City of Fayetteville
CAD/GIS Data Submission Standards
Effective Date: June 20, 2005

The City of Fayetteville 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 most development plans are now created using computer aided design and drafting (CAD), it is the goal of The City of Fayetteville to leverage such advanced techniques to expedite the design and plan review processes within the City. For such an effort to succeed, standards must be implemented to allow CAD data to be integrated into the City's GIS while preserving the referential and positional accuracy of the original measurements.

These data submission standards are intended to improve the process of reviewing plans and help maintain a digital database of geographic information for the City. As the GIS program develops and foundation data is established, the City will be able to offer base layers to the development and engineering communities. The City 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.

The mission of the GIS 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.

In addition to standard paper documents, each Site Plan, Final Plat and As-Built document/plan delivered to The City of Fayetteville will be accompanied by several digital files relating to that submission. Digital files to be submitted include:

- A completed original CAD drawing in .dwg or .dxf format. This file shall include all layers and graphic elements included in the submitted paper document (text, legend, scale, labels, etc.). This file will include features classified in the standard layers defined in Table 1. If the drawing contains layers that are not included in Table 1, then a list of these layers shall also be submitted (ASCII text file labeled: 'xlyrspec.txt'). The completed CAD drawing file should contain text in standard fonts that can be read without third-party software.

- A metadata text file containing information listed in Appendix A. 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 labeled 'metadat.txt'.

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

- Standard transfer media will be accepted. Files will be stored on media approved by The City of Fayetteville. Such media include CD-ROM. The use of alternate media must be approved by the City. The submitted media shall be labeled with the title of the drawing (drawing file name), type of drawing (i.e. As-built, Final Plat, etc.), project contact information (name, affiliation, phone number, etc.), and a submittal and file creation date.

- All drawing elements shall be submitted referencing US State Plane coordinate system, NAD 83, GA West Zone, US Survey Feet. It is not the intention of The City of Fayetteville to replicate legal surveys. With this in mind, control of plan features must be tied to the City of Fayetteville Control Network using traditional surveying or GPS methods. The method employed to gain geodetic control shall be identified in the submitted 'metadat.txt' file.

- Drawing features shall include layer names as indicated in Table 1. 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 in the .dxf file creation process 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 Table 1.

- Closure is critical in converting CAD elements to GIS features. If appropriate (i.e. parcel boundaries), all polygonal features shall be 'snapped' closed.

- Submitted .dxf files shall contain only complete parcel polygon features. All partial polygons (parcel boundaries) shown for reference in drawings (.dwg files) are not to be included in the PARCEL1 layer (Table 1). Such features can be included in an unnamed layer in the submitted .dxf file.

- All elevation points shall be delivered in a single comma-delimited ASCII text file. Each line of the file shall contain values for a single point as follows:

Easting, Northing, Elevation

1249773.123965, 2196299.797004, 797.482892

1250010.182828, 2196549.060209, 801.301399

1250235.118734, 2196589.876301, 797.513845

- Additional layers (not identified in Table 1) may utilize any open layer beyond the 60 reserved layers. As outlined above, a list of these layers shall also be submitted (ASCII text file labeled: 'xlyrspec.txt').

General Requirements

o All as-built drawings must be georeferenced to the US State Plane coordinate system, NAD 83, GA West Zone, US Survey Feet. All drawings must contain a reference survey marker (pin) tied to the City of Fayetteville GPS control network. A copy of 34 City of Fayetteville survey monument pair locations can be found on the City of Fayetteville web site at: www.fayetteville-ga.org or may be obtained in person at the City of Fayetteville's City Hall.

o All features depicted in the as-built drawings must be surveyed *after* construction. The City of Fayetteville will spot check all coordinates to ensure accuracy. Table 1 specifies the features that must be surveyed. Water system features must be surveyed at a horizontal accuracy of $\leq$ 0.3 ft and vertical accuracy of $\leq$ 0.5 ft. Sanitary and Storm Sewer system features must be surveyed at a horizontal accuracy of $\leq$ 0.5 ft and a vertical accuracy of $\leq$ 0.1 ft.

o The following feature geometry types must be shot directly using the survey instrument and tied to the City of Fayetteville control network:

- All point features (hydrants, valves, storm sewer junction boxes, sanitary sewer manholes, etc.)
- All line features at all endpoints, bends, and turns (pipes, etc.)
- All polygon features at all corners and bends (project boundaries, lots, right of ways, etc.)

o The following feature types are acceptable: *Line, Polyline, Text,* and *Insert.* Any other features such as Leaders, Blocks, etc. should not be present on the standard City of Fayetteville CAD layers.

