

July 5, 2016

To Whom It May Concern:

The Polk County UTILITIES CODE COMMITTEE is charged with updating the seven REFERENCE MANUALS associated with Ordinance 10-081 (AKA: Utilities Code). In accordance with Section 11: Utilities Code Committee and Section 12: Reference Manual Revision Procedure, the UTILITIES CODE COMMITTEE recommends approval of revisions to portions of the following reference manuals:

- Utilities Standards and Specifications Manual (6B)
  - Chapter Two (2): Development Coordination
    - Section 210: Part 3 – Project Acceptance Documentation
  - Chapter Three (3): General Requirements
    - Standard Drawing:
      - GR-20-1 Potable Water and Reclaimed Water Services (Typical)
  - Chapter Four (4): Potable Water
    - Section 410: H Dead Ends
    - Section 450-B: Approved Materials Checklist
    - Standard Drawing:
      - WA-04-2 Fire Service Master Meter Assembly
  - Chapter Five (5): Wastewater
    - Section 510: Part 7 Grease Traps, Interceptors, and Separators
    - Section 516: Wastewater Lift Station Electrical System Specifications
    - Section 550-C: Approved Materials Checklist
    - Standard Drawings:
      - WW-14-2: Triplex Lift Station Section View
  - Chapter Six (6): Reclaimed Water
    - Section 650-B: Approved Materials Checklist
- Cross Connection Control Policy Manual (6C)
  - Appendix A-100

Details concerning each respectively edited manual, section, chapter, and appendix are attached herewith for reference.

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Pursuant to Ordinance 10-081, all of the above listed and subsequently described recommendations are hereby approved as noted. In accordance with Section 12 of the aforementioned Ordinance, the Utilities Director is authorized to approve these updates as recommended by the Utilities Code Committee. The effective date of these revisions shall be 30 calendar days from the date of this approval and shall supersede the prior content and detail drawings in the respective manuals. Similarly all approved revisions will be incorporated into the master set of Utilities Code Documents and Manuals in a clean form without markups within 30 calendar days from the date of this approval.

Each REFERENCE MANUAL that has been revised shall be formally presented to the BoCC and adopted by separate resolution.

Marjorie G. Craig, P.E.  
Polk County Utilities Director

  
\_\_\_\_\_  
(Signature)

  
\_\_\_\_\_  
(Date)

- **Chapter Two (2): Development Coordination**
  - **Section 210: Part 3 – Project Acceptance Documentation**

**CHAPTER 2**

**DEVELOPMENT COORDINATION**

**Section 210**

**Development Coordination**

December 2010

- 9) Warranty Surety, based upon the Engineer's signed and sealed cost estimate.
- 10) Any additional information required pursuant to a Developer/Utilities Agreement.
- 11) Final Record Drawings that are in accordance with the Section entitled "Project Design Documents and Submittals".

C. Submittal

The ENGINEER shall submit this Package to the Land Development Division.

D. PCU Response

Upon receipt of a complete Board Acceptance Request Package, the Development Review staff shall review the submitted information for completeness and accuracy. Should any of the information be incomplete or unsatisfactory, a letter shall be sent to the ENGINEER stating the deficiencies. No further processing of the Package shall occur until all incomplete and/or unsatisfactory items are satisfactorily addressed by the ENGINEER.

**PART 3 PROJECT ACCEPTANCE DOCUMENTATION**

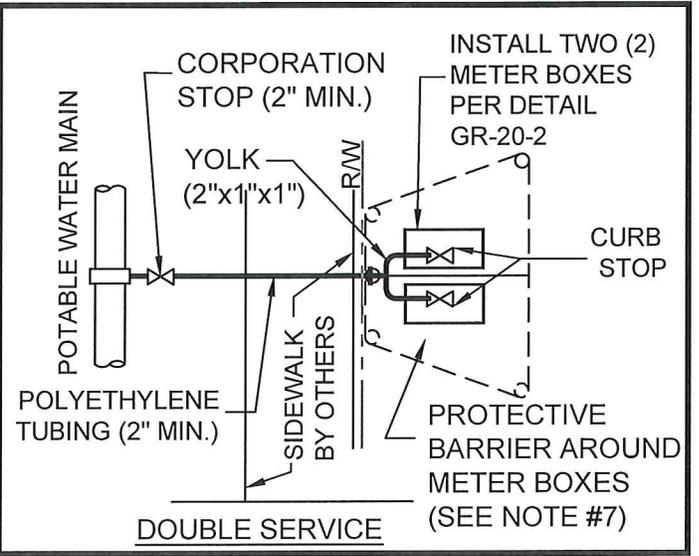
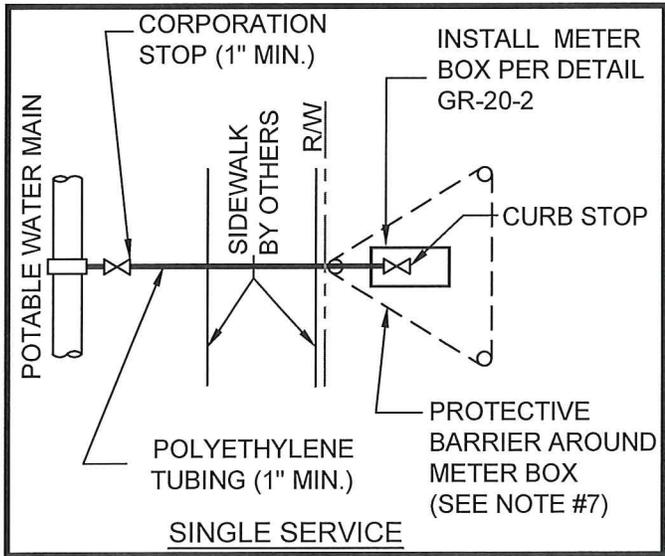
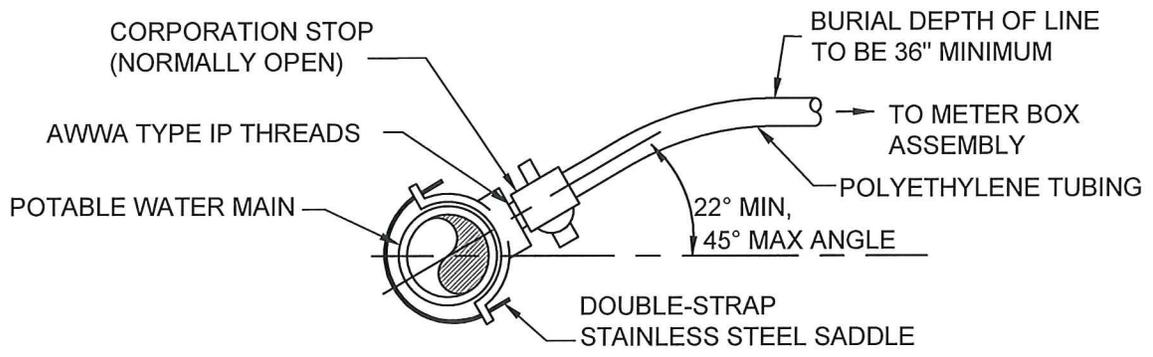
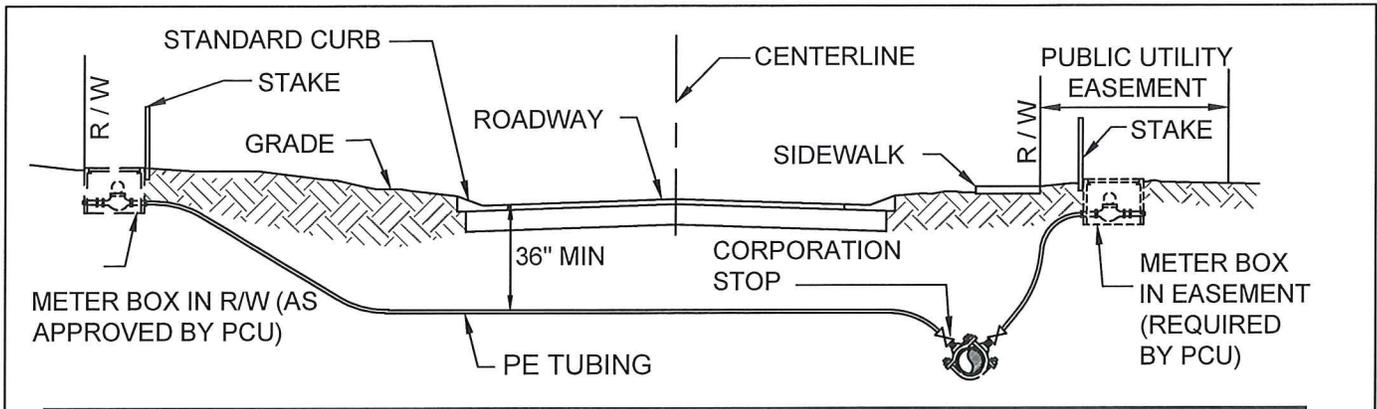
**3.01 Record Documents**

A. General

1. Three sets of certified, full size, black line prints of the RECORD DRAWINGS signed and sealed by the ENGINEER.
2. A digital version of the certified, hard copy RECORD DRAWING in tagged information file (tif) format OR portable document file (pdf) format.
3. The CONTRACTOR shall be responsible for recording information on the approved PLANS concurrently with construction progress.
4. The ENGINEER shall be responsible for preparing accurate RECORD DRAWINGS in accordance with Section 61G15-30.002(9) F.A.C. which presently requires the following minimum information be included if the ENGINEER is relying on information from others:
  - a. A statement that the documents are a compiled representation of the constructed project.
  - b. A listing of the sources and the basis of the information used in the preparation of the documents.
  - c. A statement that the documents are believed to be correct to the best of the ENGINEER's knowledge and that the accuracy of the information cannot be guaranteed.
5. RECORD DRAWINGS shall be legibly marked to record actual construction.
6. RECORD DRAWINGS shall show location of all underground and above ground water, wastewater and reclaimed water piping and related appurtenances, based

(24" x 36")

- **Chapter Three (3): General Requirements**
  - **Standard Drawing:**
    - **GR-20-1 Potable Water and Reclaimed Water Services (Typical)**



NOTES:

1. DRAWING NOT TO SCALE.
2. METER BOXES FURNISHED BY CONTRACTOR IN ACCORDANCE WITH FIGURE GR-20-2.
3. SEPARATION BETWEEN CURB AND METER BOX AND BETWEEN METER BOX AND SIDEWALK SHALL BE 12 INCHES MINIMUM WITH A 18 INCHES MAXIMUM.
4. CONTRACTOR TO LOCATE CURB STOP BY PLACING A STAKE (2" X 2" AT 24" ABOVE GROUND) TOP PAINTED WITH THE COLOR OF THE UTILITY SERVICE AND WITH THE LOT NUMBERS IT SERVES.
5. ALL FITTINGS SHALL BE BRASS WITH COMPRESSION/PACK JOINT CONNECTIONS.
6. ~~NO SERVICE LINE SHALL CONNECT OR TERMINATE UNDER A DRIVEWAY.~~
6. ~~PROTECTIVE BARRIER TO BE 3-2x4 or 2" POLES w/ WITH RED CONSTRUCTION WARNING FENCE OR TAPE.~~
7. ~~TUBING SHALL BE BLUE FOR POTABLE WATER AND PURPLE PANTONE 522C FOR RECLAIMED WATER IN COLOR.~~
8. ~~CONTRACTOR TO INSTALL SERVICE LINE, METER BOX, AND TERMINATE LINE IN BOX WITH CURB STOP EQUIPPED WITH TEMP PLASTIC PLUG AT END.~~

**POTABLE WATER AND RECLAIMED WATER SERVICES (TYPICAL)**

**FIGURE GR-20-1**

9. Meter boxes as described shall not be installed in driveway or sidewalk.

- **Chapter Four (4): Potable Water**
  - **Section 410: H Dead Ends**
  - **Section 450-B: Approved Materials Checklist**
  - **Standard Drawing:**
    - **WA-04-2 Fire Service Master Meter Assembly**

**CHAPTER 4**

**WATER**

**Section 410**

**Potable Water Main Standards and Specifications**

December 2010

1. At a minimum, specifications outlined in the latest version of LAND DEVELOPMENT CODE and applicable COUNTY fire codes shall apply. Specifically, minimum fire flow rates for individual uses shall be established by the Fire Marshall.
2. Hydrants assemblies shall be placed on the same side of the roadway as the water mains and shall be placed at 500-foot intervals in commercial, multifamily, and industrial areas. Hydrant spacing for single-family residential and other areas shall be 1,000-foot intervals.
3. Unless otherwise directed by the Fire Marshall, fire hydrant assemblies in non-residential developments shall have a minimum horizontal separation distance from a structure that is equal to the vertical distance from the finished ground elevation to the eaves of the structure.
4. If an existing fire hydrant assembly has to be relocated more than five feet longitudinally for any reason, the main shall be tapped and the existing fire hydrant assembly re-installed by the DEVELOPER. Should the existing assembly not be in good condition according to PCU or not in compliance with this MANUAL, it shall be replaced with a new fire hydrant assembly by the DEVELOPER. Relocations of five feet or less shall be accomplished by the DEVELOPER utilizing a section of pipe of the approximately length, diameter, material, and restrained joints.

