

VDOT CADD MANUAL

CHAPTER 4

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4 CADD PRODUCTION

4.1 FOLDER STRUCTURE

The CADD Support Section has created a standard project folder structure as discussed in Chapter 2 which contains sub-folders for each discipline for the placement of CADD files developed during the course of a project. All files should be placed under the project folder in the appropriate discipline folders and sub-folders to ensure they can be located by all divisions needing to reference the files.

- Project Folders – Storage of all project related documents including current project CADD files, archived project CADD files, and current PDF files
 - Discipline folders – Storage of current CADD files generated by a discipline during the course of a project
 - Archive folder – Storage of CADD files from the milestone submittals
 - Current Drawings folder – Storage of current plan sheet PDF files generated by disciplines
- Plan File Room Folders – Storage of PDF files for approved plans noted below
 - Approved Right of Way Plans for property acquisitions including approval signature and revisions
 - Approved Construction Plans for Advertisements including approval signatures and revisions

Care must be taken to place files in the correct folders and subfolders to ensure the correct files are available in the expected location at all times during the project development process. Additional details on discipline folders and sub-folders can be found in Chapter 2.

4.2 FILE STRUCTURE

The development of a project in CADD will consist of the creation and development of a series of master files and reference files. The following are examples of files used in developing a set of Right of Way Plans and Construction Plans.

- Survey Planimetric File (contains topography)
- Survey Property Owner File (contains property owner information)
- Survey Boundary File (contains existing Right of Way and other boundary information)
- Survey Utility File (contains existing utilities)
- DTM File (contains all digital terrain model data)
- Master Design File (contains proposed alignment, roadway items, etc.)
- Utility File (contains proposed or relocated utilities)

- Hydraulics File (contains proposed drainage and stormwater management)
- ESC File (contains erosion and sediment control items)
- Environmental Commitments File (contains environmental commitments items)
- Cross Sections File (contains existing and proposed cross section data)
- Sheet Files (contains sheet border, project #, etc.)
- Traffic Engineering Files (contains pavement markings, lighting, signing, signals)
- Structure and Bridge Files (contains structure and bridge plans)
- Landscape Architecture Files (contains trees, shrubs, grass, etc.)
- Environmental Files (contains soundwalls, wetland mitigation, stream restoration)

The list above is only a brief example of the files that will be required to develop a set of plans. Depending on the complexity of the project and the disciplines involved, there will be other types of files that will be created by users for use as both master files and reference files. Additionally, due to the evolution of VDOT's CADD standards, projects which began development prior to the issue of this manual may not have all of the types of files described in this manual and/or the information may not be separated out between files in the same way as described in the current standards.

Users from individual divisions will create their own design files using the CADD Standards provided in Chapter 3. These CADD standards provide instructions and guidance on the naming and formatting of data in the CADD files including the information noted below:

- CADD Workspace
- Working Units
- Seed Files
- File Names
- Scale
- Levels and Symbology
- Text and Dimensions
- Cell Libraries

Detailed discipline specific instructions for the preparation of the individual files and components required in a set of Right of Way and Construction Plans will be addressed below.

4.3 MASTER DESIGN FILES

Master design files are the base files created by individual disciplines for the placement of that discipline's elements and features and for use of existing reference data. Care must be taken with the development of an individual discipline's master design files so that users from other disciplines will be able to clearly decipher the design intent. This includes following the

prescribed CADD standards regarding proper file naming, level structure, and the use of cells and labels. Master design files must be maintained and kept intact for each discipline over the course of the project. In general, master design files will also have other files referenced into them as described below in order to facilitate the design of a project or to ensure plan sheet clarity.

Multiple users can use and edit the master design file, though close coordination between the various files and users is critical. On large complex projects, there are often instances where an engineer may want to divide a larger project into separate segments in order to allow multiple designers to work simultaneously on the project. When several users need to develop their design in the master design file, the recommended way to accomplish this is to create multiple uniquely named master design files. It is critical that each of these separate files has a unique file name. This can be accomplished by adding a qualifier, such as a letter or number to the end of the filename (d123456desa.dgn or d123456des1.dgn). Prior to submittals, each uniquely named design file must be copied into the master design file. Once the data has been copied back into the single master design file, the uniquely named master design files should be deleted.

4.4 REFERENCE FILES

A reference file is any of a variety of file types described below which is referenced into another design file and displayed for reference purposes. Many different file types can be used as a reference files including: MicroStation and ORD DGN files, AutoCAD DWG files, DXF files, raster image files (multiple types), GIS shape files, and PDF files. This is not an exhaustive list as MicroStation and ORD support additional file types as reference data. Using reference files allows for the seamless sharing of project data between disciplines and teams while maintaining the integrity of the project data. Data developed or obtained by one group can be referenced into the design files of another group for reference purposes and for display on plan sheets and exhibits without copying or manipulating the source information. By using reference files instead of copying files from other disciplines or teams into a particular discipline's folder, the duplication of project data is avoided, and updates during file progression are readily available to all user.

For example, survey files developed during the preliminary stages of a project are referenced into the design and sheet files of many other disciplines to assist those disciplines in designing and clearly displaying project components based on the underlying survey. The designers will use survey files as reference files only (some may be nested). Likewise, the originators of the survey files may need to reference in the various discipline's design files used in the development of a set of plans in order to move and adjust text for clarity on the printed plans.

This same process is duplicated across all of the disciplines on a project and results in efficient and effective coordination during plan development.

Specific reference file attachment settings which affect the display and functionality of the reference files are discussed below.

4.4.1 LOGICAL NAMES

The logical name field should be filled out when attaching reference files to a design file. This field provides users with a clear understanding of the reference file's purpose in the design. Additionally, it must be filled out correctly for the file to print correctly. Logical names are read by the pen tables used during the printing process to change the line weights, subdue the survey, screen reference files. All MicroStation and ORD pen tables have been set up to use the reference file logical names in order to produce prints correctly.

- Link to [Reference File Logical Names and Pen Table Functions](#)

4.4.2 NESTED ATTACHMENTS

The file reference tools in MicroStation and ORD provide users with three different options for handling the nesting of reference files: no nesting, live nesting, and copy attachments. Special care must be exercised with the options selected when using nested references which include the following: display overrides, nesting depth, and new level display. The options available differ depending on whether the live nesting or copy attachments option is being used and will affect the display of the files as well as whether child references will be displayed.

