

Capital Projects Drafting Standards

The Capital Projects Drafting Standards provides guidance for the preparation and delivery of accurate and consistent drawings and is managed by Denver Water's Design Drafting Section. Project setup and deliverables will be established prior to project initiation and will include AutoCAD production and methods in accordance with the Denver Water CAD Standards; the project deliverable definition; the preparation of AutoCAD instructions for the project; and the establishment of project drafting standards.

Production Applications

Projects shall be produced with Denver Water's current version of AutoCAD.

The CAD Standards External Requirements (CAD Standards) shall be utilized for guidance on layering, pen settings, color setting files (CTB), coordinate system, and templates, including title borders.

When creating documentation for capital project drawings, refer to the current editions of Denver Water's Capital Projects Construction Standards (CPCS) and Engineering Standards.

Project Drawing Deliverables

A preliminary list of drawings will be prepared by Denver Water's Design Project Manager (DPM). Drawings shall not be added without the knowledge and approval of the DPM. Drawings shall be coordinated with the Drafting Supervisor or their designated representative.

Scope of Work

After a project is assigned, the Drafter will receive design data and be briefed by the DPM and/or the Drafting Supervisor. Before beginning the project, the full scope of work needs to be considered by the project Drafter. The project Drafter is responsible for Denver Water's written standards that include, but are not limited to:

- thoroughly and methodically reviewing all disciplines required to support the project.
- understanding the drawing scales required for plans, sections, elevations, profiles, and details.
- arranging the layout on the drawing so that all work lies within the work area of the sheet border.
- evenly spacing objects and minimizing white space.
- working with the DPM to determine the necessary drawings to best depict the work to be done.
- logically arranging drawings to utilize space and subject accordingly.

A project frequently requires several drawings, each of which shall be laid out as described herein and shall cover each specific discipline.

Drafting Fundamentals

Definitions

CPCS Details – Denver Water's standard design details; arranged by division and numerically sequenced with a 5-digit number. CPCS details shall be referenced in the Contract Drawings; they shall not be added to the Contract Drawings.

Plan – A drawing that depicts an object, assembly, or floor plan from above. Civil plans are the aerial (top) views; architectural plans show floor plans and roof plans; structural plans show foundation plans; mechanical plans represent work within an architectural plan or structural plan. A plan shall be placed in the top left quarter of a drawing.

Profile – A drawing showing a vertical section of pipe, ground, interference, etc, usually taken along the centerline of a construction project. Civil profiles must include existing ground surfaces and proposed ground surfaces that are created to provide vertical data along an alignment. Profiles are set up using Denver Water’s template styles.

Elevation – (Alphabetic) A view or drawing of the interior or exterior of a structure as projected onto a vertical plane. Structural and architectural elevations are the front, rear, and side of an object (e.g., a building).

Section – (Alphabetic) A drawing of an object or construction member cut through to show the interior (i.e., a linear cut through a surface). Architectural, structural, and mechanical sections are cutaway views through a structure or a view of the interior of a part or assembly.

Details – (Numeric) A large-scale architectural or engineering drawing indicating specific configurations and dimensions of construction elements. If the large-scale drawing differs from the general drawing, the large-scale drawing shall be used to clarify the general drawing.

General Drawing Information

- Do not use periods in abbreviations in the drawing.
- Periods in abbreviations shall be used only in the Project Title, to match abbreviations in the Specifications.
- Only abbreviations identified in Division 1 of the CPCS shall be used in drawing sets. Abbreviations shall be avoided in titles and used only when needed for space saving. Use of abbreviations in drawing titles must be applied consistently throughout the drawing set.
- Do not use the CU-WATR-CNTR line type when identifying the centerline of a pipe that is shows full pipe width on details, sections, and elevations; instead use layer CU-WATR-CNTR-DETL. CU-WATR-CNTR shall be used on the plan of Plan and Profiles regardless of line pipe representation.
- Hatch patterns shall be scaled to the same density throughout the plan set. This can be done by creating the hatch pattern in paper space and pushing it through to model space using CHSPACE.
- Modified CPCS details shall be approved by the DPM and shall appear in ascending numerical order at the end of the corresponding plan set discipline.
- Dimensions shall be created and kept on one of the pre-defined L100 dimension styles.
- Place a blank space underline before and after (Alt 0160) plan titles. Use PLAN Title from the *General Drafting* tab on the *Startup Tools* palette.
- Reference the Capital Projects Procedures Manual (CPPM) for instructions on issuing drawings associated with 30%-60%-90% Reviews, Final for Bid, Addendum, Final for Construction, Field Order, Request for Quotations, Work Change Directives, and Change Order Requests.
- Solid lines represent new features.
- Screened lines represent existing features.
- Use “DEMO” in front of reference notes to depict work to be demolished on demolition drawings.
- Use “EXIST” in front of reference callouts to depict existing features on new work drawings.
- When referencing drawing notes on a drawing, only the word “NOTE” and the note number shall be called out (e.g., NOTE 3, not SEE NOTE 3).

Drawing Discipline Control

Drawing sets shall adhere to the following discipline order as defined in the National CAD Standards:

- G – General
- B – Geotechnical
- D – Demolition
- C – Civil
- L – Landscape
- S – Structural
- A – Architectural
- M – Mechanical
- E – Electrical
- EI – Electrical Instrumentation
- CP – Cathodic Protection
- R – Reference/Information Only
- X – Other Disciplines

Drawing numbers shall begin with the discipline indicator followed by a dash and end in a numeric sheet count (e.g., G-1, C-1, M-1).

If drawing series are required, drawing numbers shall begin with a specific location signified by a number followed by a dash, the discipline indicator followed by a dash, and end in a numeric sheet count (e.g., 1-G-1, 2-C-1, 2-M-1).

Drawing Index

Place the drawing index on G-1. If the index is too large for G-1, place it on G-2 or on multiple drawings if necessary. To create a drawing index, access the *Sheet Set Manager (SSM)*. Right-click the project name and click *Insert Sheet List Table*. Under *Table Style Setting*, select *Table Style Name: Drawing Index*. Click *OK* and the table will appear on the drawing. The sheet set will automatically populate the drawing index.

DRAWING INDEX	
DWG NO	DWG TITLE
G-1	COVER SHEET
G-2	KEY MAP
G-3	CITY AND COUNTY OF DENVER CONSTRUCTION NOTES & DETAIL
G-4	SURVEY CONTROL PLAN
C-1	S TAMARAC DR FROM STA 0+00.00 TO STA 6+75.00
C-2	S TAMARAC DR FROM STA 6+75.00 TO STA 14+00.00
C-3	S TAMARAC DR FROM STA 14+00.00 TO STA 21+75.00
C-4	S TAMARAC DR FROM STA 21+75.00 TO STA 29+00.00
C-5	S TAMARAC DR FROM STA 29+00.00 TO STA 32+75.00
C-6	S TAMARAC DR FROM STA 32+75.00 TO STA 36+50.00
C-7	S TAMARAC DR FROM STA 36+50.00 TO STA 42+00.00
C-8	S TAMARAC DR FROM STA 42+00.00 TO STA 50+75.00
C-9	S TAMARAC DR FROM STA 50+75.00 TO STA 57+12.00
C-10	S TAMARAC DR & E PRINCETON AVE CONNECTION PLAN & PROFILE
C-11	S TAMARAC DR & E HAMPDEN AVE DEMOLITION PLAN
C-12	S TAMARAC DR & E HAMPDEN AVE CONNECTION PLAN & PROFILE
C-13	DETAILS
C-14	DETAILS
E-1	S TAMARAC DR & E HAMPDEN AVE CATHODIC PROTECTION

Lines

Lines are represented by line thicknesses and line types that signify specific features in a drawing. Denver Water indicates existing information using screened lines, which are defined in the Color Dependent Plot Style Table in Denver Water's CAD Standards, Appendix A.

