Digital Data Submission

SECTION 1 - SCOPE OF WORK

A. The CITY OF CLERMONT has adopted geographic information system (GIS) technologies to store, manage and maintain geographic/spatially-related data. Likewise, the majority of the civil engineering community has evolved to the point where the predominating design environment is computer-aided design and drafting (CAD). The purpose of this section is to set a basic CAD standard to ensure consistent electronic and paper deliverables. Included in this data are representations of the CITY OF CLERMONT's water, wastewater, and reclaimed water and stormwater systems. It is the goal of the CITY OF CLERMONT to use these technologies, GIS and CAD, to improve the efficiency of the permitting, GIS data entry, and asset management processes. These standards and procedures are for integration of digital engineering CAD drawings and attribute data into the database environments, while maintaining the integrity and positional accuracy of the data. These standards will also enhance file transfer abilities between the CITY OF CLERMONT, developers and engineers as well as between departments of the CITY OF CLERMONT. The process will also improve efficiency in the form of data input time, cost, manpower, and services at the CITY OF CLERMONT.

B. The following information will be provided on the CITY OF CLERMONT's website http://www.cityofclermontfl.com.

1) A copy of the most recent revision of the "Digital Data Submission" standards in Adobe Acrobat pdf format and the most recent revision of the "Standard Detail Drawings" in dwg format and Adobe Acrobat pdf format.

C. Upon review of the digital submittals, the CITY OF CLERMONT may contact the consultant to discuss problems or omissions. Questions regarding the data or standards tables shall be made through the GIS Coordinator, at (352) 241-7335.

D. It is important that the consultant read over the entire digital standards document to become as familiar with the requirements as possible, and shall be the first source of reference when questions arise.

SECTION 2 - ASBUILT DRAWINGS

A. In addition to the required 3 hard copies of ASBUILT DRAWING plans, the engineer shall deliver ASBUILT DRAWING plans in DWG format in AutoCAD files version **2004** or higher and GIS shapefile when possible. Standard transfer media will be accepted. This media includes CD or DVD.

B. The engineer shall deliver one digital set of approved, signed and sealed ASBUILT DRAWING plans. The set shall be complete and include the title sheet, plan/profile sheets, cross-sections, and details. The plans shall be exported into a single pdf (Adobe Acrobat) file representing the complete plan set. These drawings will assist in the process of performing quality control and quality assurance on the electronic submittal specified in this document. The drawings will be reviewed for format and completeness. Specifically, the following requirements shall be met.

C. Include a label on the media indicating project name and number, consultant name, project manager and telephone number, type of submittal (approved construction plans or asbuilt drawings), date of submittal, and file format. The "Digital Data Submission" form is provided in Appendix A.

1) Only drawings relevant to the project's phase of submittal shall be included. For example, do not include "Bid Set" drawings in a "ASBUILT DRAWING" submittal. Also, do not include drawings or documents that would not normally be included in the set of printed drawings, except for base drawings or drawings to be externally referenced.

2) Record drawing data to be uploaded will include only new construction and care will be taken to exclude any "existing" facilities from this dataset so as to not duplicate information in the GIS system. Existing data can be included in the drawing but should reside on separate layers. It is recommended that the prefix "EX-"be added to the layers of all existing data.

3) All text shall appear on separate layers from the layers they annotate. For example, text describing a water main shall be on the WATER-MAIN-TXT layer and not the WATER-MAIN layer.

4) Sewer Gravity Lines and Force Mains shall be drawn as polylines and broken only at changes in pipe type, valves, tees, crosses, bends (elbows, manholes and reducers.

5) Water lines shall be drawn as polylines and broken only at changes in pipe type, valves, tees, crosses and reducers.

6) All line work and objects will be created using the standard AutoCAD "OSNAP" command ensuring proper joining of features. Objects inserted such as valves, meters, hydrants, etc. shall be snapped to the appropriate endpoint.

7) All External References (xrefs) shall be bound to create a completely independent and standalone drawing.

