

April 22, 2013

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
    - **Require Overall Utility Plan Sheet**
  - Chapter Three (3): General Requirements
    - **Standard Drawing GR-21 (MJ Tapping Sleeve and GV)**
      - **Flange Gasket Note added**
  - Chapter Four (4): Potable Water
    - **Standard Drawing WA-09-2 (Master Meter) – DELETE**
      - **Rendered unnecessary by WA-09-1**
  - Chapter Five (5): Wastewater
    - **Section 550C: Wastewater Approved Materials Checklist**
    - **Generator Fuel Tank provider added (Modern Welding)**
  - SCADA Standards for Water (Chapter 4), Wastewater (Chapter 5), Reclaimed Water (Chapter 6) Facilities

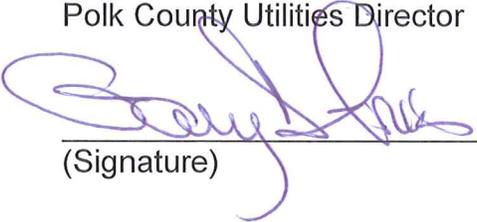
Details concerning each respectively edited Manual, Section, Chapter, and Appendix are attached herewith for reference.

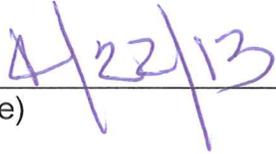
---

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 before calendar year end of 2013.

Gary Fries, P.E.  
Polk County Utilities Director

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

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

- **Chapter Two (2): Development Coordination**
  - **Require Overall Utility Plan Sheet**

**CHAPTER 2**

**DEVELOPMENT COORDINATION**

**Section 211**

**Project Design Documents and Submittals**

December 2010

**PART 1 GENERAL**

**1.01 Purpose**

- A. This Section establishes the minimum requirements for project design documents, hydraulic calculations, and submittals that are required to be submitted to the COUNTY for proposed water, wastewater, and reclaimed water improvements.

**1.02 Survey Control and Datum**

- A. Drawings shall be geographically oriented in the Florida State Plane Coordinate System with regard to the project's location within Polk County.
- B. Horizontal and vertical control shall be used by the ENGINEER in preparing the construction PLANS and established at the project site by a SURVEYOR utilizing the following datum.

1. Horizontal:

Coordinate System: Florida State Plane West.

Units: United States survey feet.

Horizontal Datum: North American Datum of 1983 (NAD 83) latest National Geodetic Survey (NGS) adjustment.

2. Vertical:

Units: United States survey feet.

Vertical Datum:

North American Vertical Datum of 1988 (NAVD 88).

Table 211-1. Minimum Spatial Data Accuracy Levels.

Asset	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: horizontal center and vertical top, unless otherwise specified
Bench Marks	N/A	0.01	Point
Horizontal Control	0.01	N/A	Point

**1.03 Documents**

- A. The drawing sets shall be complete and include the title sheet, plan/profile sheets, cross-sections, and details. Depending on the size and scale of a project, overall utility plan sheets may be required in addition to plan/profile sheets. Submitting drawing sets that only include plan/profile sheets without an overall utility plan sheet is strictly subject to County approval. Project scale may necessitate the use of

**CHAPTER 2**

**DEVELOPMENT COORDINATION**

**Section 211**

**Project Design Documents and Submittals**

December 2010

multiple sheets to present the overall utility plan at the largest practical scale to be incorporated with construction and final record drawings. Each individual sheet contained in the printed set of the drawings shall be included in the electronic submittal, with each sheet being converted into an individual pdf (portable document file) or tif (tagged image file). The plan sheets shall be scanned in pdf or tif format Group 4 at 300 dpi resolution to maintain legibility of each drawing.

**PART 2 DESIGN DOCUMENTATION**

**2.01 Construction PLANS Approval**

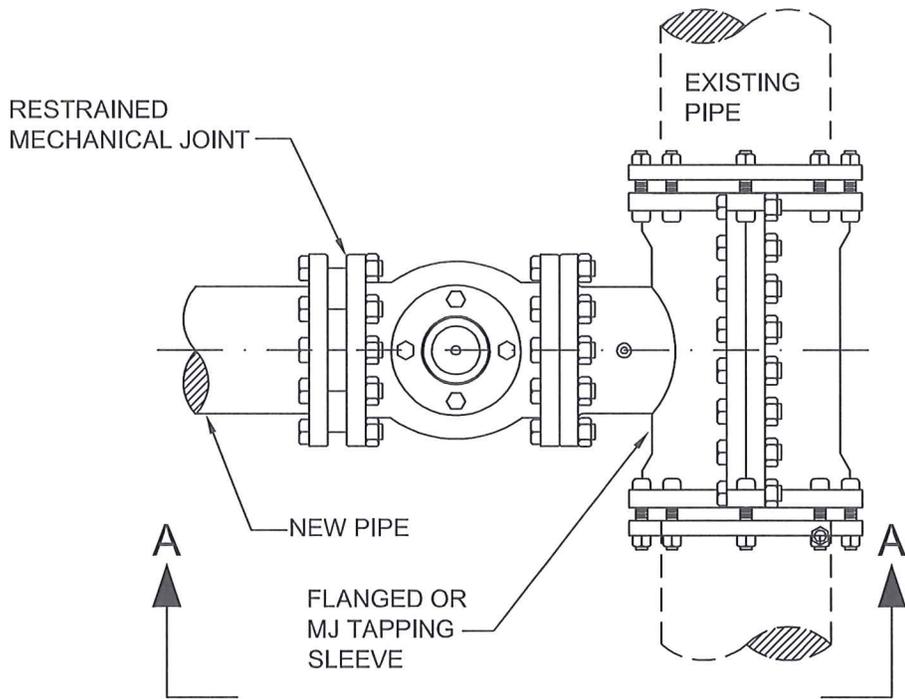
- A. The following documents are required from the ENGINEER and shall be submitted to the Land Development Division for distribution and review by the Development Review Staff.
  - 1. When the construction PLANS are approved by the COUNTY, the Land Development Division shall provide one (1) set of certified, full size, hard copy sets of the construction PLANS to PCU.
  - 2. In the event that the approved construction PLANS are modified by a State, County, or Local authority, the ENGINEER shall be responsible for revising and resubmitting the PLANS to the Land Development Division for distribution to the Development Review Staff for review, comment, and consideration for approval at least 10 business days prior to construction. When the modified construction PLANS are approved by the COUNTY, the Land Development Division shall provide one (1) set of certified, full size, hard copy sets of the modified construction PLANS to PCU

**2.02 System Modeling Analysis**

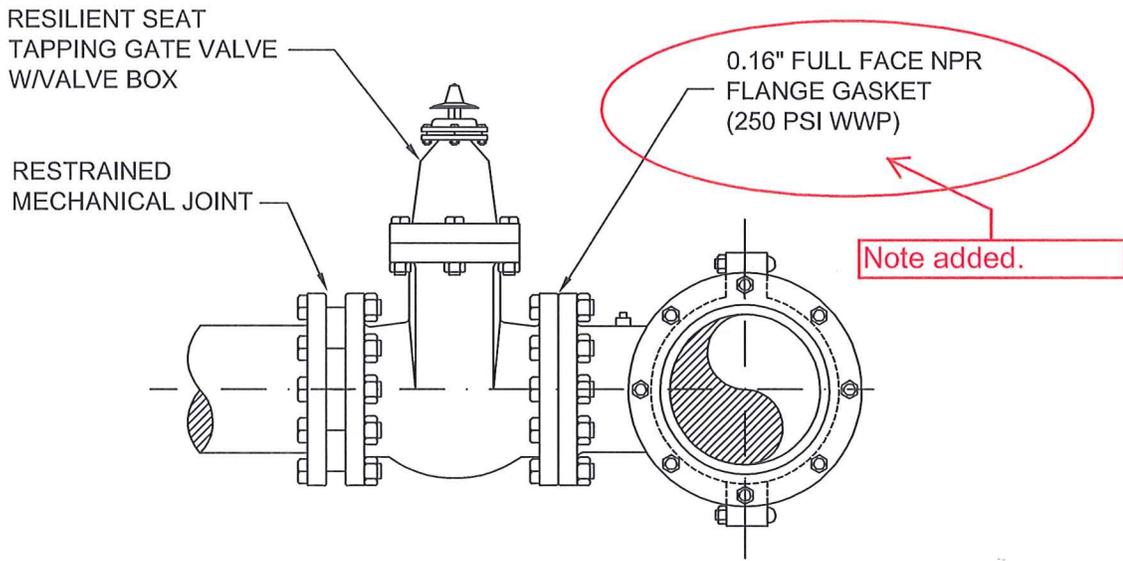
- A. WATER, WASTEWATER, AND RECLAIMED WATER SYSTEMS
  - 1. The ENGINEER shall submit one copy of all system modeling calculations to the Land Development Division with the construction PLANS that address the required fire flow demand, maximum day demand, peak hour demand, and locations of proposed connection points. All system modeling shall utilize either a Water Cad or WaterGems modeling program for water systems and/or a SewerCad modeling program for wastewater systems in accordance with the hydraulic modeling standards provided in this MANUAL as appropriate for the system being analyzed. When providing connection point locations, an engineering sketch with an address or parcel identification number for each individual location shall be included. The Land Development Division shall request PCU to analyze the impact of the proposed development on the existing PCU water, wastewater, and reclaimed water systems utilizing the appropriate PCU master plan system models. PCU shall provide the results of each individual system analysis to the Land Development Division for distribution to the ENGINEER in the event that deficiencies are revealed. ENGINEER shall resolve all such deficiencies to the satisfaction of PCU

**2.03 MASTER PLAN**

- **Chapter Three (3): General Requirements**
  - **Standard Drawing GR-21 (MJ Tapping Sleeve and GV)**
    - **Flange Gasket Note added**



**PLAN**



**SECTION A - A**

**NOTES:**

1. TAPPING VALVE SHALL BE PLACED IN AN UPRIGHT POSITION AND USED AS THE ISOLATION VALVE UNLESS FIELD CONDITIONS REQUIRE THE TAPPING VALVE TO BE LAID HORIZONTAL IN A PERMANENT OPEN POSITION AND THE ISOLATION VALVE LOCATED NEARBY.

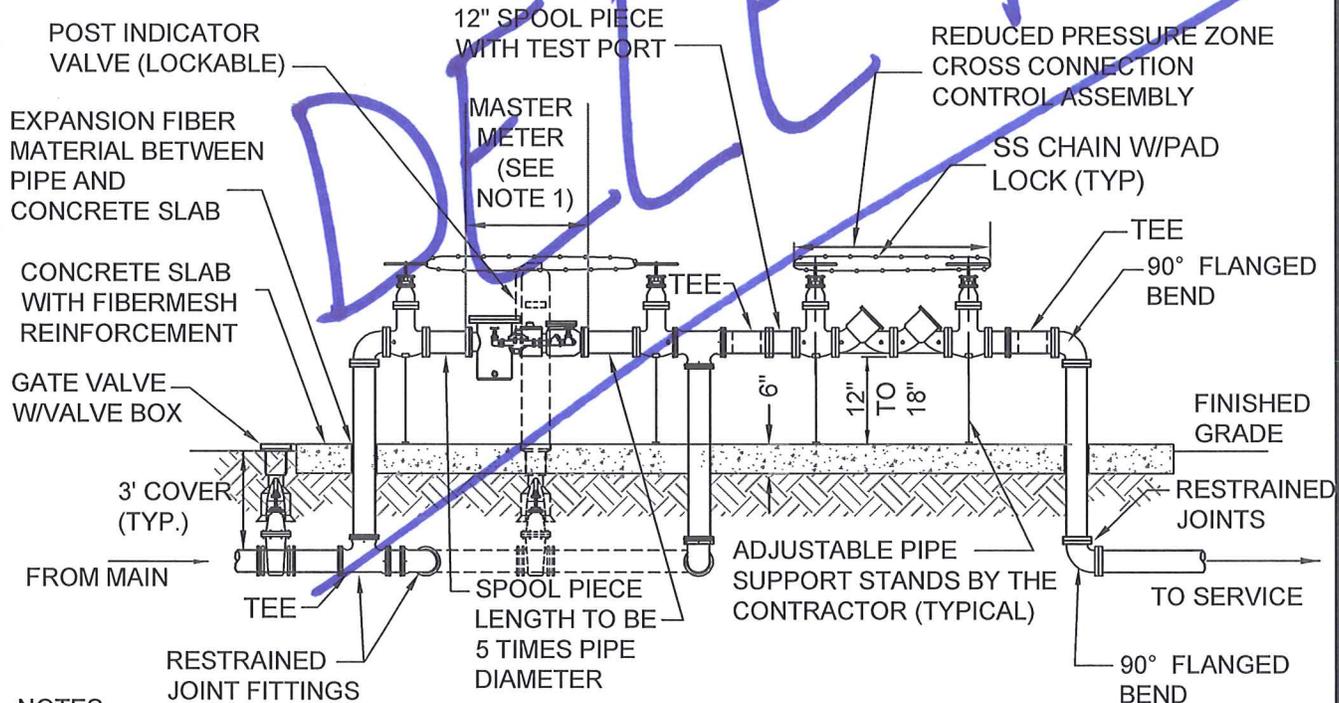
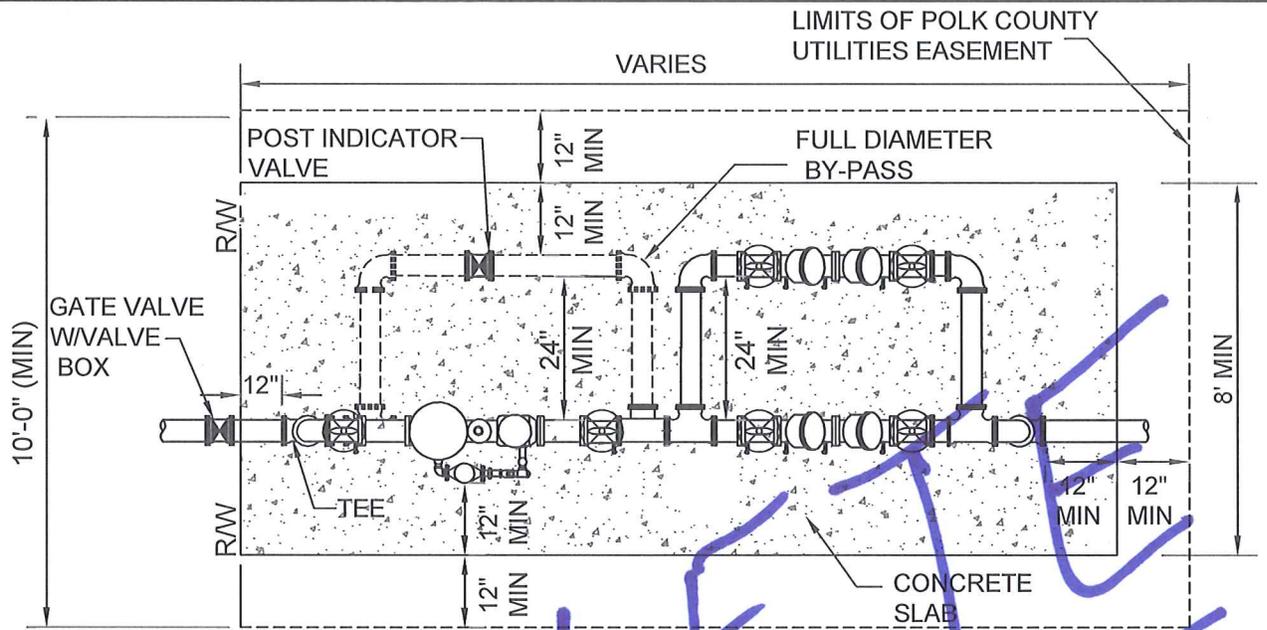
**MJ TAPPING SLEEVE AND GATE VALVE ASSEMBLY (TYPICAL)**

**FIGURE  
GR-21**

POLK COUNTY UTILITIES, FLORIDA

DECEMBER, 2010

- **Chapter Four (4): Potable Water**
  - **Standard Drawing WA-09-2 (Master Meter) – DELETE**
    - **Rendered unnecessary by WA-09-1**

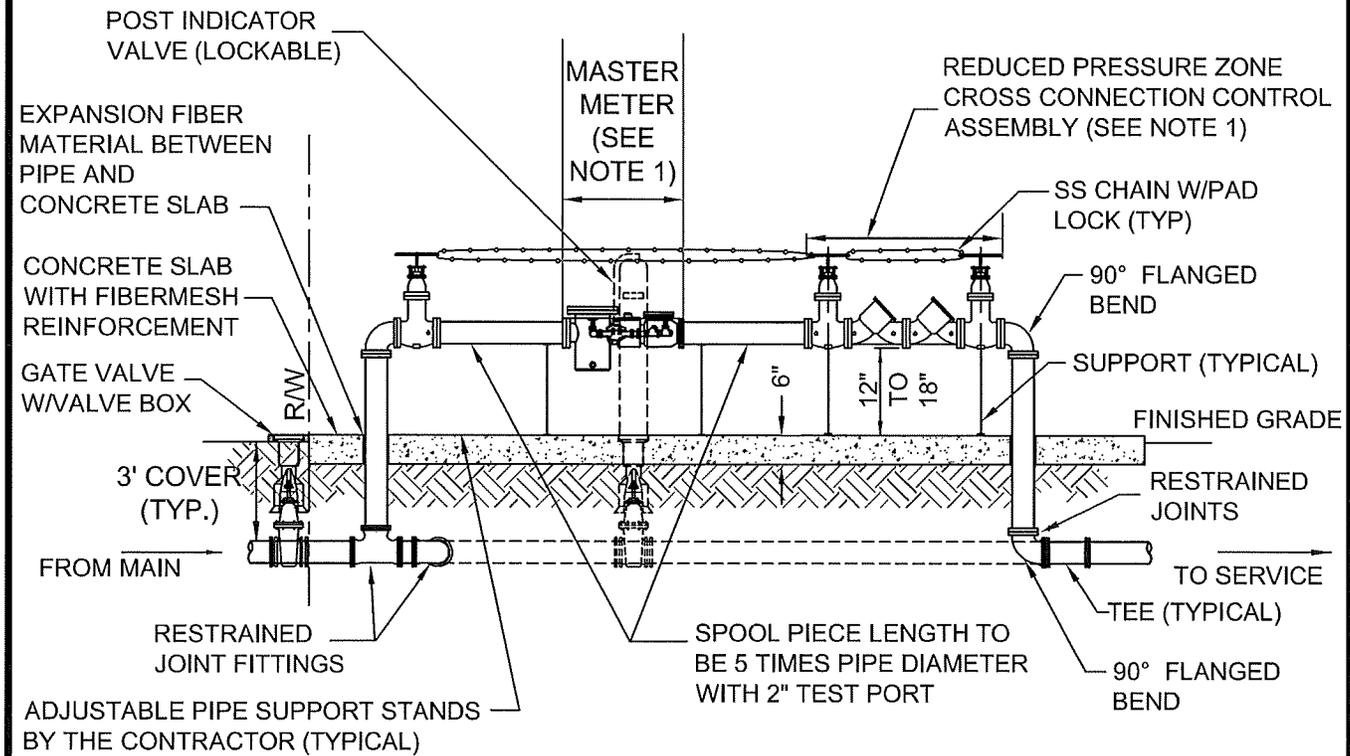
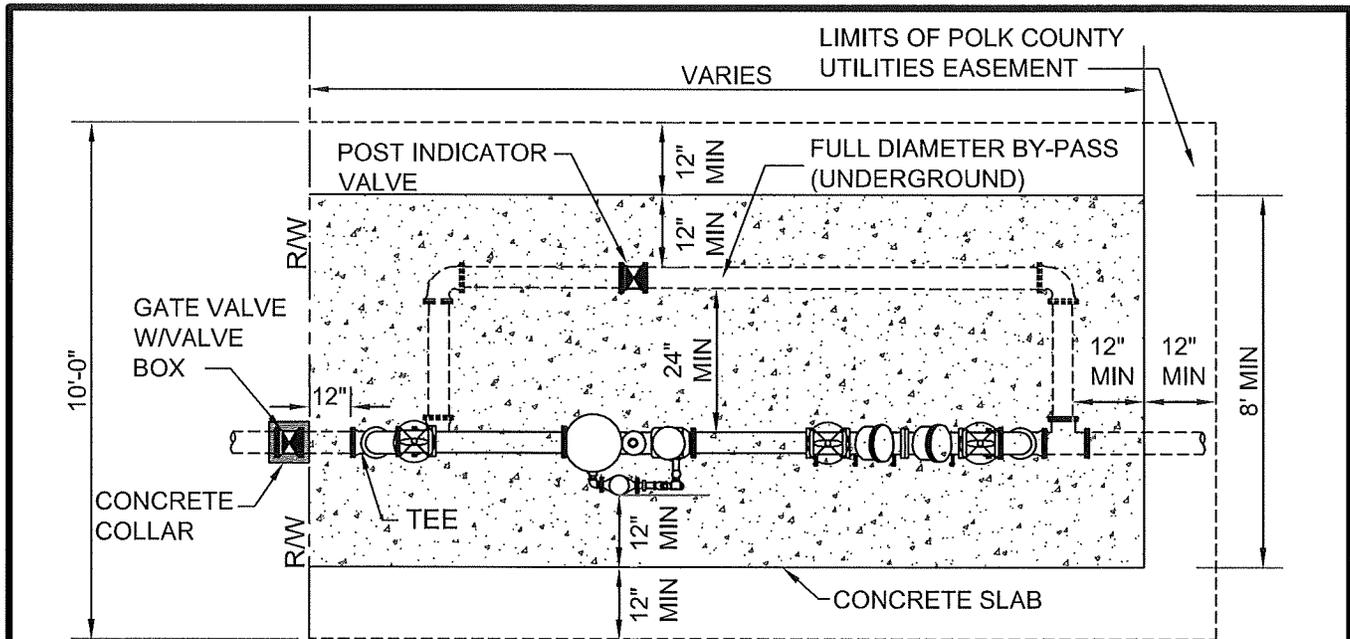


**NOTES:**

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 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.

