

CCU CADD STANDARDS



Charlotte County Utilities

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PREFACE

We believe that corporate data is as important and critical of an asset to the County as our physical infrastructure. Managing enterprise-wide corporate data is essential to our success and enhances the data-driven decision-making mode that helps us to manage the County's assets. Creating CADD documents to a common standard puts the County in better control of our engineering data.

Using this CADD standard will make our engineering data compatible with GIS and other systems used to track and manage assets. It will also make it easier for people in County departments to work effectively together using concurrent engineering principles and allows us to more easily re-use and build on data for future projects, studies, or initiatives. Over time, this effort should help our departments realize more efficiency for data reuse and as a result help us better control costs.

If you have any questions regarding this standard, please contact us at CCUSupport@CharlotteCountyFL.gov

TABLE OF CONTENTS

PREFACE 2

INTRODUCTION 5

CADD REQUIREMENTS FOR CONSULTANTS..... 5

SUPPORTED SOFTWARE VERSION 5

DISCLAIMER..... 5

HORIZONTAL/CONVEYANCE ASSETS: DRAFTING PROPOSED UTILITIES IN PLAN 6

FILE REQUIREMENTS 6

DRAWING SET-UP 6

COORDINATE SYSTEM 6

MODEL SPACE / PAPER SPACE 7

DRAWING UNITS 7

SNAPPING & CONNECTIVITY 7

AUTOCAD LINE OBJECTS 7

LAYER FORMATTING 7

LAYER 0..... 7

LAYER SEGREGATION 7

LAYER NAMES 8

ADDITIONAL LAYERS 9

LAYER COLORS 9

DEFPOINTS LAYER 9

FONTS..... 9

PURGE / AUDIT..... 9

EXTERNAL REFERENCES AND SUBMITTALS..... 10

TEMPLATES 10

HOW TO “ATTACH OBJECT DATA” 13

ELECTRONIC TRANSMITTALS 14

Glossary

TERM

DEFINITION

NSRS11	National Spatial Reference System 2011, NAD83(2011) / Florida West (ftUS).
NAD 1983	Or NAD83 (2011) is an acronym for North American Datum of 1983, a geocentric datum and geographic coordinate system based on the 1980 Geodetic Reference System ellipsoid (GRS80). Which was adjusted in 2011. Mainly used in North America, its measurements are obtained from both terrestrial and satellite data.
NAVD 88	Is the vertical datum for orthometric heights established for vertical control surveying in the United States of America based upon the General Adjustment of the North American Datum of 1988.
NGVD 29	is the vertical datum established for vertical control surveying in the United States of America by the General Adjustment of 1929. NGVD29 was superseded by the North American Vertical Datum of 1988 (NAVD 88).
NAVD	North American Vertical Datum (NAVD) is a fixed reference adopted by the U. S. Government as a standard geodetic datum for vertical elevations.
AC	Asbestos Concrete pipe is made by adding asbestos fibers to cement pipe with improved tensile strength. The pipe has been mostly discontinued due to health concerns.
DIP	Ductile Iron Pipe is pipe made of ductile cast iron commonly used for potable water transmission and distribution.
CIP	Cured-in-place pipe is a trenchless rehabilitation method used to repair existing pipelines. It is a jointless, seamless pipe lining within an existing pipe.
Clay	Vitrified clay pipe is pipe made from a blend of clay and shale that has been subjected to high temperature to achieve vitrification, which results in a hard, inert ceramic.
HDPE	High-Density Polyethylene Pipe is a type of flexible plastic pipe made from the thermoplastic HDPE (high-density polyethylene).

INTRODUCTION

Charlotte County Utilities has developed CADD TO GIS STANDARDS to streamline the process of importing CADD information into the Utilities Enterprise GIS. The CADD TO GIS STANDARDS are required for consultants on private development and all County capital projects when submitting drawings to the County for approval. The requirements ensure data received by the County can be rapidly incorporated into the Counties GIS and made available internally and externally for future design projects. These requirements are limited to the data the County has defined as important information required for department function and operation and data already required for project construction. This manual was developed with trained CADD Technicians in mind and is neither a textbook nor a substitute for CADD knowledge, experience, or judgment. No attempt is made to explain or detail basic CADD techniques and/or commands.

