

**CHARLOTTE COUNTY
UTILITIES
DESIGN MANUAL**

DRAFT

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
	INTRODUCTION	i
	DEFINITIONS AND ABBREVIATIONS	li
1	GENERAL REQUIREMENTS	1-1
1.1	GENERAL	1-1
1.2	APPLICATION	1-1
	A. MANDATORY PRE-APPLICATION MEETING	1-1
	B. LETTERS OF AVAILABILITY REQUESTS	1-2
	C. FIRE FLOW TEST REQUEST	1-2
	D. DESIGN STANDARDS	1-2
	E. UTILITY REPORT	1-2
	F. APPLICATION SUBMISSION	1-2
	G. SUBMITTAL FEES	1-2
	H. STAFF REVIEW TIMELINES	1-3
1.3	POST-PERMIT APPROVAL	1-3
	A. DEP COORDINATION AND CCU SIGNING APPS	1-3
	B. PRE-CONSTRUCTION MEETING	1-3
	C. SHOP DRAWING SUBMITTALS	1-3
1.4	DURING CONSTRUCTION	1-4
	A. CONTRACTOR RESPONSIBILITY	1-4
	B. INSPECTION REQUIREMENTS	1-4
	C. INSPECTION NOTICE	1-4
	D. INSPECTION SCHEDULING	1-4
1.5	POST -CONSTRUCTION	1-4
	A. RECORD DRAWINGS	1-5
	B. FDEP CERTIFICATIONS	1-5
	C. EASEMENTS	1-5
	D. OWNERSHIP TRANSFER	1-5
	E. GIS	1-5
	F. WATER METER REQUESTS	1-5
	G. WARRANTY	1-6

1.6	MISCELLANEOUS	1-6
	A. HYDRANT METER FOR TEMPORARY WATER USE	1-6
	B. DESIGN WAIVERS	1-6
	C. FIELD CHANGES	1-6
	D. 811 RESPONSIBILITY	1-6
	E. UTILITY DAMAGES DURING CONSTRUCTION	1-6
	F. RESTORATION OR REPAIR OF PROPERTY	1-7
	G. CAD STANDARDS	1-7
2	POTABLE WATER SYSTEMS	2-1
2.1	GENERAL	2-1
2.2	PROCESS GUIDANCE	2-1
	A. DEVELOPMENT DESIGN	2-1
	B. REVIEW OF ADJACENT PROPERTIES	2-1
	C. CCU APPROVAL	2-1
	D. DEVELOPMENT OVERALL CONCEPTUAL PLAN	2-1
	E. POTABLE WATER SYSTEM LAYOUT	2-1
2.3	ENGINEERING REPORT	2-1
	A. COMPLETE REPORT	2-1
2.4	SYSTEM DESIGN	2-2
	A. FLOW DEMANDS	2-2
	B. SYSTEM SIZE COMPUTATION	2-5
	C. MINIMUM WATER MAIN SIZE	2-5
	D. HYDRAULIC CALCULATIONS	2-6
	E. WATER MAIN INSTALLATION, LOCATION, AND DEPTH	2-7
	F. HORIZONTAL AND VERTICAL SEPARATION FOR MAINS	2-8
	G. WATER METER BOX	2-8
	H. CONNECTION TO EXISTING SYSTEM	2-8
	I. TAPPING SLEEVES	2-9
	J. VALVES AND VALVE LOCATIONS	2-9
	K. ARVs	2-9
	L. FIRE HYDRANTS	2-9
	M. JOINT RESTRAINING	2-11
	N. ELECTROLYSIS PREVENTION	2-11

	O. BACKFLOW PREVENTION	2-12
	P. MATERIALS	2-12
2.5	CASING INSTALLATION	2-12
	A. GENERAL	2-12
	B. CONDITIONS REQUIRING CASING	2-12
3	SANITARY SEWER SYSTEMS	3-1
3.1	GENERAL	3-1
3.2	PROCESS GUIDANCE	3-1
	A. DEVELOPMENT DESIGN	3-1
	B. DEVELOPMENT OVERALL CONCEPTUAL PLAN	3-1
3.3	ENGINEERING REPORT	3-2
	A. REPORT SUBMITTAL	3-2
3.4	SYSTEM DESIGN	3-3
	A. FLOW DEMANDS	3-4
	B. HORIZONTAL AND VERTICAL SEPARATION FOR MAINS	3-6
3.5	GRAVITY SEWER COLLECTION SYSTEM DESIGN	3-7
	A. GRAVITY PIPE SIZE AND SLOPE	3-7
	B. MANHOLES	3-8
	C. PIPE LOCATION AND DEPTH	3-9
	D. SANITARY SEWER SERVICES	3-9
	E. PIPE AND MANHOLE MATERIALS	3-10
3.6	GRAVITY SYSTEM TESTING	3-10
	A. TELEVISIONING	3-10
	B. PIPE ROUNDERS	3-10
3.7	SEWAGE FORCE MAIN DESIGN	3-10
	A. FORCE MAIN SIZING	3-10
	B. DESIGN CONSIDERATIONS	3-11
	C. HYDRAULIC COMPUTATIONS	3-11
	D. PIPE MATERIAL	3-12
	E. AIR RELEASE VALVES	3-12
	F. PIPE LOCATION AND DEPTH	3-12
	G. VALVES AND VALVE BOXES	3-13
	H. CASING	3-13
	I. CONDITIONS REQUIRING CASING	3-14

3.8	LIFT STATION TYPES	3-14
	A. STATION CLASSIFICATIONS	3-14
	B. LIFT STATION DESIGN REQUIREMENTS	3-17
	C. WET WELL DESIGN	3-18
	D. PUMPS AND MOTORS	3-19
	E. PIPING DESIGN	3-20
3.9	LIFT STATION GENERAL REQUIREMENTS	3-21
	A. SITE	3-21
	B. LIFT STATION POWER	3-23
3.10	LOW PRESSURE SYSTEMS (LPS)	3-23
	A. LPS MAIN SIZING	3-24
	B. DESIGN CONSIDERATIONS	3-24
	C. HYDRAULIC COMPUTATIONS	3-24
	D. PIPE MATERIAL	3-25
	E. AIR RELEASE VALVES	3-25
	F. PIPE LOCATION AND DEPTH	3-25
	G. VALVE LOCATIONS	3-26
	H. VASING	3-27
	I. LPS TANKS	3-27
3.11	VACUUM SEWER	3-27
	A. GENERAL	3-27
4	RECLAIMED WATER	4-1
4.1	GENERAL	4-1
4.2	SYSTEM DESIGN	4-1
	A. FLOW DEMANDS	4-1
	B. PIPE SIZING	4-1
	C. HYDRAULIC CALCULATIONS	4-1
	D. PIPE LOCATION AND DEPTH	4-2
	E. HORIZONTAL AND VERTICAL SEPARATION FOR MAINS	4-3
	F. METER BOXES	4-3
	G. METERS	4-3
	H. CONNECTION TO EXISTING SYSTEM	4-4
	I. TAPPING SLEEVES	4-4
	J. VALVES AND VALVE LOCATIONS	4-4

	K. VALVE BOXES	4-4
	L. AIR RELEASE VALVE (ARV)	4-4
	M. ELECTROLYSIS PREVENTION	4-4
	N. BACKFLOW PREVENTION	4-4
	O. EFFLUENT RECLAIMED STORAGE	4-5
	P. PIPE MATERIAL	4-5
	Q. REDUCING, PRESSURE SUSTAINING, AND CHECK VALVES	4-5
4.3	CASING	4-5
	A. GENERAL	4-5
	B. CONDITIONS REQUIRING CASING	4-6
5	APPENDICES	

DRAFT

INTRODUCTION

The standards set forth in this Design Manual are intended to provide a basis for permitting, design, and construction of potable water, sanitary sewer, and reclaimed water infrastructure within Charlotte County Utilities' (CCU) Service Area. The Design Manual is intended to supplement the construction and material specifications as described in the approved CCU Standard Specifications and Design Drawings. Applicable Federal, State, and Local laws and regulations must be considered concurrently with this text. Developer must submit any variation from these standards to Charlotte County Utilities (CCU) and obtain CCU's approval prior to construction. The requirements of this document are applicable in all cases where the proposed facilities will be owned and maintained by CCU.

The CCU design standards or specifications referenced herein, refer to the most recent edition of the standards or specifications and have the same force and effect as if they were included herein in their entirety. All referenced material can be found on the Charlotte County Utilities and Charlotte County Community Development websites.

**CHARLOTTE COUNTY
UTILITIES DESIGN
MANUAL**

Definitions & Abbreviations

1. ANALOGOUS WORDS AND TERMS

A. General

For the purpose of this manual, analogous words and terms shall be interpreted to have similar meanings when not inconsistent with the context.

- 1) Words used in the singular number include the plural, and words used in the plural number include the singular.
- 2) Words used in the present tense include the future tense.

B. Common Analogous Words

- 1) The following words shall be interpreted to have similar meanings when not inconsistent with the context.
 - a) Constructed – Erected, Built, Installed, Rebuilt and Repaired.
 - b) Structure – Building.
- 2) “Include” is a word of enlargement and not limitation.
- 3) The word “shall” is mandatory and the word “may” is permissive.

2. DEFINITIONS

Except where specific definitions are used within a specific section of this Design Manual for the purpose of such sections, the following terms, phrases, words, and their derivations shall have the meaning given herein when not inconsistent with the context:

A. GENERAL

ACCESSWAY: Land that is used or intended to be used for ingress or egress to abutting parcels of land and is not dedicated to the public.

APPLICANT: Any individual, firm, association, syndicate, co-partnership, corporation, trust or any other legal entity, or their duly authorized representative conducting activities under these regulations.

ARCHITECT: A professional architect duly registered and licensed by the State of Florida.

BOARD: The Board of County Commissioners of Charlotte County.

COUNTY: Charlotte County, Florida.

CURRENT: The regulations in effect at the time the Developer's permit application or design plan is submitted to CCU for acceptance or approval.

CUSTOMER: Any person, firm, corporation, or government entity, using or receiving potable water, wastewater, or reclaimed water service from CCU.

DEVELOPER: Any person, corporation, or other legally recognized entity engaged in the business of making utility improvements to serve real property located within the utility service area of Charlotte County as either the owner or the legally authorized agent of the owner of such real property.

DIRECTOR: Charlotte County Utilities' Department Director or his authorized representative.

DRIVEWAY: An accessway which provides vehicle access from a street to a single parcel of land containing two or fewer dwelling units in a single structure and from which vehicles may legally enter or leave the street in a forward or backward motion.

DWELLING UNIT: A room or rooms connected together, constituting a separate, independent housekeeping establishment for a family, for owner occupancy, or for rental or lease on a weekly, monthly, or longer basis, and physically separated from any other rooms or dwelling units which may be in the same structure, and containing sleeping and sanitary facilities and one kitchen. The term "dwelling unit" shall not include rooms in hotels, motels, or institutional facilities.

EASEMENT: A grant of a right to use land for specified purposes. It is non-possessory interest in land granted for limited use purposes. Where the term "easement" is preceded by the term "street" or any other adjective, the preceding term describes the easement's purpose.

ENGINEER: A professional engineer duly registered and licensed by the State of Florida. ENGINEER OF RECORD (EOR): A professional engineer duly registered and licensed by the State of Florida who is responsible for the preparation, signing, dating, sealing, and issuing of any engineering document(s) for any engineering service or creative work.

LANDSCAPE ARCHITECT: A professional landscape architect duly registered and licensed by the State of Florida.

LOT FRONT: The distance measured along a line between the points of intersection

of the side lot lines with the street right-of-way or easement.

LOT LINE: A line which designates the boundary of a lot.

LOT LINE FRONT: The lot line which divides the lot from a street right-of-way or easement. LOT LINE SIDE: Any lot line other than a front or rear lot line, dividing said lot from the neighboring lot.

MULTI-FAMILY RESIDENTIAL PARCEL: Property that contains three (3) or more attached dwelling units, regardless of whether the units are under common or individual ownership.

OWNER: Any person having a legal or equitable interest in property.

PERMIT: Any official document or certificate required or issued by the agency authorizing performance of a specified activity.

PERSON: Any individual, partnership, association, corporation, trust, or other legal entity.

PLUMBING OFFICIAL: A Charlotte County Division of Codes and Building Services Code Enforcement Official.

PUBLIC STREET: A street that has been dedicated to the public; and the public through use of the street; or the Board through express action at a public hearing, has accepted the offer of dedication. Note: Regardless of the Board's acceptance of the offer of public dedication, the Board may or may not have accepted the street for maintenance purposes.

