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Chapter 19 - UTILITIES STANDARDS

CADD Production Criteria Handbook

19.1 INTRODUCTION OF UTILITY COORDINATION OF CADD FILES

Although Florida Department of Transportation (FDOT) has standardized on the MicroStation design file format, many utilities and utility firms use AutoDesk's AutoCAD. Due to the inherent differences in the products, concerns were voiced over the distribution of Utility Computer Aided Design and Drafting (CADD) deliverables. Currently the FDOT has asked Utility companies to markup roadway construction plans at each design phase. The work is duplicated because those same markups are transferred to CADD files.

During the fall of 1995, the Florida Utilities Coordinating Committee (FUCC) met and determined that a dialog was needed to create a set of guidelines for the utility coordination within an electronic format. The recommendation of the appointed taskforce was that the CADD standards would be revised for utilities, including expanding levels from two (Levels 10 and 8) to a full 63 levels. Both the existing and proposed utilities would have their own files with 63 levels. The process in which these electronic files would be shared was determined and an alternative method of delivery was also defined, ASCII input files. The transfer of that data via FTP was also established as the standard means of data exchange.

In 2004 a new Utility Task Team was formed to develop CADD standards for the migration from MicroStation J V7 to MicroStation 2004 V8 and from AutoCAD 2000 to AutoCAD 2004.

The purpose of this chapter is to define FDOT2010 guidelines for the sharing of data between the District Offices and the Utility Agency/Owner (UAO) and the final file format required for electronic submittals. Utility conflicts shall be shown on the roadway profile using utility cross section by-level symbology and cells.

19.1.1 BENEFITS OF UTILITY COORDINATION OF CADD FILES

Coordinating the sharing of data between the Districts and the Utility companies is advantageous to both parties. Some of the benefits are:

- Increased accuracy (No longer a hand-drawn markup of construction drawings).
- Reduction in liability (The Utility owner is responsible for the placing of their facility, while the FDOT is responsible for its roadway construction documents).
- Reduction in work effort (No longer is redundant data being placed as markups on several sets of plans).
- Reduction in paper (Reproduction issue of phased construction sets).
- Provides UAO access to FDOT resources (cells, line styles, etc) so that both parties are using the same standard resources.
- Access to the FDOT graphic files. (This allows the UAO to use the project data as As-Builts for later design of new utilities).

19.2 FDOT COMMITMENT

The FDOT will provide tools, training and information to Utility Companies in several areas of electronic data usage and exchange. In an effort to improve the exchange of data between FDOT and Utility Companies, FDOT has:

- Revised the CADD FDOT2010 Standards for MicroStation.
- Provided information for migrating existing electronic files to the FDOT2010 standards.
- Created new FDOT programs and menus to assist the UAO or consultant in the production of Utility Plans in accordance with the FDOT2010 Standards.

19.3 UTILITY FILE COORDINATION OPTIONS

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

- Exchange of graphic files (DGN or DWG) – the preferred option
- Creation of ASCII files
- Import of Geographic Information System (GIS) data

19.3.1 SHARING OF GRAPHIC FILES

The sharing of files between the Districts and the UAO has two possible paths. If the UAO uses MicroStation, or AutoCAD the file is simply created to FDOT 2010 CADD Standards and returned to the District for review. The UAO will then use these files as XREF's in AutoCAD or MicroStation to create the existing or proposed utility files. These files (Existing or Proposed) would then be submitted back to the District. Since utility work is not part of a contract, it is the District's responsibility to come to an agreement with the Utility Company as to the obligation of graphic files or the second possible path ASCII files.

19.3.2 ASCII INPUT FILE

The second option is the ASCII input file that can be created from existing or proposed utilities. The ASCII file format will be either in Station/Offset or in Northing/Easting. It does not require the use of AutoCAD nor MicroStation. Both methods will contain information pertinent to the utility, as well as, the type of utility and where it is located in regards to the (survey baseline) alignment or state plane coordinates.

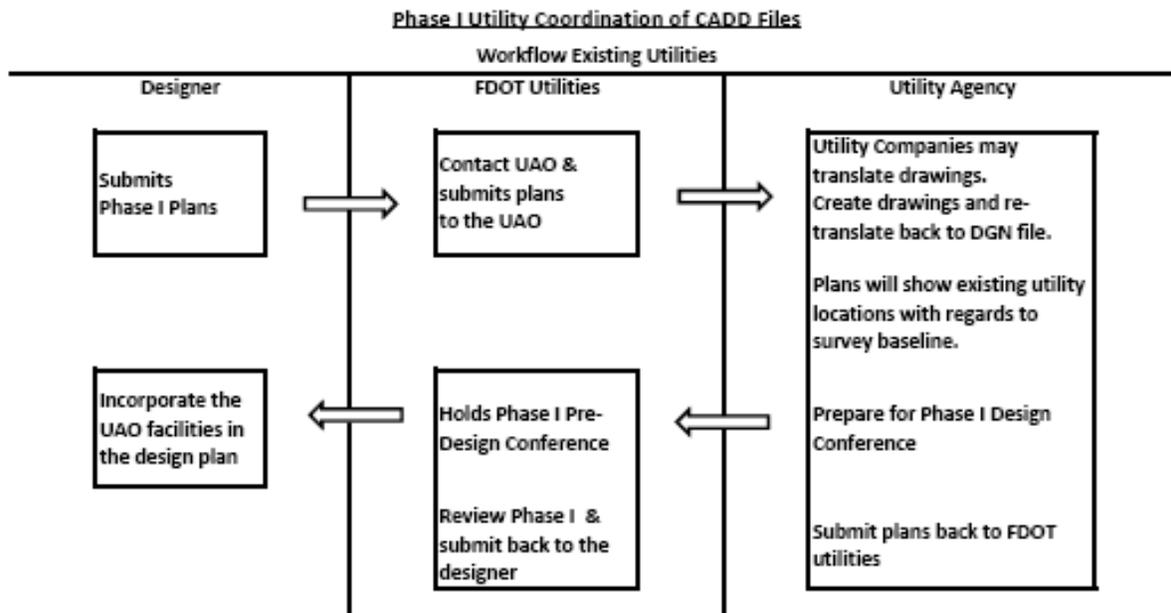
19.3.3 GEOGRAPHIC INFORMATION SYSTEM (GIS) FILE

In the event that a utility company maintains a GIS database of utility data and would make it available for use, this data can be imported into MicroStation or AutoCAD. MicroStation's and AutoCAD's geographic software allows the user to import GIS shape files into a DGN or DWG file. The imported elements maintain the database information allowing text annotation and re-symbolization by a specific query or criteria.

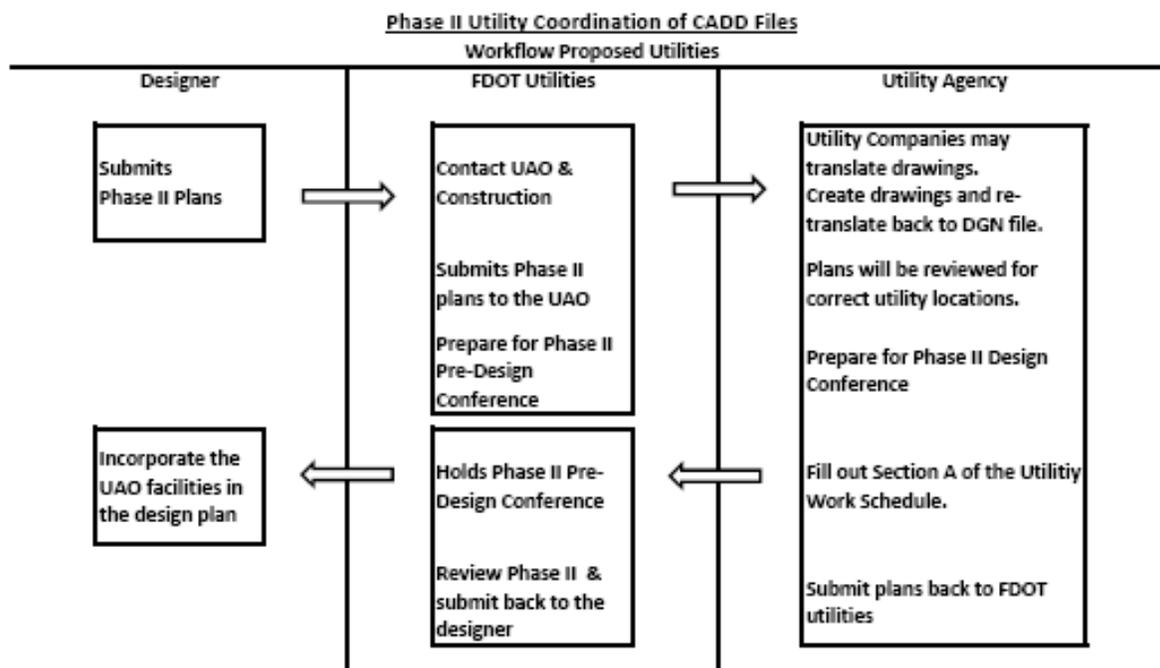
19.4 UTILITY COORDINATION WORKFLOW

Each workflow is shown as a flow chart from the Designer to the FDOT District Utilities Office, then to the Utility Agency and back to the FDOT District Utilities Office and finally to the Designer.