Line Thicknesses

In AutoCAD, line weights are most commonly represented by colors. However, line thicknesses are also used to indicate specific information, as described herein:

- Fine lines (pen 1 width) are used for dimension lines, leader lines, extension lines, detail centerlines, and construction lines within detailed information. Fine screened lines are similar and represent existing features.
- Medium lines (pen 2 width) are used to outline new information, planes, surfaces, solid shapes, and hidden (dashed) lines. Medium screened lines are similar and represent existing features.
- Heavy lines (pen 3 and pen 4 widths) show new information or information that needs to stand out.
- Heavy bold lines (pen 5 width and heavier) are used for borders, match lines, cutting plane lines, and any objects that need to be focused upon.

Line Types

An object (continuous) line is a solid line and is used to indicate the visible edges of an object. It stands out in contrast to other lines so that the shape of an object is apparent.



A hidden line is a dashed line and is used to show surfaces, edges, or corners of an object that are hidden from view.



A centerline is a line used to show the center of holes and symmetrical features. It consists of alternate long and short dashes.



A phantom line is used to illustrate features that do not exist, such as match lines, right of ways, a ground system, future work, or an area of representation.

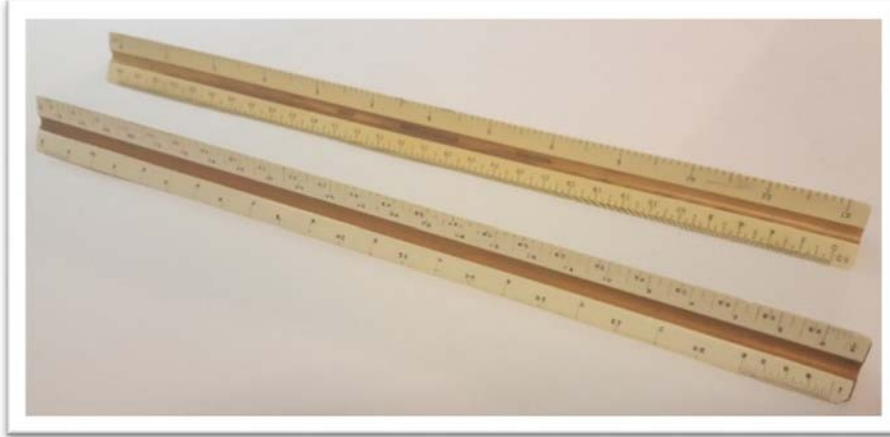


NOTE: There are additional line types that represent specific descriptions.

Denver Water has established line types, line weights, and layer names within its templates: <https://www.denverwater.org/contractors/construction-information/design-standards/cad-standards>. Each type of line represents something specific; each line must be carefully considered before being drawn.

Scales

Drawings shall be drawn **TO A SCALE**. Two types of drawing scales are used: Engineer's and Architect's scales. No other scales will be accepted. **NO SCALE** may be used if the drawing is not drawn to a scale or there are no dimensions on the drawing, but every effort must be made to draw to a scale.



- Architectural/mechanical/structural using feet and inches or fractions:
 $1/4" = 1'-0"$, $3/8" = 1'-0"$, $1/2" = 1'-0"$, $3/4" = 1'-0"$, or $1" = 1'-0"$, etc.
- Civil using multiples of 10, with divisions from 10 to 60:
 $1" = 50'$, $1" = 1000'$, or $1" = 5'$, etc.

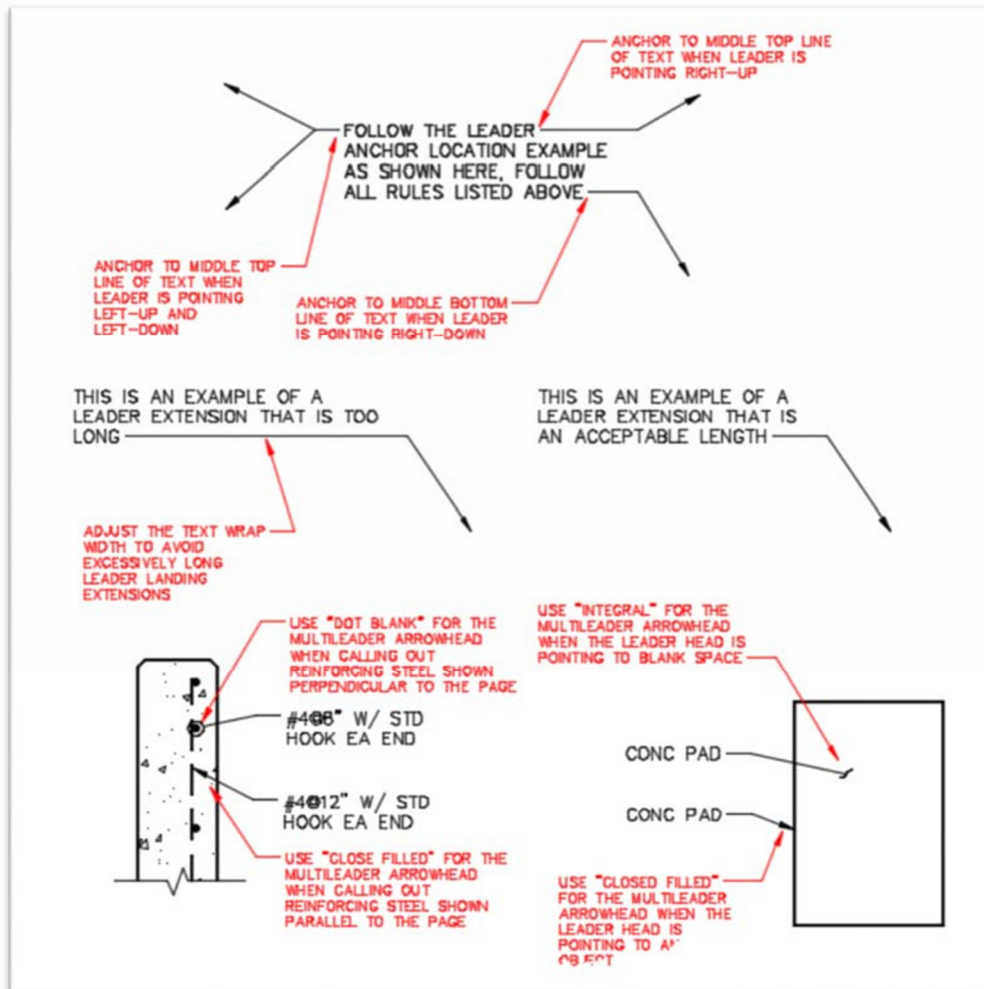
North Arrow

The North arrow is located on Denver Water's Tool Palette in the *Civil* tab of the *Section Tools* palette and placed on layer G-ANNO-SYMB. This block will be used on all Denver Water projects. Place the North arrow at the upper right corner of the plan on a drawing. Orient the North arrow to the top of the drawing or up to 90 degrees to the left or right; exceptions will be accepted with approval by Denver Water's Design Drafting Manager. If multiple plans are shown on the same drawing and North is oriented in the same direction, only one North arrow is required and shall be placed in the upper right corner of the drawing.

Multileader

- Denver Water's CAD multileader styles shall be used.
- Text shall be left justified.
- Text size and arrowhead size are determined by multileader style and drawing scale.
- Do not use periods in a multileader; use a comma if a notation break is necessary and parentheses to clarify or as an aside.
- Set the Leader Extension property field value to YES.
- Leader lines shall not cross text, other leaders, or dimension lines.

Leader Placement



Dimensions

A dimension line shall be a fine, solid line terminated by arrowheads. The dimension line nearest the object shall be $\frac{5}{16}$ inch from the object. Other parallel dimension lines shall be offset by at least $\frac{3}{8}$ -inch. The spacing of dimension lines shall be uniform.

