CAD Manual

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CITY OF GRESHAM

DEPARTMENT OF ENVIRONMENTAL SERVICES
1333 NW Eastman Parkway
Gresham, OR 97030
(503) 618-2525

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For questions regarding these guidelines, please contact the City of Gresham Department of Environmental Services.

1.0 Introduction

This Computer Aided Drafting (CAD) Manual was developed to assist engineers, designers, drafters and other professionals throughout plan production for construction projects within the City of Gresham (City). The intent is to provide a coordinated, uniform and economical system for preparation of construction plans. These standards are designed to be used by private development contractors when proposing public infrastructure, as well as for city-initiated and managed capital projects.

These CAD standards and guidelines integrate National CAD Standards (NCS), as well as City of Gresham standards and preferences including requirements for adherence to a defined coordinate system and datum, templates for symbols, layers, borders, hatch patterns and line types.

The goal is to provide clear direction and parameters to designers so that final construction drawings are concise and consistent for all infrastructure improvements throughout the City. Long-term, the construction as-built plans are a critical source of information for future development and modifications to existing development. As such, consistent details and drawings will be valuable to future users.

AutoCAD drawings should originate from the current City of Gresham AutoCAD Template (City CAD Template) which includes approved title blocks, layer naming conventions and text styles. The template, named COG_template2019, can be obtained from the Department of Environmental Services or online at GreshamOregon.gov. It may be converted to other CAD formats provided that the CAD files submitted to the City are capable of maintaining the prototype drawing appearance after being imported back into AutoCAD 2010 or later, up to AutoCAD 2013. The plot file associated with this template, Gresham.ctb, is also available from the Department of Environmental Services or online at GreshamOregon.gov. The COG_template2019 contains the following:

1. City title block and attributes (in paper space)
2. City cover sheet example
3. Standard text styles
4. Symbols library
5. General layers

1.01 Definitions

As-Built Plans - Plans signed and dated by the Engineer of Record indicating that the plans have been reviewed and revised, if necessary, to accurately show all as-built construction. Also referred to as Record Drawings.

City - The City of Gresham, a municipal corporation of the State of Oregon, and its elected officials, officers, employees, volunteers and agents.

Engineer - The applicable City Department of Environmental Services division manager, or designee, who is licensed as a registered professional engineer in the State of Oregon.

Engineer of Record - A registered professional engineer licensed to practice in the State of Oregon who is responsible for the design of a public improvement and has stamped the Plans.

Plans - The Standard Details or reproductions thereof and project specific plans, profiles, cross sections, elevations, details, and other working or supplementary drawings signed by the Engineer of Record that show the location, character, dimensions, and details of the work to be performed. Plans for privately financed public improvement projects must be approved by the Project Manager. Plans for privately financed public improvement projects may either be bound in the same book as the balance of the Contract Documents or bound in separate sets and are a part of the Contract Documents regardless of the method of binding.

Project Manager - The City's representative charged with the management of the project. For publicly financed public improvement projects the Project Manager is typically the Engineer or the Engineer's representative. For privately financed public improvement projects the Project Manager is typically a development engineering specialist of the City.

Public Works Standards - The *Public Works Standards* adopted by the City of Gresham and containing Design Standards, Standard Specifications, and Standard Details.

Record Drawings - See As-Built Plans.

Standard Details - Detailed representations of structures, devices, or instructions set forth in the *Public Works Standards*.

Station - A distance measured horizontally along the established centerline of a street, sewer, or other work, unless specified otherwise.

1.02 CAD General Drawing Practices

The intent of a CAD drawing is to present the design of a project in a form that can be understood, is reviewable and can be constructed. The user of the drawing depends upon it to understand the idea accurately. Another purpose of a drawing, especially relating to CAD work, is the possibility of data retrieval and reuse. If CAD drawings are built in a standard way, data can be extracted for use in other applications such as databases, estimates, proposals and other drawings.

