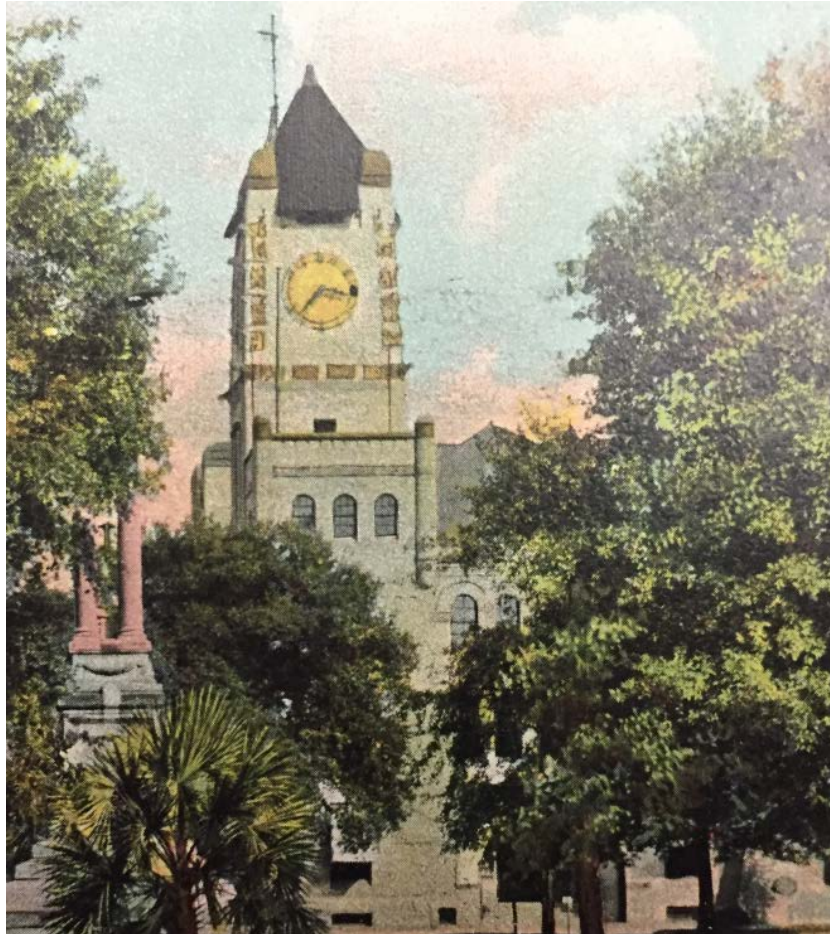




Digital As-built Data Submission Technical Guide

Department of Engineering



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1.0 GIS

Chatham County has adopted geographic information systems (GIS) technologies to store, manage, and maintain spatially-related (geographic) data. The land development, engineering, and surveying communities have also embraced digital technologies in their respective professional communities. Because development plans are now created using computer aided design and drafting (CAD), it is the goal of Chatham County to leverage such advanced techniques to improve the content and accuracy of improvements completed during various construction projects. For such an effort to succeed, standards must be implemented to allow CAD data to be integrated into the County GIS while preserving the referential and positional accuracy of the original measurements.

The mission of the Chatham County Department of Engineering is to establish a foundation of geographic information to support community decision-making. The resulting foundation of fundamental geographic data elements will be a representation of features that comprise our community and are not intended to convey legal boundaries of any kind.

2.0 Timeframe for Submission and Approval

All construction projects in new developments, infrastructure or utility enhancements are required to submit as-built (plan of record) digital drawings in accordance with the standards outlined below. Digital as-builts need to be submitted to Department of Engineering staff prior to the scheduling of the final inspection and prior to the transfer of right-of-way maintenance duties. For commercial developments, a digital 'as-built' submission need to be submitted to the Chatham County Department of Engineering GIS staff prior to the issuance of a certificate of occupancy. Submission of digital as-builts for infrastructure improvements, including utility projects when work is completed.

