Digital As-built CAD Standards for Consultants

Effective Date: February 1, 2005, revised – November 1, 2023, Rev. 1.6, added Point feature: hydrant valves and Deliverable Format.

Effective February 1, 2005, new development plans submitted to the Henry County Water Authority (HCWA) will require electronic as-built drawings in a computer aided design (CAD) format. The following standards must be followed for all as-built drawings. As-built drawings will not be approved until these standards are met.

- **General Requirements**
  - ➢ Final Plats required in digital format showing address and lot number inside each lot, all lots must be closed polygons.

All as-built drawings must be geo-referenced to the US State Plane coordinate system, NAD 83, GA West Zone, US Survey Feet. All drawings must contain two reference survey markers (pins) with x, y, z coordinates tied to the Henry County GPS monument network. A copy of the more than 100 GPS survey monument pair locations can be found on the Henry County web site at: https://www.co.henry.ga.us/Departments/D-L/GIS, or may be obtained in person at the Henry County Water & Sewerage Authority administrative complex.

  - ➢ All features depicted in the as-built drawings must be surveyed after construction. HCWA, at its discretion, will spot check all coordinates and features to ensure accuracy. Table 1 specifies the features that must be surveyed. Water system features must be surveyed at a horizontal accuracy equal or less than 0.3 ft and vertical accuracy equal or less than 0.5 ft. Sewer system features must be surveyed at a horizontal accuracy equal or less than 0.5 ft and a vertical accuracy equal or less than 0.1 ft.
  - ➢ The following utility feature types must be shot directly using a survey instrument and tied to the Henry County monument network:
    - ▪ Point features: hydrants, hydrant valves, valves, meter boxes, sewer manholes, service cleanouts, etc.
    - ▪ Line features: pipe (endpoints, & bends greater than 45°)
    - ▪ Polygon features: water/sewer easements, right-of-way, lot lines, project boundary, etc.
  - ➢ The following additional information must be shown on all As-built drawings:
    - ▪ Line & text features: lot numbers, road names, street address, curb & gutter, and other features as shown in Table 1.
  - ➢ HCWA will provide template or seed drawing files upon request.

- **Drawing**
  - ➢ All layers must conform to the proper geometry type (line, text, or polygon) as indicated in Table of HCWA CAD layers.
  - ➢ All Polygon type features must be completely closed. Lines may need to be duplicated on more than one layer.

- Subdivision/project parcels need to be closed figures on their layer (not closed with the subdivision/project boundary).
- Road edge-of-pavement and road right-of-way must be drawn as closed polygons.
- Where a polygon feature extends beyond the edge of the plan, the property boundary (repeated on the polygon feature's layer) will be used to close the polygon.
- All edges on polygon features must be snapped together at the vertices. Gaps in polygon boundaries will not be accepted.

➢ Sewer Features
- Sewer lines and sewer taps need to be digitized with proper directionality: lines must be drawn from the uphill node to the downhill node or flipped after the lines have been digitized.
- All tangents between sewer manholes need to be drawn with a single line. Lines must not continue for more than one tangent.
- All tangents must be snapped at endpoints intersecting at the exact center of the manhole. No gaps should exist between tangents.
- Manholes need to be symbolized consistently with a circle centered exactly on the tangent endpoints.
- Sewer tap locations must be snapped to the sewer tangent and accurately placed. Placement should be based on direct survey of the tap where it connects to the sewer tangent, or based on the televising report. HCWA will verify tap placement against the televising report. Televising reports may be obtained from the HCSWA inspector.

➢ Water Features
- Water lines must be digitized with all straight-line pipes consisting of only two points. Straight-line pipes will begin and end at the following features (nodes): hydrants, valves, meters, pumps, tees, crosses, and valves. Polylines should be used wherever a water line contains elbows or bends (i.e., when the line does not make a straight run from node to node).
- Curves may be digitized with enough vertices to capture the curve geometry, but they must be single, continuous lines. Curves or arcs may also be used to designate curved pipe.
- Hydrants must be shown in their true, surveyed location, and must be connected to the water main via a valved fire hydrant line.
- All water lines must be continuous, with pipe endpoints snapped to each other at endpoints (nodes).
- End-of-line caps must be drawn to differentiate end-of-lines from lines that extend beyond the extent of the drawing. Caps should be drawn for lines that are to be permanently capped when the project is complete, not for lines that are temporarily capped pending inspection.

➢ Easements
- All easements (existing and abandoned) must be shown on their layer.
- Easements must be closed polygons.