The quality of a drawing is largely dependent upon the following criteria:

- Contrast existing features (lighter) with design features (darker), including text
- Do not crowd the drawing
- Produce a well-proportioned drawing
- Give careful consideration to the placement of details and notes
- Keep text size consistent (Arial, Height: 0.10)
- Text cannot cross over line features unless it is masked
- Be consistent within each job
- Line, hatching and text legibility is to be maintained on full and half size prints

Specific Drawing Guidelines

- No information or drawing shall be on Layer 0
- Create the design in model space at 1 drawing unit = 1 ft

- Create each design element/discipline as a separate file (XREF) as appropriate for project scope
- XREF in (as overlays) the survey/civil base map drawings and other needed design files as required on separate layers specific to each XREF
- Work in the correct horizontal & vertical coordinate systems: Lambert State Plane Coordinate System, Oregon North Zone (NAD 83/91 Horizontal & NGVD 29 Vertical) (See **Subsection 1.03 - Coordinate System** below)
- Draft at Z = 0, design at Z = true elevation
- Use standard City of Gresham Layers (Located in the City CAD Template)
- Use standard City of Gresham blocks (Located in the City CAD Template)
- Use City of Gresham text styles (see **Subsection 2.01.04** - **Text Style**)
- Standard symbols should be used rather than text, if possible
- Plot with Gresham.ctb style table
- Make plans clearly legible when printed at 50% of the original scale
- When calling out items for additional clarification, the reference must include the detail number and plan sheet number

1.03 Coordinate System

All electronic drawings submitted to the City of Gresham shall be in Lambert State Plane Coordinate System, Oregon North Zone NAD 83/91 Horizontal & NGVD 29 Vertical.

The City has provided a network of control points throughout the city. These consist of vertical benchmarks (with horizontal x,y coordinates), some GPS control points and plat corners. Some points were mapped some years ago and are subject to being destroyed and the City makes no guarantee of all of the points' existence. Again, this network is provided as a help so that the use of traditional survey equipment (such as a total station) can be utilized to tie into two of these points.

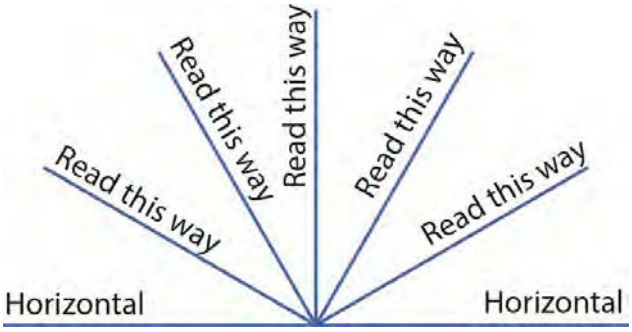
Consultants may use survey grade GPS equipment to achieve the same results.

A database and map can be accessed at the City's website. Each database record may contain the type of monument, what the monument marks, a rough bearing from a prominent landmark, an address and possible additional comments.

2.0 Private Development CAD Standards and Guidelines

2.01 CAD Basics

2.01.01 Text Orientation



If possible, lettering and dimensions shall be placed so they may be read from left to right as viewed from the bottom of the sheet or from bottom to top when viewed from the right side of the sheet.

2.01.02 Line Spacing

Line spacing shall be 50% of the text height (LS = 0.5 x TH).

2.01.03 Fonts

Third party fonts, (hatch patterns and line types) shall not be used in drawing files submitted to the City. Only standard text fonts supplied with AutoCAD shall be used. In general, fonts supplied in the City CAD Template will be used and text placed on the appropriate layers.

2.01.04 Text Style

For 22” x 34” size drawings the minimum plotted text height is 0.10. Use “COG STANDARD” text style for standard text (Arial, Height: 0.10). Use “COG TITLE” for title or header text (Arial, Height: 0.15). Titles and headers may be underlined. The oblique angle shall be either 0° or 8°.

2.01.05 Scale

The standard scale for construction drawings is given below:

Sanitary Sewer, Stormwater, Water and Street Plan	1” = 20’*
Sanitary Sewer, Stormwater, Water and Street Profile	Vertical may be 1” = 2’* Horizontal shall match plan view
A.D.A. Ramps Plan	1” = 5’
Details	Vary According to Item and Complexity

*Additional scales may be accepted with approval by the City.

Complex utility locations may require a larger scale plan to show the necessary detail. If a scale is indicated on a plan sheet, a bar scale shall be used.

Architectural scales may be used for buildings and special details, or as approved by the Project Manager.

2.01.06 Combined Plan and Profile

Plan and profile shall be placed on the same sheets and lined up with one another; having the profile view immediately below the plan view. Profiles shall be the same horizontal scale as the plan view. Stationing shall be from left to right with lower stations to the left, unless approved otherwise by the City.