H. Dead Ends:

1. In order to provide adequate increased system reliability, of service and reduce head loss, and avoid water quality degradation, all water mains shall be designed to provide complete system looping with all portions of the system being fed from at least two directions. At the discretion of PCU, dead ends may be permitted in cul-de-sacs if the project does not have future phases or it is determined that no other practical looping alternative is available. Dead end water mains in cul-de-sacs shall be designed and constructed as shown in Figure GR-19-1.~~dead ends shall be minimized by making appropriate tie ins whenever practical, as determined by PCU.~~
2. Where permanent dead-end mains occur, they shall terminate with a fire hydrant, flushing hydrant, or blow-off assembly for flushing purposes. Automatic-metered flushing devices may be required to maintain water quality in water mains. No potable water flushing device shall be directly connected to any WASTEWATER or STORMWATER SYSTEM.

I. Valves:

Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Inline valves shall be located no more than 500 feet apart in commercial, industrial, and high-density residential areas and no more than 1000 feet in all other areas. In addition, inline valves shall be utilized to isolate a maximum of 40 ERC's in order to reduce inconveniences to other customers. A minimum of two valves per tee and three valves per cross shall be required to isolate and maintain adequate service. Valves shall be placed at phase lines and located at the end

**CHAPTER 4**

**WATER**

**Section 450-B**

**Approved Materials Checklist**

December 2010

Four (4) sets of the CONTRACTOR's and ENGINEER's executed APPROVED MATERIALS CHECKLIST and any necessary shop drawings shall be submitted to PCU for its use and approval, plus the number of sets needed for the CONTRACTOR use. Ordering materials and products without specific written approval from PCU of the submitted list and shop drawings is NOT recommended and is done at the CONTRACTOR's sole expense and responsibility.

**NOTE: The latest changes approved by the Utilities Code Committee are indicated by "underlining" and deleted items by "~~strikethroughs~~".**

<b>Water Category 1 of 10: VALVES AND ACCESSORIES</b>			
<b>ITEM TO BE USED</b>	<b>Manufacturer</b>	<b>Part Number</b>	<b>Comments</b>
<b>Automatic Combination Air / Vacuum Release Valves:</b>			
	ARI	D-040	Combination
	ARI	S-050	Air Release Only
	ARI	S-010	Air Release Only
	Val-Matic	VM-38	Air Release Only – Plant, Facility Use Only
	Val-Matic	VM-45	Air Release Only – Plant, Facility Use Only
	Val-Matic	VM-200C	Combination – Plant, Facility Use Only
<b>Air / Vacuum Release Valve Enclosure (Horizontal Venting and Medium Blue):</b>			
	Water Plus	131632	
	Channell	BPH 1730	
	Hydro-Guard	Safety-Guard 15100 Low Profile or 02100	
<b>Air / Vacuum Release Valve Vault Frame And Cover:</b>			
	US Foundry	USF-679-BK-M	
	CertainTeed	Pamrex 36"	Alternative – <u>Not to be used in paved roadways.</u>
<b>Blow Off Valve:</b>			
	Hydro Guard	HG-2 Low Profile	Automatic Blow Off (Self-contained unit)
	<del>Water Plus</del>	<del>Series VB 2000</del>	<del>Automatic Blow Off (Self-contained unit)</del>

**CHAPTER 4**

**WATER**

**Section 450-B**

**Approved Materials Checklist**

December 2010

<b>Water Category 4 of 10: PIPE FITTINGS</b>			
<b>ITEM TO BE USED</b>	<b>Manufacturer</b>	<b>Part Number</b>	<b>Comments</b>
<b>Expansion Joints:</b>			
	EBAA Iron		
	Metraflex		
	Star	Star Flex Series 5000, 5100, & 5200	
	Proco		
	Mercer Rubber		
<b>Fittings C153 SSB / C110 Flange (Cement Mortar Lined And Asphaltic Coated In Accordance With C104) (Outside Surfaces Shall Be Prime Coated Only If Located Aboveground And Painted):</b>			
	American		
	Union/Tyler		
	US Pipe		
	<u>Serampore Industries (SIP)</u>		
	Sigma		
	Star Pipe		
<b>Restrained Joints - Ductile Iron Pipe:</b>			
	American	Fast Grip Gasket Flex Ring Field Flex Ring Lok Ring	
	EBAA Iron Inc.	Mega-lug Series 1100 Series 1700 Bell Restrainer Series RS-3800 Restrainer - sleeve included	
	<u>Serampore Industries (SIP)</u>	<u>EZ Grip</u>	<u>For DI Pipe</u>
	Sigma	One LOK SLD	
	Sigma	LOK Series PVP and PVPF	

**CHAPTER 4**

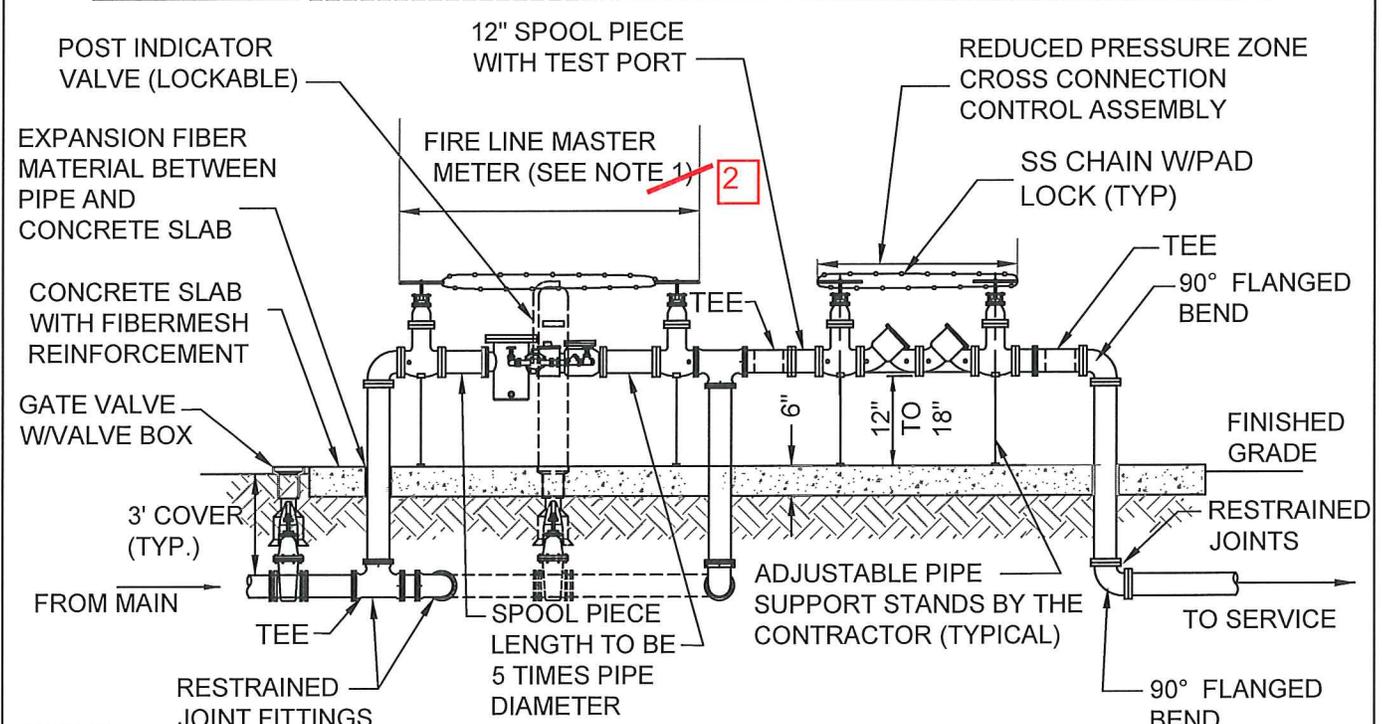
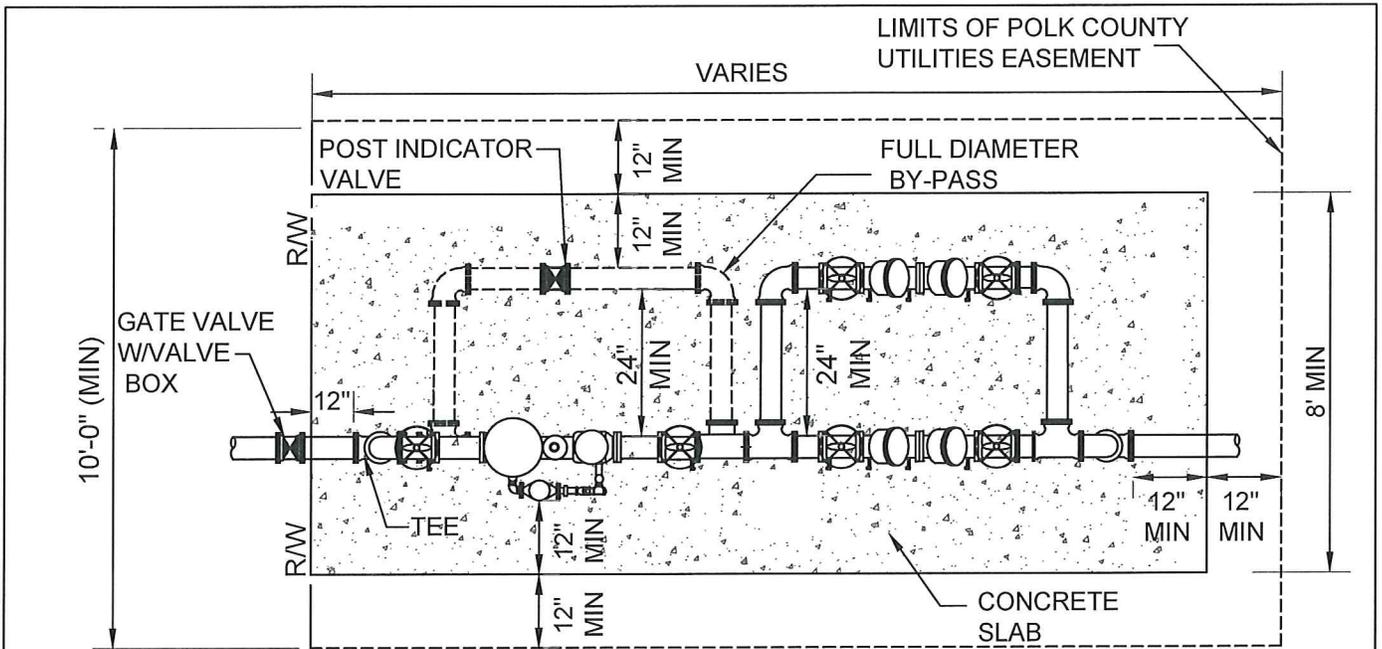
**WATER**

**Section 450-B**

**Approved Materials Checklist**

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	Star	Stargrip Series 3000, 3000S,& 3000OS Series 3100S & 3100P Flange Adapter Series 200 & 400 Retainer Gland Series 600 Series 1000, 1100, & 1200 Adapter Flange Series 3200 & 4200	
	Tyler/Union	Tuf Grip TLD Series 1000, 1000S  Tuf Grip Dual Wedge Restraint Series 1500	For DI Pipe Use  For PVC, DIP, HDPE pipe use
<b>Restrained Joints - PVC Pipe:</b>			
	EBAA Iron Inc.	Mega-lug Series 2000PV Series 1500 & 1600 Bell Restrainer (4-inch to 12-inch) Series RS-3800 Restrainer – sleeve included	
	JCM	620 Sur-Grip Bell Joint 621 Sur-Grip Bell Joint	
	Uni-Flange/Ford	1350 Bell Restrainer 1360 Bell Restrainer 1390 Bell Restrainer 900 Adapter Flange 1300 Fitting Restrainer 1500 Series	
	<u>Serampore Industries (SIP)</u>	<u>EZ Grip</u>	<u>For PVC</u>
	Sigma	One LOK SLC	
	Sigma	PV LOK Series PVP and PVPF	
	Star	PVC Stargrip Series 4000 & 4000P PVC Harness Series 1000, 1100, & 1200 Adapter Flange Series 3200 & 4200 Adapter Flange Series 200 & 400	



- NOTES:
1. DOUBLE CROSS CONNECTION CONTROL ASSEMBLIES SHALL BE UTILIZED WHERE THE WATER SUPPLY CAN NOT BE INTERRUPTED.
  2. THE CONTRACTOR SHALL PROVIDE AND INSTALL THE FIRE SERVICE MASTER METER INCLUDING THE METER, CROSS CONNECTION CONTROL ASSEMBLY, ALL PIPE FITTINGS, AND APPURTENANCE.
  3. ALL THE ABOVE GROUND PIPE SHALL BE FLANGED DUCTILE IRON.
  4. PAINT THE ABOVE GROUND ASSEMBLY, INCLUDING ENTIRE LENGTH OF TIE RODS, AFTER MANUFACTURER'S RECOMMENDED SURFACE PREP IS COMPLETED. DO NOT PAINT OVER NAME/SERIAL PLATE OR BRASS FITTINGS. PAINT COLOR SHALL BE "INTERNATIONAL ORANGE"
  5. BOLLARDS SHALL BE REQUIRED BY PCU ON CORNERS OF THE CONCRETE PAD TO PROVIDE PROTECTION FROM VEHICULAR TRAFFIC .
  6. ABOVE GROUND VALVES SHALL BE O.S. & Y TYPE.