**MASTER METER ASSEMBLY (3" AND LARGER)  
(DOUBLE CROSS CONNECTION CONTROL ASSEMBLIES)**

**FIGURE  
WA-09-2**



**NOTES:**

1. THE CONTRACTOR SHALL PROVIDE AND INSTALL THE MASTER METER INCLUDING THE METER, CROSS CONNECTION CONTROL ASSEMBLY, ALL PIPE FITTINGS, STAINLESS STEEL (CHAINS) AND APPURTENANCES.
2. ALL THE ABOVE GROUND PIPE SHALL BE FLANGED DUCTILE IRON.
3. 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".
4. BOLLARDS SHALL BE REQUIRED BY PCU ON CORNERS OF THE CONCRETE PAD TO PROVIDE PROTECTION ADJACENT TO VEHICULAR USE AREAS.
5. ABOVE GROUND VALVES SHALL BE O.S. & Y TYPE.

REV DECEMBER, 2012

**MASTER METER ASSEMBLY ( 3" AND LARGER )  
( SINGLE CROSS CONNECTION CONTROL ASSEMBLY )**

**FIGURE  
WA-09-1**

POLK COUNTY UTILITIES, FLORIDA

DECEMBER, 2010

- **Chapter Five (5): Wastewater**
  - **Section 550C: Wastewater Approved Materials Checklist**
  - **Generator Fuel Tank provider added (Modern Welding)**

**CHAPTER 5**

**WASTEWATER**

**Section 550-C**

**Approved Materials Checklist**

December 2010

	Yokogawa		
	Endress Hauser		
	Foxboro		
<b>Generator Circuit Breaker</b>			
	Square D		
<b>Generator Fuel Tanks (Double Walled And For Fixed Generator Systems Only)</b>			
	Convault		
	<u>Modern Welding</u>		
	Phoenix		
<b>Generator Systems, Fixed</b>			
	Caterpillar/Olympian		
	Onan (Cummins)		
	Kohler		
	Tradeswinds		
<b>Generator Systems, Portable</b>			
	Kohler		
	Caterpillar/Olympian		
	Onan (Cummins)		
<b>Generator Receptacle (GR)</b>			
	Russelstoll	JRSB 1044 FR (100 amp)	For ≤ 25 Hp Pumps
	Russelstoll	JRSB 2044 (200 amp)	For 25 Hp > Pumps
<b>Generator Transfer Switch</b>			
	Onan		
<b>Human Machine Interface (HMI)</b>			
	Maple Systems	HMI 5070TH	
<b>Main Service Disconnect Breaker</b>			
	Square D		
<b>Main Circuit Breaker (MCB)</b>			
	Square D		
<b>Main Circuit Transformer (MCT)</b>			
	Square D	500SV43F	
<b>Odor Control Monitoring Instrument</b>			
	Precision Control	Model SRC-1	
<b>Pressure Gauges:</b>			
	Ashcroft	40-1009 0-60 PSI	

- **SCADA Standards for Water (Chapter 4),  
Wastewater (Chapter 5), Reclaimed Water (Chapter  
6) Facilities**

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

**PART 1 – GENERAL WATER PRODUCTION FACILITY SCADA STANDARDS**

**1.01 SUMMARY OF SYSTEM**

- A. These standards represent minimum requirements for County projects at the time the standards were adopted. The County reserves the right to approve changes based on site specific design requirements
- B. Water treatment facilities shall be able to be monitored and controlled remotely. The CONTRACTOR shall provide a Human Machine Interface (HMI) / Supervisory Control and Data Acquisition (SCADA) system, Programmable Logic Controller (PLC), and decentralized Historian for water treatment facility control as identified in this Section.
- C. The SCADA process data shall be organized by unit process (UP) as identified below:

<u>Unit Process Number</u>	<u>Process Name</u>
10	Raw Pump Station/Wells
20	Preliminary Treatment
30	Primary Filtration
40	Ground Storage
50	Distribution High Service Pumping
60	Secondary Filtration
70	Pressure Control
80	Chemical Storage and Feed
90	Electrical Power

- D. SCADA tag numbering shall be as follows:
  - 1. Facility = SW
  - 2. Unit Process = 10
  - 3. Function of Device = Level Indicating Transmitter
  - 4. Quantity/Discrete Identifier = 1
    - i. E.g. SW\_010\_LIT\_001

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

**1.02 EQUIPMENT TO BE MONITORED AND CONTROLLED**

- A. The following typical elements at standard unit processes must be monitored and controlled at the various unit processes with alarms as defined:
- a. UP 10 Raw Pump Station/Wells
    - i. Influent Flow Meter
      - Monitored Data
        - 1. Instantaneous Flow
        - 2. Totalized Daily Flow, Current and Previous Day
      - Alarms
        - 1. Out of Range
        - 2. No Signal
    - ii. Pumps
      - Monitored Data
        - 1. Pump Motor Status
        - 2. Level in Pump Station
      - Alarms
        - 1. Pump Over-Torque
        - 2. Pump Fail
        - 3. High Level Alarm
        - 4. High-High Level Alarm
        - 5. Low Level Alarm
  - b. UP 20 Preliminary Treatment
    - i. Mechanical Bar Screen/Level Operated (Surface Water)
      - Monitored Data
        - 1. Motor Status
        - 2. Level in Channel
        - 3. Screw Conveyor Motor Status
      - Alarms
        - 1. Screen Over-Torque
        - 2. Screen Fail
        - 3. Channel Level High
        - 4. Screw Wash/Press Over-Torque
        - 5. Screw Wash/Press Fail
  - c. UP 30 Primary Filtration
    - i. Multimedia/Greensand Filters
      - Monitored Data
        - 1. Valve Status
        - 2. Pressure Differential
      - Alarms
        - 1. Valve
        - 2. High Pressure Differential
  - d. UP 40 Ground Storage
    - i. Levels/Valves
      - Monitored Data

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

1. Ground Storage Tank Levels
  2. Calculated Ground Storage Tank Volumes
  3. Calculated Rate of Change (gpm) in Storage
  4. Raw Storage Tank Levels
  5. Calculated Raw Storage Tank Volumes
  6. Calculated Rate of Change (gpm) in Raw Water
  7. Transfer Pump Wet Well Level
  8. Fill Valve Status
  9. In/Eff Valves for Tanks Status
- Alarms
1. High Ground Storage Level
  2. Low Ground Storage Level
  3. High Raw Water Storage Level
  4. Low Raw Water Storage Level
  5. High Wet Well Level
  6. Low Wet Well Level
  7. Valve Failure
- ii. Pumps
- Monitored Data
1. Pump Motor Status
  2. VFD Speed
- Alarms
1. Pump Over-Torque
  2. Pump Fail
- e. UP 50 Distribution High Service Pumping
- i. Pumps
- Monitored Data
1. Pump Motor Status
  2. VFD Speed
  3. Pressure
  4. Flow Rate
- Alarms
1. Pump Over-Torque
  2. Pump Fail
  3. Flow Out of Range
  4. High Pressure
  5. Low Pressure
- f. UP 60 Secondary Filtration
- i. Slow Sand Filters/Green Sand Filters/Rapid Rate Filters
- Monitored Data
1. Backwash Pump and Wash Unit Motor Status
  2. Level in Filter
  3. Valve Status
  4. Total Suspended Solids and/or Nephelometric Turbidity Units

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- 5. Flow Rate
- Alarms
  - 1. Pump/Wash Unit Motor Fail
  - 2. Valve Fail
  - 3. High Level
  - 4. Low Level
  - 5. Flow Rate Out of Range
- g. UP 70 Pressure Control
  - i. Instrumentation
    - Monitored Data
      - 1. Hydopneumatic Tank Liquid Level
      - 2. Pressure
      - 3. Compressor Status
    - Alarms
      - 1. Low Pressure
      - 2. High Pressure
      - 3. Compressor Fail
      - 4. Low Tank Level
      - 5. High Tank Level
- h. UP 80 Chemical Storage and Feed
  - i. Chemical Feed and Monitoring
    - Monitored Data
      - 1. pH
      - 2. Effluent Chlorine Residual
      - 3. Sodium Hypochlorite Level/Volume
      - 4. Alum Level/Volume
      - 5. Ferric Chloride Level/Volume
      - 6. Anti-Scalant Level/Volume
      - 7. Potassium Permanganate Level/Volume
      - 8. Sodium Hydroxide Level/Volume
      - 9. Sulfuric Acid Level/Volume
      - 10. Carbon Dioxide Mass
      - 11. Chemical Metering Pump Status
      - 12. Exhaust Fan Status
      - 13. Eye Wash Status
    - Alarms
      - 1. Effluent pH Out of Range
      - 2. High Chlorine Residual
      - 3. Low Chlorine Residual
      - 4. Chemical Metering Pump Failures
      - 5. Exhaust Fan Failure
      - 6. Eyewash In Use or Failure
      - 7. High Chemical Level
      - 8. Low Chemical Level

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- i. UP 90 Electrical Power
  - i. Electrical Line Power
    - Monitored Data
      - 1. Phase Voltage Difference
      - 2. Phase Amperage
      - 3. Tie-Breaker Status
      - 4. Main Breaker Status
    - Alarms
      - 1. Low Voltage
      - 2. High Voltage
      - 3. Loss of Power
  - ii. Generator Power
    - Monitored Data
      - 1. Generator Status
      - 2. Phase Voltage Difference
      - 3. Phase Amperage
      - 4. Transfer Switch Status
    - Alarms
      - 1. Low Voltage
      - 2. High Voltage
      - 3. Generator Failure
      - 4. Transfer Switch Failure

**1.03 DATA TO BE STORED IN HISTORIAN**

- A. The following typical data at standard and alarm at unit processes. Historical data shall be stored at a minimum rate of one point every ten seconds, or a change greater than a set dead-band, and shall be stored as defined:
  - a. UP 10 Raw Pump Station/Wells
    - i. Influent Flow Meter
      - Monitored Data
        - 1. Instantaneous Flow
        - 2. Totalized Daily Flow, Current and Previous Day
    - ii. Pumps
      - Monitored Data
        - 1. Pump Motor Status
        - 2. Level in Pump Station
      - Alarms
        - 1. Pump Fail
  - b. UP 20 Preliminary Treatment
    - i. Mechanical Bar Screen/Level Operated (Surface Water)
      - Monitored Data
        - 1. Motor Status
        - 2. Level in Channel
        - 3. Screw Conveyor Motor Status

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- Alarms
  - 1. Screen Fail
  - 2. Screw Wash/Press Fail
- c. UP 30 Primary Filtration
  - i. Multimedia/Greensand Filters
    - Monitored Data
      - 1. Valve Status
      - 2. Pressure Differential
    - Alarms
      - 1. Valve Fail
- d. UP 40 Ground Storage
  - i. Levels/Valves
    - Monitored Data
      - 1. Ground Storage Tank Levels
      - 2. Calculated Ground Storage Tank Volumes
      - 3. Raw Storage Tank Levels
      - 4. Calculated Rate of Change (gpm) in Raw Water
      - 5. Transfer Pump Wet Well Level
      - 6. Fill Valve Status
      - 7. In/Eff Valves for Tanks Status
    - Alarms
      - 1. Valve Failure
  - ii. Pumps
    - Monitored Data
      - 1. Pump Motor Status
      - 2. VFD Speed
    - Alarms
      - 1. Pump Fail
- e. UP 50 Distribution High Service Pumping
  - i. Pumps
    - Monitored Data
      - 1. Pump Motor Status
      - 2. VFD Speed
      - 3. Pressure
      - 4. Flow Rate
    - Alarms
      - 1. Pump Fail
- f. UP 60 Secondary Filtration
  - i. Slow Sand Filters/Green Sand Filters/Rapid Rate Filters
    - Monitored Data
      - 1. Backwash Pump and Wash Unit Motor Status
      - 2. Level in Filter
      - 3. Valve Status
      - 4. Total Suspended Solids and/or Nephelometric Turbidity Units

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- 5. Flow Rate
- Alarms
  - 1. Pump/Wash Unit Motor Fail
  - 2. Valve Fail
- g. UP 70 Pressure Control
  - i. Instrumentation
    - Monitored Data
      - 1. Hydopneumatic Tank Liquid Level
      - 2. Pressure
      - 3. Compressor Status
    - Alarms
      - 1. Compressor Fail
- h. UP 80 Chemical Storage and Feed
  - i. Chemical Feed and Monitoring
    - Monitored Data
      - 1. pH
      - 2. Chlorine Residual
      - 3. Sodium Hypochlorite Level/Volume
      - 4. Alum Level/Volume
      - 5. Ferric Chloride Level/Volume
      - 6. Anti-Scalant Level/Volume
      - 7. Potassium Permanganate Level/Volume
      - 8. Sodium Hydroxide Level/Volume
      - 9. Sulfuric Acid Level/Volume
      - 10. Carbon Dioxide Mass
      - 11. Chemical Metering Pump Status
      - 12. Exhaust Fan Status
      - 13. Eye Wash Status
    - Alarms
      - 1. Chemical Metering Pump Failures
      - 2. Exhaust Fan Failure
      - 3. Eyewash In Use or Failure
- i. UP 90 Electrical Power
  - i. Electrical Line Power
    - Monitored Data
      - 1. Phase Voltage Difference
      - 2. Phase Amperage
      - 3. Tie-Breaker Status
      - 4. Main Breaker Status
    - Alarms
      - 1. Loss of Power
  - ii. Generator Power
    - Monitored Data
      - 1. Generator Status
      - 2. Phase Voltage Difference

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

3. Phase Amperage
4. Transfer Switch Status

Alarms

1. Generator Failure
2. Transfer Switch Failure

**PART 2 – COMPONENTS AND INTEGRATION**

**2.01 SOFTWARE, PLC, COMPUTERS, and NETWORK COMPONENTS**

A. The CONTRACTOR shall purchase and install equipment compatible with the PCU existing SCADA central station equipment.

1. Water treatment facility control systems must utilize GE PAC RX3i PLC components.
2. Water treatment facility SCADA controls must be integrated utilizing iFix with the licenses for the latest version supplied as part of the construction effort. CONTRACTOR must verify and utilize the iFix version currently in use by PCU prior to integrating PLC/SCADA.
3. CONTRACTOR shall provide local servers and historian, including a license for GE Historian, latest version, as part of the construction effort.
4. iFix and Historian licenses must be provided with sufficient tags for at least 30% spare tags.
5. Servers provided will be mapped to PCU network by Owner. Hardware to be provided to Owner at a time scheduled at least two (2) weeks in advance for mapping purposes.

B. SCADA Computer Server equipment shall be as follows:

1. Primary SCADA server
  - i. Dell server or approved equivalent with minimum criteria
  - ii. Two Pentium Xeon Hex-Core Processors, 3.0 Ghz min, 12 Mb L3 Cache
  - iii. 24 Gb of DDR3 RAM, 1333 MHz, expandable to 128 Mb
  - iv. Hard Drives: (2) RAID 1 configuration HD, SAS, SCSI, 15,000 rpm, Hot-Swappable. Size of each drive shall be at least 200% of capacity required for current system implementation.
  - v. Multi-use optical drive, 24x, CD-RW/DVD-RW
  - vi. Multimedia cards: manufacturer's standard
  - vii. Dual Hot-Swappable Power Supplies
  - viii. Two IEEE 802.3 network card, dual redundant, 1 GbE
  - ix. External 56k modem, V.90 PCI, USB interface, voice and data modem,

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- as manufactured by US Robotics.
- x. Windows Server 2008 R2 Standard Operating System, 5 Client Access Licenses
- xi. Keyboard, Video, Mouse module
- xii. Proficy iFix Software Run License, Latest Version
- xiii. 3-Years Onsite Warranty
- 2. Backup SCADA server
  - i. Dell or approved equivalent
  - ii. Pentium Quad-Core Processor, 3.6 Ghz min, 12 Mb L2 Cache
  - iii. 16 Gb of DDR3 RAM, 1333 MHz
  - iv. Hard Drives: (2) RAID 1 configuration HD, SATA, 7,200 rpm. Size of each drive shall be at least 200% of capacity required for current system implementation.
  - v. Multi-use optical drive, 24x, CD-RW/DVD-RW
  - vi. Audio Card: manufacturer's standard
  - vii. Video Card: capable of running two monitors and software noted
    - 1. Dual Channel VGA color graphics, 16X transfer rate
    - 2. 512 Mb DDR3, min
    - 3. NVIDIA Quadro NVS 300
  - viii. Single Power Supply, 500 kW min
  - ix. 101-key Enhanced Keyboard
  - x. Mouse: two button with thumb wheel, min
  - xi. IEEE 802.3 network card, dual redundant, 1 GbE
  - xii. Windows Server 2008 R2 Standard Operating System, 5 Client Access Licenses
  - xiii. Proficy iFix Development License, Latest Version
  - xiv. (2)-47-inch Flat Panel Displays
  - xv. 3-Years Onsite Warranty
- 3. Historian SCADA server
  - i. Link with all Historian tags sent to Base One Master Historian
  - ii. Dell R710 or approved equivalent
  - iii. Dual Pentium Xeon Hex-Core Processor, 3.0 Ghz min, 12 Mb L3 Cache
  - iv. 24 Gb of DDR3 RAM, 1333 MHz, expandable to 128 Mb
  - v. Hard Drives: (4) RAID 5 configuration HD, SAS, SCSI, 15,000 rpm, Hot-Swappable. Size of drive array shall be at least 200% of capacity required for current system implementation with 5 years of data stored.
  - vi. Multi-use optical drive, 24x, CD-RW/DVD-RW
  - vii. Multimedia cards: manufacturer's standard
  - viii. Dual Hot-Swappable Power Supplies
  - ix. IEEE 802.3 network card, dual redundant, 1 GbE
  - x. External 56k modem, V.90 PCI, USB interface, voice and data modem, as manufactured by US Robotics.
  - xi. Windows Server 2008 R2 Standard Operating System, 5 Client Access Licenses

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- xii. Keyboard, Video, Mouse module
- xiii. Proficy iFix Historian, Latest Version
- xiv. Proficy Web Server, Latest Version
- xv. 3-Years Onsite Warranty
- 4. Additional Equipment
  - i. Cisco 1 GbE Network Switch
    - 1. 24 ports, 4 Dual Ports
    - 2. 4 Dual Port Uplinks Support 1 GbE Upload and Download
    - 3. Catalyst 2960S series
  - ii. 1 KVM Module, Tripplite B040-008-19
  - iii. Tripplite 6 kVA UPS
  - iv. Network Rack, 42 RU min
  - v. Cable Management Unit for Network Rack
  - vi. 24" Monitor, ViewSonic VG2436wm or Equal
- C. New plants shall have integrated WiFi throughout the facility in accordance with IEEE 802.11. WiFi shall be able to be utilized for remote SCADA access at any unit process in the plant.
  - 1. Radio propagation studies shall be performed during design and construction of WiFi networks to ensure WiFi is functional at all unit processes.
- D. New unit processes shall have decentralized I/O to limit long runs of buried copper communication. Localized OLMs shall be designed and installed with a fiber connection to carry the information to a point local to the PLC. There the data can be converted back into a readable signal for the PLC.
- E. CONTRACTOR to perform testing on integrated systems at key stages in the process. At a minimum, Operational Readiness Testing (ORT) and Performance Acceptance Testing (PAT) shall be performed. Factory Testing and Staging Testing may be added at COUNTY or ENGINEER discretion. Minimum testing requirements shall be as follows:
  - 1. Operational Readiness Test (ORT): Prior to startup test period and PAT, inspect, test, and document that entire Process Instrumentation and Control System (PICS) is ready for operation.
    - i. Loop/Component Inspections and Tests:
      - 1. Check PICS for proper installation, calibration, and adjustment on a loop-by-loop and component-by-component basis.
      - 2. Provide space on forms for signoff by PICS subcontractor.
      - 3. Use loop status report to organize and track inspection, adjustment, and calibration of each loop and include the following:
        - a. Project name.
        - b. Loop number.

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

- c. Tag number for each component.
  - d. Checkoffs/Signoffs for Each Component:
    - i. Tag/identification.
    - ii. Installation.
    - iii. Termination wiring.
    - iv. Calibration/adjustment
  - e. Checkoffs/Signoffs for the Loop
    - i. Field Device Signals Transmitted to the PLCs are Operational: Received/sent, processed, adjusted.
4. Component calibration sheet for each active field component (except simple hand switches, lights, gauges, and similar items) include the following:
- a. Project name.
  - b. Loop number.
  - c. Component tag number or PLC register address.
  - d. Component code number for field device elements.
  - e. Manufacturer for field device elements.
  - f. Model number/serial number for field device elements.
  - g. Summary of Functional Requirements, for Example:
    - i. Indicators and recorders, scale and chart ranges.
    - ii. Transmitters/converters, input and output ranges.
    - iii. Computing elements' function.
    - iv. Controllers, action(direct/reverse) and control modes (P&ID).
    - v. Switching elements, unit range, differential (fixed/adjustable), reset (auto/manual).
  - h. Calibrations, for Example, but not Limited to:
    - i. Analog Devices: Actual inputs and outputs at 0,10, 50, and 100 percent of span, rising and falling.
    - ii. Other Field Devices: Actual trip points and reset points.
    - iii. Controllers: Mode settings (P&ID).
    - iv. Actual inputs or outputs of 0, 10, 50, and 100 percent of span, rising and falling.
    - v. Space for comments.
  - i. Maintain loop status reports, valve adjustment sheets, and component calibration sheets at site and make them available to Engineer at all times.
  - j. Test and calibrate all fiber optic data links. Document that the dB links are within specified limits and the data communication is error free at specified baud rates.
  - k. These inspections and tests will be spot checked by Engineer.

**CHAPTER 4**

**WATER**

**Section 413**

**Water Production Facility SCADA Specifications**

December 2012

1. Engineer reviews loop status sheets and component calibration sheets and spot-check their entries periodically, and upon completion of ORT. Correct deficiencies found.
2. Performance Acceptance Tests (PAT):
  - i. Once ORT has been completed and facility has been started up, perform a witnessed PAT on complete PICS to demonstrate that it is operating as required by the Contract Documents. Demonstrate each required function on a paragraph-by-paragraph, loop-by-loop, and site-by-site basis.
  - ii. Loop-specific and non-loop-specific tests same as required for Factory Testing except that entire installed PICS tested using actual process variables and all functions demonstrated.
  - iii. Perform local and manual tests for each loop before proceeding to remote and automatic modes.
  - iv. Where possible, verify test results using visual confirmation of process equipment and actual process variable. Unless otherwise directed, exercise and observe devices supplied by others, as needed to verify correct signals to and from such devices and to confirm overall system functionality. Test verification by means of disconnecting wires or measuring signal levels is acceptable only where direct operation of plant equipment is not possible.
  - v. Provide updated versions of the following documentation available to Engineer at site, both before and during tests.
    1. One copy of submittals applicable to the equipment to be tested.
    2. One copy of the Drawings and Specifications together with addenda and applicable change orders.
    3. Make one copy of all O&M manuals.
  - vi. Specialty Equipment: For certain components or systems provided under this section but not manufactured by PICS Subcontractor, provide services of qualified manufacturer's representative during installation, startup, demonstration testing, and County training. Refer to Article Onsite Services in PICS Subsystems for specific requirements.
  - vii. Instruments shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale through wired and wireless communications to the PLC and to the HMI insofar as is practical and

not to put effluent quality at risk.

