CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

SURVEY & CAD STANDARDS FOR CIVIL PROJECTS

DRAFT 8/9/12

City of Everett
Public Works Department

Revised: August 9, 2012

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Introduction

The purpose of this of this document is to provide the surveying and engineering consultants with the appropriate guidelines for completing surveys and CAD drawings created for the COE-PWD.

Compliance with agreed upon project control and data management conventions is important to the City and public in terms of quality control and return on investment. The success of this compliance/cooperation will influence the continuation of the present program of contracting with private surveying firms for City projects.

Survey Standards

1 General Information

Prior to the start of any survey work, the following steps are required:

- A job-specific scope of work must be coordinated with and approved by the COE-PWD project manager and the City survey representative prior to beginning surveying work for the City. This scope of work shall include, at a minimum, compliance with this document and specify the vertical datum to be used for the survey.

- A meeting will be scheduled to review the project scope of work and compliance with these standards. At minimum, representatives from the survey firm shall include the project manager (PE or PLS) and the CAD manager or operator who will be preparing the digital base maps and associated files. The City will be represented by the project engineer, a representative for surveying and the COE-PWD CAD manager.

- The survey firm will be provided a current copy of this document along with a disk including this document, current blocks and templates, and other CAD support files necessary to meet the COE-PWD CAD standards.

- The survey firm will be provided with City of Everett field books, appropriate monument "Survey Recovery Forms" for existing monuments within or adjacent to project area. Information derived from these forms is to be used to establish project elevations, and horizontal coordinates for project. "GO! Sync Mapbook" prints of the project area showing existing City utilities.

All consultant survey work done for the COE-PWD shall be coordinated and completed under the direct supervision of a State of Washington professional land surveyor in accordance with their professional services contract with the City of Everett.

Surveys done under contract to the COE-PWD by private surveyors can provide important information to update the City of Everett's Geographic Information System (GIS) database as well as meet the surveying and CAD needs for specific projects. The City of Everett is interested in maintaining and expanding its GIS and Survey base drawing files with information provided through this consulting surveying process.

Since most of the surveying work done by private surveyors will have to be archived and used by City staff and the public for many years, it is essential that surveying work comply with this document.

All survey data will be submitted to the City in a digital format that is compatible with the version of AutoCAD currently being used by the City of Everett. Any departure from the requirements set forth in this document must be approved by the City of Everett City Engineer before any work is started by the consulting survey firm. Surveys not complying with this convention will not be accepted.

It is highly recommended that all survey base maps be started by using:

- EVT-Templates\SPECIALIZED DESIGN DRAWINGS\ Evt-SURVEY BASE.dwt or

- EVT-Templates\SPECIALIZED DESIGN DRAWINGS\ Evt-SURVEY COMPLETE.dwt

2 Horizontal & Vertical Control

Basic horizontal and vertical survey control information on all City projects must be recorded in City supplied field books. This requirement is particularly important as it pertains to control monuments, right-of-way and property corner locations. For surveys done with data collectors, the work recorded in the field books, although limited, should include sketches and diagrams of the survey control base lines, horizontal and vertical control monument descriptions, the basis for horizontal and vertical control on a project such as the state plane coordinates for control monuments and the benchmark elevations. This information will be included in the digital drawing files on the appropriate control, monument and GIS layers.

3 Stationing Conventions

The following stationing conventions will be followed and provided in the base drawing on a stationing layer with ties to existing City monument documentation. Deviations from these conventions may be necessary on certain utility projects as determined by the City's project manager.

- Stationing shall read left (10+00) to right (?+??). The minimum stationing start point will be 10+00. Negative stationing will not be allowed.

- Stationing shall run from South to North or West to East.

- North shall be to the top or right of the printed page. On the data file, north shall be up (World Coordinate System).

- Centerline stationing shall have Minor tick marks every 50 or 20 feet with Major annotation at 100 foot intervals

Departures from data collection and presentation conventions will be approved by the City survey representative, COE-PWD project manager, and CAD manager prior to beginning surveying work. In all cases, the Revised Code of Washington (RCW) and the Washington Administrative Code (WAC) shall take precedence over policy and convention.

4 Survey Control

The appropriate vertical and horizontal control for a project will be discussed and agreed upon at a coordination meeting with the consultant surveyor, City survey representative, and COE-PWD project manager. Local monumentation should be researched, reviewed and shared by the City survey representative, and the consultant surveyor for the specific project. The selection of control should be based upon the appropriate instrumentation, methodology and required control closures for the project. The project budget, scope and quality control should be considered as well as GIS database enhancement. Field surveying instruments and measuring techniques to be used on the project should also be discussed and agreed upon. In general, a 1:20,000 minimum closure will be regarded as an appropriate closure for project control surveys although a 1:10,000 minimum closure may be accepted under some circumstances.

In order for projects to be incorporated into the City's GIS mapping, projects must be referenced or tied to the Washington State Plane Coordinate System which is used for the City's GIS mapping system. This will be incorporated in the digital base drawing file using the GIS layer "VF-CTRL-GIS~-MONU-E" using "TB-SURVY" block. In most cases, due to the proximity of the City's GIS control monuments, this work will have to be done by Global Positioning System (GPS) techniques. GPS work for a City project must be coordinated with the City survey representative prior to beginning work. All GPS data developed as part of a survey project must be submitted for review and approval to the City along with the other survey data. Data submitted for each monument shall include but shall not be limited to the information requested on the "Survey Recovery Form". GPS data shall conform to the section titled "Requirements for Submission of GPS Data".

Horizontal coordinate datum for the GIS control network is presently based on the North American Datum of 1983, with the 1991 re-adjustment, (NAD 83/91). Locations, elevations and coordinates of both horizontal and vertical control points for use on a project shall be provided by or approved for use by the City survey representative prior to beginning the survey.

All elevations and state plane coordinates submitted to the City as shown on the Survey Recovery Form shall be in both meters and U.S. Survey Feet.

5 New and Existing Monument Recovery

All existing un-named/numbered monuments located by the survey, shall be named/numbered by the consultant surveyor in accordance with this document. A Survey Recover Form must be prepared by the consultant surveyor and submitted to the City survey representative.

If the monument has already been by the City the consultant surveyor shall use the City's existing designations. Monument references submitted to the City as part of a City project shall not be assigned names/numbers without prior approval of the monument names/numbers by City survey representative. Names/numbers for monuments shall be assigned to monuments according to function, i.e. Right-of-Way Monuments, Public Land Survey System (PLSS) Monuments or GIS Monuments as follows:

Right-of-way monument:	(4 spaces) Field Book #	(2 spaces) Page #	(2 spaces) Point #

Example: Point No. 3 on Page 13 of field book No. 614 should be written as 614 13 03

Sections/Quarter Corners:	(2 spaces) Township #	(2 spaces) Range #	(3 spaces) Section # *

*Section number used DNR alpha/numeric convention

Example: The northwest corner of Sec. 17, T. 28 N., R 5 E. should be written as 28 05 J05

GIS Control Monument:	(4 spaces) Number/Name

Example: A typical City GIS monument will be a 3-digit number preceded by an "E" such as: EO88

In addition to survey control, other survey data, which shall be coordinated with the City survey representative and COE-PWD project manager, shall include the data sheet orientation, cross section intervals, stationing requirements and other project specific data collection requirements.

6 Field Books

All work must be recorded in City field books and shall provide the following information:

- The name or title of the project as assigned by the City project manager.
- The date the work was done on each page of the field book.
- The pages of the field book shall be numbered.
- The names of members of the field party doing the work.

All work shall be indexed in the front of the field book.

References and/or descriptions of all PLSS land record monuments, City of Everett GIS monuments, NGS monuments, and any other governmental land record or mapping monuments utilized during the course of the work shall be indexed independently in a monument index at the front of the field book.

Field notes shall be clear, concise, and legible and shall contain sufficient information for ease of use by unfamiliar parties.

All City supplied field books shall be returned to the City's project manager at the completion of the survey tasks.

7 Deliverable Digital Survey Data

The following instructions must be followed on all survey projects, unless prior approval is obtained in righting from City survey representative and the City Engineer:

- Survey data provided to the City in a digital format shall be compatible with the version of AutoCAD presently being used by the City. Third party fonts, hatch patterns, and linetypes shall not be used in drawing files submitted to the City. Custom objects generated by other software, such as Land Desktop, shall be converted to a format readable by standard AutoCAD without the use of plug-ins such as Autodesk's Object Enablers. Files must be complete and usable without having to download any files not included in the standard AutoCAD release. Digital survey data shall be provided to the City on CD-ROM.

- All line work, symbols and text will follow current standards presented in this document.

- Use the following guidelines for text:

    - Only standard text fonts supplied with AutoCAD will be used. Text style names will be the same and the text font used to create the style. Text height will not be defined in the text style definitions. Roman, Standard and Complex are the City default text styles/fonts.

    - All text will be placed on separate layers per the drafting standards.

    - All text describing *existing* entities will be placed in Model Space. Text height will be such that when viewed through a 1=20 scaled viewport, it will no smaller than 0.08 inches and no greater than 0.10 inches high.

    - Street names placed in Model Space will be on layer "VG-ROAD-TEXT-E". Text height will be such that when viewed through a 1=20 scaled viewport it will be 0.17 inches high. Street names in Model Space are normally frozen during printing. Street names placed in Paper Space will be on "SHEET-MISC" layer. Text height shall be 0.17 inches high.

    - An attempt shall be made to orient existing feature text annotation (asphalt, grass, fence etc.) so it is in the general direction of the project centerline stationing.

    - Utility line text annotation is included in the line via use of Everett linetypes.

- All survey base drawing files shall be tied to the City's GIS mapping control monument system. This will be accomplished by inserting the Everett standard block "TB-SURVY" on layer GIS---SURVY-SYMBL. The block will be scaled such that it is readily visible when the base drawing is opened. A leader/line will be provided from the inserted block to the control monument(s).

- The surveyor shall provide a complete print-out of the coordinate file that lists or describes all points surveyed in project datum as specified by the City's project manager, and in station and offset left or right format whenever possible.

- Separate AutoCAD files will be provided for:
    - Surveyed base map consisting of line work, blocks, text representing existing topography, and utilities in accordance with CAD Standards and Procedures of this document.
    - Point data per item 2 above.
    - Surface Contours.

8 Requirements for Submission of GPS Data

All hard copy and digital data files, as indicated in Typical Files Table, shall be bound/included in a binder for easy review and analysis by City personnel.

Information provided shall include:

1. The make and model of all equipment used in data collection.
2. The serial number of each instrument
3. The type of method or procedure used for the project, i.e., static, fast static or other used
4. Single or dual frequency

For all GPS stations used as a starting point for a project. The City requires at least two vectors from stations approved by the City surveyor. Additional GPS positions required for any other reasons, including temporary points, must be approved by the City surveyor.

Data sheets will be filled out as outlined:

a. State plane coordinates in US survey feet "WA NORTH ZONE," three decimal places
b. State plane coordinates in meters "WA NORTH ZONE," four decimal places
c. Final coordinates in latitude and longitude, five decimal places
d. Final orthometic heights, if leveling was used to derive:
    In US survey feet to three decimal palaces
    In meters to four decimal places
e. Final orthometric heights, if GPS was used to derive:
    In US survey feet to two decimal places
    In meters to two decimal places
f. Convergence angle in degrees, minutes and tenths of seconds
g. Scale factor to at least eight decimal places
h. Fill out text with pertinent information, description of monument and how to get to the point

Static or rapid static will be used for all GPS control surveys. Kinematic GPS will not be acceptable for control surveys.

Minimal satellite conditions:

a. Check satellite almanac prior to GPS session to determine optimum time/day for GPS sessions.
b. PDOP for all observations shall be five or less.

City supplied field book shall be used to record pertinent information describing the GPS session such as:

a. Project description including names of constrained (stationary) position
b. Monument description
c. Receiver (start time)
d. Receiver (stop time)
e. Height of instrument
f. Offset distance
g. At least three reference azimuths at each monument
h. Diagram of monument location
i. Any other information of interest about the monuments or the GPS session

Different types of equipment will produce their own formats; please send similar files.

Deliverables Table:

Typical Files	Digital	Hard Copy
Diagram of points and vectors		X
Raw data files	X	
Corrected vector files	X	
Point files (point #, Northing, Easting, Elevation & Description) [csv]		
Session log files	X	X
Xml files		
Minimally constrained adjustment	X	X
a. Analysis data	X	X
b. Adjustment parameters	X	X
c. Statistical summaries	X	X
Fully constrained adjustment	X	X
a. Analysis data	X	X
b. Final adjustment iterations	X	X
c. Final adjustment parameters	X	X
d. Final weighting parameters	X	X
e. Final adjustment closures and statistical data	X	X
f. Final state plane coordinates in US survey feet		
g. Final orthometric heights: In US survey feet (two decimal places) In meters (three decimal places)	 X X	 X X
h. Convergence angle in degrees, minutes & tenths of seconds	X	X
i. Final ellipsoid heights	X	X
j. Final	X	X
Vertical adjustment files; if vertical adjustment is done separately, submit the same files as in Number 6	X	X
Conversion files from state plane coordinates, Washington North Zone, to latitude & longitude & metric coordinates.	X	X

9 Project Coordinates Conversion to State Plane (City GIS) Coordinates

- Prior to final submittal to the City, the surveyor shall provide the following information on each base drawing in a size that is clearly legible when viewing the entire base drawing:

- Set the current layer to: “VF-CTRL-GIS~-MONU-E” normally a non print layer.

- For horizontal control point(s), insert the block: “TB-SURVY” or “TB-SURVY-2”. (Insertion point and scale to make visible and not interfere with existing TOPO)

- For separate project vertical control point (benchmark), insert the block “TB-VERT CNTR”. (Insertion point and scale to make visible and not interfere with existing TOPO)

- Answer the attribute questions and the information will be inserted on the drawings in the format shown in the Survey Control Data Tables included in the Appendix. Note: the block should not be exploded when inserted into base map. Leader lines will point to the control points referenced in the table.

10 Description Keys

- Description keys are used when you insert points into the drawing from the point database file or when you import points into the drawing from an external file or user database. When the point is inserted into the drawing, the point layer and symbol associations of the description key file are applied to the points.

- A sample description key file (EVERETT SAMPLE.mdb) is being supplied as a starting point to create your own file. This sample file is not intended to be complete, nor is it intended to define your company’s description codes. It is merely a portion of a file that was used on an actual project. Note that the last field of the Point Layer field in this sample file contains “CO_ABBREV“ as a reference to the consultant’s company name. This should be changed to fit your abbreviated company name. *Tip – you can use Microsoft Access to do a search and replace operation on this description key field. Just make sure the description key file isn’t being used in AutoCAD while you are making your edits in Access.*

11 Monument Survey Recovery Form

Survey Recovery Form

City of Everett **State: Washington**
Department of Public Works **County: Snohomish**

Station Name:_____

Horizontal Datum: NAD 83/91
Vertical Datum: NAVD 88 **Established by:**
Control Point ID: **Book:** **Page:** **Pt #:** **Date:**

Section: Township: Range:

LATITUDE: (5 decimal places)_____
LONGITUDE: (5 decimal places) _____

ORTHOMETRIC HEIGHT: _____ Feet
_____ Meters

Washington State Plane Coordinates – North Zone

	Northing (4 decimal places)	Easting (4 decimal places)	Point Scale Factor (to 9 decimal places)	Convergence Deg Min Sec
Feet				
Meters				

HORIZONTAL DATA:
Horizontal position established by:
_____ resection survey, comments: _____
_____ GPS survey, GPS adjustment software used: _____
_____ other, explain: _____
surveyor's estimated relative positional accuracy: _____ft @ _____% confidence
surveyor's estimated absolute positional accuracy: _____ft @ _____% confidence
VERTICAL DATA:
vertical position established by:
_____ differential leveling to: _____ order accuracy
_____ GPS survey, accuracy within _____ft. _____meters
surveyor's estimated relative positional accuracy: _____ft. @ _____% confidence
surveyor's estimated absolute positional accuracy: _____ft. @ _____ % confidence