- **Layers/Levels**
  - ➢ Layer names for required layers must appear exactly as in Table below.
  - ➢ All required layers listed in HCWA CAD layers must contain only the features that are described for that layer. For example, the FIRE_HYDRANT layer must only contain the fire hydrants and not features such as north arrows or parcels.
  - ➢ All layers must be clearly differentiated from each other.
    - ▪ Two layers having similar names such as, WATER_LINE and WATER_LINES should not exist in the same drawing.
    - ▪ SEWER_LINE_TEXT and SEWER_TEXT should not exist in the same drawing.
  - ➢ All text & leaders must not appear on the same layer of the feature being described. For example, text describing a sewer line must be on the SEWER_LINE_TEXT layer, not the SEWER_LINE layer.

HCWA CAD Layers			
Layer Name	*Type*	*Layer Contents*	*Surveyed*
ADDRESS_TEXT	Text	Street postal address number	No
CASING	Poly	Water and sewer line casing	Yes
CASING_TEXT	Text	Text associated with CASING	No
FDC	Insert	Fire Department Connection	Yes
FIRE_HYDRANT	Insert	Fire Hydrants	Yes
FIRE_HYDRANT_TEXT	Text	Text associated with FIRE_HYDRANT	No
FIRE_HYDRANT_MANUFACTURER	Text	Manufacturer name (M&H, Mueller, CLOW, Etc.)	No
FIRE_HYDRANT_MANUFACTURED_YEAR	Text	Year Hydrant was manufactured	No
FIRE_HYDRANT_EXISTING	Insert	Existing Fire Hydrants	Yes
FIRE_HYDRANT_EXISTING_TEXT	Text	Text associated with existing FIRE_HYDRANT	No
FIRE_HYDRANT_VALVE	Insert	Fire Hydrant Valves	Yes
FIRE_HYDRANT_VALVE_TEXT	Text	Text associated with FIRE_HYDRANT_VALVE	No
FIRE_HYDRANT_VALVE_EXISTING	Insert	Existing Fire Hydrant Valves	Yes
FIRE_HYDRANT_VALVE_EXISTING_TEXT	Text	Text associated with existing FIRE_HYDRANT_VALVE	No
HORIZONTAL_AND_VERTICAL_CONTROL_POINT	Line	Survey control points (rebar or monuments) with x,y,z coordinates	Yes
HORIZONTAL_AND_VERTICAL_CONTROL_TEXT	Text	Text associated with HORIZONTAL_AND_VERTICAL_CONTROL_POINT	No
LAND_LOT_LINE	Line	Land lot lines	No
LAND_LOT_LINE_TEXT	Text	Land lot numbers	No
LOT_NUMBER_TEXT	Text	Individual lot numbers	No
PROJECT_BOUNDARY	Poly	The boundary line of the subdivision or commercial property.	Yes
PROJECT_BOUNDARY_TEXT	Text	Text labels for the project boundary	No
PROPERTY_LINE	Poly	Property Lines (parcel lines)	Yes
PUMP_STATION	Poly	Walls of the sewer pump (lift) station	Yes
PUMP_STATION_TEXT	Text	Text associated with PUMP_STATION	No
ROAD_EDGE_OF_PAVEMENT	Poly	Street edge of pavement (not back of curb)	Yes
ROAD_RIGHT-OF-WAY	Poly	Road right-of-way	Yes
ROAD_RIGHT-OF-WAY_TEXT	Text	Text relating to the ROAD_RIGHT-OF-WAY	No