These data submission standards are intended to improve the process of reviewing plans and help maintain a digital database of geographic information for the County. As the GIS program develops and foundation data are established, the County will be able to offer base layers to the development and engineering communities. The County understands that these GIS layers cannot be used for construction; however, the multiple layers of data are expected to provide potential users with descriptive information that will be invaluable in planning and property valuation.

3.0 Digital File Format

In addition to standard paper documents, each final approved engineering document/plan delivered to Chatham County will be accompanied by several digital files relating to that submission. Digital files to be submitted include:

- A completed original CAD drawing in .dwg format named using the development name (i.e. Fernwood_phases56_asbuilt.dwg). This file shall include all layers and graphic elements included in the submitted paper document (geography, text, legend, scale, labels, etc.). This file will include features classified in the standard layers defined in Appendix A. If the drawing contains layers that are not included in Appendix A, then a list of these layers shall also be submitted (ASCII text file labeled: 'subdivisionname_phasesXX_xlyrspec.txt'). The completed CAD drawing file shall contain text in standard fonts that can be read without third-party software. Contact our office to ensure your software version will be compatible with our GIS software.

- A metadata text file containing information listed in Appendix B. This file includes submittal information as well as technical parameters that may be necessary to review if problems in data conversion occur. The ASCII text file will be named using the following convention: (subdivisionname_phasesXX_meta.txt).
- An ASCII text file containing elevation points. When submitting plans that include surveyed ground surfaces, a separate ASCII text file containing all elevation points shall be delivered. This file shall be named using the following convention: (subdivisionname_phasesXX_elev.txt)
- A complete copy of the construction or development plan in .pdf format.

4.0 Digital File Submission

To expedite the conversion of CAD data into the County GIS, the following requirements shall be met:

- Submissions may be zipped and emailed to coengineer@chathamcounty.org with the project name in the subject field and contact information in the body. Files may be sent via other media (thumb drive or CD/DVD ROM) if technical issues preclude the use of email. The submitted media shall be labeled with the title of the drawing (drawing file name), type of drawing (i.e. As-built, Permitted, etc.), project contact information (name, affiliation, phone number, etc.), and a submittal and file creation date.
- All drawing elements shall be submitted referencing Georgia State Plane (GSP) coordinates NAD 1983 Georgia East, Units Feet. Elevations should be NAVD 88. Errors in conversion must not exceed three linear feet. It is not the intention of Chatham County to replicate legal surveys. With this in mind, control of plan features may be tied to the GSP system using traditional surveying or GPS methods. The method employed to gain geodetic control shall be identified in the submitted metadata file.
- Drawing features shall include layer names as suggested in Appendix A. Features other than those thematically defined by the individual layer name/description shall not be included in that layer. Systems using numbered levels, such as Microstation, include a conversion table that can be used to specify named layers.
- 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 A.
- No polylines or annotation shall be stored in blocks. Explode all blocks that do exist. (*Block references migrate to GIS as a single point at the block's insertion point.*)
- All points shall be stored as "POINT" or "BLOCK REFERENCE" (*cannot be softdesk point or aecc_point or any other feature type*).
- All Chatham County required layers shall be made visible prior to submission – all other layers can be turned off.
- Closure is critical in converting CAD elements to GIS features. If appropriate (i.e. parcel boundaries, subdivision boundary, buildings), all polygonal features shall be 'snapped' closed.