- **Layering**

o All required layers listed in the City of Fayetteville CAD layers must contain only the features that are described for that layer. For example, the BOUNDARY_LINE layer must only contain the boundary line and not such features as north arrows or parcels.

o All required layers must be present in the drawing except for features that do not pertain to a particular project. For example, some commercial projects may not contain sewer taps as part of the construction and should not be included in the drawing.

o All layers must be clearly differentiated from each other.

- Two layers having the names "SEWER_LINE" and "SEWER_LINES" should not exist in the same drawing.
- WATER_LINE_TEXT and WATER_TEXT should not exist in the same drawing.

o All text must appear on separate layers from the layers they annotate. For example, the leader for the diameter of a water pipe should be on the

WATER_LINE_TEXT layer, not the WATER_LINE layer. Leaders should be drawn using *Line* features not *Leaders.*

- **Drawing**
  - All layers must conform to the proper geometry type (insert, line, polygon, text) as indicated in Table 1.

Table 1			
Layer Name	**Type**	**Layer Contents**	**Surveyed**
ADDRESS_TEXT	Text	Street postal address number	No
BLOCK_LETTER_TEXT	Text	Indicates the block letter of a subdivision	No
CITY_BOUNDARY	Line	City boundary line	No
CITY_BOUNDARY_TEXT	Text	City name associated with the CITY_BOUNDARY layer	No
COUNTY_BOUNDARY	Line	County boundary line	No
COUNTY_BOUNDARY_TEXT	Text	County name associated with the COUNTY_BOUNDARY layer	No
FIRE_HYDRANT	Insert	Fire Hydrants	Yes
FIRE_HYDRANT_TEXT	Text	Text associated with FIRE_HYDRANT layer	No
FLOOD_ZONES	Poly	Outlined Flood Zones of the subdivision or project	Yes
HORIZONTAL_AND_VERTICAL _CONTROL_POINT	Line	Survey control points (rebar or monuments) with x, y, z coordinates	No
HORIZONTAL_AND_VERTICAL _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 and other text	No
LOT_NUMBER_TEXT	Text	Individual Lot numbers	Yes
PROJECT_BOUNDARY	Poly	The boundary line of the subdivision or property	No
PROJECT_BOUNDARY_TEXT	Text	Text labels for the project boundary line	Yes
PROPERTY_LINE	Poly	Property Lines (parcel lines)	Yes
ROAD_EDGE_OF_PAVEMENT	Poly	Polygon: Street Edge of Pavement (not back of curb)	No
ROAD_TEXT	Text	Road Names	Yes
SANITARY_SEWER_END_OF _LINE	Insert	End of sewer line	No
SANITARY_SEWER_END_OF _LINE_TEXT	Text	Text associated with SANITARY_SEWER_END_OF _LINE	Yes
SANITARY_SEWER_EXISTING	Line	Sewer lines present before the subdivision/project was built	No
SANITARY_SEWER_EXISTING _TEXT	Text	Text associated with SANITARY_SEWER_EXISTING	Yes
SANITARY_SEWER_FLOW _ARROW	Insert	Sanitary sewer line flow arrows	No