RECORD DRAWINGS: Documents that are a compiled representation of the constructed project. If the engineer is relying on information provided by others not under the direct supervision and control of the engineer, then the engineer shall not be required to sign, date, and seal the Record Drawings. If relying on information by others, as a minimum, the following shall be included on the Record Drawings:

- (1) Statement that the Record Drawings are a compiled representation of the constructed project.
- (2) Listing of the sources and basis of information used in the preparation of the Record Drawings.
- (3) Statement that the Record Drawings are believed to be correct to the best of the engineer's knowledge, and that the accuracy of the information cannot be guaranteed.

RIGHT-OF-WAY: A general term denoting land in which the County owns or has a platted or conveyed easement dedicated to, or required for use by, the public.

ROAD: Streets, sidewalks, alleys, highways, and other ways opened or unopened to travel by the public, including the roadbed, right-of-way and all culverts, drains, sluices, ditches, water storage areas, waterways, embankments, slopes, retaining walls, bridges, tunnels and viaducts necessary for the maintenance of travel.

ROADWAY: A general term denoting land, property, or interest therein, usually in a strip, acquired for, or devoted to, transportation purposes including the travel way, shoulders and swales.

SERVICE AREA: The geographical region consisting of the lot(s) being served or being proposed to be served by a public facility, including but not limited to public water or sewage systems.

STRUCTURE: Any construction or any production or piece of work artificially built up or composed of parts joined together in some definite manner. "Structure" includes "building," as well as other things constructed or erected on the ground, attached to something having location on the ground or requiring construction or erection on the ground. The term "structure" shall be construed as if followed by the words "or part thereof".

SURVEYOR: A professional land surveyor duly registered and licensed by the State of Florida.

TRAFFICWAY: A public street used primarily to facilitate the movement of vehicles. A trafficway includes freeways, expressways, arterials, and collector streets.

B. WATER

AIR GAP (AG): A physical separation between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An approved Air Gap separation shall be a distance of at least two (2) times the diameter of the supply pipe measured vertically above the top rim of the vessel - with a minimum distance of 3 inches.

BACK PRESSURE: any elevation of pressure in the downstream piping system (by pump, elevation or piping, or stream and/or air pressure) above the supply pressure at the point of consideration which would cause, or tend to cause, a reversal of the normal direction of flow through the backflow prevention assembly.

BACK SIPHONAGE: A form of backflow due to a reduction in system pressure which causes a negative or sub-atmospheric pressure to exist at a site in the water system.

BACKFLOW: The undesirable reversal of flow of water or mixtures of water and other liquids, gases, or other substances into the distribution pipes of the potable supply of water from any source or sources.

BACKFLOW PREVENTION DEVICE: Any one of the following devices used as a means to prevent backflow further described in the Backflow Prevention Devices section found in the current Charlotte County Utilities Standard Specifications.

- (1) DOUBLE DETECTOR CHECK VALVE (DDCV): A specifically designated assembly composed of a line size approved double check valve assembly with a specific bypass water meter and a meter sized approved double check valve assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flow. This assembly shall only be used on fire lines to protect against a non-health hazard (i.e., pollutant).
- (2) DOUBLE CHECK VALVE (DCV): An assembly composed of two single, independently acting, check valves, including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve. A check valve is a valve that is drip-tight in the normal direction of flow when the inlet pressure is one psi and the outlet pressure is zero. The check valve shall permit no leakage in a direction reverse to the normal flow. The closure element (e.g. clapper) shall be internally weighted or otherwise internally loaded to promote rapid and positive closure. A backflow prevention device consisting of two internally loaded check valves, either spring loaded or weighted, installed as a unit between two resilient-seated shut off valves with properly located resilient-seated test cocks. This assembly shall only be *used to protect against a non-health type hazard*.
- (3) PRESSURE VACUUM BREAKER (PVB): An assembly consisting of an independently operating internally loaded check valve, an air inlet valve located on the discharge side of the check valve, with resilient-seated test cocks and resilient-seated shut off valves at each end of the assembly designed to prevent back siphonage. PVBs may not be subjected to back pressure.
- (4) REDUCED PRESSURE PRINCIPLE (RPZ): An assembly consisting of two independently acting check valves together with a hydraulically operating,

mechanically independent pressure differential relief valve located between the check valves and below the first check valve. These units are located between two resilient-seated shut off valves and are equipped with properly located resilient-seated test cocks. Assembly is to be used for *High Hazard Protection*.

CERTIFIED BACKFLOW PREVENTION ASSEMBLY TESTER: A person who can prove competency to the satisfaction of Charlotte County Utilities (proof may be required). The tester shall have attended and successfully completed an approved course for Backflow Prevention Assembly Testers, or other programs or training acceptable to Charlotte County Utilities.

CROSS-CONNECTION: Any unprotected actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system and any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. By-pass arrangements, jumper connections, removable sections, swivel, or change-over assemblies and other temporary or permanent assemblies through which or because of which "backflow" can or may occur are considered to be cross connections.

CROSS CONNECTION CONTROL: Control of connection between a potable water system and a non-potable plumbing and/or water system by proper installation of approved backflow prevention assembly that will continuously protect the potable water system.

HAZARD: Risk to public health and/or adverse effect on the Public Water Supply, the degree of which is derived from an evaluation of a particular hazard and/or the adverse effect of that hazard upon the public water system. Hazards are divided into 2 Categories:

- (1) **HEALTH HAZARD:** A cross connection or potential cross connection involving any substance that could, if introduced into the potable water supply, cause death, illness, spread disease or have probability of causing such effects. A contaminate.
- (2) **NON-HEALTH HAZARD:** A cross connection or potential cross

connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable, if introduced into the public water system. A pollutant.

PRIVATE WATER SYSTEM: A water system that is supplied by a well, spring, or other similar source of water, used for human consumption by four (4) dwelling units or less and is regulated by Chapter 381 of the Florida Statutes and Chapter 10D-4 of the Florida Administrative Code as may be amended from time to time.

PUBLIC WATER SYSTEM: A water system that is not a private water system as herein defined, and includes those water systems regulated under Chapter 381 of the Florida Statutes and defined as “Public Water Systems” “Community Water Systems”, and “Non-Community Water Systems” in Chapter 17-22 of the Florida Administrative Code; and defined as “Public Water Systems” not covered or included in the “Florida Safe Drinking Water Act” in Chapter 10D-4 of the Florida Administrative Code, as may be amended from time to time.

SERVICE CONNECTION: The terminal end of service from the public potable water system. That is, it is that point where the CCU loses jurisdiction and sanitary control over the water at its delivery to the consumer. Typically, at the meter installation.

WATER, POTABLE: Water from any source which has been approved for human consumption by the health department.

WATER SYSTEM: A system of pipes, pumps, water treatment plants, or water sources, and all other appurtenances or equipment needed to treat, transport, and distribute water.

C. Wastewater

INDIVIDUAL PUMP STATION: Those pump stations which have design flows up to 10 ERCs.

INDIVIDUAL SEWAGE DISPOSAL SYSTEM OR FACILITY: Those sewage systems which include a septic tank, a system of piping and a soil absorption bed or drain field and as further defined and regulated by Chapter 381 of the Florida Statutes and Chapter 10D-6 of the Florida Administrative Code as may be amended from time to time.

MASTER PUMP STATION: Those pump stations which repump wastewater flow from other pump stations and/or have a discharge force main diameter of 12-inches or greater.

PRIVATE PUMP STATION: Those pump stations which have one owner, one connection to the station, and are privately owned.

PUBLIC SEWAGE SYSTEM: A sewage system that contains a wastewater treatment plant, is not an individual sewage disposal system, and is not regulated by Chapter 10D-6 of the Florida Administrative Code.

SERVICE CONNECTION: The terminal end of service from the public wastewater system. For gravity service connections, this would be a clean-out at the public right-of-way line or a Charlotte County Utilities Easement line. For pressurized main connections (force mains), this would be a plug valve at the public right-of-way line or a Charlotte County Utilities Easement line.

SEWAGE SYSTEM: A system of pipes, pumps, tanks or wastewater treatment plants and all other appurtenances or equipment needed to treat, transport and disposal of sewage.

STANDARD PUMP STATION: Those pump stations which have multiple unit's wastewater flowing to one station.

3. ABBREVIATIONS:

A. Agencies:

AASHTO: American Association of State Highway & Transportation Officials

ANSI: American National Standards Institute

ASSE: American Society of Sanitary Engineers ASTM: American Society for Testing Materials

AWWA: American Water Works Association

BMP: Best Management Practice

CMOM: Capacity, Management, Operation, and Maintenance Program

DER: Department of Environmental Regulation

DOT: Department of Transportation (Federal)

FEMA: Federal Emergency Management Agency

FDEP: Florida Department of Environmental Protection (State)

FDOT: Florida Department of Transportation (State)
EPA: Environmental Protection Agency (Federal Government)
FCCC & HR: Foundation of Cross Connection Control and Hydraulic
Research (University of Southern California)
NCPI: National Clay Pipe Institute NEC: National Electrical Code
NEMA: National Electrical Manufacturers Association
NFPA: National Fire Protection Association
OSHA: Occupational Safety & Health Administration
UL: Underwriters Laboratories

B. General

DIP: Ductile Iron Pipe
fps: feet per second
gpcd: gallons per capita per day
gpd: gallons per day
gpm: gallons per minute
HDPE: High Density Polyethylene mgd: million gallons per day
psi: Pounds per Square Inch (gauge)
PVC: Polyvinyl Chloride
ROW: Right-of-Way
Sq. Ft.: square feet

SECTION 1
GENERAL REQUIREMENTS

The purpose of this manual to set forth the general requirements for the developer's design of proposed utility improvements including water distribution, wastewater collection, and reclaimed systems. Unless otherwise approved or conditioned by CCU, all developer's designs shall be in accordance with Charlotte County Utility's (CCU) design compliance standards, latest edition, posted on the Charlotte County website.

1.1 GENERAL

A. Developer must apply and obtain all other Local, State, and Federal permits applicable to the project (county site plan, dewatering, FDEP, etc.).

1. All applicable permits to be submitted to CCU prior to the mandatory pre-construction meeting with CCU.

2. Applicable Charlotte County Preliminary and Final Site Plan Approval

a) Owner shall submit all required documentation per Charlotte County Code.

3. Applicable FDEP Construction Permits

a) Owner shall submit all required documentation per the FDEP to Charlotte County Utilities.

4. Applicable FDOT Construction Permits

a) For any work within the FDOT ROW, the Owner shall submit all required documentation to the FDOT for a construction permit.

B. Site Plan Requirements

1. Refer to the CCU Minimum Drawing and Submittal Requirements for Potable Water, Wastewater, and Reclaimed Water Projects for all General Plan Requirements.

2. Refer to the CCU Standard Drawing Details for all applicable details to be included within plans.

1.2 APPLICATION – RESIDENTIAL AND COMMERCIAL

A. Mandatory Pre-Application Meeting

1. Submit request for a Pre-Application Meeting to:

coordinator.engineering@charlottecountyfl.gov

2. Complete the Pre-Application Checklist prior to meeting.
 3. Meeting should be attended by the Applicant/Owner and Engineer of Record.
- B. Letters of Availability
1. Utility Availability Request Form shall be submitted by Developer to CCU at or prior to Pre-Application meeting.
- C. Fire Flow Test Requests
1. Complete Water Flow Test Application found on CCU website.
 2. Water Flow Test Application Form shall be submitted by Developer to CCU at or prior to Pre-Application meeting.
- D. Design Standards – Refer to the Standard Specifications for each applicable section.
- E. Utility Report
1. The Developer's Utility Report shall include sections for Potable Water, Sanitary Sewer (Force Main/Lift Station), and Reclaimed Water.
 2. Utility Report must be electronically signed and sealed by the Engineer Of Record ("EOR").
 3. Utility Report shall include details of the proposed utility design.
 4. All engineering design assumptions made by the EOR in the Utility Report must be clearly identified.
 5. All supporting engineered design calculations must be included in the Utility Report.
 6. The Utility Report must include all model results with diagrams.
- F. Application Submission
1. Developer shall submit the Application electronically.
 2. Mid-review meetings during the review process are encouraged by CCU to help clarify design and streamline reviews.
 3. Approval with Conditions.
 - (1) CCU may grant Application Approvals with Conditions.
 - (2) All conditions must be satisfied prior to first water meter being installed.
- G. Application Fees

- a) Application fee is \$500.00 and due at time of initial submittal. One resubmittal for review is permitted without additional cost to Developer.
- b) Resubmittal fee for the third (3rd) review and each review thereafter is \$500 per resubmittal.
- c) Inspection Fee is 5% of the Engineers Opinion of Probable Cost of utility infrastructure, minimum of \$500.00 and due at time of Utility Agreement execution in accordance with current Utility Extension Standards.