It is not the intent to provide the drawing information necessary to reproduce plan sets, but rather a select set of linework to migrate data from CADD to the Counties GIS platform. Upon completion of plat, site, and civil projects the designer should create a separate digital CAD drawing file that holds the required layers described herein.

The use of XREF files in the creation of plan sets is an acceptable practice, but for the purposes of the CADD TO GIS STANDARDS submission, all required data should be merged into a single CADD file before submittal.

CADD REQUIREMENTS FOR CONSULTANTS

If you are performing computer-aided-drafting (CAD) services for the County you must adhere to the requirements in the Design Drafting Guidelines document found here: [Design Compliance Standards | Charlotte County, FL](#)

SUPPORTED SOFTWARE VERSION

The version(s) of civil mapping/design/plan production software supported by the County is posted on [Design Compliance Standards | Charlotte County, FL](#)

DISCLAIMER

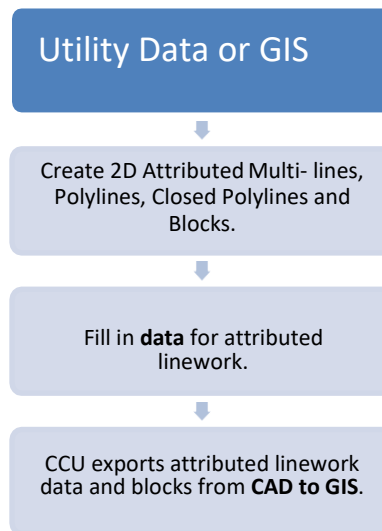
This CADD Manual (“Document”) should not be used as a substitute for codes and regulations. The applicant is responsible for compliance with all code and rule requirements, whether or not described in this Document.

This Document contains Autodesk® AutoCAD® and Autodesk® AutoCAD® Civil 3D® usage tips and instructions which are for reference only and are not a replacement for formal training. Contact an Autodesk® Certified Instructor for training opportunities.

HORIZONTAL/CONVEYANCE ASSETS: DRAFTING PROPOSED UTILITIES IN PLAN

Design of utility systems are done in 2D using “Polylines”, “Multilines” and “Blocks” because geo- referenced pipes and structures must be accurately portrayed in a specific way with data attached in order to be exported into CCU’s GIS system. 2D utility linework (w/data) is always required by CCU.

AutoCAD® Civil 3D® Pipe/Pressure Networks may be used for data referencing, clash detection, labeling, analysis, optimization and quantity take-offs. A typical method is to set Pipe/Pressure Network objects to a non-plotting style and trace over them with 2D linework (in a separate XREF).



FILE REQUIREMENTS

The accompanying DWG file submitted shall be named “CCU Project Number” Utilities Only.dwg” and have ONLY the newly installed Utility Assets and Layers in the drawing, along with a complete and separate Plan Set DWG.

Example: 23-1010 Utilities Only.dwg. All As-built survey data shall be provided for all newly installed assets and be in the “PNEZD” format in a CSV file with a complete and uniform description of the asset etc., size, type, material, year.

DRAWING SET-UP

The following standards relate to how the AutoCAD drawing will need to be set up.

COORDINATE SYSTEM

Coordinate system will be as provided by the Surveyor as outlined in CCU Minimum Drawing and Submittal Requirements for Potable Water, Wastewater and Reclaimed Water Projects. The Scope of Work provided to the Surveyor should specify that survey data will be based on the coordinate system known as **NAD 1983 2011 State Plane Florida West FIPS 0902 Ft US, AutoCAD coordinate assignment NSRS11 2011 Florida State Planes, West Zone, US Foot** Vertical elevations will be **North American Vertical Datum (NAVD) 1988**. CCU will **not** accept NGVD29 datum

MODEL SPACE / PAPER SPACE

All entities are to be drawn in AutoCAD's model space. Paper space (layout view) shall be used for title blocks, north arrows, and other data not pertinent to the Geodatabase.

