

DIVISION A - GENERAL

A 1.00 - INTRODUCTION

A 1.01 PURPOSE AND ORGANIZATION

The purpose of these Engineering Standards documents is to provide a consistent policy for implementing design of public improvements and related facilities. The elements contained herein are Public Works oriented and are related to public improvements.

These Engineering Standards cannot provide for all situations. They are intended to assist, but not to substitute for competent work by design professionals by providing basic information. Engineers are expected to bring the best of their skills and judgment from their respective disciplines to each project. If the Engineer anticipates challenges in meeting these Engineering Standards, they should contact the City prior to extensive design efforts.

These Engineering Standards are also not intended to limit unreasonably any innovative or creative effort, which could result in better quality, better cost savings, or both. Any proposed departure from the Engineering Standards will be judged, however, on the likelihood that such variance will produce a long- term compensating or comparable result, in every way adequate for the user and resident. Any departure from these standards shall only be allowed by the approval of the City Engineer.

A 1.02 APPLICABILITY AND AUTHORITY

This Engineering Standards document shall govern all design and upgrading of all public improvements and related facilities within the City of Millersburg. This document will be routinely referred to as the Engineering Standards. These standards are developed under the authority of the City Engineer or the City Engineer's designee. Modifications of or variations from these Engineering Standards shall be approved by the City Engineer or the City Engineer's designee.

Appeals to these Engineering Standards for specific project application shall be in writing. The appeal shall identify the standard section for which the appeal is being made, reasons for the appeal, and for which specific project/application the appeal is being made. The appeal shall be handled at the lowest level possible. Therefore, appeals shall be forwarded to the City in the following order:

- A. The staff person reviewing the project plans and specifications.
- B. City Engineer

A 1.03 ENGINEERING POLICY

The City of Millersburg requires strict compliance with Oregon Revised Statute 672 for professional engineers. All engineering plans, reports, or documents shall be prepared by a registered professional Civil Engineer or by a subordinate employee under his/her direction, and shall be signed by him/her and stamped with his/her seal to indicate responsibility for them. It shall be the project engineer's responsibility to review any proposed infrastructure extension, and/or existing system change with the City, prior to

engineering or proposed design work, to determine any special requirements or whether the proposal is permissible. An approval stamp of the City on the plans or other documents, for any job, does not in any way relieve the project engineer of his/her responsibility to meet all requirements of the City or obligation to protect the life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined the full requirements of the City have not been met.

A 1.04 REFERENCES

These Engineering Standards are intended to be consistent with the most current provisions of the documents and requirements as listed below. Periodic revisions to these Engineering Standards will be made as necessary to maintain consistency in that regard. Nevertheless, all projects are expected to be consistent with the:

- A. *Millersburg Municipal Code*
- B. *Millersburg Land Use Development Code*
- C. *Millersburg's adopted Standard Construction Specifications*
- D. State regulations
- E. Federal regulations

