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### **D7.01 General**

This chapter defines the standards required for preparing electronic Computer Aided Drafting and Design (CADD) data at major milestones including final delivery. These standards are intended to support the *Plans Preparation Manual* (PPM) but relate to the management of electronic files and symbology specifically. The PPM will supersede in the case of any conflicts with this manual.

The designer is responsible for resolving all omissions, deficiencies, and errors in a timely manner to prevent any negative impacts on the project schedule.

### **D7.02 Drafting Requirements**

Contract plan sets and associated deliverables shall be prepared in accordance with the *Plans Preparation Manual* and this manual. The *Plans Preparation Manual* contains guidance and requirements for content and organization of final plotted R/W and PS&E plan sets. This manual contains guidance, appearance, and standards regarding the electronic version of the plan set and the requirements and attributes specific to the electronic version.

All elements shall comply with the [Symbology 4](#) for Right of Way deliverables and [Symbology 5](#) for PS&E deliverables. Exceptions must be approved by the appropriate WSDOT Plan Review staff. For symbology not currently available in the WSDOT CAE standard environment, contact the *WSDOT HQ CAE Help Desk* ([hqcaehelpdesk@wsdot.wa.gov](mailto:hqcaehelpdesk@wsdot.wa.gov)) to submit for inclusion.

All project deliverables including supporting files shall be named and stored as defined (see [Deliverables 3](#) and [Deliverables 4](#)).

## D7.02(1) Element Symbology

All elements – cells, linework, shapes, and text, contained in the DGN file set shall be assigned an appropriate 1) feature definition, or 2) element template. If an appropriate feature definition or element template is not available in the WSDOT CAE environment, contact the *WSDOT HQ CAE Help Desk* ([hqcaehelpdesk@wsdot.wa.gov](mailto:hqcaehelpdesk@wsdot.wa.gov)).

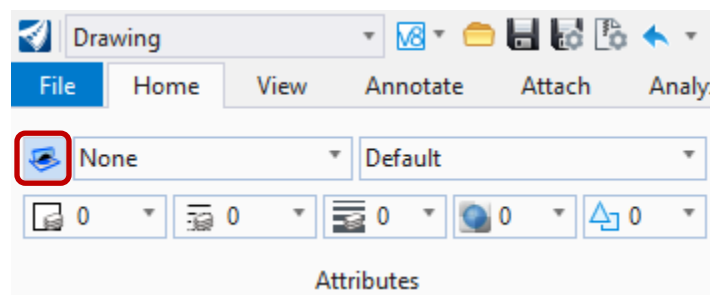
All standard elements shall utilize *ByLevel* active attributes. Selecting an appropriate feature definition or element template sets the active attributes to *ByLevel* by default. Feature definitions may use multiple element templates depending on the view (plan, profile, 3D, etc.) and/or associated annotation group(s). Element templates assign level and all active attributes. This also initiates other settings such as active cell (for point/cell related elements) and in some cases text and other functions based on the element. It also allows for more robust standards checking capabilities.

### Important Settings

Prior to drawing any elements in a DGN file, the following settings should be confirmed:

- Element Template Association **ON**

**FIG D7-1: Element Template Association in the Active Attributes tool set.**

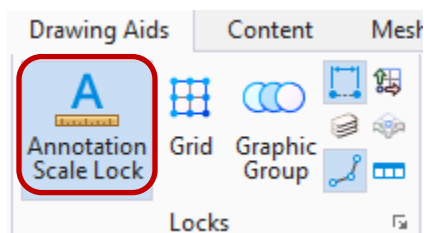


This toggle assigns the element template to new elements as they are created.

If OFF, the element template settings are used, but not retained with the element. This limits standards checking functionality and global change capability.

- Annotation Scale Lock **ON**

**FIG D7-2: Annotation Scale Lock**



This lock enables dynamic annotation control via the Drawing Annotation Scale control. If OFF, cells, line styles, and text placed will not apply drawing scale changes.

## Cells

All cells should be placed at a scale of 1 with Annotation Scale Lock ON. The resulting scale as shown in the *Element Information* dialog will be a factor of the Drawing Scale. If the cell scale is modified (for example x2), the results would be that cell will be twice the size (for example) of standard scale cells at any drawing scale.

## Line Styles

After setting the appropriate Element Template, line style placement applies the annotation scale automatically. The results in the Element Information dialog will show a line style scale of 1. The drawing annotation scale is applied internally.