<b>FIRE SERVICE MASTER METER ASSEMBLY (DOUBLE CROSS CONNECTION CONTROL ASSEMBLIES)</b>	<b>FIGURE WA-04-2</b>
POLK COUNTY UTILITIES, FLORIDA	DECEMBER, 2010

- **Chapter Five (5): Wastewater**
  - **Section 510: Part 7 Grease Traps, Interceptors, and Separators**
  - **Section 516: Wastewater Lift Station Electrical System Specifications**
  - **Section 550-C: Approved Materials Checklist**
  - **Standard Drawings:**
    - **WW-14-2: Triplex Lift Station Section View**

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**Section 510 Gravity Wastewater System Standards and Specifications** December 2010

with the specified ASTM designation and with the approved manufacturer's drawings. Sections shall be inspected for general appearance, dimension, "scratch-strength" blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

3. Manholes shall be inspected by PCU and defective manholes replaced by the CONTRACTOR. Pressure grouting of manholes for repair shall not be accepted.

**PART 6 - SERVICE LATERAL CONNECTIONS**

- A. Service connections shall be as shown in the STANDARD DRAWINGS.
- B. Service connections shall be permanently marked by cutting an "S" in the curb in direct alignment with the wye and the installation of a stake at the temporary plug to indicate the location of the service pipe as per the STANDARD DRAWINGS.
- C. Size and Length:  
Service laterals and fittings shall be a minimum of four inches in diameter for single services and six inches in diameter for double services. Service laterals shall be laid perpendicular to the receiving main, except in cul-de-sacs where service laterals may be connected to an upstream terminal manhole. Service laterals shall not exceed 150 feet. Service laterals shall terminate with a temporary plug at the right-of-way with individual cleanouts installed by the building's plumber in accordance with the STANDARD DRAWINGS.
- D. Slope:  
Service laterals shall have a minimum slope of one percent.
- E. If a floor slab elevation is lower than the closest manhole top elevation, then a private prefabricated pump station with a check valve (for each occurrence) shall be required to pump wastewater to the lateral at the cleanout in the road right-of-way. The private pump station shall be operated and maintained by the property OWNER.
- F. Connection:

Service laterals shall not be directly connected to sanitary manholes, except at terminal manholes. A maximum of three service laterals maybe connected directly to a terminal manhole. Incoming flows shall not be more than 90 degrees to the flow path in the manhole.

**PART 7 - GREASE TRAPS, INTERCEPTORS, AND SEPARATORS**

- A. Grease interceptors shall be required for all commercial establishments where food will be processed or cooked in any way. The grease interceptor will be sized as defined below and will have a minimum volume of 750 gallons. All kitchen waste lines will be routed through the grease interceptor. However, no domestic waste will be allowed to enter the grease interceptor. All wastewater flow from the kitchen areas of these establishments shall flow through approved grease interceptors prior to entering the

**CHAPTER 5 WASTEWATER**

**Section 510 Gravity Wastewater System Standards and Specifications** December 2010

PCU system. In some cases, a grinder may be required for meat and fish processing plants.

- B. Grease interceptors shall be located outside of buildings where the proposed food waste line will have adequate slope and be accessible for maintenance and inspection at all times.
- C. Sizing:  
Refer to Table 510-4 for sizing requirements.
- D. Grease interceptors shall be placed where the proposed food waste line will have adequate slope and be accessible for maintenance and inspection at all times.
- E. Under-the-Counter Grease Traps:
  - 1. Where location of an outside grease interceptor is determined not feasible by PCU, PCU may approve an under-the-counter grease trap on a case-by-case basis. A commercial establishment where food will be processed or handled will only be considered for an under-the-counter grease trap if it meets all of the following criteria:
    - a. The building must be in existence at the time the under-the-counter grease trap is being proposed;
    - b. The restaurant or food preparation establishment must have less than 600 gpd of wastewater flow;
    - c. An under-the-counter grease trap must be installed on all drain fixtures in the food preparation areas; and
    - d. ENGINEER shall consult with PCU personnel before finalizing the design.

2. Refer to the following calculation to determine minimum grease trap sizing (flow through rating) requirements:

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$$\text{Minimum Grease Trap Capacity (GPM)} = [\text{Combined Sink} * \text{Storage Volume (units in gallons)}]1 \times 0.75$$

\*\*Include all hand sinks and food/beverage prep sink interior bowl/basin volumes, but do not include the mop sink basin volume or floor drain flows in this calculation.

F. Lint Interceptors/Traps: Lint interceptors/traps are required for all commercial laundry operations, laundry mats, hotels, and resorts having more than two residential sized laundry machines or one or more commercial laundry machine. Lint interceptors/traps must be a minimum of 100 gallons in size, removable for cleaning, prevent passage into the drainage system of solids 0.5 inch or larger in size as well as, string, rags, buttons, or other materials detrimental to the public sewer system. Lint traps shall be sized based on number of washing machines, wastewater flow rate, wastewater retention time and storage factor. Refer to the following calculation to determine minimum lint interceptor/trap sizing requirements:

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CHAPTER 5

WASTEWATER

Section 510 Gravity Wastewater System Standards and Specifications

December 2010

Minimum Lint Interceptor/Trap Size (in gallons) = (TGC)x(CPH)x(RT)x(ST)

Where:

TGC = Total gallons per standard wash cycle

CPH = Cycles per hour

RT = Retention time:

2.5 for institutional laundry

2.0 for standard commercial laundry

1.5 light commercial laundry

ST = Storage factor, based on hours of operation:

1.0 for 8 hours of operation

1.5 for 12 or more hours of operation

G. Oil and Water Separators:

1. Oil and water separators are required for all facilities where commercial vehicles or equipment are repaired, maintained or washed, including vehicle repair garages, car-washing facilities, factories, and all other facilities where oily liquid wastes are produced.
2. Oil and water separators shall be individually designed and sized for each site-specific application but shall have a depth of no less than two feet below the invert of the discharge drain. The outlet opening of the separator shall have no less than an 18-inch water seal.
3. Where automobiles are serviced, greased, repaired or washed or where gasoline is dispensed, oil and water separators shall have a minimum capacity of 6 cubic feet for the first 100 square feet of area to be drained, plus 1 cubic foot for each additional 100 square feet of area to be drained into the separator.
4. All commercial vehicle-washing systems shall be equipped with a water recycling system that has no connection to the county sanitary sewer system. For the purposes of this Section, commercial vehicle washing systems shall include systems associated with businesses that sell or lease cars, trucks, boats, and other motorized vehicles. Hand-held hoses are exempt from this provision.

H. Sand and grit separators/traps: Sand and grit separators/traps are required for all commercial facilities discharging fine particles, floatables, or other debris that could cause clogs or blockages in the county collection system. Examples include sand, dust, metal shavings, rags, strings, feathers, glass, etc.. Sand and grit separators shall be individually designed and sized for each site-specific application and include ready access for cleaning and shall have a water seal of no less than six inches.

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**CHAPTER 5**

**WASTEWATER**

**Section 510 Gravity Wastewater System Standards and Specifications**

December 2010

**Table 510-4. Sizing Requirements for Grease Traps, Interceptors, and Separators.**

Type	Unit	Grease Interceptor/ Trap Capacity Single (gallons)*	Grease Interceptor/ Trap Capacity In Series (gallons)*	<del>Grease, Oil and Water, or Sand</del> Separator Capacity (gallons) <u>minimum</u>	<del>Separator</del> Lint Interceptor/ & Sand Trap Capacity (gallons) <u>minimum</u>
Restaurant	seat	20	10		
Restaurant – Fast Food	seat	10	5		
Restaurant – 24-hour	seat	30	15		
Convention Center/ Manufacturing Cafeteria	meal	3	1.5		
Vehicle Repair, Maintenance, or Equipment Wash Facility	bay			200*	
Facility Using Commercial-Type Laundry Machines	machine				100*

\* Minimum volume of 750 gallons.

**PART 8 - SERVICE LOCATION AND IDENTIFICATION**

- A. The location of all service lines shall be as shown on the STANDARD DRAWINGS. On curbed streets, the exact location of each service shall be adequately and permanently identified using durable plastic green colored pavement markers that states “Wastewater Service” and “Call Before You Dig” as specified by the appropriate “Approved Materials Checklist”. Each marker shall be securely attached to the curb in accordance with the manufacturer’s guidelines approximately 6 inches from the top of the curb.
- B. Where no curb exists, the exact location of each service shall be adequately and permanently identified using durable plastic green colored pavement markers that states “Wastewater Service” and “Call Before You Dig” as specified by the appropriate “Approved Materials Checklist”. Each marker shall be securely attached to the pavement in accordance with the manufacturer’s guidelines approximately 6 inches from the edge of pavement.

**CHAPTER 5**

**WASTEWATER**

Re-written September 2014

**Section 516 Wastewater Lift Station Electrical System Specifications**

December 2010

**PART 1 - GENERAL**

**1.01 SCOPE OF WORK**

- A. This Section specifies the electrical system requirements for wastewater lift stations. These requirements apply to standard lift stations and also include general requirements applying to stations with Variable Frequency Drives (VFDs) and Motor Control Centers (MCCs). Provide all work necessary for a complete and operational lift station installation.
- B. All work shall be performed in accordance with the current revision of the National Fire Protection Association (NFPA) 70, National Electrical Code (NEC) and OSHA regulations and guidelines. Provide equipment labeled or listed by a nationally recognized testing laboratory or other organization as a basis for approval under the NEC.
- C. Pump Operation shall be controlled automatically by means of hydrostatic pressure transducer level sensors with a float ball backup system for pump control and level alarms. VFD pump operation shall be PID-controlled to maintain a level set point in the wet well. VFD driven pumps shall start and stop based on specific level set points.
- D. Lift station control panel(s) shall be provided for each wastewater lift station. Refer to Section 517, SCADA and Control Panel Specifications for requirements related to lift station control and monitoring and control panel construction and materials.

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**1.02 DESIGN REQUIREMENTS**

- A. Unless otherwise noted, the latest version of the following codes and standards shall be used for the design and construction of County Utility Lift Stations.
  - a. Institute of Electrical and Electronics Engineers (IEEE).
    - i. Standards as applicable for design and implementation.
  - b. National Electrical Manufacturers Association (NEMA).
    - i. Standards as applicable for design and implementation.
  - c. National Fire Protection Association (NFPA):
    - i. 70 – National Electrical Code.
    - ii. 70E - Standard for Electrical Safety in the Workplace.
    - iii. 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
  - d. Telecommunications Industry Association (TIA); Electronics Industry Association (EIA):
    - i. 607. Commercial Building Grounding and Bonding Requirements for Telecommunications.
  - e. Underwriters Laboratory, Inc.
    - i. 508. Standards for Safety, Industrial Control Equipment.
    - ii. Component specific standards as applicable.
- B. All lift station designs shall comply with the requirements of the Florida Administrative Code and Florida Administrative Register Rule Chapter 61G15-33. Responsibility Rules

of Professional Engineers Concerning the Design of Electrical Systems.

- C. All lift station electrical designs shall be signed and sealed by an Electrical Engineer registered in the State of FL.
- D. The following documents shall be provided for each lift station design and construction project at a minimum:
  - a. Power Distribution riser or single line diagram with available utility short circuit current and equipment short circuit current interrupt ratings and all breaker and wire ratings and sizes.
  - b. Conductor gauges and insulation type and conduit size and type.
  - c. Location and type of surge protective devices.
  - d. Location and sizes of all electrical equipment and control devices. Equipment rack layouts.
  - e. Load calculations.
  - f. Grounding and bonding layouts and details including type and location of grounding rods, conductor type and size, and bonding requirements.
  - g. Control and instrumentation wiring risers or diagrams.
  - h. Electrical Legends.
  - i. Design specifications noting all equipment, workmanship, installation, and testing requirements
  - j. Construction Submittals for all components.
  - k. As-built construction drawings.
  - l. Testing documentation.
  - m. Lift station electrical O&M manuals.

