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Chapter 8 - Electronic Delivery Procedure

CADD Production Criteria Handbook

8.1 GENERAL

The delivery of an electronic plan set is a first step in the Department's goal of achieving a total electronic workflow for the life of a project. Processes manifested in software have been developed, herein referred to as “Electronic Delivery”, to help accomplish that goal. Software is available from the Engineering / CADD Systems Office called the FDOT2008 CADD software and subsequent updates distributed on the FDOT Engineering / CADD Systems website (Note: For reasons associated with proprietary licensing of certain software products, distribution of updates inside FDOT may vary from distribution methods used outside FDOT). The software addresses the challenges in three phases: Pre-Production, Production and Post-Production operations.

The timeline of electronic delivery tasks performed on a project cannot be identified as linear - It is difficult to describe the electronic delivery process as an itemized list of sequential tasks. Some tasks, such as creating a seed project, will only be performed once during the lifespan of the project. Other tasks, such as journaling, signing and sealing files, or maintaining a project index work best when performed throughout the project’s lifespan.

The electronic delivery process is centered on the preparation and use of secured project deliveries. The delivery preparation process of a project's lifecycle, differentiated by the type of work performed, can be divided into three phases:

- **Preproduction**

The first phase of the project is by far the shortest and only performed once. All tasks performed during this phase center around preparing the folders and files needed for electronic delivery. The FDOT 2008 suite contains tools needed to create a seed project which will provide the files necessary to begin production.

- **Production**

The second phase of the electronic delivery process centers on the tasks involved in producing the delivery and a secure file set to the FDOT. This phase not only includes the production of design work for the project, but a number of maintenance tasks that assist in electronic delivery, such as preparing a project journal, indexing sheets, preparing reports, signing and sealing sheets, and other non-design related activities. The FDOT2008 suite includes a number of tools that help to facilitate these tasks.

- **Postproduction**

Once the design of a project has been completed, packaged, secured and delivered to the Department, certain activities will be done by the Department to authenticate the data, preserve, and advance the project to letting. An important aspect of postproduction is to consider the maintenance of file security. Once a delivery is secured by PEDDS, the files may not be altered in any way. Once again, the FDOT2008 suite offers a toolset to perform the tasks needed during this phase.

8.2 GLOSSARY

The following terms are used throughout the Electronic Delivery documentation:

Authentication — The process of comparing the PEDDS generated message digests (SHA-1 Hash Codes) of the Manifest file and Signature files for an on-hand delivery to those appearing on a PEDDS generated, signed Manifest Document (paper) for a specific delivery. This process is similar to validation, but extends the process to the signed paper Manifest Document.

Change Report — An HTML report that is created by the Project 'Delta' application. It contains information about sheet-specific differences between a secured, delivered file set and a new, corrected file set. This report is named and placed anywhere by the user. 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.* (See Section on Revisions in regards to file naming convention; however the name of the report is Deltandx***N***.htm, where ***N*** is the revision number.)

Compliance Certification Worksheet — A document that contains the data producers' certification that all items required by the FDOT CADD Manual and this Handbook are included in the project.

Composite PDF — A single document which contains all plan sheet images in index order. This file must be in Adobe Portable Document Format, reside in the project's root directory, and is generally titled 'Project.pdf' for an original delivery. During the revision process, PDF files are created called ProjectN.pdf that contains the state of the plans at the time during a specific revision ***N***. This revised PDF file is named 'ProjectRev***N***.PDF,' where ***N*** is the number of the revision.

In addition, a second PDF is produced for the courtesy of the contractor called Revision***N.***pdf which is a subset of Project***N***.pdf and only contains those sheets which were revised for the revision numbered ***N***.

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 Joint Participation Agreement Plans

As such, all applications in the electronic delivery suite of tools can only recognize the components listed above. The 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 are to be included as part of the Roadway Plans component.

Delivery A set of electronic files—generally corresponding to a Department work-project—secured by the PEDDS process, plus additional project metadata.

Delivery Key A unique message digest (SHA-1 hash code) used to reference the delivery. The delivery key is the message digest (hash code) of the delivery's Manifest file.

Electronic Delivery Indexer (EDI) Electronic Delivery Indexer, or EDI, has been developed to provide users with the ability to quickly build an index for a set of plans. It is designed to work in conjunction with the Department's core CADD platforms and the FDOT workspaces and associated applications. EDI also helps develop the project Journals, and helps produce plotted image files of the plans sheets.

Hash Code See *Message Digest.*

File Checker An application to assist with the verification of QC compliance for adhering to certain Electronic Delivery standards, such as directory structure, file naming, etcetera.

Index An XML file created by the Electronic Delivery Indexer that contains metadata concerning all files that have been identified as sheets in a project directory. Indexed metadata is contained in 'Index.XML' and the plans index extracted from that is titled 'ProjectIndex.XML' (regardless of revision number). These files must reside at the root of the project. These are the only files that the Electronic Delivery suite of tools recognizes as official indexes.

Journal Documentation that is included with a project, detailing the decisions made, methods used, and actions taken on the project as they occur. This is maintained in the form of electronic documentation, comprising all the journal files for the project. The Professional of Record is responsible for the overall journal for the project. In the FDOT2004 software suite, Journal files are .XML format files maintained by the Electronic Delivery Indexer (EDI) in the projects \data sub-folder. For post-FDOT2004 projects, Journals can be Rich Text Format (RTF) files.

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

Manifest Document A signed paper document used to secure a Manifest file, and to reference the Signature files in a project delivery corresponding to the manifest. By signing the Manifest document, one has associated their name to the Manifest file that corresponds to the hash code appearing on the paper document. The Manifest file lists the project files by their relative URL and the files' SHA-1 hash-codes, thus the signatory has signed the files listed in the manifest.

Manifest File The XML file, created and maintained by PEDDS to define and secure the entire contents of a project delivery. This file is titled 'Manifest.XML' and will always reside in the project's _meta_info sub-directory.

Message Digest An alphanumeric string that is generated by a one-way cryptographic hashing algorithm and used by PEDDS to process and identify the contents of a file. This is often referred to as a *hash code*. Every electronic file has its own unique hash code based on the files' content.

PEDDS The Professionals' Electronic Data Delivery System (PEDDS) is an application used to simplify the tasks involved with file and project security. PEDDS allows users to sign electronic files, ensuring that users can easily test to determine if a project has been changed, corrupted or tampered with.

Plans & Specs CD A file set consisting of a data sub-set derived from the project data set (Project CD) containing only those items needed to prepare a project for advertisement and letting. The file set may also be stored or transmitted electronically.

Project An entity, corresponding to a Department work-project, that uniquely identifies a delivery or collection of deliveries containing electronic files made during the creation of the work-project. Multiple deliveries can occur for a single project, each representing the status of the project at the time of delivery. Projects are identified by the Department through the Financial Project Identification Number and related project identification information.

Project CD A CD containing all data associated with a project, including all files on the Plans & Specs CD, all design files, all reference files, project journals, etc. Though the term refers to a CD, the file set may be stored or transmitted electronically.

Project Delta 'Project Delta' is a report generating application used to simplify the job of keeping track of file changes after revisions and corrections. Users can quickly identify and report on any indexed differences between two deliveries of the same project. Project Delta creates the Revision Report (Deltandx***N***.htm) and Change Report, where ***N*** is the revision number (See Section on Revisions in regards to file naming convention.)

Project Key An alphanumeric character string (a Global Unique Identifier or GUID), generated at the time of project creation (by PEDDS or EDI) that uniquely identifies a project. This number is unique across all projects that are secured using PEDDS and identifies one project and one project only.

Project Root Directory The file system directory that contains all project 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.

The FDOT project folder structure is defined in chapter 4 of the CADD Production Criteria Handbook.

qSheet 'qSheet' is a printing application which offers a means to print all or part of an indexed project sheet set. qSheet uses the Project Index (ProjectIndex.XML) and Revision Reports (Deltandx***N***.htm) as input for the user to select files to be printed. (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.

Revision Report An HTML report that is created by the Project 'Delta' application. It contains information about sheet-specific differences between a secured, delivered file set and a new, corrected file set. This report is named 'Deltandx***N***.htm', where ***N*** is the revision number, and is placed in the root folder of the project. 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 Change Report.

(See Section on Revisions in regards to file naming convention.)

Revision Set The set of files that denote changes from one delivery to the next, as well as the Revision Report (Deltandx***N***.htm) that helps define them. Because Revision Sets are managed as independent entities (and have their own Delivery Keys, but Same Project Key) they must be authenticated and unique signatories must be created and used for each revision set during the project revision process.

(See Section on Revisions in regards to file naming convention.)

Securing Files The act of creating and storing a SHA-1 message digests for a specific file or file set. Message digests and relative file paths are kept in the project's Manifest.XML file, which in turn will allow PEDDS to validate secured files.

Seed Project A seed project is a template folder set that contains all folders as listed in Chapter 4 of the FDOT CADD Production Criteria Handbook, as well as the project configuration files. Once a seed project is created, it is ready for the Production phase.

SetMaker 'SetMaker' is an application to assist in the validation of Projects and provide for the generation of the various types of electronic project file subsets that are required during the lifespan of a project.

SHA-1 Hash Standard US Secure Hash Algorithm 1 (SHA1) is a secure hash standard which produces a condensed representation of a "message" or data file. The SHA-1 is called secure because it is computationally infeasible to find two different files which produce the same message digest (SHA-1 hash codes).

Sheet Electronic Delivery applications recognize a sheet as a discreet image file representing a page in the plans that is listed in the project index. It must belong to a plans component and also be found in a defined discipline sub-folder of the project.

Sheet Index See *Index*

Sheet Index Report An HTML report which is derived from the project's Index (the 'ProjectIndex.XML' file). The report file must be titled 'Sheetndx***N***.HTM', where ***N*** is the revision number, and must reside in the project's root directory. (See Section on Revisions in regards to file naming convention.). Like Project.pdf, the original delivery file name is Sheetndx.htm (omitting the ***N*** revision number).

Sheet Navigator The 'Sheet Navigator' is an application which runs inside MicroStation, allowing users to easily browse and open MicroStation files containing sheets for verification or editing. Its purpose is to 'tag' sheets with data that supports later Electronic Delivery Indexing and Plotting. It is a foundation utility for subsequent Electronic Delivery processes and should be run against every MicroStation design file in the project that has sheets, checking sheet data is both extracted and edited properly.

Signatory File A file that defines the project files that a signatory is going to sign, or sign-and-seal. All signatory files are created by PEDDS and reside in the project's _meta_info sub-directory. The signatory file lists each selected file by its relative URL in the project, the SHA-1 hash code of the each selected file, and any qualifiers the Signatory may have placed on his/her signature for a given file.

Signature Document A physically signed or signed-and-sealed paper document used to secure a signatory file. Florida and Federal law accept the association of a physical signature with an electronic document. The Florida Boards of Professional Regulation have adopted rules whereby professionals can electronically sign and seal electronic documents in accordance with these laws. Therefore, by signing the Signature Document, the signatory is, by proxy, signing and sealing all files that are listed in the signature file.

A professional may have multiple signatories in a project, as needed, and as such, may have multiple Signature Documents (and signatory files) associated with a project. The Signature Document for a legal record set must never be lost

or separated from the data; otherwise, the data representing the legal record can never be truly authenticated.

Signing Acts of securing a set of files under a signature file without the benefit of signing-and-sealing under Florida Boards of Professional Regulation rules. This implies that the signatory is a lay person and not a professional. Signing a file adds file information to the signatory's signature file.

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. 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— each file in that list defined by the relative URL to the project and the SHA-1 hash-code for each file—that are to be signed and sealed
- any qualifiers the Signatory has placed on the scope of responsibility, usability, or reliability for any of the files

Signing and Sealing can only be done by a professional. Signing and Sealing a file adds file information to the signatory's signatory file.

Strung Project Two or more projects let in the same contract. For electronic delivery, Plans and Specs CD datasets may be assembled into a directory structure representing the Strung Project. An application called Strung Project is provided to help perform this function. Note that Project CD data sets are never merged for stringing – only Plans and Specs subsets extracted from Project CD data sets.

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-deliveries are normally only a portion of the overall project.

Sub-project A complete project that is let with other projects as part of a strung project. One of multiple projects that constitute a strung project. These are referred in the vernacular as 'Lead' and 'Goes-with' projects.

Subset A set of files that is entirely derived from a secure delivery file set. Electronic Delivery contains a tool called 'SetMaker' whose main function is to create subsets from Project data sets.

Validation The automated comparison of file message digests (SHA-1 codes) and signatory security information in the project's Manifest file against information that is calculated from a delivery that is on hand. Whereas Authentication compares the calculated results with those on the printed Manifest Document, validation tests to determine if the project file set was altered since the project was secured.

8.3 REVISION FILE NAME CONVENTIONS FOR ELECTRONIC DELIVERY

The following illustrated the file names used for Electronic deliver in each successive revision.

Revision sequence and naming or the following files (circa FDOT2008 software release, January 2009):

Original Delivery	***Revision 1***	***Revision 2***	***Revision 3***
ProjectIndex.XML	ProjectIndex.XML	ProjectIndex.XML	ProjectIndex.XML
Project.PDF	Project***1***.PDF	Project***2***.PDF	Project***3***.PDF
Sheetndx.HTM	Sheetndx***1***.HTM	Sheetndx***2***.HTM	Sheetndx***3***.HTM
	Deltandx***1***.HTM	Deltandx***2***.HTM	Deltandx***3***.HTM
	Revison***1***.PDF	Revision***2***.PDF	Revision***3***.PDF
ProjectFiles.htm	ProjectFiles.htm	ProjectFiles.htm	ProjectFiles.htm

8.4 PRE-PRODUCTION

8.4.1 Purpose

The “Pre-Production Phase” involves creation of a “seed” project electronically, to provide an environment for meeting CADD standards as defined in the CADD Manual and this document. Functions include the specification of the project directory structure, creating a project information file and providing the opportunity to include applicable administrative documents. To ensure a successful environment for the production phase later, it is essential that the project begin correctly so that compliance to FDOT standards for electronic delivery can be met.

8.4.2 Overview

The Electronic Delivery software contains several tools to create a project directory structure with the appropriate project information file. It also allows the user to provide additional administrative files to be added to the project for delivery to the design team. This newly generated project, referred to as the “seed project,” should be made available to the prime consultant, or the prime consultant could create his own “seed project” with the appropriate information and tools provided. If the prime consultant subcontracts parts of the project, it is the prime’s responsibility to provide to his subcontractors the seed project with the appropriate electronic files. The Electronic Delivery software provides tools to help perform these tasks.

Note *In-house projects are managed through the TIMS project management software, and the district will define the method by which they will initialize in-house projects.*

The software application called *Professionals Electronic Data Delivery System (PEDDS)* has a module that is 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). It is the Department’s responsibility to provide much of this information to the consultant. PEDDS should also be used to secure the seed project prior to handoff to the prime consultant or from the prime to his sub-consultant.