In the plan view, all infrastructure components shall be included in model space. Drawing objects not directly tied to the model and/or sheet specific information may be placed in model or paper space. In the profile view, details, and cross sections, all infrastructure components not directly tied to the model may be placed in model space or paper space.

2.01.07 Layer Names and Nomenclature

The City of Gresham has adopted an abbreviated, slightly modified version of National CAD Standard Layers as the base for all CAD drawings. The structure of NCS layers allows for user defined layers and there may be instances where the City has created its own user defined layer to fit its needs.

As shown in the example below, there are four defined layer name data fields: Discipline Designator, Major Group, and two Minor Groups.

- A Discipline Designator denotes the category of subject matter that the specified layer contains. This Discipline Designator is a two-character field, although the second character is optional. The first character is the discipline character and the second character is an optional modifier. In the example, “C” designates that the discipline is Civil, and the second character is blank or unused.
    - Discipline Designators:
        - A - Architectural
        - C - Civil
        - E - Electrical
        - EX - Existing, not surveyed
        - L - Landscaping
        - M - Mechanical
        - V – Survey

- A Major Group is a four-character field that identifies a major building system or aspect. In the example, the major group PROF designates that this layer represents a Civil profile component or a designed profile element.

- A Minor Group is an optional four-character field to further define the Major Groups. In the example above, the Major Group further defines the Civil category PROF (profile) and the minor group GRID signifies that it is a layer that represents a grid component of the profile and a second minor group, MAJR denotes that it is a layer that represents the major axis (or in most cases a grid line of an integer) on the profile.

If a designer/developer does not begin a project with the current City CAD Template, layers can be converted to the City layer styles/names by using the Layer Translator feature in AutoCAD. A how to guide for this feature can be found in **Appendix A**.

2.02 Construction Drawing Requirements

2.02.01 Engineer Registration and Certification

All construction drawings shall be stamped, signed and dated by a civil engineer registered with the State of Oregon, prior to City approval. An expiration date of the civil engineer's stamp shall also be shown below the signed stamp. Other design details may be signed/stamped by registered professionals as it pertains to specific areas of expertise.

2.02.02 Sheet Size/Material

Sheet sizes shall be 22" x 34".

All paper sheets shall be on an approved 20 lb. bond paper copy. All digital file(s) shall be in an AutoCAD compatible format and a PDF format. Any form of sepia mylar, blueline xerographic mylar or aerial photo mylar will not be accepted.

2.02.03 Typical Sheet Sequence

a. Cover Sheet
b. Notes and Legend
c. Plat Sheet
d. Existing Conditions and Demolition Plan
e. Grading and Erosion Prevention & Sediment Control (EPSC) Plan
f. Composite Utility Plan
g. Street and Stormwater Plan and Profile
h. Sanitary Sewer and Water Plan and Profile
i. Signing & Striping Plan
j. Signal Plan
k. Streetlight Plan (may be included on the plan and profile sheets)
l. Landscape Plan (may be included on the plan and profile sheets)
m. Stormwater Facility Planting Plan (when applicable)
n. Park Plan (when applicable)
o. Details (may be put at the end of the plan set or split up by discipline)

Separate public and private improvements, if necessary. At a minimum, the construction plan submittal shall contain the Cover Sheet (unless not required by the City), Composite Utility Plan, Erosion Prevention & Sediment Control Plan and Tree Removal Plan.

2.02.04 General Sheet Requirements

Construction drawings and as-built plans shall show and clearly identify the following items:

