

CADD Standards Manual



July 2011



Edition Changes

January 2011

Section 100 wording was changed to from "MicroStation XM" to "MicroStation".

Sections 565 and 575 were edited to clarify the use of upper case text.

Appendix B was updated to reflect new Construction folders.

Appendix D S-1-E-2_TRAFFIC_Util_ENV_Etc was updated with new Environmental symbology.

July 2010

Appendix B was updated to include addition of directories for Plan Reviews.

Appendix D, and F were updated to add levels and symbology to Alignments, Design, Survey and Topography.

Created Appendix G, Survey Features, Codes and Styles.

Section 675 was edited to include reference to Appendix G.

Section 710 was edited to include plan sheet scales for Traffic Drawings.

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SECTION 100 - INTRODUCTION

The ITD Computer Aided Drafting and Design Standards and Procedures Manual (CADD Standards Manual) is intended to outline the use of Idaho Transportation Department's (ITD) corporate workspace and Bentley System's MicroStation and InRoads software, as well as other tools and procedures developed internally.

Following these standards will help to unify the appearance of drawings included in plan sets and facilitate the exchange of information between ITD districts and sections as well as consultants working on ITD projects. The ITD CADD Standards Manual will address issues such as software, standards, tools, and procedures which will aid in the efficient, consistent production of ITD plan sets. This manual and the electronic resource files contained in the ITD workspace are intended to be used by both ITD internal design sections and the consulting firms doing business with ITD.

Phase I of the CADD Standards project began in 2005 with the development of electronic resource and configuration files and the creation of an ITD Corporate Workspace. The project was implemented in March of 2007, coinciding with the release of Bentley's V8 XM Edition of software. User training was provided and existing projects were updated at that time.

In the initial phase of this project the Project Development disciplines were emphasized. The goal over time is to continue the standards project by addressing each of the specialty groups within ITD as well as providing continued enhancement of the current configuration by continually updating software and adding to ITD's Workspace configuration, workflows, and training programs.

Ultimately, the CADD Standards project will create a complete electronic project delivery and archival system beginning with Planning and continuing through Construction and Maintenance. The combination of software, workspace, and workflows will allow all users to work together in the most efficient and productive environment possible.

Updating of the manual is intended to be a continuous process and revisions will be issued regularly in conjunction with the release of the ITD Design Manual updates. The current workspace version can be obtained by going to the "About_ITD_Workspace" folder in the Corporate Workspace and accessing the "Readme_WhatsNew" file.

SECTION 200 - ITD Corporate Workspace

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SECTION 200 - ITD Corporate Workspace

The ITD Corporate Workspace is a custom environment designed to facilitate CADD productivity and direct the user to ITD specific standards, workflows and procedures. The ITD Workspace is a set of configuration files, MicroStation and InRoads resource files, documentation, and customized tools, designed to work together to allow for development of a standardized project plan set. Some of the items in the workspace are:

- Seed files
- Cell libraries
- DGN libraries
- Line style resource files
- Design Scripts
- Settings files
- InRoads XIN files
- ITD configuration files
- Documentations

The ITD configuration files define locations where MicroStation and InRoads will find ITD specific resources. They also enable or disable specific MicroStation and InRoads tools allowing for a streamlined and standard environment within ITD. Along with the configuration files, custom tools, tasks and utilities needed to perform design and drafting functions have also been created and made available to the user within the workspace. These tools have been included to save the users time and enable them to be consistent between projects.

205 Installation

For ITD users, the installation of the Workspace will be performed and maintained by the HQ CADD Support Team and the District IS or CADD Coordinator or Primary User. This includes the CADD software upgrades and the maintenance and backup of ITD workspace files. This will ensure that all ITD CADD workstations have the latest Workspace files available and that they are updated through automated routines.

210 Configuration Files

Custom configuration files have been created that will set the correct MicroStation resource files and other standard files located on the user's computer. Along with these configuration files, personal DGNLIB files have also been included in the workspace allowing users to customize their workstations without impacting other users.

For the Consultant process to install the ITD Workspace and Configuration Files see the instructions in [Appendix A](#).

215 Folder Structure and Project Creation Utility

An ITD Corporate folder structure has been developed to store all project related data from planning through maintenance. This manual is concerned only with folders under the CADD directory and to the resource files and information related to the ITD Workspace. The CADD folder structure is integrated with the MicroStation configuration files so that the user will not

have to navigate to find files. MicroStation and InRoads will find the necessary files to ensure the ITD configuration runs correctly.

A custom utility named ITD Project Creation Utility has been developed to create the ITD project folder structure on the Projects server and populate those folders with the proper files including cell libraries, font libraries, seed files, InRoads preferences and template files, sheet borders and all other resources.

220 Customized MicroStation Menu

The ITD workspace contains a personal DGNLIB file called “My Interface” under ITD Tools dropdown on the main menu bar that allows users to make changes to the configuration without affecting other users.

The customized ITD Task Navigation sidebar menu provides access to tools and tasks intended to provide the user a simple, efficient method to apply ITD’s CADD standards to every project. These tools and tasks direct MicroStation to place elements on discipline-defined levels using ByLevel symbology for drawing consistency.

MicroStation levels can be filtered to make specific levels more readily available during the design session. Standard filters have been created in the ITD workspace to allow the user to quickly and efficiently select the proper level. These filters, the levels and By-Level symbology assigned to each are shown as separate tabs in the spreadsheet in [Appendix D](#).

225 ITD_Standard.xin

ITD has developed an “ITD_Standard.xin” file to provide a means by which to apply ITD standards to InRoads and Survey generated data and graphics. This preference file stores the preferences available for use in each dialog box. Style settings and Named Symbology settings apply ITD’s standard ByLevel symbology when data is displayed. The .xin file is placed in the project folder structure by the Project Creation Utility when the utility is run and is used by surveyors and designers through out the life of the project.

SECTION 300 - Project Directory Structure and Project Creation Utility

305 - Project Creation Utility

310 - Security

SECTION 300 - Project Directory Structure and Project Creation Utility

ITD has adopted a standard Project Directory Structure for all project related data. This directory structure, along with a standard CADD file naming convention, has been created to enable efficient management of all files within an ITD project. This will aid in the exchange of data between ITD sections and ensure consistent, reliable data retrieval by all members of a project team. This document will only address that portion of the file structure that pertains to the CADD design process.

The ITD “Projects” Directory has been designed so that the top level directory for each project is designated by the 5 digit project Key Number prefaced by the letters “prj”. Under this directory the user will find sub-directories where all project information will be created and stored using ITD’s standard file naming convention. Below the project directory you will find subdirectories for each of ITD’s specialty sections. Under each specialty section directory is a sub-directory structure unique to that section.

This directory structure is the foundation of a project lifecycle that includes electronic plan review, bidding, inspection, machine control and maintenance. Following this standard directory structure without revision will ensure the accurate sharing of information between sections within the department as well as with consultants and contractors

305 Project Creation Utility

ITD has developed a Project Creation Utility that automates the creation of ITD’s standard project directory structure on the file server. At the beginning of each project, the CADD Coordinator or Primary User will run the Project Creation Utility to create the directories in the Projects folder. These directories will be the permanent location for all information pertaining to a given project. The utility will create the project directory folders and sub-folders as well as populating certain folders with project related resources and appropriate security

310 Security

Security and access permissions are controlled by active directory groups and assigned to each folder by the Project Creation Utility. The ITD active directory groups are shown on the file structure in [Appendix B](#). Each district is required to determine the level of security needed by members of their design teams and to arrange for them to be included in the appropriate active directory groups.

The ITD active directory groups are removed from the Consultant version of the Project Creation Utility. Security on project folders should be assigned by consultants to meets the needs of their organizations.

For a complete directory structure example see [Appendix B](#).

SECTION 400 - CADD File Naming Convention

The ITD design process requires that CADD drawings be created in multiple design files depending on their discipline. Over the life of an design project, many of the specialty sections will create CADD data in design files that need to be referenced together to produce a final plan set. These design files need standard, unique, names that allow the CADD user to easily identify the specialty section responsible for the file and the type of design data the file contains.

When used consistently, ITD's CADD File Naming Convention will allow for easy, dependable, archiving and retrieval of data for the complete lifecycle of a project. All ITD CADD drawings should follow this standardized naming convention so that project data can easily be identified and accessed by all sections.

For details of the ITD file naming convention see [Appendix C](#).

SECTION 500 - Drafting Standards and Resource Files

505 - Seed Files

510 - Working Units

515 - Units Resolution

520 - Coordinate and Angular Readouts

525 - Global Origin

530 - 2D or 3D Seed Files

535 - Cell Libraries

540 - Design File Level Libraries

545 - Level Filters

550 - Color Table

555 - Line Weights

560 - Line Styles

565 - Annotation

570 - Annotation Scale

575 - Drawing Notes

SECTION 500 - Drafting Standards and Resource Files

ITD standard resource files consist of cell libraries, seed files, level libraries, text and linestyle design libraries, and other CADD information necessary to create project plan sets that conform to ITD standards. Adherence to these standards ensures consistent plan set appearance and accuracy.

505 Seed Files

Seed files are the basis for all ITD MicroStation Design files. Seed files are templates in which parameters have been set for the ITD standards. The seed files define the working units, global origin of the coordinate system, resolution, and whether the file is a 2D or 3D file. Seed files for both 2D and 3D are available in the workspace and should always be used when creating a new design file. All ITD design disciplines use the ITD “Standard” seed files with the exception of the Bridge Section. ITD’s Bridge Section has its own “Bridge” 2D and 3D files.

510 Working Units

Working units settings are used to control units of measurement for design files. ITD requires that all design projects be completed in imperial or “English” units; therefore, ITD seed files have been developed for imperial units only. ITD working units are based on the U.S. Survey Foot for master units and inches for the sub unit.

515 Units Resolution

The resolution for all ITD seed files, including Bridge seed files, has been set to 12000 units per Survey Foot and this resolution setting should not be changed. This setting affects the size of the elements within a MicroStation file and if changed will incorrectly scale all existing elements within the file.

520 Coordinate and Angular Readouts

The coordinate system determines the accuracy and format of the design file. ITD uses the Idaho State Plane Coordinate System on all roadway design projects and the standard seed files will accommodate this coordinate system.

The Coordinates set the format and accuracy of the design file based on the working units. The degree of accuracy is based on the number of decimal places or, for Bridge, the fraction selected. ITD Standard seed files are set to a coordinate readout of Master Units with an accuracy of three decimal places. The Bridge seed files are set to a coordinate readout of Master Units and accuracy of 1/32.

The Angle settings control the format, mode, or accuracy of the design file angular readout. ITD Standard 2D and 3D seed files are set with the angular format of Degrees/Minutes/Seconds and the mode set to “Bearing” with an accuracy of 0. The Bridge seed files set the angular format to Degrees/Minutes/Seconds and the mode to “Conventional” with an accuracy of 0.

525 Global Origin

The file global origin is a point within the design plane used as a base point for the placement of graphics elements. ITD's 2D and 3D files use the default MicroStation global origin which is located in the center of the design plane.

530 2D or 3D Seed Files

The ITD Standards contains both 2D and 3D seed files and both are available for use when creating a new design file. Both files have the same settings applied to them with the addition of the Z value in the 3D file. All design model files should be created using the 3D seed file. The XM version of MicroStation allows 3D model files to be referenced to 2D sheet files and the ITD border or *.bdr files have been developed in 2D and are to be referenced to a 3D sheet file.

535 Cell Libraries

The ITD Workspace contains many cell libraries, each of which is made up of discipline specific data, and is intended to be accessed and used by designers of all sections. All cell libraries are assigned to the seed files and most cell libraries have a corresponding Cell Selector feature with an icon on the ITD Task Navigation menu to sort the cells into discipline specific groups for ease of use.

540 Design File Level Libraries

Design File Level Libraries (DGNLIB) and corresponding specialty section filters have been developed to allow users to seamlessly work across disciplines and level duplication has been avoided wherever possible. The DGNLIB files are assigned to the seed files and available when a new file is created. The creation of new levels and changes to the existing levels has been locked within the ITD Workspace in order to maintain the "ByLevel" symbology that allows data to inherit attributes for color, linestyle and weight from the level it is placed on. This ByLevel Symbology also allows for the data's use by other applications such as InRoads and Quantity Manager. ByLevel symbology is the default for all level libraries and is the required ITD standard.

545 Level Filters

Filters have been created for each of the ITD discipline specific level libraries to allow users to quickly and efficiently place elements on the appropriate levels and to turn levels on or off.