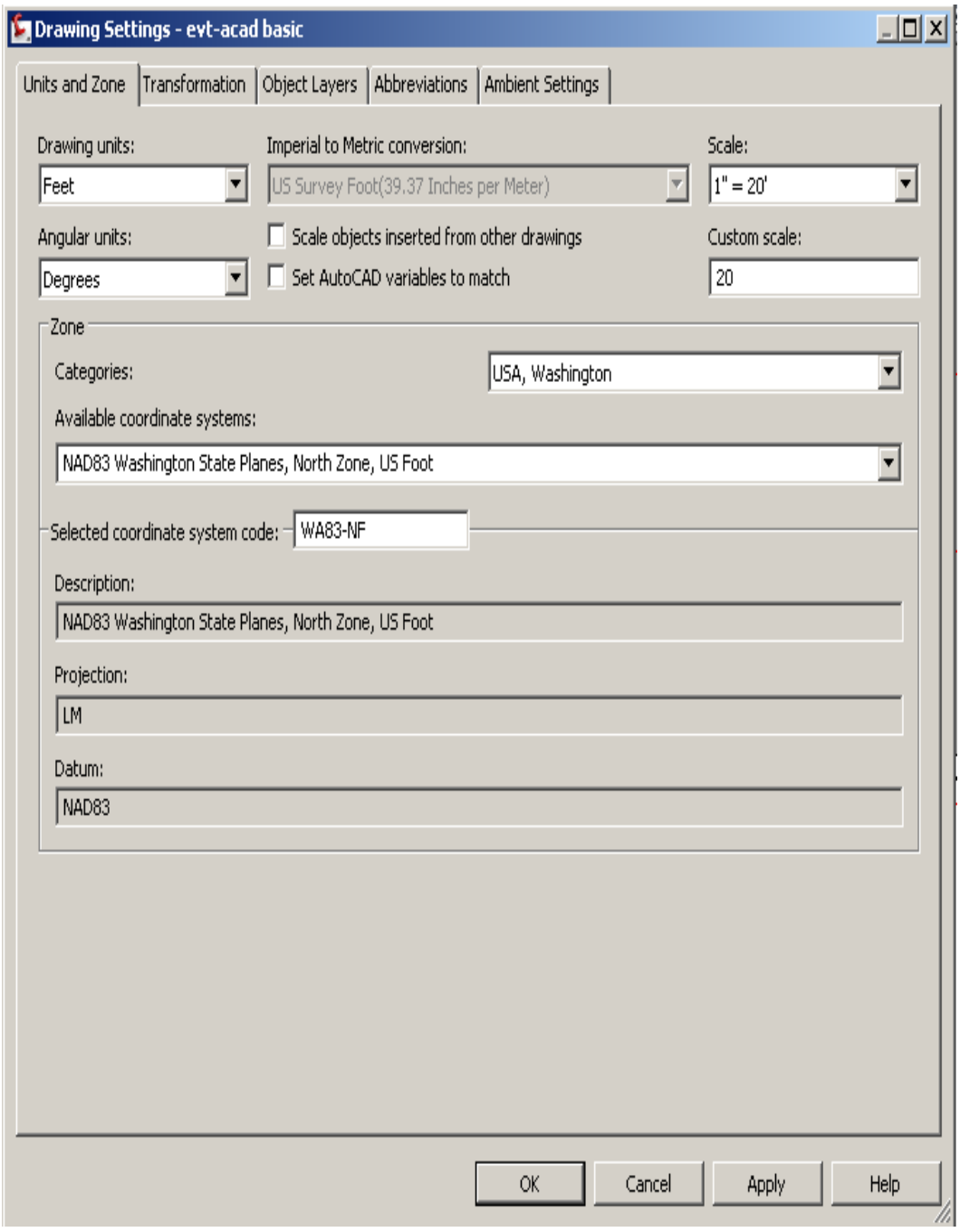
MONUMENT DESCRIPTION

TO REACH

REFERENCES:
Az from North Distance Reference Description

Month & Year Recovered: Condition Mark: Recovered By:

12 City of Everett Vertical Datum



12 City of Everett Vertical Datum Conversion Diagrams

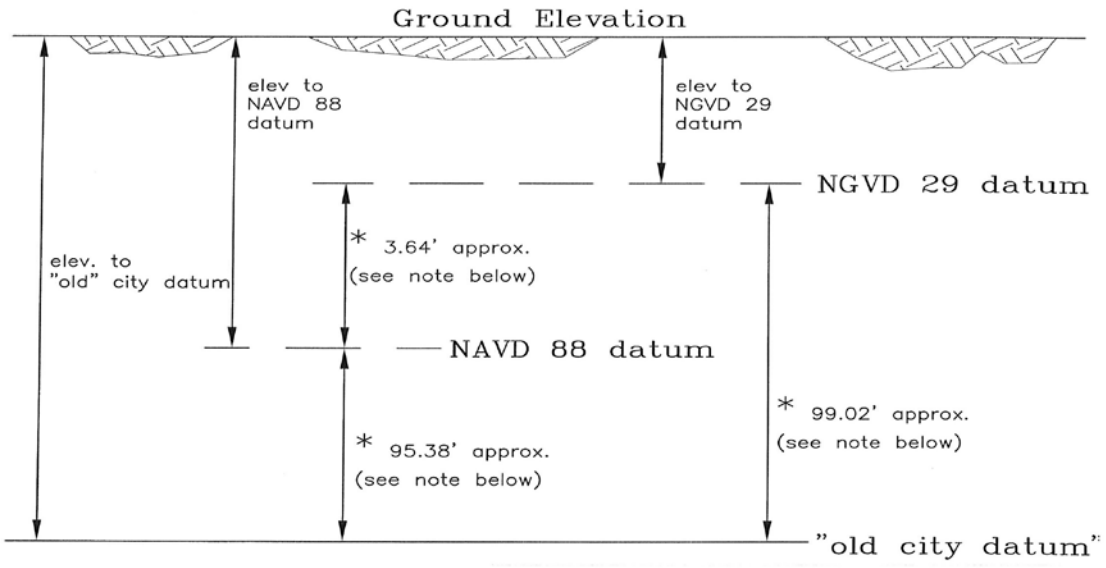
Diagram 1

CITY OF EVERETT VERTICAL DATUM

The North American Vertical Datum of 1988 (NAVD 88) as established by the National Geodetic Survey (NGS) has been adopted as the vertical datum for the City of Everett.

The NAVD 88 datum supersedes the previous National Geodetic Vertical Datum of 1929 (NGVD 29). The City of Everett had for many years used a datum called the "old city datum" which was 99.02 feet below the NGVD 29 datum. This "old city datum" had been originally adopted as 100 feet minus the NGVD datum, but over the years the USC&GS made adjustments to their datum which resulted in the City's minus 100 feet datum being changed to a minus 99.02 feet. It is believed that the City's original adoption of the minus 100 foot datum was to prevent minus elevations on many of the early public works projects constructed under the Snohomish River and the along the waterfront which were below sea level.

The relationships between the various datums is as follows:

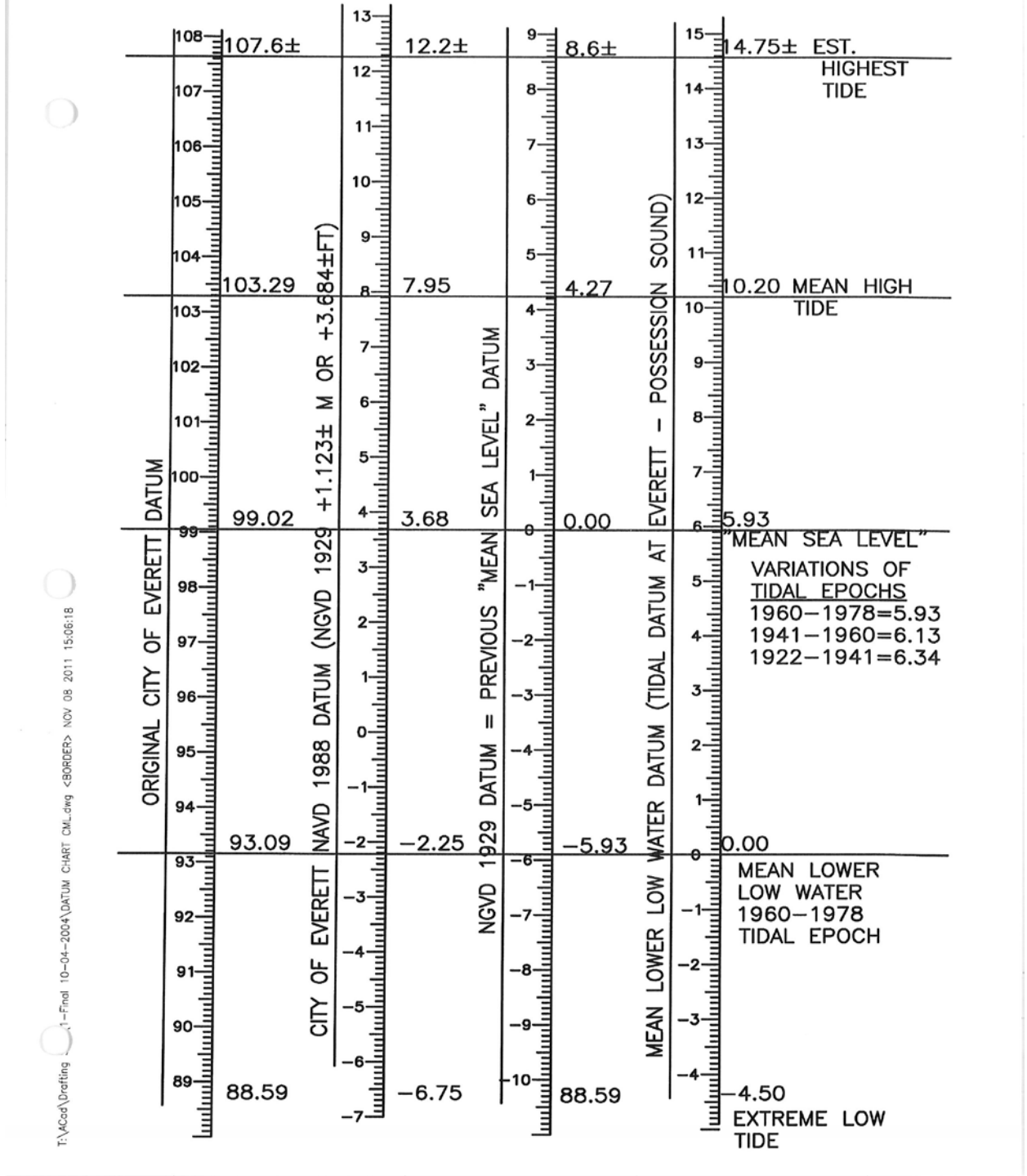


* Note: To convert from the NGVD 29 datum to NAVD 88 datum, add approximately 3.64 feet to the NGVD 29 elevations.
The 3.64 feet is approximate since the distance between these two datums varies from place to place and can only be accurately determined by knowing the latitude and longitude at a specific location. Within the City of Everett this distance varies from about 3.64 feet to 3.67 feet depending on the location, 3.64 feet being the mean. The exact difference between the two datums can be found by using a computer program such as NGS's "VERTCOM" program.

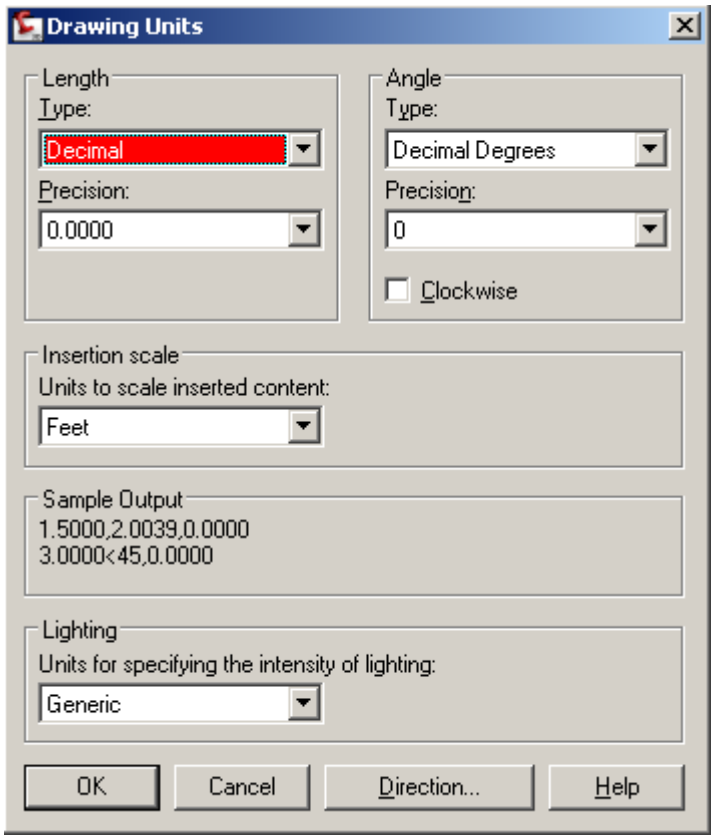
T:\ACad\Drafting Stds\1-Final 10-04-2004\Final DWG Files\EVT-Datum Details.dwg <Layout1> MAR 22 2005 11:23:48

12

Diagram 2


ORIGINAL CITY OF EVERETT DATUM
CITY OF EVERETT NAVD 1988 DATUM (NGVD 1929 +1.123± M OR +3.684±FT)
NGVD 1929 DATUM = PREVIOUS "MEAN SEA LEVEL" DATUM
MEAN LOWER LOW WATER DATUM (TIDAL DATUM AT EVERETT – POSSESSION SOUND)
107.6±
12.2±
8.6±
14.75± EST. HIGHEST TIDE
103.29
7.95
4.27
10.20 MEAN HIGH TIDE
99.02
3.68
0.00
5.93 "MEAN SEA LEVEL"
93.09
−2.25
−5.93
0.00
88.59
−6.75
88.59
−4.50 EXTREME LOW TIDE
VARIATIONS OF TIDAL EPOCHS
1960−1978=5.93
1941−1960=6.13
1922−1941=6.34
MEAN LOWER LOW WATER 1960−1978 TIDAL EPOCH
T:\ACad\Drafting\1-Final 10-04-2004\DATUM CHART CML.dwg <BORDER> NOV 08 2011 15:06:18

13 City of Everett Drawing Units



CAD Standards and Procedures

Preface

The information contained in this document is intended for any and all CAD work completed for the City of Everett Public Works Department (COE-PWD) internally or by outside contract (Consultant). The basis of developing the CAD Standards & Procedures is to maintain consistency throughout the drawings for the COE-PWD. This helps the CAD Department immensely in managing the plans and providing well managed plans to the city personnel and consultants for future needs. All consultants that provide pans the COE-PWD need to adhere to these standards. Drawings that do not comply with these CAD Standards & Procedures may not be accepted.

The CAD Department under the direction of the City Engineer and CAD manager is responsible for creating, implementing, and providing the CAD Standards & Procedures for all COE-PWD consultants that provide plans to this department. The COE-PWD currently uses AutoCAD Civil 3D release 2011. All drawing files will be saved in release 2010 or newer.

This is a dynamic document that will change as the CAD Department evolves in response to customer needs, available resources and technological growth. Consultants are responsible to stay informed and ask for the latest revisions of the CAD Standards & Procedures when they work on each new project for the COE-PWD

Every effort has gone into these CAD Standards and Procedures to ensure that they are basic and easy to follow without creating a large amount of extra work in order for the CAD technicians and engineers to comply. The COE-PWD CAD Department is committed to providing their customers & clients with the highest standards and best practices. Any and all suggestions are welcome and are an important part of that commitment. Department personnel are always available to assist and answer questions regarding the implementation of document. It is highly recommended that all projects be started using COE-PWD template drawings.

Chapter 1 Requesting & Submitting Plan Files

1.0 Requesting Files

The COE-PWD currently uses AutoCAD Civil 3D and/or AutoCAD Map 3D version 2012 “dwg” format.

Consultants may request copies of existing CAD data from the COE-PWD CAD or GIS sections. Such data is provided for the convenience of the recipient only. This data has been gathered from a variety of sources, and it may or may not conform to current CAD standards set forth by this current document. Also the data may be incomplete or may not accurately reflect current conditions. The COE makes no representation as to the completeness or accuracy of the data. Consultants should keep in mind that CAD data may appear to be accurate because it is computer-generated, however, its appearance does not guarantee that the data truly represents existing conditions.

1.1 Drawing & File Formats for Submittals

CAD drawings that consultants submit to the COE-PWD must be accurate and conform to the current CAD Standards, even if data that the COE-PWD provided to the consultant was inaccurate or did not conform to the standards.

Formats required for submittal of files to the COE-PWD:

1.1a Table – Submittal Formats By Phase

File Type	Survey Base	30% Review	60% Review	90% Review	Bid Set	Construction Set	Record Set
DWG	X	X	X	X	X	X	X
DWF	X	X	X	X			
PDF					X	X	X
Full Size Plot (22”x34”)	X				X	X	X
Half Size Plot (11”x17”)	X	X	X	X	X	X	X

- As requested by the COE project manager (PM)

The COE-PWD shall validate all CAD data and other materials that the consultant submits. If submittals do not conform to the CAD standards the COE-PWD can reject the submittals from the consultant. The consultant is responsible for making revisions to the materials to make them conform to this document.