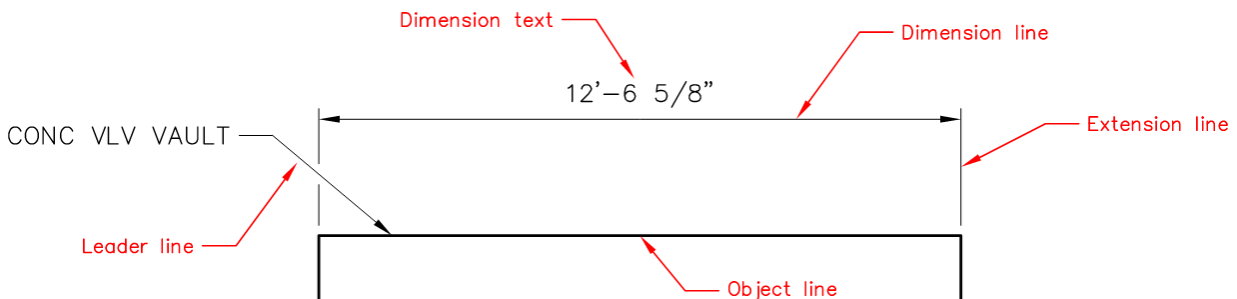
An extension line shall be a fine, solid line that extends from a point on the drawing to which a dimension refers. The dimension line meets the extension line at a right angle except in unusual cases. Provide a gap of $\frac{1}{16}$ inch where the extension line joins the object line. The extension line shall extend $\frac{1}{16}$ inch beyond the dimension line.

Only use dimension styles defined in the CAD Standards.

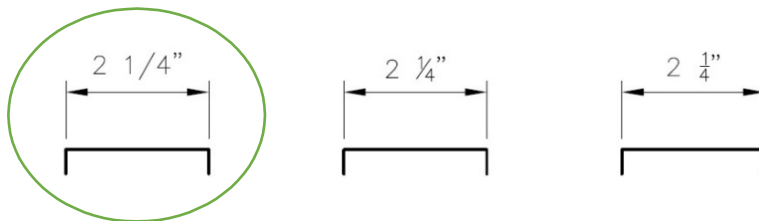
An arrowhead indicates the extent of dimensions. The default arrowhead provided within the template is the arrowhead style to be used on plans. As a general rule, the length of an arrowhead shall be three times the width. The default length is $\frac{1}{8}$ inch.

Text shall be placed above the dimension line and within the extension lines when space permits.

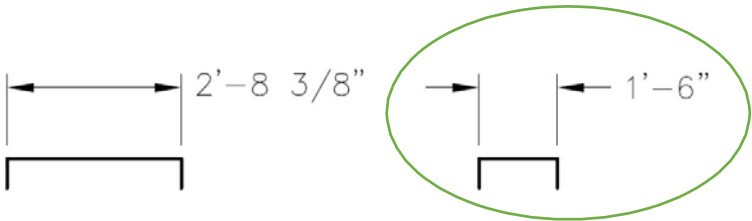
A leader line shall be a fine, solid line leading from a note or dimension and terminated by an arrowhead touching the object. A leader line shall be an inclined straight line with a short horizontal landing of $\frac{1}{8}$ inch in length. A leader to a circle shall be radial, so that if extended it shall pass through the center of the circle. If leader lines are near each other, the leader lines shall be drawn parallel to one another. Leader lines shall not cross each other nor cross dimension lines. It is acceptable for a leader line to cross an extension line if the extension line is broken.



Diagonal and horizontal stacking shall not be used, fraction type is not stacked in the properties. Of the following examples, the first is correct.

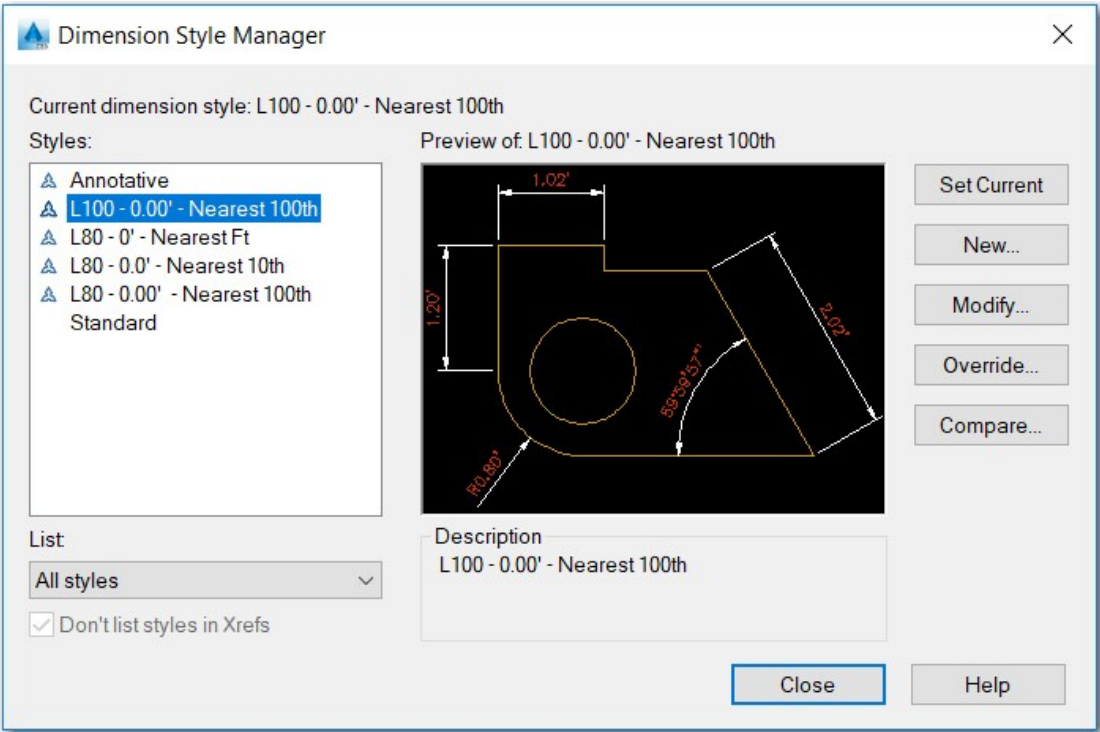


If there is not enough space inside the extension lines, place the dimension lines and text outside the extension lines. Do not extend the dimension line across the open space between the extension lines; the second example below is correct.

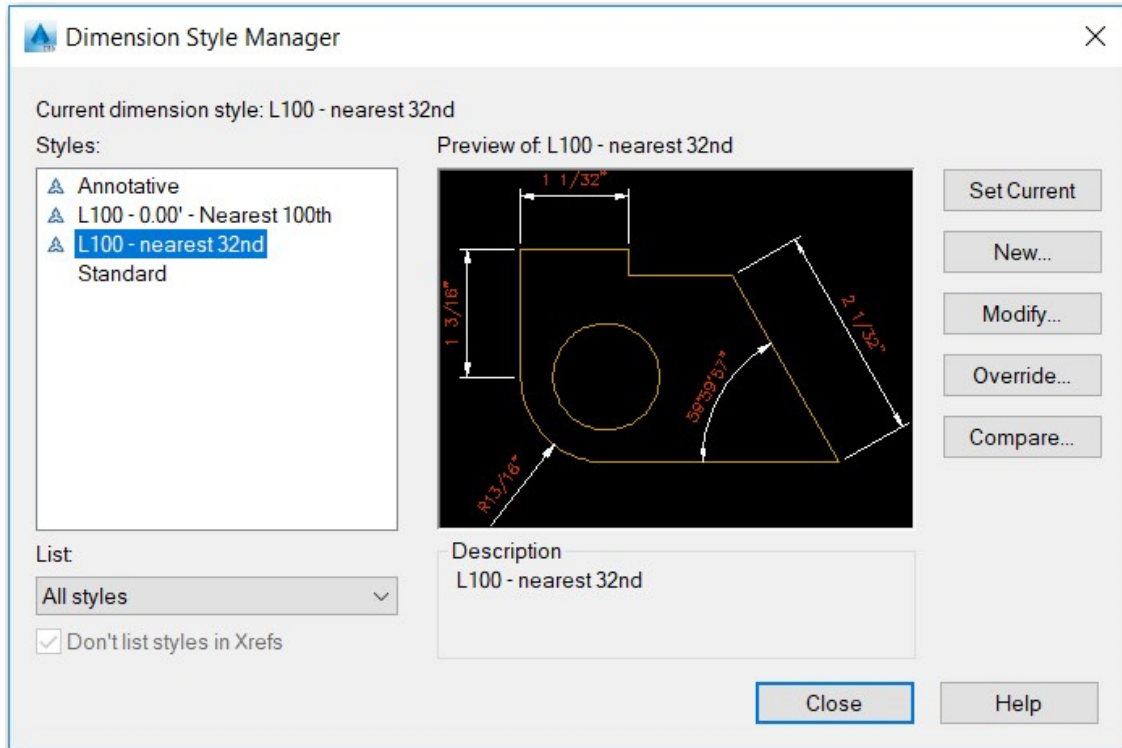


Use the dimension styles within Denver Water’s CAD templates.