For a complete list of ITD's MicroStation Levels and their Named Symbology see [Appendix D](#).

550 Color Table

The standard color table file, ITD.tbl, is attached by default to all ITD seed files. The colors within the table correspond to the By Level color symbology specified in the level libraries. Specific colors are assigned to ensure consistency and to enable users to easily identify data.

Colors are defined by a number and MicroStation reads this color table to determine the correct color to display.

555 Line Weights

Line weights in MicroStation are defined by designating the thickness of the line used when plotting an element. ITD uses line weights 0-4 on plan sets. These weights correspond to the ByLevel weight assignments within the level libraries and are shown in [Appendix F](#).

560 Line Styles

A custom line styles library has been developed for use within ITD. The line styles are contained within the workspace in a MicroStation resource file called Line_Style.DGNLIB. These line styles correspond to ByLevel line style assignments within the level libraries and are shown in [Appendix F](#).

565 Annotation

ITD has developed several font resources available in the ITD workspace and they are attached to the design file by configuration variables. The standard Font for plan sheet text is “130 ITD Gen Eng” and is loaded as the default font in the text editor.

ITD standard annotation text styles and dimension styles are contained in DGNLIB files. These libraries contain predefined text and dimension settings for several different sizes of text. These standard text styles have been defined to ensure consistent legibility on all plan sheets. When a user selects a text style, the height, width, line spacing and justification is set automatically so no adjustments are needed. The desired style must be picked from the drop down menu before placing text as the default style attached to all ITD Seed files is “No Style”. If Italics or Underline is desired, it can be selected through the MicroStation Text Editor.

ITD text style names include whether it is a “Standard” or “Bridge” style and the text size (08”). The default justification is at the left bottom and other justifications, such as CB for Center Bottom, are included in the text style name. Standard text sizes refer to the size of the text when plotted, not the text size in the MicroStation file. The text size in the MicroStation file is dependent upon the intended plot scale and the annotation scale. There is also a style for masked text which blocks out other graphics around the text being placed.

Maintaining the minimum letter height and letter stroke width is very important so that information does not disappear or become illegible when plan sheets are photocopied or reduced.

The standard text style to be used for general purpose annotation is “Standard 08”. There are several larger size text styles available, however, these sizes are normally only used as titles or on presentations or exhibits.

The Dim_Styles.DGNLIB file contains standard dimension styles for Bridge, Traffic and Design drawings.

570 Annotation Scale

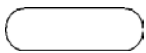
The annotation scale is used for defining the scale of the cells, text, custom line styles, and dimensioning in both sheet files and model files. Only custom linestyles are affected by this scale factor, native MicroStation line codes are not. By default the annotation scale lock is turned on. The default drawing scale setting is 1:40. If a different scaled drawing is desired, the user must edit the drawing scale in the model properties or under the “Settings” option on the main menu bar. Annotation that has been placed by InRoads is not affected by the model drawing scale. InRoads text size is controlled by the global scale factor in InRoads. If InRoads text is not displayed the right size or if a different scale is required, the annotation should be redisplayed with InRoads using the correct global scale factor.

575 Drawing Notes

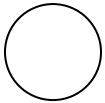
Drawing notes should be a combination of uppercase and lowercase lettering. Uppercase lettering is desirable for all drawing titles.

Notes and lettering on plan sheets should be readable from either the bottom or right-hand edge of the sheet. Vertical lettering, approximately perpendicular to the bottom of the sheet, should be upright in relation to the right-hand edge of the sheet. All other lettering should be upright in relation to the bottom of the sheet.

Callouts on the plan sheets that make reference to notes or further information shall use the following standards:



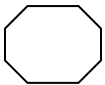
Capsules designate the pay item callouts. (Numbers to reflect bid items and/or special provision items. Use the pay item number.)



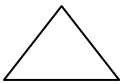
Circles may be used for notes.



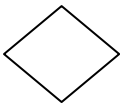
Squares designate curve data. (Start with number 1 and increase by increments of 1. Number each sheet separately.)



Octagons designate property ownership. (Number according to right of way information.)



Triangles designate revisions to the plans. (Start with number 1 and increase by increments of 1. To be used only during Contract Advertising submittal by Roadway Design.)



Miscellaneous items to be determined by the designer.

SECTION 600 - InRoads Standards

605 - InRoads Files

610 - Preferences

615 - Styles

620 - Drafting Notes

625 - InRoads Data Files

630 - Digital Terrain Models (*.dtm)

635 - Existing Ground Surface

640 - Proposed Ground Surface

645 - Geometry Project Files (*.alg)

650 - Template Library (*.itl)

655 - Roadway Library (*.ird)

660 - Project File (*.rwk)

665 - XML Data File (*.xml)

670 - Styles Sheets (*.xsl)

675 - Survey Files

SECTION 600 - InRoads Standards

This chapter covers directory locations, descriptions, and naming conventions for the data files used or created by the InRoads design software. These binary files contain all engineering design data created during a project and the instructions on how that data is output, whether to a MicroStation graphic format or to a text report format.

605 InRoads Files

InRoads requires multiple file types to perform the various functions required for the creation of a roadway model. These files can be generally segregated into two categories.

The first group, or preference files, controls the graphic display, text reporting, and precision of data.

The second group, InRoads Data files, contains the data files created during the process of designing a roadway project.

610 Preferences

The ITD_Standard.xin file contains information necessary for InRoads to display design data accurately as MicroStation graphics. All named symbologies, feature style information, and preference symbology is contained within the .xin file and ITD policy does not allow user modifications of this files in the ITD Workspace. This information is configured to exactly match the standards contained in the ITD Workspace and is consistent with the ITD by-level symbology. This preference file also controls the precision readout, command settings, grid spacing, and a multitude of other settings required for InRoads to perform correctly.

A project .xin file is placed in the Project_Development\Project_Resources\Inroads folder and renamed to “prjxxxxx Preferences.xin” when the Project Creation Utility is run. This file is used through out the life of the project. Limited additions may be made to the project .xin file if unique project situations arise, however, changes to the established standards and by-level symbology must be avoided as the accuracy and display of many InRoads functions are dependent on these standards. Users are encouraged to submit a change request to the CADD Support Team if adjustments or additions are repeatedly required to the established standards. The request will be reviewed and incorporated into future workspace releases upon approval.

615 Styles

InRoads Styles control symbology for the display of horizontal and vertical geometry in the MicroStation Model file. Points, Lines, Arcs, and Spirals from the InRoads alignment files are displayed according to ITD by-level symbology.

620 Drafting Notes

This file contains InRoads intelligent drafting notes that access engineering data from the geometry file and digital terrain model files. The drafting notes file sets the graphic parameters for displaying notes that contain data such as station, offset, or elevation from the data files.

625 InRoads Data Files

InRoads data files contain all pertinent engineering-generated data assembled during the project. These files are user-created during the evolution of a project and are saved in the project folder. [See Appendix C_ITD Naming Convention](#) for naming and location of InRoads data files.

630 Digital Terrain Models (*.dtm)

Digital Terrain Models are mathematical representations of the surface of the earth. InRoads uses DTM data to produce contours, display the existing and proposed groundlines in profile and cross section grids and in the calculation of cut and fill quantities. DTMs are created with a combination of surface points identified as spot points, breaklines, contour lines or other point types used to define the surface.

635 Existing Ground Surface

Existing ITD Digital Terrain Models represent existing ground conditions at the time that survey data was collected. Existing DTMs may be assembled from traditional survey, LiDAR mapping, aerial orthophotography, or a combination of those methods.

640 Proposed Ground Surface

Proposed ITD Digital Terrain Models represent the project design surface as generated by InRoads using the horizontal alignments, vertical alignments, templates and roadway definitions created by the designer. Most projects will contain multiple DTMs that define the changes to the existing ground surface for various portions of the project, such as the mainline, ramps or detours.

645 Geometry Project Files (*.alg)

ITD Geometry Project files contain horizontal alignment, vertical alignment, and superelevation information. The Existing Geometry Project contains the centerline of survey as acquired by the Survey department. Proposed Geometry files contain geometry relating to proposed horizontal and vertical data. The proposed geometry file will contain all alignments for the roadway design including ramps, detours, cross streets and the associated vertical profiles.

Important note: There are a number of settings in the alignment file that must be evaluated by the design engineer. Many of the settings have been addressed in the ITD configuration; however care must be taken to assign proper values for the

modeling of the design surface as required by the project. One example of these settings is the Rounding Linear Transitions variable for superelevation which is on by default in the ITD configuration. With the setting to on, superelevation transitions will be rounded to the nearest 30 feet. With the setting off, InRoads will calculate the transitions exactly.

650 Template Library (*.itl)

The Template Library contains templates, template components and end conditions, transition control names, and other data used to model the proposed roadway surface. The standard ITD Template Library file contains standard templates and tables that can be copied and modified for each specific project requirement and is placed in the Project Development\Civil folder when the Project Creation Utility is run. The naming convention for Template Library consists of the project key number with the .itl file extension.

655 Roadway Library (*.ird)

The Roadway Library contains roadway definitions and independent template controls that define which template to apply and where and how often to apply it. ITD Roadway Library files are defined by the designer and saved in the Project Development\Civil_Data folder. The naming convention for the Roadway Library consists of the project key number with the .ird file extension.

660 Project File (*.rwk)

The Project File contains the directory location of all the InRoads data files used for a particular project and is used to load all necessary files for an InRoads session. This file is an ASCII file that can be edited using Notepad. The naming convention for the Project File consists of the project key number with the .rwk file extension and is stored in the Project Development\Civil_Data folder.

665 XML Data File (*.xml)

This file contains the geometry project cogo points and surface data that is used to create XML reports. When the xml file is generated by the InRoads XML Report tool, the file is placed in a temporary directory. If the xml file is to be saved for later formatting, the file should be placed in the Project_Development\Civil_Data folder in the project directory.

670 Styles Sheets (*.xsl)

InRoads reports are the result of xml data formatted by an .xsl or Style Sheet file. These files specify what information is used from the XML Data files that are output by InRoads and how the information will be formatted and displayed to create an Inroads report. Several ITD standard style sheets have been defined and are stored in the Corporate Workspace\InRoads\Style Sheets directory.

675 Survey Files

InRoads Survey requires similar files to InRoads and uses the ITD_Standard.xin file for the control and display of survey data. The ITD_Standard.xin file specifies survey field coding, survey control codes, and code properties for planimetrics, DTMs, and geometry symbology. See [Appendix G](#) for Survey Features, Codes, and Styles.

SECTION 700 - Project Plan Sets

705 - Plan Sheet Size

710 - Plan Sheet Scales

715 - Plan Sheet Title Block

715.01 - Revisions

715.02 - Preparer's Names

715.03 - CADD File Name

715.04 - Date

715.05 - Section Name

715.06 - Federal-Aid Project Number

715.07 - Sheet Title, Project Name, and Description Box

715.08 - County, Key Number, Sheet Number

715.09 - Engineer's Endorsement Space

720 - Order of Plan Sheets

725 - Assembling Sheets Files

730 - Standard Linestyles, Cells, Symbols and Levels

SECTION 700 - Project Plan Sets

This chapter is concerned with the CADD standards aspects of preparing an ITD plan set. For help with the required design elements of the plans see [Section 800 – Plans in the Design Manual](#).

All plan sheets should be developed using ITD's CADD Standards and the ITD Corporate Workspace. All plan sets will have English units throughout and shall be in a format compatible with the ITD CADD system.

Historical or archived data that was produced before the system was available and those plan sheets that cannot be produced using the ITD CADD system may be scanned and stored on the CADD system.

Final plan sheets submitted for advertisement shall be properly endorsed by the engineer. They shall be on a durable medium such as Mylar to preserve the drawings for archival purposes.

Some necessary details for preparing project plan sheets may not be covered in these procedures. If questions arise on the amount of detail or appropriate format, other similar project plans should be reviewed for example or the Roadway Design section should be contacted. Variations to these instructions require approval from Roadway Design.

[Appendix E](#) contains specific plans, drawings, examples, etc., that can be followed when preparing project plans.

The following information explains typical plan preparations and organization for preparing project plan sheets for the Idaho Transportation Department.

705 Plan Sheet Size

ITD prepares plan sheets for design and construction in two sizes, Standard plan sheet which is 11" x 17"; and Maintenance Project sheet which is 8 ½" x 11". In addition to the plan sheets, the Bridge section requires a 22"x34" mylar sheet for their records and the Location section produces a Record of Survey which is a 18"x27" transparency. The drawing details should not be crowded on the plan sheet and the text size should conform to ITD standards as outlined in section 500 - Drafting Standards and Resource Files.