1.2 Media Types

For hard copy sets of plans that are submitted to the COE-PWD, 22”x34”, 20# bond paper is the requirement. Half size plans will be on 11”x17”, 20# bond paper. Bond paper is easier to scan and take out into the field. Electronic files will be supplied on a CD or DVD disk.

1.3 Plan Archiving

The COE-PWD will keep copies of the Bid, Construction/Conformed, and Record Sets for all projects as listed in “Drawing & File Formats for Submittals” above.

1.4 File Naming Convention

All projects drawing that are issued to the COE-PWD shall be provided in the following manner. The following are examples of how project drawing files will be named. The COE-PWD uses the City Work Order Number to file all records pertaining to any and all projects. All DWG files submitted will include all Referenced DWG files and Data Link files. Referenced files not included within the project file may be bound as a block.

1.4a Project files representing one sheet of a drawing set.

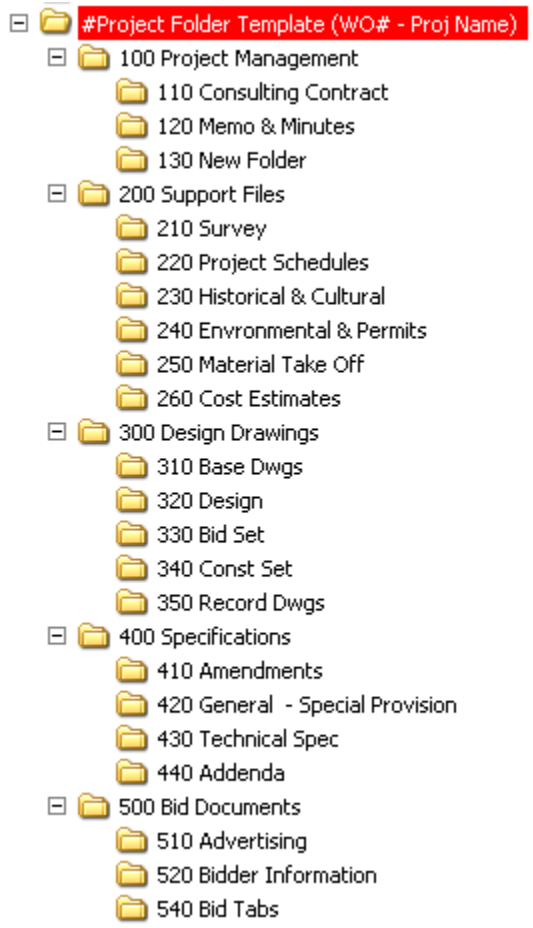
- Single Drawing DWG PW3384-C1.dwg
- Single Drawing PDF PW3384-C1.pdf
- Single Drawing DWF PW3384-C1.pdf

1.4b Project files with multiple sheets of a drawing set

- Project Drawing File PW3384.dwg
- Project Drawing PDF file PW3384 dd-mm-yyyy.pdf
- Project Drawing DWF file PW3384 dd-mm-yyyy.dwf

1.5 File Folder Structure

- COE-PWD internal design projects will follow the sample structure in "S:\#Common\Engineering Projects\#Project Folder Template (WO# - Proj Name)"



- Consultant files should follow the 300 series portions of this structure at a min.

  Project Folder (WO# - Project Name
  - 300 – Design Drawings
  - 310- Base Dwg
  - 320- Design
  - 330- Bid Set & Addenda
  - 340- Construction Set including Addenda
  - 341- Conformed Set (if used)
  - 350- Record Set (redlines of construction changes)

Example for Consultant:
?:\PW3384-PROJECT NAME\300 DESIGN DRAWINGS\320 DESIGN\PW3384-C1.DWG
?:\PW3384-PROJECT NAME\300 DESIGN DRAWINGS\310 BASE DWGS\PW3384-V1.DWG
?:\PW3384-PROJECT NAME\300 DESIGN DRAWINGS\320 DESIGN\PW3384-C1.LPDF
?:\PW3384-PROJECT NAME\300 DESIGN DRAWINGS\320 DESIGN\PW3384-C1.LDWF

Chapter 2 Sheets

2.1 Sheet Set Size

There are only two sheet size formats that shall be used and accepted by the COE-PWD for hard drawings that are provided by an outside contractor or consultant. These plans should be provided on 20# bond coated paper only.

- Full size= "22x34" (ANSI D)
- Half size= "11x17" (Tabloid)

2.2 Sheet Designation Table

The following list consists of the drawing disciplines for the project sheets provided to the COE-PWD.

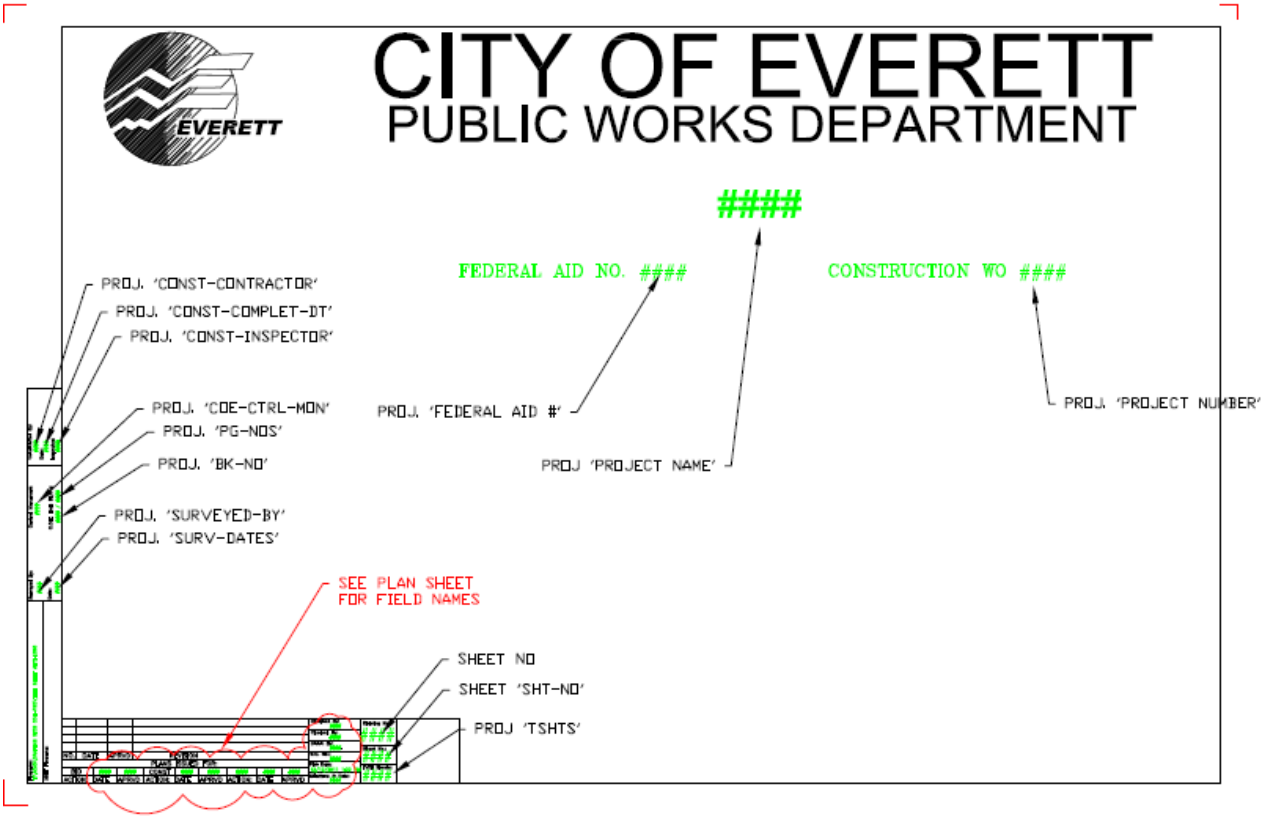
Sheet Designation	Discipline Description
B	Geo Technical
C	Civil (Road Work)
D	Demolition
E	Electrical
G	General (Notes, Cover, Vicinity Maps, & Legend)
H	Hazardous Materials
L	Landscaping
S	Structural, Mechanical, Equipment, etc
T	Traffic, Telecommunications
U	Utilities
V	Survey Control

For example the third sheet of the Demolition drawings would be "D3".

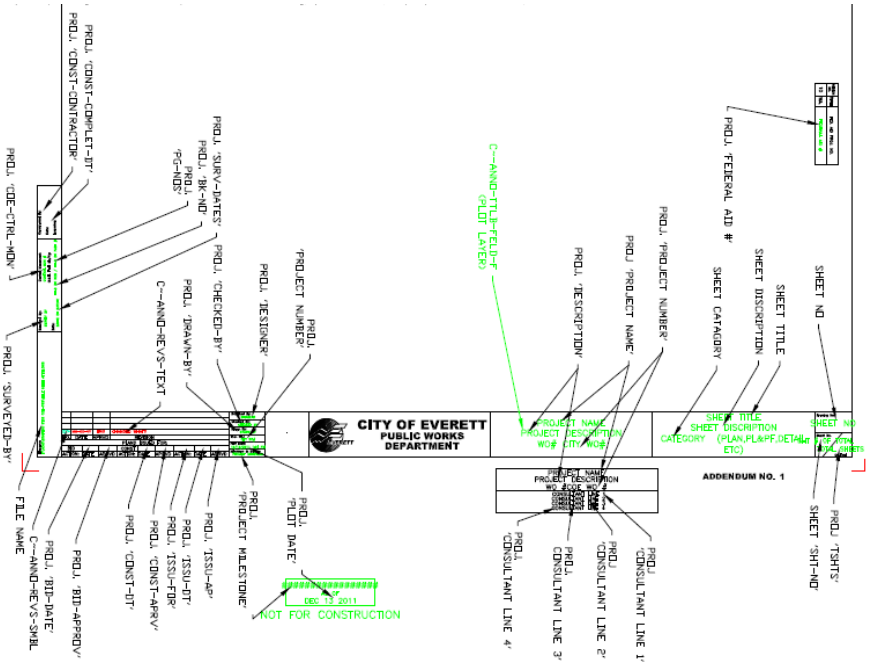
2.3 Required Project Sheets

The following are required sheets for any project:

Cover G1:



Legend:

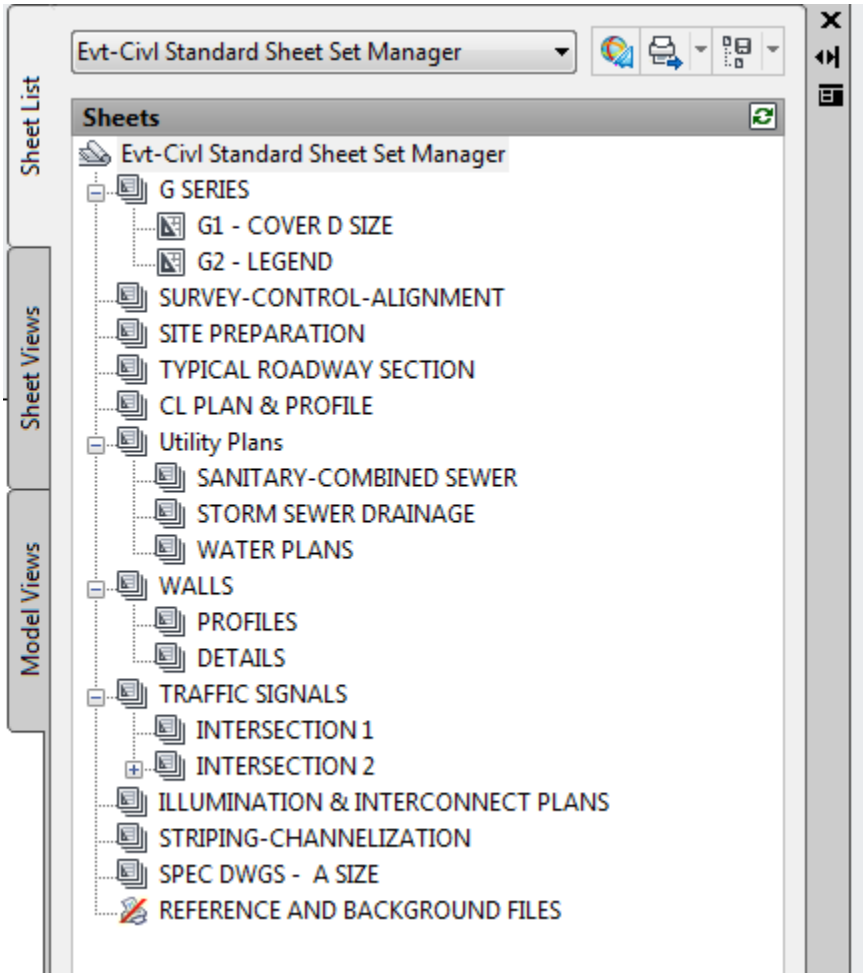


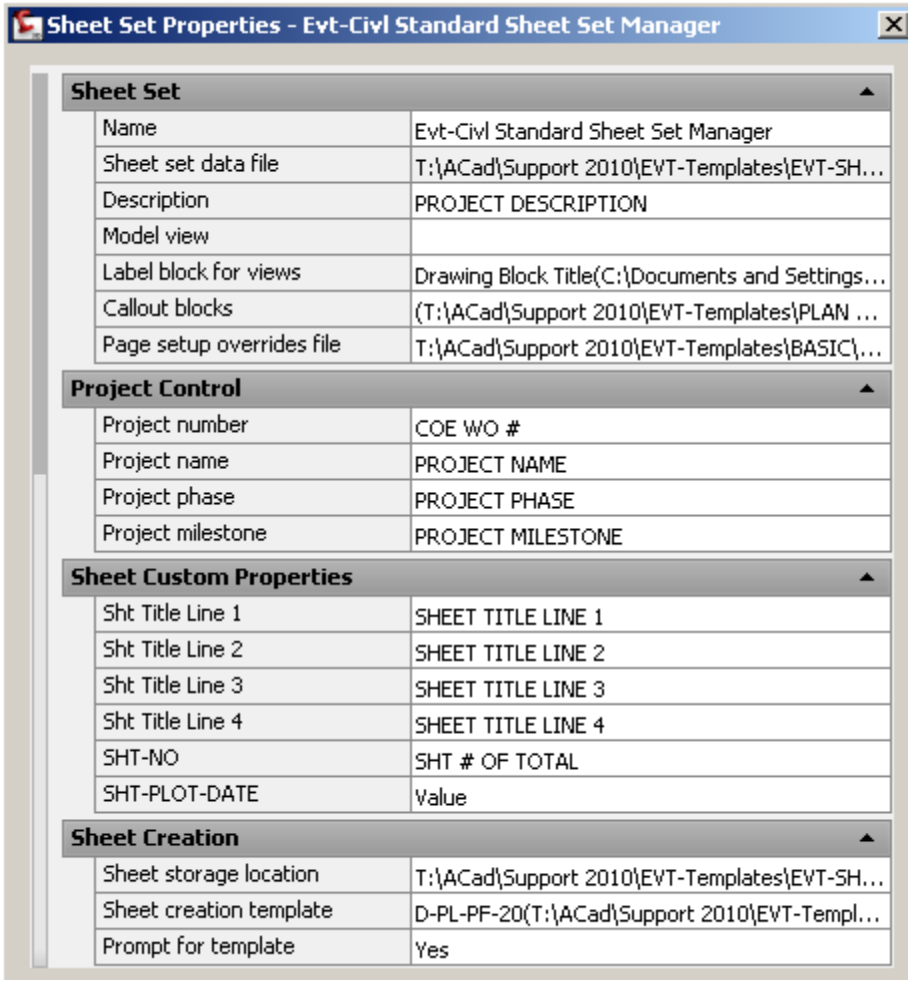
2.4 Sheet Set Manager (DST)

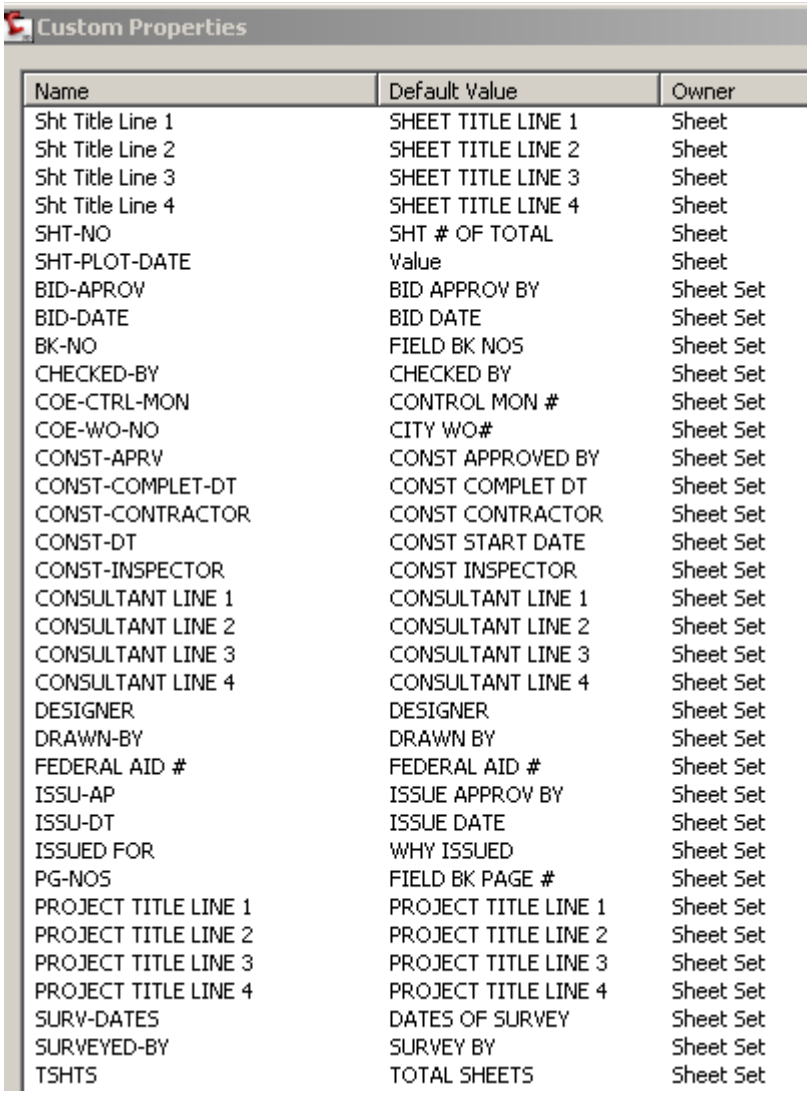
The Sheet Set Manager in Autodesk is a major leap forward in terms of creating, organizing, annotating and publishing of projects. The Sheet Set Manager as defined in a DST file stored in the project file folder structure will be used by all projects prepared for COE-PWD.