Rotation of the "model space" from the x, y, and z axis shall not be accepted. The axis shall be set to 0. Any rotation of the project view shall be done in the "layout view" or "paper space".

All plot configurations shall be set to Architectural D landscape page size.

DRAWING UNITS

Drawing units in AutoCAD should be set to decimal or engineering. Each drawing unit shall represent 1 foot.

Architectural units will not be acceptable. Units for angles shall be set to decimal degrees for insertion. Scale units shall be set to unitless.

SNAPPING & CONNECTIVITY

All line work and objects will be created using standard AutoCAD "OSNAP" commands ensuring proper joining of the features. Objects inserted such as valves, meters, hydrants, etc., shall be snapped to the appropriate endpoint. Separate line segments shall be used to separate and identify varying pipe diameters and pipe materials, as well as distances between valves and fittings. Polygon easements will be represented in AutoCAD with lines, polylines, and arcs and all endpoints must be snapped ensuring that a closed polygon will be created in GIS. Additionally, the following shall apply:

- Each line will begin and end with a point entity
- Each line intersecting another line within the same layer shall be split
- A line being intersected by a line from an unrelated layer should not be split
- The appropriate point entity must be populated at intersections of all lines
- e.g. 3 Pressurized Mains/Tee, or 4 Pressurized Mains/Cross
- If two distinctly different lines are connected, the appropriate point entity that describes the change must be used;
- e.g. Reducer, Transition Gasket

AUTOCAD LINE OBJECTS

Only lines, polylines, arcs and blocks are to be used. The use of Splines is not acceptable.

LAYER FORMATTING

All objects shall be drawn or created on the appropriate layer. All properties (color, linetype) shall be set to "Bylayer". No entity shall have a separate color or linetype.

LAYER 0

Layer 0 - Color White, Continuous linetype. No entity or text should be drawn on Layer 0. Only blocks should be drawn on Layer 0 then inserted on the appropriate layer.

LAYER SEGREGATION

Components to be uploaded will be segregated in layers to include **only** the features for that component. Other line work and text not associated with that component but required for the production of the construction plans shall be housed on other layers. Not all layers will apply to all projects. Exact name matching is required for proper functionality.

LAYER NAMES

Layer names have been preset by Charlotte County. A **complete list** of Layer names is provided in the AutoCAD template provided by the County on the County web site. It is essential that the correct entity is on the correct layer. **Do not alter any layer name; doing so will result in not capturing required data and failing QA.**

<u>LAYER NAME</u>	<u>DESCRIPTION</u>
CU-FIRE-HYDR	fire hydrants-blocks
CU-FIRE-PIPE	fire protection piping-polylines
CU-REC-ANNO	design reclaimed water annotation (0.125 text height)
CU-REC-FTTNG	water fittings-blocks
CU-REC-METER	water meters- blocks
CU-REC-PIPE-LRGE	reclaimed water mainlines $\geq 12''$ diameter-polyline
CU-REC-PIPE-PATT	reclaimed hatch (DOTS hatch pattern, 0 deg, 0.5 annotative scale)
CU-REC-PIPE-SMAL	reclaimed water mainlines $< 12''$ diameter-polyline
CU-REC-SERV	reclaimed water service-polyline
CU-REC-VALVE	water valves- blocks
CU-SSWR-ANNO	sewer annotation (0.125 text height)
CU-SSWR-FTTNG	sanitary sewer fittings-blocks
CU-SSWR-LATL	side sewers-polyline
CU-SSWR-PIPE-LRGE	sanitary sewer mainlines $\geq 12''$ diameter-polyline
CU-SSWR-PIPE-PATT	sanitary sewer hatch (DOTS hatch pattern, 0 deg, 0.5 annotative scale)
CU-SSWR-PIPE-SMAL	sanitary sewer mainlines $< 12''$ diameter-polyline
CU-SSWR-STRC	sanitary sewer structures-blocks
CU-VAC-ANNO	vacuum sewer annotation (0.125 text height)
CU-VAC-FTTNG	vacuum sewer fittings-blocks
CU-VAC-PIPE-LRGE	vacuum sewer mainlines $\geq 12''$ diameter-polyline
CU-VAC-PIPE-PATT	vacuum hatch (DOTS hatch pattern, 0 deg, 0.5 annotative scale)
CU-VAC-PIPE-SMAL	vacuum sewer mainlines $< 12''$ diameter-polyline
CU-VAC-SERV	vacuum sewer service-polyline
CU-VAC-STRC	vacuum sewer structures-blocks