710 Plan Sheet Scales

The following plan sheet scales shall be used on all drawings for the Idaho Transportation Department:

Roadway drawings

1"=10'

1"=20'

1"=40'

1"=100'

1"=200'

1"=400'

Full Size 1=1

Traffic drawings

1" = 100' ----- Minimum scale for pavement markings plan sheets without transitions or special details.

1" = 40' ----- Preferred scale for pavement markings plan sheets with transitions or special details.

1" = 40' ----- Scale for traffic signal intersection plans.

Bridge drawings

1"=1'

1"=5'

1"=10'

1"=20'

1"=30'

1"=40'

1"=50'

1"=60'

1"=100'

3/32"=1'

1/8"=1'

3/16"=1'

1/4"=1'

3/8"=1'

1/2"=1'

3/4"=1'

1 1/2"=1'

715 Plan Sheet Title Block

All plan sheets shall use the ITD title block designed for that specific sheet. The title block shall have all the necessary information shown in its appropriate place. Changes to the title block may be made with the approval of the Roadway Design section. The following describes the basic information in a standard title block.

715.01 Revisions

The revisions section is only for changes to the plan sheets after they have been stamped and endorsed by the engineer. Each change should be marked with a triangle and numbered successively. In the revisions box the triangle shape should be marked with the corresponding number of the plan sheet change and a date, the initials of the person making the revisions, and a description of the revision entered in the appropriate place. Each different change should be

entered on a new line. Entries in this box should primarily be made by the Roadway Design section.

715.02 Preparer's Names

Enter the names of the designer, the person who checks the design, the detailer, and the person who checks the drawing, whenever appropriate.

715.03 CADD File Name

File Name: A standard electronic file naming convention is used by ITD for the naming of plan sheets to be retained and archived.

See [Appendix C](#) for complete details of the file naming convention.

715.04 Date

Enter the date the drawing is completed, which is usually when the last corrections are made for Final Design or Contract Advertising submittal.

715.05 Section Name

The section name box is directly below the ITD name and seal and is for the area section name, or the consultant may place their business name within this box. Appropriate names would include the district and section, such as “District 6 Design” or “Headquarters Traffic Section.”

715.06 Federal-Aid Project Number

On the title sheet only, for federal-aid projects it may be necessary to show two or more project numbers when right of way and construction are handled under separate project numbers. Show the construction project number only on all other sheets.

If it is a state project, show the project number in this box.

715.07 Sheet Title, Project Name, and Description Box

A sheet title consisting of the type of sheet it is should be shown for each sheet. The names should generally coincide with those shown in the index.

The large box below should generally have the project name, but may include additional information such as sheet station limits, structure numbers, intersection names, and other brief identifying descriptions.

715.08 County, Key Number, Sheet Number

The top box is generally open but may contain the catalog number or the ITD sheet number for a particular sheet. The second box should show the county or counties in which the project is located. The third box should show the project key number. The bottom box is for sheet numbering.

715.09 Engineer's Endorsement Space

The endorsement by the engineer must be on a standard size plan sheet. Full size electronic representations of the engineer's stamp shall be used on standard size plan sheets.

720 Order of Plan Sheets

Plan sheets shall be assembled in the following order.

Roadway Group

- Title Sheet
- Standard Drawing Index
- Vicinity Sketch
- Total Ownership Map
- Plan sheet index showing the area covered by each plan sheet on the Total Ownership
- Special Maps
- Project Clearance Summary
- Typical Sections
- Summaries
- Roadway
- Bridge
- Pipe Culvert
- Pipe Siphon
- Irrigation Pipe
- Sewer Pipe
- Pipe Under drain
- Plan and Profile Sheets
- Special Drawing Group
- Sediment and Erosion Control
- Minor Structures Drawings
- Drainage Plans
- Paving, Concrete Joint, Approach Slab Details
- Roadside Development and Landscaping Plans
- Bike Lanes and Pedestrian Path Plans
- Source Plat and Reclamation Plans

Traffic Group

- Illumination Materials List
- Illumination Plans
- Traffic Signalization Materials List
- Traffic Signal Plans
- Railroad Signal and Crossings
- Signing Erection Specifications
- Signing Plans
- Pavement Marking
- Delineation and Raised Channelization
- Traffic Control Plans

Utility Group
Optional separate numbering

Right of Way Group
Optional separate numbering

Bridge Drawings
Optional separate numbering

State Maintenance Group
Optional separate numbering

Standard Drawings

Detail sheets shall be located directly after the plan sheets to which they are related.

725 Assembling Sheets Files

Projects plan sets consist of both planimetric sheets, which contain plan and/or profile views of a design model and informational sheets that contain text-only information.

Project plan sheet files should be made up of design model files drawn in real world coordinates and attached to the sheet files as reference files. Informational sheets need not contain design graphics, but may only contain text such as general notes, or other instructions or details. It is recommended that text-only information be placed within the sheet file. If the text is in a table format the text and linework should be placed on their appropriate levels. In the case of a typical section or detail drawing it is suggested that the linework be drawn in a model file on the appropriate drafting levels and the text and dimensioning be placed in the sheet file.

Some types of graphic information that does not reside in real world coordinates such as a scaled detail of an irrigation structure, could be placed in either a model file or a sheet file.

Right of way or Utility plans are put together in the same manner as Roadway plan sheets, according to the guidelines in the ROW or Utility section of the ITD CD-ROM Publications, by referencing a combination of existing design and plan sheet files to specific Right-of-Way or Utility files to show the necessary topo, survey and roadway details required to make up a detailed set of plans for the use of the Right of Way and Utility sections in their work.

ROW plans should be plotted using the “Halfsize ROW.pen” design script which plots everything on levels ROW_Parcel, ROW_Easement-Hatch, and ROW_Total-Ownership-Boundary in color with a transparency of 80% and everything else black.

Utility plans should be plotted using the “Halfsize Utility.pen” design script which plots everything on levels beginning with UTIL_ in color with a transparency of 80% and everything else black.

ITD has adopted the use of the InRoads Plan and Profile Generator tool for the creation of plan sheet files and can be used to create plan only, profile only, or plan and profile sheets. The Plan

and Profile Generator automates the attachment of reference files and rotates and clips the files to align with the profile and sheet border. Sheet files must be created by the Plan and Profile Generator before the InRoads Quantity Tools can gather pay item quantities from the design files.

The Plan and profile generator tool uses the designated InRoads horizontal alignment to determine the center of the plan view window. The clipping boundaries and match line locations are defined by the user. This tool has the ability to automatically shift the displayed elevation range to insure that the vertical alignment and surface graphics fit inside the profile window. Plan and Profile Generator also fills in certain fields in the title block, automatically rotates and places the north arrow cell, and creates and annotates match lines based on user defined station limits.

Plan sheets for projects that do not contain InRoads alignments will need to be set up by individually attaching, rotating and clipping the required reference files to the sheet file.

730 Standard Linestyles, Cells, Symbols and Levels

Standard linestyles, cells, symbols, and levels used on project plans are shown in the Standard Drawing “S” series in [Appendix F](#). The “S” series drawings show the symbol size and BY-Level symbology (line style, line weight and color) for each symbol or linestyle and the named level assignment for each. These standard symbols and linestyles are stored in the CADD system for internal reference and use and are available on the ITD web site for use outside of the Department.

SECTION 800 - ProjectWise Plot Organizer

805 - Settings Files

810 - Design Scripts

815 - Acceptable Plot Sizes

SECTION 800 - ProjectWise Plot Organizer

ITD has selected ProjectWise Plot Organizer as its standard plotting software. ITD standard settings files and design scripts have been developed to create uniform plot sets that can be quickly re-plotted with updated data when needed. Project Wise plots can also be published as PDF files for sharing with other programs or archiving of project data.

805 Settings Files

Settings files provide a way of defining standard plotting parameters such as plotter, design script, scale, and rotation for plots each time the plotting dialog box is opened. ITD settings files have been developed to create plots on plotters in each district and are imbedded in the district specific plotter queue loaded to the workstation through the “Printers and Faxes” section of the Control Panel.

810 Design Scripts

ITD design scripts are applied during plotting to control pen widths, colors, and specially colored plots such as right-of-way plan sheets. These design scripts recognize ITD’s named levels and elements placed on incorrect levels may not plot as desired. Standard design scripts have been created for black and white plotting, full color plotting, and for black and white plotting with colored right-of-way or utility details in each acceptable sheet size.

815 Acceptable Plot Sizes

The standard ITD plot size is 11" x 17" which is the default setting. Other plot size settings are available, such as 8 ½"x11" for “Maintenance” type jobs or 22"x34" for Bridge drawings and “Roll” for larger size exhibits or presentations.

APPENDIX A ITD WORKSPACE INSTALLATION

Workspace Installation for ITD

The ITD Workspace resides on the District file server DXitfs01 in the DX\CADD directory and must be mapped as the drive letter “S”. No other installation is necessary. The CADD directory also contains documentation files and other supporting data. For ITD sections, the workspace itself resides in a folder named “Corporate_Workspace.” Project files reside on the server in the “Projects” directory and must be mapped to the drive letter P. All users working in the workspace must have appropriate read/write permissions on those drives.

Workspace Installation for Consultants

For Consultant installation, the ITD Workspace resides on the file server in the “ITD_Workspace” directory and must be mapped to the drive letter S. Project files reside in the “Projects” directory and must be mapped to the drive letter P. For example: S:\ITD_Workspace, and P:\Projects. These drive letters are hard coded in the workspace and some software functions can not find a URL address. All users working in the workspace must have appropriate read/write permissions on those drives.

Unzip the file ITD_Workspace.zip to the S: drive. This file will create the folder named ITD_Workspace that contains all the files and resources necessary for the workspace. Create a folder named “Projects” on the P: drive.

Software

The ITD workspace is compatible only with Bentley Systems Inc.’s MicroStation and InRoads software and they must be installed on the user’s computer.

Custom configuration files have been created that will set up the correct MicroStation resource files and other standard files on the user's computer. Copy the configuration file, ITD_Standards_Local.cfg from S:\Software\Local_CFG_File to C:\Program Files\Bentley\MicroStation\config\appl.

Installing the ITD workspace does not over ride the standard MicroStation environment. Users can choose to enter the standard MicroStation workspace or the ITD Workspace by selecting the appropriate shortcut icon on the desktop. The “ITD MicroStation” shortcut icon resides in the Cadd\Software\Software Icons” folder and can be copied to the users desktop. The target for this shortcut may need to be edited as the path to the MicroStation installation may vary from version to version.

Create Users

Each user working in the ITD Workspace must have a folder for his personal resource files such as a personal DGNLIB file, user preference file, function key menus, etc. This folder is created in the workspace under the User_Workspace folder by running the Create User.bat file located in

that folder. Enter the user's server login at the prompt and run the .bat file for each person that will be working in the ITD Workspace.

Project Creation Utility

The ITD workspace contains a Project Creation Utility that automates the creation of ITD's standard project directory structure. At the beginning of each project, the project manager will run the Project Creation Utility to create the directories in the "Projects" folder on the P drive. These directories will be the permanent location for all information pertaining to a given project. The utility will create the project directory folders and sub-folders as well as populating certain folders with project related resources.

This directory structure is the foundation of a project lifecycle that includes electronic plan review, bidding, inspection, machine control and maintenance. Following this standard directory structure without revision will ensure the accurate sharing of information between ITD and consultants and contractors.

Quantity Manager

ITD uses InRoads' Quantity Manager to compute and harvest quantities from InRoads features and tagged MicroStation elements. Quantity Manager uses that data to create a report that is used to populate the fields in the project Roadway Summary sheet. This summary sheet is an Excel spreadsheet and contains all instructions and macros required to produce the Roadway Summary Sheet. Quantity Manager also creates a .pdf file containing pay item information for the sidebar summary and a .csv file to import the pay item information into Estimator and TrnsPort. The Quantity Manager Configuration file, qm.cfg, must be copied from the ITD_Workspace\CFG_Files folder to the C:\Program Files\Bentley\InRoads Group v8.9\QM\classes folder on each user's workstation.