Note *It is the recommendation of the Engineering / CADD Systems Office that the "seed project" be created by FDOT and delivered to the consultant via a CD-ROM or other electronic media. Though the initial creation of the project may be accomplished using the Department's document management system for in-house projects, the production phase requirements for electronic delivery are the same for both in-house and consultants.*

One must not confuse a "PEDDS project" and a "seed project". The use of "seed" implies growth. A seed project is merely a directory structure with a root directory named with a valid FDOT project ID number. It is a template of directories to be filled with project data during the production phase. A "PEDDS project" means that the seed project directory structure created in the Pre-Production phase must also be introduced to the PEDDS program and made ready for PEDDS processing. Once PEDDS has "done its thing" with the seed directory structure, the directory structure is not only a seed project, but also a PEDDS project. In other words, PEDDS knows about the seed project. Once a given directory structure becomes a PEDDS project, the directory structure can be secured, authenticated, professional signatories can be defined, files can be signed/sealed, etc.

8.5 PRODUCTION

8.5.1 Purpose

Successful electronic delivery and future utilization of project data requires both compliance with standards and documentation of the methods and decisions used to produce the CADD deliverable. The "Production Phase" incorporates several functions to be accomplished, including the creation of files to FDOT standards, the documentation of those files, and the electronic securing and packaging of them. There are also output specifications called for in the CADD Manual and documented in this Chapter. FDOT provides the necessary tools in the Electronic Delivery Software to perform many of the tasks as set forth in this Handbook and to achieve the requirements for electronic delivery as defined in the CADD Manual.

8.5.2 Overview

If the seed project was secured with PEDDS, the recipient of the project should also authenticate the project files with PEDDS prior to beginning work on the project. This authentication process, while not absolutely required, will familiarize the user with PEDDS and will provide an instance of actual review of the hash codes from the signatory reports provided by the Department with those generated by PEDDS during the authentication process. This process is true authentication of data. If the hash codes generated by PEDDS do not match those on the paper reports, something has changed in the seed project data provided by the Department since the time it was packaged and delivered to the designer. Though the seed project at this point is not a legal record set, in concept this exercise will help strengthen the emphasis we have placed on physically securing the paper signatory reports and show their importance in maintaining a legal record set of the final secured data sets delivered to the Department.

During the production phase of the project, the designer should create and maintain the project index and journal files. At the end of the production phase, several tasks must be performed prior to the creation of a CD-ROM meeting FDOT electronic delivery requirements specified here and in the CADD Manual. Prior approval should be obtained for any other media, such as DVD, to be used for electronic delivery.

A summary listing of these tasks and required output include:

- Understand and follow the directory structure and file naming requirements for electronic delivery

- Draw CADD files to FDOT Standards as defined in this Handbook, using the workspaces and resources provided. Deliver any non-standard user created CADD resources, such as cell libraries, etc.

- Use the Sheet Navigator application in MicroStation to test that each design file containing sheets is properly identified and tagged with the sheet administrative data. Every sheet should be accounted for by this application, unless the source of the sheet is external to MicroStation (i.e. a scanned file).

- Document all approved deviations from FDOT standards in the project journal file(s).

- Document important methods used and decisions made during design in the project journal file(s), including deviation from Department standards.

- Create required engineering data and quantity output files for each discipline (also defined in this Handbook).

- Generate Quality Control (QC) Reports for all design files using the CADD QC tools provided. These reports indicate compliance to file naming and CADD element symbology standards.

- Merge any external project files into the project directory structure, including all files from sub-consultants, external reference files, scanned images for sheets (if any) and specifications documents.

- Create final Postscript (or PDF) images from MicroStation design files containing the sheets.

- Bundle any non-standard MicroStation dependent resource files into the project sub-directory **\symb** (to also include user created fonts and/or line styles)

- **\cell** (to include project specific / user created cell libraries).

- Check for any duplication of files and resolve (documenting reasons for duplications, if any). Remove non-essential file duplication.

- Using the Electronic Deliver Indexer (EDI), create the indexes of plan sheets and files. EDI is also used to batch plot sheets to Postscript image files.

- Using EDI, create final versions of the Index reports, including an HTML format version for use in the letting.

- If a revision, create the Revision Report (Deltandx***N***.htm) using the ProjectDelta application.

- Subsequently using EDI, create the composite Acrobat file (Project***N***.Pdf) of all the plan sheets. Likewise, if the project represents a revision, create the revision PDF (Revision***N***.pdf) containing those sheets that were revised.

- Electronically sign and/or sign and seal files (plan sheets and specifications files, engineering reports, etc.), as required, using PEDDS.

- Review the project for completeness and accuracy. The application FileChecker is provided to help assist with this task.

- Secure the entire project dataset with PEDDS for electronic delivery to FDOT.

- Create the Secured Project CD (or DVD) with the appropriate labels and the required checklist and PEDDS documents.

- If required by the District, create the Plans and Specs dataset using the SetMaker application, which contains the data used for advertising the project for letting, or for distributing revisions with the appropriate label and PEDDS documents.

- If the project is a Strung Project, use the Strung Project application to create the data set from Plans and Specs data sets created in the previous step. Secure the Strung Project delivery with PEDDS.

- Create Plans and Specs CD with the appropriate labels and PEDDS documents.

- Authenticate hardcopy media (CD-ROM, DVD-ROM, etc) with PEDDS to ensure the data is readable and represents the secured project delivery.

8.5.3 Engineering Data

In addition to the delivery of all files used or produced during the course of the project, the **FDOT CADD Manual** requires the inclusion of *engineering data files* for critical geometrics in the design of the transportation facility. These include the alignments, profiles, cross sections, and quantity details. Critical geometric items like the centerline and profile of the proposed mainline roadway, side streets, special ditches, utilities, etc., should be included. The geometric files delivered must contain sufficient data for the Department, or any customer to reconstruct these critical geometrics in any design package in the future. The engineering data files delivered with the project will comply with the standards defined herein. This is applicable for all CADD projects produced by and for the Department, regardless of the software packages used to develop the project.

- **Syntax for Standard Electronic Engineering Data**

The following provides the required syntax for the engineering ASCII files transmitted to FDOT for a project as part of the electronic data delivery requirements. The syntax covers basic route geometry element types, and is readable by FDOT software systems. FDOT has standardized the a more universally supported format, namely the LandXML. Specific information about the LandXML formats can be found at http://www.landxml.org, and defines a data exchange format for:

Point data	Profiles
Curve data (circular arcs)	Cross Sections
Spiral data	Terrain Models
Chains (with station equations)	Hydrology and Hydraulics

- **Cross Sections**

Although LandXML also defines a specification for the exchange of cross section data, the Department has legacy systems (Multiline) that do not support LandXML cross sections. The designer shall also create and deliver the cross sections in an alternate ASCII text file format (GEN file) as defined herein, ensuring that each set of delivered cross sections for the project has a matching ASCII text file. These include existing ground terrain, bottom of the proposed template, undercut lines, muck lines, limits of construction, etc. as defined in FDOT Design Standards Indexes 500, 505 and 506.

The cross section ASCII text file format (*filename*.GEN) referred to as the *Multi-Line General File format*, can represent cross sections, alignment station equations, horizontal offsets and limits. Deliver GEN file cross section data in a separate file from the alignment geometry (which is LandXML). The ASCII text file format is documented in the following pages.

- **Comments Section**

This section of the surface definition contains records that are comment in nature. The information that should be included in these comments is:

  - Definition of what each Limits Table represents
  - Definition of what the surface or surface feature code represents
  - Definition of the Alignment and Profile (if applicable) that is referenced by the Cross Section data. The geometry of the alignment is not contained in the .GEN file, so adequate description needs to be documented so an end-user of the data can establish the proper relationships.

- **Station Equation Section**

If station equations are present in the cross sections, an **EQUATIONS table** must be present defining the region over which those equations apply. A new station equation region is started when a station equation is introduced into the alignment, where the ahead stationing differs from the back stationing at the given cross section where the equation is introduced.

- **Limits Table Section**

If the project has lateral limits represented in the cross sections (such as excavation limits, construction limits, R/W, etc.), these limits will be represented in a **LIMITS table**. The **LIMITS** table represents a pair of offsets at a particular cross section where a limit or pair of limits exists. A new **LIMITS** table will be included for each set of limits produced for a particular cross section or set of cross sections.

- **Cross Section Data**

The cross section for each surface represented is introduced with the command **GROUND** followed by the surface definition. For each type of surface (i.e. Existing Ground, Proposed Template, Subsoil Excavation, etc.), a **GROUND** section will appear in the format covering the station range for which that surface applies.

Standard Surface descriptions	Line type
Roadway Sub_Design Template	A
Original Borrow Terrain	B
Tolerance Line	C
Original Channel Terrain	D
Extra Depth Subsoil	E
Final Roadway	F
Final Subsoil	G
High	H
Final Borrow	J
Final Channel	K
Low	L
Channel Template	O
Pre_Construction Roadway Terrain	P
Roadway Template Bottom of Base	R
Roadway Template Top of Surface	S
Original Roadway Terrain	T
Unassigned	I, M, N, Q, U, V, W, X , Y

For a given station on a particular surface, the station, the region that the station falls in and the points on the cross section (represented by offset elevation pairs) are entered on a line.

- The points are ordered left-most offset to right-most offset as you read left to right along the line.
- White space separates the offset and elevation and the adjacent offset/elevation pairs (other points on the cross section).
- Offsets left of centerline are indicated by a minus sign “-” in front of the offset. Offsets right of centerline are unsigned.
- A zero offset point (centerline) is not necessary, but is highly recommended, as that would leave no confusion concerning how to interpolate the centerline elevation.
- The maximum line-length is 132 characters, so multiple lines may be used to include all of the points necessary for a given surface on a particular cross section.
- Each surface definition must be provided in the complete format as shown. Only station equations and limits tables’ sections may be omitted from a surface definition if they do not exist for the given cross sections.

Example of Comments section:

```
$ These are cross sections for Centerline US9A
$ This data is in ENGLISH units
$ Limits Table A is Federal Aid Participation limits
$ Surface EXIST is Pre-Construction Existing Ground
$ Horizontal Alignment is CHAIN SR9A1
$ Feature of Surface EXIST is feature code EXIST
```

Notes on the format above:

- Keyword "$" precedes any remarks needed
- Description of any included Limits Tables
- Description of any surfaces included (i.e. Surface EXIST)
- Alignment referenced by the cross section data
- Feature code assignments
- Other comments as necessary

Example of Equations section:

```
EQUATIONS
EQ R1  23+50.000    23+10.000
EQ R2  24+76.000    24+90.000
EQ R3  53+22.000    53+55.250
END EQUATIONS
```

Notes on the format above:

- Keyword "**EQUATIONS**" to start station equation section
- 1st station equation region "1" begins at station 23+50 back, 23+10 ahead
- 2nd station equation region "2" begins at station 24+76 back, 24+90 ahead
- 3rd station equation region "3" begins at station 53+33 back, 53+55 ahead
- Keyword "**END EQUATIONS**" to end station equation section

Example of Limits section:

```
LIMITS TABLE A
LI  23+00.000          -42.000     39.000
LI  24+00.000 R1       -46.000     34.000
LI  25+00.000 R2       -46.000     34.000
LI  54+00.000 R3       -50.000     30.000
END LIMITS
```

Notes on the format above:

- Keyword "**LIMITS TABLE**" to indicate offset limits
- Limits are defined with keyword "**LI**" followed by **station** and **region**. The leftmost offset is first (negative if left of centerline, positive if right) and rightmost is next. If more than one set of limits are needed per station, a second limits table (In this case "LIMITS TABLE B") may be required.
- Keyword "**END LIMITS**" indicates the end of the end of limits table.

Example of Cross Section Data (in this case existing Ground sections):

```
GROUND EXISTING GROUND SURFACE
XS 23+00.000      -60.000 21.300  .000 18.300   50.000 16.700
XS 24+00.000 R1   -50.000 17.000  .000 16.300   30.000 14.000
XS 25+00.000 R2   -50.000 17.000  .000 15.800   30.000 14.300
XS 26+00.000 R2   -50.000 17.000  .000 15.600   30.000 14.600
XS 27+00.000 R2   -50.000 17.000  .000 15.900   30.000 14.800
XS 28+00.000 R2   -50.000 17.000  .000 16.300   30.000 15.100
XS 28+50.000 R2   -50.000 17.000  .000 16.500   30.000 15.400
XS 29+00.000 R2   -50.000 17.000  .000 16.800   30.000 14.800
XS 30+00.000 R2   -50.000 17.000  .000 16.300   30.000 14.500
XS 31+00.000 R2   -50.000 17.000  .000 16.100   30.000 14.300
XS 32+00.000 R2   -50.000 17.000  .000 15.800   30.000 14.700
XS 33+00.000 R2   -50.000 17.000  .000 15.600   30.000 14.300
END GROUND
```

Notes on the format above:

- Each surface defined in the cross section will have its own set of data given in the format as shown.
- Keyword "**GROUND"** shall be followed by comments identifying the surface.
- Keyword "**XS**" followed by station, region, and offset, elevation pairs (up to 132 characters per line)
- Keyword "**END GROUND**" indicating end of cross sections

Other **GROUND** sections should be included for the finish surface of the proposed roadway, as well as the bottom of the base, sub grade, and any other soil layers that must be excavated (A4, A6, A8, etc).

Other Ground Sections might start like the following, indicating the surface being represented by the data:

GROUND MULTILINE DATA LINE TYPE R	← Roadway Template Bottom of Base
GROUND MULTILINE DATA LINE TYPE T	← Original Terrain

For a step by step demonstration of importing an ASCII text file in Multi-Line Earthwork, go to the ECSO Training website: *http://www.dot.state.fl.us/ecso/main/fdotcaddtraining.shtm*

- **Quantity ASCII Text Files**

Engineering data supporting quantity calculations will be retained according to the guidelines and formats defined by Final Estimates in the Computation Methods for Design, Construction and Final Estimates Handbook.

8.5.4 Merging External Project Files

Two groups of files must be merged into the main project directory structure prior to securing the project for delivery. These include MicroStation dependency files and files provided from outside sources, such as those produced by sub-consultants.

- **MicroStation Dependency Files**

Certain MicroStation files that are used, or referenced might reside external to the project directory during the production phase. Before delivery to FDOT, these files must be placed in the appropriate locations within the FDOT project directory structure. It is highly recommended that these files be included early on in the project, and verified that the referencing systems used by MicroStation function properly with the files located in the required delivery locations. Reference files must also be located without the "save full path" option, and should be located by MicroStation by their relative paths from the root project directory.

For plotting purposes, any user created MicroStation custom line style, font resource, and cell library files used for the project must be packaged with the project in the sub-directory **\symb**. In addition, any external design files that are referenced, such as sheet border files, must be copied to the project directory. This will allow future customers of the data to be able to view, or recreate MicroStation plots matching those that were part of the original delivery.

- **Files from Outside Sources**

Files that come from an outside source include files produced by a sub-consultant. Files from sub-consultants shall be delivered to the primary consultant, or the in-house designer, following the same requirements for electronic delivery. The sub-consultant shall return to the prime only those files for which he is responsible. These files must be merged into appropriate discipline directories prior to delivery to FDOT. Tools are available in FDOT's Electronic Delivery software suite to assist the user with these operations.

8.5.5 Reviewing the project

After all project files have been merged into the FDOT project directory structure, and prior to securing the project with PEDDS, the files to be submitted should be thoroughly reviewed. The checklist found in the Electronic Delivery software should be employed to help the user consider critical milestones in this important review. There are several tools available in the Electronic Delivery software to help with the review. One tool available is the FileChecker utility. Consult the available documentation for the ED software and training materials that are available on the use and operation of the software tools.