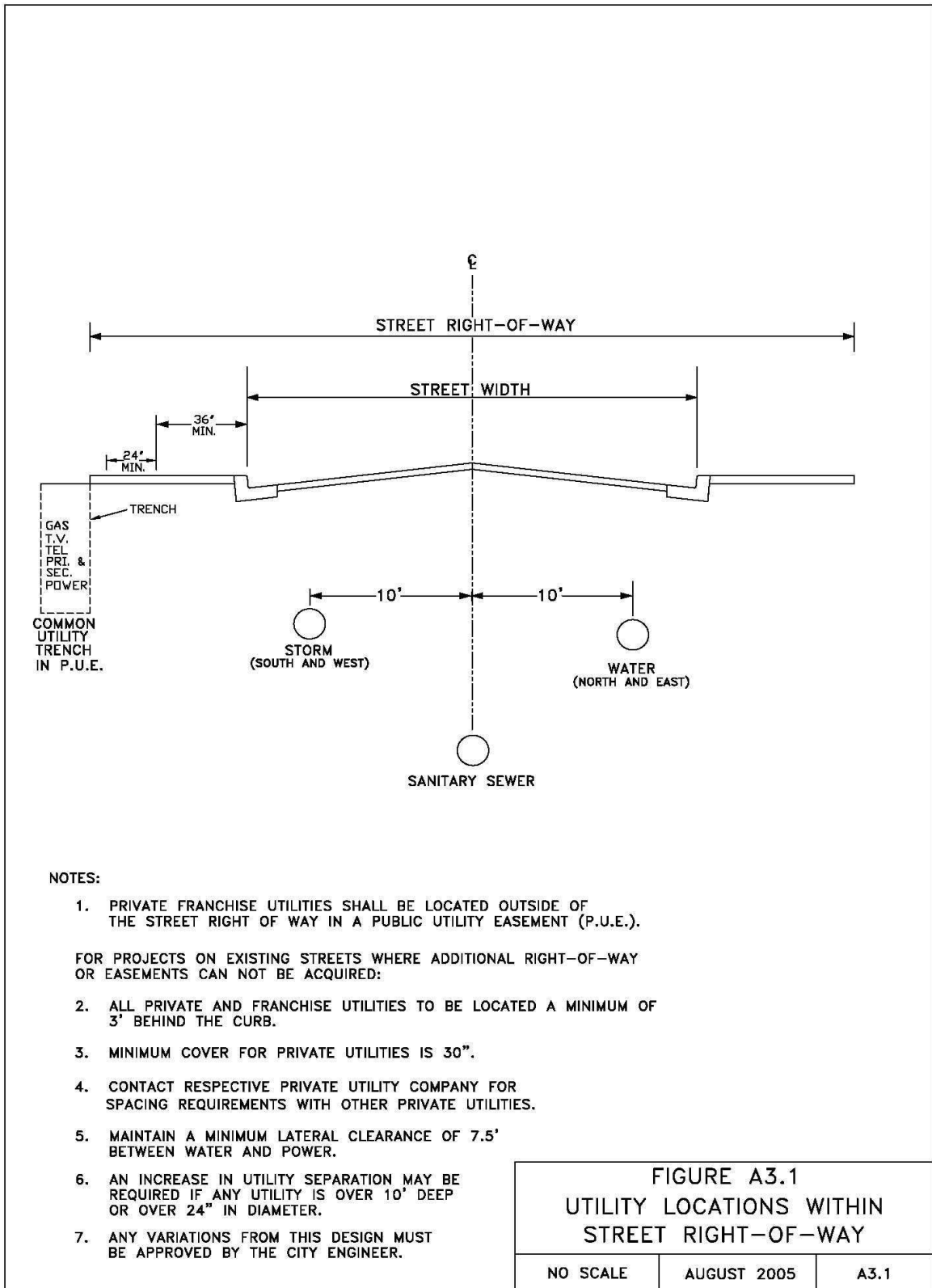
Proper design of public improvements must follow and incorporate the City's *Standard Construction Specifications*.

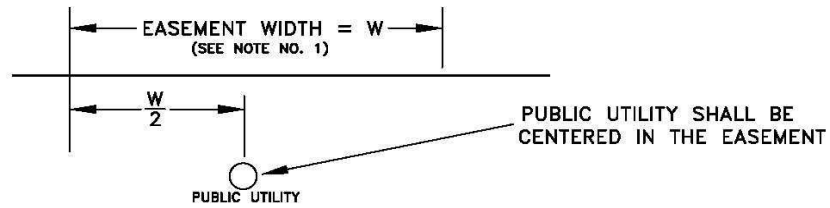
A 2.00 - EASEMENTS

A 2.01 GENERAL REQUIREMENTS

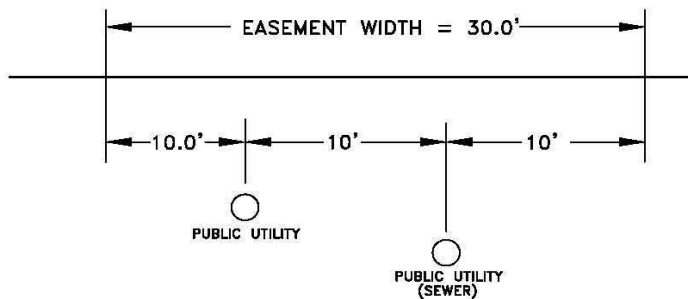
Where an easement is needed to construct the public improvement, the following guidelines and requirements will govern the requirements for and the use of public easements:

- A. Easements will only be permitted when it has been shown to be impractical or unfeasible to locate the needed public improvement within the public right-of-way. Utilities in the right-of-way shall be located as shown on figure A 3.1.
- B. All public utilities located on private property shall be located at the center of a permanent easement. The easement for a single line shall be 15 feet in width for water lines and 20 feet in width for sewer and storm drain lines. If two or more lines are located within the same easement, the easement width shall be increased. Easement widths and configuration shall conform to figure A 3.2.
- C. If a utility is deeper than 10 feet or has a diameter greater than 24 inches, a wider easement may be required. In such cases, a slope of one horizontal to one vertical will be used to determine the width of the easement, after taking into account the width of the pipe trench itself.
- D. At the terminus of all public lines, the easement shall be extended a minimum of 10 feet past the end of the line, manhole, or cleanout.
- E. All easements shall be granted to the City on a standard approved format. All private easements shall consist of two separate 8.5 by 11-inch exhibits. Exhibit A shall provide the easement's legal description, as prepared by a registered Oregon professional land surveyor. Exhibit B shall provide a site and vicinity survey drawing of the final easement configuration, also prepared by a registered Oregon professional land surveyor.
- F. Any variation in easement widths shall vary in 5-foot increments.
- G. All easements shall be shown on the City-approved project engineering drawings.
- H. Public easements within Planned Developments, manufactured home parks, apartment complexes, or commercial/industrial developments shall be located in parking lots, private drives, or similar open areas that permit unobstructed vehicle access for maintenance and inspection purposes.
- I. Easements along property lines shall be centered on the property line. For these locations, place the utility 18 inches off the property line.
- J. Easements shall be in effect prior to construction. All easements must be furnished to the City for review and approval prior to recording.

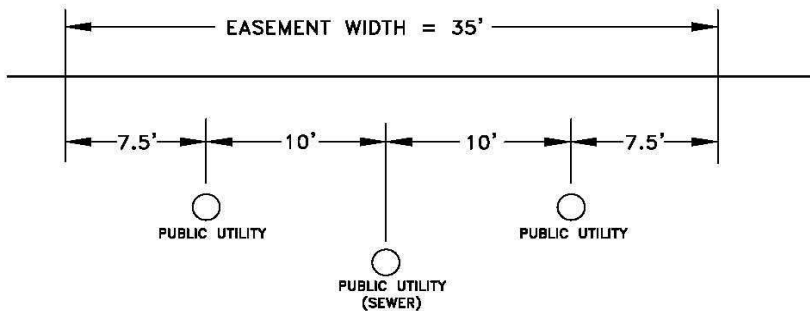




EASEMENT FOR SINGLE PUBLIC UTILITY LINE



EASEMENT FOR TWO PUBLIC UTILITY LINES



EASEMENT FOR THREE PUBLIC UTILITY LINES

NOTES:

1. MINIMUM EASEMENT WIDTHS FOR VARIOUS UTILITIES ARE:
 WATER W = 15FT.
 STORM DRAIN W = 20FT.
 SANITARY SEWER W = 20FT.
2. AN INCREASE IN EASEMENT WIDTH MAY BE REQUIRED FOR ANY PUBLIC UTILITY THAT IS OVER 10' DEEP OR OVER 24" IN DIAMETER.
3. WITH THE EXCEPTION OF UTILITY CROSSINGS, PRIVATE UTILITY LINES MAY NOT BE LOCATED WITHIN THE PUBLIC UTILITY EASEMENT.
4. NO STRUCTURES, INCLUDING DECKS AND OVERHANG AREAS, MAY ENCROACH INTO THE EASEMENT AREA.

FIGURE A3.2
EASEMENT WIDTH REQUIREMENTS

NO SCALE	AUGUST 2005	A3.2
----------	-------------	------

A 3.00 - DRAFTING STANDARDS

A 3.01 PURPOSE OF THESE STANDARDS

These Engineering Standards have been established to facilitate producing drawings that are consistent in appearance and presentation. These drafting standards are intended to provide consistent drawings and records of the City's infrastructure. Adherence to these Engineering Standards will aid the City in maintaining accurate and readily readable records. It will also aid in the efficient review and turnaround of construction plans.