CU-VAC-VALVE	vacuum sewer valves and meters-blocks
CU-WATR-ANNO	water annotation (0.125 text height)
CU-WATR-FTTNG	water fittings-blocks
CU-WATR-METER	water meters-blocks
CU-WATR-PIPE-LRGE	water mainlines ≥ 12" diameter-polylines
CU-WATR-PIPE-PATT	water hatch (DOTS hatch pattern, 0 deg, 0.5 annotative scale)
CU-WATR-PIPE-SMAL	water mainlines < 12" diameter-polylines
CU-WATR-SERV	water services-polylines
CU-WATR-STRC	water structures- blocks
CU-WATR-VALVE	water valves-blocks

ADDITIONAL LAYERS

Record/As-Built 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 not to 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.

LAYER COLORS

Standardized colors for layers are not critical, however very light colors such as, but not limited to White, and Yellow shall not be used. They are too difficult to see on a computer screen or when plotted on white media.

DEFPOINTS LAYER

Do not alter, use or place objects in the Defpoints layer. AutoCAD automatically creates the Defpoints layer when dimensions are added to the drawing and its purpose is to contain the definition points at the end of the dimension lines. The Defpoints layer is designed not to plot and allows you to view and edit its contents, however, do not alter the Defpoints layer. If you need to have objects on a viewable layer that won't plot, then you will need to create a specific layer for that purpose.

FONTS

Use standard AutoCAD fonts. Other fonts used, such as architectural fonts, must be approved by Charlotte County. Supply the electronic font file or shape file (.SHX) to the County if using a nonstandard AutoCAD font. SOFTDESK fonts are acceptable.

PURGE / AUDIT

All drawings shall be PURGED of all unused items using the PURGE command and a CADD audit performed and any errors fixed using the AUDIT command prior to submitting.

EXTERNAL REFERENCES AND SUBMITTALS

The use of XREF files in the creation of plan sets is an acceptable practice, but for the purposes of the CADD TO GIS STANDARDS submission, all required data should be merged into a single CADD file before submittal

Before the drawing is submitted to the County, AutoCAD's formatting tool eTransmit shall be used for preparing all DWG files for submittal. All Drawing Dependencies in the drawing set shall be included when submitting. All files that are in the drawing shall be placed in one (1) file folder using eTransmit tool. The drawing for transferring the CADD data to the Utilities Enterprise GIS shall be named "CCU Project Number_Utilities Only.DWG".

TEMPLATES

Charlotte County will provide an AutoCAD template that will include all the standard layers, classifications, and blocks. This will be set to the appropriate drawing units. It is strongly recommended that you use the provided template.

Example: The easiest way to utilize this template is to open it in AutoCAD and immediately SAVE AS: to whatever file name and location you were going to use for your drawing, so essentially you are using a copy of the template as a new drawing (.dwg) file. In this way, layer names will already be established for you and you can just pick which layers to utilize when drawing. Just remember not to overwrite the template itself.

FILE NAMING

The naming of the DWG files that will be submitted should utilize the County Project Number, the type of sheet, and sheet number i.e.; UR 14-0014 PLAN, UR 14-0014 PROFILE, UR 14-0014 SURVEY and so on. U stands for Utility and R stands for Record/As-Built. **Any file naming over 20 characters, will be rejected. Periods, commas, and special characters will not be accepted and will be rejected.**

CAD TO GIS

CCU exports CAD data to GIS the Record/As-Built Drawing phase.