H. CCU Staff Review Timelines

1. Intake – 6 business days
2. Initial Review – 30 business days
3. Resubmittal Review – 30 business days
4. Permit issuance allowance – 7 business days

I. Process information, including submittal of master utility plan should be defined here, along with the cost sharing process.

1.3 POST-PERMIT APPROVAL

A. DEP Coordination and CCU signatures

1. Refer to CCU website for information necessary to include to submit for signatures of FDEP General Use Permit Applications.
 - a) Submit Post-Permit Approval Request to CCU engineering department at coordinator.engineering@charlottecountyfl.gov
 - b) An email from CCU requesting additional information or signed Application for submittal to FDEP to be returned to Developer within five (5) business days.

B. Mandatory Pre-Construction Meeting

1. Contractor, Owner, and Engineer must be present.
2. Developer must submit Pre-Construction Meeting through Accela.
3. Mandatory Pre-Construction Meeting must be held at least 48 hours prior to commencement of construction.
4. Developer must complete and submit the Pre-Construction Meeting Checklist with applicable documents one (1) week prior to the Mandatory Pre-Construction Meeting.

C. Shop Drawing Submittals

1. Developer shall submit Shop Drawings one week prior to the Mandatory Pre-Construction Meeting.
2. Submittal package to include:
 - a) Valve types
 - b) Air Release Valves
 - c) Fire Hydrants
 - d) Sanitary Sewer Manholes
 - e) Lift Station
 - (1) Pumps
 - (2) Wetwell
 - (3) Electrical Components
 - (4) Control Panel
 - (5) Telemetry Logics

1.4 DURING CONSTRUCTION

- A. Developer is responsible for maintaining all site BMPs per Standard Specifications and State/Local requirements.
- B. CCU Inspector shall be present (onsite) for periodic observation and the specific inspections listed below:
 1. Pressure tests
 - a) Potable Water Mains
 - b) Force Mains
 - c) Reclaimed Water Mains
 - d) Gravity Sewer Low Pressure Test
 2. Sewer Main TV Inspection (at Inspector's discretion)
 3. Hot Taps/Main Tie-In
 4. Flushing
 5. Hydrant Assembly Inspection
 6. Lift Station Startup
 7. Utility Walkthrough
- C. Developer shall request inspections with 48-hr notice to CCU and are based on inspector's availability.
- D. Inspections are to be scheduled through CCU for each project.

1.5 POST CONSTRUCTION

- A. Record Drawings – Refer to CCU Minimum Drawing and Submittal Requirements for Potable Water, Wastewater, and Reclaimed Water Projects.
- B. FDEP Certifications – Items to be submitted with checklist:

1. Record Drawings
 2. Pressure Test Reports
 3. Passing Bac-T Test Results
 4. Sewer TV Tapes
 5. Lift Station Start-Up
- C. Easements – Requirements of utility easements outside of the Right-of-Way (ROW)
1. Easement to be 10' wide if adjacent to the existing ROW.
 2. Easement to be 20' wide for single pressure main outside of ROW and for gravity sewer main up to 10' deep.
 3. Easement to be 25' wide for a single gravity sewer main 12' deep or greater.
 4. Easement to be 25' wide for two pressure pipes included.
 5. For easements containing a gravity sewer main and one pressure pipe – Add the gravity sewer requirement, based on depth, plus 10'.
 6. The maximum easement width required is 30' wide, unless otherwise approved by CCU.
 7. CCU Utility forms contain approved easement dedication language.
- D. Ownership transfer
- a) Utility Forms –
<https://www.charlottecountyfl.gov/departments/utilities/about-utilities/forms.shtml>
 - b) Bill of Sale
 - c) Lien Releases
 - d) Easements
2. Developer must submit Transfer Checklist and all applicable items to CCU.
- E. GIS – Reference “Charlotte County GIS Naming Convention” file for GIS standard naming convention
- F. Water Meter Requests
1. All necessary FDEP and CCU approvals and certifications are needed prior to submitting for first water meter.
 2. Water meters are to be requested and paid for electronically.
- G. Warranty – Developer’s contractor to warranty all work for one (1) year from CCU’s date of acceptance.

1.6 MISCELLANEOUS

- A. Developer may request a CCU Hydrant Meters for temporary construction water onsite.
1. CCU has limited number of Hydrant Meters. If no Hydrant Meters are available for Developer use, Developer may purchase additional CCU approved hydrant meter, provided that CCU shall retain the purchased Hydrant Meter upon completion of project. (No credit shall be given by CCU to the Developer for the purchase of a Hydrant Meter.)
- B. Design Waivers
1. Design Waiver Requests shall be submitted to CCU through email to: coordinator.engineering@charlottecountyfl.gov
 2. Design Waiver Requests shall be reviewed and decisioned within 5 business days of submission.
 3. A \$250 Fee for Design Waiver Request must be paid by Developer at time of Design Waiver Request submission.
- C. Field Change
1. Field Changes that are immaterial to overall project cost and design intent must be approved by CCU prior to installation.
 2. All field changes that are deemed material in nature by a CCU inspector will require a plan modification submission and approval.
 3. All changes or revisions to installation that deviate from CCU approved Site Plans shall be noted and clouded on Record Drawings submitted to CCU.
- D. 811. Developer's Contractors must call 811 prior to excavation or work commencement.
- E. Utility Damages During Construction
1. Developer is responsible for costs related to damages to County Facilities caused by Developer, Developer's Contractor, or anyone under their responsible charge to County facilities during construction.
 2. CCU may make any and all necessary repairs to County Facilities damaged by Developer.
 3. CCU shall invoice Developer for the costs to make any and all necessary repairs to County Facilities damaged by Developer. Developer shall reimburse necessary repairs to County Facilities damaged by Developer within thirty (30) days of receipt of invoice.
 4. If Developer fails to make payment within thirty (30) days of receipt, all

future inspections will be held until time of payment.

F. Restoration or repair of other property damages due to construction or material storage will be the Developer's responsibility to complete before final certification is provided from CCU.

G. CAD Standards

Current CAD standards and layer templates to be used throughout the design plans are available on the CCU website.

DRAFT

SECTION 2

Potable Water Systems

2.1 **GENERAL**

This section sets forth the general requirements for design of water distribution and transmission systems for potable water service and fire protection.

2.2 **PROCESS GUIDANCE**

- A. Developer must design the potable water distribution and transmission system to ensure the development to maintains system capacity and operation.
- B. Developer must review adjacent and surrounding properties to determine limits of the proposed development's potable water system.
- C. Developer must obtain CCU approval of the proposed development service area prior to proceeding with the remainder of the application process.
- D. Development Overall Conceptual Plan
 - 1. Developer shall submit an Overall Conceptual Plan to CCU for approval.
 - 2. A phasing plan must be submitted detailing the sequencing intended for phased developments.
- E. Developer must provide an overall potable water system layout for the CCU approved development service area including:
 - 1. Based on the full build-out of the development:
 - a) All potable water system main locations and sizes; and
 - b) All main locations, sizes, and outlet connection points to the existing CCU potable water system; and
 - c) All potable water system main locations and sizes to serve adjoining properties within the CCU approved development service area (if applicable); and
 - d) The estimated potable water flows and ERCs from the entire proposed development.
 - 2. Once the Overall Conceptual Plan is approved by CCU, engineering plans, specifications, and the Engineering Report can be submitted to CCU for review/ approval.
 - a) A CAD version of the approved Overall Concept Plan must be submitted with the engineering plans, specifications, and the Engineering Report .

2.3 **ENGINEERING REPORT**

- A. A complete Engineering Report shall be submitted to CCU and must include the following:
1. Project Overview, including approved Overall Conceptual Plan.
 2. Detailed Potable Water Demand Calculations.
 3. Proposed Phase Scenario (if applicable).
 4. Build Out Scenario.
 5. Potable water pipe capacity calculations.
 6. Pressure at the potable water main connection point to the existing CCU system.
 7. Model pipe and junction outputs for all scenarios.
 8. A hard copy of the modeling results. (An electronic file of the modeling results may be requested by CCU on a case-by-case basis).
 9. Hydraulic design computations shall be submitted in conformance with the CCU WaterGEMs model using the most current version of software employed by CCU or approved equal.
 10. The pipe sizing must be based upon max day peak flows plus fire demands. Specific fire flow demands shall be provided by engineer with justification in accordance with NFPA 1.
 11. The effect of the proposed potable water capacity needs on the hydraulic capacity of the existing potable water system shall be evaluated by the Developer prior to CCU approval of the connection of the proposed potable water system to the existing CCU system.
 - a) A hydraulic analysis shall be performed to demonstrate that the existing CCU system can meet the increase in potable water capacity needs from the development as follows:
 - i. Does not negatively affect the existing CCU system normal operating water pressures under maximum day flow plus fire demand conditions,
 - ii. Does not negatively affect chlorine residuals and water age.
 12. All potable water mains shall be designed for build out conditions.
 13. Separate domestic and fire mains are not allowed.

2.4 **SYSTEM DESIGN**

- A. Flow Demands

1. Flow demands for Developer’s proposed design shall be calculated on the basis of full development as known or projected. The average daily flow shall be calculated at the minimum rate as follows:

Table 2-4: Schedule of daily rated gallonage for various occupancies based on Charlotte County Code Section 3-8-4.

The following usages shall be deemed to be applicable for the purpose of calculating flows for all new connections to the system. Commercial, Institutional, and other units not identified herein shall conform to the Florida Department of Health and Rehabilitative Services Chapter 64E-6.008.	
Types of Buildings	Usage
Apartments	157.5 gpd
Arcades (no food services) *other facilities/services calculated according to appropriate occupancies	3 gpd/seat
Restaurants, Bars, Cocktail Lounges, Fast Food	20 gpd/seat
Bars, Cocktail Lounges or Pubs not serving or preparing food	12 gpd/seat
Beauty Salons/Barber Shops <8 hours/day	50 gpd per chair
Beauty Salons/Barber Shops > or equal to 8 hours/day	74 gpd per chair
Boarding Schools (Students and Staff)	75 gpcd
Bowling Alleys (Toilet Wastes only, per lane)	50 gpd + 20 gpd per bar and restaurant seat
Construction, Manufacturing, or Industrial Equipment operations *other occupancies may apply, subject to reclaimed water applicability	Based on equipment supplier or Engineers design analysis data
Country Clubs (Per member)	5 gpd + 30 gpd per bar and restaurant seat
Day Schools (Students and Staff)	6 gpcd + 4gpcd if shower + 4 gpcd if cafeteria
Factories (With showers)	30 gpcd
Factories (Without Showers)	10 gpd/100 Sq. Ft.
Gas Stations without food outlets, per restroom	225 gpd
Car Wash	Based on equipment supplier data
Hospitals (in-patient services only, with or without laundry) *out-patient labs, medical Center operations and other facilities calculated according to appropriate occupancies	200 gpd/bed

Hotels and Motels	125 gpd/room or unit + 20 gpd per restaurant and bar seat
Laundromats	225 gpd/washer
Mobile Home Park	225 gpd/trailer
Movie Theaters, Auditoriums, Churches (Per Seat)	3 gpd
Churches	3 gpd per seat or per capita if no seat
Nursing Homes	100 gpd/bed
Office Buildings (excludes Medical Offices, Dental Offices, refer to FAC 64E-6-008 for the occupancies)	10 gpd/100 Sq. Ft.
Public Institutions (other than those listed herein)	75 gpcd
Single-Family Residence with (1) 5/8" x 3/4" meter *assumes a 3-bedroom residence. For residences with more than 3 bedrooms or that require larger meter refer to FAC 64E- 6.008	225 gpd
Townhouse Residences	225 gpd
Stadiums, Frontons, Ballparks, Etc. (Per Seat)	3 gpd
Stores/Retail operations (Without Kitchen Wastes) *other occupancies may apply	5 gpd/100SQ.Ft.
Speculative Buildings	30 gpd + 10 gpd/100 Sq.Ft.
Warehouse (each unit) *other occupancies may apply. See FAC 64E-6.008 for self- storage units	30 gpd + 10 gpd/1000 Sq.Ft.

Gpd= gallon per day; gpcd= gallon per capita per day

- a) If use is not specified in the table above, base flow is assumed to be 1,500 gpd.
 - b) Refer to the most current rate resolution on CCU website for meter sizing fees.
2. A Minimum Day Peaking hour factor shall be 2.5 times the average daily value.
 3. The Maximum Day peaking hour factor shall be 1.5 times the average daily value.
 4. An Equivalent Residential Connection (ERC) is equivalent to peak flow of 225 gpd.
 5. CCU Water Flow Test Requirements
 - a) A request to perform the test should be submitted at time of the
Mandatory Pre-Application Meeting or to

coordinator.engineering@charlottecountyfl.gov. A two-week time frame should be taken into consideration once the initial request is submitted.