ROAD_TEXT	Text	Road Names	No
SEWER_EASEMENT	Poly	Sewer Easements	Yes
SEWER_EASEMENT_TEXT	Text	Text associated with SEWER_EASEMENT	No
SEWER_END_OF_LINE	Insert	End of sewer line (stubbed out for future)	Yes
SEWER_END_OF_LINE_TEXT	Text	Text associated with SEWER_END_OF_LINE	No
SEWER_FORCE_MAIN	Line	Sewer force mains	Yes
SEWER_FORCE_MAIN_TEXT	Text	Text associated with SEWER_FORCE_MAIN	No
SEWER_FORCE_MAIN_EXISTING	Line	Existing sewer force mains	Yes
SEWER_FORCE_MAIN_EXISTING_TEXT	Text	Text associated with SEWER_FORCE_MAIN_EXISTING	No
SEWER_LINE	Line	Sewer lines built as part of the development.	Yes
SEWER_LINE_TEXT	Text	Text associated with SEWER_LINE	No
SEWER_LINE_EXISTING	Line	Sewer lines present before the development was built	Yes
SEWER_LINE_EXISTING_TEXT	Text	Text associated with SEWER_LINE_EXISTING	No
SEWER_MANHOLE	Insert	Sewer Manholes	Yes
SEWER_MANHOLE_TEXT	Text	Text associated with SEWER_MANHOLE	No
SEWER_MANHOLE_EXISTING	Insert	Existing sewer manholes	Yes
SEWER_MANHOLE_EXISTING_TEXT	Text	Text associated with SEWER_MANHOLE_EXISTING	No
SEWER_TAP	Line	Sewer tap/lateral	Yes
SEWER_TAP_TEXT	Text	Distance between taps	No
UTILITY_EASEMENT	Poly	General Utility easements	Yes
UTILITY_EASEMENT_TEXT	Text	Text associated with UTILITY_EASEMENT	No
UTILITY_EASEMENT_EXISTING	Poly	Existing Water & Sewer Easements	Yes
UTILITY_EASEMENT_EXISTING_TEXT	Text	Existing Water & Sewer Easement Text	No
WATER_EASEMENT	Poly	Water Easements	Yes
WATER_EASEMENT_TEXT	Text	Text associated with WATER_EASEMENT	No
WATER_END_CAP	Line	End of line cap	Yes
WATER_END_CAP_TEXT	Text	End of line cap text	No
WATER_LINE	Line	Water lines installed in development	Yes
WATER_LINE_TEXT	Text	Text associated with WATER_LINE (size and material) i.e. (8" DI)	No
WATER_LINE_EXISTING	Line	Water lines present before the development was built	Yes
WATER_LINE_EXISTING_TEXT	Text	Text associated with WATER_LINE_EXISTING (size and material) i.e. (8" PVC C-900I)	No
WATER_METER	Insert	Customer water meters	Yes
WATER_METER_TEXT	Text	Text associated with WATER_METER	No
WATER_QUALITY_CRITICAL_AREA	Line	Water quality critical area boundary	Yes
WATER_SERVICE	Line	Water service lines	No
WATER_SERVICE_TEXT	Text	Text associated with WATER_SERVICE (size and material) i.e. (1" copper, single service)	No
WATER_VALVE	Insert	Water valves	Yes
WATER_VALVE_TEXT	Text	Text associated with WATER_VALVE	No
WATER_VALVE_EXISTING	Insert	Existing water valves	Yes
WATER_VALVE_EXISTING_TEXT	Text	Text associated with WATER_VALVE_EXISTING	No
WATER_VAULT	Insert	Large meter or fire connection vault	Yes
WATER_VAULT_TEXT	Text	Text associated with WATER_VAULT	No
WETLAND_BOUNDARY	Line	Wetland boundary	Yes

- **Symbolization**
  - ➢ Symbols must be standardized according to examples provided in the HCWA template file. The following "point" features must be symbolized using standard HCWA CAD symbols and drawn as inserts:

Water Vault (⬜) Water Valve (⧓) Fire Hydrant (⬡)

Sewer Manhole (◎)Water Meter (WM)
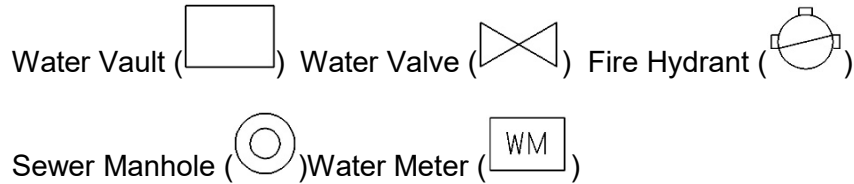
- **Annotations**
  - ➢ Any non-standard water and sewer lines must be annotated as such. Line diameter, material, ownership, etc. that does not conform to standard practice should be noted in the corresponding annotation layer. For example, standard subdivision sewer lines are 8" in diameter. Any other diameter must be annotated on the SEWER_LINE_TEXT layer.
  - ➢ All addresses and lot numbers must be number data type (that is not text or symbols (#, -, ft, _, "," etc.)). If the lot does not have a number, this layer should be blank.
  - ➢ All required text must be single line text.
  - ➢ All annotation for polyline (polygon) features must be bounded by the polyline it annotates. For example, the project name must be within the project boundary, and not extend beyond it.

- **File naming and revisions**
  - ➢ File names should correspond exactly to the subdivision name and should be consistent from one version to the next. The file name should contain the drawing revision date (in YYMMDD format) as part of the name. There should be no blank spaces in the name, only underscores. An example file name for the May 13, 2004 revision for the third phase of the Apple Valley subdivision is: "Apple_Valley_3_040513".
  - ➢ File revision dates should only be updated by the contractor/developer and not by HCWA or Henry County.

- **Deliverable Format**
  - ➢ All files will be delivered in DWG format. Files shall not span over more than 20mbs.
  - ➢ All deliveries will be labeled with the file name, company name, contact name, and phone number.