**2.02 INSTRUMENTATION**

- A. The CONTRACTOR shall purchase and install instrumentation equipment as standardized below. The equipment aligns with what Polk County Utilities currently utilizes. Exact models shall be determined during design:
1. Liquid Level
    - i. Pressure – Rosemount 3051
    - ii. Ultrasonic – Endress Hauser FMU95 or Siemens SITRAN LU
    - iii. Approved Equal
  2. Pressure Indicating and Differential Transmitters
    - i. Rosemount 3051
    - ii. Approved Equal
  3. Pressure Switches
    - i. Ashcroft B-Series
    - ii. Approved Equal
  4. Pressure Gauges
    - i. Ashcroft
    - ii. Approved Equal
  5. Flow Meters
    - i. Electromagnetic – Foxboro
    - ii. Vortex – Foxboro
  6. Chemical Metering Pumps
    - i. Prominent
  7. Chlorine Analyzers
    - i. Prominent
  8. Hach Transmitters
    - i. Hach SC200 or SC1000 depending on number of elements
    - ii. Approved Equal
  9. pH Element
    - i. Prominent – pH sensor
  10. Conductivity
    - i. Hach
    - ii. Approved Equal
  11. Motor Operated Valves
    - i. Limitorque or Auma Actuators, Valve per Polk County Standards
    - ii. Approved Equal

**CHAPTER 4**

**WATER**

**Section 413**

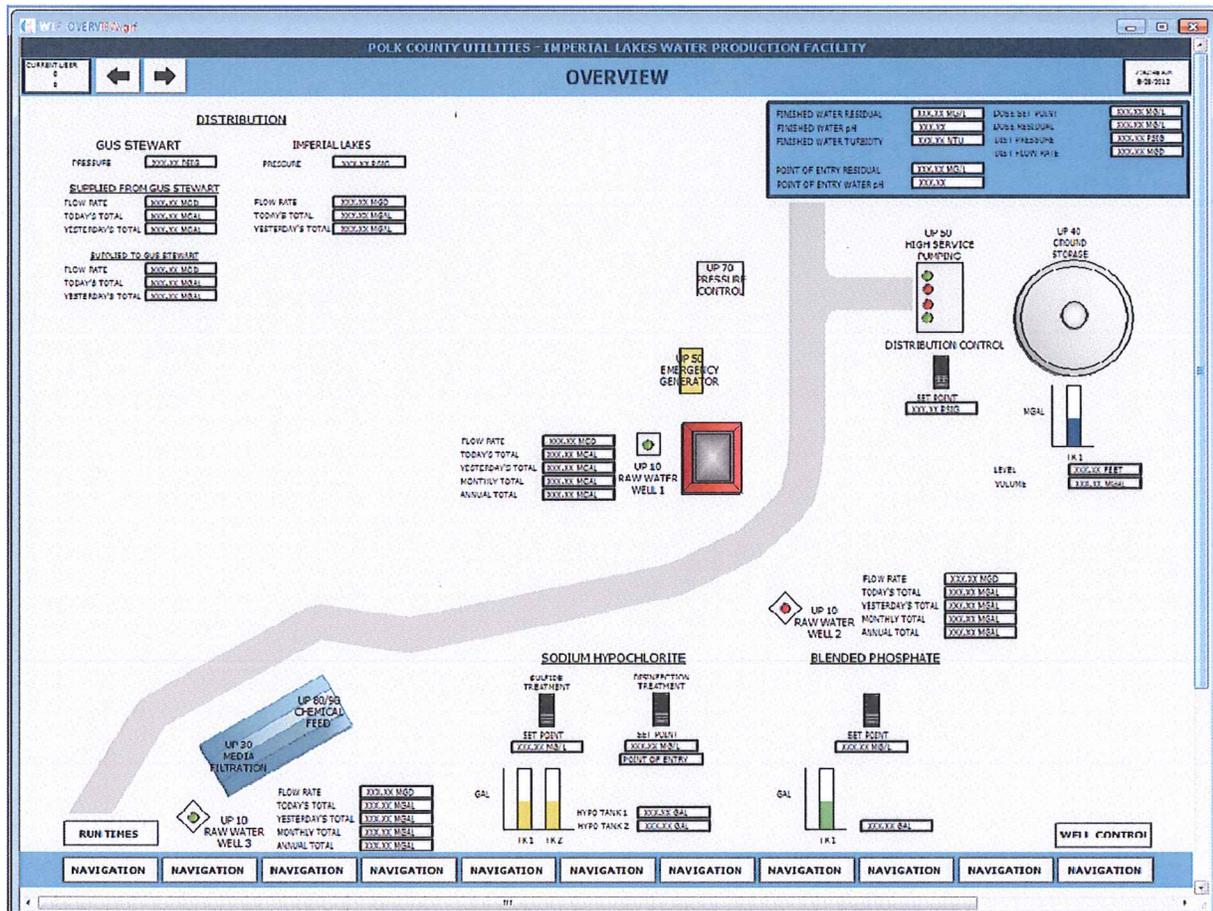
**Water Production Facility SCADA Specifications**

December 2012

**2.03 STANDARD SCREENS**

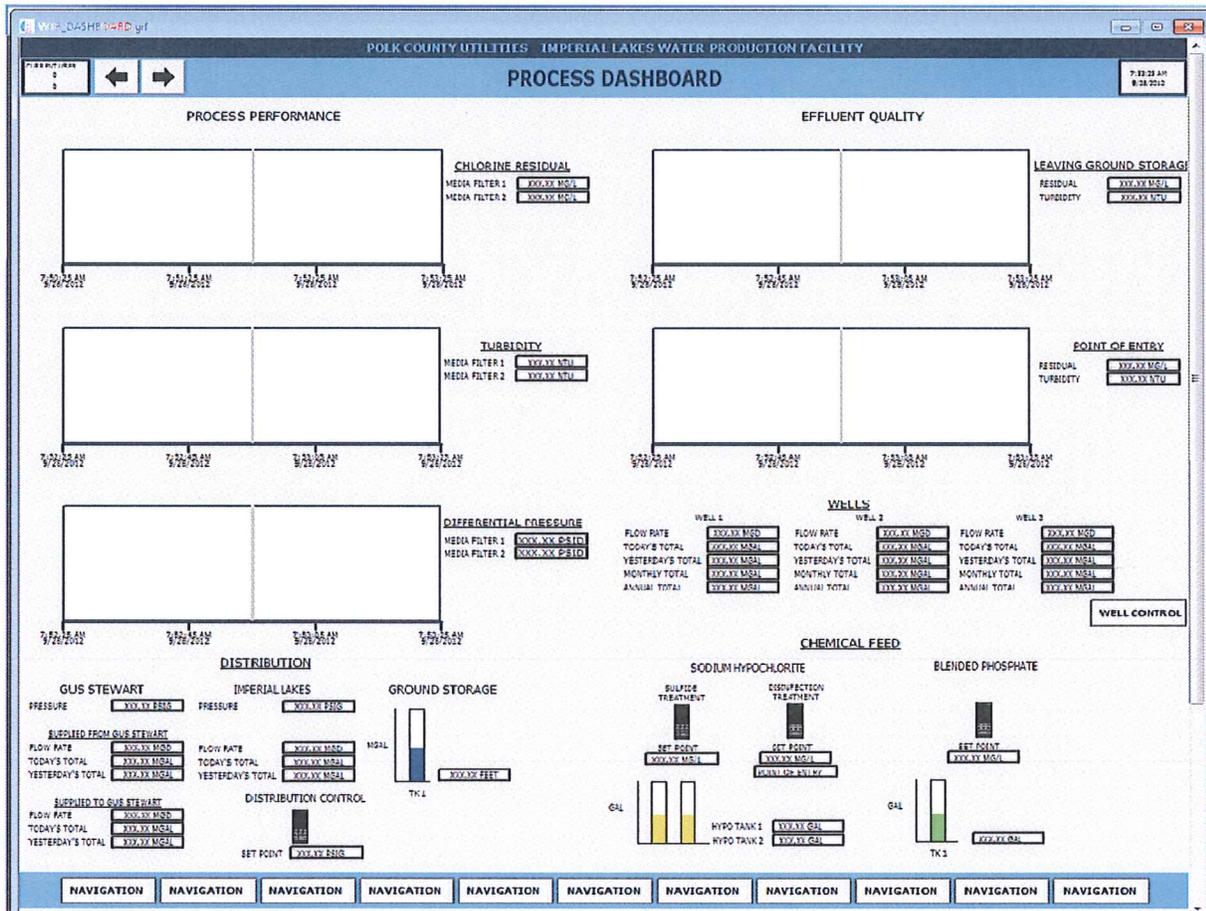
- A. The following pages are intended to be standard screens as a basis for creating water treatment facility SCADA pages. The screens shall be used as a basis by both designers and integrators.