## Text

All text shall be assigned an appropriate WSDOT standard Text Style.

For PS&E and Plans for Approval (PFA) plan sheets, minimum text size is 0.07" on 11" x 17" printed sheets, represented by Text Styles 07\*.

For Right of Way (R/W) plan sheets, minimum text size for existing text is 0.05", and 0.06" for new text on 11" x 17" printed sheets, represented by Text Styles 05\*, and 06\* respectively.

Text shall be all upper case.

Specific font and text size requirements for each data item can be found in the [Symbology 4](#) and [Symbology 5](#).

## User Levels/Element Templates

As users are not allowed to create new levels, *User-Level* Element Templates have been provided for project-specific requirements that necessitate the drawing of elements of non-standard, or project specific features. In the Element Template selection dialog, enter "User" in the search to see the full listing.

The use of non-standard information on user levels should be kept to a minimum and must be documented.

### **D7.02(2) Referencing WSDOT Legacy Data**

If legacy MicroStation DGN files adhering to WSDOT's previous 63-level standards or Expanded Level standards are to be used in conjunction with files in the current environment, the data should be converted, and coordinate values confirmed to match the current environment data. See [FileConversion](#) (WSDOT ProjectWise) or the *WSDOT HQ CAE Help Desk* ([hqcaehelpdesk@wsdot.wa.gov](mailto:hqcaehelpdesk@wsdot.wa.gov)) for more info.

## D7.03 Data Organization

### Base Files

Base files are typically 2D DGN files that contain coordinate (XY) based information for the plan set. This includes locations for all new data and all metadata text related to those elements and features. Except for 3D DGN for existing survey deliverables from photogrammetry and field collection of existing data. Base file purpose is for supporting plans preparation.

In CONNECT, civil containers may act as base plans in development of plan sets. See [Deliverables 6](#) for more information on civil containers.

Depending on the project footprint, activity, and other factors on any specific project, there may be one or more base plans. For small, simple projects it may make more sense to keep all coordinate-based data in one base plan. With more complicated projects it is commonly more efficient to split the coordinate-based information into multiple base plans. Typically, these multiple base plans would contain data for specific activities that translate to plan types (e.g., drainage, channelization, and site preparation) or sources of data (e.g. existing condition, alignments). A multiple base plan organization allows more than one drafter to access and work on base plan data simultaneously. Either configuration is acceptable. However, experience may prove that setting up multiple base plans in the beginning is easier to adjust to project scope creep rather than attempting to manage more than is practical in a single file.

HQ Right of Way Plans Office manages all Right of Way projects and associated plan sets. Each R/W project includes a 2D base plan if available, containing all data to support each R/W plan sheet. Sheet specific annotation is placed in the sheet DGN file.

### Sheet Layout

For sheet layout, a named boundary DGN file should be created for consistency across plan types (see WSDOT CAE training video in ProjectWise: [12\\_CreatingNamedBoundaryBasePlan.mkv](#)).

### Container Files

Plans production container files are defined as a blank file with individual files attached as references. Each plan type will have a container of referenced base files that support that discipline. Each container will control the level display for each base reference to support the discipline plan type.

Uses WSDOT 2D seed file.

### Sheet Files

Sheet files are used to create the contract plan set or any deliverable that needs to be printed using a border\title block. They are created using Named Boundaries from the project sheet layout DGN file referenced through the discipline/plan type container file. Named boundaries are used to define plan, profile, and cross section clipping areas. Named boundaries tools will create Drawing and Sheet models needed for plan, profiles, and cross section contract sheets. Each sheet shall be generated in a separate DGN file.

Detail sheets such Roadway Sections may not require Named Boundary creation. A sheet model can be created, sheet border placed, and details referenced or drawn directly in the sheet.