These Engineering Standards are to be followed by all consultants and sub-consultants who are involved in producing drawings for City of Millersburg projects and Private Construction of Public Infrastructure (PCPI) projects. Exceptions will be made only after a request has been submitted and approved by the City Engineer. If any situation occurs that is not specifically addressed, application of good judgment on the part of the engineer is appropriate.

A 3.02 DRAWING CREATION AND LAYOUT

All drawings will be created in AutoCAD. AutoCAD drawings submitted to the City digitally shall be compatible with the AutoCAD release being used by the City at that time. Drawings shall be located and oriented within the horizontal Oregon State Plain Coordinate System (NAD 83-89). All elevations shall be in the National Geodetic Vertical Datum of 1929 (NGVD 1929).

Review drawings may be submitted on 11-inch x 17-inch paper. Bidding and construction documents may also be printed on 11-inch x 17-inch paper. Final as-built drawings must be submitted to scale on white, acid-free Engineering bond paper. Drawings shall be drawn such that reduction of plans from full size (24x36) to half size (11x17) can be done and maintain a true scale on the half-sized plans.

A 3.03 SHEET LAYOUT AND DESIGN INFORMATION

A. Title Sheets. All projects shall include a title sheet. This requirement may be waived if the project consists of only one plan sheet. If a title sheet is not used for a single sheet project, a vicinity map must be included on the single sheet. One title sheet may be used when constructing more than one facility (sewer, storm drain, etc.); however, all requirements for the title sheet must be met. The following information shall be included on all title sheets:

1. A Site Plan of the entire project, showing street right-of-way and/or subdivision layout. The site plan shall be a composite plan showing all complete properties to be served by the improvements and properties adjacent to and within 100 feet of those served. A North arrow shall be included on the title sheet and shall be oriented to the top of the sheet.
2. Index of Sheets.
3. Complete legend of symbols used.
4. Vicinity Map to a scale of not less than 1" = 800' showing the project location.

5. Permanent bench marks including their descriptions.
 6. General and special notes relating to construction methods.
 7. A statement referencing the *Standard Construction Specifications*.
 8. Statement required by state law regarding utility locates.
 9. Statement requiring compliance with federal, state and local erosion prevention and sediment control regulations.
- B. Plan and Profile Sheets. Plan sheets shall be laid out and organized in a fashion that facilitates easy plan reading and interpretation. Proposed utility improvements shall be laid out on individual plan sheets. For example, street, sewer, water, and storm drain plans shall each be on their own designated plan sheet. Do not combine utilities and street plans on the same plan sheet. Storm drain improvements associated directly with street improvements can be combined on the street plan sheets.
1. Plan Sheets: Plan sheets shall show all existing improvements within the boundary of the project and within 250 feet of the terminus of the proposed improvements that can be extended. Items that should be included are:
 - a) Natural Features: Base sheets shall include at least 10-foot contour lines to show the existing topographical characteristics of the site and adjacent areas that impact the project or are immediately impacted by the project. Contour lines of 2-foot intervals may be required when grades are flat or additional information is required. Alternative contour intervals may be used with prior approval of the City Engineer. Identify all relevant features, including ditches, swales, channels, streams, and trees.
 - b) Transportation Improvements: Show all existing edge of pavement/curbs, bridges, alleys, driveways, and sidewalks that are adjacent to or abutting the project. Include the location of curb cuts and wheel chair ramps. Show all lights, signs, signals, signal loops, boxes, etc. Show all railroad tracks and crossings. Show existing slopes and grades of improvements.
 - c) Public Utilities: Show all water, sewer, and storm drain lines, including service laterals. Identify manholes, drainage inlets and outlets, valve and meter locations, hydrant locations, and all other appurtenances. Indicate elevations of each feature at match points with the appropriate slope, grade, or direction of flow indicated. Abandoned utilities shall also be shown where known.
 - d) Franchise Utilities: Show franchise utilities, including underground and overhead lines, vaults, poles, and all appurtenances, located within or adjacent to the project, or that would be affected by the project.
 - e) Private Improvements: Show all property and right-of-way lines, easements, and found survey monuments. Show all relevant existing improvements within or adjacent to the project, such as railroads, private streets and walks, landscaping, fences, walls, trees, buildings

or structures, wells, private utility lines and appurtenances, and any other existing feature that would impact or be impacted by the project.