All of the DWT files have been converted to handle Sheet Set Manager fields. SDI template files are provided in:

EVT-Templates\EVT-SHEET SETS\COE STANDARDS\Evt-Civl SHT SET Standard.dst




Sheet Set Properties - Evt-Civl Standard Sheet Set Manager
Sheet Set
Name
Evt-Civl Standard Sheet Set Manager
Sheet set data file
T:\ACad\Support 2010\EVT-Templates\EVT-SH...
Description
PROJECT DESCRIPTION
Model view
Label block for views
Drawing Block Title(C:\Documents and Settings...
Callout blocks
(T:\ACad\Support 2010\EVT-Templates\PLAN ...
Page setup overrides file
T:\ACad\Support 2010\EVT-Templates\BASIC\...
Project Control
Project number
COE WO #
Project name
PROJECT NAME
Project phase
PROJECT PHASE
Project milestone
PROJECT MILESTONE
Sheet Custom Properties
Sht Title Line 1
SHEET TITLE LINE 1
Sht Title Line 2
SHEET TITLE LINE 2
Sht Title Line 3
SHEET TITLE LINE 3
Sht Title Line 4
SHEET TITLE LINE 4
SHT-NO
SHT # OF TOTAL
SHT-PLOT-DATE
Value
Sheet Creation
Sheet storage location
T:\ACad\Support 2010\EVT-Templates\EVT-SH...
Sheet creation template
D-PL-PF-20(T:\ACad\Support 2010\EVT-Templ...
Prompt for template
Yes



Name	Default Value	Owner
Sht Title Line 1	SHEET TITLE LINE 1	Sheet
Sht Title Line 2	SHEET TITLE LINE 2	Sheet
Sht Title Line 3	SHEET TITLE LINE 3	Sheet
Sht Title Line 4	SHEET TITLE LINE 4	Sheet
SHT-NO	SHT # OF TOTAL	Sheet
SHT-PLOT-DATE	Value	Sheet
BID-APROV	BID APPROV BY	Sheet Set
BID-DATE	BID DATE	Sheet Set
BK-NO	FIELD BK NOS	Sheet Set
CHECKED-BY	CHECKED BY	Sheet Set
COE-CTRL-MON	CONTROL MON #	Sheet Set
COE-WO-NO	CITY WO#	Sheet Set
CONST-APRV	CONST APPROVED BY	Sheet Set
CONST-COMPLET-DT	CONST COMPLET DT	Sheet Set
CONST-CONTRACTOR	CONST CONTRACTOR	Sheet Set
CONST-DT	CONST START DATE	Sheet Set
CONST-INSPECTOR	CONST INSPECTOR	Sheet Set
CONSULTANT LINE 1	CONSULTANT LINE 1	Sheet Set
CONSULTANT LINE 2	CONSULTANT LINE 2	Sheet Set
CONSULTANT LINE 3	CONSULTANT LINE 3	Sheet Set
CONSULTANT LINE 4	CONSULTANT LINE 4	Sheet Set
DESIGNER	DESIGNER	Sheet Set
DRAWN-BY	DRAWN BY	Sheet Set
FEDERAL AID #	FEDERAL AID #	Sheet Set
ISSU-AP	ISSUE APPROV BY	Sheet Set
ISSU-DT	ISSUE DATE	Sheet Set
ISSUED FOR	WHY ISSUED	Sheet Set
PG-NOS	FIELD BK PAGE #	Sheet Set
PROJECT TITLE LINE 1	PROJECT TITLE LINE 1	Sheet Set
PROJECT TITLE LINE 2	PROJECT TITLE LINE 2	Sheet Set
PROJECT TITLE LINE 3	PROJECT TITLE LINE 3	Sheet Set
PROJECT TITLE LINE 4	PROJECT TITLE LINE 4	Sheet Set
SURV-DATES	DATES OF SURVEY	Sheet Set
SURVEYED-BY	SURVEY BY	Sheet Set
TSHTS	TOTAL SHEETS	Sheet Set

Chapter 3 Titleblocks

3.1 Titleblocks

All drawing files submitted to the COE-PWD will use the standard COE-PWD title blocks as shown in:

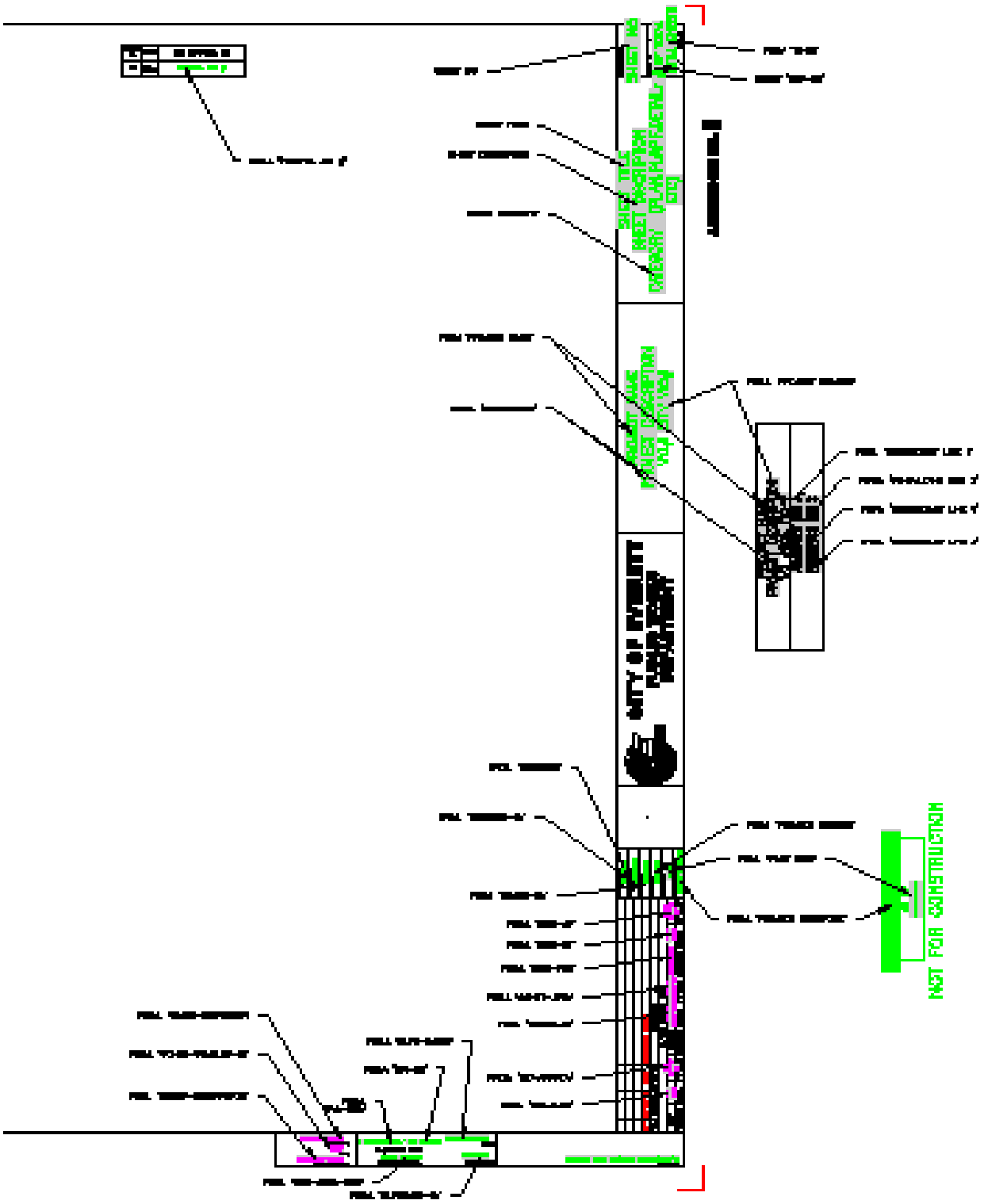
> "EVT-Templates\SPECIALIZED DESIGN DRAWINGS\GENERAL SHEETS\
> Evt-G COVER G1.dwt"
>
> and
>
> "EVT-Templates\BASIC\ Evt-TB D Plan.dwt"

3.2 Title Block (dst field names)

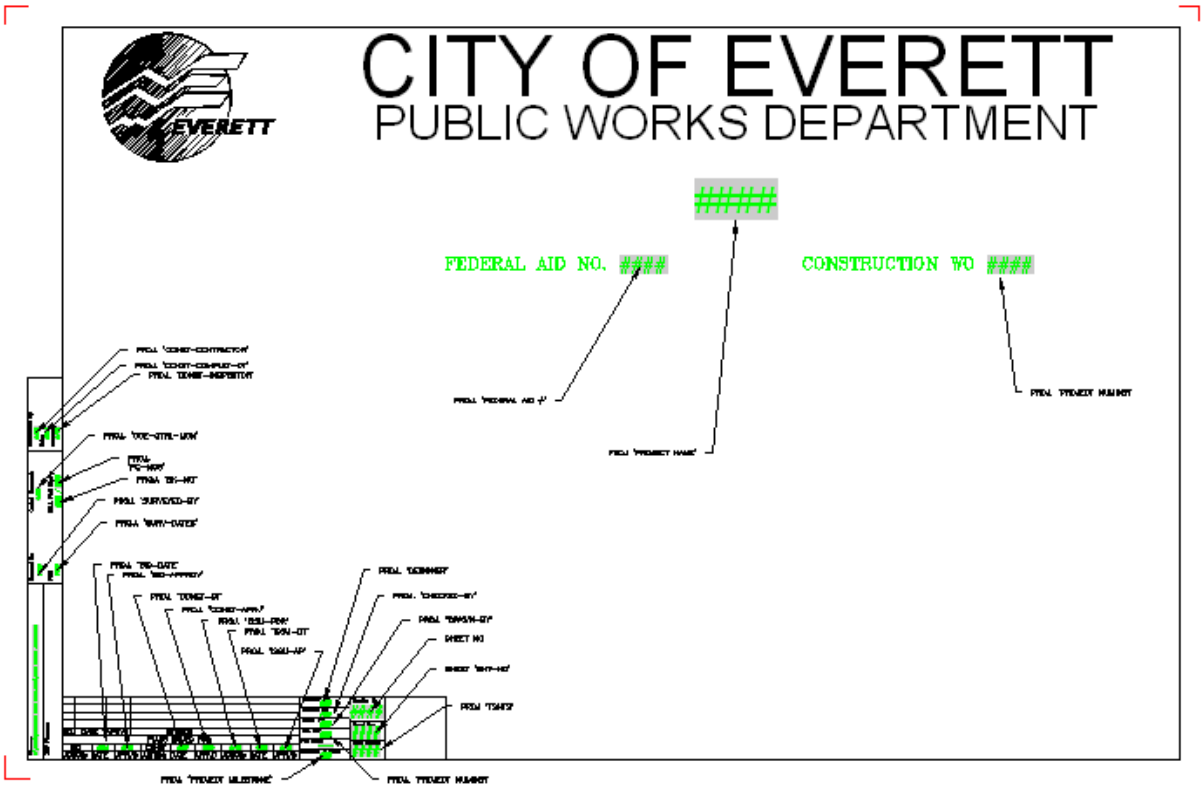
- Drawing Number – the sheet number within a discipline within in the project
- Project Total Sheets – total number of sheets with in the complete project
- Sheet Number- the sequential number of the sheet within the set
- Sheet Title – general subject of applicable sheet (B Street Utilities)
- Sheet Description – specific topic (Sta 102+00 to Sta 112+00)
- Sheet Category – Plan, Plan & Profile, Construction Notes, etc.
- Project Name – project official title or as appears on grant paperwork (Z Street Improvements)
- Project Description – scope of project (Varian Blvd to Victor Way)
- Project # - WO# assigned by COE-PWD (AA####)
- Consultant line 1 - consultant name (Jackson and Associates)
- Consultant line 2 – consultant address (342 B St, Jules, WA)
- Consultant line 3 – consultant contact info (phone, email, fax, etc.)
- Consultant line 4 – as needed or consultant info
- Designer – designer of the project drawing set
- Checked By – name of person who reviewed and approved project
- Drawn By – initials of CAD techs on project
- Plot Date – date that drawing was plotted
- Project Phase – project milestone (30%, 60%, 90%, State Reviews etc)
- Bid-Date – date project approved for bidding
- Bid-Approv – initials of person approving project for Bid
- Const-Dt – date Bid Date and all Addendum are approved for construction (Bid Awarded)
- Const- Aprv – initials of person approving construction to proceed
- Issu-For – reason being issued for (State Approved etc)
- Issu-Dt – date issued
- Issu- Ap – initials of person approving issuing
- Surveyed-by – name of surveying company or individual & PLS #)
- Surv-dates – dates that field survey was conducted
- COE-CTRL-MON – city approved survey control monument
- Bk-No – COE survey book used by surveyor during project surveys
- Pg-Nos – page numbers used in COE survey book
- Const-Contractor- name of construction contractor
- Const-Complet-Dt – date construction completed
- Const- Inspector – COE inspector (prepares Record Redlines)
- Federal Aid # - federal aid # issued by WA State DOT

3.3 Title Block (dst field locations)

Plan Sheet:



Cover Sheet:


CITY OF EVERETT
PUBLIC WORKS DEPARTMENT
EVERETT
#####
FEDERAL AID NO. ####
CONSTRUCTION WO ####

Chapter 4 Drawing Environment

4.1 The Two Drawing Environments

There are two distinct working environments or “spaces” in which to create objects in an AutoCAD drawing. These are represented by the Model (Model Space) and the layout tabs, (paper space). A drawing may have several layout tabs or just one within it. These layout tabs are within the paper space views of the drawing.

There are several benefits to switching between model space and paper space to perform certain tasks. Model space is used generally for creating and editing the drawing model. Model space can be a convenient area to create details and view through scaled viewports in paper space. Paper space is used for composing the drawing sheets, defining views, and plotting.

4.1a Model Space

Model space is AutoCAD’s working area for developing the drawing. The drawing is always drawn in model space at full scale (1:1). Any additional items that help define the drawing data, schedules or sections must be drawn at full scale in model space. Vertical stretch is included in item where as horizontal is at full scale. This information then can be scaled in a viewport within a sheet.

4.1b Paper Space

Paper space is where the drawing created in model space is shown at a variety of views and scales with use of viewports. General project graphic elements such as titleblocks, legends, view titles, and sheet specific notes & blocks are inserted.