The SheetNavigator is used in MicroStation to ensure that all sheets are accounted for and have the proper sheet numbers, descriptions, County name and Financial Project ID numbers, etc.

- Take particular care to look for missing sheets, gaps in the numbering scheme, or more than one sheet with the same sheet number.
- Make certain the Electronic Plan Note appears on all plan sheets indicating the source of the official record (SheetNavigator can assist with the placement of this note).
- If SheetNavigator indicates all sheets are accounted for, the project should be further reviewed with the Electronic Delivery Indexer (EDI).
- Also, ascertain whether an image file (.PS, .PDF, or .TIF format) is available for each sheet in the electronic plans.
- It is also important to review the Electronic Document Management System (EDMS)/ Comments about particular files using the Electronic Delivery Indexer. These comments should supplement the documentation in your project Journal(s).
- Double-check that the Journal(s) for the project is complete and accurate.

FileChecker can be used to find multiple files in the project directory structure with the same file name, but different content. Likewise, it can find files with the same content, but different filenames. These tools should be used to find and resolve potential file naming problems.

Once the user is certain all components of the project are accurate, correct and complete, PEDDS will be used for Signing and Sealing. PEDDS will also be used to secure the project before delivery to FDOT. Upon receipt of the delivery, FDOT will authenticate the data delivered using PEDDS and the manually signed/sealed paper signatory reports. See PEDDS software help for detailed instructions on usage.

8.5.6 Sign and Seal Project Files

The requirements for sealing information stored in electronic files have been defined by the Board of Professional Engineers in Rule 61G15-23.003, F.A.C.(see other Boards of Professional Regulation rules for Surveyors, Geologists, Registered Architects, and Landscape Architects) and Volume I, Chapter 19 of the FDOT Plans Preparation Manual. For each professional in responsible charge who is signing and sealing files in a project, the PEDDS program generates:

- A Signature file, which defines the files that are being signed and sealed (this is an XML format file found in the *_meta_info* directory of the project). The signature file identifies files signed by the professional Signatory - including the file's SHA-1 hash code, and any qualifiers (conditions) the signatory placed on the signing of a particular file.

- A Signature Document (a report to be printed) that is signed, dated, and sealed by the professional Signatory with an impression seal.

Note *Finished sheets that will imminently become Signed and Sealed electronically should bear the electronic signature note as shown in the FDOT Plans Preparation Manual exhibits. During the early course of plans preparation, the note should not be applied to sheets to minimize the potential for confusion by a recipient that a sheet may be signed and sealed (the eventual intention), but at the time is not.*

- **Signature Document**

The Signature document is a report generated by PEDDS after a signatory elects to sign and seal selected files. This document is printed, signed, dated, and sealed with a metal impression seal by the professional in responsible charge of the work. This document secures the files signed and sealed by the professional, using the SHA-1 hash code computed for the signature file itself. If a non-licensed signatory selects files to sign (typically using his/her driver's license number), then the signature document is printed, signed and dated, but is not sealed with an impression seal.

Important: The signature document must be preserved and protected and must never be lost or separated from the data it is associated with. Without this document the associated data cannot be truly authenticated and thus, cannot be considered a legal record.

- **Securing the Project for Delivery**

PEDDS includes a process to secure the complete project directory, including all contained files for delivery. This process is similar to signing and sealing, however all files in the project directory structure a re "secured." This securing process is run after all the project files are finished, and all the signature files have been created, printed, and the Signature Documents are signed, dated, and sealed. The process of securing a project for delivery creates a Manifest Document containing the computed hash code of the Manifest File (Manifest.XML - which lists all files in the project with their individual hashes), thus securing ALL the files in the project directory. The Manifest Document is printed, signed, and dated (but is not sealed), by a project manager (or data manager), and delivered to FDOT along with the media containing the complete project submittal.

- **Authentication a Delivery**

PEDDS and the PEDDS paper reports received with the project will be used by FDOT to authenticate a project. The Authentication Report generated by the authentication process in PEDDS will be compared against the documents submitted with the delivery, including the Signature Documents provided and the Manifest Document. If the project submitted is found to generate the same hash codes, the delivery will be considered authenticated.

8.5.7 Media Requirements for Delivery

All electronic projects submitted to FDOT will be on CD-ROM or DVD-ROM unless otherwise approved by the FDOT Project Manager. If the project is too large to fit on one CD-ROM, then the process for delivery to the Department must be reviewed with the FDOT Project Manager before splitting the project on multiple CD-ROMS or choosing an alternate media. All Project CD's must be labeled with the required project identification information shown. Media not labeled with this information are generally not acceptable.

Project Identification Label:
Financial Project ID Number of Project:
Project Description (including County and State Road numbers, local road designation):
Firm doing the work (if done with consultant services) or District
Name of FDOT and Consultant Project Managers
Creation Date of the Media
Disk (#) of (total #)
Delivery type label (Project CD, Plans and Specs CD, etc.)
Anticipated Letting Date for the project

Note *After burning project data to a CD, or other media for delivery to the Department, that media should be authenticated with PEDDS by the data producer to ensure no changes were introduced during the media production process prior to submission to the Department.*

8.5.8 Compliance Certification

All electronic data submittals are to be delivered to the FDOT Project Manager, unless an alternate agreement is reached. A Compliance Certification (a similar one is presented in the Electronic Delivery software) containing items that should be checked before a final submittal. Although this checklist is not completely comprehensive of all work ensuring a quality electronic delivery, it does represent a minimum assurance to the Department that care was exercised in preparing the delivery. A copy of this or a similar form should accompany the documents in the delivery and be given to the Project Manager. (See example on the following page and provided in the Electronic Delivery software). Note that Districts may use a more comprehensive form in their Quality Assurance processes that the one shown.

The Electronic Delivery suite also includes an application called FileChecker, which is also used to review certain portions of ongoing project both during development and at submission for adherence of FDOT standards and business rules for the Electronic Delivery. It produces an HTML formatted report of the results which may be required by the local Districts. (See Chapter 7.4 for more information). FileChecker is only a tool, and is not a substitute for a thorough and comprehensive check by the data producer and the persons responsible for receiving and accepting an electronic delivery. Every report created by FileChecker bears this admonition at the top of the report:

This report flags suspected inconsistencies in an Electronic Delivery project, but does not replace a thorough technical review by a qualified professional or eliminate the responsibility of the user. A report with few or no status errors is a good sign, but does not guarantee an error free project. Likewise a report with many status warning or errors cannot be assumed to indicate an invalid project. The user or reviewer of this report must carefully consider the standards applicable to the pr*oject at the time of development.*

Compliance Certification Checklist Report

All electronic data submittals are to be transmitted to the FDOT Project Manager. The following questions shall be answered before submittal, and given to the Project Manager along with the submittal.
Note: Not all of the items above may apply to scopes entered prior to July 2000.

- ☐ 1. Have project journals 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 graphics files in MicroStation format, and are they compliant with the FDOT CADD standards for directory structure, file naming, and element symbology?
- ☐ 5. Does the submittal include all user-created MicroStation resource files (line styles, fonts) that may have been used with the project?
- ☐ 6. Has the GDM QC program been run against the MicroStation design files specified in the CPCH? Are the resultant reports of compliance included in the delivery submittal?
- ☐ 7. Have the project's corresponding engineering data files supporting the design been generated?
- ☐ 8. Have the prescribed ASCII Engineering data files been created and submitted for the alignments, profiles, and quantities in the formats described in the CADD Production Criteria Handbook? Is this information stored in the appropriate directories?
- ☐ 9. Have ASCII Multi-line general file format files been created and included for the surfaces represented in the cross sections?
- ☐ 10. Are project raster images for Photogrammetry work submitted in Descartes HMR format?
- ☐ 11. Have Postscript image files for all sheets been created, checked and included for all sheets in the plan set? If not Postscript, are the files in PDF?
- ☐ 12. If the project is intended for electronic advertisement and letting (the official record will be electronic), are the files representing the plans, referenced by Chapter 19 of the FDOT Plans Processing Manual, signed and sealed with PEDDS? Is the Electronic Plan Note on each sheet?
- ☐ 13. Has the entire delivery been secured with PEDDS? Has the resulting Manifest Document been signed? Have all Signatory sections been checked and initialed?
- ☐ 14. Are hardcopy reports of the PEDDS documents included, printed and signed? This includes the signed and initialed Manifest Documents and all signed Signatory Documents.
- ☐ 15. Has the final media for submission been properly labeled and re-checked to make sure the data is readable and can be authenticated with PEDDS?
- ☐ 16. Has a Project.PDF file been included that contains all sheets that are defined by the delivery's index?
- ☐ 17. Has an index report SheetNDX.htm file been included that links all sheets that are defined by the delivery's index for the plans?

FPN: _____

Date of Scope: _____

Certified by EOR: _____

8.6 POST-PRODUCTION

8.6.1 Purpose

The "Post-Production Phase" involves the review and acceptance of an electronic delivery, and making that delivery available to FDOT internal services for posting. Functions include the receipt and authentication of the delivery media, and placement of the project data into systems designed for general access to the data.

8.6.2 Overview

Upon receipt of the secured electronic delivery package and the accompanying documents, it will be authenticated using PEDDS by the Department's designated representative for accepting project data. The electronic submittal checklist will also be reviewed for completion. See Chapters 8.4.6 and 7.2 regarding: the handling of Signature Documents and Manifest Documents.

8.6.3 Acceptance

The CADD Manual defers to this handbook on technical issues regarding the content and formatting of the electronic delivery. Following the requirements in this Handbook does not guarantee an acceptable work product, as this Handbook does not address the quality of the engineering or survey work performed – it only attempts to address presentation in electronic form. Therefore, following the guidelines and requirements herein does not absolve the professional from providing a professional work product, meeting the standards of practice established in rule and law.

Once the electronic submittal is accepted, the electronic project will be imported into FDOT file management systems for subsequent use. Copies of the submittal media may be distributed among various stakeholders, such as Construction and Maintenance.

8.6.4 Internal FDOT Usage

The processes for Post-Production activities utilizing the electronic delivery are continually being refined as the Department receives electronic submittal projects with scopes developed after July 1, 2000. The Engineering/CADD Systems Office is charged with working closely with the production offices in the Districts and Central Offices to help develop processes for handling electronic deliveries for the intended uses. The following tasks should be accomplished by the Department:

- Provide receipts of electronic delivery to the data producer
- Log receipt of an electronic delivery into a tracking system
- Secure all paper documentation associated with the delivery of the electronic project media
- The designated persons responsible for putting the data into Department file management systems (such as TIMS or PEDDS-DB) will do so, and document completion of that task in a tracking system
- The designated persons responsible for handling delivery media will catalog and store the media, including making any copies necessary. This activity will be documented in a tracking system. It is extremely important that the paper signatory (signature) reports with raised seal be handled and managed properly. They must not be separated from the data or lost. Without them the data cannot be considered a legal record set.
- Copies of the media will be forwarded to the appropriate persons

8.7 REVISIONS USING THE FDOT ELECTRONIC DELIVERY SUITE

Revisions are an often confused function for novices of Electronic Delivery, however by reading this section carefully, file management for revisions are handled in a consistent and automated manner. When processing revisions in the context of Electronic Delivery (ED), it is important to recognize the need to protect legacy data previously delivered. The methods described in this section are the recommendation for revising plan sheets using current software in the Electronic Delivery suite of tools.

The processes described include operations to do revisions as part of the overall contemporary (revised) version of the project. The project is brought up-to-date; a revised project data delivery is created.

1. **Back up your original delivery** (make assurances you have a secured version available of your earlier delivery). Make all edits on a "copy" of the original. **The software depends upon you having the original delivery still available!**

   Note: Make certain that you have removed any "read-only" attributes on the project's file copies you will be revising including the Index file(s) (ProjectIndex.xml), Sheetndx.htm, Project.pdf, and the _meta_info\ folder, etc.

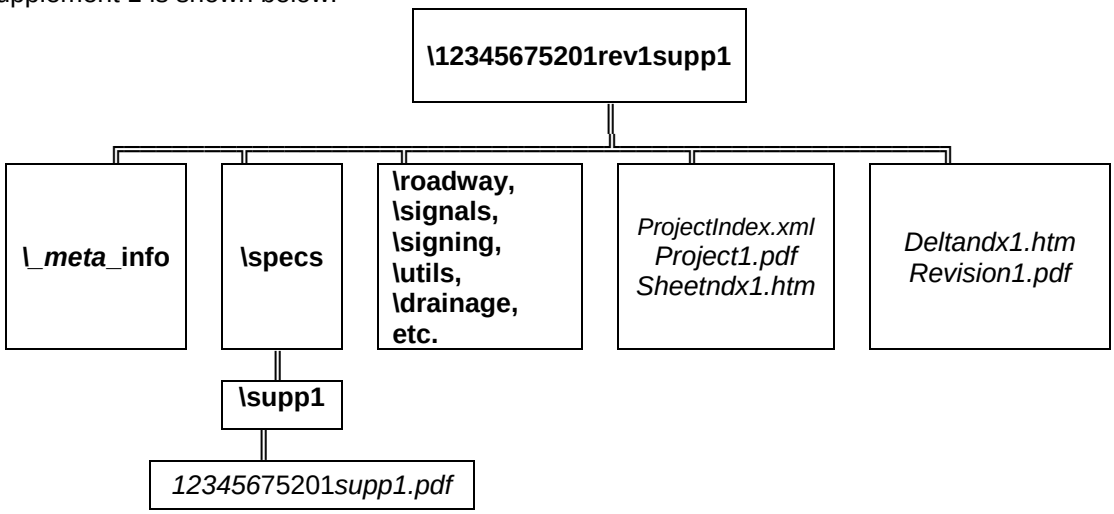
   Delivered directory structure for project Revisions / Supplements submissions:
   (revised "Plans and Specs CD" only):

   Central Office, or District plans processing units working outside of a managed environment (such as TIMS or PEDDS-DB) require the revised "Plans and Specs" data submittal (contrasted with the "Project CD" submittal) on their servers to use a specific directory naming convention for revisions and / or supplements. This convention can be created with the SetMaker tool, but the user must be aware of the conventions (it's not automatic).

   Note: Project root folder renaming does not apply for the "Project CD" submissions (that directory name NEVER changes, regardless of which revision); only the subsets created for revisions and/or supplements ("Plans and Specs CD") have their root folders renamed.

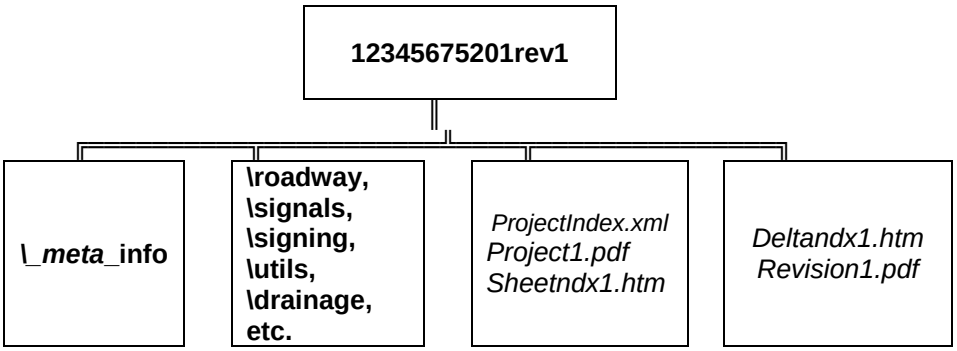
   Note: Some Districts do not require the consultant to process a "Plans and Specs" subset for delivered "Project CDs." If such is the case, read on to step 2. On page 8-24.

