Chapter 5: Record Plans & Digital Submission

Table of Contents

1. General information on Record Drawings 2
2. DXF (Digital Exchange Format) Files 3
3. Record Drawings 5

1. General information on Record Drawings

Within ninety business days after the Engineer's final inspection, the Developer shall submit for record an updated "as-built" plan to the City of Delaware. The original construction drawings for the improvements shall be revised to reflect the actual construction. Prior to preparing record drawings, it shall be the responsibility of the consulting engineering firm to obtain a copy of the City's redline construction drawing plan set. All changes from the approved plans to utility lines, structures or appurtenance locations, roadway, driveway or parking areas, or any other item must be noted on the plans accordingly. In addition to the requirements of these Standards, the information and data obtained for and presented on the "as-built" plan should conform to the "as-built" survey specifications currently accepted by the surveying profession. The "as-built" drawings shall become the "Record Drawings" for the project and must be clearly noted as such. All Record Drawings shall become the property of the Municipality and shall be on file in the Public Works Department.

Record drawings are required to be submitted in electronic format as well as mylar form. All electronic record drawing information shall be contained on a technology approved by the City Engineer. The computer aided design (CAD) drawings shall have a drawing (.DXF) file type. A separate CAD drawing with all utilities shall be drafted in State Plane Coordinates. Sanitary and storm flow calculations should be included on the electronic format. They shall be made accessible through Microsoft Word and Excel. Consult with the City Engineer's office as to which release of the software is acceptable for storage.

Record Drawing sets must contain the same address as the approved development plan set including title sheet, general notes, details, utilities, site grading, etc. All files must be saved and submitted on a CD-ROM in a jewel case without using any file compression. The CD label shall include the following:

A. Engineering Company Name
B. Project Name
C. Date the data is burnt to CD
D. Designate CD is Record Drawing or Construction Plan.
E. File names should make sense to viewer who may not be familiar with the consulting firms naming conventions and be indicative of the contents of the file.
F. Name of file must be 8 characters and include the phase number (where exists) And no spaces included. An underscore may be used to attach letters where applicable.
    1. Ex: Kroger Phase 1 would be Kroger1.dxf Ex 2: Krgr_ph1.dxf
    2. If multiple sections of a project are being submitted, files shall be placed in separate directories on the CD.
G. Coordinate System
    1. Projection shall be referenced to NAD 83 (86 Revision) Ohio State Plane Coordinate System Ohio North
    2. Elevations should be in the NAVD 88 Vertical Datum using U.S. Survey –Feet, Zone 4976.
    3. The coordinate location of the items listed below shall be obtained by a field survey and with vertical data that meets survey grade accuracy.
H. Complete Record Drawing Submittal:
    1. A TIFF file shall be submitted of all Record Drawings.
    2. A DXF File shall be submitted of the Final Engineering Plans (plan view)

3. One (1) full sized (ANSI D) mylar set
4. One (1) electronic copy on disk or CD (a DXF file containing the base drawing and TIFF files of each of the plan sheets).

2. DXF (Digital Exchange Format) Files

The City of Delaware is responsible for maintaining a comprehensive Geographic Information System. The GIS is used primarily to make the process of data management and data sharing a smoother and faster transition. The Cities database is comprised of several layers such as: Schools, Townships, Major Hydrology, Commercial Building Footprints, 1991 and 1997 GPS points, Zoning, Land Use, Right-of-Way, Parcels, Road Center Line Data, Subdivisions, Flood Plains, Water Lines, Sewer Lines, Spot Elevation, and Topography.

One of the basic tasks involved in cadastral map maintenance is performing updates to property information. With the use of CAD and GIS software, a digital submittal drawing can be directly inserted into the GIS base map. In concept, the engineering CAD drawing should be easily placed in the map to afford these benefits. However, the migration of spatial data from CAD to GIS has its problems and is not a seamless procedure. It has to be planned and implemented so that the issues pertaining to the conversion can be addressed thereby having the maximum benefit.

The process includes setting standards for the submittal of digital plat and subdivision drawings and the technique of converting AutoCAD drawings to a format that is congruent with the ArcGIS database design managed by the City of Delaware's GIS office. In order to comply with our Digital Standards, a DXF (Digital Exchange Format) file shall be submitted to the Public Works Department or the Department of Planning and Economic Development, as appropriate, at the conveyance stage (final plats and needed as-builts).

A Digital Submission Drawing should be created from the base drawing files for the project using the City of Delaware template in DXF format. Each DXF file should be for one section of development. Multiple sections will not be accepted in one file and care must be taken to clearly mark existing infrastructure facilities. Files must be in DXF format (generated in AutoCAD version 2000 or higher.) All pertinent drawing elements will reside in the primary drawing file. There should be no cells, nodes, blocks, or reference files (x-refs) attached to the drawing. This file will include features classified in the standard layers defined in Appendix N. If the drawing contains layers that are not included in Appendix H, then a list of these layers shall also be submitted as an ASCII text file labeled: 'subdivisionname_phasesXX_xlyrspec.txt'.