4.2 Layouts

A drawing can have multiple layout tabs. The number of tabs does affect regen and plotting times.

4.3 Layout Viewports

A layout can have multiple viewports which act as windows into model space. Within these viewports the properties, rotation, and scale of the model space view are controlled using “dview” “DVIEWBLOCK”, “VIEWPORT SCALE”, and Layer States Manager. Viewports are created on layer “Defpoints” or some other preapproved, non-plotting layer. Viewports will not be created on layer “0”.

4.4 Drawing Rotation for Plotting

If a drawing is rotated in model space for ease of design it must be rotated back before submitting it to COE-PWD. The drawing model can only be parentally rotated within a layout viewport.

4.5 Drawing Variable Settings

- USCICON shall be ON, <1>
- VISRETAIN shall be ON, <1>
- BLIPMODE shall be OFF, <0>
- PSLTSCALE shall be ON, <1>
- LTSCALE shall be set to <1>
- DIMASSOC shall be set to ON, <2> (Associative dimensions)

Chapter 5 Layers

5.1 Industry CAD Layering Systems

COE-PWD has evaluated the two major industry CAD layering standards (NCS/AIA & APWA) and has elected to use the NCS/AIA as the basis for all civil design projects. Layer names not conforming to this standard will cause rejection of the plans. Design projects for buildings should follow standards selected by the COE Facilities Department. All land surveying work will follow the standards set forth in this document.

For more information about NCS, visit 'www.nationalcadstandard.org'

5.2 COE-PWD Layering Organization

The COE-PWD layering system is based on the NCS layering system which was based on the AIA CAD layer guidelines, with the layer name organized as a hierarchy. The level of detail required within a project (which is controlled by the COE project manager) is controlled by the number of options used in the layer naming.

Example:

C~-WATR-LINE-N
This lumps all water lines regardless of size or material on one layer which allows the visibility to be controlled all together.

C~-WATR-08AC-LINE-N
This separates water lines by size and type on separate layers which can be selectively controlled within a viewport.

There are four defined layer name data fields in the system: Discipline Designator, Major Group, two fields max (normally) for Minor Group, and Status.

5.3 Layer Name Format

The City of Everett's layer name format is identical to that of the National CAD Standard (NCS), Version 4. Like NCS, it uses four field types – Discipline Designator, Major Group, two (max. normally but not necessarily) optional Minor Groups, and an optional Status Field – each separated by a dash. The layer name format is organized as a hierarchy, allowing the user to include field codes to the desired level of detail. The following is a description of the fields used.

5.3a Discipline Designator

The first character of the Discipline Designator denotes the category of subject matter contained on the specified layer. The second character is a modifier to the first character, sometimes describing the source of the information on the layer.

AA	-	BBBB	-	CCCC	-	DDDD	-	E

5.3b Major Group

The Major Group denotes the main group of the subject matter.

AA	-	**BBBB**	-	CCCC	-	DDDD	-	E

5.3c Minor Groups

The optional Minor Groups denote a more detailed breakdown of the major group.

AA	-	BBBB	-	**CCCC**	-	**DDDD**	-	E

5.3d Status (Phase)

The optional Status (Phase) field denotes the status of the work or a construction phase.

AA	-	BBBB	-	CCCC	-	DDDD	-	**E**

5.4 Complete List of Codes to Populate Layer Name Fields

The following tables show the codes used in the COE-PWD standard within each of the four fields of the layer name format. The codes shown here represent a subset of the complete NCS Layer Guidelines. In addition to these codes, new codes (shown bold & italics) were created by the COE-PWD to help define categories unique to the COE-PWD's needs – a practice allowed by the NCS. The definitions of selected codes that were already defined in NCS were not changed.

The file "EVT-Templates\BASIC\ Evt-LAYERS ONLY.DWG" is supplied to be used with the "DesignCenter" that contains the majority of the COE-PWD layer names with the appropriate properties. All layers have a Discipline Designator "##" this saved duplicating layer names for all possible disciplines. By dragging the appropriate layer name into a drawing and assigning the desired Discipline Designator all of the appropriate properties will be set. Most importantly the syntax, linetype, and layer description have been preset. The other properties such as Color are solely dependent on operator preference on their monitor; Plot Style is dependent on how the finished plot is to appear.

5.4a Discipline Designators:

Additional Discipline Designators can be added with approval of the COE-PWD CAD manager. The Discipline Designator is intended to denote both discipline and responsibility for the work.

C~	Civil
C3	Civil 3D objects
CP	Civil 3D Piping Networks
CS	Civil Site
CT	Civil Transportation
CU	Civil Utilities
V~	Survey / Mapping
VA	Survey - Aerial
VF	Survey - Field
VG	Survey - GIS
VR	Survey - Record Information

5.4b Major Groups

ALGN	Alignment
ANNO	Annotation (see PAPR/MODL)
BASN	Stilling and settling basin
BLDG	Buildings and primary structures
BNDY	Political boundaries
BRDG	Bridge
CATV	Cable television system
CHAN	Navigable channels
COMM	Telephone communications
CORR	Civil 3D Corridor Object
CREK	Creek
CSWR	Combined sanitary sewer
CTRL	Control points
CURB	Curb
DETL	Detail
DIKE	Dike
DRIV	Driveways
DTCH	Ditches or washes
DTUR	Detour plan
EROS	Erosion and sediment control
ESMT	Easements
FENC	Fences
FUEL	Fuel systems
GNDW	Ground water
GRAD	Civil 3D Grading Object
GRND	Ground
IRRG	Irrigation
LAKE	Lake
LITE	Lighting
LSCP	Landscape
MBOX	Mailbox
NGAS	Natural gas

NODE	Node
MODL	Model Space (no specific MG)
PIPE	Pipe Network
PAPR	Paper Space (no specific MG)
POWR	Power
PRCL	Parcel
PROF	Civil 3D Profile View
RAIL	Railroad
REFR	Reference, external files
RIVR	River
ROAD	Roadways
RTWL	Retaining wall
RWAY	Right-of-way
SECT	Section
SGNL	Signals (Traffic)
SOIL	Soils
SSWR	Sanitary sewer
STRM	Storm sewer
SURF	Civil 3D Surface Object
SWAL	Swale
SWLK	Sidewalks
SWMP	Swamp
TABL	Tables
TOPO	Topographic feature
TRAF	Traffic
TRAL	Trails or paths
TRNS	Transit
VPRT	Viewport
WATR	Water supply
WETL	Wetlands

5.4c Minor Groups

ACCI	Accident diagram
ASPH	Asphalt
BACK	Back
BMRK	Benchmarks
BRKL	Break lines
BUSW	Busways
CABL	Cable
CITY	City
CMUW	Concrete masonry unit
CNDT	Conduit
CNTR	Center
CNTY	County
COMM	Communications
CONC	Concrete
DATA	Data
DBRY	Direct bury
DESL	Diesel Fuel
DIMS	Dimensions
DTCH	Ditches or washes
EQPM	Equipment
FIBR	Fiber optics cable
FLOW	Flowline
FORC	Force main
GASO	Gasoline Fuel
GCVR	Ground cover
GRAL	Guard rail
GRID	Grid
GRND	Ground
GRVL	Gravel
HALF	Half-size
HEAD	Door and window headers
HORZ	Horizontal
JBOX	Junction box
LABL	Labels
LEGN	Legend, symbol keys
LINE	Lines
LINK	Chain link
LOOP	Traffic control loop
MAJR	Major
METL	Metal
MINR	Minor
MONI	Monitoring
MONU	Monument
NGAS	Natural gas line
NODE	Nodes
NOTE	Notes
NPLT	Non-plotting graphic information
OVHD	Overhead
OVLY	Overlay limits
PATT	Texture or hatch patterns
PLNT	Plants
PNTS	Points
POLE	Poles
POND	Retention pond
PRIV	Private
PROP	Property boundary
QTRS	Quarter section
REVC	Revision clouds
REVS	Revisions (Symbols or Text)
ROCK	Large rocks and outcroppings
RWAY	Right-of-way
SAWC	Sawcut line
SBCK	Setback lines
SERV	Service
SHLD	Shoulder
SIGN	Signage
SILT	Silt fence
SKIP	Skip
SLID	Solid
SLOP	Slope
STAN	Stationing
STAT	State
STMP	Professional stamp
STRC	Structures
STRP	Striping
SXTS	Sixteenth section
SYMB	Reference symbols
TABL	Data tables
TANK	Storage tanks
TEMP	Temporary
TEXT	Text
TOE~	Toe
TOP~	Top
TRAC	Tract lines
TRAN	Transmission system
TRAV	Transverse
TREE	Trees
TSHP	Town or township
TURN	Turn
UGND	Underground
UTIL	Utility lines
VEGE	Trees, shrubs, other vegetation
VERT	Vertical
WATR	Water supply
WELL	Well
WOOD	Wood
ZONE	Zoning

5.4d Status Fields

A	*Abandoned*
D	Existing to demolish / remove
E	Existing to remain
F	Future work
M	Items to be moved
N	New work
T	Temporary work
X	Not in contract
1-9	Phase number

5.4e Pipe Codes Table

Pipe Material Codes	
##@@	Special Codes for pipe size & mat'l
##	Pipe diameter (inches)
AC	Asbestos Cement
AL	Aluminum
BR	Brick
CI	Cast Iron
CL	Clay Pipe
CM	Corrugated Metal Pipe
CO	Concrete Pipe (non-reinforced)
CP	Concrete Cylinder Pipe
CU	Copper
DI	Ductile Iron Pipe
DL	Ductile Iron Pipe CL 52

GI	Galvanized Iron
HD	HDPE High Density Polyethylene
HI	HDPE DIPS Ductile Iron Pipe Size
HP	High Pressure Gas Pipe
HR	HDPE IPS Iron Pipe Size
HW	High Pressure Wrapped Gas Pipe
PE	Polyethylene
PR	Perforated Drain Pipe
PV	Polyvinyl Chloride
RC	Reinforced Concrete
SP	Steel Pipe
SW	Steel Wrapped
WD	Wood

5.5 Logical groupings of Major and Minor field codes.

5.5a Water Features

Water Features	
BASN	Basin
CREK	Creek
DIKE	Dike
DTCH	Ditches or washes
LAKE	Lake
RIVR	River
SWMP	Swamp
WETL	Wetlands

5.5b Surface Features

Surface Features		
BLDG	Building	
EROS	Erosion Control	
	DTCH	Ditch
	POND	Pond
	SILT	silt fence
FENC	Fence	
	LINK	chain link
	METL	Metal
	WOOD	Wood
GRND	Ground	
	SLOP	Slope
	TOE~	toe
	TOP~	Top
LSCP	Landscaping	
	GCVR	ground cover
	PLNT	Plants
	TREE	Trees
	VEGE	vegetation
MBOX	Mailbox	
RTWL	Retaining Wall	
	CMUW	Concrete masonry unit
	ROCK	rock
	TOP~	top
SWAL	Swale	
TOPO	Topographic feature	

5.5c Land Delineation

Land Delineation		
BNDY	Boundary	
	CITY	city
	CNTY	county
	PROP	property
	STAT	state
	TRAC	tract lines
	ZONE	zoning
ESMT	Easements	
	CATV	cable television
	COMM	communications
	NGAS	natural gas
	POWR	power
	SBCK	setback lines
	SSWR	sanitary sewer
	STRM	storm sewer
	UTIL	utility lines
	WATR	water supply
RWAY	Right-of-way	
	CNTR	center
SECT	Sections	
	QTRS	quarter section
	SXTS	sixteenth section
	TSHP	town or township

5.5d Transportation:

Transportation			
BRDG	Bridge		
CHAN	Channelization		
	STRP	striping	
		BUSW	busway
		SKIP	skip lane stripe
		SLID	solid lane stripe
		TURN	turn arrows
CURB	Curb		
	ASPH	asphalt	
	BACK	back	
	CONC	concrete	
	FLOW	flow line	
DRIV	Driveways		
	ASPH	asphalt	
	CONC	concrete	
	GRVL	gravel	
DTUR	Detour plan		
	SIGN	signs	
	STRP	striping	
RAIL	Railroad		
ROAD	Roadways		
	TURN	vehicle turning data	
TRAL	Trails or paths		
	ASPH	asphalt	
	CONC	concrete	

	ASPH	asphalt	
		OVLY	overlay limits
	CNTR	center	
	CONC	concrete	
	GRAL	guard rail	
	GRVL	gravel	
	SAWC	sawcut line	
	SHLD	shoulder	
SGNL	Signals (Traffic)		
	CNDT	conduit	
	HEAD	head	
	JBOX	junction box	
	LOOP	loop detector	
	POLE	pole	
SWLK	Sidewalks		
	ASPH	asphalt	
	CONC	concrete	
TRAF	Traffic		
	ACCI	Accident diagram	
	DATA	volume data	
	SIGN	traffic signs	

	GRVL	gravel
TRNS	Transit	
	BUSW	busways

5.5e Utilities:

Utilities		
CATV	Cable television system	
	EQPM	equipment
	SERV	service
	UGND	underground
		CNDT conduit
		DBRY direct bury
COMM	Telecommunications	
	EQPM	equipment
	FIBR	fiber optics cable
	OVHD	overhead
	SERV	service
	UGND	underground
		CNDT conduit
		DBRY direct bury
CSWR	Combined sanitary sewer	
	##@@	##=size; @@=pipe material
	STRC	Structure
FUEL	Fuel systems	
	##@@	##=size; @@=pipe material
IRRG	Irrigation	
	##@@	##=size; @@=pipe material
LITE	Lighting	
	EQPM	equipment
	OVHD	overhead
	PRIV	private
	UGND	underground
		CNDT conduit
		DBRY direct bury

NGAS	Natural gas	
	##@@	##=size; @@=pipe material
	EQPM	equipment
POWR	Power	
	EQPM	equipment
	OVHD	overhead
	SERV	service
	UGND	underground
		CNDT conduit
		DBRY direct bury
	UGND	underground
SSWR	Sanitary sewer	
	##@@	##=size; @@=pipe material
	DATA	data table
	FORC	force main
	SERV	service
	STRC	structures

STRM	Storm sewer	
	##@@	##=size; @@=pipe material
	DATA	data table
	SERV	service
	STRC	structures
WATR	Water Supply	
	##@@	##=size; @@=pipe material
	DATA	data table
	SERV	service
	STRC	structures
	TRAN	transmission

5.5f Geotechnical:

Geotechnical		
GNDW	Groundwater	
	MONI	Monitoring
SOIL	Soils	
	BORE	Boring

5.5g Minor Entity Codes:

AutoCAD Entity Type	
DIMS	Dimensions
LINE	Lines
NODE	Node
PATT	Texture or hatch patterns
SYMB	Reference Symbols
TEXT	Text

5.5h 3D Major Field Codes:

Civil 3D Objects		
ALGN	Alignment	
	LABL	labels
CORR	Corridor	
	LABL	labels
GRAD	Grading	
	LABL	labels
PIPE	Pipe Network	
	LABL	labels
PRCL	Parcel	
	LABL	labels
PROF	Profile View	
	GRID	grid
	LABL	labels
SECT	Section	
	LABL	labels
SURF	Surface	
	LABL	labels

5.5i Specialized Major Codes:

Model Space/Layouts Tabs		
PAPR (LTAB)	Annotations in Layout Tabs (PS)	
	HALF	half-size
	LEGN	legend
	NOTE	notes
	NPLT	non-plotting info
	REVS	revision clouds
	REVS	revisions
	STMP	Professional stamp
	TTLB	Border and title block
	VPRT	Viewport
MODL (LTAB)	Annotations in Model Space (MS)	
	NOTE	notes
DETL	**HALF**	half-size
PROF	**LEGN**	legend
XSEC	**NOTE**	notes
XREF	**NPLT**	non-plotting info
	REVC	revision clouds
	REVS	revisions
	STMP	Professional stamp
	TTLB	Border and title block
	VPRT	Viewport

Chapter 6 Blocks (Symbols)

6.1 Block Creation

Original COE-PWD blocks were adapted from APWA and generally accepted civil engineering practices. Over the last 20 years these have been modified, updated and added to. All TOPO, Utility, Surface Features, and Mapping blocks/symbols are only developed by the COE-PWD under the approval and direction of the CAD manager. All approved blocks/symbols are contained in “EVT-Symbols” directory. The COE-PWD develops one block for all statuses (Exist, New, Demolished, Future, Temporary, etc). The visibility/appearance is controlled by the block layer properties. This facilitates translation of the entity from exist to demolished/removed or new to existing after installation.