- b) Developer is required to pay the current fee in the CCU rate resolution for each test requested prior to any construction.
- c) CCU will perform all water flow tests.

B. System Size Computation

1. Developer shall submit an Engineering Report, signed and sealed by the Engineer of Record, highlighting the water system design and supporting hydraulic modeling for review and approval to CCU. The proposed system size computation must demonstrate no adverse impacts to CCU's overall system performance.
2. The minimum design for water systems shall provide for the greater of the two scenarios below:
 - a) Peak Hour Flow (PHF).
 - b) Max Day Flow (MDF) + Required Fire Flow.
 - (1) Required Fire Flow shall be determined as per the parameters set forth in NFPA 1 Section 18.4 – Fire Flow Requirements for Buildings.
3. The allowable minimum system pressure shall be 20 psi.
4. Design computations shall be completed by a water modeling software and included in an Engineer's Report with the following information:
 - a) Project Overview, including overall map.
 - b) Water Demand Calculations.
 - c) Build-out scenarios including Fire Flows.
 - d) Proposed Phasing Scenarios.
 - e) Max Day plus Fire Flow results.

- f) Peak Hour Flow Results.
- g) Junction Tables (Peak Hour and Max Day plus Fire Flow).
- h) Pipe Tables (Peak Hour and Max Day plus Fire Flow).
- i) Connection Point: Pressure and Flow.

*If the project is phased, a master model must be submitted for full build-out of the project.

C. Pipe Sizing (Mains)

- 1. The minimum size for pipes shall be 6-inches in diameter. Nominal sizes acceptable to CCU are 6-inch, 8-inch, 12-inch, 16-inch, 20-inch, 24-inch, 30-inch, and 36-inch. No other sizes shall be allowed without prior written approval by CCU.

D. Hydraulic Computations

- 1. Hydraulic calculations shall be prepared for proposed potable water main systems to determine the various operational conditions as follows:
 - a) Pipe friction loss shall be calculated using the Hazen-William's Formula.
 - b) A conservative coefficient of friction factor (C-factor) of 120 shall be used for all pipes. This will assume all minor losses are accounted for.

(1) If a higher C-factor is required, the minor losses shall be calculated based on a per foot calculation as an average throughout the system with prior approval by CCU. The design engineer may use a more precise calculation using the following values for "K" coefficients to account for head losses in the system:

<u>Fitting</u>	<u>Coefficient, K</u>
Gate Valves (Fully Opened)	0.77
Swing Check Valves (Fully Opened)	2.50
900 Bends	0.80
450 Bends	0.20
Tees (Straight Run)	0.35
Tees (Branch Run)	1.28

Wyes (Straight Run)	0.30
Wyes (Branch Run)	0.50
Expansion Sudden $D2/D1 = 0.75$	0.19
Pipe Exit	1.00

2. The allowable velocities shall be from 2 feet per second to 8 feet per second.
3. Head loss shall not exceed 10 feet per 1,000 feet of pipe.
4. Multifamily developments composed of buildings with more than six dwelling units per building and exceeding two stories in height shall be served by water mains no less than 8 inches in diameter.
5. All commercial developments shall be served by water mains no less than 8 inches in diameter.
6. All industrial developments and all hazardous storage areas shall be served by water mains no less than 8 inches in diameter.
7. Losses through meters, backflow prevention devices, or other major losses shall be accounted for in the design.

D. Pipe Installation, Location, and Depth

1. Pipes are to be designed on the same side of the road as the existing main unless otherwise approved in writing by CCU.
2. Pipe depth shall in accordance with the following:
 - a) Pipe is intended to be installed at a consistent depth. Deviations to avoid conflict are subject to approval by CCU.
 - b) Minimum 36-inch depth from the top of pipe to finished grade for pipes 12- inches diameter and smaller.
 - c) Minimum 54-inch depth from the top of pipe to finished grade for pipes 16- inches in diameter or greater (Final depth subject to valve stem length requirements) or as approved in writing by CCU.
3. Directional Drilling, other than under waterways, shall be installed at depths consistent with Paragraph D.2. To minimize air pockets, consistency of depth

of bury shall be maintained and no depths greater than 8 feet will be accepted. Developer must secure written approval from CCU for any exceptions. For additional information, please see CCU Design Compliance Standards.

4. Vertical and horizontal deflections shall be accomplished with the least amount of bend possible. Pipe deflection is preferred over 11.25-degree bends. 11.25-degree bends are preferred over 22.5-degree bends. 22.5-degree bends are preferred over 45-degree bends. Where pipe deflections are used, they are not to exceed 50 percent of the maximum recommended deflection limits.
5. Typical distance from edge of pavement shall be a minimum of 5-feet, preferred 7-feet.
6. Pipes shall be looped to eliminate dead ends greater than 600-feet within the project unless prior written approval is obtained from CCU.
 - a) Dead end mains shall be terminated with an approved fire hydrant assembly.
 - b) All developments shall have two points of connection to the water system unless prior written approval is received from CCU.

E. Horizontal and Vertical Separation for Mains

1. All main separations, both horizontal and vertical, shall be per FDEP Rule 62-555.314, Florida Administrative Code, as amended from time to time.
2. A minimum of ten (10) feet horizontal separation shall be required between other public and/or private utilities, structure(s), building(s), wall(s), fountain(s), fence(s) and CCU infrastructure unless specifically approved by CCU.
3. Drainage inlets shall be located no closer than five (5) feet from proposed or existing potable water mains.
4. All new light pole foundations shall be a minimum of five (5) feet from any existing or proposed CCU owned and maintained pipeline or facility unless

approved by CCU.

5. The root ball of palm trees shall be a minimum of five (5) feet and the root ball of shade trees shall be a minimum of ten (10) feet from any existing or proposed CCU owned and maintained pipe or facility.
6. TV cable, telephone, gas, electric power, and irrigation lines may cross under CCU facilities with a minimum of eighteen (18) inches of vertical clearance.
7. Where the potable water main, reclaimed water main and force mains cross, unless otherwise approved by CCU, reclaimed water main and force main shall pass beneath the potable water main and the force main shall pass beneath the reclaimed water main.

F. Meter Box

1. All meter boxes to be furnished by CCU and installed by Developer.

G. Meters

1. CCU shall supply the meter(s) and the Developer shall pay for the meter(s) in accordance with the County's latest rate resolution.
2. Master Meters are not allowed for Single Family developments.
 - a) Single Family or Two-Family attached projects may utilize meter banks.
 - b) For Commercial applications, one master meter is required for each building.

H. Connection to Existing System

1. All connections to existing mains shall be made as authorized by CCU.
2. Existing system capacity shall be evaluated in the Engineer's Report.

I. Tapping Sleeves

1. No size-on-size taps shall be allowed. If equivalent or nominal size mains are proposed to be connected, a cut in tee shall be necessary.
2. No back-tapping is allowed unless authorized in writing by CCU.

J. Valves and Valve Locations

1. No side actuated valves are allowed.
2. Valves shall be provided at all locations necessary to provide an operable, easily maintained, and repaired potable water system including but not limited to:

- a) Pipe terminations.
 - b) All intersecting mains.
 - c) The number of valves at connection points shall be one less than the number of legs (n-1).
 - d) Valves shall be placed at extension of right of way lines.
 - e) Valves are not to be placed in roadways or sidewalk/bike paths.
 - f) Fire hydrants.
 - g) On both sides of all subaqueous or bridge crossings.
3. The maximum length of main between valves shall be no greater than 1,000 feet.
 4. Additional valve spacing to be reviewed and approved by CCU.
 5. Valves may only be operated by licensed CCU operations staff or someone under the direct supervision of licensed CCU staff.
 6. The maximum length of water main between valves shall not exceed:
 - a) Single family developments: max 25 units at a time
 - b) Multiple Family developments: max 50 units at a time or 600 feet whichever is less.
 - c) Any other valve spacing variance requires written approval by CCU.

K. Air Release Valves (ARV)

1. ARVs are required at highpoints in the system or as required by CCU.

L. Fire Hydrants

1. No private fire hydrants are allowed.
2. Fire hydrants and associated isolation valves are to be located within the Right-of-Way and/or permanent utility easement with sufficient access to the fire hydrant and valve for use and maintenance.
3. A 7-foot (7') clear zone in the front and a five (5) foot clear zone on the two sides and in the back of the fire hydrant is required.
4. Fire hydrants shall be designed to be located within five (5) feet of Right of Way or property line.
5. Fire hydrants and isolation valves shall be designed to be located a minimum of

one foot beyond the sidewalk and located between the sidewalk and property line.

6. Fire hydrants shall be designed to be located on the 'parcel' side of the water main.
7. Fire hydrants shall be designed to be located a minimum of ten (10) feet away from any street or driveway.
8. Fire hydrants shall be designed to be located along property lines at the Right of Way.
9. Fire hydrant barrels shall be painted AWWA Safety Yellow.
10. Fire hydrant breakaway flange shall be set minimum of two (2) inches and a maximum of four (4) inches above finished ground elevation. The top of the fire hydrant nut elevation shall be shown on the plan sheets for every hydrant.
11. Fire Hydrant Spacing and Flow Requirements
 - a) Fire hydrants shall be designed to be located in accordance with applicable minimum fire spacing requirements of NFPA Chapter 18, Section 18.5, as amended from time to time.
 - b) Fire hydrants shall provide flow in accordance with applicable minimum fire flow requirements of NFPA Chapter 18, Section 18.4, as amended from time to time.
12. Any deviation from these fire hydrant design requirements shall be at the discretion of the Utility Director and Charlotte County Fire Marshall.

M. Joint Restraining

1. Pipe restraints shall be provided on all fittings and valves and where required by CCU.

N. Electrolysis Prevention

1. All systems shall be designed to best avoid electrolytic action through the contact of dissimilar metals.
2. CCU may require preventative action consisting of the installation of insulating or dielectric couplings between the two materials.

O. Backflow Prevention

1. Any property which is served by the Charlotte County Utilities potable water system shall provide for a backflow prevention device at the customer's water service connection in accordance with the Charlotte County Utilities Cross Connection Control Policy.

P. Materials

1. PVC pipe shall be used for all reclaimed water mains unless otherwise approved by CCU.
2. HDPE is only to be used in trenchless installation applications or as otherwise approved by CCU.
3. Fusible PVC is not an acceptable pipe material in Charlotte County.

2.5 **CASING INSTALLATION**

The provisions of this section shall represent the minimum standards and referenced sections for the design and installation of casing pipe for mains as well as conditions requiring casing.

A. General

1. Casings shall be installed in accordance with permit conditions of the authority having jurisdiction.

B. Conditions Requiring Casing

1. When new roadways, turn lanes, acceleration lanes, deceleration lanes, or driveways are proposed; PVC or steel casing pipe with bell restraints and casing spacers shall be installed on any existing PVC main. CCU reserves the right to require the replacement of any existing mains within proposed construction limits as part of the overall project construction, as needed.
2. New carrier pipe conditions which will require a casing are as follows:
 - a) Collector street of more than four (4) lanes or Arterial Roadway.
 - b) Controlled Access, Expressway, and Freeway.
 - c) Railroads.

In addition to the above, CCU reserves the right to require casings for new mains if conditions warrant and/or if deemed necessary.

SECTION 3

SANITARY SEWER SYSTEMS

3.1 **GENERAL**

This section sets forth the general requirements for design of sanitary sewer gravity collection system, force mains, lift stations, low pressure sewers, and vacuum sewers.

3.2 **Process Guidance**

- A. Developments shall be designed to minimize the number of lift stations required. Where possible, regional stations to service multiple developments shall be encouraged.
1. New developments with more than one (1) proposed lift station shall provide a master lift station so that only one connection is required to the existing force main. All proposed lift stations on a project shall pump to the master station within the development service area.
 2. Lift station service area shall be based upon maximum depths of the lift stations for gravity sewer systems.
 3. Service area for vacuum sewer extensions shall be based upon vacuum sewer modeling results.
 4. Service area extensions for low pressure sewer shall be based upon low pressure sewer modeling results.
- B. Development Overall Conceptual Plan - Copy shall be submitted to CCU for approval.
1. Provide overall sewer system layout for the CCU approved development service area including:
 - a. Based on the full build-out of the development.
 - b. All sewer system main locations and sizes.
 - c. All lift stations with type designated. Also designate each lift station as cascading to another proposed lift station or ~~manifolding~~ connecting directly to CCU transmission system.
 - d. All main locations, sizes and outlet connection points to the existing CCU sewer system.
 - e. All sewer system main locations, depths and sizes to serve adjoining properties within the CCU approved development service area.
 - f. The estimated sewer flows and ERCs from each adjoining property within the CCU approved development service area.