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## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Provide products and materials as specified in the appropriate "Approved Materials Checklist" and as specified herein. Provide products of the same or similar type of one manufacturer in order to achieve standardization.
- B. Equipment and devices installed outdoors shall be capable of continuous operation within a minimum ambient temperature range of minus 22 degrees F to 144 degrees F unless noted otherwise.
- C. Provide manufacturer's standard finish except where specific color or finish is indicated.

### 2.02 POWER SUPPLY AND MAIN DISCONNECT

- A. Coordinate installation of all new and modified power services with the local utility and obtain all required permits.
- B. Power supply to the control panel shall be 240-volt, 3-phase, 4-wire (Delta) or 480-

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volt, 3-phase, 4-wire (Wye). Service shall be designed for the station full load amperes including the loading of any planned future equipment plus a minimum 50% spare capacity. Single-phase power is not permitted.

- C. The power supply cables to the control panel from the off-site source shall be installed underground within a minimum 3-inch diameter schedule 80 PVC electrical conduit and in accordance with the NEC.
- D. For systems having a permanently mounted standby generator, refer to Section 516 Part 2.07 "Standby Power Generator System" for generator and transfer switch requirements.
- E. Systems requiring a portable generator connection shall meet the following requirements:
  - 1. Coordinate requirements with control panel supplier ~~to ensure the appropriate transfer mechanisms, breakers, and generator receptacle are provided based on the selection of service entrance equipment.~~
  - 2. Provide a breaker based UL1008 listed and service entrance rated transfer switch with generator cam-lock connectors to be used as the service entrance equipment and terminate utility feed to this device. Refer to Manual Transfer Switch (MTS) specification for requirements.
  - 3. ~~At the option of the Contractor, a generator receptacle with appropriately interlocked breakers in the control panel and externally mounted breaker based service entrance rated disconnect switch may be used in lieu of the above transfer switch. A separately mounted service entrance rated breaker type main disconnect shall be provided to terminate utility power outside of the control panel. The service entrance rated breaker type disconnect shall be rated for 100A minimum and be of NEMA 4X construction. A main circuit breaker and generator breaker with mechanical interlock and generator receptacle shall be installed in the control panel for manual switching between utility and generator power. Coordinate all requirements with the control panel supplier.~~
- F. Manual Transfer Switch:
  - 1. Provide service entrance rated UL 1008 listed manual transfer switch for lift stations requiring portable generator systems.
  - 2. Transfer switch shall be molded case breaker-based with safety interlocked door and interior dead-front panel construction. Transfer switch enclosure shall be NEMA 3R ~~304 Stainless Steel~~ powder coated galvaneal steel construction ~~powder coated white.~~
  - 3. Switches shall be 240V or 480V AC 3-phase, 4-wire based on available site voltage and rated for a minimum of 100A. Provide with color coded cam-lock style connectors as required for the site specific amperage having a minimum 400A rating.
  - 4. ~~Provide local indication of utility power available and utility power status dry~~

~~contact for connection to the control panel.~~

~~5.4.~~Manufacturer: ESL Power Systems Stormswitch or approved equal.

- G. ~~On all 480-volt systems~~Where required by the local electrical utility, an additional UL listed, NEMA 3R, lockable, non-fused, safety type switch utility service disconnect shall be installed ahead of the utility meter in accordance with local utility requirements. The disconnect shall be rated for the maximum available fault current from the utility serving the lift station.
- H. Provide 3-phase surge suppression on the downstream side of the transfer switch to provide surge protection on both utility and generator power. A Surge Protective Device (SPD) shall be included and wired to protect motors and control equipment from induced line surges. All SPD's shall be UL listed and installed in accordance with the respective power company requirements and manufacturer's specifications. SPD's shall be attached to the load side of the main transfer switch and mounted in a separate NEMA 4X enclosure directly attached to the transfer switch enclosure. Where a manual transfer switch is not supplied, SPD's shall be installed downstream of the control panel main and generator breakers and mounted external to the control panel. SPD's shall meet the following minimum requirements:
1. The SPD unit shall be UL listed and labeled as per UL 1449 latest edition and have a UL 1283 listing for active sine wave tracking.
  2. The unit shall meet "Testing Requirements" of IEEE 62.41 and 62.45.
  3. Minimum 10-year replacement warranty.
  4. Provide with Disconnect Only option.
  5. Provide status indicator lights and contact relay output indicating suppressor fault.
  6. Manufacturer:
    - i. Eaton, SPD series.
    - ii. Eaton/Innovative Technology Protector, PTE series.
    - iii. Approved Equal.

### 2.03 BOXES

- A. Outlet and Device Boxes:
1. General: Outlet and device boxes shall be cast aluminum with a powder coat finish and threaded outlets. The boxes shall be gasketed, weatherproof, and UL listed for wet locations. Provide with matching gasketed weatherproof covers selected for the appropriate application.
  2. All receptacles and switches shall be industrial grade as manufactured by Eaton/Cooper, Hubbell, or Leviton.
  3. For wet location receptacles, provide die-cast powder coated aluminum impact-resistant, single-gang outlet cover with a NEMA 3R rating while in-use.

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4. For wet location switches, provide gasketed powder coated aluminum covers with hinge.
  5. Manufacturers (boxes):
    - i. Crouse-Hinds, Cast Aluminum Weatherproof FS/FD Boxes.
    - ii. Thomas and Betts, Cast Aluminum Weatherproof FS/FD Boxes.
    - iii. Appleton, Cast Aluminum Weatherproof FS/FD Boxes.
- B. Terminal Junction Boxes (Hazardous Locations):
1. Terminal junction boxes for hazardous locations shall be provided for all junction boxes having a direct connection to the lift station wet well where there is not an appropriate listed conduit seal-off or air gap in between.
  2. Provide an ATEX or equivalently approved Type Ex e Class I Zone 1 terminal junction box having UL Listed NEMA 4X Type 304 stainless steel construction for termination of wet well power and control wiring. Power and control wiring shall be separated by a minimum of 12-inches. Separate power and control wiring junction boxes may be provided. The box shall be provided with corrosion resistant terminal strips to accommodate instrumentation and power conductors from the wet well. Seal conduits entering the junction box from the wet well with duct seal, or equivalent, and provide a minimum Class I Division 2 poured conduit seal between the junction box and control panel.
  3. Junction Box: Hoffman Zonex ATEX certified Type 4X, or approved equal.
  4. Terminal Block: Eaton XB series, Phoenix Contact UT series, or approved equal Ex e labeled corrosion resistant screw type terminal block.
- C. Terminal Junction Boxes (Non-Hazardous Locations):
1. General: Provide terminal junction boxes as required.
  2. Terminal junction boxes shall be NEMA 4X Type 304 Stainless Steel with hinged cover and white enamel painted interior mounting panel.
  3. Manufacturers:
    - i. Hoffman.
    - ii. Rittal.
    - iii. Schaefer.
- D. Concrete electrical box:
1. General: Provide concrete electrical boxes as required for underground electrical circuits.
  2. Concrete electrical boxes shall be sized as required, have H/20 loading capacity and shall be reinforced concrete with extension and open bottom with openings in each end for conduit entry. Covers shall be galvanized steel diamond plate with

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integral handle with appropriate label/markings and locking bolts.

3. Manufacturer: Oldcastle/Christy B series or approved equal.

**2.04 CONDUIT AND FITTINGS**

A. Rigid Aluminum Conduit:

1. Provide rigid aluminum conduit above grade and where conduit sealing fittings are used. Provide aluminum sealing fittings to prevent galvanic corrosion and seizing of threaded connections. Use with stainless steel Myers hub for connections to enclosures. Provide PVC-coated conduit or coat aluminum with bitumastic where in contact with concrete.
2. Rigid aluminum conduit shall meet requirements of NEMA C80.5 and UL6A and be of Type 6063 copper-free aluminum alloy.

B. PVC Schedule 80 Conduit:

1. Provide PVC Schedule 80 conduit below grade. PVC conduit may be extended from below to above grade where conduit sealing fittings are not required such as from the wet well to the terminal junction box.
2. PVC Schedule 80 conduit shall meet the requirements of NEMA TC-2 and UL 651 and shall be furnished without factory formed bell.

C. Flexible Metal Liquid-tight Conduit:

1. Provide flexible metal liquid-tight conduit where necessary to provide flexible connections for instrument and equipment connections.
2. Flexible metal liquid-tight conduit shall meet the requirements of UL 360 and be constructed of galvanized steel with an extruded PVC jacket.

D. Fittings:

1. Rigid aluminum fittings shall meet the requirement of UL 514B and be of copper-free construction.
2. PVC fittings shall meet the requirements of NEMA TC-3.
3. Manufacturers:
  - i. Crouse-Hinds.
  - ii. Thomas and Betts.
  - iii. OZ-Gedney.

**2.05 ALARM LIGHT, HIGH LEVEL**

- A. A vapor proof and vandal proof screw-on type red alarm light shall be mounted on top of a separate 1½ inch minimum diameter Schedule 40 aluminum riser pole located behind and connected to the bottom of the panel by a 1½ inch minimum

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diameter water tight flexible electrical conduit. The riser pole shall be secured to the horizontal cross member struts, not the panel, with the bottom of the light being no less than 12 inches but not more than 18 inches above the top of the enclosure.

- B. Alarm Light Specification:
  - 1. Type: Rotating reflector or flashing bulb.
  - 2. Dome: Polycarbonate.
  - 3. Color: Red.
  - 4. Enclosure: NEMA 4X with ½-inch threaded pipe fitting.
  - 5. UL Listed.
  - 6. Power: 24Vdc.
  - 7. Manufacturer:
    - a. Federal Signal, 225XST.
    - b. Edwards Signaling.
    - c. Approved equal.

**2.06 ELECTRICAL EQUIPMENT RACK**

- A. The main support beams shall be minimum 6-inch structural aluminum I-Beams or H-Beams with a minimum web thickness of 0.210 inches. Two coats of bitumastic coating shall be applied where aluminum will be in contact with concrete or the ground.
- B. Horizontal cross member struts shall be 12-gauge stainless steel U-channels with a minimum nominal dimension of 1-1/2" inch by 1-inch. The ENGINEER shall review the structure's wind loading requirements and make any size increases to the main support posts as needed. All other electrical equipment support brackets and hardware shall be 316-stainless steel. Hardware shall include, as a minimum, brackets, nuts, bolts, washers, toggle bolts, clamps, straps, etc.
- C. An outdoor rated weatherproof GFCI receptacle, UL listed for wet locations, shall be mounted on the electrical equipment rack with NEMA 3R while-in-use aluminum cover. The receptacle shall be fed from a dedicated circuit.

**2.07 STANDBY POWER GENERATOR SYSTEM**

- A. General:
  - 1. A stationary standby power generator system including the diesel engine generator and automatic transfer switch shall be installed at lift stations, as required by Section 512 entitled "Wastewater Lift Station Standards and Specifications".
  - 2. The generator shall be sized to carry the full lift station load with all pumps operating. Operating voltage shall match of the lift station utility source.

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3. Generator configuration shall be diesel engine in a weatherproof sound attenuated enclosure with a diesel fuel tank(s) and separately mounted automatic transfer switch.
  4. Manufacturers:
    - i. Caterpillar
    - ii. Cummins
    - iii. Kohler
- B. Generator Set:
1. Generator Set shall be a UL 2200 listed package.
  2. The generator set shall consist of a diesel engine directly coupled to an electric generator, together with the necessary controls and accessories to provide continuous electric power to the lift station for a minimum duration of 48-hour failure of the normal power supply. The main fuel tank shall have at least 133 percent of the amount of fuel required for the class rating (Class 48), as defined in NFPA 110. The generator set shall be sized to operate continually for the minimum run time of 48 hours under a full load condition.
  3. A complete engine generator system shall be furnished and installed with fuel transfer pump, fuel tank, day tank with rupture basin (where required), battery, battery charger, muffler, radiator, control panel, remotely mounted automatic transfer switch, and all other accessories required for an operational system. All materials and parts of the generator set shall be new and unused. Each component shall be of current manufacture from a firm regularly engaged in the production of such equipment. The set shall be of a standard model in regular production at the manufacturer's place of business.
- C. Requirements:
1. The emergency generator set and accessories shall be of a type that complies with the latest edition of the NEC and all applicable state and local building codes.
  2. The material and workmanship used in the manufacture of this equipment shall be of the highest quality consistent with the current standards for like equipment, and the equipment shall be manufactured in such a manner so as to conform to the latest applicable IEEE, ANSI, ISA, and NEMA standards.
- D. Engine:
1. The engine shall be water-cooled, four-stroke cycle, compression ignition diesel. The engine shall be equipped with a fuel filter with a replaceable spin-on canister, lube oil and intake air filters, lube oil and fuel coolers, a fuel transfer pump, fuel priming pump, and a jacket water cooling system consisting of jacket water pump, fan assembly, fan guard, and duct flange outlet.
  2. The engine and generator shall be torsionally compatible to prevent damage to either engine or generator. An engine instrument panel shall be installed on the

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generator set in an approved location. The panel shall include oil and fuel pressure and water temperature gauges. A mechanically driven engine hour meter shall also be provided.