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



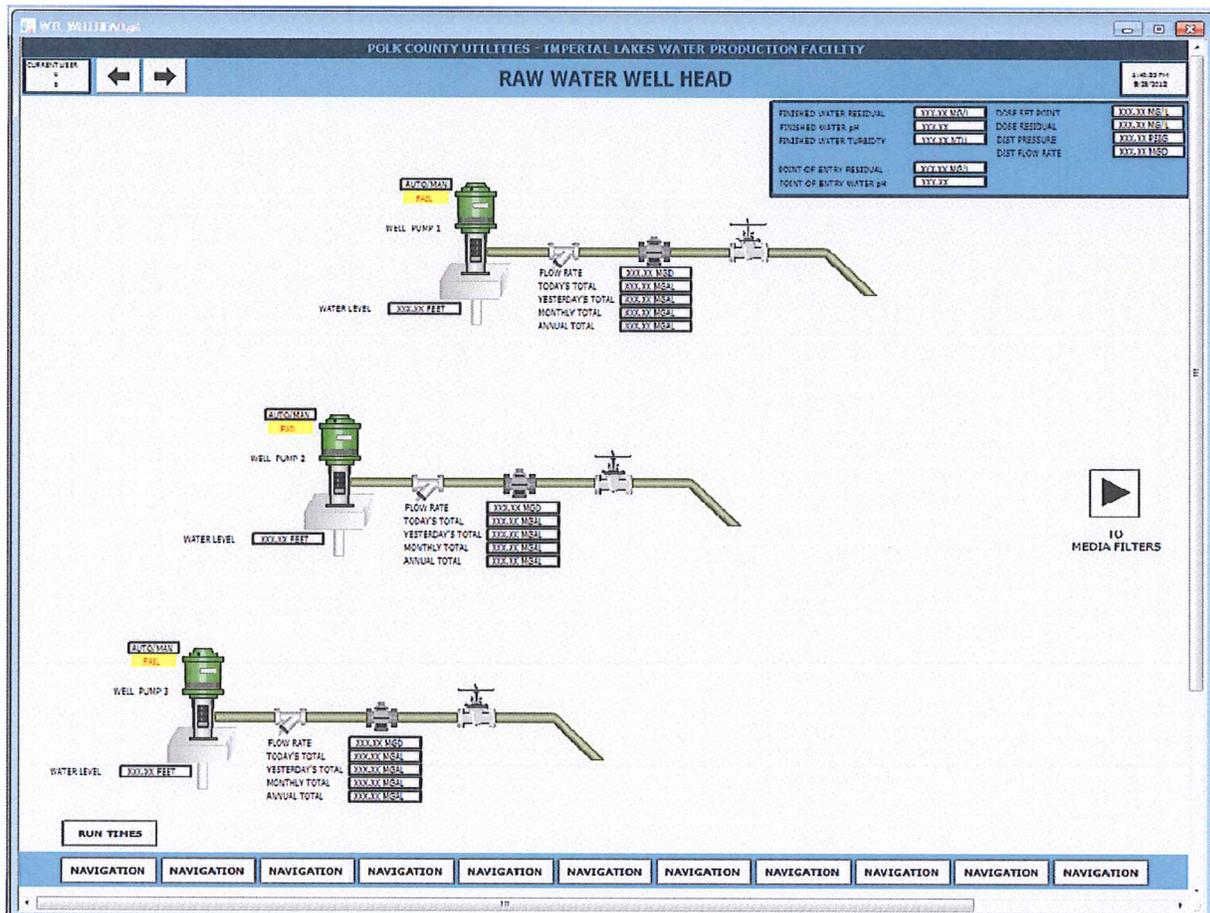
WA-S-01

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



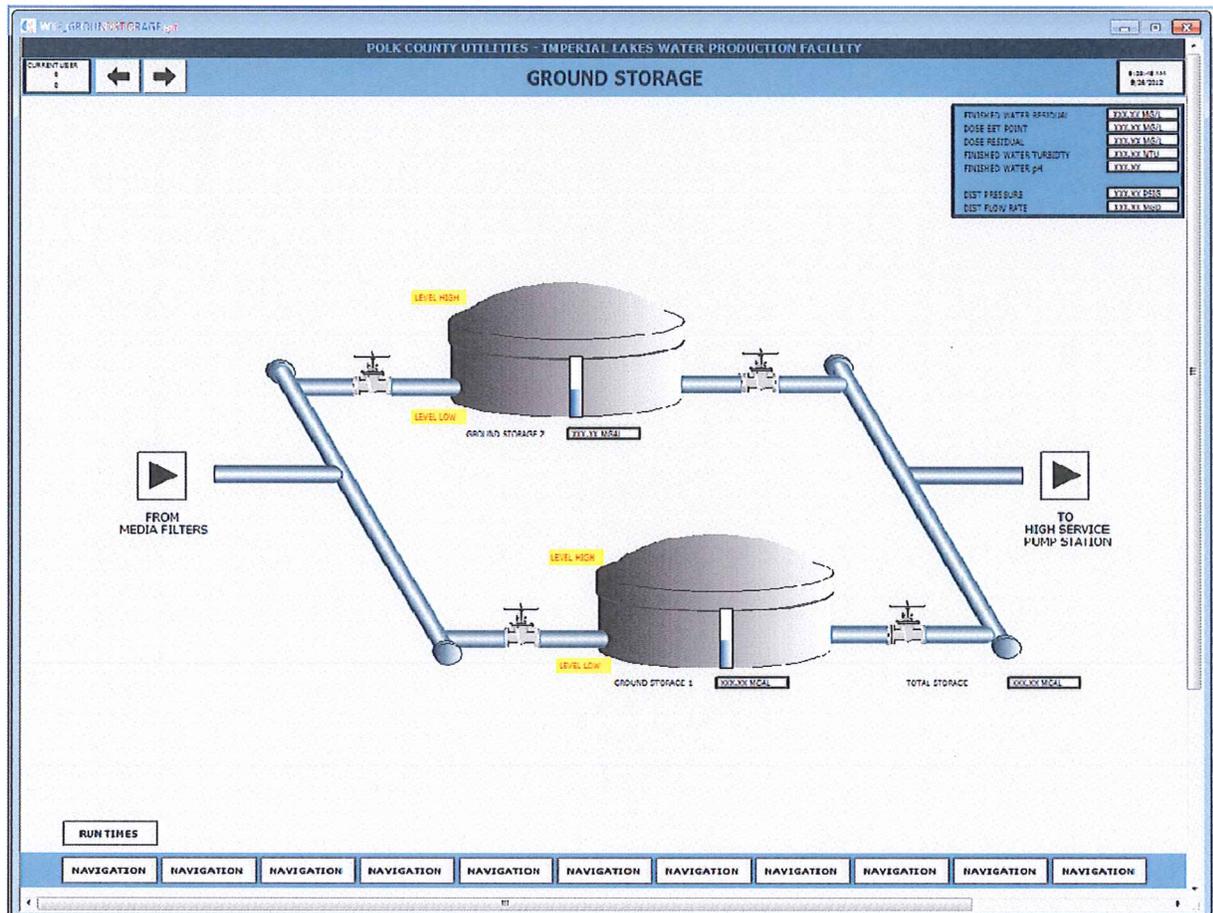
WA-S-02

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



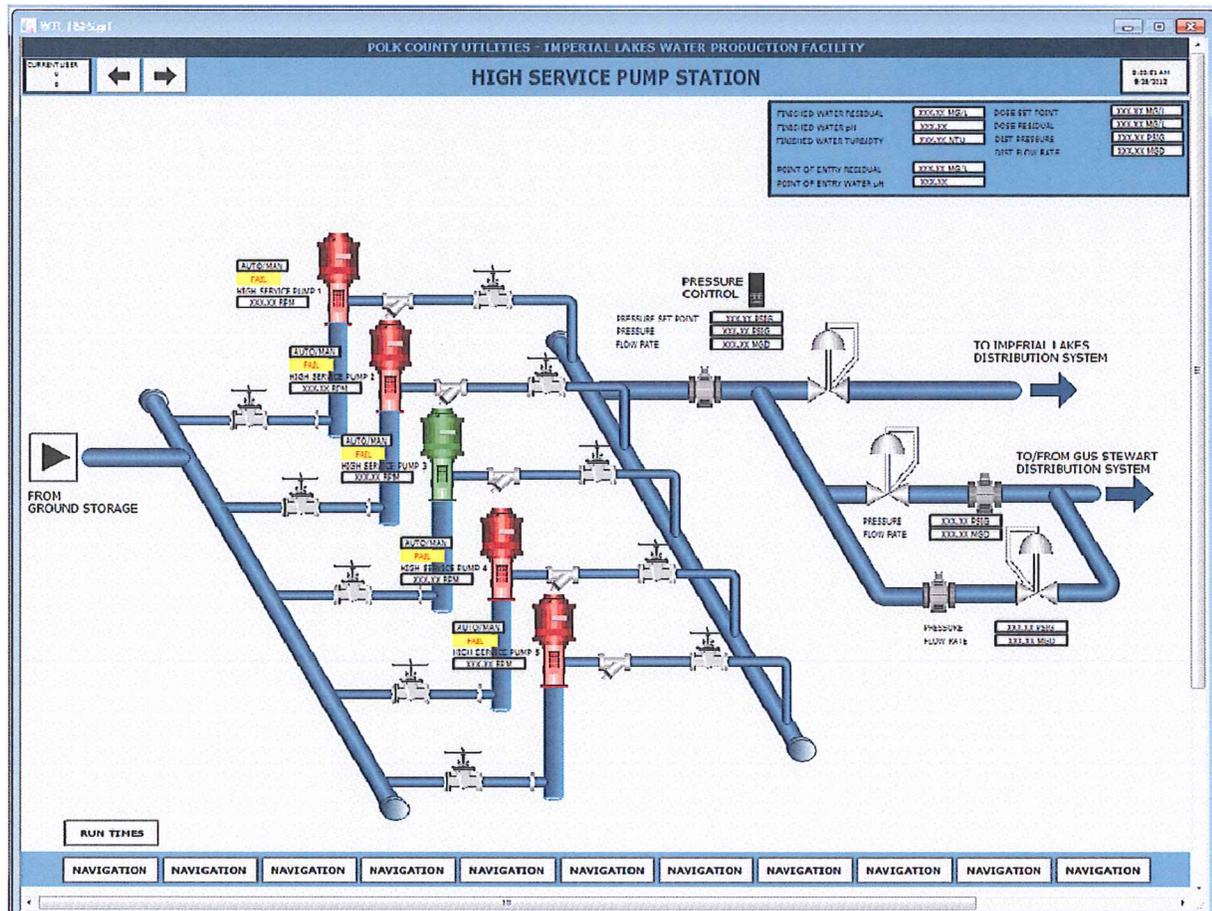
WA-S-03

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



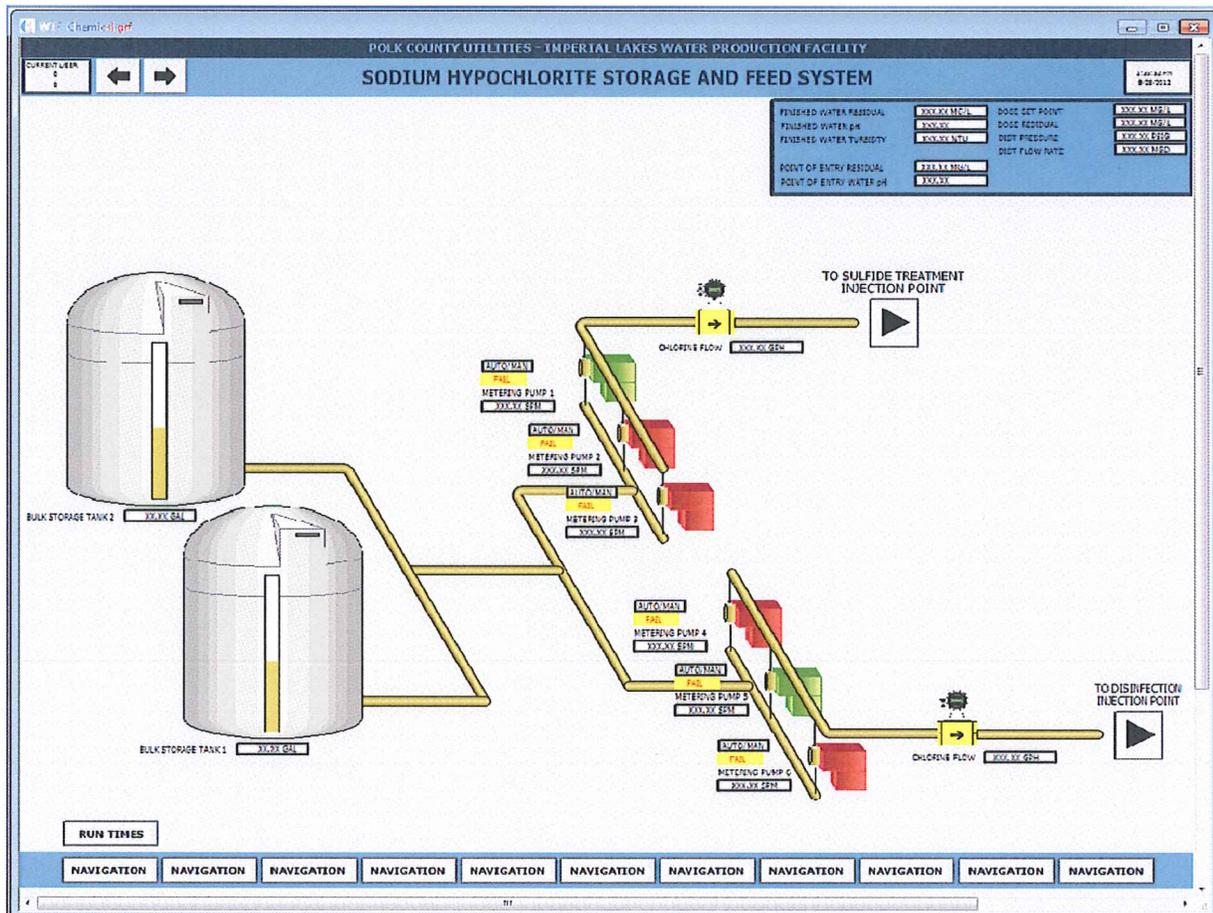
WA-S-04

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



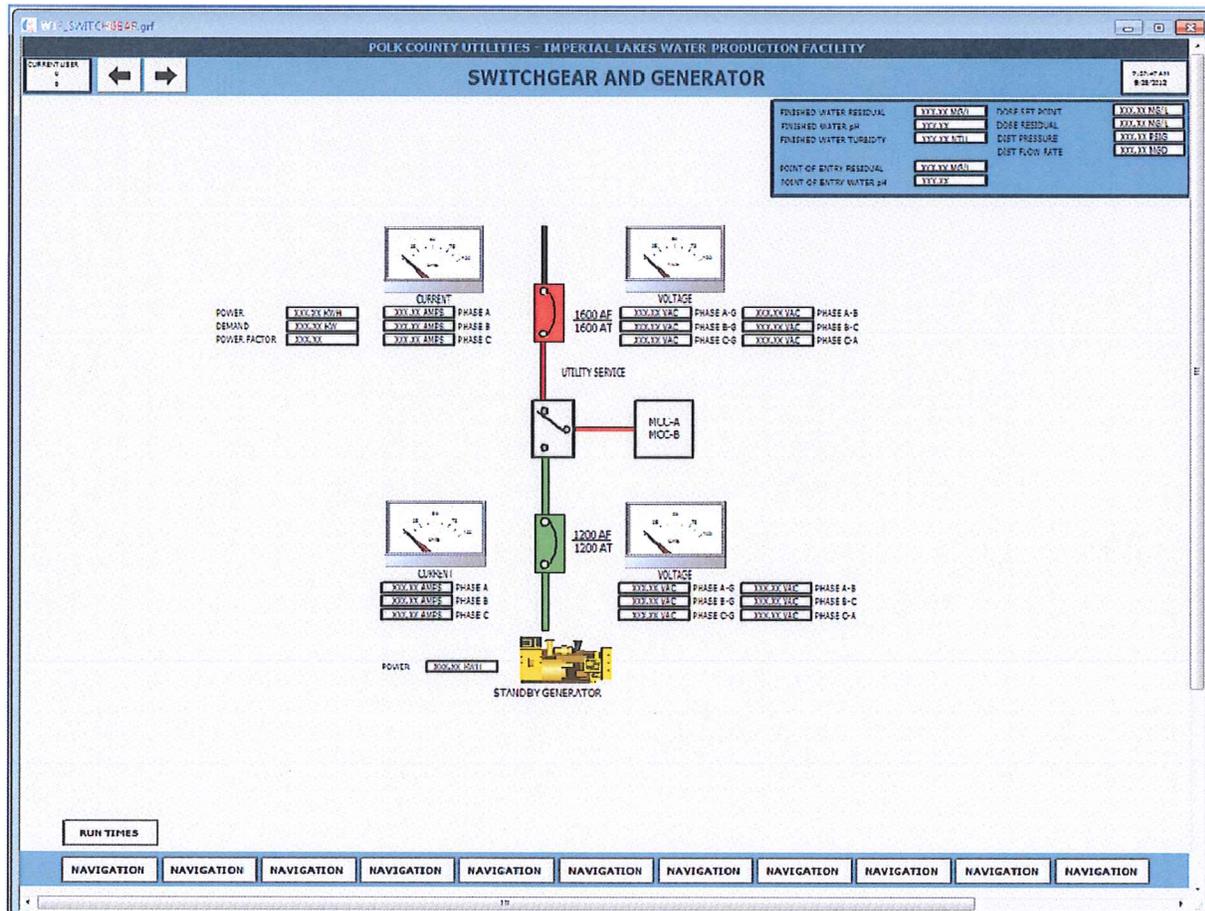
WA-S-05

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



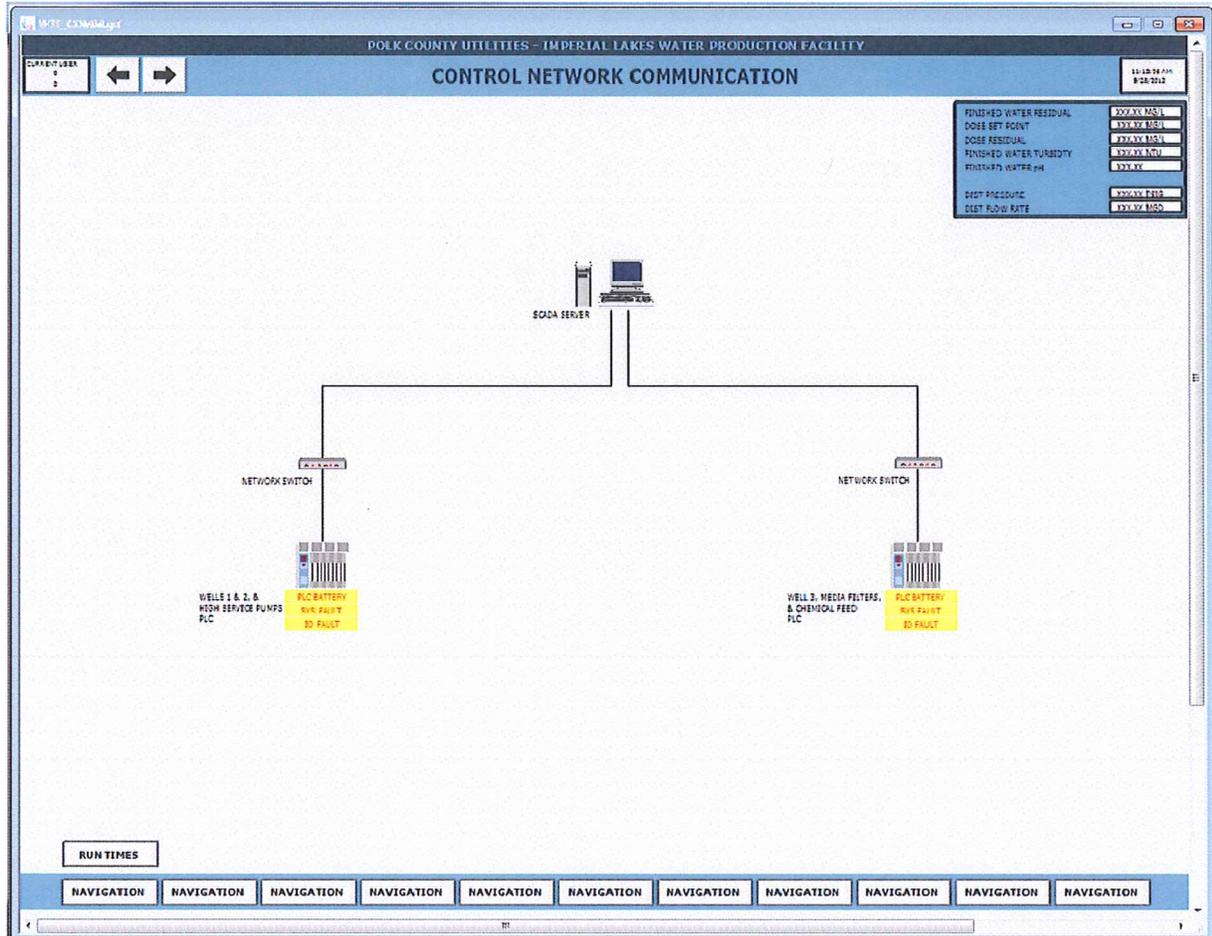
WA-S-06

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



WA-S-07

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



WA-S-08

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

**PART 1 – GENERAL WASTEWATER PLANT SCADA STANDARDS**

**1.01 SUMMARY OF SYSTEM**

- A. These standards represent minimum requirements for County projects at the time the standards were adopted. The County reserves the right to approve changes based on site specific design requirements
  
- B. Wastewater treatment facilities shall be able to be monitored and controlled remotely. The CONTRACTOR shall provide a Human Machine Interface (HMI) / Supervisory Control and Data Acquisition (SCADA) system, Programmable Logic Controller (PLC), and decentralized Historian for wastewater treatment facility control as identified in this Section.
  
- C. The SCADA process data shall be organized by unit process (UP) as identified below:

<u>Unit Process Number</u>	<u>Process Name</u>
5	Relocated Headworks
10	Influent Pump Station
15	Return Pump Station
20	Headworks/Preliminary Treatment
25	Biological Nutrient Reactor
30	Aeration/Oxidation Ditch
35	Aeration Blowers
37	Intermediate Pump Station
40	Clarifiers
50	Return Activated Sludge/Waste Activated Sludge
60	Tertiary Filtration
70	Disinfection/Chlorine Contact Chamber
80	Chemical Storage and Feed
90	Reclaimed/Reject Storage and Transfer Pumping
100	Reclaimed High Service Pumping
105	Reclaimed Augmentation
110	Sludge Holding/Digestion
115	Sludge Dewatering
120	Operations Electrical Building
130	Maintenance Building
140	Electrical Building

**CHAPTER 5 WASTEWATER**

**Section 519 Wastewater Treatment Facility SCADA Specifications**

December 2012

150	Unused
160	Unused
170	Unused
180	Vacuum Truck Receiving Area

D. SCADA tag numbering shall be as follows:

1. Facility = SW
2. Unit Process = 10
3. Function of Device = Level Indicating Transmitter
4. Quantity/Discrete Identifier = 1
  - i. E.g. SW\_010\_LIT\_001

**1.02 EQUIPMENT TO BE MONITORED AND CONTROLLED**

- i. The following typical elements at standard unit processes must be monitored and controlled at the various unit processes with alarms as defined:
  - a. UP 5/20 Headworks
    - i. Influent Flow Meter  
Monitored Data
      1. Instantaneous Flow
      2. Totalized Daily Flow, Current and Previous DayAlarms
      1. Out of Range
      2. No Signal
    - ii. Mechanical Bar Screen/Level Operated  
Monitored Data
      1. Motor Status
      2. Level in Channel
      3. Screw Conveyor Motor StatusAlarms
      1. Screen Over-Torque
      2. Screen Fail
      3. Channel Level High
      4. Screw Wash/Press Over-Torque
      5. Screw Wash/Press Fail
    - iii. Grit Removal  
Monitored Data
      1. Grit Air Lift Motor Status
      2. Grit Classifier Motor Status
      3. Screw Wash/Press Motor StatusAlarms
      1. Grit Air Lift Failure
      2. Grit Classifier Failure
      3. Screw Wash/Press Over-Torque

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- 4. Screw Wash/Press Fail
- b. UP 10 Influent Pump Station
  - i. Influent Flow Meter (may be same as UP 5/20)
    - Monitored Data
      - 1. Instantaneous Flow
      - 2. Totalized Daily Flow, Current and Previous Day
    - Alarms
      - 1. Out of Range
      - 2. No Signal
  - ii. Pumps
    - Monitored Data
      - 1. Pump Motor Status
      - 2. Level in Pump Station
    - Alarms
      - 1. Pump Over-Torque
      - 2. Pump Fail
      - 3. High Level Alarm
      - 4. High-High Level Alarm
      - 5. Low Level Alarm
- c. UP 15 Return Pump Station
  - i. Flow Meter
    - Monitored Data
      - 1. Instantaneous Flow
      - 2. Totalized Daily Flow, Current and Previous Day
    - Alarms
      - 1. Out of Range
      - 2. No Signal
  - ii. Pumps
    - Monitored Data
      - 1. Pump Motor Status
      - 2. Level in Pump Station
    - Alarms
      - 1. Pump Over-Torque
      - 2. Pump Fail
      - 3. High Level Alarm
      - 4. High-High Level Alarm
      - 5. Low Level Alarm
- d. UP 20 Headworks – See UP 5
- e. UP 30 Aeration/Oxidation Ditch
  - i. Mechanical Aerator
    - Monitored Data
      - 1. Aerator Motor Status
      - 2. VFD Speed
      - 3. Dissolved Oxygen (DO)
      - 4. Oxidation Reduction Potential (ORP)

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- Alarms
  - 1. Aerator Motor Fail
  - 2. Aerator Motor Over-Torque
  - 3. High DO/ORP
  - 4. Low DO/ORP
  - 5. Aerator Oil Pressure Low
- ii. Anoxic Mixer
  - Monitored Data
    - 1. Anoxic Mixer Motor Status
  - Alarms
    - 1. Anoxic Mixer Over-Torque
    - 2. Anoxic Mixer Fail
- f. UP 40 Clarifiers
  - i. Clarifier Rake
    - Monitored Data
      - 1. Clarifier Motor Status
    - Alarms
      - 1. Clarifier Motor Fail
      - 2. Clarifier Motor Over-Torque
  - ii. Scum Pumps
    - Monitored Data
      - 1. Scum Pump Motor Status
    - Alarms
      - 1. Scum Pump Over-Torque
      - 2. Scum Pump Fail
      - 3. Scum Pump Over Pressure
- g. UP 50 Return Activated Sludge/Waste Activated Sludge
  - i. Flow Meters
    - Monitored Data
      - 1. Instantaneous Flow (Both)
      - 2. Totalized Daily Flow, Current and Previous Day (RAS)
      - 3. Set to Waste, Current and Previous Day (WAS)
      - 4. Total Wasted, Current and Previous Day (WAS)
      - 5. Valve Status (if common pump station)
    - Alarms
      - 1. Out of Range
      - 2. Valve Failure
      - 3. No Signal
  - ii. Pumps
    - Monitored Data
      - 1. Pump Motor Status
      - 2. VFD Speed
      - 3. Level in Pump Station
    - Alarms
      - 1. Pump Over-Torque

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

2. Pump Fail
  3. High Level Alarm
  4. High-High Level Alarm
  5. Low Level Alarm
- h. UP 60 Tertiary Filtration
- i. Backwash Filters/Deep Bed Filters
- Monitored Data
1. Backwash Pump and Wash Unit Motor Status
  2. Level in Filter
  3. Valve Status (if using deep bed)
  4. Total Suspended Solids and/or Nephelometric Turbidity Units
  5. Flow Rate
- Alarms
1. Pump/Wash Unit Motor Fail
  2. Valve Fail
  3. High Level
  4. Low Level
  5. Flow Rate Out of Range
- i. UP 70 Disinfection/Chlorine Contact Chamber
- i. Instrumentation
- Monitored Data
1. Chlorine Dosage Measurement
  2. Chlorine Residual Measurement
  3. Final pH
  4. Flow Rate
  5. Valve Position for Reject/Storage
- Alarms
1. Low Chlorine Residual
  2. High Chlorine Residual
  3. Effluent pH Out of Range
  4. Flow Rate Out of Range
  5. Valve Fail
- j. UP 80 Chemical Storage and Feed
- i. Chemical Feed and Monitoring
- Monitored Data
1. Sodium Hypochlorite Level/Volume
  2. Alum Level/Volume
  3. Sodium Hypochlorite Pump Status
  4. Sodium Hypochlorite Pump Stroke
  5. Sodium Hypochlorite Pump Speed
  6. Alum Pump Status
  7. Exhaust Fan Status
  8. Eye Wash Status
- Alarms

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

1. Sodium Hypochlorite Pump Failure
2. Alum Pump Failure
3. Exhaust Fan Failure
4. Eyewash In Use or Failure
5. High Alum Level
6. Low Alum Level
7. High Sodium Hypochlorite Level
8. Low Sodium Hypochlorite Level
- k. UP 90 Reclaimed/Reject Storage and Transfer Pumping
  - i. Levels/Valves  
Monitored Data
    1. Ground Storage Tank Levels
    2. Calculated Ground Storage Tank Volumes
    3. Calculated Rate of Change (gpm) in Storage
    4. Reject Storage Tank Levels
    5. Calculated Reject Storage Tank Volumes
    6. Calculated Rate of Change (gpm) in Reject
    7. Transfer Pump Wet Well Level
    8. Fill Valve Status
    9. In/Eff Valves for Tanks StatusAlarms
    1. High Ground Storage Level
    2. Low Ground Storage Level
    3. High Reject Storage Level
    4. Low Reject Storage Level
    5. High Wet Well Level
    6. Low Wet Well Level
    7. Valve Failure
  - ii. Pumps  
Monitored Data
    1. Pump Motor Status
    2. VFD SpeedAlarms
    1. Pump Over-Torque
    2. Pump Fail
- l. UP 100 Reclaimed High Service Pumping
  - i. Pumps  
Monitored Data
    1. Pump Motor Status
    2. VFD Speed
    3. Pressure
    4. Flow RateAlarms
    1. Pump Over-Torque
    2. Pump Fail

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

3. Flow Out of Range
  4. High Pressure
  5. Low Pressure
- m. UP 105 Reclaimed Augmentation
- i. Pumps
    - Monitored Data
      1. Pump Motor Status
      2. Pressure
      3. Flow Rate
      4. Well Level
    - Alarms
      1. Pump Over-Torque
      2. Pump Fail
      3. Flow Out of Range
      4. High Pressure
      5. Low Pressure
      6. Well Below Desired Liquid Level Set point
- n. UP 110 Sludge Digestion
- i. Blowers
    - Monitored Data
      1. Blower Motor Status
      2. VFD Speed
      3. Air Flow Rate
    - Alarms
      1. Blower Fail
      2. Flow Out of Range
      3. High Pressure
  - ii. Sludge Transfer Pumps
    - Monitored Data
      1. Pump Motor Status
      2. VFD Speed
      3. Flow Rate
    - Alarms
      1. Pump Fail
      2. Flow Out of Range
      3. High Pressure
  - iii. Instrumentation
    - Monitored Data
      1. DO or ORP
      2. Liquid Level
      3. Calculated Volume In Digester
      4. Rate of Change (gpm in/out)
    - Alarms

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

1. High DO/ORP
2. Low DO/ORP
3. High Liquid Level
4. Low Liquid Level
- o. UP 120 Operations Electrical Building
  - i. Electrical Line Power  
Monitored Data
    1. Phase Voltage Difference
    2. Phase Amperage
    3. Tie-Breaker Status
    4. Main Breaker StatusAlarms
    1. Low Voltage
    2. High Voltage
    3. Loss of Power
  - ii. Generator Power  
Monitored Data
    1. Generator Status
    2. Phase Voltage Difference
    3. Phase Amperage
    4. Transfer Switch StatusAlarms
    1. Low Voltage
    2. High Voltage
    3. Generator Failure
    4. Transfer Switch Failure
- p. UP 130 Maintenance Building  
(Not typically utilized)
- q. UP 140 Electrical Building
  - i. Electrical Line Power  
Monitored Data
    1. Phase Voltage Difference
    2. Phase Amperage
    3. Tie-Breaker Status
    4. Main Breaker StatusAlarms
    1. Low Voltage
    2. High Voltage
    3. Loss of Power
  - ii. Generator Power  
Monitored Data
    1. Generator Status
    2. Phase Voltage Difference
    3. Phase Amperage
    4. Transfer Switch Status

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

Alarms

1. Low Voltage
2. High Voltage
3. Generator Failure
4. Transfer Switch Failure

**1.03 DATA TO BE STORED IN HISTORIAN**

A. The following typical data at standard and alarm at unit processes. Historical data shall be stored at a minimum rate of one point every ten seconds, or a change greater than a set dead-band, and shall be stored as defined:

a. UP 5/20 Headworks

i. Influent Flow Meter

Monitored Data

1. Instantaneous Flow
2. Totalized Daily Flow, Current and Previous Day

ii. Mechanical Bar Screen/Level Operated

Monitored Data

1. Screen Motor Status
2. Screw Wash/Press Motor Status
3. Level in Channel

Alarms

1. Screen Fail
2. Screw Wash/Press Fail

iii. Grit Removal

Alarms

1. Grit Air Lift Failure
2. Grit Classifier Failure
3. Screw Wash/Press Fail

b. UP 10 Influent Pump Station

i. Influent Flow Meter (may be same as UP 5/20)

Monitored Data

1. Instantaneous Flow
2. Totalized Daily Flow, Current and Previous Day

Pumps

Monitored Data

1. Pump Motor Status
2. Level in Pump Station

Alarms

1. Pump Fail

c. UP 15 Return Pump Station

i. Flow Meter

Monitored Data

1. Instantaneous Flow
2. Totalized Daily Flow, Current and Previous Day

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- ii. Pumps
  - Monitored Data
    - 1. Pump Motor Status
    - 2. Level in Pump Station
  - Alarms
    - 1. Pump Fail
- d. UP 20 Headworks – See UP 5
- e. UP 30 Aeration/Oxidation Ditch
  - i. Mechanical Aerator
    - Monitored Data
      - 1. VFD Speed
      - 2. Dissolved Oxygen (DO)
      - 3. Oxidation Reduction Potential (ORP)
    - Alarms
      - 1. Aerator Motor Fail
  - ii. Anoxic Mixer
    - Monitored Data
      - 1. Anoxic Mixer Motor Status
    - Alarms
      - 1. Anoxic Mixer Fail
- f. UP 40 Clarifiers
  - i. Clarifier Rake
    - Monitored Data
      - 1. Clarifier Motor Status
    - Alarms
      - 1. Clarifier Motor Fail
  - ii. Scum Pumps
    - Monitored Data
      - 1. Scum Pump Motor Status
    - Alarms
      - 1. Scum Pump Fail
      - 2. Scum Pump Over Pressure
- g. UP 50 Return Activated Sludge/Waste Activated Sludge
  - i. Flow Meters
    - Monitored Data
      - 1. Instantaneous Flow (Both)
      - 2. Totalized Daily Flow, Current and Previous Day (RAS)
      - 3. Set to Waste, Current and Previous Day (WAS)
      - 4. Total Wasted, Current and Previous Day (WAS)
      - 5. Valve Status (if common pump station)
    - Alarms
      - 1. Valve Failure
  - ii. Pumps
    - Monitored Data
      - 1. Pump Motor Status