ITD Project Directory Structure (Expanded) (4_2011)

Folder Name		Description
Projects		Root directory for all projects
Prjnnnnn		Project data folder
Bridge (HQ Brdg Des)		Bridge model files (Design Files)
	Analysis	All calculations, computer runs, charts, graphs, permits, maps and etc.
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Photographs	Digital photos, prints and videos
	Quantities	Bridge Quantity calculations and documentation
	Specifications	Structure related special provisions
Concept (Dx Planning) (Dx Design)		
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations, computer runs, charts, graphs, permits, maps and etc.
	Exhibits	Information such as photos and data for public exhibits
	Photographs	Digital photos, prints and videos
Construction (Dx Const Prj)		All files and documentation related to the project construction
	25-A Construction Diaries	e-files of the daily diaries
	100 Preliminary Data	All materials prior to advertisement
	100-A Horizontal Alignment	Final alignment files from design for field use
	100-B Verticle Alignment	DTM files from design for field use
	100-C Cross Sections	Field notes from survey data
	102 Corespondence	Any letters, e-mails (in RTF format) and memorandums; Start with advertisement, file by date
	103 (B) Plans	Set of project plans, copy of the contract, bid ab
	103 (C) Bond Req and Contract Status Inquiry	Bond documents, insurance verification, and warranty requirements
	104.02A Contract Revisions	RFC or Engineer initiated change (Letter of transmittal, DH-406 and QVR)
	104.02B Extra Work	Documents requiring extra work (All calculations and information)
	104.02C Differing Site Conditions	Documents verifying Change
	104.02D Changes in Character of Work	Documents to substantiate Change
	104.04 Value Engineering	Documents that are supporting or disputing Change Proposal
	105.02 Plans and Working Drawings	Contractor Submitted plans and working drawings (Fabrication data, stress calculations, letters)
	105.07 Utility and Railroad Facilities	Utility needs or R/R requirements (Transmittal letters on left, agreements and DH-245)
	105.11 Inspection of Work	Inspector assignments and schedules or Diaries pertaining and FHWA inspection form 1446A
	105.13 Legal Weights	Record special haul conditions or differing circumstances
	105.14 Construction Maintenance	Notible information about work zones, traffic, and detour routes
	105.16 Dispute Resolution	Any documents that relate to differences between the Engineer and Contractor
	106.01 Source of Supply	Copy of letters listing commercial suppliers
	106.02 Materials Order Approval	Copy of letters of approval and list of materials
	106.04 Materials Certifications	Material Certs provided by the Contractor
	106.05 Plant Inspection	Acceptance and approval letters to the Contractor
	106.07 Test Result Dispute Resolution	Documents relating to test results including the time lines
	106.09 Materials Sources	Subfiles are set up for each source with documentation (e.g. requests, approvals, royalties, agreements). Material Lease Agreements. Copy of letters on right, payment and release on left
	106.14 State Furnished Material	Verification of delivery schedule

107.01	Safety and Health Regs	Corrispondance associated with OSHA or DEQ plus Transmittal letters and check list for safety
107.02	Permits and Licenses	Documentation relating to permits and licenses. Tax assessments and special permits required
107.10	Contract Insurance	Documents and Information relating to injury damage. Copy of all insurance data
107.17	Environmental Monitoring	Permits, plans, and third party inspection reports
108.01	Subcontracts	Request to subcontract - DH-315 and letters
108.03	Project Schedule	File the Intial, baseline, and each update schedule
108.04	Preconstruction and preoperational Conference	Meeting minutes and voice tapes. Transmittal letters, conference notes, DH-2220
108.06	Methods, equipment, and character of workers	
108.07	Time Extension	File documents that may delay the contract work
109.01	Scale Certification	Documents that have to do with weight and measurement, Form DH-2216
109.02	Scope of Payment	File calculations and quantity measurements for each estimate
109.03	Quantity variations, Contract revisions, and Delays	Force account records. Subfiles are set up for each specific change order or bid item contingency amount, DH-270 daily sheets - ITD-1009A worksheets
109.05	Progress and Detail Estimates	Detailed estimate on left, ITD-1009 and DA-8 on right
109.06	Materials on Hand	Invoices and production costs
109.08	Final Documents	File punch list items for project close-out
110.01	Material Summary and MTRs	Minimum test requirements
110.03	Project Records Audit and Inspection	DH-1970, FHWA and construction acceptance
110.09	Construction Photos	Photographs and descriptions
111	Final Forms and Project Control Data	Pencil copy on right, typed copies on left
111.02	As Constructed Plans	Eletronic or printed copy of plans after construction is complete
111.04	Final Estimate	
112	Labor Compliance	Contractor certified payrolls should be separated. Include Interviews, and correspondence
113	Labor Compliance-EEO	Document any violations and corrispondance
114	Inspector Certifications	Identify inspectors and their WAQTC number with expiration dates, Form 1210-P
116	News Release	Save news releases with the date
117	Work Activity Code	
118	Work by State and Local Forces	
140	Construction Inspection Report	File periodic inspection reports from HQ and FHWA.
	Bid Items	Separate folders for each bid item in the schedule.
DRI (Dx DRI)		All District Records Inspectors project related files.
Environmental (Dx Env)		Environmental model files (Design Files)
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Corridor_Assessment	General and technical information related to the corridor or roadway assessment, such as traffic analysis reports
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Exhibits	Information such as photos and data for public exhibits
	Photographs	Digital photos, prints and videos
GIS (Dx GIS)		All files and documentation related to GIS
Maintenance (Dx Maint Prj)		
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Photographs	Digital photos, prints and videos
Plan Review (Domain Users)		
	Final	All files needed for Final Plan Reviews (PDF, Design Files & Documents)
	Intermediate	All files needed for Intermediate Plan Reviews (PDF, Design Files & Documents)
	Preliminary	All files needed for Preliminary Plan Reviews (PDF, Design Files & Documents)
	PS&E	All files needed for PS&E Plan Reviews (PDF, Design Files & Documents)
Plan Submittal (Domain Users)		All files needed for Plan Submittals (PDF, Design Files & Documents)
PlotTemp (Domain Users)		IPARM files and metafiles from lplot
Project_Development		
	Civil_Data (Dx Civil) (Dx Design) (Dx Loc)	Civil data files (InRoads System Files)
	Quantities	Quantity Manager Quantities

District_Bridge_Data (Dx Design)		District Bridge model files (Design Files)
	Correspondence (Dx RW Prj) (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Photographs	Digital photos, prints and videos
Erosion and Sediment Control (Dx Design)		Erosion and Sediment Control Plans
Existing (Dx Design) (Dx Loc)		All existing data including data collected from field surveys, aerial or satellite surveys, scanned-in drawings, existing utilities, existing right of way information, existing signaling information, etc.
Hydraulics (Dx Hydro) (Dx Design)		Hydraulic model files (Design Files)
	Hydraulic_Studies	Signed ITD-210 Reports and all Hydraulic Reports
	Correspondence (Dx Admin Prj)	Any letters, e-mails and memorandums concerning Hydraulic issues
	Documentation (Dx RW Prj)	Hydrographic and hydraulics calculations,computer runs,charts, graphs,permits,maps and etc.
	Photographs	Digital photos, prints and videos at hydraulic sites
Intelligent_Transportation_Systems (HQ Traffic Prj)		
	Closed_Circuit_Television	
	Communication	
	Dynamic_Message_Signs	
	Highway_Advisory_Radio	
	Misc_ITS_Data	
Landscape (Dx Landscape) (Dx Design)		Landscape model files (Design Files)
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx RW Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Photographs	Digital photos, prints and videos
Location (Dx Loc)		Location section model files (Design Files)
	Civil_Data	Civil data files ie InRoads system files and GPS files
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx RW Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Photographs	Digital photos, prints and videos
Materials (Dx Mtls Prj)		Materials source plats (Design Files)
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Phase_Reports	Materials Phase Report files and documentation
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	District_Review	District adds comments prior to HQ review
	Final	Final copy of each phase report with <i>draft</i> watermark removed
	HQ_Review (ITD\Mtls Phase Reports Change)	HQ Materials can add comments; copy of HQ Mtls' review memo
	Joint_Comments	Copy with Dist & HQ comments; District reconciles & sends to consultant
	Under_Revision	ITD developed projects or Consultant's original submittals
Minor_Structures (Dx Str) (Dx Design)		Minor structure model files (Design Files)
	Analysis	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Photographs	Digital photos, prints and videos
	Quantities	Minor structures quantity calculations and documentation
	Specifications	Minor structure related special provisions
Plan_Sheets (Dx Design)		Project construction design drawings (Design Files)
Project_Resources (Dx Resource) (Dx Design) (Dx Loc)		MicroStation support files that are specific to the project
	InRoads	
	MicroStation	
	Miscellaneous	
Right_of_Way (Dx RW)		Right-of-way model files (Design Files)
	Correspondence (Dx RW Prj) (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx RW Prj) (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Exhibits (Dx RW Prj)	Information such as photos and data for court exhibits
	Parcels (Dx RW Prj)	Add subdirectories as needed for parcels
	Parcel_1-name	All files and documents related to Parcel No. 1
	Parcel_2-name	All files and documents related to Parcel No. 2

	Negotiations	All Owner contact and negotiations done by Right of Way (Right of Way only)
	Photographs (Dx RW Prj)	Digital photos, prints and videos
	Quantities (Dx RW Prj)	Right-of-way quantity calculations, including documentation for Payments in Lieu of Construction
Roadway (Dx Design)		Main design model, typical sections, profiles, cross section and contour files (Design Files)
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Photographs	Digital photos, prints and videos
Traffic (Dx Traffic Prj)		Traffic related model files (Design Files)
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	HQ_Review (HQ Traffic Prj)	
	Signal_Cabinets (HQ Traffic Prj)	
	Photographs	Digital photos, prints and videos
Utilities (Dx Utility) (Dx Design)		Utility model files (Design Files)
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Photographs	Digital photos, prints and videos
Project_Management (Dx Proj Mgmt) (Dx Design)		
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Estimating_Data	All calculations,computer runs and data used to create the estimate
	Professional_Agreement	Consultant Agreement documents
	Proposals	Working and final design proposals
	Scope	Project description and scope
	Scheduling	Project and construction schedule
Public_Involvement (Dx Public Involve) (Dx Design)		
	Correspondence (Dx Admin Prj)	Any letters, e-mails (in RTF format) and memorandums
	Documentation (Dx Admin Prj)	All calculations,computer runs,charts, graphs,permits,maps and etc.
	Exhibits	Information such as photos and data for public exhibits
	Public_Comments	Informal and formal public comments
Visualization (Dx Visual) (Dx Design)		All files and supporting resources for visualization projects

APPENDIX C

Design File Types and Standard Naming Convention

Four primary design file types have been adopted with the new CADD standard naming convention.

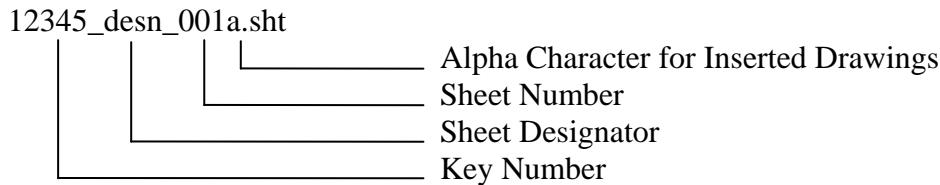
1. Border Files

Border files are MicroStation design files that contain a border template and annotation that is common to all pages within the plan set. This border file is referenced to the sheet files. Border files are stored with a .BDR file extension and are copied into the project “prj#####\Project_Development\Project_Resources” directory when the Project Creation Utility is run.

2. Sheet Files

Sheet files are MicroStation design files that contain annotation and graphics that are specific to one page in a plan set. Model files and border files are referenced to the sheet file to create a plan set drawing ready for plotting. Sheet files are created by the designer or by the InRoads “Plan and Profile Generator” and are stored in the project “prj#####\Project_Development\Plan_Sheets” directory with a .SHT file extension.

Sheet files will be named using a project key number prefix, four-letter sheet designator code, a three-digit sheet number and an alpha character used only if the sheet is being inserted into an existing plan set. The three primary components will be separated by underscores in the file name, as shown below:

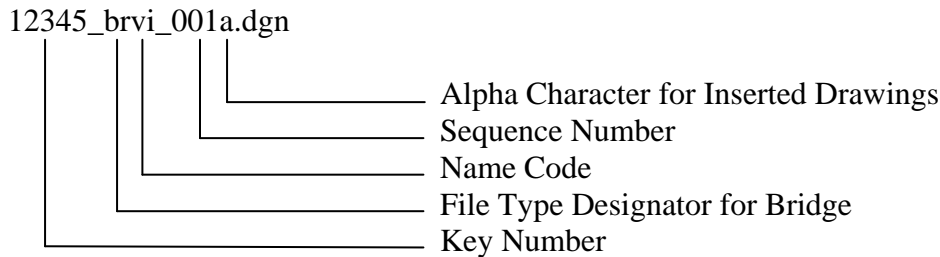


Roadway Sheet File Types

Sheet Type	Discipline	Sheet Designator Code
Roadway Detail	Roadway	RDTL
Bridge Detail	Bridge	BDTL
Traffic Detail	Traffic	TDTL
District Traffic Signal	Traffic	DTSG
Erosion Control	Roadway	EROS
HQ Signal	Traffic	HQSG
Intersection Controller Schematics	Traffic	ICSC
Roadway Materials Quantities	Roadway	RWMT
Illumination Materials	Traffic	ILMT
Bridge Materials	Bridge	BRMT
Plan	Roadway	PLAN
Plan and Profile	Roadway	PLPR
Profile	Roadway	PROF

Record of Survey	Survey	ROSV
Signal Controller Schematics	Traffic	SCSC
Signing	Traffic	SIGN
Special Drawings	General	SPEC
Title	General	TITL
Typical Section	Roadway	TYPI

There will be slight differences in the naming convention for Bridge files.