   When both a **plans revision** and **specifications changes** (called a supplement) are needed, the directory structure (and content) for the "Plans and Specs" subset for the revision 1 and supplement 1 is shown below:

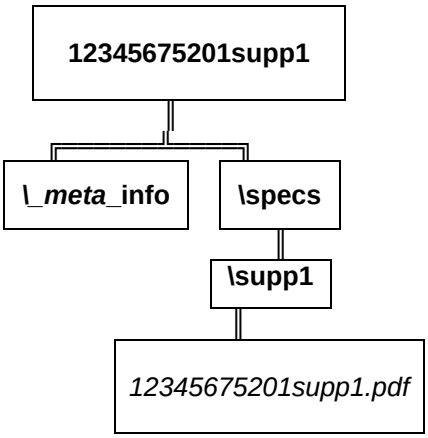


Note *A complete "Project CD" deliverable, named the original project name, is usually required to be submitted with each contemporary revision to the project. The directory naming conventions shown in these diagrams apply only to "Plans and Specs" subsets extracted from those revised "Project CD" submissions.*

If there are **plans revisions only**, the following directory structure would be used:



If there are specifications supplements only, the following directory structure would be used:



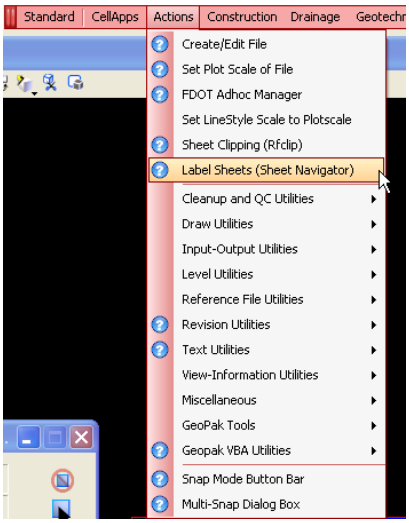
The *root directory name* for "Plans and Specs CD" data sets created for a revision and/or supplement are then:

	Project CD	Plans & Specs (Revision) CD
Original Delivery	12345675201	12345675201
After Revision 1	12345675201	12345675201rev1
After Supplement 1	12345675201	12345675201supp1
After Supplement 2	12345675201	12345675201supp2
After Revision 2	12345675201	12345675201rev2
After Revision 2, Supplement 2	12345675201	12345675201rev2supp2

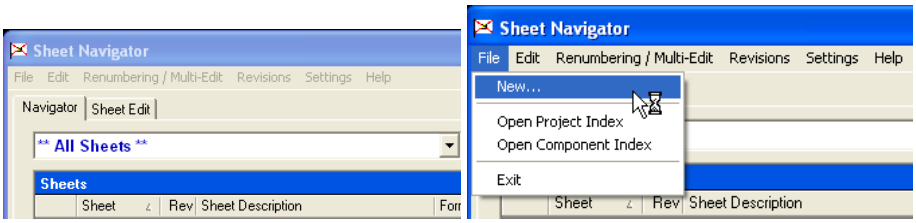
Now that this concept has been introduced, let's discuss the remaining steps necessary to create a revision.

Important: When preparing the revision, the user should preserve data in the original delivery's DGNs, and any plots made from them, because these may be signed & sealed by a signatory in the earlier delivery. Do not over plot any signed and sealed file from an earlier delivery – doing so will make the Signatory of those files not Authenticate in PEDDS.

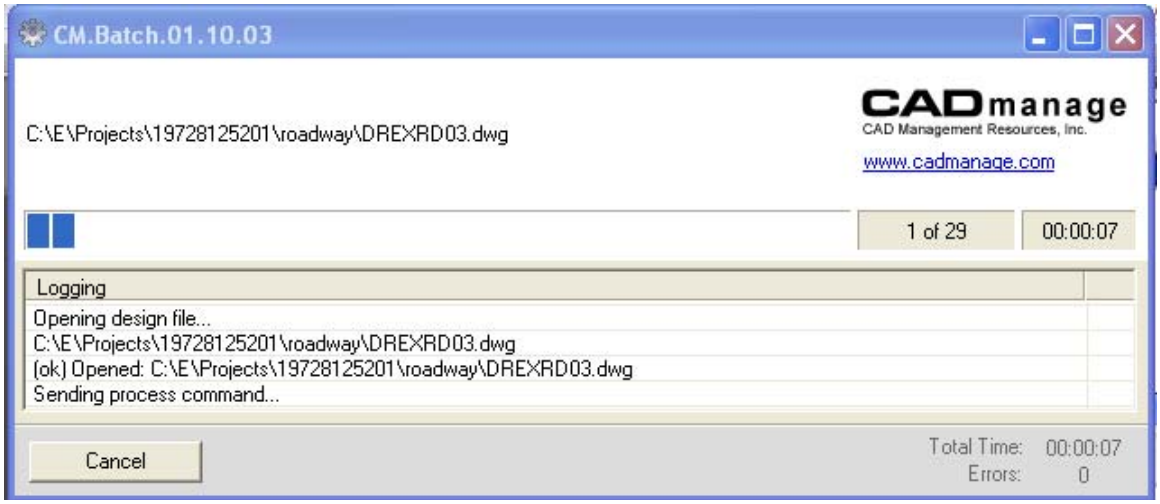
2. In MicroStation, from the FDOT Menu interface, select Actions -> Label Sheets to select the Sheet Navigator application. Sheet Navigator can now help you manage revisions to sheets.



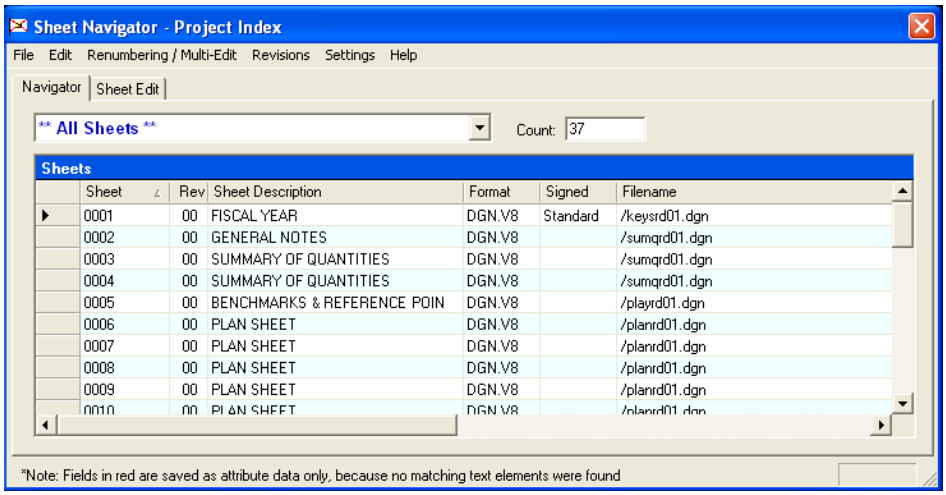
3. First, go into Navigator mode (making certain the Navigator tab has focus) and from the File pull down, select the "New" option to create a new *SheetInfo.xml* file, unless you have one already and it is completely up to date (In which case you would Open the Project Index (SheetInfo.xml).



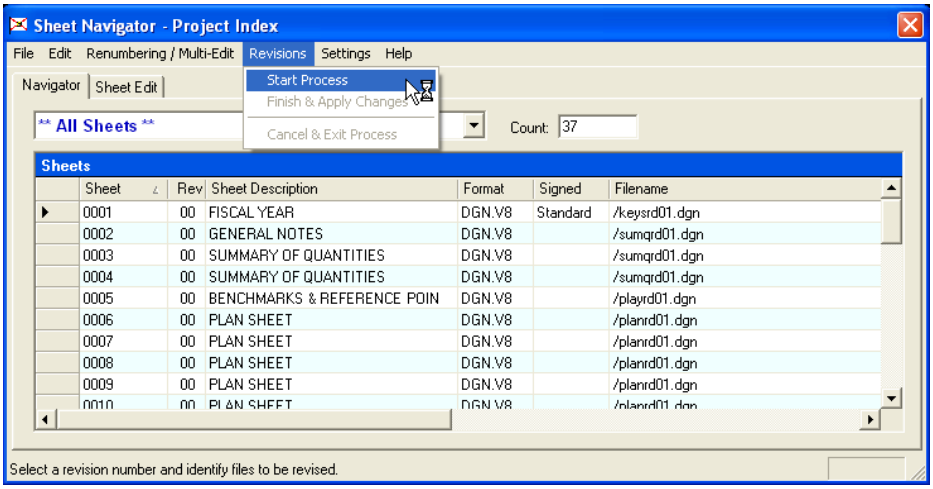
SheetNavigator will process each design file in the project directory structure looking for design file that have properly formatted sheet border cells if a new SheetIfo.xml file is being created.



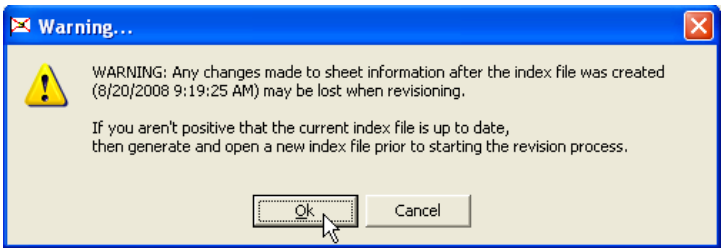
When SheetNavigator has finished, the Navigator dialog is displayed showing the current active sheets in the project. Always inspect for missing sheets, extra sheets, incorrect sheet descriptions (see the first entry for the Key Sheet in the capture below as an example), etc.:

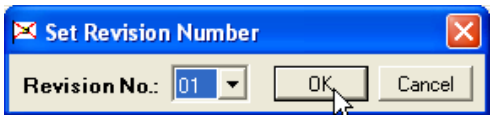


4. To begin the revision process, choose Revisions -> Start Revision Process option from the pull-down menu.

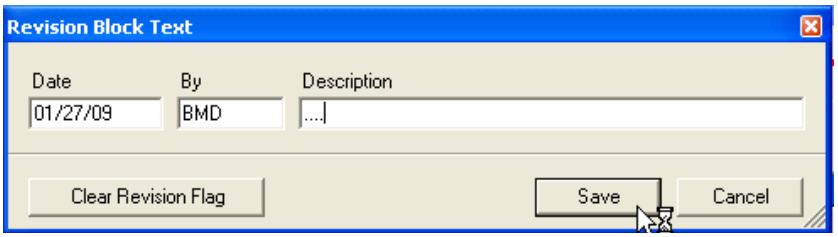


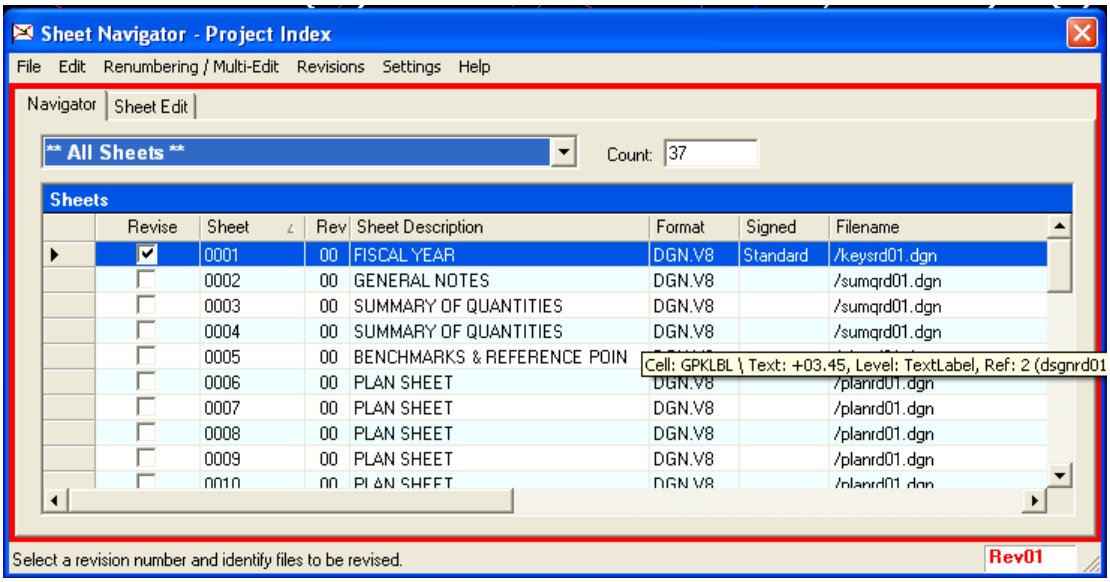
Note *The warning shown below. Select the revision number and continue with the [OK] button.*

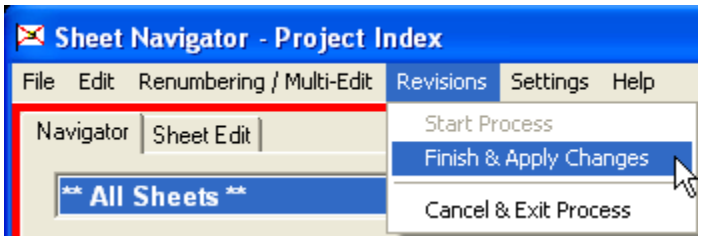


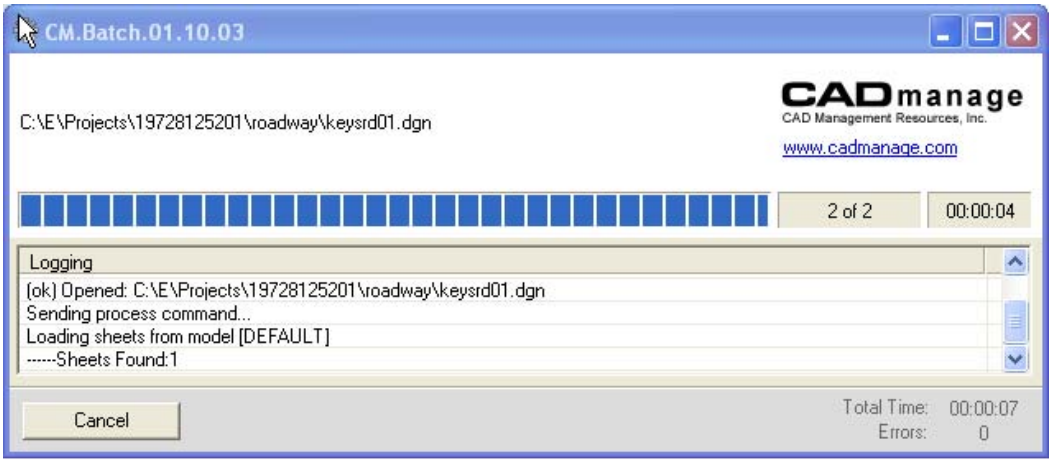


5. Select the revision number for the revision. Note you should choose the "official" revision number that will appear in the revision blocks and Key sheet. You must also choose which sheets to revise with the check boxes below. Enter the information to appear in the Revision Block on the Sheet, and Press the [OK] button and SheetNavigator will process the highlighted sheets.