- Submitted .dwg files shall contain only complete parcel polygon features. All partial polygons (parcel boundaries) shown for reference in drawings are not to be included in the PARCEL1 layer (Appendix A). Such features can be included in an unnamed layer in the submitted .dwg file.
- When feature share dual purposes, such as Green Space and Green Infrastructure two polygons should exist differentiating the intended purpose.
 - Elevation differences greater than 10th of a foot need to be in the annotation.
- All elevation points shall be delivered in a single comma-delimited ASCII text file. Each line of the file shall contain values (in NAD83 State Plane Georgia East coordinates) in PNEZD order. (column 1 is Point number, column 2 is Easting, column 3 is Northing, column 4 is Elevation, and column 5 is Description) As shown in the following example:


```
1, 726967.024, 1021624.647, 0.728, bare earth
2, 728108.201, 1022704.577, 3.225, top of berm
3, 727020.401, 1021686.658, 1.187, marsh
4, 729077.318, 1023868.727, 4.017, sand
5, 746444.0795, 910403.389, 10.987, top of bank
6, 761197.390, 990733.146, 4.987, ground
7, 753959.130, 966422.000, 16.934, pavement
...

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- Additional layers (not identified in Appendix A) may utilize any open layer beyond the reserved layers. As outlined above, a list of these layers shall also be submitted (ASCII text file labeled: 'subdivisionname_phasesXX_xlyrspec.txt').
- As-builts shall be created by actual survey performed after work is complete.
- Digital as-builts will be electronically and physically signed by responsible professional engineer or land surveyor.
- Surveys of buried pipe shall include horizontal location, size, material, and elevations. Elevations shall be taken on the top of the pipe or conduit at 100' intervals, and all bends / tees / and other fittings and at key points such as high or low points which are within the intervals.
- Surveys of roadways and drainage channels should include horizontal location, surface type (ie. Asphalt, concrete, earth) at ground surface. Locations and elevations shall be obtained by cross sections through the entire right-of-way and /or easement at 100 foot intervals and at intermediate points where necessary (pipe crossings, low points, high points, intersections, etc.)
- As-built contours shall be provided at 1 foot intervals, within the limits of the project plans.

Appendix A

Graphic File (.dwg) Specifications

Chatham County Department of Engineering.

Layer Name	Feature Type	Layer Description
BLDG	Snapped Polyline / Polygon	Building/structure outline or footprint
BM	Point	All benchmark and geodectic monument locations (point Z)
BSL	Snapped Polyline / Polygon	All building setback areas
BUFFER	Snapped Polyline / Polygon	All exclusion areas as required by ordinance(s)
COMAREA	Snapped Polyline / Polygon	All common areas inside the subdivision. Public areas such as street islands/community entrances, Utilities, wildlife, transp., storm drainage
EAS	Snapped Polyline / Polygon	All existing and newly dedicated easement areas located wither inside or adjacent to the subdivision / development.
ESBWANNO	Text Annotation	All text describing Easements, Setbacks, Buffers, and Wetlands. (Deed and Plat References) For existing and new easements.
MISCANNO	Text Annotation	Any additional (optional) plat text and graphics not included in the annotation layers defined above.
PARCEL	Snapped Polyline / Polygon	All parcel boundary within the project / development. Parcel/lot boundaries
PARCELANNO	Text Annotation	All new PINs, lot numbers and street addresses for subdivision and lots (individual or tabular).
ROW	Snapped Polyline / Polygon	All existing and new road and drainage right-of-way areas, located either inside or adjacent to the subdivision / development