a. A 2” x 2” blank square in the upper right-hand corner for the City review stamp to be placed.
b. North arrow and scale. Within each plan set the north arrow must be pointing in the northwest quadrant, where north is between the top of the page and the left of the page, or the northeast quadrant, where north is between the top of the page and the right of the page.
c. Complete legend of symbols used and abbreviations
d. General and construction notes pertinent to the project
e. All plan sets shall reference the City of Gresham horizontal and vertical datums and conform to Multnomah County Surveying Standards. Basis of bearing for all measurements shall be listed with control points on the cover page.
f. All vertical survey measurements and elevations shall be made with reference to the vertical datum as defined in the *Public Works Standards Section 1.02*.
g. Show property corner and curb elevations to determine water service level, serviceability of lot/property for sanitary sewer lines, points of disposal for building stormwater laterals, and how new curbs will join to existing curbs.
h. Title Block: Each sheet shall include the current City of Gresham title block with the following information:
    - Development name and location by section, township and range
    - Land Use Number or Public Works Number
    - Engineer of Record’s stamp and signature (If plans are submitted to the City for review and comment, the plans shall be clearly marked “PRELIMINARY – NOT FOR CONSTRUCTION” over the stamp and signature)
    - Date of drawing
    - Revisions block with revision number, description and date
    - Sheet title which corresponds to the improvements shown on the sheet
    - Sheet number of that sheet along with the total number of sheets (i.e. Sheet 1 of X)
i. Developer’s/Owner’s name, address, and phone number
j. Designer’s company/agency information – name(s), address(es), phone number(s), email address(es), logo, etc.
k. Boundary Lines: Show existing and proposed lines with dimensions and identification of the following:
    - Section lines
    - Property and right of way lines
    - Development boundaries – show proposed limits of construction
    - Easements – referenced to property lines, street centerlines and/or intersections
    - Restricted areas – open spaces, preservation areas, etc.
    - Development phases or block boundaries
    - City and County lines
    - Sheet match lines
l. Utility lines: Sanitary sewer, stormwater, water, gas, power, telephone, cable, etc. – show size and type if known. Include the location of all known underground utilities within 100-feet of the project.

m. Structures: Telephone/Power poles and guy anchors, buildings, vaults, manholes, valves, catch basins, cleanouts, fire hydrants, signs, etc.
n. Parks, Trails, and Natural Areas: Provide the following minimum information:
    - Dimensions of horizontal distances from at least two permanent visible structures to each angle point or other change in direction of irrigation piping as well as sleeves, valves, and other buried appurtenances
    - Depth of bury of irrigation piping
    - Design system flow, in GPM, and valve schedule, head placement, etc.
o. Profile View: The following minimum information shall be shown:
    - Existing profile at centerline of proposed utility or street
    - Proposed profile grade, as appropriate, for all street grade, wastewater systems, stormwater lines, and water lines – include pipe/structure information
    - Existing and proposed underground utilities that cross the alignment of the proposed facility
    - Beginning of all vertical curves, points of vertical intersection, end of vertical curve, low points and/or high points, and length of vertical curve
    - Existing centerline grade extending a minimum of 250-feet beyond the end of the improvement, whenever practical
    - All potential conflicts with existing public and private utilities (i.e. pipes, conduits, vaults, cathodic protection systems, etc.) that impact the proposed design
p. Match Lines: Where the plan is drawn on more than one sheet or split within one sheet:
    - Include match line sheet numbers
    - If the plan is shown on three or more sheets, include a site plan key map at a common scale of 1” = 100’ or 1” = 200, or a representative fraction of either on each plan sheet

2.02.05 Cover Sheet

All projects shall have a cover sheet as the first page of the construction plans. This sheet shall contain the following minimum information:

- Site plan of entire project with street right-of-way and/or subdivision layout at a 1” = 100’ scale. A 1” = 200’ scale may be used if project size is too large.
- Site plan key map (on cover sheet or all sheets), as necessary or required by the Project Manager
- Vicinity map at a 1” = 1000’ scale or smaller – Showing the location and limits of the project
- Index of sheets with sheet titles and page numbers
- Show tax lot numbers or lot and block designations
- Horizontal and vertical control stations used as a basis of project control – include temporary and/or permanent benchmarks used along with their descriptions, elevations, and coordinate locations
- Statement referencing City of Gresham *Public Works Standards*
- Phone numbers for all affected utility companies and pertinent City personnel

2.02.06 Plat Sheet

The plat sheet shall show the horizontal stationing with points of tangency and curvature for each centerline. The curve data shall show tangent length, radius distance, centerline curve length, and delta angle. Centerline intersection stationing, in both directions, shall be shown.