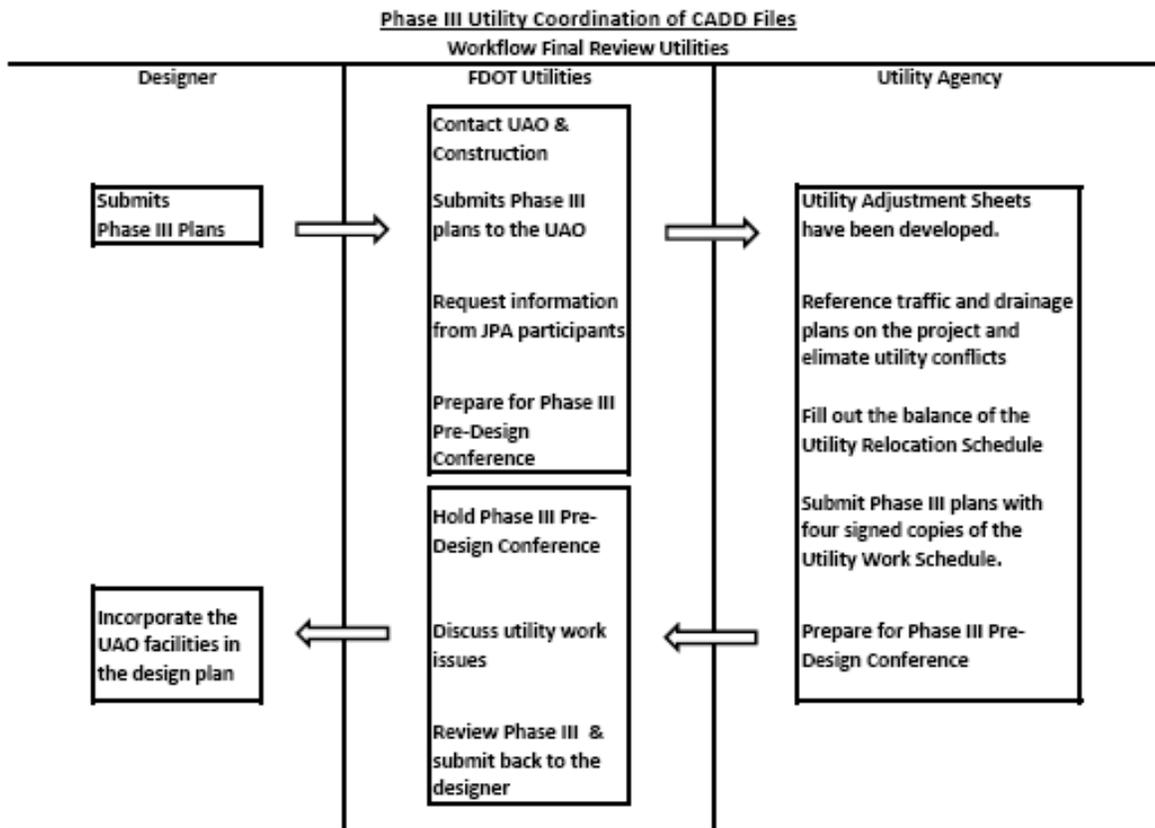
19.4.1 PHASE I UTILITY COORDINATION WORKFLOW



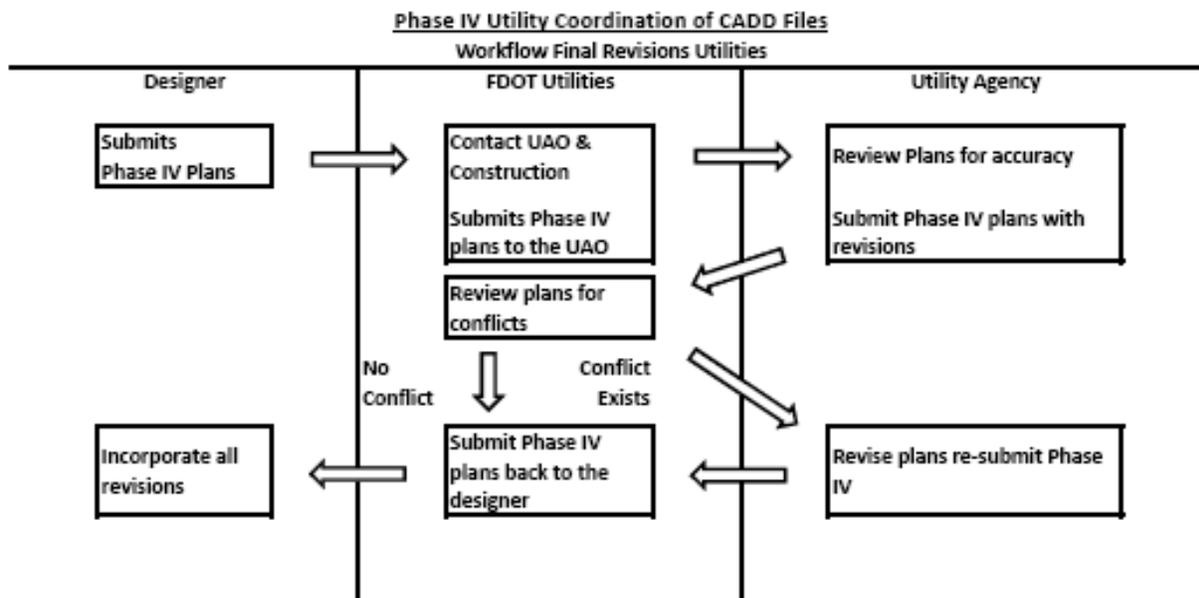
19.4.2 PHASE II UTILITY COORDINATION WORKFLOW



19.4.3 PHASE III UTILITY COORDINATION WORKFLOW



19.4.4 PHASE IV UTILITY COORDINATION WORKFLOW



19.5 PROCEDURE FOR EXCHANGE OF FILES

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

These files will be delivered in MicroStation DGN or AutoCAD DWG format only. The files will be used as a "backdrop" either as XREF'd file or as Reference models to the utility drawings.

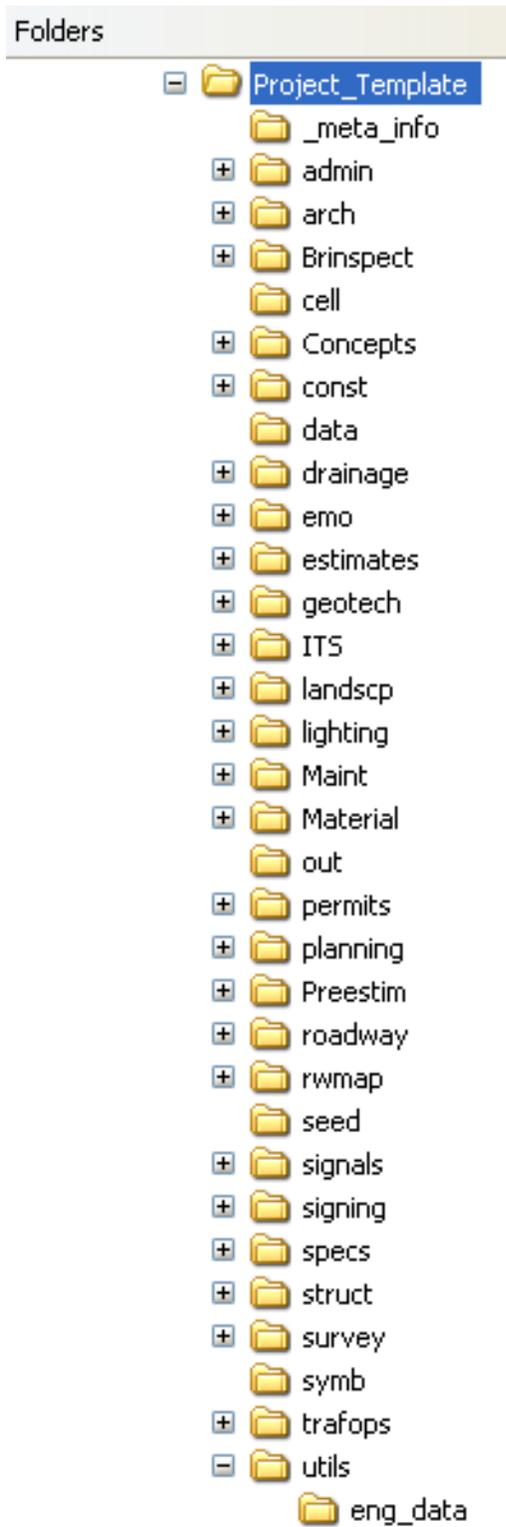
No editing of any files provided by FDOT is permitted. The UAO will be placing data into newly created files at all times. The UAO bears the full legal responsibility of any edits made to the topographic, design, drainage or existing utility file(s) provided by the FDOT. File naming standards should be maintained at all times. (See the CADD Production Criteria Handbook (CPCH) for the complete list.)

19.5.1 STANDARD ROADWAY FILES

The standard file names shall be used at all times. The standard file naming conventions are an eight (8)-digit prefix followed by a .dgn or .dwg suffix. The discipline files that are shared and referenced by utilities are in the Roadway Design Group. While a typical project may contain many files, the following files on the next page are the main ones used for sharing between Roadway Design and Utilities:

DSGNRD_.dgn	Roadway Proposed Design
KEYSRD_.dgn	Roadway Key Sheet
PLPRRD_.dgn	Roadway Plan and Profiles
PLANRD_.dgn	Roadway Plans
PROFRD_.dgn	Roadway Profiles
TOPORD_.dgn	Topography Existing
RW(7 digit FP ID).dgn	R/W Existing and Proposed
DREXRD_.dgn	Drainage Existing
DRPRRD_.dgn	Drainage Proposed
UTEXRD_.dgn	Utilities Existing
UTPRRD_.dgn	Utilities Proposed

19.5.2 FDOT 2010 PROJECT DIRECTORY



19.5.3 STANDARD FILE NAMES

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

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

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

Note Please see CPCH Chapter 4 for more information.