Bridge Sheet File Types

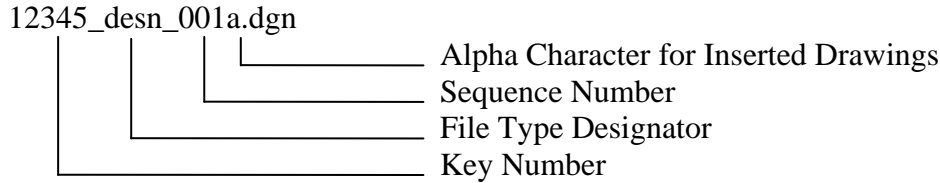
Bridge Sheet Type	Discipline	Sheet Designator Code
Situation Layout	Bridge	SI__*
Notes	Bridge	NO__*
Details	Bridge	DE__*
Rebar	Bridge	RE__*
Foundation Investigation	Bridge	FI__*
Temp Excavation Support Elev	Bridge	EL__*
Tieback Layout Plans	Bridge	PL__*
Substructure Layout	Bridge	PL__*
Superstructure Cross Section	Bridge	SE__*
Superstructure Framing Plan	Bridge	PL__*
Existing Bridge Mod.	Bridge	PL__*
Bridge Typical Roadway Sections	Bridge	SE__*
Retaining Wall Elevations	Bridge	EL__*
Retaining Wall Footing		
Reinforcement Plan	Bridge	PL__*

* The spaces in the naming convention for the Bridge sheets indicate where a two-character code will be inserted to denote the location of the bridge in the roadway project.

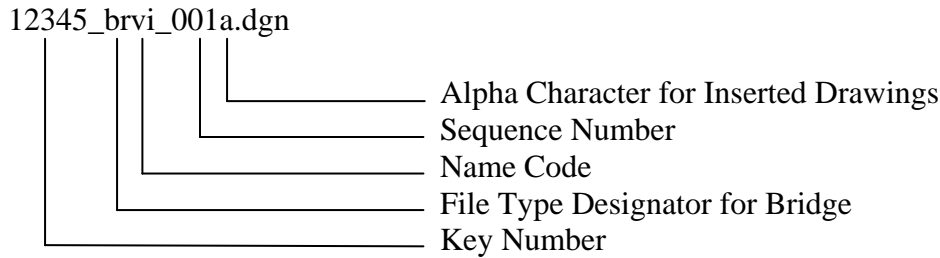
3. Model Files

Model files are MicroStation design files that contain design graphics representing existing or proposed features and conditions of the project. These files are referenced to the sheet files. Models could be referenced to a single sheet file multiple times, or may be referenced to multiple sheet files. Model files are created by the designer and stored in the appropriate section or discipline's directory in the "prj#####" \Project_Development directory with the standard MicroStation .DGN file extension.

The naming conventions that are presented below are intended for model design files. Names will include a project key number prefix, a file type designator code, three-digit sequence number, and alpha character used only for design files that are inserted into the sheet sequence at a later time. The three primary components of the name will be separated by underscores when the design file is created, as shown in the example below:



For Bridge model design files, the “br” drawing type designation will be used to indicate that the file contains bridge structure information, followed by a name code for the street, river, or other feature for which the bridge is being generated, as illustrated in the example below:



Design Model Types

File Type	Discipline or Section	Type Designator
Border	All	bord
Design	Roadway	desn
Details and Diagrams	All	detl
Foundation Investigation	Materials	finv
Hydraulics	Hydraulics	hydr
Illumination	Traffic	illm
Landscape	Roadway	land
Minor Structures	Roadway	mstr
Profile	Roadway	prof
Record of Survey	Right-of-Way	rsrv
Right-of-Way	Right-of-Way	row
Signals	Traffic	sgnl
Signing and Pavement Marking	Traffic	sign
Soils Profile	Materials	soil
Source	Plat Materials	plat

Source	Reclamation Plan Materials	recl
Special Map	All	smap
State Maintenance Group	Maintenance	smgr
Structures	Bridge	br__*
Topography	Survey	topo
Total Ownership Map	Roadway	omap
Typicals	Roadway	typi
Utilities	Roadway	util
Vicinity Map	All	vmap
Work zone Traffic Control	Traffic	traf
X-Section	Roadway	xsec
Vicinity Map	General	vmap
Total Ownership Map	General	omap
Special Map	General	smap

* The spaces in the naming convention for the Bridge sheets indicate where a two-character code will be inserted to denote the location of the bridge in the roadway project.

4. Standard Drawing files

Standard drawings are design files that contain completed design standards that are used repetitively in plan sets and have their own special border sheets. These drawings are inserted, without modification, directly into the plan sets. Standard drawings are stored on the ITD web page in PDF format and are available in MicroStation format upon request to ITD Roadway Design section.

InRoads Data File Types and Standard Naming Convention

Five primary InRoads file types have been adopted with the new CADD standard naming convention.

1. Geometry Project files

The primary working geometry project file for a roadway project will be named using the project key number and the word “work” and stored in the prj12345\Project_Development\Civil_Data directory, for example:

12345_work.rwk.

InRoads-generated data that represents final project geometry will be copied to a new geometry project that uses the project key number and the word “final” in its name, as shown below:

12345_final.rwk2.

2. Geometry Alignment files

The primary working geometry alignment file for a roadway project will be named using the project key number and stored in the prj12345\Project_Development\Civil_Data directory, for example:

12345.alg

This working file may contain many horizontal alignments and working variations of the project geometry. The alignment description should include the date, the route number and a brief explanation of the purpose. For example:

3/17/08 I-15 expansion

Horizontal alignments are generally used to represent geometry of the centerline of both existing and proposed routes. Horizontal alignment will be named using the route number or name. For example:

US-20
└────────── Route Number

When alternate horizontal geometry alignments become necessary during the course of a roadway project, their names will consist of the name of the route, an underscore character, the letters “alt” to designate that the file contains alternate geometry and a sequencing number:

US-20_alt1
└──┬────────── Sequence Number
 └──┬──────── Alternate
 └── Route Number

For final horizontal alignments simply add the word “final” to the name to indicate that the horizontal alignment represents the final vertical geometry as shown below:

US-20_final
└────────── Final Horizontal Alignment

Vertical alignments are children of the horizontal alignment. Each parent alignment may have several “children” and their names only need to designate the difference between versions or revisions. Vertical alignments will be named “alt” with a sequencing number to designate different alternates as shown below:

alt1
└────────── Vertical Alignment with Sequencing Number

For final vertical alignments simply use the word “final” in the name to indicate that the vertical alignment represents the final vertical geometry as shown below:

final
└────────── Final Vertical Alignment

Alignments for streets or cross streets will include the street name. Alternate alignments for streets will include the “_alt” designation and final alignments for streets will include “_final” in their names as shown below:

broadway.alg
_____ Street Name

broadway_alt1.alg
_____ Sequence Number
_____ Alternate
_____ Key Number

broadway_final.alg
_____ Final Alignment Designator
_____ Street Name

Alignments for ramps will include the name of the street to which the ramp will connect, an underscore, and a two-letter code representing the terminal points of the ramp. Alternate alignments for ramps will include a “_alt” designation and final alignments for streets will include “_final” in their names as shown below:

broadway_ab.alg
_____ Ramp Code
_____ Street Name

broadway_ab_alt1.alg
_____ Alternate
_____ Ramp Code
_____ Street Name

broadway_ab_final.alg
_____ Final Alignment Designator
_____ Ramp Code
_____ Street Name

3. Surface files

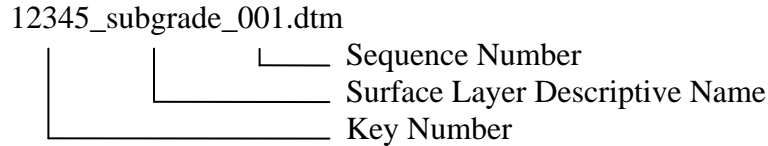
Original ground surface names will include the project key number, the descriptive name “orig” to indicate that the surface represents original ground and a 3 digit number to indicate the surface sequence. Original ground surface files will be stored in the prj12345\Project_Development\Location directory.

12345_orig_001.dtm
_____ Sequence Number
_____ Original Ground Designator
_____ Key Number

The description will include the date, the route number and a brief description of the surface, as shown below:

3/17/03 I-15 original ground surface

The surface files that are created during the design process will also use this convention with a descriptive name indicating the design layer the surface represents and a 3 digit number to indicate the surface sequence. These files will be stored in the prj12345\Project_Development\Civil_Data directory.

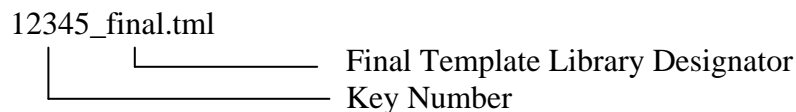
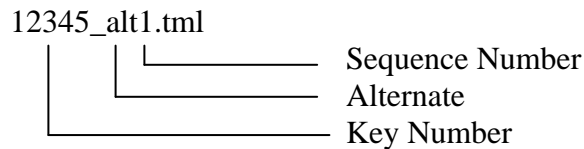
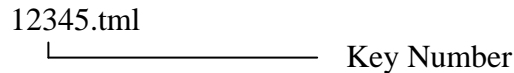


The surface description will include the date, the route number and a brief explanation of the surface, as shown in the example below.

3/17/03 I-15 mainline subgrade surface

4. Template Libraries

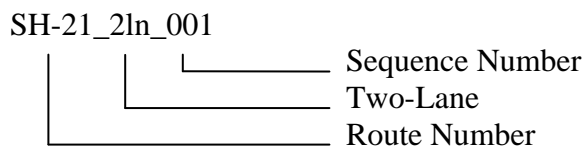
Template library names will use the project key number and will be stored in the prj12345\Project_Development\Civil_Data directory. If alternate template libraries are created, the names will consist of the project key number, an underscore character, the letters “alt” to designate that the file contains alternate templates and a sequencing number. The final template libraries will include “_final” in their names as shown below:



The template library description will include the date, the route number and a brief explanation of the purpose of the template library. For example:

3/17/03 I-15 typical sections

Template names will include descriptive information, such as the route number, the number of lanes that the template will model and a sequencing number to differentiate between multiple templates. For example, a two-lane template for a section of highway on Idaho State Highway 21 could be named as follows:

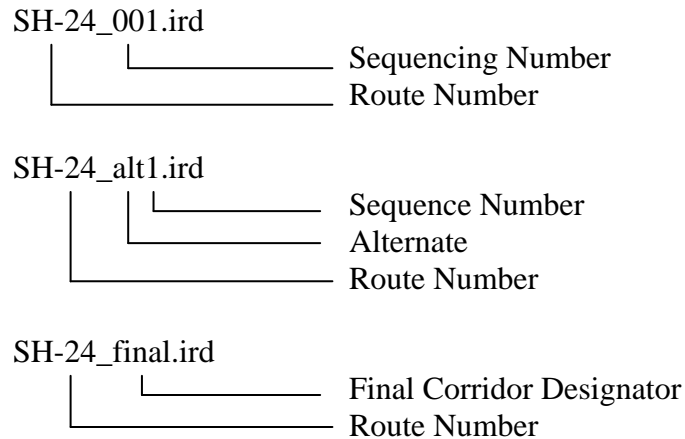


The template description will include the date, route number, short indication of the template's purpose and the station range in which the template will be used, as shown in the example below:

3/17/03 SH-95 centerline two-lane from 125+50 to 235+70

5. Corridor Definitions

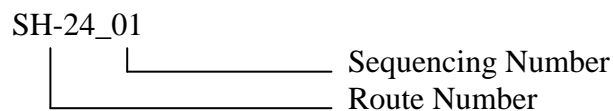
Corridors Libraries will be named using the route number, as shown below, and stored in the prj12345\Project_Development\Civil_Data directory. If alternate Corridor Libraries are created, the names will consist of the letters "alt", to designate that the file contains alternate corridors, and a sequencing number. The final corridor definition will include "_final" in their names as shown below:



The corridor library description will include the date, the route number and a brief explanation of the corridor. For example:

3/17/03 SH-24 corridor definitions

Corridor names for the roadway project will include the route number, an underscore character and a sequencing number. For example, a roadway definition for a section of highway on State Highway 24 will be named as follows:



The Corridor description will include the date, route, street or location and station range of the corridor being modeled. For example:

3/17/03 SH-95 main line from 1500+00 to 2700+00
or
3/17/03 Broadway from 240+00 to 290+00

APPENDIX D - LEVEL ASSIGNMENTS

ALIGNMENT

BRIDGE

CONSTRUCTION

DESIGN

ENVIRONMENTAL

GENERAL

BORDER

GIS

HYDROLOGY

LANDSCAPE

MATERIALS

RIGHT OF WAY

STANDARD DRAWING

MINOR STRUCTURES

SURVEY

TOPOGRAPHY

TRAFFIC

UTILITIES

VISUALIZATION

APPENDIX E PLANS EXAMPLES

The Example ITD plans are in the process of being updated to the new CADD Standards and Symbology and will be available with a future release of this manual.