2.02.07 Existing Conditions and Demolition Plan

Show and identify, as required by development standards, the following features:

- Trees – show size, type and those proposed for removal
- Topography – show contours, spot elevations and topographic bench marks. Include entire project area and, whenever practicable, a minimum of 100 feet beyond the site boundary. Contour intervals shall be shown at:
    - 2-foot for slopes less than or equal to 15%
    - 10-foot for slopes greater than 15%

  All elevation contours shall use elevations based on the datum described in **Subsection 1.03 - Coordinate System.**
- Water Courses – show banks and corridor boundaries
- Location of all subsurface water outlets (i.e. springs)
- Wetlands – show boundaries and inventory as required
- Floodplains – show floodway and floodplain boundaries. All water courses shall show the 100-year floodplain as indicated on the U.S. Army Corps of Engineers and Federal Emergency Management Agency (FEMA) maps.
- Graveled surfaces
- All structures, buildings, parking lots and utilities on the property
- Curb lines – show curb types and elevations
- Sidewalks and pathways – show widths, materials, and relationships to street lights, fire hydrants, trees, etc.
- Streetlights – show fixture type and wattage, pole type, and location; include conduits and/or overhead power lines, junction boxes and any other surrounding power structures
- Identify public vs. private streets and label with City of Gresham street names
- Other related structures or features – railroad crossings, culverts, bridges, etc.

Show existing features on a screened line type when proposed features are shown on the same sheet.

2.02.08 Grading and Erosion Prevention & Sediment Control Plan

The grading and erosion prevention & sediment control (EPSC) plan shall address the EPSC measures as required by the *City's Stormwater Management Manual*. Construction projects anticipating construction activity between October 1st and May 31st will be required to submit a plan addressing wet weather measures as outlined in the Stormwater Management Manual. Construction activity is assumed as "active" until permanent vegetation and/or erosion protection is established.

The plan shall include the following:

- Topography – show existing contours. Include entire project area and, whenever practicable, a minimum of 100 feet beyond the site boundary. Contour intervals shall be shown at:
    - 2-foot for slopes less than or equal to 15%
    - 10-foot for slopes greater than 15%

- Finished contours of the property after development at 2-foot and 5-foot intervals as described above
- Limits of cut and fill, including structural fill placement areas
- Label waterways, drainage features and boundaries of environmentally sensitive areas, such as wetlands
- Location of erosion control facilities (i.e. silt fence, straw mulch, sediment ponds, etc.) – including permanent measures (i.e. seeding, jute matting, etc.)
- Location of primary access point(s) for construction traffic with Best Management Practices (BMP)
- Location of inlet and outlet structures (i.e., catch basins, culverts, creeks, etc.)
- Location of limits of construction and sensitive areas
- Location of existing and proposed public and private drainage facilities – including paved areas, curbs, sidewalks, drainage ditches and culverts

All trees with 8-inch and larger diameters shall be shown on the plan. The plan shall identify the location, caliper, and species of the tree and shall indicate if the tree is proposed to remain or to be removed.

2.02.09 Composite Utility Plan

The composite utility plan shall include all public utilities, including, but not limited to, water, stormwater, and wastewater. Additionally, all proposed street trees shall be shown on the composite utility plan. If a landscape plan is included, it shall point to the composite utility plan for precise street tree locations.

2.02.10 Street and Stormwater Plan and Profile

Topography – show proposed contours, spot elevations, percent grade for graded slopes and topographic bench marks. Contour intervals shall be shown at:

- 2-foot for slopes less than or equal to 15%
- 10-foot for slopes greater than 15%

All elevation contours shall use elevations based on the datum described in **Subsection 1.03 - Coordinate System.**

Proposed Street Improvements: Show dimensions, descriptions, location and stationing of the following:

- Road plans and cross-sections – show width, materials, right of way, property lines, center line, utility locations, etc.
- Horizontal alignment, curve data, and stationing of primary control points (i.e. PC, PI, PT, PRC)
- Curb lines – show curb types and elevations
- Sidewalks and pathways – show widths, materials, typical cross-sections and relationships to street lights, fire hydrants, trees, etc.
- Pavement areas, with elevations for street widenings (if applicable) to determine pavement cross slope to new curb or pavement edge
- Identify public vs. private streets and label all new and existing streets with approved City of Gresham names
- Other related structures or features – railroad crossings, culverts, bridges, etc.

Note on the plans that all survey monuments in Arterials and Collectors shall be placed in monument boxes per **Standard Detail 634**.

