

Basic Drawing Guidelines & Checklists

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OVERVIEW - SECTION 4.0

In order for projects to be shared easily it is important that the method of drafting and structure of the drawing set be standardized. These standards are applicable to projects prepared by and for Denver Water; however, there may be instances where a variance from these standards is necessary. Variances to the CAD Standards shall be submitted in writing to the Denver Water Engineering Technical Support Supervisor (CAD Manager).

Projects and CAD drawings shall be set up using the Sheet Set Manager. Drawings shall maintain a defined coordinate system in order to allow existing conditions and design information to translate accurately into the GIS system.

See [Section 5.0 – Example Sheets](#) for a representation of each of the following lists.

GENERAL STARTUP CHECKLIST

- Start or create drawings using the Sheet Set Manager
 - [see [Section 7.0 – Sheet Set Manager](#)]
- Fill out Drawing Properties (as-built plans only)
 - [see [Section 15.0 – DW's Tool Palettes](#)]
- Set Coordinate System
 - [see [Section 11.0 – Coordinate Systems](#)]
- Set drawing scales – Model Space and Paper Space viewports
 - [see [Section 13.1 – Model/Paper Space and Annotation Scales](#)]
- Attach XREF's as overlays with relative pathing
 - [see [Section 9.2 – External References \(XREF's\)](#)]
- Use DW standard layers*, colors, and linetypes
 - [see [Section 12.0 – Layers and Linetypes](#)]
- Use DW standard text and dimension styles
 - [see [Section 13.0 – Labeling and Annotation Tools](#)]
- Maintain the use of DW standard symbols and blocks
 - [see [Section 14.0 – DW Standard Symbols and Blocks](#)]
- Use a separate layout for each sheet, multiple layouts are permitted in a single drawing
- Where abbreviations are used, refer to the Denver Water Engineering Standards (ES) and/or Capital Projects Construction Standards (CPCS)
- Spell check all sheets
- Plot using *DW Engineering.ctb*
 - [see [Section 16.1 – DW's Plot Styles \(CTBs\)](#)]

*NOTE: Do not draw on layer 0 or Defpoints

TITLE BLOCKS

Drawings should be started using a predefined Sheet Set Manager (SSM), which automatically references the Denver Water title blocks in the 2016 templates. Use the SSM to edit title block and cover sheet information [see [Section 7.0 – Sheet Set Manager](#)].

Always check the subsections located under [Section 5.0 – Example Sheets](#) for specifics.

All Denver Water title blocks shall contain the following items (from top to bottom):

- Denver Water Logo – imbedded, not editable
- Consultant Logo (if applicable)
- Professional Engineer's Stamp, if applicable
- Project Title – edit using SSM
- Project Description – edit using SSM
- Service Address – edit using SSM
- Reference to DW Standards (ES and/or CPCS depending on scope of work) – imbedded, not editable
- Sign off block for Milestone Review/Revision Block/Change Orders/Addendums – edit using SSM
- Scale – imbedded, not editable
- Appropriate coordinate system
- Project Tracker Number (PT NO) – edit using SSM
- Drafter, Checker, Approver, and As-Built Drafter's last name – edit using SSM
- Date – see example sheets for editing
- As-Built Date – edit using SSM
- Drawing Title (Sheet Title) – edit using SSM
- Sheet Numbers (Sheet # of # Sheets – the cover shall be Sheet 1) – edit using SSM

ATTENTION

DO NOT explode title blocks or overwrite attribute fields with text. See [Section 7.0 – Sheet Set Manager](#) for editing Sheet Set Properties; to add company logos insert them as a block on the G-ANNO-LOGO layer, and situate them in the designated area of the title blocks.

COVER SHEET & GENERAL DRAWING GUIDELINES

Most plan sheets should contain the following information. Check the subsections located under [Section 5.0 – Example Sheets](#) for specifics:

- Cover Sheet Information
 - Sheet 1 – edit using SSM
 - Denver Water – Denver, Colorado – imbedded, not editable
 - Project Title– edit using SSM
 - Project Description – edit using SSM
 - Contract Number or Project Tracker Number (based on scope of work) – edit using SSM
 - Location Map
 - Vicinity Map
 - North Arrow
 - Project contact info
- Index of Sheets / Drawing Index (Cover Sheet preferred if possible)
- General Notes
- Plan Legend (Symbols and Abbreviations)
- Datum information, including:
 - Vertical Datum:
 - Benchmark: reference number, description, location, and elevation
 - Coordinate System name/Datum name
 - Horizontal Datum:
 - Basis of Bearing description
 - Description of the monuments used for basis of bearing
 - Coordinates of each monument used for basis of bearing
 - Bearing and Distance between the two monuments
 - Source of coordinates (Published, GPS, etc.)
- Materials List (if applicable)
- Fire Flow Data (if applicable)
- Fire Hydrant Note (if applicable)
- Professional Land Surveyor (PLS) and/or Professional Engineer (PE) seal (if applicable)
- Contract/Project Numbers (City Pipe and Capital Projects)

GENERAL PLAN SET GUIDELINES

Most plan sheets should contain the following information. Check the subsections located under [Section 5.0 – Example Sheets](#) for specifics:

- Define Coordinate System
- Adjoining sheets/views must use match lines at an even station with the sheet number referenced
- Dimensioning, within profiles, between features shown on separate sheets should be shown with double arrowheads
- Location, dimensions and labels of dedicated streets, easements, DW Property Boundary, and right-of-ways (ROW)
- Plan views should have a North arrow with the scale noted with Plan Title Standard Block (include contour interval (CI) when contours are shown in Plan View)(if applicable)
- Utility Notification Center of Colorado “Call Before You Dig” note (Cover Sheet only)
- North should be shown at a 90 degrees increment or “building” North, as a general rule
- Lots to be served
- Existing and proposed curb and gutter
- Existing and proposed utilities
- Existing and proposed utility appurtenances such as vaults, catch basins, traffic islands, retaining walls, detention ponds, footers, etc.
- Proposed alignment, with stationing, of water mains and/or conduits and the location of proposed facilities such as valves, fire hydrants, fittings, etc.
- Location and size of taps, services, stub-ins, curb stops or property line valves, and meters for fire service lines and domestic connections. A typical blow-up detail may be used, provided exceptions to the typical detail are clearly identified on the plan
- References to applicable Denver Water Standard ES Drawing number or CPCS detail number
- Proposed elevations, upstream and downstream hydraulic grade line, and pressure on Pressure Regulating Valves (PRV)
- Profile views on plans for water mains 16-inch or larger
- Where applicable, profile views are shown below plan views; the plan and profile views should be aligned so that the improvement is in direct relationship between the two views
- Add standard plan & profile notes

SURVEY CONTROL GUIDELINES

Survey control information shall be included in every plan set. Utilize Data Shortcuts and x-referencing (XREF or XR) [see [Section 9.0 – Sharing Project Data](#)].

ALL EXTERNAL SURVEYS

- Defined Coordinate System
- Street names must be shown
- Description of every monument (size, type, construction, markings, cased, buried, surface brass cap, etc.)
- Range lines for survey's within Denver City limits
- Coordinates for each monument, which must include Northing and Easting
- Bearing and distance between two monuments, and distance from offset monument (if any) to the intersection
- Curve data: radius, delta angle, and arc length on any curving monument lines or baselines
- Bearing and distance and/or dimension from monument line to construction baselines
- Station at each intersection and PCs and PTs of curving monument lines (no stationing that starts at the property line, end of existing paving, or other indeterminate point)
- Description and elevation of any site Benchmarks or Control Points with elevation
- Dimension from the monument line to right-of-way line on each street; if variable, show dimension at each end of block
- Professional Land Surveyor (PLS) stamp (the stamp must be signed if plans are complete)
- Current contact information for PLS

CITY PIPE SURVEY MAPS (INTERNAL USE ONLY)

Property Requirements

- Public ROW limits
- Denver Water property lines
- Easements, existing and proposed lines
- Flowline with distance from property line or edge of asphalt
- Type of curb and gutter (Hollywood, 6-inch vertical with concrete pan, etc.)
- Street names
- Range Points and Range Lines (tied out for post construction replacement also, if needed)
- Aliquot Section Corners and Aliquot Lines (only if range points are missing)
- Pertinent information pertaining to surveyor, and horizontal and vertical datum
 - GPS Coordinate System used
- Additional City or County requirements

Drafting/Interference Requirements

- Horizontal distance (dimension) to all utilities from property line or ROW
- Roadway centerline and flowline, include lane marking for traffic plan
- Size of vaults and manholes (inside dimensions or circumference)
- Vertical and horizontal alignment of utilities, including, but not limited to, gas, fiber optic, electrical (overhead and underground), water, sanitary sewer, sanitary sewer forcemain, and storm sewer extending upstream and downstream of the proposed limits of work
- Type and size of storm and sanitary sewer mains
- Rim and invert elevation on all storm and sanitary manholes extending upstream and downstream of the proposed limits of work
- Upstream and downstream utility appurtenances
- One-foot contours with centerline, flowline, and property lines defined (depending on project site)
- Scale and North arrow
- Note any abandoned utilities in the area, and existing water mains including valves, hydrants, and the size and type of pipe
- Water main crossings with utilities including high pressure gas, underground electric lines
- Verify and document any discrepancies between field investigation and GIS data (import GIS into drawings for comparison)**
- Determine if conduits are connected to mains, if they are not connected, it should be clearly shown
- Surface material limits including, but not limited to: concrete, asphalt, or gravel, etc. Also note if it is new asphalt or chip seal
- Notate trees, fences, retaining walls, railroad tracks, light rail tracks, drainageway, detention ponds, ditches, tunnels, footers, wing walls, approach slabs, medians, signs, encroachments, and overhead interference
- Note of current for construction at the time of the field survey

EROSION CONTROL PLANS

Erosion Control is project and jurisdiction dependent. Plans shall be developed in accordance with the permitting Jurisdiction's Grading, Erosion, and Sediment Control (GESC) requirements. Best Management Practices (BMPs) shall be in conformance with the current, applicable drainage criteria within the project county/counties.

References include but are not limited to:

- Urban Drainage and Flood Control District (<http://www.udfcd.org/>)
- Southeast Metro Stormwater Authority (<http://semswa.org>)
- Jefferson County (<http://jeffco.us/>)
- Douglas County (<http://www.douglas.co.us/>)