6. The SheetNavigator dialog will return in appearance to what it looked like prior to step 4, showing the Revision Number in the column for those sheets to be revised. When SheetNavigator was processing the revision, it was making changes to the revised sheets and doing other file manipulation behind the scenes.

   - The design file being revised is copied so it may be preserved. In this case, ***PLANRD01.DGN*** is copied to ***PLANRD01_2009-01-27.OLD*** (notice the date in the name of the backup file, this is the current date the revision is being processed on)

   - In ***PLANRD01.DGN***, the sheets that are not revised will have the "*allow plot*" attribute removed. This way, only the sheets to be plotted later for the revision will be allowed to do so from the batch plotting process in the Electronic Delivery Indexer.

7. In ***PLANRD01.DGN*** (or the design files containing the sheets needed to be revised) complete the necessary revisions and complete appropriate tagging and notations with Sheet Navigator.

8. Plot the revised sheets by plotting the effected design files in their own plotting session in EDI. **DO NOT re-plot any design files containing existing unchanged sheets, otherwise you risk overwrite existing signed and sealed files, and invalidate existing PEDDS signature files – Be very careful here!**

   Note: EDI will warn if you are about to over plot a signed and sealed file – **Don't Do it!**

9. Update the Project Index (Project.XML), and edit and save a sheet index (ProjectIndex.XML) with ***Electronic Delivery Indexer (EDI)*** to reflect the newly revised sheets in the plans.

10. Create **NEW Signatory(s)** in PEDDS (even if it is the same physical person signing / sealing a revision as the original delivery) to sign / seal the newly revised sheet image files you plotted. **DO NOT use the old Signatory files - leave the files signed with old Signatories and Signatory file intact.** Also create a new (different) Signatory to sign any specifications supplements. ***PEDDS*** allows for multiple signatory files for any given professional of record. **Sign and Seal the revised sheet Postscript files with the NEW Signatories. This is a very important step!**

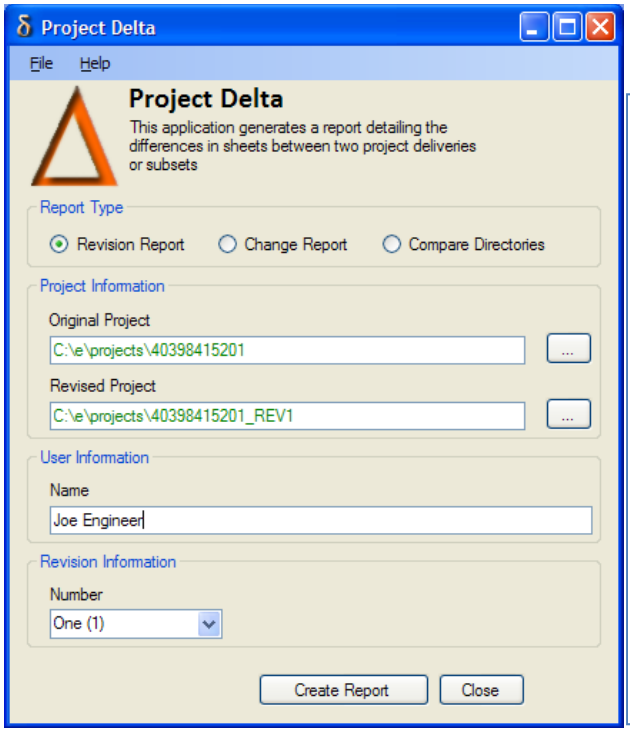
Note *Up to this point, all steps have been defined in terms of producing the Revised Project CD deliverable to reflect the updated state of the project with the revisions. In the remaining steps, certain actions are needed to also produce the Plans and Specs Revision CD used in the letting process. Some Districts reserve this process in-house.*

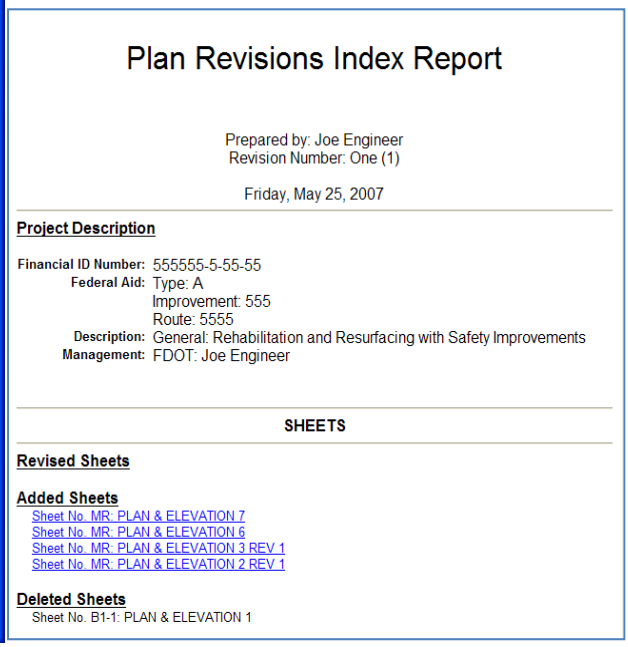
11. Create the Plan Revisions Index Report using the *ProjectDelta* application, comparing the original project delivery to the revised (contemporary) version of the project.

    ProjectDelta will no longer output a file simply named DeltaNDX.htm, but it will append the revision number selected to the end of the file in the format of Deltandx***N***.htm (***N*** being the revision number).

    The report (***DeltandxN.htm***) is placed in the root directory of the revised project and only displays information about indexed sheets and their impacted files that have been added, removed, or revised.

Note *Other non-indexed files that may have changed are not reported. This action is needed for producing the Plans and Specs Revision CD deliverable required for the letting process.*





Note *Both the Revision and Change options produce the changes between two sets of project data.*

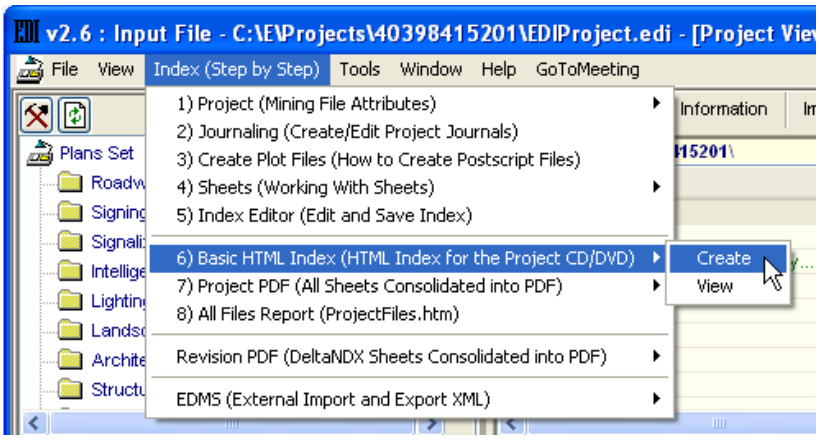
- The **Revision Report** option is used in producing the Plans and Specs Revision CD deliverable and creates the necessary file Deltandx***N*.**htm**.

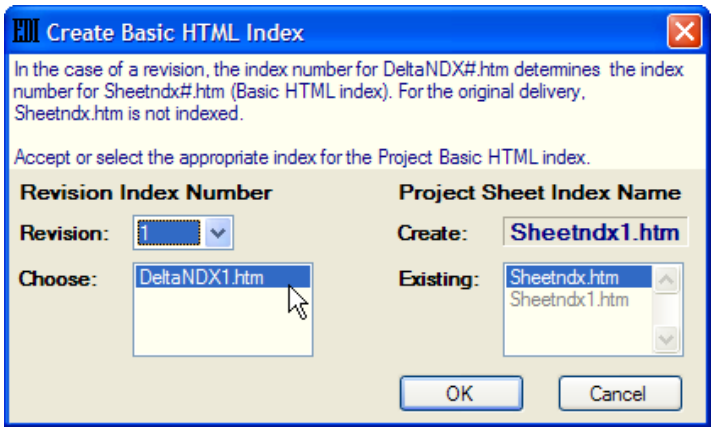
- The Change Report option produces a report of th***e differences*** between the Index of an earlier delivery and the contemporary (revised) projects index. It does not produce any intelligent hyperlinked reports (but the output can be saved). It is merely a tool to assist when one desires to compare two sets of data to know what has changed between them.

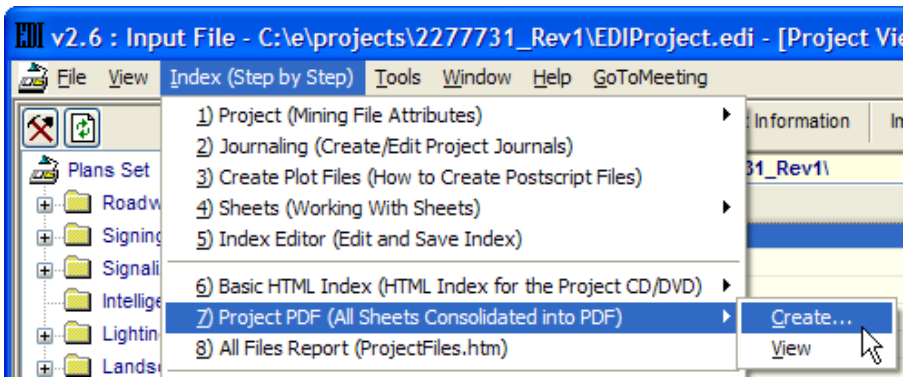
- The Compare Directories option creates a report of the actual file differences between the Original and Revised project directories; no type of actual project information is validated. This option gives the user some reporting options and uses the *CSDIFF* application to compare the original and revised project directories.

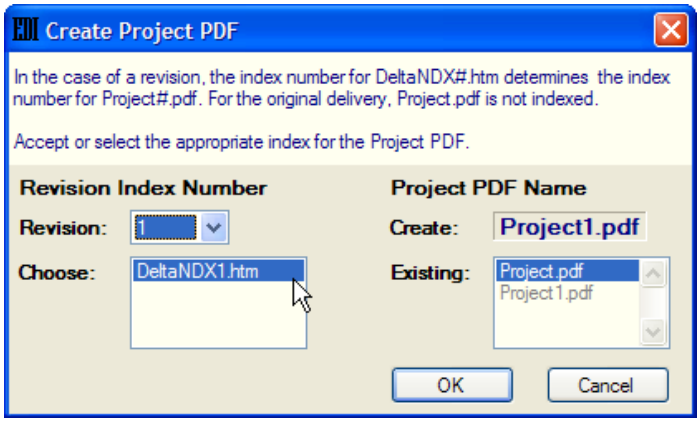
12. Update the Sheet Index Report (***SheetndxN.htm***) and project composite PDF (***ProjectN.PDF***) using ***EDI***.

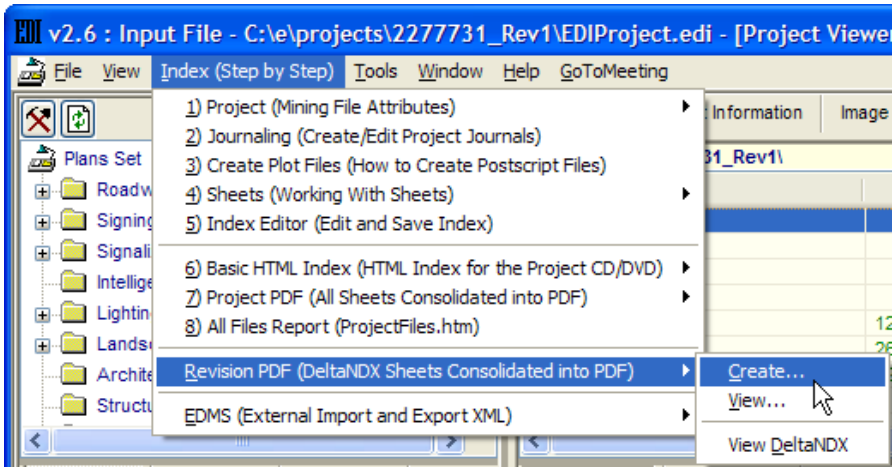
Note *These actions in Step 12 are necessary for defining the state of the project as will be reflected in the Revised Project CD deliverable. The new SheetndxN.htm file and ProjectN.pdf file will make reference to all sheets currently active in the project following the revision. However, as shown below, the updated project sheets are assembled into a composite RevisionN.pdf as needed for the Plans and Specs Revision CD deliverable used in the letting process.*

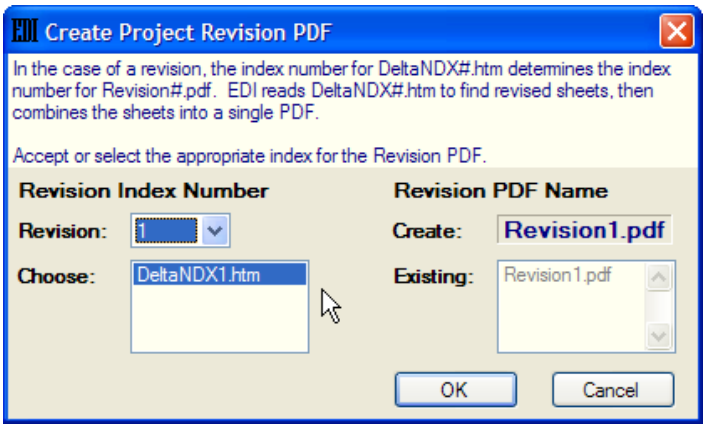










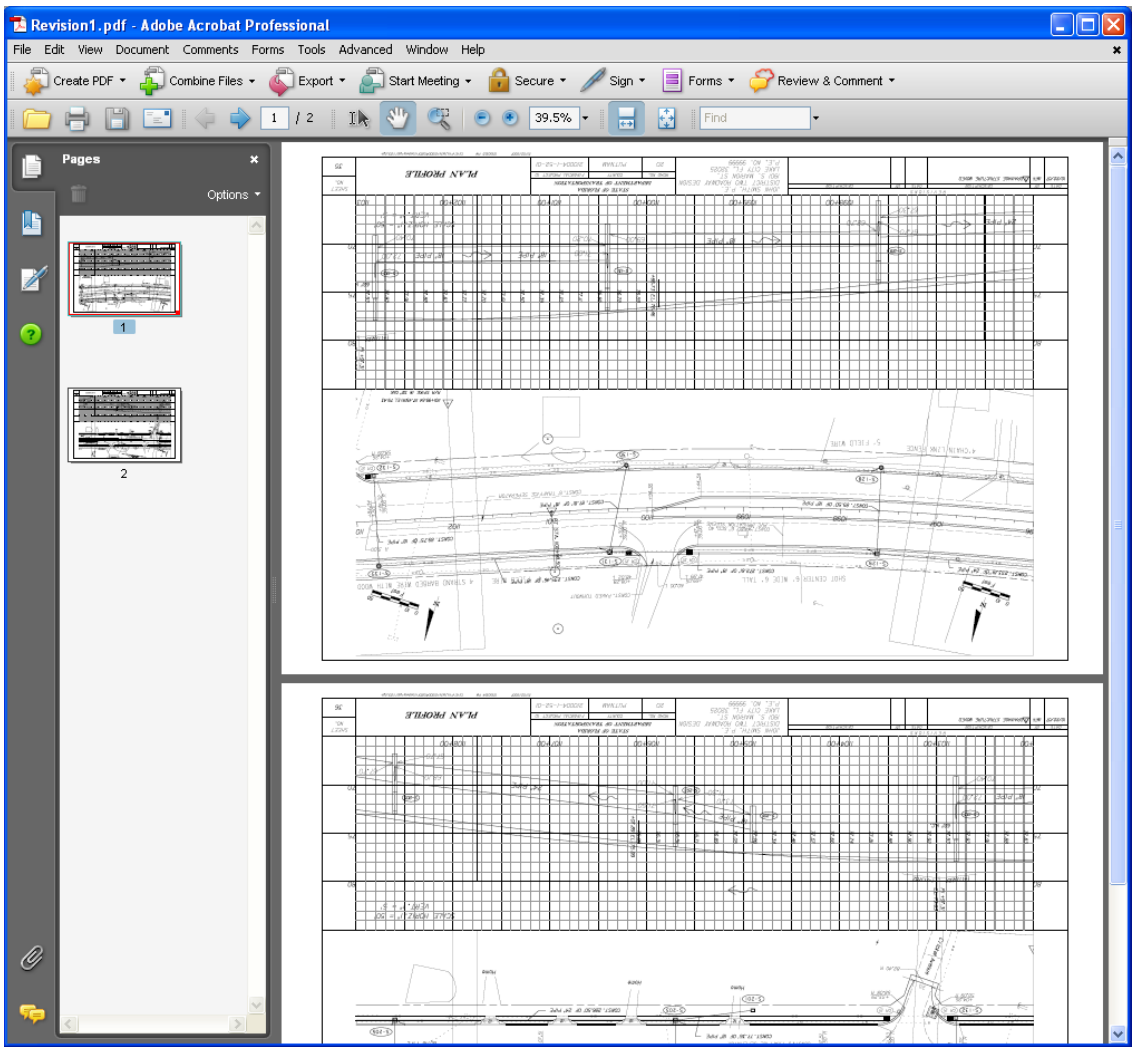


13. Create the composite Project***N***.pdf with EDI. This file contains all sheets currently part of the project. Select the appropriate index as defined by Deltandx***N***.htm for each revision.