In most cases, reference files are attached to master files such that only the selected reference file is attached. In this case the reference file is considered a direct reference attachment with no nesting. However, there are situations when users may want to attach a reference file directly to a master file, while also including the files attached directly to the reference file, which are considered nested references. The reference file attached directly to the master file is considered a parent reference file. The reference files attached directly to the parent reference file are considered child reference files and are the nested references in relation to the master file. MicroStation and ORD allow users to continue referencing files through this parent/child relationship to a user specified nesting depth. When the decision has been made to use live nesting or copy attachments, users must have a complete understanding of the related settings in order to achieve the desired results and to avoid creating issues with displaying and manipulating reference files.

Additional information on using the live nesting or copy attachments options with nested attachments is provided within the MicroStation and ORD help menus.

4.5 PRINTING

In order to maintain a uniform plan assembly appearance between projects, the CADD Support Section has developed printing standards for plans produced in MicroStation or ORD. These printing standards will produce “to scale” prints of the plan sheets when used with the standard sheet border cells provided by VDOT. PDFs generated by the printing process described below will yield matching “to scale” paper prints when printed on a compatible printer with a matching paper size. PDFs printed on the tabloid (11-inches by 17-inches) page selection on printers will not result in true half size reproductions due to the reduction in scale required to fit the information on the paper size.

4.5.1 REQUIRED FORMAT

As of July 1, 2009 the required file format will be PDF files for all electronic submissions to VDOT due to sealing and signing requirements. See Chapter 5 for additional information regarding these requirements and electronic delivery.

PDF version should be 1.6 or later and PDF images should be at least 400 dpi. However, 600dpi is preferable. Only single layer PDF files are accepted at this time.

Overall dimensions for PDF files should be as follows:

- Full Size - 23 inches by 35 inches
- Half Size – 11.5 inches by 17.5 inches

4.5.2 PRINT DRIVERS (PLOT CONFIGURATION FILES)

The CADD Support Section has developed the MicroStation and ORD print drivers shown below in Table 4-1. When used with the appropriate pen table and the correct reference logical names, these print drivers will produce prints matching VDOT’s print specifications. These print drivers are used to create PDF files (or TIF files for No-Plans projects) of the DGN files. These print drivers are not used to print directly from MicroStation or ORD to a printer or plotter.

Table 4-1: MicroStation and ORD Print Drivers

Print Driver Name	Division(s)	Purpose	Associated Pen Tables
Bridge Local PDF File HALF Generator.pltcfg	Structure and Bridge	Half Size Bridge Plans	bhalf.tbl
Bridge Local PDF File Generator.pltcfg	Structure and Bridge	Full Size Bridge Plans	bfull.tbl
LD Local PDF File Generator.pltcfg	Survey, Roadway, Hydraulics, Right of Way, Utilities, Environmental, Landscape	Roadway Plans Right of Way Plans Utilities Plans Environmental Plans Landscape Plans	half_v95.tbl ld_v95.tbl rw_sheet.tbl ld_v95_utilities_Color.tbl Utilities-SUE.tbl
Public Hearing PDF File Generator.pltcfg	Roadway	Public Hearing Displays	ld_v95.tbl
Tif file generator for No-Plans.pltcfg	Roadway, Hydraulics	No-Plan TIFF Images	ld_v95.tbl
Traffic Local PDF File Generator.pltcfg	Traffic Engineering	Traffic Plans	ld_v95traffic.tbl half_ld_v95traffic.tbl
VDOT Xsect PDF.pltcfg	Roadway	Cross Section Sheets	ld_xsc.tbl ld_xsc_5_scale.tbl ld_xsc_10_scale.tbl

The list above covers the primary Bentley Print Drivers (.pltcfg files) used to create PDF files. Additional .pltcfg files may appear in the plotcfg folder(s) which are used by VDOT employees to print directly to VDOT Printers/Plotters.

4.5.3 PEN TABLES

In addition to print drivers, pen tables are used to help style the printed file (whether it is printed to a PDF, or to a hard copy). The pen tables shown below in Table 4-2 were developed by the CADD Support Section and utilize the VDOT Division specific logical names assigned to reference files as described previously in Section 4.4.1 to manage settings like output line weights, colors, screening, transparency, priority, etc. Several of VDOT’s print drivers have multiple pen tables available to choose from in order to achieve a desired appearance for a specific deliverable type (Roadway Plans, Right of Way Plans, Color Utility Field Inspection Plans, etc.) or size (full size/half size).

Table 4-2: MicroStation and ORD Pen Tables

Pen Table Name	Division/Purpose
bfull.tbl	Full size Bridge prints
bhalf.tb	Half size Bridge prints
half_v95.tbl	Half size Roadway prints (Survey, Roadway, Hydraulics, Utilities, Environmental, Landscape)
ld_v95.tbl	Full size Roadway prints (Survey, Roadway, Hydraulics, Utilities, Environmental, Landscape)
half_v95traffic.tbl	Half size Traffic Engineering prints
ld_v95traffic.tbl	Full size Traffic Engineering prints
rw_sheet.tbl	Right of Way (RW) sheet prints
half_v95_row.tbl	Half size Right of Way Plan sheet prints
ld_v95_row.tbl	Full size Right of Way Plan sheet prints
ld_v95_utilities_Color.tbl	Utility (UT) sheet prints in color for UFI Meeting
Utilities-SUE.tbl	Survey check prints with utilities in color
ld_xsc.tbl	Cross Section Sheet prints
ld_xsc_5_scale.tbl	Cross Section Sheet prints Changes the line styles from dashed to solid and reduces the lines weights so the design and existing ground shows up more clearly on cross sections prints at the 5 scale or 10 scale as noted
ld_xsc_10_scale.tbl	

4.5.4 PRINT STYLES

The CADD Support Section developed Print Styles that may be selected when using MicroStation or ORD for manual printing or when using Print Organizer. These Print Styles automatically select the appropriate print driver and pen table based on the discipline or sheet type selected. Some examples of the available Print Styles are shown below.

Note: The “Xerox plotter” Print Styles shown below are only available to VDOT employees.