Civil Template



AEC Template



- Dimension lines shall be drawn at right angles to the extension lines; however, an exception may be made in the interest of clarity. Avoid dimensioning to hidden lines.
- Legibility shall not be sacrificed by crowding dimensions into a limited space.
- Dimensions shall not be repeated on the same view or on additional views nor shall the same dimension be presented in two different ways. Dimensions shall be shown clearly so they can be interpreted in only one way.
- Dimensions shall be presented in a way that will not make it necessary to calculate, scale, or assume any dimension.
- Dimensions of one foot and smaller are expressed in inches.
- Dimensions larger than one foot are expressed in feet and inches.
- For steel plate dimensions, width and thickness shall be shown in inches even if wider than one foot; length shall be shown in feet and inches.
- Keep text and dimensions outside the object whenever possible.

Labels and Specification Section Callouts

Coordinates shall be represented as shown below. Add a space between North and the first number and take the number to the hundredth decimal place at a minimum.

N 123456.00
E 987654.00

Elevations shall be represented as shown below and be taken to the hundredth decimal place.

EL 5280.00

Stations shall be represented as shown below and be taken to the hundredth decimal place. There shall not be a leading "0" on single-digit stations.

STA 0+00.00, STA 2+00.00 not 02+00.00, STA 150+00.00, etc.

Deflection angles and bearings shall be represented as shown below. There shall not be a leading "0" on single-digit degrees.

42°57'29", 5°27'36" not 05°27'36"
N 86°38'12" E

Numeric text with fraction will be represented as follows:

1 1/4", not 1-1/4" (fractions shall be unstacked)

Specifications shall be represented as follows:

Drawing reference note: IN ACCORDANCE W/ SPEC SECT 12 34 56.78

Drawing notes: IN ACCORDANCE WITH SPECIFICATION SECTION 12 34 56.78

Multiple Count Callout

When calling out multiple items, place the note in parentheses as shown below.



Notes

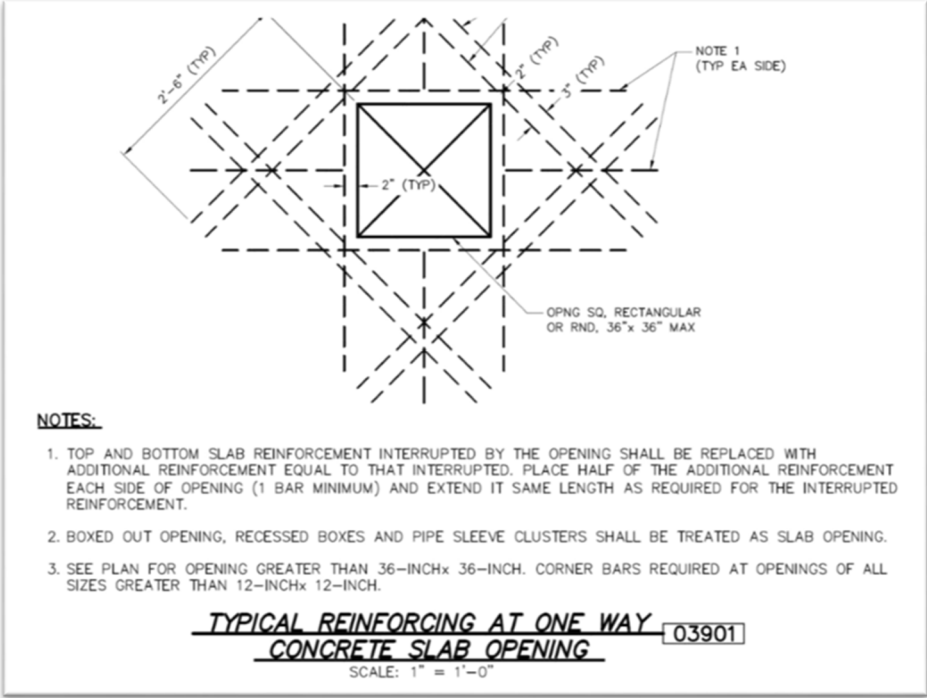
When describing an object, add a hyphen between measurement value and the unit of measure if the unit of measure is immediately followed by a noun or adjective. Don't use a hyphen if not followed by a noun or adjective, as shown in the following examples:

- 12-INCH PIPE
- 6-INCH BY 6-INCH POST
- 5/16-INCH-THICK STEEL GAUGE BLOCK
- 6 INCHES DEEP
- 18 INCHES ON CENTER

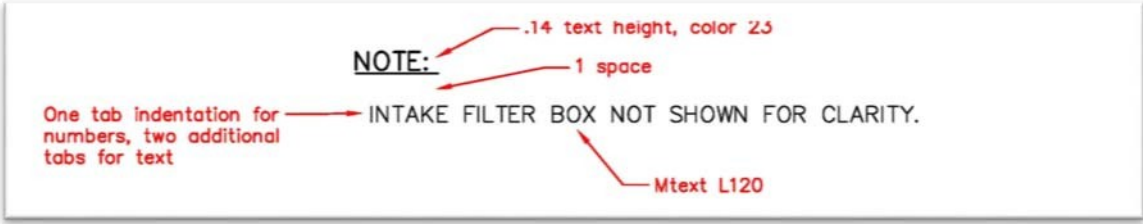
Notes relating to the whole drawing are placed on the bottom right of the drawing. Do not end a line in the middle of a dimension, specification section number, or product name or number:

NOTES: 1. 316 STAINLESS STEEL FOR ALL CHANNELS, ASSOCIATED FASTENERS, AND CLAMPS. 2. WASHDOWN PIPE SHALL BE SCHEDULE 80 PVC. 3. PIPE CONFIGURATION SHOWN FOR TANK NUMBER 2 AND TANK NUMBER 3. PIPE CONFIGURATION FOR TANK NUMBER 1 IS OPPOSITE HAND. SEE STRUCTURAL DRAWINGS FOR DETAILS. 4. TANK NUMBER 1 AND 2 SAMPLE LINES TERMINATED AT COLUMN 5F. TANK NUMBER 3 SAMPLE LINES TERMINATE AT COLUMN 5E. 5. STAIRS NOT SHOWN FOR CLARITY.	PT NO: 17352
	DRAWN BY: MCMILLEN
	CHKD BY: RIES/
	CHKD BY: ARCHER/
	APPD BY:
	DATE: NOVEMBER 2014
	CONTRACT: 15979D
	AS-BUILT DATE: FEBRUARY 2022
	AS-BUILT BY: MCMILLEN
	DRAWING TITLE
FLOOR SLAB WATER QUALITY AND WASHDOWN PIPING PLAN	
M-5	