14. Create the Sheetndx#.htm, which is the index for all sheets in the project. Select the appropriate index as defined by Deltandx***N***.htm for each revision

15. Additionally create the composite Revision***N***.pdf by selecting the appropriate Deltandx***N***.htm, from the project root folder. EDI will automatically prompt for and then reads the data from Deltandx***N***.htm to create Revision***N***.pdf. Only revised sheets are included in the revision PDF, as found in the Deltandx***N***.htm index.

    This action is necessary to produce a PDF file of the revised sheets to be included in the Plans and Specs Revision CD deliverable. An example of a Revision1.PDF is shown below:



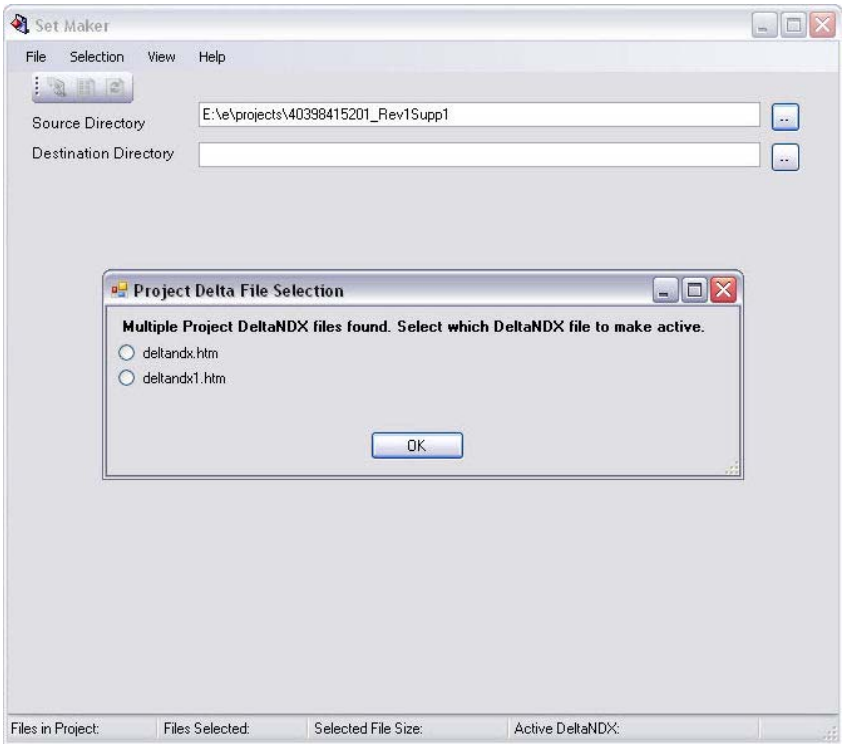
16. Secure the new project delivery with *PEDDS*. The "Revised Project CD" (now containing revisions) can be prepared and burned for delivery.

Note *Remember the revision is developed within the complete contemporary project that is brought up-to-date, making a "Revised Project CD" delivery.*

Label the Revised Project CD carefully, distinguishing the label with the Revision or Supplement number, as well as the other required text on the CD label. After the CD had been burned, always authenticate the CD (the physical media) using *PEDDS*, to make sure the CD burning process went smoothly.

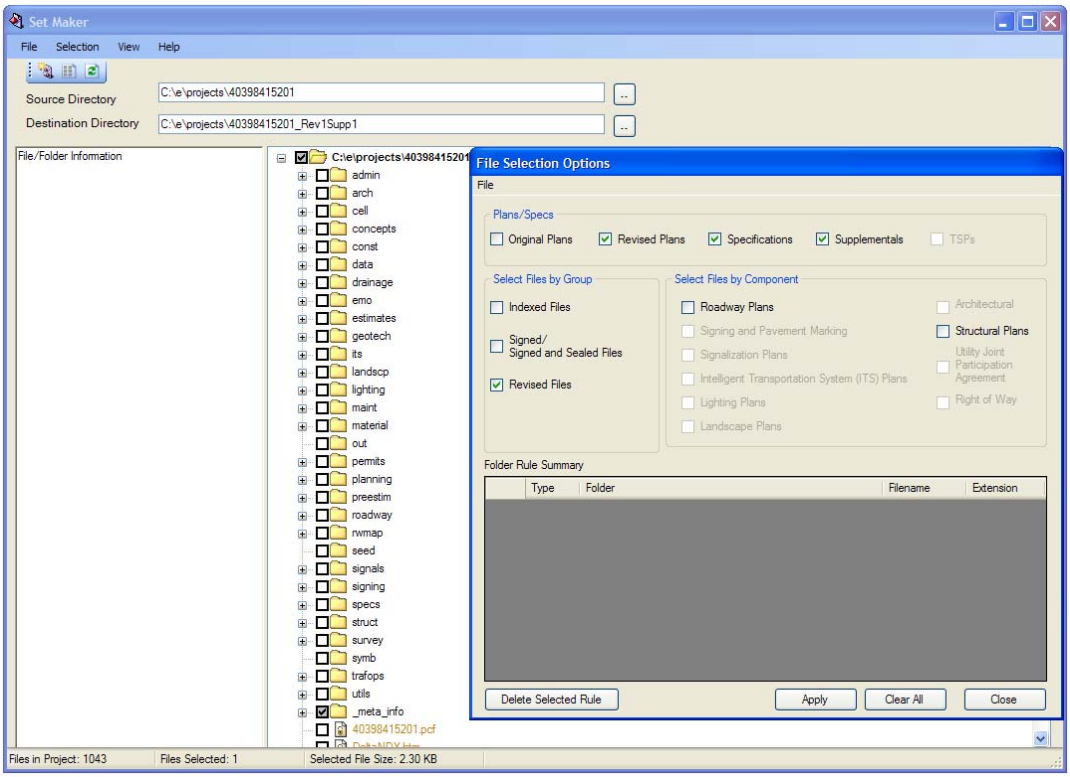
17. Create a sub-set using *SetMaker* for the "Plans and Specs Revision CD" for the revised project. The *Destination Folder* field should contain the directory name using the Naming Structure discussed after Step 1 earlier.

    In SetMaker, if the Source Directory folder contains more than one deltandx.htm file, the user will be given the option to select which deltandxN file will be the active one as shown below.



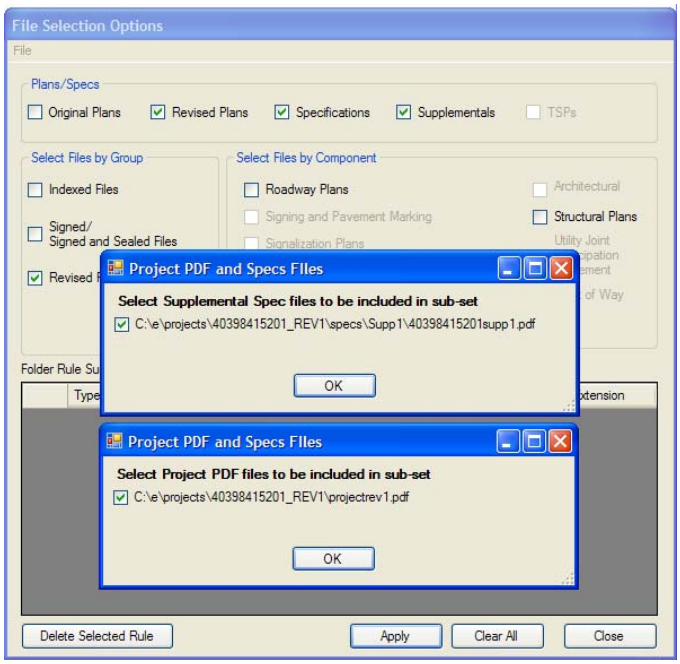
    File selection settings in *SetMaker* are shown to create the updated project subset representing the "Plans and Specs Revision" CD. Note that the specifications supplement has been selected using the Supplemental File Selection rule as shown below:

Note *Selecting the "Revised Plans" rule in the "Plans/Spec" rule group will automatically select the "Revised Files" in the "Select Files by Group" rule group. The difference is that the "Revised Plans" rule also selects the revised project.pdf file and the project revision report (DeltaNDX.htm).*

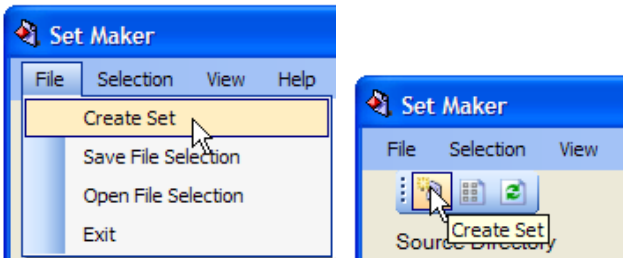


Note *Seek guidance from the State Specifications Office for the required sub-directory structures and file naming conventions for specifications supplements.*

Once the Apply button has been pressed, *SetMaker* will present a list of all Project***N***.pdf and Supplemental.pdf files that are detected. The latest file of each type will automatically be selected; the user at this point has the option of selecting/de-selecting any file at this point.



Once the file selection rules are complete, the "Plans and Specs Revision" set is ready to be created by either selecting the File>Create Set menu item or pressing the Create Set button from the button bar.



SetMaker copies the selected files, along with the minimum necessary directory structure to the *Destination Folder* and automatically Secures the Subset of the project it creates.

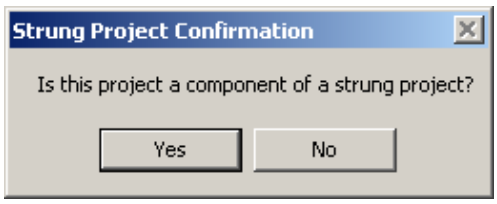
18. Make sure to print the *Manifest Report* generated by *SetMaker***,** and burn your "Plans and Specs Revision CD."

Note *Always Authenticate the physical CD-ROM after burning your CDs to ensure a secure delivery set for submission to FDOT.*

8.8 STANDARDS ON HOW TO PREPARE STRUNG PROJECTS FOR ELECTRONIC DELIVERY

Electronic Delivery of "strung projects" involves the act of combining two or more independent and secured project data sub-sets together. Stringing projects involves combining the data in a way that the end-user of the data (typically a contractor) can reasonably navigate "lead" and "goes-with" sub-project data comprising the strung project using a simple Internet Browser. The reader should already be familiar with the process of creating "Plans and Specs" data sub-sets from "Project" data sets that should be created prior to operations necessary for project stringing. The following steps will familiarize the user with the basic operations necessary, which should be applied when preparing a Plans & Specs delivery of a strung project.

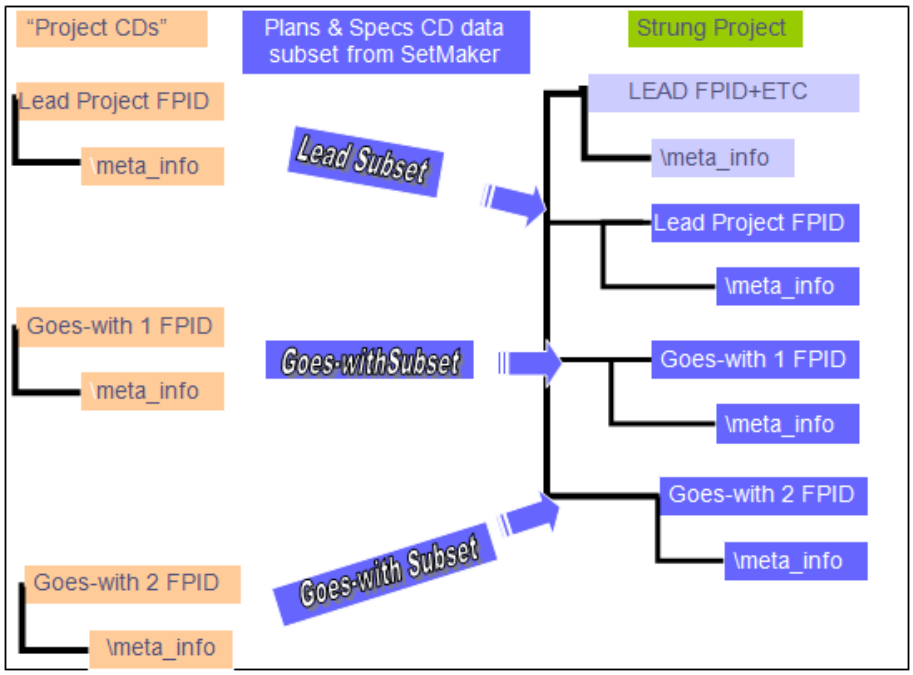
1. The first step - choose which two, or more projects will be strung together. Each project delivery contains an index (ProjectIndex.xml), and a modified version of the basic HTML Index report (Sheetndx.htm) that will contain a navigational hyperlink to the strung project parent folder. Navigation is permanent in each Lead and Goes-with *Sheetndx.htm* file as it is created by EDI. The user is prompted at the time of creating the Sheet Index Report (*Sheetndx.htm*) if this project is a component of a strung project or not?