SANITARY_SEWER_FORCE _MAIN	Line	Sanitary sewer force mains	No
SANITARY_SEWER_FORCE _MAIN_TEXT	Text	Text associated with SANITARY_SEWER_FORCE _MAIN	Yes
SANITARY_SEWER_LINE	Line	Sewer lines built as part of the subdivision/project	No
SANITARY_SEWER_LINE _TEXT	Text	Text associated with SANITARY_SEWER_LINE	Yes
SANITARY_SEWER_MANHOLE	Insert	Sanitary Sewer Manholes	No
SANITARY_SEWER_MANHOLE _TEXT	Text	Text associated with the SANITARY_SEWER_MANHOLE	Yes
SANITARY_SEWER_TAP	Line	Sanitary Sewer taps	Yes
SANITARY_SEWER_TAP_TEXT	Text	Distance between taps in feet	Yes
STORM_SEWER_END_OF_LINE	Insert	End of Storm Sewer line	Yes
STORM_SEWER_END_OF_LINE _TEXT	Text	Text associated with STORM_SEWER_END_OF_LINE	No
STORM_SEWER_EXISTING	Line	Storm sewer lines present before the subdivision/project was built	Yes
STORM_SEWER_EXISTING _TEXT	Text	Text associated with the STORM_SEWER_EXISTING layer	No
STORM_SEWER_JUNCTION _BOX	Insert	Storm sewer junction boxes	Yes
STORM_SEWER_JUNCTION _BOX_TEXT	Text	Text associated with STORM_SEWER_JUNCTION _BOX	No
STORM_SEWER_LINE	Line	Storm sewer lines built as part of the subdivision/project	Yes
STORM_SEWER_LINE_TEXT	Text	Text associated with the STORM_SEWER_LINE layer	No
UTILITY_EASEMENT	Poly	Utility line easements	Yes
UTILITY_EASEMENT_TEXT	Text	Text Associated with Utility Easements	No
WATER_CAP	Insert	Cap at the end of water line	Yes
WATER_CAP_TEXT	Text	Text associated with WATER_CAP	No
WATER_EXISTING	Line	Water lines present before the subdivision/project was built	Yes
WATER_EXISTING_TEXT	Text	Text associated with WATER_EXISTING	No
WATER_LINE	Line	Water lines built as part of the subdivision/project	Yes
WATER_LINE_TEXT	Text	Text associated with WATER_LINE	No
WATER_METER	Insert	Customer water meters	Yes
WATER_METER_TEXT	Text	Text associated with WATER_METER	No
WATER_REDUCER	Insert	Water line reducer	Yes
WATER_REDUCER_TEXT	Text	Text associated with WATER_REDUCER	No
WATER_SERVICE	Line	Water service lines	Yes
WATER_SERVICE_TEXT	Text	Text associated with WATER_SERVICE	No
WATER_VALVE	Insert	Water valves	Yes
WATER_VALVE_TEXT	Text	Text associated with WATER_VALVE	No
WATER_VAULT	Insert	Large meter or fire connection vault	Yes

WATER_VAULT_TEXT	Text	Text associated with WATER_VAULT	No
SANITARY_PUMP_STATION	Poly	Walls of the sanitary sewer pump station	Yes
SANITARY_PUMP_STATION _TEXT	Text	Text associated with SANITARY_PUMP_STATION	No
WETLANDS	Poly	Wetlands associated with the development	Yes

- All Polygon type features must be completely closed. Lines may need to be duplicated on more that one layer.
  - Subdivision Parcels need to be closed figures on their layer (not closed with the subdivision boundary)
  - Road edge-of-pavement 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.
- Sanitary Sewer and Storm Sewer Features
  - Sanitary Sewer Lines, Sanitary Sewer Taps and Storm Sewer Lines 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 or junction boxes need to be drawn with a single line from manhole to manhole or junction box to junction box.
  - All tangents must be snapped at endpoints intersecting at the exact center of the manhole or the junction box. No gaps should exist between tangents.
  - Manholes and junction boxes need to be symbolized consistently with a circle centered exactly on the tangent endpoints.
- 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, and crosses.
  - Curves may be digitized with enough vertices to capture the curve geometry. Curves or arcs may also be used to designate curved pipe.
  - All water lines must be continuous, with pip 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 to be permanently capped when the project is complete, not for lines that are temporarily capped pending inspection.

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

- Vault (□)
- Valve (⋈)
- Hydrant (⊏)
- Manhole (e)
- Meter (⊞)
- End of Line/Cap ( ])
- Reducer (▷)

- **Annotations**
  - Any non-standard water, sanitary sewer and storm 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.

- **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 July 23, 2003 revision for the third phase of McIntire Woods subdivision is: "McIntire_Woods_3_030723".
  - File revision dates should only be updated by the contractor/developer and not by the City of Fayetteville.

- **Deliverable Format**
  - All files will be delivered on single disk media in AutoCAD (release 14 or higher) or DXF format (for projects created in Microstation). CDs are the only acceptable media for delivery. Files should not be spanned over more than one disk.

Appendix A

Metadata Text File Submittal

Subdivision or Development Name: _____

Submittal Date: _____

County: _____

City: _____

Land Lot #: _____

Parcel #: _____

Number of Lots: _____

Type of Geodetic Control:

Monument Reference: Y / N

<u>GPS</u>

Unit Type: _____

PDOP of Control Points: _____

Differentially Corrected: Y / N

Elevation Reference: Y / N

<u>Traverse to Monument</u>

Referenced Monument Name/Number: _____

Distance to Monument: _____

Prepared by/Firm Name: _____

Engineer of Record: _____

Drawing/File Name: _____

Software/Version Used: _____