- RW_Sheets
- UT_Sheets
- Bridge PDF File Generator
- Bridge PDF Half-size Generator
- LD PDF File Generator
- Traffic PDF File Generator
- Xerox plotter L&D
- Xerox plotter S&B
- Xerox plotter Traffic
- Xsect VDOT 10 Scale PDF
- Xsect VDOT 5 Scale PDF
- Xsect VDOT PDF

4.5.5 PDF FILE NAMES

PDF file names are based on the project number or bridge plan number, as discussed in the section on Plan File Room Folder Structure in Chapter 2. Using the unique project number or bridge plan number in the filename is required since the PDFs of the plans will ultimately be stored in Plan File Room and provided to contractors. This unique number is helpful in searching for and identifying plans. Sheet numbers are discussed in Chapter 2E of the Roadway Design Manual and Chapter 3 of this manual.

4.5.5.1 PLANS (FOR DISCIPLINES OTHER THAN BRIDGE)

- Files will be named project number_sheet number (Example: 0123-025-102 C501_01.pdf).
- In the two series, if you have double letters put 02z in front of the sheet number (example: 0123-025-102 C501_02z 2aa.pdf).

4.5.5.2 CROSS SECTION SHEETS

- Files will be named the project number_xsheets number (Example: 0123-025-102 C501_x001.pdf).

4.5.5.3 BRIDGE PLANS

- Files will be named bridge plan number_sheet number (Example: 278-14_01.pdf).

Additional information regarding PDF file naming for No-Plan projects, Right of Way revisions, construction revisions, field changes, as built, and Plats (where applicable) is provided in Chapter 2 under Plan File Room Naming.

4.5.6 MICROSTATION AND ORD PRINTING

The basic MicroStation and ORD print functions can be used to create PDF files. The print driver configuration files and pen tables described above are provided in the VDOT CADD Workspace. Instructions for creating PDF files using the basic printing functions in MicroStation and ORD are provided at the links below.

- Link to [MicroStation Printing](#) Job Aid
- Link to [ORD Printing](#) Job Aid

4.5.7 PROJECTWISE CREATE RENDITIONS

The CADD Support Section has implemented ProjectWise's Renditions tool to allow for the automated creation of PDF prints from a plan sheet file stored in ProjectWise. This tool allows a user to select and print a group of MicroStation or ORD DGN files from the ProjectWise Explorer without opening each individual DGN file. The user is also able to select the destination folder for the PDF files with the choice of the project's Current Drawings or Plan File Room folder depending on the current stage of the project.

- Link to [Creating PDF of Sheets through Renditions](#) Job Aid
- Link to [Creating PDF of Structures and Bridge Sheets through Renditions](#) Job Aid
- Link to [Creating Cross Section Sheets through Renditions](#) Job Aid

4.5.8 MICROSTATION AND ORD PRINT ORGANIZER

The Print Organizer tool within MicroStation and ORD allows a user to setup a batch plot of a job. This allows users to create saved batch print sets by selecting a set of plan sheets to print PDF files from, applying print standards to them, and saving them as a batch print set. Once a batch print set is created, users can open them in the future and quickly create a set of PDF files from the saved list of plan sheet DGN files. Instructions for using Print Organizer are not provided since the ProjectWise Create Renditions tool is VDOT's preferred method for creating and updating the PDF files in the Current Drawings folder and Plan File Room subfolders.

4.5.9 PROJECTWISE MULTI-PRINT

The CADD Support Section has developed a process for VDOT employees using ProjectWise which allows a user to send multiple PDF files at the same time to a networked printer. Instructions are provided at the link below. This tool is for use by VDOT employees only.

- Link to [ProjectWise Multi-Print](#) Job Aid

4.6 GENERAL PLAN PRODUCTION PROCEDURES

General information and plan production procedures applicable to multiple disciplines has been provided below. For information and procedures specific or unique to a particular discipline, please refer to the discipline specific plan production procedures for that discipline.

4.6.1 CADD FILE CREATION

All CADD files (including design files, survey files, sheet files, etc.) shall be created using the proper seed files and naming convention provided in Chapter 3 of this manual. Links have been provided below to the documentation developed by VDOT for creation and naming of the CADD files.

- Link to [Design and Sheet File Names](#) (All Disciplines)
- Link to [ProjectWise CADD File Creation](#) Job Aid
- Link to [Revising Multiple Files in ProjectWise](#) Job Aid

4.6.2 LEVEL STRUCTURE AND SYMBOLOGY

A detailed discussion of VDOT's level structure and symbology is presented in Chapter 3 of this manual. The standard level structure and symbology including patterning standards are provided at the links below.

- Link to [Level Structure and Symbology](#) (All Disciplines)
- Link to [Patterning](#) Job Aid

4.6.3 STANDARD TEXT AND DIMENSION STYLES

VDOT has developed standards for placing text and dimensions based on a project's drawing scale which are available at the link below.

- Link to [Text and Dimension Styles](#) Job Aid

4.6.4 CELL LIBRARIES

Standard cells have been developed by VDOT for each discipline. These include cells representing individual elements and features as well as cells used in the patterning of areas. A list of cell libraries available for use by each discipline is provided in Chapter 3.

4.7 SURVEY PLAN PRODUCTION PROCEDURES

4.7.1 SURVEY/SUE AUTHORIZATION

All surveys for highways on all systems, including closed surveys for determination of ownership or for purchase, are to be authorized by the State Location and Design Engineer or his representative. This authorization will be in the form of a memorandum in which the scope of the project, length, type of survey required, and any other pertinent data will be outlined. Supplemental data, made available to assist in performing the survey, will be furnished also.

- Link to [Survey Manual Chapter 1](#)

4.7.2 SURVEY/SUE CADD FILE CREATION, NAMING AND DIRECTORIES

Links have been provided below to the documentation developed by VDOT for creation and naming of the Survey/SUE files.

- Link to [Survey File Creation Seeds](#) Job Aid
- Link to [Survey File Naming](#) Job Aid
- Link to [Survey File Directories](#) Job Aid
- Link to [Survey Master Survey File Creation](#) Job Aid
- Link to [Survey Planimetric Master File Creation](#) Job Aid
- Link to [Survey Control and Legend File Creation](#) Job Aid
- Link to [Survey Boundary File Creation](#) Job Aid
- Link to [Survey Property Owner File Creation](#) Job Aid
- Link to [Survey Bridge Situation File Creation](#) Job Aid
- Link to [Survey Wetland File Creation](#) Job Aid
- Link to [Survey Utility Master File Creation](#) Job Aid
- Link to [Survey Lot/Map Check File Creation](#) Job Aid
- Link to [Survey RW Color Sheet Creation](#) Job Aid

4.7.3 SURVEY/SUE LEVEL STRUCTURE AND SYMBOLOGY

The standard survey/SUE level structure and symbology are provided at the links below.