List of Horizontal/Conveyance CAD Attributes

There are three types of objects that may have attributes applied which can be exported to GIS:

1. **POLYLINES:** pipes, services, laterals, etc.
2. **BLOCKS:** Manholes, valves, fittings, hydrants, meters, etc.
3. **POLYGONS:** CCU does not use these as a data collection vehicle.

Some attributes apply to specific types of objects, while other attributes apply to all.

ATTRIBUTE NAME	APPLIES TO	USE	ACCOUNTABLE PERSON
BLOCKNAME	Blocks	Type of feature	Surveyor/Engineer
ROTATION	Blocks	Rotation of block	Surveyor/Engineer
DIAMETER	Polylines	Pipe data	Surveyor/Engineer
MATERIAL	Polylines	Pipe data	Surveyor/Engineer
UPSTREAMINVERT	Polylines	Pipe data	Surveyor/Engineer
DOWNSTREAMINVERT	Polylines	Pipe data	Surveyor/Engineer
LAYER	All	AutoCAD layer name	Surveyor/Engineer
DATE_CREATED	All	Date	CCU
USER_ID	All	Responsible party	CCU
ACAD_VERSION	All	Software version	CCU

Adding Object Data for Proposed and Record/As-Built Drawing Utilities

In order for 2D utility linework to be exported into our GIS system, “Object Data” needs to be added to each 2D utility pipe (“Polylines”) and structure, valve, fitting etc. (“Blocks”). At the end of a project, County staff export the geo-referenced utility data into the GIS system. “Object Data Attribution” is done in three steps within Civil 3D/Map 3D:

1. Use the ATTACHDATA command to attach the object data to a polyline.
2. Attach the data to the water, sewer and reclaimed water “Polylines” and blocks. Care must be taken to ensure each object has the correct object Data Table for the asset type PressurizedMain, SystemValve etc.
3. Select objects to view the attached object data and use the PROPERTIES command to fill in or modify the data (the Diameter, MainMaterial, WaterType, etc.).

Checklist for Attributing Record/As-Built Drawing Utilities

Below are critical fields to be filled in during Record/As-Built drawing phase. The remaining fields (not listed here) will be filled in by CCU staff at the time data is exported from CAD to GIS.

LINES: Water, sewer, and reclaimed water (including mainlines, laterals and services must have the following object data attached and filled out. The information below is used as an example.

- Diameter (inches – a real number without other characters; 0=unknown)
- MainMaterial (common materials: AC, DIP, CIP, Clay, HDPE, PVC, Stainless Steel, etc.)
- UpstreamInvert (pipe-invert/elevation in decimal feet)
- DownstreamInvert (pipe-invert/elevation in decimal feet)
- WaterType (Potable Water, Raw Water, Reclaimed Water, Wastewater - Domestic, Wastewater - Industrial, Plant Effluent, Chemical, etc.)
- PipeClass (C900 DR-25, C900 DR-18, C900 CR-14, DR-11, PC 350, CL 50, CL 51, etc.)

BLOCKS: Water, sewer, and reclaimed water blocks must have the accompanying object data attached and filled out. The information below is used as an example. CCU blocks are in a separate DWG file that is included in the template download.

- Diameter (inches – a real number without other characters; 0=unknown)
- MainMaterial (common materials: AC, DIP, CIP, Clay, HDPE, PVC, Stainless Steel, etc.)
- WaterType (Potable Water, Raw Water, Reclaimed Water, Wastewater - Domestic, Wastewater - Industrial, Plant Effluent, Chemical, etc.)
- ValveType (Ball, Butterfly, Double Disc, Gate, Plug, Check, Insertion, etc.)
- Manufacturer (American, AVK, A.Y. McDonald, Clow, Ford, Jones, Kennedy, M & H, etc.)