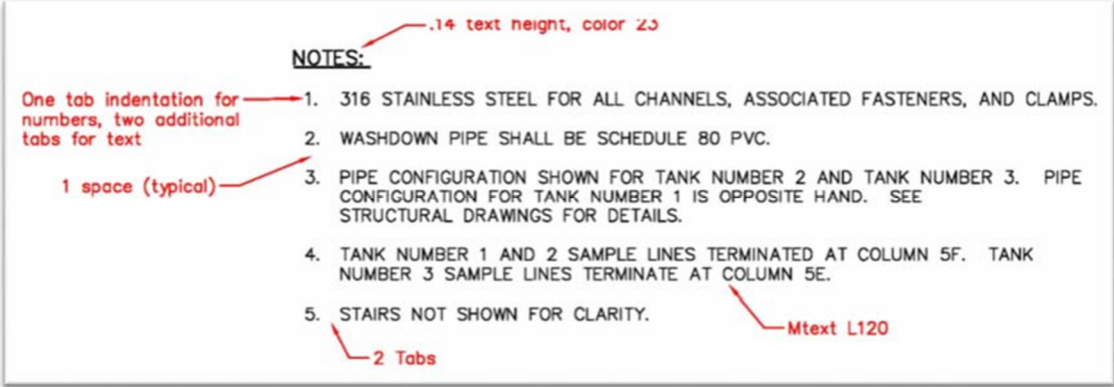
Notes relating to a specific Plan, Profile, Section, Elevation, or Detail are placed between the title and the drawing:



Single Note



Multiple Notes



Multiple Column Notes

NOTES:

1. DISCONNECT EXISTING EQUIPMENT. REMOVE EXISTING CONDUIT AND WIRING BACK TO SOURCE. PROVIDE CONNECTIONS TO NEW EQUIPMENT WITH NEW CONDUIT AND WIRING AND PROVIDE NEW CONDUIT TAGS.
 2. EXISTING THERMOSTAT TO BE REMOVED. REPLACE WITH NEW TEMPERATURE SENSOR AND CONNECT TO THERMOSTAT MEZZANINE LEVEL FOR AVERAGING OF THE FOUR NEW TEMPERATURE SENSORS.
 3. DISCONNECT EXISTING DAMPER ACTUATOR AND CONNECT REPLACEMENT ACTUATOR TO EXISTING CONTROLS.
 4. PROVIDE NEW THERMOSTAT AND CONTROL WIRING. THERMOSTAT T1 SHALL BE CAPABLE OF ACCEPTING INPUTS FROM AT LEAST 4 TEMPERATURE SENSORS FROM TEMPERATURE AVERAGING.
 5. PROVIDE NEW DUCT DETECTOR FOR UNIT SHUTDOWN.
 6. EDH-1 AND CF-1 ARE CONTROLLED VIA EXISTING TEMPERATURE CONTROL PANEL. REUSE EXISTING CONTROL WIRING AND SEQUENCE OF OPERATION FOR REPLACEMENT UNITS.
 7. PROVIDE NEW THERMOSTAT SENSOR AND CONNECTION TO THERMOSTAT T1.
- ALIGN
- APPROX 1/2"
- BALANCE NOTES IN EACH COLUMN

For example:

NOTES:

1. DISCONNECT EXISTING EQUIPMENT. REMOVE EXISTING CONDUIT AND WIRING BACK TO SOURCE. PROVIDE CONNECTIONS TO NEW EQUIPMENT WITH NEW CONDUIT AND WIRING AND PROVIDE NEW CONDUIT TAGS.
2. EXISTING THERMOSTAT TO BE REMOVED. REPLACE WITH NEW TEMPERATURE SENSOR AND CONNECT TO THERMOSTAT MEZZANINE LEVEL FOR AVERAGING OF THE FOUR NEW TEMPERATURE SENSORS.
3. DISCONNECT EXISTING DAMPER ACTUATOR AND CONNECT REPLACEMENT ACTUATOR TO EXISTING CONTROLS.
4. PROVIDE NEW THERMOSTAT AND CONTROL WIRING. THERMOSTAT T1 SHALL BE CAPABLE OF ACCEPTING INPUTS FROM AT LEAST 4 TEMPERATURE SENSORS FROM TEMPERATURE AVERAGING.
5. PROVIDE NEW DUCT DETECTOR FOR UNIT SHUTDOWN.
6. EDH-1 AND CF-1 ARE CONTROLLED VIA EXISTING TEMPERATURE CONTROL PANEL. REUSE EXISTING CONTROL WIRING AND SEQUENCE OF OPERATION FOR REPLACEMENT UNITS.
7. PROVIDE NEW THERMOSTAT SENSOR AND CONNECTION TO THERMOSTAT T1.

Keyed Notes

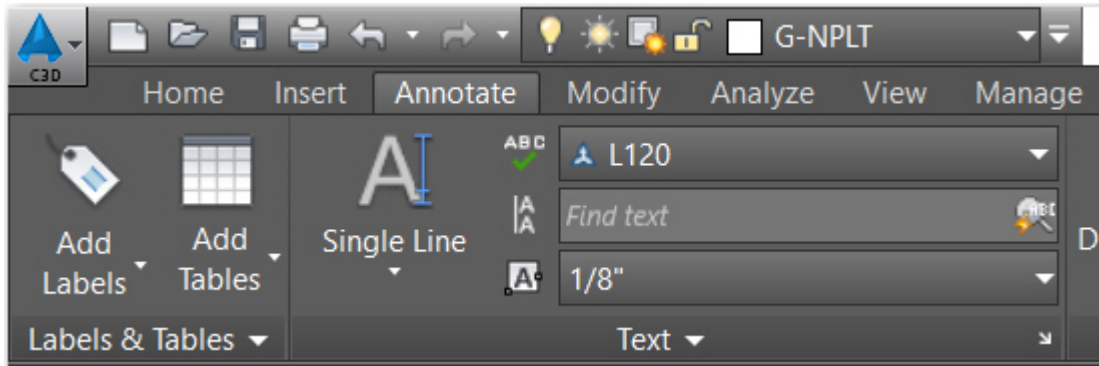
Keyed Notes are a consistent way of annotating the different types of items in a set of construction documents to identify material size and type, or to provide special instructions or explanations. Keyed Notes should only be used if the drawing is too cluttered to identify items with individual reference notes. If used, a circle with a number is acceptable.

KEYED NOTES:

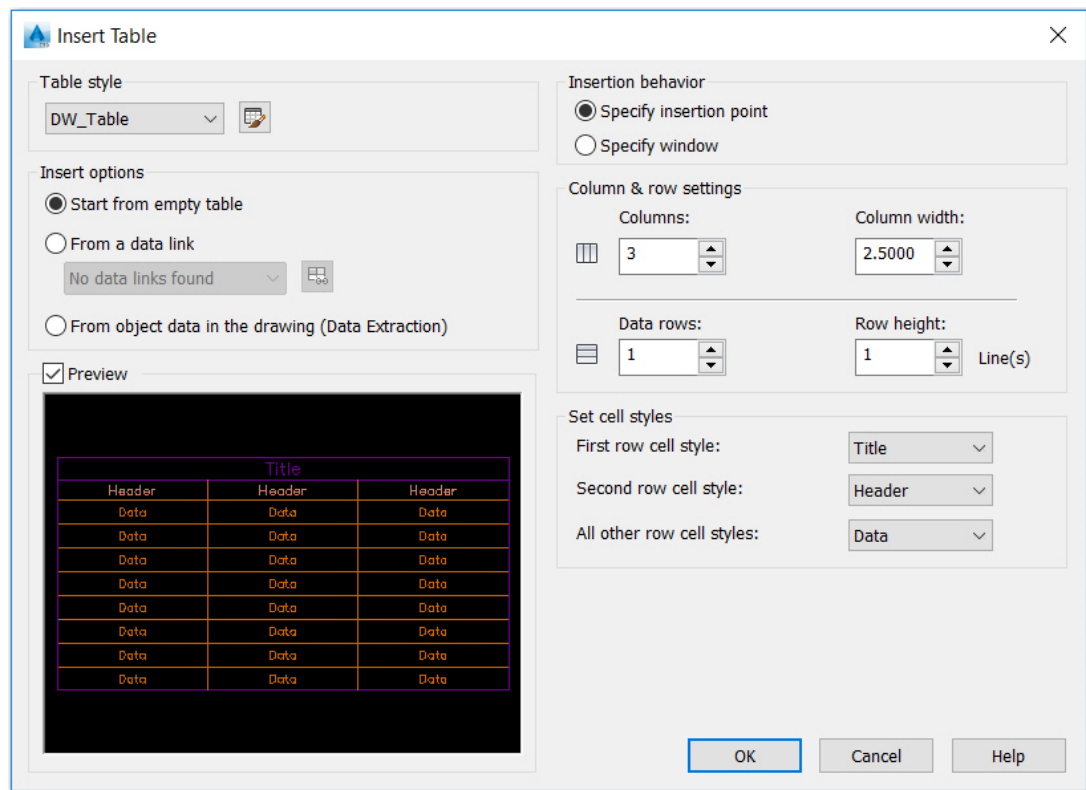
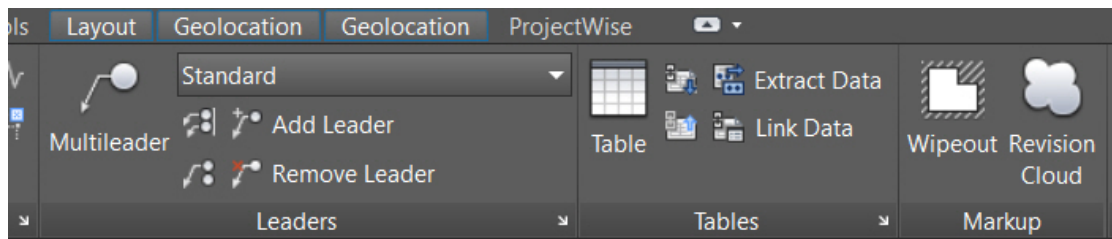
- ① PRESSURE-RATED FEEDER
- ② PRESSURE GAUGE & COCK
- ③ SIGHT GLASS OR FLOW INDICATOR
- ④ FUNNEL
- ⑤ 3/4" FILL & VENT BALL VALVE (V300)
- ⑥ SHUTOFF BALL VALVE (V300)