8) The following are file format and layer name standards:

a) A folder shall be created with the named project and phase number

b) A file named coversheet.dwg

c) File named site_plan.dwg showing only the following 5 layers visible:

-Layer named lots

-Layer named lot numbers

-Layer named addresses

-Layer named ROW showing all rights-of-ways

-Layer named EOP showing all edge of pavements

d) A file named masterutilityplan.dwg with site_plan.dwg x-ref bound and only the following 3 layers visible:

-Layer named waterline showing all pertinent features

-Layer named reusewater and all pertinent features

-Layer named sewer and all pertinent features

e) File named grading_drainage.dwg with site_plan.dwg x-ref bound and only the following layers visible:

-Layer named stormwater and all pertinent features

-Layer named spotelev showing all spot elevations

-Any other layers pertinent to the grading and drainage of the site

f) File named lighting.dwg with site_plan.dwg xref bound and the following layer visible

-Layer named lighting showing all lighting locations

-Lighting annotation layer including (Pole_ID, Pole_Material

Provider, Wattage and Fixture (make/model).

g) If applicable, a file named off_site_utilities.dwg

h) Include any other files pertinent to the project (survey, details, x-refs etc.)

SECTION 3 - MASTER UTILITY PLAN AND MASTER STORMWATER PLAN

A. A master utility plan of the affected construction area shall be submitted in an encompassing file that includes the overall utility system layout (including lighting) and the associated parcel features. A master stormwater plan of the affected construction area shall be submitted in an encompassing file that includes the overall stormwater system layout and the associated parcel features. The master utility plan and the master stormwater plan will heretofore be referred to as the Master Plans within this document. Digital files submitted to the CITY OF CLERMONT in a standardized CAD format can logically be imported into the GIS instead of the historical less efficient procedure of digitizing assets from hard copies. Therefore, feature point, line and polygon information for new or altered structures in the work area and all accompanying geodetic control and survey data shall be included in the master plans using the standard CITY OF CLERMONT layer naming and coordinate system standards.

B. The master plans digital data shall be provided by the engineer, and consist of the affected construction area showing the new construction, existing infrastructure, deletion or alteration of infrastructure and its related properties. This submittal is required for both the approved construction and record drawing plan phases. This drawing is subject to the requirements set forth in this document and will be used by the CITY OF CLERMONT to input data into the GIS system. There are some basic "rules" that apply to the process of creating the proposed or altered features within the overall plan drawing. These shall be adhered to in order for the data to be efficiently downloaded into the GIS. These "rules" are as follows.

1) The drawing shall be submitted in state plane coordinates with at least two points referenced to Lake County's geodetic control network with a horizontal accuracy of plus/minus three centimeters relative to Lake County's geodetic control network points used as reference. For any vertical measurements, **at least** three points shall be referenced to Lake County's geodetic control network with an accuracy of plus/minus five centimeters relative to Lake County's geodetic control network points used as reference. Features in drawing files that are stored in drawing units will be translated to real world locations. The geodetic control chosen shall correspond to existing monuments in Lake County's control network. The new structures and features shall be geographically registered to the geodetic control. State Plane coordinates exist for most quarter section corners in Lake County. If the geodetic control point is located *within* the project limits, it shall be symbolically indicated and annotated in the design file. If the nearest geodetic control is located well *outside* of the project area then it shall be tied to one of the other geodetic control points used, and a reference tie annotated and indicated in the design file. The two geodetic control points described above are the least survey grade geo-referencing information a developer can use to create the plan view drawing. Please refer to the section 4, "Conventional and GPS Survey Standards" to understand the type of structures and survey grade needed for the additional geodetic information contained in this drawing. This document

describes which structures need to be surveyed and created within the drawing according to its corresponding horizontal coordinates and vertical elevation. **All drawings need to be geographically registered in the Florida State Plane Coordinate System, units feet, horizontally corrected to the North American Datum of 1983 using the HARN (High Accuracy Reference Network) correction, vertically corrected to the North American Vertical Datum of 1988.**

2) The spatial accuracy of the feature data contained in the master plans shall be equal to or better than the graphical data contained in the plan/profile sheets.

3) Survey data shall be provided for certain assets as set forth in section 4, "Conventional and GPS Survey Standards".