3. The engine governor shall be of the isochronous electronic type. Frequency regulation shall not exceed plus/minus 0.25 percent under steady state conditions. The engine shall start and assume its rated load within 10 seconds, including transfer time.
- E. Generator:
1. The generator shall be a three-phase, 60-hertz, single bearing, synchronous type, built to NEMA Standards. Epoxy impregnated Class F insulation shall be used on the stator and the rotor.
  2. The excitation system shall employ a generator-mounted volt per hertz type regulator. Voltage regulation shall be plus/minus two percent from no load to full load. Readily accessible voltage drop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of plus/minus five percent.
- F. Engine Generator Control Panel:
- Control panel shall be mounted inside generator enclosure. Panel shall contain, but not be limited to, the following equipment:
1. Control Equipment:

Control equipment shall consist of all necessary exciter control equipment, generator voltage regulators, voltage-adjusting rheostat, and speed control equipment and automatic starting controls, as required to satisfactorily control the engine/generator set. In addition an automatic safety shut down shall be provided for low oil pressure and/or high temperature conditions in the engine. An emergency shut down lever switch shall be provided on the air intake. Provide the following I/O for interface with the control panel PLC via a Modbus or an Ethernet Modbus TCP interface:

    - a) System Not in Auto.
    - b) Engine ON.
    - c) Engine Fault.
    - d) Engine Control Panel Fault.
    - e) Low Battery.
    - f) Low-Oil Pressure.
    - g) Low-Coolant Temperature.
    - h) High-Coolant Temperature.
    - i) Over Crank Fault.
    - j) Over Speed.
  2. Metering Equipment:

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Metering equipment shall include 3-1/2-inch meters (dial or digital type frequency meter, two percent accuracy voltmeter, and ammeter and ammeter-voltmeter phase selector switch). The control panel shall also include the engine water temperature, lube oil pressure and hour meter.

3. Fault Indicators:

Individual press-to-test fault indicator lights for low oil pressure, high water temperature, low water level, over speed, and over crank shall be provided.

4. Function Switch:

A four-position function switch marked "Auto", "Manual", "Off/Reset", and "Stop" shall be provided.

G. Battery Charger:

The battery charger shall be UL 1236 listed and designed that it shall not be damaged and shall not trip its circuit protective device during engine cranking or it shall be automatically disconnected from battery during cranking period. The charger shall be mounted inside the emergency generator enclosure. The charger shall have a 7-day/24-hour timer control. The charger shall include an ammeter and voltmeter, Power ON pilot light, AC failure relay and light, and a low and high DC voltage alarm and relay.

H. Battery:

The battery shall be lead-acid type with sufficient capacity to provide 90 seconds total cranking time without recharging. The battery shall be adequately rated for the specific generator set. The battery shall be encased in hard rubber or plastic, shall be housed in an acid resistant frame, and shall be furnished with proper cables and connectors, together with rack and standard maintenance accessories.

I. Base Mounting:

A suitable number of spring-type vibration isolators with a noise isolation pad shall be provided to support the set and its liquids. Isolators shall be bolted to concrete generator pad.

J. Electrical Connections:

All connections to the generator set shall be underground.

K. Cooling System:

The generator set shall be equipped with an engine-mounted radiator sized to maintain safe operation at 110 degrees Fahrenheit maximum ambient temperature. A blower type fan shall be used directing the airflow from the engine through the radiator. The motor shall be equipped with a crankcase heater. The entire cooling system shall be filled with 50 percent glycol-water solution.

L. Fuel System:

1. Regulated Tanks - a fuel tank that has a capacity greater than 550 gallons.

Regulated tanks are subject to F.A.C. 62.762 and must have registration submitted and insurance in place. Both registration and monthly visual inspection reports shall be kept on site and readily available for review by the Federal Department of Environmental Protection (FDEP) and/or the Florida Department of Health (DOH). Any tank installation that is greater than 1320 gallons shall have a Spill Prevention, Control, and Countermeasure Plan (SPCC) completed by the Engineer of Record prior to installation and registration as per the COUNTY and Title 40 Code of Federal Regulations (CFR), Part 112. Tanks shall have a 1993 sticker and content "diesel" label located in a conspicuous location that can be seen by anyone approaching the tank for inspection or fueling.

2. Non-Regulated Tanks - a fuel tank that has a capacity of less than 550 gallons.

Non-regulated tanks do not require registration or insurance and will be visually inspected quarterly and shall have a 1993, "Less than 550 Gallons" sticker and a content "diesel" label applied to the tank in a conspicuous location that can be seen by anyone approaching the tank for inspection or fueling.

3. All fuel tanks that are to be incorporated into a design drawing shall be reviewed and signed off by COUNTY staff prior to 100 percent plans for CIP projects being submitted for review or Level 2 approval for private development projects involving such infrastructure to be dedicated to PCU. Prior to ordering any fuel tank, the following will take place. Five signatures will be collected from the appropriate COUNTY staff that acknowledges a proposed delivery and installation of a fuel tank. Those signatures will come from the offices of Purchasing, PCU, Risk (insurance), Risk (regulatory) and Fleet Management. The PCU Environmental Staff shall be notified thirty (30) days prior to delivery to a COUNTY facility.

4. Fuel Storage Tank:

- a. All fuel tanks shall be double wall steel or steel and concrete tanks with an interstitial annular space.
- b. Provide fuel tanks sized as required for 48 hours of continuous runtime.
- c. Two fuel tanks in series is the maximum allowed at any one facility.
- d. Fuel tanks requiring a day tank for the generator shall include a rupture basin for the day tank.
- e. All fuel lines shall be installed above ground with a concrete pad separating the piping from the ground. The piping will be secured to the concrete every five feet to avoid vibration. The pipe shall be black iron with threaded ends. Pipe dope shall be used at all connections. No thread tape shall be used. Underground piping is prohibited for the fuel delivery system.
- f. All external tanks (non-belly tanks) shall have hurricane tie downs.
- g. Provide audible alarm when liquid level in tank reaches 90 percent of the capacity.
- h. Non-regulated tanks may have visual leak detection.
- i. Regulated tanks shall be equipped with the following fuel monitoring system:

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- a) Fuel tank level control panel for tank gauging, leak sensing, and audible/visual alarm annunciation. Panel shall be NEMA 4X construction.
- b) Provide 4-20mA output proportional to tank level and dry contact outputs for leak indication, and high-high, low, and low-low levels suitable for connection to SCADA control panel. Signals may be transmitted via Modbus or Ethernet Modbus TCP.
- c) Provide audible alarm for high and low levels and leak detection.
- d) Provide visual indication of tank level.
- e) If two tanks of 500 gallons, or greater, are installed at one site, both tanks shall follow the "regulated" installation procedures, meaning both tanks shall be equipped with the Pneumercator system.
- f) Provide Pneumercator type TMS-1000D or TMS-2000 console with MP55xS level probe and LS-600 series leak sensor.

5. Paint:

The fuel piping shall be painted red. The spill bucket, handrails, and front of stair tread shall be painted yellow. Vent pipes and all other appurtenances shall be painted black.

6. Fueling:

No fuel will be delivered to any tank prior to pressure testing and inspection by COUNTY staff. This includes but is not limited to testing of the generator. Fuel for testing and the first delivery to fill the tanks shall be at the CONTRACTOR's expense.

7. Inspection and Testing:

Inspection of the fuel tank and piping shall be completed by a member of the PCU Environmental staff. Inspection by anyone other than a member of the PCU Environmental staff will not relieve the CONTRACTOR or ENGINEER of responsibility or be accepted. Pressure testing of the fuel lines shall be conducted with a member of PCU Environmental staff present. The test will be conducted for two (2) hours at 5 PSI.

8. Violations:

All violations of the rules set forth by the Polk County Environmental Regulatory Committee shall be punishable as set forth by the Florida Department Environmental Protection. Any and all fines charged to the COUNTY as a result of regulatory violations on the part of a contractor will be paid by the contractor. All violations incurred by the CONTRACTOR will be reported to the Polk County Purchasing Division.

N. Exhaust System:

1. The generator set supplier shall provide a residential grade critical-type silencer, with flexible exhaust fittings, properly sized and installed, according to the manufacturer's recommendation. The silencer shall be mounted so that the

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engine does not support its weight.

2. Exhaust pipe size shall be sufficient to ensure that measured exhaust backpressure does not exceed the maximum limitations specified by the generator set manufacturer. The exhaust system shall be stainless steel and include a flexible, seamless, stainless steel connection between the engine exhaust outlet and the muffler. The exhaust system shall be a part of generator enclosure. A stainless steel weatherproof rain cap shall be installed over the exhaust pipe.
- O. Weatherproof Enclosure:
1. Enclosure and all other items shall be designed and built by engine manufacturer as an integral part of the entire generator set in accordance with UL 2200 and shall be designed to perform without overheating in the ambient temperature specified.
  2. Enclosure shall be constructed of 14 or 16-gauge sheet aluminum suitably reinforced to be vibration free in the operating mode. Enclosure shall have a rating of 75 db at the perimeter of the lift station site. Enclosure hardware shall be stainless steel.
  3. Four hinged doors shall be provided to allow complete access without their removal. Doors shall be pad lockable on handles.
  4. Each door shall have at least two latch-bearing points.
  5. Panels shall be completely and simply removable for major service access. Additional doors in front of the radiator shall be supplied for easy removal of radiator assembly.
  6. Enclosure shall be waterproof and the roof shall be peaked to allow drainage of rainwater.
  7. Baked enamel finish with primer and finish coat shall be painted before assembly. All fasteners shall be stainless steel.
  8. Unit shall have sufficient guards to prevent entrance by small animals.
    - a. Batteries shall be designed to fit inside enclosure and alongside the engine and shall be easily removable for service. Batteries under the generator are not acceptable.
    - b. Unit shall have coolant and oil drains outside the unit to facilitate maintenance. Each drain line shall have a high quality valve located near the fluid source.
    - c. Fuel filter shall be inside the base perimeter and located so spilled fuel cannot fall on hot parts of engine or generator. A cleanable primary fuel strainer shall be used to collect water and sediment between tank and main engine fuel filter.
    - d. Crankcase fumes disposal shall terminate in front of the radiator to prevent oil from collecting on the radiator core and reducing cooling capacity.
- P. Automatic Transfer Switch:
1. The automatic transfer switch shall be the product of a single manufacturer and

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housed in a NEMA 3R Type 304-stainless steel enclosure with drip shield and door gasket. There shall be permanently affixed to the interior side of the enclosure door both a data-plate that includes generator kVA/kW, fuel tank capacity, rated fuel consumption, serial and model number of generator set, and a 10-inch x 12-inch pocket for log sheet storage.

2. The transfer switch shall be provided with the following features:
  - a. Complete protection, close differential voltage sensing relays monitoring all three phases (pick-up set for 95 percent of nominal voltage, dropout set for 85 percent nominal voltage).
  - b. Voltage sensing relay on emergency source (pick-up set for 95 percent of nominal frequency).
  - c. Time delay on engine starting-adjustable from 1 second to 300 seconds (factory set at three second)
  - d. Time delay normal to emergency transfer-adjustable from zero second to 300 seconds (factory set at one second). The CONTRACTOR shall request time delay settings in accordance with the priority rating or their respective loads.
  - e. Time delay emergency to normal transfer-adjustable 30 seconds to 30 minutes (factory set at five minutes), and time delay bypass switch shall be provided on door of the switch cabinet.
  - f. Unload running time delay for emergency engine generator cooling down-adjustable from zero to five minutes (factory set at five minutes) unless the engine generator control panel includes the cool down timer.
  - g. A dual time on neutral position shall be present from emergency power to regular utility power upon generator exercise routine.
  - h. Provisions shall be adequate for monitoring the condition of the generator under the SCADA system. Provide dry contacts for monitoring of the following status signals. Signals may be communicated via Modbus or Ethernet Modbus TCP:
    - a) Switch in Auto.
    - b) Switch in Utility Position.
    - c) Switch in Generator Position.
    - d) Utility Power Available.
    - e) Generator Power Available.
    - f) Fault.
3. Manufacturers:
  - a. Emerson/ASCO
  - b. Cummins
  - c. Russelectric
  - d. Eaton/Cutler-Hammer

**2.08 INSTRUMENTATION**

- A. Provide instrumentation as shown on the PLANS and as required by Section 512 entitled "Wastewater Lift Station Standards and Specifications". Wire all analog instrumentation to the SCADA control panel for local and remote monitoring.
- B. Level Element/Transmitter, Hydrostatic, Wastewater:
  - 1. General: Measure and transmit signal proportional to water level. Provide cable length and level range as required for lift station.
  - 2. Type: Hydrostatic.
  - 3. Wetted materials may be stainless steel, titanium, Teflon, or Kynar.
  - 4. Provide with sintered metal filter or desiccant vent to prevent water intrusion into the vent tube.
  - 5. Loop-powered 4-20mA transmitter with integral lightning protection.
  - 6. Provide with all necessary installation materials. Provide strain relief cord for cable hanging.
  - 7. The element/transmitter shall be specifically designed for wastewater application.
  - 8. Manufacturer:
    - a. Endress and Hauser, Waterpilot FMX 21 with 42mm heavy duty construction.
    - b. Keller America, Level Rat.
    - c. Blue Ribbon, BC001 Birdcage type.
- C. Large Float Level Switches:
  - 1. General: Actuate contact at set liquid level.
  - 2. Type: Teflon coated stainless steel float with mercury switch.
  - 3. 6.5-inch maximum actuation differential.
  - 4. Provide switches with stainless steel mounting cable kit including 15-pound anchor and stainless steel cable clamps.
  - 5. Manufacturer:
    - a. Anchor Scientific, Roto-Float.
    - b. Siemens, 9G.
    - c. Contegra, FS 96.
- D. Pressure Gauges:
  - 1. General: Pressure indication with range 0 – 60 psi.
  - 2. Type: Bourdon tube with glycerin fill.
  - 3. Phenolic case with 4-1/2" diameter dial and glass window.