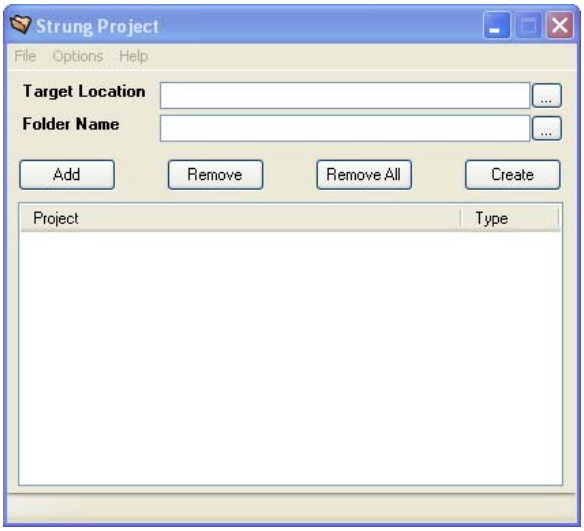
2. Strung projects combine data from "Plans & Specs" **sub-sets** extracted from full project deliveries. *SetMaker* is the tool used to make the extraction of the Plans and Specs subset from each full Project delivery.

3. Always make a backup of the original data - In case of a user error, the software crashes, or whatever the mishap, the backup is a good starting point for recovery.

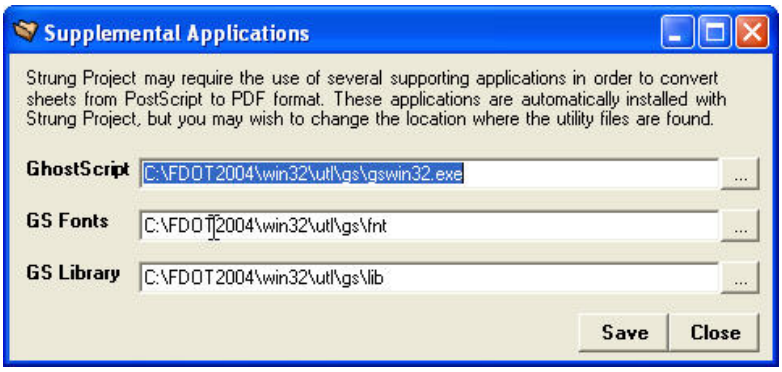
4. Decide which project is the "lead project", and the remainder projects are "goes-with." The following diagram below shows the structure of the strung project, the source data coming from the "plans and specs" data subsets of each component project. The top level directory of the strung project is the Lead project's 11-digit FPID number, with "ETC" appended (i.e. 12345678901ETC).



5. To create the strung project, run the *StrungProject* application from the Electronic Delivery interface.



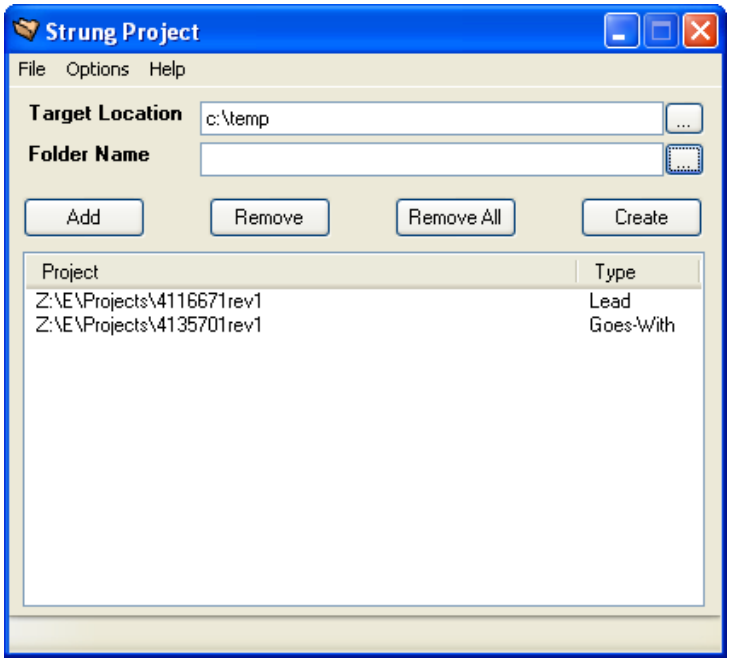
6. In order for *StrungProjec*t to create a composite 'Project.PDF' for all of the Lead and Goes-with projects (to be placed in the root directory of the strung project structure), the operation requires the paths to the *GhostScript* utility be set in the “Options” Menu pull down as shown below and saved:



7. From the “File Name” field shown in the StrungProject interface, navigate to the ‘Lead Plans and Specs’ data sub-set by pressing the ellipsis button […] at the right of the 'File Name' field. Optionally, you can key-in the full path to the Lead, and press the [Add] button. The first ‘Plans and Specs’ data sub-set select will always be considered the ‘Lead’ by StrungProject.

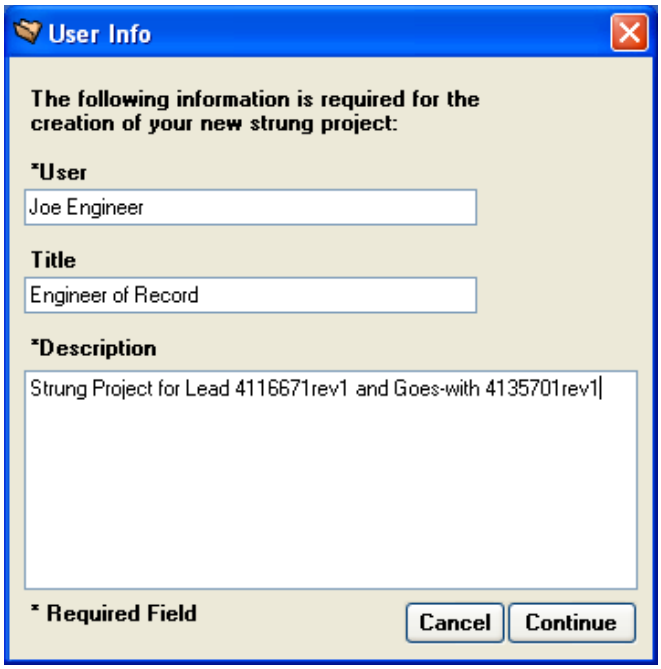
   StrungProject will validate the Lead, and if no errors are found, it will add the Lead to the composition window at the bottom of the dialog. If the Lead was selected by mistake, it can be removed from the composition window by highlighting the entry, then pressing the [Remove] button.

   When you are satisfied the Lead project was selected properly, select a Goes-with project. Follow the same procedure as described above. As each Goes-with is selected, they too will be validated prior to populating the composition window. If needed, Goes-with projects can also be removed from the composition window by highlighting the entry and pressing the [Remove] button.



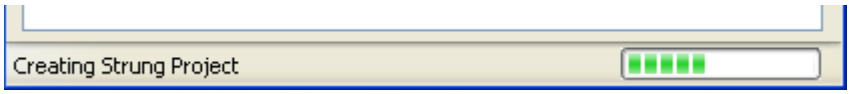
When the Lead, and all Goes-with projects have been selected correctly, you should enter the path to the destination folder where the resulting strung project will be written. Here too, you can navigate to an existing directory, or key-in a new directory, etcetera. *StrungProject* will create the strung project folder structure, under the directory entered in the 'Target Location' field. The folder name of the strung project will be called \12345678901ETC in our example.

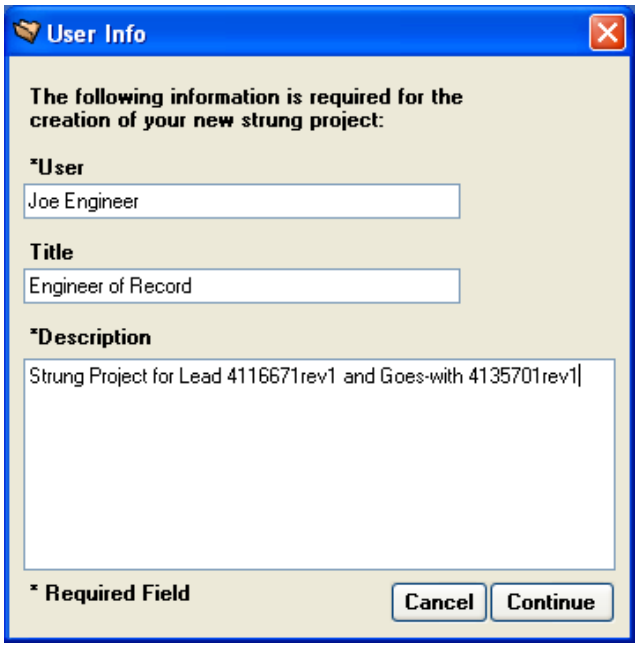
8. Press the [Create] button. *StrungProject* will ask for some identification information to create a Project Identification file (ProjectID.xml) in the _meta_info folder of the root strung project structure. This Project ID file is copied from the Lead project, and modified slightly by Strung Project so that *PEDDS* will recognize the strung project as a unique project (a new *PEDDS* Project key is created). Likewise, a “seed” Manifest file (Manifest.xml) is also created in the _meta_info folder; however it does not contain any file listing data (URLs or Hash codes).



9. On the User Info dialog, press the [Cancel] button to return to the main *StrungProject* Screen, (OR) press the [Continue] button and *StrungProject* will begin creating and completing the appropriate strung project directory structure. Each of the component ‘Lead’ and ‘Goes-with’ sub-projects will be copied into the strung project structure. As copying takes place, Strung project displays a progress bar, and descriptive text about what is being processed.

Note *As described previously StrungProject will also create the ProjectID.xml and Manifest.xml files at this point.*

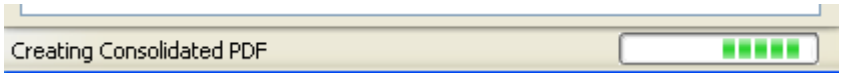




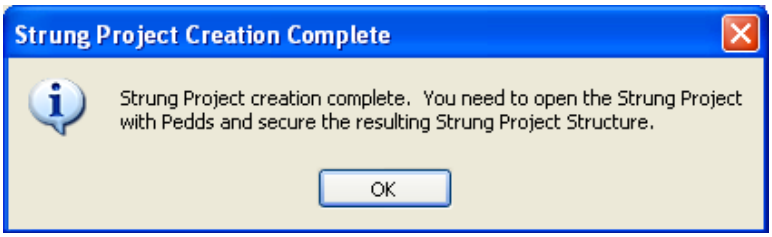
Note *The strung project directory structure is not secured by StrungProject – use PEDDS to do all securing.*

Once *StrungProject* has created the directory structure and all appropriate files, *StrungProject* will append any "Project.pdf" files found in the Lead and Goes-with project(s) and place the appended composite (also called Project.pdf) in the root directory of the strung project.

GhostScript runs once, with no user interface, for each Project.pdf file found in the component projects(s), and builds the composite Project.pdf file in the root directory of the strung project. *StrungProject* displays a progress bar and descriptive text as all the PDFs are being un-distilled to PostScript, concatenated, and re-distilled back to PDF, which is a very computer intensive operation, so be patient please.



When StrungProject has finished its work, it prompts the user with a message box to open the strung project directory structure with PEDDS.



PEDDS is used to modify the Project identification data (ProjectID.xml) for the strung project, as required, or Project Header data (stored in Manifest.xml). Once the user is ready to secure the strung project structure for delivery, he/she would do so by the ordinary procedure in *PEDDS.*

10. Test all Sheet Index File Reports from an Internet Browser to make certain they are functional for navigation, and hyperlinks to plan sheets.

11. Prior to delivery, secure the entire strung project structure (from the top strung project directory) prior to delivery using *PEDDS*.

    When doing revisions when projects have been strung for letting, the user is reminded of the following concepts:

    - Individual Revised Project CDs are created separately for each project in the string to be revised. The Revised Project CDs should be created using the concepts, instructions and guidelines provided in section 8.6.

    - Revised Plans and Specs CDs are to be created from the Revised Project CDs using *SetMaker*.

    - The Revised Plans and Specs CDs are strung together using the *StrungProject* application.

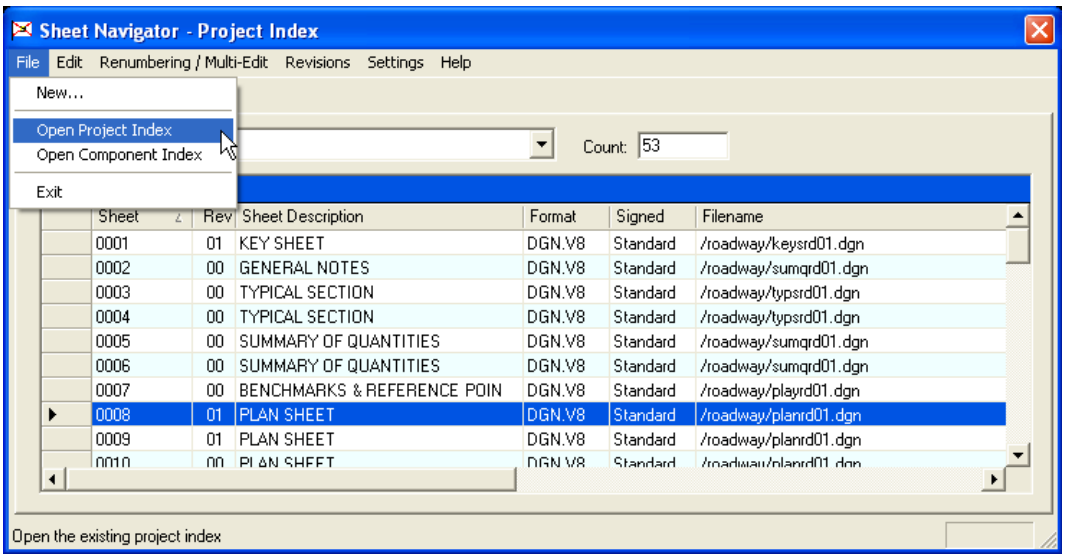
    - Just like Project CDs, Revised Project CDs are never strung together; rather, it is the Revised Plans and Specs subsets created by *SetMaker*, i.e. Revised Plans and Specs CDs, that get processed by the *StrungProject* application to create the revision package for the string.

    - If only one of the member projects of the strung project is revised, do not include the other unrevised member projects when submitting the revision. Only the revised project data needs to be submitted.

8.9 RE-LET PROJECTS AND ROLLING BACK REVISIONS

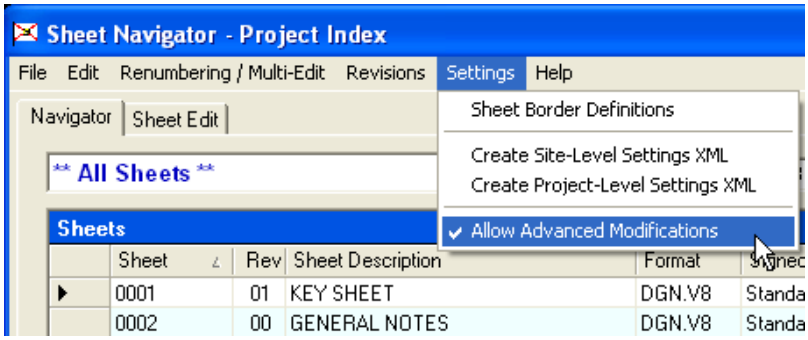
In seldom cases, projects must be re-let. If no revisions have occurred to the project that must be re-let, FDOT will simply re-advertise and let the project with the submitted Project CD or Plans and Specs CD data. However if a revision has been applied to the project to be re-let, then the revision is no longer germane and 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 was an original delivery. This could involve updating the plan sheets to remove the revision enumerations - potentially removing the notations a revision has even occurred (Note: the changes to plans that were once identified as a revision are now considered simply a plan change).