- f) Hydrology. Location of water courses, streams, ditches, and swales that will be impacted or affected by the project. All water course crossings must show the 100-year floodplain.

Special Note: The design engineer shall perform field investigations to determine an accurate picture of existing utilities. This shall be done to assure the project can be built as designed and to prevent conflicts that will significantly alter the construction of the improvements from the approved plans. For utility connection locations, the design engineer shall field locate and verify the alignment, depth, invert elevations, and connection requirements of all existing facilities shown on the plans. All other utilities that will be crossed by proposed facilities that may cause a conflict shall also be field located for the alignment, depth, and invert elevations. City as-built drawings are only to be used as aids to the design engineer when field verifying the existing facilities.

- 2. Profiles. Profiles for the improvements shall be to the same horizontal scale on the same sheet and drawn immediately below the corresponding plan view, and shall be required in the following instances:

- a) All street, sewer, and storm drain improvements.
- b) On water line projects at railroad and culvert crossings, ditch or stream crossings with elevations of the ditch or stream bed, and the 100-year flood elevation profile and casing details; utility crossings that conflict with the proposed water line installation; water lines installed in unimproved streets or easements across private property; or as otherwise directed by the City.

- C. In addition to the standard information that must be provided on all plans, there are some specific information and guidelines required on plans for each type of improvement.

- 1. Water Improvements:

- a) Type and location of internal restraint where required. Pipe with internal restraint shall be shown as a heavier/different line type than pipe without internal restraint.
- b) Type and connection configuration of all proposed fittings, valves, and appurtenances.
- c) Detailed drawings shall be included for all water system appurtenances and connections to existing water lines. Where appropriate, references to the *Standard Construction Specifications* may be used in-lieu-of details actually shown on the plans.
- d) Type of material and class of pipe between fittings.
- e) Backfill material of the trench.

- f) All water system components not specifically covered by Standard Detail Drawings, as found in the *Standard Construction Specifications*, shall be identified on the construction drawings. Components shall be identified as to type and connection configuration, i.e. flange, mechanical joint, etc.

NOTE: All connection and detail information shall be shown on the plan view (not profile view).

2. Sewer Improvements:

- a) Type of material and class of pipe between manholes.
- b) Backfill material of the trench.
- c) Invert elevations, direction, and diameter of all pipes at manholes.
- d) Rim elevations of all manholes (and ground elevation if different than rim elevation).
- e) Pipe slopes.
- f) All sewer system components not specifically covered by Standard Detail Drawings, as found in the *Standard Construction Specifications*, shall be identified on the construction drawings.

3. Storm Drain Improvements:

- a) Type of material and class of pipe between manholes and inlets.
- b) Backfill material of the trench.
- c) Invert elevations, direction, and diameter of all pipes at manholes.
- d) Rim elevations of all manholes (and ground elevation if different than rim elevation).
- e) Pipe slopes.
- f) All storm drain system components not specifically covered by Standard Detail Drawings, as found in the *Standard Construction Specifications*, shall be identified on the construction drawings.
- g) Inlet and outlet details, including grate details.
- h) Open channel invert and top of bank slopes. High and mean water surface elevations shall also be shown on the plans where appropriate.
- i) Cross sections shall be shown for each section of open channel. The cross sections shall have invert, top of bank, high, and mean water surface elevations labeled on them.

4. Street Improvements:

- a) Standard cross section with structural sections for each street. Cross sections shall extend a minimum of 25 feet beyond the existing or proposed right-of-way. In steeper areas, cross sections shall be shown to catch points. Cross sections shall be developed for all

areas where improvement dimensions are different and for all locations where the adjacent property's topography changes.