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4. Connection size: 1/2" lower connection.
5. Manufacturer:
  - a. Ashcroft, 1279 series.
  - b. Ametek, 1980 series.
  - c. Wika, XSEL series.
- E. Pressure Transmitter:
  1. General: Measure and transmit signal proportional to pressure.
  2. Provide with 0-150 psi range.
  3. Loop-powered with 4-20mA output with HART.
  4. Silicone filled with 1/2" NPT connection.
  5. NEMA 4X coated aluminum housing.
  6. Provide installation brackets, stand, and block and bleed valves.
  7. Manufacturer:
    - a. Rosemount; Model 2051.
    - b. Siemens; Sitrans P.
    - c. Endress and Hauser; Cerebar S.
- F. Electromagnetic Flow Meter and Transmitter:
  1. General: Measure, indicate, and transmit the flow of a conductive process liquid in a full pipe.
  2. Type: The magnetic flow meter shall be of the low frequency electromagnetic induction type and shall produce a DC-pulsed signal directly proportional and linear to the liquid flow rate..
  3. Provide flow range as required with a minimum 10:1 turndown ratio.
  4. Features:
    - a. Zero stability feature.
    - b. Empty pipe detection.
    - c. Measure bi-directional flow.
  5. Metering Tube: The metering tubes shall be constructed of stainless steel with carbon steel flanges. All magnetic flow meters shall be designed to mount directly in the pipe between ANSI Class 150 flanges and shall consist of a flanged pipe spool piece with laying length of at least 1-1/2 times the meter diameter.
  6. Enclosure: NEMA 6P continuous submergence.
  7. Liner: Hard rubber or polyurethane.

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8. Electrodes: Type 316 Stainless Steel or Hastelloy C.
9. Grounding rings: Provide two (2) type 316 stainless steel, if required.
10. The length of the section of straight pipe before and after the meter shall be a minimum of five (5) times the outside diameter of the pipe or as otherwise recommended by the manufacturer.
11. Transmitter:
  - a. NEMA 4X construction remote mounted.
  - b. Power 120Vac, 60Hz.
  - c. Digital LCD display with configuration menu and keypad.
  - d. 4-20mA output proportional to flow with HART.
  - e. Mount transmitter on separate stand with sunshield and face north.
12. Calibrated in an ISO 9001 or NIST certified factory.
13. Manufacturer:
  - a. Foxboro; 9100A with IMT25.
  - b. Siemens; Sitrans F M Mag 5100 W with F M MAG 5000.
  - c. ABB; WaterMaster.
- G. Outdoor Instrument Surge Suppression:
  1. General: Provide surge suppression for all 2, 3, and 4-wire instrumentation. Ground surge suppressor in accordance with manufacturer's instructions.
  2. NEMA 4X enclosure.
  3. UL 1449 Listed.
  4. LED indication where available.
  5. Manufacturers: Phoenix Contact, Weidmuller, Emerson/Edco.

**2.09 ELECTRICAL GROUNDING SYSTEM**

- A. Lift stations shall be grounded in accordance with the NEC and IEEE 142-2007, Recommended Practice for Grounding for Industrial and Commercial Power Systems. All grounding systems shall be tested by the 3-point fall of potential test in accordance with ANSI/IEEE Standard 81, or approved equivalent testing. Documentation shall include all test apparatus information and results in both tabular and graphical formats, where applicable.
- B. General: Provide 5/8-inch diameter copper clad steel ground rods 10-feet in length, minimum.
  - a. Provide ground rods around the concrete wet well pad perimeter at all four corners. Provide additional ground rods as required to ensure ground rods have a separation

- of approximately 20-feet.
- b. Provide ground rod box for most accessible ground rod to allow for access for testing purposes. Ground rod box shall be Christy No. G5, Lightning and Grounding Systems Inc. I-R series, Alltec Corp. TW-FL8T, or approved equal.
- C. Connectors:
- a. Below grade connectors and connections to reinforcing steel shall be exothermic weld type, Erico Cadweld or Cadweld Exolon.
  - b. All other connectors shall be mechanical type copper alloy as manufactured by Erico, Burndy, or Thomas and Betts.
- D. Conductors:
- a. Provide grounding ring connecting all system ground rods. Ground ring conductor shall be minimum #2/0 tinned stranded copper. Install ground ring approximately 30 inches below grade and 30 inches away from the wet well.
  - b. Provide #2/0 tinned stranded copper wire to equipment and structures as noted below.
  - c. Provide minimum #6 AWG green XHHW insulated copper stranded ground wire to instrumentation and equipment as noted below.
- E. The following outlines minimum grounding requirements:
- a. Bond wet well cover to wet well structural steel using #2/0 tinned copper wire.
  - b. Bond metallic valve vault covers to ground system using #2/0 tinned copper ground wire.
  - c. Bond control panel ground bus to grounding system using minimum #6 insulated copper ground.
  - d. Bond generator frame and neutral to grounding system with #2/0 tinned copper ground wire in accordance with the NEC.
  - e. Bond utility system neutral to grounding system with #2/0 tinned copper ground wire in accordance with the NEC.
  - f. Bond metallic enclosures to grounding system with minimum #6 insulated copper ground wire.
  - g. Bond chain link fencing to nearest ground rod using #2/0 tinned copper ground wire.
  - h. Ground all surge suppression and instrumentation in accordance with manufacturer's instructions using minimum #6 insulated copper ground wire.
  - i. Ground electromagnetic flow meter grounding rings with #6 insulated copper ground wire.
  - j. Ground all analog instrumentation shielded cables at one end at the control panel ground bus.
  - k. Bond together system neutrals, service equipment enclosures, exposed

noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.

1. Bond all metallic railing, supports, and cable racks with minimum #2/0 tinned copper ground wire.

### **2.13 VALVE ACTUATORS**

- A. The actuators shall be suitable for use on a nominal 460-volt or 220-volt three-phase 60-hertz power supply and are to incorporate motor, integral reversing starter, local control facilities, and terminals for remote control and indication connections. It shall be possible to carry out the setting of the torque, turns, and configuration of the indication contacts without the necessity to remove any electrical compartment covers.
- B. The electric motor shall be Class F insulated with a time rating of at least 15 minutes at 104 degrees Fahrenheit (40 degrees Celsius) or twice the valve stroking time, whichever is the longer, at an average load of at least 33 percent of maximum valve torque. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gear case. Plugs and sockets are not acceptable as a means of electrical connection for the motor.
- C. Motor Protection:
  1. Protection shall be provided for the motor as follows:
    - a. The motor shall be de-energized in the event of stall when attempting to unseat a jammed valve.
    - b. A thermostat to protect against overheating shall sense motor temperature.
- D. Gearing:

The actuator gearing shall be totally enclosed in an oil-filled gear case suitable for operation at any angle. All main drive gearing must be of metal construction. Where the actuator operates gate valves or large diameter ball or plug valves, the drive shall incorporate a lost-motion hammer blow feature. For rising spindle valves, the output shaft shall be hollow to accept a rising stem and incorporate thrust bearings of the ball or roller type at the base of the actuator, and the design should be such as to permit the gear case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service. Standard SAE80EP gear oil shall be used to lubricate the gear case.

- E. Hand Operation:
  1. A hand wheel shall be provided for emergency operation and engaged when the motor is declutched by a lever or similar means. The hand/auto selection lever should be pad lockable in both "hand" and "auto" positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in "Hand" without damage to the drive train.

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2. The hand wheel drive must be mechanically independent of the motor drive, and any gearing should be such as to permit emergency manual operation in a reasonable time. Clockwise operation of the hand wheel shall give closing movement of the valve unless otherwise stated in the job specification. For safety purposes, it shall be possible to disengage the electric drive with the declutch lever. This disengagement and any subsequent reengagement shall not cause any damage to the valve or operator, even with the motor running.
- F. Drive Bushing:
1. The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. Normally, the drive bush shall be positioned in a detachable base of the actuator. Thrust bearings, when housed in a separate thrust base, should be of the sealed-for-life type.
- G. Torque and Turns Limitations:
1. Torque and turns limitation to be adjustable as follows:
    - a. Position setting range: 2.5 to 100,000 turns, with resolution to 7.5 degrees of actuator output. Torque setting: 40 to 100 percent rated torque. Torque sensing must be affected directly electrically or electronically. Extrapolating torque from mechanically measured motor speed is not acceptable due to response time. Torque measurement shall be independent of variations in frequency, voltage, or temperature.
    - b. "Latching" to be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads.
    - c. The electric circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque or position limit. An inexpensive setting tool is required for non-intrusive calibration and interrogation of the actuator. This setting tool will provide speedy interrogation capabilities as well as security in a non-intrusive intrinsically safe watertight casing.
- H. Remote Valve Position and Actuator Status Indication:
1. In the event of a (main) power (supply) loss or failure, the position contacts must continue to be able to supply remote position feedback and maintain interlock capabilities. If batteries are required to maintain contact functionality, then the actuator vendor shall provide a supply sufficient for 30 continuous days of unpowered operation with one complete valve cycle every hour. A backup power source must be provided in the actuator to ensure correct remote indication should the actuator be moved manually when the power supply is interrupted. Four contacts shall be provided which can be selected to indicate any position of the valve with each contact externally selectable as normally open or normally closed. The contacts shall be rated at 5-ampere, 250-VAC, 30-VDC.
  2. At a minimum, the following contact outputs shall be provided for each open/close service valve actuator:

- a. Open.
  - b. Closed.
  - c. Remote Selected.
  - d. Fault.
3. At a minimum, the following signals shall be accepted from the control panel for open/close service valve actuator control:
    - a. Open Command.
    - b. Close Command.
  4. At a minimum, the following status signals shall be provided for each modulating valve actuator:
    - a. Position Feedback, analog 4-20mA.
    - b. Fault, discrete contact.
    - c. Remote, discrete contact.
  5. At a minimum, the following signals shall be accepted from the control panel for modulating service valve actuator control:
    - a. Position Command, analog 4-20mA.
- I. Local Position Indication:
- The actuator must provide a local display of the position of the valve, even when the power supply is not present. The display shall be able to be rotated in 90-degree increments so as to provide easy viewing regardless of mounting position. The actuator shall include a digital position indicator with a display from fully open to fully closed in one percent increments. Green and red lights corresponding to open (green) and closed (red) positions shall be included on the actuator with both lights on indicating mid-travel position
- J. Integral Starter and Transformer:
1. The reversing starter, control transformer, and local controls shall be integral with the valve actuator, suitably housed to prevent breathing and condensation buildup. For "On/Off" service, this starter shall be an electromechanical-type suitable for 60 starts per hour and of rating appropriate to motor size. For modulating duty, the starter shall be suitable for up to a maximum of 1,200 starts per hour. The controls supply transformer shall be fed from two of the incoming three phases. It shall have the necessary tapings and be adequately rated to provide power for the following functions:
    - a. 120-VAC energization of the contactor coils;
    - b. 24-VDC output where required for remote controls; and
    - c. Supply for all the internal electrical circuits.
  2. Easily replaceable fuses shall protect the primary and secondary windings.
- K. Integral Push Buttons and Selector:
1. Integral to the actuator shall be local controls for open, close, and stop, and a

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local/remote selector switch, pad lockable in any one of the following three positions:

- a. Local Control Only;
  - b. Off (No Electrical Operation); and
  - c. Remote Control plus Local Stop Only.
2. It shall be possible to select maintained or non-maintained local control. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.