The completed DXF drawing file shall contain text in standard fonts that can be read without third-party software. All data shall be cleaned at a tolerance of .002 map units. No loop back, turn backs, undershoots or overshoots. No annotation shall be included in any feature layer and no feature shall be included in any annotation layer. Annotation for each layer shall be placed in annotation layers as specified in Appendix N. All City of Delaware required layers shall be made visible prior to submission - all other layers can be removed (preferred) or turned off.

Closure is critical in converting CAD elements to GIS features. All polygonal features shall be closed polylines (i.e. parcel boundaries, subdivision boundary, buildings).

The DXF file shall contain the following infrastructure items:

A. Storm Conduit, Storm Water Manholes, Inlets, Catch Basins, Head Walls, End Walls, Junction Boxes, Etc.
B. Detention, Retention Basins
C. Flood Routing Swales
D. Sanitary Sewer Conduits, Manholes, Lift Stations, Force Mains, Junctions, Laterals, Etc.
E. Water Main Lines, Laterals, Junction box, Valves, Hydrants, Etc.
F. Street Lights, pull boxes, disconnects, underground conduits, circuit cable, controller, power service, etc.
G. Power poles and Lines
H. Traffic Signal Poles and associated items (i.e., underground conduit, wiring, pull boxes, etc.)
I. Underground utilities including fiber optic cables, gas lines, electric lines
J. Underground Utilities Appurtenances (pedestals, junction boxes, etc.)
K. Street center lines, curbs, and edge of pavement
L. Sidewalks and/or bike paths
M. Driveways
N. Parking lots
O. Buildings, if applicable (commercial and industrial)
P. Structures will be points (nodes) and have an appropriate Structure ID on the adjoining text layer.
Q. Storm and Sanitary sewer lines must be lines with a beginning and ending at a structure insertion point. Pipes are to be line segments connecting no more than two (2) structures. Pipes are to be drawn from upstream to downstream
R. All infrastructure pipes will have a length, pipe size (in inches) and material listed on a separate layer and
S. A comma-delimited ASCII text file (or)
T. An Excel file
U. Must have graphical representation of all off-site platted easements, right-of-ways, lot-lines, etc. encompassing infrastructure improvements as closed polylines.
V. Impervious Surface boundary lines must be shown for all buildings, parking lots, driveways, sidewalks, gravel areas, etc as closed polylines.
W. Comma-delimited Text Files for as-built information
    1. All elevation points shall be delivered in a single comma-delimited ASCII text file or an Excel file with the following columns. Each line of the file shall contain values in Ohio State Plane Coordinates for a single point as follows:

        (Easting, Northing, Elevation)
    2. All storm water and sanitary structures will have top of castings and invert elevations listed in a comma-delimited ASCII text file or Excel file as follows:

        (Structure Number, Easting, Northing, Invert in, Invert out, Top of casting)
    3. All infrastructure pipes will have as-built information for the pipe length, pipe size (in inches) and pipe material listed a comma-delimited ASCII text file or Excel file as follows:

        (Name, Length, Size, Material)

3. Record Drawings

Record drawings, also known as "as builts". The City of Delaware requires that record drawing engineering plans be submitted to the City Engineering Department at the completion of each development project.

Record drawings are to be submitted in PDF/A format, and/or in other digital form(s) as deemed acceptable by the City of Delaware and be reproducible to scale. Reproducible mylar format may also be required. Verify with Public Works Department the appropriate format(s) of record drawings to be submitted.

Plans are to include the following:

A. Record Drawings must be clearly noted as such.
B. Record Drawing sets must contain the same address as the approved development plan set including title sheet, general notes, details, utilities, site grading, etc.
C. Prior to preparing record drawings, it is the responsibility of the Engineer of Record to obtain a copy of the City's redline construction drawing set. The information contained in this redline must be incorporated into the record drawings.
D. All changes from the approved plans to utility line, structures or appurtenance locations, roadway, driveway or parking areas, or any other item must be noted on the plans accordingly.
E. All sanitary and storm sewer structures located on the site, whether new or existing, must have top of casting and flowline elevations verified and recorded on the plans.
F. State Plane Coordinates for all newly constructed public utility structures, including fire hydrants and main line water valves.
G. Retention/Detention Basin Volume Calculations based on an as-built survey of the basin must be provided to verify that detention/retention facility was constructed per Stormwater Management Plans. The as-built survey sheets (11 x 17) must be included in the submittal.
H. All flood routing swales must be field verified prior acceptance of the Record Drawings
I. Record Drawings of the the lighting plan must show the location of all streetlights, disconnects, pull-boxes, routing circuit cable, controller cabinet, meter, photo sensor, etc., and 20 foot wide minimum easements for all electrical source feeds between the light poles and power source.
J. Record Drawings of fiber optic conduit and cable instalaltion must show the location of all conduits, cable, pull boxes, etc.