- g. The estimated sewer flows and ERCs from the entire proposed development.
 - h. The estimated sewer flows to each lift station.
 - i. If the development is to be phased, a separate phasing plan shall be submitted detailing the sequencing intended.
2. Once the Overall Conceptual Plan is approved by CCU, engineering plans, specifications and the engineering report can be initiated for submittal to CCU for approval.
 - a) A CAD version of the approved Overall Concept Plan shall be submitted at this time.

3.3 **ENGINEERING REPORT**

- A. A complete engineering report shall be submitted to CCU including the following:
 1. Project Overview, including approved Overall Conceptual Plan.
 2. More detailed Wastewater Demand Calculations.
 3. Proposed Phase Scenario.
 4. Build Out Scenario.
 5. Sanitary sewer pipe capacity calculations.
 6. Lift station calculations including wet well sizing, wet well and float switch elevations, head conditions, design flows, and force main piping.
 7. Pressure at the force main connection point to the existing CCU system.
 8. Pump selection including all pertinent supporting information.
 9. Model pipe and junction outputs for all scenarios.
 10. A hard copy of the modeling results. An electronic file of the modeling results may be requested by CCU on a case by case basis.
 11. Hydraulic design computations shall be submitted in conformance with the CCU Sewer GEMs model the most current version of software employed by CCU or approved equal.

For a force main system with only one pump station, the system's head capacity shall be calculated under peak hour flow conditions utilizing:

 - a. one pump running,
 - b. all pumps running, and

c. other combinations, if applicable.

12. System head capacity for force main systems with multiple lift stations manifolded together shall be calculated under the maximum head, (i.e. wet well level of the proposed lift station set at the pump off elevation and under peak hour flow conditions), as follows:

a. Only one station running at a time

b. All stations running together at the same time

c. Or other combinations if applicable

i. The effect of the proposed lift station on the hydraulic capacity of the existing sewer system shall be evaluated prior to CCU approval of the connection of the proposed lift station to the existing CCU system. A hydraulic analysis shall be performed to demonstrate that the increase in wastewater flow from the proposed lift station does not adversely affect the existing CCU system as follows:

ii. Does not surcharge any existing gravity sewers,

iii. Does not reduce the design pumping capacity of all manifolded existing lift stations, and

d. Does not cause the receiving lift station to exceed its design capacity.

Designs may be proposed to utilize smaller pumps in an interim situation with larger pumps to be installed at buildout with future phases. Pump replacement shall be at the expense of the developer.

A minimum force main velocity of 2 fps shall be met during all phases unless otherwise approved by CCU. The wet well shall be designed to accommodate the larger pumps.

3.4 **SYSTEM DESIGN**

Sanitary sewer systems shall be designed by a Florida Licensed Professional Engineer (Engineer of Record) and constructed in accordance with the design and installation requirements as specified by Charlotte County Utilities (CCU), the Florida Department of

Environmental Protection (FDEP), and any other relevant state and local regulatory agencies as well as with the requirements established by the Code of Laws and Ordinances-Charlotte County, FL latest edition.

A. Flow Demands

1. Flow demands for design shall be calculated on the basis of full development as known or projected.
 - a. For phased developments, the design shall be based on total build out conditions for the development, or the anticipated service area of the proposed lift station.
 - b. Surcharge conditions downstream shall not be allowed in any gravity system design.
 - c. The existing system shall be evaluated for capacity as part of the engineering report.
2. The average daily flow shall be calculated at the minimum rate as follows:

The following usages shall be deemed to be applicable for the purpose of calculating flows for all new connections to the system. Commercial, Institutional, and other units not identified herein shall conform to the department of health and rehabilitative services section 64E-6.008.	
Types of Buildings	Usage
Apartments	157.5 gpd
Arcades (no food services) *other facilities/services calculated according to appropriate occupancies	3 gpd/seat
Restaurants, Bars, Cocktail Lounges, Fast Food	20 gpd/seat
Bars, Cocktail Lounges or Pubs not serving or preparing food	12 gpd/seat
Beauty Salons/Barber Shops <8 hours/day	50 gpd per chair
Beauty Salons/Barber Shops > or equal to 8 hours/day	74 gpd per chair
Boarding Schools (Students and Staff)	75 gpcd
Bowling Alleys (Toilet Wastes only, per lane)	50 gpd + 20 gpd per bar and restaurant seat
Construction, Manufacturing, or Industrial Equipment operations *other occupancies may apply, subject to reclaimed water applicability	Based on equipment supplier or Engineers design analysis data
Country Clubs (Per member)	5 gpd + 30 gpd per bar and restaurant seat

Day Schools (Students and Staff)	6 gpcd + 4gpcd if shower + 4 gpcd if cafeteria
Factories (With showers)	30 gpcd
Factories (Without Showers)	10 gpd/100 Sq. Ft.
Gas Stations without food outlets, per restroom	225 gpd
Car Wash	Based on equipment supplier data
Hospitals (in-patient services only, with or without laundry) *out-patient labs, medical Center operations and other facilities calculated according to appropriate occupancies	200 gpd/bed
Hotels and Motels	125 gpd/room or unit + 20 gpd per restaurant and bar seat
Laundromats	225 gpd/washer
Mobile Home Park	225 gpd/trailer
Movie Theaters, Auditoriums, Churches (Per Seat)	3 gpd
Types of Buildings	Usage
Churches	3 gpd per seat or per capita if no seat
Nursing Homes	100 gpd/bed
Office Buildings (excludes Medical Offices, Dental Offices, refer to FAC 64E-6-008 for the occupancies)	10 gpd/100 Sq. Ft.
Public Institutions (other than those listed herein)	75 gpcd
Single-Family Residence with (1) 5/8" x 3/4" meter *assumes a 3-bedroom residence. For residences with more than 3 bedrooms or that require larger meter refer to FAC 64E- 6.008	190 gpd
Townhouse Residences	225 gpd
Stadiums, Frontons, Ballparks, Etc. (Per Seat)	3 gpd
Stores/Retail operations (Without Kitchen Wastes) *other occupancies may apply	5 gpd/100 Sq.Ft.
Speculative Buildings	30 gpd + 10 gpd/100 Sq.Ft.
Warehouse (each unit) *other occupancies may apply. See FAC 64E-6.008 for self- storage units	30 gpd + 10 gpd/1000 Sq.Ft.

Gpd= gallon per day; gpcd= gallon per capita per day

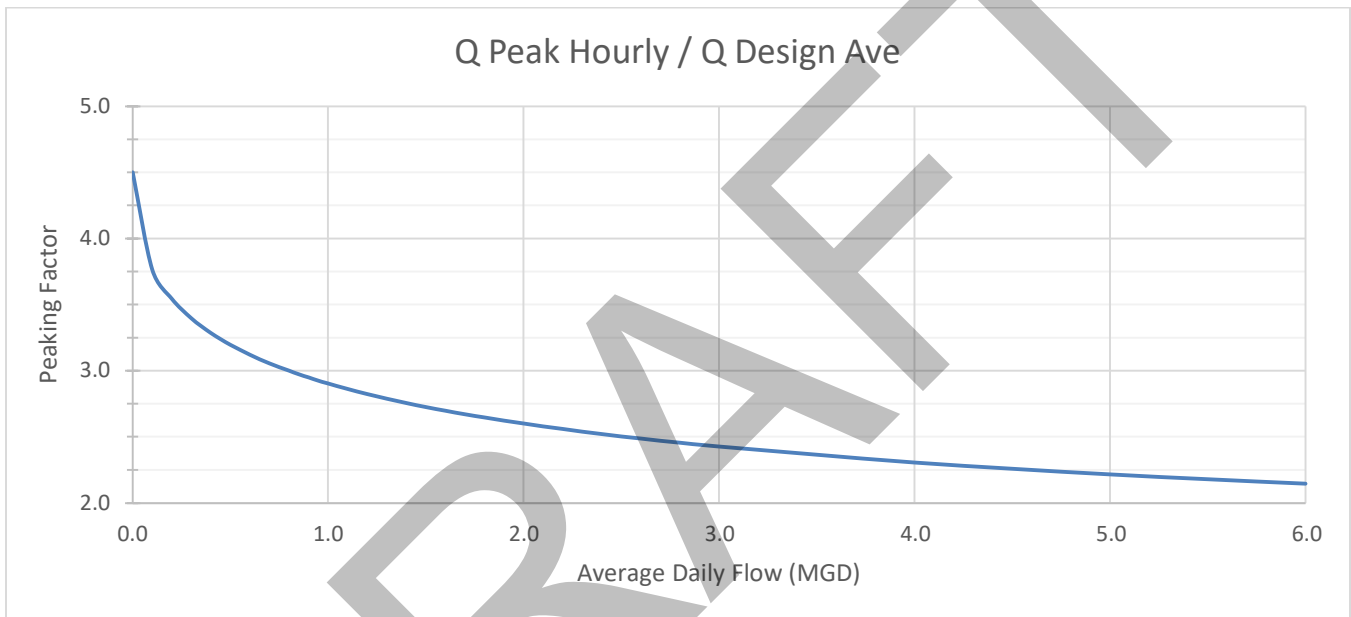
a) If use is not specified within table above, base flow is assumed to be 1,500 gpd/AC.

3. An Equivalent Residential Connection (ERC) is equivalent to peak flow of 190 gpd.

4. Sanitary sewer systems shall be sized to provide ample capacity for the required peak flow rates. The maximum required capacity shall be the product of the cumulative average daily flow for the total service area and the peak factor as calculated below in accordance with FDEP requirements (10 State Standards):

$$\text{Peak factor for wastewater} = \frac{18 \left(\frac{\text{Population}}{1000}\right)^{\frac{1}{2}}}{4 + \left(\frac{\text{Population}}{1000}\right)^{\frac{1}{2}}}$$

5. Minimum Peak Factor per flow graph below.



6. The minimum allowable peaking factor for an average daily flow above 6 mgd is 2.0.
7. An Equivalent Residential Connection (ERC) is equivalent to 190 gpd.

B. Horizontal and Vertical Separation for Mains

1. All main separations, both horizontal and vertical, shall be per FDEP Rule 62-555.314, F.A.C.
2. A minimum of five (5) feet horizontal separation shall be required between other public and/or private utilities, structure(s), building(s), wall(s), fountain(s), fence(s) and CCU infrastructure unless specifically approved by CCU.
3. Drainage inlets shall be located no closer than (5) feet from proposed or existing reclaimed water mains.
4. All new light pole foundations shall be a minimum of five (5) feet from any existing or

- proposed CCU owned and maintained pipeline or facility unless approved by CCU.
5. The root ball of palm trees shall be a minimum of five (5) feet and the root ball of shade trees shall be a minimum of ten (10) feet from any existing or proposed CCU owned and maintained pipe or facility.
 6. TV cable, telephone, gas, electric power, and irrigation lines may cross under CCU facilities with a minimum of eighteen (18) inches of vertical clearance.
 7. Where the potable water main, reclaimed water main and force mains cross, unless otherwise approved by CCU, reclaimed water main and force main shall pass beneath the potable water main and the force main shall pass beneath the reclaimed water main.

3.5 GRAVITY SEWER COLLECTION SYSTEM DESIGN

This sub-section sets forth the general requirements for design of sanitary sewer gravity mains, sewer manholes and service laterals.

A. Gravity Pipe Size and Slope Computation

1. Gravity sewer pipes shall be sized to provide ample capacity for the required peak flow rates.
2. Infiltration and inflow impacts need to be addressed in these calculations.
3. Gravity sewer mains flow depth in pipe shall not exceed full pipe diameter.
4. The minimum allowable size for any gravity sewer pipes, other than service connections, shall be 8-inches in diameter.
5. All gravity sewers pipes shall be designed at slopes providing minimum velocities of not less than 2 feet per second (fps) when flowing full, based on Manning's formula and an "n" value of 0.013.
 - a. The following minimum and maximum slopes for allowable pipe sizes shall be used as a design guideline:

<u>Nominal Sewer Size</u>	<u>Minimum Slope</u>	<u>Max Slope</u>
8 inch	0.40%	10.0%
10 inch	0.28%	6.23%
12 inch	0.22%	4.88%

15 inch	0.15%	3.62%
18 inch	0.12%	2.83%
21 inch	0.10%	2.30%
24 inch	0.08%	1.93%
30 inch	0.06%	1.43%
36 inch	0.05%	1.12%

Note: Slopes less than the minimum slope may be accepted in certain special cases by CCU with proper documentation and FDEP approval is obtained.