L. Wiring and Terminals:

1. Internal wiring shall be of tropical grade PVC insulated stranded cable of appropriate size for the control and three-phase power. Each wire shall be clearly identified at each end. The terminals shall be embedded in a terminal block of high tracking resistance compound. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal.
2. The terminal compartment of the actuator shall be provided with a minimum of three threaded cable entries. When required, a fourth cable entry shall be provided. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable. Control logic circuit boards and relay boards must be mounted on plastic mounts to comply with double insulated standards. No more than a single primary size fuse shall be provided to minimize the need to remove single covers for replacement. A durable terminal identification card showing plan of terminals shall be provided attached to the inside of the terminal box cover indicating:
  - a. Serial Number;
  - b. External Voltage Values;
  - c. Wiring Diagram Number; and
  - d. Terminal Layout.
3. This must be suitable for the contractor to inscribe cable core identification beside terminal numbers.

M. Enclosure:

1. Actuators shall be O-ring sealed and listed IP68 and NEMA 4X/6 for submergence to 7 meters for 72 hours. Actuators shall have an inner watertight and dustproof O-ring seal between the terminal compartment and the internal electrical elements of the actuator that fully protects the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed on site for cabling. Enclosure protection of NEMA 6, IP68, shall be guaranteed without the need of suitable cable glands. The enclosure shall allow for temporary site storage without the need for an electrical supply connection.

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2. All external fasteners shall be stainless steel.
  3. Actuators for explosion/hazardous applications shall be certified flameproof for Zones 1 and 2 (Divisions 1 and 2) Group A, B, C, and D gases.
- N. Startup Kit: Each actuator shall be supplied with a startup kit comprised of installation instructions, electrical wiring diagrams, and spare cover screws and seals.
- O. Manufacturer:
1. Auma.
  2. Rotork.
  3. Beck.

**2.14 LED Lighting**

- A. Provide LED lighting for each liftstation.
- B. Master Lift Station Lighting Features:
1. Two Light Engines, 40 LEDs minimum.
  2. Color Temperature: 40K.
  3. Distribution: Medium of appropriate type.
  4. Power: 120Vac.
  5. Provide with motion control and photocell. Wire to On/Off/Motion handswitch.
  6. Mounting: Pole Mounted. Mount to 140MPH rated light pole ~~or alternatively extend aluminum H-beam to mounting height and mount light to H-beam.~~
  7. Finish, dark bronze to match light pole ~~or natural aluminum to match H-beam.~~

C. Residential Lift Station Lighting Features:

1. Two adjustable LED heads.
2. High performance 5000K CCT LEDs with 1222 lumen output.
3. Dual array motion sensor wired to On/Off/Motion handswitch.
4. Power: 120Vac.
5. Rugged aluminum housing.
6. Mounting: Pole Mounted in accordance with manufacturer instructions.
7. Finish: Bronze.
8. UL listed for wet locations.

E,D. Manufacturer:

1. Master Lift station: Lithonia; DSX1 series.
2. Residential Lift Station: Lithonia OFLR 6LC 120 MO BZ

Formatted: Numbered + Level: 1 +  
Numbering Style: 1, 2, 3, ... + Start at: 1 +  
Alignment: Left + Aligned at: 0.75" + Tab  
after: 1" + Indent at: 1"

~~2.3.~~ Approved equal.

**PART 3 - EXECUTION – TESTING, SERVICE, AND WARRANTY**

**3.01 GENERAL**

- A. All installed work shall comply with NECA installation standards.
- B. Provide arc flash labeling for all electrical enclosures in accordance with the NEC and NFPA 70E.
- C. Face all transmitters and displays north where feasible.
- D. The CONTRACTOR shall provide conduit and wire from all signal instruments to the control panel:
  - a. Analog signals and other DC voltage signals shall be run in a separate conduit from AC voltage wiring to minimize interference.
  - b. Ground all shielded conductor shields at one end only.

**3.02 TESTING**

- A. Provide lift station startup as specified in the Section 550-B entitled “Testing and Inspection for Acceptance (Lift Stations).
- B. The grounding system shall be tested to less than five ohms of resistance. Testing results by a certified testing agency using 3-point fall of potential testing as described by ANSI/IEEE Standard 81, or approved equivalent testing, and documented as described by NETA (International Electrical Testing Association), shall be provided to PCU during lift station startup.
- C. Generator and Transfer Switch Testing:
  - 1. Equipment shall be completely assembled and tested at the factory prior to shipment. Certified copies of the data obtained during these tests shall be submitted to PCU.
  - 2. Final tests shall be conducted at the site, after installation has been completed, in the presence of a PCU representative. The emergency generator manufacturer shall furnish a service representative to operate the engine during the tests, to check all details of the installation and to instruct PCU representatives in proper equipment operation.
  - 3. Field tests shall include operating the diesel generating set for carrying normal lift station loads. A full load bank test shall be required unless otherwise noted by PCU. The CONTRACTOR shall fill the main fuel tank at the completion of the tests to 90 percent of tank capacity.
  - 4. The rating of the generator shall be as required to meet the specifications. The generator rating must be substantiated by the manufacturer’s standard published curves. Special ratings shall not be acceptable. The set shall be capable of supplying the specified usable kilowatts for the specified duration, including the power required for the pump start-up, without exceeding its safe operating

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temperature. The generator shall be sized to run all pumps.

5. Transfer switches shall be tested for proper switching operation with the installed generator or with a PCU supplied portable generator in the case of manual transfer switches and breakers.

E. Actuator Testing:

1. Actuator testing shall be performance tested and individual test certificates shall be supplied free-of-charge. The test equipment should simulate a typical valve load and the following parameters should be recorded:
  - a. Current at Maximum Torque Setting.
  - b. Torque at Maximum Torque Setting.
  - c. Flash Test Voltage.
  - d. Actuator Output Speed or Operating Time.
2. In addition, the test certificate should record details of specification, such as gear ratios for both manual and automatic drive, closing direction, and wiring diagram code number.

**3.03 SERVICE**

A. Generator service:

1. Warranty and service center for the generator shall be located in Orange, Lake, Polk, Hillsborough, or Osceola Counties and service response shall be within two hours during normal working hours, and provide emergency service 24 hours 7 days a week.
2. The CONTRACTOR shall submit a written one-year manufacturer's standard service contract for the diesel engine generator and essential support systems, commencing on the date of acceptance of the unit to PCU at the time of acceptance of the unit(s). Contract shall include one preventative maintenance inspection of the installation prior to expiration of the warranty period to assure the safe and dependable operation of the system.

- C. Provide one set of all special tools that are required for the normal operation and maintenance of the engine driven generator unit.

**3.04 WARRANTY**

A. General:

Equipment installed under this Section shall have a minimum one calendar year warranty against defects in materials and workmanship covering parts and labor from the date of PCU acceptance unless otherwise noted below.

B. Generator:

The generator manufacturer shall provide a 36 calendar month non-prorated certified written warranty cover materials, labor, and workmanship.

C. Generator Batteries:

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The generator batteries shall be provided with a 48 calendar month warranty for the replacement of the battery if found to be defective.

- D. Actuators shall be warranted for 24 calendar months from date of lift station acceptance.

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<b>Wastewater Category 3 of 10: PIPE FITTINGS</b>			
<b>ITEM TO BE USED</b>	<b>Manufacturer</b>	<b>Part Number</b>	<b>Comments</b>
<b>Expansion Joints</b>			
	EBAA Iron Inc.		
	Fernco		
	Star Pipe	Star Flex 5000, 5100, & 5200	
<b>Fittings – Ductile Iron (C153 SSB/C110 FLG) (Cement Mortar Lined and Coated In Accordance With AWWA C104) (Outside Surfaces Shall Be Prime Coated Only If Located Aboveground And Painted):</b>			
	Union/Tyler		
	US Pipe		
	American		
	<u>Serampore Industries (SIP)</u>		
	Sigma		
	Star Pipe		
<b>Fittings, Adapters, And Plugs - Gravity PVC (SDR 26, Light Green in Color):</b>			
	Harco		
	JM-Eagle		
	Multi-Fittings		
	Plastic Trends		
<b>Clean-Outs With Caps – PVC (White in Color, Exterior Nut):</b>			
	USSI	Clean-Out Smart Plug with Plug Seat	For Use On PCU Operated Infrastructure As Required By PCU
<b>Restrained Joints (Ductile Iron Pipe):</b>			
	EBAA Iron Inc.	Mega-lug 1100 (3-inch to 48-inch) Mega-lug 1100HD (10-inch to 48-inch) Mega-lug 2100 (3-inch to 12-inch) Series RS 3800 Restrainer	RS 3800 Includes Sleeve
	American	Fast Grip Gaskets Flex Ring Field Flex Ring Lok Ring	

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	Ford	Series 1400-D	
	<u>Serampore Industries (SIP)</u>	<u>EZ Grip</u>	<u>For DI Pipe</u>
	Sigma	One LOK SLD	
	Sigma	LOK Series PVP and PVPF	
	Star Pipe	Stargrip Series 3000, 3000S, 3000OS, 3100P, & 3100S Flange Adapter Series 200 & 400 Retainer Gland Series 600 Restrainer Series 1000, 1100, & 1200 Flange Adapter Series 3200 Series 4000 & 4100P Series 3200 & 4200	
	Tyler/Union	Tuf Grip TLD Series 1000, 1000S  Tuf Grip Dual Wedge Restraint Series 1500	For DI Pipe Use  For PVC, DIP, HDPE pipe use
<b>Restrained Joints (PVC Pipe):</b>			
	EBAA Iron Inc.	Mega-lug 2000 PV (4-inch to 36-inch) F/IPS, DR25, DR18, DR14 & DR41 Mega-lug 2000 SV (4-inch to 12-inch) Mega-lug 2100 Flange Adapter (3-inch to 12-inch) Mega-lug 1500 Bell Restraint (4-inch to 12-inch) Mega-lug 1600 Bell Restraint (4-inch to 12-inch) F/PVC C-900 Bell Restraint 2800 Series (14-inch to 42-inch) F/PVC C-905 Bell Restraint	

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	Uni-Flange/Ford	1350 Bell Restrainer (2-inch to 12-inch) 1350 Bell Restrainer (2-inch to 8-inch) (14-inch to 24-inch) 1390 Bell Restrainer (4-inch to 12-inch) (12-inch to 24-inch) 900 Adapter Flange (4-inch to 12-inch) 1500 Series "CIRCLE LOCK" 1300 Fitting Restrainer (14-inch to 24-inch)	
	JCM	610 Sur-Grip Bell Joint Restrainer (14-inch to 24-inch) 621 Sur-Grip Bell Joint Restrainer (14-inch to 24-inch) 610 Fitting Restrainer (4-inch to 30-inch) 620 Bell Restrainer (4-inch to 12-inch) 621 Bell Restrainer (14-inch to 30-inch)	
	<u>Serampore Industries (SIP)</u>	<u>EZ Grip</u>	<u>For PVC Pipe</u>
	Sigma	One LOK SLC	
	Sigma	PV LOK Series PVP and PVPF	
	Star	Stargrip PVC Series 4000 Series 1100 PVC Harness Series 1200 PVC Harness Series 4000 & 4100P Series 3200 & 4200 Restrainer Series 1000, 1100, & 1200 Flange Series 3200 & 4200 Adapter Flange Series 200 & 400	
	Tyler/Union	Tuf Grip TLP Series 2000, 2000S  Tuf Grip Dual Wedge Restraint Series 1500  Bell Joint Restraints Series 3000: 32U, 33U, 34U, 35U	For PVC Pipe Use  For PVC, DIP, HDPE pipe use  For PVC Pipe Use