6.2 Block Rules for Creation, Storing and Use

- Blocks will be created on the layer “0” and defined on “0”
- Color will be by layer.
- Lineweight will be default (stb controls)
- Blocks will be in real dimensions (Ft) to show conflict problems. COE-PWD CAD manager may permit exceptions based on visibility at 1”=20’ scale.
- Blocks will be developed with a insertion point related to normal field constriction installation (CB grate at FOC)
- Attribute text styles will follow text style standards in this manual.
- Blocks will be filed in the “EVT-Symbols” overall directory with sub-directories indicating where intended use of the block between Model Space and Paper Space. Within these directories blocks are sorted by general categories which are intended to be intuitive.
- Block naming syntax consists of a 2 letter discipline suffix, a single dash, and an intuitive name.

The file “EVT-Templates\BASIC\ Evt-BLOCKS ONLY.dwg” is supplied to be used with the “DesignCenter” that contains a majority of the COE-PWD blocks. This allows any of the COE-PWD blocks to be dragged into any dwg file that is open. Once the block is inserted into the drawing the layer will control the visibility and plotting of the block. Use of non-approved blocks in a drawing file may result in the file not being accepted.

Requests for any additional blocks required by a project, forward the individual drawing file the block along with a description of its intended use to the COE-PWD CAD manager. After the request has been reviewed the block may be adopted and added to the CAD Standards.

6.3 Block Discipline Suffix

6.3a Block/Symbol Name Table

2-Character Block Prefix	Block Prefix Description
AC-	Accidents Diagrams
CH-	Non-Striped Channelization
EE-	Electrical Diagram Symbols
LD-	Landscaping and Vegetation
LT-	Light, Street Light or Other Light
ME-	Mechanical Diagram Symbols
NT-	Note Or Call Out Symbol
PV-	Pavement Or Curb and Gutter
RR-	Railroads
SF-	Surface Features Not Otherwise Specified
SG-	Signals
SH-	Sheet, Legends, North Arrow, Title Blocks, Etc
SN-	Signs
SP-	Striping
SV-	Survey, Section Lines
TB-	Data Table
TR-	Transit
UT-	Utilities
WD-	Wiring Diagram Component
WL-	Wall, Rockeries, Guardrails

Refer to “EVT-Symbols” for a complete listing of City of Everett symbols.

Chapter 7 Linetype Standards

7.1 General

Linetypes are used in drawing to delineate one line from another thus providing a clearer drawing. With the development of Complex Linetype definitions, the descriptive text is imbedded in the definition showing the function of the line or pipe represented. All complex line definitions use the AutoCAD default text style "Standard" there for the COE-PWD defines Plot Style "Standard" using the "romans.shx" file.

All of the lines included in "EVT-Support\ everett.lin" file have been developed based on the assumption that the standard horizontal scale for COE-PWD plans would be 1"=20'. Thus the drawing variables "ltscale & psltscale" can be set or left at the default of 1. Lines will appear the same in the typical layout.

7.2 Custom Annotative Linetypes

All custom line types created for the COE-PWD CAD Standards are contained in the EVT-Support\EVERETT.LIN file. AutoCAD standard line types are permitted. COE-PWD annotative linetypes are preferred (everett.lin).

7.2a Naming Syntax

- Linetype syntax

-EV	-	BBBB	-	CC…C	-	DD…D	-	HF

  - BBBB=Major category
  - CCCC=Secondary category
  - DDDD= Descriptors as needed
  - HF=Alternate linetype use with scales less than 1"=20'

7.2b Creation Criteria

- The overall appearance of the plotted line was determined by its appearance and clarity within a 20 scale viewport. These lines were designed for use in COE-PWD standard view ports.
  Note: All other scales must be approved by the COE-PWD PM.
- The standard line type name consists of three fields separated by a hyphen.
  - The first field consists of "-EV-".
  - The second field is a short abbreviation/description of the line's intended use or discipline (see table below).
  - The third field indicates the annotation used in annotated line types. In non-annotated line types this field is used as a short, more definitive description.
  - An optional forth field can be used for further clarification. For example, REV would indicate the line appears the opposite of a line type with the same name (only used on directional lines). The use of HF is intended to indicate a line type which repeats in approximately half the distance as the line with the same name.
- Standard AutoCAD default text style is used in all annotated line types.
- Text in annotated line types is intended to have a height of 0.1" in all standard 1"=20' viewports.

- The same line type is used to represent existing, new, to be removed etc lines. The properties of the layer containing the line will determine the appearance of the line.

When working in model space it may be desirable to set the LTSCALE from 1 to 20. This will display the line spacing and text as it would in a standard 1"=20' scale viewport. However, since the LTSCALE variable is a drawing standard variable and not controlled by the layout the LTSCALE=20 must be returned back to LTSCALE=1 before printing the layout sheets.

7.2c Second Field Abbreviations Table

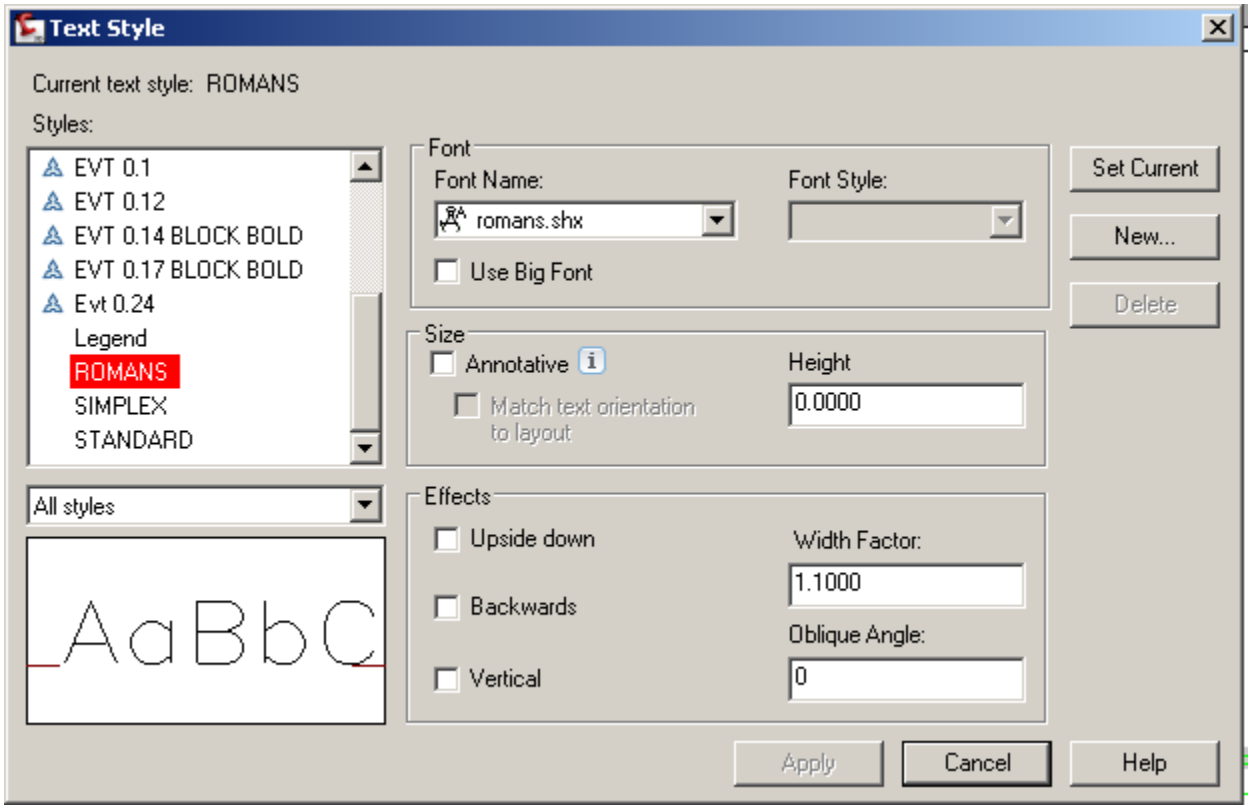
Second Field Abbreviation	Description
CD	Conduit (Unknown Owner or Contents)
CNT	Contour Lines
CS	Combined Sanitary Storm Line
CUT	Cut Limit
DITCH	Ditch Line
EL	Electrical (Generic Electrical)
EP	Edge of Pavement
FILL	Fill Limit
FN	Fence Line
FO	Fiber Optic Lines
G	Gas Line
GRID	Profile Grid Lines
GUARD	Guard Rail
IR	Irrigation Line
LFG	Landfill Gas Collection Line
PWR	Power Lines (Commercial Power Service ie PUD etc)
RR	Railroad Track
RW	Right-of-Way
SD	Storm Drainage Main
SIG	Signal Cable
SL	Street Light
SS	Sanitary Sewer Main
STRIP	Striping Lines
TEL	Telephone
TLM	Telemetry Cable
TV	Cable Television
UT	Generic Utility Line
WTR	Water Main
WTRSV	Water Service

Refer to the Appendix for a complete listing of City of Everett linetypes.

Chapter 8 Text Styles

8.1 Text Styles

The COE-PWD Standards for naming text styles (ROMANS, COMPLEX, etc) is to match the font shape file (shx) name that is being us in the “Text Style” dialog box shown below.



“STANDARD” is the default text style used by AutoCAD in compound line types. The COE-PWD used the “romans.shx” to define this text style.

The COE-PWD has defined several annotative text styles; these style names begin with the prefix “EVT-” followed by the annotative height that used and the “romans.shx”. When a different shape (shx) file is used to define the style a descriptive name has been included.

These text styles can be inserted into any drawing by using the Design Center and “EVT-Templates\BASIC\Evt-acad Complete.dwg.”

Chapter 9 Dimension Styles

9.1 Dimension Styles

- “Dimension Styles” are a named group of dimension settings that determine the appearance of the dimension. The COE-PWD does not use different dimension styles depending on the discipline of the drawing. The appearance of dimensions should appear the same through all projects. Dimensions may be put on a general layer such as “C~-ANNO-DIMN-N or C~-ANNO-DIMN-E” or tied to specific items with the use of a layer such as “C~WATR-DIMN-N).

- COE-PWD supplies two dimension styles “EVT 0.1 and EVT 0.08” for use in drawings prepared for the COE-PWD.

- Dimensions may appear in either model space or paper space. The dimension text will be either 0.1” or 0.08” height. The text style will be either Romans or Standard defined by romans.shx font. Dimension variable such as color, linetype, visibility are controlled by layer, not block. Arrowheads will be consistent within any project and be solid, and between 0.1” and 0.18” in size. All dimension parts will be controlled by layer. Dimension text locations and orientations may be adjusted for drawing clarity. No dimensions will be exploded. The drawing system variable “dimscale” will always be set to “1”.

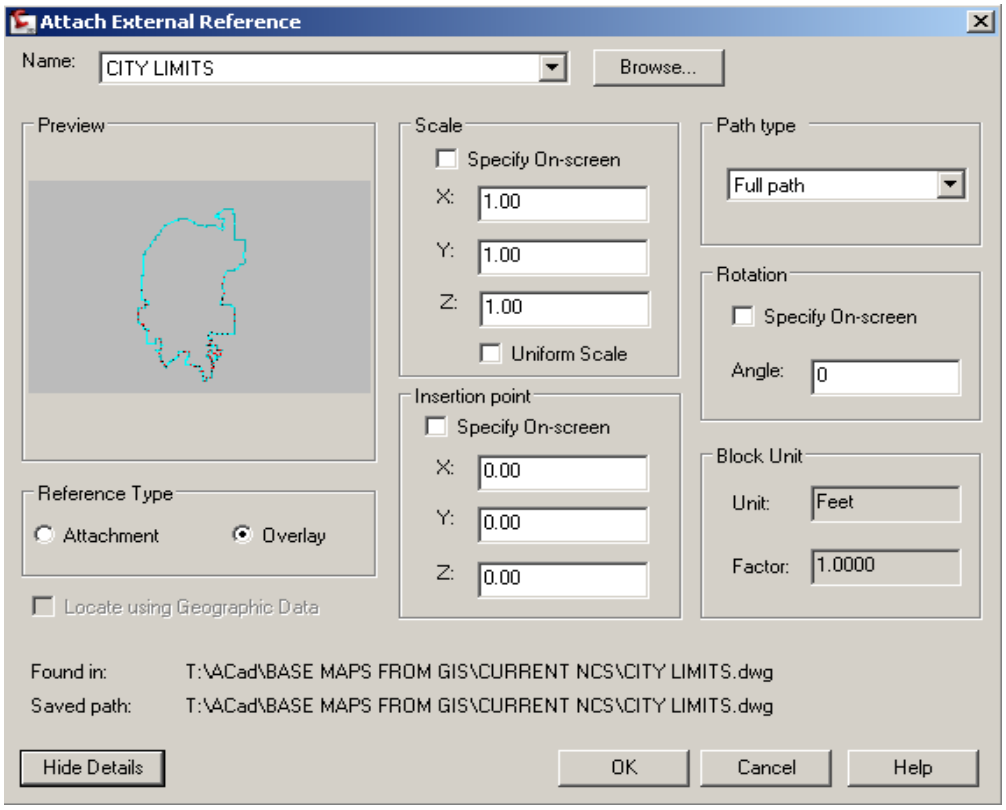
- Dimensions styles will not be exploded and normally are not annotative.

Chapter 10 External References

10.1 General XREF Information

The following are required when using external references:

- Xref drawings should follow the COE coordinate system as defined in the Survey section of this manual. “NAD83 Washington State Planes, North Zone, US Foot”.
- All external references will be inserted (0,0,0) with scale factor of 1 with no exceptions.
- Xrefs will only be used as necessary. Any referenced files used only during design and not displayed in final drawing will be unloaded prior to delivery.
- Xrefed dwgs will be included in the project file directory “310 Base Dwgs” the survey base contained in “210 Survey” will not be altered other than the Surveyor responsible for the Survey. A copy of that survey will be copied to the 310 file and be named BASE or Survey Base.
- Xref files will be attached as OVERLAYS to prevent any duplicate references.



10.2 XREF Folder & File Structure

- External referenced drawings will retain drawings file name in the “External References” dialog box in order to facilitate locating original file.

- Referenced files may be inserted on the same layer such as “C~-XREF” with overall visibility controlled by Status and selective visibility controlled by referenced drawing layers. Referenced files may also be inserted on separate layer such as “C~-XREF-(BASE, STRM, SWER, WATR, ETC)-N” with overall visibility controlled by Status “Loaded or Unloaded” and selective visibility controlled by referenced drawing layers.

- Any files that are XRefd from outside the project file structure must be bound (using bind) as an insert (like a block)

- or copied to the file project file folder “310 Base Dwgs”.

Chapter 11 Plotting

The COE-PWD requires the use of NAMED PLOT STYLES (.stb) on all drawings. The use of COLOR PLOT STYLES (.ctb) will not be accepted.