- b. Minimum acceptable as-built slopes post construction has a tolerance of 5% of the minimum design slopes from above referenced table. Any other variance will require CCU approval.
- c. Changes in slope and direction shall only occur at manholes.
- d. Sanitary sewer services shall be installed at slopes not less than 1% (1/8 inch per foot) and no more than 15% (1 3/4 inch per foot) unless otherwise approved in writing by CCU.

B. Manholes

- 1. Manholes shall be located in the center of the roadway (preferred) or in the center of the travel lane unless otherwise approved by CCU.
- 2. Manhole spacing may not exceed 500 feet.
- 3. Manholes shall be designed at all changes in pipe size, direction and/or termination of gravity mains.
- 4. Provide a minimum slope of 1% for all pipes across all manholes.
- 5. The maximum slope across any manhole shall be no more than 2%.
- 6. When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.
- 7. A drop manhole connection shall be required for all pipes where the inverts are 24 inches or more above the invert of the manhole.
- 8. All drop manholes shall have drop pipe outside of the manhole.

9. Internal drop pipes are not allowed by CCU.
10. Influent pipes of the same diameter shall match the inverts at all manhole locations.
11. Terminal manholes shall be extended past the last connecting property sanitary sewer service line to minimize the sanitary sewer service lateral length.
12. Sanitary sewer service laterals shall not be directly connected to the manhole.
13. Manholes shall not be located in drainage swales or any other low area likely to collect or pond water during rains, unless otherwise approved by CCU.
14. All master manholes (last manhole before lift station) shall be a minimum of six feet in diameter and shall be provided as follows:
 - a. Within 75 feet of the wet well at all new lift stations unless otherwise approved by CCU.

C. Pipe Location and Depth

1. Gravity mains shall be designed with straight alignment and uniform slope between manholes.
2. Gravity mains shall have a minimum 4 feet of cover to the top of the pipe unless otherwise approved by CCU.
 - a. In all cases where 4 feet of cover cannot be achieved, the complete run between manholes shall be constructed of C-900 DR 18.

D. Sanitary Sewer Services

Service connections shall be designed at property lines. Service connections shall be made into gravity mains only.

1. Service wyes shall be a minimum of 5 feet from either upstream or downstream manholes. A minimum of one (1) service connection shall be installed to service every property.
 - a. CCU prefers one (1) double service lateral for serving two (2) adjoining lots.
 - b. If double service laterals are unfeasible, single service laterals for each lot may

be designed and must be approved by CCU.

2. Sanitary sewer clean-outs shall be required at the property line or at edge of utility easement.
3. Service connections shall be a minimum of 6 inches in size for all single and double residential services, commercial, and industrial service.

E. Pipe and Manhole Materials

1. PVC pipe shall be used for all gravity mains unless otherwise approved by CCU.
2. HDPE is only to be used in trenchless installation applications if approved by CCU.
Fusible PVC is not an acceptable pipe material in Charlotte County.
3. Manholes shall be precast concrete structures unless otherwise approved by CCU.

3.6 **GRAVITY SYSTEM TESTING**

A. Televising

1. All sanitary sewer gravity mains shall be televised by the Developer/Owner at their expense.
2. CCU reserves the right to require sewer service laterals be televised should staining or foreign material be detected during the main line inspection.

B. Pipe Rounders

1. The use of pipe rounders for corrective action in gravity sewer mains is acceptable by CCU upon request.

3.7 **SEWAGE FORCE MAIN DESIGN**

This Section includes the general requirements for design of pressurized sewage force mains.

A. Force Main Sizing

1. Force mains shall be of adequate size to efficiently transmit the total ultimate peak operational flow.
 - a. Force mains shall be 4-inch minimum diameter, unless approved by CCU.
 - b. Nominal sizes acceptable to CCU are 4", 6", 8", 12", 16", 20" and 24". No other sizes shall be allowed without prior written approval by CCU.

B. Design Considerations

1. Vertical and horizontal deflections shall be accomplished with the least amount of bend possible. Pipe deflection is preferred over 11.25-degree bends. 11.25-degree bends is preferred over 22.5-degree bends. 22.5-degree bends is preferred over 45-degree bends. Where pipe deflections are used, they are not to exceed 50 percent of the maximum recommended deflection limits.
2. In order to provide adequate pipeline cleansing, force main flow velocity shall not be less than 2 fps at minimum pumping capacity, nor greater than 10 fps at ultimate maximum design pumping capacity.
 - a. With multiple pumping station systems or phased development, this minimum velocity requirement may be waived by CCU for an interim period of time.
 - i. To address odor control issues, the force main outletting into the lift station shall discharge below the liquid low level in the wet well.
3. For connection pressures to the existing system, please submit formal request to CCU at time of pre-application meeting with the Pre-Application Meeting Checklist.

C. Hydraulic Computations

1. Hydraulic calculations shall be prepared for proposed force main systems in order to determine the various operational conditions as follows:
 - a. Pipe friction loss shall be calculated using the Hazen-William's Formula.
 - b. A conservative coefficient of friction factor (C) of 120 shall be used for all pipes. This will assume all minor losses are accounted for.
 - i. If a higher C-factor is required, the minor losses shall be calculated based on a per foot calculation as an average throughout the system with prior approval by CCU. The design engineer may use a more precise calculation using the following values for "K" coefficients to account for head losses in the system:

<u>Fitting</u>	<u>Coefficient, K</u>
Plug Valves (Fully Opened)	0.77
Swing Check Valves (Fully Opened)	2.50
90° Bends	0.80
45° Bends	0.20
Tees (Straight Run)	0.35

Tees (Branch Run)	1.28
Wyes (Straight Run)	0.30
Wyes (Branch Run)	0.50
Expansion Sudden $D2/D1 = 0.75$	0.19
Pipe Exit	1.00

D. Pipe Material

1. PVC pipe shall be used for all force mains unless otherwise approved by CCU.
2. HDPE is only to be used in trenchless installation applications or as otherwise approved by CCU.
3. Fusible PVC is not an acceptable pipe material in Charlotte County.

E. Air Release Valves

1. ARVs are required at highpoints in the system as required by CCU.
 - a. Where the force main profile is such that air pockets or entrapment could occur, provisions for air release shall be provided.
2. Automatic air release assemblies shall be installed at the upstream end of a direction drill on a subaqueous crossing.

F. Pipe Location and Depth

1. Pipes are to be designed on the same side of the road as the existing main unless otherwise approved in writing by CCU.
2. Typical distance from edge of pavement shall be a minimum of 5-feet, preferred 7-feet.
3. Sanitary sewer force mains shall be designed between the edge of the road pavement and the right-of-way line or within a CCU Easement abutting the road right-of-way opposite of potable water mains unless otherwise approved by CCU.
4. The standard minimum cover for pipes shall be the following:
 - a. Pipe is intended to be installed at a consistent depth. Deviations to avoid conflict are subject to approval by CCU.
 - b. Minimum 48-inch depth from the top of pipe to finished grade.
5. Additional depth for avoidance of conflicts is subject to CCU approval.

6. Directional Drilling, other than under waterways, shall be installed at depths consistent with Paragraph C.4. To minimize air pockets, consistency of depth of bury shall be maintained and no depths greater than 8 feet will be accepted. Any exceptions shall be approved by CCU in writing.

G. Valve Locations

1. Plug valves shall be installed in force main runs a minimum of every 1,000 feet unless otherwise approved by CCU.
2. Where one (1) force main connects to another force main, a minimum of one (1) plug valve shall be installed on each force main at the connection point.
3. Where force mains are to be extended in the future, valves shall be placed at the future connection point to preclude line shutdown at the time of extension.
 - a. Unless otherwise approved by CCU, these branches are to be restrained by methods other than thrust blocking in order to facilitate said connection without system shutdown.
4. Valves shall be placed at extension of right of way lines.
5. On both sides of all subaqueous crossings.
6. Additional valve spacing to be reviewed and approved by CCU.
7. Valves may only be operated by CCU operations staff or someone under the direct supervision of CCU staff.
8. Connection to Existing System: for discharge of new force main connections to existing manholes or lift station wet wells, the developer shall install an CCU approved liner/coating system for corrosion protection of the existing manhole or wet well structure.

H. CASING

The provisions of this section shall represent the minimum standards and referenced sections for the design of casing pipe for mains as well as conditions requiring casing.

1. General

- a. Casings shall be designed in accordance with permit conditions of the authority

having jurisdiction.

I. Conditions Requiring Casing

1. New carrier pipe conditions which will require a casing are as follows:
 - a. Crossings for Collector roadways more than 4 lanes or Arterial Roadway.
 - b. Crossings for Controlled Access, Expressway, and Freeway.
 - c. Crossings for Railroads.
2. In addition to the above, CCU reserves the right to require casings for new mains if conditions warrant and/or if deemed necessary.

3.8 LIFT STATION TYPES

A. There are four classifications of lift stations as follows:

1. Private Lift Station

- a. Lift stations are considered private when there is only one building connection to the lift station.
- b. Private lift stations are privately owned, operated and maintained by the owner and are not the responsibility of CCU.
- c. The stations shall be designed to meet all pertinent CCU, FDEP, and Ten State Standards for Plumbing and Electrical codes.
- d. The station shall be designed to pump at a pressure ranging from 5 psi to 70 psi to deliver the wastewater flows to the Utilities sewer connection point.
- e. The station shall be designed to provide a sealed system to eliminate infiltration and inflow as well as unauthorized access.
- f. The system shall include a shut off valve at the property line, prior to connection with the CCU infrastructure.
- g. CCU shall review and inspect the station to ensure conformance with the Standard Specifications and that it will operate and function properly.
- h. CCU shall inspect the following portions of the private lift station prior to a Certificate of Occupancy being issued for the project.
- i. Station start-up to ensure system operates properly
- j. Inspection of valves to ensure proper placement and operation

- k. Inspection of station to ensure proper seal to prevent infiltration and inflow.
2. Individual Lift Station (Commercial and Mixed-use)
- a. Lift stations are considered individual when the maximum day design peak flows are less than 10,000 gpd.
 - b. The minimum discharge piping shall be 2 -inch. Three inch piping is allowed.
 - c. The minimum discharge velocity is 2 fps.
 - d. The minimum wet well diameter is 4 feet.
 - e. Individual lift station site shall include a 35-foot by 35-foot permanent easement.
 - f. Individual lift stations shall include SCADA monitoring only.
 - g. Individual lift stations shall be designed to utilize grinder pumps.
 - h. The station shall be designed to pump at a pressure ranging from 5 psi to 70 psi to deliver the wastewater flows to the Utilities sewer connection point.
 - i. The station shall be designed to provide a sealed system to eliminate infiltration and inflow as well as unauthorized access.
 - j. The system shall include a shut off valve at the property line, prior to connection with the CCU infrastructure.
3. Standard Lift Station
- a. Lift stations are considered standard when the maximum day design peak flows are more than 10,001 gpd but less than 1,000,000 gpd and no other lift stations contribute flow into the standard lift station.
 - b. The minimum discharge piping shall be 4 -inch.
 - c. The minimum discharge velocity is 2 fps.
 - d. The minimum wet well diameter is 6 feet. For lift stations with 20 HP pumps or greater, wet well diameter shall not be less than 8 feet. Final diameter size shall be based upon build out pump size requirements.
 - e. Standard lift station site shall include a minimum 35-foot by 35-foot permanent easement. Final size to be determined by CCU.

- f. Standard lift stations have a maximum overall interior wet well depth of 25 feet.
- g. Standard lift stations shall include full SCADA monitoring and control. .
- h. A standard lift station does not require odor control equipment but does require space for odor control to be added later.
- i. Standard lift station's electrical panel is required to have an emergency portable generator connection.

4. Master Lift Station

- a. Lift stations shall be considered master lift stations when they meet one of the following criteria:
 - i. The discharge force main is 12 inch in diameter or larger.
 - ii. When the maximum day design peak flows are more than 1,000,000 gpd.
 - iii. One or more other lift station discharge into the lift station.
- b. Master lift station site shall include a minimum of 50-foot by 50-foot permanent easement. Final size shall be determined by CCU.
- c. Master lift stations have a maximum overall interior wet well depth of 30 feet.
- d. The minimum wet well diameter is ~~8~~ 6 feet. Lift stations requiring 20hp pumps or greats shall be required to have 8 foot diameter wet wells minimum. Final diameter size shall be based upon build out pump size requirements.
- e. If directed by CCU, Master lift stations ~~need to adhere to CMOM Criteria, including:~~ shall provide the following:
 - i. Flow Meter.
 - ii. Odor control unit
 - iii. Onsite permanent generator (specifics below)
 - iv. Full SCADA telemetry control unit ~~and a flow meter.~~
- f. Permanent Generators

- i. All master lift stations are required to have a permanent generator.
- ii. The engine shall be of adequate size to automatically start and operate the pumps required for design flow conditions, lights, controls, and other critical items.
- iii. If there is only one additional lift station, no portable generator is required.
- iv. If there is a master lift station and two to four additional lift stations, one portable generator is required to be supplied to CCU.
- v. If there is a master lift station and more than four additional lift stations, two portable generators are required to be supplied to CCU.
- vi. In order to minimize noise levels, the generator shall be equipped with a noise reduction package that shall be approved by CCU. Residential mufflers are recommended.
- vii. If a new lift station creates a new master lift station, downstream of the new installation, the developer shall be required to upgrade the downstream station to comply with the master lift station requirements, including but not limited to upsizing of pumps, electrical, wetwell and providing a generator.
- viii. Generator fuel tanks shall be sized to allow the generator to run a minimum of 72 hours at $\frac{3}{4}$ load capacity.