Tables

In AutoCAD, select *Table* from the *Annotate* menu or type *TB* in the command line.



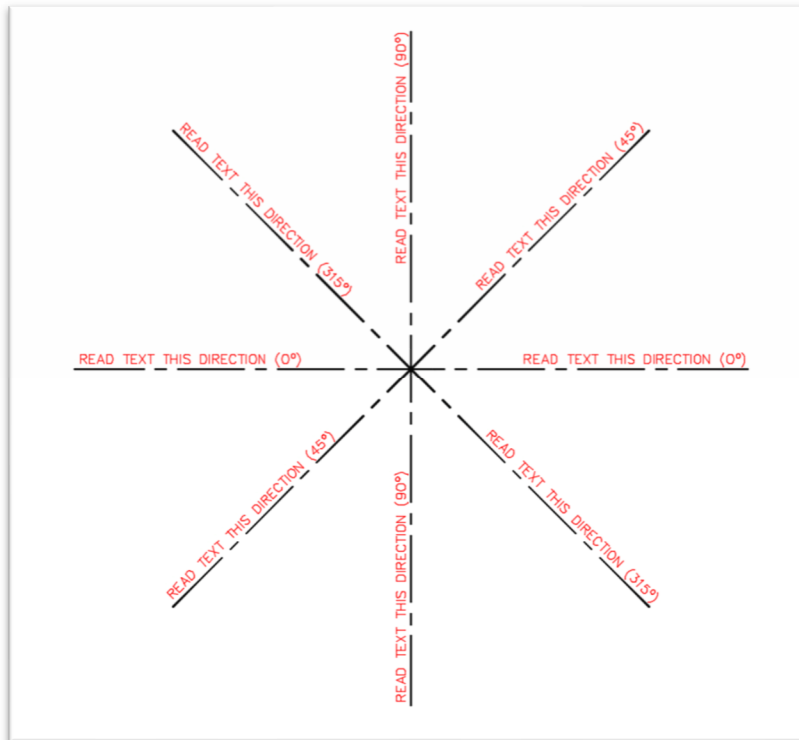
In *Insert Table*, select *DW_Table* and adjust the *Column & row settings* to the desired numbers.



Titles, headers, and data fields are all center justified.

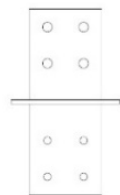
Text Rotation

Text shall be legible from the bottom or right side of the drawing.

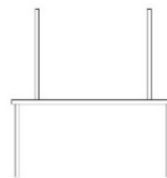


Subtitles

Subtitles are necessary when details show multiple views of an object. Subtitles shall be accompanied by an overall plan/detail title. The subtitle uses L175 multiline text style created on the L175 annotation layer. Maintain the rules of 3rd angle projection when laying out details with multiple views.



FRONT



SIDE

EXAMPLE W/ SUBTITLE 1
SCALE: 1" = 5" THIS DWG

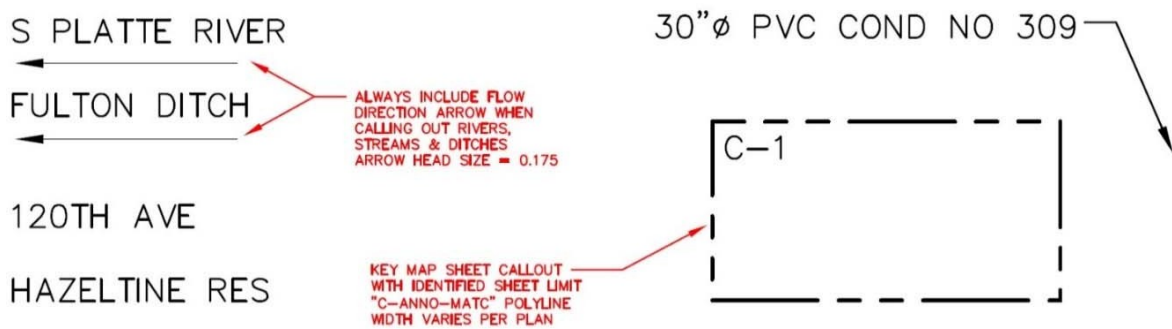
Plan View Text

Generally, annotation used in drawings shall be L100 text style. However, there are instances when L120, L140, L175, and L200 text shall be used.

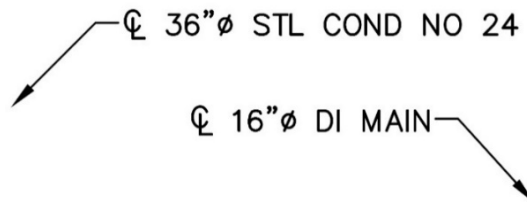
L120 text shall be used in plans for improper nouns that inform the reader of significant site features or conditions. The use of L120 text is specific to the plan set being developed and may vary from drawing to drawing. Such improper nouns include the following:

ACS RD, GVL ACS RD, ACS GATE, CONTRACTOR ACS, DW ESMT, PUMP RM, ELEC RM, HEADWORKS BLDG, PS STAGING AREA, RES HYDROELECTRIC POWERHOUSE

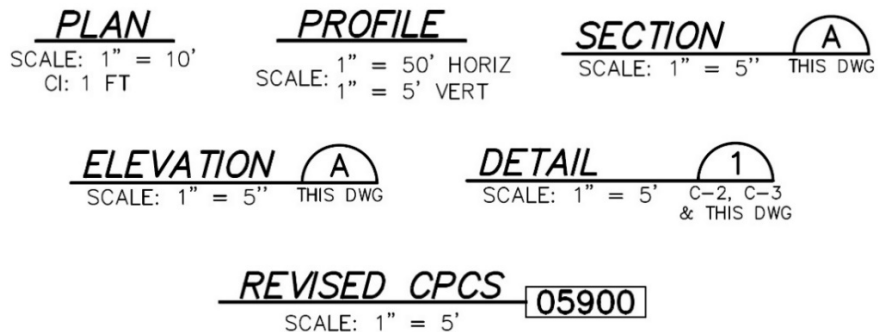
L140 text shall be used in plans for proper nouns that inform the reader of significant site features. L140 text is also used to call out drawing numbers on key maps and existing conduits.