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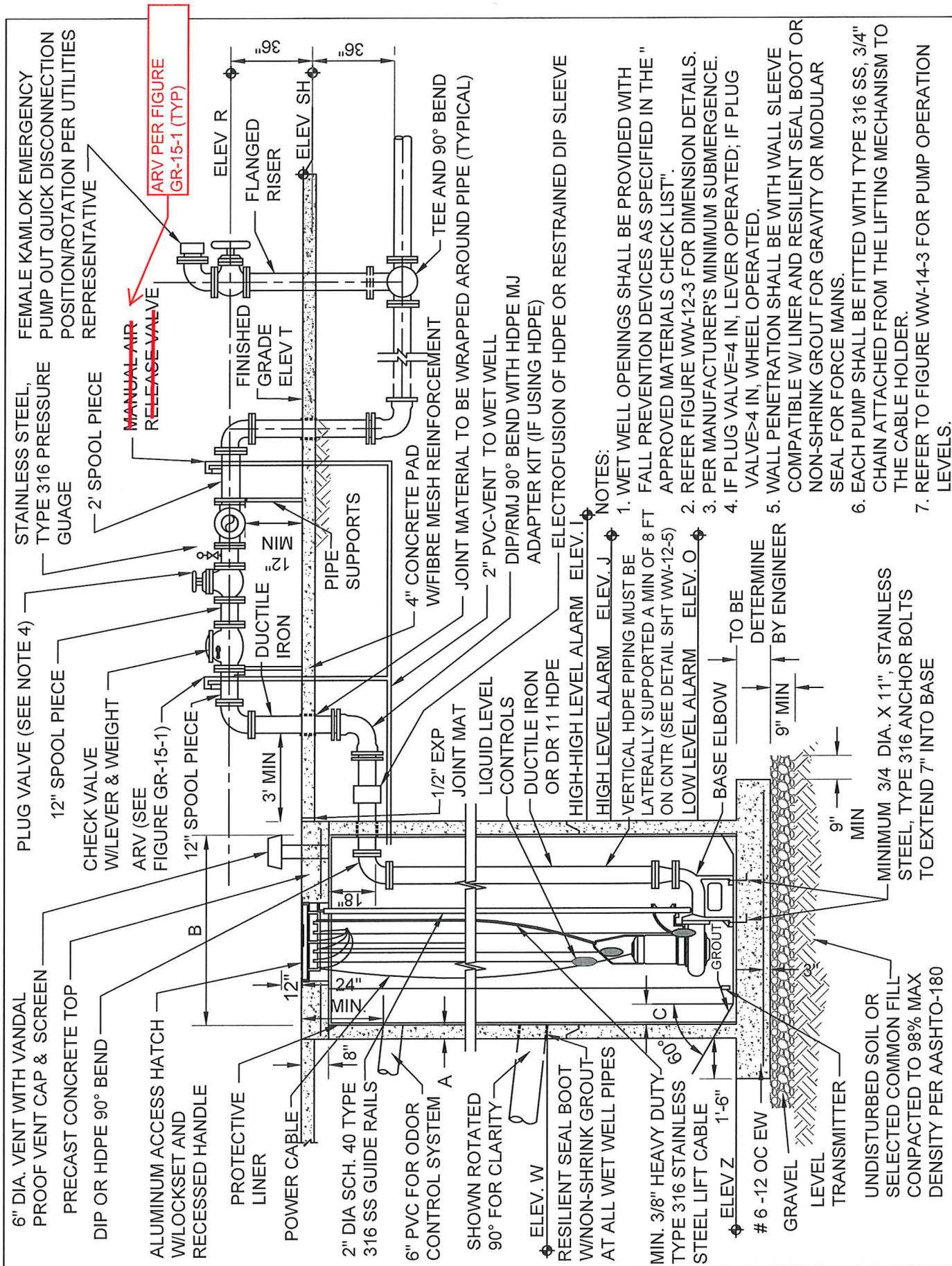
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	Blue Ribbon Ind.	Birdcage Pressure Transducer	
<b>Sluice Gate For Wet Well</b>			
	BNW	Model 77	316 ss
	Fontaine	Model 20	316 ss
<b>Submersible Pumps With Enclosed Impellers</b>			
	Hydromatic		
	Flygt		
	<u>Wilo-EMU</u>		
<b>Check Valves 4-inch And Larger (8 mil Epoxy Lined)</b>			
	M & H	159	
	Mueller	Series 2600 (Up to 12 inches)	
	Mueller	Series 8001 (16" and Larger)	
	American Flow Control	Series 600 or 50 line	
<b>Cushion Check Valves (Oil Filled)</b>			
	GA		
	APCO		
	CCNE		
<b>Variable Frequency Drives</b>			
	Schneider-Electric Square D	Altivar	
<b>Variable Frequency Motors</b>			
	U.S. Motors	Rated for inverter duty only	
	Baldor	Rated for inverter duty only	
	Reliance	Rated for inverter duty only	
<b>Wet Well and Valve Vault Access Frames and Covers (A minimum non-traffic bearing load rating of 300 PSF or, if subject to vehicular traffic, a H-20 traffic bearing load rating)</b>			
	Halliday Products		
	Bilco Company		
	USF Fabrication, Inc.		
<b>Lift Station Wet Well Fall Protection System</b>			
	Halliday Products	Retro Grate Fall Thru Protection System	
	Bilco	Fall Protection Grating System	
	USF Fabrication, Inc.	Hinged Hatch Safety Grate	
<b>Pad Locks</b>			



6" DIA. VENT WITH VANDAL PROOF VENT CAP & SCREEN  
 PRECAST CONCRETE TOP  
 DIP OR HDPE 90° BEND  
 ALUMINUM ACCESS HATCH W/LOCKSET AND RECESSED HANDLE  
 PROTECTIVE LINER  
 POWER CABLE  
 2" DIA SCH. 40 TYPE 316 SS GUIDE RAILS  
 6" PVC FOR ODOR CONTROL SYSTEM  
 SHOWN ROTATED 90° FOR CLARITY  
 ELEV. W  
 RESILIENT SEAL BOOT W/NON-SHRINK GROUT  
 AT ALL WET WELL PIPES  
 MIN. 3/8" HEAVY DUTY TYPE 316 STAINLESS STEEL LIFT CABLE  
 ELEV. Z 1'-6"

PLUG VALVE (SEE NOTE 4)  
 12" SPOOL PIECE  
 CHECK VALVE W/LEVER & WEIGHT  
 ARV (SEE FIGURE GR-15-1)  
 12" SPOOL PIECE  
 3' MIN  
 1/2" EXP JOINT MAT  
 LIQUID LEVEL CONTROLS  
 DUCTILE IRON OR DR 11 HDPE  
 HIGH-HIGH LEVEL ALARM ELEV. I  
 HIGH LEVEL ALARM ELEV. J  
 VERTICAL HDPE PIPING MUST BE LATERALLY SUPPORTED A MIN OF 8 FT ON CNTR (SEE DETAIL SHT WW-12-5)  
 LOW LEVEL ALARM ELEV. O  
 BASE ELBOW TO BE DETERMINE BY ENGINEER  
 9" MIN  
 9" MIN  
 MINIMUM 3/4 DIA. X 11", STAINLESS STEEL, TYPE 316 ANCHOR BOLTS TO EXTEND 7" INTO BASE  
 UNDISTURBED SOIL OR SELECTED COMMON FILL COMPACTED TO 98% MAX DENSITY PER AASHTO-180  
 GRAVEL LEVEL  
 TRANSMITTER

STAINLESS STEEL, TYPE 316 PRESSURE GAUGE  
 2' SPOOL PIECE  
 MANUAL AIR RELEASE VALVE  
 ARV PER FIGURE GR-15-1 (TYP)  
 FINISHED GRADE ELEV T  
 FLANGED RISER  
 ELEV R  
 TEE AND 90° BEND  
 JOINT MATERIAL TO BE WRAPPED AROUND PIPE (TYPICAL)  
 4" CONCRETE PAD W/FIBRE MESH REINFORCEMENT  
 2" PVC-VENT TO WET WELL  
 DIP/RMJ 90° BEND WITH HDPE MJ ADAPTER KIT (IF USING HDPE)  
 ELECTROFUSION OF HDPE OR RESTRAINED DIP SLEEVE

PIPE SUPPORTS  
 4" CONCRETE PAD W/FIBRE MESH REINFORCEMENT  
 JOINT MATERIAL TO BE WRAPPED AROUND PIPE (TYPICAL)  
 2" PVC-VENT TO WET WELL  
 DIP/RMJ 90° BEND WITH HDPE MJ ADAPTER KIT (IF USING HDPE)  
 ELECTROFUSION OF HDPE OR RESTRAINED DIP SLEEVE  
 NOTES:  
 1. WET WELL OPENINGS SHALL BE PROVIDED WITH FALL PREVENTION DEVICES AS SPECIFIED IN THE "APPROVED MATERIALS CHECK LIST".  
 2. REFER FIGURE WW-12-3 FOR DIMENSION DETAILS.  
 3. PER MANUFACTURER'S MINIMUM SUBMERGENCE.  
 4. IF PLUG VALVE=4 IN, LEVER OPERATED; IF PLUG VALVE>4 IN, WHEEL OPERATED.  
 5. WALL PENETRATION SHALL BE WITH WALL SLEEVE COMPATIBLE W/ LINER AND RESILIENT SEAL BOOT OR SEAL FOR FORCE MAINS.  
 6. EACH PUMP SHALL BE FITTED WITH TYPE 316 SS, 3/4" CHAIN ATTACHED FROM THE LIFTING MECHANISM TO THE CABLE HOLDER.  
 7. REFER TO FIGURE WW-14-3 FOR PUMP OPERATION LEVELS.

**TRIPLEX LIFT STATION (ABOVE GROUND PIPING)  
 SECTION VIEW**

**FIGURE  
 WW-14-2**

POLK COUNTY UTILITIES, FLORIDA

OCTOBER, 2015

- Chapter Six (6): Reclaimed Water
  - Section 650-B: Approved Materials Checklist

**CHAPTER 6**

**RECLAIMED WATER**

**Section 650-B**

**Approved Materials Checklist**

December 2010

<b>Reclaimed Water Category 4 of 9: PIPE FITTINGS</b>			
<b>ITEM TO BE USED</b>	<b>Manufacturer</b>	<b>Part Number</b>	<b>Comments</b>
<b>Expansion Joints:</b>			
	EBAA Iron		
	Metraflex		
<b>Fittings C153 SSB / C110 Flange (Cement Mortar Lined and Asphaltic Coated In Accordance With AWWA C104) (Outside Surfaces Shall Be Prime Coated Only If Located Aboveground And Painted):</b>			
	American		
	Union/Tyler		
	US Pipe		
	Sigma		
	Star Pipe		
	<u>Serampore Industries (SIP)</u>		
<b>Restrained Joints - Ductile Iron Pipe:</b>			
	American	Fast Grip Gasket Flex Ring Field Flex Ring Lok Ring	
	EBAA Iron Inc.	Mega-lug Series 1100 Series 1700 Bell Restrainer Series RS-3800 Restrainer - sleeve included	
	<u>Serampore Industries (SIP)</u>	<u>EZ Grip</u>	
	Sigma	One LOK SLD	
	Sigma	LOK Series PVP and PVPF	

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	Star	Stargrip Series 3000, 3000OS, 3100P & 3100S Flange Adapter Series 200 & 400 Retainer Gland Series 600 Adapter Flange Series 3200 Series 4000 & 4100P Series 3200 & 4200 Series 1000, 1100, & 1200 Flange Series 3200 & 4200 Adapter Flange Series 200 & 400 Star Flex Series 5000, 5100, & 5200	
	Tyler/Union	Tuf Grip TLD Series 1000, 1000S  Tuf Grip Dual Wedge Restraint Series 1500	For DI Pipe Use  For PVC, DIP, HDPE pipe use
<b>Restrained Joints - PVC Pipe:</b>			
	EBAA Iron Inc.	Mega-lug Series 2000PV Series 1500 & 1600 Bell Restrainer (4-inch to 12-inch) Series RS-3800 Restrainer – sleeve included	
	JCM	620 Sur-Grip Bell Joint 621 Sur-Grip Bell Joint	
	Uni-Flange/Ford	1350 Bell Restrainer 1360 Bell Restrainer 1390 Bell Restrainer 900 Adapter Flange 1300 Fitting Restrainer 1500 Series	
	<u>Serampore Industries (SIP)</u>	<u>EZ Grip</u>	<u>For PVC</u>
	Sigma	One LOK SLC	
	Sigma	PV LOK Series PVP and PVPF	
	Star	Stargrip PVC Series 4000 PVC Harness Series 1100 & 1200	

- Cross Connection Control Policy Manual (6C)
  - Appendix A-100

Rev March  
2012

**APPROVED CROSS CONNECTION CONTROL ASSEMBLIES LIST**

**APPENDIX A-100**

December 2010

Only the assemblies listed below shall be utilized within or connected to a PCU potable water system.

**Double Check Valve Assemblies (DCVA)**  
**Including Reduced Pressure Zone Assemblies (RPZs)**

<u>Manufacturer and Model</u>	<u>Size</u>	<u>Orientation</u>
Wilkins 950 XL	.75"	Horizontal & Vertical Up
Wilkins 950 XL	1", 1.25", 1.50", 2"	Horizontal
Wilkins 950 XLD	.75"	Horizontal & Vertical Up
Wilkins 350 – OS&Y Valves	2.5", 3", 4", 6", 8", 10"	Horizontal & Vertical Up
Wilkins 350 – OS&Y Valves	12"	Horizontal
Wilkins 350 G	6"	Horizontal & Vertical Up

**Reduced Pressure Principle/Reduced Pressure Detector Assemblies (RPPA/RPDA)**

Wilkins 375 – OS&Y Valves	2.5", 3", 4", 6", 8", 10"	Horizontal
Wilkins 975 XL	.75", 1", 1.25", 1.5", 2"	Horizontal
Wilkins 975 XLSE	.75", 1", 1.25", 1.5", 2"	N & Z
Wilkins 975 XLSEU	.75", 1", 1.25", 1.5", 2"	N & Z
Wilkins 975 XLV	.75", 1"	N & Z

**Double Check Detector Assemblies (DCDA)**

Wilkins 350DA – OS&Y Valves	2.5", 3", 4", 6", 8", 10"	Horizontal & Vertical Up
Wilkins 350DA – OS&Y Valves	12"	Horizontal
Wilkins 350DAG – OS&Y Valves	2.5", 3", 4", 6", 8", 10"	Horizontal & Vertical Up
Wilkins 350DAG – OS&Y Valves	12"	Horizontal