4) Infrastructure features, designated to be numbered in this section, shall have unique identification numbers shown on the drawing. These unique identifiers will have a format corresponding to the specifications included in this document.

5) Pressure piping is to be entered as a single line between tees, crosses, wyes, and reducers. Pipe sections should be continuous through structures such as valves and other fittings. Pipes should be broken and joined by a suitable fitting when a line changes its diameter or material properties. For wastewater force mains, the line feature(s) shall be input using the same direction from point to point as the proposed or existing flow. Therefore, the starting point of force main line segments within these layers shall be the upstream point and the downstream point shall be the endpoint of that segment. This procedure is required to indicate the continuity of flow and connectivity within the wastewater layers.

6) Gravity lines shall be entered as a single line, digitized in the direction of the design flow, and broken at manholes. The beginning point of the line would the upstream end and the ending point would be the downstream end.

7) Text identifying piping shall be aligned with the piping. Point and linear feature attribute text shall be visible on the drawing in a standard font and the lower left-hand corner of the text shall be just clear of the linear or point feature to which it corresponds, unless legibility requires that the label be moved and accompanied by a leader arrow. The labels shall be placed onto a separate layer and not to be placed in the feature layer. For reading from the bottom or right side of the plan sheet, the rotation angle shall be between -90 degrees and 90 degrees.

8) Features shall be placed on their appropriate layers and assigned colors by layer for consistency. Features shown in the AutoCAD files shall be in model space and be contained in the AutoCAD files as opposed to being linked to externally referenced files. CAD systems which use a numbering system for layers instead of names shall also include a conversion chart explaining which layer number corresponds with which layer name.

9) The features included in the master plans(s) shall follow the standards in section 2 ASBUILT DRAWINGS.

SECTION 4 - CONVENTIONAL AND GPS SURVEY STANDARDS

A. As part of the initiative to adopt geographic information system (GIS) technologies to store, manage and maintain geographic/spatially-related data, this set of survey standards is to establish quality and accuracy of survey grade data submitted for improvements and/or new developments. This chapter is broken down into three sections:

1. Part 4.01 Acceptable Technology;
2. Part 4.02 Available Accuracy; and
3. Part 4.03 Requirements.

4.01 ACCEPTABLE TECHNOLOGY

A. GPS units used to collect data must meet the minimum qualifications outlined in this section. At a minimum, GPS units used to collect data should be accurate to 2-5 meters when differentially corrected. GPS units that do not meet this standard are not acceptable (Note: Recreational GPS receivers do not comply with these standards).

B. A GPS receiver can be either a standalone unit, or a GPS module plugged into a portable computer. The GPS receiver should:

1) Have six channel parallel reception or better.

2) Employ these processing parameters:

i. Position acquisition rate - 1/second or better

ii. Position mode - 3D (uses 4 satellites)

iii. Maximum PDOP – 6, recommended < 4

iv. Minimum Elevation - User-selectable

v. Have the ability to store at least 180 raw position measurements for the purpose of post-processing differential correction.

vi. Have the ability to transfer position data to a personal computer via a serial port.

vii. Include software to perform differential correction, point data averaging, and conversion to common formats.

C. The Real-time correction receiver should:

i. Receive correction data from a recognized, reliable source, and which is appropriate for real-time correction in the geographic area in which the GPS measurements will be made.

ii. Output correction data in RTCM-SC-104 (Radio Technical Commission of Maritime Service - Special Committee Paper No. 104) format via an RS-232 cable, which matches the GPS receiver.

B. Dilution of Precision (DOP)

i. Do not collect GPS data when the Position Dilution of Precision (PDOP) value equals or exceeds 6.0. Do not use DOPs other than PDOP when collecting GPS data.

C. Collection Methods

i. The superimposed method involves standing close or upon the subject for which you are collecting GPS locational data.

ii. The centroid method is used when the superimposed method cannot be used (e.g. well inside a locked fence or structure).

D. Differential Correction

i. Differentially correct all GPS data before submitting to the TCEQ. Perform differential correction either by post processing or by real-time differential correction. Wide Area Augmentation System (WAAS) corrections are acceptable for point data.