If the Utility work is accomplished by a Highway Contractor as a separate contract (UWHC plans), the discipline designation for the file name is "UW". For example a utility adjustment file name would be utaduw01.dgn. If the utility adjustments are included in the Roadway plan set the discipline designation for the file name is "RD". For example a utility adjustment file name would be utadrd01.dgn. See Chapter 13 for the standard Utility file names defined for use by Roadway Design.

The following table defines the Utilities File Name Standards in regards to FDOT Projects with the understanding that each file name will include sequence numbering.

File Type	File Name	Model	File Description	Rule File	Seed File	Critical File
Borders & Sheets	BDPLUW.dgn	default	UWHC Border for Plan Sheets when sheet is referenced	planrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Borders & Sheets	GNNTUW.dgn	default	UWHC General Notes Sheet	planrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Borders & Sheets	PLANUW.dgn	default	UWHC Plan Sheet	planrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Borders & Sheets	PROFUW.dgn	default	UWHC Profile Sheet	plprrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Clip Borders	CLIPUW.dgn	default	UWHC Clip Borders	cliprd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Clipping	MTPLUW.dgn	default	Motif files for plan sheets	planrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Clipping	MTPRUW.dgn	default	Motif files for profile sheets	plprrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Existing Topography	TOPOUW.dgn	default	UWHC Topography - Existing (Utilities or Drainage not included)	topord.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Key Sheet	KEYSUW.dgn	default	UWHC Key Sheet	keysht.rul	\$(MX_SEEDIR)fdotseedkeymap.dgn	
Proposed Design	TEXTUW.dgn	default	UWHC Text Labels and Miscellaneous Descriptions	planrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Utilities	UTADUW.dgn (UTADR.D.dgn)	default	UWHC Utility Adjustment Sheet	utadrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Utilities	PLPRUW.dgn (PLPRRD.dgn)	default	UWHC Plan & Profile Sheet	plprrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Utilities	UTDTUW.dgn	default	UWHC Special Details	spdtrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Utilities	UTEXUW.dgn (UTEXRD.dgn)	default	UWHC Utilities - Existing	utexrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	X
Utilities	UTPRUW.dgn (UTPRRD.dgn)	default	UWHC Utilities - Proposed	utprrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	X
Verified Utilities	SBVHUW.dgn	default	UWHC Summary of Verified Utilities (2D)	planrd.rul	\$(MX_SEEDIR)fdotseed2d.dgn	
Verified Utilities	UTVHUW.dgn	default	UWHC Survey of Verified Utilities (3D version of UTEXRD.dgn)	utexrd.rul	\$(MX_SEEDIR)fdotseed3d.dgn	X

19.6 UTILITY PLANS

The plans should be sufficiently detailed so a determination can be made that all indicated work is necessary, that the planned adjustment will meet with all design policy requirements of the Department and that such plans represent the most economical means of making the adjustment. For **REIMBURSABLE** work, the plans should be detailed so that the quantities of major items of materials can be correlated with like items and quantities as they appear in the estimate.

Major highway construction elements such as pavement areas, bridges, drainage structures, right of way, lane widths, control of access limits and highway-straight-line numbers should also appear on or in the plans. Construction plans prepared by your office in lieu of marked Department plans will be satisfactory, provided they meet all of the above mentioned requirements.

The plans should be marked with the following color code:

- Green Line** – for all existing facilities to remain in place
- Red Line** – for all existing facilities to be removed or abandoned
- Brown Line** – for all proposed new construction

One set of the completed plans should be returned to the Department with each copy of the Utility Agreement as part of the legal assembly.

19.7 RESOURCE FILES

FDOT has provided custom line styles for utility related linear repeating patterns. Also provided are utility related cells. The utility custom line styles are stored in a line style resource file located in *drive: \FDOT2010\Resources\syemb\utilities.rsc* and the utility related cells are located in *drive: \FDOT2010\Resources\cell\syeng.cel* and *\FDOT2010\Resources\cell\luteng.cel*.

“Drive” is the hard drive on which the FDOT2010 software is installed. The path to the resource file and the cell libraries are set by the MicroStation configuration variables MS_SYMBRSC and MS_CELL. These are set during the installation of the FDOT2010 software.

Note Refer to Chapter 3 for a complete listing of the FDOT Custom Line Styles.

19.8 SYMBOLOGY STANDARDS

FDOT Standard Level Libraries define the FDOT CADD Symbology Standards for each Discipline with the associated ByLevel Color, ByLevel Line Style, and ByLevel Line Weight symbology. Designers are to use these standards to assign each element within FDOT CADD design files. These levels and symbology are grouped and translated into FDOT Standards Rule Files utilized for Quality Control to check compliancy of each FDOT standard design file to the FDOT CADD Standards.

The Standard File Names for the Utilities discipline with associated Rule Files are found in Section 19.5.3 of this chapter.

Note Refer to Chapter 3 (Resource and Support Files) of this document for more details and complete listing of Rule Files with associated Levels/Symbology information.

19.9 FDOT MENU

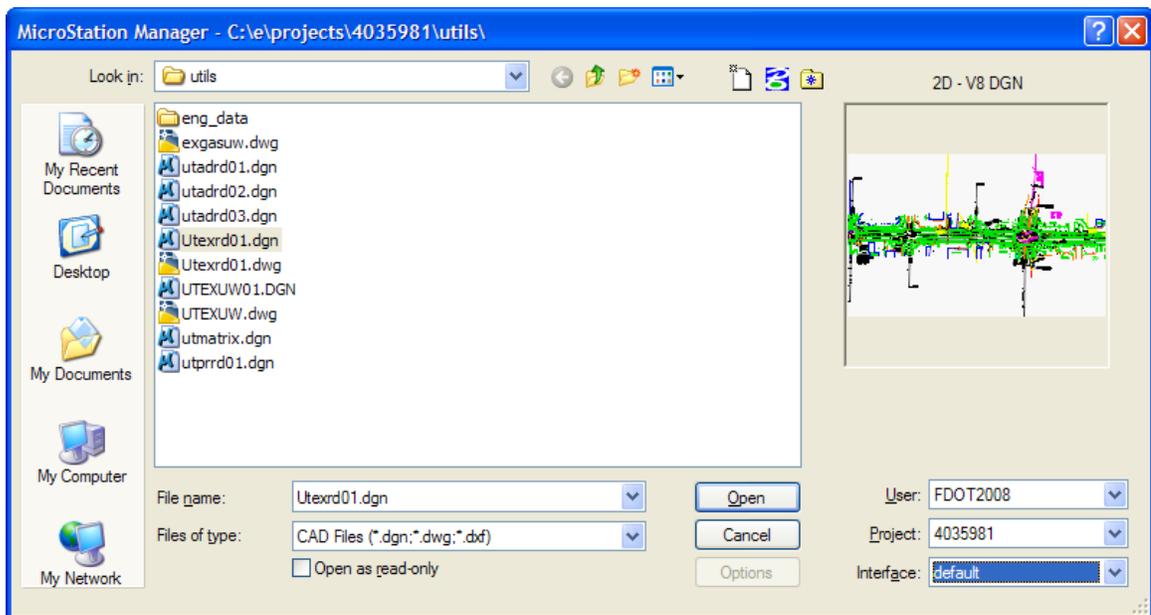
19.9.1 MICROSTATION ENVIRONMENT

FDOT uses a workspace to setup its MicroStation environment. A workspace is a customized MicroStation work environment that uses specific support files, defines configuration variables and sets paths. The FDOT2010 Workspace also defines the location of the projects and creates the standard project directory structure. Many of the FDOT2010 programs and supporting files are dependent on GEOPAK being activated.

The FDOT 2010 workspace is made up of two parts: the User Configuration and the Project Configuration.

By selecting the Workspace “FDOT2010”, the configuration ‘FDOT2010.ucf’ is accessed. This file then “calls” two other files, ‘sitefdot.txt’ (which sets all of the standard variables) and utilities.txt (which sets the utility specific variables). These configuration files define the location of level libraries, cell libraries, conversion files, seed files and many other types of files.

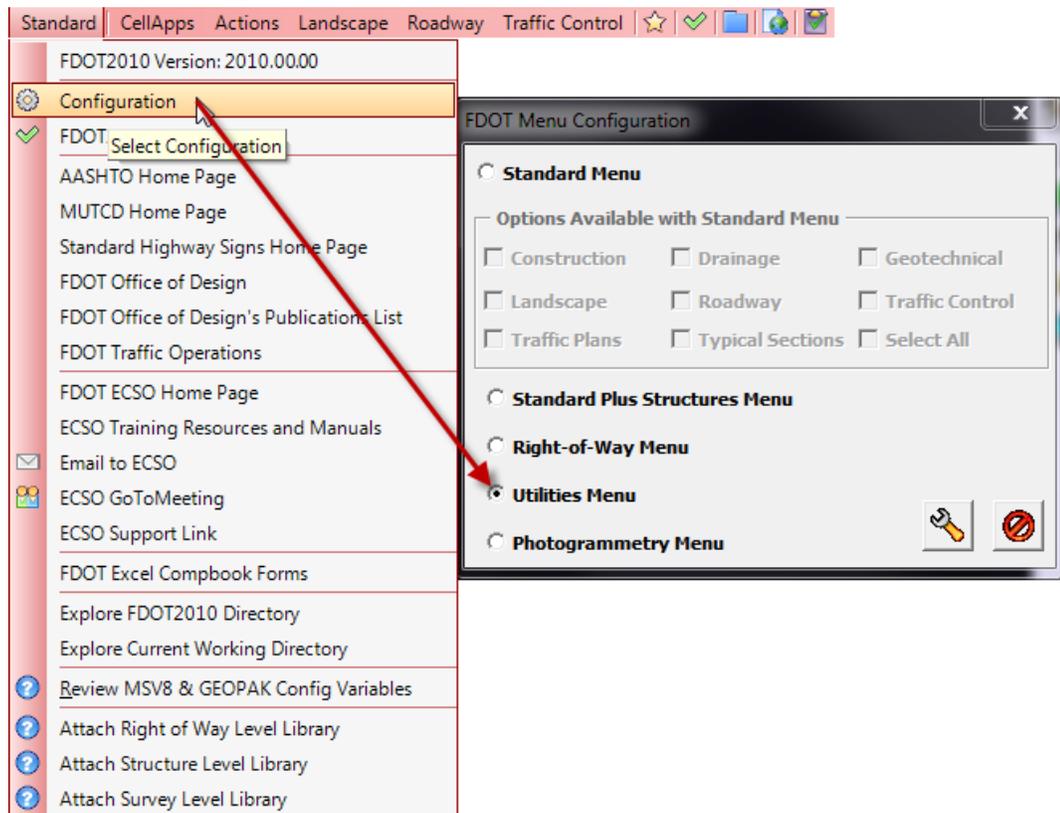
In addition to the User configuration file there is a Project configuration file. This file will define the Financial Project Identification Number and the location of the project files. To open in MicroStation, double click on the FDOT2010 MicroStation icon. Select the appropriate project or create a new one.