- b) Dimensions shall be shown on each plan sheet indicating right-of-way width, street width, distance from centerline to face of curb, width of the landscape strip, and sidewalk width.
- c) Horizontal Alignment: Show the construction centerline for each street, with stationing labeled at 50-foot intervals, beginning and ending points, centerline-centerline intersections, and changes in horizontal alignment. The future horizontal alignment of dead-end streets shall be shown 250 feet beyond the proposed termination point.
- d) Horizontal Curves: For each horizontal curve, show stationing labels for Point of Curvature (PC), Point of Reverse Curvature (PRC), and Point of Tangency (PT). In a table on the plan sheet, show the centerline curve data including the tangent length, curve length, long chord distance, delta angle, and centerline radius distance.
- e) Curb and Gutter Alignment: Show face of curb alignment throughout the project, labeling alignment changes with street stationing. The beginning or end of curb returns at intersections shall be labeled with the appropriate street station, with curb return data listed in a table on the plan sheet. The table shall show the total length of the return, delta angle, curb radius distance, and elevations of the beginning, $\frac{1}{4}$ delta, $\frac{1}{2}$ delta, $\frac{3}{4}$ delta, and end of the return.
- f) Profile Information: The profile information for each street design shall be to the same horizontal scale, on the same plan sheet, and drawn immediately below the corresponding plan view. The profile grid shall clearly show elevations along the left and right sides of the grid and label stations every 50 feet along either the top or bottom of the grid.
- g) Vertical Grades: Show the existing ground and finish grade profiles at the top face of curb (or at edge of pavement if curb is not being constructed) and the finish grade profile at centerline. The proposed future vertical alignment of dead-end streets shall be shown 250 feet beyond the proposed termination point, and the vertical alignment of existing side streets shall be shown at least 40 feet beyond the curb return. This is to insure that the street grade is set low enough to enable the adjacent properties to drain to the street. On each plan sheet, the street and curb grades shall be labeled on the profile for each tangent section near grade breaks or vertical transitions.
- h) Vertical Curves: For each vertical curve, label the station and elevation for the Vertical Point of Curvature and Vertical Point of Tangency on the profile. At a convenient location on the profile, list the station and elevation for the Vertical Point of Intersection, Turning Point, and length of the vertical curve.

5. Grading Plans:

- a) Show contours at a minimum of 2-foot intervals. Indicate whether land is cut or filled.
- b) Identify the direction of flow for all ditches and creeks and water surface elevations for lakes.
- c) Identify drainage direction and drainage basin boundaries.
- d) Provide cross sections or profile plans to show existing and final grading.

A 3.04 DRAWING TITLE BLOCK

Standard title blocks shall be used unless otherwise specified. The preferred location for the title block is vertically on the right-hand side of the drawing.

Upon creation or revision of a drawing, the information/attributes inserted into the title block of the drawing shall be revised. All information relevant to finding the file, plotting the file, and dating the plot shall be listed in the appropriate portion of the title block. Regardless of the title block location and or size, the title block shall contain the following at a minimum:

- A. Project Name
- B. City Project Number
- C. Designer's name
- D. Drafter's name
- E. Date of last edit
- F. Engineer's stamp
- G. CADD file name
- H. Other plotting codes

A 3.05 PROFESSIONAL STAMPS AND CITY APPROVAL STAMPS

Professional stamps shall be included on all drawings submitted for review for the discipline represented by the work. The preferred placement of the stamp is within the title block.

Drawings for privately-constructed site improvement projects shall provide a 3-inch square near the bottom right of each plan sheet for placement of the City plan approval stamp.

A 3.06 DRAWING SCALES

- A. Scales for Maps, Graphics, and Construction Plans. A graphic scale is required on all maps and graphics. The graphic scale shall be two-inches long on 24x36- sized sheets and one-inch long on 11x17-sized sheets. It shall have a minimum of three labels, with the leftmost label being 0 and the middle and rightmost labels displaying the appropriate distances respectively, as shown in Figure A 3.06-A.