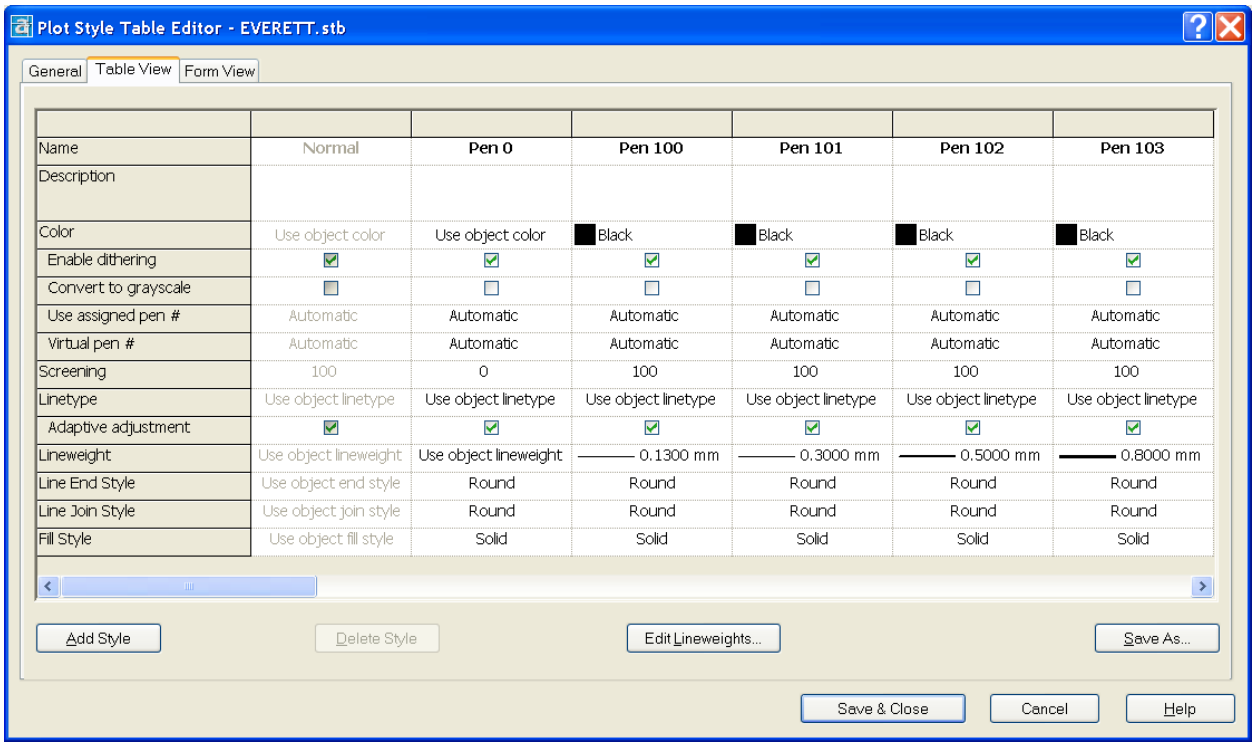
11.1 Color Standards

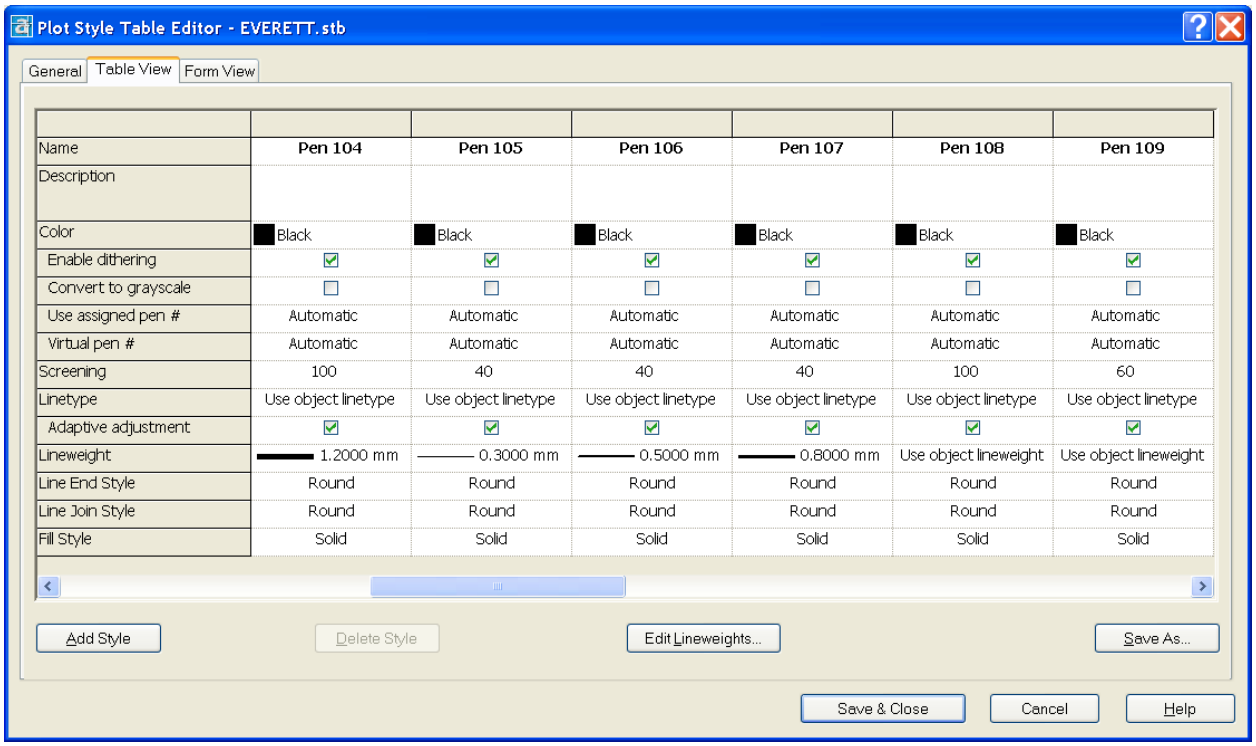
Under the COE-PWD system the color of any entity signifies nothing. This permits the operator or designer to use any color that is advantageous to their current situation. For example it is possible to have each utility appear on the monitor at the same time and be readily distinguished from other utilities by setting the layer property “Color” different for each utility. This allows the appearance each utility by use of the layer plot style. Under color base systems the plotted line weight of all items on that layer are the same when controlled by block. Assignment by entity is not permitted, because of the difficulty to locate these items and change for use in different layout viewports.

11.2 Plot Style Standard

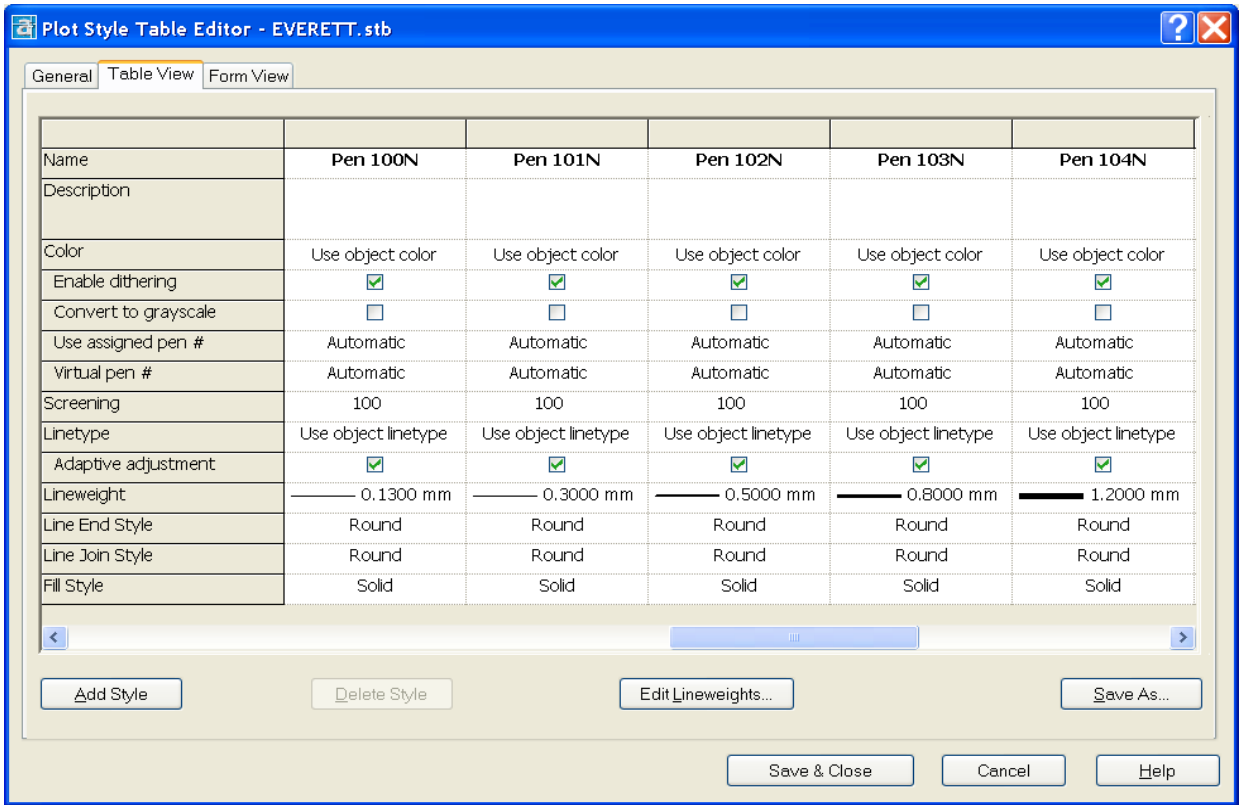
- The COE-PWD only permits the use named plot styles (stb’s). Color based plot styles (ctb’s) will not be accepted.
- The lineweights of all drawings should be to distinguish the subject of the particular drawing from existing and new entities that are not the subject of drawing. The subject being the boldest. Existing objects should be displayed as very fine &/or dashed lines, or screened lines.
- Different drawings, layouts, and viewports may display the same objects with different line weights and therefore the same entity may need to appear differently in each of the drawings. Under a color based system the same object must appear as a different color in each viewport throughout the project. This tends to lead to confusion.
    - For example, new curb and gutter and electrical conduit may appear differently in the electrical drawing than they would in the drawing used to construct the curb and gutter.
- The COE-PWD CAD Standard is based on this same idea. It has always been the industry standard practice to show this distinction by the use of 3 or 4 solid line weights and the use of possibly 2 screened lines weights.
- This relationship of line weight and intensity is shown in the EVERETT.STB plot style table shown in this section.

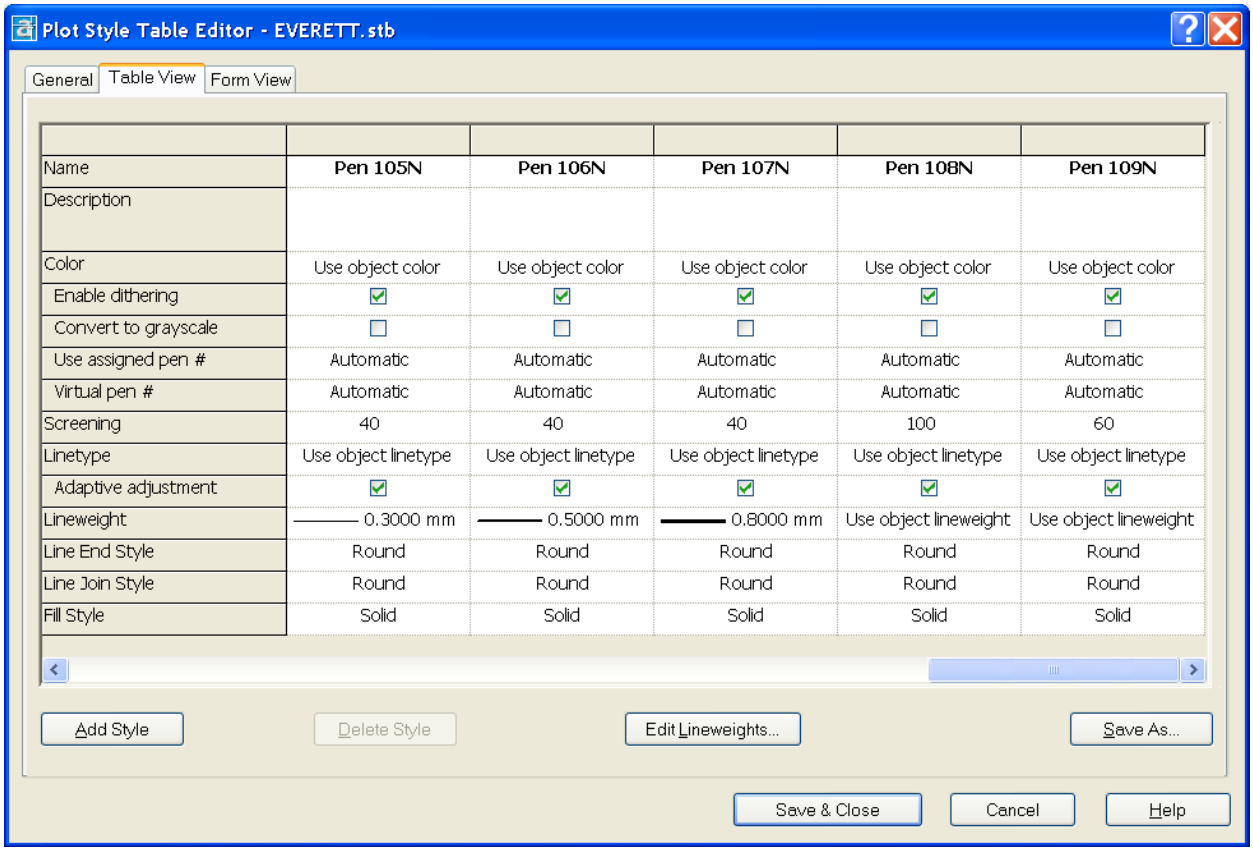
11.3 EVERETT.STB (All Black)





11.4 EVERETT.STB (Layer Color)





11.5 Plotted Pen Widths & Screening Density

PEN #	WIDTH			SCREENIG
	INCHES	MM	400 DPI	%
101	0.005	0.13	2	100
102	0.012	0.30	5	100
102	0.020	0.50	8	100
103	0.031	0.80	12	100
104	0.047	1.20	19	100
105	0.012	0.30	5	40
106	0.020	0.50	8	40
107	0.031	0.80	12	40
108	*			
109	*			

11.6 Plotter Selection

The main differences between plotters are the Colors (any one color tends to look different on each plotter), and the DPI (density) which will affect the appearance of the screened lines. Therefore, depending on which plotter is used, the user is permitted to change the screened % of the “Everett.stb”. No other changes will be permitted.

Tip – Print the attached sheet “Everett Plot Styles (EVERETT.STB) & 255 Color Palette” on your in-house printer/plotter used for draft and/or final production. This will give you an accurate preview of the colors and shades of gray that you have to print with.

Chapter 12 Abbreviations

12.1 Abbreviation List

The following City of Everett Abbreviations List includes the common abbreviations used in our AutoCAD drawings. These abbreviations should be used only if necessary to conserve space on the drawing.

	Description
A	
AB	Anchor Bolt
ABAND	Abandoned
ABBR	Abbreviation
ABUT	Abutment
ACT	Actual
ADD	Addendum, Addition
ADJ	Adjust
AFF	Above Finished Floor
AH	Ahead
ALT	Alternate
ALY	ALLEY
AMEND	Amendment
AP	Angle Point
APPROX	Approximately
APWA	American Public Works Association
ARCH	Architecture
ARV	Air Relief Valve
ASPH	Asphalt
AUX	Auxiliary
AVE	Avenue
AVG	Average
AWG	American Wire Gauge
B	
B	Black, Beam
BC	Block Corner
BITUM	Bituminous
BK	Back
BL	Baseline, Blue
BLDG	Building
BLK	Block
BLVD	Boulevard
BM	Bench Mark
BOC	Back of Curb
BOL	Bollard
BOT	Bottom
BOW	Back of Walk
BRDG	Bridge
BRG	Bearing
BRK	Break
BTWN	Between
C	
C	Conductor, Channel, Column
C/L	Centerline
CAP	Capacity
CB	Catch Basin, Cable
CB1	Catch Basin Type 1

	Description
CB2	Catch Basin Type 2
CC	Center to Center, Closing Corner, Concrete Curb
CCb	Coaxial Cable
CCd	Control Conduit
CCG	Concrete Curb & Gutter
CCGS	Concrete Curb, Gutter & S/W
CCL	Creek Center Line
CD	Conduit
CG	Curb and Gutter
CHG	Change
CHK	Check
CI	Cast Iron
CICL	Cast Iron Concrete Lined
CIP	Cast in Place
CIR	Circuit, Circle
CJ	Construction Joint
CL	Centerline
CLASS	Classification
CLF	Chain Link Fence
CLR	Clearance, Clear
CLY	Clay
CMP	Corrugated Metal Pipe
CMU	Concrete Masonry Unit
CND	Conduit
CNTY	County
CO	Clean Out
COE	City of Everett
COL	Column
COM	Common
COMM	Communicate
CONC	Concrete
CONN	Connection
CONST	Construct, Construction
CONT	Continued, Continuous, Control
COOR	Coordinate
COP	Copper
COR	Corner
CORR	Corrugated
CRK	Creek
CRN	Crown of Road
CS	Combined SS & SD System
CT	Court, Community Transit
CTR	Center
CTRE	Tree (conifer)
CU	Cubic
CULV	Culvert

	Description
CYL	Cylinder
D	
D	Depth, Dipole
DB	Direct Burial Cable
D/L	Daylight
D/W	Driveway
DBL	Double
DCL	Ditch CL
DE	DE-Energize
DEG	Degree
DET	Detail or Detector
DI	Ductile Iron
DIA	Diameter
DIAPH	Diaphragm
DIR	Direction
DN	Down
DR	Drain
DWG	Drawing
DWY	Driveway
E	
E	East, Electrical
EA	Each
ECb	Buried Electrical Cable
ECC	Eccentric
EF	Each Face
EJB	Electric Junction Box
EL	Easement Line, Elevation
ELB	Elbow
ELEC	Electrical
ELEV	Elevation
EMB	Embankment
EMH	Electrical Manhole
ENCL	Enclose
ENG	Engine
ENGR	Engineer
EO	Edge of
EOA	Edge of Asphalt
EOC	Edge of Concrete
EOD	Edge of Dirt
EOG	Edge of Gravel
EP	Edge of Pavement
EQ	Equal
EQUIP	Equipment
ET	Everett Transit
EV	Electrical Vault
EVC	End Vertical Curve
EVP	Emergency Vehicle Pre-Emption
EVT	Everett, City of Everett
EW	Each Way
EX	Existing, Example
EXC	Excavation
EXIST	Existing
EXP	Expansion
EXP JT	Expansion Joint
EXT	Exterior, Extension, Extruded
F	
F	Flanged
FAB	Fabricate