Note The MicroStation Resource Files are located in the \FDOT2010\Resources\ directory.

19.10 USING FDOT MENU

From the FDOT Menu option Standard, select *Configuration* to open the Utility Menus.

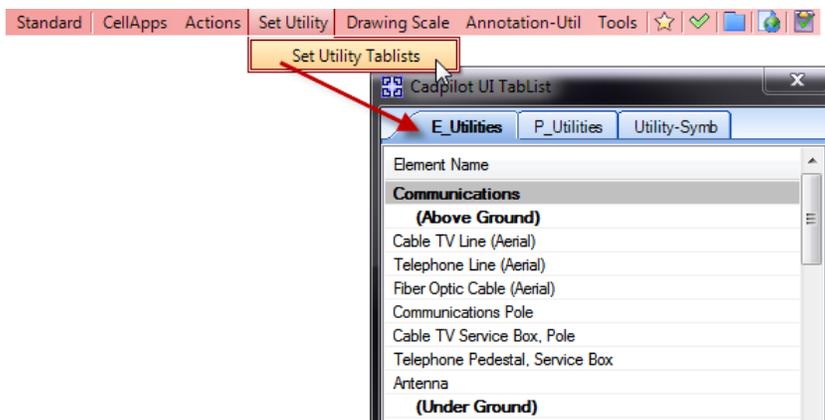


19.10.1 UTILITY MENU

FDOT Menu *bars* are used to send commands to MicroStation and AutoCAD. Menu bars provide a simple, low-profile interface designed to access **hierarchical menus and submenus** of CAD standards and design automation tools.

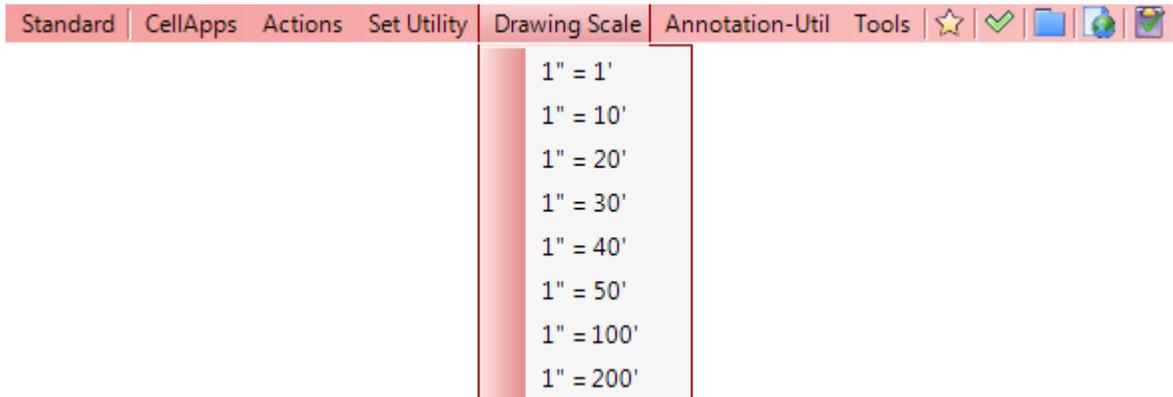
19.10.2 SET UTILITY

Set Utility option links to a TabList of all Existing and Proposed Utilities. Select the utility feature desired from the TabList to automate symbology.



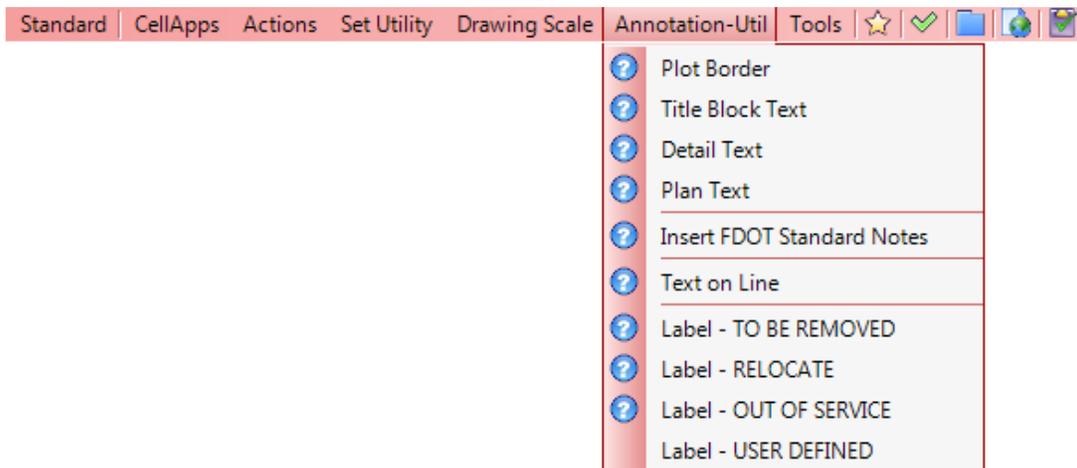
19.10.3 DRAWING SCALE

Drawing scale sets the active scale in the file for the placement of cells and text.



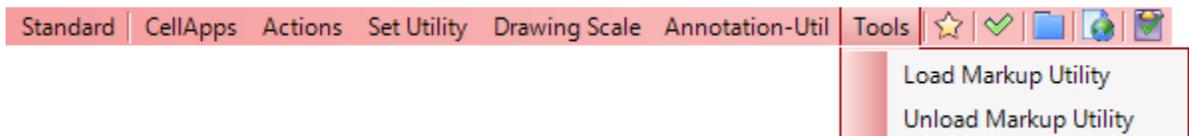
19.10.4 ANNOTATION

This option sets the commands for the placement of standard text labels.

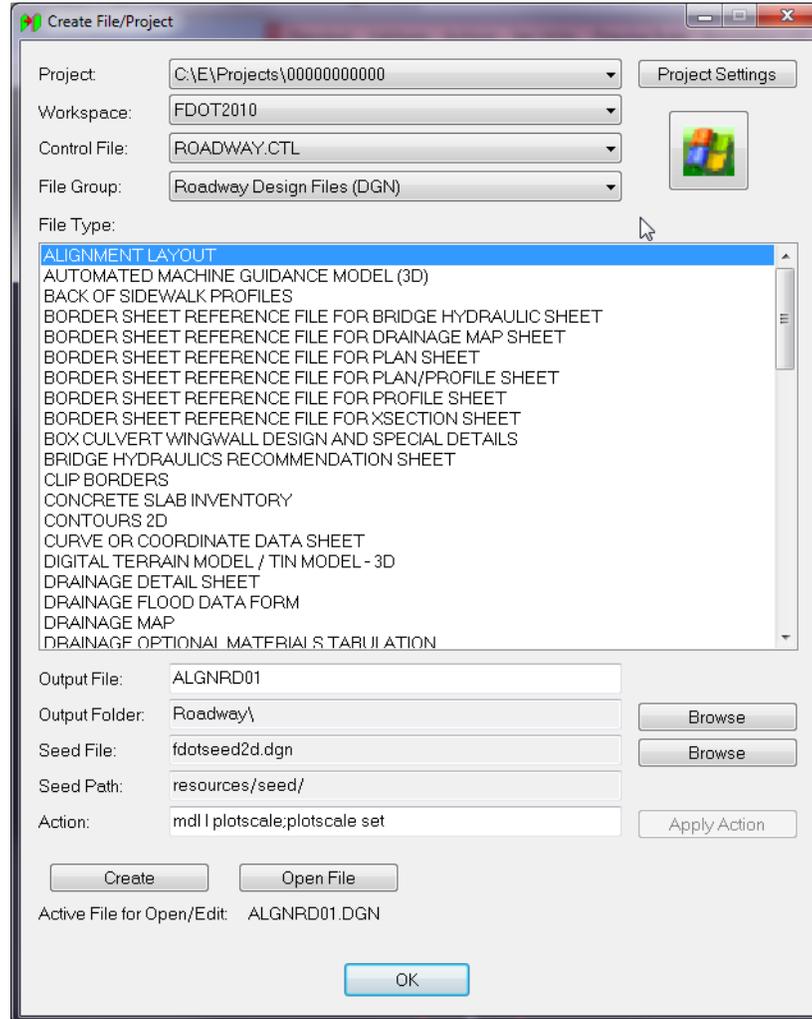


19.10.5 TOOLS

This option allows the Markup Utility VBA to load or unload.