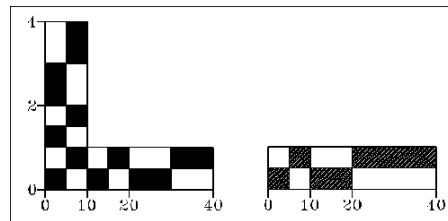


Figure A 3.06-A Drawing Scale

All construction drawings are to have the scale clearly indicated. When the drawing contains only one view, detail, or section, the scale is to be noted prominently on the drawing. When the drawing contains multiple views, and/or details, and/or sections, the scale is to be noted as part of each individual component's title. When all views and/or details and/or sections on a single drawing are the same scale, the scale should be noted in the appropriate space on the drawing.

The preferred scale for plan and profile drawings shall be 1" = 20'. However, scale must be selected with the following requirements in mind:

1. Maintain clarity when notes and dimensions are added to the drawings.
2. Maintain legibility when drawings are reduced to half size.

The use of distorted scales (different horizontal and vertical scales) is acceptable for profile map and graphical drawings. For example, for plan and profile views on map and graphical drawings, the vertical and horizontal scales should have a 1:10 ratio where possible. That is, if the vertical scale is 1 inch = 2 feet, then the horizontal scale should be 1 inch = 20 feet. Similarly, a 1 inch = 10 feet vertical scale would correspond to a 1 inch = 100 feet horizontal scale, and so on. However, distorted scales are not acceptable for mechanical drawings.

A 3.07 DRAWING ORIENTATION

- A. North Orientation. General plans such as maps and site plans must always include a north arrow. If possible, the north arrow should point to the top on all drawings. However, the north arrow should be oriented to allow project stationing to increase from left to right and from bottom to top of page. However, North should not be oriented to the bottom of the page.
- B. North Arrow Placement. North arrow locations on construction drawings are preferred in the upper right corner. Exceptions may be made, but consistency

should be maintained throughout the drawing set.



Figure A 3.07-A North Arrow

- C. Sizing. For 11x17-size, the size of the North arrow should be 1.0" from top to bottom. For 24x36-size drawings, the size of the North arrow should be 2" from top to bottom.

A 3.08 TEXT

- A. General. All text on a drawing shall be legible on full- and half-sized plans. Text should be laid out as shown in Figure A 3.08-A unless otherwise specified in this standard. Uppercase lettering shall be used for all text.

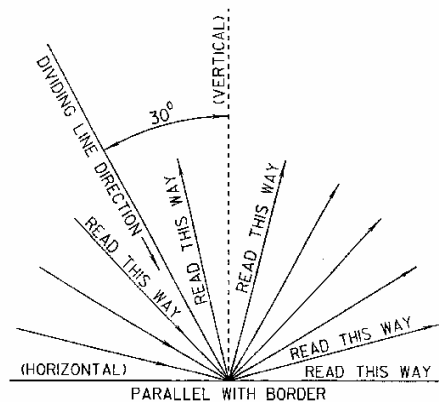


Figure A3.08-A Text

- B. Text Over Linework. Whenever text and linework conflict, the text should be relocated if possible. If this is not possible, the linework can be broken at the drafter's discretion.
- C. For Mapping Projects. The Engineering Standards shall be applied wherever possible unless specific presentation needs require the use of special fonts. The use of special fonts should be minimized and font sizes, placement, and location should be consistent throughout the project.

A 3.09 DIMENSIONS

- A. General. Dimensions less than 12 inches shall be shown as inches with an inch label i.e., 11". Dimensions 12 inches and larger shall be shown in feet and tenths of feet. Decimal fractions shall be rounded off to the nearest hundredth. Horizontal dimensions shall be shown on plan views only unless used on other views when needed for clarity. Vertical dimensions shall be shown on sections, elevations, and details only unless used on other views when needed for clarity. Dimensional repetition shall be avoided.

Dimensions referring to structure size, wall thickness, wall penetrations, and the like

shall be shown on structural drawings only, unless required on other drawings for clarity. Dimensions locating equipment, clearance between equipment, or piping shall be shown on mechanical drawings only. Dimensions shall be set as follows:

1. All dimensions and leader lines shall use arrows 0.10" to 0.25" long (in paper space).
2. All text shall be centered above the dimension.
3. All dimensions shall force interior lines.
4. Text shall be parallel with the dimension line or the orientation of the plan sheet.