APPENDIX F - LINSTYLES, CELLS, NAMED LEVELS AND BY-LEVEL SYMBOLOGY

S-1-A-1_ TOPO_SURVEY
S-1-A-2_ TOPO_SURVEY
S-1-A-3_ TOPO_SURVEY
S-1-A-4_ TOPO_SURVEY
S-1-A-5_ TOPO_SURVEY
S-1-B-1_ ALG_BORDER_GEN
S-1-B-2_ ALG_BORDER_GEN
S-1-B-3_ ALG_BORDER_GEN
S-1-B-4_ ALG_BORDER_GEN
S-1-B-5_ ALG_BORDER_GEN
S-1-C-1_ BRDG_HYDR_STRUC
S-1-C-2_ BRDG_HYDR_STRUC
S-1-D-1_ DESIGN_ROW
S-1-D-2_ DESIGN_ROW
S-1-E-1_ TRAFFIC_UTIL_ENV_Etc
S-1-E-2_ TRAFFIC_UTIL_ENV_Etc

Feature Table Report

Feature Description	Alpha Code	Point Type	Style
SURV_MON_Rebar-Six-Found	BARC	Random - Do Not Triangulate	SURV_MON_Rebar-Six-Found
SURV_MON_Spike-Set	RRSPIKE SPKS	Random - Do Not Triangulate	SURV_MON_Spike-Set
Survey Monument Bench Mark	BM BMRK	Random - Do Not Triangulate	SURV_MON_Bench-Mark
Survey Monument Cap Alloy Found	ALCAP ALCAPF	Random - Do Not Triangulate	SURV_MON_Cap-Alloy-Found
Survey Monument Cap Alloy Set	ALCAPS	Random - Do Not Triangulate	SURV_MON_Cap-Alloy-Set
Survey Monument Cap Brass Found	BCF BRCAP BRCAPF	Random - Do Not Triangulate	SURV_MON_Cap-Brass-Found
Survey Monument Cap Brass Set	BCS BRCAPS	Random - Do Not Triangulate	SURV_MON_Cap-Brass-Set
Survey Monument Cap Plastic Found	PLCAP	Random - Do Not Triangulate	SURV_MON_Cap-Plastic-Found
Survey Monument Concrete Found	CMONF	Random - Do Not Triangulate	SURV_MON_Concrete-Found
Survey Monument Control Traverse	TRAV TRV	Random - Do Not Triangulate	SURV_MON_Control-Traverse
Survey Monument GPS Control Point Found	GPS GPSF GPSX	Random - Do Not Triangulate	SURV_MON_GPS-Con-Pt-Found
Survey Monument GPS Control Point Set	GPSP GPSS	Random - Do Not Triangulate	SURV_MON_GPS-Con-Pt-Set
Survey Monument Iron Pipe Found	IRPIPEF	Random - Do Not Triangulate	SURV_MON_Pipe-Iron-Found
Survey Monument Iron Pipe Set	IRPIPES	Random - Do Not Triangulate	SURV_MON_Pipe-Iron-Set
Survey Monument Miscellaneous	CHK CKPNT HBTK IP IRPIN MISCPNT MSCMT	Random - Do Not Triangulate	SURV_MON_Misc
Survey Monument PK Found	PK PKF	Random - Do Not Triangulate	SURV_MON_PK-Found
Survey Monument PK Set	PKS	Random - Do Not Triangulate	SURV_MON_PK-Set
Survey Monument Point of Curvature	PCPNT	Random - Do Not Triangulate	SURV_MON_PC

Survey Monument Point of Intersection	PI PIPNT	Random - Do Not Triangulate	SURV_MON_PI
Survey Monument Point of Tangency	PTPNT	Random - Do Not Triangulate	SURV_MON_PT
Survey Monument Property Line Existing	LINEPL LINESPL	Breakline - Do Not Triangulate	SURV_MON_Property-Line-Ex
Survey Monument Railroad Right-of-Way Line Existing	RRRW	Breakline - Do Not Triangulate	SURV_MON_RR-ROW-Line-Ex
Survey Monument Rebar Number Five Found	BARB BARBF BARFFV	Random - Do Not Triangulate	SURV_MON_Rebar-Five-Found
Survey Monument Rebar Number Five Set	BARSFV	Random - Do Not Triangulate	SURV_MON_Rebar-Five-Set
Survey Monument Rebar Number Four Found	BARA BARAF BARFHF	Random - Do Not Triangulate	SURV_MON_Rebar-Four-Found
Survey Monument Rebar Number Four Set	BARSHF	Random - Do Not Triangulate	SURV_MON_Rebar-Four-Set
Survey Monument Right-of-Way Line Existing	RW	Breakline - Do Not Triangulate	SURV_MON_ROW-Line-Ex
Survey Monument Right-of-Way Line Existing with Fence	RWF	Breakline - Do Not Triangulate	SURV_MON_ROW-Line-Ex-With-Fnc
Survey Monument Right-of-Way Marker Found	RWM	Random - Do Not Triangulate	SURV_MON_ROW-Found
Survey Monument Section Corner	SCRN	Random - Do Not Triangulate	SURV_MON_Section-Corner
Survey Monument Section Line	SECLINE	Breakline - Do Not Triangulate	SURV_MON_Section-Line
Survey Monument Section Quarter Corner	SCRNQ	Random - Do Not Triangulate	SURV_MON_Section-Qtr-Corner
Survey Monument Section Quarter Line	QTRLINE	Breakline - Do Not Triangulate	SURV_MON_Section-Qtr-Line
Survey Monument Section Sixteenth Corner	SCRNSIX	Random - Do Not Triangulate	SURV_MON_Section-Six-Corner
Survey Monument Section Sixteenth Line	LINESIX	Breakline - Do Not Triangulate	SURV_MON_Section-Six-Line
Survey Monument Spike Found	SPIKE SPKF	Random - Do Not Triangulate	SURV_MON_Spike-Found
Survey Monument Stone Found	STONE STONEF	Random - Do Not Triangulate	SURV_MON_Stone-Found
Survey Monument Survey Line Township Range	TRLINE	Breakline - Do Not Triangulate	SURV_MON_Survey-Line-Twnshp-Rng
Survey Monument Survey Marker Miscellaneous	MARKER	Random - Do Not Triangulate	SURV_MON_Survey-Marker-Misc
Topo Building Concrete Pad	BLDPAD PADBLD	Breakline - Do Not Triangulate	TOPO_BLDG_Conc-Pad
Topo Building Deck	DECK	Breakline - Do Not Triangulate	TOPO_BLDG_Deck
Topo Building Footprint	BLD BUILD	Breakline - Do Not Triangulate	TOPO_BLDG_Footprint
Topo Building Foundation	FNDTN FOUND	Breakline - Do Not Triangulate	TOPO_BLDG_Foundation

Topo Building Grain Bin	GRBIN	Breakline - Do Not Triangulate	TOPO_BLDG_Grain-Bin
Topo Building House	HOME HOUSE	Breakline - Do Not Triangulate	TOPO_BLDG_House
Topo Building Silo	SILO	Breakline - Do Not Triangulate	TOPO_BLDG_Silo
Topo Culvert Cast Iron	CULVCIP	Breakline - Do Not Triangulate	TOPO_CULV_Cast-Iron
Topo Culvert Corrugated Plastic Pipe	CULVCPP	Breakline - Do Not Triangulate	TOPO_CULV_Corr-Plastic-Pipe
Topo Culvert Corrugated Steel Pipe	CMP CULVCMP PIPECM	Breakline - Do Not Triangulate	TOPO_CULV_Corr-Steel-Pipe
Topo Culvert Perforated Underdrain CMP	UDRNCMP	Breakline - Do Not Triangulate	TOPO_CULV_Perf-Underdrain-CMP
Topo Culvert Perforated Underdrain Other	UDRN	Breakline - Do Not Triangulate	TOPO_CULV_Perf-Underdrain-Other
Topo Culvert Perforated Underdrain PVC	UDRNPVC	Breakline - Do Not Triangulate	TOPO_CULV_Perf-Underdrain-PVC
Topo Culvert Pipe End	PEND	Random - Do Not Triangulate	TOPO_CULV_Pipe-End
Topo Culvert Pipe Miscellaneous	CULVERT CULVMISC PIPE UDRAIN	Breakline - Do Not Triangulate	TOPO_CULV_Pipe-Misc
Topo Culvert Reinforced Concrete Pipe	CULVRCP PIPEC	Breakline - Do Not Triangulate	TOPO_CULV_Reinforc-Conc-Pipe
Topo Curb and Gutter Back of Curb	BCRB CRBBK	Breakline	TOPO_CURBGTR_Back-of-Curb
Topo Curb and Gutter Curb	CURB	Breakline	TOPO_CURBGTR_Curb
Topo Curb and Gutter Face of Curb	CRBFC FCRB	Breakline	TOPO_CURBGTR_Face-of-Curb
Topo Curb and Gutter Gutter	GUT GUTTER	Breakline	TOPO_CURBGTR_Gutter
Topo Curb and Gutter Gutter Flow Line	ETWR FLCRB FLGTR GUTFL	Breakline	TOPO_CURBGTR_Gutter-Flow-Line
Topo Curb and Gutter Lip of Gutter	GUTLIP LGTR	Breakline	TOPO_CURBGTR_Lip-of-Gutter
Topo Curb and Gutter Top of Curb	CRBTP TCRB	Breakline	TOPO_CURBGTR_Top-of-Curb
Topo Electric Cable	ELINE	Breakline - Do Not Triangulate	TOPO_ELEC_Cable
Topo Electric Cable Marker	EMARK	Random	TOPO_ELEC_Cable-Marker
Topo Electric Guy Wire Power Line	EGUY GUY GUYE	Random - Do Not Triangulate	TOPO_ELEC_Guy-Wire-Power
Topo Electric Junction Box	EJBX	Random - Do Not Triangulate	TOPO_ELEC_Junction-Box

Topo Electric Manhole	JBXE PJBX EMH	Random - Do Not Triangulate	TOPO_ELEC_Manhole
Topo Electric Meter	MHE EMTR	Random - Do Not Triangulate	TOPO_ELEC_Meter
Topo Electric Miscellaneous	EMISC	Random	TOPO_ELEC_Misc
Topo Electric Power Pole	EPOLE EPOLEP POLEE PPOLE	Random - Do Not Triangulate	TOPO_ELEC_Power-Pole
Topo Electric Vault	EVAULT	Breakline	TOPO_ELEC_Vault
Topo Fence Barbed Wire	BARBFEN FENB	Random	TOPO_FENCE_Barbed-Wire
Topo Fence Cattleguard	CATTLE	Random	TOPO_FENCE_Cattleguard
Topo Fence Chain Link	CTLG CHNLKFEN	Random	TOPO_FENCE_Chain-Link
Topo Fence Combination Wire	FENCHN CMBOFEN	Random	TOPO_FENCE_Combination-Wire
Topo Fence Corner	FCOR	Random	TOPO_FENCE_Corner
Topo Fence Electric	ELECFEN	Random	TOPO_FENCE_Electric
Topo Fence Gate	FENE FGATE GATE	Random	TOPO_FENCE_Gate
Topo Fence Line	GT FEN	Breakline	TOPO_FENCE_Line
Topo Fence Other	FLINE FENCE FENM FNC	Random	TOPO_FENCE_Other
Topo Fence Silt	SILTFEN	Breakline	TOPO_FENCE_Silt
Topo Fence Snow	FNSNOW SNFNC	Random	TOPO_FENCE_Snow
Topo Fence Wood	SNOWFEN FENW WOODFEN	Random	TOPO_FENCE_Wood
Topo Gas Air Vent	GVENT	Random - Do Not Triangulate	TOPO_GAS_Air-Vent
Topo Gas Line	GLINE	Breakline - Do Not Triangulate	TOPO_GAS_Line
Topo Gas Line High Pressure	GLINEHP	Breakline - Do Not Triangulate	TOPO_GAS_Line-High-Pressure
Topo Gas Line Marker	GMARK	Random	TOPO_GAS_Line-Marker