- Link to [Survey Cells and Symbols](#)
- Link to [Survey/SUE Level Structure](#)

Place all lines, cells or other graphic elements necessary to illustrate the survey in the appropriate survey files in accordance with the standard level structure. Place all items in the file using the proper levels and symbology (including ByLevel settings where possible). The

use of the OpenRoads Feature Definitions, Quantity Input tool D&C Manager (GEOPAK), or the named levels will assure that all items are in accordance with those standards. The OpenRoads Feature Definitions tools used for setting and modifying the Feature Definitions for an element are located under Tools -> Civil Geometry. The D&C Manager is located under Applications -> GEOPAK Road Tools in the pull-down menu in MicroStation or in Main Tool Box of Task Manager.

4.7.4 SURVEY/SUE PLAN STANDARD TEXT SIZES

VDOT has developed standards for placing text and dimensions in survey files based on a projects drawing scale which are available at the link below.

- Link to [Survey Text Standards](#)

4.7.5 SURVEY/SUE PEN TABLES

See Section 4.5 for printing. Survey/SUE specific styles are available at the link below.

- Link to [Survey/SUE Pen Tables](#)

4.8 ROADWAY PLAN PRODUCTION PROCEDURES

4.8.1 ROADWAY PLAN DEVELOPMENT

After notification of completed survey from the District Survey Manager or the Geospatial Program Manager, the Project Manager will request that preliminary design development begin. The letter notifying the engineer of the completed survey will include both project file name and design scale. The steps involved in the preliminary design development are outlined below. If no additional location studies are necessary, plans for a Preliminary Field Inspection can begin. The required plan work involved for the Preliminary Field Inspection (PFI), Public Hearing (PH), Field Inspection (FI), Right of Way (RW) and Advertisement Submission (ADV) milestones of the project are outlined in the [Electronic Plan Submission Process Flow Chart](#) and will be checked in accordance with the [LD-436 Quality Control Checklist](#), per Chapter 6 of this manual. Plan Scrolls and Profile Scrolls, in lieu of plan and profile sheets, are acceptable for the PFI and PH Stages, unless the Project Manager would prefer plan and profile sheets be prepared for those stages. The Lead Design Engineer is to check with the Project Manager for the roll or plan assembly requirements and scale prior to assembling documents for the PFI and PH Meetings.

4.8.2 ROADWAY PLAN CADD FILE CREATION

Links have been provided below to the documentation developed by VDOT for creation of the roadway plan files.

- Link to [Creating Plan and Profile Sheets \(ORD\)](#) Job Aid
- Link to [Creating Section Sheets \(ORD\)](#) Job Aid
- Link to [Transportation Management Plan Creation](#) Job Aid

Keep the master design files intact as your "roadway design files" for inputting roadway design items throughout the life of the project. Do not place design items or annotation for design items in the individual sheet files. However, notes, special symbols, reference notations, and symbol legends can be placed in sheet files.

This master design file will have the survey deliverables referenced to it. The survey deliverables will be read only by all users outside of the survey group. The designer must coordinate with the responsible survey group to have any text moved in the file for plan clarity purposes.

NOTE: DO NOT COPY the locked Survey File to a new file and make changes to the new file. This will create a situation where the Designer's changes will be lost when the Survey Master File is updated.

All other necessary files should be referenced to the master design file at this time.

4.8.3 ROADWAY PLAN SYMBOLOGY

Place all lines, cells or other graphic elements necessary to illustrate the design in the design file in accordance with the standard level structure. Place all proposed items in the file using the proper levels and symbology (including ByLevel settings where possible). The use of the OpenRoads Feature Definitions, Quantity Input tool D&C Manager (GEOPAK), or the named levels will assure that all items are in accordance with those standards. The OpenRoads Feature Definitions tools used for setting and modifying the Feature Definitions for an element are located under Tools -> Civil Geometry. The D&C Manager is located under Applications -> GEOPAK Road Tools in the pull-down menu in MicroStation or in Main Tool Box of Task Manager.

4.8.4 ROADWAY PLAN FRONT END SHEET SETUP

VDOT has developed detailed instructions for the creation and development of many of the front end plan sheets (Title Sheet thru Insertable Sheets) which are available at the links below.

- Link to [Title Sheet](#) Job Aid
- Link to [Location Map](#) Job Aid
- Link to [Index of Sheets](#) Job Aid
- Link to [General Notes](#) Job Aid

- Link to [Typical Sections Job Aid](#)
- Link to [Insertable Sheets Job Aid](#) (where applicable)

4.8.5 ROADWAY PLAN ANNOTATION INSTRUCTIONS

4.8.5.1 PROPOSED WORK

Annotate all proposed work on projects in lieu of designations that require legends for explanations. When possible, label each continuous proposed work item once at each side of the roadway per plan sheet. This will decrease the amount of plan clutter. See the instructions below for using Text and Dimensions to use the Place Note Command for annotating with leader lines and terminators or use the Plan View Labeling tool in GEOPAK.

- Link to [Text and Dimensions Styles Job Aid](#)

4.8.5.2 USE OF LEGENDS

Complex projects that involve dense topography and proposed work will require the use of special legends. These legends must incorporate the standard symbols as specified in the Road Design Manual. Designers must review all legends for consistency with the plans.

4.8.5.3 STANDARD SYMBOLS

Some construction items incorporate standard symbols in lieu of labeling. These symbols are included in a legend at the bottom of the plan sheet. Erosion control items, construction limits, and crosshatching for demolition of pavement are examples of such symbols.

4.8.5.4 USE OF "PROPOSED" AND "REQUIRED"

The term "Proposed" applies to roadways, lanes, interchanges and other items that are not construction items in the contract. The term "Required" applies to all paid items that the contractor is constructing.

4.8.5.5 LABELING ALIGNMENTS

Label all field survey lines "Survey Baseline." Label the alignment used to build the road "Construction Baseline." If you create an office-revised line for obtaining survey, but do not use it for construction, label it "Office Revised Baseline."

4.8.5.6 DIMENSIONING

When dimensioning such items as existing right of way, proposed pavement, medians, etc., which are consistent throughout a plan sheet, only one dimension is needed for the item on each sheet. However, in areas where there are median breaks, intersections and other configurations, additional dimensioning may be required.

4.8.5.7 ARROWS ON POWER POLES

The arrows indicating that power poles are within the construction limits are no longer required on the plans if the poles are not to be relocated.