	Description
FDN	Foundation
FF	Far Face, Finished Floor
FG	Finish Grade
FH	Fire Hydrant
FIG	Figure
FIN	Finish, Finished
FL	Fog Line, Flow Line, Flash, Flashing, Floor
FLD	Field
FLEX	Flexible
FLG	Flange
FLT	Filter
FLX	Flexible
FM	From, Force Main
FNC	Fence
FOC	Face of Curb
FOG	Fog Line
FOW	Face of Wall
FP	Full Penetration, Flag Pole
FT	Feet/Foot
FTG	Footing
FWD	Forward
FWPS	Finished Water Pump Station
FWY	Freeway
G	
G	Gas Line, Green, Girder
GA	Gauge
GALV	Galvanized
GAR	Garage
GB	Green W/Black Tracer, Grade Break
GDWY	Gravel Driveway
GE	Grate Elevation
GEN	Generator
GI	Galvanized Iron
GL	Glass, Gutter Line
GLU	Globe Value
GM	Gas Meter
GND	Ground
GOVT	Government
GR	Guard Rail
GRD	Ground, Grade
GV	Gate Valve
GVL	Gravel
GVT	Gas Vault
H	
H	Height, High
H-T	Hub & Tack
HD	Head
HDCP	Handicap Parking Symbol
HDG	Hot Dipped Galvanized
HI	Height of Instrument
HORIZ	Horizontal
HPS	High Pressure Sodium, High Pressure Steam
HSB	High Strength Bolt
HSE	House
HT	Height of Target
HTS	Heights

	Description
HW	Hot Water
HWY	Highway
HYDR	Hydraulic
I	
I	Iron
ID	Inside Diameter
IDENT	Identification
IE	Invert Elevation
IF	Inside Face
IL	Inlet
ILLUM	Illuminate
IMSA	International Municipal Signal Assoc.
IN	Inch/Inches
INCL	Include
INCR	Increase
IND	Indicator
INDUCT	Inductance
INST	Install, Instrument
INSUL	Insulation
INT	Intersection, Internal
INV	Invert, Inverse
IP	Iron Pipe
IS	Island
ITE	Institute of Transportation Engineering
J	
JB	Junction Box, Jersey Barrier
JCT	Junction
JNX	Junction
JT	Joint
K	
KG	Kilogram
KHZ	Kilohertz
KM	Kilometer
KV	Kilovolt
KW	Kilowatt
KWH	Kilowatt Hour
L	
L	Length of Arc, Traffic Detection Loop
LAB	Laboratory
LAT	Lateral, Latitude
LBS	Pounds
LEN	Length
LF	Linear Foot/Feet
LIM	Limit
LK	Lake
LOC	Locate
LONG	Longitudinal, Longitude
LP	Lamp, Light Pole
LT	Left, Light
LUMIN	Luminaire
LWR	Lower
M	
M	Meter, Mile
M/L	Monument Line
MA	Traffic Detection Magnetometer

	Description
MACH	Machine
MAINT	Maintenance
MATL	Material
MAX	Maximum
MB	Mailbox
MC	Meander Corner
MECH	Mechanical
MED	Medium
MER	Meridian
MFR	Manufacture
MH	Manhole
MHHW	Mean Higher High Water
MHT	Mean High Tide
MHW	Mean High Water
MIC	Monument In Case
MID	Middle
MIL	Military
MIN	Minimum, Minute, Minor
MISC	Miscellaneous
MJ	Mechanical Joint
MK	Mark
ML	Match Line
MLLW	Mean Lower Low Water
MLCSP	Mortar lined & Coated Steel Pipe
MLTCS	Mortar Lined Tape Coated Steel Pipe
MLECSP	Mortar Lined Epoxy Coated Steel Pipe
MLT	Mean Low Tide
MLW	Mean Low Water
MOD	Modification
MON	Monument
MPOC	Midpoint On Curve
MSNRY	Masonry
MT	Mean Tide
MUTCD	Manual On Uniform Traffic Control Devices
N	
N	North
NA	Not Applicable
NAUT	Nautical
NEG	Negative
NEMA	National Electrical Manufacturers Association
NEUT	Neutral
NF	Near Face
NIC	Not in Contract
NO	Number
NOM	Nominal
NTS	Not To Scale
O	
O	Orange
O-XING	Overhead Crossing
OB	Orange with Black Tracer
OC	On Center
OD	Outside Diameter
OF	Outside Face
OH	Overhead

	Description
OL	Overlap Phase
OHP	Overhead Power
OHW	Ordinary High Water
OPNG	Opening
OPP	Opposite
OPR	Operate
OPT	Optic
ORIG	Original
OT	Overhead Telephone
OZ	Ounce
P	
P	Pole, Power
P/C	Pre-cast
P/L	Property Line
P/S	Pre-stressed
P/T	Post Tensioned
PAR	Parallel, Parcel
PC	Point of Curve
PCC	Point of Compound Curve
PD	Perforated Drain Line
PE	Plain End
PED	Pedestrian, Pedestal
PERM	Permanent
PERP	Perpendicular
PH	Phase
PI	Point of Intersection
PKWY	Parkway
PL	Place, Plastic, Plain Bar, Plate, Plug
PLSS	Public Land Survey System
POA	Pole Orientation Angle
POC	Point On Curve, Point of Vertical Curve
POS	Positive, Position
PPB	Pedestrian Push Button
PPBP	Pedestrian Push Button Post
PR	Pair
PRC	Point of Reverse Curve
PROJ	Project
PROP	Property
PRV	Pressure Reducing Valve
PSI	Pounds per Square Inch
PT	Point of Tangency, Point
PUD	Public Utility District #1 of Sno Cnty
PV	Power Vault
PVC	Polyvinyl Chloride
PVMT	Pavement
PVRC	Point of Vertical Reverse Curve
PVT	Point of Vertical Tangency
PWR	Power
Q	
Q	Quadruple
QC	Quarter Corner
QT	Quart
QTR	Quarter
QTY	Quantity
QUAD	Quadrant, Quadrangle
QUAL	Quality

	Description
R	
R	Radius
R-C	Rebar & Cap
R/W	Right-of-Way
RA	Raised
RB	Red with Black Tracer
RC	Reinforced Concrete
RCKY	Rockery
RCP	Reinforced Concrete Pipe
RD	Road, Round
RECD	Received
RECT	Rectangle
REF	Reference
REG	Regular
REINF	Reinforced
REM	Remove, Removed
REPL	Replace, Replaced
REQ	Required
RET	Retaining
RETW	Retaining Wall
RIV	River
RLD	Rolled
RMC	Rigid Metal Conduit
RPT	Report
RR	Railroad
RRC	Railroad Crossing
RRCS	Railroad Crossing Signal
RRG	Railroad Crossing Gate
RT	Right
S	
S	South, Slab, Slope
S/L	Survey Line
S/W	Sidewalk
SAN	Sanitary
SB	Soil Boring
SC	Section Corner
SCb	Shielded Cable
SCC	Closing Corner
SCEN	Section Center
SCHED	Schedule
SD	Storm Drain
SDMH	Storm Drain Manhole
SE	Spot Elevation, Southeast
SEC	Second
SECT	Section
SEG	Segment
SEP	Separate
SERV	Service
SEW	Sewage
SHLD	Shielded
SHLDR	Shoulder
SHT	Sheet
SIG	Signal
SIM	Similar
SL	Sea Level, Span Length, Section Line
SLJB	Street Lighting Junction Box
SLP	Slope

	Description
SLS	Stainless Steel
SLV	Sleeve
SM	Small
SN	Sign
SOV	Shut-off Valve
SP	1 Shielded Pair, Single Cable, Span Wire, Spiral Space, Specific
SPA	Space/Spaces
SPC	Shielded Individual Single Cable
SPCb	Shielded, Twisted pairs in a Single Cable
SPEC	Specifications
SQ	Square
SS	Sanitary Sewer
SSCO	Sanitary Sewer Cleanout
SSMH	Sanitary Sewer Manhole
SSXC	Sixteenth Corner
ST	Straight, Street, Straight Bar
STA	Station
STAG	Staggered
STD	Standards
STIR	Stirrup
STL	Steel
STLT	Street Light
STP	Lane Stripes
STPS	Steps
STR	Stream
SUB	Substitute
SUR	Surface
SURV	Survey
SVL	Survey Line
SW	Switch
SYM	Symmetrical, Symbol
SYS	System
T	
T	Top, Tangent
T&B	Top & Bottom
TAB	Tabulate
TAN	Tangent
TB	Thrust Block
TBM	Temporary Benchmark
TCB	Buried Telephone Cable
TEBO	Telephone Booth
TESC	Temp Erosion & Sedimentation Control
TK	Thick
TEL	Telephone
TEMP	Temporary
TJB	Telephone Junction Box
TMH	Telephone Manhole
TOC	Top of Curve, Top of Curb
TOE	Concave Slope Break
TOP	Convex Slope Break
TOPO	Topography
TOS	Top Of Slab
TOW	Top of Wall
TP	Twisted Pairs, Test Pit
TPOL	Traffic signal Pole
TR	Traffic, Telephone Riser

	Description
TRAN	Transition
TRJB	Traffic Control Junction Box
TS	Test Station
TSD	Traffic Sign Double Post
TSS	Traffic Sign Single Post
TUN	Tunnel
TV	Television, TV Vault
TWST	Twisted
TYP	Typical
U	
UDS	Utility Duct System
UG	Underground
UGPC	Underground Power Cable
UGTS	Underground Telephone Cable
UNGD	Underground
UNO	Unless Noted Otherwise
UP	Utility Pole
UPA	Utility Pole Anchor
UTIL	Utility
V	
V	Valve, Voltage
VAR	Varies, Variable
VB	Valve Box, Vapor Barrier
VEH	Vehicle
VERT	Vertical
VLT	Vault
VP	Vent Pipe
VPC	Vertical Curve PC
VPCC	Vertical Curve PCC
VPI	Vertical Curve PI
VPRC	Vertical Curve PRC
VPT	Vertical Curve PT
W	
W	West, Width, Water Line, White
W/	With
WB	White with Black Tracer
WC	Witness Corner
WCR	Wheel Chair Ramp
WGV	Water Gate Valve
WHSE	Warehouse
WK	Walk
WL	Water Line
WM	Water Meter, Water Main
W/O	Without
WO	Work Order
WP	Work Point
WSDOT	Wash St Dept of Transportation
WT	Watts, Weight
WV	Water Valve
WW	Wing Wall
X	
X-BM	Cross Beam
X-RD	Cross Road
XFOC	Extruded Face of Curb
Y	
Y	Yellow
YD	Yard

Chapter 13 Plan Phases

13.1 Design (30%, 60%, 90%)

PHASE	DESCRIPTION	Min Tasks Achieved
30%	An estimated 30% of drawing completion DWT format for review	• Basic Sheet Set Manager established • Survey base map • Initial sheets created/cut
60%	An estimated 60% of drawings completion DWT format for review. Plotted set size & quantity per City PM discretion	• 30% review comments included • Preliminary control, alignment, stationing. • Plan &/or Profile Sheet • Preliminary Design • Preliminary Views, Details, Typical Section, Project details, and CrossSections
90%	All drawings at a 90% completion level DWT format for review. Plotted set size & quantity per City PM discretion (1full and 2 half min)	• 60% review comments included • Final design completed • Appropriate for Agency reviews • Views, Details, Sections Etc • Right-of-way and parcel dwgs complete.

13.2 Bid Set

12.2a Initial Printing

1. The Engineer of Record shall seal, sign and date the Bid Document Set.
2. The Engineer of Record shall include the words “BID SET” (EVT-Symbols\PAPER SPACE\PLAN PHASE STAMP\ SH-BIDSET.DWG) in large bold letters in the lower right corner of cover sheet of the Plans and Technical Specifications.
3. The COE-PWD project manager shall ensure that the Bid Set’s cover is signed and dated by Public Works managers.
4. The COE-PWD project manager shall date and initial the appropriate “BID” boxes below the revision box in the lower left corner of every plan sheet.
5. The original Bid Set printed and electronic versions will be preserved for future use.

12.2b During Bid Process

1. All addenda issued during the bidding period shall be signed by the Engineer of Record and the COE-PWD project manager only.
2. Non-technical addenda may be signed by the COE-PWD project manager only.
3. New drawings and plan sheets issued by addendum shall be sealed, signed and dated by the Engineer of Record. The COE-PWD project manager shall also date and initial all plan sheets issued by the addendum in the appropriate “blank” boxes below the revision box in the lower left corner of every plan sheet.

13.2c Final Bid Documents

The original Bid Document Set (Plans and Specifications) in conjunction with the "Bid Addenda" become the official legal "BID DOCUMENTS". Plotted and electronic copies will be retained.

Note:
Any re-bidding of the work shall follow the same procedure as for the original bidding except that the words "BID SET" are replaced with "RE-BID SET'.

13.3 For Construction Set

13.3a After Project Award

1. After the award of the project the COE-PWD project manager shall have a "FOR CONSTRUCTION" set of plans and specifications prepared. The Engineer of Record re-issues only the sheets with incorporated addenda changes.
2. The Engineer of Record re-issues a copy of the original "Bid Document Set" and specifications' Cover Sheets with the words "FOR CONSTRUCTION" (EVT-Symbols\PAPER SPACE\PLAN PHASE STAMPS\ SH-FOR CONSTRCTION.DWG) box in large bold letters in the lower right corner of the respective plans and specifications cover sheets.
3. The Engineer of Record also provides the following disclaimer (EVT-Symbols\PAPER SPACE\PLAN PHASE STAMPS\ SH-CONSTRUCTION DOCUMENTS.DWG) on the "FOR CONSTRUCTION" cover sheets for both the plans and specifications boxed and shown prominently above the "FOR CONSTRUCTION" box described in 2 above.
4. The Engineer of Record prepares the "FOR CONSTRUCTION" set of plans by incorporating all the relevant addenda items into the "FOR CONSTRUCTION" set. The Engineer of Record must clearly identify and number all addenda changes in the "FOR CONSTRUCTION" set. Also number, note addendum number and provide brief descriptions or all changes in the "REVISIONS" box in the lower left corner of all affected plans.
5. The Engineer of Record prepares the "FOR CONSTRUCTION" set of specifications by incorporating the relevant addenda items into the "FOR CONSTRUCTION" set. The Engineer of Record must clearly identify and number all addenda changes in the "FOR CONSTRUCTION" specifications. Below is an example of the format to be followed by the Engineer of Record in incorporating the addenda changes to the "FOR CONSTRUCTION" specifications.
6. The COE-PWD project manager must initial and date the "CONST" blocks in the lower left corner of the "FOR CONSTRUCTION" plans set.

13.4 Record Drawing Set

13.4a After Construction Completion

- The construction project manager/Inspector forwards to the COE-PWD project manager, a red-lined set of plans showing all the changes to the "FOR CONSTRUCTION" plan set that occurred during construction.

- The COE-PWD project manager decides who will produce and an unsigned full size hard copy, and an electronic (dwg) file of the "RECORD DRAWING"

set with all construction changes to the “FOR CONSTRUCTION” set incorporated as shown in the “Red-Line” set.

- The COE-PWD project manager and/or the Engineer of Record provides the following disclaimer on both the electronic dwg file and full size “RECORD DRAWING” set bolded and prominently shown on every plan sheet in the “RECORD DRAWING” set:

  “THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION GATHERED DURING CONSTRUCTION AND HISTORICAL DOCUMENTS. ALTHOUGH BASED ON THE BEST AVAILABLE INFORMATION, NO PRESUMPTION SHOULD BE MADE REGARDING THE DRAWING’S ACCURACY.”

- The COE-PWD project manager will forward two copies of the AutoCAD (electronic dwg) file along with the full size hard copy of the “RECORD DRAWING” and the original redline sets to the construction project manager/inspector for review. The second electronic set will be delivered to the COE-PWD CAD manager for archiving with that group for future design projects.

- After confirming that the “RECORD DRAWING” set conforms to the redline set, the construction project manager/inspector shall sign and date all plan sheets in the full size hard copy set of the “RECORD DRAWING” set.

- The construction project manager/inspector shall deliver the full size, signed “RECORD DRAWING” set along with the AutoCAD files to the COE-PWD Records Group.

- The COE-PWD Utility Mapping Group will update the GIS and produce a PDF file of the signed copy of the “RECORD DRAWING” set for the Record drawing index.

13.5 Phase Stamps