Topo Gas Meter	GMTR	Random - Do Not Triangulate	TOPO_GAS_Meter
Topo Gas Miscellaneous	GMISC	Random	TOPO_GAS_Misc
Topo Gas Propane Tank	GPROTK	Breakline - Do Not Triangulate	TOPO_GAS_Propane-Tank
	GPRPANE		
	PTANK		
Topo Gas Riser	GRSR	Random - Do Not Triangulate	TOPO_GAS_Riser
Topo Gas Valve	GVLV	Random - Do Not Triangulate	TOPO_GAS_Valve
Topo Geology Test Hole	BH	Random - Do Not Triangulate	TOPO_GEOLOGY_Test-Hole
	DH		
	TH		
	TSTHL		
Topo Guardrail Cable	GRCABLE	Random	TOPO_GRDRAIL_Cable
Topo Guardrail Concrete	CRAIL	Random	TOPO_GRDRAIL_Concrete
	GRAILC		
Topo Guardrail End Anchor	GRANCH	Random	TOPO_GRDRAIL_End-Anchor`
Topo Guardrail Metal	GRAILM	Random	TOPO_GRDRAIL_Metal
	GRAILW		
	GRDRL		
	MRAIL		
	WBEAM		
Topo Guardrail Post	GRPOST	Random	TOPO_GRDRAIL_Guard-Post
Topo Landscape Bush	BUSH	Random	TOPO_LNDSCP_Bush
Topo Landscape Bush Boundary	BRSHL	Random	TOPO_LNDSCP_Bush-Boundary
	BUSHB		
Topo Landscape Coniferous Tree	CTREE	Random - Do Not Triangulate	TOPO_LNDSCP_Coniferous-Tree
	TREEC		
Topo Landscape Cultivation Boundary	AGR	Breakline	TOPO_LNDSCP_Cultiv-Boundary
	CULTB		
	FIELD		
	LAWN		
	LNDSCP		
Topo Landscape Deciduous Tree	DTREE	Random - Do Not Triangulate	TOPO_LNDSCP_Deciduous-Tree
	TREED		
Topo Landscape Embankment Protector	EMBNK	Random	TOPO_LNDSCP_Embank-Protector
Topo Landscape Miscellaneous	LNDSCPMSC	Random	TOPO_LNDSCP_Misc
	C		
Topo Landscape Stump	STUMP	Random - Do Not Triangulate	TOPO_LNDSCP_Stump
Topo Landscape Tree	TREE	Random - Do Not Triangulate	TOPO_LNDSCP_Tree
Topo Landscape Tree Boundary	TREEB	Random	TOPO_LNDSCP_Tree-Boundary
Topo Lighting Luminaire Pole	LMNR	Random - Do Not Triangulate	TOPO_LIGHTING_Luminaire-Pole

Topo Lighting Other	LPOLE		
Topo Miscellaneous Above Ground Fuel Tank	LIGHTNG	Random - Do Not Triangulate	TOPO_LIGHTING_Light-Other
Topo Miscellaneous Bollard	FTANKAG	Breakline - Do Not Triangulate	TOPO_MISC_Above-Grnd-Fuel-Tank
Topo Miscellaneous Feature Line	BOLLARD	Random	TOPO_MISC_Bollard
Topo Miscellaneous Flag Pole	ML	Random	TOPO_MISC_Feature-Line
Topo Miscellaneous flat Asphalt	FLAG	Random - Do Not Triangulate	TOPO_MISC_Flag-Pole
Topo Miscellaneous Flat Concrete	PADA	Breakline	TOPO_MISC_Flat-Asphalt
	CON	Breakline	TOPO_MISC_Flat-Concrete
Topo Miscellaneous Gas Pump	PADC		
	FUELP	Breakline	TOPO_MISC_Gas-Pump
	GASPMP		
	GPMP		
Topo Miscellaneous Item	MISC	Random - Do Not Triangulate	TOPO_MISC_Item
Topo Miscellaneous Mailbox	MBOX	Random	TOPO_MISC_Mailbox
Topo Miscellaneous Manhole Type Unknown	MHMISC	Random - Do Not Triangulate	TOPO_MISC_Manhole-Type-Unknown
Topo Miscellaneous Underground Fuel Tank	FTANK	Random - Do Not Triangulate	TOPO_MISC_Underground-Fuel-Tank
	FTANKUG		
	TANK		
Topo Oil Line	OLINE	Breakline - Do Not Triangulate	TOPO_OIL_Line
Topo Oil Line Marker	OMARK	Random	TOPO_OIL_Line-Marker
Topo Oil Meter	OMTR	Random - Do Not Triangulate	TOPO_OIL_Meter
Topo Oil Miscellaneous	OMISC	Random - Do Not Triangulate	TOPO_OIL_Misc
Topo Oil Riser	ORSR	Random - Do Not Triangulate	TOPO_OIL_Riser
Topo Oil Valve	OVLV	Random - Do Not Triangulate	TOPO_OIL_Valve
Topo Railroad Bridge	RRBRDG	Breakline	TOPO_RROAD_Bridge
Topo Railroad Protective Device	RRDEV	Random - Do Not Triangulate	TOPO_RROAD_Protective-Device
Topo Railroad Signal	RRLIT	Random - Do Not Triangulate	TOPO_RROAD_Signal
	RRSINGL		
Topo Railroad Signal Cabinet	RRCAB	Breakline - Do Not Triangulate	TOPO_RROAD_Signal-Cabinet
	SRCAB		
Topo Railroad Switch	RRSW	Random - Do Not Triangulate	TOPO_RROAD_Switch
Topo Railroad Top of Rail	RR	Breakline - Do Not Triangulate	TOPO_RROAD_Top-of-Rail
	RRA		
	RRB		
	TOPRAIL		
Topo Railroad Track Centerline	RRCL	Breakline	TOPO_RROAD_Centerline-Track
Topo Roadway Approach Paved Rural	APPR	Breakline	TOPO_RDWY_Approach-Paved-Rural
	APPRPR		

Topo Roadway Approach Unpaved Rural	APPRU	Breakline	TOPO_RDWY_Approach-Unpvd-Rural
Topo Roadway Approach Urban	APPRUPR	Breakline	TOPO_RDWY_Approach-Urban
Topo Roadway Centerline Dirt Road	CLDIRT	Breakline	TOPO_RDWY_Ctrline-of-Dirt-Road
Topo Roadway Centerline Road	CLRD	Breakline	TOPO_RDWY_Ctrline-of-Road
Topo Roadway Crown of Road	CRWN	Breakline	TOPO_RDWY_Crown-of-Road
	TCL		
	TCRWN		
Topo Roadway Double Yellow Lane Line	DBLYEL	Random - Do Not Triangulate	TOPO_RDWY_Dbl-Ylw-Lane-Line
Topo Roadway Edge of Driveway	EDW	Breakline	TOPO_RDWY_Edge-of-Driveway
Topo Roadway Edge of Parking Lot	APAD	Breakline	TOPO_RDWY_Edge-of-Parking-Lot
	CPAD		
	PARKING		
Topo Roadway Edge of Road	EC	Breakline	TOPO_RDWY_Edge-of-Road
	EO		
Topo Roadway Lane Line	FGLN	Random	TOPO_RDWY_Lane-Line
	FOG		
	LANELINE		
	LNLN		
	LS		
	PASLN		
	SPPAVE		
Topo Roadway Miscellaneous	RDWMSC	Random	TOPO_RDWY_Misc
Topo Roadway Shoulder	ASHLD	Breakline	TOPO_RDWY_Shoulder
	SHLD		
	SHLDR		
Topo Roadway Skip White Lane Line	SKPWHITE	Random - Do Not Triangulate	TOPO_RDWY_Skip-Wht-Lane-Line
Topo Roadway Skip Yellow Lane Line	SKPYEL	Random - Do Not Triangulate	TOPO_RDWY_Skip-Ylw-Lane-Line
Topo Roadway Solid White Lane Line	SLDWHITE	Random - Do Not Triangulate	TOPO_RDWY_Solid-Wht-Lane-Line
Topo Roadway Solid Yellow Lane Line	SLDYEL	Random - Do Not Triangulate	TOPO_RDWY_Solid-Ylw-Lane-Line
Topo Roadway Trail	BIKEPATH	Random	TOPO_RDWY_Trail
	TRAIL		
Topo Sanitary Cast Iron Pipe	SNCIP	Breakline - Do Not Triangulate	TOPO_SAN_Cast-Iron-Pipe
Topo Sanitary Ductile Iron Pipe	SNDIP	Breakline - Do Not Triangulate	TOPO_SAN_Ductile-Iron-Pipe
Topo Sanitary Plastic Pipe	SNPLP	Breakline - Do Not Triangulate	TOPO_SAN_Plastic-Pipe
Topo Sanitary Reinforced Concrete Pipe	SLINE	Breakline - Do Not Triangulate	TOPO_SAN_Reinforc-Conc-Pipe
	SNRCP		
	SPIPE		
Topo Sanitary Septic Tank	SEPTIC	Random - Do Not Triangulate	TOPO_SAN_Septic-Tank

Topo Sanitary Sewer Cleanout	SNCLNOUT	Random - Do Not Triangulate	TOPO_SAN_Sewer-Cleanout
Topo Sanitary Sewer Flowline	SANFL	Random	TOPO_SAN_Sewer-Flowline
Topo Sanitary Sewer Manhole	MH	Random - Do Not Triangulate	TOPO_SAN_Sewer-Manhole
	MHSAN		
	SNMH		
	SNMHL		
Topo Sanitary Sewer Marker	SNMARK	Random - Do Not Triangulate	TOPO_SAN_Sewer-Marker
Topo Sanitary Sewer Miscellaneous	SNMISC	Random - Do Not Triangulate	TOPO_SAN_Sewer-Misc
Topo Sanitary Sewer Vault	SNVAULT	Random - Do Not Triangulate	TOPO_SAN_Sewer-Vault
Topo Sanitary Vitrified Clay Tile	SNVCP	Breakline - Do Not Triangulate	TOPO_SAN_Vitrified-Clay-Tile
Topo Sidewalk Back	BSDWLK	Breakline	TOPO_SW_Back
	BSW		
	SDWLKBK		
Topo Sidewalk Edge	ESDWLK	Breakline	TOPO_SW_Edge
	ESW		
	FSW		
	SDWALK		
	SDWLK		
Topo Signs Billboard	BILBRD	Random - Do Not Triangulate	TOPO_SIGNS_Billboard
	SIGNBB		
Topo Signs Double Post	SIGNB	Random - Do Not Triangulate	TOPO_SIGNS_Post-Double
Topo Signs Interstate Shield	ISHLD	Random - Do Not Triangulate	TOPO_SIGNS_Shield-Interstate
Topo Signs Single Post	SIGN	Random - Do Not Triangulate	TOPO_SIGNS_Post-Single
	SIGNA		
Topo Signs State Highway Shield	SSHLD	Random - Do Not Triangulate	TOPO_SIGNS_Shield-State-Highway
Topo Signs US Highway Shield	USHLD	Random - Do Not Triangulate	TOPO_SIGNS_Shield-US-Highway
Topo Storm Sewer Catch Basin	CATBN	Random	TOPO_STORM_Catch-Basin
	CBSN		
	SSCB		
Topo Storm Sewer Channel Earthen	SSECHNL	Breakline	TOPO_STORM_Channel-Earthen
Topo Storm Sewer Channel Rigid	SSRCHNL	Breakline	TOPO_STORM_Channel-Rigid
Topo Storm Sewer Corrugated Steel Pipe	SSCMP	Breakline - Do Not Triangulate	TOPO_STORM_Corr-Steel-Pipe
Topo Storm Sewer Inlet	INLET	Breakline	TOPO_STORM_Inlet
	SSINLET		
Topo Storm Sewer Line Other	SSLINE	Breakline - Do Not Triangulate	TOPO_STORM_Line-Other
	SSPIPE		
	STLINE		
Topo Storm Sewer Manhole	MHST	Random - Do Not Triangulate	TOPO_STORM_Manhole
	SSMH		