E. Correction Status

i. Submit all GPS data with a field indicating each record=s differential correction status. Uncorrected data cannot be used. There are only three selections available:

ii. Differential Correction - Indicates that the record has been differentially corrected.

iii. Real-time Corrected - Indicates that the record has been real-time differentially corrected.

iv. Uncorrected - Indicates that the record has not been differentially corrected. Uncorrected data are not of value and cannot be used.

4.02 AVAILABLE ACCURACY

A. The following table summarizes the established accuracies from FDEP. See Section D for Level 1 and 2 standards.

Table 6.13-1 FDEP Spatial Data Accuracy Levels

Accuracy Level	Accuracy Expectations	Typical Applications	Methods Available
Level 1	+/- 0.01 meters (0.39 inches)	• High Accuracy Reference Network (HARN) • Vertical topography	• **GPS, integer resolved, carrier processed, differential**
Level 2	**0.01 to 1.0 meters (0.39-39 inches)**	• **Ground control for photo and digital mapping** • **GPS controlled aerial photos** • **Parcel or right-of-way mapping** • **Mapped data in cooperation with local governments** • **Mapping jurisdictional wetlands**	• **GPS, integer resolved, carrier processed, differential, lower order traverse** • **GPS 3-D code phase real-time and post processed carrier smoothed psuedo-range differential corrections**

4.03 REQUIREMENTS

A. Horizontal datum shall be in:
NAD_1983_HARN_StatePlane_Florida_East_FIPS_0901_Feet.

Vertical datum shall be in:
NGVD 1988

State plane coordinates shall depict actual horizontal and vertical locations of utility assets such as: manholes, system valves, hydrants, blow-off valves, air release valves, master meters, and the pump station wet well. Also, the locations at the intersection of water, wastewater and reclaimed water pressure piping, as well as at 100 feet intervals along the pipeline. A surveyor shall certify the state plane coordinates, provide the coordinates on the ASBUILT DRAWINGS, and provide the coordinate attribute table in an electronic database submittal.

B. The "Coordinate Attribute Table", provided in Appendix B, for water, wastewater, reclaimed water, and stormwater assets shall be populated and provided with the record drawing submittal.

C. The water, wastewater, reclaimed water, and stormwater assets maintained by the CITY OF CLERMONT have been classified based on accuracy levels per utility feature. State plane coordinate accuracy shall be provided in accordance with the following table.

Table 4.3 State Plane Coordinate Accuracies per Asset

Asset	Measured Horizontal Accuracy (feet)	Measured Elevation Accuracy (feet)	Shot Location (horizontal center and vertical top)
Hydrants	<= 2 ft	N/A	**Operating nut**
Blow off valves	<= 2 ft	N/A	**Valve enclosure**
Air Release Valves	<= 2 ft	N/A	**Valve enclosure**
Master Meters	<= 2 ft	N/A	**Register**
Pump Stations	<= 2 ft	N/A	**Wet well**
Manholes	<= 1 ft	1.0	**Center of cover**
System Valves	<= 1 ft	1.0	**Operating nut**
Fittings	<= 1 ft	1.0	**Fitting**
Piping at 100' max intervals	<= 1 ft	1.0	**Pipe**
Storm Inlet	<= 1 ft	0.1 ft	**Grate, Throat, Invert(s), Notch**
Storm Pipe	<= 1 ft	0.1 ft	**End**
Pipe End Treatment	<= 1 ft	0.1 ft	**Invert**
Ditch Block	<= 1 ft	0.1 ft	**Invert**
Lighting	**<=2 ft**	**N/A**	**Base**

D. The CITY OF CLERMONT has designated the following two levels of quality for water, wastewater and reclaimed water assets survey.

1. Level 1- **Survey Grade** (Dual Frequency Carrier Phase Static & RTK) GPS:

i. Accuracy is equal to or greater than one centimeter horizontal;

ii. Applications: surveying;

iii. Minimum number of satellites: five;

iv. Maximum GDOP: six;

v. Recommended GDOP: < four;

vi. Maximum CQ: 0.2;

vii. Recommended CQ: <0.1;

viii. Recommended Redundant Measurements: 2 with at least 60 minutes difference;

ix. Maximum Static Baseline: 20 miles; and

x. A SURVEYOR must supervise GPS or conventional survey crew. Follow instructions given in the GPS equipment's Operation Manual.

