where # is the revision number, and resides in the project's root folder. This report is not produced for Digital Delivery projects.
- Sheet Navigator** An application which runs inside 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 Electronic Delivery for both Indexing and Printing. It is a foundation utility for subsequent Classical Electronic Delivery processes and should be run against every MicroStation design file.
- Sheet Set Organizer** The 'Sheet Set Organizer' is an application which runs in conjunction with AutoCAD Sheet Set Manager. Its purpose is to update fields in the Sheet Set Manager database(s) with data that supports later Electronic Delivery Indexing and Plotting. It is a foundation utility for subsequent Electronic Delivery processes using AutoCAD Civil 3D and is run against every Sheet Set Manager database (*.DST) in the project, ensuring sheet data can be extracted properly.
- Signatory** The person or professional who secures files in a delivery using a signature file and document. If the signatory is a professional, signatures will be governed by rules defined by the Florida Boards of Professional Regulation. A professional may have multiple signatories in a project as needed by the revision process. See 'Revision Set' for more details.
- Signatory File** Defines / lists files that a Signatory signs, or signs-and-seals. All signatory files are created by PEDDS and stored in the project's _meta_info sub-folder. The signatory file lists each file selected by the Signatory to sign/sign and seal by that file's relative URL to the project's root folder, and the SHA-1 hash code.
- A professional Signatory may have multiple signatory files for their work within a project.
- The Signature Document secures the legal record must be at hand with the data; otherwise, the data representing the legal record can never be truly authenticated.
- Digital Signature does not use a Signature Document.
- Signature Document** A wet-ink signed or signed-and-sealed paper document used to secure a signatory file. By signing the Signature Document, the Signatory is electronically signing all files listed in the signature file.
- A professional Signatory may have multiple signatory files for their work within a project.
- The Signature Document secures the legal record must be at hand with the data; otherwise, the data representing the legal record can never be truly authenticated.
- Digital Signature does not use a Signature Document.

- Signatory File** Defines / lists files a Signatory signs, or signs-and-seals. All signatory files are created by PEDDS and reside in the project's _meta_info sub-folder. The signatory file lists each file selected by relative URL in the project, the SHA-1 hash code, and any qualifiers the Signatory indicated for his/her signature.
- Signing** Acts of securing a file or set of files under a signature file (for Electronic Signature) without the benefit of signing-and-sealing under Florida Boards of Professional Regulation rules. This implies that the Signatory is signing with a signature type intended to sign only, and not as a Professional of Record. Note that Digital Signature makes no distinction between Signing, or Signing and Sealing, and the context of the activity and any exculpatory language included at the time of signing will establish the intent of the Signatory.
- Signing and Sealing** The act of securing a set of files based on the rules defined by the Florida Boards of Professional Regulation governing signing-and-sealing of electronic files. For Electronic Signature, these rules provide for:
- a signature file that defines the type of professional that is signing and sealing (i.e., engineer, surveyor, geologist, landscape architect, etc.)
 - the professional's name, license number, and scope of work for the signature
 - the list of files selected — each file listed is defined by its relative URL to the project, the SHA-1 hash-code for each file, and any qualifiers the Signatory has indicated regarding the scope of responsibility, usability, or reliability for any of the files selected
- Signing and Sealing a file adds file information to the Signatory's signatory file, and generates the signatory report. Signing and sealing is not complete until the professional wet-ink signs, dates, and seals the signatory report.
- In contrast, Digital Signature instead relies upon Public Key Infrastructure to embed secure data into a file the Signatory is Signing, or Signing and Sealing.
- Strung Project** Two or more projects let in the same contract. For Classical Electronic Delivery, Bid Set CD subsets for those projects may be assembled into a directory structure representing the Strung Project. An application called 'StrungProject' is provided to help perform this function. Note that Project CD datasets (contrast with Bid Sets CD subsets) are never merged for stringing – only Bid Set subsets extracted from Project CD datasets.
- Digital Delivery simplifies the delivery – each Subset is delivered separately. The StrungProject application is not used, and data between Lead and Goes-with projects are never intermingled.
- 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.
- Sub-project** A project that is combined and let with other projects as part of a strung project. These are also referred as 'Lead' and 'Goes-with' projects. The 'Lead' sub-project is the first project in the strung project and all others are 'Goes-with' projects.
- For Classical Electronic Delivery, sub-projects may be combined with the StrungProject application, binding them under a single Strung project directory structure.
- Digital Delivery simplifies the delivery – Each Subset is delivered separately. The StrungProject application is not used, and data subsets of Lead and Goes-with projects are never combined.

- Subset** For Classical Electronic Delivery projects, a set of files that is entirely derived from a secure Project CD. 'SetMaker' is an application used to create subsets from secured Project CD data sets. Sub-Projects are Subsets of Lead and Goes-with projects.
- For Digital Delivery, Subsets must be created manually, as the Digital process has no index (or perhaps PEDDS data) to work with.
- Supporting CADD Files** Any files, including CADD platform specific resource files (such as fonts, line styles, pen tables, cell/block libraries, etc.) that are required to reproduce the sheet or document image files.
- Surface** A geometric construction that can partition space but cannot enclose a volume.
- Symbol** A character placed from a MicroStation symbol font.
- Symbology** See element symbology or level symbology.
- Text Attributes** The color, weight, font, height and width of text.
- Text Element** MicroStation places text in design files as a distinct type of element.
- Units of Resolution (UORs)** The distance between adjacent points in MicroStation's design plan. 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). This process is similar to setting up a piece of graph paper to represent data of a particular range.
- Validation** The comparison of SHA-1 hash codes recorded in the project's Manifest file against those hash codes calculated from the contemporary delivery. Validation tests to determine if the project file set was altered since the project was secured.
- Validation is also 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. For Digital Signature the Validation also 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.
- Working Area** Size, in working units square, of design plane.
- Working Resolution** Number of positional units, or units of resolution, per sub-unit.
- Working Units** The real-world units that the design plane is configured to.

1.7 ABBREVIATIONS

The abbreviations are listed in the FDOT Design Standards STANDARD ABBREVIATIONS Index No.001 for contract plans production. This list is not inclusive. Other Department accepted abbreviations may be used when deemed more appropriate. Where special abbreviations are used a descriptive tabulation may be necessary in the plans.

<http://www.dot.state.fl.us/rddesign/DesignStandards/Standards.shtm>

1.8 REFERENCED DOCUMENTS

Plans Preparation Manual (Topic No. 625-000-007 Vol1 English) (Topic No. 625-000-008 Vol2)

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.

Facilities Design Manual (Topic No. 625-020-016)

This document describes the Florida Department of Transportation (Department) guidelines and requirements for providing professional Architectural/Engineering (A/E) consulting services for building facility projects for the Department.

FDOT CADD Manual (Topic No. 625-050-001)

This manual provides guidance to engineers and technicians in **Computer Aided Drafting and Design (CADD)** techniques for the development of Contract CADD plans.

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.

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

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

Drainage Manual (Topic No. 625-040-002)

The Drainage Manual sets forth drainage design standards for the Florida Department of Transportation.

Utility Accommodation Manual (Topic No. 710-020-001)

This guide is to regulate the location, manner, installation and adjustment of utility facilities along, across or on any road under the jurisdiction of the Department of Transportation.

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