B. Lift Station Design Requirements

1. Lift stations shall include a minimum of two (2) pumps.
2. Master Lift stations shall include three (3) or more pumps if the flow conditions warrant them based upon pumping requirements and reliability criteria by FDEP subject to the approval of CCU.
 1. Portable backup generators need to be dual voltage to handle 120v, 240, and 480v pump station ratings.
 2. All lift stations shall be designed such that the design peak hour flow can be pumped with the largest pump out of service.

3. The selected sewage pump system shall be capable of pumping the design peak hour flow at the maximum computed system total head requirements.

C. Wet Well Design

1. The wet well shall be circular unless otherwise approved by CCU.
2. The design plans shall include a note that 'All structures shall be constructed level and plumb.'
3. Wet wells shall provide sufficient space for all equipment and required piping. Documentation needs to be provided in the engineering report.
4. In general, the normal operational water level shall provide positive suction head for the pumps.
5. Operating volume in wet well shall be sufficient in size to meet pump cycling that is less than 6 cycles per hour.
 - a. The design fill time and minimum pump cycle time shall be considered in sizing the wet well. The effective volume of the wet well shall be based on the design average flow and a filling time not to exceed 30 minutes to prevent septic conditions. When the anticipated initial flow tributary to the pumping station is less than the design average flow whereby exceeding the 30 minute fill time, provisions should be made so that the fill time is reduced by raising the pump-off elevation or lowering the pump-on elevation or combination thereof. Provisions should be made to prevent septicity.
 - b. Pump cycle time is defined as the time required to:
 - i. Fill the storage volume in the wet well from the pump "Off" level to the Lead Pump "On" level plus
 - ii. The time required to pump down the wet well to the Pump "Off" level including the continuous flow of wastewater into the wet well at the various conditions being considered.
 - iii. For a duplex pump station, the number of pump starts will be one half of the calculated cycles per hour as a result of pump alternation.
 - c. The minimum depth between the bottom invert of the wet well and the lowest invert of the pipe coming into the wet well shall be as follows:
 - i. Individual lift station: minimum 3 feet
 - ii. Standard lift station: minimum 5 feet

- iii. Master lift station: minimum 5 feet
- d. Pump Cycles
 - i. Under average daily flow conditions, the time for one pump cycle is given by the equation.

$$\text{Cycle Time, min} = \frac{\text{Storage Volume, gal}}{\text{Pump Capacity, gmp} - \text{Wet Well Inflow, gpm}}$$

- ii. Under peak hourly flow conditions, the time for one pump cycle is calculated as the pump down rate with zero inflow and then refilling of the wet well at peak hourly flow conditions immediately after the pump shuts off. This will result in maximum cycles per hour for the pump station.
- iii. The time for one pump cycle under peak hourly flow conditions is given by the equation:

$$\text{Max Cycle Time, min} = \frac{\text{Storage Volume, gal}}{\text{Pump Capacity, gmp} + \text{Wet Well Inflow, gpm}}$$

- 6. The following are the suggested initial settings for wet well liquid level sensors:
 - e. Low Level/All pumps off – minimum 1.5 feet above the bottom invert of the wet well.
 - f. Lead pump on - distance above low level/all pumps off sensor required to achieve optimal operating volume as presented above.
 - g. Lag pump on - one foot above lead pump level.
 - h. High water level alarm - six inches above lag pump on and a minimum of three inches below influent pipe invert.
 - i. A redundant control high level float may be required in special cases by CCU.

D. Pumps And Motors

- 1. Where two or more pumps are provided, they shall be of the same size.
- 2. Pumps shall be designed to facilitate easy removal and replacement for inspection or maintenance purposes without personnel entering or dewatering the wet well.
- 3. Pumps shall be:
 - a) non-clog,

- b) mechanical seal,
 - c) capable of handling raw, unscreened sewage, and passing a sphere of at least 3-inches in diameter.
 - d) Pump suction and discharge openings shall be a minimum of 4 inches.
4. Pumps shall be provided to pump the required peak design
 - a) They shall be suitable for operation within the total hydraulic range of operation without overloading the motors.
 5. Lift stations with 20 HP motors and greater require soft starters.
 6. VFDs are not acceptable unless approved by CCU.

E. Piping Design

1. Lift station piping shall have the same requirements as those for force mains except that HDPE shall be utilized within the wet well structure.
2. Lift station piping, valves and air release valve outside the wet well shall be above ground unless otherwise approved by CCU.
3. Each sewage pump shall have individual piping.
4. The plug valve shall follow the check valve to facilitate shut-off.
5. All pipes discharging into the wet well shall be designed to discharge below the lead pump "pump-off" level.
 - a) This may be accomplished using a drop pipe connection.
6. Where pipes enter structures from the exterior, flexible connections (mechanical or push-on type joints) shall be provided at the exterior wall face.
7. Flexible connections such as flanged coupling adapters, expansion joints and couplings, etc., shall be provided within flanged piping systems in order to provide for:
 - a) expansion and contraction,
 - b) differential settlement,
 - c) and/or to expedite installation and maintenance.
8. Special consideration shall be given to the support and restraining of piping systems where flexible connections are used.

a) This requirement shall apply to both interior and exterior systems.

3.9 LIFT STATION GENERAL REQUIREMENTS

A. Site

1. Lift Stations shall be installed outside of any road right-of-way.
2. The site shall be adequate to meet the setback requirements per the Code of Laws and Ordinances - Charlotte County, Florida.
3. Lift station sites shall have adequate area provided for operation and maintenance of the facility, Pump Station siting shall be subject to review and approval by CCU.
4. All lift stations shall be located on a separate parcel of land or within a utility permanent easement. A permanent utility easement for ingress and egress to the lift station from a public right of way and a permanent utility easement for the lift station shall be prepared and recorded before the lift station can be accepted by CCU for operation and maintenance.
5. The lift station shall be sited with consideration of the neighborhood, surrounding site features, landscaping, aesthetics, safety, and security.
6. A master manhole shall be provided within 75 feet of the wet well as approved by CCU.
 - a. This master manhole shall have only one effluent pipe to the lift station.
7. Lift station sites are to be well drained.
 - a. Private, Individual, and Standard Stations
 - i. The wet well top slab and rim elevation shall be set a minimum of 1.0 foot above the flood elevation as determined from the most current FEMA flood insurance rating maps, if applicable, or a minimum of 1.5 feet above the adjacent crown of road elevation, whichever is greater.
 - ii. The bottom of all electrical cabinets, vents, generators, if required, and odor control units, if required, shall be a minimum of one tenth of one foot (0.1') above the 500-year flood elevation or 3.1' above the base flood elevation (100-year), whichever is greater, in accordance with the Code of Laws and Ordinances - Charlotte County Florida Section 3-2-280 and FEMA Policy 206-21-003-0001. Steps, platforms, and safety rails shall be installed to provide access for safe maintenance and operational activities to meet all pertinent

agency requirements. All electrical conduits and generator fuel tank below base flood elevation shall be water resistant. A licensed surveyor or professional engineer shall submit a 100-year flood elevation and a 25-year flood elevation, in accordance with county requirements for an elevation certificate, for acceptance by CCU.

- b. Master Lift Stations
 - i. The wet well top slab and rim elevation shall be set a minimum of 1.0 foot above the flood elevation as determined from the most current FEMA flood insurance rating maps, if applicable, or a minimum of 1.5 feet above the adjacent crown of road elevation, whichever is greater.
 - i. The bottom of all electrical cabinets, vents, generators, if required, and odor control units, if required, shall be a minimum of one tenth of one foot (0.1') above the 500-year flood elevation or 3.1' above the base flood elevation (100-year), whichever is greater, in accordance with the Code of Laws and Ordinances - Charlotte County Florida Section 3-2-280 and FEMA Policy 206-21-003-0001. Steps, platforms, and safety rails shall be installed to provide access for safe maintenance and operational activities to meet all pertinent agency requirements. All electrical conduits and generator fuel tank below base flood elevation shall be water resistant. A licensed surveyor or professional engineer shall submit a 500-year flood elevation and a 100-year flood elevation, in accordance with county requirements for an elevation certificate, for acceptance by CCU.
- 8. Lift station sites shall be readily accessible by CCU vehicles and shall include:
 - a. A minimum 16-foot wide concrete driveway with a maximum slope of 10%. Cross-slopes shall be a maximum of 2%.
 - b. Driveway(s) shall be designed to drain water away from the lift station.
 - c. Driveway(s) shall be accessible during the FEMA 25-year flood.
- 9. Sufficient lighting shall be provided for nighttime operation and maintenance work.

- a. Provide a 15-foot-tall aluminum light pole.
- b. The lamp shall be a 250-watt halogen lamp.

B. Lift Station Power

1. Each lift station shall have an electric meter supplied by the company providing power to the station.
2. A separate power disconnect switch shall be provided at each lift station.
3. Control Panels
 - a. The developer shall request service from the appropriate power company. All lift stations operating on 480 V shall include appropriately sized transformer to step down the voltage to 120 V to accommodate a minimum of 20-amp circuit in the receptacle.
 - b. All wiring shall be color coded and numbered as required by all pertinent agencies.
 - c. A waterproof wiring schematic showing the color-coded wiring and corresponding descriptions shall be affixed to the inside of the pump control panel door.
 - d. A lightning arrestor shall be provided and sized for voltage, current and phase for particular installation as approved by a licensed electrical engineer.
 - i. The lightning arrestor shall be mounted appropriately to provide adequate protection to the lift station.
 - e. Lift stations not supplied with permanent generators on site shall include a service generator receptacle of the type and size sufficient to operate all necessary equipment and connect to power via CCU portable generators.

3.10 LOW PRESSURE SEWER (LPS)

Construction of new Low Pressure Sewer systems are not allowed for new development unless approved by CCU. However, existing LPS systems may be extended if feasible to service new connections. This section sets forth the general requirements for design and extension of existing ~~of~~ low pressure sewer systems.

A. LPS Main Sizing

1. LPS mains shall be of adequate size to efficiently transmit the total ultimate

peak operational flow.

- a. LPS mains shall be 4-inch minimum diameter, unless approved by CCU.
- b. Nominal sizes acceptable to CCU are 4", 6", 8", and 12". No other sizes shall be allowed without prior written approval by CCU.

B. Design Considerations

- 1. Vertical and horizontal deflections shall be accomplished with the least amount of bend possible. Pipe deflection is preferred over 11.25-degree bends. 11.25-degree bends is preferred over 22.5-degree bends. 22.5-degree bends is preferred over 45-degree bends. Where pipe deflections are used, they are not to exceed 50 percent of the maximum recommended deflection limits.
- 2. In order to provide adequate pipeline cleansing, LPS main flow velocity shall not be less than 1 fps at minimum pumping capacity, nor greater than 10 fps at ultimate maximum design pumping capacity.
- 3. To address odor control issues, the LPS main out letting into the lift station shall discharge below the liquid low level in the wet well.
- 4. For connection pressures to the existing system, please submit formal request to CCU at time of pre-application meeting with the Pre-Application Meeting Checklist.

C. Hydraulic Computations

- 2. Hydraulic calculations shall be prepared for proposed LPS main systems in order to determine the various operational conditions as follows:
 - a. Pipe friction loss shall be calculated using the Hazen-William's Formula.
 - b. A conservative coefficient of friction factor (C) of 120 shall be used for all pipes. This will assume all minor losses are accounted for.
 - i. If a higher C-factor is requested and approved by CCU, the minor losses shall be calculated based on a per foot calculation as an average throughout the system. The design engineer may use a more precise calculation using the following values for "K" coefficients to account for head losses in the system:

Fitting

Coefficient, K

Plug Valves (Fully Opened)	0.77
Swing Check Valves (Fully Opened)	2.50
90° Bends	0.80
45° Bends	0.20
Tees (Straight Run)	0.35
Tees (Branch Run)	1.28
Wyes (Straight Run)	0.30
Wyes (Branch Run)	0.50
Expansion Sudden D2/D1 = 0.75	0.19
Pipe Exit	1.00

D. Pipe Material

1. PVC pipe shall be used for all LPS mains unless otherwise approved by CCU.
2. HDPE is only to be used in trenchless installation applications or as otherwise approved by CCU.
3. Fusible PVC is not an acceptable pipe material in Charlotte County.