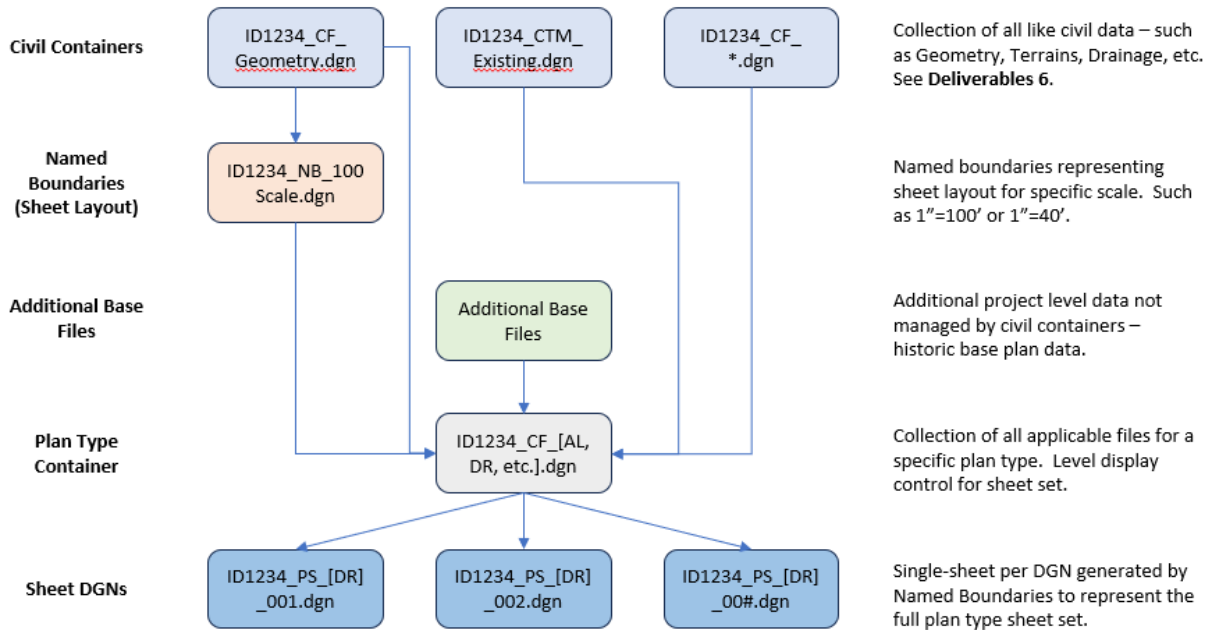
Uses WSDOT 2D seed file.

**References**

Referencing base plans, civil containers, or any model to another model/DGN file should be done by reprojecting via assigned Geographic Coordinate Systems (GCS). If both models do not have GCS assigned, references should be Coincident World to align both datasets to the same coordinate values.

Each reference may have more than one level of nested references. Be aware of the impacts to downstream customers of setting nested reference depth too shallow.

**Figure D7-1 Basic file organization to generate sheet sets**



**D7.03(1) Managing Sheet Sets/Deliverables**

During a WSDOT PS&E project, there may be multiple disciplines working on developing portions of milestone deliverables and, ultimately the complete contract plan set.

Each work area group folder such as *\Design*, *\Hydraulics*, and *\Traffic*, etc. includes a *\\_CADD* folder to contain all engineering drawings and deliverables.

The Design group folder includes a breakdown of the *\\_CADD* folder to include *\\_BasePlans* and *\Sheets*. These may be added to each of the remaining active group folders. Under the *\Sheets* folder, additional folders may be created to organize plan types and/or complete milestone deliverables. Limit additional folder depth as much as possible.

**Title Block Information**

Use ProjectWise Attributes to add/update title block information.

In ProjectWise Explorer, the Work Area Properties control project level attributes and are inherited by sheet border DGN files within the work area. For other title block entries, use the document attributes (right-click > Properties > Attributes) to populate or update values.

In the DGN file, use the Key-in to enter "Titleblock Modify". This accesses the ProjectWise attribute dialog as in the Explorer. Enter title block values and close the dialog.

Do not enter title block data using text commands in the DGN file. This does not carry to the ProjectWise document and may be in conflict when the attribute is entered properly.

### Plan Sets

When working with multiple discipline groups, here are a few methods of managing the complete plan set:

- Have the Design team manage all current final sheets within the `\Design\CADD\Sheets` folder structure.
  - This requires communication when a revision is updated, or new sheet created by a discipline is to be added to the complete set.
- Create a plan type folder in `\Design\CADD\Sheets` and place a shortcut to the discipline group's `\CADD\Sheets` folder.
  - This maintains sheet files in their owner discipline group folder.
  - Allows for Design to view all sheet files in all discipline group folders.
  - Communication is still required to ensure the right files and only the right files are included.
- Create a ProjectWise Set that includes all discipline sheet deliverables across all discipline groups.
  - This requires communication when a new sheet is added by a discipline.
  - Revisions or updates to already included files will be visible.

### Milestones

When a workflow or deliverable milestone is reached, a copy of all associated files (base, container, sheet, Excel, etc. – anything included in producing the milestone deliverable) will be copied to a new `\CADD\Deliverable_Milestone` folder. Where *Deliverable* is the specific deliverable, and *Milestone* is the state of the deliverable.

Copied files that contain references to base files (for example) will continue to reflect future changes made in those base files. To prevent that from impacting the milestone file set, right-click the new folder and select *Scan References and Linked Sets*. Set the reference search to only include files in the Milestone folder. This will redirect all references in the milestone CADD files. The `\Deliverable_Milestone` folder will represent a complete, stand-alone, deliverable package of the indicated milestone.

This can be done for Contract Plans at 30% (`\ContractPlans_PSE30`), Contract Plans at Ad Ready (`\ContractPlans_AdReady`), Plans for Approval submittals (`\PFA_Sumbmittals`) and most other deliverable milestones including Right of Way revision and other coordination efforts.

### Final Contract Plans

Final contract plans shall be stored in `Design\ContractAD` using the *Scan References and Linked Sets* utility to isolate the final deliverable set.

## Addendums

Addendum sheets are stored in a *Design\ContractAd\Addendum\_#* folder. This folder will contain copies of only the files relating to the current addendum. This includes all required referenced base files and only specifically applicable/revised sheet files. No other files shall be included.

Right-click the new addendum folder and select *Scan References and Linked Sets*. Set the reference search to only include files in the addendum folder. This will redirect all references in the addendum CADD files.

File naming conventions will comply with this manual (see [Deliverables 4](#)).

## D7.04 PS&E Deliverables

All PS&E DGN file deliverables shall comply with the [Plans Preparation Manual - Division 4](#).

Project deliverables include approval submittals such as Plans For Approval (PFA), quantity tabulations, a full set of contract plans, and stakeholder outreach materials, among various other reports and communications along the way.

Basic initial DRAFTING file set contains:

`\_CADD\BasePlans\XL1234_NB_100Scale.dgn`

`\_CADD\Sheets\AL\XL1234_CF_Alignment.dgn`

`\_CADD\Sheets\AL\XL1234_PS_ALG_[001,002,...].dgn`

### Sheet Border Dimensions (in paper units)

Sheet deliverables shall be one sheet border per DGN file, stored in the appropriate WSDOT ProjectWise work area structure.

All sheets shall use appropriate WSDOT sheet seeds for the deliverable requirements.

PS&E sheet border are in landscape orientation and measure 10.5" x 15.75" positioned in a plot limit shape to provide the standard margins on 11" x 17" paper.

PFA sheet borders are in landscape orientation and measure 10.5" x 15.75" positioned in a plot limit shape to provide the standard margins on 11" x 17" paper.

Army Corps of Engineers sheet borders are in portrait orientation and measure sheets centered on 8.5" x 11" or 11" x 17".

Sheet models shall be used for all sheet deliverables.

Sheet content shall be in accordance with the [Plans Preparation Manual](#).

All elements placed directly in the sheet model shall be at 1:1 scale.

PS&E plan sheet title blocks are managed by ProjectWise Title Block Integration (see [D7.03\(1\)](#)).

## D7.05 Right of Way Deliverables

All Right of Way DGN file deliverables shall comply with the *Plans Preparation Manual* Division 1 & 2.

### Sheet Border Dimensions (in paper units)

Sheet deliverables shall be one sheet border per DGN file, stored in the appropriate WSDOT ProjectWise work area structure.

Each sheet shall be geolocated and full scale to align with the applicable corridor(s).

Right of Way sheet borders are in landscape orientation and measure 21" x 33". Standard margins are 0.5" on all sides on 22" x 34" paper.

Each Record of Survey sheet border measures 17" x 21.5". Standard margins are 2" Left, 0.5" all other sides on 18" x 24" paper per most county requirements.

Sheet content shall be in accordance with the *Plans Preparation Manual*.

Right of Way plan sheet title blocks are managed by ProjectWise Title Block Integration (see D7.03(1)).

For additional information on Right of Way deliverable requirements, contact your region Right of Way Plans Office or the WSDOT HQ Right of Way Plans Office (<mailto:RWPlans@wsdot.wa.gov>).