4.8.5.8 UTILITY DATA

On projects that have an Underground Utilities Test Hole Information Sheet, the utility owners name, address and phone number are to be shown on the sheet, and only the utility owners name should appear on the plan sheet. Projects with minimal utility involvement and without a utility data sheet will continue to list all information on each plan sheet. The Test Hole Information Sheet can be found in the sheet2015.cel cell library.

4.8.5.9 UNAPPROVED STAMPS

Place the following note in each sheet design file prior to approval for Right of Way. This note can be found in the dsymgeo2015.cel library (AC=DES_PLANSHEET_UNRWC).

"THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY."

4.9 TRAFFIC ENGINEERING (TED) PLAN PRODUCTION PROCEDURES

4.9.1 TRAFFIC CONTROL DEVICE (TCD) PLAN DEVELOPMENT

This section describes procedures for creating Traffic Control Device (TCD) plans using MicroStation or ORD for VDOT. The user should also refer to VDOT's Traffic Engineering Design Manual (TEDM) for additional requirements, details, and sample plans for the preparation of TCD plans.

- Link to [Traffic Engineering Design Manual](#)

4.9.2 TCD PLAN CADD FILE CREATION

VDOT TED has developed specific detailed instructions for creating the design and sheet files for TCD plans.

- Link to [Creating Traffic Control Device Plans Job Aid](#)

4.9.3 TCD PLAN ANNOTATION

VDOT TED has developed specific text standards for use on TCD plans.

- Link to [Traffic Control Device Plan Text Standards](#)

4.9.4 TCD PLAN CELL LIBRARIES

VDOT TED has developed specific instructions which demonstrate the purpose and uses of the provided TED cell libraries for completion of the TCD plans.

- Link to [TCD Plan Cell Libraries Job Aid](#)

4.9.5 GUIDESIGN SIGN DESIGN SOFTWARE INSTRUCTIONS

VDOT TED has developed detailed instructions for using the GuideSIGN program for creating non-standard sign panels.

- Link to [GuideSIGN Sign Design Software Instructions Job Aid](#)

4.9.6 AGI 32 LIGHTING DESIGN SOFTWARE INSTRUCTIONS

VDOT TED has developed detailed instructions for using the AGI 32 program for creating lighting plans.

- Link to [AGI 32 Lighting Design Software Instructions Job Aid](#)

4.10 RIGHT OF WAY AND UTILITIES PLAN PRODUCTION PROCEDURES

4.10.1 RIGHT OF WAY AND UTILITIES PLAN DEVELOPMENT

This section describes procedures for creating Right of Way and Utilities plans using MicroStation or ORD for VDOT. The user should also refer to VDOT's Right of Way Manual and Utility Manual for additional information and requirements.

- Link to [Right of Way Manual](#)
- Link to [Utility Manual](#)

4.10.2 RIGHT OF WAY PLAN CADD FILE CREATION

VDOT Survey and Right of Way staff have developed specific detailed instructions for creating and developing the right of way plan design and sheet files for the right of way plan sheets.

- Link to [Right of Way Plan CADD File Creation Job Aid](#)
- Link to [Right of Way Revisions Job Aid](#)

4.10.3 MAINTAINING THE SURVEY PROPERTY OWNERS FILE

As discussed previously in the Survey Division procedures section, the survey property owners “spo” file, created by the Survey Division, contains only property owner information, i.e., owner’s name(s), tax map number, deed book and page, acreage, etc. The “spo” file resides in a survey property owners subfolder under the survey folder. Roadway design staff will have full access to the survey property owners subfolder so they can make the needed changes to the “spo” file but they will not be able to modify any other information in the survey folder. Full access by roadway design staff to the “spo” file and subfolder will be maintained until the completion of the UFI milestone, when the handoff of the Right of Way design files and sheet files from the roadway design staff to survey staff occurs. At that time, the survey staff will take over the files as they further develop the Right of Way Plans for Right of Way Acquisition.

Other relevant files must be referenced to the “spo” file to ensure the owner information is being located between the property lines, shows up on each plan sheet, and does not interfere with any other text, topographic, or design features.

4.10.3.1 UPDATING THE SURVEY PROPERTY OWNERS FILE

It will not be necessary to create separate property owner files when updating. All changes must be made in the original “spo” file. This file should remain referenced to the master design files and sheet files at all times so that each discipline will have the latest information. All changes are to remain on the same level, at the same size, weight, style, etc. Property owner name changes should only be performed by the Surveyor. Designers should only move text for clarity.

4.10.4 RIGHT OF WAY DATA SHEET CREATION

Detailed instructions have been developed for the creation of the Right of Way Data Sheet and are provided at the link below.

- Link to [Right of Way Data Sheet Job Aid](#)

4.10.5 RIGHT OF WAY PARCEL CHECKS AND PRINTING

Detailed instructions have been developed for the creation and printing of the Right of Way Parcel Checks and are provided at the link below.

- Link to [Survey R/W Parcel Checks and Plotting Job Aid](#)

4.10.6 UTILITY SHEETS (UT) CREATION

Detailed instructions have been developed for the creation of the utility sheets (UT) and are provided at the link below.

- Link to [Utility Sheet \(UT\) Job Aid](#)

4.11 ENVIRONMENTAL PLAN PRODUCTION PROCEDURES

4.11.1 NOISE SECTION

4.11.1.1 NOISE SECTION INTRODUCTION

The noise section will use Location and Design files as references for the noise files. The noise section will develop and submit several files to be stored in ProjectWise. The files may include a file with noise barriers only (**nUPC#**), a noise working file (**nUPC#work**), a noise graphics file (**nUPC#pic**), and others.

The files should be created using the appropriate file names and seed file (based on the survey file working units) and referencing in the appropriate design files. The noise section CADD files will use the levels and symbology (color, line style, and line weight) provided in the CADD workspace. The noise barrier files (**nUPC#**) can then be referenced back into the design file by the roadway design staff, for incorporation into the plans.

4.11.1.2 NOISE SECTION PROCEDURES

Preliminary noise abatement designs should be submitted to the roadway design staff for review of potential conflicts, such as right-of-way, utilities, drainage, or sight distance conflicts. The roadway design staff may modify the barrier design to avoid such conflicts. However, they must send the revised barrier back to the noise staff to evaluate for barrier effectiveness. There may be several iterations of this process.