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- 2. VFD Speed
    - 3. Level in Pump Station
  - Alarms
    - 1. Pump Over-Torque
    - 2. Pump Fail
- h. UP 60 Tertiary Filtration
  - i. Backwash Filters/Deep Bed Filters
    - Monitored Data
      - 1. Backwash Pump and Wash Unit Motor Status
      - 2. Level in Filter
      - 3. Valve Status (if using deep bed)
      - 4. Total Suspended Solids and/or Nephelometric Turbidity Units
      - 5. Flow Rate
    - Alarms
      - 1. Pump/Wash Unit Motor Fail
      - 2. Valve Fail
- i. UP 70 Disinfection/Chlorine Contact Chamber
  - i. Instrumentation
    - Monitored Data
      - 1. Chlorine Dosage Measurement
      - 2. Chlorine Residual Measurement
      - 3. Final pH
      - 4. Flow Rate
      - 5. Valve Position for Reject/Storage
    - Alarms
      - 1. Valve Fail
- j. UP 80 Chemical Storage and Feed
  - i. Chemical Feed and Monitoring
    - Monitored Data
      - 1. Sodium Hypochlorite Level/Volume
      - 2. Alum Level/Volume
      - 3. Sodium Hypochlorite Pump Status
      - 4. Sodium Hypochlorite Pump Stroke
      - 5. Sodium Hypochlorite Pump Speed
      - 6. Alum Pump Status
      - 7. Exhaust Fan Status
      - 8. Eye Wash Status
    - Alarms
      - 1. Sodium Hypochlorite Pump Failure
      - 2. Alum Pump Failure
      - 3. Exhaust Fan Failure
      - 4. Eyewash In Use or Failure
- k. UP 90 Storage Transfer Pumping, Ground Storage and Reject Storage
  - i. Levels/Valves

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

Monitored Data

1. Ground Storage Tank Levels
2. Calculated Ground Storage Tank Volumes
3. Reject Storage Tank Levels
4. Calculated Reject Storage Tank Volumes
5. Transfer Pump Wet Well Level
6. Fill Valve Status
7. In/Eff Valves for Tanks Status

Alarms

1. Valve Failure

ii. Pumps

Monitored Data

1. Pump Motor Status
2. VFD Speed

Alarms

1. Pump Fail

1. UP 100 Reclaimed High Service Pumping

i. Pumps

Monitored Data

1. Pump Motor Status
2. VFD Speed
3. Pressure
4. Flow Rate

Alarms

1. Pump Fail

m. UP 110 Sludge Digestion

i. Blowers

Monitored Data

1. Blower Motor Status
2. VFD Speed
3. Air Flow Rate

Alarms

1. Blower Fail

ii. Sludge Transfer Pumps

Monitored Data

1. Pump Motor Status
2. VFD Speed
3. Flow Rate

Alarms

1. Pump Fail
2. High Pressure

iii. Instrumentation

Monitored Data

1. DO or ORP
2. Liquid Level

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

3. Calculated Volume In Digester
- n. UP 120 Operations Electrical Building
  - i. Electrical Line Power
    - Monitored Data
      1. Phase Voltage Difference
      2. Phase Amperage
      3. Tie-Breaker Status
      4. Main Breaker Status
    - Alarms
      1. Low Voltage
      2. High Voltage
      3. Loss of Power
  - ii. Generator Power
    - Monitored Data
      1. Generator Status
      2. Phase Voltage Difference
      3. Phase Amperage
      4. Transfer Switch Status
    - Alarms
      1. Low Voltage
      2. High Voltage
      3. Generator Failure
      4. Transfer Switch Failure

**PART 2 – COMPONENTS AND INTEGRATION**

**2.01 SOFTWARE, PLC, COMPUTERS, and NETWORK COMPONENTS**

- A. The CONTRACTOR shall purchase and install equipment compatible with the PCU existing SCADA central station equipment.
  1. Wastewater treatment facility control systems must utilize GE PAC RX3i PLC components.
  2. Wastewater treatment facility SCADA controls must be integrated utilizing iFix with the licenses for the latest version supplied as part of the construction effort. CONTRACTOR must verify and utilize the iFix version currently in use by PCU prior to integrating PLC/SCADA.
  3. CONTRACTOR shall provide local servers and historian, including a license for GE Historian, latest version, as part of the construction effort.
  4. iFix and Historian licenses must be provided with sufficient tags for at least 30% spare tags.

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

5. Servers provided will be mapped to PCU network by Owner. Hardware to be provided to Owner at a time scheduled at least two (2) weeks in advance for mapping purposes.

**B. SCADA Computer Server equipment shall be as follows:**

1. Primary SCADA server
  - i. Dell R710 or approved equivalent
  - ii. Two Pentium Xeon Hex-Core Processors, 3.0 Ghz min, 12 Mb L3 Cache
  - iii. 24 Gb of DDR3 RAM, 1333 MHz, expandable to 128 Mb
  - iv. Hard Drives: (2) RAID 1 configuration HD, SAS, SCSI, 15,000 rpm, Hot-Swappable. Size of each drive shall be at least 200% of capacity required for current system implementation.
  - v. Multi-use optical drive, 24x, CD-RW/DVD-RW
  - vi. Multimedia cards: manufacturer's standard
  - vii. Dual Hot-Swappable Power Supplies
  - viii. Two IEEE 802.3 network card, dual redundant, 1 GbE
  - ix. External 56k modem, V.90 PCI, USB interface, voice and data modem, as manufactured by US Robotics.
  - x. Windows Server 2008 R2 Standard Operating System, 5 Client Access Licenses
  - xi. Keyboard, Video, Mouse module
  - xii. Proficy iFix Software Run License, Latest Version
  - xiii. 3-Years Onsite Warranty
2. Backup SCADA server
  - i. Dell or approved equivalent
  - ii. Pentium Quad-Core Processor, 3.6 Ghz min, 12 Mb L2 Cache
  - iii. 16 Gb of DDR3 RAM, 1333 MHz
  - iv. Hard Drives: (2) RAID 1 configuration HD, SATA, 7,200 rpm. Size of each drive shall be at least 200% of capacity required for current system implementation.
  - v. Multi-use optical drive, 24x, CD-RW/DVD-RW
  - vi. Audio Card: manufacturer's standard
  - vii. Video Card: capable of running two monitors and software noted
    1. Dual Channel VGA color graphics, 16X transfer rate
    2. 512 Mb DDR3, min
    3. NVIDIA Quadro NVS 300
  - viii. Single Power Supply, 500 kW min
  - ix. 101-key Enhanced Keyboard
  - x. Mouse: two button with thumb wheel, min
  - xi. IEEE 802.3 network card, dual redundant, 1 GbE
  - xii. Windows Server 2008 R2 Standard Operating System, 5 Client Access Licenses
  - xiii. Proficy iFix Development License, Latest Version
  - xiv. (2)-47-inch Flat Panel Displays

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- xv. 3-Years Onsite Warranty
- 3. Historian SCADA server
  - i. Link with all Historian tags sent to Base One Master Historian
  - ii. Dell R710 or approved equivalent
  - iii. Dual Pentium Xeon Hex-Core Processor, 3.0 Ghz min, 12 Mb L3 Cache
  - iv. 24 Gb of DDR3 RAM, 1333 MHz, expandable to 128 Mb
  - v. Hard Drives: (4) RAID 5 configuration HD, SAS, SCSI, 15,000 rpm, Hot-Swappable. Size of drive array shall be at least 200% of capacity required for current system implementation with 5 years of data stored.
  - vi. Multi-use optical drive, 24x, CD-RW/DVD-RW
  - vii. Multimedia cards: manufacturer's standard
  - viii. Dual Hot-Swappable Power Supplies
  - ix. IEEE 802.3 network card, dual redundant, 1 GbE
  - x. External 56k modem, V.90 PCI, USB interface, voice and data modem, as manufactured by US Robotics.
  - xi. Windows Server 2008 R2 Standard Operating System, 5 Client Access Licenses
  - xii. Keyboard, Video, Mouse module
  - xiii. Proficy iFix Historian, Latest Version
  - xiv. Proficy Web Server, Latest Version
  - xv. 3-Years Onsite Warranty
- 4. Additional Equipment
  - i. Cisco 1 GbE Network Switch
    - 1. 24 ports, 4 Dual Ports
    - 2. 4 Dual Port Uplinks Support 1 GbE Upload and Download
    - 3. Catalyst 2960S series
  - ii. 1 KVM Module, Tripplite B040-008-19
  - iii. Tripplite 6 kVA UPS
  - iv. Network Rack, 42 RU min
  - v. Cable Management Unit for Network Rack
  - vi. 24" Monitor, ViewSonic VG2436wm or Equal
- C. New plants shall have integrated WiFi throughout the facility in accordance with IEEE 802.11. WiFi shall be able to be utilized for remote SCADA access at any unit process in the plant.
  - 1. Radio propagation studies shall be performed during design and construction of WiFi networks to ensure WiFi is functional at all unit processes.
- D. New unit processes shall have decentralized I/O to limit long runs of buried copper communication. Localized OLMs shall be designed and installed with a fiber connection to carry the information to a point local to the PLC. There the data can be converted back into a readable signal for the PLC.

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- E. CONTRACTOR to perform testing on integrated systems at key stages in the process. At a minimum, Operational Readiness Testing (ORT) and Performance Acceptance Testing (PAT) shall be performed. Factory Testing and Staging Testing may be added at COUNTY or ENGINEER discretion. Minimum testing requirements shall be as follows:
1. Operational Readiness Test (ORT): Prior to startup test period and PAT, inspect, test, and document that entire Process Instrumentation and Control System (PICS) is ready for operation.
    - i. Loop/Component Inspections and Tests:
      1. Check PICS for proper installation, calibration, and adjustment on a loop-by-loop and component-by-component basis.
      2. Provide space on forms for signoff by PICS subcontractor.
      3. Use loop status report to organize and track inspection, adjustment, and calibration of each loop and include the following:
        - a. Project name.
        - b. Loop number.
        - c. Tag number for each component.
        - d. Checkoffs/Signoffs for Each Component:
          - i. Tag/identification.
          - ii. Installation.
          - iii. Termination wiring.
          - iv. Calibration/adjustment
        - e. Checkoffs/Signoffs for the Loop
          - i. Field Device Signals Transmitted to the PLCs are Operational: Received/sent, processed, adjusted.
      4. Component calibration sheet for each active field component (except simple hand switches, lights, gauges, and similar items) include the following:
        - a. Project name.
        - b. Loop number.
        - c. Component tag number or PLC register address.
        - d. Component code number for field device elements.
        - e. Manufacturer for field device elements.
        - f. Model number/serial number for field device elements.
        - g. Summary of Functional Requirements, for Example:
          - i. Indicators and recorders, scale and chart ranges.
          - ii. Transmitters/converters, input and output ranges.
          - iii. Computing elements' function.
          - iv. Controllers, action(direct/reverse) and control modes (P&ID).
          - v. Switching elements, unit range, differential

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

- (fixed/adjustable), reset (auto/manual).
- h. Calibrations, for Example, but not Limited to:
    - i. Analog Devices: Actual inputs and outputs at 0,10, 50, and 100 percent of span, rising and falling.
    - ii. Other Field Devices: Actual trip points and reset points.
    - iii. Controllers: Mode settings (P&ID).
    - iv. Actual inputs or outputs of 0, 10, 50, and 100 percent of span, rising and falling.
    - v. Space for comments.
  - i. Maintain loop status reports, valve adjustment sheets, and component calibration sheets at site and make them available to Engineer at all times.
  - j. Test and calibrate all fiber optic data links. Document that the dB links are within specified limits and the data communication is error free at specified baud rates.
  - k. These inspections and tests will be spot checked by Engineer.
  - l. Engineer reviews loop status sheets and component calibration sheets and spot-check their entries periodically, and upon completion of ORT. Correct deficiencies found.
2. Performance Acceptance Tests (PAT):
- i. Once ORT has been completed and facility has been started up, perform a witnessed PAT on complete PICS to demonstrate that it is operating as required by the Contract Documents. Demonstrate each required function on a paragraph-by-paragraph, loop-by-loop, and site-by-site basis.
  - ii. Loop-specific and non-loop-specific tests same as required for Factory Testing except that entire installed PICS tested using actual process variables and all functions demonstrated.
  - iii. Perform local and manual tests for each loop before proceeding to remote and automatic modes.
  - iv. Where possible, verify test results using visual confirmation of process equipment and actual process variable. Unless otherwise directed, exercise and observe devices supplied by others, as needed to verify correct signals to and from such devices and to confirm overall system functionality. Test verification by means of disconnecting wires or measuring signal levels is acceptable only where direct operation of

**CHAPTER 5**

**WASTEWATER**

**Section 519**

**Wastewater Treatment Facility SCADA Specifications**

December 2012

plant equipment is not possible.

- v. Provide updated versions of the following documentation available to Engineer at site, both before and during tests.
  - 1. One copy of submittals applicable to the equipment to be tested.
  - 2. One copy of the Drawings and Specifications together with addenda and applicable change orders.
  - 3. Make one copy of all O&M manuals.
- vi. Specialty Equipment: For certain components or systems provided under this section but not manufactured by PICS Subcontractor, provide services of qualified manufacturer's representative during installation, startup, demonstration testing, and County training. Refer to Article Onsite Services in PICS Subsystems for specific requirements.
- vii. Instruments shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale through wired and wireless communications to the PLC and to the HMI insofar as is practical and not to put effluent quality at risk.

**2.02 INSTRUMENTATION**

- A. The CONTRACTOR shall purchase and install instrumentation equipment as standardized below. The equipment aligns with what Polk County Utilities currently utilizes. Exact models shall be determined during design:
  - 1. Liquid Level
    - i. Pressure – Rosemount 3051
    - ii. Ultrasonic – Endress Hauser FMU95 or Siemens SITRAN LU
    - iii. Approved Equal
  - 2. Pressure Indicating and Differential Transmitters
    - i. Rosemount 3051
    - ii. Approved Equal
  - 3. Pressure Switches
    - i. Ashcroft B-Series
    - ii. Approved Equal
  - 4. Pressure Gauges
    - i. Ashcroft
    - ii. Approved Equal
  - 5. Flow Meters
    - i. Electromagnetic – Foxboro
  - 6. Chemical Metering Pumps
    - i. Prominent
  - 7. Chlorine Analyzers
    - i. Prominent

**CHAPTER 5 WASTEWATER**

**Section 519 Wastewater Treatment Facility SCADA Specifications**

December 2012

8. Hach Transmitters
  - i. Hach SC200 or SC1000 depending on number of elements
9. pH Element
  - i. Prominent – pH sensor
10. Dissolved Oxygen
  - i. Hach LDO
  - ii. Approved Equal
11. Oxidation Reduction Potential
  - i. Hach pHD – ORP sensor
  - ii. Approved Equal
12. Turbidity Sensor
  - i. HF Scientific – Microtol2
  - ii. Approved Equal
13. Motor Operated Valves
  - i. Limitorque or Auma Actuators, Valve per Polk County Standards
  - ii. Approved Equal
14. Total Suspended Solids (High and Low) and NTU
  - i. Hach Solitax
  - ii. Approved Equal
15. Sludge Blanket Monitor
  - i. Cerlic CAT microP
  - ii. Approved Equal

**CHAPTER 5** **WASTEWATER**

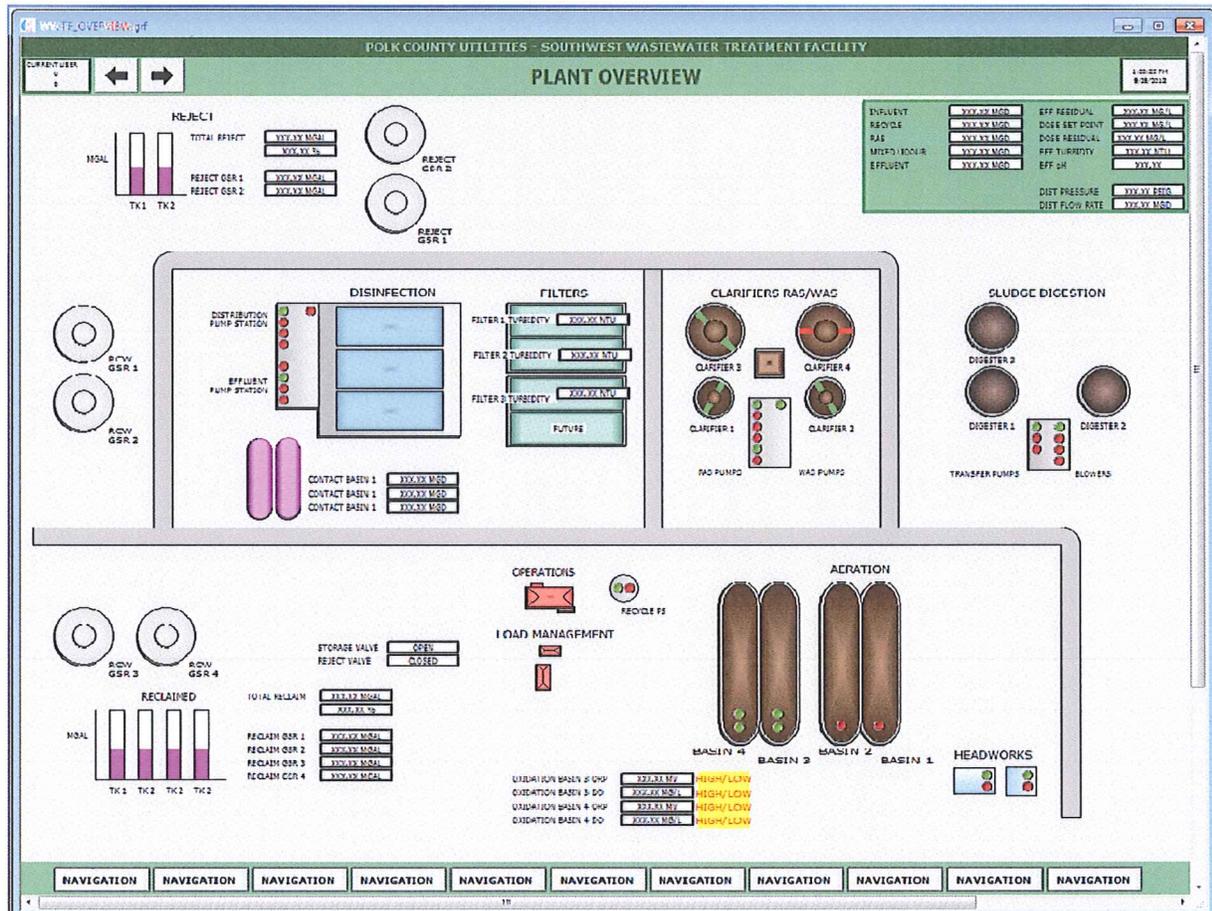
**Section 519** **Wastewater Treatment Facility SCADA Specifications**

December 2012

**2.03 STANDARD SCREENS**

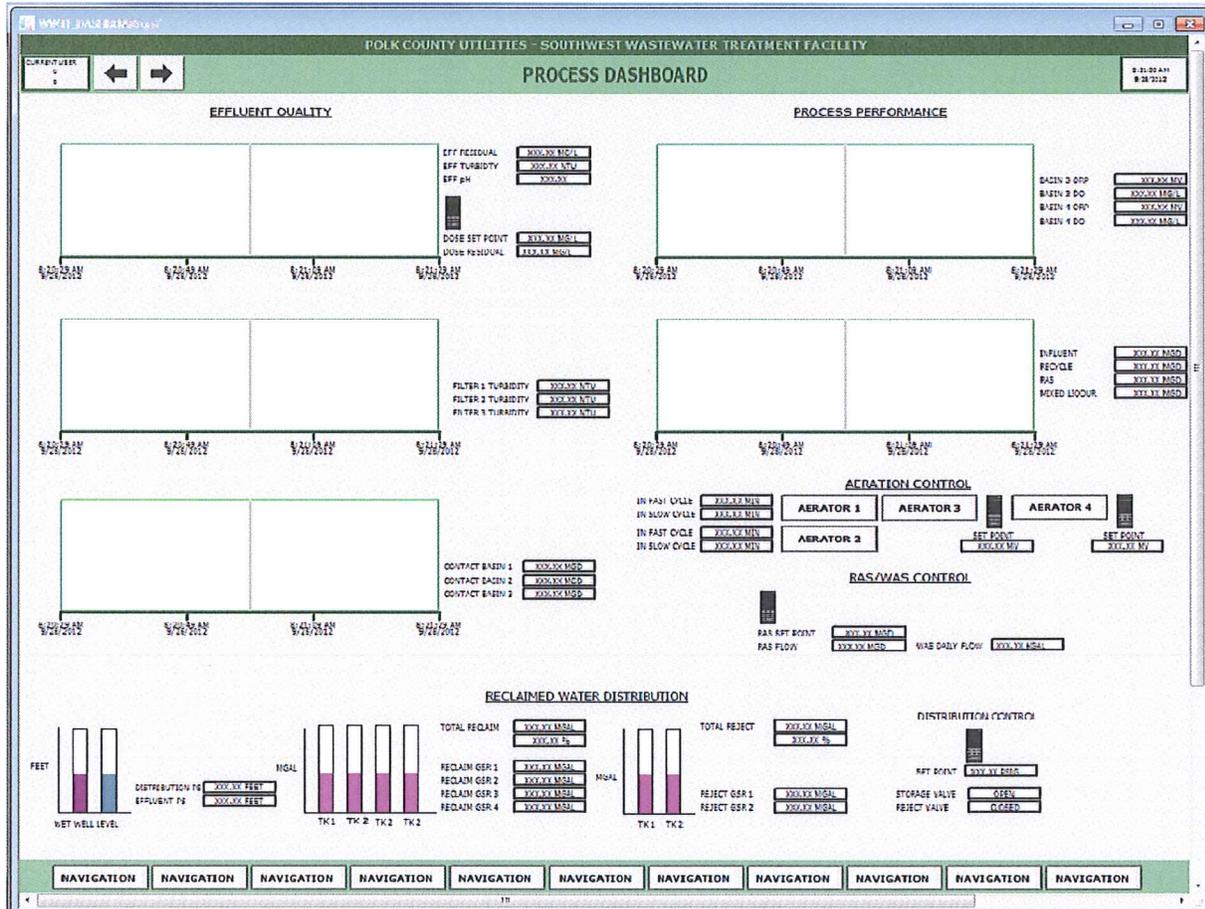
- A. The following pages are intended to be standard screens as a basis for creating wastewater treatment facility SCADA pages. The screens shall be used as a basis by both designers and integrators.