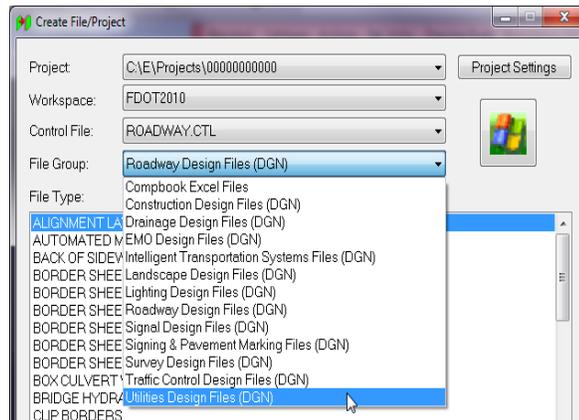
19.11 CREATE / EDIT FILE



The Create/Edit File program is a Visual Basic program that runs external to MicroStation and AutoCAD and from within MicroStation and AutoCAD.

This application uses an ASCII file called a control file (*.ctl) to create, text files, MicroStation design files and AutoCAD drawing files. New files are created according to the standard file naming conventions and the correct seed files. The file is then placed into the current working directory. After a file is created the user has the option to open the file.

The File Group defines the standard file names for each discipline.

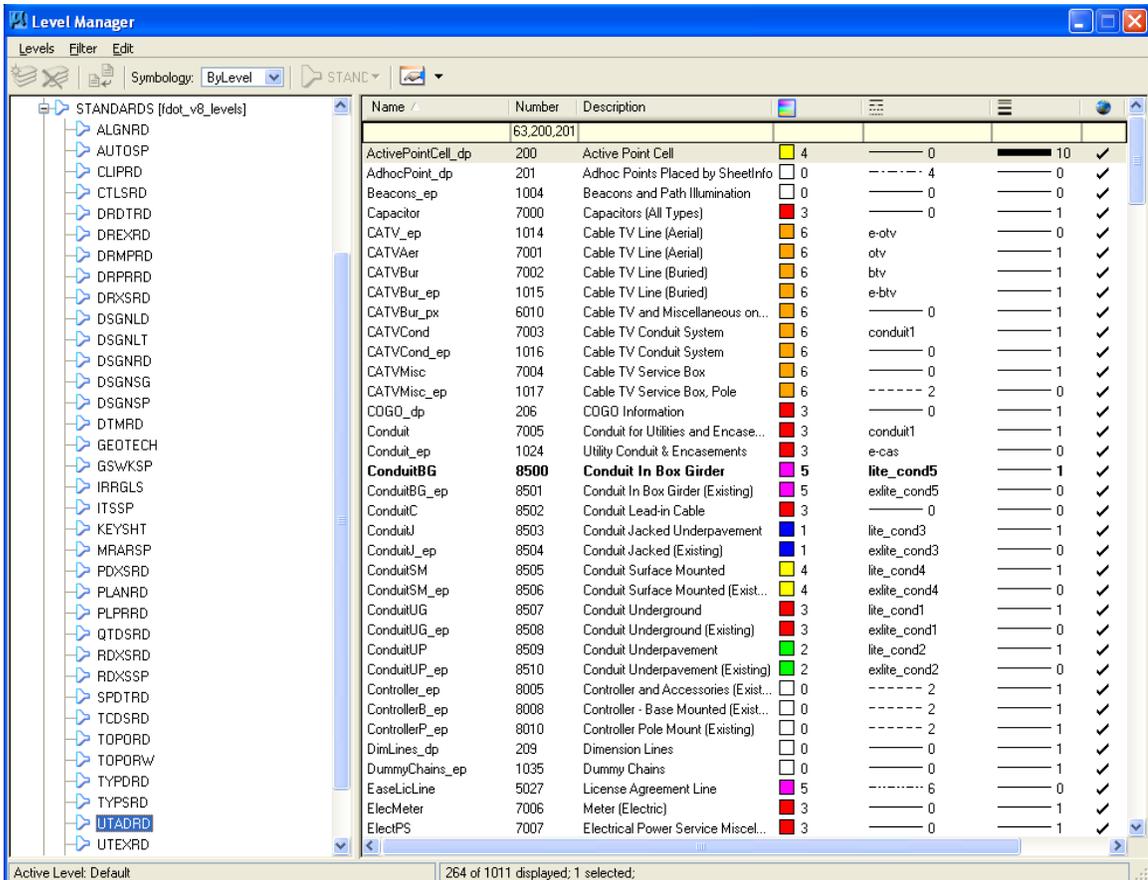


To use, select the Utilities Design Files (DGN) group or the Utilities Design (DWG) group from the File Group drop down.

Select a file from the File Type listing and then click **Create**. The file is created using the correct “seed” file.

Click on **Open DGN** to open the file and review the working units and resolution from the MicroStation menu *Settings > Design File* and then click on working units from the DGN File settings list.

Review FDOT standard levels for utilities from the MicroStation menu *Settings > Level > Manager* and then click on Filters and select Utilities.

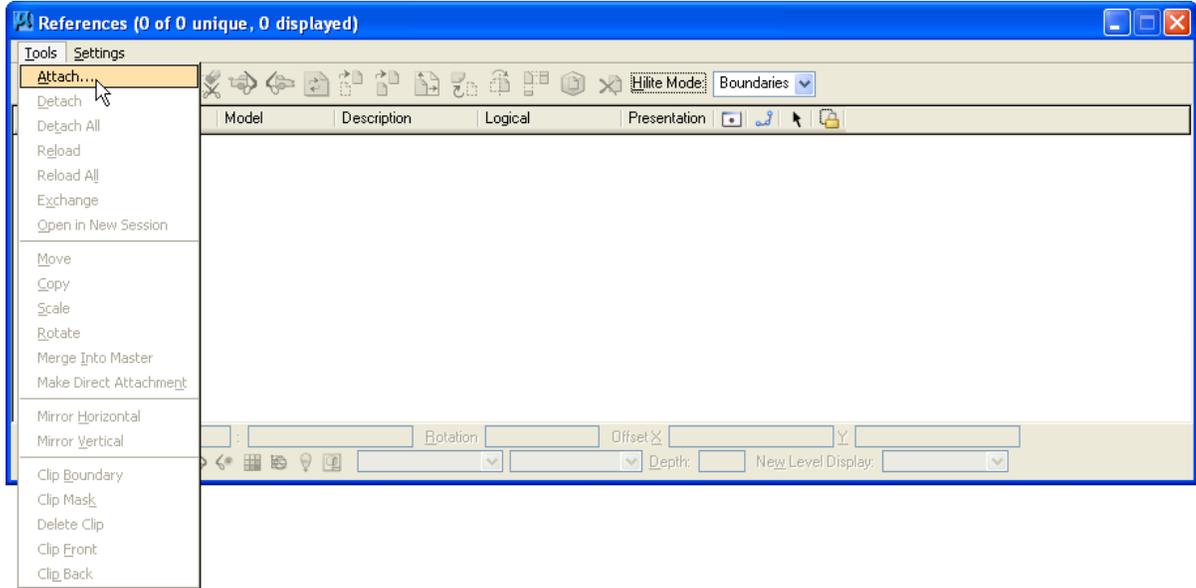


19.12 REFERENCING FDOT DESIGN FILES

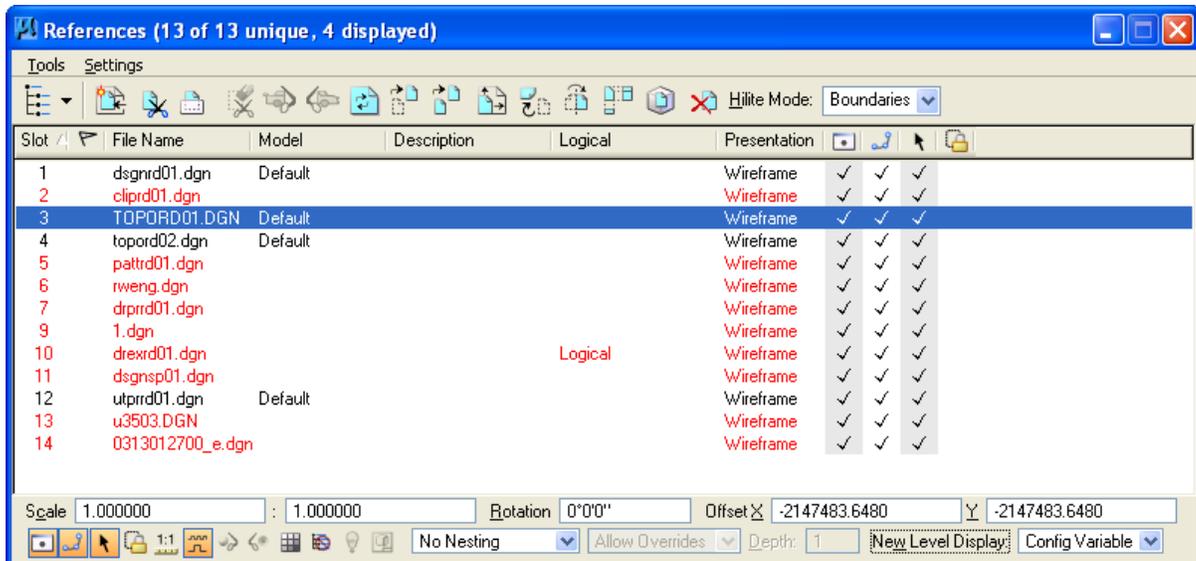
FDOT will supply to the utility company or their consultant, the survey topography file and the proposed design file in MicroStation DGN format. With the advent of MicroStation V8, the Roadway designer could possibly supply the same files in DWG format if this is agreed upon between the two parties.

After receiving the electronic Roadway files, the Utility designer will reference the Roadway files to the utility file. **The Roadway files should not be modified at all.**

To attach the Roadway design files, from the MicroStation menu select *File > Reference*. From the References dialog box, click on *Tools > Attach*.