ROWANNO	Text Annotation	All existing and new street and canal names and right-of-way widths.
SUBDIV	Snapped Polyline / Polygon	Subdivision boundary areas
SUBPHASE	Snapped Polyline / Polygon	Subdivision Phase Area
SURVEYANNO	Text Annotation	All survey data (bearing, distances, curve data, tie lines, etc.)
WETLAND	Snapped Polyline / Polygon	All existing delineated wetland areas either inside or adjacent to the subdivision / development.
SURVEYLINE	Polyline	Survey line information
SURVEYPOINT	Point	Survey point information
PAVEDGE	Snapped Polyline / Polygon	Edge of pavement (recommended maximum spacing at least every 100 feet)
CNTRLIN	Polyline	Street/road centerlines (paved and unpaved)
PAVTEXT	Text Annotation	Annotation describing paving features
SIDEWLK	Snapped Polyline / Polygon	Sidewalks (including ramps, miscellaneous concrete ie. ac pad, dumpster pads)
CURB	Polyline	Curb/gutter - face of curb
CARPRK	Snapped Polyline / Polygon	Parking lots
RAIL	Polyline	Railroads
HYDLINE	Polyline	Linear hydrography, creeks/streams
HYDPOLY	Snapped Polyline / Polygon	Polygonal hydrography, lakes/ponds. Wet surface of pond, lakes, and rivers.
FP	Snapped Polyline / Polygon	Floodplain
FW	Snapped Polyline / Polygon	Floodway
CTOUR	Polyline	contour lines (polyline z, unbroken)
CTOURVAL	Text Annotation	Elevation of individual contours
GREENSP	Snapped Polyline / Polygon	Greenspace - Any area retained as permeable unpaved ground and is dedicated to supporting vegetation. Buffers, Tree Protections Zones, and other landscaping as greenspace. Not Paved Space and Not Wet Space.
TREEPOINT	Point	Tree as point
TREEANNO	Text Annotation	Text description of species and girth of all trees.
IRRIG	Polyline	Irrigation system – pipeline (polyline)
IRRIGPT	Point	Irrigation system point features (meters, valves, control box, etc.)

IRRIGANNO	Text Annotation	Text for Irrigation System
TRAFSIGN	Point	Traffic Signage, Traffic Signal, Traffic Box
TRAFTXT	Text Annotation	Text description of signage feature
GREENINF	Snapped Polyline / Polygon	Green Infrastructure in accordance with the Coastal Stormwater Supplement. If not used as Green Infrastructure use the stormwater detention "SDPOND" layer, if natural waterbody use "HYDPOLY"
GREENTEXT	Text Annotation	Green Infrastructure Annotation with text describing features in accordance the Coastal Stormwater Supplement
POLE	Point	Lamp poles, Utility poles, traffic light poles, etc.
ELECTR	Polyline	Electrical lines (overhead and underground) (polyline)
STREETLIGHT	Point	Point for a streetlight. May have multiple streetlights per pole.
STLIGHTANNO	Text Annotation	Text annotation describing street light. (Wattage, Street Light: Type, Architectual: Pole Number)
GAS	Polyline	Gas pipe (polyline z)
COMMUNICATION	Polyline	Phone lines, Cable TV and/or fiber datacom lines (polyline z)
UTILITYANNO	Text Annotation	Utility Text Annotation - Use this if infrastructure is different than other utilities listed as a text annotation feature
UTILITYPOINT	Point	Utility Point feature (point z) – Use this if infrastructure is different than other utilities listed as a point feature
UTILITYLINE	Polyline	Utility line (polyline z) - Use this if infrastructure is different than other utilities listed as a line feature
WTRLINK	Polyline	Water pipe (polyline z)
WTRNODE	Point	Water Access/Junction Box, Valves, Flush Valve, Post Hydrant, Wells, Tee, Bend, Fitting etc.
FIREHYD	Point	Fire Hydrant
WTRTEXT	Text Annotation	Annotation describing water features and Owner
SSLINK	Polyline	Sanitary sewer pipe (polyline z)
SSNODE	Point	Sanitary Sewer Manholes, Pumps, Junctions, Septic Tank etc.
SSTEXT	Text Annotation	Annotation describing sanitary sewer (SS) features and Owner
SSLIFT	Snapped Polyline / Polygon	Lift Station footprint