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



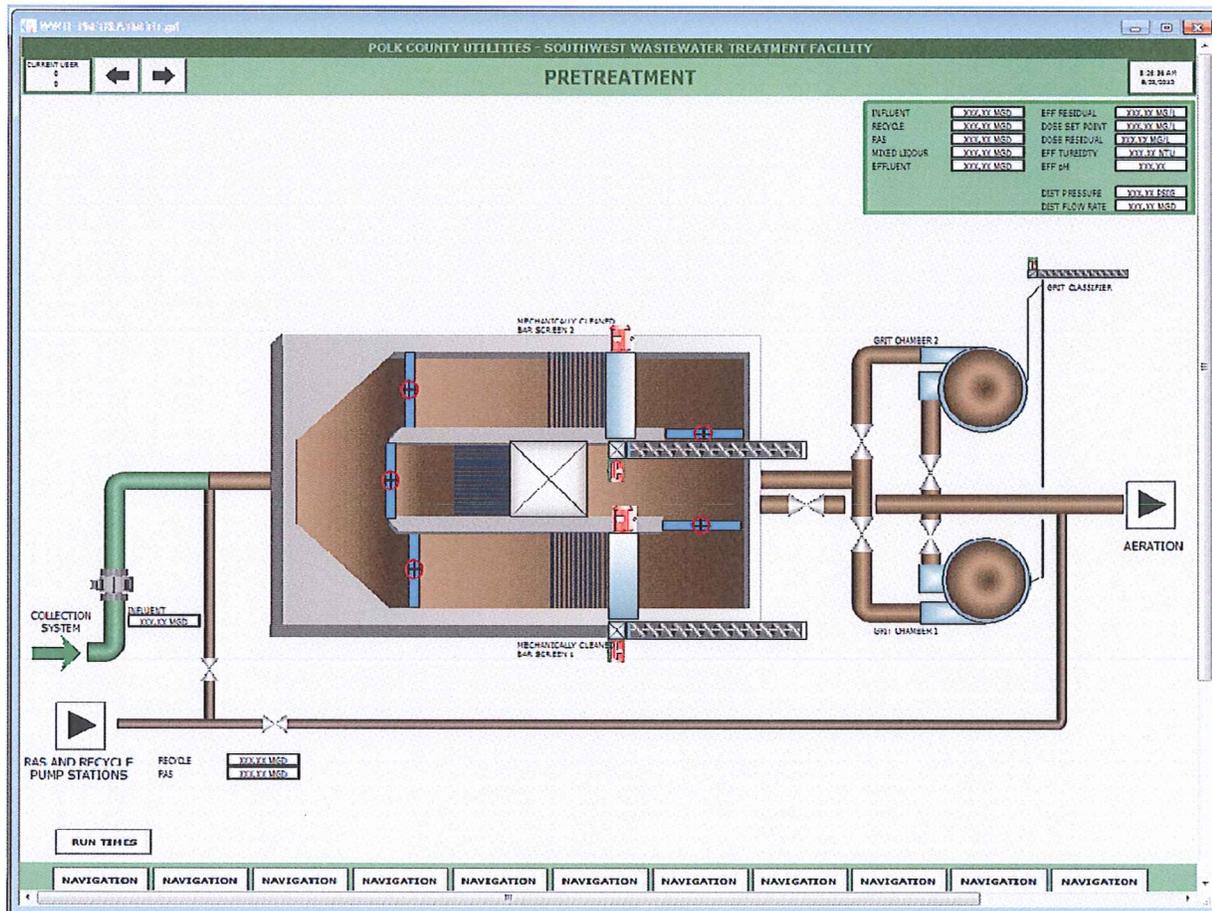
WW-S-01

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL

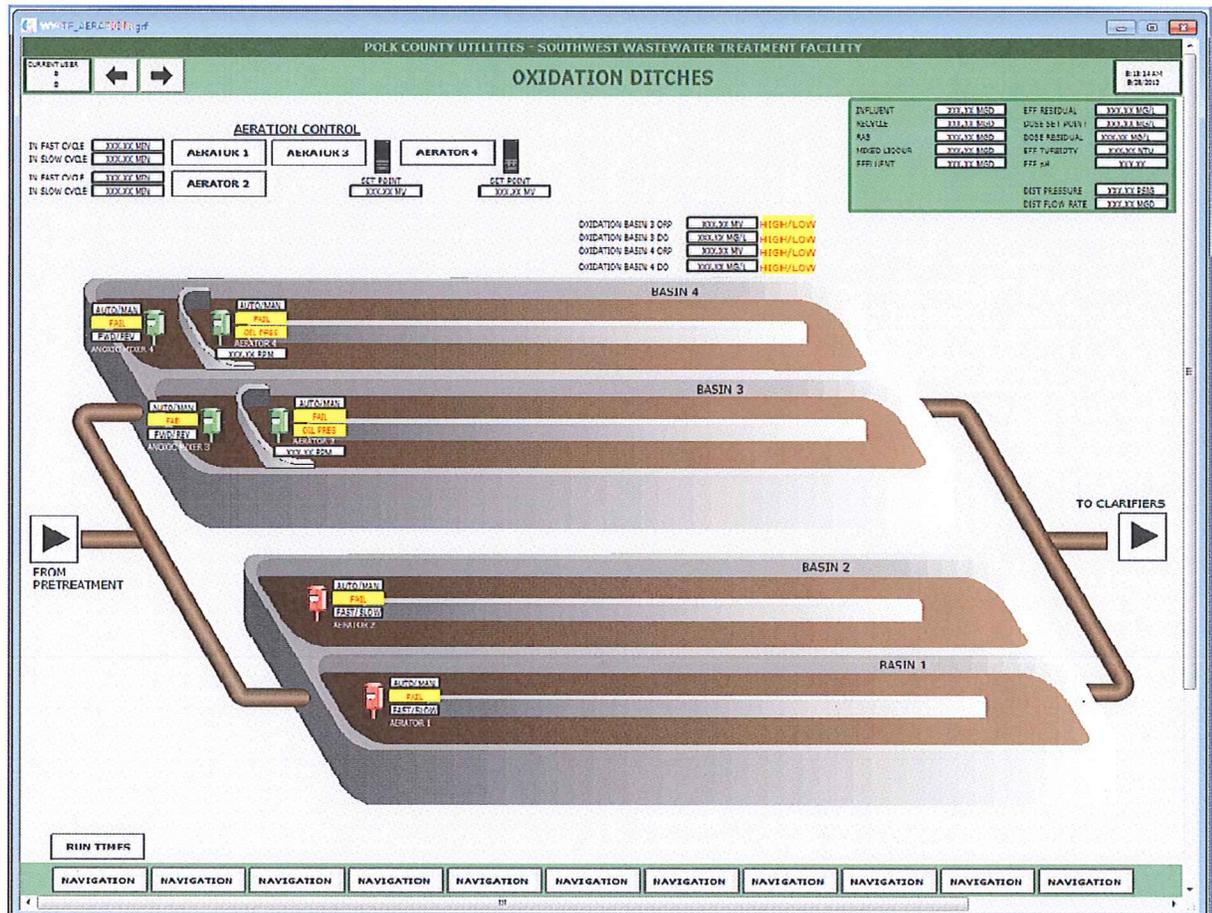


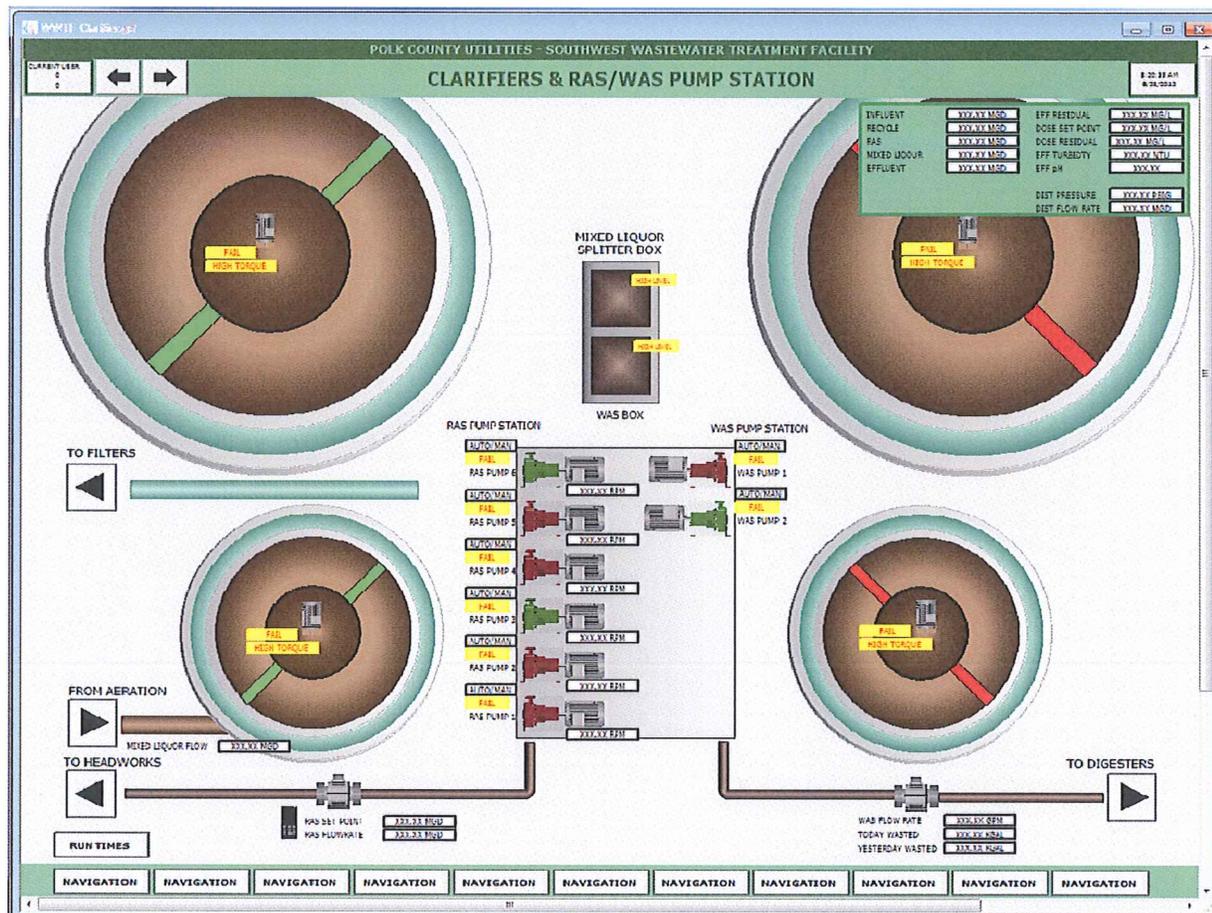
WW-S-02

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL

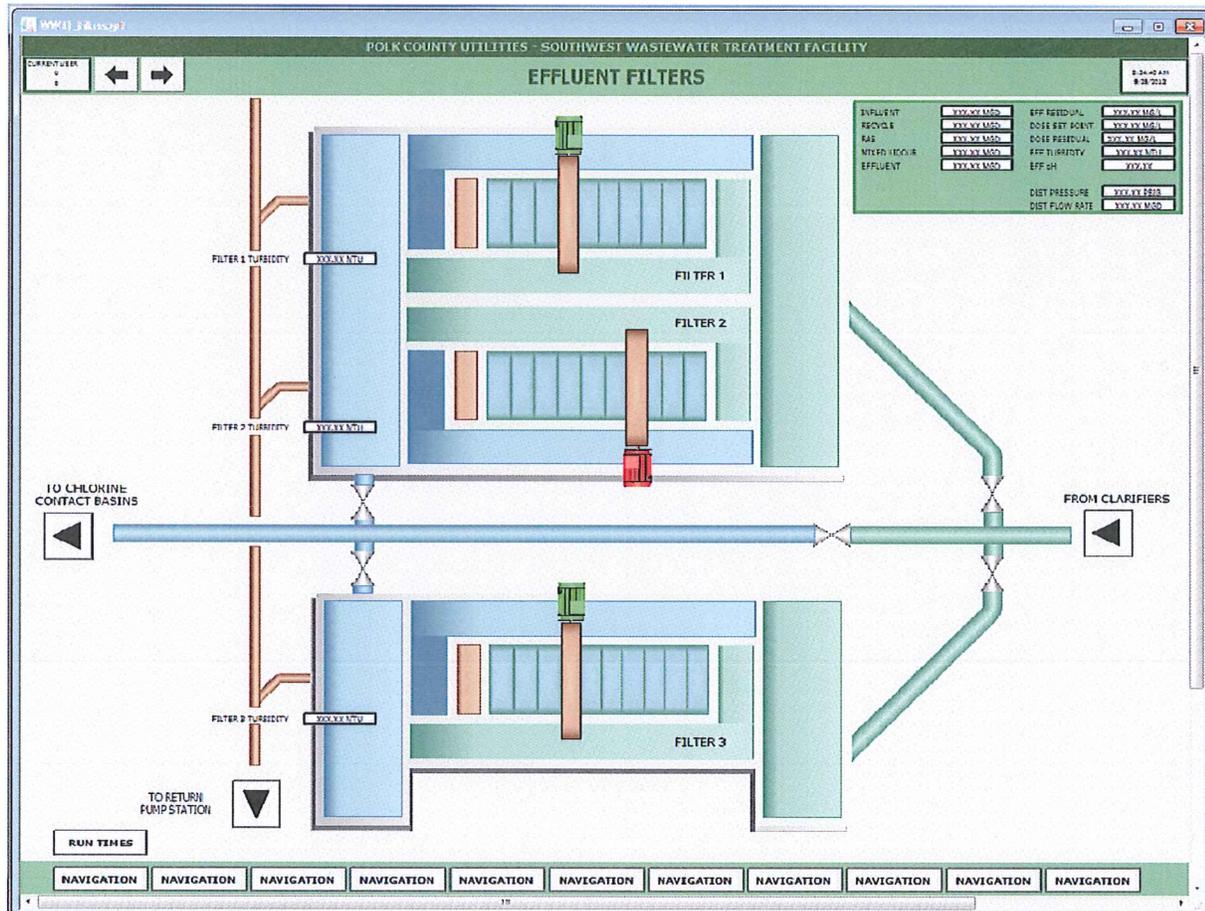


WW-S-03



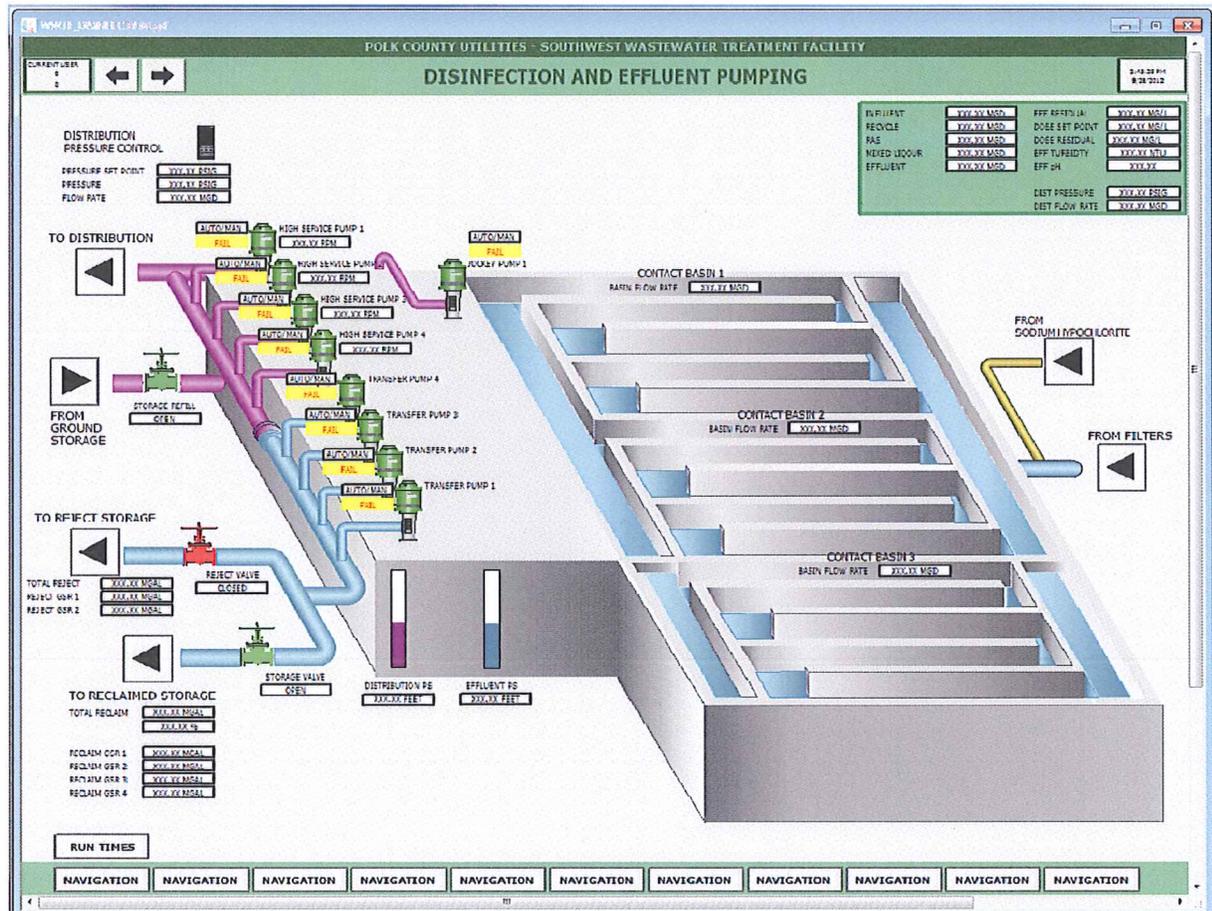


Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



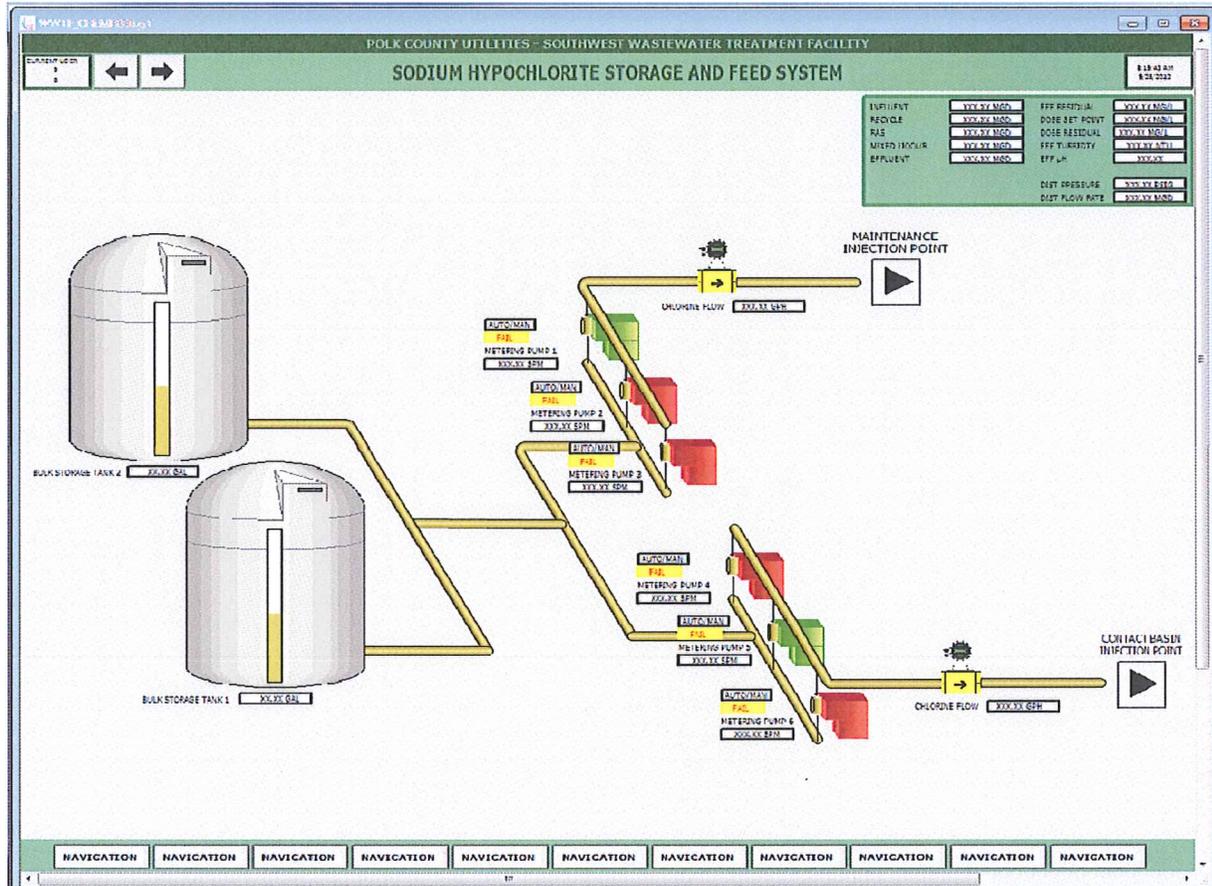
WW-S-06

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



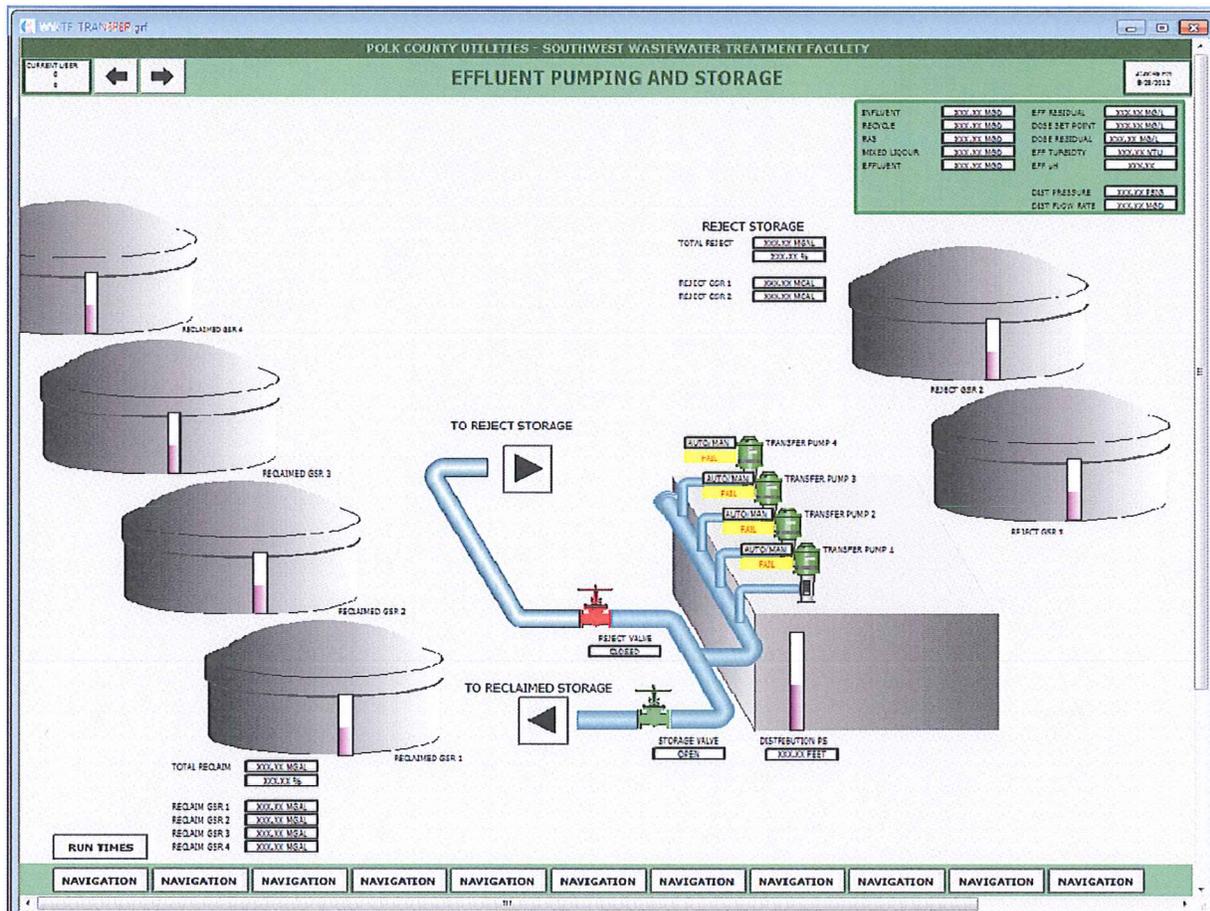
WW-S-07

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



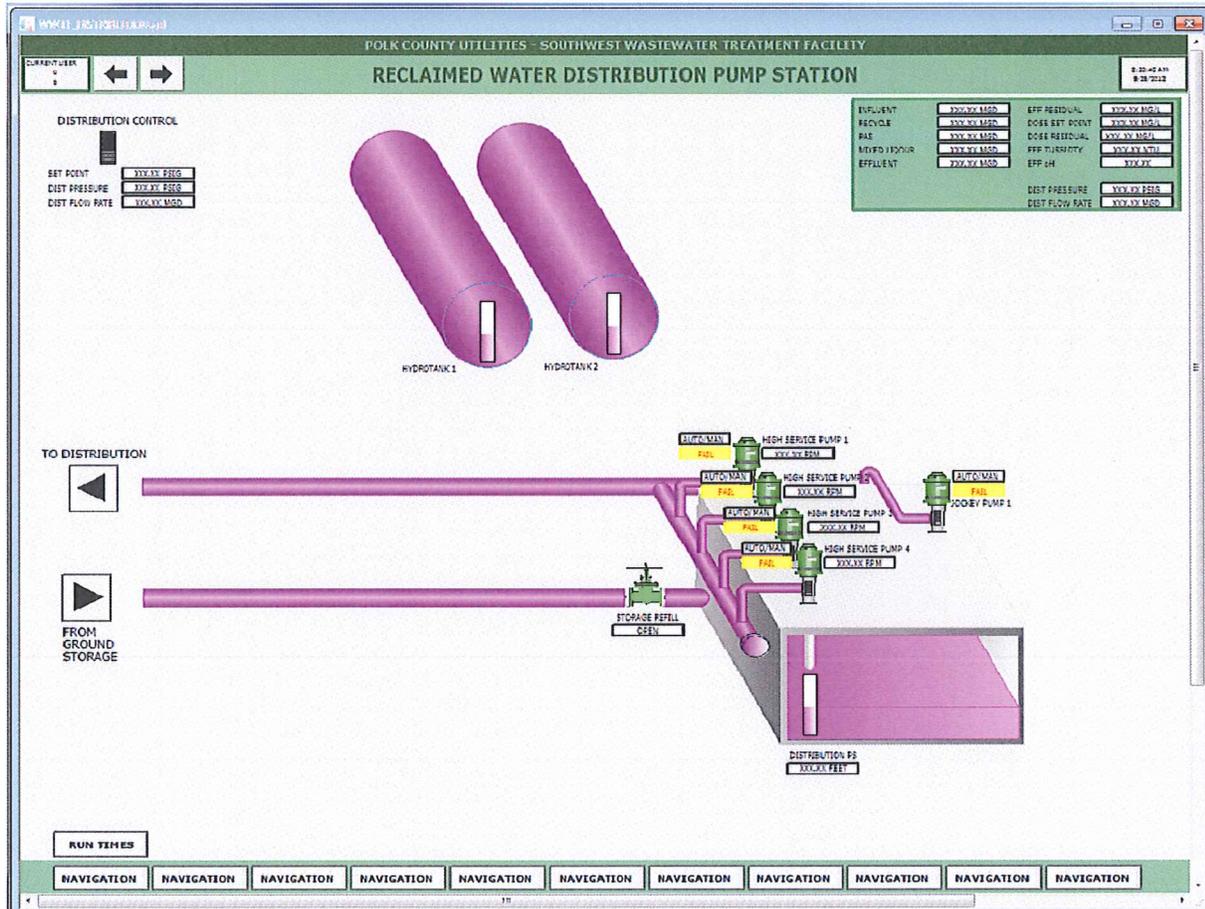
WW-S-08

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL

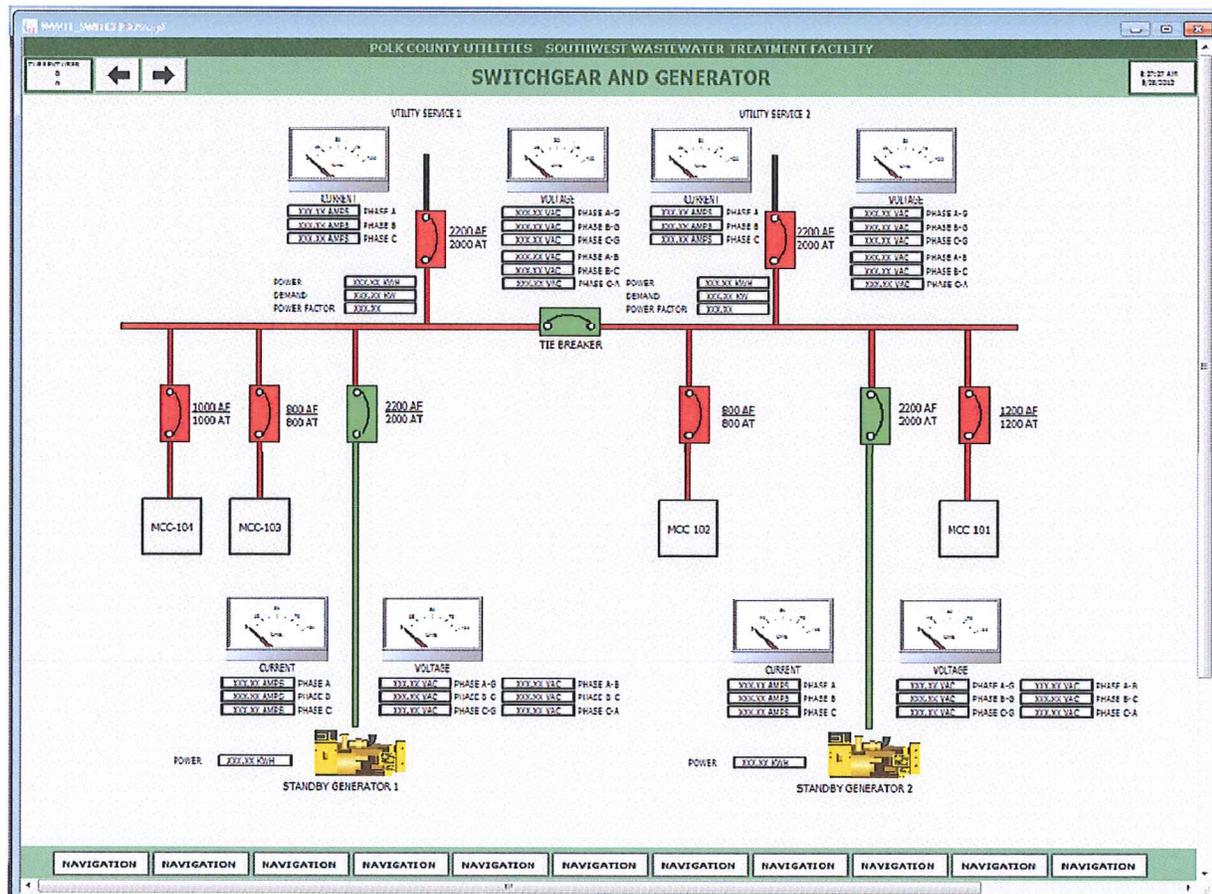


WW-S-09

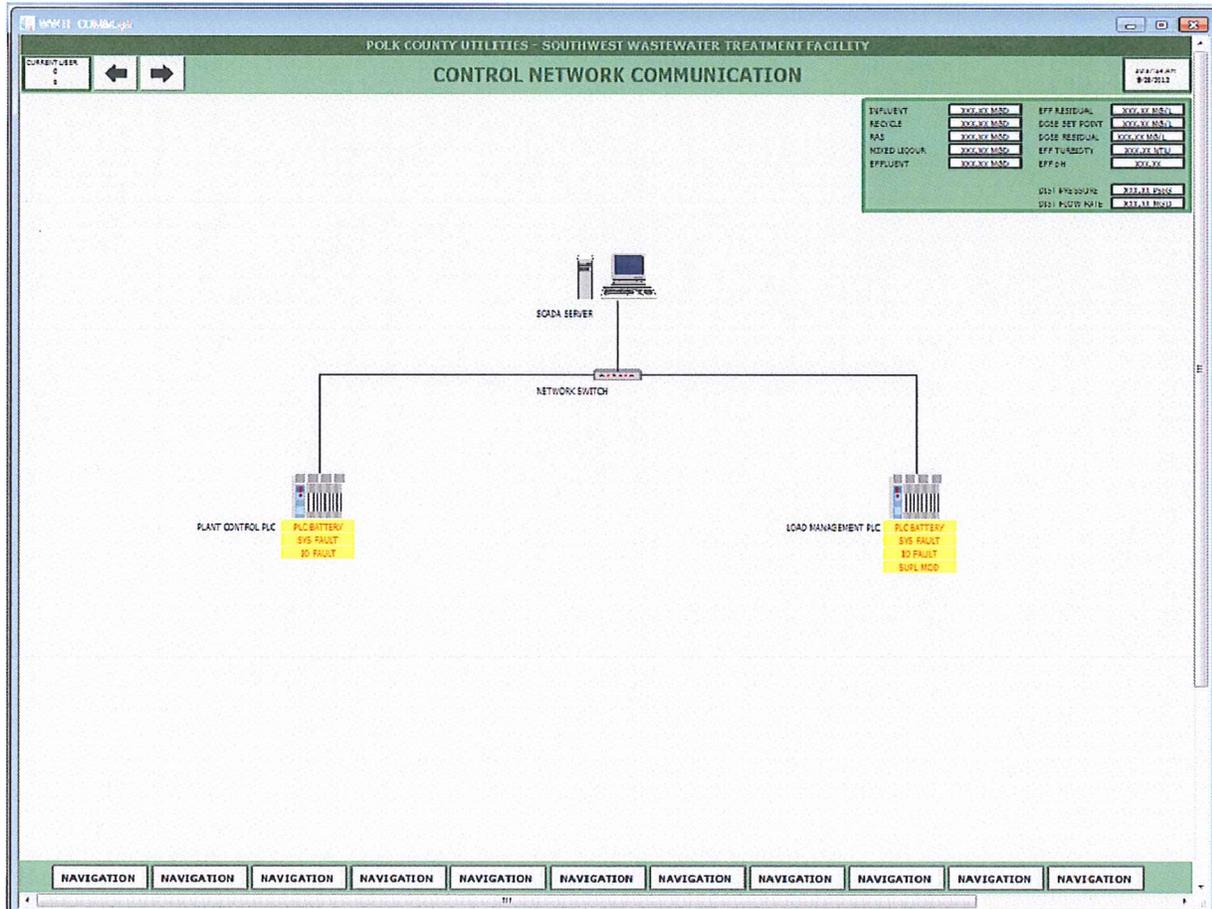
Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

**PART 1 – GENERAL RECLAIMED WATER SCADA STANDARDS**

**1.01 SUMMARY OF SYSTEM**

- A. These standards represent minimum requirements for County projects at the time the standards were adopted. The County reserves the right to approve changes based on site specific design requirements.
- B. Reclaimed water storage and pumping facilities shall be able to be monitored and controlled remotely. The CONTRACTOR shall provide a Remote Terminal Unit (RTU) and integration with Supervisory Control and Data Acquisition as identified in this Section. Additional reference for remote control panels is included in Section 517.
- C. The SCADA process data shall be organized as identified below:
  - Process Name
  - Inlet Flow
  - Chemical Storage and Feed
  - Reclaimed Storage
  - High Service Repumping With Flow Rate
  - Electrical Power

**1.02 EQUIPMENT TO BE MONITORED AND CONTROLLED**

- A. The following typical elements at standard unit processes must be monitored and controlled at the various unit processes with alarms as defined:
  - a. Influent Flow Meter
    - Monitored Data
    - 1. Instantaneous Flow
    - 2. Totalized Daily Flow, Current and Previous Day
    - Alarms
    - 1. Out of Range
    - 2. No Signal
  - b. Chemical Storage and Feed
    - i. Chemical Feed and Monitoring
      - Monitored Data
      - 1. Sodium Hypochlorite Level/Volume
      - 2. Sodium Hypochlorite Pump Status
      - 3. Sodium Hypochlorite Pump Stroke
      - 4. Sodium Hypochlorite Pump Speed
      - 5. Exhaust Fan Status
      - 6. Eye Wash Status
      - Alarms
      - 1. Sodium Hypochlorite Pump Failure
      - 2. Exhaust Fan Failure

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

3. Eyewash In Use or Failure
4. High Sodium Hypochlorite Level
5. Low Sodium Hypochlorite Level
- c. Ground Storage
  - i. Levels/Valves
    - Monitored Data
      1. Ground Storage Tank Levels
      2. Calculated Ground Storage Tank Volumes
      3. Calculated Rate of Change (gpm) in Storage
    - Alarms
      1. High Ground Storage Level
      2. Low Ground Storage Level
      3. Valve Failure
- d. Reclaimed High Service Pumping
  - i. Pumps
    - Monitored Data
      1. Pump Motor Status
      2. VFD Speed
      3. Pressure
      4. Flow Rate
    - Alarms
      1. Pump Over-Torque
      2. Pump Fail
      3. Flow Out of Range
      4. High Pressure
      5. Low Pressure
- e. Electrical Power
  - i. Electrical Line Power
    - Monitored Data
      1. Phase Voltage Difference
      2. Phase Amperage
      3. Tie-Breaker Status
      4. Main Breaker Status
    - Alarms
      1. Low Voltage
      2. High Voltage
      3. Loss of Power
  - ii. Generator Power
    - Monitored Data
      1. Generator Status
      2. Phase Voltage Difference
      3. Phase Amperage
      4. Transfer Switch Status
    - Alarms
      1. Low Voltage

2. High Voltage
3. Generator Failure
4. Transfer Switch Failure

**1.03 DATA TO BE STORED IN HISTORIAN**

A. The following typical data are standard and alarm at unit processes. Historical data shall be stored at a minimum rate of one point every ten seconds, or a change greater than a set dead-band, and shall be stored as defined:

a. Influent Flow Meter

Monitored Data

1. Instantaneous Flow
2. Totalized Daily Flow, Current and Previous Day

b. Chemical Storage and Feed

i. Chemical Feed and Monitoring

Monitored Data

1. Sodium Hypochlorite Level/Volume
2. Sodium Hypochlorite Pump Status
3. Sodium Hypochlorite Pump Stroke
4. Sodium Hypochlorite Pump Speed
5. Exhaust Fan Status
6. Eye Wash Status

Alarms

1. Sodium Hypochlorite Pump Failure
2. Exhaust Fan Failure

c. Ground Storage

i. Levels/Valves

Monitored Data

1. Ground Storage Tank Levels
2. Calculated Ground Storage Tank Volumes

Alarms

1. Valve Failure

d. Reclaimed High Service Pumping

i. Pumps

Monitored Data

1. Pump Motor Status
2. VFD Speed
3. Pressure
4. Flow Rate

Alarms

1. Pump Fail

e. Electrical Power

i. Electrical Line Power