L175 text shall be used in plans when identifying plan subject piping systems and conduits.

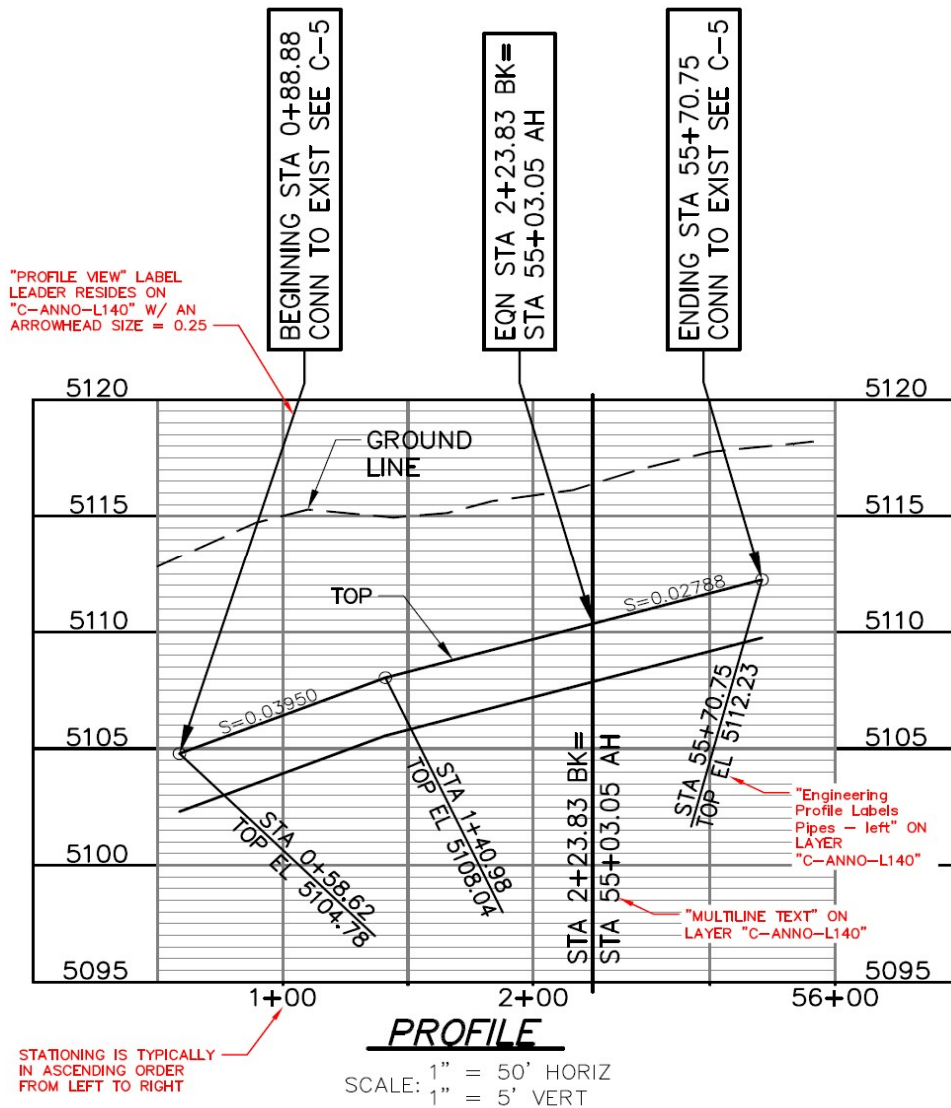


L200 text shall be used in plans for identifying titles (already defined on the DW Tool Palette).

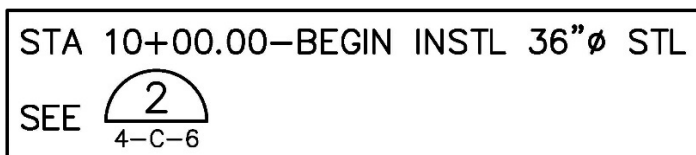


Civil Profile Text

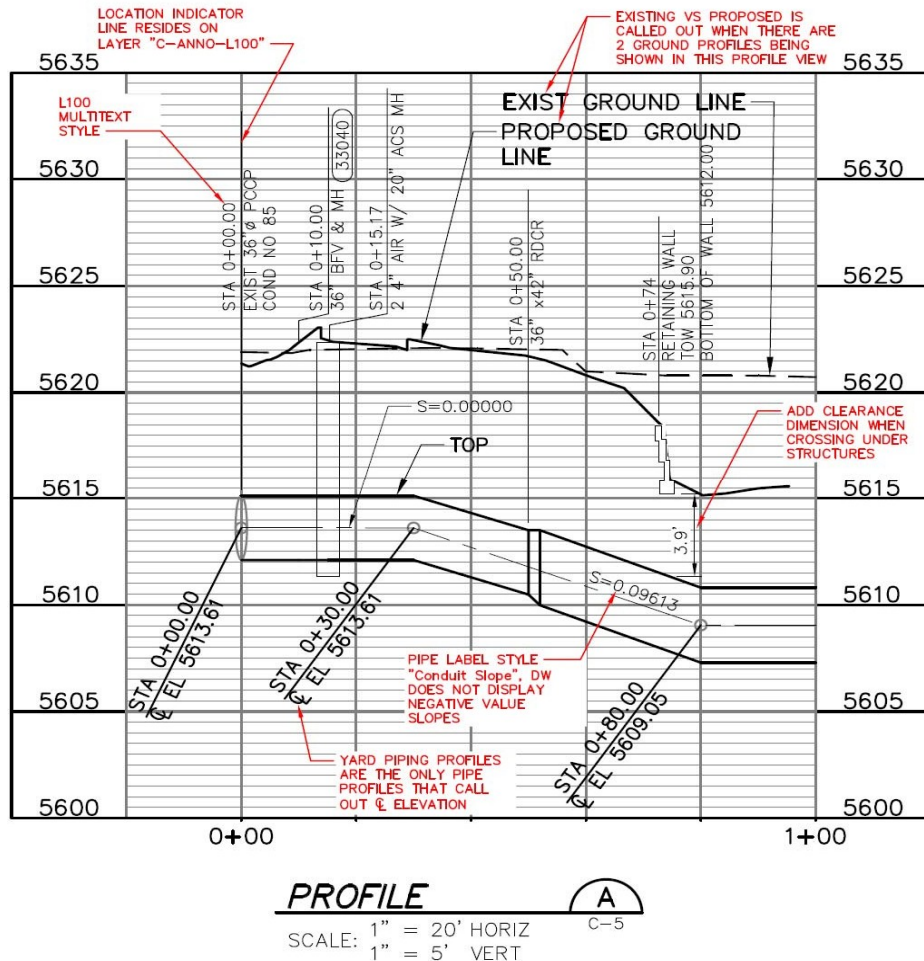
The following profile shows the format for a station equation. The Equation Station delineation line resides on layer C-ANNO-MATC. The profile uses the 50-scale left to right style.



When referencing a detail within a text box, label as shown below:



The below profile shows the format for piping. Use this profile when the corresponding yard piping plan resides in a separate plan drawing. The example profile uses the 20-scale left to right style.



Hatch Patterns

- Hatch patterns shall be consistently sized to appear the same size in views that have different viewport scales.
- Be consistent with layer names within disciplines.
- Demolition hatch patterns shall extend slightly outside of the objects being hatched.
- Hatch patterns representing building outlines shall be ANSI 31 hatch pattern and the hatch shall offset inside the building outline by 5 feet.

Numbering Non-Standard CPCS Details

When placing approved non-standard CPCS details in a contract drawing set, the details shall be numbered by division first, followed by 900 series and they shall increase sequentially. For example, details in Division 13 would be numbered using the following format 13900, 13901, etc. Use the title shown below with a rectangular detail number box (use the *CPCS Detail Title – revised* on the *DW Design Drafting* tool palette.)