The roadway design staff is responsible for developing barrier plans and profiles that meet their specifications for inclusion into the construction plan set. If a noise study is completed by the Noise Abatement Section's on-call consultant, the on-call consultant will submit the barrier plan and profile. Roadway design staff will advise the noise staff if any changes are made to the files, so the noise staff may evaluate the proposed changes to determine if this alters the results of the noise study.

4.11.1.3 NOISE BARRIER FILE

The noise barrier file (**nUPC#**) should contain only the noise barriers under consideration, to be included in the construction plans. The file prepared by noise staff may contain only line

segments which the roadway design staff may modify to use chains, arcs, curve segments, or other elements to depict the barrier.

4.11.1.4 NOISE WORKING FILE

For the noise working file (**nUPC#work**), identify all objects to be exported to the **Traffic Noise Model (TNM)**, such as existing roadways, build roadways for each alternative, noise sensitive receptor sites, potential barrier locations, terrain features, ground zones, tree zones, etc. This file is a working file. The graphics for the **noise report** may be generated from the noise working file, but will not likely contain all objects created in the work file. The noise staff must manage the available levels as appropriate, especially for multiple alternative analyses.

4.11.1.5 NOISE GRAPHICS FILE

For the noise graphics file (**nUPC#pic**), preferably use an aerial photo in the background for ease of identifying noise sensitive sites. Bring the design and survey (optional) files in as references. Identify noise study sites, barriers, and contour lines, and label existing and proposed roadways as needed. This file should be used to generate graphics for the noise study.

4.11.2 NATURAL RESOURCE SECTION

4.11.2.1 NATURAL RESOURCE SECTION INTRODUCTION

In an effort to produce consistent construction plans, the Natural Resource Section has adopted CADD Standards. The CADD Standards will apply to all construction plans designed for and by the Natural Resource Section.

CADD files for wetland mitigation, stream restoration/compensation sites and relocations that require plans should be created using the appropriate file names and seed file (based on the survey file working units) and referencing in the appropriate design files. The Natural Resource Section will use the level structures and symbology (color, line style, and line weight) provided in the CADD workspace. If necessary, the line weights may be adjusted due to the complexity of the design. The designed level structure supports our construction plans and provides consistency throughout our design process.

The Natural Resource Section views this as a sub-section of the complete CADD Manual and the complete manual offers guidelines and procedures that shall be followed for topics not covered here.

4.11.2.2 NATURAL RESOURCE SECTION SHEET NUMBERING

In accordance with sheet numbering standards as specified in the Road Design Manual and shown in Chapter 3 of this manual, each type of drawing has a specific sheet number or

number range, which must be used. For stand-alone Natural Resource Section projects, Table 4-3 below provides a list of these sheet numbering standards. Users will have to confer with the Road Designer for sheet numbers to be utilized on projects where the Natural Resource Sheets are included as a portion of the overall project.

Table 4-3: Stand-alone Natural Resource Section Project Plan Sheet Numbering Standards

Sheet Name	Sheet Number
Title Sheet	01
Location Map Sheet	01A *
Index of Sheets	01B *
Right of Way Data Sheet	01C *
Revision Data Sheet	01D *
Survey and Construction Alignment Data Sheets	01E, 01F *
General Notes	02
Typical Sections	02A (1 st Typical Sheet)
Typical Sections	02B * (Additional Typical Sheets)
Details	02C * (Summary Sheets, Detail Sheets, SWPPP Sheets, etc.)
Existing Conditions General Plan	03 *
Property Acquisition Plan (if applicable)	04RW1 – 04RW2
Plan Sheets	05, 06, 07...
Profile Sheets	05A, 06A, 07A...
Erosion and Sediment Control Sheets	05B, 06B, 07B...
Planting Sheets (including details and summaries)	08(1) – 08() **

Sheet Name	Sheet Number
Monitoring Sheets	09(1) – 09() **
Cross Section Sheets	10(1) – 10() **

* The Designer assigns the Alpha Letter to sheets.

** Planting Sheets, Monitoring Sheets, and Cross Section Sheets, when required to be incorporated into the plan assembly, are to be assigned plan sheet series numbers beginning after the last plan sheet number by the Designer.

4.11.2.3 NATURAL RESOURCE SECTION PATTERNS

The patterns used to show mitigation components shall be readable when plotted at half size. Patterns and/or fills will be placed in a pattern reference file named in accordance with the file naming conventions described above in Section **Error! Reference source not found.**

4.11.2.4 NATURAL RESOURCE SECTION MITIGATION SURVEY

Wetland mitigation sites, wetland banks, stream restoration, and stream relocation sites that require survey shall be in accordance with the Section 4.6 Survey Plan Production Procedures.

4.12 HYDRAULICS PLAN PRODUCTION PROCEDURES

The VDOT Hydraulics Division has developed detailed procedures for the creation of hydraulics, stormwater management (SWM), erosion and sediment control (ESC), and environmental commitment plan sheets (ECPS). These procedures include general information applicable to the production of all plans created by the division as well as information specific to the creation of the individual hydraulics, stormwater management, erosion and sediment control, and environmental commitment plans.

4.12.1 HYDRAULICS PLAN GENERAL INFORMATION

4.12.1.1 HYDRAULICS PLAN INTRODUCTION

For development and application of drainage, SWM and ESC design, refer to the Drainage Manual and State Hydraulics Engineer Directives (SHEDs). Instructions for VDOT policy and procedures can be found in the Location and Design Instructional & Informational Memorandum. Standard details for drainage structures, SWM features, and ESC items can be found in Section 100 of the Road and Bridge Standards. Links are provided below to each of the documents.

- Link to [Drainage Manual](#)

- Link to [L&D Instructional & Informational Memorandum](#)
- Link to [Road & Bridge Standards](#).

4.12.1.2 HYDRAULICS PLAN CADD FILE CREATION

To maintain CADD file conformity statewide, all hydraulics design files (including drainage and SWM, ESC, and Environmental design files) need to be created in accordance with this manual and shall be maintained in the Hydraulics discipline folder.

Separate CADD files are created for the items in the Hydraulics discipline folder as noted below.

- Drainage items are placed in the master hydraulics design file.
- Stormwater management basin design is generally included in the master hydraulics design file.
- Stormwater management basin details are generally provided in a separate file.
- Erosion and Sediment Control (ESC) items are placed in a separate ESC design file.
- Separate ESC design files will be required for multi-phased ESC plans.
- Environmental Commitment Plan sheets (ECPS) items are placed in separate ECPS design files and sheet files.