Proposed Stormwater Improvements: Provide the following minimum information:

- Stormwater pipes – show invert elevation, size, length and pipe material
- Alignments (Each line shall be stationed continuously on the plan sheet, with names distinguishing the lines from one another; i.e. Storm Line "A", Storm Line "B')
- Pipe grades
- Stormwater laterals – show station of connection into main line, location, size, pipe material, and tie the end of the branch line to the nearest property corner at the right-of-way line and provide the distance back from the face of the curb
- Private roof and foundation drain systems
- Manholes – show pipe invert elevation and rim elevation;
- Catch basins, ditch inlets, etc.
- Ditches – show typical sections including depth, width and side slopes
- Stormwater facilities – show locations, sections, proposed contours and details, where applicable
- Related detail drawings
- Identify public vs. private
- Other related structures or features

2.02.11 Sanitary Sewer and Water Plan and Profile

Proposed Sanitary Sewer Improvements: Provide the following minimum information:

- Sanitary Sewer lines – show elevation, size, length, pipe material, and backfill material
- Alignments (Each line shall be stationed continuously on the plan sheet, with names distinguishing the lines from one another; i.e. Sanitary Sewer Line "A", Sanitary Sewer Line "B')
- Pipe grades
- Sanitary Sewer laterals – show length measured from centerline of sewer main to end of pipe, station, location, invert elevation at the end of the pipe, depth at the end of the pipe measured from existing ground to invert of pipe, size and pipe material
- Wyes or tees into main lines – show stationing and tie the end of the sewer lateral to the nearest property corner at the right-of-way line and provide the distance back from the face of the curb
- Manholes – show pipe invert elevation and rim elevation;
- Cleanouts
- Related detail drawings
- Identify public vs. private
- Other related structures or features

Proposed Water Improvements: Provide the following minimum information:

- Water lines – show depth, size, length and pipe material
- Alignments
- Pipe grades
- Fire hydrants

- Fittings and valves – show size, type of fitting (i.e. MJ x MJ, FLG x MG, etc), manufacturer and station and/or distance from a property line/corner; provide information in the form of an inventory list on construction drawings;
- Blocking – show size and type
- Water service lines – show length, station, location, depth, size and pipe material
- Related detail drawings
- Identify public vs. private
- Borehole location(s)
- Other related structures or features
- Intersection details for fittings and valves are required when scale of plans is smaller than 1" = 20'.

2.02.12 Streetlight Plan

Provide the following minimum information:

- Fixture type and wattage
- Pole type and location
- Conduits and/or overhead power lines
- Junction boxes
- Location of the streetlight disconnect
- Streetlight circuits
- Power supply
- Photometrics, as required
- Any other power structures related to the project

Also, include a table with the circuit number, number of lights per circuit, total load per circuit (in Watts), and total circuit length in one direction (in feet). Add a note to the plans that states that all wire shall be 8 AWG.

2.02.13 Detail Sheets

Provide all related details pertinent to the project. If a Standard Detail must be modified to fit existing or unique conditions, the modified drawing shall be marked accordingly on the detail. When appropriate, due to required detail complexity or if a standard detail does not exist, a separate detail shall be drawn without the City's Standard Detail border.

2.03 As-Built Plan Requirements

2.03.01 General Information

1) The electronic copy, in PDF format, must be **identical** to the hard copy. CAD files must also be identical to the hard copy, with the exception of the signature of the Engineer of Record on the engineer's stamp.

2) Revisions to construction plans, for the purpose of creating As-built Plans, must be approved by the Engineer of Record and re-stamped and resigned.

3) All changes shall be clouded (encircled) and labeled with the appropriate symbol associated with the revision block for the “As built Drawing” entry.

4) Electronic CAD plan submittals shall adhere to the following minimum standards:
   a. All electronic CAD base files must be generated by using the e-transmit command in AutoCAD. This will keep external references, dwgs, and image files included and attached to the drawings.
   b. Audit and purge all CAD files before submission – Including purging vehicle tracking data using command PURGEVEHICLETRACKING, unless necessary for plan production.
   c. If registered orthophotography is used as a backdrop, the image and registration file, along with directory information, shall be provided.
   d. All layers must match the layering conventions in the City CAD Template, including text, structures and lines. (If necessary, layers can be converted to the City layer styles/names by using the Layer Translator feature in AutoCAD. A how to guide for this feature can be found in **Appendix A**.)
   e. All specific construction notes shall be placed in model space. General construction notes may be located in either model space or paper space.
   f. All files shall be zipped in one folder.