Monitored Data

1. Phase Voltage Difference

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

2. Phase Amperage
3. Tie-Breaker Status
4. Main Breaker Status

Alarms

1. Low Voltage
2. High Voltage
3. Loss of Power

ii. Generator Power

Monitored Data

1. Generator Status
2. Phase Voltage Difference
3. Phase Amperage
4. Transfer Switch Status

Alarms

1. Low Voltage
2. High Voltage
3. Generator Failure
4. Transfer Switch Failure

**PART 2 – COMPONENTS AND INTEGRATION**

**2.01 SOFTWARE, RTU, and NETWORK COMPONENTS**

A. The CONTRACTOR shall purchase and install software and equipment compatible with the PCU existing SCADA central station equipment, as defined below.

1. Reclaimed Water SCADA controls must be integrated utilizing iFix with the licenses for the latest version supplied as part of the construction effort. CONTRACTOR must verify and utilize the iFix version currently in use by PCU prior to integrating PLC/SCADA. The controls for the remote Reclaimed Water location shall be integrated into the Wastewater Treatment Plant control system which is supplying effluent to the remote site.
2. CONTRACTOR shall integrate the remote Reclaimed Water site such that the pages are mapped into the Wastewater Treatment Facility control system as a remote unit process. The mapping shall allow for sufficient buttons to go to the remote site or return to the main wastewater plant control system seamlessly.
3. iFix and Historian licenses must be upgraded with sufficient tags for at least 30% spare tags.
4. Radio propagation studies shall be performed during design and construction of proposed Reclaimed Water RTU panels to ensure functionality of radio

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

system at time of integration.

- A. The SCADA/RTU equipment shall be in conformance with the appropriate “Approved Materials Checklist”. Qualified suppliers shall provide system warranties. At a minimum, the SCADA/RTU supplier must have the following qualifications:
1. Certified Motorola ACE-3600 solutions provider indicating that the supplier was Motorola trained to insure proper software configuration, application and functionality of the RTU.
  2. Motorola contract indicating the supplier has a formal licensing agreement with Motorola to resell ACE-3600 components is required to ensure that the supplier can receive warranty, application and technical support of Motorola to the benefit of PCU.
- B. Control panels must be fabricated in an UL-508A panel shop. The RTU shall be manufactured to comply with UL-508A and have a UL sticker with registration affixed in accordance with UL standards.
- C. SCADA shall consist of RTUs, field interface units/front end processors (FIU/FEPs) and multiple redundant SCADA computers operating with Human Machine Interface (HMI) software. Lift station SCADA shall be compatible with PCU’s 800 MHz trunked radio system or current wireless communication system.
1. A complete RTU shall be installed in a single RTU control panel enclosure. The RTU shall be compatible with and provide all the functionality and features of PCU’s existing wireless SCADA system. The RTU shall be the latest edition of Motorola ACE-3600 with Motorola SCADA RTU software. The SCADA/RTU supplier shall provide the specified RTU hardware and software.
  2. The pump control panel shall also operate independently of the SCADA/telemetry system in the event of failure of the remote communications link. The RTU shall be supplied in a NEMA 4X 304 Type SS powder coated white enclosure. The RTU shall be the latest edition of Motorola ACE-3600 to ensure compatibility with existing equipment and the specified I/O requirement.
  3. The SCADA RTU and back-up control panels shall house the control devices, PLC, RTU, displays and necessary accessories, wiring and terminal blocks required for a full operational system. Panel doors shall be equipped with a door latch kit or fast operating clamp assembly, as applicable. Panels shall operate on 120 VAC control voltage and shall develop other required voltages internally.
  4. HMI and HMI software shall be provided to view and change PLC parameters and to display alarm messages. The HMI shall be a touch screen type.
- D. The RTU shall provide local automatic monitoring of instrumentation identified in section 1. Inputs shall be provided for both digital inputs and analog (4 to 20 milliamps DC) transducers. If a critical analog level sensing device fails, then an alternate level sensing device(s) shall be automatically activated. Analog sensors and specific float alarms shall report to the central HMIs if floats operate out of

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

sequence. The RTU shall be supplied with an input for an emergency “high level float”. Battery backup power shall be provided so that monitoring is maintained during utility power failures.