4.12.1.3 HYDRAULICS PLAN GENERAL NOTES

Hydraulics, SWM and ESC General Notes are available as cells for placement on the General Notes sheet in the plans. The General Notes cells are provided in VDOT's standard General Notes cell libraries.

- The General Notes cells should be reviewed against the plans and [IIM-LD-110 General Notes](#) for applicability.
- The location of the ESC legend, which is included in the available General Note cells, should be referenced on the ESC plan sheets where applicable.

4.12.1.4 HYDRAULICS PLAN INSERTABLE SHEETS

The creation, editing, and maintenance of all insertable sheets is the responsibility of the VDOT Standards/ Special Design Section. When insertable sheets are required in the plans, they are to be developed according to the instructions provided at the link below.

- Link to [Insertable Sheets](#) Job Aid

4.12.2 HYDRAULICS DESIGN AND STORMWATER MANAGEMENT

4.12.2.1 DRAINAGE DESCRIPTION GUIDELINES

Drainage description guidelines can be found in Chapter 3 of the Drainage Manual. The structure designation numbers are to be shown within ellipses. The single and double ellipses are cells located in the drainage cell library (drainage2015.cel) and are named HYD_DRAIN_DES_DB and HYD_DRAIN_DES_DB.

4.12.2.2 GRAPHICAL REPRESENTATION OF DRAINAGE AND SWM ITEMS

Graphical representations of drainage and SWM plan elements include custom line styles, cells, and labels. Instructions have been developed and are provided at the links below.

- Link to [Hydraulics Standards](#) Job Aid (*Coming Soon*)
- Link to [Hydraulics](#) Job Aid
- Link to [SUDA](#) Job Aid

4.12.2.3 GRAPHICAL REPRESENTATION OF BOX CULVERTS

Box culverts, box culvert extensions, three-sided structures and their wingwalls/ headwalls shall be drawn to scale and labeled using the appropriate symbology provided in the Hydraulics Level Structure and using the dimensions provided in Section 1000 of the Road and Bridge Standards and specific special design sheets where applicable. Quantities are obtained from tables in Section 1000 of the Road & Bridge Standards and specific special design sheets.

4.12.2.4 ENGINEERING AND PLAN PREPARATION OF SWM FACILITIES

Information on engineering and plan preparation of stormwater management (SWM) facilities can be found in the Location and Design Division Instructional and Informational Memorandum IIM-LD-195. The SWM design shall contain the following: baseline/alignment, contours of the proposed basin and their tie-in to the existing ground contours, structure details, spillway details, SWM dam details and other notes, cross-sections, profiles, typical sections, or details specifically for the basin.

4.12.2.5 UNDERDRAIN PROCEDURES

Underdrain procedures are located in Chapter 9 of the Drainage Manual.

4.12.2.6 DRAINAGE SUMMARY GUIDELINES

Drainage summary guidelines can be found in Chapter 3 of the Drainage Manual and in Chapter 2G of the Road Design Manual. An example drainage summary sheet is included in Chapter 2H of the Road Design Manual.

4.12.3 EROSION AND SEDIMENT CONTROL (ESC)

4.12.3.1 ESC PLAN FORMAT

All projects will have individual ESC Plan Sheets that show existing contours, Limits of Disturbance (LOD), and ESC measures. The project scope and complexity will determine the appropriate ESC plan. Some projects will be able to show all of the ESC measures on the construction plans. Others will require additional sheets to depict multiple phases to correctly show items needed to be installed before grubbing operations and measures to be installed as grading and drainage operations progress. For details about the ESC Program guidelines as well as the ESC plan requirements and details, see Chapter 10 of the Drainage Manual.

4.12.3.2 GRAPHICAL REPRESENTATION OF ESC PLAN ITEMS

ESC plan elements include: custom line styles, cells and labels. Instructions have been developed and are provided at the links above in Section 4.12.2.2.

4.12.3.3 ESC PLAN PATTERNING – EROSION CONTROL STONE

Placement of erosion control stone is accomplished by patterning an area. Patterning instructions, pattern names and scales can be found in the pattern section in Chapter 3 and at the link below.

- Link to [Using Patterns](#) Job Aid

To facilitate the placement of erosion and sediment control patterns, cells have been developed for many of the standard applications which define the area to receive erosion control stone. When using the erosion control stone cells, you must drop element status of the cell before patterning. Cells as listed below are from the drainage2015.cel cell library:

- HYD_EC_ECS_CL_I_EC-1_XX – EC Stone ES 1, Class I, 12” to 60”
- HYD_EC_ECS_CL_II_EC-1_XX – EC Stone ES 1, Class 2, 12” to 60”
- HYD_EC_ECS_EW-1_XX_IN – EC Stone EW 1, 12” to 30”
- HYD_EC_ECS_EW-2_XX_IN – EC Stone EW 2, 42” to 84”

4.12.4 ENVIRONMENTAL COMMITMENT PLAN SHEETS (ECPS)

4.12.4.1 ENVIRONMENTAL COMMITMENT PLAN FORMAT

All projects will have individual Environmental Commitment Plan Sheets that show Limits of Disturbance (LOD) and environmental commitments provided by the District Environmental Managers. The project scope and complexity will determine the appropriate ECPS sheets. Some projects will be able to list all commitments on the insertable sheet on the construction plans. Others will require additional sheets to depict the actual environmental commitments

shown on the individual plan sheets. For details about the ECPS Program guidelines as well as the ECPS requirements and details, see State Hydraulics Engineer Directive (SHED).

4.13 LANDSCAPE PLAN PRODUCTION PROCEDURES

It is recommended that the level structure provided in the CADD workspace be utilized.

4.13.1 LANDSCAPE PLAN LINE WEIGHTS AND LINE TYPES

4.13.1.1 LANDSCAPE PLAN BASE INFORMATION

It is recommended that all base information be shown at the line weight zero (0). Exceptions (on a case by case basis) may be a particular structure that the contractor needs to be made aware of, or significant above ground structures which impact the design. In such cases, appropriate line weight should be assigned by the designer in order to highlight the particular object or structure.

4.13.1.2 LANDSCAPE PLAN PLANT SYMBOLS

Line weights for all landscape symbols should be appropriate for clearly illustrating and distinguishing different classes of vegetation (Major Tree, Minor Tree, Shrub, etc.) on the plans, as well as clearly defining multiple layers of planting. **The specific line weight for each class of material is to be determined by the designer**, depending on the extent of background information from which landscape symbols must be distinguishable. As a general rule, use the default line weights for landscape symbols while preparing the design, then go back and adjust line weights as needed.