2.03.02 Additional Required Plan Information

The following information is required to be provided on the As-Built Plans in addition to the requirements in **Subsection 2.02 - Construction Drawing Requirements**:

- Location of at least two benchmarks or City control points used. These locations shall be labeled with the appropriate coordinates and easily identifiable in the CAD file
- Actual location and depth, from finish grade, of any other utilities encountered during construction – shown on both the plan and profile views
- Note all changes from standard 36-inch cover for all waterlines; limits shall be shown on plans with annotated reason for change; actual pipe elevation (top of pipe) shall be taken at every fitting that is not at standard cover
- All public and private easement information
- Changes to the approved thickness for street structural section components, show limits where the changes occur
- Changes to driveway locations and/or widths
- Contractor’s company name, phone number and contact person for all improvements relating to parks, trails, and natural areas
- The words “As built Drawing” appear as the last entry in the revision block along with the month, day, and year the as-built plan was prepared
- Each page includes the below stamp with the correct date

AS-BUILT

JANUARY 1, 2019

THESE AS-BUILT DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE CONTRACTOR. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED INTO THESE DRAWINGS.

- Current signed engineer’s stamp

- Any other changes altering the approved plans

2.03.03 As-Built Plan Submittal Process

- Request an as-built number from the City Development Engineering Specialist.
- Add the as-built number plus page number (City Page Number) in ½ inch letters below the City logo in the bottom right hand corner of each sheet.

  Example of numbering: 1st sheet: GR0001AA, 2nd sheet: GR0001AB, 27th sheet: GR0001BA, 54th Sheet: GR0001CB

- Submit PDF draft as-built plans and the As-built Process and Checklist for City review.
- After City review, make all required edits and submit CAD and PDF files to the Project Manager. Each PDF sheet shall be saved as an individual file and be named using City Page Numbers, and shall have a file name with no spaces or special characters.
- Only CAD base files shall be submitted and must be saved to AutoCAD 2010 or later, up to AutoCAD 2013. All CAD files shall be on the correct horizontal and vertical datums.
- PDF files must be high resolution, black and white drawings, unless otherwise approved.
- Submit all files zipped in one folder to the Project Manager.

2.03.04 Accompanying Documents

When required by the City, CAD files must be accompanied by the following:

1) Plotting List – Listing of all plotted sheets and source drawings files
2) Drawing Assembly List – Instructions for all referenced or inserted drawings
3) Non-standard Drawing List – Listings of all non-standard drawings used in the project
4) Non-standard Layer List – Listing of all non-standard layers used in the project
5) CTB File (Color-Dependent Plot Style Table or named plot style) – Provided by the City unless changes were approved by the Project Manager. If modifications were made, the file name should be renamed from the City CTB file name
6) Complete test results from field tests associated with the drawings

Appendix A: How to Convert Layers in AutoCAD to City of Gresham Layer Styles

AutoCAD Feature: LAYER TRANSLATOR

In the Layer Translator, you specify the layers in the current drawing that you want to translate, and the layers to translate them to. The translation maps the layers in the current drawing to different layer names and layer properties in a specified drawing (.dwg), template (.dwt) or standards (.dws) file, and then converts them using those mappings.

How To - When Using the City of Gresham Template (*.dwt) File:

1. Click Manage Tab ► CAD Standards panel ► Layer Translator, or use the command LAYTRANS.
2. In the Layer Translator dialog box click **Load** to load layers from the drawing template (.dwt) file. In the Select Drawing File dialog box, make sure the *Files of Type* (located at the bottom of the dialog box) is set to "Drawing Template (*.dwt)" before you start navigating to the folder location where you have stored the current City of Gresham template file. Select the file and click **Open**.
3. Map layers in the current drawing to the layers you want to convert to. Use either or both of the following methods to map layers:
    a. Map identically named layers from one list to the other by clicking **Map Same**. This will automatically assign all layers from the *Translate From* and *Translate To* lists with the same names into the *Layer Translation Mappings* box.
    b. Map individual layers by selecting one or more layers in the *Translate From* list and one layer in the *Translate To* list with the desired properties, and click **Map**. Repeat for each layer or group of layers to be translated.
4. If this is a translation that may be repeated in the future, click **Save**. This will save the mapping from the layer styles used by the Engineer of Record to the layer styles defined in the City of Gresham template in a Drawing Standards (*.dws) format that can be used in the future.
5. Click **Translate** to perform the layer translations you have specified. All layers that you did not map from the original drawing will be maintained in their current state.

NOTE: After using the Layer Translator all layers will be turned on and thawed.