1. To update the index, open the SheetNavigator Project index file (SheetInfo.xml) in SheetNavigator.



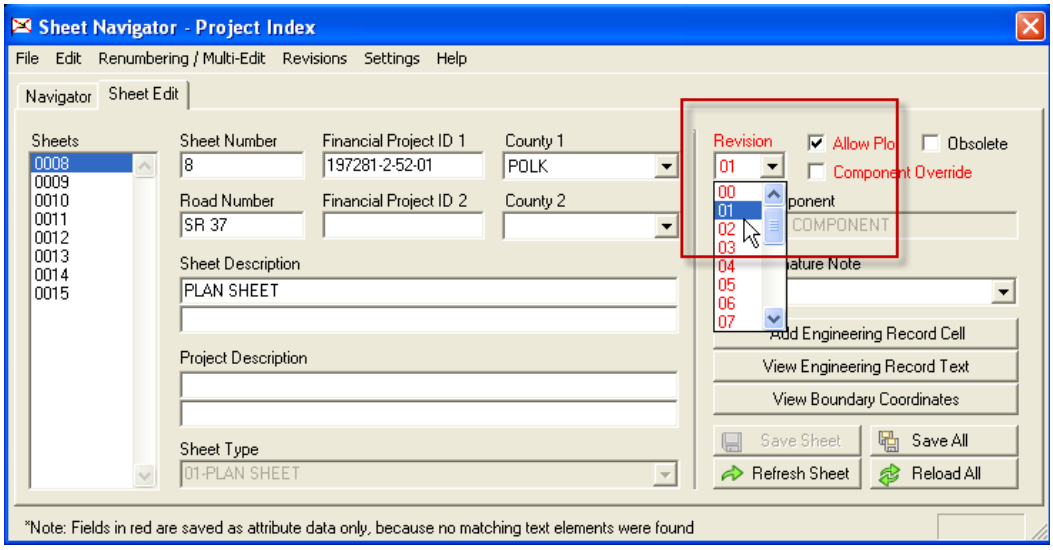
Note *Notice the revision numbers (in this case Rev 01) for the revised sheets.*

2. In the Settings menu, make sure SheetNavigator is set to allow advanced modifications.



3. Select each revised sheet by double-clicking in the data grid view. SheetNavigator will open the design file containing that sheet. In the Sheet Edit dialog, navigate to the sheet that contains the revision.

   You should notice that the setting for the Revision field is now Red and enabled, so the revision number may be modified. If the project is being re-let and the revisions are reverting back to an original delivery, then the revision number to each sheet can be set back to zero. To do so, simply select the drop down list and select the appropriate number (00 for an original delivery).

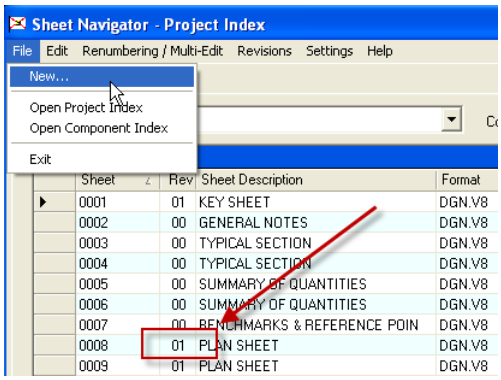


4. You must also manually edit the revision text found in the title block of each sheet. SheetNavigator will not remove that text automatically.

Note *Automatic revisioning process using SheetNavigator described Section 8.7 can not be used to roll a revision number backward. Each sheet must be visited as described above.*

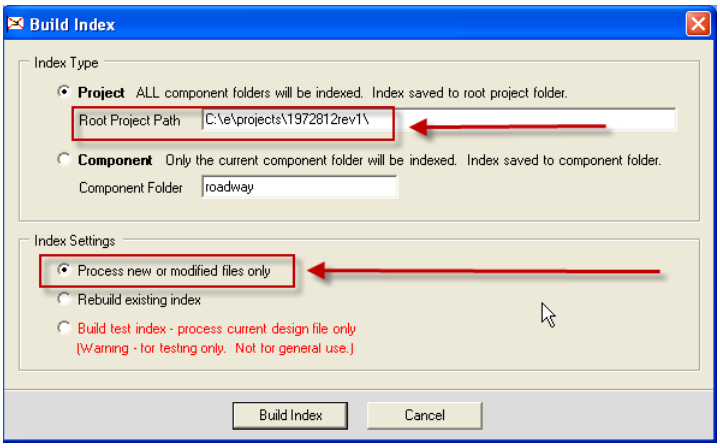
5. Once all the sheets have their revision number updated, the SheetInfo.XML Index must be regenerated so it is up to date.

6. Switch back to the Navigator tab, and select File > New from the menu.

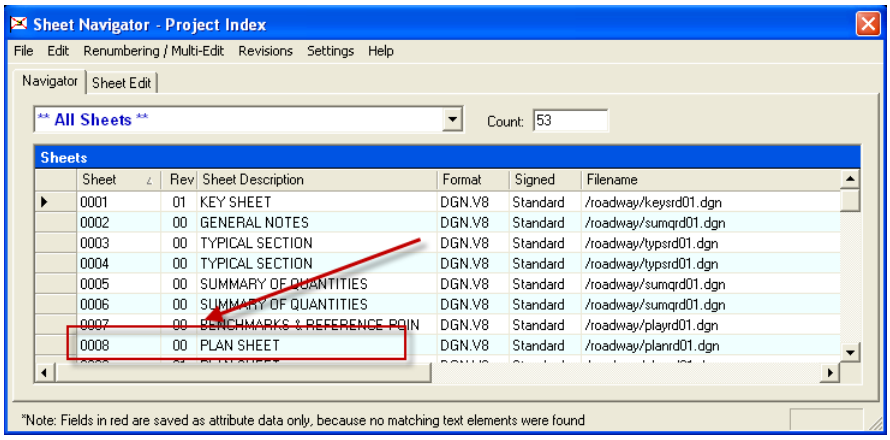


7. Rebuild the index by allowing SheetNavigator to modify the effected files that were updated during the revision roll-back process described above. Press the [Rebuild Index] button to process the files.

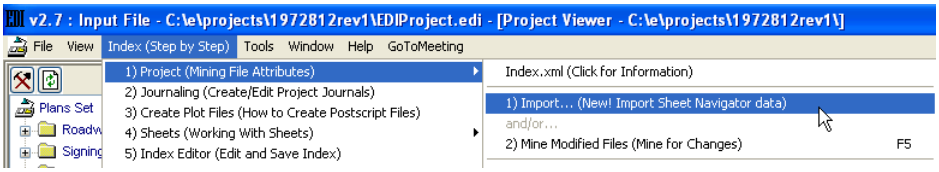
8. Note also that root project directory may also contain the wrong folder name if rolling back. Just remember to rename the folder back at some point prior to securing the project. Take caution that there may already be a folder in your data without the Revx extension.



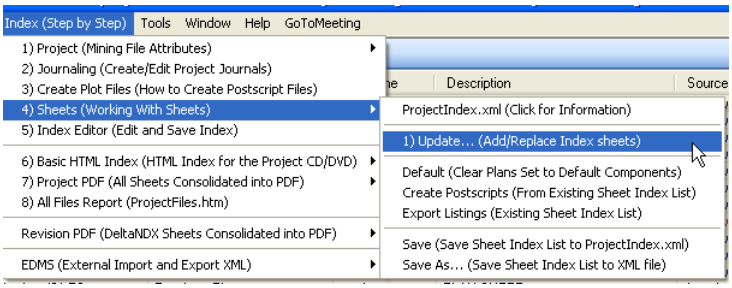
9. The CM Batch process will execute, and the Index will be rolled back to the original revision level.



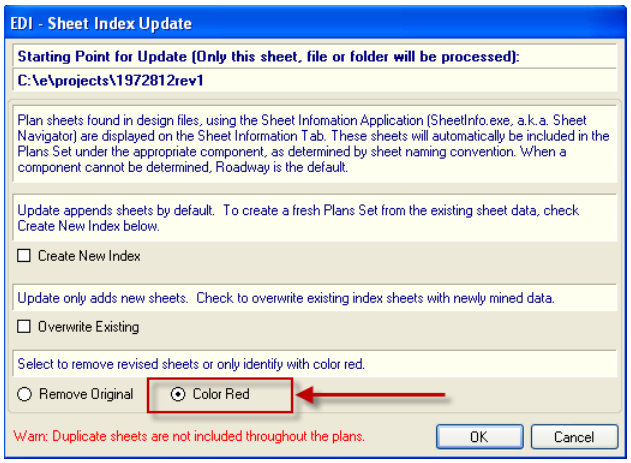
10. Reopen the project in EDI, and reimport the SheetNavigator Index data.



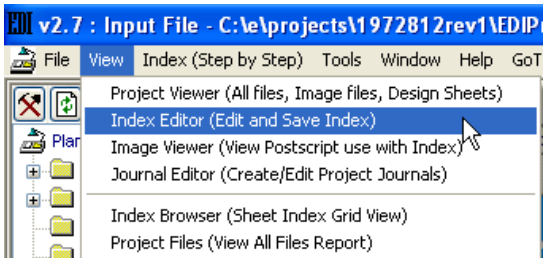
11. Update EDI's awareness of sheet changes (do this even if no sheets were added or removed).



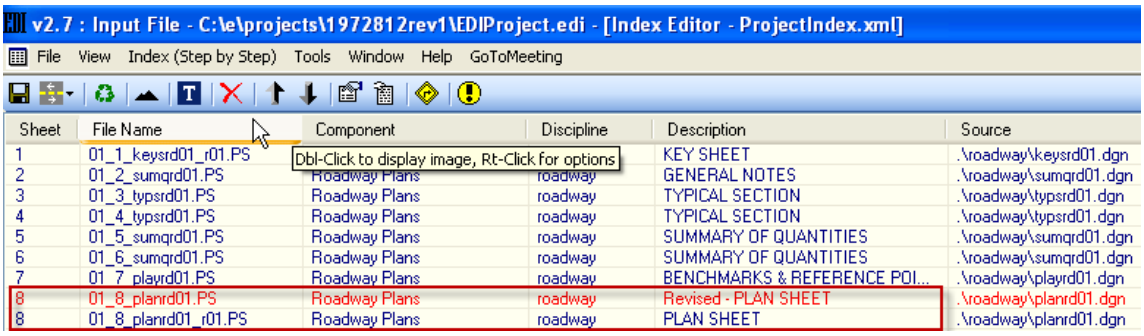
12. Select to color the changed sheets red in the existing index.



13. Press OK, then review the resulting update to the Index to ensure EDI picked up all the changes. This will indicate which sheets will be replotted because they have changed. To review the index, select the Index editor view.



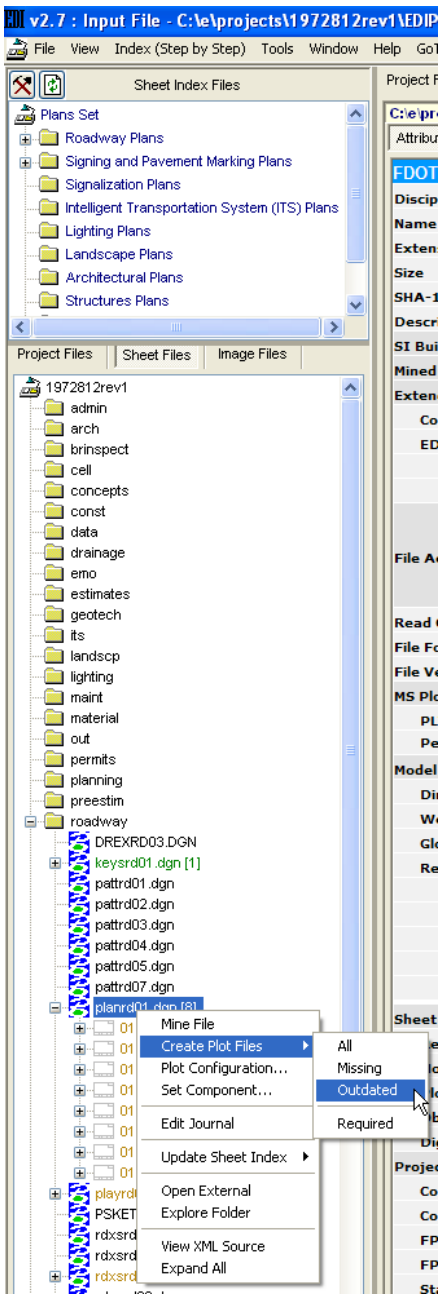
14. Now we see both the revised sheet back to revision 00 and the redacted revision 01 sheet.



Sheet	File Name	Component	Discipline	Description	Source
1	01_1_keysrd01_r01.PS			KEY SHEET	.\roadway\keysrd01.dgn
2	01_2_sumqrd01.PS	Roadway Plans	roadway	GENERAL NOTES	.\roadway\sumqrd01.dgn
3	01_3_typsrd01.PS	Roadway Plans	roadway	TYPICAL SECTION	.\roadway\typsrd01.dgn
4	01_4_typsrd01.PS	Roadway Plans	roadway	TYPICAL SECTION	.\roadway\typsrd01.dgn
5	01_5_sumqrd01.PS	Roadway Plans	roadway	SUMMARY OF QUANTITIES	.\roadway\sumqrd01.dgn
6	01_6_sumqrd01.PS	Roadway Plans	roadway	SUMMARY OF QUANTITIES	.\roadway\sumqrd01.dgn
7	01_7_playrd01.PS	Roadway Plans	roadway	BENCHMARKS & REFERENCE POI...	.\roadway\playrd01.dgn
8	01_8_planrd01.PS	Roadway Plans	roadway	Revised - PLAN SHEET	.\roadway\planrd01.dgn
8	01_8_planrd01_r01.PS	Roadway Plans	roadway	PLAN SHEET	.\roadway\planrd01.dgn

15. Once we are sure all of our revisions are accounted for and rolled back, each of the prior revised sheets can be deleted from the index. For example, the last line for Sheet 8 can be deleted and the Index resaved. The line for sheet 8 above, colored red, indicates the plot is still out of date, and must be re-plotted.

    Re-plotting of the rolled back sheets is done in a similar manner as described previously from the Project view of EDI. Here is where great care must be taken, and though about the impacts to previously signed and sealed files that might bear the same plot file names.

16. You must consider the impact of those sheets for the original signatory who signed the revision 00, especially if the sheets are being rolled back from revision1. The normal revision process rolling forward was to create a new Signatory and use that to sign revised sheets. For the case rolling back, we INTEND to overwrite sheets previously signed and sealed. Doing so invalidates the Sign used to sign and seal those sheets originally. The recommended solution is to delete those original Signatory's using PEDDS, and re-sign and seal those that were affected by the roll back of the revision.

17. Once you have accounted for the impacts noted above, you are ready to process the remainder of the delivery as if it were an original delivery.