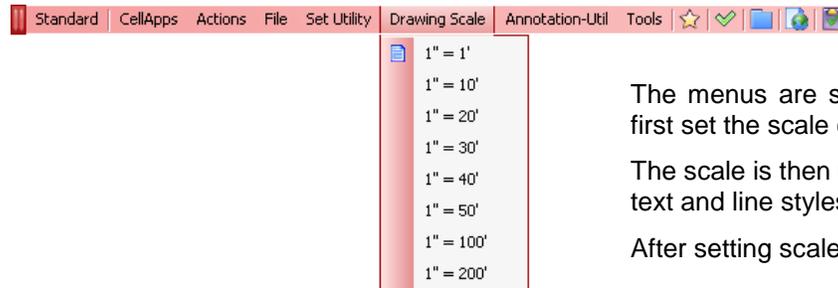
See the image below with the various design files attached.



19.13 DRAWING UTILITY LINES AND CELLS

The FDOT Menu provides tools to set the scale, place cells and labels and draw custom utility line styles. Setting Scales

19.13.1 SETTING SCALES



The menus are set up to allow the user to first set the scale of the file.

The scale is then used to place cells to scale text and line styles.

After setting scale, select the desired utility.

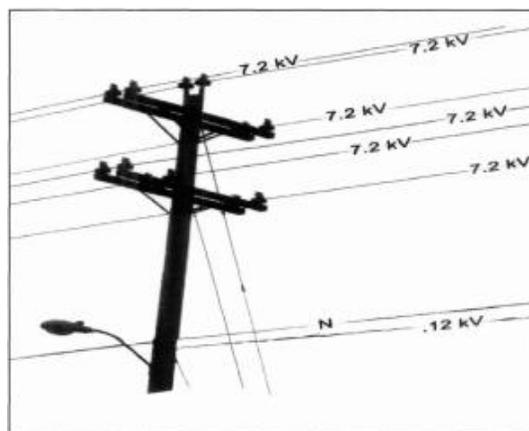
19.13.2 OSHA RULE 1926 OVERHEAD ELECTRICAL LINES CLEARANCES

FDOT issued Roadway Design Bulletin 11-03 stating that a new OSHA Rule (29 CFR Part 1926) Cranes and Derricks in Construction went into effect on November 8, 2010. The new regulations control equipment operations in the vicinity of overhead electrical facilities. Contractors performing work within the Departments right of way in the vicinity of overhead electric lines with voltages of 50 kV or greater may be impacted by the new regulations. The OSHA Rule has a 20 foot "trigger distance."

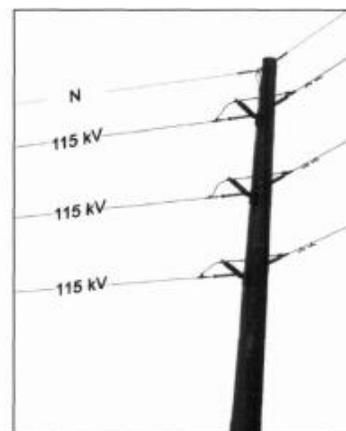
19.13.2.1. Design Implementation

It was determined that labeling of the voltage for overhead electric lines would provide the information necessary for the contractor to determine the operating clearance for his equipment to bid the project. Currently labeling of the line voltage of existing overhead electric lines may not be consistent. Design Index 002 shows labeling of the line voltage for overhead electric facilities. The most common practice, however, has been to use only the "OE" line style that is propagated using standard FDOT software.

For all projects with a letting date after July 1, 2011, all overhead electrical facilities shall be labeled with the line voltage. Utility owners will be required to furnish the line voltages at the coordination phase. Multiple lines with different voltages may be found on a common pole line. For labeling purposes only one line should be shown even if there are multiple lines with different voltages. For poles with multiple lines and multiple voltages which do not exceed the 50kV threshold (see Example 1), the line should be shown in the plans as -----OE (< 50kV)-----.



Example 1



Example 2

For poles with multiple lines and multiple voltages which exceed the 50kV threshold (see Example 2), the line with the greatest vertical clearance will be labeled first, separated by a slash mark, and followed by the next voltage as you move down the pole. If multiple voltages exist at the same height, the highest voltage should be labeled. In Example 2, the line should be shown in the plans as -----OE (115kV/115kV/115kV)----- or -----OE (All lines 115kV)-----.

For projects with letting dates between now and June 30, 2011, where possible, the electrical facilities should be evaluated. After evaluating, if all the voltages are less than 50kV the voltages do not need to be labeled in the plans. In the special notes and requirements of the "Transmittal of Plans, Specifications, and Estimates Package" provide the following state meant for posting in the advertisement; "All of the overhead utilities shown in the plans are less than or equal to 50kV." However, if there are some voltages greater than 50kV, and there is in sufficient time to revise the plans, provide the following statement in the special notes and requirements for posting in the advertisement. "There are overhead utilities shown in the plans that exceed 50kV."

If you have any questions concerning design implementation, please contact Chester Henson at 850-414-4117.

19.13.2.2. Construction Implementation

For all active contracts, require the contractor to comply with OSHA Rule 1926. The Department's policy is to use Option 3 of the rule, which is to determine the line voltage and provide clearance in accordance with Table A. Refer to Table A below to determine minimum clearance distances. For contracts let prior to July 2011, this may involve contacting the utility companies to determine the overhead electric facilities voltage. Coordinate any changes to the utility work schedule and any information requests from the utility companies with the District Utilities Office.

Table A -- Minimum Clearance Distances

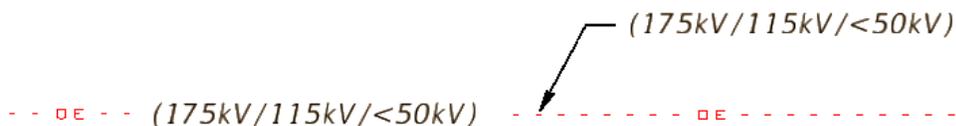
Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 550	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	

(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

Note The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

If you have any questions concerning construction implementation, please contact Stefanie Maxwell at 850-414-4314.

For determination of the minimum clearance, FDOT has adopted two types of labeling (in-line and leader) to be utilized to identify the voltage used in the design files, as shown below:



19.14 ASCII FILE TRANSFER - LOCATING EXIST / PROPOSED UTILS

19.14.1 PURPOSE OF THE ASCII FILE

The purpose of using ASCII files for the transfer of Utility location data is to offer another alternative to the UAO. The most useful platform would be to provide this location information by means of CADD drawings. However, some firms may provide this data via an ASCII file. The UAO can provide data that they may already have in a Coordinate Geometry format and simply translate it into a format that FDOT can accept. An example might be exporting a report from AutoDesk's Land Development Desktop, Eagle Point, Landcadd or any other coordinate based CADD product. This will also suffice for a Utility without any form of CADD software, relying on manual drawings showing either State Plane coordinates or Station Offset.

There are two methods available for transmitting this location data. The first is referred to as the Station/Offset Report and the second method is called the Northing/Easting Report. If possible, the Roadway designer should provide the utility company with an ASCII format file of the baseline geometrics so that they can provide utility location data relative to the baseline and not duplicate existing point numbers or chain names.

19.14.2 ASCII FILE NAME CONVENTIONS

The file naming convention for this input file will be `utilx**.inp` for existing utilities and `utilpr**.inp` for proposed utilities. The ** will be replaced by a sequencing number (01, 02, 03 etc.). Each electronic ASCII report file will be stored on media according to the FDOT CADD Deliverable Standards. This media will bear a label with the name of every input file, the utility owner's name, date, state project number and contact person's name and telephone number. When delivery is made, the ASCII report will be accompanied by a printed hardcopy. Provided are four examples of input files. Two examples are of Station/Offset and two are of Northing/Easting, each with and without explicit elevations or depth of cover.

19.14.3 ASCII HEADER CONVENTION

These files will follow a standard format and its header is described below:

1. "Name:" -- Utility owner's name.
2. "Date:" -- Month, Day, Year and optionally, the Time.
3. "Proj:" -- Project Financial Number
4. "Type:" -- Type of utility (Existing or proposed).
5. "File:" -- Filename
6. "Cont:" -- Utility owner's contact person responsible for creating the report.
7. "Note:" -- Any additional information that will describe the utility.

19.14.4 FORMAT OF STATION AND OFFSET ASCII FILE

The Station Offset Report method consists of generating a report, which will locate key utility points along a defined alignment. The report will store those points in the form of a utility chain.

Example of point location: LOC 10020 ON CHA blsr54 STA 18+89.760 OFF -8.534 \$BT100

Format of the Command: LOCATE n ON CHAIN name STA station OFF offset \$description

<i>LOC</i>	Initiates the locate command.
<i>N</i>	Determines the utility point number (begin with 10,000).
<i>ON</i>	Determines how to locate the utility point.
<i>CHA</i>	Initiates the read chain name command.
<i>NAME</i>	Describes the chain name, usually of the survey baseline, that is provided by FDOT.
<i>STA</i>	Initiates the find station command.
<i>Station</i>	Display's the utility point's station location.
<i>OFF</i>	Initiates the offset distance command.
<i>Offset</i>	The offset distance value, "+" for positive to the right and "-" for negative to the left, to the chain.
<i>Description</i>	The description has two options, the first showing the EL option with a defined elevation and the feature code. The second option shows the feature code and a defined depth of cover.

- **Example of Station Offset Option 1, Defined Elevation**

LOC 10029 ON CHA blsr54 STA 19+79.818 OFF -8.530 \$ EL 2.806000 BT100

The above statement locates point 10029 on chain blsr54 at station 19+79.818 left 8.530 at elevation 2.80600 as a feature BT100 or Buried Telephone 100 pair.