How To - When Using a Previously Saved Drawing Standards (*.dws) File Based on the City of Gresham Template (*.dwt) File:

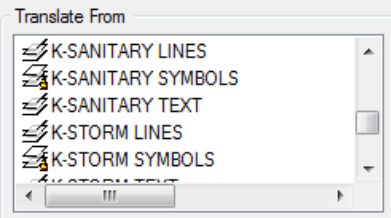
1. Click Manage Tab ► CAD Standards panel ► Layer Translator, or use the command LAYTRANS.
2. In the Layer Translator dialog box click **Load** to load the drawing standards (.dws) file. In the Select Drawing File dialog box, make sure the *Files of Type* (located at the bottom of the dialog box) is set to "Standards (*.dws)" before you start navigating to the folder location where you have stored your translation file. Select the file and click **Open**. All of the previously mapped layer translations will appear in the *Layer Translation Mapping* box.
3. Click **Translate** to perform the layer translations you have specified.

NOTE: After using the Layer Translator all layers will be turned on and thawed.

Features of the Layer Translator Dialog Box

Translate From

Specifies the layers to be translated in the current drawing. You can specify layers by selecting layers in the *Translate From* list or by supplying a selection filter.



The symbol preceding the layer name indicates whether or not the layer is referenced in the drawing. An icon without a lock indicates that the layer is referenced; an icon with a yellow lock indicates the layer is unreferenced. Unreferenced layers can be deleted from the drawing by right-clicking in the *Translate From* list and choosing **Purge Layers**.

Selection Filter

Specifies layers to be selected in the *Translate From* list, using a naming pattern that can include wild-cards (*). The layers identified by the *Selection Filter* are selected in addition to any layers previously selected once you click **Select**.

Translate To

Lists the layers you can translate the current drawing's layers to.

Load

Loads layers in the *Translate To* list using a drawing (.dwg), drawing template (.dwt), or standards (.dws) file that you specify. If the specified file contains saved layer mappings, those mappings are applied to the layers in the *Translate From* list and are displayed in *Layer Translation Mappings*.

You can load layers from more than one file. If you load a file that contains layers of the same name as layers already loaded, the original layers are retained and the duplicate layers are ignored. Similarly, if you load a file containing mappings that duplicate mappings already loaded, the original mappings are retained and the duplicates are ignored.

New

Defines a new layer to be shown in the *Translate To* list for translation. If you select a *Translate To* layer before choosing **New**, the selected layer's properties are used as defaults for the new layer. You cannot create a new layer with the same name as an existing layer.

Map

Maps the layer(s) selected in *Translate From* to the layer selected in *Translate To*.

Map Same

Automatically maps all layers that have the same name in both lists.

Layer Translation Mappings

Lists each layer to be translated and the properties to which the layer will be converted. You can select layers in this list and edit their properties using **Edit**.

Edit

Opens the Edit Layer dialog box, where you can edit the selected translation mapping. You can change the layer's color, linetype, lineweight, and transparency. If all drawings involved in translation use plot styles, you can also change the plot style for the mapping.

Remove

Removes the selected translation mapping from the *Layer Translation Mappings* list.

Save

Saves the current layer translation mappings to a file for later use.

Layer mappings can be saved in the .dwg or .dws file format. You can replace an existing file or create a new file. The Layer Translator creates the referenced layers in the file and stores the layer mappings in each layer. All linetypes used by those layers are also copied into the file.

Settings

Opens the Settings dialog box, where you can customize the process of layer translation by selecting the options you want.

Force Object Color to ByLayer

Specifies whether or not every object translated takes on the color assigned to its layer.

Force Object Linetype to ByLayer

Specifies whether or not every object translated takes on the linetype assigned to its layer.

Force Object Transparency to ByLayer

Specifies whether or not every object translated takes on the transparency assigned to its layer.

Translate Objects in Blocks

Specifies whether or not objects nested within blocks are translated.

Write Transaction Log

Specifies whether or not a log file detailing the results of translation is created. If this option is selected, a log file is created in the same folder as the translated drawing. The log file is assigned the same name as the translated drawing, with a .log file name extension.

Show Layer Contents When Selected

Specifies which layers to display in the drawing area.

Translate

Starts layer translation of the layers you have mapped.

If you have not saved the current layer translation mappings, you are prompted to save the mappings before translation begins.