- E. Local manual pump control is provided by “Hand-Off-Auto” (HOA) switches, located in the pump control panel. In the absence of RTU power, or in the case of a RTU failure, the pump motor starters shall remain operational in the “hand” position. In no case shall the RTU have the capability to operate or override the pumps in the “hand” or “off” positions. HOA switches shall be reported back to the central HMIs when a switch has been set in the “hand”, “off” or “auto” positions.
- F. The capability to remotely override or disable individual pumps shall be provided.  
These functions shall be logged with a time stamp at the redundant central HMIs.
- G. The capability to remotely disable the pump station shall be provided. This function shall be logged with a time stamp at the redundant central HMIs.
- H. All assemblies shall be UL listed and approved.
- I. RTU Mountings:
  - 1. Outdoors
    - a. The RTU shall be housed in a dust-proof, water-proof, NEMA 4X, Type 304, 14-gauge stainless steel enclosure that includes a door seal, rain drip guard, powder coated white, lockable, and three-point handle type latching mechanism. Exterior hardware and hinges shall be stainless steel.
    - b. A stainless steel sunshield shall be provided for the panel. The sunshield shall be powder coated white and provide shielding to the panel on the top, left and right sides.
  - 2. Indoors (Dry location within non-corrosive environment)
    - a. The RTU shall be mounted in a NEMA 12, steel enclosure with a lockable, three point latching mechanism.
- J. A 14-gauge painted steel back panel shall be provided to mount all electrical control devices.
- K. Wiring:  
All wiring to the control devices within the RTU panel shall be harnessed and permanently attached to the panel. Stick-on tie wrap fasteners are not acceptable. Wiring shall be supported a minimum of every eight inches. The panel shall be grounded via stud located in the bottom hinged side and bonded to the enclosure and ground buss.
- L. There shall be a permanently affixed document pocket in the interior side of the exterior enclosure door to include a laminated wiring diagram and bill of

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

materials.

- M. No devices or equipment shall be mounted to the top of the control panel enclosure, exclusive of the radio antenna.
- N. Paint:  
The enclosure, sub-panel and dead front operator panel shall be painted with heat fused polyester powder, electro-statically applied paint on a phosphatized base. The enclosure shall be white, inside and outside. The interior panels shall be silver-tek bronze.
- O. Environmental Ratings:  
All components shall be able to operate at -22 degrees Fahrenheit or lower to 140 degrees Fahrenheit and higher at 95 percent humidity.
- P. RTU Panels:  
a. RTUs shall meet the following criteria:  
i. Motorola ACE-3600 as required;  
ii. 4-watt, 800 MHz trunked radio or a radio able to communicate with the PCU wireless system;  
iii. Mixed input/output, as required to meet specific IO with 25% spare;  
iv. NEMA stainless steel powder coated white enclosure;  
v. Battery backup; and  
vi. 120 VAC, 8-amp power supply.  
b. The unit shall have a 120 VAC surge suppressor installed directly on the AC main terminals.  
c. A minimum two 120 VAC, circuit breakers shall be installed; one sized for the RTU and the second for auxiliary power.  
d. All internal wiring shall conform to UL standards and be fully point-to-point labeled using permanent wire markers.
- Q. RTU Software Application:  
Each RTU shall have the latest RTU SCADA application license compatible with the existing central configuration. Software functionality and algorithms shall perform all of the functions described in the design drawings. Proven debugged software shall be provided to perform the functions listed under each lift station type. The complete annotated software application and a copy of the latest software license shall be provided at substantial completion of the project for Polk County review.
- R. Radio:

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

- a. The radio shall be the latest model from Motorola that is designed for this purpose. No RTU or radio shall be integrated into a PCU SCADA system without written PCU authorization.
- S. Antenna:
- a. The antenna subsystem shall be supplied and installed by the RTU supplier.  
At a minimum, the following requirements must be met:
    - i. Greater than 16 decibels receive signal separation between transmitting tower sites as measured by monitoring the control channel signal level;
    - ii. Minimum -85 dBm receive signal level at the MOSCAD radio;
    - iii. Maximum -53 dBm signal at the trunking site antenna;
    - iv. The antenna must be rated for the corrosive environment;
    - v. Antenna ground planes shall be installed where required;
    - vi. The antenna shall be three decibel gain 800 MHz trunked low profile antenna, as specified within the appropriate "Approved Materials Checklist" unless more power is required to meet above requirements;
    - vii. Antenna cable shall be Times LMR 400 cable with Type N connectors, coaxial Polyphase surge suppression and Type N bulkhead cable connector. The coaxial surge suppressor shall be securely mounted and connected to ground with 12 AWG minimum copper. Antenna connections made outdoors must be weatherproofed, sealed and taped.
- T. Uninterruptible Power Supply/Battery Backup;
- a. The RTU shall be supplied with an integrated power supply/uninterruptible power supply (UPS) with battery backup capability for operating the RTU for a minimum of six hours (five amp/hour minimum) in the event of a commercial power failure.
  - b. The power supply shall keep batteries at a float charge. The RTU shall contain a low battery cutout circuit and the batteries shall not be damaged by deep discharges.
  - c. The power supply shall supply power to the processor/PLC and I/O and/or function modules.
  - d. The power supply shall also provide a 24 VDC voltage source for field devices.
- U. Instrument Surge Protection;
- a. All analog instrumentation shall have surge suppression mounted in the RTU.

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

V. Shop Testing;

1. After fabrication in the control panel manufacturer's plant, an operational test shall be performed to check out the entire panel before delivery.
2. The RTU panel shall have all software loaded and all I/O shall be proven to the RTU with inputs simulated. A signed, dated detailed test report shall be shipped with the unit.

W. CONTRACTOR to perform testing on integrated systems at key stages in the process. At a minimum, Operational Readiness Testing (ORT) and Performance Acceptance Testing (PAT) shall be performed. Factory Testing and Staging Testing may be added at COUNTY or ENGINEER discretion. Minimum testing requirements shall be as follows:

- a. Operational Readiness Test (ORT): Prior to startup test period and PAT, inspect, test, and document that entire Process Instrumentation and Control System (PICS) is ready for operation.
  - i. Loop/Component Inspections and Tests:
    1. Check PICS for proper installation, calibration, and adjustment on a loop-by-loop and component-by-component basis.
    2. Provide space on forms for signoff by PICS subcontractor.
    3. Use loop status report to organize and track inspection, adjustment, and calibration of each loop and include the following:
      - a. Project name.
      - b. Loop number.
      - c. Tag number for each component.
      - d. Checkoffs/Signoffs for Each Component:
        - i. Tag/identification.
        - ii. Installation.
        - iii. Termination wiring.
        - iv. Calibration/adjustment
      - e. Checkoffs/Signoffs for the Loop
        - i. Field Device Signals Transmitted to the PLCs are Operational: Received/sent, processed, adjusted.
    4. Component calibration sheet for each active field component (except simple hand switches, lights, gauges, and similar items) include the following:
      - a. Project name.
      - b. Loop number.
      - c. Component tag number or PLC register address.
      - d. Component code number for field device elements.
      - e. Manufacturer for field device elements.
      - f. Model number/serial number for field device elements.
      - g. Summary of Functional Requirements, for Example:

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

- i. Indicators and recorders, scale and chart ranges.
      - ii. Transmitters/converters, input and output ranges.
      - iii. Computing elements' function.
      - iv. Controllers, action(direct/reverse) and control modes (P&ID).
      - v. Switching elements, unit range, differential (fixed/adjustable), reset (auto/manual).
    - h. Calibrations, for Example, but not Limited to:
      - i. Analog Devices: Actual inputs and outputs at 0,10, 50, and 100 percent of span, rising and falling.
      - ii. Other Field Devices: Actual trip points and reset points.
      - iii. Controllers: Mode settings (P&ID).
      - iv. Actual inputs or outputs of 0, 10, 50, and 100 percent of span, rising and falling.
      - v. Space for comments.
    - i. Maintain loop status reports, valve adjustment sheets, and component calibration sheets at site and make them available to Engineer at all times.
    - j. Test and calibrate all fiber optic data links. Document that the dB links are within specified limits and the data communication is error free at specified baud rates.
    - k. These inspections and tests will be spot checked by Engineer.
    - l. Engineer reviews loop status sheets and component calibration sheets and spot-check their entries periodically, and upon completion of ORT. Correct deficiencies found.
  - b. Performance Acceptance Tests (PAT):
    - i. Once ORT has been completed and facility has been started up, perform a witnessed PAT on complete PICS to demonstrate that it is operating as required by the Contract Documents. Demonstrate each required function on a paragraph-by-paragraph, loop-by-loop, and site-by-site basis.
    - ii. Loop-specific and non-loop-specific tests same as required for Factory Testing except that entire installed PICS tested using actual process variables and all functions demonstrated.
    - iii. Perform local and manual tests for each loop before proceeding to remote and automatic modes.
    - iv. Where possible, verify test results using visual confirmation of process equipment and actual process variable. Unless otherwise directed, exercise and observe devices supplied by others, as needed to verify correct signals

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

to and from such devices and to confirm overall system functionality. Test verification by means of disconnecting wires or measuring signal levels is acceptable only where direct operation of plant equipment is not possible.

- v. Provide updated versions of the following documentation available to Engineer at site, both before and during tests.
  - 1. One copy of submittals applicable to the equipment to be tested.
  - 2. One copy of the Drawings and Specifications together with addenda and applicable change orders.
  - 3. Make one copy of all O&M manuals.
- vi. Specialty Equipment: For certain components or systems provided under this section but not manufactured by PICS Subcontractor, provide services of qualified manufacturer's representative during installation, startup, demonstration testing, and County training. Refer to Article Onsite Services in PICS Subsystems for specific requirements.
- vii. Instruments shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale through wired and wireless communications to the PLC and to the HMI insofar as is practical and not to put effluent quality at risk.

**2.02 INSTRUMENTATION**

- A. The CONTRACTOR shall purchase and install instrumentation equipment as standardized below. The equipment aligns with what Polk County Utilities currently utilizes. Exact models shall be determined during design:
  - 1. Liquid Level
    - i. Pressure – Rosemount 3051
    - ii. Ultrasonic – Endress Hauser FMU95 or Siemens SITRAN LU
    - iii. Approved Equal
  - 2. Pressure Indicating and Differential Transmitters
    - i. Rosemount 3051
    - ii. Approved Equal
  - 3. Pressure Switches
    - i. Ashcroft B-Series
    - ii. Approved Equal
  - 4. Pressure Gauges
    - i. Ashcroft
    - ii. Approved Equal
  - 5. Flow Meters
    - i. Electromagnetic – Foxboro
  - 6. Chemical Metering Pumps
    - i. Prominent
  - 7. Chlorine Analyzers
    - i. Prominent

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

**Reclaimed Water SCADA Specifications**

December 2012

8. Transmitters
  - i. Hach SC200 or SC1000 depending on number of elements
  - ii. Approved Equal
9. pH Element
  - i. Prominent
10. Motor Operated Valves
  - i. Limitorque or Auma Actuators, Valve per Polk County Standards
  - ii. Approved Equal
11. Total Suspended Solids (High and Low) and NTU
  - i. Hach Solitax
  - ii. Approved Equal

**CHAPTER 6**

**RECLAIMED WATER**

**Section 611**

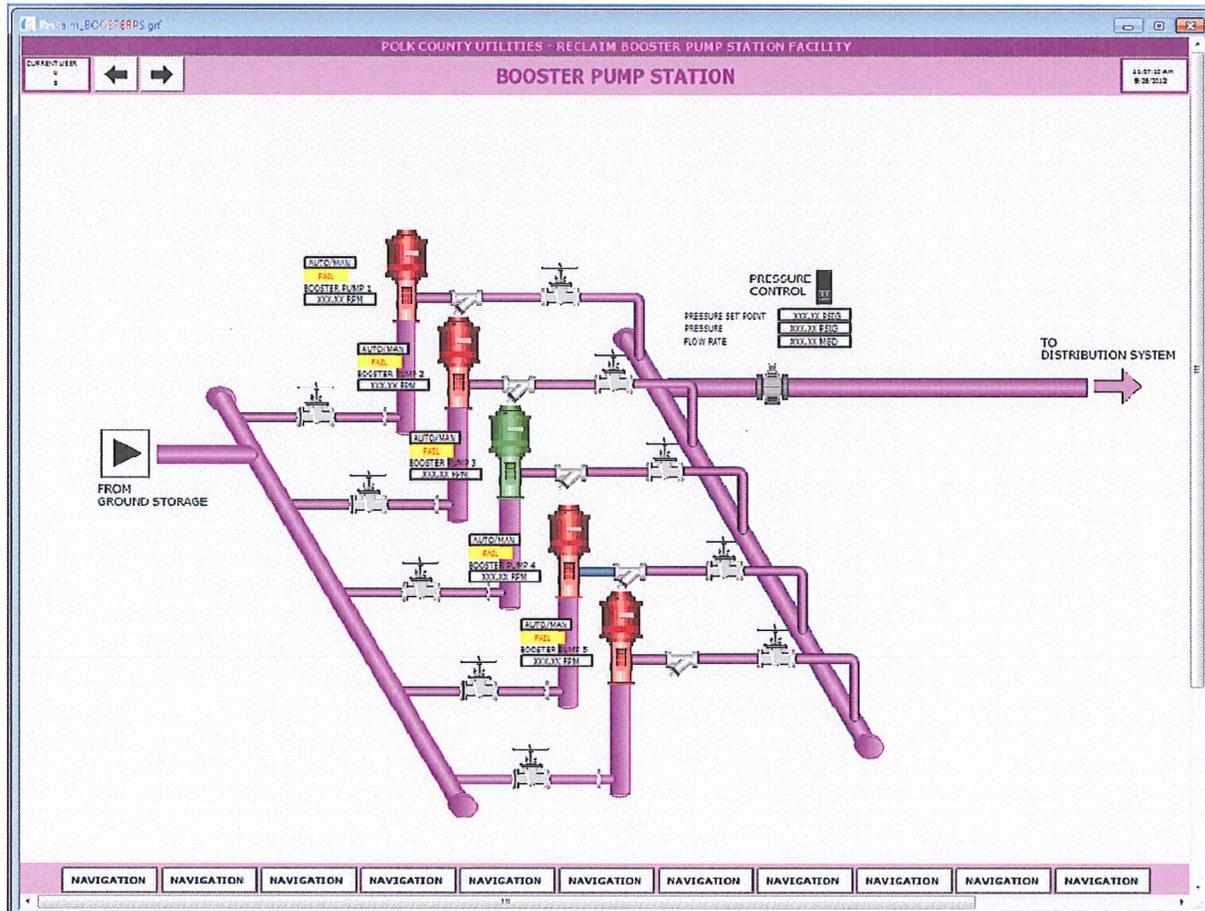
**Reclaimed Water SCADA Specifications**

December 2012

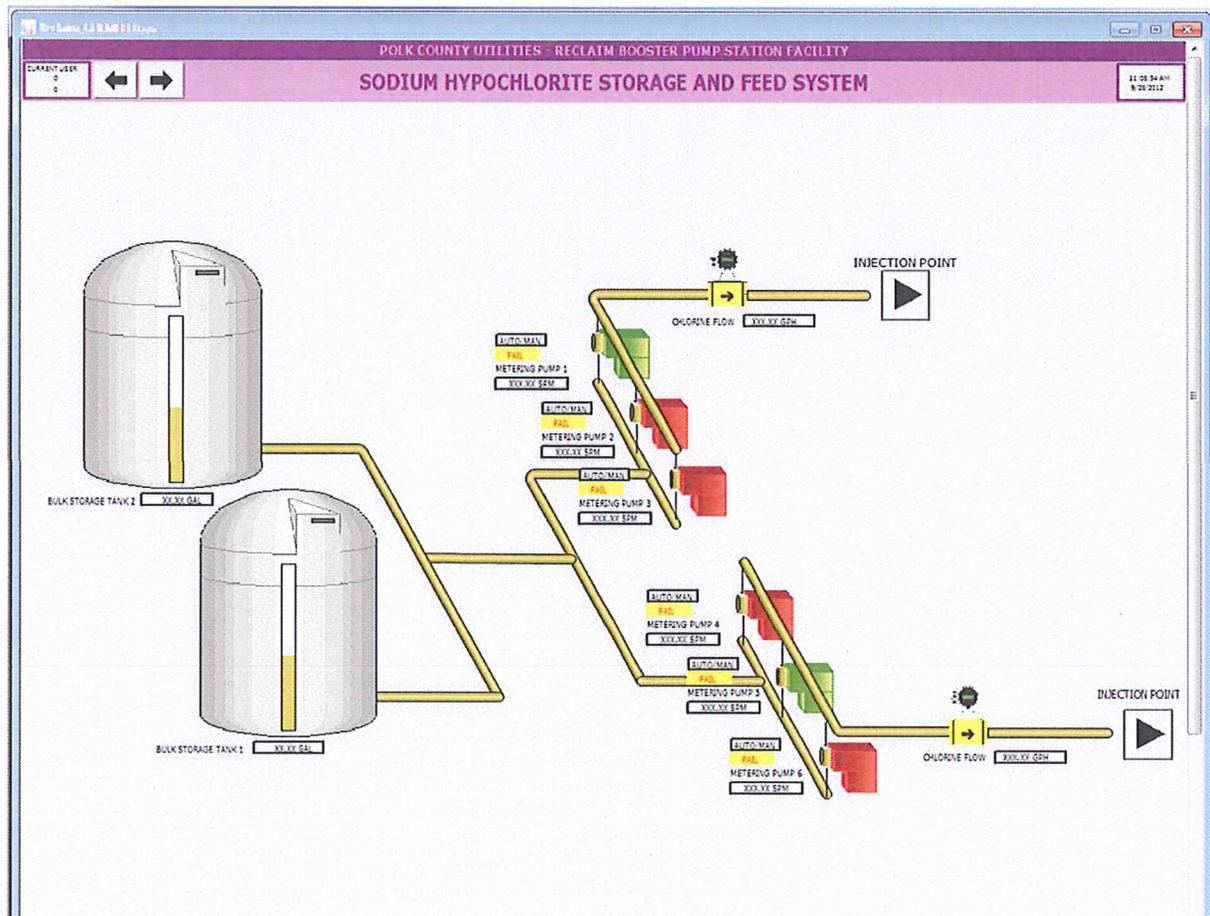
**2.03 STANDARD SCREENS**

- A. The following pages are intended to be standard screens as a basis for creating reclaimed water remote site SCADA pages. The screens shall be used as a basis by both designers and integrators.

Polk County Utilities, Florida  
UTILITIES STANDARDS AND SPECIFICATIONS MANUAL

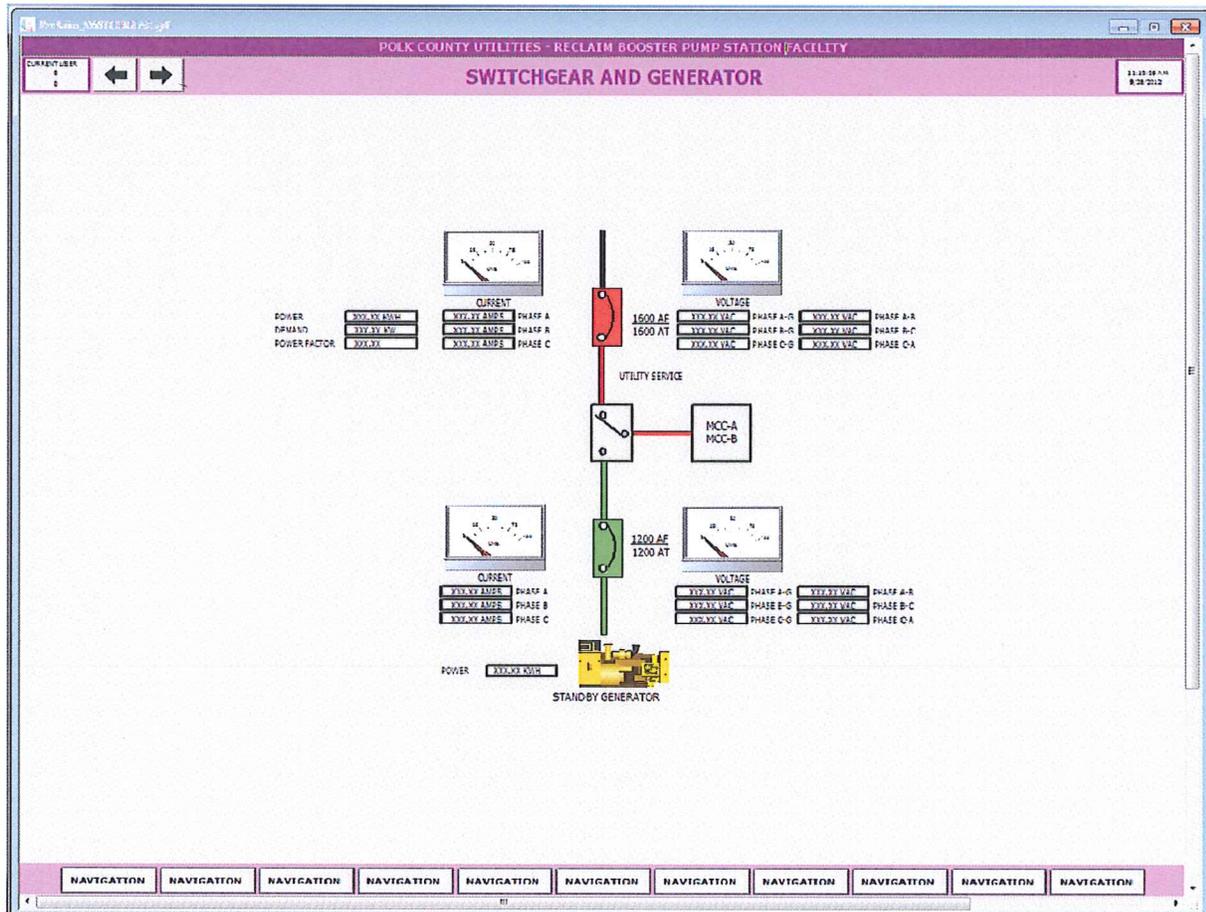


RW-S-01



RW-S-02

Polk County Utilities, Florida  
 UTILITIES STANDARDS AND SPECIFICATIONS MANUAL



RW-S-03