NON-STANDARD CPCS DETAIL 13900

SCALE: 1" = 2'

Abbreviations and Symbols

For abbreviations and symbols, follow Division 1 of the CPCS. If an abbreviation or symbol is not represented and is required on the drawing set, an abbreviation list and/or legend shall be placed on the drawings.

See the Detailing Convention located at the end of this document when labeling structural steel, bolts, and anchors on drawings.

Preliminary Submittal

If drawings are required prior to issuing Final for Bid documents, a FOR INFORMATION ONLY stamp shall be placed on the drawing using Bluebeam, as shown below,

FOR INFORMATION ONLY

DENVER WATER
DENVER, COLORADO
 MOFFAT TREATMENT PLANT
 DRAIN VALVE REPLACEMENT

BOARD OF WATER COMMISSIONERS
 DENVER, COLORADO
 Gary M. Reiff – President
 James S. Lochhead – CEO/Manager
 Robert J. Mahoney – Chief Engineering Officer

VICINITY MAP
 SCALE: 1" = 200'

LOCATION MAP
 SCALE: 1" = 3 miles

DRAWING INDEX	
DWG. NO.	DWG. TITLE
G-1	COVER SHEET
G-2	VICINITY MAP
M-1	DEMO PLAN & ELEVATION
M-2	INSTALLATION PLAN & ELEVATION
R-1	REFERENCE DRAWING
R-2	REFERENCE DRAWING

PROJECT DIRECTORY	
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REVISIONS		
No.	Date	Description

FOR INFORMATION ONLY

The stamp shall be applied at both the top and bottom of the drawing outside of the drawing border, and centered. Arial Black font, size 24, color red shall be used. Font Height may be altered for proper fit. Right-click on the stamp and select Apply to Pages to populate the stamp on all drawings in a multiple drawing set. Flatten the document prior to saving it. Make sure to save the drawing with an appropriate title identifying it as FOR INFORMATION ONLY.

Detailing Steel Conventions

When labeling structural steel, bolts, and anchors on drawings, refer to the following table:

Description	Drafting Convention	Written Description	Limitations
Angle	$\angle 4'' \times 3'' \times 3/8''$ _x_ 0'-10" SST_ $\angle 4'' \times 3'' \times 3/8''$ _x_ 0'-10" GALV_STL_ $\angle 4'' \times 3'' \times 3/8''$ _x_ 0'-10"	Angle Symbol, 4" leg by 3" leg by 3/8" overall thickness by 10" long	
Hollow Structural Section - Square or Rectangular	HSS_ 6"x4"x1/2" _x_ 1'-3_1/2" AL_HSS_ 6"x4"x1/2" _x_ 1'-3_1/2" GALV_STL_HSS_ 6"x4"x1/2" _x_ 1'-3_1/2"	Hollow Structural Section, 6" by 4" rectangular shape by 1/2" wall thickness by 1'-3 1/2" long	
Hollow Structural Section - Round	HSS_ 1.900"x0.145" _x_ 2'-6" FRP_HSS_ 1.900"x0.145" _x_ 2'-6" GALV_STL_HSS_ 1.900"x0.145" _x_ 2'-6"	Hollow Structural Section, 1.9" outside diameter, round by 0.145" wall thickness by 2'-6" long	
Bar	BAR_ 4"x1/2" _x_ 2'-6" SST_BAR_ 4"x1/2" _x_ 2'-6" GALV_STL_BAR_ 4"x1/2" _x_ 2'-6"	Bar, 4" wide by 1/2" thick by 2'-6" long	6" or less in width, 0.203" and over in thickness. Over 6" to 8" in width, 0.230" and over in thickness.
Round Bar	RND_BAR_ 3/4" \emptyset _x_ 0'-9_5/8" AL_RND_BAR_ 3/4" \emptyset _x_ 0'-9_5/8"	Round Bar, 3/4" diameter by 9 5/8" long	
Plate	PL_ 1/2"x8" _x_ 0'-10_3/4" FRP_PL_ 1/2"x8" _x_ 0'-10_3/4" GALV_STL_PL_ 1/2"x8" _x_ 0'-10_3/4"	Plate, 1/2" thick by 8" wide by 10 3/4" long	Over 8" to 48" in width, 0.230 and over in thickness. Over 48" in width, 0.180" and over in thickness.
Pipe	1_1/2" \emptyset _ SCHED_40_STL_PIPE 1_1/2" \emptyset _ SCHED_40_SST_PIPE 1_1/2" \emptyset _ SCHED_40_GALV_STL_PIPE	1/2" nominal diameter steel pipe (or other pipe type), Schedule 40 wall thickness	
Wide Flange	W16x31	Wide flange shape, 16" nominal depth by 31 pounds per linear foot	
S shape	S4x9.5	S shape, 4" nominal depth by 9.5 pounds per linear foot	
HP shape	HP13x100	HP shape, 13" nominal depth by 100 pounds per linear foot	
WT shape	WT7x31	WT shape, 7" nominal depth by 31 pounds per linear foot	
Standard Channel	C15x33.9	Standard Channel, 15" nominal depth by 33.9 pounds per linear foot	
Miscellaneous Channel	MC6x12	Miscellaneous Channel, 6" nominal depth by 12 pounds per linear foot	
Structural Bolt	3/4" \emptyset _ BOLT	3/4" diameter structural bolt	
Anchor Bolt	1_1/4" \emptyset _ AHR_BOLT _x_ 10"	1 1/4" diameter anchor bolt by 10" long	
Expansion Anchor	1/2" \emptyset _ EXP_AHR_x_ 3"	1/2" diameter expansion anchor by 3" long	
Adhesive Anchor	3/4" \emptyset _ ADH_AHR_x_ 1'-2"	3/4" diameter adhesive anchor by 1'-2" long	
Headed Concrete Anchor	1/2" \emptyset _ HAS_x_ 5"	1/2" diameter headed concrete anchors by 5" long	
Anchor Embedment Depthw/_ 4_3/4" EMBED	Described Anchor has a minimum embedment depth of 4 3/4"	
Drilled Hole	9/16" DRILL	Drilled hole 9/16" in diameter	
Slotted Hole	SLOT_ 15/16" \emptyset _ x_ 1_1/8"	Slotted hole 15/16" in diameter by 1 1/8" long	
Drill and Counterbore	3/4" \emptyset _ THRU_COUNTERBORE_ 2" \emptyset _ x_ 1" DEEP	Drill 3/4" diameter hole thru the plate or material then counterbore in same hole 2" diameter by 1" deep.	
Reinforcing Steel (sections)	#5@12" EW_EF	Number 5 rebar at 12" on center, each way, each face	

Description	Drafting Convention	Written Description	Limitations
<i>Reinforcing Steel (plans)</i>	(84) #4x24'-6"	Eighty-four number 4 rebar, each bar is 24'-6" long	
<i>Reinforcing Steel (plan or section)</i>	(22) #7x10'-0"@12"_IF	Twenty-two number 7 rebar at 12" on center on inside face, each bar is 10'-0" long. (OF = Outside Face)	
<i>Reinforcing Steel clearance</i>	3"_CLR	3" clearance between face of concrete and face of reinforcing steel	
<i>Reinforcing Steel Hoops</i>	#4_HOOPS@12" OC	Number 4 rebar hoop at 12" on center	
<i>Repetitive Features or Dimensions</i>	(13) SPA@12" =_13'-0"	13 equal spaces at 12" on center totaling 13'-0" in dimensional length	

Notes:

- Structural shapes and bars, including angles, Hollow Structural Sections, and channels, can be steel, aluminum, or fiberglass. Carbon steel is implied if no other description is used. Drafting Convention descriptions within the first three rows define how to describe the element if it is stainless steel (SST), aluminum (AL), fiberglass (FRP), or galvanized steel (GALV STL).
- Underscore (_) indicates intentional space.
- Inch and feet marks are only used where shown.
- Lowercase "x" indicates "by."