A 3.10 LEADER LINES

Avoid leader lines that are:

- A. Horizontal or vertical
- B. At the same angle as cross-hatching
- C. At very small angles to the terminating surface
- D. Parallel to extension or dimension lines
- E. Curved
- F. Crossed
- G. Too long

Crossing dimensions and leaders are generally to be avoided. When necessary, the leader lines are to be broken so that the lines will not physically cross on the paper.

A 3.11 PLANS, SECTIONS, AND DETAILS

- A. Plans. Plans that do not show entire structure, areas, or the like, shall be titled "Partial Plan." Do not abbreviate "Partial."

Plans shown within a structure shall have the elevation as part of the title. Such a title would read: "PLAN AT ELEVATION 94.00." The elevation indicated shall be the high-point elevations of the bottom slab.

- B. Sections. Sections shall be called out alphabetically within a series of drawings, with the section letter used only for one section in that series. When the sections are so numerous that the alphabet is used up, start with AA, AB, AC, etc. The letters I, O, or Q should not be used. Sections shall be titled in accordance with Figure A 3.14-A.

Section cuts and the views they indicate may be shown either on the same sheet or on a different sheet. If a drawing shows only sections, details, and so on, sections take precedence, and are shown in sequential order from the drawings top left corner.

Show a section cut on the drawing with a cutting-plane line terminating at both ends with arrowheads pointing perpendicular to the line. Label each end with the section letter.

- C. Details. Details shall be called out numerically within a series of drawings, with the

detail number used only for one detail in that series. Details shall be titled with detail number and the plan sheet on which it appears. As with sections, details may be shown on the same sheet or a different sheet depending on their size.

A 3.12 CONTOURS

Inclusion of contours on drawings shall be included as outlined in A 3.03 B 1. a). Otherwise they shall be omitted to keep the drawing clear and uncluttered.

A. Recommended Contour Interval:

Contour Interval	Indexed Interval
1 foot	5 feet
2 feet	10 feet
10 feet	50 feet
20 feet	100 feet
40 feet	200 feet

B. Contour Cross Sections. Contour cross sections are generally to be created with the same vertical and horizontal scale factors. Grid spacing is to be developed such that grid lines appear every 0.25 inch in the horizontal direction with labels every 0.5 inch. Vertical grid spacing may be as often as necessary to convey the needed information.

A 3.13 ABBREVIATIONS

Abbreviations shall be used only when enough room is not available to spell out the word. Any abbreviations used on the drawing shall be defined on the cover sheet of the plans. If there is any question as to the meaning of an abbreviation, spell out the entire word.

Standard abbreviations to be used for different pipe types are as follows:

- | | |
|---------------------------------------|--|
| ABS - Acrylonitrile Butadiene Styrene | NCP - Non-Reinforced Concrete |
| AC - Asbestos Cement | ODDW - Steel, Outside Diameter, Dipped and Wrapped |
| ACT - Transite | PVC - Polyvinyl Chloride |
| CI - Cast Iron | RCP - Reinforced Concrete |
| CMP - Corrugated Metal | STL - Steel |
| CONC - Concrete | TEC - Techite |
| DI - Ductile Iron | TRU - Truss |
| GI - Galvanized Iron | VCP - Vitrified Clay |
| HDPE - High Density Polyethylene | |

A 3.14 SYMBOLS

Each set of plans shall have a symbol index on the cover sheet. The symbol index shall show all symbols used on the plans.

A 3.15 MODEL SPACE / PAPER SPACE

- A. Model Space. All drawings shall be created at 1:1 in model space and scaled into paper space for plotting except where unavoidable or the scale of the drawing allows it to be drawn at 1:1 in paper space.

Text, arrowheads, section callouts, north arrows, etc. used in model space shall be appropriately scaled such that they are the standard size in 1:1 paper space.

- B. Paper Space. Paper space shall be 1:1 scale. All drawings except 1:1 drawings shall be scaled from model space into paper space by creating viewports and zooming to the appropriate scale factors.