2. Level 2- **Mapping Grade** (Single Frequency Code Differential) GPS for GIS:

i. Horizontal accuracy is equal to or greater than one meter horizontal;

ii. Applications: Accurate collection of features for use in a GIS;

iii. Minimum number of satellites: five;

iv. Maximum PDOP: six;

v. Recommended PDOP: < four;

vi. Recommended minimum number of positions per feature:

   i. Point feature - 30 positions;

   ii. Line feature - two positions; and

   iii. Polygon feature – three positions.

vii. Real-Time Status: Always on (log only Real-Time positions); and

viii. Rover file management: Rover files should not be re-opened or added to. Rover files should not span more than one day of data collection.

APPENDIX A

Digital Data Submission Form

This form is to be utilized for the submittal of digital data in accordance with the requirements outlined in section 2, " ASBUILT DRAWINGS".

Date of Submittal: _____

Project Number: _____

Project Name: _____

Project Manager: _____

Consulting Firm: _____

Address: _____

City: State: Zip: _____

Phone: _____

Email: _____

Type of Submittal: _____

File Format: _____

Appendix B

City of Clermont Coordinate Attribute Table

		Name in Attribute Field (10 letter limit)
Shapefile Name:	Water_lines	
Attributes:	Pipe Id	Pipe_Id
	Size	Size
	Depth	Depth
	Material (PVC,DIP,AC,DI,Clay, or HDPE)	Material
	Slope	Slope
	Condition	Condition

Shapefile Name:	Sewer_lines	
Attributes:	Pipe Id	Pipe_Id
	Size	Size
	Depth	Depth
	Material (PVC,DIP,AC,DI,Clay, or HDPE)	Material
	Slope	Slope
	Condition	Condition

Shapefile Name:	Reuse_lines	
Attributes:	Pipe Id	Pipe_Id
	Size	Size
	Depth	Depth
	Material (PVC,DIP,AC,DI,Clay, or HDPE)	Material
	Slope	Slope
	Condition	Condition

Shapefile Name:	Valves	
Attributes:	Valve Id	Valve_Id
	Type (Main, Hydrant, Air Release, Blow off, PRV)	Type
	Type-Water, Sewer, Reuse	Type
	Size	Size
	Number of Turns	Num_Turns
	Age	Age
	Depth	Depth
	Condition	Condition

Shapefile Name:	Hydrant_Valve	
Attributes:	Valve_Id	Valve_Id
	Size	Size
	Number of Turns	Num_Turns
	Age	Age
	Depth	Depth
	Condition	Condition

Shapefile Name:	Hydrant	
Attributes:	Hydrant number	Hydr_nu
	Manufacturer	Manufactur
	Barrel diameter	Barrel_dia

	Nozzle diameter	Nozzle_dia
	Outlet configuration	Outlet_con
	Date installed	Date_insta
	Bonnet color	Bonnet_color
	Private	Private
	City	City
	Condition	Condition

Shapefile Name:	Fittings	
Attributes:	Type (Bend, Cap, Cross, Coupling, Offset	Type
	Reducer, Saddle, Sleeve, Tap, Tee, Wye)	

Shapefile Name:	Meter	
Attributes:	Meter Id	Meter_Id
	Type (Disc, Compound, Turbine, Other)	Type
	Service Type (Water, Reuse)	Serv_type
	Size	Size
	Read (Manual, Touch, Radio)	Read
	Year Installed	Yr_install
	Flow Range	Flow_range
	Condition	Condition

Shapefile Name:	Manhole	
Attributes:	Manhole Id	Mh_Id
	Top Elevation	Top_Elev
	Invert Elevation 1	Inv_Elev1
	Invert Elevation 2	Inv_Elev2

Shapefile Name:	Lighting	
Attributes:	Pole Id	Pole_Id
	Pole Material (concrete, metal, wood)	Pole_Mater
	Energy Provider	Provider
	Wattage	Wattage
	Fixture (make/model)	Fixture