- **Example of Station Offset Option 2, Fixed Depth of Cover**

LOC 10020 ON CHA blsr54 STA 18+89.760 OFF -8.534 \$ BT12

The above statement locates point 10020 on chain blsr54 at station 18+89.760 left 8.534 as a feature BT12 or Buried Telephone 12 pair. In the header of the file, there is a line that states the depth of cover. "All elevations assume a 0.750 meter depth of cover."

- **The Store Chain Command**

The store chain command will store a range of points as a utility chain. It provides the point range, the chain name and the feature that describe the utility chain. The format is shown below:

<i>Command</i>	STO CHA BT50A 10020 - 10023 \$ BT50 list: BT1 - BT4
<i>Format</i>	STORE CHAIN name list \$description
<i>Store</i>	Initiates the Store Chain Command.
<i>Chain</i>	Initiates the Read Chain Name Command.
<i>Name</i>	Names the Utility Chain (BT12 etc.).
<i>Range</i>	Defines a range of stores utility points.
<i>\$ Comment</i>	Initiates a comment insertion.
<i>Description</i>	Describes the list of utility point numbers, which make the utility chain.

19.14.5 FORMAT OF NORTHING AND EASTING ASCII FILE

The Northing and Easting report method consists of generating a report which stores key utility points according to their relative State Plane Coordinates (X, Y, and Z) and stores this information in the form of a utility chain.

The store point command is shown below:

Command	S 10020 N 430059.370000 E 127421.085000 EL 2.513 \$ BT100
Format	Store n N northing E easting EL elevation \$description
S	Initiates the Store Point command.
n	Defines the utility point number (above 10,000).
N	Initiates the read Northing command.
Northing	Establishes the Y, horizontal coordinate.
E	Initializes the read Easting command.
Easting	Establishes the X, horizontal coordinate.
EL	Initiates either the read elevation command or uses a defined depth of cover.
Elevation	The Elevation argument has two options, the EL option with a defined read elevation. Second option is a defined depth of cover.
Description	This describes the utility feature code.

- **Example of Nothing Easting Option 1, Defined Elevation**

S 10020 N 430059.370000 E 127421.085000 EL 2.513000 \$ BT12

The above statement stores the point 10020 at 127421.085000/430059.370000 (X, Y) at elevation 2.513000 with a feature code of BT12 (Buried Telephone 12 pair).

- **Example of Northing Easting Option 2, Fixed Depth of Cover**

S 10020 N 430059.370000 E 127421.085000 \$ BT12

The above statement stores the point 10020 at 127421.085000/430059.370000 (X, Y) at a given depth of cover with a feature code of BT12 (Buried Telephone 12 pair).

- **The Store Chain Command**

The store chain command will store a range of points as a utility chain. It provides the point range, chain name and the feature that describes the utility chain. The format is shown below:

Command	STO CHA BT50A 10020 - 10023 \$ BT50 list: BT1 - BT4
Format	STORE CHAIN name list \$ description
Store	Initiates the Store Chain Command.
Chain	Initiates the Read Chain Name Command.
Name	Names the Utility Chain (BT12 etc.).
Range	Defines a range of stores utility points.
\$ Comment	Initiates a comment insertion.
Description	Describes the list of utility point numbers, which make the utility chain.

19.14.6 ASCII INPUT FILE EXAMPLES

- **Northing Easting, no elevation**

```
$*****$
$***** Name: General Telephone Company *****$
$***** Date: Nov 5, 1999 08:00:00 *****$
$***** Proj: c:\proj\14570\1519 *****$
$***** Type: Existing Buried Telephone *****$
$***** File: utilex04.inp (Metric) *****$
$***** Cont: Alex Bell (813) 975-6000 *****$
$ Note: All elevations assume a 0.750 meter depth of cover $
$*****$
S 10020 N 430059.370000 E 127421.085000 $ BT1
S 10021 N 430059.342000 E 127420.188000 $ BT2
S 10022 N 430058.733000 E 127420.235000 $ BT3
S 10023 N 430058.772000 E 127421.112000 $ BT4
S 10024 N 430025.015000 E 127425.677000 $ BT5
S 10025 N 430024.463000 E 127425.921000 $ BT6
S 10026 N 430024.120000 E 127425.150000 $ BT7
S 10027 N 430024.711000 E 127424.906000 $ BT8
S 10028 N 430010.203000 E 127442.371000 $ BT9
S 10029 N 430010.404000 E 127441.806000 $ BT10
S 10030 N 430009.593000 E 127441.488000 $ BT11
S 10031 N 430009.365000 E 127442.088000 $ BT12
S 10032 N 430011.003000 E 127472.172000 $ BT13
S 10033 N 430010.111000 E 127472.198000 $ BT14
S 10034 N 430010.091000 E 127471.575000 $ BT15
S 10035 N 430010.963000 E 127471.555000 $ BT16
S 10036 N 429939.130000 E 127431.218000 $ BT17
S 10037 N 429939.202000 E 127432.171000 $ BT18
S 10038 N 429940.582000 E 127432.122000 $ BT19
S 10039 N 429940.518000 E 127431.231000 $ BT20
S 10040 N 429974.677000 E 127481.061000 $ BT25
S 10041 N 429974.731000 E 127481.671000 $ BT26
S 10042 N 429973.882000 E 127481.730000 $ BT27
S 10043 N 429973.821000 E 127481.144000 $ BT28
```

\$ BT50 list: BT1-BT4
STO CHA BT50A 10020-10023

\$ BT75 list: BT17-BT20
STO CHA BT75A 10036-10039

\$ BT100 list: BT5-BT8
STO CHA BT100A 10024-10027

\$ BT200 list: BT9-BT12
STO CHA BT200A 10028-10031

\$ BT300 list: BT13-BT16
STO CHA BT300A 10032-10035

\$ BT400 list: BT25-BT28
STO CHA BT400A 10040-10043

• **Northing and Easting Example with Elevation**

```
*****$
***** Name: General Telephone Company *****$
***** Date: Nov 5, 1999 08:00:00 *****$
***** Proj: c:\proj\14570\1519 *****$
***** Type: Existing Buried Telephone *****$
***** File: utilex03.inp (Metric) *****$
***** Cont: Alex Bell (813) 975-6000 *****$
*****$
S 10020 N 430059.370000 E 127421.085000 EL 2.513000 $ BT1
S 10021 N 430059.342000 E 127420.188000 EL 2.532000 $ BT2
S 10022 N 430058.733000 E 127420.235000 EL 2.533000 $ BT3
S 10023 N 430058.772000 E 127421.112000 EL 2.502000 $ BT4
S 10024 N 430025.015000 E 127425.677000 EL 2.483000 $ BT5
S 10025 N 430024.463000 E 127425.921000 EL 2.470000 $ BT6
S 10026 N 430024.120000 E 127425.150000 EL 2.517000 $ BT7
S 10027 N 430024.711000 E 127424.906000 EL 2.530000 $ BT8
S 10028 N 430010.203000 E 127442.371000 EL 2.793000 $ BT9
S 10029 N 430010.404000 E 127441.806000 EL 2.806000 $ BT10
S 10030 N 430009.593000 E 127441.488000 EL 2.800000 $ BT11
S 10031 N 430009.365000 E 127442.088000 EL 2.788000 $ BT12
S 10032 N 430011.003000 E 127472.172000 EL 2.564000 $ BT13
S 10033 N 430010.111000 E 127472.198000 EL 2.576000 $ BT14
S 10034 N 430010.091000 E 127471.575000 EL 2.563000 $ BT15
S 10035 N 430010.963000 E 127471.555000 EL 2.551000 $ BT16
S 10036 N 429939.130000 E 127431.218000 EL 2.310000 $ BT17
S 10037 N 429939.202000 E 127432.171000 EL 2.250000 $ BT18
S 10038 N 429940.582000 E 127432.122000 EL 2.286000 $ BT19
S 10039 N 429940.518000 E 127431.231000 EL 2.266000 $ BT20
S 10040 N 429974.677000 E 127481.061000 EL 2.671000 $ BT25
S 10041 N 429974.731000 E 127481.671000 EL 2.639000 $ BT26
S 10042 N 429973.882000 E 127481.730000 EL 2.698000 $ BT27
S 10043 N 429973.821000 E 127481.144000 EL 2.679000 $ BT28
```