As an example, for plans with little or no background clutter, a line weight of three (3) would be appropriate for major trees, one (1) for minor trees, a line weight of one (1) for shrub mass/ground cover outlines, and zero (0) for shrub and ground cover patterns. The outer edge of vegetative masses may be enhanced with a heavier line weight as deemed appropriate by the designer.

4.13.1.3 LANDSCAPE PLAN PATTERNS

All area patterns should be shown at line weight zero (0). This applies to hardscape or vegetation.

4.13.1.4 LANDSCAPE PLAN DIMENSIONS & LABELING

Detail dimension lines on Detail Sheets should have a line weight of one (1). Lines for labeling detail references on plan layout sheets, bed areas, and planting items should have a line weight of five (5).

4.13.1.5 LANDSCAPE PLAN DETAIL DRAWINGS

The specific line weights for supplementary details should be determined by the designer in order to clearly and accurately illustrate the work to be performed. It is recommended that the designer begin with a line weight of one (1) and then make adjustments accordingly.

4.13.2 LANDSCAPE PLAN LEVEL STRUCTURE / COLORS

Level structure details including ByLevel symbology settings (line style, color, and line weight) are discussed in Chapter 3. VDOT has also provided detailed tables which document the levels available for use as well as the symbology applied to the items placed on those levels.

- Link to [Landscape Levels \(Named\)](#) table
- Link to [Landscape Levels \(Legacy\)](#) table

4.13.3 LANDSCAPE PLAN TEXT / LABELS

Text sizes and text line weights will vary depending on the complexity and scale of the plans and the degree of background clutter but will generally match the sizes and line weights of the text shown on the roadway plan sheets. The following is a general guideline which covers most situations for plans, details, and summaries for transportation related projects. Text, label lines and boxes may be placed on the appropriate levels shown in the levels table.

- Link to [Landscape Text/Labels](#) Job Aid

4.13.4 LANDSCAPE PLAN SYMBOLS GENERAL GUIDELINES

Landscape symbols for graphic representation may be chosen by the designer from the cell libraries available in the CADD Workspace or from custom cells created by the designer. Landscape Symbols should be of a size and design which convey to the customer and contractor an accurate and legible representation of work proposed in keeping with professional practice.

4.13.4.1 LANDSCAPE SYMBOLS FORM

The form or design of any landscape symbol should illustrate the scale, and if necessary, the texture of the object it represents as distinguishable from other objects in the landscape. For example, a landscape plan which has ten different species of major trees, such as Oak, Maple, Ash, etc. would be redundant and confusing if the designer illustrated all the trees with a circle of the same size and line weight. A better approach would be to use different symbols including, but not limited to the circle. Also, since oaks are on average a larger tree than maples, the designer may want to illustrate them with a larger symbol. When vegetative masses are intended, such as groundcover, it is not necessary to use individual symbols for each plant. In such cases, the designer should consider using an area pattern if possible.

4.13.4.2 LANDSCAPE SYMBOLS SIZE

The size of landscape symbols is relative to what the designer is trying to illustrate, and at what scale they are illustrated. But more importantly, it must also be remembered that plants are living growing things. Therefore, for the purpose of construction plans, it is not advisable to illustrate them at the size they would appear at the time of installation as they would appear too small. Neither is it advisable to show them at their ultimate size, as this would prove impractical for interpreting construction plans. In most roadway situations, therefore, the following general guidelines in Table 4-4 will help the designer begin to understand the delicate balance between scale and adequate graphic illustration. However, these guidelines are not a substitute for the designer to choose what is appropriate to their specific design.

Table 4-4: Landscape Symbols

Item	Symbol Size
Major Trees	25' - 35' diameter
Minor Trees	12' - 20' diameter
Large Shrubs	5' - 10' diameter
Small Shrubs	2' - 4' diameter
Large Ornamental Grasses	5' diameter
Ornamental Grasses	3' - 5' diameter
Groundcovers Shrub masses Reforestation masses	Use area patterns
Hardscape items	Show with recognizable symbol with detail reference, or at actual size depending on the scale.

4.14 STRUCTURE AND BRIDGE PLAN PRODUCTION PROCEDURES

The general drafting procedures and practices for the development of plans for the Structure and Bridge Division are stipulated in Chapter 1 of Part 2 of the Manual of the Structure and

Bridge Division. It is expected that the users of this manual will adhere to the provisions stated therein so that there will be uniformity for plans developed for VDOT.

Successive chapters in Part 2 of the Manual of the Structure and Bridge Division detail specific requirements for drafting and detailing various specific sheets (title sheet, interior sheets, transverse section, abutment sheets, pier sheets, etc.) including cross references with other parts of this manual and design aids to assist the designer.

The following link connects directly to Part 2, Chapter 1 - General Drafting Procedures of the Manual of the Structure and Bridge Division:

<http://www.virginiadot.org/business/resources/bridge/Manuals/Part2/Chapter1.pdf>

All parts of the Manual of the Structure and Bridge Division can be viewed at:

<http://www.virginiadot.org/business/bridge-manuals.asp>

Questions/comments may be forwarded to the Structure and Bridge Division Engineering Services Program Area using the following email address:

SBEengineeringervices@vdot.virginia.gov

4.15 PUBLIC INVOLVEMENT – PUBLIC HEARING DISPLAYS

Public hearing displays provide a vital communication tool to convey proposed roadway and trail designs to the public. This portion of the CADD Manual will establish electronic and branding procedures to facilitate the creation of displays to be shown to the public. Public hearing displays typically consist of plan views and typical sections but may also include renderings and/or photographs of the existing and proposed design in certain situations. The plan view displays should provide an intuitive picture to allow for broader communication since the general public is not familiar with reviewing highway plans. This goal will be accomplished using aerial photographs which will be overlaid with proposed design elements. These elements are shaded using transparency options and framed by standardized borders to provide consistency across the state. Typical sections will show only the idealized view and will generally convey the roadway or trail using an isometric view and shading.

VDOT has developed detailed instructions for developing public hearing displays as well as examples of displays which follow the developed standards. These public hearing display development instructions differ from the instructions provided above for standard design files and plan sheets and are provided at the link below.

- Link to [Creating Public Hearing Displays](#) Job Aid