Topo Storm Sewer Reinforced Concrete Pipe	SSMHL		
Topo Storm Sewer Rigid Plastic Pipe	STMH		
Topo Storm Sewer Vitrified Clay Pipe	SSRCP	Breakline - Do Not Triangulate	TOPO_STORM_Reinforc-Conc-Pipe
Topo Structure Bridge	SSPLP	Breakline - Do Not Triangulate	TOPO_STORM_Rigid-Plastic-Pipe
	SSVCP	Breakline - Do Not Triangulate	TOPO_STORM_Vitrified-Clay-Pipe
	BRDECK	Breakline - Do Not Triangulate	TOPO_STRUCT_Bridge
	BRDG		
	BRG		
	BRIDGE		
Topo Structure Bridge Abutment	ABUT	Breakline	TOPO_STRUCT_Bridge-Abutment
	BRABUT		
Topo Structure Bridge Pier	BRPIER	Breakline - Do Not Triangulate	TOPO_STRUCT_Bridge-Pier
	PIER		
Topo Structure Bridge Steel Rail	BRDGRAILS	Breakline - Do Not Triangulate	TOPO_STRUCT_Bridge-Rail-Steel
	BRDGRL		
Topo Structure Bridge Timber Rail	BRDGRAILT	Breakline - Do Not Triangulate	TOPO_STRUCT_Bridge-Rail-Timber
Topo Structure Canal	CNLSTR	Breakline - Do Not Triangulate	TOPO_STRUCT_Canal
Topo Structure Concrete Box Culvert	BOXCULV	Breakline - Do Not Triangulate	TOPO_STRUCT_Conc-Box-Culvert
Topo Structure Concrete Wall	CONWALL	Breakline - Do Not Triangulate	TOPO_STRUCT_Concrete-Wall
Topo Structure Headgate	HDGATE	Random - Do Not Triangulate	TOPO_STRUCT_Headgate
Topo Structure Headwall	HDWL	Breakline	TOPO_STRUCT_Headwall
Topo Structure High Water Mark	HIGHWTR	Random - Do Not Triangulate	TOPO_STRUCT_High-Water-Mark
	HIWTR		
Topo Structure Miscellaneous	STRCMISC	Random	TOPO_STRUCT_Misc
Topo Structure Retaining Wall	RWALL	Breakline - Do Not Triangulate	TOPO_STRUCT_Retaining-Wall
Topo Structure Riprap	RIPRAP	Breakline	TOPO_STRUCT_Riprap
Topo Structure Siphon	SIPH	Breakline - Do Not Triangulate	TOPO_STRUCT_Siphon
	SIPHON		
Topo Structure Spillway	SPLWAY	Breakline	TOPO_STRUCT_Spillway
Topo Structure Wingwall	BRWNG	Breakline	TOPO_STRUCT_Wingwall
	WNGWL		
	WWALL		
Topo Telephone Booth	PHONE	Random - Do Not Triangulate	TOPO_TELE_Booth
Topo Telephone Cable Marker	TMARK	Random - Do Not Triangulate	TOPO_TELE_Marker-Cable
Topo Telephone Fiber Optics Junction Box	FOJBX	Random - Do Not Triangulate	TOPO_TELE_Junction-Box-FO
	JBXFO		
Topo Telephone Fiber Optics Marker	FOMARK	Random - Do Not Triangulate	TOPO_TELE_Marker-Fiber-Optics
	SIGNFO		

Topo Telephone Guy Wire	GUYT TGUY	Random - Do Not Triangulate	TOPO_TELE_Guy-Wire
Topo Telephone Junction Box	JBXT TJBX	Random - Do Not Triangulate	TOPO_TELE_Junction-Box
Topo Telephone Manhole	MHT	Random - Do Not Triangulate	TOPO_TELE_Manhole
Topo Telephone Miscellaneous	TMISC	Random - Do Not Triangulate	TOPO_TELE_Misc
Topo Telephone Overhead Line	TLINEOH TOL	Breakline - Do Not Triangulate	TOPO_TELE_Overhead-Line
Topo Telephone Pole	POLET TPOLE	Random - Do Not Triangulate	TOPO_TELE_Pole
Topo Telephone Underground Cable	TLINE TLINEUG	Breakline - Do Not Triangulate	TOPO_TELE_Underground-Cable
Topo Telephone Underground Fiber Optics Cable	FOLINE FOLINEUG	Breakline - Do Not Triangulate	TOPO_TELE_Underground-FO-Cable
Topo Television Antenna	TVANT	Random - Do Not Triangulate	TOPO_TV_Antenna
Topo Television Cable Junction Box	JBXTV	Random - Do Not Triangulate	TOPO_TV_Cable-Junction-Box
Topo Television Cable Marker	TVMARK	Random - Do Not Triangulate	TOPO_TV_Cable-Marker
Topo Television Cable Overhead	TVLINEOH	Breakline - Do Not Triangulate	TOPO_TV_Cable-Overhead
Topo Television Cable Underground	TVLINEUG	Breakline - Do Not Triangulate	TOPO_TV_Cable-Underground
Topo Television Miscellaneous	TVMISC	Random - Do Not Triangulate	TOPO_TV_Misc
Topo Television Satellite Dish	TVSAT	Random - Do Not Triangulate	TOPO_TV_Satellite-Dish
Topo Terrain Bank Top	BANKTOP TBNK	Breakline	TOPO_TERRAIN_Bank-Top
Topo Terrain Breakline	BRK LIM	Breakline	TOPO_TERRAIN_Breakline
Topo Terrain Crest	CREST	Breakline	TOPO_TERRAIN_Crest
Topo Terrain Ditch Bottom	DBTM DTCH	Breakline	TOPO_TERRAIN_Ditch-Bottom
Topo Terrain Ditch Top	DTCHBTM DTCHTOP DTOP TDTCH	Breakline	TOPO_TERRAIN_Ditch-Top
Topo Terrain Existing Toe of Fill	FILL TOEFILL	Breakline	TOPO_TERRAIN_Toe-of-Fill-Exist
Topo Terrain Existing Toe of Slope	TOE	Breakline	TOPO_TERRAIN_Toe-of-Slope-Exist
Topo Terrain Existing Top of Cut	CUT TOPCUT TPSL	Breakline	TOPO_TERRAIN_Top-of-Cut-Exist
Topo Terrain Flowline	FL	Breakline	TOPO_TERRAIN_Flowline
Topo Terrain Spot Elevation	REGLR	Random	TOPO_TERRAIN_Spot-Elevation

	SHOT		
	SPOT		
Topo Terrain Stockpile Site	STKPIL	Random	TOPO_TERRAIN_Stockpile-Site
Topo Traffic Control Delineator	DLNTR	Random	TOPO_TRFCTRL_Delineator
Topo Traffic Control Emergency Vehicle Preemption Conduit	DEVPC	Random - Do Not Triangulate	TOPO_TRFCTRL_Emer-Veh-Prmp-Con
Topo Traffic Control Emergency Vehicle Preemption Detector	DTEVP	Random - Do Not Triangulate	TOPO_TRFCTRL_Emer-Veh-Prmp-Det
Topo Traffic Control Impact Attenuator	IMPATT	Random - Do Not Triangulate	TOPO_TRFCTRL_Impact-Attenuator
Topo Traffic Control Parking Meter	PARKMTR	Random	TOPO_TRFCTRL_Parking-Meter
Topo Traffic Signal Controller Cabinet	SCCAB	Random - Do Not Triangulate	TOPO_TRFSIGNL_Controller-Cab
	SCNTL		
Topo Traffic Signal Electrical Conduit	SC	Random	TOPO_TRFSIGNL_Conduit-Elec
Topo Traffic Signal Mast Arm Pole	MARM	Random - Do Not Triangulate	TOPO_TRFSIGNL_Mast-Arm-Pole
	POLESG		
	SGPOLE		
Topo Traffic Signal Miscellaneous	SGNLMSC	Random - Do Not Triangulate	TOPO_TRFSIGNL_Traf-Sig-Misc
Topo Traffic Signal Traffic Detector Loop	DTLOP	Breakline - Do Not Triangulate	TOPO_TRFSIGNL_Traf-Det-Loop
	LPSGNL		
Topo Water Utility Dry Well	DWELL	Random - Do Not Triangulate	TOPO_WTRUTIL_Dry-Well
Topo Water Utility Fire Hydrant	FHYD	Random - Do Not Triangulate	TOPO_WTRUTIL_Fire-Hydrant
Topo Water Utility Irrigation Box	IRBOX	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Box
	IRRBOX		
Topo Water Utility Irrigation Headwall	IRHDWL	Breakline	TOPO_WTRUTIL_Irrig-Headwall
Topo Water Utility Irrigation Manhole	IRMHL	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Manhole
	MHIRR		
Topo Water Utility Irrigation Meter	IRMTR	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Meter
Topo Water Utility Irrigation Minor Structure	IRSTR	Breakline	TOPO_WTRUTIL_Irrig-Struc-Minor
Topo Water Utility Irrigation Pipe	IRPIPE	Breakline - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Pipe
Topo Water Utility Irrigation Pump	IRPMP	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Pump
Topo Water Utility Irrigation Riser	IRRSR	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Riser
Topo Water Utility Irrigation Siphon	IRSIPH	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Siphon
Topo Water Utility Irrigation Sprinkler	SPR	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Sprinkler
Topo Water Utility Irrigation Valve	IRVLV	Random - Do Not Triangulate	TOPO_WTRUTIL_Irrig-Valve
Topo Water Utility Line	WLINE	Breakline - Do Not Triangulate	TOPO_WTRUTIL_Line
Topo Water Utility Line Marker	WMARK	Random - Do Not Triangulate	TOPO_WTRUTIL_Line-Marker
Topo Water Utility Line Test Riser	WRSR	Random - Do Not Triangulate	TOPO_WTRUTIL_Line-Test-Riser
Topo Water Utility Meter	WMTR	Random - Do Not Triangulate	TOPO_WTRUTIL_Meter
Topo Water Utility Miscellaneous	WMISC	Random - Do Not Triangulate	TOPO_WTRUTIL_Misc
Topo Water Utility Spigot	WSPGOT	Random - Do Not Triangulate	TOPO_WTRUTIL_Spigot

Topo Water Utility Swimming Pool	SWMPOOL	Breakline	TOPO_WTRUTIL_Swimming-Pool
Topo Water Utility Tank	WTANK	Random	TOPO_WTRUTIL_Tank
Topo Water Utility Valve	WVLV	Random - Do Not Triangulate	TOPO_WTRUTIL_Valve
Topo Water Utility Vault	WVAULT	Breakline	TOPO_WTRUTIL_Vault
Topo Water Utility Well	WELL	Random - Do Not Triangulate	TOPO_WTRUTIL_Well
Topo Waterway Creek	CREEK	Breakline	TOPO_WTRWAY_Creek
	STREAM		
Topo Waterway Ditch Flow Line	DFL	Breakline	TOPO_WTRWAY_Ditch-Flow-Line
	DTCHFL		
Topo Waterway Edge of Water	CANAL	Breakline	TOPO_WTRWAY_Edge-of-Water
	CHANNEL		
	EOWAT		
	RIVER		
	SHORE		
Topo Waterway Flow Line of River	RIVERFL	Breakline	TOPO_WTRWAY_Flow-Line-of-River
Topo Waterway High Water Line	HWTRLN	Breakline	TOPO_WTRWAY_High-Water-Line
Topo Waterway Lake	LAKE	Breakline	TOPO_WTRWAY_Lake
Topo Waterway Marshland	MARSH	Breakline	TOPO_WTRWAY_Marshland
Topo Waterway Miscellaneous	SPRING	Random	TOPO_WTRWAY_Misc
	WWMISC		
Topo Waterway Pond	POND	Breakline	TOPO_WTRWAY_Pond
Topo Waterway Wetland	WETLAND	Breakline	TOPO_WTRWAY_Wetland
TOPO_GEOLOGY_Test-Pit	TESTPIT	Random - Do Not Triangulate	TOPO_GEOLOGY_Test-Pit
TOPO_TERRAIN_Rock-Outcrop	OUTCRP	Breakline	TOPO_TERRAIN_Rock-Outcrop