\$ BT50 list: BT1-BT4
STO CHA BT50A 10020-10023

\$ BT75 list: BT17-BT20
STO CHA BT75A 10036-10039

\$ BT100 list: BT5-BT8
STO CHA BT100A 10024-10027

\$ BT200 list: BT9-BT12
STO CHA BT200A 10028-10031

\$ BT300 list: BT13-BT16
STO CHA BT300A 10032-10035

\$ BT400 list: BT25-BT28
STO CHA BT400A 10040-10043

• **Station Offset Example with Assumed Depth of Cover**

```
*****$
$***** Name: General Telephone Company *****$
$***** Date: Nov 5, 1999 08:00:00 *****$
$***** Proj: c:\proj\14570\1519 *****$
$***** Type: Existing Buried Telephone *****$
$***** File: utilex02.inp (Metric) *****$
$***** Cont: Alex Bell (813) 975-6000 *****$
$ Note: All elevations assume a 0.750 meter depth of cover $
*****$
LOC 10020 ON CHA blsr54 STA 18+89.760 OFF -8.534 $ BT1
LOC 10021 ON CHA blsr54 STA 18+99.818 OFF -8.530 $ BT2
LOC 10022 ON CHA blsr54 STA 19+09.018 OFF -8.524 $ BT3
LOC 10023 ON CHA blsr54 STA 19+19.018 OFF -8.540 $ BT4
LOC 10024 ON CHA blsr54 STA 19+29.760 OFF -8.534 $ BT5
LOC 10025 ON CHA blsr54 STA 19+39.818 OFF -8.530 $ BT6
LOC 10026 ON CHA blsr54 STA 19+49.018 OFF -8.524 $ BT7
LOC 10027 ON CHA blsr54 STA 19+59.018 OFF -8.540 $ BT8
LOC 10028 ON CHA blsr54 STA 19+69.760 OFF -8.534 $ BT9
LOC 10029 ON CHA blsr54 STA 19+79.818 OFF -8.530 $ BT10
LOC 10030 ON CHA blsr54 STA 19+89.018 OFF -8.524 $ BT11
LOC 10031 ON CHA blsr54 STA 19+99.018 OFF -8.540 $ BT12
LOC 10032 ON CHA blsr54 STA 20+09.760 OFF -8.534 $ BT13
LOC 10033 ON CHA blsr54 STA 20+19.818 OFF -8.530 $ BT14
LOC 10034 ON CHA blsr54 STA 20+29.018 OFF -8.524 $ BT15
LOC 10035 ON CHA blsr54 STA 20+39.018 OFF -8.540 $ BT16
LOC 10036 ON CHA blsr54 STA 19+49.760 OFF +8.534 $ BT17
LOC 10037 ON CHA blsr54 STA 19+59.818 OFF +8.530 $ BT18
LOC 10038 ON CHA blsr54 STA 19+69.018 OFF +8.524 $ BT19
LOC 10039 ON CHA blsr54 STA 19+79.018 OFF +8.540 $ BT20
LOC 10040 ON CHA blsr54 STA 19+89.760 OFF +8.534 $ BT25
LOC 10041 ON CHA blsr54 STA 19+99.818 OFF +8.530 $ BT26
LOC 10042 ON CHA blsr54 STA 20+09.018 OFF +8.524 $ BT27
LOC 10043 ON CHA blsr54 STA 20+19.018 OFF +8.540 $ BT28
```

\$ BT50 list: BT1-BT4
STO CHA BT50A 10020-10023

\$ BT75 list: BT17-BT20
STO CHA BT75A 10036-10039

\$ BT100 list: BT5-BT8
STO CHA BT100A 10024-10027

\$ BT200 list: BT9-BT12
STO CHA BT200A 10028-10031

\$ BT300 list: BT13-BT16
STO CHA BT300A 10032-10035

\$ BT400 list: BT25-BT28
STO CHA BT400A 10040-10043

• **Station Offset Example with Elevation**

```
*****$
***** Name: General Telephone Company *****$
***** Date: Nov 5, 1999 08:00:00 *****$
***** Proj: c:\proj\14570\1519 *****$
***** Type: Existing Buried Telephone *****$
***** File: utilex01.inp (Metric) *****$
***** Cont: Alex Bell (813) 975-6000 *****$
*****$
LOC 10020 ON CHA blsr54 STA 18+89.760 OFF -8.534 $ EL 2.513000 BT1
LOC 10021 ON CHA blsr54 STA 18+99.818 OFF -8.530 $ EL 2.532000 BT2
LOC 10022 ON CHA blsr54 STA 19+09.018 OFF -8.524 $ EL 2.533000 BT3
LOC 10023 ON CHA blsr54 STA 19+19.018 OFF -8.540 $ EL 2.502000 BT4
LOC 10024 ON CHA blsr54 STA 19+29.760 OFF -8.534 $ EL 2.483000 BT5
LOC 10025 ON CHA blsr54 STA 19+39.818 OFF -8.530 $ EL 2.470000 BT6
LOC 10026 ON CHA blsr54 STA 19+49.018 OFF -8.524 $ EL 2.517000 BT7
LOC 10027 ON CHA blsr54 STA 19+59.018 OFF -8.540 $ EL 2.530000 BT8
LOC 10028 ON CHA blsr54 STA 19+69.760 OFF -8.534 $ EL 2.793000 BT9
LOC 10029 ON CHA blsr54 STA 19+79.818 OFF -8.530 $ EL 2.806000 BT10
LOC 10030 ON CHA blsr54 STA 19+89.018 OFF -8.524 $ EL 2.800000 BT11
LOC 10031 ON CHA blsr54 STA 19+99.018 OFF -8.540 $ EL 2.788000 BT12
LOC 10032 ON CHA blsr54 STA 20+09.760 OFF -8.534 $ EL 2.564000 BT13
LOC 10033 ON CHA blsr54 STA 20+19.818 OFF -8.530 $ EL 2.576000 BT14
LOC 10034 ON CHA blsr54 STA 20+29.018 OFF -8.524 $ EL 2.563000 BT15
LOC 10035 ON CHA blsr54 STA 20+39.018 OFF -8.540 $ EL 2.551000 BT16
LOC 10036 ON CHA blsr54 STA 19+49.760 OFF +8.534 $ EL 2.310000 BT17
LOC 10037 ON CHA blsr54 STA 19+59.818 OFF +8.530 $ EL 2.250000 BT18
LOC 10038 ON CHA blsr54 STA 19+69.018 OFF +8.524 $ EL 2.286000 BT19
LOC 10039 ON CHA blsr54 STA 19+79.018 OFF +8.540 $ EL 2.266000 BT20
LOC 10040 ON CHA blsr54 STA 19+89.760 OFF +8.534 $ EL 2.671000 BT25
LOC 10041 ON CHA blsr54 STA 19+99.818 OFF +8.530 $ EL 2.639000 BT26
LOC 10042 ON CHA blsr54 STA 20+09.018 OFF +8.524 $ EL 2.698000 BT27
LOC 10043 ON CHA blsr54 STA 20+19.018 OFF +8.540 $ EL 2.679000 BT28
```

\$ EL 2.000000 BT50 list: BT1-BT4
STO CHA BT50A 10020-10023

\$ EL 2.000000 BT75 list: BT17-BT20
STO CHA BT75A 10036-10039

\$ EL 2.000000 BT100 list: BT5-BT8
STO CHA BT100A 10024-10027

\$ EL 2.000000 BT200 list: BT9-BT12
STO CHA BT200A 10028-10031

\$ EL 2.000000 BT300 list: BT13-BT16
STO CHA BT300A 10032-10035

\$ EL 2.000000 BT400 list: BT25-BT28
STO CHA BT400A 10040-10043

19.15 PREPARATION OF UTILITY DRAWINGS BY THE UAO FOR USE IN AUTOCAD

19.15.1 TRANSLATING THE ROADWAY FILES TO AUTOCAD USING MICROSTATION

Sometimes there is no exact match, only a “best fit” translation. An example of “best fit” translation is MicroStation fonts to AutoCAD fonts. For example, font one in MicroStation has no exact match in AutoCAD so font one is mapped to the “txt” font in AutoCAD.

The MicroStation Roadway Design files that are translated for use as XREF's to the UTEXRD or UTPRRD files are not translated back into MicroStation. The only files that will be translated from AutoCAD to MicroStation are the UTEXRD and UTPRRD. This should keep translations trouble free.

The designer should collect the relevant design files that will be provided to the UAO. The files provided to the UAO should include all available survey. This may include Right-of-Way, baseline, topographic features, existing utilities, and drainage. This information is referenced by the UAO for use when creating the existing or proposed utility information in a blank CADD file. To package the files, first determine the appropriate format and file naming convention. Since, the UAO will be returning this file along with other UAO's owning similar facilities, it is recommended to add an under bar with the UAO's name for easier identification.

Example: utexrd_PhoneCompanyName.dwg

Once the data files for the UAO are collected, the blank file for the UAO's information can be created using the 'Create/Edit Files' program from the FDOT 2010 software. For utility files, the CADD file is available for creation in DGN or DWG format. The software dialog allows the user to edit the name of the pending file.

When DGN utility files are requested by the UAO in DWG format, they can be converted and packaged with the following process. Reference all DGN's to be converted to a single DGN file. Perform a 'Save As' and change the file type to *.DWG. The default save options are set to convert the active DGN file and references to individual DWG files. Once complete, these files are packaged and delivered to the UAO.

19.16 FILE TRANSFER PROTOCOL

File Transfer Protocol or FTP is a method of transferring files from one computer to another on the Internet or other networks. The protocol, part of the Transmission Control Protocol/Internet Protocol (TCP/IP), is a set of rules that ensures a file or sets of files are transmitted properly to the receiving computer. A computer that stores files that can be retrieved using FTP is called an FTP site or FTP server.

19.16.1 HOW IT WILL BE USED

FTP will be used to transfer the current phase submittal MicroStation files to the Florida Department of Transportation District Office. These CADD files will be as follows: the UTPRRD01.DGN for the proposed utility relocations and the UTEXRD01.DGN, the existing facility information.

19.17 MERGING OF UTILITY DATA BY FDOT

The last step in the process is to merge or incorporate the UAO's changes into the project dataset. Since the utility data comes from different companies, all the existing utilities must be merged into the existing utility file and the proposed utilities into the proposed utility file. The MicroStation merge command can be used to accomplish this task. Each returned UAO file may be referenced into a UAO specific model that is created in the master utility file. The master utility file is maintained by the designer and submitted with the contract plans. Each UAO specific model is referenced to the default model in the master utility file (ex. UTEXRD01.dgn). Once each file provided by the UAO is referenced into the default model, all the data can be merged into the default model using the 'merge into master' command found in the reference file dialog box. This process merges the necessary data into one file and maintains the source files from the UAO for reference and quality control review.

19.18 UTILITY SCANNED IMAGES

If the utilities are handled through a joint utility agreement and electronic files are not provided to the District for the Utility plans, the paper plans must be scanned. The format must be a published format with a minimum resolution of 300DPI. The preferred formats are postscript and Group 4 TIFFS.