E. Air Release Valves

1. ARVs are required at highpoints in the system as required by CCU.
 - a. Where the LPS main profile is such that air pockets or entrapment could occur, provisions for air release shall be provided.
2. Automatic air release assemblies shall be installed at the upstream end of a direction drill on a subaqueous crossing.

F. Pipe Location and Depth

1. Pipes are to be designed on the same side of the road as the existing main unless otherwise approved in writing by CCU.
2. Typical distance from edge of pavement shall be a minimum of 5-feet, preferred 7-feet.
3. LPS mains shall be designed between the edge of the road pavement and the right-of-way line or within a CCU Easement abutting the road right-of-way opposite of potable

water mains unless otherwise approved by CCU.

4. The standard minimum cover for pipes shall be the following:
 - a. Pipe is intended to be designed at a consistent depth. Deviations to avoid conflict are subject to approval by CCU.
 - b. Minimum 48-inch depth from the top of pipe to finished grade.
 - c. Additional depth for avoidance of conflicts is subject to CCU approval.
- b) Directional Drilling, other than under waterways, shall be designed at depths consistent with Paragraph F.4. To minimize air pockets, consistency of depth of bury shall be maintained and no depths greater than 8 feet will be accepted. Any exceptions shall be approved by CCU in writing.

G. Valve Locations

1. Plug valves shall be designed in LPS main runs a minimum of every 1,000 feet unless otherwise approved by CCU.
2. Where systems have multiple LPS stations manifolding into singular force main, a minimum of 1 plug valve shall be added at each station connection to the main.
3. Where LPS mains are to be extended in the future, a LPS cleanout assembly shall be designed at the future connection point to preclude line shutdown at the time of extension.
 - a. Unless otherwise approved by CCU, these branches are to be restrained by methods other than thrust blocking in order to facilitate said connection without system shutdown.
 - b. Valves shall be placed at extension of right of way lines.
 - c. On both sides of all subaqueous crossings.
 - d. Additional valve spacing to be reviewed and approved by CCU.
 - e. Valves shall only be operated by CCU operations staff or someone under the direct supervision of CCU staff.
 - f. Connection to Existing System: for discharge of new LPS main connections to existing manholes or lift station wet wells, the developer shall install an CCU approved liner/coating system for corrosion protection of the existing manhole or wet well structure.

H. CASING

The provisions of this section shall represent the minimum standards and referenced sections for the design of casing pipe for LPS mains as well as conditions requiring casing.

1. General

- a. Casings shall be designed in accordance with permit conditions of the authority having jurisdiction.

2. Conditions Requiring Casing

- a. New carrier pipe conditions which will require a casing are as follows:
- b. Crossings for Collector roadways more than 4 lanes or Arterial Roadway. Crossings for Controlled Access, Expressway, and Freeway.
- c. Crossings for Railroads.

3. In addition to the above, CCU reserves the right to require casings for new LPS mains if conditions warrant and/or if deemed necessary.

4. Connection to LPS Sewer Main

5. All LPS connections to gravity sewer systems shall be made at a manhole and enter at the existing invert to minimize turbulence of flow and the release of hydrogen sulfide gas. If the LPS sewer main cannot enter at the existing invert, then a restrained joint inside drop shall be constructed per CCU standards.

I. LPS Tanks

1. If the LPS tank design is within seven (7) feet of vehicular traffic or parking, a load bearing tank and appurtenances shall be required.

3.11 VACUUM SEWER

A. General

1. This section sets forth the general requirements for design of vacuum sewer system extensions.

B. Vacuum sewer systems are allowed to be extended from existing systems within planned vacuum sewer service areas. Extension to be approved by CCU.

C. No new vacuum sewer systems allowed for new developments.

SECTION 4

RECLAIMED WATER SYSTEMS

4.1 GENERAL

This section sets forth the general requirements for design of reclaimed water systems for approved reclaimed water use.

4.2 SYSTEM DESIGN

The Engineer of Record shall comply with the design and installation requirements of Charlotte County Utilities. Reclaimed water is only provided to the developer through either a pond delivery system (preferred) or a direct feed system. CCU's responsibility ends at the reclaimed water meter. It is the Developer/Owner's responsibility to install booster pumps on the Developer/Owner's side of the reclaimed water meter to ensure the onsite pressure meets the developer's design requirements.

A. Flow Demands

1. Flow demands for design shall be calculated on the basis of full development as known or projected.
2. Irrigation flow demands shall be based upon 1-inch reclaimed water application per acre per week for pervious areas only. Non-irrigation flow demands shall be based upon actual needs for the purpose intended based upon proper documentation.
3. Applicant shall supply CCU with their demand needs. A copy of the Reclaimed Customer & Site Checklist form shall be submitted with this information. CCU will determine the amount of supply to be provided. CCU will determine hours and frequency of delivery.

B. Pipe Sizing (Mains)

1. The minimum size for pipes shall be 3" diameter. Nominal sizes acceptable to CCU are 4", 6", 8", 12", 16", 20" and 24". No other sizes shall be allowed without prior written approval by CCU.
2. The allowable velocities shall be from 2 feet per second to 8 feet per second.
3. Head loss shall not exceed 10 feet per 1,000 feet of pipe.

C. Hydraulic Computations

1. Hydraulic calculations shall be prepared for proposed reclaimed water main systems in order to determine the various operational conditions as follows:
 - a) Pipe friction loss shall be calculated using the Hazen-William's Formula.

b) A conservative coefficient of friction factor (C) of 120 shall be used for all pipes.

This will assume all minor losses are accounted for.

i. If a higher C-factor is required, the minor losses shall be calculated based on a per foot calculation as an average throughout the system with prior approval by CCU. The design engineer may use a more precise calculation using the following values for “K” coefficients to account for head losses in the system:

<u>Fitting</u>	<u>Coefficient, K</u>
Gate and Plug Valves (Fully Opened)	0.77
Swing Check Valves (Fully Opened)	2.50
90° Bends	0.80
45° Bends	0.20
Tees (Straight Run)	0.35
Tees (Branch Run)	1.28
Wyes (Straight Run)	0.30
Wyes (Branch Run)	0.50
Expansion Sudden $D2/D1 = 0.75$	0.19
Pipe Exit	1.00

D. Pipe Location and Depth

1. Pipes are to be designed on the same side of the road as the existing main unless otherwise approved in writing by CCU.
2. The standard minimum cover for pipes shall be in accordance with the following:
 - a. Pipe is intended to be designed at a consistent depth. Deviations to avoid conflict are subject to approval by CCU.
 - b. Minimum 48-inch depth from the top of pipe to finished grade for pipes 12-inches diameter and smaller.
 - c. Minimum 54-inch depth from the top of pipe to finished grade for pipes 16-inches in diameter or greater (Final depth subject to valve stem length requirements).
 - d. Or as approved in writing by CCU.
3. Directional Drilling, other than under waterways, shall be designed at depths consistent with Paragraph C.2. To minimize air pockets, consistency of depth of bury

shall be maintained and no depths greater than 8 feet will be accepted. Any exceptions shall be approved by CCU in writing.

4. Vertical and horizontal deflections shall be accomplished with the least amount of bend possible. Pipe deflection is preferred over 11.25-degree bends. 11.25-degree bends is preferred over 22.5-degree bends. 22.5-degree bends is preferred over 45-degree bends. Where pipe deflections are used, they are not to exceed 50 percent of the maximum recommended deflection limits.
5. Typical distance from edge of pavement shall be a minimum of 5-feet, preferred 7-feet.

E. Horizontal and Vertical Separation for Mains

1. A minimum of five (5) feet horizontal separation shall be required between other public and/or private utilities, structure(s), building(s), wall(s), fountain(s), fence(s) and CCU infrastructure unless specifically approved by CCU.
2. Drainage inlets shall be located no closer than (5) feet from proposed or existing reclaimed water mains.
3. All new light pole foundations shall be a minimum of five (5) feet from any existing or proposed CCU owned and maintained pipeline or facility unless approved by CCU.
4. The root ball of palm trees shall be a minimum of five (5) feet and the root ball of shade trees shall be a minimum of ten (10) feet from any existing or proposed CCU owned and maintained pipe or facility.
5. TV cable, telephone, gas, electric power, and irrigation lines may cross under CCU facilities with a minimum of eighteen (18) inches of vertical clearance.

Where the potable water main, reclaimed water main and force mains cross, unless otherwise approved by CCU, reclaimed water main and force main shall pass beneath the potable water main and the force main shall pass beneath the reclaimed water main.

F. Meter Box

1. All meter boxes to be furnished by CCU and installed by Contractor.

G. Meters

1. CCU supplies the meter, and the Developer/Owner pays for the meter in accordance

with the latest rate resolution.

H. Connection to Existing System

1. All connections to existing mains shall be made as authorized by CCU.

I. Tapping Sleeves

1. No size-on-size taps shall be allowed. If equivalent or nominal size mains are proposed to be connected, a cut in tee shall be necessary.

J. Valves and Valve Locations

1. No side actuated valves are allowed.
2. Valves shall be designed at all locations necessary to provide an operable, easily maintained, and repaired reclaimed water system including but not limited to:
 - a. Pipe terminations.
 - b. All intersecting mains.
 - c. The number of valves at connection points shall be one less than the number of legs.
 - d. Valves shall be placed at extension of right of way lines.
 - e. On both sides of all subaqueous crossings.
3. The maximum length of main between valves shall be no greater than 1,500 feet.
4. Additional valve spacing to be reviewed and approved by CCU.
5. Valves may only be operated by CCU staff or someone under the direct supervision of CCU staff.

K. Valve Boxes

1. Valve Boxes shall be furnished and installed by the developer.

L. Air Release Valve (ARV)

1. ARVs are required at highpoints in the system or as required by CCU.

M. Electrolysis Prevention

1. All systems shall be designed to best avoid electrolytic action through the contact of dissimilar metals.
2. Preventative action, if required by CCU, may consist of installing insulating or dielectric couplings between the two materials.

N. Backflow Prevention

5. Any property which is served by the Charlotte County Utilities potable water shall provide for a

backflow prevention device at the customer's water service connection in accordance with the Charlotte County Utilities Cross Connection Control Policy.

O. Effluent Reclaimed Storage

5. It is the intent of the Charlotte County Utilities that all customers that have on-site storage in the form of a tank (s) or pond (s) are required to have an air gap for the delivery of Effluent Reclaimed. Storage capacity of the on-site facility shall be reviewed and accepted by Charlotte County Utilities.

P. Pipe Material

5. PVC pipe shall be used for all reclaimed water mains unless otherwise approved by CCU.
6. HDPE is only to be used in trenchless installation applications or as otherwise approved by CCU.
7. Fusible PVC is not an acceptable pipe material in Charlotte County.

Q. Reducing, Pressure Sustaining, and Check Valve

1. This valve shall maintain a constant downstream pressure regardless of fluctuations in demand. When the upstream pressure becomes equal to the spring setting of the pressure sustaining control, the valve throttles to maintain a constant inlet pressure. If the downstream pressure is greater than the upstream pressure, the valve closes automatically to prevent return flow. Solenoid control shall intercept pressure reducing control to close/open main valve. This valve shall be hydraulically operated.
2. The pressure sustaining pilot control shall be a direct-acting adjustable, spring-loaded, normally closed diaphragm valve which opens when upstream pressure exceeds the spring setting. The control system shall include a strainer orifice assembly, and an adjustable opening speed control.

4.3 Casing Installation

The provisions of this section shall represent the minimum standards and referenced sections for the design and installation of casing pipe for mains as well as conditions requiring casing.

A. General

1. Casings shall be installed in accordance with permit conditions of the authority having jurisdiction.

B. Conditions Requiring Casing

1. When new roadways, turn lanes, acceleration lanes, deceleration lanes, or driveways are proposed; PVC or steel casing pipe with bell restraints and casing spacers shall be installed on any existing PVC main. CCU requires replacement of all old mains for existing mains.
2. New carrier pipe conditions which will require a casing are as follows:
 - a. Collector more than 4 lanes or Arterial Roadway.
 - b. Controlled Access, Expressway, and Freeway.
 - c. Railroads.
3. In addition to the above, CCU reserves the right to require casings for new mains if conditions warrant and/or if deemed necessary.

DRAFT