SDLINK	Polyline	Storm drain culvert, ditch, canal, pipe, swale, etc. (polyline Z, with Ditch and Canal spacing max 100 foot spacing)
SDNODE	Point	Storm drain structure (manhole, junction box, etc.)
SDTEXT	Text Annotation	Annotation of storm drainage (SD) features. Top of Structure, Invert In/Out, Throat, Bottom of Box. Pipe size, Public/Private
SDPOND	Snapped Polyline / Polygon	Stormwater management pond boundaries. (50 year flood elevation)
ADDTEXT	Text Annotation	Address Text referring to address point with Street Number, Street Name Prefix, Street Name, Street Extension
ADDPOINT	Point	Address Location
FFEANNO	Text Annotation	Finished Floor Elevation of Structures
FFELINE	Polyline	Finished Floor Elevation Line for structure determined with Finished Floor Elevation (polyline Z)
PROPCORN	Point	Property Corner
PROPCORNTXT	Text Annotation	Property Corner Text described in annotated form
FENCE	Polyline	Line representing Fence / Gate
FENCEANNO	Text Annotation	Fence annotation (Height and Material)

Submittals shall be delivered in NAD83 State Plane, Georgia East - Elevations shall use NAVD88
Submittals shall adhere to at least
sub-meter accuracy.

Contours and Storm & Sanitary Sewer Utilities layers be submitted with polyline-Z elevation

Asbuilts shall be submitted in .dwg AutoCAD 2004 and later version .dwg format

Utilities (gas, power, lights) - shall be submitted by entity which installs the features.

Appendix B

Metadata Text File ('projectname_phasesXX_meta.txt') Specifications

Project Name:
Submittal Date:
County:
City:
Parent Parcel #:
Number of Lots:
Type of Geodetic Control:
Monument Reference: Y / N

Traverse to Monument

Referenced Monument Name/Number:
Distance to Monument:

GPS

Unit Type:
PDOP of Control Points:
Differentially Corrected: Y / N
Elevation Reference: Y / N

Prepared by/Firm Name:
Engineer of Record:
Drawing/File Name:
Software/Version Used:

CHECKLIST FOR DIGITAL DATA SUBMISSIONS

Project Name:	
Date Received:	Date Failed:
Date Passed:	Review Name:

The following is a checklist of required information needed in order to satisfy the Chatham County digital data submission requirements. These steps are checked in ArcMap.

Section 1-Submittal		
Is the digital file a .dwg?	Yes	No
Drawing files named by Sub_Phase.dwg?	Yes	No
Metadata text file present?	Yes	No
Elevation text file present?	Yes	No
North American Datum 1983 State Plane coordinates, Georgia East, US Survey Foot, NAVD88 vertical?	Yes	No
Section 2-Linear Features		
Parcel present?	Yes	No
Parcel snapped closed?	Yes	No
Subdivision present?	Yes	No
Subdivision snapped closed?	Yes	No
Road Centerline present?	Yes	No
Road Speed Limit present?	Yes	No
Building(s) present?	Yes	No
Row(s) and size present?	Yes	No
Water link present?	Yes	No
Paved edge present?	Yes	No
Sidewalks present?	Yes	No
Section 3-Point Features		
Ground Control Points present?	Yes	No
Fire hydrants present?	Yes	No
Section 4-Annotation		
Lot numbers present?	Yes	No
Lot dimensions present?	Yes	No
Subdivision name present?	Yes	No
Road names present?	Yes	No
Addresses present?	Yes	No
Section 5-Features Present if Present on Paper Submittal		
Easements-Setbacks present?	Yes	No
Road names present?	Yes	No
Pavement type present?	Yes	No
Text describing water, storm water and sewer features present?	Yes	No

LEGEND

POINT

LAYER

- ADDPOINT
- BM
- FIREHYD
- POLE
- PROPCORN
- SDNODE
- SSNODE
- STREETLIGHT
- TRAFSIGN
- TREEPOINT
- UTILITYPOINT
- WTRNODE











POLYLINE

LAYER

- BLDG
- BSL
- BUFFER
- CARPRK
- CNTRLIN
- COMMUNICATIOI
- CTOUR
- CURB
- EAS
- ELECTR
- FENCE
- FFELINE
- GAS
- GREENINF
- HYDLINE
- IRRIG
- PARCEL
- PAVEDGE
- ROW
- SDLINK
- SDPOND
- SDTEXT
- SIDEWLK
- SSLINK
- SURVEYLINE
- WTRLINK

POLYGON

LAYER

-  BLDG
-  BSL
-  BUFFER
-  PARCEL
-  CARPRK
-  CTOUR
-  EAS
-  FFELINE
-  GREENINF
-  PAVEDGE
-  SDPOND
-  SDTEXT
-  SIDEWLK