Asset Data Requirements

Some attributes can be used in labels to be printed on plan sheets. Other attributes, such as inverts must be entered in the correct way. Follow these requirements and guidelines when entering data into the following attribute fields:

Value Requirement for Valves

Valves must have the size and valve type added to the attribute fields. For example: 12”GV

“UpstreamInvert” and “DownstreamInvert” Attribute Values

Follow these guidelines when filling in the DownstreamInvert and DownstreamInvert fields:

Gravity Pipes and Vacuum Mains

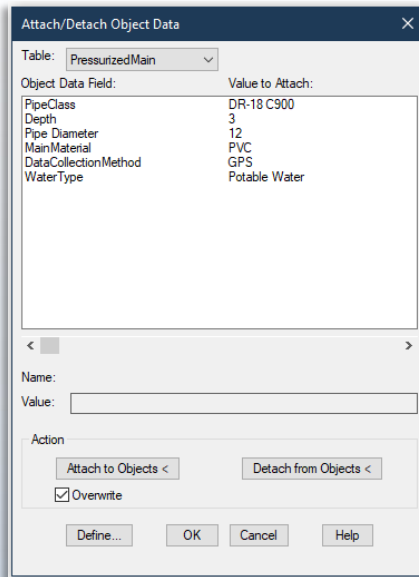
Go from high to low inverts. Laterals start at a high invert and end at a mainline or a structure.

HOW TO “ATTACH OBJECT DATA”

Attach the Object Class Definition File to your drawing by using the **ATTACHDATA** command. The CCU-template has all the object data tables for the attachment of object data.

[Design Compliance Standards | Charlotte County, FL](#)

To attach asset data, use the “**adeattachdata**” command in Civil 3D.



OD:PressurizedMain	
PipeClass	DR-18 C900
Depth	3
Diameter	12
MainMaterial	PVC
DataCollectionMethod	GPS
WaterType	Potable Water

Select the type of objects you are attaching data to. For example, if you want to attach data to all the water lines, select the “PressurizedMains” table and click OK and then select all the water lines in your drawing.

Once “Object Data” has been added to the utility linework, review the data. To modify data of an object, simply select one or more objects and start the **PROPERTIES** command. At the bottom of the “Properties” palette, you will see the object data fields. Simply type the data into the fields and hit ESC to deselect the linework. Repeat this until all the linework has the object data filled in.

Remember, you can select multiple objects at the same time. For example, you could select several or even all pipes that are the same size and material. Then you only have to enter the object data for those pipes once, rather than individually for each object.

ELECTRONIC TRANSMITTALS

Here is an electronic transmittal checklist:

- We require to receive the file package in .ZIP format.
- All Points from the As-Built Survey data are included as a CSV file.
- Make sure files follow our file naming convention.
- Use organized folder structure (proper file naming and relative XREF paths ensure smooth translation).
- Include files from data links (i.e. Excel files).
- Include sheet set data and files (including .DST file, plot files, and XREFs).
- Include data shortcut source files & LandXML files (you may need to manually include these).
- Include PDF file(s) of the plan set.

Recommended eTransmit Settings

AutoCAD® Civil 3D® enables you to package up a set of files for Internet transmission with the eTransmit tool. Start eTransmit by opening a drawing that you would like to transmit and typing ETRANSMIT on the command line or by right clicking on a sheet set (command: SSM) and selecting eTransmit.

Click the “Transmittal Setups...” button in the “Create Transmittal” dialog box and click the “Modify...” button in the “Transmittal Setups” dialog box:

The screenshot shows the 'Transmittal Setups' dialog box with the following settings:

- Transmittal type and location:**
 - Transmittal package type: Zip (*.zip)
 - File format: Keep existing drawing file formats
 - Maintain visual fidelity for annotative objects:
 - Transmittal file folder: [Blank]
 - Transmittal file name: Prompt for a filename
- Path options:**
 - Use organized folder structure:
 - Source root folder: [Blank]
 - Place all files in one folder:
 - Keep files and folders as is:
- Actions:**
 - Send e-mail with transmittal:
 - Set default plotter to 'none':
 - Bind external references:
 - Bind:
 - Insert:
 - Prompt for password:
 - Purge drawings:
- Include options:**
 - Include fonts:
 - Include textures from materials:
 - Include files from data links:
 - Include photometric web files:
 - Include unloaded file references:
 - Include sheet set data and files: