SECTION 01010

SUMMARY OF WORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide administrative and scheduling personnel as well as provide all the labor, superintendence, materials, construction facilities, tools and equipment necessary and required for properly performing and completing the Work as described and more particularly specified herein within the time stipulated. The Contractor shall furnish, erect, maintain and remove the construction facilities and such temporary works as may be required. These requirements include, but are not limited to, suitable quarters for workers where necessary, including temporary sanitary facilities, electric power supply, heat and light for the workers as well as for construction purposes. The connection to, and the extension of, existing utility services from locations on the existing property is part of this Contract. Existing access roads to the site may be affected by construction activities. The Contractor will be required to keep these roads in a safe condition and suitable for the public use. The Contractor shall furnish all material, equipment and labor necessary to complete the work in accordance with the terms of this Contract and the requirements thereunder, including all General and Technical Specifications hereinafter outlined.

B. The construction schedule shall be presented at the preconstruction meeting, and shall be coordinated with the CMCMUA, the Facility Superintendent and the Resident Engineer. Unless otherwise directed, regularly scheduled job meetings shall occur once a month during the full Contract period and more frequently as may be necessary.

C. The work to be done under this contract and in accordance with these specifications consists of furnishing all equipment, superintendence, labor, skill, material and all other items necessary for the installation of control system equipment at the thirty-three (33) locations within the Wildwood, Cape May, and Ocean City Regions identified below:

WILDWOOD/LOWER REGION (WW)		
Location	**Address 1**	**Address 2**
Oak Avenue Pump Station	511 W. Oak Ave.	North Wildwood, NJ 08260
Neptune Avenue Pump Station	401 Ritz Avenue	West Wildwood, NJ 08260
Lower Twp Pump Station	2900 Bayshore Road	Villas, NJ 08251
Rio Grande Pump Station	East Maryland Ave.	Rio Grande, NJ 08242
10th Avenue Pump Station	1002 Delaware Ave.	North Wildwood, NJ 08260
Spicer Avenue Pump Station	307 W. Spicer Ave.	Wildwood, NJ 08260
Rosemary Road Pump Station	6410 Park Blvd	Wildwood Crest, NJ 08260
Shawcrest Pump Station	Shawcrest Road	Wildwood, NJ 08260
WW Effluent Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Preliminary Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Sludge Processing Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Thickener Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Clarifier Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Admin Building	2701 Route 47 South	Rio Grande, NJ 08242

WW Chemical Addition Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Primary Building	2701 Route 47 South	Rio Grande, NJ 08242
WW Secondary Building	2701 Route 47 South	Rio Grande, NJ 08242

CAPE MAY REGION (CM)		
Location	**Address 1**	**Address 2**
Madison Avenue Pump Station	1005 Michigan Ave.	Cape May, NJ 08204
Claghorn Pump Station	234 Capehart Lane	Cape May, NJ 08204
Coral Avenue Pump Station	211 Yale Ave.	Cape May Point, NJ 08212
CM Effluent Building	545 Sunset Blvd	Cape May Point, NJ 08212
CM Influent Building	545 Sunset Blvd	Cape May Point, NJ 08212
CM Sludge Processing Building	545 Sunset Blvd	Cape May Point, NJ 08212
CM Admin Building	545 Sunset Blvd	Cape May Point, NJ 08212

OCEAN CITY REGION (OC)		
Location	**Address 1**	**Address 2**
OC Secondary Building	4600 Simpson Ave.	Ocean City, NJ 08226
OC Primary Building	4600 Simpson Ave.	Ocean City, NJ 08226
OC Effluent Building	4600 Simpson Ave.	Ocean City, NJ 08226
OC Sludge Processing Building	4600 Simpson Ave.	Ocean City, NJ 08226
OC Admin Building	4600 Simpson Ave.	Ocean City, NJ 08226
20th Street Pump Station	1939-41 Bay Ave.	Ocean City, NJ 08226
32nd Street Pump Station	3149 West Ave.	Ocean City, NJ 08226
3rd Street Pump Station	256-62 West Ave.	Ocean City, NJ 08226
46th Street Pump Station	4600 Simpson Ave.	Ocean City, NJ 08226

D. The Contractor shall perform all work required for such construction in accordance with the contract documents and subject to the terms and conditions of the contract, complete and ready for use.

E. The principal features of the work to be performed under these contracts include:

1. Work occurring prior to on-site installation:

a. Submittal of all equipment and materials product technical data for the CMCMUAs review.

b. Procurement of equipment and materials identified in the provided bill of materials.

c. Assembly, wiring, and factory acceptance testing of PLC electrical enclosures as indicated on the provided electrical and arrangement drawings.

d. Tracing and tagging of all field wiring in existing PLC electrical enclosures.

e. Pre-Construction Photographs:

A minimum of ten (10) photographs to be taken prior to beginning work at each location. Photographs shall include, but not limited to, interior and exterior of building, as well as all current equipment. All photographs shall be emailed to the Project Manager, Robert Winder at winderr@cmcmua.com.

2. Work occurring during and after on-site installation:

a. Set up and wiring of temporary control systems that will allow equipment to continue to operate with limited capabilities during the demolition and installation process as outlined in section 01011.

b. Installation of sensors and field equipment as indicated by the specifications. Installation of wiring and conduit between electrical enclosures and equipment as indicated by the specifications.

c. Removal and disposal of existing PLC electrical enclosures and contents.

d. Mounting of new PLC electrical enclosures, and termination of field wiring in the enclosures as indicated by the drawings.

e. Support during commissioning and testing to correct any wiring discrepancies found between field devices and PLC enclosures.

f. Daily Progress Requirement:

A minimum of ten (10) daily progress photographs shall be taken. All progress photographs shall be emailed daily to the Project Manager, Robert Winder at winderr@cmcmua.com.

F. The work restrictions of this project are limited to the following schedule:

1. As a result of seasonal fluctuations in flow, no onsite work shall be conducted between May 25 through September 8, during the years of 2023, 2024 and 2025 at the following locations:

a. WW - Rosemary Pump Station

b. WW - 10th Ave Pump Station

c. OC - 32nd Street Pump Station

d. OC - 3rd Street Pump Station

e. CM - Madison Avenue

f. CM - Claghorn Avenue Pump Station

g. WW - Spicer Avenue Pump Station

h. WW - Oak Avenue Pump Station

i. OC - 20th Street Pump Station

2. As a result of scheduled work of a piping and pump replacement contract no work shall be conducted between October 2023 through May 2024 at the following station:

    a. OC - 32nd Street Pump Station

3. During the restricted periods in paragraphs F.1 through F.2 above, the Contractor is not permitted to conduct physical work at the project sites. During those time frames, the Contractor shall be permitted to visit those project sites to take measurements and assess the site situations. Since the stations will be operating at that time, the Contractor's assessment will be limited to the levels above the wet wells. All visits must be scheduled in advance through the CMCMUA. Also, the Contractor shall be responsible for providing and implementing all Confined Space safety measures during such visits.

4. Work shall take place at plant and pump station sites in order to complete all construction activities within the contract duration.

5. The Contractor shall start work at the Cape May Regional Wastewater Treatment Facility, unless otherwise approved by the CMCMUA.

6. **Unless otherwise approved by the CMCMUA, work must be substantially completed at each location prior to commencing work at the next building.**

    a. **It is the intent to have no more than two (2) locations being commissioned within the same week.**

7. The Contractor may complete work on any pump station in the order they choose; adhering to the seasonal limitations outlined in paragraphs F.1 through F.2 above.

8. The coordination and staging of all work shall be reflected in the project schedule and any costs related to coordination shall be included in the Contractor's bid price.

G. The foregoing description(s) are a general summary of work included in this contract and shall not be construed as a complete description of all work required. Detailed descriptions of the work to be performed by the Contractor for each of the thirty-three (33) locations is provided in the Contractor Detailed Scope of Work Section 01011.

H. The Contractor shall provide a schedule and sequence of work for the project which must be approved by the CMCMUA prior to the start of work and shall provide a revised schedule at each pay request.

1.02 CONTRACT DOCUMENTS

A. Contract Documents shall include a complete set of Drawings along with these Specifications.

B. Contractor shall complete all work as shown on the Contract Drawings and as described in the Specifications complete in all respects and ready for final inspection.

C. The specific PLC work to be done is shown on the set of drawings identified in the table below. For each drawing set, the numbers and titles of each sheet appear on the table of contents sheet XX01-TOC (where XX is WW, CM, or OC as applicable). All drawings so enumerated shall be considered an integral part of the contract documents as defined herein.

Location	Drawing File
Wildwood Facility Network	Wildwood_DWG_ NetworkArchitecture
Oak Avenue Pump Station	Wildwood_DWG_ Plant_Oak_Electrical
Neptune Avenue Pump Station	Wildwood_DWG_ Plant_Neptune_Electrical
Lower Twp Pump Station	_DWG_ Plant_Lower_Electrical
Rio Grande Pump Station	Wildwood_DWG_ Plant_Rio_Electrical
10th Avenue Pump Station	Wildwood_DWG_ Plant_10th_Electrical
Spicer Avenue Pump Station	Wildwood_DWG_ Plant_Spicer_Electrical
Rosemary Road Pump Station	_DWG_ Plant_Neptune_Electrical
Shawcrest Pump Station	Wildwood_DWG_ Plant_Shawcrest_Electrical
WW Effluent Building	Wildwood_DWG_ Plant_Effluent_Electrical
WW Preliminary Building	Wildwood_DWG_ Plant_Preliminary_Electrical
WW Sludge Processing Building	Wildwood_DWG_ Plant_Sludge_Electrical
WW Thickener Building	Wildwood_DWG_ Plant_Thickener_Electrical
WW Clarifier Building	Wildwood_DWG_ Plant_Clarifier_Electrical
WW Admin Building	Wildwood_DWG_ Plant_Admin_Electrical
WW Chemical Addition Building	Wildwood_DWG_ Plant_ChemicalAddition_Electrical
WW Primary Building	Wildwood_DWG_ Plant_Primary_Electrical
WW Secondary Building	Wildwood_DWG_ Plant_Secondary_Electrical
Cape May Facility Network	CapeMay_DWG_ NetworkArchitecture
Madison Avenue Pump Station	CapeMay_DWG_ Plant_Madison_Electrical
Claghorn Pump Station	CapeMay_DWG_ Plant_Claghorn_Electrical
Coral Avenue Pump Station	CapeMay_DWG_ Plant_Coral_Electrical
CM Effluent Building	CapeMay_DWG_ Plant_Effluent_Electrical
CM Influent Building	CapeMay_DWG_ Plant_Influent_Electrical
CM Sludge Processing Building	CapeMay_DWG_ Plant_Sludge_Electrical
CM Admin Building	CapeMay_DWG_ Plant_Admin_Electrical
Ocean City Facility Network	OceanCity_DWG_ NetworkArchitecture
OC Secondary Building	OceanCity_DWG_ Plant_Secondary_Electrical

OC Primary Building	OceanCity_DWG_ Plant_Primary_Electrical
OC Effluent Building	OceanCity_DWG_ Plant_Effluent_Electrical
OC Sludge Processing Building	OceanCity_DWG_ Plant_Sludge_Electrical
OC Admin Building	OceanCity_DWG_ Plant_Admin_Electrical
20th Street Pump Station	OceanCity_DWG_ Plant_20th_Electrical
32nd Street Pump Station	OceanCity_DWG_ Plant_32nd_Electrical
3rd Street Pump Station	OceanCity_DWG_ Plant_3rd_Electrical
46th Street Pump Station	OceanCity_DWG_ Plant_46th_Electrical

B. Certain document sections refer to divisions of the contract specifications. Sections are each individually numbered portions of the specifications (numerically) such as 08110, 13182, 15206, etc. The term division is used as a convenience term meaning all sections within a numerical grouping. Division 16 would thus include Sections 16000 through 16999.

C. Where references in the contract documents are made to Contractors for specific disciplines of work (i.e. Electrical Contractor, etc.), these references shall be interpreted to be the single prime Contractor when the project is bid or awarded as a single prime contract.

1.03 GENERAL ARRANGEMENT

A. Drawings indicate the extent and general arrangement of the work. If any departures from the drawings are deemed necessary by the Contractor to accommodate the materials and equipment the Contractor proposes to furnish, details of such departures and reasons therefore shall be submitted as soon as practicable to the CMCMUA for approval. No such departures shall be made without the prior written approval of the CMCMUA. Approved changes shall be made without additional cost to the CMCMUA for this work.

B. The specific equipment proposed for use by the Contractor on the project may require changes, in structures, auxiliary equipment, piping, electrical, mechanical, controls or other work to provide a complete satisfactory operating installation. The Contractor shall submit to the CMCMUA, for approval, all necessary drawings and details showing such changes to verify conformance with the overall project structural and architectural requirements and overall project operating performance. The bid price shall include all costs in connection with the preparation of new drawings and details and all changes to construction work to accommodate the proposed equipment.

1.04 CONSTRUCTION PERMITS

A. The Contractor shall obtain, keep current and pay all fees for any necessary construction, zoning and planning permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the contract limits and which will be occupied, encountered, used, or temporarily interrupted by the Contractor's operations unless otherwise stated. Record copies of all permits shall be furnished to the CMCMUA.

B. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency or municipality, it shall be the Contractor's responsibility to familiarize and comply with such regulations or requirements as they apply to the operations on this project.

1.05 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the CMCMUA.

B. Structural design shown on the contract drawings is based upon typical weights for major items of equipment as indicated on the contract drawings and specified. If the equipment furnished exceeds the weights of said equipment, the Contractor shall assume the responsibility for all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the Engineer's expenses in connection therewith.

1.06 ADDITIONAL CMCMUA'S EXPENSES

A. Unless otherwise specifically permitted, the normal time of work under this contract is limited to eight (8) hours per day, Monday through Friday. Work beyond these hours will result in additional expense to the CMCMUA. Any expenses and/or damages, including the cost of the Engineer's onsite personnel, arising from the Contractor's operations beyond the hours and days specified above shall be borne by the Contractor.

B. Charges assessed to the Contractor for additional engineering and inspection costs shall be determined based on actual hours charged to the job by the Engineer. Daily rates shall depend on the number and classifications of employees involved, but in no case shall such charges exceed $500 per day for field personnel and $800 per day for engineering personnel based on an eight (8) hour workday.

C. Charges for additional CMCMUA's expenses shall be in addition to any liquidated damages assessed in accordance with the contract.

1.07 TIME OF WORK

A. The Contractor shall schedule all work during the hours listed in Section 01040. Should the Contractor wish to schedule work beyond the given working hours, the Contractor must make a request to the CMCMUA at least forty-eight (48) hours prior to the additional work hours.

1. The CMCMUA shall deduct the cost of additional engineering costs from monies due the Contractor.

B. If it shall become imperative to perform work at night, the CMCMUA and Engineer shall be informed a reasonable time in advance of the beginning of such work. Temporary lighting and all other necessary facilities for performing and inspecting the work shall be provided and maintained by the Contractor.

1.08 WASTE DISPOSAL

A. Refer to Article 33 of the General Instruction to Bidders

1.09 FIRE PROTECTION

A. Contractor shall take all necessary precautions to prevent fires at or adjacent to the work, buildings, etc., and shall provide adequate facilities for extinguishing fires which do occur. Burning, if permitted in Division 2, shall be limited to areas approved by the Engineer and CMCMUA and properly controlled by the Contractor.

B. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks, or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal, the Engineer, and the CMCMUA of such tank or device. The Contractor shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the CMCMUA of the tank or device to prevent the occurrence of fire or explosion.

1.9 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable rules and regulations.

1.10 CONFINED SPACE ENVIRONMENT

A. Work will be conducted in a Confined Space Environment and the Contractor shall adhere to all confined space requirements as outlined in Section 01126 – Confined Space Procedures. The Contractor shall be equipped with the proper gas monitoring devices, ventilation equipment and all necessary safety equipment. The Contractor shall provide an onsite safety officer to ensure that the proper safety procedures are followed.

1.11 FIRST AID FACILITIES AND ACCIDENTS

A. First Aid Facilities

1. The Contractor shall provide at the site such equipment and facilities as are necessary to supply first aid to any of Contractor's personnel who may be injured in connection with the work.

B. Accidents

1. The Contractor shall promptly report, in writing, to the Engineer and CMCMUA all accidents whatsoever out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses.

2. If death, serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the CMCMUA and the Engineer.

3. If any claim is made by anyone against the Contractor or a Subcontractor on account of any accidents, the Contractor shall promptly report the facts, in writing, to the CMCMUA, giving full details of the claim.

1.12 LIMITS OF WORK AREA

A. The Contractor shall confine the construction operations within the contract limits shown on the drawings and/or property lines and/or fence lines. Storage of equipment and materials, or erection and use of sheds outside of the contract limits, if such areas are the property of the CMCMUA, shall be used only with the CMCMUA's approval. Such storage or temporary structures, even within the contract's limits, shall be confined to the CMCMUA's property and shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the contract documents.

1.14 WEATHER CONDITIONS

A. The Contractor shall take necessary precautions (in the event of impending storms) to protect all work, materials, or equipment from damage or deterioration due to floods, driving rain, wind, and snow storms. The Contractor shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the CMCMUA for damage to the work from weather elements.

1.15 PERIODIC CLEANUP: BASIC SITE RESTORATION

A. During construction, the Contractor shall regularly remove from the site of the work all accumulated debris and surplus materials of any kind which result from the Contractor's operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the project.

B. When the work involves the installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across streets, rights-of-way, easements, or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade, and otherwise restore the disturbed area to the basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or functions consistent with the original use of the land. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere. Unsightly mounds of earth, large stones, boulders, and debris shall be removed so that the site presents a neat appearance.

C. The Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the CMCMUA. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the CMCMUA, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

D. Upon failure of the Contractor to perform periodic cleanup and basic restoration of the site to the CMCMUA's satisfaction, the CMCMUA may, upon five (5) days prior written notice to the Contractor, without prejudice to any other rights or remedies of the CMCMUA, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the CMCMUA, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due to Contractor.

1.16 USE OF FACILITIES BEFORE COMPLETION

A. The CMCMUA reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this contract.

B. It shall be the CMCMUA's responsibility to prevent premature connections to or use of any portion of the installed facilities by private or public parties, persons or groups of persons, prior to the completion of work.

C. Consistent with the approved progress schedule, the Contractor shall cooperate with the CMCMUA, CMCMUA's agents, and the Engineer to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the CMCMUA.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01011
CONTRACTOR DETAILED SCOPE OF WORK

The following descriptions are summaries of the work to be done under this contract at each location. This is not a complete and exhaustive list of all work to be completed. The contractor shall refer to this document, the Drawings, and additional specifications provided for the complete project scope.

GENERAL NOTES

1. All conduit installed shall be rigid metal steel or aluminum conduit and grounded per the NEC.
2. All conduit length given below are conservative estimates given in the following format (~XX'). Field verification of conduit path and supports shall be performed by the Contractor.
3. All wires referenced below shall be terminated on both ends per drawings unless otherwise specified.
4. Shielded Twisted Pair is abbreviated as STP
5. Connection to a switch implies a power wire and a signal return wire. Where multiple switches reside in a single enclosure the power shall be used as a common power for all switches unless indicated otherwise.
6. All 24 VDC PLC control power shall be isolated from all field voltages (24 VDC VFD control power, 120 VAC, and higher voltages) through the use of control relays and/or separate contact blocks e.g. run command relays, HOA contact blocks.
7. All 24 VDC PLC Control power and analog signals shall not be run in the same conduit as motor feeders, power feeders, or branch circuits.
8. For Stations without Temporary PLC the CMCMUA Operators will run the station in manual during the switch over to the new PLC.
9. Hand Off Auto switch is abbreviated "HOA switch" and is the standard 30.5mm all plastic switch with finger safe stackable contact blocks listed in the technical specifications. Please purchase and install four (4) individual contact blocks per HOA which allows connection mixture of 120 VAC, 24 VDC PLC power and/or 24 VDC VFD power.
10. The term "Run Command" is a 24 DVC digital output from the PLC. The Run Command normally terminates to the coil of a Contractor Supplied 24VDC relay as specified in the technical specifications.
11. Close coordination with CMCMUA Operations Personnel shall be maintained whenever equipment is taken offline, removed from an existing PLC, or moved from an existing PLC to a new PLC. It is the intent of this contract that no equipment shall be taken offline without approval from the CMCMUA Operations Personnel in order to maintain proper wastewater treatment throughout this project. High flow events such as large storms, flood events, and major summer holidays may disrupt the ability to remove equipment from service. Proper project planning 48 hours ahead of time in order to remove equipment from service shall be adhered to by the Contractor.
12. Where descriptions are given for multiple pieces of equipment e.g. 1, 2, 3, and 4, the descriptions, equipment, and lengths provided shall be for single piece of equipment unless otherwise noted. Please multiply the conduit and wire lengths given by the number pieces of equipment in the title for that equipment.
13. Reference detail drawings in appendices for motor contactors wiring, heater relays, and other wiring diagrams.

WILDWOOD FACILITY

1. **OAK AVENUE PUMP STATION**
   - 1.1. **Reference Drawings**
     - 1.1.1. OakAvenuePumpStationElectrical.PDF
   - 1.2. **Station Description**
     - 1.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 21' x 33' x 14' ceiling height.
     - 1.2.2. Poured concrete walls underground with single landing 9' below grade, a second landing 18' below grade, and bottom level 29' below grade where dry well pumps are located.
     - 1.2.3. Wet Well Class I Division I confined space below grade with dimensions of 45' x 16' x 24' depth. Separated from dry side with poured concrete wall.
     - 1.2.4. Conduit concrete cutout access to lower levels is available under existing PLC Enclosure.
     - 1.2.5. Flat roof above ground floor made of prestressed concrete slabs. Fixed ladder access to roof from generator room. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.
   - 1.3. **Preliminary work before taking site off line**
     - 1.3.1. General
       - 1.3.1.1. Trace and tag all field wiring in existing PLC enclosure.
     - 1.3.2. Temporary PLC Setup:
       - 1.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.
       - 1.3.2.2. Mount Temporary PLC
       - 1.3.2.3. Install temporary power to PLC
       - 1.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA
       - 1.3.2.5. PLC code will be provided by CMCMUA
       - 1.3.2.6. HMI code will be provided by CMCMUA
       - 1.3.2.7. Wire items listed in section 1.3.3 below to temporary PLC.
       - 1.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA
     - 1.3.3. Wire to Temporary PLC and Auto Dialer:
       - 1.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.
       - 1.3.3.2. Install Bubbler system provided by CMCMUA.
       - 1.3.3.3. Install temporary wire to temporary PLC for Well Level control
       - 1.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:
         - 1.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches
         - 1.3.3.4.2. Pumps 1 and 2 Running Status
         - 1.3.3.4.3. Pumps 1 and 2 Fault Status
         - 1.3.3.4.4. Pumps 1 and 2 Run commands
         - 1.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)
       - 1.3.3.5. Install temporary wire to Auto Dialer for the following:
         - 1.3.3.5.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.
         - 1.3.3.5.2. Phone line
     - 1.3.4. Items not needed on temporary PLC:
       - 1.3.4.1. Flow Meter
       - 1.3.4.2. Grinder HOA and Running Status
       - 1.3.4.3. Grinder Failure Status

1.3.4.4. Conveyance Pumps 3 and 4
1.3.4.5. Motorized Valves 1 & 2
1.3.4.6. Drywell Sumps 1 & 2
1.3.4.7. Compressor 1 & 2 Pressures
1.3.4.8. Bubbler Purge and Isolation Valves
1.3.4.9. Exhaust and Supply Fans
1.3.4.10. Generator Day Tank
1.3.4.11. Generator
1.3.4.12. Transfer Switch
1.3.4.13. Diesel Tank Level
1.3.4.14. Temperature Control
1.3.4.15. Door Switches
1.3.4.16. Scrubber system

1.4. **Individual Systems**

1.4.1. **Bubbler Control Enclosure**

1.4.1.1. Demo existing stainless steel 4' x 8' x 1.5' bubbler enclosure.

1.4.1.1.1. Safe off existing electrical conductors

1.4.1.1.2. Reuse two (2) air compressors for new bubbler installation

1.4.1.1.3. Remove wiring passing through enclosure from PLC to pump VFD enclosures

1.4.1.1.4. Reuse existing two (2) 120 VAC conductors for air compressors and install two (2) dedicated 120 VAC 20-amp receptacles within 5 feet of the existing air compressors.

1.4.1.1.5. Install wire trough on wall and existing 4" conduit above new bubbler enclosure for power feeds to bubbler air compressor and sump pump enclosures.

1.4.1.2. Install Bubbler Control Enclosure provided by CMCMUA in place of demoed stainless steel 4' x 8' x 1.5' bubbler enclosure. Leave room for sump pump controllers.

1.4.1.2.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D

1.4.1.2.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):

1.4.1.2.2.1. 1 STP for Compressor 1 Pressure transmitter

1.4.1.2.2.2. 1 STP for Compressor 2 Pressure transmitter

1.4.1.2.2.3. 1 STP Wet Well Level transmitter

1.4.1.2.2.4. 24VDC signal and common for isolation control solenoid valve

1.4.1.2.2.5. 24VDC signal and common for purge control solenoid valve

1.4.1.2.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe

1.4.1.2.3.1. CMCMUA will provide the flexible tubing: 25 Feet

1.4.1.2.4. Mount air compressors on floor beneath new bubbler enclosure

1.4.2. **Sump Pumps in Dry Well**

1.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA.

1.4.2.2. Install new pump control enclosures on wall next to the bubbler enclosure.

1.4.2.3. Use existing 4" conduit to 120 VAC Panel P and Install two (2) single phase 120 VAC circuits. Use existing sump breaker and supply one (1) new 15-

amp Eaton bolt on breaker for Eaton panel type PRL1a, connect wires in new pump control enclosures (35').

1.4.2.4. Install two (2) new ¾" conduits to Sump Pump area in drywell from each pump control enclosure for motor circuit conductors, one conduit for each pump (40' each). Use existing floor cutout for conduit route.

1.4.2.4.1. Terminate each conduit with a junction box and route sump pump wires to junction box.

1.4.2.4.2. Install motor circuit wires and connect pumps and connect to sump pump wires.

1.4.2.5. Install new ¾" conduit between sump control enclosures to new PLC enclosure and Install and terminate the following wires to each of the two (2) sump pump enclosures (20'):

1.4.2.5.1. Control Power

1.4.2.5.1.1. 24 VDC from PLC enclosure power supply

1.4.2.5.1.2. 24 VDC Common from PLC enclosure power supply

1.4.2.5.2. Pump Controls

1.4.2.5.2.1. Auto switch

1.4.2.5.2.2. Hand switch

1.4.2.5.2.3. Running status

1.4.2.5.2.4. Fault status

1.4.2.5.2.5. Run Command (pump start command from PLC)

1.4.2.5.2.5.1. Field install run command relay in enclosure

1.4.2.6. Use existing 1" conduit between sump pit and new PLC enclosure for float wires to new PLC enclosure (70' wire).

1.4.2.7. Install new stainless steel Unistrut float hanger bar with wall bracket for float support (10' Unistrut)

1.4.2.8. Purchase and install six (6) new weighted floats, two (2) N.C. and four (4) N.O. floats, and install on hanger bar on concrete floor over circular sump pit.

1.4.2.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

1.4.2.10. Demo existing sump pump enclosure next to pumps and safe off existing 120 VAC circuit(s) into a surface box.

1.4.2.11. Wire float wire to terminals in new PLC enclosure

1.4.2.12. In 1" conduit Install the following wires:

1.4.2.12.1. Control Power

1.4.2.12.1.1. 24 VDC from PLC enclosure power supply

1.4.2.12.1.2. 5 VDC dialer voltage

1.4.2.12.2. Controls

1.4.2.12.2.1. Low level float (N.O.)

1.4.2.12.2.2. Stop float (N.O.)

1.4.2.12.2.3. Start float (N.O.)

1.4.2.12.2.4. Lag Start float (N.O.)

1.4.2.12.2.5. High level float (N.C.)

1.4.2.12.2.6. High drywell float (N.C. to auto dialer)

1.4.2.13. Purchase and install one (1) N.C. weighted float near the floor of the drywell.

1.4.2.14. Demo existing sump pump enclosure and safe off existing 120 VAC circuit.

1.4.3. **Flow Meter**

1.4.3.1. Relocate flow meter and mount to wall near PLC enclosure.

1.4.3.2. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (20'):
1.4.3.2.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.
1.4.3.2.2. One (1) STP wire for MODBUS Communication

1.4.4. **Grinder**
1.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.
1.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.
1.4.4.2. Use existing ¾" conduit to wire 24 VDC controls for the following:
1.4.4.2.1. 24 VDC from PLC enclosure power supply
1.4.4.2.2. Auto switch
1.4.4.2.3. Hand switch
1.4.4.2.4. Running status
1.4.4.2.5. Fault status

1.4.5. **Pump Drives 1 and 2**
1.4.5.1. Install two (2) new ¾" conduits from new PLC enclosure to each of the pump control panels (50' x2)
1.4.5.2. Pull new wires for the following for each pump drive from the new PLC Enclosure to each of the two (2) pump drive enclosure:
1.4.5.2.1. Control Power
1.4.5.2.1.1. 24 VDC from PLC enclosure power supply
1.4.5.2.1.2. 24 VDC Common from PLC enclosure power supply
1.4.5.2.2. Pump Controls
1.4.5.2.2.1. Auto switch
1.4.5.2.2.2. Hand switch
1.4.5.2.2.3. Running status
1.4.5.2.2.4. Fault status
1.4.5.2.2.5. Run Command (pump start command from PLC)
1.4.5.2.2.5.1. Field install run command relay in enclosure
1.4.5.2.2.6. Ethernet Wire
1.4.5.2.2.7. STP speed command

1.4.6. **Pumps 1 and 2**
1.4.6.1. Install one (1) new ¾" conduit from new PLC enclosure to serve the two (2) pumps in the dry well for a vibration switch for each of the two (2) pumps (80').
1.4.6.2. Demo existing two (2) 1-1/4" conduits (approx. 20' each pump) and enclosure at each pump that houses existing emergency stop and existing vibration wires. Demo conduits back to the wall and remove wires. These conduits can be used for the sump pump controls and wiring.
1.4.6.3. Purchase and install two (2) new Vibration Switch's on the pumps.
1.4.6.4. Install two conductors for each pump vibration switch back to the new PLC enclosure.

1.4.7. **Wet Well**
1.4.7.1. Purchase and install one (1) N.C. weighted float.
1.4.7.2. Install new ¾" conduit from the new PLC enclosure and ISBR, Class I Division I, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (70').
1.4.7.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Float and connect to ISBR in new PLC enclosure.

1.4.8. **Drywell**

1.4.8.1. Use the new ¾" vibration switch conduit and tee off for existing effluent discharge pressure transmitter.

1.4.8.2. Pull new STP from new PLC enclosure to pressure transmitter – powered transmitter (3 wire) (40').

1.4.9. **Scrubber Equipment**

1.4.9.1. Demo existing 3' x 5' x 14" fiberglass enclosure from outside wall in scrubber area along with all conduit feeding existing motors (50' ¾" conduit).

1.4.9.1.1. Demo back feed conductors from 1 x ½" conduit fed from the 480 VAC panel.

1.4.9.2. Remove existing 40-amp feed conductors from main 480 VAC panel circuit 13-15-17 and abandon.

1.4.9.3. Purchase and install a new 5 HP 480 VAC three phase contactor enclosure with controls for the scrubber blower motor. Install next to the existing 480 VAC main panel in generator room.

1.4.9.3.1. Install new ¾" conduit between main 480 VAC panel and scrubber contactor and connect to existing 40-amp breaker (10').

1.4.9.4. Purchase and install one (1) new 5 HP 480 VAC three phase contactor enclosure with controls for the scrubber recirculation motor. Install next to the existing 480 VAC main panel in generator room.

1.4.9.4.1. Install new ¾" conduit between main 480 VAC panel and recirculation contactor and connect to existing 15-amp breaker (20')

1.4.9.5. Purchase and install one (1) new 1 HP 120 VAC single phase contactor enclosure with controls for the chemical pump. Install next to the existing 480 VAC main panel in generator room.

1.4.9.5.1. Install new ¾" conduit between main 120 VAC panel and chemical pump contactor and connect to existing 15-amp breaker #13 for power to chemical pump (30').

1.4.9.6. From scrubber blower contactor install new ¾" conduit through generator room to outside scrubber area for motor feed (60').

1.4.9.7. From recirculation pump contactor install ¾" conduit and pull chemical pump motor conductors with recirculation motor conductors to feed recirculation pump motor and extend ¾" conduit into shed area and install a single weatherproof receptacle for the chemical pump (80' total).

1.4.9.8. Install new ¾" conduit between blower contactor, recirculation contactor, and chemical pump contactor to new PLC enclosure and pull and terminate the following wires (50'):

1.4.9.8.1. Control Power

1.4.9.8.1.1. 24 VDC from PLC enclosure power supply

1.4.9.8.1.2. 24 VDC Common from PLC enclosure power supply

1.4.9.8.2. Controls

1.4.9.8.2.1. Auto switch

1.4.9.8.2.2. Hand switch

1.4.9.8.2.3. Running status

1.4.9.8.2.4. Fault status

1.4.9.8.2.5. Relocate Run Command relay into control panel

1.4.9.8.2.6. Run Command (start command from PLC)

1.4.9.9. From the new PLC enclosure install new 1" conduit to the scrubber pad area and tee off with ¾" conduit for the following wires (80' total):

1.4.9.9.1. 24 VDC from PLC enclosure power supply x2

1.4.9.9.2. Low level float

1.4.9.9.3. Safety shower switch
1.4.9.9.4. STP chemical tank level – loop powered (3 wire)
1.4.9.9.5. STP chemical pump speed
1.4.9.10. Tee off with ¾" conduit for the scrubber sump low level float (+30' ¾")
1.4.9.11. Tee off the conduit for chemical tank level transmitter (+30' ¾").
1.4.9.11.1. Purchase and install a new ultra-sonic level transmitter on the chemical tank.
1.4.9.11.2. Purchase and install a flanged bulkhead fitting with threaded 2" NPT on the chemical tank for the ultra-sonic level transmitter.
1.4.9.11.3. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.
1.4.9.12. Tee off conduit and leave wires in a junction box at the base of the safety shower – two (2) conductors (+30' ¾").
1.4.9.13. Tee off conduit and install a junction box next to chemical pump receptacle for STP for chemical pump speed – one (1) STP (30' of ¾").

1.4.10. **Generator Room**
1.4.10.1. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (50'):
1.4.10.1.1. Install a CAT 5 cable between generator and new PLC enclosure (must be 600V rated).
1.4.10.2. Install new ¾" conduit from the new PLC enclosure to existing day tank, louver and battery charger and pull and terminate the following wires (50'):
1.4.10.2.1. Control Power
1.4.10.2.1.1. 24 VDC from PLC enclosure power supply
1.4.10.2.1.2. 24 VDC Common from PLC enclosure power supply
1.4.10.2.2. Status and Control Wires
1.4.10.2.2.1. Day Tank Auto switch
1.4.10.2.2.2. Day Tank Manual switch
1.4.10.2.2.3. Day Tank overflow alarm status
1.4.10.2.2.4. Fault status
1.4.10.2.2.5. Battery Charger Fault status
1.4.10.2.2.6. Louver status

1.4.11. **Diesel tank**
1.4.11.1. Install new ¾" conduit from the new PLC enclosure to the diesel tank outside and install the following (80')
1.4.11.1.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (20' of ¾").
1.4.11.1.2. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank – one (1) STP– loop powered (2 wire) (30' of ¾").
1.4.11.1.3. Purchase and install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.
1.4.11.1.4. Program Level Transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

1.4.12. **Transfer Switch**
1.4.12.1. Use existing ¾" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (40' wire).

1.4.13. **Ventilation and Heating**

1.4.13.1. Purchase and install two (2) new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status for SF-2 and EF-2 below.

1.4.13.2. Install new 1" conduit from new PLC enclosure to the Wet Well Supply Fan SF-2 contactor in the generator room and install the following wires (60'):

1.4.13.2.1. Control Power

1.4.13.2.1.1. 24 VDC from PLC enclosure power supply

1.4.13.2.1.2. 24 VDC Common from PLC enclosure power supply

1.4.13.2.2. Status and Command Wires

1.4.13.2.2.1. Auto switch

1.4.13.2.2.2. Hand Switch

1.4.13.2.2.3. Running status

1.4.13.2.2.4. Overload status

1.4.13.2.2.5. Relocate the Run Command relay

1.4.13.2.2.6. Run Command (start command from PLC)

1.4.13.3. In the same 1" conduit tee off to the EF-2 Dry Well Exhaust Fan contactor and install the following wires (60' of wire):

1.4.13.3.1. Control Power

1.4.13.3.1.1. 24 VDC from PLC enclosure power supply

1.4.13.3.1.2. 24 VDC Common from PLC enclosure power supply

1.4.13.3.2. Status and Command Wires

1.4.13.3.2.1. Auto switch

1.4.13.3.2.2. Hand Switch

1.4.13.3.2.3. Running status

1.4.13.3.2.4. Overload status

1.4.13.3.2.5. Relocate the Run Command relay

1.4.13.3.2.6. Run Command (start command from PLC)

1.4.13.4. For two (2) fans, Wet Well Supply Fan SF-2 and EF-2 Dry Well Exhaust Fan install the following:

1.4.13.4.1. Purchase and install two (2) new pressure differential switches.

1.4.13.4.1.1. Attach one switch with hose to the Dry Well ductwork in the motor room.

1.4.13.4.1.2. Install new ¾" conduit from the new PLC enclosure to the switch (20').

1.4.13.4.1.3. Attach the second switch with to the wall above the new PLC enclosure and route the hose through the block wall to the ductwork in the wet well.

1.4.13.4.1.4. Install new ¾" flex from the new PLC enclosure to the switch (6').

1.4.13.4.2. Purchase and install tubing from pressure differential switch and route as needed to associated fan ventilation duct (20' of hose for each fan).

1.4.13.4.3. Seal all wall and duct penetrations air tight.

1.4.13.4.4. Wire pressure switches back to new PLC Enclosure – 2 conductors.

1.4.13.5. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

1.4.13.5.1. Temperature Probe provided by CMCMUA.

1.4.13.6. Install ¾" conduit to interconnect two (2) existing gas heaters to new PLC enclosure for low voltage control of heaters (180').

1.4.13.6.1. Purchase and install run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit.

1.4.13.7. Keep existing 120 VAC emergency disconnect switches and remove existing thermostat and blank 4" square box on both heaters.

1.4.14. **Fire/Security/Lights**

1.4.14.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (50'):

1.4.14.1.1. Purchase and install three (3) door switches

1.4.14.1.2. Install one (1) of the switches on the outside of the wet well door.

1.4.14.1.3. Install two (2) of the switches on the inside of the front double door to the motor room.

1.4.14.2. Install new ¾" conduit from new PLC enclosure to next to existing phone for security switch and future fire alarm panel (50')

1.4.14.3. Purchase and install, near front door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (2 wires).

1.4.14.4. Install three (3) wires for future fire panel and leave in junction box next to phone.

1.4.14.4.1. 24 VDC from PLC enclosure power supply

1.4.14.4.2. Fire Alarm

1.4.14.4.3. System Trouble

1.4.15. **Auto Dialer**

1.4.15.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.

1.4.15.2. Use fire alarm ¾" conduit from new PLC enclosure for dialer wires.

1.4.15.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:

1.4.15.3.1. Dialer common 5VDC

1.4.15.3.2. Wet Well High-Level Float through I.S. Barrier

1.4.15.3.3. Dry Well High-Level Float

1.4.15.3.4. PLC Communication Fault through PLC CR relay

1.5. **Demo Existing PLC enclosures**

1.5.1. Safe off the wires, lift from existing enclosure and pull back.

1.5.2. Demo and dispose of enclosure

1.5.3. Steel two door enclosure

1.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

1.6. **Install New PLC Enclosure**

1.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 1.xx above

1.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

1.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

1.6.4. Extend conduits and wires to new enclosure as needed.

1.6.5. Terminate existing wiring per drawings

1.6.6. Terminate new wires per drawings

1.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

1.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

1.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:
1.6.9.1. Wet Well High-Level Float
1.6.9.2. Wet well hatch switch if applicable

1.7. **Testing and Commissioning System**

1.7.1. Assist Avanceon and CMCMUA with testing and commissioning
1.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
1.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

1.8. **Remove Temporary PLC enclosure**

1.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

2. NEPTUNE AVENUE PUMP STATION

2.1. **Reference Drawings**

2.1.1. NeptunePumpStationElectrical.PDF

2.2. **Station Description**

2.2.1. Block building with brick face overlaid with overall dimensions of 10' x 18' x 10' ceiling height.

2.2.2. Poured concrete walls underground with single basement 9' below grade with ladder access for flow meter and piping access – dry pit.

2.2.3. Septic Tank style wet well located outside 15' from side of building is a Class I Division 1 location.

2.2.4. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

2.3. **Preliminary work before taking site off line:**

2.3.1. General

2.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

2.3.2. Temporary PLC Setup:

2.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

2.3.2.2. Mount Temporary PLC

2.3.2.3. Install temporary power to PLC

2.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

2.3.2.5. PLC code will be provided by CMCMUA

2.3.2.6. HMI code will be provided by CMCMUA

2.3.2.7. Wire items listed in 2.3.3 below to temporary PLC.

2.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

2.3.3. Wire to Temporary PLC and Auto Dialer:

2.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

2.3.3.2. Install Bubbler system provided by CMCMUA.

2.3.3.3. Install temporary wire to temporary PLC for Well Level control.

2.3.3.4. Install temporary wire to the pump enclosure and pick up the following points:

2.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

2.3.3.4.2. Pumps 1 and 2 Running Status

2.3.3.4.3. Pumps 1 and 2 Fault Status

2.3.3.4.4. Pumps 1 and 2 Run commands

2.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

2.3.3.5. Install temporary wire to Auto Dialer for the following:

2.3.3.5.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

2.3.3.5.2. Phone line

2.3.3.6. Items not needed on temporary PLC:

2.3.3.6.1. Flow Meter

2.3.3.6.2. Grinder HOA and Running Status

2.3.3.6.3. Grinder Failure Status

2.3.3.6.4. Drywell Sumps 1 & 2

2.3.3.6.5. Compressor 1 & 2 Pressures

2.3.3.6.6. Bubbler Purge and Isolation Valves

2.3.3.6.7. Exhaust and Supply Fans

2.3.3.6.8. Generator Day Tank
2.3.3.6.9. Generator
2.3.3.6.10. Transfer Switch
2.3.3.6.11. Diesel Tank Level
2.3.3.6.12. Temperature Control
2.3.3.6.13. Door Switches

2.4. **Individual Systems**

2.4.1. **Bubbler Control Enclosure**

2.4.1.1. Install Bubbler Control Enclosure provided by CMCMUA next to PLC enclosure.

2.4.1.2. Wall mount non-metallic enclosure 30" H x 20" W x 10" D

2.4.1.3. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (10'):

2.4.1.3.1. 1 STP for Compressor 1 Pressure transmitter
2.4.1.3.2. 1 STP for Compressor 2 Pressure transmitter
2.4.1.3.3. 1 STP Wet Well Level transmitter
2.4.1.3.4. 24DVC signal and common for isolation control solenoid valve
2.4.1.3.5. 24DVC signal and common for purge control solenoid valve

2.4.1.4. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe

2.4.1.4.1. CMCMUA will provide the flexible tubing: 25 Feet

2.4.1.5. Install new receptacles for two (2) 120 VAC 20-amp circuits for the air compressors.

2.4.1.6. Install two (2) dedicated receptacles within 5 feet of the bubbler enclosure.

2.4.1.7. Purchase and install two (2) type Square D NQ single pole 20-amp breakers to power circuits.

2.4.1.8. Mount air compressors on floor beneath new bubbler enclosure

2.4.2. **Sump Pumps in Dry Well**

2.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA.

2.4.2.2. Install one new 120 VAC sump pump control enclosure on west wall near the sump pump in basement.

2.4.2.3. Install ¾" conduit from 120 VAC panel for new pull one (1) single phase 120 VAC circuit. Purchase and install new Square D type NQ 20-amp breaker (60'). Existing core through floor can be used to route conduit.

2.4.2.4. Install ¾" conduit to sump pump area from the pump control enclosure for motor circuit conductors (10').

2.4.2.5. Terminate each conduit with a junction box and route sump pump wire to box and connect.

2.4.2.6. Pull motor circuit wires and connect pumps.

2.4.2.7. Install new ¾" conduit between sump control enclosure to new PLC enclosure and pull and terminate the following wires (50'):

2.4.2.7.1. Control Power

2.4.2.7.1.1. 24 VDC from PLC enclosure power supply
2.4.2.7.1.2. 24 VDC Common from PLC enclosure power supply
2.4.2.7.1.3. 5 VDC Dialer voltage

2.4.2.7.2. Pump Controls

2.4.2.7.2.1. Auto switch
2.4.2.7.2.2. Hand switch
2.4.2.7.2.3. Running status

2.4.2.7.2.4. Fault status
2.4.2.7.2.5. Run Command (pump start command from PLC)
2.4.2.7.2.5.1. Field install run command relay in enclosure
2.4.2.7.2.6. Single mechanical sump pump start float
2.4.2.7.2.7. High drywell float 5 VDC (N.C.)
2.4.2.7.3. Purchase and install mechanical float assembly (Square D 9036FG)
2.4.2.7.4. Purchase and install one (1) N.C. weighted float near floor of drywell

2.4.3. **Flow Meter**
2.4.3.1. Reuse existing MODBUS wire from flow meter to PLC enclosure.
2.4.3.2. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (20'):
2.4.3.2.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.
2.4.3.2.2. One (1) STP wire for MODBUS Communication

2.4.4. **Pump Drives 1 and 2**
2.4.4.1. Reuse existing 1' conduit from new PLC enclosure to the existing pump control panel.
2.4.4.2. Install new wires for each pump controller from the new PLC enclosure for the following:
2.4.4.2.1. Control Power
2.4.4.2.1.1. 24 VDC from PLC enclosure power supply
2.4.4.2.1.2. 24 VDC Common from PLC enclosure power supply
2.4.4.2.2. Pump Controls
2.4.4.2.2.1. Auto switch
2.4.4.2.2.2. Hand switch
2.4.4.2.2.3. Running status
2.4.4.2.2.4. Fault status
2.4.4.2.2.5. Run Command (pump start command from PLC)
2.4.4.2.2.5.1. Field install run command relay in enclosure
2.4.4.2.2.6. Ethernet Wire

2.4.5. **Wet Well**
2.4.5.1. Purchase and install one (1) weighted N.C. float.
2.4.5.2. Purchase and install door sensor switch
2.4.5.3. Install new ¾" conduit, Class I Division I, from new PLC Enclosure to septic tank lid edge with stainless steel weatherproof box for connection of intrinsic safe wiring for Wet Well High-Level Float and hatch switch from the new PLC enclosure (60').
2.4.5.4. Install hatch switch on top of lid and wire (2 wires).
2.4.5.5. Install High Level Float in wet well tank (2 wires).

2.4.6. **Drywell**
2.4.6.1. Install ¾" conduit from new PLC enclosure to forcemain tee that exits the basement in the southeast corner for future pressure transmitter (40').
2.4.6.2. Pull new STP from new PLC enclosure to future Pressure transmitter – powered transmitter (3 wire).

2.4.7. **Scrubber Equipment**
2.4.7.1. None

2.4.8. **Generator Room**
2.4.8.1. Install new ¾" conduit to existing day tank controller, louver and battery charger and pull and terminate the following wires (50'):

2.4.8.1.1. Control Power
2.4.8.1.1.1. 24 VDC from PLC enclosure power supply (x3)
2.4.8.1.2. Status
2.4.8.1.2.1. Day Tank Not in Auto
2.4.8.1.2.2. Day Tank High Level
2.4.8.1.2.3. Day Tank Low Level
2.4.8.1.2.4. Day Tank Leak
2.4.8.1.2.5. Day Tank Return Pump Running
2.4.8.1.2.6. Battery Charger Fault status
2.4.8.1.2.7. Louver status - leave louver wires near louver motor in junction box

2.4.8.2. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (30'):
2.4.8.2.1. Install a CAT 5 cable between generator and new PLC enclosure.

2.4.9. **Diesel tank**
2.4.9.1. Install new ¾" conduit from the new PLC enclosure to the diesel tank outside and install the following (80')
2.4.9.1.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (20' of ¾").
2.4.9.1.2. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank – one (1) STP – loop powered (2 wire) (30' of ¾").
2.4.9.1.3. Purchase and install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.
2.4.9.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

2.4.10. **Transfer Switch**
2.4.10.1. Install new ¾" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (20').

2.4.11. **Ventilation and Heating**
2.4.11.1. Ventilation – none.
2.4.11.2. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.
2.4.11.3. Temperature Probe provided by CMCMUA.
2.4.11.4. Install ¾" conduit to existing gas heater from new PLC enclosure for low voltage control of heaters (20').
2.4.11.5. Install run command relay into the heater and bypass existing thermostat to allow the run command relay to control the heater control circuit.
2.4.11.6. Keep existing 120 VAC emergency disconnect switches and remove existing thermostat and blank 4" square box.

2.4.12. **Fire/Security/Lights**
2.4.12.1. Use existing ¾" conduit and wiring from the new PLC enclosure for the following door sensor:
2.4.12.1.1. Purchase and install one (1) door switch
2.4.12.1.2. Install the switch on the inside of the entry door.
2.4.12.2. Install new ¾" conduit from new PLC enclosure to area near existing phone for security switch and future fire alarm panel (40')
2.4.12.3. Purchase and install, near front door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (2 wires).

2.4.12.4. Install three (3) wires for future fire panel and leave in junction box next to phone.
2.4.12.4.1. 24 VDC from PLC enclosure power supply
2.4.12.4.2. Fire Alarm
2.4.12.4.3. System Trouble

2.4.13. **Auto Dialer**
2.4.13.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.
2.4.13.2. Use fire alarm ¾" conduit from new PLC enclosure for dialer wires.
2.4.13.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:
2.4.13.3.1. Dialer common 5VDC
2.4.13.3.2. Wet Well High-Level Float through I.S. Barrier
2.4.13.3.3. Dry Well High-Level Float
2.4.13.3.4. PLC Communication Fault through PLC CR relay
2.4.13.4. Install a new ¾" conduit from the 120 VAC panel and install a duplex receptacle next to the dialer (50')
2.4.13.5. Purchase and install Square D QO bolt -in single pole breaker in the panel.
2.4.13.5.1. Purchase and install 120 VAC cord whip on dialer and plug into receptacle (6').

2.5. **Demo Existing PLC enclosures**
2.5.1. Safe off the wires, lift from existing enclosure and pull back.
2.5.2. Demo and dispose of enclosures
2.5.3. Steel two door enclosure
2.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

2.6. **Install new PLC Enclosure**
2.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 2.xx above
2.6.2. Cut out bottom of enclosure as need to access existing floor conduits
2.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
2.6.4. Extend conduits and wires to new enclosure as needed.
2.6.5. Terminate existing wiring per drawings
2.6.6. Terminate new wires per drawings
2.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
2.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply
2.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:
2.6.9.1. Wet Well High-Level Float
2.6.9.2. Wet well hatch switch if applicable

2.7. **Testing and Commissioning System**
2.7.1. Assist Avanceon and CMCMUA with testing and commissioning
2.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed
2.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

2.8. **Remove Temporary PLC enclosure:**
2.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

3. **LOWER TOWNSHIP EFFLUENT DISCHARGE STATION**

3.1. **Reference Drawings**

3.1.1. LowerPumpStationElectrical.PDF

3.2. **Station Description**

3.2.1. One block building with brick face overlaid with overall dimensions of 50' x 36' x 45' ceiling height houses the pumps and controls.

3.2.2. A second block building with brick face with overall dimensions of 27' x 42' x 20' ceiling height houses the generator.

3.2.3. All controls and pumps are above grade.

3.3. **Preliminary work before taking site off line:**

3.3.1. General

3.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

3.3.2. Temporary PLC Setup:

3.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

3.3.2.2. Mount Temporary PLC

3.3.2.3. Install temporary power to PLC

3.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

3.3.2.5. PLC code will be provided by CMCMUA

3.3.2.6. HMI code will be provided by CMCMUA

3.3.2.7. Wire items listed in 3.3.3 below to temporary PLC.

3.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

3.3.3. Wire to Temporary PLC and Auto Dialer:

3.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

3.3.3.2. Install temporary wire to temporary PLC for Well Level control (Ultrasonic).

3.3.3.3. Install temporary wire to the pump enclosure and pick up the following points:

3.3.3.3.1. Pumps 1 and 4 Auto from HOA Switches

3.3.3.3.2. Pumps 1 and 4 Running Status

3.3.3.3.3. Pumps 1 and 4 Fault Status

3.3.3.3.4. Pumps 1 and 4 Run commands

3.3.3.3.5. Pumps 1 and 4 Analog Speed Command (For VFDs Only)

3.3.3.4. Install temporary wire to Auto Dialer for the following:

3.3.3.4.1. Auto dialer shall always have a high wet well level float attached and active at all times.

3.3.3.4.2. Phone line

3.3.3.5. Items not needed on temporary PLC:

3.3.3.5.1. Flow Meter

3.3.3.5.2. Exhaust and Supply Fans

3.3.3.5.3. Generator Day Tank

3.3.3.5.4. Generator

3.3.3.5.5. Transfer Switch

3.3.3.5.6. Diesel Tank Level

3.3.3.5.7. Temperature Control

3.3.3.5.8. Door Switches

3.4. **Individual Systems**

3.4.1. **Bubbler Control Enclosure**

3.4.1.1. Wet well level (Ultrasonic)

3.4.1.2. Reuse the 4-20mA signal wire for the wet well level. Connect existing wire to the new PLC

3.4.2. **Sump Pumps in two (2) piping vaults**

3.4.2.1. Purchase and install four (4) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA.

3.4.2.2. Install four (4) new 120 VAC sump pump control enclosure on south wall in control room.

3.4.2.3. Install ¾" conduit from 120 VAC panel for new pull four (4) single phase 120 VAC circuits. Use existing 20-amp breakers to feed the four circuits (40') (breakers 14, 15, 20, 27).

3.4.2.4. For the two (2) sump pumps in the Lower Township piping vault, use the two (2) existing 1 – ½" conduits, one for power and one for signal.

3.4.2.4.1. Inside the vault, extend the 1 – ½" power conduit to the sump area and terminate the conduit with a junction box and route sump pump wires to box and connect (50').

3.4.2.4.2. Pull motor circuit wires and connect pumps to the new controllers (wire 350').

3.4.2.5. For the two (2) sump pumps in the EDS piping vault, install two (2) new 1 – ½" conduits, one for power and one for signal (225' each).

3.4.2.5.1. Asphalt paving will need to be cut for 90' in order to bury the conduits to the EDS vault.

3.4.2.5.2. The vault will need to be core drilled for conduit entry (12" thick concrete)

3.4.2.5.3. Inside the vault, extend the 1 – ½" power conduit to the sump area and terminate the conduit with a junction box and route sump pump wires to box and connect (50').

3.4.2.5.4. Pull motor circuit wires and connect pumps to the new controllers (wire 225').

3.4.2.6. Install new ¾" conduit between four (4) sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the four (4) sump controllers (50'):

3.4.2.6.1. Control Power

3.4.2.6.1.1. 24 VDC from PLC enclosure power supply

3.4.2.6.1.2. 24 VDC Common from PLC enclosure power supply

3.4.2.6.2. Pump Controls

3.4.2.6.2.1. Auto switch

3.4.2.6.2.2. Hand switch

3.4.2.6.2.3. Running status

3.4.2.6.2.4. Fault status

3.4.2.6.2.5. Run Command (pump start command from PLC)

3.4.2.6.2.5.1. Field install run command relay in enclosure

3.4.2.7. Install new stainless steel Unistrut float hanger bar with wall bracket for float support (10' Unistrut)

3.4.2.8. Purchase and install six (6) new weighted floats, two (2) N.C. and four (4) N.O. floats, and install on hanger bar on concrete floor over sump pit.

3.4.2.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

3.4.2.10. Demo existing sump pump enclosure next to pumps and safe off existing 120 VAC circuit(s) into a surface box.

3.4.2.11. Wire float wire to terminals in new PLC enclosure

3.4.2.12. Use 1 - ½" conduits between sump pits and new PLC enclosure and pull multi-point float wire to new PLC enclosure.
- 3.4.2.12.1. Control Power
  - 3.4.2.12.1.1. 24 VDC from PLC enclosure power supply
  - 3.4.2.12.1.2. 5 VDC dialer voltage
- 3.4.2.12.2. Controls
  - 3.4.2.12.2.1. Low level float (N.O.)
  - 3.4.2.12.2.2. Stop float (N.O.)
  - 3.4.2.12.2.3. Start float (N.O.)
  - 3.4.2.12.2.4. Lag Start float (N.O.)
  - 3.4.2.12.2.5. High level float (N.C.)
  - 3.4.2.12.2.6. High drywell float (N.C. to auto dialer)

3.4.2.13. Purchase and install one (1) N.C. weighted float near the floor of the drywell.
- 3.4.2.13.1. For Lower Township Vault (350' wire length)
- 3.4.2.13.2. For EDS Vault (225' wire length)

3.4.2.14. Install multi-point float into sump pits

3.4.2.15. Wire float wire to terminals in new PLC enclosure

3.4.2.16. Demo existing sump pump enclosures, floats and safe off existing 120 VAC circuits at each sump location.

3.4.3. **Flow Meters**

3.4.3.1. Remove existing Flexim Flow Meter from door of old PLC enclosure and relocate to south wall near sump controllers.

3.4.3.2. Tee off existing 1 – ½ conduit from Flexim Flow Meter to new PLC enclosure for the following wires to be connected (50'):
- 3.4.3.2.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.
- 3.4.3.2.2. One (1) STP wire for MODBUS Communication
- 3.4.3.2.3. Pull back existing transducer wires and reconnect to flow meter.

3.4.3.3. Install new Flexim Flow Meter next to existing meter on south wall and pull wires for the following:
- 3.4.3.3.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.
- 3.4.3.3.2. One (1) STP wire for MODBUS Communication
- 3.4.3.3.3. Install two (2) new Belden 9222 triax wires using new 1 – ½" signal conduit from section 3.4.2.5, from flow meter to EDS piping vault (near EDS sump pit) for flow meter transducers on effluent pipe (250' each wire).
  - 3.4.3.3.3.1. Extend a ¾" conduit from the 1 – ½" signal conduit to the section of effluent pipe where the flow meter resides (60') and terminate to flow meter transducer junction boxes.

3.4.4. **Pump Drives 1, 2, 3, and 4**

3.4.4.1. The existing concrete floor gutter can be used to route wiring between new PLC enclosure and all pump control panels.

3.4.4.2. Install new wires to each of the four (4) pump controllers from the new PLC enclosure for the following:
- 3.4.4.2.1. Control Power
  - 3.4.4.2.1.1. 24 VDC from PLC enclosure power supply
  - 3.4.4.2.1.2. 24 VDC Common from PLC enclosure power supply
- 3.4.4.2.2. Pump Controls
  - 3.4.4.2.2.1. Auto switch
  - 3.4.4.2.2.2. Hand switch

3.4.4.2.2.3. Running status
3.4.4.2.2.4. Fault status
3.4.4.2.2.5. Run Command (pump start command from PLC)
3.4.4.2.2.5.1. Field install run command relay in enclosure
3.4.4.2.2.6. Ethernet Wire

3.4.5. **Pump Motors 1, 2, 3, and 4**

3.4.5.1. Purchase and install four (4) vibration switches for each pump motor.

3.4.5.2. Use existing ¾" conduits to each motor for the installation of new conductors for the status of the vibration switch between the new PLC enclosure and the four (4) motors (80' x4).

3.4.6. **Wash Water Pump**

3.4.6.1. Locate existing wires for over pressure switch and flow switch and connect to new PLC.

3.4.6.2.

3.4.7. **Wet Well**

3.4.7.1. Install new 1" conduit from new PLC enclosure to northwest side of garage door and terminate outside near effluent wet well sump pit (75').

3.4.7.2. Purchase 2 weighted floats, 1 normally open and 1 normally closed.

3.4.7.3. Install wire and High-Level Float NC at sump area.

3.4.7.4. Install wire for Low Level Float and leave capped off in weatherproof box and supply Normally Open float to CMCMUA for future installation.

3.4.7.5. Locate and use existing ¾" conduit to distribution wet well and pull new wires for the following:

3.4.7.5.1. Purchase and install one (1) normally closed float for distribution wet well level high alarm

3.4.7.5.2. Purchase and install one (1) ultrasonic level transmitter (STP – loop powered (2 wire))

3.4.7.6. Connect STP to existing Ultra-Sonic level transmitter and to PLC

3.4.8. **Drywell**

3.4.8.1. Extend wet well float 1" conduit (3.4.7.1) across north wall to northeast corner where existing pressure transmitter is installed in forcemain (70').

3.4.8.2. Pull new STP from new PLC enclosure to pressure transmitter and connect – loop powered (3 wire) (145').

3.4.9. **Scrubber Equipment**

3.4.9.1. None

3.4.10. **Generator Room**

3.4.10.1. Use existing ¾" conduit to existing day tank controller, louver and battery charger and pull and terminate the following wires (120'):

3.4.10.1.1. Control Power
3.4.10.1.1.1. 24 VDC from PLC enclosure power supply
3.4.10.1.1.2. 24 VDC Common from PLC enclosure power supply

3.4.10.1.2. Status and Control Wires
3.4.10.1.2.1. Day Tank Auto switch
3.4.10.1.2.2. Day Tank Manual switch
3.4.10.1.2.3. Day Tank overflow alarm status
3.4.10.1.2.4. Day Tank Fault status
3.4.10.1.2.5. Battery Charger Fault status
3.4.10.1.2.6. Louver status– leave louver wires near louver motor in junction box

3.4.10.2. Install new ¾" conduit from day tank controller to louver (80')

3.4.10.2.1. Extend louver status wires and leave in junction box next to louver.

3.4.10.2.2. Wire junction is permitted in day tank controller enclosure.

3.4.10.3. Install new ¾" conduit from day tank controller to battery charger (80')

3.4.10.3.1. Extend battery charger status wires and leave in battery charger.

3.4.10.3.2. Wire junction is permitted in day tank controller enclosure.

3.4.10.4. From new PLC enclosure install new ¾" conduit to the generator control box on the generator. Follow existing conduit path and Unistrut. (150' conduit, two (2) core holes through block and brick, 20' stainless steel Unistrut)

3.4.10.4.1. Install new CAT 5 cable from PLC to generator and leave in control box of generator.

3.4.11. **Diesel tank**

3.4.11.1. Extend wet well 1" conduit (3.4.7.1) to the diesel tank outside and install the following (20')

3.4.11.1.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (20' of ¾").

3.4.11.1.2. Use existing level transmitter and connect existing wires to new PLC

3.4.12. **Transfer Switch**

3.4.12.1. Use existing spare ¾" conduit from PLC enclosure to day tank for CAT 5 cable.

3.4.12.2. Install new ¾" conduit from day tank controller to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (20' conduit 100' of CAT 5).

3.4.12.2.1. No splice of CAT 5 cable is permitted in day tank controller enclosure.

3.4.13. **Ventilation and Heating**

3.4.13.1. In existing MCC for EF-1 remove red running light and purchase and install new HOA switch with four (4) contact blocks.

3.4.13.1.1. Using MCC control voltage wire contactor for hand operation through the hand switch.

3.4.13.1.2. Install two (2) wires to new PLC output relay for auto switch operation using floor gutter (30').

3.4.13.2. In existing MCC for EF-2 remove red running light and purchase and install new HOA switch with four (4) contact blocks.

3.4.13.2.1. Using MCC control voltage wire contactor for hand operation through the hand switch.

3.4.13.2.2. Install two (2) wires to new PLC output relay for auto switch operation using floor gutter (30').

3.4.13.3. In existing MCC for EF-3 remove red running light and purchase and install new HOA switch with four (4) contact blocks.

3.4.13.3.1. Using MCC control voltage wire contactor for hand operation through the hand switch.

3.4.13.3.2. Install two (2) wires to new PLC output relay for auto switch operation using floor gutter (30').

3.4.13.4. For EF-1, EF-2, EF-3 install the following wires to the new PLC enclosure (30'):

3.4.13.4.1. Control Power

3.4.13.4.1.1. 24 VDC from PLC enclosure power supply

3.4.13.4.2. Status Wires

3.4.13.4.2.1. Auto switch

3.4.13.4.2.2. Hand switch
3.4.13.4.2.3. Overload
3.4.13.4.2.4. Note: PLC run command wires and relay will be in PLC enclosure.

3.4.13.5. Demo wires and control relays from MCC to existing Johnson Control enclosure on south wall.
3.4.13.5.1. Leave enclosure on wall as other power wires pass through it.
3.4.13.5.2. Remove control labels and four (4) 30mmm lights from door and plug holes

3.4.13.6. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.
3.4.13.6.1. Temperature Probe provided by CMCMUA.

3.4.13.7. Use wet well 1" conduit (3.4.7.1) and tee off to three (3) existing electric heaters from new PLC enclosure for low voltage control of heaters (40' of additional conduit – 2 conductors 250' each in total to reach all three heaters).

3.4.13.8. Install run command relay into each of the three (3) heaters and bypass existing thermostat connected to heater to allow the run command relay to control the heater control.

3.4.14. **Fire/Security/Lights**

3.4.14.1. Install new ¾" conduit and wiring from the new PLC enclosure to the existing fire alarm panel (40'):

3.4.14.2. Install four (4) wires for future connection and leave in fire panel.
3.4.14.2.1. 24 VDC from PLC enclosure power supply
3.4.14.2.2. Fire Alarm
3.4.14.2.3. System Trouble
3.4.14.2.4. Intrusion

3.4.14.3. Purchase and install, next to new PLC enclosure, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (10').

3.4.15. **Auto Dialer**

3.4.15.1. Purchase and install new Auto Dialer next to existing phone service block and extend phone line to dialer.

3.4.15.2. Use fire alarm ¾" conduit from new PLC enclosure for dialer wires.

3.4.15.3. Using field terminal blocks in PLC extend wires to the Auto Dialer from PLC Enclosure for the following (40'):
3.4.15.3.1. Dialer common 5VDC
3.4.15.3.2. Effluent Wet Well High-Level Float NC (new)
3.4.15.3.3. Distribution Box High Level NC (existing)
3.4.15.3.4. PLC Communication Fault through PLC CR relay

3.4.15.4. Purchase and install 120 VAC cord whip on dialer and plug into existing receptacle near phone panel (6').

3.5. **Demo Existing PLC enclosures**

3.5.1. Safe off the wires, lift from existing enclosure and pull back.

3.5.2. Demo and dispose of enclosures

3.5.3. Steel two door enclosure

3.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

3.6. **Install new PLC Enclosure**

3.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 3.xx above

3.6.2. Cut out bottom of enclosure as need to access existing floor conduits
3.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
3.6.4. Extend conduits and wires to new enclosure as needed.
3.6.5. Terminate existing wiring per drawings
3.6.6. Terminate new wires per drawings
3.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
3.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

3.7. **Testing and Commissioning System**

3.7.1. Assist Avanceon and CMCMUA with testing and commissioning
3.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed
3.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

3.8. **Remove Temporary PLC enclosure:**

3.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

4. RIO GRANDE PUMP STATION

4.1. Reference Drawings

4.1.1. RioGrandePumpStationElectrical.PDF

4.2. Station Description

4.2.1. Block building with brick face overlaid with overall dimensions of 10' x 21' x 10' ceiling height.

4.2.2. Poured concrete walls underground with single basement 9' below grade with ladder access for flow meter and piping access – dry pit.

4.2.3. Septic Tank style wet well located outside 15' from side of building is a Class I Division 1 location.

4.2.4. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

4.3. Preliminary work before taking site off line:

4.3.1. General

4.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

4.3.2. Temporary PLC Setup:

4.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

4.3.2.2. Mount Temporary PLC

4.3.2.3. Install temporary power to PLC

4.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

4.3.2.5. PLC code will be provided by CMCMUA

4.3.2.6. HMI code will be provided by CMCMUA

4.3.2.7. Wire items listed in 4.3.3 below to temporary PLC.

4.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

4.3.3. Wire to Temporary PLC and Auto Dialer:

4.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

4.3.3.2. Install Bubbler system provided by CMCMUA.

4.3.3.3. Install temporary wire to temporary PLC for Well Level control.

4.3.3.4. Install temporary wire to the pump enclosure and pick up the following points:

4.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

4.3.3.4.2. Pumps 1 and 2 Running Status

4.3.3.4.3. Pumps 1 and 2 Fault Status

4.3.3.4.4. Pumps 1 and 2 Run commands

4.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

4.3.3.5. Install temporary wire to Auto Dialer for the following:

4.3.3.5.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

4.3.3.5.2. Phone line

4.3.3.6. Items not needed on temporary PLC:

4.3.3.6.1. Flow Meter

4.3.3.6.2. Grinder HOA and Running Status

4.3.3.6.3. Grinder Failure Status

4.3.3.6.4. Drywell Sumps 1 & 2

4.3.3.6.5. Compressor 1 & 2 Pressures

4.3.3.6.6. Bubbler Purge and Isolation Valves

4.3.3.6.7. Exhaust and Supply Fans

4.3.3.6.8. Generator Day Tank
4.3.3.6.9. Generator
4.3.3.6.10. Transfer Switch
4.3.3.6.11. Diesel Tank Level
4.3.3.6.12. Temperature Control
4.3.3.6.13. Door Switches

4.4. **Individual Systems**

4.4.1. **Bubbler Control Enclosure**

4.4.1.1. Install Bubbler Control Enclosure provided by CMCMUA next to PLC enclosure. Leave room for sump pump controllers.

4.4.1.2. Wall mount non-metallic enclosure 30" H x 12" W x 10" D narrow style bubbler enclosure

4.4.1.3. Use existing ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (10'):

4.4.1.3.1. 1 STP for Compressor 1 Pressure transmitter
4.4.1.3.2. 1 STP for Compressor 2 Pressure transmitter
4.4.1.3.3. 1 STP Wet Well Level transmitter
4.4.1.3.4. 24DVC signal and common for isolation control solenoid valve
4.4.1.3.5. 24DVC signal and common for purge control solenoid valve

4.4.1.4. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe

4.4.1.4.1. CMCMUA will provide the flexible tubing: 25 Feet

4.4.1.5. Two existing air compressors stay installed and utilize existing power.

4.4.2. **Sump Pumps in Dry Well**

4.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA.

4.4.2.2. Install two (2) new 120 VAC sump pump control enclosure on north and west wall near the sump pump in basement.

4.4.2.3. Use existing ¾" conduit and existing circuit(s) from 120 VAC panel for new sump control enclosures.

4.4.2.4. Route sump pump wires to sump control enclosures and connect.

4.4.2.5. Open existing core hole for control conduit route to basement.

4.4.2.6. Install new 1" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires (50'):

4.4.2.6.1. Control Power

4.4.2.6.1.1. 24 VDC from PLC enclosure power supply
4.4.2.6.1.2. 24 VDC Common from PLC enclosure power supply

4.4.2.6.2. Pump Controls

4.4.2.6.2.1. Auto switch
4.4.2.6.2.2. Hand switch
4.4.2.6.2.3. Running status
4.4.2.6.2.4. Fault status
4.4.2.6.2.5. Run Command (pump start command from PLC)

4.4.2.6.2.5.1. Field install run command relay in enclosure

4.4.2.7. Install new stainless steel Unistrut float hanger bar with wall bracket for float support (10' Unistrut)

4.4.2.8. Purchase and install six (6) new weighted floats, two (2) N.C. and four (4) N.O. floats, and install on hanger bar on concrete floor over circular sump pit.

4.4.2.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

4.4.2.10. Demo existing sump pump enclosure next to pumps and safe off existing 120 VAC circuit(s) into a surface box.
4.4.2.11. Wire float wire to terminals in new PLC enclosure
4.4.2.12. In 1" conduit pull the following wires:
4.4.2.12.1. Control Power
4.4.2.12.1.1. 24 VDC from PLC enclosure power supply
4.4.2.12.1.2. 5 VDC dialer voltage
4.4.2.12.2. Controls
4.4.2.12.2.1. Low level float (N.O.)
4.4.2.12.2.2. Stop float (N.O.)
4.4.2.12.2.3. Start float (N.O.)
4.4.2.12.2.4. Lag Start float (N.O.)
4.4.2.12.2.5. High level float (N.C.)
4.4.2.12.2.6. High drywell float (N.C. to auto dialer)
4.4.2.13. Purchase and install one (1) N.C. weighted float near the floor of the drywell.

4.4.3. **Flow Meter**
4.4.3.1. Reuse existing MODBUS wire from flow meter to PLC enclosure.
4.4.3.2. Use existing 120 VAC power for flow meter

4.4.4. **Grinder**
4.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.
4.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.
4.4.4.2. Install new ¾" conduit from new PLC enclosure to existing grinder enclosure (60')
4.4.4.3. Pull wires to Grinder and connect for 24 VDC controls for the following:
4.4.4.3.1. 24 VDC from PLC enclosure power supply
4.4.4.3.2. Auto switch
4.4.4.3.3. Hand switch
4.4.4.3.4. Running status
4.4.4.3.5. Fault status

4.4.5. **Pump Drives 1 and 2**
4.4.5.1. Reuse existing 1' conduit from new PLC enclosure to the existing pump control panels.
4.4.5.2. Install new wires for each pump controller from the new PLC enclosure for the following:
4.4.5.2.1. Control Power
4.4.5.2.1.1. 24 VDC from PLC enclosure power supply
4.4.5.2.1.2. 24 VDC Common from PLC enclosure power supply
4.4.5.2.2. Pump Controls
4.4.5.2.2.1. Auto switch
4.4.5.2.2.2. Hand switch
4.4.5.2.2.3. Running status
4.4.5.2.2.4. Fault status
4.4.5.2.2.5. Run Command (pump start command from PLC)
4.4.5.2.2.5.1. Field install run command relay in enclosure
4.4.5.2.2.6. Ethernet Wire

4.4.6. **Wet Well**
4.4.6.1. Purchase and install one (1) weighted N.C. float.
4.4.6.2. Purchase and install door sensor switch

4.4.6.3. Install new ¾" conduit from new PLC Enclosure to septic tank lid edge with stainless steel weatherproof box for connection of intrinsic safe wiring for Wet Well High-Level Float and hatch switch from the new PLC enclosure (60').

4.4.6.4. Install hatch switch on top of lid and wire (2-wire).

4.4.6.5. Install High Level Float in wet well tank (2-wire).

4.4.7. **Drywell**

4.4.7.1. Connect existing forcemain pressure transducer STP to new PLC per electrical drawings – loop powered (3 wire)

4.4.8. **Scrubber Equipment**

4.4.8.1. None

4.4.9. **Generator Room**

4.4.9.1. Install new ¾" conduit to existing day tank controller and louver and pull and terminate the following wires (50'):

4.4.9.1.1. 24 VDC from PLC enclosure power supply

4.4.9.1.2. Day Tank Auto switch

4.4.9.1.3. Day Tank Manual switch

4.4.9.1.4. Day Tank overflow alarm status

4.4.9.1.5. Day Tank Fault status

4.4.9.1.6. Louver status – leave louver wires in junction box near louver motor

4.4.9.2. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (50'):

4.4.9.2.1. Install a CAT 5 cable between generator and new PLC enclosure.

4.4.10. **Diesel tank**

4.4.10.1. Install new ¾" conduit from the new PLC enclosure to the existing conduit near day tank controller and connect to reuse existing outdoor ¾" conduit to diesel tank (60').

4.4.10.1.1. Purchase and install new 24 VDC Diesel Tank Horn on the side of the diesel tank – two (2) conductors (20' of ¾").

4.4.10.1.2. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank – one (1) STP – loop powered (2 wire) (30' of ¾").

4.4.10.1.3. Purchase and install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.

4.4.10.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

4.4.11. **Transfer Switch**

4.4.11.1. Install new ¾" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (40').

4.4.12. **Ventilation and Heating**

4.4.12.1. Purchase and install 1 HP 120 VAC single phase contactor for dry well ventilation fan.

4.4.12.1.1. Demo existing timer and HOA switch.

4.4.12.1.2. Reuse existing 120 VAC circuit to power contactor.

4.4.12.1.3. Install new ¾" conduit to new contactor and install the following wires (50'):

4.4.12.1.4. Control Power

4.4.12.1.4.1. 24 VDC from PLC enclosure power supply

4.4.12.1.4.2. 24 VDC Common from PLC enclosure power supply

4.4.12.1.5. Pump Controls

4.4.12.1.5.1. Auto switch
4.4.12.1.5.2. Hand switch
4.4.12.1.5.3. Running status
4.4.12.1.5.4. Fault status
4.4.12.1.5.5. Run Command (pump start command from PLC)
4.4.12.1.5.5.1. Field install run command relay in enclosure

4.4.12.2. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

4.4.12.3. Temperature Probe provided by CMCMUA.

4.4.12.4. Install ¾" conduit to existing gas heater from new PLC enclosure for low voltage control of heaters (60').

4.4.12.5. Install run command relay into the heater and bypass existing thermostat to allow the run command relay to control the heater control circuit.

4.4.12.6. Keep existing 120 VAC emergency disconnect switches and remove existing thermostat and blank 4" square box.

4.4.13. **Fire/Security/Lights**

4.4.13.1. Use gas heater ¾" conduit and wire from the new PLC enclosure for the following door sensors:
4.4.13.1.1. Purchase and install two (2) door switches
4.4.13.1.2. Install one (1) switch on the inside of the entry door to the generator room.
4.4.13.1.3. Install one (1) switch on the inside of the entry door to the PLC room.

4.4.13.2. Use existing 1" conduit from new PLC enclosure to area near existing fire alarm panel.

4.4.13.3. Install three (3) wires for fire panel and leave in junction box next to phone.
4.4.13.3.1. 24 VDC from PLC enclosure power supply
4.4.13.3.2. Fire Alarm
4.4.13.3.3. System Trouble

4.4.13.4. Purchase and install, near PLC entry door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (2 wires).

4.4.14. **Auto Dialer**

4.4.14.1. Move existing dialer next to the existing phone.

4.4.14.2. Extend the phone line and connect to the dialer.

4.4.14.3. Install new ¾" conduit from new PLC enclosure to the dialer for the following wires (50'):
4.4.14.3.1. Dialer common 5VDC
4.4.14.3.2. Wet Well High-Level Float through I.S. Barrier
4.4.14.3.3. Dry Well High-Level Float
4.4.14.3.4. PLC Communication Fault through PLC CR relay

4.4.14.4. Install new ¾" conduit to the MCC panel A and install a new 120 VAC duplex receptacle for the dialer, use emergency lights breaker (40').

4.4.14.5. Purchase and install 120 VAC cord whip on dialer and plug into receptacle (6').

4.5. **Demo Existing PLC enclosures**

4.5.1. Safe off the wires, lift from existing enclosure and pull back.

4.5.2. Demo and dispose of enclosures

4.5.3. Steel two door enclosure

4.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

4.6. **Install new PLC Enclosure**

4.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 4.xx above

4.6.2. Cut out bottom of enclosure as need to access existing floor conduits

4.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

4.6.4. Extend conduits and wires to new enclosure as needed.

4.6.5. Terminate existing wiring per drawings

4.6.6. Terminate new wires per drawings

4.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

4.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

4.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

4.6.9.1. Wet Well High-Level Float

4.6.9.2. Wet well hatch switch if applicable

4.7. **Testing and Commissioning System**

4.7.1. Assist Avanceon and CMCMUA with testing and commissioning

4.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed

4.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

4.8. **Remove Temporary PLC enclosure:**

4.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

5. **10th AVENUE PUMP STATION**

5.1. **Reference Drawings**

5.1.1. 10thAvenuePumpStationElectrical.PDF

5.2. **Station Description**

5.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 34' x 33' x 16' ceiling height.

5.2.2. Poured concrete walls underground with single landing 9' below grade, a second landing 18' below grade, and bottom level 29' below grade where dry well pumps are located.

5.2.3. Wet Well Class I Division I confined space below grade with dimensions of 34' x 16' x 24' depth. Separated from dry side with poured concrete wall.

5.2.4. Conduit concrete cutout access to lower levels is available under existing bubbler Enclosure.

5.2.5. Flat roof above ground floor made of prestressed concrete slabs. Fixed ladder access to roof from pump room. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

5.3. **Preliminary work before taking site off line:**

5.3.1. General

5.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

5.3.2. Temporary PLC Setup:

5.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

5.3.2.2. Mount Temporary PLC

5.3.2.3. Install temporary power to PLC

5.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

5.3.2.5. PLC code will be provided by CMCMUA

5.3.2.6. HMI code will be provided by CMCMUA

5.3.2.7. Wire items listed in section 5.3.3 below to temporary PLC.

5.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

5.3.3. Wire to Temporary PLC and Auto Dialer:

5.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

5.3.3.2. Install Bubbler system provided by CMCMUA.

5.3.3.3. Install temporary wire to temporary PLC for Well Level control

5.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:

5.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

5.3.3.4.2. Pumps 1 and 2 Running Status

5.3.3.4.3. Pumps 1 and 2 Fault Status

5.3.3.4.4. Pumps 1 and 2 Run commands

5.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

5.3.3.5. Purchase and install Auto Dialer.

5.3.3.5.1. Extend existing phone line to Auto Dialer

5.3.3.6. Install temporary wire to Auto Dialer for the following:

5.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

5.3.3.6.2. Phone line

5.3.4. Items not needed on temporary PLC:

5.3.4.1. Flow Meter

5.3.4.2. Grinder HOA and Running Status

5.3.4.3. Grinder Failure Status

5.3.4.4. Conveyance Pumps 3 and 4
5.3.4.5. Motorized Valves 1 & 2
5.3.4.6. Drywell Sumps 1 & 2
5.3.4.7. Compressor 1 & 2 Pressures
5.3.4.8. Bubbler Purge and Isolation Valves
5.3.4.9. Exhaust and Supply Fans
5.3.4.10. Generator Day Tank
5.3.4.11. Generator
5.3.4.12. Transfer Switch
5.3.4.13. Diesel Tank Level
5.3.4.14. Temperature Control
5.3.4.15. Door Switches
5.3.4.16. Scrubber system

5.4. **Individual Systems**

5.4.1. **Bubbler Control Enclosure**

5.4.1.1. Demo existing stainless steel 4' x 8' x 1.5' bubbler enclosure.
5.4.1.1.1. Safe off existing electrical conductors
5.4.1.1.2. Reuse two (2) air compressors for new bubbler installation
5.4.1.1.3. Remove wiring passing through enclosure from PLC to pump VFD enclosures
5.4.1.1.4. Install new ¾" conduit from Panel P (120VAC) (20').
5.4.1.1.4.1. Install two (2) 120VAC circuits for two (2) existing compressors.
5.4.1.1.4.2. Reuse existing breaker #17 for one 120 VAC circuit.
5.4.1.1.4.3. Use existing 20-amp spare breaker #35 for second compressor.
5.4.1.1.4.4. Install two (2) 120VAC 20-amp receptacles for the two (2) compressors.
5.4.1.1.5. Install wire trough on wall and existing 4" conduit above new bubbler enclosure for power feeds to bubbler air compressor and sump pump enclosures.

5.4.1.2. Install Bubbler Control Enclosure provided by CMCMUA in place of demoed stainless steel 4' x 8' x 1.5' bubbler enclosure. Leave room for sump pump controllers and flow meter display.
5.4.1.2.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D
5.4.1.2.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):
5.4.1.2.2.1. 1 STP for Compressor 1 Pressure transmitter
5.4.1.2.2.2. 1 STP for Compressor 2 Pressure transmitter
5.4.1.2.2.3. 1 STP Wet Well Level transmitter
5.4.1.2.2.4. 24DVC signal and common for isolation control solenoid valve
5.4.1.2.2.5. 24DVC signal and common for purge control solenoid valve
5.4.1.2.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe
5.4.1.2.3.1. CMCMUA will provide the flexible tubing: 25 Feet
5.4.1.2.3.2. Use existing breakers to power circuits.
5.4.1.2.4. Mount air compressors on floor beneath new bubbler enclosure

5.4.2. **Sump Pumps in Dry Well**

5.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA.

5.4.2.2. Install new pump control enclosures on wall next to the bubbler enclosure.

5.4.2.3. Use existing 4" conduit to 120 VAC Panel P and pull two (2) single phase 120 VAC circuits. Use existing sump breaker #6 and spare breaker #37 (35' wire).

5.4.2.4. Use existing 1" conduit to Sump Pump area in drywell from each pump control enclosure for both sump pump motor circuit conductors, (80' wire).

5.4.2.4.1. Terminate conduit with two (2) junction boxes, one for each sump pump, and route sump pump wires to junction box.

5.4.2.4.2. Pull motor circuit wires and connect pumps and connect to sump pump wires.

5.4.2.5. Install new ¾" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the two (2) sump pump enclosures (20'):

5.4.2.5.1. Control Power

5.4.2.5.1.1. 24 VDC from PLC enclosure power supply

5.4.2.5.1.2. 24 VDC Common from PLC enclosure power supply

5.4.2.5.2. Pump Controls

5.4.2.5.2.1. Auto switch

5.4.2.5.2.2. Hand switch

5.4.2.5.2.3. Running status

5.4.2.5.2.4. Fault status

5.4.2.5.2.5. Run Command (pump start command from PLC)

5.4.2.5.2.5.1. Field install run command relay in enclosure

5.4.2.6. Install new 1" conduit between sump pit and new PLC enclosure and pull the following float wires to new PLC enclosure (50'):

5.4.2.6.1. Control Power

5.4.2.6.1.1. 24 VDC from PLC enclosure power supply

5.4.2.6.1.2. 5 VDC Dialer voltage

5.4.2.6.2. Controls

5.4.2.6.2.1. Low level float (N.O.)

5.4.2.6.2.2. Stop float (N.O.)

5.4.2.6.2.3. Start float (N.O.)

5.4.2.6.2.4. Lag Start float (N.O.)

5.4.2.6.2.5. High level float (N.C.)

5.4.2.6.2.6. High drywell float (N.C. to auto dialer)

5.4.2.7. Demo existing floats and conduit in sump pit.

5.4.2.8. Use existing float hanger bar

5.4.2.9. Purchase and install six (6) new weighted floats, two (2) N.C. and four (4) N.O. floats, and install on hanger bar on concrete floor over circular sump pit.

5.4.2.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats. Demo existing sump pump enclosure next to front door and safe off existing 120 VAC circuit.

5.4.3. **Flow Meter**

5.4.3.1. Relocate flow meter and mount to wall near Bubbler enclosure.

5.4.3.2. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (20'):

5.4.3.2.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.
5.4.3.2.2. One (1) STP wire for MODBUS Communication

5.4.4. **Grinder**

5.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.
5.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.

5.4.4.2. Install new ¾" conduit to between new PLC enclosure and grinder panel and wire 24 VDC controls for the following (50'):
5.4.4.2.1. 24 VDC from PLC enclosure power supply
5.4.4.2.2. Auto switch
5.4.4.2.3. Hand switch
5.4.4.2.4. Running status
5.4.4.2.5. Fault status

5.4.5. **Pump Drives 1, 2 and 3**

5.4.5.1. Install three (3) new ¾" conduits from new PLC enclosure to each of the pump control panels (30')

5.4.5.2. Pull new wires for the following for each pump drive from the new PLC Enclosure to each of the three (3) pump drive enclosure:
5.4.5.2.1. Control Power
5.4.5.2.1.1. 24 VDC from PLC enclosure power supply
5.4.5.2.1.2. 24 VDC Common from PLC enclosure power supply
5.4.5.2.2. Pump Controls
5.4.5.2.2.1. Auto switch
5.4.5.2.2.2. Hand switch
5.4.5.2.2.3. Running status
5.4.5.2.2.4. Fault status
5.4.5.2.2.5. Run Command (pump start command from PLC)
5.4.5.2.2.5.1. Field install run command relay in enclosure
5.4.5.2.2.6. Ethernet Wire
5.4.5.2.2.7. STP speed command

5.4.6. **Pumps 1, 2 and 3**

5.4.6.1. Use existing 1-1/4" (1) conduit from new PLC enclosure to serve the three (3) pumps in the dry well for a vibration switch for each of the three (3) pumps (80').

5.4.6.2. Demo existing three (3) 1-1/4" conduits (approx. 20' at each pump) and enclosure at each pump that houses existing emergency stop and existing vibration wires. Demo conduits back to the wall and remove wires.

5.4.6.3. Extend three (3) new ¾" conduits from 1-1/4" conduit to each of the three (3) pumps for new vibration switch (40' each)

5.4.6.4. Purchase and install three (3) new Vibration Switch's on the pumps.

5.4.6.5. Install two conductors for each pump vibration switch back to the new PLC enclosure (120' wire each pump).

5.4.7. **Wet Well**

5.4.7.1. Purchase and install one (1) weighted N.C. float.

5.4.7.2. Install new ¾" conduit, Class I Division I, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (100').

5.4.7.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Float and connect to ISBR in new PLC enclosure.

5.4.8. **Drywell**

5.4.8.1. Reuse existing STP from new PLC enclosure to pressure transmitter and connect to new PLC.

5.4.9. **Scrubber Equipment**

5.4.9.1. From existing 7.5 HP 480 VAC three phase contactor enclosure with controls for the scrubber blower motor in the generator room (EF-1 wet well) install new ¾" conduit to existing scrubber blower motor (100').

5.4.9.1.1. Purchase and install a new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status.

5.4.9.2. Purchase and install a new 5 HP 480 VAC three phase contactor enclosure with disconnect and HOA switch for the scrubber recirculation motor. Install near the existing 480 VAC main panel in generator room.

5.4.9.2.1. Install new ¾" conduit and wire between main 480 VAC panel and recirculation contactor and connect to existing 15-amp breaker 19-21-23 (10').

5.4.9.2.2. Install new ¾" conduit from recirculation contactor to scrubber pad recirculation pump (50').

5.4.9.3. Purchase and install a new 1 HP 120 VAC single phase contactor enclosure with disconnect and HOA switch for the chemical pump motor. Install near the existing 480 VAC main panel in generator room.

5.4.9.4. Install new ¾" conduit between main 120 VAC panel and chemical pump contactor and connect to existing 15-amp breaker #40 for power to chemical pump.

5.4.9.4.1. Pull chemical pump motor conductors in recirculation motor conduit to feed recirculation pump motor and extend ¾" conduit into shed area and install a single weatherproof receptacle for the chemical pump (30').

5.4.9.5. Install new ¾" conduit between blower contactor, recirculation contactor and chemical pump contactor to new PLC enclosure and pull and terminate the following wires (20'):

5.4.9.5.1. Control Power

5.4.9.5.1.1. 24 VDC from PLC enclosure power supply

5.4.9.5.1.2. 24 VDC Common from PLC enclosure power supply

5.4.9.5.2. Status Wires

5.4.9.5.2.1. Auto switch

5.4.9.5.2.2. Hand switch

5.4.9.5.2.3. Running status

5.4.9.5.2.4. Fault status

5.4.9.5.2.5. Relocate Run Command relay

5.4.9.5.2.6. Run Command (start command from PLC)

5.4.9.6. Install new 1" conduit from new PLC enclosure to scrubber area and tee off with ¾" conduit for the following wires (90' of 1" total):

5.4.9.7. Control Power

5.4.9.7.1. 24 VDC from PLC enclosure power supply x2

5.4.9.8. Controls

5.4.9.8.1. Low sump float

5.4.9.8.2. STP for chemical tank level – loop powered (3 wire)

5.4.9.8.3. Shower flow switch

5.4.9.8.4. STP for chemical pump speed

5.4.9.9. Install conductors for safety shower switch and leave in a junction box at the base of the shower.

5.4.9.10. Extend safety shower conduit and purchase and install a new ultra-sonic level transmitter – STP – loop powered (2 wire) (+20' ¾").

5.4.9.10.1. Purchase and install a new ultra-sonic level transmitter on the chemical tank.

5.4.9.10.2. Purchase and install a flanged bulkhead fitting with threaded 2" NPT on the chemical tank for the ultra-sonic level transmitter.

5.4.9.10.3. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

5.4.9.11. Tee off safety shower conduit and install the following wire for the low-level float for the scrubber sump – two (2) conductors (+20' ¾").

5.4.9.11.1. Purchase and provide a NC float to the CMCMUA for installation and leave wires in j-box for connection to float at the wet scrubber sump.

5.4.9.12. Extend safety shower conduit and junction box next to chemical pump receptacle for STP for chemical pump speed – one (1) STP (30' of ¾").

5.4.10. **Generator Room**

5.4.10.1. Install new ¾" conduit to existing day tank controller and pull the following wires (70'):

5.4.10.1.1. Control Power

5.4.10.1.1.1. 24 VDC from PLC enclosure power supply

5.4.10.1.2. Status and Control Wires

5.4.10.1.2.1. Day Tank Auto switch

5.4.10.1.2.2. Day Tank Manual switch

5.4.10.1.2.3. Day Tank overflow alarm status

5.4.10.1.2.4. Day Tank Fault status

5.4.10.2. Install new ¾" conduit to existing louver and pull and terminate the following wires (60'):

5.4.10.2.1. Control Power

5.4.10.2.1.1. 24 VDC from PLC enclosure power supply

5.4.10.2.1.2. 24 VDC Common from PLC enclosure power supply

5.4.10.2.2. Status and Control Wires

5.4.10.2.2.1. Louver status

5.4.10.3. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (60'):

5.4.10.3.1. Install a CAT 5 cable between generator and new PLC enclosure.

5.4.11. **Diesel tank**

5.4.11.1. Install new ¾" conduit from the new PLC enclosure to the diesel tank outside and install the following (110')

5.4.11.1.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (20' of ¾").

5.4.11.1.2. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank – one (1) STP – loop powered (2 wire) (30' of ¾").

5.4.11.1.3. Purchase and install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.

5.4.11.1.4. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

5.4.11.2. Demo existing ¾" PVC conduit, wires, existing alarm horn and switch box back to enclosure in generator room (60' of conduit removed).

5.4.12. **Transfer Switch**

5.4.12.1. Use existing 4" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (40' wire).

5.4.13. **Ventilation and Heating**

5.4.13.1. Purchase and install two (2) new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status for SF-1 and EF-2 below.

5.4.13.2. Install new ¾" conduit for Drywell Exhaust Fan Contactor and Wetwell Supply Fan Contactor status (30'):

5.4.13.2.1. Control Power

5.4.13.2.1.1. 24 VDC from PLC enclosure power supply

5.4.13.2.2. Status Wires

5.4.13.2.2.1. Auto switch

5.4.13.2.2.2. Hand Switch

5.4.13.2.2.3. Running status

5.4.13.2.2.4. Overload status

5.4.13.3. For two (2) fans, Drywell Exhaust Fan Contactor and Wetwell Supply Fan purchase and install the following:

5.4.13.3.1. Purchase and install two (2) new pressure differential switches.

5.4.13.3.1.1. Attach one switch with hose to the Dry Well ductwork in the motor room.

5.4.13.3.1.2. Install new ¾" flex from the new PLC enclosure to the switch (6').

5.4.13.3.1.3. Attach the second switch to the wall next to front door and route the hose through the block wall to the ductwork in the wet well.

5.4.13.3.1.4. Install new ¾" conduit from the new PLC enclosure to the switch (20').

5.4.13.3.2. Purchase and install tubing from pressure differential switch and route as needed to associated fan ventilation duct (20' of hose for each fan).

5.4.13.3.3. Seal all wall and duct penetrations air tight.

5.4.13.3.4. Wire pressure switches back to new PLC Enclosure – 2 conductors.

5.4.13.4. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

5.4.13.4.1. Temperature Probe provided by CMCMUA.

5.4.13.5. Install ¾" conduit to interconnect two (2) existing gas heaters to new PLC enclosure for low voltage control of heaters (100').

5.4.13.5.1. Install run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit.

5.4.13.6. Keep existing 120 VAC emergency disconnect switches and remove existing thermostat and blank 4" square box on both heaters.

5.4.14. **Fire/Security/Lights**

5.4.14.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (50'):

5.4.14.1.1. Purchase and install two (2) door switches

5.4.14.1.2. Install one (1) of the switches on the outside of the wet well door.

5.4.14.1.3. Install one (1) of the switches on the inside of the front door to the motor room.

5.4.14.2. Tee off door sensor conduit and terminate next to existing phone by the front door for security switch and future fire alarm panel (10')

5.4.14.3. Purchase and install, near front door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (2 wires).

5.4.14.4. Install three (3) wires for future fire panel and leave in junction box next to phone.

5.4.14.4.1. 24 VDC from PLC enclosure power supply

5.4.14.4.2. Fire Alarm

5.4.14.4.3. System Trouble

5.4.15. **Auto Dialer**

5.4.15.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.

5.4.15.2. Use door sensor ¾" conduit from new PLC enclosure for dialer wires.

5.4.15.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:

5.4.15.3.1. Dialer common 5VDC

5.4.15.3.2. Wet Well High-Level Float through I.S. Barrier

5.4.15.3.3. Dry Well High-Level Float

5.4.15.3.4. PLC Communication Fault through PLC CR relay

5.5. **Demo Existing PLC enclosures**

5.5.1. Safe off the wires, lift from existing enclosure and pull back.

5.5.2. Demo and dispose of enclosure

5.5.3. Steel single door enclosure

5.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

5.6. **Install New PLC Enclosure**

5.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 5.xx above

5.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

5.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

5.6.4. Extend conduits and wires to new enclosure as needed.

5.6.5. Terminate existing wiring per drawings

5.6.6. Terminate new wires per drawings

5.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

5.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

5.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

5.6.9.1. Wet Well High-Level Float

5.6.9.2. Wet well hatch switch if applicable

5.7. **Testing and Commissioning System**

5.7.1. Assist Avanceon and CMCMUA with testing and commissioning

5.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

5.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

5.8. **Remove Temporary PLC enclosure**

5.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

6. **SPICER AVENUE PUMP STATION**

6.1. **Reference Drawings**

6.1.1. SpicerAvenuePumpStationElectrical.PDF

6.2. **Station Description**

6.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 40' x 54' x 17' ceiling height.

6.2.2. Poured concrete walls underground with single landing 12' below grade, a second landing 15' below grade, and bottom level 27' below grade where dry well pumps are located.

6.2.3. Wet Well Class I Division I confined space below grade with dimensions of 15' x 54' x 24' depth. Separated from dry side with poured concrete wall.

6.2.4. Conduit concrete cutout access to lower levels is available under existing bubbler enclosure and existing PLC enclosure.

6.2.5. Flat roof above ground floor made of prestressed concrete slabs. Indoor ladder access from indoor scrubber area to roof. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

6.3. **Preliminary work before taking site off line:**

6.3.1. General

6.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

6.3.2. Temporary PLC Setup:

6.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

6.3.2.2. Mount Temporary PLC

6.3.2.3. Install temporary power to PLC

6.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

6.3.2.5. PLC code will be provided by CMCMUA

6.3.2.6. HMI code will be provided by CMCMUA

6.3.2.7. Wire items listed in section 6.3.3 below to temporary PLC.

6.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

6.3.3. Wire to Temporary PLC and Auto Dialer:

6.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

6.3.3.2. Install Bubbler system provided by CMCMUA.

6.3.3.3. Install temporary wire to temporary PLC for Well Level control

6.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:

6.3.3.4.1. Pumps 1 and 4 Auto from HOA Switches

6.3.3.4.2. Pumps 1 and 4 Running Status

6.3.3.4.3. Pumps 1 and 4 Fault Status

6.3.3.4.4. Pumps 1 and 4 Run commands

6.3.3.4.5. Pumps 1 and 4 Analog Speed Command (For VFDs Only)

6.3.3.5. Purchase and install Auto Dialer.

6.3.3.5.1. Extend existing phone line to Auto Dialer

6.3.3.6. Install temporary wire to Auto Dialer for the following:

6.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

6.3.3.6.2. Phone line

6.3.4. Items not needed on temporary PLC:

6.3.4.1. Flow Meter

6.3.4.2. Grinder HOA and Running Status

6.3.4.3. Grinder Failure Status

6.3.4.4. Conveyance Pumps 3 and 4
6.3.4.5. Motorized Valves 1 & 2
6.3.4.6. Drywell Sumps 1 & 2
6.3.4.7. Compressor 1 & 2 Pressures
6.3.4.8. Bubbler Purge and Isolation Valves
6.3.4.9. Exhaust and Supply Fans
6.3.4.10. Generator Day Tank
6.3.4.11. Generator
6.3.4.12. Transfer Switch
6.3.4.13. Diesel Tank Level
6.3.4.14. Temperature Control
6.3.4.15. Door Switches
6.3.4.16. Scrubber system

6.4. **Individual Systems**

6.4.1. **Bubbler Control Enclosure**

6.4.1.1. Demo existing stainless steel 20" x 24"' x 12" bubbler enclosure.

6.4.1.1.1. Safe off existing electrical conductors

6.4.1.1.2. Reuse two (2) air compressors for new bubbler installation

6.4.1.1.3. Demo adjacent steel 4' x 8' x 1.5' enclosure that houses flow meter.

6.4.1.1.4. Utilize the existing 4" conduit from the adjacent steel enclosure and install wire trough on wall above new bubbler enclosure for power feeds to bubbler air compressor and sump pump enclosures.

6.4.1.1.5. From wireway install new ¾" conduit for circuits from Panel P (120VAC) (30').

6.4.1.1.5.1. Install two (2) 120VAC circuits for two (2) existing compressors.

6.4.1.1.5.2. Use existing breakers #11 and #21 for the two (2) 120 VAC circuits.

6.4.1.1.5.3. Install two (2) 120VAC receptacles for the two (2) compressors.

6.4.1.1.6. Install wire trough on wall and existing 4" conduit above new bubbler enclosure for power feeds to bubbler air compressor and sump pump enclosures.

6.4.1.2. Install Bubbler Control Enclosure provided by CMCMUA in place of demoed stainless steel 20" x 24"' x 12" bubbler enclosure. Leave room for sump pump controllers and flow meter display.

6.4.1.2.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D

6.4.1.2.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):

6.4.1.2.2.1. 1 STP for Compressor 1 Pressure transmitter

6.4.1.2.2.2. 1 STP for Compressor 2 Pressure transmitter

6.4.1.2.2.3. 1 STP Wet Well Level transmitter

6.4.1.2.2.4. 24DVC signal and common for isolation control solenoid valve

6.4.1.2.2.5. 24DVC signal and common for purge control solenoid valve

6.4.1.2.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe

6.4.1.2.3.1. CMCMUA will provide the flexible tubing: 25 Feet

6.4.1.2.4. Mount air compressors on floor beneath new bubbler enclosure

6.4.2. **Sump Pumps in Dry Well**

6.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA switch.

6.4.2.2. Install new pump control enclosures on wall next to the bubbler enclosure.

6.4.2.3. Use existing 4" conduit from 6.4.1.1.4 above to 120 VAC Panel P and pull two (2) new single phase 120 VAC circuits. Install new ¾" conduit from wire trough to new Sump Control Enclosures. Use existing sump breaker #6 and spare breaker #3 (30' ¾" conduit and 110' wire).

6.4.2.4. Use existing 1" conduit to Sump Pump area in drywell from each pump control enclosure for both sump pump motor circuit conductors (100' wire).

6.4.2.4.1. Terminate conduit with two (2) junction boxes, one for each sump pump, and route sump pump wires to junction box.

6.4.2.4.2. Pull motor circuit wires and connect pumps and connect to sump pump wires.

6.4.2.5. Install new ¾" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the two (2) sump pump enclosures (30'):

6.4.2.5.1. Control Power

6.4.2.5.1.1. 24 VDC from PLC enclosure power supply

6.4.2.5.1.2. 24 VDC Common from PLC enclosure power supply

6.4.2.5.2. Pump Controls

6.4.2.5.2.1. Auto switch

6.4.2.5.2.2. Hand switch

6.4.2.5.2.3. Running status

6.4.2.5.2.4. Fault status

6.4.2.5.2.5. Run Command (pump start command from PLC)

6.4.2.5.2.5.1. Field install run command relay in enclosure

6.4.2.6. Install new 1" conduit between sump pit and new PLC enclosure and pull the following float wires to new PLC enclosure (50'):

6.4.2.6.1. Control Power

6.4.2.6.1.1. 24 VDC from PLC enclosure power supply

6.4.2.6.1.2. 5 VDC dialer voltage

6.4.2.6.2. Controls

6.4.2.6.2.1. Low level float (N.O.)

6.4.2.6.2.2. Stop float (N.O.)

6.4.2.6.2.3. Start float (N.O.)

6.4.2.6.2.4. Lag Start float (N.O.)

6.4.2.6.2.5. High level float (N.C.)

6.4.2.6.2.6. High drywell float (N.C. to auto dialer)

6.4.2.7. Demo existing floats and conduit in sump pit.

6.4.2.8. Use existing float hanger bar

6.4.2.9. Purchase and install six (6) new weighted floats, two (2) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

6.4.2.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

6.4.3. **Flow Meter**

6.4.3.1. Relocate flow meter and mount to wall near Bubbler enclosure and reroute transducer cable from enclosure direct to flow meter (10').

6.4.3.2. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (20'):

6.4.3.2.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.
6.4.3.2.2. One (1) STP wire for MODBUS Communication

6.4.4. **Grinder**

6.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.
6.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.

6.4.4.2. Install new ¾" conduit to between new PLC enclosure and grinder panel and wire 24 VDC controls for the following (60'):
6.4.4.2.1. 24 VDC from PLC enclosure power supply
6.4.4.2.2. Auto switch
6.4.4.2.3. Hand switch
6.4.4.2.4. Running status
6.4.4.2.5. Fault status

6.4.5. **Pump Drives 1, 2, 3 and 4**

6.4.5.1. Use four (4) existing 1" conduits in the concrete pour to each of the four (4) pump drive enclosures and pull new wires for the following for each pump drive:
6.4.5.1.1. Control Power
6.4.5.1.1.1. 24 VDC from PLC enclosure power supply
6.4.5.1.1.2. 24 VDC Common from PLC enclosure power supply
6.4.5.1.2. Pump Controls
6.4.5.1.2.1. Auto switch
6.4.5.1.2.2. Hand switch
6.4.5.1.2.3. Running status
6.4.5.1.2.4. Fault status
6.4.5.1.2.5. Run Command (pump start command from PLC)
6.4.5.1.2.5.1. Field install run command relay in enclosure
6.4.5.1.2.6. Ethernet Wire
6.4.5.1.2.7. STP speed command

6.4.6. **Pumps 1, 2, 3 and 4**

6.4.6.1. Use four (4) existing 1-1/4" conduits from new PLC enclosure that serve the four (4) pumps in the dry well for a vibration switch for each of the four (4) pumps.

6.4.6.2. Extend four (4) new ¾" conduits from the ends of each of the 1-1/4" conduits to each of the four (4) pumps for new vibration switch (20' each)

6.4.6.3. Purchase and install four (4) new Vibration Switch's on the pumps.

6.4.6.4. Install two conductors for each pump vibration switch back to the new PLC enclosure (80' wire each pump).

6.4.7. **Wet Well**

6.4.7.1. Purchase and install one (1) weighted N.C. float.

6.4.7.2. Install new ¾" conduit, Class I Division I, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (100').

6.4.7.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Float connect to ISBR in new PLC enclosure.

6.4.8. **Drywell**

6.4.8.1. Use ¾" conduit from 6.4.8.1 above and wire to pressure differential switch for dry well exhaust/supply fan from new PLC location to wall in pump room near front door (10').

6.4.8.1.1. Purchase and install new air flow switch on wall in pump room.
6.4.8.1.2. Purchase and install tubing from pressure differential switch and route through into dry well ventilation duct (10').
6.4.8.1.3. Seal all wall and duct penetrations air tight.
6.4.8.2. Reuse existing STP from new PLC enclosure to pressure transmitter and connect to new PLC.

6.4.9. **Scrubber Equipment**

6.4.9.1. Use existing contactor (EF-1) for scrubber blower fan motor (480 VAC feed). Use existing 4" conduit from 6.4.1.1.4 above for control wires.
6.4.9.1.1. Purchase and install a new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status.
6.4.9.2. Purchase and install one (1) new 5 HP 480 VAC three phase contactor enclosure with disconnect and HOA switch for the scrubber recirculation motor. Install near the existing 480 VAC main panel in motor room.
6.4.9.3. Purchase and install one (1) new 1 HP 120 VAC single phase contactor enclosure with disconnect and HOA switch for the chemical pump motor. Install near the existing 480 VAC main panel in motor room.
6.4.9.3.1. Install new ¾" conduit and wire between main 480 VAC panel and recirculation contactor and connect to existing 20-amp breaker 09-11-13 (10')
6.4.9.3.2. Install new ¾" conduit between main 120 VAC panel and chemical pump contactor.
6.4.9.3.2.1. Remove and return to CMCMUA the existing double pole 30-amp breaker 13-15 and install two (2) new 20-amp single pole breakers (one for a spare).
6.4.9.3.2.2. Connect chemical pump feed to breaker #13 for power to chemical pump.
6.4.9.3.3. Install new ¾" conduit from recirculation contactor to indoor scrubber pad recirculation pump (80').
6.4.9.3.4. Install new ¾" conduit from chemical feed contactor to outdoor chemical tank area and install a new weatherproof receptacle for future chemical feed pump.
6.4.9.4. Use existing 4" conduit from 6.4.1.1.4 above between blower contactor, recirculation contactor, and chemical pump contactor to new PLC enclosure and pull and terminate the following wires (20'):
6.4.9.4.1. Control Power
6.4.9.4.1.1. 24 VDC from PLC enclosure power supply
6.4.9.4.1.2. 24 VDC Common from PLC enclosure power supply
6.4.9.4.2. Controls (EF-1 wet well existing contactor)
6.4.9.4.2.1. Auto switch
6.4.9.4.2.2. Hand switch
6.4.9.4.2.3. Running status
6.4.9.4.2.4. Fault status
6.4.9.4.2.5. Relocate Run Command relay to contactor enclosure
6.4.9.4.2.6. Run Command (start command from PLC)
6.4.9.5. Scrubber Safety Shower
6.4.9.5.1. Install new ¾" conduit from new PLC enclosure to indoor scrubber area for the following wires (100' total):
6.4.9.5.2. Control Power
6.4.9.5.2.1. 24 VDC from PLC enclosure power supply x2 (one feed for each device below)
6.4.9.5.3. Status Wires

6.4.9.5.3.1. Safety shower flow switch
6.4.9.5.3.2. Low level float
6.4.9.5.4. Install conductors for safety shower switch and leave in a junction box on the wall next to the shower.
6.4.9.5.5. Tee off safety shower conduit and install the following wire for the low-level float for the indoor scrubber sump.
6.4.9.5.5.1. Purchase and provide a NC float to the CMCMUA for installation and leave wires in j-box for connection to float at the wet scrubber

6.4.10. **Generator Room**
6.4.10.1. Install new ¾" conduit to existing day tank controller and pull the following wires (50'):
6.4.10.1.1. Control Power
6.4.10.1.1.1. 24 VDC from PLC enclosure power supply
6.4.10.1.2. Status and Control Wires
6.4.10.1.2.1. Day Tank Auto switch
6.4.10.1.2.2. Day Tank Manual switch
6.4.10.1.2.3. Day Tank overflow alarm status
6.4.10.1.2.4. Day Tank Fault status
6.4.10.2. Install new ¾" conduit to existing louver and pull and terminate the following wires (60'):
6.4.10.2.1. Control Power
6.4.10.2.1.1. 24 VDC from PLC enclosure power supply
6.4.10.2.1.2. 24 VDC Common from PLC enclosure power supply
6.4.10.2.2. Status and Control Wires
6.4.10.2.2.1. Louver status
6.4.10.3. Extend day tank controller ¾" conduit to the battery charger and pull the following wires (20'):
6.4.10.3.1. Control Power
6.4.10.3.1.1. 24 VDC from PLC enclosure power supply
6.4.10.3.2. Status and Control Wires
6.4.10.3.2.1. Battery Charger Fault Status
6.4.10.4. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (60'):
6.4.10.4.1. Install a CAT 5 cable between generator and new PLC enclosure.

6.4.11. **Diesel Tank and Chemical Tank Outside**
6.4.11.1. Install new 1" conduit from the new PLC enclosure to the area near diesel tank outside and tee off with ¾" conduits to install the following (110' of 1" conduit):
6.4.11.1.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (+10' of ¾").
6.4.11.1.2. Purchase and install new Class 1 Division 2 ultra-sonic level transmitter on outdoor diesel tank – one (1) STP – loop powered (2 wire) (+30' of ¾").
6.4.11.1.2.1. Purchase and install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.
6.4.11.1.2.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.
6.4.11.1.3. Purchase and install a new ultra-sonic level transmitter on the chemical tank – one (1) STP – (+30').

6.4.11.1.3.1. Purchase and install a flanged bulkhead fitting of with threaded 2" NPT on the chemical tank for the ultra-sonic level transmitter.

6.4.11.1.3.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

6.4.11.1.4. Conduit to the safety shower for the following wires – two (2) conductors (30' of ¾").

6.4.11.1.4.1. Install conductors for safety shower switch and leave in a junction box next to the shower.

6.4.11.1.5. Install conduit and junction box next to chemical pump receptacle for STP for chemical pump speed – one (1) STP (30' of ¾").

6.4.12. **Transfer Switch**

6.4.12.1. Use existing 4" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (20' ¾" conduit and 120' wire).

6.4.13. **Ventilation and Heating**

6.4.13.1. Use existing 4" conduit from new PLC enclosure to the existing SF-3 Wet Well Supply Fan and install the following wires (100' of wire):

6.4.13.1.1. Control Power

6.4.13.1.1.1. 24 VDC from PLC enclosure power supply

6.4.13.1.1.2. 24 VDC Common from PLC enclosure power supply

6.4.13.1.2. Status and Command Wires

6.4.13.1.2.1. Auto switch

6.4.13.1.2.2. Hand Switch

6.4.13.1.2.3. Running status

6.4.13.1.2.4. Overload status

6.4.13.1.2.5. Relocate the Run Command relay

6.4.13.1.2.6. Run Command (start command from PLC)

6.4.13.2. Use existing 4" conduit from new PLC enclosure to the existing EF-4 Dry Well Exhaust Fan and install the following wires (100' of wire):

6.4.13.2.1. Control Power

6.4.13.2.1.1. 24 VDC from PLC enclosure power supply

6.4.13.2.1.2. 24 VDC Common from PLC enclosure power supply

6.4.13.2.2. Status and Command Wires

6.4.13.2.2.1. Auto switch

6.4.13.2.2.2. Hand Switch

6.4.13.2.2.3. Running status

6.4.13.2.2.4. Overload status

6.4.13.2.2.5. Relocate the Run Command relay

6.4.13.2.2.6. Run Command (start command from PLC)

6.4.13.3. For two (2) fans, EF-4 Dry Well Exhaust Fan and SF-3 Wet Well Supply Fan Purchase and install the following:

6.4.13.3.1. Install new ¾" conduit from new PLC enclosure to pressure switches (60').

6.4.13.3.2. Install wiring for the pressure switches:

6.4.13.3.3. Control Power

6.4.13.3.3.1. 24 VDC from PLC enclosure power supply

6.4.13.3.4. Controls

6.4.13.3.4.1. Drywell pressure switch

6.4.13.3.4.2. Wetwell pressure switch

6.4.13.3.5. Purchase and install two (2) new pressure differential switches. Mount on wall in pump room next to dry well duct work to monitor fan duct pressure/vacuum.

6.4.13.3.6. Purchase and install tubing from pressure differential switch and route as needed to associated fan ventilation duct (20' of hose for each fan).

6.4.13.3.7. Seal all wall and duct penetrations air tight.

6.4.13.3.8. Wire pressure switches back to new PLC Enclosure.

6.4.13.4. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

6.4.13.4.1. Temperature Probe provided by CMCMUA.

6.4.13.5. Install ¾" conduit to interconnect three (3) existing gas heaters to new PLC enclosure for low voltage control of heaters (150').

6.4.13.5.1. Install run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit.

6.4.13.6. Keep existing 120 VAC emergency disconnect switches and remove existing thermostat and blank 4" square box on both heaters.

6.4.14. **Fire/Security/Lights**

6.4.14.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (100'):

6.4.14.1.1. Purchase and install three (3) door switches

6.4.14.1.2. Install one (1) of the switches on the outside of the wet well door.

6.4.14.1.3. Install one (1) of the switches on the inside of the front door to the motor room.

6.4.14.1.4. Install one (1) of the switches on the inside of the front door to the motor room.

6.4.14.2. Tee off door sensor conduit and terminate conduit next to existing phone by the front door for security switch and future fire alarm panel (10')

6.4.14.3. Purchase and install, near front door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (2 wires).

6.4.14.4. Tee off door sensor conduit near bathroom door and install box with three (3) wires for future fire panel and leave in junction box.

6.4.14.4.1. 24 VDC from PLC enclosure power supply

6.4.14.4.2. Fire Alarm

6.4.14.4.3. System Trouble

6.4.15. **Auto Dialer**

6.4.15.1. Purchase and install new Auto Dialer next to existing phone jack.

6.4.15.2. Extend the phone line to the dialer.

6.4.15.3. Use door sensor conduit and run new phone line from phone service box outside front door to the Auto Dialer (20' conduit 70' of wire).

6.4.15.4. Connect wires to the Auto Dialer from PLC Enclosure for the following:

6.4.15.4.1. Dialer common 5VDC

6.4.15.4.2. Wet Well High-Level Float through I.S. Barrier

6.4.15.4.3. Dry Well High-Level Float

6.4.15.4.4. PLC Communication Fault through PLC CR relay

6.4.15.5. Install a new ¾" conduit from the 120 VAC panel and install a duplex receptacle next to the dialer (50')

6.4.15.6. Use existing spare single pole breaker in the panel.

6.4.15.7. Purchase and install 120 VAC cord whip on dialer and plug into receptacle (6').

6.5. **Demo Existing PLC enclosures**

6.5.1. Safe off the wires, lift from existing enclosure and pull back.

6.5.2. Demo and dispose of two (2) enclosures

6.5.2.1. Steel single door enclosure

6.5.2.2. Stainless steel double door enclosure

6.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

6.6. **Install New PLC Enclosure**

6.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 6.xx above

6.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

6.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

6.6.4. Extend conduits and wires to new enclosure as needed.

6.6.5. Terminate existing wiring per drawings

6.6.6. Terminate new wires per drawings

6.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

6.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

6.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

6.6.9.1. Wet Well High-Level Float

6.6.9.2. Wet well hatch switch if applicable

6.7. **Testing and Commissioning System**

6.7.1. Assist Avanceon and CMCMUA with testing and commissioning

6.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

6.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

6.8. **Remove Temporary PLC enclosure**

6.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

7. **ROSEMARY ROAD PUMP STATION**

7.1. **Reference Drawings**

7.1.1. RosemaryRoadPumpStationElectrical.PDF

7.2. **Station Description**

7.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 30' x 35' x 15' ceiling height.

7.2.2. Poured concrete walls underground with single landing 9' below grade, a second landing 16' below grade, and bottom level 27' below grade where dry well pumps are located.

7.2.3. Wet Well Class I Division I confined space below grade with dimensions of 15' x 54' x 24' depth. Separated from dry side with poured concrete wall.

7.2.4. Conduit concrete cutout access to lower levels is available under existing bubbler enclosure and existing PLC enclosure.

7.2.5. Flat roof above ground floor made of prestressed concrete slabs. Indoor ladder access from motor room area to roof. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

7.3. **Preliminary work before taking site off line:**

7.3.1. General

7.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

7.3.2. Temporary PLC Setup:

7.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

7.3.2.2. Mount Temporary PLC

7.3.2.3. Install temporary power to PLC

7.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

7.3.2.5. PLC code will be provided by CMCMUA

7.3.2.6. HMI code will be provided by CMCMUA

7.3.2.7. Wire items listed in section 7.3.3 below to temporary PLC.

7.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

7.3.3. Wire to Temporary PLC and Auto Dialer:

7.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

7.3.3.2. Install Bubbler system provided by CMCMUA.

7.3.3.3. Install temporary wire to temporary PLC for Well Level control

7.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:

7.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

7.3.3.4.2. Pumps 1 and 2 Running Status

7.3.3.4.3. Pumps 1 and 2 Fault Status

7.3.3.4.4. Pumps 1 and 2 Run commands

7.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

7.3.3.5. Purchase and install Auto Dialer.

7.3.3.5.1. Extend existing phone line to Auto Dialer

7.3.3.6. Install temporary wire to Auto Dialer for the following:

7.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

7.3.3.6.2. Phone line

7.3.4. Items not needed on temporary PLC:

7.3.4.1. Flow Meter

7.3.4.2. Grinder HOA and Running Status

7.3.4.3. Grinder Failure Status

7.3.4.4. Conveyance Pumps 3 and 4
7.3.4.5. Motorized Valves 1 & 2
7.3.4.6. Drywell Sumps 1 & 2
7.3.4.7. Compressor 1 & 2 Pressures
7.3.4.8. Bubbler Purge and Isolation Valves
7.3.4.9. Exhaust and Supply Fans
7.3.4.10. Generator Day Tank
7.3.4.11. Generator
7.3.4.12. Transfer Switch
7.3.4.13. Diesel Tank Level
7.3.4.14. Temperature Control
7.3.4.15. Door Switches
7.3.4.16. Scrubber system

7.4. **Individual Systems**

7.4.1. **Bubbler Control Enclosure**

7.4.1.1. Demo existing stainless steel 20" x 20"' x 12" bubbler enclosure.
7.4.1.1.1. Safe off existing electrical conductors
7.4.1.1.2. Reuse two (2) air compressors for new bubbler installation
7.4.1.1.3. Demo adjacent steel 4' x 8' x 1.5' enclosure that houses flow meter.
7.4.1.1.4. Utilize the existing overhead 4" conduit above the adjacent steel enclosure and install wire trough on wall above new bubbler enclosure for power feeds to bubbler air compressor and sump pump enclosures.
7.4.1.1.5. From wireway install new ¾" conduit for circuits from Panel P (120VAC) (40').
7.4.1.1.5.1. Purchase and install two (2) 120VAC circuits for two (2) existing compressors.
7.4.1.1.5.2. Use existing spare breakers #36 and #38 for the two (2) 120 VAC circuits.
7.4.1.1.5.3. Install two (2) 120VAC receptacles for the two (2) compressors.
7.4.1.1.6. Install wire trough on wall and existing 4" conduit above new bubbler enclosure for power feeds to bubbler air compressor and sump pump enclosures.

7.4.1.2. Install Bubbler Control Enclosure provided by CMCMUA in place of demoed stainless steel 20" x 24"' x 12" bubbler enclosure. Leave room for sump pump controllers and flow meter display.
7.4.1.2.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D
7.4.1.2.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):
7.4.1.2.2.1. 1 STP for Compressor 1 Pressure transmitter
7.4.1.2.2.2. 1 STP for Compressor 2 Pressure transmitter
7.4.1.2.2.3. 1 STP Wet Well Level transmitter
7.4.1.2.2.4. 24DVC signal and common for isolation control solenoid valve
7.4.1.2.2.5. 24DVC signal and common for purge control solenoid valve
7.4.1.2.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe
7.4.1.2.3.1. Core new ¾" hole through floor (12" concrete)
7.4.1.2.3.2. CMCMUA will provide the flexible tubing: 25 Feet

7.4.1.2.4. Mount air compressors on floor beneath new bubbler enclosure

7.4.2. **Sump Pumps in Dry Well**

7.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA switch.

7.4.2.2. Install new pump control enclosures on wall next to the bubbler enclosure.

7.4.2.3. Use existing 4" conduit from 7.4.1.1.4 above to 120 VAC Panel P and pull two (2) new single phase 120 VAC circuits. Install new ¾" conduit from wire trough to new Sump Control Enclosures. (30' ¾" conduit and 110' wire).

7.4.2.3.1. Remove existing spare two pole 30-amp breaker and install two (2) new Eaton 20-amp single pole breakers in #2 and #4.

7.4.2.4. Core a new 1" hole below sump pump enclosures and run a 1" conduit and intercept existing 1" conduit tee at second landing to Sump Pump area in drywell from each pump control enclosure for both sump pump motor circuit conductors (30' conduit and 100' wire).

7.4.2.4.1. Terminate conduit with two (2) junction boxes, one for each sump pump, and route sump pump wires to junction box.

7.4.2.4.2. Pull motor circuit wires and connect pumps and connect to sump pump wires.

7.4.2.5. Install new ¾" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the two (2) sump pump enclosures (20'):

7.4.2.5.1. Control Power

7.4.2.5.1.1. 24 VDC from PLC enclosure power supply

7.4.2.5.1.2. 24 VDC Common from PLC enclosure power supply

7.4.2.5.2. Pump Controls

7.4.2.5.2.1. Auto switch

7.4.2.5.2.2. Hand switch

7.4.2.5.2.3. Running status

7.4.2.5.2.4. Fault status

7.4.2.5.2.5. Run Command (pump start command from PLC)

7.4.2.5.2.5.1. Field install run command relay in enclosure

7.4.2.6. Install new 1" conduit between sump pit and new PLC enclosure and pull the following float wires to new PLC enclosure (50'):

7.4.2.6.1. Control Power

7.4.2.6.1.1. 24 VDC from PLC enclosure power supply

7.4.2.6.1.2. 5 VDC dialer voltage

7.4.2.6.2. Controls

7.4.2.6.2.1. Low level float (N.O.)

7.4.2.6.2.2. Stop float (N.O.)

7.4.2.6.2.3. Start float (N.O.)

7.4.2.6.2.4. Lag Start float (N.O.)

7.4.2.6.2.5. High level float (N.C.)

7.4.2.6.2.6. High drywell float (N.C. to auto dialer)

7.4.2.7. Demo existing floats and conduit in sump pit.

7.4.2.8. Use existing float hanger bar

7.4.2.9. Purchase and install six (6) new weighted floats, two (2) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

7.4.2.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

7.4.2.11. Demo existing sump pump enclosure above sink and safe off existing 120 VAC circuit.

7.4.3. **Flow Meter**

7.4.3.1. Relocate flow meter and mount to wall near Bubbler enclosure and reroute transducer cable from enclosure direct to flow meter (10').

7.4.3.2. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (20'):

7.4.3.2.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.

7.4.3.2.2. One (1) STP wire for MODBUS Communication

7.4.4. **Grinder**

7.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.

7.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.

7.4.4.2. Install new ¾" conduit to between new PLC enclosure and grinder panel and wire 24 VDC controls for the following (30'):

7.4.4.2.1. 24 VDC from PLC enclosure power supply

7.4.4.2.2. Auto switch

7.4.4.2.3. Hand switch

7.4.4.2.4. Running status

7.4.4.2.5. Fault status

7.4.5. **Pump Drives 1, 2, and 3**

7.4.5.1. Use three (3) existing 1" overhead conduits to each of the three (3) pump drive enclosures and pull new wires for the following for each pump drive:

7.4.5.1.1. Control Power

7.4.5.1.1.1. 24 VDC from PLC enclosure power supply

7.4.5.1.1.2. 24 VDC Common from PLC enclosure power supply

7.4.5.1.2. Pump Controls

7.4.5.1.2.1. Auto switch

7.4.5.1.2.2. Hand switch

7.4.5.1.2.3. Running status

7.4.5.1.2.4. Fault status

7.4.5.1.2.5. Run Command (pump start command from PLC)

7.4.5.1.2.5.1. Field install run command relay in enclosure

7.4.5.1.2.6. Ethernet Wire

7.4.5.1.2.7. STP speed command

7.4.6. **Pumps 1, 2, and 3**

7.4.6.1. Use three (3) existing 1-1/4" conduits from new PLC enclosure that serve the three (3) pumps in the dry well for a vibration switch for each of the three (3) pumps.

7.4.6.2. Extend three (3) new ¾" conduits from the ends of each of the 1-1/4" conduits to each of the three (3) pumps for new vibration switch (20' each)

7.4.6.3. Purchase and install three (3) new Vibration Switch's on the pumps.

7.4.6.4. Install two conductors for each pump vibration switch back to the new PLC enclosure (80' wire each pump).

7.4.7. **Wet Well**

7.4.7.1. Purchase and install one (1) weighted N.C. float.

7.4.7.2. Install new ¾" conduit, Class I Division I, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (100').

7.4.7.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Float and connect to ISBR in the new PLC enclosure.

7.4.8. **Drywell**

7.4.8.1. Install new ¾" conduit to duct near generator room door and wire to pressure differential switch for dry well exhaust/supply fan from new PLC location to wall in pump room near front door (30').

7.4.8.1.1. Purchase and install new air flow switch on wall or duct in pump room.

7.4.8.1.2. Purchase and install tubing from pressure differential switch and route through into dry well ventilation duct (10').

7.4.8.1.3. Seal all wall and duct penetrations air tight.

7.4.8.2. Install new ¾" conduit from new PLC enclosure to pressure transmitter on second landing and connect to new PLC (30').

7.4.8.2.1. Route existing STP through conduit and connect to PLC.

7.4.9. **Scrubber Equipment**

7.4.9.1. Demo existing 3' x 5' x 14" fiberglass enclosure from outside wall in scrubber area along with all conduit feeding existing motors (50' ¾" conduit).

7.4.9.1.1. Demo back feed conductors from 1 x ½" conduit fed from the 480 VAC panel.

7.4.9.2. From existing 7.5 HP 480 VAC three phase contactor enclosure with controls for the scrubber blower motor in the generator room (wet well exhaust fan EF-1) install new 1" conduit to scrubber fan motor outside in scrubber fan shed (60').

7.4.9.2.1. Purchase and install a new HOA switch with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status.

7.4.9.3. Purchase and install a new 5 HP 480 VAC three phase contactor enclosure with disconnect and HOA switch for the scrubber recirculation motor. Install near the existing 480 VAC main breaker in generator room.

7.4.9.4. Purchase and install a new 1 HP 120 VAC single phase contactor enclosure with disconnect and HOA switch for the chemical pump motor. Install near the existing 480 VAC main breaker in generator room.

7.4.9.4.1. Install new ¾" conduit and wire between main 480 VAC panel and recirculation contactor and connect to existing 20-amp breaker 20-22-24 (20')

7.4.9.4.2. Install new ¾" conduit between main 120 VAC panel and chemical pump contactor (20').

7.4.9.4.2.1. Remove and return to CMCMUA the existing double pole 30-amp breaker 6-8 and install two (2) new 20-amp single pole breakers.

7.4.9.4.2.2. Connect chemical pump feed to breaker #6 for power to chemical pump.

7.4.9.4.3. Install new ¾" conduit from recirculation contactor to scrubber pad recirculation pump (50').

7.4.9.4.4. Install new ¾" conduit between chemical pump contactor to a weatherproof 20-amp receptacle mounted next to chemical tank on scrubber pad (60').

7.4.9.5. Use existing 4" conduit from 7.4.1.1.4 above between blower contactor recirculation contactor, and chemical pump contactor to new PLC enclosure and pull and terminate the following wires (20'):

7.4.9.5.1. Control Power

7.4.9.5.1.1. 24 VDC from PLC enclosure power supply

7.4.9.5.1.2. 24 VDC Common from PLC enclosure power supply
7.4.9.5.2. Controls
7.4.9.5.2.1. Auto switch
7.4.9.5.2.2. Hand switch
7.4.9.5.2.3. Running status
7.4.9.5.2.4. Fault status
7.4.9.5.2.5. Relocate the Run Command relay
7.4.9.5.2.6. Run Command (start command from PLC)
7.4.9.6. Install new 1" conduit from new PLC enclosure to scrubber area and tee off with ¾" conduit for the following wires (90' total):
7.4.9.7. Control Power
7.4.9.7.1. 24 VDC from PLC enclosure power supply x2
7.4.9.8. Controls
7.4.9.8.1. Low sump float
7.4.9.8.2. Shower flow switch
7.4.9.8.3. STP for chemical tank level – loop powered (3 wire)
7.4.9.8.4. STP for chemical pump speed (2 wire)
7.4.9.9. Install conductors for safety shower switch and leave in a junction box at the base of the shower.
7.4.9.10. Tee off conduit for STP for chemical tank ultra-sonic – loop powered (3 wire) (+30' ¾").
7.4.9.11. Purchase and install a new ultra-sonic level transmitter on the chemical tank.
7.4.9.11.1. Purchase and install a flanged bulkhead fitting of with threaded 2" NPT on the chemical tank for the ultra-sonic level transmitter.
7.4.9.11.2. Program Level Transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.
7.4.9.12. Tee off with ¾" conduit for the scrubber sump low level float (+30' ¾")
7.4.9.12.1. Purchase and provide a NC float to the CMCMUA for installation and leave wires in j-box for connection to float at the wet scrubber sump.
7.4.9.13. Tee off conduit and install a junction box next to chemical pump receptacle for STP for chemical pump speed – one (1) STP – loop powered (2 wire) (30' of ¾").

7.4.10. **Generator Room**

7.4.10.1. Install new ¾" conduit to existing day tank controller and pull the following wires (60'):
7.4.10.1.1. Control Power
7.4.10.1.1.1. 24 VDC from PLC enclosure power supply
7.4.10.1.2. Status Wires
7.4.10.1.2.1. Day Tank Auto switch
7.4.10.1.2.2. Day Tank Manual switch
7.4.10.1.2.3. Day Tank overflow alarm status
7.4.10.1.2.4. Day Tank Fault status
7.4.10.2. Extend day tank controller ¾" conduit to existing louver and pull and terminate the following wires (50'):
7.4.10.2.1. Control Power
7.4.10.2.1.1. 24 VDC from PLC enclosure power supply
7.4.10.2.1.2. 24 VDC Common from PLC enclosure power supply
7.4.10.2.2. Status Wires
7.4.10.2.2.1. Louver status

7.4.10.3. Extend day tank controller ¾" conduit to the battery charger and pull the following wires (20'):
7.4.10.3.1. Control Power
7.4.10.3.1.1. 24 VDC from PLC enclosure power supply
7.4.10.3.2. Status Wires
7.4.10.3.2.1. Battery Charger Fault Status
7.4.10.4. From new PLC enclosure install new ¾" conduit to the generator control box on the generator (20', 50' of wire).
7.4.10.4.1. Install new CAT 5 cable from PLC to generator and leave in control box of generator.
7.4.10.5. Use existing 4" conduit to ATS
7.4.10.5.1. Install new CAT 5 cable from PLC to ATS and leave in ATS (40').

7.4.11. **Diesel tank**
7.4.11.1. Demo existing two (2) ¾" PVC conduits to diesel tank.
7.4.11.2. Use wall penetrations for new conduit(s.)
7.4.11.3. Install new ¾" conduit from the new PLC enclosure to the diesel tank outside and install the following (80')
7.4.11.3.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (10' of ¾").
7.4.11.3.2. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank – one (1) STP – loop powered (2 wire) (30' of ¾").
7.4.11.3.3. Purchase and install threaded reducer for existing 4" tank opening to accommodate new Level Transmitter mounting configuration.
7.4.11.4. Program Level Transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

7.4.12. **Transfer Switch**
7.4.12.1. Use existing 4" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (60' wire).

7.4.13. **Ventilation and Heating**
7.4.13.1. Purchase and install two (2) new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status for SF-2 and EF-2 below.
7.4.13.2. Use existing 4" conduit from new PLC enclosure to the existing Wet Well Supply Fan SF-2 and install the following wires (60' of wire):
7.4.13.2.1. Control Power
7.4.13.2.1.1. 24 VDC from PLC enclosure power supply
7.4.13.2.1.2. 24 VDC Common from PLC enclosure power supply
7.4.13.2.2. Status and Command Wires
7.4.13.2.2.1. Auto switch
7.4.13.2.2.2. Hand Switch
7.4.13.2.2.3. Running status
7.4.13.2.2.4. Overload status
7.4.13.2.2.5. Relocate the Run Command relay
7.4.13.2.2.6. Run Command (start command from PLC)
7.4.13.3. Use existing 4" conduit from new PLC enclosure to the existing EF-2 Dry Well Exhaust Fan and install the following wires (60' of wire):
7.4.13.3.1. Control Power
7.4.13.3.1.1. 24 VDC from PLC enclosure power supply
7.4.13.3.1.2. 24 VDC Common from PLC enclosure power supply

7.4.13.3.2. Status and Command Wires
7.4.13.3.2.1. Auto switch
7.4.13.3.2.2. Hand Switch
7.4.13.3.2.3. Running status
7.4.13.3.2.4. Overload status
7.4.13.3.2.5. Relocate the Run Command relay
7.4.13.3.2.6. Run Command (start command from PLC)

7.4.13.4. For two (2) fans, Wet Well Supply Fan SF-2 and EF-2 Dry Well Exhaust Fan install the following:
7.4.13.4.1. Purchase and install two (2) new pressure differential switches.
7.4.13.4.1.1. Attach one switch with hose to the Dry Well ductwork in the motor room.
7.4.13.4.1.2. Install new ¾" conduit from the new PLC enclosure to the switch (20').
7.4.13.4.1.3. Attach the second switch with to the wall above the new PLC enclosure and route the hose through the block wall to the ductwork in the wet well.
7.4.13.4.1.4. Install new ¾" flex from the new PLC enclosure to the switch (6').
7.4.13.4.2. Purchase and install tubing from pressure differential switch and route as needed to associated fan ventilation duct (20' of hose for each fan).
7.4.13.4.3. Seal all wall and duct penetrations air tight.
7.4.13.4.4. Wire pressure switches back to new PLC Enclosure – 2 conductors.

7.4.13.5. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.
7.4.13.5.1. Temperature Probe provided by CMCMUA.

7.4.13.6. Install ¾" conduit to interconnect existing gas heater to new PLC enclosure for low voltage control of heaters (50').
7.4.13.6.1. Purchase and install run command relay into heater and bypass existing thermostat to allow the run command relay to control the heater control circuit.

7.4.13.7. Keep existing 120 VAC emergency disconnect switches and remove existing thermostat and blank 4" square box on both heaters.

7.4.14. **Fire/Security/Lights**
7.4.14.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (40'):
7.4.14.1.1. Purchase and install three (3) door switches
7.4.14.1.2. Install one (1) of the switches on the outside of the wet well door.
7.4.14.1.3. Install one (1) of the switches on the inside of the front door to the motor room.
7.4.14.1.4. Install one (1) of the switches on the inside of the front door to the motor room.

7.4.14.2. Tee off door sensor conduit and terminate conduit next to existing phone by the front door for security switch and future fire alarm panel (10')

7.4.14.3. Purchase and install, near front door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status (2 wires).

7.4.14.4. Relocate fire panel from inside existing PLC enclosure to wall next to front door.
7.4.14.4.1. Install new ¾" conduit for power and detector wires (50')

7.4.14.4.2. Install terminal blocks on din rail in new PLC enclosure and extend existing 120 VAC circuit and existing detector circuits.
7.4.14.4.3. Extend existing wires from new PLC enclosure to new location of fire panel.
7.4.14.4.4. Install three (3) wires from fire panel to new PLC enclosure for connection to new PLC.
7.4.14.4.4.1. 24 VDC from PLC enclosure power supply
7.4.14.4.4.2. Fire Alarm
7.4.14.4.4.3. System Trouble

7.4.15. **Auto Dialer**
7.4.15.1. Purchase and install new Auto Dialer next to existing phone.
7.4.15.2. Extend the phone line to the dialer.
7.4.15.3. Use door sensor conduit and run new phone line from phone service box outside front door to the Auto Dialer (20' conduit 60' of wire).
7.4.15.4. Connect wires to the Auto Dialer from PLC Enclosure for the following:
7.4.15.4.1. Dialer common 5VDC
7.4.15.4.2. Wet Well High-Level Float through I.S. Barrier
7.4.15.4.3. Dry Well High-Level Float
7.4.15.4.4. PLC Communication Fault through PLC CR relay
7.4.15.5. Purchase and install 120 VAC cord whip on dialer and plug into existing receptacle near phone (6').

7.5. **Demo Existing PLC enclosures**
7.5.1. Safe off the wires, lift from existing enclosure and pull back.
7.5.2. Demo and dispose of two (2) enclosures
7.5.2.1. Steel single door enclosure
7.5.2.2. Stainless steel double door enclosure
7.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

7.6. **Install New PLC Enclosure**
7.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 7.xx above
7.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
7.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
7.6.4. Extend conduits and wires to new enclosure as needed.
7.6.5. Terminate existing wiring per drawings
7.6.6. Terminate new wires per drawings
7.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
7.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply
7.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:
7.6.9.1. Wet Well High-Level Float
7.6.9.2. Wet well hatch switch if applicable

7.7. **Testing and Commissioning System**
7.7.1. Assist Avanceon and CMCMUA with testing and commissioning
7.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
7.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

7.8. **Remove Temporary PLC enclosure**

7.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

8. **SHAWCREST PUMP STATION**

8.1. **Reference Drawings**

8.1.1. ShawcrestPumpStationElectrical.PDF

8.2. **Station Description**

8.2.1. Block building with brick face overlaid with overall dimensions of 10' x 16' x 10' ceiling height.

8.2.2. Building has two rooms, one 4.5' x 10' x 10' ceiling and one 16' x 10' x 10' ceiling height separated by a block wall. Larger room is equipment room and smaller room is empty and will be used for PLC and bubbler equipment

8.2.3. Poured concrete walls underground with single basement 9' below grade with ladder access for flow meter and piping access – dry pit.

8.2.4. Septic Tank style wet well located outside 15' from side of building is a Class I Division I location.

8.2.5. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

8.3. **Preliminary work before taking site off line:**

8.3.1. General

8.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

8.3.2. Temporary PLC Setup:

8.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

8.3.2.2. Mount Temporary PLC

8.3.2.3. Install temporary power to PLC

8.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

8.3.2.5. PLC code will be provided by CMCMUA

8.3.2.6. HMI code will be provided by CMCMUA

8.3.2.7. Wire items listed in 8.3.3 below to temporary PLC.

8.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

8.3.3. Wire to Temporary PLC and Auto Dialer:

8.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

8.3.3.2. Install Bubbler system provided by CMCMUA.

8.3.3.3. Install temporary wire to temporary PLC for Well Level control.

8.3.3.4. Install temporary wire to the pump enclosure and pick up the following points:

8.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

8.3.3.4.2. Pumps 1 and 2 Running Status

8.3.3.4.3. Pumps 1 and 2 Fault Status

8.3.3.4.4. Pumps 1 and 2 Run commands

8.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

8.3.3.5. Install temporary wire to Auto Dialer for the following:

8.3.3.5.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

8.3.3.5.2. Phone line

8.3.3.6. Items not needed on temporary PLC:

8.3.3.6.1. Flow Meter

8.3.3.6.2. Grinder HOA and Running Status

8.3.3.6.3. Grinder Failure Status

8.3.3.6.4. Drywell Sumps 1 & 2

8.3.3.6.5. Compressor 1 & 2 Pressures

8.3.3.6.6. Bubbler Purge and Isolation Valves
8.3.3.6.7. Exhaust and Supply Fans
8.3.3.6.8. Generator Day Tank
8.3.3.6.9. Generator
8.3.3.6.10. Transfer Switch
8.3.3.6.11. Diesel Tank Level
8.3.3.6.12. Temperature Control
8.3.3.6.13. Door Switches

8.4. **Individual Systems**

8.4.1. **Bubbler Control Enclosure**

8.4.1.1. Install new ¾" conduit from Panel A MCC to small room for two (2) 120 VAC 20-amp receptacle circuits for two (2) air compressors (20'). Existing circuit breakers 15 and 14. Wall mount non-metallic enclosure 30" H x 20" W x 10" D

8.4.1.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (10'):

8.4.1.2.1. 1 STP for Compressor 1 Pressure transmitter
8.4.1.2.2. 1 STP for Compressor 2 Pressure transmitter
8.4.1.2.3. 1 STP Wet Well Level transmitter
8.4.1.2.4. 24DVC signal and common for isolation control solenoid valve
8.4.1.2.5. 24DVC signal and common for purge control solenoid valve

8.4.1.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe.

8.4.1.3.1. CMCMUA will provide the flexible tubing: 25 Feet

8.4.1.4. Install new receptacles for two (2) 120 VAC 20-amp circuits for the air compressors within 5 feet of the bubbler enclosure.

8.4.1.5. Mount air compressors on floor beneath new bubbler enclosure

8.4.2. **Sump Pumps in Dry Well**

8.4.2.1. Purchase and install two (2) new 120 VAC 1 HP single phase Sump Control Enclosures with disconnect and HOA switch.

8.4.2.2. Install two (2) new 120 VAC sump pump control enclosure on south wall above hatch to basement.

8.4.2.3. Install ¾" conduit from 120 VAC panel for new pull one (1) single phase 120 VAC circuit. Use existing circuit breaker 11 for two sump pumps (20').

8.4.2.4. Install ¾" conduit to sump pump area from the pump control enclosures for motor circuit conductors (50').

8.4.2.5. Terminate each conduit with a junction box and route sump pump wire to box and connect.

8.4.2.6. Pull motor circuit wires and connect pumps.

8.4.2.7. Install new ¾" conduit between sump control enclosure to new PLC enclosure and pull and terminate the following wires (50'):

8.4.2.7.1. Control Power

8.4.2.7.1.1. 24 VDC from PLC enclosure power supply
8.4.2.7.1.2. 24 VDC Common from PLC enclosure power supply

8.4.2.7.2. Pump Controls

8.4.2.7.2.1. Auto switch
8.4.2.7.2.2. Hand switch
8.4.2.7.2.3. Running status
8.4.2.7.2.4. Fault status
8.4.2.7.2.5. Run Command (pump start command from PLC)

8.4.2.7.2.5.1. Field install run command relay in enclosure

8.4.2.8. Demo existing floats in sump pit

8.4.2.9. Purchase and install one new multi-point float assembly per station specification.

8.4.2.10. Install new 1" conduit between sump pit and new PLC enclosure and pull the following wire to new PLC enclosure (70' plus a 12" concrete core).

8.4.2.10.1. Control Power

8.4.2.10.1.1. 24 VDC from PLC enclosure power supply

8.4.2.10.1.2. 5 VDC dialer voltage

8.4.2.10.2. Controls

8.4.2.10.2.1. Low level float (N.O.)

8.4.2.10.2.2. Stop float (N.O.)

8.4.2.10.2.3. Start float (N.O.)

8.4.2.10.2.4. Lag Start float (N.O.)

8.4.2.10.2.5. High level float (N.C.)

8.4.2.10.2.6. High drywell float (N.C. to auto dialer)

8.4.2.11. Purchase and install one (1) N.C. weighted float near the floor of the drywell.

8.4.2.12. Purchase and install one (1) N.C. weighted float near the floor of the drywell.

8.4.3. **Flow Meter**

8.4.3.1. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (50'):

8.4.3.1.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.

8.4.3.1.2. One (1) STP wire for MODBUS Communication

8.4.4. **Pump Drives 1 and 2**

8.4.4.1. Install new 1' conduit from new PLC enclosure to the existing pump control panel.

8.4.4.2. Install new wires for each pump controller from the new PLC enclosure for the following:

8.4.4.2.1. Control Power

8.4.4.2.1.1. 24 VDC from PLC enclosure power supply

8.4.4.2.1.2. 24 VDC Common from PLC enclosure power supply

8.4.4.2.2. Pump Controls

8.4.4.2.2.1. Auto switch

8.4.4.2.2.2. Hand switch

8.4.4.2.2.3. Running status

8.4.4.2.2.4. Fault status

8.4.4.2.2.5. Run Command (pump start command from PLC)

8.4.4.2.2.5.1. Field install run command relay in enclosure

8.4.4.2.2.6. Ethernet Wire

8.4.5. **Wet Well**

8.4.5.1. Install new ¾" conduit from new PLC Enclosure to septic tank lid edge with weatherproof box for connection of intrinsic safe wiring for Wet Well High-Level Float and hatch switch from the new PLC enclosure (80').

8.4.5.2. Purchase and install one (1) weighted N.C. float.

8.4.5.3. Purchase and install door sensor switch

8.4.6. **Drywell**

8.4.6.1. Install ¾" conduit from new PLC enclosure to forcemain in the basement next to the flow meter for future pressure transmitter (40').

8.4.6.2. Pull new STP from new PLC enclosure to future Pressure transmitter – powered transmitter (3 wire).

8.4.7. **Scrubber Equipment**

8.4.7.1. None

8.4.8. **Generator Room**

8.4.8.1. Install new ¾" conduit to existing day tank controller and louver and pull and terminate the following wires (70'):

8.4.8.1.1. 24 VDC from PLC enclosure power supply

8.4.8.1.2. Day Tank Auto switch

8.4.8.1.3. Day Tank Manual switch

8.4.8.1.4. Day Tank overflow alarm status

8.4.8.1.5. Day Tank Fault status

8.4.8.1.6. Louver status - leave louver wires near louver motor in junction box

8.4.8.2. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (60'):

8.4.8.2.1. Install a CAT 5 cable between generator and new PLC enclosure.

8.4.9. **Diesel tank**

8.4.9.1. Install new ¾" conduit from the new PLC enclosure to the diesel tank outside and install the following (80')

8.4.9.1.1. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank – two (2) conductors (20' of ¾").

8.4.9.1.2. Purchase and install new Diesel Tank Level Transmitter on outdoor diesel tank – one (1) STP – loop powered (2 wire).

8.4.9.1.3. Purchase and install threaded reducer for existing 4" tank opening to accommodate new Level Transmitter mounting configuration.

8.4.9.2. Program Level Transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

8.4.10. **Transfer Switch**

8.4.10.1. Install new ¾" conduit from PLC Enclosure to transfer switch and install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (20').

8.4.11. **Ventilation and Heating**

8.4.11.1. Purchase and install 1 HP 120 VAC single phase contactor for dry well ventilation fan.

8.4.11.1.1. Demo existing timer and HOA switch.

8.4.11.1.2. Reuse existing 120 VAC circuit to power contactor.

8.4.11.1.3. Install new ¾" conduit to new contactor and install the following wires (50'):

8.4.11.1.4. Control Power

8.4.11.1.4.1. 24 VDC from PLC enclosure power supply

8.4.11.1.4.2. 24 VDC Common from PLC enclosure power supply

8.4.11.1.5. Pump Controls

8.4.11.1.5.1. Auto switch

8.4.11.1.5.2. Hand switch

8.4.11.1.5.3. Running status

8.4.11.1.5.4. Fault status

8.4.11.1.5.5. Run Command (pump start command from PLC)

8.4.11.1.5.5.1. Field install run command relay in enclosure

8.4.11.2. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

8.4.11.3. Temperature Probe provided by CMCMUA.

8.4.11.4. Install ¾" conduit to existing electric heater from new PLC enclosure for low voltage control of heater (30').

8.4.11.5. Purchase and install run command relay into the heater (heater control voltage 24 V at 0.34 amp) and bypass existing thermostat to allow the run command relay to control the heater control circuit.

8.4.12. **Fire/Security/Lights**

8.4.12.1. Use heater conduit and tee off for wiring from the new PLC enclosure for the following door sensors and security switch (20'):

8.4.12.1.1. Purchase and install two (2) door switches

8.4.12.1.2. Install one switch on the inside of the entry door of the generator room.

8.4.12.1.3. Install one switch on the inside of the entry door of the PLC room.

8.4.12.2. Install wiring from new PLC enclosure to area near existing phone for security switch and future fire alarm panel (40').

8.4.12.3. Purchase and install, near front door, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status.

8.4.12.4. Install three (3) wires for future fire panel and leave in junction box next to phone.

8.4.12.4.1. 24 VDC from PLC enclosure power supply

8.4.12.4.2. Fire Alarm

8.4.12.4.3. System Trouble

8.4.13. **Auto Dialer**

8.4.13.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.

8.4.13.2. Use heater conduit from new PLC enclosure for dialer wires (10' – 40' of wire).

8.4.13.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:

8.4.13.3.1. Dialer common 5VDC

8.4.13.3.2. Wet Well High-Level Float through I.S. Barrier

8.4.13.3.3. Dry Well High-Level Float

8.4.13.3.4. PLC Communication Fault through PLC CR relay

8.5. **Demo Existing PLC enclosures**

8.5.1. Safe off the wires, lift from existing enclosure and pull back.

8.5.2. Demo and dispose of enclosures

8.5.3. Steel single door enclosure

8.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

8.6. **Install new PLC Enclosure**

8.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 8.xx above

8.6.2. Cut out bottom of enclosure as need to access existing floor conduits

8.6.3. Mount new enclosure in small room secure to wall and floor.

8.6.4. Extend conduits and wires to new enclosure as needed.

8.6.5. Terminate existing wiring per drawings

8.6.6. Terminate new wires per drawings

8.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

8.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

8.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

8.6.9.1. Wet Well High-Level Float
8.6.9.2. Wet well hatch switch if applicable

8.7. **Testing and Commissioning System**

8.7.1. Assist Avanceon and CMCMUA with testing and commissioning

8.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed

8.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

8.8. **Remove Temporary PLC enclosure:**

8.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

9. **WILDWOOD EFFLUENT BUILDING**

9.1. **Reference Drawings**

9.1.1. WildwoodEffluentElectrical.PDF

9.2. **Location Description**

9.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 90' x 200' x 30' ceiling height.

9.2.2. Poured concrete walls with underground basement, 20' below grade where dry well pumps are located.

9.2.3. Conduit concrete cutout access to lower level is available under existing PLC enclosure.

9.2.4. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

9.2.5. The Effluent Building houses the Effluent Pumping station, Dilution water pumps, Non-potable water pumps, Generator, Blowers, and Sump pumps.

9.3. **Preliminary work before taking site off line:**

9.3.1. General

9.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

9.3.2. Temporary PLC Setup:

9.3.2.1. None. Temporary PLC has been installed by CMCMUA

9.3.3. Items not needed on temporary PLC:

9.3.3.1. None.

9.4. **Individual Systems**

9.4.1. **Bubbler Control Enclosure**

9.4.1.1. The Effluent well consists of three (3) unique wells each needing level control.

9.4.1.2. Install 3 phase 480 VAC 30-amp circuit from Panel L4 existing breaker 12 through existing ¾" conduit 439P for air compressor (80' wire).

9.4.1.2.1. Cut ¾" conduit 439P at LB next to raised platform and extend to compressor (30').

9.4.1.3. Install Bubbler Control Enclosure provided by CMCMUA.

9.4.1.3.1. Floor mount non-metallic enclosure 72" H x 24" W x 12" D

9.4.1.3.2. Cut ¾" conduit 439I at LB next to raised platform and extend to Bubbler Control Enclosure (30').

9.4.1.3.3. Use existing ¾" conduit 439I and install wire from Bubbler Control enclosure to new PLC enclosure for the following (80' wire):

9.4.1.3.4. 24 VDC Common to all solenoids

9.4.1.3.5. STP for compressor 1 PSI

9.4.1.3.6. STP for compressor 2 PSI

9.4.1.3.7. STP – Effluent well level

9.4.1.3.7.1. 24DVC signal for isolation control solenoid valve

9.4.1.3.7.2. 24DVC signal for purge control solenoid valve

9.4.1.3.8. STP – Non-Pot well level

9.4.1.3.8.1. 24DVC signal for isolation control solenoid valve

9.4.1.3.8.2. 24DVC signal for purge control solenoid valve

9.4.1.3.9. STP – Gravity well level

9.4.1.3.9.1. 24DVC signal for isolation control solenoid valve

9.4.1.3.9.2. 24DVC signal for purge control solenoid valve

9.4.1.3.10. Run three (3) flexible discharge tubing from bubbler enclosure to bubbler line hard pipe

9.4.1.3.10.1. CMCMUA will provide the flexible tubing: 25 Feet

9.4.2. **Wet Well**

9.4.2.1. Use existing ¾" conduit 439I for bubbler system and install the following wires (110' wire):

9.4.2.1.1. Control Power

9.4.2.1.1.1. 24 VDC from PLC enclosure power supply

9.4.2.1.2. Floats

9.4.2.1.2.1. High Level Float

9.4.2.1.2.2. Low Level Float

9.4.2.1.3. Purchase and install a NC weighted float

9.4.2.1.4. Purchase and provide to the CMCMUA a NO weighted float

9.4.2.1.5. Junctions can be made in the Bubbler enclosure or in a junction box purchased and installed near the bubbler enclosure.

9.4.3. **Sampler**

9.4.3.1. Cut ¾" conduit 444P at LB next to raised platform and extend to sampler area (10').

9.4.3.2. Pull back existing 120VAC circuit and reuse.

9.4.3.3. Install a quad receptacle near the sampler.

9.4.4. **Sump Pumps 9 and 10 - in Dry Well**

9.4.4.1. Purchase and install two (2) new 480VAC 5 HP three phase Sump Control Enclosures with disconnect and HOA switch.

9.4.4.2. Sump Control Enclosures (480VAC).

9.4.4.3. Demo existing sump control enclosure.

9.4.4.4. Install new pump control enclosures on wall and reuse existing 3 phase 480 VAC feed for both sump pumps.

9.4.4.5. Reconnect sump pump motor conductors to new enclosure.

9.4.4.6. Reuse existing ¾" control conduit between PLC enclosure and sump control enclosure.

9.4.4.6.1. Remove seal off and extend conduit to enclosure (non-classified area, seal off not required) and demo existing control wires.

9.4.4.7. Install new wires to each of the two (2) sump pump enclosures from the new PLC Enclosure (120' wire):

9.4.4.7.1. Control Power

9.4.4.7.1.1. 24 VDC from PLC enclosure power supply

9.4.4.7.1.2. 24 VDC Common from PLC enclosure power supply

9.4.4.7.2. Pump Controls

9.4.4.7.2.1. Auto switch

9.4.4.7.2.2. Hand switch

9.4.4.7.2.3. Running status

9.4.4.7.2.4. Fault status

9.4.4.7.2.5. Run Command (pump start command from PLC)

9.4.4.7.2.5.1. Field install run command relay in enclosure

9.4.4.8. Demo existing floats in sump pit

9.4.4.9. Install new 1" conduit between sump pit and new PLC enclosure and pull the following wires to new PLC enclosure (120').

9.4.4.9.1. Control Power

9.4.4.9.1.1. 24 VDC from PLC enclosure power supply

9.4.4.9.2. Controls

9.4.4.9.2.1. Low level float (N.O.)

9.4.4.9.2.2. Stop float (N.O.)

9.4.4.9.2.3. Start float (N.O.)

9.4.4.9.2.4. Lag Start float (N.O.)

9.4.4.9.2.5. High level float (N.C.)

9.4.4.10. Demo existing floats and conduit in sump pit.

9.4.4.11. Install new Unistrut float hanger bar (10' Unistrut)

9.4.4.12. Purchase and install six (6) new weighted floats, two (2) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

9.4.4.12.1. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

9.4.5. **Sump Pumps 5 and 6 Near RBC's**

9.4.5.1. Purchase and install two (2) new NEMA -3R 480VAC 5 HP three phase Sump Control Enclosures with disconnect and HOA switch.

9.4.5.2. Demo existing sump control enclosure.

9.4.5.3. Install new pump control enclosures on wall and reuse existing 3 phase 480 VAC feed for both sump pumps.

9.4.5.3.1. Purchase and install new stainless steel Unistrut (40')

9.4.5.4. Reconnect sump pump motor conductors to new enclosure.

9.4.5.4.1. Do not install a conduit connection between well and sump enclosure.

9.4.5.4.2. Use cord grip fittings between existing 12" x 12" PVC junction box on well lid and new sump enclosure.

9.4.5.5. Demo existing wires from 1" control conduit.

9.4.5.6. Reuse existing 1" control conduit between PLC enclosure and sump control enclosure.

9.4.5.7. Use existing four (4) ¾" conduits to install new wires to each of the two (2) sump pump enclosures from the new PLC Enclosure. Existing conduit route runs through existing RBC PLC enclosure slated for demo. Route new conductor into RBC PLC floor gutter and through existing conduit in the pour to the outside sump pump area. Wires also pass through an outdoor wire trough (275' wire – long, multi person pull see 9.4.27.3).

9.4.5.7.1. Control Power

9.4.5.7.1.1. 24 VDC from PLC enclosure power supply

9.4.5.7.1.2. 24 VDC Common from PLC enclosure power supply

9.4.5.7.2. Pump Controls

9.4.5.7.2.1. Auto switch

9.4.5.7.2.2. Hand switch

9.4.5.7.2.3. Running status

9.4.5.7.2.4. Fault status

9.4.5.7.2.5. Run Command (pump start command from PLC)

9.4.5.7.2.5.1. Field install run command relay in enclosure

9.4.5.7.3. Floats (only one set of wires)

9.4.5.7.3.1. High Level (NC)

9.4.5.7.3.2. Lag Start (NO)

9.4.5.7.3.3. Lead Start (NO)

9.4.5.7.3.4. Stop (NO)

9.4.5.7.3.5. Low Level (NO)

9.4.5.8. Demo existing floats in sump pit

9.4.5.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on existing hooks in wet well.

9.4.5.9.1. Do not install a conduit connection between well and sump enclosure.

9.4.5.9.2. Use cord grip fittings between existing 12" x 12" PVC junction box on well lid and new sump enclosure.

9.4.5.10. Wire float wire to terminals in new PLC enclosure

9.4.6. **Sump Pumps 11 and 12 In Meter Pit**

9.4.6.1. Purchase and install two (2) new NEMA -3R 480VAC 5 HP three phase Sump Control Enclosures with disconnect and HOA switch.

9.4.6.2. Demo existing sump control enclosure.

9.4.6.3. Install new pump control enclosures on wall and reuse existing 3 phase 480 VAC feed for both sump pumps.

9.4.6.3.1. Purchase and install new stainless steel Unistrut (40')

9.4.6.4. Reconnect sump pump motor conductors to new enclosure.

9.4.6.4.1. Do not install a conduit connection between well and sump enclosure.

9.4.6.4.2. Use cord grip fittings between existing 12" x 12" PVC junction box on well lid and new sump enclosure.

9.4.6.5. Demo existing wires from 1" control conduit.

9.4.6.6. Reuse existing 1" control conduit between PLC enclosure and sump control enclosure.

9.4.6.7. Use existing four (4) ¾" conduits to install new wires to each of the two (2) sump pump enclosures from the new PLC Enclosure. Existing conduit route runs through existing RBC PLC enclosure slated for demo. Route new conductor into RBC PLC floor gutter and through existing conduit in the pour to the outside sump pump area. Wires also pass through an outdoor wire trough (275' wire – long, multi person pull see 9.4.27.3).

9.4.6.7.1. Control Power

9.4.6.7.1.1. 24 VDC from PLC enclosure power supply

9.4.6.7.1.2. 24 VDC Common from PLC enclosure power supply

9.4.6.7.2. Pump Controls

9.4.6.7.2.1. Auto switch

9.4.6.7.2.2. Hand switch

9.4.6.7.2.3. Running status

9.4.6.7.2.4. Fault status

9.4.6.7.2.5. Run Command (pump start command from PLC)

9.4.6.7.2.5.1. Field install run command relay in enclosure

9.4.6.7.3. Floats (only one set of wires)

9.4.6.7.3.1. High Level (NC)

9.4.6.7.3.2. Lag Start (NO)

9.4.6.7.3.3. Lead Start (NO)

9.4.6.7.3.4. Stop (NO)

9.4.6.7.3.5. Low Level (NO)

9.4.6.8. Demo existing floats in sump pit

9.4.6.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on existing hooks in wet well.

9.4.6.9.1. Do not install a conduit connection between well and sump enclosure.

9.4.6.9.2. Use cord grip fittings between existing 12" x 12" PVC junction box on well lid and new sump enclosure.

9.4.6.10. Wire float wire to terminals in new PLC enclosure

9.4.7. **Flow Meters**

9.4.7.1. Reconnect existing Effluent Flow Meter 4-20 mA STP

9.4.7.2. Reconnect existing Dilution Water Flow Meter 4-20 mA STP

9.4.7.3. Reconnect existing Non-Potable Flow Meter 4-20 mA STP

9.4.8. **Non-Potable Drives 1 and 2**

9.4.8.1. Purchase and install new HOA switch on each VFD control enclosure door.
9.4.8.2. Use existing 1" conduits to each of the two (2) pump drive enclosures and pull new wires for the following for each pump drive:
9.4.8.2.1. Control Power
9.4.8.2.1.1. 24 VDC from PLC enclosure power supply
9.4.8.2.1.2. 24 VDC Common from PLC enclosure power supply
9.4.8.2.2. Pump Controls
9.4.8.2.2.1. Auto switch
9.4.8.2.2.2. Hand switch
9.4.8.2.2.3. Running status
9.4.8.2.2.4. Fault status
9.4.8.2.2.5. Run Command (pump start command from PLC)
9.4.8.2.2.5.1. Field install run command relay in enclosure
9.4.8.2.2.6. Ethernet Wire
9.4.8.2.2.7. STP speed command
9.4.8.2.3. Demo existing vibration switch from motor and remove conductors leaving the spare ¾" conduit.

9.4.9. **Non-Potable Pumps 1 and 2**
9.4.9.1. Demo all 12 x 12 x 6 junction box, flex and piping from around pump.
9.4.9.2. Reuse existing ¾" conduit from PLC enclosure for vibration switch conductors.
9.4.9.3. Purchase and install new vibration switches on each pump.
9.4.9.4. Install new flex from existing ¾" conduit to vibration switch.
9.4.9.5. Install new wire from the new PLC enclosure to the vibration switch (110' wire)
9.4.9.5.1. Control Power
9.4.9.5.1.1. 24 VDC from PLC enclosure power supply
9.4.9.5.2. Strainer Status
9.4.9.5.2.1. Vibration switch

9.4.10. **Non-Potable Motors 1 and 2**
9.4.10.1. Reconnect vibration switch on motor.
9.4.10.2. Install new wires in the existing ¾" conduit from vibration switch back to existing PLC enclosure and connect for the following:
9.4.10.2.1. Control Power
9.4.10.2.1.1. 24 VDC from PLC enclosure power supply
9.4.10.2.2. Strainer Status
9.4.10.2.2.1. Vibration switch
9.4.10.2.2.2. Temperature switch (future)

9.4.11. **Non-Potable Strainer 1 and 2**
9.4.11.1. Reroute existing ¾" power conduit feeding NPW Strainer 1 directly into existing controller (10'). Use existing ¾" anybody and existing wire. Currently NPW 1 Strainer power routes through NPW 2 Strainer controller.
9.4.11.2. Install new ¾" conduit from new PLC enclosure to NPW Strainer 1 and tee off to NPW Strainer 2 and install the following wires (120'):
9.4.11.2.1. Control Power
9.4.11.2.1.1. 24 VDC from PLC enclosure power supply
9.4.11.2.2. Strainer Status
9.4.11.2.2.1. Auto switch
9.4.11.2.2.2. Hand switch
9.4.11.2.2.3. Running status

9.4.11.2.2.4. Fault status
9.4.11.2.2.5. STP pressure transducer– loop powered (3 wire)
9.4.11.2.3. Reconnect existing pressure transducer.

9.4.12. **Dilution Water Drives 1 and 2**
9.4.12.1. Purchase and install new HOA switch on each VFD control enclosure door.
9.4.12.2. Use existing 1" conduits to each of the two (2) pump drive enclosures and pull new wires for the following for each pump drive:
9.4.12.2.1. Control Power
9.4.12.2.1.1. 24 VDC from PLC enclosure power supply
9.4.12.2.1.2. 24 VDC Common from PLC enclosure power supply
9.4.12.2.2. Pump Controls
9.4.12.2.2.1. Auto switch
9.4.12.2.2.2. Hand switch
9.4.12.2.2.3. Running status
9.4.12.2.2.4. Fault status
9.4.12.2.2.5. Run Command (pump start command from PLC)
9.4.12.2.2.5.1. Field install run command relay in enclosure
9.4.12.2.2.6. Ethernet Wire
9.4.12.2.2.7. STP speed command
9.4.12.2.3. Demo existing vibration switch from motor and remove conductors leaving the spare ¾" conduit.

9.4.13. **Dilution Water Pumps 1 and 2**
9.4.13.1. Demo all 12 x 12 x 6 junction box, flex and piping from around pump.
9.4.13.2. Reuse existing ¾" conduit from PLC enclosure for vibration switch conductors.
9.4.13.3. Purchase and install two (2) new Vibration Switch's on the pumps.
9.4.13.4. Install new flex from existing ¾" conduit to vibration switch.
9.4.13.5. Install new wire from the new PLC enclosure to the vibration switch (110' wire)
9.4.13.5.1. Control Power
9.4.13.5.1.1. 24 VDC from PLC enclosure power supply
9.4.13.5.2. Strainer Status
9.4.13.5.2.1. Vibration switch

9.4.14. **Dilution Water Motors 1 and 2**
9.4.14.1. Reconnect vibration switch on motor.
9.4.14.2. Install new wires in the existing ¾" conduit from vibration switch back to existing PLC enclosure and connect for the following:
9.4.14.2.1. Control Power
9.4.14.2.1.1. 24 VDC from PLC enclosure power supply
9.4.14.2.2. Strainer Status
9.4.14.2.2.1. Vibration switch
9.4.14.2.2.2. Temperature switch (future)

9.4.15. **Effluent Pump Drives 1, 2, 3, 4 and 5**
9.4.15.1. Use four (4) existing 1" conduits to each of the four (4) pump drive enclosures and extend to the new drive enclosure (20').
9.4.15.2. Install new wires for the following for each pump drive:
9.4.15.2.1. Control Power
9.4.15.2.1.1. 24 VDC from PLC enclosure power supply
9.4.15.2.1.2. 24 VDC Common from PLC enclosure power supply
9.4.15.2.2. Pump Controls

9.4.15.2.2.1. Auto switch
9.4.15.2.2.2. Hand switch
9.4.15.2.2.3. Running status
9.4.15.2.2.4. Fault status
9.4.15.2.2.5. Run Command (pump start command from PLC)
9.4.15.2.2.5.1. Field install run command relay in enclosure
9.4.15.2.2.6. Ethernet Wire
9.4.15.2.2.7. STP speed command

9.4.16. **Effluent Pump Motors 1, 2, 3, 4 and 5**

9.4.16.1. Use four (4) existing 1" overhead conduits to each of the four (4) motors and pull new wires for the following for each motor (90' wire):
9.4.16.1.1. Control Power
9.4.16.1.1.1. 24 VDC from PLC enclosure power supply
9.4.16.1.2. Motor status
9.4.16.1.2.1. Vibration switch
9.4.16.1.2.2. Temperature switch
9.4.16.1.3. Purchase and install a new vibration switch on each of the four (4) motors

9.4.17. **Effluent Pumps 1, 2, 3, 4 and 5**

9.4.17.1. Use the existing 1" conduit serving the motors to install wires for the following (100' wire):
9.4.17.1.1. Control Power
9.4.17.1.1.1. 24 VDC from PLC enclosure power supply
9.4.17.1.2. Pump status
9.4.17.1.2.1. Vibration switch
9.4.17.2. Purchase and install a new vibration switch on each of the four (4) pumps.

9.4.18. **Drywell**

9.4.18.1. Purchase and install twenty (20) LED Hubbell RLB Reverie™ Decorative Low Bay or equivalent industrial fixtures.
9.4.18.2. Use existing ¾" conduit and wires.
9.4.18.3. Remove existing twenty (20) fluorescent fixtures.

9.4.19. **Sample Pumps 1 and 2**

9.4.19.1. Reuse existing conduit and 480 VAC feeds to Sample Pumps.
9.4.19.2. Remove existing disconnect
9.4.19.3. Purchase and install two (2) pump controllers (equivalent to sump controllers)
9.4.19.3.1. 480 VAC, three phase, 0.5 HP at FLA of 1.0 amps, HOA switch
9.4.19.3.2. Reuse/refit existing conduit to motors for motor conductors (10')
9.4.19.4. In existing MCC move the motor conductors from the contactor/OL to the MCC breaker. Bypass the MCC contactor and use MCC bucket as breaker disconnect only.
9.4.19.5. Use existing ¾" conduit to abandoned 60-minute probe and reroute to pump controllers for the following wires (40' conduit 150' wire):
9.4.19.5.1. Control Power
9.4.19.5.1.1. 24 VDC from PLC enclosure power supply
9.4.19.5.1.2. 24 VDC Common from PLC enclosure power supply
9.4.19.5.2. Pump Controls
9.4.19.5.2.1. Auto switch
9.4.19.5.2.2. Hand switch
9.4.19.5.2.3. Running status

9.4.19.5.2.4. Fault status
9.4.19.5.2.5. Run Command (pump start command from PLC)
9.4.19.5.2.5.1. Field install run command relay in enclosure

9.4.20. **Gravity Valve**
9.4.20.1. Use existing ¾" conduit 457C to install new STP for MODBUS communication to valve actuator.
9.4.20.2. Remove existing single conductors from 457C.
9.4.20.3. Connect MODBUS wires to valve (6' ¾" flex) and in new PLC enclosure.

9.4.21. **Flow Meters**
9.4.21.1. Reconnect existing STP to new PLC enclosure for Non-Potable Water Flow Meter.
9.4.21.2. Reconnect existing STP to new PLC enclosure for Dilution Water Flow Meter.
9.4.21.3. Purchase and install field terminal blocks in new PLC enclosure to extend STP to telefast connection (6 terminal blocks and 10' STP).

9.4.22. **Process Air Blowers 1, 2, 3, and 4**
9.4.22.1. Remove existing single conductors from existing 1" conduit for each blower (100' of demo).
9.4.22.2. Install wires for the following:
9.4.22.2.1. Control Power
9.4.22.2.1.1. 24 VDC from PLC enclosure power supply
9.4.22.2.1.2. 24 VDC Common from PLC enclosure power supply
9.4.22.2.2. Blower Controls
9.4.22.2.2.1. Auto switch
9.4.22.2.2.2. Hand switch
9.4.22.2.2.3. Running status
9.4.22.2.2.4. Fault status
9.4.22.2.2.5. High vibration 1
9.4.22.2.2.6. High vibration 2
9.4.22.2.2.7. High temperature 1
9.4.22.2.2.8. High temperature 2
9.4.22.2.2.9. Power on
9.4.22.2.2.10. High pressure fault
9.4.22.2.2.11. Relocate Run Command relay into blower panel
9.4.22.2.2.12. Run Command (start command from PLC)
9.4.22.2.3. Add 24 VDC power distribution terminal blocks in the blower enclosure for various status feeds (8 terminal blocks with center jumper)

9.4.23. **Fuel Area**
9.4.23.1. Install new 1" conduit from the new PLC enclosure to the outdoor diesel fuel tank (160'). Follow existing ¾" conduit to fuel pump and use existing Unistrut for support.
9.4.23.2. Install the following wires:
9.4.23.2.1. Control Power
9.4.23.2.1.1. 24 VDC Common from PLC enclosure power supply
9.4.23.2.2. Instrumentation and status
9.4.23.2.2.1. STP for diesel tank level sensor – loop powered (3 wire)
9.4.23.2.2.2. Fill horn signal wire
9.4.23.2.2.3. Pull string for future wire pull
9.4.23.2.3. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank on wall of Effluent Building.

9.4.23.2.4. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank.

9.4.24. **Generator 1, 2, and 3**

9.4.24.1. Install new 1" conduit from new PLC enclosure and tee off at each generator control panel. Drop to generator control panel can be ¾" conduit. Use existing Unistrut for conduit support.

9.4.24.2. Install the following wire:

9.4.24.2.1. CAT 6 Ethernet cable

9.4.24.3. Secure wire in control panel leaving 10' of wire for future use.

9.4.24.4. Secure wire in new PLC enclosure near MODBUS terminal block/Ethernet Switch for future connection.

9.4.24.5. Install new 1" conduit to existing three (3) day tank controllers and pull the following wires (350' conduit total and 175' wire each):

9.4.24.5.1. Control Power

9.4.24.5.1.1. 24 VDC from PLC enclosure power supply

9.4.24.5.2. Status and Control Wires

9.4.24.5.2.1. Day Tank Not In Auto alarm

9.4.24.5.2.2. Day Tank high level

9.4.24.5.2.3. Day Tank low level

9.4.24.5.2.4. Day Tank leak alarm

9.4.24.5.2.5. Day Tank return pump running

9.4.24.6. Using the day tank conduit tee off with ¾" conduit to existing three (3) existing louver motors and pull and terminate the following wires (20' conduit from tee and 150' wire each):

9.4.24.6.1. Control Power

9.4.24.6.1.1. 24 VDC from PLC enclosure power supply

9.4.24.6.2. Status and Control Wires

9.4.24.6.2.1. Louver status

9.4.24.7. Using the day tank conduit tee off with ¾" conduit to existing three (3) battery chargers and pull the following wires (20' conduit from tee and 150' wire each):

9.4.24.7.1. Control Power

9.4.24.7.1.1. 24 VDC from PLC enclosure power supply

9.4.24.7.2. Status and Control Wires

9.4.24.7.2.1. Battery Charger Fault Status

9.4.24.8. Install Indoor Temperature Probe using 0.25" compression fitting mounted in a tee off of the conduit for the day tank for probe tip to hang in free air and wire to PLC.

9.4.24.8.1. Temperature Probe provided by CMCMUA.

9.4.25. **Ventilation and Heating**

9.4.25.1.1.1. None

9.4.26. **Fire/Security/Lights**

9.4.26.1. Install new ¾" conduit to existing fire panel and pull the following wires (50'):

9.4.26.1.1. Control Power

9.4.26.1.1.1. 24 VDC from PLC enclosure power supply

9.4.26.1.2. Status and Control Wires

9.4.26.1.2.1. Fire Alarm

9.4.26.1.2.2. System Trouble

9.4.27. **Network Equipment**

9.4.27.1. Mount fiber closet enclosure in existing network cabinet.

9.4.27.2. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (20').
9.4.27.2.1. Route existing fiber cable through 1" conduit and reconnect to fiber closet.
9.4.27.3. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (20').
9.4.27.3.1. Route existing fiber patch cables between fiber closet and network switch in new PLC enclosure.
9.4.27.4. Supply Ethernet patch cables to the network switch for the following:
9.4.27.4.1. Dell Wyse computer
9.4.27.4.2. Stratus Node 1
9.4.27.4.3. Stratus Node 2
9.4.27.4.4. Operator touch screen
9.4.27.4.5. PLC Processor
9.4.27.4.6. PLC NOE

9.4.28. **RBC PLC Enclosure – Removal of PLC**
9.4.28.1. Purchase and install one (1) new single door enclosure 36" x 90" x 24" per the drawings.
9.4.28.1.1. This enclosure will be used as a junction for the RBC MODBUS connections and terminal blocks for the RBC sump wires to be extended to the new PLC enclosure.
9.4.28.2. Demo the existing three-door enclosure 108" x 90" x 24" and existing Symax PLC racks. No new PLC will be installed at this location.
9.4.28.3. Purchase and install terminal blocks for nine (9) existing STP on the lowest din rail of the new enclosure and terminal the STP.
9.4.28.4. RBC Sump float wires may be terminated through din rail mounted terminal blocks in the new RBC enclosure if needed (see 9.4.5 above)
9.4.28.4.1. Purchase and install six terminal blocks for the five (5) RBC floats and PLC 24 VDC.
9.4.28.5. Remove the existing Fiber Closet and place in wire gutter during demo of enclosure.
9.4.28.6. Demo existing wires between door controls, Symax PLC and ninety-six (96) RBC MCC Buckets used for HOA and Status.
9.4.28.7. Remove four (4) short lengths of conduit from side of existing enclosure and demo back to the 90 degree bend next to wall and leave for future use.
9.4.28.8. Use existing ¾" conduit from Effluent PLC enclosure and pull #18 STP for MODBUS communication to RBC Bucket 8-1 (250' wire)
9.4.28.9. Install new single door enclosure over top wire gutter next to floor mounted wire trough.
9.4.28.10. Cut out bottom of enclosure as need to access existing floor conduits and wire gutters
9.4.28.11. Cut out side of enclosure as need to access existing floor mounted wire trough for wireway to existing RBC MCC.
9.4.28.12. Install 6' x 2' x 3/8" thick diamond plate or steel plate over top of wire gutter on floor next to new enclosure and secure with bolts into concrete gutter curbing.
9.4.28.13. Reuse existing 120 VAC feed and terminate to din rail mounted 20-amp breaker.
9.4.28.14. Mount Fiber Closet on enclosure backplane.
9.4.28.15. Mount Ethernet Switch on backplane.

9.4.28.16. Purchase and install terminal blocks for nine (9) existing STP on the lowest din rail of the new enclosure and terminal the STP.

9.4.28.17. RBC Sump float wires may be terminated through din rail mounted terminal blocks in the new RBC enclosure if needed (see 9.4.5.7 above)

9.4.28.17.1. Purchase and install twenty-three (23) terminal blocks for the sump status and control wires and float wires (these terminal blocks would break up the long wire pull into two separate pulls).

9.5. **Demo Existing PLC enclosures**

9.5.1. Safe off the wires, lift conduits (31) from existing enclosure and pull back.

9.5.2. Demo and dispose of one (1) two-door enclosure 72" x 90" x 27" (overhead crane available)

9.5.2.1. Steel double door enclosure

9.5.3. Demo and dispose of one (1) three-door enclosure 108" x 90" x 24" (overhead crane available)

9.5.3.1. Steel triple door enclosure

9.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

9.6. **Install New PLC Enclosure**

9.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 9.xx above

9.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

9.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

9.6.4. Extend conduits and wires to new enclosure as needed.

9.6.5. Terminate existing wiring per drawings

9.6.6. Terminate new wires per drawings

9.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

9.6.8. Reconnect Ethernet wires.

9.6.9. Reconnect fiber cables.

9.7. **Testing and Commissioning System**

9.7.1. Assist Avanceon and CMCMUA with testing and commissioning

9.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

9.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

9.8. **Remove Temporary PLC enclosure**

9.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

10. **WILDWOOD PRELIMINARY TREATMENT**

10.1. **Reference Drawings**

10.1.1. WildwoodPreliminaryElectrical.PDF

10.2. **Location Description**

10.2.1. Block building with brick face overlaid over block with overall dimensions of:

10.2.1.1. Control Room 17' x 12' x 15' ceiling height.

10.2.1.2. Class 1 Division 1 Area 100' x 50' x 15 ceiling height.

10.2.2. Poured concrete walls with elevated first floor, 20' above grade. Crane or forklift will be needed to get new PLC enclosure up to the second floor and through the 36" wide door and remove railing.

10.2.3. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

10.2.4. The Preliminary Treatment Building houses the Bar Screen, Grit Chamber equipment, Scrubber, and sumps.

10.3. **Preliminary work before taking site off line:**

10.3.1. General

10.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

10.3.1.2. Remove fiber optic cable from existing wall next to PLC enclosure, CMCMUA will assist.

10.3.1.3. Pull STP from existing PLC enclosure and route from open wireway near ceiling back to flow meter.

10.3.2. Temporary PLC Setup:

10.3.2.1. None. Temporary PLC has been installed by CMCMUA

10.3.3. Items not needed on temporary PLC:

10.3.3.1. None.

10.4. **Individual Systems**

10.4.1. **Influent Flow Meter**

10.4.1.1. Remove flow meter from wall and relocate to left side of window near T-Stat.

10.4.1.2. Install two (2) ¾" conduit for 120 VAC power and signal to new PLC enclosure (30').

10.4.1.2.1. Install new 120 VAC circuit back to CB 10 in new PLC enclosure per drawings.

10.4.1.2.2. Install new STP to new PLC enclosure for Influent Flow Meter.

10.4.1.3. Install new ¾" conduit from wireway near celling for existing signal wire from transmitter (20'). Route existing transmitter wire and connect to flow meter terminal block.

10.4.2. **Gas Monitoring**

10.4.2.1. Mount gas monitor next to new PLC enclosure on block wall. Gas monitor will be provided by CMCMUA.

10.4.2.2. Install ¾" conduit from new PLC enclosure to Gas monitor for the following wire (10'):

10.4.2.2.1. Control Power

10.4.2.2.1.1. 24 VDC from PLC enclosure power supply FU2

10.4.2.2.1.2. 24 VDC Common from PLC enclosure power supply

10.4.2.2.2. Status and Control Wires

10.4.2.2.2.1. 1 STP for H2S East

10.4.2.2.2.2. 1 STP for H2S West

10.4.2.3. Install ¾" conduit from Gas Monitor into Class 1 Division 1 area Gas Monitor to west wall next to manual bar screen for H2S sensor (10') for the following wire:

10.4.2.3.1.1. 1 STP for H2S East

10.4.2.4. Install ¾" conduit from Gas Monitor into Class 1 Division 1 area Gas Monitor to north wall, lower level, next to ladder for H2S sensor (70') for the following wire:

10.4.2.4.1.1. 1 STP for H2S West

10.4.2.5. Install two (2) H2S sensor heads and supplied junction box to block wall and connect the 2 pair shielded wires listed above. Sensor heads and junction box supplied by CMCMUA.

10.4.3. **Bar Screens 1 and 2**

10.4.3.1. Extend existing 1" conduit C16 to new PLC enclosure and use existing labelled wire connected to the temporary PLC to connect to new PLC (10').

10.4.3.2. Existing wires to connect for two (2) Bar Screens:

10.4.3.2.1. Control Power

10.4.3.2.1.1. 24 VDC from PLC enclosure power supply

10.4.3.2.2. Controls

10.4.3.2.2.1. Bar Screen 1 Auto switch
10.4.3.2.2.2. Bar Screen 1 Hand switch
10.4.3.2.2.3. Bar Screen 1 Running status
10.4.3.2.2.4. Bar Screen 1 Fault status
10.4.3.2.2.5. Bar Screen 1 High level
10.4.3.2.2.6. Bar Screen 1 Upstream high level
10.4.3.2.2.7. Bar Screen 1 High differential level
10.4.3.2.2.8. Bar Screen 2 Auto switch
10.4.3.2.2.9. Bar Screen 2 Hand switch
10.4.3.2.2.10. Bar Screen 2 Running status
10.4.3.2.2.11. Bar Screen 2 Fault status
10.4.3.2.2.12. Bar Screen 2 High level
10.4.3.2.2.13. Bar Screen 2 Upstream high level
10.4.3.2.2.14. Bar Screen 2 High differential level
10.4.3.2.2.15. Compactor 1 Auto switch
10.4.3.2.2.16. Compactor 1 Hand switch
10.4.3.2.2.17. Compactor 1 Running status
10.4.3.2.2.18. Compactor 1 Fault status
10.4.3.2.2.19. Compactor 2 Auto switch
10.4.3.2.2.20. Compactor 2 Hand switch
10.4.3.2.2.21. Compactor 2 Running status
10.4.3.2.2.22. Compactor 2 Fault status
10.4.3.2.2.23. Belt Conveyor Auto switch
10.4.3.2.2.24. Belt Conveyor Hand switch
10.4.3.2.2.25. Belt Conveyor Running status
10.4.3.2.2.26. Belt Conveyor Fault status

10.4.3.2.3. Remove three position switch from bar screen panel and replace with 30 mm blank plug.

10.4.4. **Sump Pumps: Influent Channel Sump, Influent Building Sump 25 and 26, Rag Hopper Sump 1 and 2**

10.4.4.1. Purchase two (2) new duplex 480 VAC, three phase, 5 HP Sump Control Enclosures with disconnect and HOA switch with a maximum 20" width each and purchase and install one (1) 480 VAC, three phase, 5 HP single sump controller.

10.4.4.2. Demo three (3) existing sump control enclosures and return to CMCMUA.
10.4.4.3. Install new pump control enclosures on wall and reuse existing 3 phase 480 VAC feed for all sump pumps.
10.4.4.4. Reconnect sump pump motor conductors to new enclosure.
10.4.4.5. Reuse existing 1" control conduit between PLC enclosure and Influent Channel Sump control enclosure.
10.4.4.6. Install new ¾" conduit between new PLC enclosure and tee off to the two (2) remaining sump enclosures (50').
10.4.4.7. Install new wires to each of the three (3) sump pump enclosures from the new PLC Enclosure (50' wire):
- 10.4.4.7.1. Control Power
  - 10.4.4.7.1.1. 24 VDC from PLC enclosure power supply
  - 10.4.4.7.1.2. 24 VDC Common from PLC enclosure power supply
- 10.4.4.7.2. Pump Controls
  - 10.4.4.7.2.1. Auto switch
  - 10.4.4.7.2.2. Hand switch
  - 10.4.4.7.2.3. Running status
  - 10.4.4.7.2.4. Fault status
  - 10.4.4.7.2.5. Run Command (pump start command from PLC)
  - 10.4.4.7.2.6. Field install run command relay in enclosure

10.4.4.8. Influent Channel Sump does not get any floats.
10.4.4.9. **Influent Building Sump** floats: Demo existing ¾" conduit and junction box back to seal-off (40').
10.4.4.10. Install new ¾" conduit for intrinsic safe circuits from new PC enclosure into Class I Division I area terminating into a purchased and installed 6" x 6" x 6" stainless steel junction box at the Influent Building sump location and install the following wires (70'):
- 10.4.4.10.1. Control Power
  - 10.4.4.10.1.1. Intrinsic safe supply
- 10.4.4.10.2. Floats Intrinsic Safe
  - 10.4.4.10.2.1. High Level (NC)
  - 10.4.4.10.2.2. Lag Start (NO)
  - 10.4.4.10.2.3. Lead Start (NO)
  - 10.4.4.10.2.4. Stop (NO)
  - 10.4.4.10.2.5. Low Level (NO)
- 10.4.4.10.3. Purchase and install five (5) weighted floats (25' cable) hanging them under the sump pit lid using stainless hooks drilled into concrete.
- 10.4.4.10.4. Demo existing floats in sump pit

10.4.4.11. **Rag Hopper Sump** floats: Demo existing ¾" conduit and j-box back to seal-off (80').
10.4.4.12. Install new ¾" conduit for intrinsic safe circuits from new PC enclosure into Class I Division I area terminating into a purchased and installed 6" x 6" x 6" stainless steel junction box at the Rag Hopper Sump location and install the following wires (110'):
- 10.4.4.12.1. Control Power
  - 10.4.4.12.1.1. Intrinsic safe supply
- 10.4.4.12.2. Floats Intrinsic Safe
  - 10.4.4.12.2.1. High Level (NC)
  - 10.4.4.12.2.2. Lag Start (NO)
  - 10.4.4.12.2.3. Lead Start (NO)
  - 10.4.4.12.2.4. Stop (NO)

10.4.4.12.2.5. Low Level (NO)

10.4.4.12.3. Purchase and install five (5) weighted floats (10' cable) hanging them using stainless hooks drilled into concrete.

10.4.4.12.4. Demo existing floats in sump pit

10.4.4.12.5. While running new float conduit secure existing conduits (¾" and 1") with new stainless steel Unistrut straps to existing Unistrut (20 - ¾" straps and 5 - 1" straps).

10.4.4.13. Wire all float wires to intrinsic safe terminals in new PLC enclosure

10.4.5. **Sluice Gate Actuators**

10.4.5.1. Extend existing 1" conduit to new PLC enclosure and use existing labelled wire connected to the temporary PLC to connect to new PLC (10').

10.4.5.2. Connect existing wires for seven (7) sluice gate actuators:

10.4.5.2.1. MODBUS Communication

10.4.5.2.1.1. STP to MODBUS terminal block

10.4.6. **Influent Channel High Level Float**

10.4.6.1. Extend existing ¾" conduit to new PLC enclosure and use existing labelled wire connected to the temporary PLC to connect to new PLC (10').

10.4.6.2. Existing wires to connect for high level float:

10.4.6.2.1. Control Power

10.4.6.2.1.1. Intrinsic safe supply

10.4.6.2.2. Floats Intrinsic Safe

10.4.6.2.2.1. High Level (NC)

10.4.7. **Grit Chambers and Classifiers (six (6) pieces of individual equipment)**

10.4.7.1. Use existing 2" conduit to MCC for control wires (70') for the following equipment:

10.4.7.2. Grit Blower 1, Grit Blower 2, Grit Blower 3, Aerated Grit Classifier 1, Aerated Grit Classifier 2, Aerated Grit Classifier 3 (six (6) pieces of equipment)

10.4.7.3. Purchase and install six (6) new HOA switches with four (4) contact blocks, one for each piece of equipment, on the MCC bucket door.

10.4.7.4. Install wires for the following to each of the six (6) blower MCC buckets.

10.4.7.4.1. Control Power

10.4.7.4.1.1. 24 VDC from PLC enclosure power supply

10.4.7.4.1.2. 24 VDC Common from PLC enclosure power supply

10.4.7.4.2. Pump Controls

10.4.7.4.2.1. Auto switch

10.4.7.4.2.2. Hand switch

10.4.7.4.2.3. Running status

10.4.7.4.2.4. Fault status

10.4.7.4.2.5. Run Command (pump start command from PLC)

10.4.7.4.2.5.1. Field install run command relay in MCC

10.4.8. **Network Equipment**

10.4.8.1. Mount fiber closet enclosure in existing network cabinet.

10.4.8.2. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (20').

10.4.8.2.1. Route existing fiber cable through 1" conduit and reconnect to fiber closet.

10.4.8.3. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (20').

10.4.8.3.1. Route existing fiber patch cables between fiber closet and network switch in new PLC enclosure.

10.4.8.4. Supply Ethernet patch cables to the network switch for the following:

10.4.8.4.1. Dell Wyse computer
10.4.8.4.2. Stratus Node 1
10.4.8.4.3. Stratus Node 2
10.4.8.4.4. Operator touch screen
10.4.8.4.5. PLC Processor
10.4.8.4.6. PLC NOE

10.5. **Demo Existing PLC enclosures**

10.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
10.5.2. Demo and dispose of one (1) single door enclosure 36" x 90" x 27"
10.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

10.6. **Install New PLC Enclosure**

10.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 10.xx above
10.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
10.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
10.6.4. Extend conduits and wires to new enclosure as needed.
10.6.5. Terminate existing wiring per drawings
10.6.6. Terminate new wires per drawings
10.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
10.6.8. Reconnect Ethernet wires.
10.6.9. Reconnect fiber cables.

10.7. **Testing and Commissioning System**

10.7.1. Assist Avanceon and CMCMUA with testing and commissioning
10.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
10.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

10.8. **Remove Temporary PLC enclosure**

10.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

11. **WILDWOOD SLUDGE PROCESSING BUILDING**

11.1. **Reference Drawings**

11.1.1. WildwoodSludgeElectrical.PDF

11.2. **Location Description**

11.2.1. Two story block building with brick face overlaid over block with overall dimensions of:

11.2.1.1. Lower Floor 80' x 50' x 15' ceiling height.

11.2.1.2. Upper Flor 80' x 50' x 15' ceiling height

11.2.2. Flat roof above ground floor made of prestressed concrete slabs. Indoor ladder access from second floor area to roof. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

11.2.3. The Sludge Processing Building houses the Rotary Press, Scum Concentrator equipment, Scrubber, and sumps.

11.3. **Preliminary work before taking site off line:**

11.3.1. General

11.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

11.3.1.2. Install new PLC enclosure. New PLC enclosure is not being installed in place of existing PLC enclosure.

11.3.1.2.1. New PLC enclosure will be mounted in the southwest room along the south wall

11.3.1.2.2. **Install new 4" concrete pad under enclosure base of 76" x 26"** for a new 72" x 90" x 24" PLC enclosure as per drawings.

11.3.1.2.3. From MCC 3B Panel P3 upstairs, install new ¾" conduit to new PLC enclosure for 120VAC feeder (90').

11.3.2. Temporary PLC Setup:

11.3.2.1. None. Temporary PLC has been installed by CMCMUA.

11.4. **Individual Systems**

11.4.1. **Batch Water Pumps 1 and 2**

11.4.1.1. Purchase and install two (2) new contactor enclosures, 480 VAC, three phase, 5 HP with disconnect and HOA switch for batch water pumps.

11.4.1.2. Install contactors on wall next to the batch water pumps.

11.4.1.2.1. Use existing ¾" conduit to each motor for 480 VAC feeds to new contactors.

11.4.1.2.2. Modify ¾" conduit to feed contactors (10').

11.4.1.2.3. In MCC 3B upstairs, reroute existing motor T leads directly to the breaker bypassing the MCC contactor in order to feed 480 VAC to the new contactors.

11.4.1.3. From new contactors run ¾" flex to the motors (10')

11.4.1.4. Install new ¾" conduit from new PLC enclosure to Batch Water Pumps 1 and 2 for the following (30'):

11.4.1.4.1. Control Power

11.4.1.4.1.1. 24 VDC from PLC enclosure power supply

11.4.1.4.1.2. 24 VDC Common from PLC enclosure power supply

11.4.1.4.2. Controls

11.4.1.4.2.1. Auto switch

11.4.1.4.2.2. Hand switch

11.4.1.4.2.3. Running status

11.4.1.4.2.4. Fault status

11.4.1.4.2.5. Run Command (pump start command from PLC)

11.4.1.4.2.5.1. Field install run command relay in contactor enclosure

11.4.1.5. Install new ¾" conduit from new PLC enclosure to Batch Water tank for the following (50'):
11.4.1.5.1. 24 VDC from PLC enclosure power supply
11.4.1.5.2. High level float N.C.
11.4.1.5.3. Low level float N.O.
11.4.1.6. Purchase and install two (2) weighted floats, one (1) N.O. float and one (1) N.C. float.

11.4.2. **Poly Tanks 1 and 2, Poly Tank Mixers 1 and 2**
11.4.2.1. Purchase and install two (2) new contactor enclosures, 480 VAC, three phase, 5 HP with disconnect and HOA switch for poly tank mixers.
11.4.2.2. Install contactors on wall near to the batch water pumps.
11.4.2.3. From MCC 3B upstairs, install new ¾" conduit to each mixer contactor for 480 VAC feeds (80').
11.4.2.4. From new contactors, install new ¾" conduit to the mixer for motor feeds (70').
11.4.2.5. Connect motor feeds with ¾" flex (10').
11.4.2.6. Install new ¾" conduit from new PLC enclosure to Poly Mixer contactors 1 and 2 for the following (30'):
11.4.2.6.1. Control Power
11.4.2.6.1.1. 24 VDC from PLC enclosure power supply
11.4.2.6.1.2. 24 VDC Common from PLC enclosure power supply
11.4.2.6.2. Controls
11.4.2.6.2.1. Auto switch
11.4.2.6.2.2. Hand switch
11.4.2.6.2.3. Running status
11.4.2.6.2.4. Fault status
11.4.2.6.2.5. Run Command (pump start command from PLC)
11.4.2.6.2.5.1. Field install run command relay in contactor enclosure
11.4.2.7. Install new ¾" conduit from new PLC enclosure to Poly Tanks 1 and 2 for the following (80'):
11.4.2.7.1. Control Power
11.4.2.7.1.1. 24 VDC from PLC enclosure power supply
11.4.2.7.2. Controls
11.4.2.7.2.1. High level float
11.4.2.7.2.2. STP tank level – loop powered (2 wire)
11.4.2.8. Demo existing ¾" conduit and wire for existing level transmitters and floats (50').
11.4.2.8.1. Reconnect existing ultra-sonic level transmitters.
11.4.2.9. Purchase and install two (2) new weighted N.C. floats in poly tanks.

11.4.3. **Poly Tank Motorized Valves 1, 2, and 3**
11.4.3.1. Install new ¾" conduit from new PLC enclosure to each of the three (3) Poly Tank Motorized Valves (80'):
11.4.3.1.1. 120 VAC Power
11.4.3.1.1.1. 120 VAC from PLC enclosure circuit breaker
11.4.3.1.1.2. Neutral from PLC enclosure
11.4.3.1.2. Control/Status Power 120 VAC
11.4.3.1.2.1. Open Command – 10 amp relay
11.4.3.1.2.2. Open status
11.4.3.1.2.3. Close status

11.4.4. **LP Enclosure – Second Floor**

11.4.4.1. Install new 2" conduit from new PLC enclosure to existing wire trough next to batch water tank (40' This conduit will be used for all control wires going up to the second floor).
11.4.4.2. Demo all equipment from inside LP enclosure but preserve the 120 VAC feeds and land on terminal blocks.
11.4.4.3. Demo existing single door 36" x 90" x 24"
11.4.4.4. Purchase and install new single door enclosure 36" x 72" x 24" and reconnect existing conduits between RFP enclosure and 120 VAC feed conduits.
11.4.4.4.1. Cut hole in bottom of enclosure to access wire gutter.
11.4.4.5. Purchase and install din rail (5') and up to one hundred terminal blocks for field wire to new PLC extensions.

11.4.5. **Rotary Fan Press 1 and 2 – Second Floor**
11.4.5.1. Use existing conduits to the LP enclosure in the upstairs control room and existing conduits between the LP enclosure and the RFP control enclosure to the pull the following wires for two (2) rotary fan presses (90'):
11.4.5.1.1. Control Power
11.4.5.1.1.1. 24 VDC from PLC enclosure power supply SFP 2
11.4.5.1.1.2. 24 VDC Common from PLC enclosure power supply
11.4.5.1.1.3. 24 VDC from PLC enclosure power supply SFP 3
11.4.5.1.1.4. 24 VDC Common from PLC enclosure power supply
11.4.5.1.2. Status and Control
11.4.5.1.2.1. Sludge Feed Pump 2 Run Command from RFP
11.4.5.1.2.2. Sludge Feed Pump 3 Run Command from RFP
11.4.5.1.2.3. Sludge Feed Pump 2 Running status
11.4.5.1.2.4. Sludge Feed Pump 2 Fault status
11.4.5.1.2.5. Sludge Feed Pump 3 Running status
11.4.5.1.2.6. Sludge Feed Pump 3 Fault status
11.4.5.1.2.7. Sludge Feed Pump 2 Speed Command from RFP (STP)
11.4.5.1.2.8. Sludge Feed Pump 3 Speed Command from RFP (STP)
11.4.5.1.2.9. CAT5 Ethernet cable
11.4.5.2. Remove existing run command wires from RFP enclosure and land new command wires from new PLC.
11.4.5.3. Remove existing status wires from RFP enclosure and land new status wires from new PLC.
11.4.5.4. Use LP installed terminal blocks as needed.

11.4.6. **Gas Monitoring - Second Floor**
11.4.6.1. Use control conduit path to second floor LP enclosure for the following wire (total wire length 150'):
11.4.6.1.1. Control Power
11.4.6.1.1.1. 24 VDC from PLC enclosure power supply FU2
11.4.6.1.1.2. 24 VDC Common from PLC enclosure power supply
11.4.6.1.2. Status and Control Wires
11.4.6.1.2.1. 1 STP for H2S Sensor
11.4.6.1.3. Use existing ¾" conduit from LP panel to H2S sensor.

11.4.7. **Scum Concentrator – Second Floor**
11.4.7.1. Use control conduit path to second floor LP enclosure and then to the scum concentrator panel for the following wire (total wire length 140'):
11.4.7.1.1. Control Power
11.4.7.1.1.1. 24 VDC from PLC enclosure power supply
11.4.7.1.1.2. 24 VDC Common from PLC enclosure power supply
11.4.7.1.2. Controls

11.4.7.1.2.1. Auto switch
11.4.7.1.2.2. Hand switch
11.4.7.1.2.3. Running status
11.4.7.1.2.4. Fault status
11.4.7.1.2.5. High level
11.4.7.1.2.6. Start level
11.4.7.1.2.7. Stop level
11.4.7.1.2.8. Zero speed
11.4.7.1.2.9. Run Command (pump start command from PLC)
11.4.7.1.2.9.1. Purchase and install 10 amp Run Command relay into control panel

11.4.7.2. Remove existing 1" conduit 356P from scum concentrator panel (40')

11.4.7.3. Install new 1" conduit between existing LP enclosure and scum concentrator panel (40') and use for above control wires.

11.4.8. **Scrubbers – Influent Blower 1, Recirc Pump 1 and 2, Chem Pump 3, Heater**

11.4.8.1. The Influent scrubber is located outside of the Sludge Processing Building.

11.4.8.2. The existing 42" x 52" x 10" NEMA 4X stainless steel enclosure shall be demoed and new contactors mounted to the block wall using stainless steel Unistrut (40' of strut)

11.4.8.3. Purchase and install a 16" x 16" x 10" NEMA 4X stainless steel enclosure

11.4.8.3.1. The existing 2" conduit shall be reused and the 480 VAC multi-motor feed conductors shall be rerouted into the 16" x 16" x 10" NEMA 4X stainless steel enclosure.

11.4.8.4. Purchase and install three (3) finger safe power distribution block (Bussmann PDBFS330) in the 16" x 16" x 10" NEMA 4X stainless steel enclosure able to accept 1/0 wire and distribute the following size wires to the individual scrubber contactors:

11.4.8.4.1. #8 AWG – 34-amp blower motor (20' of 1" conduit)
11.4.8.4.2. #12 AWG – 8-amp recirculation pump x2 (20' of ¾" conduit)
11.4.8.4.3. #10 AWG – 30-amp heaters (20' of ¾" conduit)

11.4.8.5. Purchase and install the following raintight NEMA 3R contactor enclosures with disconnect and HOA switch:

11.4.8.5.1. 1 – 25 HP three phase size 2 contactor for blower motor
11.4.8.5.2. 2 – 5 HP three phase size 0 contactor for recirculation motors
11.4.8.5.3. 1 – 1 HP single phase size 00 contactor for chemical pump
11.4.8.5.4. 1 – 25-amp three phase contactor for heaters

11.4.8.6. Each motor needs the following conduit and wire installed from the contactor to the motor:

11.4.8.6.1. 1 – 25 HP size 2 contactor for blower motor
11.4.8.6.1.1. 1" conduit with 480VAC three phase 8 AWG wire (40')
11.4.8.6.2. 2 – 5 HP size 0 contactor for recirculation pumps
11.4.8.6.2.1. ¾" conduit with 480VAC three phase 12 AWG wire (40')
11.4.8.6.3. 1 – 1 HP size 00 contactor for chemical pump
11.4.8.6.3.1. ¾" conduit with 120VAC single phase 12 AWG wire (50')
11.4.8.6.4. 1 – 25-amp contactor for heaters
11.4.8.6.4.1. 1" conduit with 480VAC three phase 10 AWG wire (50') terminated in a 6" x 6" x 6" NEMA 4X stainless steel enclosure

11.4.8.7. All existing motor and heater conduits shall be demoed.

11.4.8.7.1. Install a 2" main conduit from the new PLC enclosure to the scrubber area for all control wires for the two scrubbers and tee off to the

contactors, chemical tank area, and scrubber sumps (100' of 2" and 120' of ¾").

11.4.8.8. The following control wires will be installed from the new PLC enclosure to each of the three (3) motor contactors listed above (50' wire):

11.4.8.8.1. Control Power

11.4.8.8.1.1. 24 VDC from PLC enclosure power supply

11.4.8.8.1.2. 24 VDC Common from PLC enclosure power supply

11.4.8.8.2. Pump Controls

11.4.8.8.2.1. Auto switch

11.4.8.8.2.2. Hand switch

11.4.8.8.2.3. Running status

11.4.8.8.2.4. Fault status

11.4.8.8.2.5. Run Command (pump start command from PLC)

11.4.8.8.2.5.1. Purchase and install 10 amp Run Command relay into control panel

11.4.8.9. The following control wires will be installed from the new PLC enclosure to each heater contactor listed above (50' wire):

11.4.8.9.1. Control Power

11.4.8.9.1.1. 24 VDC from PLC enclosure power supply

11.4.8.9.1.2. 24 VDC Common from PLC enclosure power supply

11.4.8.9.2. Pump Controls

11.4.8.9.2.1. Auto switch

11.4.8.9.2.2. Hand switch

11.4.8.9.2.3. On status

11.4.8.9.2.4. Run Command (heater start command from PLC)

11.4.8.9.2.4.1. Purchase and install 10 amp Run Command relay into contactor panel

11.4.8.9.3. The following control wires will be installed from the new PLC enclosure to scrubber recirculation sump (70' wire):

11.4.8.9.3.1. 24 VDC from PLC enclosure power supply

11.4.8.9.3.2. Low level float

11.4.8.9.4. The following control wires will be installed from the new PLC enclosure to chemical tank area for the following wires:

11.4.8.9.5. Control Power

11.4.8.9.5.1. 24 VDC from PLC enclosure power supply

11.4.8.9.5.2. 24 VDC Common from PLC enclosure power supply

11.4.8.9.6. Pump Controls

11.4.8.9.6.1. Running status chemical pump

11.4.8.9.6.2. Fault status chemical pump

11.4.8.9.6.3. STP chemical pump speed command

11.4.8.9.7. Chemical Tank Status

11.4.8.9.7.1. STP for tank level

11.4.8.9.7.2. Tank fill horn

11.4.8.9.7.3. Safety shower flow switch

11.4.8.9.7.3.1. Leave safety shower wires in a junction box for future connection.

11.4.8.9.8. Purchase and install a horn near the chemical tank area

11.4.8.10. From MCC Panel P3 in press control room install a new ¾" conduit with two (2) 120 VAC circuits for the chemical pumps for the Influent and Sludge Processing Scrubbers (100').

11.4.8.10.1. Use existing breakers in slots 16 and 18

11.4.8.10.2. Tee ¾" conduit and feed each of the chemical pump contactors

11.4.9. **Scrubbers – Sludge Processing Blower 4, Recirc Pump 6 and 7, Chem Pump 8, Heater**

11.4.9.1. The Sludge Processing scrubber is located outside of the Sludge Processing Building.

11.4.9.2. The existing 42" x 52" x 10" NEMA 4X stainless steel enclosure shall be demoed and new contactors mounted to the block wall using stainless steel Unistrut (40' of strut)

11.4.9.3. Purchase and install a 16" x 16" x 10" NEMA 4X stainless steel enclosure

11.4.9.3.1. The existing 2" conduit shall be reused and the 480 VAC multi-motor feed conductors shall be rerouted into the 16" x 16" x 10" NEMA 4X stainless steel enclosure.

11.4.9.4. Purchase and install three (3) finger safe power distribution block (Bussmann PDBFS330) in the 16" x 16" x 10" NEMA 4X stainless steel enclosure able to accept 1/0 wire and distribute the following size wires to the individual scrubber contactors:

11.4.9.4.1. #8 AWG – 34-amp blower motor (20' of 1" conduit)

11.4.9.4.2. #12 AWG – 8-amp recirculation pump x2 (20' of ¾" conduit)

11.4.9.4.3. #10 AWG – 30-amp heaters (20' of ¾" conduit)

11.4.9.5. Purchase and install the following raintight NEMA 3R contactor enclosures with disconnect and HOA switch:

11.4.9.5.1. 1 – 25 HP three phase size 2 contactor for blower motor

11.4.9.5.2. 2 – 5 HP three phase size 0 contactor for recirculation pumps

11.4.9.5.3. 1 – 1 HP single phase size 00 contactor for chemical pump

11.4.9.5.4. 1 – 25-amp three phase contactor for heaters

11.4.9.6. Each motor needs the following conduit and wire installed from the contactor to the motor:

11.4.9.6.1. 1 – 25 HP size 2 contactor for blower motor

11.4.9.6.1.1. 1" conduit with 480VAC three phase 8 AWG wire (40')

11.4.9.6.2. 2 – 5 HP size 0 contactor for recirculation pumps

11.4.9.6.2.1. ¾" conduit with 480VAC three phase 12 AWG wire (40')

11.4.9.6.3. 1 – 1 HP size 00 contactor for chemical pump

11.4.9.6.3.1. ¾" conduit with 120VAC single phase 12 AWG wire (50')

11.4.9.6.4. 1 – 25-amp contactor for heaters

11.4.9.6.4.1. 1" conduit with 480VAC three phase 10 AWG wire (50') terminated in a 6" x 6" x 6" NEMA 4X stainless steel enclosure

11.4.9.7. All existing motor and heater conduits shall be demoed.

11.4.9.8. The following wires will be installed from the new PLC enclosure to each of the three (3) motor contactors listed above (50' wire):

11.4.9.8.1. Control Power

11.4.9.8.1.1. 24 VDC from PLC enclosure power supply

11.4.9.8.1.2. 24 VDC Common from PLC enclosure power supply

11.4.9.8.2. Pump Controls

11.4.9.8.2.1. Auto switch

11.4.9.8.2.2. Hand switch

11.4.9.8.2.3. Running status

11.4.9.8.2.4. Fault status

11.4.9.8.2.5. Purchase and install 10 amp Run Command relay into contactor panels

11.4.9.8.2.6. Run Command (pump start command from PLC)

11.4.9.9. The following control wires will be installed from the new PLC enclosure to each heater contactor listed above (50' wire):
- 11.4.9.9.1. Control Power
  - 11.4.9.9.1.1. 24 VDC from PLC enclosure power supply
  - 11.4.9.9.1.2. 24 VDC Common from PLC enclosure power supply
- 11.4.9.9.2. Pump Controls
  - 11.4.9.9.2.1. Auto switch
  - 11.4.9.9.2.2. Hand switch
  - 11.4.9.9.2.3. On status
  - 11.4.9.9.2.4. Run Command (heater start command from PLC)
    - 11.4.9.9.2.4.1. Purchase and install 10 amp Run Command relay into contactor panel
  - 11.4.9.9.2.5. STP to the – loop powered (3 wire Temperature Probe)
- 11.4.9.9.3. The following wires will be installed from the new PLC enclosure to scrubber sump (70' wire):
  - 11.4.9.9.3.1. 24 VDC from PLC enclosure power supply
  - 11.4.9.9.3.2. Low level float
- 11.4.9.9.4. Purchase and install a N.C. low level weighted float in the scrubber sump
- 11.4.9.9.5. Install a 2" main conduit for the control wires and tee off to the contactors (100' of 2" and 60' of ¾").
- 11.4.9.9.6. From the 2" main conduit, tee off with a ¾" conduit and route to chemical tank area for the following wires (40'):
- 11.4.9.9.7. Control Power
  - 11.4.9.9.7.1. 24 VDC from PLC enclosure power supply
  - 11.4.9.9.7.2. 24 VDC Common from PLC enclosure power supply
- 11.4.9.9.8. Pump Controls
  - 11.4.9.9.8.1. Running status chemical pump
  - 11.4.9.9.8.2. Fault status chemical pump
- 11.4.9.9.9. See Influent Scrubber description for 120 VAC feed to chemical pump contactor

11.4.10. **Scrubbers – Sump Pumps 3 and 4**

11.4.10.1. The scrubber sump is located outside of the Sludge Processing Building.

11.4.10.2. Purchase one (1) new raintight duplex 120 VAC, single phase, 1 HP, Sump Control Enclosures with disconnect and HOA switch.

11.4.10.3. Install new sump control enclosures on wall next to Sludge Processing Scrubber controls.

11.4.10.4. From MCC Panel P3 in press control room install a new ¾" conduit with two (2) 120 VAC circuits for the sump pumps for the Influent and Sludge Processing Scrubbers (100').
- 11.4.10.4.1. Use existing breakers in slots 9 and 10

11.4.10.5. Install new ¾" conduit from contactors to sump motors (20') and connect sump pump motor conductors to new enclosure.

11.4.10.6. Tee off the 2" control conduit described in the Influent Scrubber description for the following sump controls (50' of wire):
- 11.4.10.6.1. Control Power
  - 11.4.10.6.1.1. 24 VDC from PLC enclosure power supply
  - 11.4.10.6.1.2. 24 VDC Common from PLC enclosure power supply
- 11.4.10.6.2. Pump Controls
  - 11.4.10.6.2.1. Auto switch
  - 11.4.10.6.2.2. Hand switch

11.4.10.6.2.3. Running status
11.4.10.6.2.4. Fault status
11.4.10.6.2.5. Run Command (pump start command from PLC)
11.4.10.6.2.5.1. Field install run command relay in enclosure
11.4.10.7. Demo existing floats in sump pit
11.4.10.8. Purchase and install one new multi-point float assembly per station specification.
11.4.10.9. Install multi-point float into sump pit
11.4.10.10. Wire float wire to terminals in new PLC enclosure, supply and install six (6) terminal blocks and junctions can be made in the contactor enclosure.

11.4.11. **Network Equipment**
11.4.11.1. Mount fiber closet enclosure in existing network cabinet.
11.4.11.2. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (20').
11.4.11.2.1. Route existing fiber cable through 1" conduit and reconnect to fiber closet.
11.4.11.3. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (20').
11.4.11.3.1. Route existing fiber patch cables between fiber closet and network switch in new PLC enclosure.
11.4.11.4. Supply Ethernet patch cables to the network switch for the following:
11.4.11.4.1. Dell Wyse computer
11.4.11.4.2. Stratus Node 1
11.4.11.4.3. Stratus Node 2
11.4.11.4.4. Operator touch screen
11.4.11.4.5. PLC Processor
11.4.11.4.6. PLC NOE

11.5. **Demo Existing PLC enclosures**
11.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
11.5.2. Demo and dispose of one (1) single door enclosure 36" x 90" x 27"
11.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

11.6. **Install New PLC Enclosure**
11.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 11.xx above
11.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
11.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
11.6.4. Extend conduits and wires to new enclosure as needed.
11.6.5. Terminate existing wiring per drawings
11.6.6. Terminate new wires per drawings
11.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
11.6.8. Reconnect Ethernet wires.
11.6.9. Reconnect fiber cables.

11.7. **Testing and Commissioning System**
11.7.1. Assist Avanceon and CMCMUA with testing and commissioning
11.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
11.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

11.8. **Remove Temporary PLC enclosure**

11.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

12. **WILDWOOD THICKENER BUILDING**

12.1. **Reference Drawings**

12.1.1. WildwoodThickenerElectrical.PDF

12.2. **Location Description**

12.2.1. Single story block building and basement with brick face over block with overall dimensions of:

12.2.1.1. Ground Floor 30' x 10' x 8' ceiling height.

12.2.1.2. Basement 30' x 100' x 15' ceiling height

12.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

12.2.3. The Sludge Processing Building houses the sludge transfer pumps, thickeners, sludge feed pumps, scrubber equipment, and sumps.

12.3. **Preliminary work before taking site off line:**

12.3.1. General

12.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

12.3.1.2. Remove fiber optic cable from existing wall next to enclosure in order to route fiber back into existing PLC enclosure to prep for existing enclosure removal, CMCMUA will assist.

12.3.2. Install temporary PLC and wire the following equipment to the temporary PLC:

12.3.2.1. Sludge transfer pumps for south thickener

12.3.2.2. Sludge transfer pumps for north thickener

12.3.2.3. Sludge feed pump for RFP 1

12.3.2.4. Sludge feed pump for RFP 2

12.3.2.5. High sludge storage tank float

12.3.2.6. High sump float

12.3.3. Items not needed on temporary PLC:

12.3.3.1. Sump pumps

12.3.3.2. Thickener's

12.3.3.3. Sludge storage tank mixer

12.4. **Individual Systems**

12.4.1. **Control Conduit for Basement**

12.4.1.1. Demo existing 1" PVC conduit from floor of new PLC enclosure to fire panel (40' of conduit).

12.4.1.2. Install new 2" control conduit following the path of the demoed 1" PVC and turn continuing alongside the existing 2" Power Conduit for basement equipment (150' with 7 any-bodies, use existing Unistrut for support).

12.4.2. **Thickeners 1 and 2**

12.4.2.1. Purchase and install new two-position switch on MCC door for start-stop control of contactor.

12.4.2.2. Remove any start-stop push buttons and hour meters from MCC door and plug remaining holes (30mm).

12.4.2.3. Install new ¾" conduit from new PLC enclosure to existing MCC for the following thickener control wires (30'):

12.4.2.3.1. Control Power

12.4.2.3.1.1. 24 VDC from PLC enclosure power supply

12.4.2.3.2. Controls

12.4.2.3.2.1. Running status

12.4.2.3.2.2. Fault status

12.4.2.4. Locate existing wires in PLC enclosure and connect existing high-level floats for each Thickener

12.4.2.4.1. Purchase and install four (4) field terminal blocks for extension of field wires.

12.4.3. **Sludge Storage Tank Mixer 1, 2, and 3 (impeller mixer)**

12.4.3.1. Use the two (2) existing 1" control conduits for the scrubber for the control wires from the new PLC enclosure for the two (2) propeller tank mixers and pull through the 3R junction box.

12.4.3.2. Install two (2) ¾" conduits from the 3R junction box to each of the two (2) propeller mixer control enclosures for the following wires (30'):

12.4.3.2.1. Control Power

12.4.3.2.1.1. 24 VDC from PLC enclosure power supply

12.4.3.2.1.2. 24 VDC Common from PLC enclosure power supply

12.4.3.2.2. Controls

12.4.3.2.2.1. Auto switch

12.4.3.2.2.2. Hand switch

12.4.3.2.2.3. Running status

12.4.3.2.2.4. Fault status

12.4.3.2.2.5. Purchase and install 10 amp Run Command relay into control panel

12.4.3.2.2.6. Run Command (pump start command from PLC)

12.4.3.3. Purchase and install new three-position HOA switch with four (4) contact blocks on MCC door for control of impeller mixer contactor.

12.4.3.4. Install a new ¾" conduit from new PLC enclosure to existing MCC for the following mixer control wires (30'):

12.4.3.4.1. Control Power

12.4.3.4.1.1. 24 VDC from PLC enclosure power supply

12.4.3.4.2. Controls

12.4.3.4.2.1. Auto status

12.4.3.4.2.2. Hand status

12.4.3.4.2.3. Running status

12.4.3.4.2.4. Fault status

12.4.3.4.3. Command

12.4.3.4.3.1. 120VAC MCC (TB 2)

12.4.3.4.3.2. Purchase and install 10 amp Run Command relay into MCC (TB 4)

12.4.3.4.4. 120 VAC control can be routed through same conduit as 24VDC control.

12.4.3.5. Reuse existing ¾" conduit and install the following wires:

12.4.3.5.1. STP storage tank level

12.4.3.5.2. 24 VDC from PLC enclosure power supply

12.4.3.5.3. Sludge storage tank high level float

12.4.3.5.4. D-Box high level float

12.4.3.6. Install new ¾" conduit from storage tank level conduit for D-Box float (20')

12.4.3.7. Purchase and install two (2) weighted floats, N.C. float.

12.4.3.8. Purchase and install one (1) class 1 division 1 ultrasonic level transmitter.

12.4.3.9. Demo existing ultrasonic

12.4.4. **Heater**

12.4.4.1. Install new ¾" conduit from new PLC enclosure to electric heater (30')

12.4.4.2. Remove existing thermostat wires from heater and purchase and install a run command relay in the heater and wire heater to work from new relay.

12.4.4.3. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire up Indoor Temperature Probe to PLC.

12.4.4.4. Temperature Probe provided by CMCMUA.

12.4.5. **Sludge Transfer Grinders 1 and 2**

12.4.5.1. Use existing 4" conduit from new PLC enclosure floor to existing wire trough in basement for control wires.

12.4.5.2. Install new 1" conduit from existing wire trough to the Grinder control enclosures (30' conduit total, 60' wire total, 12' ¾" flex total, and 20' stainless steel Unistrut) for the following wires:

12.4.5.2.1. Control Power

12.4.5.2.1.1. 24 VDC from PLC enclosure power supply

12.4.5.2.1.2. 24 VDC Common from PLC enclosure power supply

12.4.5.2.2. Controls

12.4.5.2.2.1. Auto switch

12.4.5.2.2.2. Hand switch

12.4.5.2.2.3. Running status

12.4.5.2.2.4. Fault status

12.4.5.2.2.5. Run Command (pump start command from PLC)

12.4.5.2.2.6. Field install run command relay in enclosure

12.4.5.2.3. Purchase and install a new HOA switch with four (4) contact blocks in each of the Mazzerator enclosures.

12.4.5.2.3.1. Rewire existing Grinder control wires on the HOA and add wiring for the status to the PLC.

12.4.6. **Sludge Transfer Pumps 1 and 2**

12.4.6.1. Purchase and install new three-position HOA switch with four (4) contact blocks on MCC door for control of contactor.

12.4.6.2. Install a new ¾" conduit from new PLC enclosure to existing MCC for the following thickener control wires (30'):

12.4.6.2.1. Control Power

12.4.6.2.1.1. 24 VDC from PLC enclosure power supply

12.4.6.2.2. Controls

12.4.6.2.2.1. Auto status

12.4.6.2.2.2. Hand status

12.4.6.2.2.3. Running status

12.4.6.2.2.4. Fault status

12.4.6.2.3. Command

12.4.6.2.3.1. 120VAC MCC (TB 2)

12.4.6.2.3.2. Purchase and install 10 amp Run Command relay into MCC (TB 4)

12.4.6.2.4. 120 VAC control can be routed through same conduit as 24VDC control.

12.4.7. **Sludge Feed Grinders 1, 2, and 3**

12.4.7.1. Use new 2" control conduit for basement equipment.

12.4.7.2. Install new ¾" conduit drop to the Mazzerator control enclosure (30' conduit each, 100' wire each) for the following wires:

12.4.7.2.1. Control Power

12.4.7.2.1.1. 24 VDC from PLC enclosure power supply

12.4.7.2.1.2. 24 VDC Common from PLC enclosure power supply

12.4.7.2.2. Controls

12.4.7.2.2.1. Auto switch

12.4.7.2.2.2. Hand switch
12.4.7.2.2.3. Running status
12.4.7.2.2.4. Fault status
12.4.7.2.2.5. High PSI switch
12.4.7.2.2.6. Run Command (pump start command from PLC)
12.4.7.2.2.7. Field install run command relay in enclosure

12.4.7.2.3. Purchase and install a new HOA switch with four (4) contact blocks in each of the Mazzerator enclosures.

12.4.7.2.3.1. Rewire existing Mazzerator control wires on the HOA and add wiring for the status to the PLC.

12.4.8. **Sludge Feed Pumps 1, 2, and 3**

12.4.8.1. Use new 2" control conduit for basement equipment.

12.4.8.2. Install new ¾" conduit drop to the Pump VFD enclosure (30' conduit each, 110' wire each) for the following wires:

12.4.8.2.1. Control Power
12.4.8.2.1.1. 24 VDC from PLC enclosure power supply
12.4.8.2.1.2. 24 VDC Common from PLC enclosure power supply

12.4.8.2.2. Controls
12.4.8.2.2.1. Auto switch
12.4.8.2.2.2. Hand switch
12.4.8.2.2.3. Running status
12.4.8.2.2.4. Fault status
12.4.8.2.2.5. High PSI
12.4.8.2.2.6. Low PSI
12.4.8.2.2.7. STP Speed Command
12.4.8.2.2.8. Cat5 Ethernet Cable
12.4.8.2.2.9. Run Command (pump start command from PLC)
12.4.8.2.2.10. Field install run command relay in enclosure

12.4.8.2.3. Purchase and install a new HOA switch with four (4) contact blocks in each of the VFD enclosures.

12.4.8.2.3.1. Rewire existing VFD control wires on the HOA and add wiring for the status to the PLC.

12.4.9. **Sludge Delivery Pump 4**

12.4.9.1. Outside near tanker hookup core drill a hole for a ¾" conduit to the basement.

12.4.9.2. Purchase and install a NEMA 4X enclosure with a two-position start-stop switch and mount on stainless steel Unistrut as a pump control station for the truck driver.

12.4.9.3. In basement, tee off existing 2" power conduit with a ¾" conduit for the pump control station (30').

12.4.9.4. Install wires from the MCC to the control station for the following wires (150'):

12.4.9.4.1. 120VAC
12.4.9.4.2. Start

12.4.9.5. In the MCC, incorporate the existing two wires of the existing basement start-stop switch so either control station will start the pump.

12.4.9.6. In the MCC bucket demo the existing HOA, stop switch, and hour meter and plug 30 mm holes.

12.4.10. **Sump Pumps 15 and 16 - Basement**

12.4.10.1. Purchase two (2) new 480 VAC, three phase, 5 HP, Sump Control Enclosures with disconnect and HOA switch.

12.4.10.2. Demo existing sump control enclosure.
12.4.10.3. Install new pump control enclosures on wall and reuse existing 3 phase 480 VAC feed for both sump pumps.
12.4.10.4. Reconnect sump pump motor conductors to new enclosure.
12.4.10.4.1. Use cord grip fitting for sump motor cords.
12.4.10.5. Use 2" control conduit and tee off with 1" conduit for pump controls and floats for the following wire:
12.4.10.5.1. Control Power
12.4.10.5.1.1. 24 VDC from PLC enclosure power supply
12.4.10.5.1.2. 24 VDC Common from PLC enclosure power supply
12.4.10.5.2. Pump Controls
12.4.10.5.2.1. Auto switch
12.4.10.5.2.2. Hand switch
12.4.10.5.2.3. Running status
12.4.10.5.2.4. Fault status
12.4.10.5.2.5. Run Command (pump start command from PLC)
12.4.10.5.2.6. Field install run command relay in enclosure
12.4.10.5.2.7. Low level float (N.O.)
12.4.10.5.2.8. Stop float (N.O.)
12.4.10.5.2.9. Start float (N.O.)
12.4.10.5.2.10. Lag Start float (N.O.)
12.4.10.5.2.11. High level float (N.C.)
12.4.10.6. Demo existing floats and conduit in sump pit.
12.4.10.7. Purchase and install new stainless steel Unistrut (10') for float hanger bar
12.4.10.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
12.4.10.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
12.4.10.10. Wire float wire to terminals in new PLC enclosure

12.4.11. **Scrubber - Blower 4, Recirc Pump 6 and 7, Chem Pump 8, Heater**

12.4.11.1. The existing 42" x 52" x 10" NEMA 4X stainless steel scrubber enclosure shall be demoed and new equipment contactors mounted on a new stainless steel Unistrut frame against wall below feeder conduit stubs (100' of strut).
12.4.11.2. Demo existing power and control conduits from where they exit the building wall (1 – 2" and 2 – 1" conduits: 30') and reuse conduits stubs and purchase and install a 16" x 16" x 12" deep NEMA 3R "3R" stainless steel junction box and mount over conduit stubs. Both power and control wires will pass through this junction box but no splices are allowed in this box.
12.4.11.3. From the 3R junction box run new surface conduits (1 – 2" and 2 – 1" conduits: 20') to the new location of the scrubber equipment below the junction box.
12.4.11.4. Inside, near new PLC enclosure, reroute one (1) existing 1" conduit into new PLC enclosure (20').
12.4.11.5. In existing 2" conduit install new 480 VAC three phase feeders and connect to existing 100-amp breaker in MCC 5B (50').
12.4.11.5.1. Along with feeders install two (2) new 120 VAC 20-amp circuits for the Thickener Sump Pumps from panel P5 (50').
12.4.11.5.1.1. Purchase and install two (2) new Westinghouse single pole 20-amp circuit breaker and install in spare locations in the panel.
12.4.11.6. Route a new 2" feeder conduit into a 16" x 16" x 10" NEMA 4X stainless steel enclosure along with power distribution block able to accept 1/0 wire and

distribute the following size wires to the individual scrubber equipment contactors (10'):

12.4.11.6.1. #10 AWG – 21-amp blower motor (20' of 1" conduit)
12.4.11.6.2. #10 AWG – 21-amp blower motor (20' of 1" conduit)
12.4.11.6.3. #12 AWG – 11-amp recirculation pump (20' of ¾" conduit)
12.4.11.6.4. #12 AWG – 11-amp heaters (20' of ¾" conduit)

12.4.11.7. Purchase and install the following raintight NEMA 3R contactors enclosures with disconnect and HOA switch:

12.4.11.7.1. 2 – 15 HP three phase size 2 contactor for blower motor
12.4.11.7.2. 1 – 5 HP three phase size 0 contactor for recirculation pump
12.4.11.7.3. 1 – 1 HP single phase size 00 contactor for chemical pump
12.4.11.7.4. 1 – 25-amp three phase contactor for heaters
12.4.11.7.5. 1 – 16" x 16" x 10" NEMA 4X stainless steel enclosure for power distribution block.

12.4.11.8. Each motor needs the following conduit and wire installed from the contactor to the motor:

12.4.11.8.1. 2 – 15 HP size X contactor for blower motor
12.4.11.8.1.1. 1" conduit with 480VAC three phase 10 AWG wire (50')
12.4.11.8.2. 1 – 5 HP size 0 contactor for recirculation pumps
12.4.11.8.2.1. ¾" conduit with 480VAC three phase 12 AWG wire (50')
12.4.11.8.3. 1 – 1 HP size 00 contactor for chemical pump
12.4.11.8.3.1. ¾" conduit with 120VAC single phase 12 AWG wire (Future)
12.4.11.8.4. 1 – 25-amp contactor for heaters
12.4.11.8.4.1. 1" conduit with 480VAC three phase 10 AWG wire (50') terminated in a 6" x 6" x 6" NEMA 4X stainless steel enclosure

12.4.11.9. All existing motor and heater conduits shall be demoed.

12.4.11.10. Use the existing 1" conduits for all control wires back to the new PLC enclosure.

12.4.11.11. The following control wires will be installed from the new PLC enclosure to each of the three (3) motor contactors listed above (60' wire):

12.4.11.11.1. Control Power
12.4.11.11.1.1. 24 VDC from PLC enclosure power supply
12.4.11.11.1.2. 24 VDC Common from PLC enclosure power supply
12.4.11.11.2. Pump Controls
12.4.11.11.2.1. Auto switch
12.4.11.11.2.2. Hand switch
12.4.11.11.2.3. Running status
12.4.11.11.2.4. Fault status
12.4.11.11.2.5. Purchase and install and install 10 amp Run Command relay into contactor panels

12.4.11.12. The following control wires will be installed from the new PLC enclosure to heater contactor listed above (50' wire):

12.4.11.12.1. Control Power
12.4.11.12.1.1. 24 VDC from PLC enclosure power supply
12.4.11.12.1.2. 24 VDC Common from PLC enclosure power supply
12.4.11.12.2. Pump Controls
12.4.11.12.2.1. Auto switch
12.4.11.12.2.2. Hand switch
12.4.11.12.2.3. On status
12.4.11.12.2.4. Run Command (heater start command from PLC)

12.4.11.12.2.4.1. Purchase and install 10 amp Run Command relay into contactor panel

12.4.11.12.2.5. STP to the heater contactor only – loop powered (3 wire) (Temperature Probe)

12.4.11.12.3. The following control wires will be installed from the new PLC enclosure to scrubber sump (120' wire):

12.4.11.12.3.1. 24 VDC from PLC enclosure power supply

12.4.11.12.3.2. Low level float

12.4.12. **Scrubber Sump Pumps 17 and 18**

12.4.12.1. The scrubber sump is located outside next to the Thickener Scrubber.

12.4.12.2. Purchase one (1) new raintight duplex 120 VAC, single phase, 1 HP Sump Control Enclosures with disconnect and HOA switch.

12.4.12.3. Install new sump control enclosures on wall next to Thickener Scrubber controls.

12.4.12.4. From Scrubber NEMA 3R junction box install new ¾" conduit and feed each of the chemical pump contactors (30').

12.4.12.5. Install new ¾" conduit from contactors to sump motors (50') and connect sump pump motor conductors to new enclosure.

12.4.12.6. Install new ¾" conduit from 3R to sump contactors (30')

12.4.12.7. Use the 1" control conduits for the following sump controls (50' of wire):

12.4.12.7.1. Control Power

12.4.12.7.1.1. 24 VDC from PLC enclosure power supply

12.4.12.7.1.2. 24 VDC Common from PLC enclosure power supply

12.4.12.7.2. Pump Controls

12.4.12.7.2.1. Auto switch

12.4.12.7.2.2. Hand switch

12.4.12.7.2.3. Running status

12.4.12.7.2.4. Fault status

12.4.12.7.2.5. Purchase and install 10 amp Run Command relay into contactor enclosure

12.4.12.7.2.6. Run Command (pump start command from PLC)

12.4.12.8. Demo existing floats in sump pit.

12.4.12.9. Install new ¾" conduit from 3R to sump pit.

12.4.12.10. Purchase and install a NEMA 3R stainless steel 6" x 6" x 6" deep enclosure for float junction next to sump pit.

12.4.12.11. Purchase and install one new multi-point float assembly.

12.4.12.12. Install multi-point float into sump pit.

12.4.13. **Safety Shower**

12.4.13.1. Install new 1" conduit and wire from new PLC enclosure to safety shower (60') for the following.

12.4.13.1.1. 24 VDC from PLC enclosure power supply

12.4.13.1.2. Pressure switch

12.4.13.1.2.1. Terminate wires in junction box for future use.

12.4.14. **Peroxide Pump 1**

12.4.14.1. Purchase and install a NEMA 3R 1 – 1 HP single phase size 00 contactor for peroxide pump.

12.4.14.2. Install new ¾" conduit and one (1)) new 120 VAC 20-amp circuits for the Peroxide Pump from panel P5 to the Peroxide Pump Contactor (30').

12.4.14.2.1.1. Purchase and install one (1) new Westinghouse single pole 20-amp circuit breaker and install in spare location in the panel.

12.4.14.3. Tee off the 1" safety shower conduit for controls of the Peroxide Pump and pull the following wire to the existing enclosure outside the front door (60' wire):

12.4.14.3.1. Control Power

12.4.14.3.1.1. 24 VDC from PLC enclosure power supply

12.4.14.3.1.2. 24 VDC Common from PLC enclosure power supply

12.4.14.3.1.3. Pump control voltage for run command

12.4.14.3.2. Pump Controls

12.4.14.3.2.1. Auto switch

12.4.14.3.2.2. Hand switch

12.4.14.3.2.3. Running status

12.4.14.3.2.4. Fault status

12.4.14.3.2.5. Relocate Run Command relay into contactor panels

12.4.14.3.2.6. Pump start – from PLC run command relay

12.4.14.3.2.7. STP speed command (future)

12.4.14.3.2.8. STP tank level – loop powered (3 wire) (future)

12.4.14.3.2.9. Fill horn

12.4.14.4. Land both STP in contactor enclosure and supply terminal blocks for termination.

12.4.14.5. Purchase and install a horn near the contactor area.

12.4.15. **Network Equipment**

12.4.15.1. Install new 1" conduit from new PLC enclosure to fiber closet enclosure (10').

12.4.15.1.1. Route existing fiber cable through 1" conduit and reconnect to fiber closet.

12.4.15.1.2. Route existing fiber patch cables between fiber closet and network switch in new PLC enclosure.

12.4.15.2. Supply Ethernet patch cables to the network switch for the following:

12.4.15.2.1. Dell Wyse computer

12.4.15.2.2. Stratus Node 1

12.4.15.2.3. Stratus Node 2

12.4.15.2.4. Operator touch screen

12.4.15.2.5. PLC Processor

12.4.15.2.6. PLC NOE

12.5. **Demo Existing PLC enclosures**

12.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.

12.5.2. Demo and dispose of one (1) single door enclosure 36" x 90" x 27"

12.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

12.6. **Install New PLC Enclosure**

12.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 12.xx above

12.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

12.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

12.6.4. Extend conduits and wires to new enclosure as needed.

12.6.5. Terminate existing wiring per drawings

12.6.6. Terminate new wires per drawings

12.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

12.6.8. Reconnect Ethernet wires.

12.6.9. Reconnect fiber cables.

12.7. **Testing and Commissioning System**

12.7.1. Assist Avanceon and CMCMUA with testing and commissioning

12.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

12.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

12.8. **Remove Temporary PLC enclosure**

12.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

13. **WILDWOOD CLARIFIER BUILDING**

13.1. **Reference Drawings**

13.1.1. WildwoodClarifier.PDF

13.2. **Location Description**

13.2.1. Single story block building with brick face over block with overall dimensions of: 35' x 15' x 10' ceiling height.

13.2.2. Concrete basement with overall dimensions of: 25' x 280' x 30' ceiling height.

13.2.3. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

13.2.4. The Clarifier Building houses the clarifier controls, sludge pump controls, and sumps.

13.3. **Preliminary work before taking site off line:**

13.3.1. General

13.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

13.3.1.2. Remove fiber optic cable from existing wall next to enclosure in order to route fiber back into existing PLC enclosure to prep for existing enclosure removal, CMCMUA will assist.

13.3.2. Temporary PLC Setup:

13.3.2.1. Temporary PLC has been installed by CMCMUA.

13.4. **Individual Systems**

13.4.1. **Primary Sludge Pumps 1, 2, 3, 4, 5, 6, 7, 8, and 9**

13.4.1.1. Primary sludge pumps are located in the basement gallery.

13.4.1.2. Use existing 4" conduits to install wire from the new PLC enclosure to the wire trough in the gallery (80' of wire per pump). The wire trough is 16' off the floor and accessible by scaffold or ladder.

13.4.1.3. Distance from the wire trough to the location of each pump control is as follows (conduit size and modification distance will follow):

13.4.1.3.1. Pump 1 - 210'
13.4.1.3.2. Pump 2 - 210'
13.4.1.3.3. Pump 3 - 210'
13.4.1.3.4. Pump 4 - 140'
13.4.1.3.5. Pump 5 - 140'
13.4.1.3.6. Pump 6 - 140'
13.4.1.3.7. Pump 7 - 70'
13.4.1.3.8. Pump 8 - 70'
13.4.1.3.9. Pump 9 - 70'

13.4.1.4. Pull the following wires from the new PLC enclosure to the Primary Sludge Pump control enclosure as outlined above:

13.4.1.4.1. Control Power

13.4.1.4.1.1. 24 VDC from PLC enclosure power supply
13.4.1.4.1.2. 24 VDC Common from PLC enclosure power supply

13.4.1.4.2. Controls

13.4.1.4.2.1. Auto switch
13.4.1.4.2.2. Hand switch
13.4.1.4.2.3. Running status
13.4.1.4.2.4. Fault status
13.4.1.4.2.5. Run Command (pump start command from PLC)
13.4.1.4.2.6. Field install run command relay in enclosure
13.4.1.4.2.7. STP speed command

13.4.1.5. At each pump location pull back the existing Ethernet cable and incorporate into control conduit with above conductors.

13.4.1.6. At each pump location existing 1-½" conduit will be repurposed to route the control wires to the new VFD pump controls. At some pump locations the conduit will be shortened and other locations the conduit will be extended. Conduit extensions and modifications will use 1" conduit by use of a reducer. Existing conduit hanger system is Unistrut and can be used for all additional conduit except as noted. The follow list denotes conduit changes at each pump location:

13.4.1.6.1. Pump 1 - remove 90' add 20' of 1"
13.4.1.6.2. Pump 2 - remove 60' add 20' of 1"
13.4.1.6.3. Pump 3 - remove 30' add 20' of 1"
13.4.1.6.4. Pump 4 - remove 10' add 30' of 1"
13.4.1.6.5. Pump 5 - remove 10' add 60' of 1"
13.4.1.6.6. Pump 6 - remove 10' add 90' of 1"
13.4.1.6.7. Pump 7 - remove 30' add 20' of 1"
13.4.1.6.8. Pump 8 - remove 60' add 20' of 1"
13.4.1.6.9. Pump 9 - remove 90' add 20' of 1"

13.4.1.7. Overall an additional 60' of stainless steel Unistrut may be needed for additional conduit supports of the installed 1" conduit.

13.4.1.8. All conduits are presently wall mounted to Unistrut ranging from 4' to 10' off the floor.

13.4.2. **Secondary Sludge Pumps 10, 11, 12, 13, 14, 15, 16, 17, and 18**

13.4.2.1. Secondary sludge pumps are located in the basement gallery.

13.4.2.2. Use existing 4" conduits to install wire from the new PLC enclosure to the wire trough in the gallery (40' of wire per pump). The wire trough is 10' off the floor and accessible by scaffold or ladder.

13.4.2.3. From distance from the wire trough to the location of each pump control is as follows (conduit size and modification distance will follow):

13.4.2.3.1. Pump 10 - 210'
13.4.2.3.2. Pump 11 - 210'
13.4.2.3.3. Pump 12 - 210'
13.4.2.3.4. Pump 13 - 140'
13.4.2.3.5. Pump 14 - 140'
13.4.2.3.6. Pump 15 - 140'
13.4.2.3.7. Pump 16 - 70'
13.4.2.3.8. Pump 17 - 70'
13.4.2.3.9. Pump 18 - 70'

13.4.2.4. Pull the following wires from the new PLC enclosure to the Secondary Sludge Pump control enclosure as outlined above:

13.4.2.4.1. Control Power
13.4.2.4.1.1. 24 VDC from PLC enclosure power supply
13.4.2.4.1.2. 24 VDC Common from PLC enclosure power supply

13.4.2.4.2. Controls
13.4.2.4.2.1. Auto switch
13.4.2.4.2.2. Hand switch
13.4.2.4.2.3. Running status
13.4.2.4.2.4. Fault status
13.4.2.4.2.5. Run Command (pump start command from PLC)
13.4.2.4.2.6. Field install run command relay in enclosure
13.4.2.4.2.7. STP speed command

13.4.2.5. At each pump location pull back the existing Ethernet cable and incorporate into control conduit with above conductors.

13.4.2.6. At each pump location existing 1-½" conduit will be repurposed to route the control wires to the new VFD pump controls. At some pump locations the conduit will be shortened and other locations the conduit will be extended. Conduit extensions and modifications will use 1" conduit by use of a reducer. Existing conduit hanger system is Unistrut and can be used for all additional conduit except as noted. The follow list denotes conduit changes at each pump location:

13.4.2.6.1. Pump 10 - remove 90' add 20' of 1"
13.4.2.6.2. Pump 11 - remove 60' add 20' of 1"
13.4.2.6.3. Pump 12 - remove 30' add 20' of 1"
13.4.2.6.4. Pump 13 - remove 10' add 30' of 1"
13.4.2.6.5. Pump 14 - remove 10' add 60' of 1"
13.4.2.6.6. Pump 15 - remove 10' add 90' of 1"
13.4.2.6.7. Pump 16 - remove 30' add 20' of 1"
13.4.2.6.8. Pump 17 - remove 60' add 20' of 1"
13.4.2.6.9. Pump 18 - remove 90' add 20' of 1"

13.4.2.7. Overall an additional 60' of stainless steel Unistrut may be needed for additional conduit supports of the installed 1" conduit.

13.4.2.8. All conduits are presently wall mounted to Unistrut ranging from 4' to 10' off the floor.

13.4.3. **Sump Pumps 7 and 8 - Basement**

13.4.3.1. Purchase two (2) new 480 VAC, three phase, 5 HP Sump Control Enclosures with disconnect and HOA switch.

13.4.3.2. Demo existing sump control enclosure and float junction box.

13.4.3.3. Install new sump enclosures on stainless steel Unistrut (20') on concrete column near sump pit.

13.4.3.4. Demo 20' of existing ¾" conduit and reroute with new ¾" conduit in order to reuse existing 3 phase 480 VAC feed for both sump pumps (20').

13.4.3.5. Reconnect sump pump motor conductors to new enclosure routing pump cables behind concrete column.

13.4.3.5.1. Use cord grip fitting for sump motor cords.

13.4.3.6. Demo 20' of existing ¾" control conduit and reroute with new ¾" conduit in order to reuse existing with conduit for pump controls and floats for the following wire:

13.4.3.6.1. Control Power
13.4.3.6.1.1. 24 VDC from PLC enclosure power supply
13.4.3.6.1.2. 24 VDC Common from PLC enclosure power supply

13.4.3.6.2. Pump Controls
13.4.3.6.2.1. Auto switch
13.4.3.6.2.2. Hand switch
13.4.3.6.2.3. Running status
13.4.3.6.2.4. Fault status
13.4.3.6.2.5. Run Command (pump start command from PLC)
13.4.3.6.2.6. Field install run command relay in enclosure
13.4.3.6.2.7. Low level float (N.O.)
13.4.3.6.2.8. Stop float (N.O.)
13.4.3.6.2.9. Start float (N.O.)
13.4.3.6.2.10. Lag Start float (N.O.)
13.4.3.6.2.11. High level float (N.C.)

13.4.3.7. Demo existing floats and conduit in sump pit.
13.4.3.8. Use existing Unistrut bar for float attachment points.
13.4.3.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
13.4.3.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
13.4.3.11. Wire float wire to terminals in new PLC enclosure

13.4.4. **Primary and Secondary Flow Meters**
13.4.4.1. Locate and reuse existing STP for the Primary and Secondary Flow Meters.
13.4.4.2. Purchase and install six (6) field terminal blocks as needed for extension of wires to PLC.

13.4.5. **Primary Clarifiers 1, 2, 3, 4, 5, and 6**
13.4.5.1. Clarifiers are controlled through existing MCC's.
13.4.5.2. MCC's have ten (10) existing wires available for use that will be used for the following:
13.4.5.2.1. Control Power
13.4.5.2.1.1. 24 VDC from PLC enclosure power supply
13.4.5.2.2. Pump Controls
13.4.5.2.2.1. Running status
13.4.5.2.2.2. Fault status
13.4.5.2.3. Trace and identify wires to be used and leave the rest as spares in the MCC wireway and bottom of PLC enclosure.
13.4.5.2.4. Connect the 24 VDC common wire to terminals 15 and 13 on the MCC external control block.
13.4.5.2.5. Connect the running status wire to terminal 16 on the MCC control block.
13.4.5.2.6. Connect the fault status wire to terminal 14 on the MCC control block.
13.4.5.2.7. Remove the existing HOA switch from the MCC control plate.
13.4.5.2.8. Remove the forward and reverse buttons from the MCC control plate and cap the 30 mm holes.
13.4.5.2.9. Remove the hour meter from the MCC control plate and cap the 30 mm hole.
13.4.5.2.10. Remove the wires from all door controls.
13.4.5.2.11. Purchase and install a two-position switch with OFF ON legend plate.
13.4.5.2.11.1. Within the MCC bucket, install two (2) wires from control terminal blocks 1 and 2 to the ON switch terminals for control.
13.4.5.3. Reconnect existing wires in PLC enclosure for Primary Clarifier shear pin alarm. Existing pinout is as follows:
13.4.5.3.1. Clarifier 1: TB4-1 and TB4-4
13.4.5.3.2. Clarifier 2: TB4-9 and TB4-12
13.4.5.3.3. Clarifier 3: TB4-17 and TB4-20
13.4.5.3.4. Clarifier 4: TB4-25 and TB4-28
13.4.5.3.5. Clarifier 5: TB4-33 and TB4-36
13.4.5.3.6. Clarifier 6: TB4-41 and TB4-44

13.4.6. **Secondary Clarifiers 7, 8, 9, 10, 11, and 12**
13.4.6.1. Clarifiers are controlled through existing MCC's.
13.4.6.2. MCC's have ten (10) existing wires available for use that will be used for the following:

13.4.6.2.1. Control Power
13.4.6.2.1.1. 24 VDC from PLC enclosure power supply
13.4.6.2.2. Pump Controls
13.4.6.2.2.1. Running status
13.4.6.2.2.2. Fault status
13.4.6.2.3. Trace and identify wires to be used and leave the rest as spares in the MCC wireway and bottom of PLC enclosure.
13.4.6.2.4. Connect the 24 VDC common wire to terminals 15 and 13 on the MCC external control block.
13.4.6.2.5. Connect the running status wire to terminal 16 on the MCC control block.
13.4.6.2.6. Connect the fault status wire to terminal 14 on the MCC control block.
13.4.6.2.7. Remove the existing HOA switch from the MCC control plate.
13.4.6.2.8. Remove the forward and reverse buttons from the MCC control plate and cap the 30 mm holes.
13.4.6.2.9. Remove the hour meter from the MCC control plate and cap the 30 mm hole.
13.4.6.2.10. Remove the wires from all door controls.
13.4.6.2.11. Purchase and install a two-position switch with OFF ON legend plate.
13.4.6.2.11.1. Within the MCC bucket, install two (2) wires from control terminal blocks 1 and 2 to the ON switch terminals for control.
13.4.6.3. Reconnect existing wires in PLC enclosure for Secondary Clarifier shear pin alarm. Existing pinout is as follows:
13.4.6.3.1. Clarifier 7: TB13-1 and TB13-4
13.4.6.3.2. Clarifier 8: TB13-9 and TB13-12
13.4.6.3.3. Clarifier 9: TB13-17 and TB13-20
13.4.6.3.4. Clarifier 10: TB13-25 and TB13-28
13.4.6.3.5. Clarifier 11: TB13-33 and TB13-36
13.4.6.3.6. Clarifier 12: TB13-41 and TB13-44

13.4.7. **Suspended Solids and pH Meter**
13.4.7.1. Install new ¾" conduit and STP for Modbus communication from new PLC enclosure to SS Meter next to north door (70').
13.4.7.2. Terminate STP in PLC enclosure and SS meter.
13.4.7.3. Core hole through wall near SS meter for a 1" conduit for primary influent SS sensor, secondary influent SS sensor, and pH sensor (10'). Terminate conduit end with an anybody.

13.4.8. **Network Equipment**
13.4.8.1. Route existing fiber cables from new PLC enclosure to fiber closet enclosure through a chase nipple.
13.4.8.2. Route existing fiber patch cables through chase nipple and reconnect to fiber closet and network switch.
13.4.8.3. Supply Ethernet patch cables to the network switch for the following:
13.4.8.3.1. Dell Wyse computer
13.4.8.3.2. Stratus Node 1
13.4.8.3.3. Stratus Node 2
13.4.8.3.4. Operator touch screen
13.4.8.3.5. PLC Processor
13.4.8.3.6. PLC NOE

13.5. **Demo Existing PLC enclosures**

13.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
13.5.2. Demo and dispose of one (1) double door enclosure 72" x 90" x 27"
13.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

13.6. **Install New PLC Enclosure**

13.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 13.xx above
13.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
13.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
13.6.4. Extend conduits and wires to new enclosure as needed.
13.6.5. Terminate existing wiring per drawings
13.6.6. Terminate new wires per drawings
13.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
13.6.8. Reconnect Ethernet wires.
13.6.9. Reconnect fiber cables.

13.7. **Testing and Commissioning System**

13.7.1. Assist Avanceon and CMCMUA with testing and commissioning
13.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
13.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

13.8. **Remove Temporary PLC enclosure**

13.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

14. **WILDWOOD ADMIN BUILDING PLC**

14.1. **Reference Drawings**

14.1.1. WildwoodPlantElectrical.PDF

14.2. **Location Description**

14.2.1. Operations Control Room has block walls overlaid with sheetrock and drop ceiling.

14.3. **Preliminary work before taking site off line:**

14.3.1. None

14.4. **Individual Systems**

14.4.1. **Admin Sump Pumps**

14.4.1.1. Purchase and install two (2) new NEMA-3R 480 VAC, three phase, 25 HP Sump Control Enclosure with disconnect and HOA switch.

14.4.1.2. Install two (2) new sump pump control enclosures outside above sump pit.

14.4.1.3. Install new stainless steel Unistrut for sump enclosures (40').

14.4.1.4. Reuse existing 480 VAC feed for sump pumps

14.4.1.5. Reuse existing pump feed conductors.

14.4.1.6. Install new ¾" conduit between sump control enclosure to new PLC in Operations Control Room enclosure and pull and terminate the following wires for each sump pump (90'):

14.4.1.6.1. Control Power

14.4.1.6.1.1. 24 VDC from PLC enclosure power supply

14.4.1.6.1.2. 24 VDC Common from PLC enclosure power supply

14.4.1.6.2. Pump Controls

14.4.1.6.2.1. Auto switch

14.4.1.6.2.2. Hand switch

14.4.1.6.2.3. Running status

14.4.1.6.2.4. Fault status

14.4.1.6.2.5. Run Command (pump start command from PLC)

14.4.1.6.2.6. Purchase and field install 10-amp run command relay in enclosure

14.4.1.6.3. Floats

14.4.1.6.3.1. High level float (NC)

14.4.1.6.3.2. Lag start Float (NO)

14.4.1.6.3.3. Lead start float (NO)

14.4.1.6.3.4. Stop float (NO)

14.4.1.6.3.5. Low level float (NO)

14.4.1.7. Demo existing floats in sump pit

14.4.1.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

14.4.1.8.1. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

14.4.1.9. Wire new floats back to PLC

14.5. **Install new PLC Enclosure**

14.5.1. Mount new enclosure on wall in Control Room.

14.5.2. Extend conduits and wires to new enclosure as needed.

14.5.3. Terminate existing wiring per drawings

14.5.4. Terminate new wires per drawings

14.5.5. Re-connect existing 120 VAC feeder to new PLC enclosure

14.5.6. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

14.5.7. Purchase and install new Isolation barriers on the back enclosure closest to entry point of the wires for the following intrinsically safe equipment:
- 14.5.7.1. High level float (NC)
- 14.5.7.2. Lag start Float (NO)
- 14.5.7.3. Lead start float (NO)
- 14.5.7.4. Stop float (NO)
- 14.5.7.5. Low level float (NO)

14.6. **Testing and Commissioning System**

14.6.1. Assist Avanceon and CMCMUA with testing and commissioning

14.6.2. The electrical contractor will need to support our testing of the equipment and wiring they installed

14.6.3. Transfer the wiring from temporary PLC to new PLC and commission.

14.7. **Remove Temporary PLC enclosure:**

14.7.1. None

15. **WILDWOOD CHEMICAL ADDITION PLC5**

15.1. **Reference Drawings**

15.1.1. ChemicalAdditionElectrical.PDF

15.2. **Location Description**

15.2.1. Block building with brick face with overall dimensions of 30' x 70' x 14' ceiling height.

15.2.2. Flat roof above ground floor made of prestressed concrete slabs. Indoor ladder access from indoor scrubber area to roof. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

15.3. **Preliminary work before taking site off line:**

15.3.1. General

15.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

15.3.2. Temporary PLC Setup:

15.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

15.3.2.2. Mount Temporary PLC

15.3.2.3. Install temporary power to PLC

15.3.2.4. Work with CMCMUA to remove existing fiber optics from enclosure and reconnect outside enclosure for network connection.

15.3.2.5. Establish communications to the Work Stations with the assistance of the CMCMUA

15.3.2.6. PLC code will be provided by CMCMUA

15.3.2.7. HMI code will be provided by CMCMUA

15.3.2.8. Wire items listed in section 15.3.3 below to temporary PLC.

15.3.2.9. Confirm operation of each item as it's moved with the assistance of the CMCMUA

15.3.3. Wire to Temporary PLC and Auto Dialer:

15.3.3.1. Build a temporary enclosure/backplane per the drawings and install temporary PLC.

15.3.3.2. Install temporary wire to temporary PLC for chemical controls and associated equipment

15.3.3.3. Use the pre-wired connector with wire whip provided by the CMCMUA to install temporary wire to the six (6) chemical pumps and pick up the following points:

15.3.3.3.1. 24 VDC

15.3.3.3.2. 0 VDC

15.3.3.3.3. FVS TFD status

15.3.3.3.4. Alarm status

15.3.3.3.5. Running status

15.3.3.3.6. Run command

15.3.3.3.7. Analog Speed Command

15.3.3.3.8. Analog RPM feedback

15.3.3.4. Install temporary wire to temporary PLC for three (3) chemical probe controls and associated equipment (30' each)

15.3.3.4.1. Analog residual reading

15.3.3.5. Remove existing system pressure STP wire from existing PLC and pull back to transmitter location. Extend STP to temporary PLC (30')

15.3.3.6. Install temporary wire to sump high level float and containment area high level float (30' each)

15.3.3.6.1. 24 VDC

15.3.3.6.2. Sump float

15.3.3.6.3. 24 VDC

15.3.3.6.4. Containment float

15.3.3.7. Coordinate with Operations to take an outage for two (2) Sample Pumps. Remove existing wires from existing PLC and pull back into 1-1/4" conduit to the first tee. Route wires out through the tee and extend wires to temporary PLC for the following points (25' each):

15.3.3.7.1. Control Power

15.3.3.7.1.1. 24 VDC

15.3.3.7.1.2. 0 VDC

15.3.3.7.2. Status

15.3.3.7.2.1. Hand status

15.3.3.7.2.2. Auto status

15.3.3.7.2.3. Fault status

15.3.3.7.2.4. Running status

15.3.3.7.2.5. Run command

15.3.4. Items not needed on temporary PLC:

15.3.4.1. Post flow meter

15.3.4.2. Pre flow meter

15.3.4.3. Dilution flow meter

15.3.4.4. CL2 tank 1 level transmitter

15.3.4.5. CL2 tank 2 level transmitter

15.3.4.6. CL2 tank 3 level transmitter

15.3.4.7. CL2 tank 4 level transmitter

15.3.4.8. CL2 tank 5 level transmitter

15.3.4.9. CL2 tank 6 level transmitter

15.3.4.10. Safety shower sensors

15.3.4.11. Sump pump 1

15.3.4.12. Sump pump 2

15.4. **Individual Systems**

15.4.1. **Chemical Pumps 1, 2, 3, 4, 5, and 6**

15.4.1.1. Existing control wires will be removed from flow meter and existing 2" conduit and temporary wire whips shall be pulled through existing 2" conduit back to new PLC Enclosure and terminated according to electrical drawings for the permanent connection.

15.4.2. **Chemical Flow Meters 1, 2, 3, and 4**

15.4.2.1. Install new STP through existing 2" conduit with Chemical Pump control wires for each of the four (4) flow meters and terminate according to electrical drawings for the permanent connection (50' each).

15.4.3. **Chemical Probes 1, 2, and 3**

15.4.3.1. Install new STP through existing 3/4" conduit with for each of the three (3) probes and terminate according to electrical drawings for the permanent connection (40' each).

15.4.4. **Chemical Tanks 1, 2, 3, 4, 5, and 6**

15.4.4.1. Purchase and install field terminal blocks in the new PLC Enclosure for existing STP wires for the six (6) chemical tank level transmitters – loop powered (3 wire) (18 blocks).

15.4.4.2. Terminate existing filed wires to field terminal blocks.

15.4.4.3. From field terminal blocks install wires to analog terminals per drawing.

15.4.4.4. Reconnect existing wires for existing fill alarm horn per electrical drawings.

15.4.5. **Safety Shower**

15.4.5.1. Reconnect existing wires for existing three (3) safety showers per electrical drawings.

15.4.6. **Chemical Containment Sump Pumps**

15.4.6.1. 480 VAC, three phase, 5 HP two (2) new Sump Control Enclosures with disconnect and HOA switch.

15.4.6.2. Install new pump control enclosures on wall in place of existing sump panel.

15.4.6.3. Reuse existing 480 VAC circuit for both sump controllers.

15.4.6.4. Reuse existing 2" conduit to route existing sump pump feed wires to new sump controllers.

15.4.6.5. Install new 1" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the two (2) sump pump enclosures (70'):

15.4.6.5.1. Control Power

15.4.6.5.1.1. 24 VDC from PLC enclosure power supply

15.4.6.5.1.2. 24 VDC Common from PLC enclosure power supply

15.4.6.5.2. Pump Controls

15.4.6.5.2.1. Auto switch

15.4.6.5.2.2. Hand switch

15.4.6.5.2.3. Running status

15.4.6.5.2.4. Fault status

15.4.6.5.2.5. Run Command (pump start command from PLC)

15.4.6.5.2.5.1. Field install run command relay in enclosure

15.4.6.6. Install new 1" conduit between sump pit and new PLC enclosure and pull the following wires to new PLC enclosure (120').

15.4.6.6.1. Control Power

15.4.6.6.1.1. 24 VDC from PLC enclosure power supply

15.4.6.6.2. Controls

15.4.6.6.2.1. Low level float (N.O.)

15.4.6.6.2.2. Stop float (N.O.)

15.4.6.6.2.3. Start float (N.O.)

15.4.6.6.2.4. Lag Start float (N.O.)

15.4.6.6.2.5. High level float (N.C.)

15.4.6.7. Demo existing floats and conduit in sump pit.

15.4.6.8. Install new Unistrut float hanger bar (10' Unistrut)

15.4.6.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

15.4.6.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats. Demo existing sump pump enclosure.

15.4.7. **Sample Pumps 7 and 8**

15.4.7.1. Purchase and install field terminal blocks in the new PLC Enclosure for existing two (2) existing Sample Pumps (14 blocks).

15.4.7.2. Terminate existing filed wires to field terminal blocks.

15.4.7.3. From field terminal blocks install wires to terminals per drawing for the following wires:

15.4.7.3.1. Control power

15.4.7.3.1.1. 24 VDC from PLC enclosure power supply

15.4.7.3.1.2. 0 VDC from PLC enclosure power supply

15.4.7.3.2. Status

15.4.7.3.2.1. Auto switch

15.4.7.3.2.2. Hand switch
15.4.7.3.2.3. Running status
15.4.7.3.2.4. Fault status
15.4.7.3.2.5. Run Command (pump start from PLC)

15.4.8. **Chemical Containment High Level Float**

15.4.8.1. Purchase and install field terminal blocks in the new PLC Enclosure for existing Containment High Level Float (2 blocks).

15.4.8.2. Terminate existing filed wires to field terminal blocks.

15.4.8.3. From field terminal blocks install wires to terminals per drawing for the following wires:

15.4.8.3.1. 24 VDC from PLC enclosure power supply

15.4.8.3.2. Chemical Containment Float status

15.5. **Demo Existing PLC enclosure**

15.5.1. Safe off the wires, lift from existing enclosure and pull back.

15.5.2. Demo and dispose of one (1) enclosure

15.5.2.1. Steel double door enclosure

15.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

15.6. **Install New PLC Enclosure**

15.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 15.xx above

15.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

15.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor with doors facing West.

15.6.4. Extend conduits and wires to new enclosure as needed.

15.6.5. Terminate existing wiring per drawings

15.6.6. Terminate new wires per drawings

15.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

15.6.8. Work with CMCMUA to reroute and reconnect fiber optic cables in new PLC Enclosure

15.7. **Testing and Commissioning System**

15.7.1. Assist Avanceon and CMCMUA with testing and commissioning

15.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

15.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

15.8. **Remove Temporary PLC enclosure**

15.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

16. **WILDWOOD PRIMARY SCUM**

16.1. **Reference Drawings**

16.1.1. WildwoodPrimaryScumElectrical.PDF

16.2. **Location Description**

16.2.1. Raised single story block building and basement with brick face block with overall dimensions of:

16.2.1.1. Upper Floor 10' x 15' x 8' ceiling height.

16.2.1.2. Basement 30' x 15' x 20' ceiling height

16.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

16.2.3. The Primary Scum Building houses the Scum Pumps and sumps.

16.3. **Preliminary work before taking site off line:**

16.3.1. General

16.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

16.3.1.2. Remove fiber optic cable from back wall of enclosure in order to prep for existing enclosure removal.

16.3.2. No temporary PLC is needed in this location.

16.4. **Individual Systems**

16.4.1. **Scum Pumps 1 and 2**

16.4.1.1. Demo existing Scum Pump contactor, Unistrut, and control conduits to PLC enclosure (20' of 1").

16.4.1.2. Purchase and install new two (2) new indoor wall mount motor contactors for 480 VAC, three phase, 7.5 HP motors with disconnect and HOA switch.

16.4.1.3. Install new 1" control conduit from the new PLC enclosure to the new motor contactors for the following wires:

16.4.1.3.1. Control Power

16.4.1.3.1.1. 24 VDC from PLC enclosure power supply

16.4.1.3.1.2. 24 VDC Common from PLC enclosure power supply

16.4.1.3.2. Controls

16.4.1.3.2.1. Auto switch

16.4.1.3.2.2. Hand switch

16.4.1.3.2.3. Running status

16.4.1.3.2.4. Fault status

16.4.1.3.2.5. Run Command (pump start command from PLC)

16.4.1.3.2.5.1. Field install run command relay in enclosure

16.4.2. **Scum Grinders 1 and 2**

16.4.2.1. Purchase and install a new HOA switch with four contact blocks on the door of the grinder enclosure.

16.4.2.1.1. Reconnect existing 120 VAC controls on the new switch.

16.4.2.2. Use existing spare conductors in the Grinder Control Enclosure and the existing PLC Enclosure for the following controls:

16.4.2.2.1. Control Power

16.4.2.2.1.1. 24 VDC from PLC enclosure power supply

16.4.2.2.1.2. 24 VDC Common from PLC enclosure power supply

16.4.2.2.2. Controls

16.4.2.2.2.1. Auto switch

16.4.2.2.2.2. Hand switch

16.4.2.2.2.3. Running status

16.4.2.2.2.4. Fault status

16.4.2.2.2.5. Run Command (pump start command from PLC)

16.4.2.2.2.5.1. Field install run command relay in enclosure

16.4.2.3. Purchase and install ten (10) field terminal blocks in order to extend wires to the new PLC terminals.

16.4.3. **Sump Pumps 19 and 20 - Basement**

16.4.3.1. Purchase two (2) new Sump Control Enclosures (120VAC).

16.4.3.2. Demo existing sump control enclosure.

16.4.3.3. Install new pump control enclosures on wall and reuse existing 120 VAC feed for both sump pumps.

16.4.3.4. Reconnect sump pump motor conductors to new enclosure.

16.4.3.4.1. Use cord grip fitting for sump motor cords.

16.4.3.5. Use existing 1" control conduit for pump controls and floats and pull new wire for the following controls (80' wire):

16.4.3.5.1. Control Power

16.4.3.5.1.1. 24 VDC from PLC enclosure power supply

16.4.3.5.1.2. 24 VDC Common from PLC enclosure power supply

16.4.3.5.2. Pump Controls

16.4.3.5.2.1. Auto switch

16.4.3.5.2.2. Hand switch

16.4.3.5.2.3. Running status

16.4.3.5.2.4. Fault status

16.4.3.5.2.5. Run Command (pump start command from PLC)

16.4.3.5.2.5.1. Field install run command relay in enclosure

16.4.3.5.2.6. Low level float (N.O.)

16.4.3.5.2.7. Stop float (N.O.)

16.4.3.5.2.8. Start float (N.O.)

16.4.3.5.2.9. Lag Start float (N.O.)

16.4.3.5.2.10. High level float (N.C.)

16.4.3.6. Demo existing floats, hangers, and conduit in sump pit.

16.4.3.7. Purchase and install new stainless steel Unistrut (10') for float hanger bar

16.4.3.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

16.4.3.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

16.4.3.10. Wire float wire to terminals in new PLC enclosure

16.4.4. **Scum Tank**

16.4.4.1. Purchase and install a new ultra-sonic level sensor for the scum tank level.

16.4.4.2. Install new sensor in place of the existing sensor.

16.4.4.3. Use the existing conduit and remove the STP and pull the following wires (80' wire):

16.4.4.3.1. Control Power

16.4.4.3.1.1. 24 VDC from PLC enclosure power supply

16.4.4.3.2. Status Wires

16.4.4.3.2.1. High-level float (25' cable)

16.4.4.3.2.2. STP Ultra-Sonic level – loop powered (2 wire)

16.4.4.3.3. Purchase and install a N.C. weighted float

16.4.4.4. Purchase and install an anybody and new flex between existing ¾" conduit, new ultra-sonic sensor, and high-level float (6').

16.4.5. **Scum Tank Mixer 1 and 2**

16.4.5.1. Demo existing NEMA 4X contactors and return to the CMCMUA.

16.4.5.2. Demo existing stainless steel Unistrut and reuse where needed.

16.4.5.3. Cap existing 1" holes in fiberglass wire trough (2).
16.4.5.4. Install two (2) new 1" conduits to extend 480 VAC three phase feed conductors from fiberglass wire trough to inside of control building. Install conduit around the outside of the tank (140' plus two (2) cores through brick/block wall).
16.4.5.5. Purchase and install two (2) new 480 VAC, three phase, 25 HP rated indoor contactors with disconnect HOA switch and mount on wall next to scum pump contactors.
16.4.5.6. Use the 1" conduit above for the motor conductors to be routed back to the mixer locations and tee out of the 1" conduit and purchase and install a 6" x 6" x 6" stainless steel NEMA 4X enclosure for motor connections (mixer has rubber cord in the style of a submersible pump).
16.4.5.7. For the east mixer an additional ¾" conduit will need to be installed from the wire trough to the mixer location (40' plus 10' Unistrut).
16.4.5.8. Install new ¾" conduit from the new PLC enclosure to the mixer contactors for the following control wires (20'):
16.4.5.8.1. Control Power
16.4.5.8.1.1. 24 VDC from PLC enclosure power supply
16.4.5.8.1.2. 24 VDC Common from PLC enclosure power supply
16.4.5.8.2. Pump Controls
16.4.5.8.2.1. Auto switch
16.4.5.8.2.2. Hand switch
16.4.5.8.2.3. Running status
16.4.5.8.2.4. Fault status
16.4.5.8.2.5. Run Command (pump start command from PLC)
16.4.5.8.2.5.1. Field install 10-amp run command relay in enclosure

16.4.6. **Suspended Solids Meter**
16.4.6.1. Remove LP-06-3 14" x 14" x 8" steel enclosure and Unistrut from wall next to door.
16.4.6.1.1. Demo control and power wiring.
16.4.6.1.2. Use existing 120VAC power wiring and install a duplex receptacle on the wall for the sampler.
16.4.6.2. In place of the LP-06-3 enclosure mount the new Suspended Solids meter provided by the CMCMUA.
16.4.6.3. Install new ¾" conduit and STP for Modbus communication and 120 VAC power circuit from new PLC enclosure to SS Meter next to east door (20').
16.4.6.4. Terminate STP and power wires in PLC enclosure and SS meter.
16.4.6.5. Core hole through wall near SS meter for a 1" conduit for primary effluent SS sensor (10'). Terminate conduit end with an anybody.
16.4.6.6. Pull sensor cable, provided by the CMCMUA, through conduit and terminate in the SS meter.

16.4.7. **Network Equipment**
16.4.7.1. Mount the fiber closet enclosure on the PLC backplane per the drawings.
16.4.7.2. Mount the network switch on the PLC backplane per the drawings
16.4.7.3. Purchase and install Ethernet patch cables to the network switch for the following:
16.4.7.3.1. PLC Processor
16.4.7.3.2. PLC NOE

16.5. **Demo Existing PLC enclosures**
16.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
16.5.2. Demo and dispose of one (1) single door enclosure 36" x 90" x 27"

16.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

16.6. **Install New PLC Enclosure**

16.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 16.xx above

16.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

16.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

16.6.4. Extend conduits and wires to new enclosure as needed.

16.6.5. Terminate existing wiring per drawings

16.6.6. Terminate new wires per drawings

16.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

16.6.8. Reconnect Ethernet wires.

16.6.9. Reconnect fiber cables.

16.7. **Testing and Commissioning System**

16.7.1. Assist Avanceon and CMCMUA with testing and commissioning

16.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

16.8. **Remove Temporary PLC enclosure**

16.8.1. None

17. **WILDWOOD SECONDARY SCUM**

17.1. **Reference Drawings**

17.1.1. WildwoodSecondaryScumElectrical.PDF

17.2. **Location Description**

17.2.1. Single story block building and basement with brick face over block with overall dimensions of:

17.2.1.1. Ground Floor 20' x 10' x 8' ceiling height.

17.2.1.2. Basement 30' x 15' x 20' ceiling height

17.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

17.2.3. The Secondary Scum Building houses the scum pumps, sample pumps, scum tank mixers, and sumps.

17.3. **Preliminary work before taking site off line:**

17.3.1. General

17.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

17.3.1.2. Remove fiber optic cable from existing wall next to enclosure in order to route fiber back into existing PLC enclosure to prep for existing enclosure removal, CMCMUA will assist.

17.3.2. Temporary PLC Setup:

17.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

17.3.2.2. Mount Temporary PLC

17.3.2.3. Install temporary power to PLC

17.3.2.4. Establish communications to the network with the assistance of the CMCMUA

17.3.2.5. PLC code will be provided by CMCMUA

17.3.2.6. No touchscreen HMI is needed at this location

17.3.2.7. Wire items listed in section 17.3.3 below to temporary PLC.

17.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

17.3.3. Wire to Temporary PLC:

17.3.3.1. Install temporary wire to the sample pump enclosures and pick up the following points:

17.3.3.1.1. Pumps 10 and 09 Auto from HOA Switches

17.3.3.1.2. Pumps 10 and 09 Running Status

17.3.3.1.3. Pumps 10 and 09 Fault Status

17.3.3.1.4. Pumps 10 and 09 Run commands

17.3.4. Items not needed on temporary PLC:

17.3.4.1. Secondary scum tank mixers

17.3.4.2. Secondary scum level

17.3.4.3. Secondary scum pumps

17.3.4.4. Sump pumps

17.4. **Individual Systems**

17.4.1. **Sample Pumps 09 and 10**

17.4.1.1. Prior to installing temporary PLC, purchase and install two (2) new indoor wall mount contactors for 480 VAC, three phase, 1 HP, 1.8 Amp motors with disconnect and HOA switch.

17.4.1.1.1. One (1) pump must remain on at all times, even if in hand.

17.4.1.2. Demo existing Sample Pump contactor and control conduits to PLC enclosure (20' of 1").

17.4.1.3. Install new 1" control conduit from the new PLC enclosure to the new motor contactors for the following wires:
- 17.4.1.3.1. Control Power
  - 17.4.1.3.1.1. 24 VDC from PLC enclosure power supply
  - 17.4.1.3.1.2. 24 VDC Common from PLC enclosure power supply
- 17.4.1.3.2. Controls
  - 17.4.1.3.2.1. Auto switch
  - 17.4.1.3.2.2. Hand switch
  - 17.4.1.3.2.3. Running status
  - 17.4.1.3.2.4. Fault status
  - 17.4.1.3.2.5. Run Command (pump start command from PLC)
    - 17.4.1.3.2.5.1. Field install run command relay in enclosure

17.4.2. **Scum Pumps 03 and 04**

17.4.2.1. Prior to installing temporary PLC, purchase and install two (2) new indoor wall mount contactors for 480 VAC 7.5 HP motors with HOA switch per detail drawing attached.

17.4.2.2. Demo existing Scum Pump contactor and control conduits to PLC enclosure (20' of 1").

17.4.2.3. Install new 1" control conduit from the new PLC enclosure to the new motor contactors for the following wires:
- 17.4.2.3.1. Control Power
  - 17.4.2.3.1.1. 24 VDC from PLC enclosure power supply
  - 17.4.2.3.1.2. 24 VDC Common from PLC enclosure power supply
- 17.4.2.3.2. Controls
  - 17.4.2.3.2.1. Auto switch
  - 17.4.2.3.2.2. Hand switch
  - 17.4.2.3.2.3. Running status
  - 17.4.2.3.2.4. Fault status
  - 17.4.2.3.2.5. Run Command (pump start command from PLC)
    - 17.4.2.3.2.5.1. Field install run command relay in enclosure

17.4.3. **Sump Pumps 21 and 22 - Basement**

17.4.3.1. Purchase and install two (2) new 120 VAC, single phase, 5 HP Sump Control Enclosures with disconnect and HOA switch.

17.4.3.2. Demo existing sump control enclosure.

17.4.3.3. Install new pump control enclosures on wall and reuse existing 120 VAC feed for both sump pumps.

17.4.3.4. Reconnect sump pump motor conductors to new enclosure.
- 17.4.3.4.1. Use cord grip fitting for sump motor cords.

17.4.3.5. Use existing ¾" control conduit for pump controls and floats, demo existing wire in conduit, and pull new wire for the following controls (100' wire through large junction box in basement 15' off the floor):
- 17.4.3.5.1. Control Power
  - 17.4.3.5.1.1. 24 VDC from PLC enclosure power supply
  - 17.4.3.5.1.2. 24 VDC Common from PLC enclosure power supply
- 17.4.3.5.2. Pump Controls
  - 17.4.3.5.2.1. Auto switch
  - 17.4.3.5.2.2. Hand switch
  - 17.4.3.5.2.3. Running status
  - 17.4.3.5.2.4. Fault status
  - 17.4.3.5.2.5. Run Command (pump start command from PLC)
    - 17.4.3.5.2.5.1. Field install run command relay in enclosure

17.4.3.5.2.6. Low level float (N.O.)
17.4.3.5.2.7. Stop float (N.O.)
17.4.3.5.2.8. Start float (N.O.)
17.4.3.5.2.9. Lag Start float (N.O.)
17.4.3.5.2.10. High level float (N.C.)

17.4.3.6. Demo existing floats, hangers, and conduit in sump pit.

17.4.3.7. Purchase and install new stainless steel Unistrut (10') for float hanger bar

17.4.3.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

17.4.3.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

17.4.3.10. Wire float wire to terminals in new PLC enclosure

17.4.4. **Scum Tank**

17.4.4.1. Purchase and install a new ultra-sonic level sensor for the scum tank level.

17.4.4.2. Install new sensor in place of the existing sensor.

17.4.4.3. Use the existing conduit and remove the STP and pull the following wires (80' wire):

17.4.4.3.1. Control Power

17.4.4.3.1.1. 24 VDC from PLC enclosure power supply

17.4.4.3.2. Status Wires

17.4.4.3.2.1. STP Ultra-Sonic level – loop powered (3 wire)

17.4.5. **Scum Tank Mixer 03 and 04 and High-Level Float**

17.4.5.1. Install a new ¾" conduit from new PLC enclosure to south mixer hatch (80').

17.4.5.2. Core through block and brick and route conduit south along building wall.

17.4.5.3. Purchase and install stainless steel Unistrut and piggy back to extend new Unistrut on existing Unistrut along railing (30' of strut).

17.4.5.4. Install wires and enclosure for high-level float:

17.4.5.4.1. Control Power

17.4.5.4.1.1. 24 VDC from PLC enclosure power supply

17.4.5.4.2. Status Wires

17.4.5.4.2.1. High-level float

17.4.5.4.3. Purchase and install a N.C. weighted float

17.4.5.5. Demo existing two (2) ¾" conduits from existing PLC enclosure to mixer pad (20').

17.4.5.6. On the mixer pad demo the existing single door enclosure (36" x 48" x 10") that houses old mixer controls.

17.4.5.7. Demo existing steel Unistrut (20').

17.4.5.8. Purchase and install a new stainless steel raintight wire trough (12" x 36" x 12") and install on existing four (4) 1" conduits stubs. Conduits come from concrete and are existing power and control conduits to old mixer control enclosure and conduits are in good shape.

17.4.5.9. From the new wire trough, install two (2) new 1" conduits, following the route of the high-level float conduit, to extend the existing 480 VAC three phase feed conductors to inside of control building. (100' plus two (2) cores through brick/block wall).

17.4.5.10. Purchase and install two (2) new 480 VAC, three phase, 25 HP rated indoor contactors with disconnect and HOA switch and mount on wall next to new PLC enclosure on north wall.

17.4.5.11. Use the two (2) 1" power conduits above for the motor conductors to be routed back to the mixer locations and tee out of the 1" conduit and install a 6" x 6" x 6" stainless steel NEMA 4X enclosure for motor connections (mixer has rubber cord in the style of a submersible pump).

17.4.5.12. For the north mixer an additional ¾" conduit will need to be installed from the wire trough to the mixer location (40' plus 10' Unistrut).

17.4.5.13. Install new ¾" conduit from the new PLC enclosure to the two (2) mixer contactors for the following control wires (20'):

17.4.5.13.1. Control Power

17.4.5.13.1.1. 24 VDC from PLC enclosure power supply

17.4.5.13.1.2. 24 VDC Common from PLC enclosure power supply

17.4.5.13.2. Pump Controls

17.4.5.13.2.1. Auto switch

17.4.5.13.2.2. Hand switch

17.4.5.13.2.3. Running status

17.4.5.13.2.4. Fault status

17.4.5.13.2.5. Run Command (pump start command from PLC)

17.4.5.13.2.5.1. Field install 10 amp run command relay in enclosure

17.4.6. **Network Equipment**

17.4.6.1. Mount the fiber closet enclosure on the PLC backplane per the drawings.

17.4.6.2. Mount the network switch on the PLC backplane per the drawings

17.4.6.3. Purchase and install Ethernet patch cables to the network switch for the following:

17.4.6.3.1. PLC Processor

17.4.6.3.2. PLC NOE

17.5. **Demo Existing PLC enclosures**

17.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.

17.5.2. Demo and dispose of one (1) single door enclosure 36" x 90" x 27"

17.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

17.6. **Install New PLC Enclosure**

17.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 17.xx above

17.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

17.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

17.6.4. Extend conduits and wires to new enclosure as needed.

17.6.5. Terminate existing wiring per drawings

17.6.6. Terminate new wires per drawings

17.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

17.6.8. Reconnect Ethernet wires.

17.6.9. Reconnect fiber cables.

17.7. **Testing and Commissioning System**

17.7.1. Assist Avanceon and CMCMUA with testing and commissioning

17.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

17.8. **Remove Temporary PLC enclosure**

17.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

CAPE MAY FACILITY

18. **MADISON AVENUE PUMP STATION NOTE:**
    - 18.1. **Reference Drawings**
        - 18.1.1. MadisonAvenuePumpStationElectrical.PDF
    - 18.2. **Station Description**
        - 18.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 25' x 30' x 13' ceiling height.
        - 18.2.2. Poured concrete walls underground with single landing 10' below grade, a second landing 20' below grade, and bottom level 34' below grade where dry well pumps are located.
        - 18.2.3. Wet Well Class I Division I confined space below grade with dimensions of 34' x 16' x 24' depth. Separated from dry side with poured concrete wall.
        - 18.2.4. There is no conduit concrete cutout access to lower level. Cores will need to be drilled through 16" of concrete in the floor beneath the new PLC enclosure.
        - 18.2.5. There is an attic above the ground floor accessible by fixed ladder from generator room for conduit paths. The ceiling is sheetrock with wood joists.
    - 18.3. **Preliminary work before taking site off line:**
        - 18.3.1. General
            - 18.3.1.1. Trace and tag all field wiring in existing PLC enclosure.
        - 18.3.2. Temporary PLC Setup:
            - 18.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.
            - 18.3.2.2. Mount Temporary PLC
            - 18.3.2.3. Install temporary power to PLC
            - 18.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA
            - 18.3.2.5. PLC code will be provided by CMCMUA
            - 18.3.2.6. HMI code will be provided by CMCMUA
            - 18.3.2.7. Wire items listed in section 18.3.3 below to temporary PLC.
            - 18.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA
        - 18.3.3. Wire to Temporary PLC and Auto Dialer:
            - 18.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.
            - 18.3.3.2. Install Bubbler system provided by CMCMUA.
            - 18.3.3.3. Install temporary wire to temporary PLC for Well Level control
            - 18.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:
                - 18.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches
                - 18.3.3.4.2. Pumps 1 and 2 Running Status
                - 18.3.3.4.3. Pumps 1 and 2 Fault Status
                - 18.3.3.4.4. Pumps 1 and 2 Run commands
                - 18.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)
            - 18.3.3.5. Reuse existing Auto Dialer.
                - 18.3.3.5.1. Extend existing phone line to Auto Dialer
            - 18.3.3.6. Install temporary wire to Auto Dialer for the following:
                - 18.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.
                - 18.3.3.6.2. Phone line
        - 18.3.4. Items not needed on temporary PLC:
            - 18.3.4.1. Flow Meter
            - 18.3.4.2. Grinder HOA and Running Status

18.3.4.3. Grinder Failure Status
18.3.4.4. Conveyance Pumps 3
18.3.4.5. Drywell Sumps 1 & 2
18.3.4.6. Compressor 1 & 2 Pressures
18.3.4.7. Bubbler Purge and Isolation Valves
18.3.4.8. Exhaust and Supply Fans
18.3.4.9. Generator Day Tank
18.3.4.10. Generator
18.3.4.11. Transfer Switch
18.3.4.12. Diesel Tank Level
18.3.4.13. Temperature Control
18.3.4.14. Door Switches
18.3.4.15. Scrubber system

18.4. **Individual Systems**

18.4.1. **Bubbler Control Enclosure**

18.4.1.1. Demo existing PVC 12" x 8" x 10" bubbler enclosure.
18.4.1.2. Demo existing air compressor and return to CMCMUA
18.4.1.3. Demo existing 12" x 12" x 6" PVC control enclosure for compressors
18.4.1.4. Demo existing receptacles
18.4.1.4.1. Safe off existing electrical conductors
18.4.1.4.2. Install two (2) air compressors, supplied by the CMCMUA, on the floor beneath the new bubbler enclosure.
18.4.1.4.3. Install new ¾" conduit from Panel 1 (120VAC) to the compressors (80').
18.4.1.4.3.1. Install two (2) 120VAC circuits for two (2) existing compressors.
18.4.1.4.3.2. Reuse existing breakers the two 120 VAC circuits.
18.4.1.4.3.3. Install two (2) 120VAC 20-amp receptacles for the two (2) compressors.
18.4.1.5. Install Bubbler Control Enclosure provided by CMCMUA next to new PLC enclosure. Leave room for sump pump controllers and flow meter display.
18.4.1.5.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D
18.4.1.5.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):
18.4.1.5.2.1. 1 STP for Compressor 1 Pressure transmitter
18.4.1.5.2.2. 1 STP for Compressor 2 Pressure transmitter
18.4.1.5.2.3. 1 STP Wet Well Level transmitter
18.4.1.5.2.4. 24DVC signal and common for isolation control solenoid valve
18.4.1.5.2.5. 24DVC signal and common for purge control solenoid valve
18.4.1.5.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe.
18.4.1.5.3.1. CMCMUA will provide the flexible tubing: 25 Feet
18.4.1.5.4. Mount air compressors on floor beneath new bubbler enclosure

18.4.2. **Sump Pumps 1 and 2 in Dry Well**

18.4.2.1. Purchase two (2) new 120 VAC single phase 3 HP Sump Control Enclosures.
18.4.2.2. Install new pump control enclosures on wall next to the bubbler enclosure.

18.4.2.3. Install new ¾" conduit from Panel 1 (120VAC) for two (2) 120 VAC feeds to the sump controllers.
18.4.2.3.1. Use existing sump breaker breakers.
18.4.2.4. Core through floor and install two (2) new ¾" conduits to the sump motors in the dry well (120').
18.4.2.4.1. Terminate conduit with two (2) junction boxes, one for each sump pump, and route sump pump wires to junction box.
18.4.2.4.2. Pull motor circuit wires and connect pumps and connect to sump pump wires.
18.4.2.5. Install new ¾" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the two (2) sump pump enclosures (20'):
18.4.2.5.1. Control Power
18.4.2.5.1.1. 24 VDC from PLC enclosure power supply
18.4.2.5.1.2. 24 VDC Common from PLC enclosure power supply
18.4.2.5.2. Pump Controls
18.4.2.5.2.1. Auto switch
18.4.2.5.2.2. Hand switch
18.4.2.5.2.3. Running status
18.4.2.5.2.4. Fault status
18.4.2.5.2.5. Run Command (pump start command from PLC)
18.4.2.5.2.5.1. Field install run command relay in enclosure
18.4.2.6. Install new 1" conduit between sump pit and new PLC enclosure and pull the following float wires to new PLC enclosure (50'):
18.4.2.6.1. Control Power
18.4.2.6.1.1. 24 VDC from PLC enclosure power supply
18.4.2.6.1.2. 5 VDC Dialer voltage
18.4.2.6.2. Controls
18.4.2.6.2.1. Low level float (N.O.)
18.4.2.6.2.2. Stop float (N.O.)
18.4.2.6.2.3. Start float (N.O.)
18.4.2.6.2.4. Lag Start float (N.O.)
18.4.2.6.2.5. High level float (N.C.)
18.4.2.6.2.6. High drywell float (N.C. to auto dialer)
18.4.2.7. Demo existing floats and conduit in sump pit.
18.4.2.8. Install new stainless steel Unistrut float hanger bar with wall bracket for float support (10' Unistrut)
18.4.2.9. Purchase and install six (6) new weighted floats, two (2) N.C. and four (4) N.O. floats, and install on hanger bar on concrete floor over circular sump pit.
18.4.2.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
18.4.2.11. Demo existing sump pump enclosure next to pumps and safe off existing 120 VAC circuit(s) into a surface box.

18.4.3. **Flow Meter**
18.4.3.1. Relocate flow meter secondary and mount to wall near Bubbler enclosure.
18.4.3.2. Core two (2) holes through floor under flow meter for two (2) ¾" conduits.
18.4.3.3. Install new ¾" conduit between new PLC enclosure and Flow Meter for the following wires to be connected (20'):
18.4.3.3.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings.

18.4.3.3.2. One (1) STP wire for 4-20 mA signal.

18.4.3.4. Reroute existing flow meter cables from second landing primary flow tube to flow meter secondary. Take note of cable connections in secondary.

18.4.3.4.1. Install two (2) ¾" conduits for power and signal from the flow tube to the flow meter secondary (80').

18.4.3.4.2. Pull flow meter cables back to flow meter secondary through new conduits and connect to secondary.

18.4.4. **Grinder**

18.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.

18.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.

18.4.4.2. Demo existing PVC control conduit and wire from grinder enclosure.

18.4.4.3. Install new ¾" conduit to between new PLC enclosure and grinder panel and wire 24 VDC controls for the following (60'):

18.4.4.3.1. Control Power

18.4.4.3.1.1. 24 VDC from PLC enclosure power supply

18.4.4.3.2. Status Wires

18.4.4.3.2.1. Auto switch

18.4.4.3.2.2. Hand switch

18.4.4.3.2.3. Running status

18.4.4.3.2.4. Fault status

18.4.5. **Pump Drives 1, 2 and 3**

18.4.5.1. Demo existing 2" PVC control conduit from old PLC enclosure to three (3) drive enclosures (30' PVC).

18.4.5.2. Install three (3) new ¾" conduits from new PLC enclosure to each of the pump control panels (30')

18.4.5.3. Pull new wires for the following for each pump drive from the new PLC Enclosure to each of the three (3) pump drive enclosure:

18.4.5.3.1. Control Power

18.4.5.3.1.1. 24 VDC from PLC enclosure power supply

18.4.5.3.1.2. 24 VDC Common from PLC enclosure power supply

18.4.5.3.2. Status Wires

18.4.5.3.2.1. Auto switch

18.4.5.3.2.2. Hand switch

18.4.5.3.2.3. Running status

18.4.5.3.2.4. Fault status

18.4.5.3.2.5. Temperature switch

18.4.5.3.2.6. Run Command (pump start command from PLC)

18.4.5.3.2.6.1. Field install run command relay in enclosure

18.4.5.3.2.7. Ethernet Wire

18.4.5.3.2.8. STP speed command

18.4.6. **Pumps 1, 2 and 3**

18.4.6.1. Core hole in floor in new PLC enclosure for control conduit(s) to lower levels.

18.4.6.2. Install new 1-1/2" conduit from new PLC enclosure to serve the three (3) pumps in the dry well for a vibration switch for each of the three (3) pumps (150').

18.4.6.3. Demo existing two (2) 2" PVC conduits from old PLC enclosure to pumps in the dry well (150') and PVC enclosure at each pump that houses existing emergency stop and existing vibration wires. Demo conduits completely and remove wires.

18.4.6.4. Extend three (3) new ¾" conduits from 1-1/2" conduit to each of the three (3) pumps for new vibration switch (40' each)

18.4.6.5. Purchase and install three (3) new Vibration Switch's on the pumps.

18.4.6.6. Install two conductors for each pump vibration switch back to the new PLC enclosure (120' wire each pump).

18.4.7. **Wet Well**

18.4.7.1. Purchase and install one (1) N.C. weighted float.

18.4.7.2. Install new ¾" conduit, Class I Division I, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (120')

18.4.7.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Float and connect to PLC wiring.

18.4.7.4. Purchase and install one (1) new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status for wet well blower MCC bucket (air compressor).

18.4.7.5. Install new ¾" conduit to between new PLC enclosure and blower bucket and wire 24 VDC controls for the following (60'):

18.4.7.5.1. Control Power

18.4.7.5.1.1. 24 VDC from PLC enclosure power supply

18.4.7.5.1.2. 24 VDC common from PLC power supply

18.4.7.5.2. Status Wires

18.4.7.5.2.1. Auto switch

18.4.7.5.2.2. Hand switch

18.4.7.5.2.3. Running status

18.4.7.5.2.4. Fault status

18.4.7.5.2.5. Run Command (pump start command from PLC)

18.4.7.5.2.5.1. Field install 10 amp run command relay in enclosure

18.4.7.5.3. Demo existing timer from blower bucket

18.4.8. **Drywell**

18.4.8.1. Tee off 1-1/2" dry well control conduit with ¾" conduit and install (1) STP for the existing forcemain pressure transducer (30' and 80' STP).

18.4.8.2. Install junction box and reconnect pressure transducer 4-20 mA loop power signal wires back to new PLC enclosure.

18.4.9. **Scrubber Equipment – Blower only**

18.4.9.1. Purchase and install a new 480 VAC, three phase, 5 HP contactor enclosure with disconnect and HOA switch for the scrubber blower motor in the generator room in place of existing disconnect.

18.4.9.2. Install new ¾" conduit from MCC to new contactor (30') and pull new conductors and terminate them to the existing 15-amp breaker.

18.4.9.3. Pull new conductors through existing conduit to scrubber pad motor and connect.

18.4.9.4. Install new ¾" conduit between blower contactor and new PLC enclosure and pull and terminate the following wires (60'):

18.4.9.4.1. Control Power

18.4.9.4.1.1. 24 VDC from PLC enclosure power supply

18.4.9.4.1.2. 24 VDC Common from PLC enclosure power supply

18.4.9.4.2. Status Wires

18.4.9.4.2.1. Auto switch

18.4.9.4.2.2. Hand switch

18.4.9.4.2.3. Running status

18.4.9.4.2.4. Fault status

18.4.9.4.2.5. Run Command (pump start command from PLC)
18.4.9.4.2.5.1. Field install run command relay in enclosure

18.4.10. **Generator Room**

18.4.10.1. Install new ¾" conduit to existing day tank controller and pull the following wires (60'):
18.4.10.1.1. Control Power
18.4.10.1.1.1. 24 VDC from PLC enclosure power supply
18.4.10.1.2. Status and Control Wires
18.4.10.1.2.1. Not in auto switch
18.4.10.1.2.2. High level alarm
18.4.10.1.2.3. Low level alarm
18.4.10.1.2.4. Leak alarm
18.4.10.1.2.5. Return pump running alarm

18.4.10.2. Install new 1" conduit to existing louver and pull and terminate the following wires (80'):
18.4.10.2.1. Control Power
18.4.10.2.1.1. 24 VDC from PLC enclosure power supply
18.4.10.2.2. Status Wires
18.4.10.2.2.1. Louver status

18.4.10.3. Tee off louver conduit and install 1" conduit to battery charger for the following wires (30' conduit and 100' wire):
18.4.10.3.1. Control Power
18.4.10.3.1.1. 24 VDC from PLC enclosure power supply
18.4.10.3.2. Status Wires
18.4.10.3.2.1. Charger fault

18.4.10.4. Tee off louver conduit and install 1" conduit to the existing Cooling Fan Contactor and Recirculation Pump Contactor and install the following wires:
18.4.10.4.1. Control Power
18.4.10.4.1.1. 24 VDC from PLC enclosure power supply
18.4.10.4.2. Status Wires
18.4.10.4.2.1. Auto switch
18.4.10.4.2.2. Hand switch
18.4.10.4.2.3. Running status
18.4.10.4.2.4. Fault status

18.4.10.5. Purchase and install two (2) new HOA with four (4) contact blocks and legend plates and reconnect existing control wires and use spare blocks for PLC status for Cooling Fan Contactor and Recirculation Pump Contactor.

18.4.10.6. Demo existing ¾" conduit to generator control panel (20').

18.4.10.7. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (50'):
18.4.10.7.1. Install a CAT 5 cable between generator and new PLC enclosure.

18.4.11. **Diesel tank**

18.4.11.1. In the generator room, demo existing 12" x 16" x 8" PVC enclosure for old diesel tank level gauge.

18.4.11.2. Install box for existing 120 VAC circuit and cap off (3/4" conduit).

18.4.11.3. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank.
18.4.11.3.1. Purchase and install threaded reducer for existing 4" tank opening to accommodate new Level Transmitter mounting configuration.
18.4.11.3.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

18.4.11.4. Demo existing horn and silence switch on outside wall near diesel tank.
18.4.11.5. Reuse core hole for new ¾" conduit. Install new ¾" conduit to new PLC enclosure for diesel tank fill horn and install the following wires (60'):
18.4.11.5.1. Control Power
18.4.11.5.1.1. 24 VDC common PLC enclosure power supply
18.4.11.5.2. Status Wires
18.4.11.5.2.1. Horn
18.4.11.5.2.2. STP for tank level
18.4.11.6. Tee off conduit for diesel tank fill horn (6' ¾" flex).
18.4.11.7. Tee off horn conduit with ¾" for the flow switch near the scrubber blower motor for the following wires (30'):
18.4.11.7.1. Control Power
18.4.11.7.1.1. 24 VDC common PLC enclosure power supply
18.4.11.7.2. Status Wires
18.4.11.7.2.1. Flow switch

18.4.12. **Transfer Switch**

18.4.12.1. Tee off generator control conduit with ¾" conduit and continue to ATS for the following wire:
18.4.12.1.1. CAT 5 Ethernet wire

18.4.13. **Ventilation and Heating**

18.4.13.1. Purchase and install a new 208 VAC, single phase, 5 HP contactor enclosure with disconnect and HOA switch for the Drywell Exhaust Fan in generator room next to existing exhaust fan contactors.
18.4.13.2. Install new ¾" conduit from Panel 1 and reuse existing circuit breaker 25-27 for 208 VAC feed (30').
18.4.13.3. From new contactor install new ¾" conduit to the attic and feed existing motor (40').
18.4.13.4. Purchase and install two (2) KA-1 stackable contact blocks and two (2) KA-3 stackable contact blocks on existing four position switches for the following existing two speed fans:
18.4.13.4.1. Exhaust Fan Generator Room Contactor
18.4.13.4.2. Exhaust Fan Motor Room Contactor
18.4.13.5. Use contact blocks for PLC status wires
18.4.13.5.1. Install new 1" conduit and wire from the new PLC enclosure to the Exhaust Fan Generator Room Contactor, Exhaust Fan Motor Room Contactor, and Dry Well Supply Contactor status (80'):
18.4.13.5.2. Exhaust Fan Generator Room Contactor:
18.4.13.5.3. Control Power
18.4.13.5.3.1. 24 VDC from PLC enclosure power supply
18.4.13.5.3.2. 24 VDC Common from PLC enclosure power supply
18.4.13.5.4. Status Wires
18.4.13.5.4.1. Auto switch
18.4.13.5.4.2. Hand switch
18.4.13.5.4.3. Running high speed
18.4.13.5.4.4. Running low speed
18.4.13.5.4.5. Fault status
18.4.13.5.4.6. Relocate High Speed Run Command relay to enclosure
18.4.13.5.4.6.1. Field install run command relay in enclosure
18.4.13.5.4.7. Relocate Low Speed Run Command relay to enclosure
18.4.13.5.4.7.1. Field install run command relay in enclosure
18.4.13.5.4.8. Run Command High Speed (start command from PLC)

18.4.13.5.4.9. Run Command Low Speed (start command from PLC)

18.4.13.5.5. **Exhaust Fan Motor Room Contactor:**

18.4.13.5.6. Control Power

18.4.13.5.6.1. 24 VDC from PLC enclosure power supply

18.4.13.5.6.2. 24 VDC Common from PLC enclosure power supply

18.4.13.5.7. Status Wires

18.4.13.5.7.1. Auto switch

18.4.13.5.7.2. Hand switch

18.4.13.5.7.3. Running low speed

18.4.13.5.7.4. Running high speed

18.4.13.5.7.5. Fault status

18.4.13.5.7.6. Relocate High Speed Run Command relay to enclosure

18.4.13.5.7.6.1. Field install run command relay in enclosure

18.4.13.5.7.7. Relocate Low Speed Run Command relay to enclosure

18.4.13.5.7.7.1. Field install run command relay in enclosure

18.4.13.5.7.8. Run Command High Speed (start command from PLC)

18.4.13.5.7.9. Run Command Low Speed (start command from PLC)

18.4.13.5.8. Dry Well Supply Contactor:

18.4.13.5.9. Control Power

18.4.13.5.9.1. 24 VDC from PLC enclosure power supply

18.4.13.5.9.2. 24 VDC Common from PLC enclosure power supply

18.4.13.5.10. Status Wires

18.4.13.5.10.1. Auto switch

18.4.13.5.10.2. Hand switch

18.4.13.5.10.3. Running status

18.4.13.5.10.4. Fault status

18.4.13.5.10.5. Relocate Run Command relay to enclosure

18.4.13.5.10.5.1. Field install run command relay in enclosure

18.4.13.5.10.6. Run Command (start command from PLC)

18.4.13.6. Purchase and install one (1) new pressure differential switch.

18.4.13.6.1. Attach switch with hose to the Dry Well ductwork in the motor room.

18.4.13.6.2. Install new ¾" conduit from the new PLC enclosure to the switch (30').

18.4.13.6.3. Seal all duct penetrations air tight.

18.4.13.6.4. Wire pressure switch back to new PLC Enclosure – 2 conductors.

18.4.13.7. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

18.4.13.7.1. Temperature Probe provided by CMCMUA.

18.4.13.8. Install ¾" conduit and wires to interconnect three (3) existing electric heaters to new PLC enclosure for low voltage control of heaters (150' and two (2) conductors).

18.4.13.8.1. Purchase and install 20-amp power run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit (heaters are line voltage at 16 amp).

18.4.14. **Fire/Security/Lights**

18.4.14.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (70'):

18.4.14.1.1. Purchase and install four (4) door switches

18.4.14.1.2. Install one (1) of the switches on the outside of the wet well door.

18.4.14.1.3. Install one (1) of the switches on the inside of the front door to the motor room.

18.4.14.1.4. Install two (2) switches on the inside of the double door to the motor room.

18.4.14.1.5. Demo existing door switches and ¾" PVC conduit and wire.

18.4.14.2. Tee off door sensor conduit and terminate next to existing first aid kit by the compressor for Personnel on Site and future fire alarm panel (10').

18.4.14.2.1. Purchase and install, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status – two (2) conductors.

18.4.14.2.2. Install three (3) wires for future fire panel and leave in junction box next to Personnel on Site switch.

18.4.14.2.2.1. 24 VDC from PLC enclosure power supply

18.4.14.2.2.2. Fire Alarm

18.4.14.2.2.3. System Trouble

18.4.14.3. Demo existing ¾" PVC door and dialer control conduits and wire (50').

18.4.14.4. Demo existing motion sensors from throughout the station (three (3) sensors)

18.4.15. **Auto Dialer**

18.4.15.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.

18.4.15.2. Install new ¾" conduit from phone service box in generator room to new dialer (50').

18.4.15.3. Install new phone line to dialer from phone service box.

18.4.15.4. Use door sensor ¾" conduit from new PLC enclosure for dialer wires (10').

18.4.15.5. Connect wires to the Auto Dialer from PLC Enclosure for the following:

18.4.15.5.1. Dialer common 5VDC

18.4.15.5.2. Wet Well High-Level Float through I.S. Barrier

18.4.15.5.3. Dry Well High-Level Float

18.4.15.5.4. PLC Communication Fault through PLC CR relay

18.5. **Demo Existing PLC enclosures**

18.5.1. Safe off the wires, lift from existing enclosure and pull back.

18.5.2. Demo and dispose of enclosure

18.5.3. Steel single door enclosure

18.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

18.5.5. Demo existing four (4) 2" PVC control conduits (100') and four (4) 12" x 12" x 6" PVC boxes and wire from old system.

18.6. **Install New PLC Enclosure**

18.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 18.xx above

18.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

18.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

18.6.4. Extend conduits and wires to new enclosure as needed.

18.6.5. Terminate existing wiring per drawings

18.6.6. Terminate new wires per drawings

18.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

18.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

18.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

18.6.9.1. Wet Well High-Level Float

18.7. **Testing and Commissioning System**

18.7.1. Assist Avanceon and CMCMUA with testing and commissioning

18.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

18.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

18.8. **Remove Temporary PLC enclosure**

18.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

19. **CLAGHORN AVENUE PUMP STATION NOTE: PLC ENCLOSURE MUST BE NO WIDER THAN 48"**

19.1. **Reference Drawings**

19.1.1. ClaghornAvenuePumpStationElectrical.PDF

19.2. **Station Description**

19.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 25' x 30' x 13' ceiling height.

19.2.2. Poured concrete walls underground with single landing 10' below grade, a second landing 20' below grade, and bottom level 34' below grade where dry well pumps are located.

19.2.3. Wet Well Class I Division I confined space below grade with dimensions of 34' x 16' x 24' depth. Separated from dry side with poured concrete wall.

19.2.4. There is no conduit concrete cutout access to lower level. Cores will need to be drilled through 16" of concrete in the floor beneath the new PLC enclosure.

19.2.5. There is an attic above the ground floor accessible by fixed ladder from generator room for conduit paths. The ceiling is sheetrock with wood joists.

19.3. **Preliminary work before taking site off line:**

19.3.1. General

19.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

19.3.2. Temporary PLC Setup:

19.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

19.3.2.2. Mount Temporary PLC

19.3.2.3. Install temporary power to PLC

19.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

19.3.2.5. PLC code will be provided by CMCMUA

19.3.2.6. HMI code will be provided by CMCMUA

19.3.2.7. Wire items listed in section 19.3.3 below to temporary PLC.

19.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

19.3.3. Wire to Temporary PLC and Auto Dialer:

19.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

19.3.3.2. Install Bubbler system provided by CMCMUA.

19.3.3.3. Install temporary wire to temporary PLC for Well Level control

19.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:

19.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

19.3.3.4.2. Pumps 1 and 2 Running Status

19.3.3.4.3. Pumps 1 and 2 Fault Status

19.3.3.4.4. Pumps 1 and 2 Run commands

19.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

19.3.3.5. Reuse existing Auto Dialer.

19.3.3.5.1. Extend existing phone line to Auto Dialer

19.3.3.6. Install temporary wire to Auto Dialer for the following:

19.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

19.3.3.6.2. Phone line

19.3.4. Items not needed on temporary PLC:

19.3.4.1. Flow Meter

19.3.4.2. Grinder HOA and Running Status

19.3.4.3. Grinder Failure Status

19.3.4.4. Conveyance Pumps 3
19.3.4.5. Drywell Sumps 1 & 2
19.3.4.6. Compressor 1 & 2 Pressures
19.3.4.7. Bubbler Purge and Isolation Valves
19.3.4.8. Exhaust and Supply Fans
19.3.4.9. Generator Day Tank
19.3.4.10. Generator
19.3.4.11. Transfer Switch
19.3.4.12. Diesel Tank Level
19.3.4.13. Temperature Control
19.3.4.14. Door Switches
19.3.4.15. Scrubber system

19.4. **Individual Systems**

19.4.1. **Bubbler Control Enclosure**

19.4.1.1. Demo existing PVC 12" x 8" x 10" bubbler enclosure.
19.4.1.2. Demo existing air compressor and return to CMCMUA
19.4.1.3. Demo existing 12" x 12" x 6" PVC control enclosure for compressors
19.4.1.4. Demo existing receptacles
19.4.1.4.1. Safe off existing electrical conductors
19.4.1.4.2. Install two (2) air compressors, supplied by the CMCMUA, on the floor beneath the new bubbler enclosure.
19.4.1.4.3. Install new ¾" conduit from Panel 1 (120VAC) to the compressors (80').
19.4.1.4.3.1. Install two (2) 120VAC circuits for two (2) existing compressors.
19.4.1.4.3.2. Reuse existing breakers the two 120 VAC circuits.
19.4.1.4.3.3. Install two (2) 120VAC 20-amp receptacles for the two (2) compressors.
19.4.1.5. Install Bubbler Control Enclosure provided by CMCMUA next to new PLC enclosure. Leave room for sump pump controllers and flow meter display.
19.4.1.5.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D
19.4.1.5.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):
19.4.1.5.2.1. 1 STP for Compressor 1 Pressure transmitter
19.4.1.5.2.2. 1 STP for Compressor 2 Pressure transmitter
19.4.1.5.2.3. 1 STP Wet Well Level transmitter
19.4.1.5.2.4. 24DVC signal and common for isolation control solenoid valve
19.4.1.5.2.5. 24DVC signal and common for purge control solenoid valve
19.4.1.5.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe.
19.4.1.5.3.1. CMCMUA will provide the flexible tubing: 25 Feet
19.4.1.5.4. Mount air compressors on floor beneath new bubbler enclosure

19.4.2. **Sump Pumps in Dry Well**

19.4.2.1. Purchase two (2) new 120 VAC single phase 3 HP Sump Control Enclosures.
19.4.2.2. Install new pump control enclosures on wall next to the bubbler enclosure.
19.4.2.3. Install new ¾" conduit from Panel 1 (120VAC) for two (2) 120 VAC feeds to the sump controllers.

19.4.2.3.1. Use existing sump breaker breakers.

19.4.2.4. Core through floor and install two (2) new ¾" conduits to the sump motors in the dry well (120').

19.4.2.4.1. Terminate conduit with two (2) junction boxes, one for each sump pump, and route sump pump wires to junction box.

19.4.2.4.2. Pull motor circuit wires and connect pumps and connect to sump pump wires.

19.4.2.5. Install new ¾" conduit between sump control enclosures to new PLC enclosure and pull and terminate the following wires to each of the two (2) sump pump enclosures (20'):

19.4.2.5.1. Control Power

19.4.2.5.1.1. 24 VDC from PLC enclosure power supply

19.4.2.5.1.2. 24 VDC Common from PLC enclosure power supply

19.4.2.5.2. Pump Controls

19.4.2.5.2.1. Auto switch

19.4.2.5.2.2. Hand switch

19.4.2.5.2.3. Running status

19.4.2.5.2.4. Fault status

19.4.2.5.2.5. Run Command (pump start command from PLC)

19.4.2.5.2.5.1. Field install run command relay in enclosure

19.4.2.6. Install new 1" conduit between sump pit and new PLC enclosure and pull the following float wires to new PLC enclosure (50'):

19.4.2.6.1. Control Power

19.4.2.6.1.1. 24 VDC from PLC enclosure power supply

19.4.2.6.1.2. 5 VDC Dialer voltage

19.4.2.6.2. Controls

19.4.2.6.2.1. Low level float (N.O.)

19.4.2.6.2.2. Stop float (N.O.)

19.4.2.6.2.3. Start float (N.O.)

19.4.2.6.2.4. Lag Start float (N.O.)

19.4.2.6.2.5. High level float (N.C.)

19.4.2.6.2.6. High drywell float (N.C. to auto dialer)

19.4.2.7. Demo existing floats and conduit in sump pit.

19.4.2.8. Install new stainless steel Unistrut float hanger bar with wall bracket for float support (10' Unistrut)

19.4.2.9. Purchase and install six (6) new weighted floats, two (2) N.C. and four (4) N.O. floats, and install on hanger bar on concrete floor over circular sump pit.

19.4.2.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

19.4.2.11. Demo existing sump pump enclosure next to pumps and safe off existing 120 VAC circuit(s) into a surface box.

19.4.3. **Flow Meters**

19.4.3.1. Relocate ABB flow meter secondary and mount to wall near Bubbler enclosure.

19.4.3.1.1. Reroute flow meter cable to new flow meter secondary (6' ¾" flex).

19.4.3.1.2. Install new 120 VAC circuit from new PLC enclosure to flow meter and connect via drawings (6' ¾" flex)

19.4.3.1.3. Install new CAT 5 cable from new PLC enclosure to flow meter (6' ¾" flex)

19.4.3.2. Relocate Pulsar flow meter secondary and mount to wall near Bubbler enclosure.

19.4.3.2.1. Reroute flow meter cable to new flow meter secondary (6' ¾" flex).
19.4.3.2.2. Install new 120 VAC circuit from new PLC enclosure to flow meter and connect via drawings (6' ¾" flex).
19.4.3.2.3. Install new STP cable for 4-20mA signal from new PLC enclosure to flow meter (6' ¾" flex).

19.4.4. **Grinder**

19.4.4.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.
19.4.4.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.
19.4.4.2. Demo existing PVC control conduit and wire from grinder enclosure.
19.4.4.3. Install new ¾" conduit to between new PLC enclosure and grinder panel and wire 24 VDC controls for the following (60'):
19.4.4.3.1. Control Power
19.4.4.3.1.1. 24 VDC from PLC enclosure power supply
19.4.4.3.2. Status Wires
19.4.4.3.2.1. Auto switch
19.4.4.3.2.2. Hand switch
19.4.4.3.2.3. Running status
19.4.4.3.2.4. Fault status

19.4.5. **Pump Drives 1, 2 and 3**

19.4.5.1. Demo existing 2" PVC control conduit from old PLC enclosure to three (3) drive enclosures (30' PVC).
19.4.5.2. Install three (3) new ¾" conduits from new PLC enclosure to each of the pump control panels (30')
19.4.5.3. Pull new wires for the following for each pump drive from the new PLC Enclosure to each of the three (3) pump drive enclosure:
19.4.5.3.1. Control Power
19.4.5.3.1.1. 24 VDC from PLC enclosure power supply
19.4.5.3.1.2. 24 VDC Common from PLC enclosure power supply
19.4.5.3.2. Status Wires
19.4.5.3.2.1. Auto switch
19.4.5.3.2.2. Hand switch
19.4.5.3.2.3. Running status
19.4.5.3.2.4. Fault status
19.4.5.3.2.5. Run Command (pump start command from PLC)
19.4.5.3.2.5.1. Field install run command relay in enclosure
19.4.5.3.2.6. Ethernet Wire
19.4.5.3.2.7. STP speed command

19.4.6. **Pumps 1, 2 and 3**

19.4.6.1. Core hole in floor in new PLC enclosure for control conduit(s) to lower levels.
19.4.6.2. Install new 1-1/2" conduit from new PLC enclosure to serve the three (3) pumps in the dry well for a vibration switch for each of the three (3) pumps (150').
19.4.6.3. Demo existing two (2) 2" PVC conduits from old PLC enclosure to pumps in the dry well (150') and PVC enclosure at each pump that houses existing emergency stop and existing vibration wires. Demo conduits completely and remove wires.
19.4.6.4. Extend three (3) new ¾" conduits from 1-1/2" conduit to each of the three (3) pumps for new vibration switch (40' each)
19.4.6.5. Purchase and install three (3) new Vibration Switch's on the pumps.

19.4.6.6. Install two conductors for each pump vibration switch back to the new PLC enclosure (120' wire each pump).

19.4.7. **Wet Well**

19.4.7.1. Purchase and install one (1) N.C. float.

19.4.7.2. Install new ¾" conduit, Class I Division I, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates for the following wires (120'):

19.4.7.2.1. Control Power

19.4.7.2.1.1. 5 VDC from dialer via PLC Enclosure and IS Barrier

19.4.7.2.2. Status Wires

19.4.7.2.2.1. High Level Float

19.4.7.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Float and connect to PLC wiring.

19.4.7.4. Purchase and install one (1) new HOA with four (4) contact blocks and reconnect existing control wires and use spare blocks for PLC status for wet well blower MCC bucket (air compressor).

19.4.7.5. Install new ¾" conduit to between new PLC enclosure and blower bucket and wire 24 VDC controls for the following (60'):

19.4.7.5.1. Control Power

19.4.7.5.1.1. 24 VDC from PLC enclosure power supply

19.4.7.5.2. Status Wires

19.4.7.5.2.1. Auto switch

19.4.7.5.2.2. Hand switch

19.4.7.5.2.3. Running status

19.4.7.5.2.4. Fault status

19.4.7.5.2.5. Run Command (start command from PLC)

19.4.7.5.2.5.1. Purchase and install 10 amp Run Command relay into enclosure

19.4.7.5.3. Demo existing timer from blower bucket

19.4.8. **Drywell**

19.4.8.1. Tee off 1-1/2" dry well control conduit with ¾" conduit and install (1) STP for the existing forcemain pressure transducer (30' and 80' STP).

19.4.8.2. Install junction box and reconnect pressure transducer 4-20 mA loop power signal wires back to new PLC enclosure.

19.4.9. **Scrubber Equipment – Blower only**

19.4.9.1. Purchase and install a new 480 VAC, three phase, 5 HP contactor enclosure with disconnect and HOA switch for the scrubber blower motor in the generator room in place of existing disconnect.

19.4.9.2. Install new ¾" conduit from MCC to new contactor (30') and pull new conductors and terminate them to the existing 15-amp breaker.

19.4.9.3. Pull new conductors through existing conduit to scrubber pad motor and connect.

19.4.9.4. Install new ¾" conduit between blower contactor and new PLC enclosure and pull and terminate the following wires (60'):

19.4.9.4.1. Control Power

19.4.9.4.1.1. 24 VDC from PLC enclosure power supply

19.4.9.4.1.2. 24 VDC Common from PLC enclosure power supply

19.4.9.4.2. Status Wires

19.4.9.4.2.1. Auto switch

19.4.9.4.2.2. Hand switch

19.4.9.4.2.3. Running status

19.4.9.4.2.4. Fault status
19.4.9.4.2.5. Run Command (start command from PLC)
19.4.9.4.2.5.1. Field install Run Command relay into enclosure

19.4.10. **Generator Room**

19.4.10.1. Install new ¾" conduit to existing day tank controller and pull the following wires (60'):
19.4.10.1.1. Control Power
19.4.10.1.1.1. 24 VDC from PLC enclosure power supply
19.4.10.1.2. Status and Control Wires
19.4.10.1.2.1. Day Tank Auto switch
19.4.10.1.2.2. Day Tank Manual switch
19.4.10.1.2.3. Day Tank overflow alarm status
19.4.10.1.2.4. Day Tank Fault status

19.4.10.2. Install new 1" conduit to existing louver and pull and terminate the following wires (80'):
19.4.10.2.1. Control Power
19.4.10.2.1.1. 24 VDC from PLC enclosure power supply
19.4.10.2.2. Status Wires
19.4.10.2.2.1. Louver status

19.4.10.3. Tee off louver conduit and install 1" conduit to battery charger for the following wires (30' conduit and 100' wire):
19.4.10.3.1. Control Power
19.4.10.3.1.1. 24 VDC from PLC enclosure power supply
19.4.10.3.2. Status Wires
19.4.10.3.2.1. Charger fault

19.4.10.4. Tee off louver conduit and install 1" conduit to the existing Cooling Fan Contactor and Recirculation Pump Contactor and install the following wires:
19.4.10.4.1. Control Power
19.4.10.4.1.1. 24 VDC from PLC enclosure power supply
19.4.10.4.2. Status Wires
19.4.10.4.2.1. Auto switch
19.4.10.4.2.2. Hand switch
19.4.10.4.2.3. Running status
19.4.10.4.2.4. Fault status

19.4.10.5. Purchase and install two (2) new HOA with four (4) contact blocks and legend plates and reconnect existing control wires and use spare blocks for PLC status for Cooling Fan Contactor and Recirculation Pump Contactor.

19.4.10.6. Demo existing ¾" conduit to generator control panel (20').

19.4.10.7. Install new ¾" conduit from new PLC enclosure to the generator control enclosure for the following wire (60'):
19.4.10.7.1. Install a CAT 5 cable between generator and new PLC enclosure.

19.4.11. **Diesel tank**

19.4.11.1. In the generator room, demo existing 12" x 16" x 8" PVC enclosure for old diesel tank level gauge.

19.4.11.2. Install box for existing 120 VAC circuit and cap off (3/4" conduit).

19.4.11.3. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank.
19.4.11.3.1. Purchase and install threaded reducer for existing 4" tank opening to accommodate new Level Transmitter mounting configuration.
19.4.11.3.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

19.4.11.4. Install new ¾" conduit from new PLC enclosure to location of demoed enclosure (80'). Connect new conduit to existing ¾" steel conduit that goes through the wall and out to the diesel tank.
19.4.11.5. Tee off conduit for diesel tank fill horn (6' ¾" flex).
19.4.11.6. Purchase and install new alarm horn on wall outside near diesel tank.
19.4.11.6.1. Pull the following wires for the diesel tank (100'):
19.4.11.6.1.1. Control Power
19.4.11.6.1.1.1. 24 VDC common PLC enclosure power supply
19.4.11.6.1.2. Status Wires
19.4.11.6.1.2.1. Alarm horn
19.4.11.6.1.2.2. STP for tank level
19.4.11.6.2. Tee off horn conduit with ¾" for the flow switch near the scrubber blower motor for the following wires (30'):
19.4.11.6.2.1. Control Power
19.4.11.6.2.1.1. 24 VDC common PLC enclosure power supply
19.4.11.6.2.2. Status Wires
19.4.11.6.2.2.1. Flow switch

19.4.12. **Transfer Switch**

19.4.12.1. Tee off generator control conduit with ¾" conduit and continue to ATS for the following wire:
19.4.12.1.1. CAT 5 Ethernet wire

19.4.13. **Ventilation and Heating**

19.4.13.1. Purchase and install a new 208 VAC, single phase, 5 HP contactor enclosure with disconnect and HOA switch for the Drywell Exhaust Fan in generator room next to existing exhaust fan contactors.
19.4.13.2. Install new ¾" conduit from Panel 1 and reuse existing circuit breaker 25-27 for 208 VAC feed (30').
19.4.13.3. From new contactor install new ¾" conduit to the attic and feed existing motor (40').
19.4.13.4. Purchase and install two (2) KA-1 stackable contact blocks and two (2) KA-3 stackable contact blocks on existing four position switches for the following existing two speed fans:
19.4.13.4.1. Exhaust Fan Generator Room Contactor
19.4.13.4.2. Exhaust Fan Motor Room Contactor
19.4.13.4.2.1. Use contact blocks for PLC status wires
19.4.13.5. Install new 1" conduit from the new PLC enclosure to the Exhaust Fan Generator Room Contactor, Exhaust Fan Motor Room Contactor, and Drywell Exhaust Fan Contactor status (80'):
19.4.13.5.1. Exhaust Fan Generator Room Contactor:
19.4.13.5.2. Control Power
19.4.13.5.2.1. 24 VDC from PLC enclosure power supply
19.4.13.5.2.2. 24 VDC Common from PLC enclosure power supply
19.4.13.5.3. Status Wires
19.4.13.5.3.1. Auto switch
19.4.13.5.3.2. Hand switch
19.4.13.5.3.3. Running low speed
19.4.13.5.3.4. Running high speed
19.4.13.5.3.5. Fault status
19.4.13.5.3.6. Relocate High Speed Run Command relay to enclosure
19.4.13.5.3.6.1. Field install run command relay in enclosure
19.4.13.5.3.7. Relocate Low Speed Run Command relay to enclosure

19.4.13.5.3.7.1. Field install run command relay in enclosure
19.4.13.5.3.8. Run Command High Speed (start command from PLC)
19.4.13.5.3.9. Run Command Low Speed (start command from PLC)
19.4.13.5.4. **Exhaust Fan Motor Room Contactor:**
19.4.13.5.5. Control Power
19.4.13.5.5.1. 24 VDC from PLC enclosure power supply
19.4.13.5.5.2. 24 VDC Common from PLC enclosure power supply
19.4.13.5.6. Status Wires
19.4.13.5.6.1. Auto switch
19.4.13.5.6.2. Hand switch
19.4.13.5.6.3. Running low speed
19.4.13.5.6.4. Running high speed
19.4.13.5.6.5. Fault status
19.4.13.5.6.6. Relocate High Speed Run Command relay to enclosure
19.4.13.5.6.6.1. Field install run command relay in enclosure
19.4.13.5.6.7. Relocate Low Speed Run Command relay to enclosure
19.4.13.5.6.7.1. Field install run command relay in enclosure
19.4.13.5.6.8. Run Command High Speed (start command from PLC)
19.4.13.5.6.9. Run Command Low Speed (start command from PLC)
19.4.13.5.7. Dry Well Exhaust Contactor:
19.4.13.5.8. Control Power
19.4.13.5.8.1. 24 VDC from PLC enclosure power supply
19.4.13.5.8.2. 24 VDC Common from PLC enclosure power supply
19.4.13.5.9. Status Wires
19.4.13.5.9.1. Auto switch
19.4.13.5.9.2. Hand switch
19.4.13.5.9.3. Running status
19.4.13.5.9.4. Fault status
19.4.13.5.9.5. Relocate Run Command relay to enclosure
19.4.13.5.9.5.1. Field install run command relay in enclosure
19.4.13.5.9.6. Run Command (start command from PLC)
19.4.13.6. Purchase and install one (1) new pressure differential switch.
19.4.13.6.1. Attach switch with hose to the Dry Well ductwork in the motor room.
19.4.13.6.2. Install new ¾" conduit from the new PLC enclosure to the switch (30').
19.4.13.6.3. Seal all duct penetrations air tight.
19.4.13.6.4. Wire pressure switch back to new PLC Enclosure – 2 conductors.
19.4.13.7. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.
19.4.13.7.1. Temperature Probe provided by CMCMUA.
19.4.13.8. Install ¾" conduit and wires to interconnect three (3) existing electric heaters to new PLC enclosure for low voltage control of heaters (150' and two (2) conductors).
19.4.13.8.1. Purchase and install 20-amp power run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit (heaters are line voltage at 16 amp).
19.4.14. **Fire/Security/Lights**
19.4.14.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (70'):

19.4.14.1.1. Purchase and install three (3) door switches
19.4.14.1.2. Install one (1) of the switches on the outside of the wet well door.
19.4.14.1.3. Install one (1) of the switches on the inside of the front door to the motor room.
19.4.14.1.4. Install one (1) of the switches on the inside of the rollup door to the motor room.
19.4.14.1.5. Demo existing door switches and ¾" PVC conduit and wire.
19.4.14.2. Demo existing 14" x14" x10" steel enclosure and ¾" control conduit (30').
19.4.14.3. Tee off door sensor conduit and terminate in place of demoed enclosure for Personnel on Site and future fire alarm panel (10').
19.4.14.3.1. Purchase and install, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status – two (2) conductors.
19.4.14.3.2. Install three (3) wires for future fire panel and leave in junction box next to Personnel on Site switch.
19.4.14.3.2.1. 24 VDC from PLC enclosure power supply
19.4.14.3.2.2. Fire Alarm
19.4.14.3.2.3. System Trouble
19.4.14.4. Demo existing ¾" PVC door and dialer control conduits and wire (50').
19.4.14.5. Demo existing motion sensors from throughout the station (three (3) sensors)

19.4.15. **Auto Dialer**
19.4.15.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.
19.4.15.2. Install new ¾" conduit from phone service box in generator room to new dialer (50').
19.4.15.3. Install new phone line to dialer from phone service box.
19.4.15.4. Use door sensor ¾" conduit from new PLC enclosure for dialer wires (10').
19.4.15.5. Connect wires to the Auto Dialer from PLC Enclosure for the following:
19.4.15.5.1. Dialer common 5VDC
19.4.15.5.2. Wet Well High-Level Float through I.S. Barrier
19.4.15.5.3. Dry Well High-Level Float
19.4.15.5.4. PLC Communication Fault through PLC CR relay

19.5. **Demo Existing PLC enclosures**
19.5.1. Safe off the wires, lift from existing enclosure and pull back.
19.5.2. Demo and dispose of enclosure
19.5.3. Steel single door enclosure
19.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA
19.5.5. Demo existing four (4) 2" PVC control conduits (100') and four (4) 12" x 12" x 6" PVC boxes and wire from old system.

19.6. **Install New PLC Enclosure**
19.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 19.xx above
19.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
19.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
19.6.4. Extend conduits and wires to new enclosure as needed.
19.6.5. Terminate existing wiring per drawings

19.6.6. Terminate new wires per drawings
19.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
19.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply
19.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:
19.6.9.1. Wet Well High-Level Float
19.6.9.2. Wet well hatch switch if applicable

19.7. **Testing and Commissioning System**

19.7.1. Assist Avanceon and CMCMUA with testing and commissioning
19.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
19.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

19.8. **Remove Temporary PLC enclosure**

19.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

20. **CORAL AVENUE PUMP STATION**

20.1. **Reference Drawings**

20.1.1. CoralAvenuePumpStationElectrical.PDF

20.2. **Station Description**

20.2.1. Block building with brick face with overall dimensions of 25' x 16' x 8' ceiling height.

20.2.2. Wet Well Class I Division I confined space tank 15 feet away from building.

20.2.3. The ceiling is sheetrock with wood joists and flat roof.

20.3. **Preliminary work before taking site off line:**

20.3.1. General

20.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

20.3.2. Temporary PLC Setup:

20.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

20.3.2.2. Mount Temporary PLC

20.3.2.3. Install temporary power to PLC

20.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

20.3.2.5. PLC code will be provided by CMCMUA

20.3.2.6. HMI code will be provided by CMCMUA

20.3.2.7. Wire items listed in section 20.3.3 below to temporary PLC.

20.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

20.3.3. Wire to Temporary PLC and Auto Dialer:

20.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

20.3.3.2. Bubbler system has been installed by CMCMUA

20.3.3.3. Install temporary wire to temporary PLC for Well Level control

20.3.3.4. Install temporary wire to the Drive enclosures and pick up the following points:

20.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

20.3.3.4.2. Pumps 1 and 2 Running Status

20.3.3.4.3. Pumps 1 and 2 Fault Status

20.3.3.4.4. Pumps 1 and 2 Run commands

20.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

20.3.3.5. Reuse existing Auto Dialer.

20.3.3.5.1. Extend existing phone line to Auto Dialer

20.3.3.6. Install temporary wire to Auto Dialer for the following:

20.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

20.3.3.6.2. Phone line

20.3.4. Items not needed on temporary PLC:

20.3.4.1. Flow Meter

20.3.4.2. Grinder HOA and Running Status

20.3.4.3. Grinder Failure Status

20.3.4.4. Conveyance Pumps 3 and 4

20.3.4.5. Drywell Sumps 1 & 2

20.3.4.6. Compressor 1 & 2 Pressures

20.3.4.7. Bubbler Purge and Isolation Valves

20.3.4.8. Exhaust and Supply Fans

20.3.4.9. Generator Day Tank

20.3.4.10. Generator

20.3.4.11. Transfer Switch

20.3.4.12. Diesel Tank Level
20.3.4.13. Temperature Control
20.3.4.14. Door Switches
20.3.4.15. Scrubber system

20.4. **Individual Systems**

20.4.1. **Bubbler Control Enclosure**

20.4.1.1.1. New bubbler system has been installed by CMCMUA.

20.4.1.1.2. Use existing ¾" conduit and install new wire from Bubbler Control enclosure to new PLC enclosure for the following (40' wire):

20.4.1.1.2.1. 1 STP for Compressor 1 Pressure transmitter
20.4.1.1.2.2. 1 STP for Compressor 2 Pressure transmitter
20.4.1.1.2.3. 1 STP Wet Well Level transmitter
20.4.1.1.2.4. 24DVC signal and common for isolation control solenoid valve
20.4.1.1.2.5. 24DVC signal and common for purge control solenoid valve

20.4.2. **Dry Well – Flow Meter Vault**

20.4.2.1. Install new ¾" conduit from new PLC enclosure to flow meter pit outside (90' conduit, 2 cores, 20' trench through dirt and loose stone) and add seal off at entry to building for gas passage only, not classified area for the following wires:

20.4.2.1.1. Control Power
20.4.2.1.1.1. 24 VDC from PLC enclosure power supply

20.4.2.1.2. Controls
20.4.2.1.2.1. High drywell float (N.C.)
20.4.2.1.2.2. STP for pressure transducer

20.4.2.2. Purchase and install one (1) new weighted float near the floor of the flow meter pit.

20.4.2.3. Leave 20' of STP wire for future connection to pressure transducer.

20.4.3. **Flow Meters**

20.4.3.1.1. Install a new ¾" conduit from new PLC enclosure to existing flow meter for the following wire (40'):
20.4.3.1.2. CAT 5 Cable for MODBUS
20.4.3.1.3. Demo existing conduit from flow meter to Red Lion touchscreen enclosure.

20.4.4. **Pump Drives 1 and 2**

20.4.4.1. Reuse existing conduit and pull new wires for each pump drive from the new PLC Enclosure to each of the two (2) pump drive enclosure (60' of wire):

20.4.4.1.1. Control Power
20.4.4.1.1.1. 24 VDC from PLC enclosure power supply
20.4.4.1.1.2. 24 VDC Common from PLC enclosure power supply

20.4.4.1.2. Status Wires
20.4.4.1.2.1. Auto switch
20.4.4.1.2.2. Hand switch
20.4.4.1.2.3. Running status
20.4.4.1.2.4. Fault status
20.4.4.1.2.5. Run Command (pump start command from PLC)
20.4.4.1.2.5.1. Field install run command relay in enclosure
20.4.4.1.2.6. Ethernet Wire
20.4.4.1.2.7. STP speed command

20.4.5. **Pump Motors 1 and 2**

20.4.5.1. Reinstall existing MiniCas pump monitoring system into new PLC enclosure and rewire as found.
20.4.5.1.1. 120 VAC from UPS breaker in panel
20.4.5.1.2. 120 V Neutral from neutral bar in panel
20.4.5.1.3. Control Power
20.4.5.1.3.1. 24 VDC from PLC enclosure power supply
20.4.5.1.4. Status Wires
20.4.5.1.4.1. Seal leak
20.4.5.1.4.2. Temperature high

20.4.6. **Wet Well**
20.4.6.1. Locate and reuse existing high wet well level float wires.
20.4.6.2. Connect to IS barrier and wiring to auto dialer.

20.4.7. **Generator Room**
20.4.7.1. Install new ¾" conduit to existing day tank controller and pull the following wires (30'):
20.4.7.1.1. Control Power
20.4.7.1.1.1. 24 VDC from PLC enclosure power supply
20.4.7.1.2. Status and Control Wires
20.4.7.1.2.1. Day Tank Auto switch
20.4.7.1.2.2. Day Tank Manual switch
20.4.7.1.2.3. Day Tank overflow alarm status
20.4.7.1.2.4. Day Tank Fault status
20.4.7.2. Extend the day tank ¾" conduit to the existing louver and pull and terminate the following wires (30', 60' of wire):
20.4.7.2.1. Control Power
20.4.7.2.1.1. 24 VDC from PLC enclosure power supply
20.4.7.2.2. Status Wires
20.4.7.2.2.1. Louver status
20.4.7.3. Tee off louver conduit and install ¾" flex to battery charger for the following wires (6' flex and 70' wire):
20.4.7.3.1. Control Power
20.4.7.3.1.1. 24 VDC from PLC enclosure power supply
20.4.7.3.2. Status Wires
20.4.7.3.2.1. Charger fault
20.4.7.4. Demo existing ¾" PVC conduit feeding day tank, diesel tank level, generator and battery charger (60').
20.4.7.5. Install new ¾" conduit from the new PLC enclosure to the generator control panel for the following wire (60'):
20.4.7.5.1. CAT 5 Ethernet wire

20.4.8. **Diesel tank**
20.4.8.1. In the generator room, demo existing 12" x 16" x 8" PVC enclosure for old diesel tank level gauge.
20.4.8.2. Outside demo existing horn and switch.
20.4.8.3. Use existing core holes for alarm horn and diesel tank ultra-sonic level transmitter.
20.4.8.4. Install box for existing 120 VAC circuit at tank level enclosure and cap off (¾" conduit).
20.4.8.5. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank
20.4.8.5.1. Purchase and install threaded reducer for existing 4" tank opening to accommodate new Level Transmitter mounting configuration.

20.4.8.5.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.
20.4.8.6. Install new ¾" conduit from new PLC enclosure to diesel tank (50').
20.4.8.7. Inside, tee off tank level conduit for diesel tank fill horn (10').
20.4.8.8. Purchase and install new alarm horn on wall outside near diesel tank.
20.4.8.8.1. Pull the following wires for the diesel tank:
20.4.8.8.1.1. Control Power
20.4.8.8.1.1.1. 24 VDC common PLC enclosure power supply (30')
20.4.8.8.1.2. Status Wires
20.4.8.8.1.2.1. Alarm horn (30')
20.4.8.8.1.2.2. STP for tank level (50')

20.4.9. **Transfer Switch**
20.4.9.1. Install new ¾" conduit from the new PLC enclosure to the ATS for the following wire (40'):
20.4.9.1.1. CAT 5 Ethernet wire, must be 600 VAC rated

20.4.10. **Ventilation and Heating**
20.4.10.1. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.
20.4.10.1.1. Temperature Probe provided by CMCMUA.
20.4.10.2. Install ¾" conduit and wires to interconnect two (2) existing electric heaters to new PLC enclosure for low voltage control of heaters (60' and two (2) conductors).
20.4.10.2.1. Purchase and install 20-amp power run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit (heaters are line voltage at 16 amp).

20.4.11. **Fire/Security/Lights**
20.4.11.1. Install ¾" conduit and wiring from the new PLC enclosure for the following door sensors (70'):
20.4.11.1.1. Purchase and install two (2) door switches
20.4.11.1.2. Install both of the switches on the inside of the front double door to the motor room.
20.4.11.1.3. Demo existing door switches and ¾" PVC conduit and wire.
20.4.11.2. Demo existing 14" x 14" x 10" steel enclosure, ¾" control conduit (30') and return touchscreen to CMCMUA.
20.4.11.3. Cap off and leave in junction box the 120 VAC circuit.
20.4.11.4. Install new ¾" conduit from new PLC enclosure to dialer area for Personnel on Site switch and future fire alarm panel (30').
20.4.11.4.1. Purchase and install, On/Off Switch and enclosure for Personnel on Site and wire to new PLC enclosure the switch status – two (2) conductors.
20.4.11.4.2. Install three (3) wires for future fire panel and leave in junction box next to Personnel on Site switch.
20.4.11.4.2.1. 24 VDC from PLC enclosure power supply
20.4.11.4.2.2. Fire Alarm
20.4.11.4.2.3. System Trouble
20.4.11.5. Demo existing ¾" PVC door and dialer control conduits and wire (50').
20.4.11.6. Demo existing motion sensors from throughout the station (three (3) sensors)

20.4.12. **Auto Dialer**

20.4.12.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.
20.4.12.2. Use door sensor ¾" conduit from new PLC enclosure for dialer wires (30' wire).
20.4.12.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:
20.4.12.3.1. Dialer common 5VDC
20.4.12.3.2. Wet Well High-Level Float through I.S. Barrier
20.4.12.3.3. Dry Well High-Level Float
20.4.12.3.4. PLC Communication Fault through PLC CR relay

20.5. **Demo Existing PLC enclosures**

20.5.1. Safe off the wires, lift from existing enclosure and pull back.
20.5.2. Demo and dispose of enclosure
20.5.3. Steel single door enclosure
20.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

20.6. **Install New PLC Enclosure**

20.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 20.xx above
20.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
20.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
20.6.4. Extend conduits and wires to new enclosure as needed.
20.6.5. Terminate existing wiring per drawings
20.6.6. Terminate new wires per drawings
20.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
20.6.8. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply
20.6.9. Install new Isolation barrier(s) on the backplane of the new PLC enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:
20.6.9.1. Wet Well High-Level Float
20.6.9.2. Wet well hatch switch if applicable

20.7. **Testing and Commissioning System**

20.7.1. Assist Avanceon and CMCMUA with testing and commissioning
20.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
20.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

20.8. **Remove Temporary PLC enclosure**

20.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

21. **CAPE MAY EFFLUENT BUILDING**

21.1. **Reference Drawings**

21.1.1. CapeMayEffluentElectrical.PDF

21.2. **Location Description**

21.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 60' x 60' x 18' ceiling height.

21.2.2. Wet Well under floor.

21.2.3. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

21.2.4. The Effluent Building houses the Effluent Pumping station, Generator, and Chemical Addition equipment.

21.3. **Preliminary work before taking site off line:**

21.3.1. Non-Potable water system and Dilution Water system

21.3.1.1. Power and control conduits and wire must be run to new pump equipment in order to be connected to the temporary PLC, work described below.

21.3.2. General

21.3.2.1. Trace and tag all field wiring in existing PLC enclosure.

21.3.3. Temporary PLC Setup:

21.3.3.1. Purchase and install a Temporary PLC enclosure per sample drawings.

21.3.3.2. Mount Temporary PLC

21.3.3.3. Install temporary power to PLC

21.3.3.4. Establish communications to the Work Stations with the assistance of the CMCMUA

21.3.3.5. PLC code will be provided by CMCMUA

21.3.3.6. HMI code will be provided by CMCMUA

21.3.3.7. Wire items listed in section 21.3.3 below to temporary PLC.

21.3.3.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

21.3.4. Items needed for the temporary PLC setup:

21.3.4.1. Effluent Pumps 1, 2, and 3

21.3.4.2. Non-Potable water pumps 1 and 2

21.3.4.3. Dilution water pumps 1 and 2

21.3.4.4. Post bleach pumps 1 and 2

21.3.4.5. Cl2 probes 1 and 2

21.3.4.6. Sample Pumps 1 and 2

21.3.4.7. Effluent bubbler

21.3.4.8. Effluent wet well high-level float

21.3.5. Items not needed on temporary PLC:

21.3.5.1. Generator

21.3.5.2. Flow meters

21.3.5.3. NPW strainer

21.3.5.4. NaOCl tank levels

21.3.5.5. Effluent wet well ventilation fan

21.4. **Individual Systems**

21.4.1. **Bubbler Control Enclosure**

21.4.1.1. From Panel P2 install new ¾" conduit for two (2) 120 VAC circuits to existing bubbler compressor area (60' use circuits 39 & 41).

21.4.1.1.1. Tee off conduit and install two duplex receptacles for the air compressors.

21.4.1.2. Demo existing 120 VAC circuit, receptacles, 12" x 12" PVC HOA enclosure, compressor wall brackets, PVC bubbler tube.

21.4.1.3. Install Bubbler Control Enclosure provided by CMCMUA (take note of city water pipes hidden in the block wall before drilling anchors).

21.4.1.3.1. Wall mount non-metallic enclosure 30" H x 20" W x 10" D

21.4.1.3.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):

21.4.1.3.2.1. 1 STP for Compressor 1 Pressure transmitter

21.4.1.3.2.2. 1 STP for Compressor 2 Pressure transmitter

21.4.1.3.2.3. 1 STP Wet Well Level transmitter

21.4.1.3.2.4. 24DVC signal and common for isolation control solenoid valve

21.4.1.3.2.5. 24DVC signal and common for purge control solenoid valve

21.4.1.3.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe.

21.4.1.3.3.1. CMCMUA will provide the flexible tubing: 25 Feet

21.4.1.3.4. Mount air compressors on floor beneath new bubbler enclosure

21.4.2. **Wet Well**

21.4.2.1. Install new 2" conduit and 6" x 6" x 4" junction box from the new PLC enclosure to the wet well hatch for the following (120'):

21.4.2.1.1. Control Power

21.4.2.1.1.1. 24 VDC from PLC enclosure power supply

21.4.2.1.2. Floats

21.4.2.1.2.1. High Level Float

21.4.2.1.3. Purchase and install a NC weighted float beneath hatch

21.4.2.1.4. Install stainless steel hook in concrete wall just below hatch to hang weighted float.

21.4.3. **Sump Pump 1 (in Meter Vault) and Sump Pump 7 (in Sample Pit)**

21.4.3.1. Purchase one (1) new 120 VAC, single phase, 3 HP Sump Control Enclosure with disconnect and HOA switch and install in meter pit near ladder.

21.4.3.2. Intercept existing 120 VAC circuit in 8" x 8" PVC junction box and install ¾" conduit to new contactor (20').

21.4.3.2.1. From new contactor run ¾" conduit to sump pit and terminate with 6" x 6" x 6" Stainless steel junction box (20').

21.4.3.2.2. Reconnect sump pump motor conductors using SS junction box.

21.4.3.2.3. Demo existing 8" x 6" PVC enclosure with timer and power relay.

21.4.3.3. Install new 1" control conduit between new PLC enclosure and meter pit using existing 2" pipe chase from effluent building to meter pit (100').

21.4.3.4. Tee off 1" control conduit and install ¾" conduit to the sump pump contactor for the following wires (20'):

21.4.3.4.1. Control Power

21.4.3.4.1.1. 24 VDC from PLC enclosure power supply

21.4.3.4.1.2. 24 VDC Common from PLC enclosure power supply

21.4.3.4.2. Pump Controls

21.4.3.4.2.1. Auto switch

21.4.3.4.2.2. Hand switch

21.4.3.4.2.3. Running status

21.4.3.4.2.4. Fault status

21.4.3.4.2.5. Run Command (pump start command from PLC)

21.4.3.4.2.5.1. Field install run command relay in enclosure

21.4.3.5. Continue ¾" control conduit to the sump pit for the following wires (20'):
- 21.4.3.5.1. Control Power
  - 21.4.3.5.1.1. 24 VDC from PLC enclosure power supply
- 21.4.3.5.2. Controls
  - 21.4.3.5.2.1. Low level float (N.O.)
  - 21.4.3.5.2.2. Stop float (N.O.)
  - 21.4.3.5.2.3. Start float (N.O.)
  - 21.4.3.5.2.4. Lag Start float (N.O.)
  - 21.4.3.5.2.5. High level float (N.C.)

21.4.3.6. Demo existing floats and conduit in sump pit.
21.4.3.7. Install new Unistrut float hanger bar (10' Unistrut)
21.4.3.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
- 21.4.3.8.1. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

21.4.3.9. Purchase one (1) new 120 VAC, single phase, 1 HP Sump Control Enclosure with disconnect and HOA switch and install on wall near sample pit.
21.4.3.10. Extend existing motor feeder circuit from pit to above the grates by extending ¾" conduit to new contactor (20').
- 21.4.3.10.1. From new contactor run ¾" conduit to sump pit and terminate with 6" x 6" x 6" Stainless steel junction box (20').
- 21.4.3.10.2. Reconnect sump pump motor conductors using SS junction box.
- 21.4.3.10.3. Demo existing 8" x 6" PVC enclosure with timer and power relay.

21.4.3.11. Install new ¾" control conduit between new PLC enclosure and contactor for the following wires (80'):
- 21.4.3.11.1. Control Power
  - 21.4.3.11.1.1. 24 VDC from PLC enclosure power supply
  - 21.4.3.11.1.2. 24 VDC Common from PLC enclosure power supply
- 21.4.3.11.2. Pump Controls
  - 21.4.3.11.2.1. Auto switch
  - 21.4.3.11.2.2. Hand switch
  - 21.4.3.11.2.3. Running status
  - 21.4.3.11.2.4. Fault status
  - 21.4.3.11.2.5. Run Command (pump start command from PLC)
    - 21.4.3.11.2.5.1. Field install run command relay in enclosure

21.4.3.12. Continue ¾" control conduit to the sump pit for the following wires (20'):
- 21.4.3.12.1. Control Power
  - 21.4.3.12.1.1. 24 VDC from PLC enclosure power supply
- 21.4.3.12.2. Controls
  - 21.4.3.12.2.1. Low level float (N.O.)
  - 21.4.3.12.2.2. Stop float (N.O.)
  - 21.4.3.12.2.3. Start float (N.O.)
  - 21.4.3.12.2.4. Lag Start float (N.O.)
  - 21.4.3.12.2.5. High level float (N.C.)

21.4.3.13. Demo existing floats and conduit in sump pit.
21.4.3.14. Install new Unistrut float hanger bar (10' Unistrut)
21.4.3.15. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
- 21.4.3.15.1. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

21.4.4. **Sample Pumps 1 (in Meter Vault) and Sample Pump 7 (in Sample pit)**

21.4.4.1. Purchase one (1) new 120 VAC, single phase, 1 HP Contactor Enclosure with disconnect and HOA switch and install in meter pit near ladder for the Meter Pit Sample pump.
21.4.4.2. Intercept existing 120 VAC circuit in surface mount junction box and install ¾" conduit to new contactor (20').
21.4.4.3. Tee off 1" Meter Pit control conduit and install ¾" conduit to the sample pump contactor for the following wires (20'):
21.4.4.3.1. Control Power
21.4.4.3.1.1. 24 VDC from PLC enclosure power supply
21.4.4.3.1.2. 24 VDC Common from PLC enclosure power supply
21.4.4.3.2. Pump Controls
21.4.4.3.2.1. Auto switch
21.4.4.3.2.2. Hand switch
21.4.4.3.2.3. Running status
21.4.4.3.2.4. Fault status
21.4.4.3.2.5. Run Command (pump start command from PLC)
21.4.4.3.2.5.1. Field install run command relay in enclosure
21.4.4.4. Purchase one (1) new 120 VAC, single phase, 1 HP Contactor Enclosure with disconnect and install on wall above Effluent Sample Pit for the Effluent Sample Pit pump.
21.4.4.5. From Panel P2 install new ¾" conduit for one (1) 120 VAC circuits to Effluent Sample Pit area (60' - use existing circuit (conduit also used for flow meter power)).
21.4.4.6. Install new 1" control conduit from the new PLC enclosure to the Effluent Sample Pit pump contactor for the following wires (60'):
21.4.4.6.1. Control Power
21.4.4.6.1.1. 24 VDC from PLC enclosure power supply
21.4.4.6.1.2. 24 VDC Common from PLC enclosure power supply
21.4.4.6.2. Pump Controls
21.4.4.6.2.1. Auto switch
21.4.4.6.2.2. Hand switch
21.4.4.6.2.3. Running status
21.4.4.6.2.4. Fault status
21.4.4.6.2.5. Run Command (pump start command from PLC)
21.4.4.6.2.5.1. Field install run command relay in enclosure

21.4.5. **Flow Meters**
21.4.5.1. Use the Effluent Sample Pit pump ¾" power conduit and install two (2) 120 VAC circuits for the Influent Flow Meter and Effluent Flow Meter and use existing breakers (60' wire).
21.4.5.2. Demo existing switches for both flow meters and connect 120 VAC circuits directly to flow meters.
21.4.5.3. Use Effluent Sample Pit pump contactor control conduit and install the following wires (60' wire and 12' of ¾" flex):
21.4.5.3.1. STP 4-20 mA for Effluent Flow Meter
21.4.5.3.2. CAT 5 for MODBUS communication for Influent Flow Meter
21.4.5.4. Reconnect existing Dilution Water Flow Meter 4-20 mA STP to new PLC
21.4.5.5. Reconnect existing Non-Potable Flow Meter 4-20 mA STP to new PLC

21.4.6. **Non-Potable Drives 1 and 2**
21.4.6.1. Install new 1" conduit from the associated MCC to each of the non-potable water VFD's 480 VAC feed wires (100' #8 AWG wire).

21.4.6.2. In associated MCC for each non-potable water pump remove all equipment from MCC other than the main breaker. Remove all equipment from door and plug three (3) 30mm holes. Connect new feeder wires to the breaker.

21.4.6.3. From non-potable water VFD install new 1" conduit and wire along wall and along existing Unistrut to each of the motors and connect motor leads (40').

21.4.6.3.1. Demo existing non-potable motor feed conduits and wire (40').

21.4.6.3.2. Demo existing non-potable 36" x 30" x 12" steel enclosures with contactors/VFD and return to CMCMUA.

21.4.6.3.3. Demo existing 1" conduits and wire that contain the motor feed wires (60').

21.4.6.3.4. Demo existing 2" PVC conduit and wire that contained the original control wires back to the original PLC (30').

21.4.6.3.5. Demo existing non-potable motor feeders back to MCC (80' of wire)

21.4.6.3.6. Tee off wet well 2" conduit to each of the two (2) pump drive enclosures and pull new wires for the following for each pump drive (100' wire):

21.4.6.3.7. Control Power

21.4.6.3.7.1. 24 VDC from PLC enclosure power supply

21.4.6.3.7.2. 24 VDC Common from PLC enclosure power supply

21.4.6.3.8. Pump Controls

21.4.6.3.8.1. Auto switch

21.4.6.3.8.2. Hand switch

21.4.6.3.8.3. Running status

21.4.6.3.8.4. Fault status

21.4.6.3.8.5. Run Command (pump start command from PLC)

21.4.6.3.8.5.1. Field install run command relay in enclosure

21.4.6.3.8.6. Ethernet Wire

21.4.6.3.8.7. STP speed command

21.4.7. **Non-Potable Strainer**

21.4.7.1. Tee off wet well 2" conduit with a ¾" conduit for the following wires (10'):

21.4.7.1.1. Control Power

21.4.7.1.1.1. 24 VDC from PLC enclosure power supply

21.4.7.1.2. Strainer Status

21.4.7.1.2.1. Auto switch

21.4.7.1.2.2. Hand switch

21.4.7.1.2.3. Running status

21.4.7.1.2.4. Fault status

21.4.7.1.2.5. STP for pressure transducer

21.4.7.1.3. Purchase and install a new HOA switch with four (4) contact blocks on the door of the NPW strainer enclosure.

21.4.7.1.3.1. Reconnect the existing control wires

21.4.7.1.3.2. Connect the PLC controls wires for auto and hand status

21.4.7.1.4. Purchase and install one (1) 120 VAC control relay for the running status.

21.4.7.1.4.1. Parallel wires off the running light to control the relay coil and connect the PLC status wires to a N.O. contact on the relay.

21.4.7.1.5. Connect the PLC fault status wires to the existing N.O. contact on the overload block.

21.4.8. **Dilution Water Drives 1 and 2**

21.4.8.1. Install new ¾" conduit from the associated MCC to each of the Dilution water VFD's 480 VAC feed wires (100' #12 AWG wire).

21.4.8.2. In associated MCC for each Dilution water pump remove all equipment from MCC other than the main breaker. Remove all equipment from door and plug three (3) 30mm holes. Connect new feeder wires to the breaker.

21.4.8.3. From Dilution water VFD install new ¾" conduit along wall and along existing Unistrut to each of the motors and connect motor leads (20').

21.4.8.3.1. Demo existing Dilution motor feed conduits and wire (40').

21.4.8.3.2. Demo existing Dilution 30" x 24" x 12" steel enclosures with contactors/VFD and return to CMCMUA.

21.4.8.3.3. Demo existing ¾" conduits and wire that contained the original motor feeds for Dilution water pumps (50').

21.4.8.3.4. Demo existing Dilution motor feeders back to MCC (80' of wire)

21.4.8.3.5. Tee off wet well 2" control conduit to each of the two (2) pump drive enclosures and pull new wires for the following for each pump drive (100' wire):

21.4.8.3.6. Control Power

21.4.8.3.6.1. 24 VDC from PLC enclosure power supply

21.4.8.3.6.2. 24 VDC Common from PLC enclosure power supply

21.4.8.3.7. Pump Controls

21.4.8.3.7.1. Auto switch

21.4.8.3.7.2. Hand switch

21.4.8.3.7.3. Running status

21.4.8.3.7.4. Fault status

21.4.8.3.7.5. Run Command (pump start command from PLC)

21.4.8.3.7.5.1. Field install run command relay in enclosure

21.4.8.3.7.6. Ethernet Wire

21.4.8.3.7.7. STP speed command

21.4.9. **Effluent Pump Drives 1, 2, and 3**

21.4.9.1. Demo existing 2" PVC conduit and control wires from Effluent VFD enclosures (60')

21.4.9.2. Install new ¾" conduit to each Effluent VFD enclosure for the following wire (60'):

21.4.9.2.1. Control Power

21.4.9.2.1.1. 24 VDC from PLC enclosure power supply

21.4.9.2.1.2. 24 VDC Common from PLC enclosure power supply

21.4.9.2.2. Status and Controls

21.4.9.2.2.1. Auto switch

21.4.9.2.2.2. Hand switch

21.4.9.2.2.3. Running status

21.4.9.2.2.4. Fault status

21.4.9.2.2.5. Run Command (pump start command from PLC)

21.4.9.2.2.5.1. Field install run command relay in enclosure

21.4.9.2.2.6. Ethernet Wire

21.4.9.2.2.7. STP speed command

21.4.10. **Effluent Pump Motors 1, 2, and 3**

21.4.10.1. Install one (1) new ¾" conduit from the new PLC enclosure to monitor status for the vibration switches for all of the pump motors (110'):

21.4.10.1.1. Control Power

21.4.10.1.1.1. 24 VDC from PLC enclosure power supply x3

21.4.10.1.2. Status

21.4.10.1.2.1. Vibration switch x3

21.4.10.2. Purchase and install three (3) new vibration switches, one on each of the three (3) motors.

21.4.11. **Chemical Pumps 1, 3, and 5 (Influent 1 and 2, Dilution 3 and 4, Effluent 5 and 6) – Running wires for only three (3) of the six (6) Pumps in the Electrical Drawings**

21.4.11.1. Demo six (6) 8" x 8" x 8" PVC enclosures and 1" PVC conduit from pump area (40').

21.4.11.2. Demo two (2) ¾" PVC conduits and wire from pump area to Panel P2.

21.4.11.3. Install one (1) new ¾" conduit and wire for three duplex receptacles (120 VAC) from existing breakers 6, 9, and 10 for the three (3) pumps (50').

21.4.11.3.1. Install receptacles near existing pumps.

21.4.11.4. Purchase and install one (1) new 12" W x 16" H x 10" D PVC NEMA 3R enclosure for status and control wire connections for all chemical pumps.

21.4.11.4.1. Purchase and install din rail and terminal blocks for all chemical pump wiring (2' din and 50 terminal blocks total).

21.4.11.5. Install new 1" conduit from new PLC enclosure to NEMA 3R enclosure in pump area for the following wires (50'):

21.4.11.5.1. Control Power

21.4.11.5.1.1. 24 VDC from PLC enclosure power supply

21.4.11.5.1.2. 24 VDC Common from PLC enclosure power supply

21.4.11.5.2. Status and Controls

21.4.11.5.2.1. Local/Auto

21.4.11.5.2.2. Running status

21.4.11.5.2.3. Fault status

21.4.11.5.2.4. Run Command (pump start command from PLC)

21.4.11.5.2.4.1. Field install run command relay in enclosure

21.4.11.5.2.5. STP for Speed Command

21.4.11.6. Route existing control cable whip from pumps to NEMA 3R enclosure (½" cord grip) and connect wires per pump schematic on site.

21.4.12. **Chemical Flow Meters 1, 2, and 3 (Pre, Post, Dilution)**

21.4.12.1. Install a new 1" conduit from the new PLC enclosure and tee off with ½" flex to each of the three (3) flow meters for both 120 VAC power form the PLC enclosure and the STP for the 4-20 mA signal for the following wires (50' – 20' of flex):

21.4.12.1.1. Control Power

21.4.12.1.1.1. 120 VAC from PLC breaker rail

21.4.12.1.1.2. Neutral from PLC power rail

21.4.12.1.1.3. Ground from PLC power rail

21.4.12.1.2. Status

21.4.12.1.2.1. STP 4-20 mA for flow

21.4.13. **Chemical Tanks 1, 2, and 3**

21.4.13.1. Demo existing PVC conduit and wire from existing ultra-sonic level transmitters (50')

21.4.13.2. Install new ¾" conduit from new PLC enclosure to ceiling beam near chemical tanks for three (3) existing ultra-sonic level transmitters for the following wire (110'):

21.4.13.2.1. Status

21.4.13.2.1.1. STP 4-20 mA for level

21.4.13.2.2. Connect new wires to the ultra-sonic level transmitters and the PLC.

21.4.13.3. Tee off tank conduit with ¾" conduit for the following wires to the safety shower (40')
21.4.13.3.1. Control Power
21.4.13.3.1.1. 24 VDC from PLC enclosure power supply
21.4.13.3.2. Status and Controls
21.4.13.3.2.1. Safety shower 1 switch
21.4.13.3.2.2. Safety shower 1 switch
21.4.13.3.3. Leave wires in junction box near safety shower for future connection.

21.4.14. **Chemical Probe**

21.4.14.1. Demo existing wires from ¾" control conduit in motor base of pump 2.
21.4.14.2. Extend existing ¾" control conduit in motor base of pump 2 to the existing Cl2 probe controller for the following wire (10' – 3' flex):
21.4.14.2.1. Status
21.4.14.2.1.1. STP 4-20 mA for Cl2 probe
21.4.14.2.2. Connect new wires to the probe controller and the PLC.

21.4.15. **Generator**

21.4.15.1. Purchase and install two (2) new 480 VAC, three phase, 3 HP contactors for generator ventilation fans with HOA switch with four (4) contact blocks for control and status.
21.4.15.2. Demo existing two (2) controllers and return to CMCMUA and mount new controllers in their place reusing the existing motor feed and motor load wires.
21.4.15.3. Reconnect the existing two (2) remote auto start wires from the generator to the auto switch circuit.
21.4.15.4. Install new ¾" conduit from new PLC enclosure and tee off at each contactor for the following wire (40'):
21.4.15.4.1. Control Power
21.4.15.4.1.1. 24 VDC from PLC enclosure power supply
21.4.15.4.2. Status
21.4.15.4.2.1. Auto switch
21.4.15.4.2.2. Hand switch
21.4.15.4.2.3. Running status
21.4.15.4.2.4. Fault status
21.4.15.4.3. Reconnect existing MODBUS wire from generator to new PLC.
21.4.15.5. Reuse existing ¾" conduit from PLC enclosure to day tank and install the following wires (70')
21.4.15.5.1. Control Power
21.4.15.5.1.1. 24 VDC from PLC enclosure power supply
21.4.15.5.2. Status and Control Wires
21.4.15.5.2.1. Day Tank Not In Auto alarm
21.4.15.5.2.2. Day Tank high level
21.4.15.5.2.3. Day Tank low level
21.4.15.5.2.4. Day Tank leak alarm
21.4.15.5.2.5. Day Tank return pump running

21.4.16. **Diesel Tank**

21.4.16.1. Demo existing 10" x 10" x 6" steel enclosure with tank level display and return to CMCMUA.
21.4.16.2. Extend existing ¾" conduit from display area to new PLC enclosure (40').
21.4.16.3. Safe of existing 120 VAC circuit in existing 4" square box.
21.4.16.4. Demo horn, light and enclosure from diesel tank and use existing ¾" conduit for the new high-level horn and tank level.

21.4.16.5. Install new wires from the new PLC enclosure to the diesel tank for the following (80' wire):
21.4.16.5.1. Control Power
21.4.16.5.1.1. 24 VDC Common from PLC enclosure power supply
21.4.16.5.2. Status and Control Wires
21.4.16.5.2.1. STP for ultra-sonic level transmitter
21.4.16.5.2.2. High level horn
21.4.16.6. Purchase and install a new diesel tank high level horn.
21.4.16.7. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank
21.4.16.7.1. Purchase and install threaded reducer for existing 4" tank opening to accommodate new Level Transmitter mounting configuration.
21.4.16.7.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

21.4.17. **Network Equipment**

21.4.17.1. Reconnect 1" fiber conduit to new PLC enclosure.
21.4.17.2. Reconnect fiber cables to existing network switch.
21.4.17.3. Purchase and install Ethernet patch cables to the network switch for the following:
21.4.17.3.1. Dell Wyse computer
21.4.17.3.2. Stratus Node 1
21.4.17.3.3. Stratus Node 2
21.4.17.3.4. Operator touch screen
21.4.17.3.5. PLC Processor
21.4.17.3.6. PLC NOE

21.5. **Demo Existing PLC enclosures**

21.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
21.5.2. Demo and dispose of one (1) two-door enclosure 72" x 90" x 27" (overhead crane available)
21.5.2.1. Steel double door enclosure
21.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

21.6. **Install New PLC Enclosure**

21.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 21.xx above
21.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
21.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
21.6.4. Extend conduits and wires to new enclosure as needed.
21.6.5. Terminate existing wiring per drawings
21.6.6. Terminate new wires per drawings
21.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
21.6.8. Reconnect Ethernet wires.
21.6.9. Reconnect fiber cables.

21.7. **Testing and Commissioning System**

21.7.1. Assist Avanceon and CMCMUA with testing and commissioning
21.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
21.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

21.8. **Remove Temporary PLC enclosure**

21.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

22. CAPE MAY PRELIMINARY TREATMENT BUILDING

22.1. Reference Drawings

22.1.1. CapeMayPreliminaryElectrical.PDF

22.2. Location Description

22.2.1. Two story block building with brick face overlaid with vinyl siding with overall dimensions of 70' x 25' x 15' ceiling height.

22.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

22.2.3. The Preliminary Treatment Building houses the Blowers, Bar Screen, Bio-Filter, Clarifiers, RBC's, Sludge pumps, and Scum pump equipment.

22.3. Preliminary work before taking site off line:

22.3.1. General

22.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

22.3.2. Temporary PLC Setup:

22.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

22.3.2.2. Mount Temporary PLC

22.3.2.3. Install temporary power to PLC

22.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

22.3.2.5. PLC code will be provided by CMCMUA

22.3.2.6. HMI code will be provided by CMCMUA

22.3.2.7. Wire items listed in section 22.3.3 below to temporary PLC.

22.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

22.3.3. Items needed for the temporary PLC setup:

22.3.3.1. Sludge Pumps 1, 2, and 3

22.3.3.2. Sludge flow meter

22.3.3.3. Bar screen fault

22.3.3.4. Influent channel high-level float

22.3.4. Items not needed on temporary PLC:

22.3.4.1. RBC's

22.3.4.2. Clarifiers

22.3.4.3. Scum pumps

22.3.4.4. Bio-Filter

22.3.4.5. Blowers

22.4. Individual Systems

22.4.1. **Bio-Filter**

22.4.1.1. Demo existing 5' x 3' x 1' stainless steel NEMA 4X enclosure from scrubber pad.

22.4.1.1.1. Plug existing ten (10) ¾" conduits in the concrete pour below enclosure.

22.4.1.2. Remove 20' of 1" PVC conduit back to where conduit goes below grade and preserve existing 50-amp feeders.

22.4.1.3. Purchase and install one (1) new 480 VAC, three phase, 10 HP contactor with HOA switch and breaker disconnect for bio-filter fan (20' SS Unistrut).

22.4.1.4. Install new 1" conduit for existing 50-amp feeders to new contactor.

22.4.1.5. Install new ¾" conduit and wires from contactor to bio-filter fan motor (20' – plus 6' flex).

22.4.1.6. Remove wires from existing 1" control conduit from new PLC enclosure to bio-filter (200' with three (3) STP).

22.4.1.7. Demo existing 1" rubber coated rigid conduit from ledge of bio-filter concrete wall back to where conduit goes below grade (30').

22.4.1.8. Install new wires in existing 1" control conduit for the following (200' wire):

22.4.1.8.1. Control Power

22.4.1.8.1.1. 24 VDC from PLC enclosure power supply

22.4.1.8.1.2. 24 VDC Common from PLC enclosure power supply

22.4.1.8.2. Status and Controls

22.4.1.8.2.1. Auto status of Bio Filter Blower

22.4.1.8.2.2. Hand status of Bio Filter Blower

22.4.1.8.2.3. Running status of Bio Filter Blower

22.4.1.8.2.4. Fault status of Bio Filter Blower

22.4.1.8.2.5. Run Command (pump start command from PLC)

22.4.1.8.2.5.1. Purchase and field install 10-amp run command relay in enclosure

22.4.1.8.2.6. STP for existing pressure transducer

22.4.1.8.2.7. STP for existing temperature probe

22.4.1.8.3. Install new 1" conduit to the blower contactor for the digital I/O

22.4.1.8.4. Tee off the 1" conduit with ¾" conduit for the STP for the existing temperature probe and existing pressure transducer for the bio-filter (20')

22.4.1.8.4.1. Reconnect existing temperature probe and existing pressure transducer.

22.4.2. **Process Air Blowers 1, 2, and 3**

22.4.2.1. Install new 1-½" control conduit to MCC 1 (10').

22.4.2.2. Install new 1-½" control conduit to MCC 2 (10').

22.4.2.3. Install the following new wire to each blower MCC (30'):

22.4.2.3.1. Control Power

22.4.2.3.1.1. 24 VDC from PLC enclosure power supply

22.4.2.3.1.2. 24 VDC Common from PLC enclosure power supply

22.4.2.3.2. Status and Controls

22.4.2.3.2.1. Auto status

22.4.2.3.2.2. Hand status

22.4.2.3.2.3. Running status

22.4.2.3.2.4. Fault status

22.4.2.3.2.5. Run Command (pump start command from PLC)

22.4.2.3.2.5.1. Purchase and field install 10-amp run command relay in enclosure

22.4.2.4. The following work shall be done in each of the blowers MCC:

22.4.2.4.1. Remove 120 V control power wires from contact 3 and wire nut through.

22.4.2.4.2. Install 24 VDC control power on contact 3

22.4.2.4.3. Install 24 VDC control power on contact 80

22.4.2.4.4. Install status wire on contact 2 for running status

22.4.2.4.5. Install status wire on contact 81 for fault status

22.4.2.4.6. Remove IAC and OAC electronic relays and control wiring and remove 120 VAC control power wires.

22.4.2.4.7. Remove and plug running light and wires and plug 30 MM hole.

22.4.2.4.8. Remove and plug fault light and wires and plug 30 MM hole.

22.4.2.4.9. Remove hour meter and wires.

22.4.2.4.10. Purchase and install new HOA switch with four (4) contact blocks on blower MCC door.

22.4.2.4.10.1. Reconnect existing control wires and use the additional blocks for hand and auto status.

22.4.2.5. Install new ¾" flex from blower existing blower pressure transmitter to new PLC enclosure (6').

22.4.2.6. Install new STP from new PLC enclosure to existing blower pressure transmitter and connect (20').

22.4.3. **Clarifiers Flights 1, 2, and 3 and Clarifier Cross Collectors 1, 2, and 3 (6 Clarifier MCC Buckets)**

22.4.3.1. Use the 1-½" control conduit from the new PLC enclosure to MCC 1 for control wires.

22.4.3.2. Install the following new wire to each Clarifier MCC (40'):

22.4.3.2.1. Control Power

22.4.3.2.1.1. 24 VDC from PLC enclosure power supply

22.4.3.2.2. Status and Controls

22.4.3.2.2.1. Running status

22.4.3.2.2.2. Overload status

22.4.3.2.2.3. Torque status

22.4.3.3. The following work shall be done in each of the Clarifier MCC:

22.4.3.3.1. Remove 120 V control power wires from contact 3 and wire nut through.

22.4.3.3.2. Install 24 VDC control power on contact 3

22.4.3.3.3. Install 24 VDC control power on contact AR1 contact

22.4.3.3.4. Install 24 VDC control power on contact AR2 contact

22.4.3.3.5. Install status wire on contact 2 for running status

22.4.3.3.6. Install status wire on contact 81 for overload status

22.4.3.3.7. Install status wire on contact 82 for torque status

22.4.3.3.8. Remove IAC and OAC electronic relays and control wiring and remove 120 VAC control power wires.

22.4.3.3.9. Remove and plug running light and wires and plug 30 MM hole.

22.4.3.3.10. Remove and plug overload light and wires and plug 30 MM hole.

22.4.3.3.11. Remove and plug torque light and wires and plug 30 MM hole.

22.4.3.3.12. Remove hour meter and wires.

22.4.3.3.13. Purchase and install new two-position switch with four (4) contact blocks on clarifier MCC door.

22.4.4. **Bar Screen**

22.4.4.1. Locate and use existing control cable for bar screen

22.4.4.2. Purchase and install thirty (30) field terminal blocks in order to extend existing wiring as needed

22.4.4.3. The following is a list of existing wiring to the bar screen control panel and existing PLC address needed for wire identification (CMCMUA staff will assist in locating the existing wires):

22.4.4.3.1. Reg 1 Bit 1 – bar screen high level float

22.4.4.3.2. Reg 1 Bit 2 - manual screen high level float

22.4.4.3.3. Reg 1 Bit 10 – bar screen high high level float

22.4.4.3.4. Reg 1 Bit 11 – bar screen parked

22.4.4.3.5. Reg 1 Bit 12 – bar screen torque overload

22.4.4.3.6. Reg 1 Bit 13 – bar screen alt sync alarm

22.4.4.3.7. Reg 1 Bit 14 – bar screen running forward

22.4.4.3.8. Reg 1 Bit 15 – bar screen running reverse

22.4.4.3.9. Reg 1 Bit 16 – scrubber air flow switch

22.4.4.3.10. Reg 2 Bit 1 – e-stop alarm

22.4.4.3.11. Reg 2 Bit 2 – e-cord alarm
22.4.4.3.12. Reg 5 Bit 9 – conveyor run command
22.4.4.3.13. Reg 5 Bit 10 – horn and strobe
22.4.4.3.14. Reg 5 Bit 11 – bar screen override enable command
22.4.4.3.15. Reg 5 Bit 12 – bar screen forward command
22.4.4.3.16. Reg 17 – LEL west sensor
22.4.4.3.17. Reg 18 – LEL east sensor
22.4.4.3.18. 24 VDC PLC supply power
22.4.4.3.19. 24 VDC common

22.4.4.4. Locate and connect existing wires above to new PLC, extending them within the new PLC enclosure as needed.

22.4.5. **RBC's 1 through 12**

22.4.5.1. Use 1- ½" control conduit to MCC to install new CAT 5 cable from new PLC enclosure to each RBC MCC bucket (40' x 12 RBC's = 480' wire).

22.4.5.1.1. The TeSys T in the MCC needs an RJ45 connector while the PLC side is a wire terminal connection for the MODBUS communication.

22.4.6. **Suspended Solids and pH Meter**

22.4.6.1. Install new ¾" flex and wire from new PLC enclosure for 120 VAC feed to existing suspended solids and pH meter (6' – 10' wire).

22.4.6.2. Install new flex and CAT 5 wire for MDOBUS communication from new PLC enclosure to meter (6' – 10' wire).

22.4.6.3. Install new 1" conduit from meter to channel near RBC following along existing Unistrut and conduit path to RBC's for two (2) suspended solids probes at two locations (250' plus one core through block and brick wall).

22.4.6.3.1. Pull meter cables through conduit back to meter.

22.4.6.4. Install new 1" conduit from meter to location just outside blower room door for suspended solids probe and pH probe (50' plus one core through block and brick wall).

22.4.6.4.1. Pull meter cable through conduit back to meter.

22.4.6.5. Connect all probes per meter manual.

22.4.7. **Grinder Pumps 1 and 2 (Outside Pit)**

22.4.7.1. From MCC 1 Sewage lift station breaker (20-amp) and from Spare breaker (20-amp) run one (1) ¾" conduit for two (2) 20-amp 480 VAC three phase feeders to pump contactors (100' plus one (1) core through block and brick)

22.4.7.2. Purchase and install two (2) new NEMA-3R, 480 VAC, three phase, 3 HP Sump Control Enclosures with disconnect and HOA switch and install on wall under the concrete steps near the grinder pump station.

22.4.7.3. From contactor enclosures install two new ¾" conduits and wire to Grinder Pump Station pit:

22.4.7.3.1. Purchase and install a 12" x 12" x 6" NEMA 3R stainless steel enclosure mounted 24" above pit grade.

22.4.7.3.2. Conduits will be buried and pass under a sidewalk (50' plus grass area and sidewalk).

22.4.7.3.3. Use stainless steel Unistrut mounted to concrete lid of pit for enclosure (30').

22.4.7.3.4. Conduit must be unbroken when emerging from grade and terminating in stainless steel enclosure as it passes through a classified area above pit lid.

22.4.7.3.5. Route existing flexible submersible motor leads to stainless steel enclosure with cord grip fitting and connect to new contactor leads.

22.4.7.4. Purchase and install a 12" x 12" x 6" NEMA 3R stainless steel enclosure mounted next to the contactors for control wires and ISBR's.

22.4.7.5. Install ¾" conduits from 12" x 12" x 6" NEMA 3R stainless steel enclosure for control wires to the two (2) contactors (10').

22.4.7.6. From new PLC enclosure install one (1) ¾" conduit for control to the 12" x 12" x 6" NEMA 3R stainless steel enclosure for control and terminate for the following wires (100' plus one (1) core through block and brick):

- 22.4.7.6.1. Control Power Pump 1 and 2
  - 22.4.7.6.1.1. 24 VDC from PLC enclosure power supply
  - 22.4.7.6.1.2. 24 VDC Common from PLC enclosure power supply
- 22.4.7.6.2. Pump 1 and 2 Status and Controls
  - 22.4.7.6.2.1. Auto status
  - 22.4.7.6.2.2. Hand status
  - 22.4.7.6.2.3. Running status
  - 22.4.7.6.2.4. Fault status
  - 22.4.7.6.2.5. Seal leak
  - 22.4.7.6.2.6. Run Command (pump start command from PLC)
    - 22.4.7.6.2.6.1. Field install run command relay in enclosure
- 22.4.7.6.3. Floats
  - 22.4.7.6.3.1. 24 VDC from PLC enclosure power supply for ISBR
  - 22.4.7.6.3.2. 24 VDC Common from PLC enclosure power supply for ISBR contacts
- 22.4.7.6.4. Float Status for Five (5) Floats (two (2) wires for each float) and Pump 1 and 2 Temp Alarm (two (2) wires for each temp)
  - 22.4.7.6.4.1. Low level float (N.O.)
  - 22.4.7.6.4.2. Stop float (N.O.)
  - 22.4.7.6.4.3. Start float (N.O.)
  - 22.4.7.6.4.4. Lag Start float (N.O.)
  - 22.4.7.6.4.5. High level float (N.C.)
  - 22.4.7.6.4.6. Pump 1 temp alarm
  - 22.4.7.6.4.7. Pump 2 temp alarm

22.4.7.7. Mount ISBR's in 12" x 12" x 6" NEMA 3R stainless steel enclosure mounted next to the contactors for seven (7) ISBR circuits.

22.4.7.8. Install a new ¾" conduit from 12" x 12" x 6" NEMA 3R stainless steel enclosure mounted next to the contactors to the Grinder Pump Station and purchase and install a 6" x 6" x 6" stainless steel NEMA 3R enclosure for float and temp ISBR connections and use cord grip fittings for floats and pump control cables.

22.4.7.9. Demo existing floats and conduit in pump pit.

22.4.7.10. Install five stainless steel hooks and mount in concrete below lid for floats to hang from.

22.4.7.11. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install hooks.

22.4.7.12. Wire float wire to terminals in new PLC enclosure and ISBR's.

22.4.7.13. Demo existing 12" x 12" x 6" pump junction box and cap existing three (3) conduits.

22.4.7.14. Demo existing 4' x 3' x 1' pump controller single door steel wall mounted enclosure.

- 22.4.7.14.1. Remove existing 20-amp three phase 480 VAC circuit back to MCC 1 (40').

22.4.7.14.2. Remove existing motor feed conductors and control conductors from demoed enclosure to 6" x 6" x 4" box

22.4.7.14.3. Remove existing wires from 6" x 6" x 4" box to 12" x 12" x 6" pump junction box at grinder pump station.

22.4.8. **Sump Pumps 3 and 4 – Ground level sludge pump area**

22.4.8.1. Purchase two (2) new 120 VAC, single phase, 2 HP Sump Control Enclosures with disconnects and HOA switch.

22.4.8.2. Demo existing sump control enclosure.

22.4.8.3. Install new pump control enclosures on wall and reuse existing 120 VAC feed for both sump pumps.

22.4.8.4. Reconnect sump pump motor conductors to new enclosure.

22.4.8.4.1. Use cord grip fitting for sump motor cords.

22.4.8.5. Install new 1" conduit to wire trough on ceiling below PLC enclosure for control conduit and tee off with ¾" conduits for pump controls and ¾" for floats for the following wire (20' 1" and 20' ¾"):

22.4.8.5.1. Control Power

22.4.8.5.1.1. 24 VDC from PLC enclosure power supply

22.4.8.5.1.2. 24 VDC Common from PLC enclosure power supply

22.4.8.5.2. Pump Controls

22.4.8.5.2.1. Auto switch

22.4.8.5.2.2. Hand switch

22.4.8.5.2.3. Running status

22.4.8.5.2.4. Fault status

22.4.8.5.2.5. Run Command (pump start command from PLC)

22.4.8.5.2.5.1. Field install run command relay in enclosure

22.4.8.5.3. Floats

22.4.8.5.3.1. Low level float (N.O.)

22.4.8.5.3.2. Stop float (N.O.)

22.4.8.5.3.3. Start float (N.O.)

22.4.8.5.3.4. Lag Start float (N.O.)

22.4.8.5.3.5. High level float (N.C.)

22.4.8.6. Demo all existing floats and conduit in sump pit.

22.4.8.7. Reuse pipe for float hanger bar

22.4.8.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

22.4.8.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

22.4.8.10. Wire float wire to terminals in new PLC enclosure

22.4.8.11. Demo existing light switch and flex from sump light

22.4.8.12. Extend receptacle box near green air piping to a surface mount box and install ¾" conduit to sump pit area for a surface mount single pole switch (10').

22.4.8.13. From single pole refeed existing light fixture over sump pit.

22.4.9. **Flow Meters: Dewatering, Primary Sludge, and Thickener Overflow**

22.4.9.1. Locate and reuse existing STP for the following flow meters:

22.4.9.1.1. Clarifier Dewatering (Drain) STP 4-20 mA (2-wire)

22.4.9.1.2. Primary Sludge STP 4-20 mA (2-wire)

22.4.9.1.3. Thickener Overflow STP 4-20 mA (2-wire)

22.4.9.2. Use field terminal blocks in PLC enclosure as needed to extend wires to PLC.

22.4.10. **Primary Sludge Pumps 1, 2, 3 and 4**

22.4.10.1. Install new ¾" conduit and wire from the associated wire trough on ceiling below associated MCC using the existing core hole for MCC to each of the existing primary sludge pump VFD's (15 HP 20-amp 480 VAC three phase motor):
- 22.4.10.1.1. Primary sludge pump 1 (40' – 60' wire)
- 22.4.10.1.2. Primary sludge pump 2 (40' – 60' wire)
- 22.4.10.1.3. Primary sludge pump 3 (60' – 80' wire)
- 22.4.10.1.4. Primary sludge pump 4 (60' – 80' wire)

22.4.10.2. In associated MCC for each primary sludge pump remove all equipment from MCC other than the main breaker. Remove all equipment from door and plug three (3) 30mm holes. Connect new feeder wires to the breaker.

22.4.10.3. From primary sludge pump VFD install new ¾" flex and wire to each of the motors and connect motor leads (6').
- 22.4.10.3.1. Demo existing primary sludge pump motor feed conduits and wire (40').
- 22.4.10.3.2. Demo existing primary sludge pump 36" x 30" x 12" stainless steel enclosures with contactors/VFD and return to CMCMUA.
- 22.4.10.3.3. Demo existing ¾" conduits and wire that contain the motor feed wires (40').
- 22.4.10.3.4. Demo existing 2" PVC conduit and wire that contained the original control wires back to the original PLC (30').
- 22.4.10.3.5. Demo existing primary sludge pump motor feeders back to MCC (70' of wire)
- 22.4.10.3.6. From each primary sludge pump VFD enclosure install a ¾" conduit to the existing wire trough on the ceiling below the PLC and install wires through existing core hole to enter the new PLC enclosure for the following (40' each VFD – 50' of wire):
- 22.4.10.3.7. Control Power
  - 22.4.10.3.7.1. 24 VDC from PLC enclosure power supply
  - 22.4.10.3.7.2. 24 VDC Common from PLC enclosure power supply
- 22.4.10.3.8. Pump Controls
  - 22.4.10.3.8.1. Auto switch
  - 22.4.10.3.8.2. Hand switch
  - 22.4.10.3.8.3. Running status
  - 22.4.10.3.8.4. Fault status
  - 22.4.10.3.8.5. Run Command (pump start command from PLC)
    - 22.4.10.3.8.5.1. Field install run command relay in enclosure
  - 22.4.10.3.8.6. Ethernet Wire
  - 22.4.10.3.8.7. STP speed command

22.4.10.4. Purchase and install ten (10) LED Hubbell RLB Reverie™ Decorative Low Bay or equivalent industrial fixtures.

22.4.10.5. Use existing ¾" conduit and wires.

22.4.10.6. Remove existing ten (10) fluorescent fixtures.

22.4.11. **Scum Pumps 1 and 2 and Scum Grinder**

22.4.11.1. Scum pump 1 will be fed from existing 30-amp MCC 1 S&M Control breaker (2 HP).

22.4.11.2. Scum pump 2 will be fed from existing 30-amp MCC 2 S&M Control breaker (2 HP).

22.4.11.3. Grinder will be fed from existing spare 15-amp MCC 1 breaker (3 HP).
- 22.4.11.3.1. Existing grinder contactor is next to scum enclosure.

22.4.11.4. All feeders will originate in associated MCC and use existing core holes to lower level.
22.4.11.5. Demo existing 5' x 4' x 1' two door steel floor standing enclosure for scum equipment.
22.4.11.6. Purchase and install two (2) new 480 VAC, three phase, 2 HP contactor with HOA switch and disconnect for scum pumps.
22.4.11.6.1. Install two (2) scum pump contactors on wall in place of demoed enclosure.
22.4.11.6.2. Install three (3) ¾" feeder conduits from associated MCC's to scum pumps and grinder contactors (70' – 90' of wire)
22.4.11.7. Use existing 1" conduit to scum enclosure and tee off with new ¾" conduit for the following wires (10' of ¾" – 90' wire):
22.4.11.7.1. Scum Pump 1, 2 and Scum Grinder
22.4.11.7.1.1. Control Power
22.4.11.7.1.1.1. 24 VDC from PLC enclosure power supply
22.4.11.7.1.1.2. 24 VDC Common from PLC enclosure power supply
22.4.11.7.1.2. Pump Controls
22.4.11.7.1.2.1. Auto switch
22.4.11.7.1.2.2. Hand switch
22.4.11.7.1.2.3. Running status
22.4.11.7.1.2.4. Fault status
22.4.11.7.1.2.5. Run Command
22.4.11.7.1.2.5.1. Run Command relay for pump 1
22.4.11.7.1.2.5.2. Run Command relay for pump 2
22.4.11.7.1.2.5.3. Run Command relay for grinder 1
22.4.11.7.1.2.5.4. Field install two pole run command relay in enclosure for each pump and grinder and wire such that is any pump starts the grinder starts
22.4.11.7.1.3. One (1) two pole relay to control both scum pump and mazzerator start command
22.4.11.7.2. Purchase and install a new HOA switch with four (4) contact blocks on the door of the Scum Grinder enclosure.
22.4.11.7.2.1. Reconnect existing switch wiring and use additional blocks for PLC status.
22.4.11.7.3. Purchase and install two (2) 120 VAC relays for running and fault status for Grinder.
22.4.11.7.3.1. Parallel off running and fault lights for relay coils.
22.4.11.7.3.2. Use NO contacts for status wires.
22.4.11.7.4. Extend ¾" conduits for motor leads to associated contactor (30' total).
22.4.11.7.5. Install new wires from contactors to associated motors (40' wire and 6' flex per motor).
22.4.11.8. Locate the existing STP for the ultra-sonic level transmitter for the scum tank and reconnect to existing PLC (loop powered device).
22.4.11.8.1. Use field blocks as needed to extend STP.

22.4.12. **Ventilation (Sludge Pump Room Fan)**

22.4.12.1. Purchase and install one (1) new 120 VAC, single phase, 1 HP contactor with HOA switch and disconnect for fan.
22.4.12.1.1. Mount contactor on wall near ventilation fan.
22.4.12.2. Remove existing wall thermostat and replace with surface mount box.

22.4.12.2.1. From surface mount box install ¾" conduit and extend 120 VAC conductors to new contactor (10').
22.4.12.2.2. From new contactor install ¾" conduit and flex to ventilation fan motor (10').
22.4.12.3. From new PLC enclosure install a new ¾" conduit for the following wires (30'):
22.4.12.3.1. Control Power
22.4.12.3.1.1. 24 VDC from PLC enclosure power supply
22.4.12.3.1.2. 24 VDC Common from PLC enclosure power supply
22.4.12.3.2. Status and Controls
22.4.12.3.2.1. Auto status
22.4.12.3.2.2. Hand status
22.4.12.3.2.3. Running status
22.4.12.3.2.4. Fault status
22.4.12.3.2.5. Run Command (pump start command from PLC)
22.4.12.3.2.5.1. Field install run command relay in enclosure
22.4.12.3.2.6. STP temperature probe
22.4.12.4. Install Indoor Temperature Probe using 0.25" compression fitting mounted on side of contactor enclosure for probe tip to hang in free air and wire to PLC.
22.4.12.4.1. Temperature Probe provided by CMCMUA.

22.4.13. **Network Equipment**

22.4.13.1. Remove existing fiber cables and secure and protect in bottom of PLC gutter until new PLC enclosure is installed.
22.4.13.2. Reconnect fiber cables to existing network switch.
22.4.13.3. Purchase and install Ethernet patch cables to the network switch for the following:
22.4.13.3.1. Dell Wyse computer
22.4.13.3.2. Stratus Node 1
22.4.13.3.3. Stratus Node 2
22.4.13.3.4. Operator touch screen
22.4.13.3.5. PLC Processor
22.4.13.3.6. PLC NOE

22.5. **Demo Existing PLC enclosures**

22.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
22.5.2. Demo and dispose of one (1) two-door enclosure 72" x 90" x 27"
22.5.2.1. Steel double door enclosure
22.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

22.6. **Install New PLC Enclosure**

22.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 22.xx above
22.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
22.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.
22.6.4. Extend conduits and wires to new enclosure as needed.
22.6.5. Terminate existing wiring per drawings
22.6.6. Terminate new wires per drawings
22.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
22.6.8. Reconnect Ethernet wires.
22.6.9. Reconnect fiber cables.

22.7. **Testing and Commissioning System**

22.7.1. Assist Avanceon and CMCMUA with testing and commissioning

22.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

22.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

22.8. **Remove Temporary PLC enclosure**

22.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

23. **CAPE MAY SLUDGE PROCESSING BUILDING – Secondary Treatment**

23.1. **Reference Drawings**

23.1.1. CapeMaySludgeElectrical.PDF

23.2. **Location Description**

23.2.1. Two story block building with basement block wall with brick face with overall dimensions of 45' x 100' x 15' ceiling height.

23.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

23.2.3. The Sludge Processing Building houses the Scum, Sludge Pump, Thickener, Bio Filter, and Recycle equipment.

23.3. **Preliminary work before taking site off line:**

23.3.1. General

23.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

23.3.2. Temporary PLC Setup:

23.3.2.1. The new PLC enclosure will not be installed in the same location as the existing PLC enclosure so no temporary PLC is needed at this location.

23.4. **Individual Systems**

23.4.1. **Scum Concentrator**

23.4.1.1. Purchase and install one (1) new 480 VAC three phase 5 HP contactor with disconnect and HOA switch in place of existing scum control panel.

23.4.1.1.1. Demo existing 36" x 36" x 10" enclosure and reuse existing feed for new contactor.

23.4.1.1.2. Install new ¾" conduit and wire from contactor to scum motor (30').

23.4.1.2. Install new 1" control conduit between new PLC enclosure and Scum Concentrator Enclosure for the following wires (70' +1 core through block wall):

23.4.1.2.1. Control Power

23.4.1.2.1.1. 24 VDC from PLC enclosure power supply

23.4.1.2.1.2. 24 VDC Common from PLC enclosure power supply

23.4.1.2.2. Controls

23.4.1.2.2.1. Auto switch

23.4.1.2.2.2. Hand switch

23.4.1.2.2.3. Running status

23.4.1.2.2.4. Fault status

23.4.1.2.2.5. High level

23.4.1.2.2.6. Zero speed

23.4.1.2.2.7. Run Command (pump start command from PLC)

23.4.1.2.2.7.1. Purchase and field install 10-amp run command relay in enclosure

23.4.1.2.2.8. Install ten (10) terminal blocks in contactor and terminate wires.

23.4.2. **Tanker Truck Flow Meter**

23.4.2.1. Install new ¾" conduit from new PLC enclosure for 120 VAC circuit from PLC enclosure breaker to Badger Flow Meter (40').

23.4.2.2. Tee off the Scum Concentrator 1" conduit to Badger flow meter for the following wires (10' – 40' of wire):

23.4.2.2.1. Tanker Truck Flow Meter STP 4-20 mA

23.4.3. **Tanker Truck Pump**

23.4.3.1. Demo existing disconnect from wall near tanker truck pump.

23.4.3.2. Demo existing PVC conduit and feeders back to MCC (40').

23.4.3.3. Demo existing PVC start/stop enclosure and PVC back to MCC (60').
23.4.3.4. Demo existing 8" x 8" x 8" steel enclosure with totalizer.
23.4.3.5. Purchase and install one (1) new 480 VAC three phase 25 HP 30.2-amp contactor with disconnect and HOA switch on the wall near the truck pump.
23.4.3.6. Install new 1" conduit and wire from MCC 6 tanker truck pump 40-amp breaker to new contactor for a motor feeder (40').
23.4.3.6.1. Demo all equipment from the MCC bucket and connect feeder wires to the breaker.
23.4.3.6.2. Remove and running light and wires and plug 30 MM hole.
23.4.3.6.3. Remove and fault light and wires and plug 30 MM hole.
23.4.3.6.4. Remove hour meter and wires.
23.4.3.7. Install new ¾" conduit from new PLC enclosure to new contactor for the following wires (20'):
23.4.3.7.1. Control Power
23.4.3.7.1.1. 24 VDC from PLC enclosure power supply
23.4.3.7.1.2. 24 VDC Common from PLC enclosure power supply
23.4.3.7.2. Status and Controls
23.4.3.7.2.1. Auto status
23.4.3.7.2.2. Hand status
23.4.3.7.2.3. Running status
23.4.3.7.2.4. Fault status
23.4.3.7.2.5. Run Command (pump start command from PLC)
23.4.3.7.2.5.1. Purchase and field install 10-amp run command relay in enclosure
23.4.3.7.3. Install new ¾" conduit from contactor to motor for motor leads (20' +6' flex)
23.4.3.7.4. Reconnect solenoid valve wires flex to contactor and wire to aux relay in contactor.
23.4.3.8. Install new ¾" conduit from the new PLC enclosure to the sludge valve for valve position sensor for the following wires (60'):
23.4.3.8.1. Tee off conduit to the contactor enclosure for the e-stop wires.
23.4.3.9. Control Power
23.4.3.9.1. 24 VDC from PLC enclosure power supply
23.4.3.9.2. 24 VDC Common from PLC enclosure power supply
23.4.3.9.3. 120 VAC from contactor control power
23.4.3.10. Status and Controls
23.4.3.10.1. STP Valve sensor - powered digital (3 conductors)
23.4.3.10.2. E-stop – 24 VDC
23.4.3.10.3. E-stop – 120 VAC
23.4.3.11. Purchase and install an e-stop mushroom switch with two sets of NC contacts with enclosure on the wall beneath the valve.
23.4.3.11.1. Wire the 120 VAC e-stop circuit into the coil of the pump contactor.
23.4.3.11.2. Wire the 24 VDC circuit to the PLC.
23.4.4. **Ventilation Fans 1 and 2 (EF1 and AHU2)**
23.4.4.1. Install new 1" control conduit to MCC 5 (50' +1 core through block wall).
23.4.4.2. Install the following new wire to each Fan MCC (50'):
23.4.4.2.1. Control Power
23.4.4.2.1.1. 24 VDC from PLC enclosure power supply
23.4.4.2.1.2. 24 VDC Common from PLC enclosure power supply
23.4.4.2.2. Status and Controls

23.4.4.2.2.1. Auto status
23.4.4.2.2.2. Hand status
23.4.4.2.2.3. Running status
23.4.4.2.2.4. Fault status
23.4.4.2.2.5. Run Command (pump start command from PLC)
23.4.4.2.2.5.1. Purchase and field install 10-amp run command relay in MCC

23.4.4.3. The following work shall be done in two (2) of the Fan MCC buckets:
23.4.4.3.1. Purchase and install one (1) new HOA switches with four (4) contact blocks on each Fan MCC door.
23.4.4.3.1.1. Reconnect existing control wires and use the additional blocks for hand and auto status.
23.4.4.3.2. Purchase and install 120 VAC control relay for fault status in the MCC bucket.
23.4.4.3.2.1. Use normally closed neutral conductor and MCC transformer 120 VAC to power fault relay.
23.4.4.3.2.2. Connect 24 VDC fault status wires to relay normally open contact.
23.4.4.3.3. Remove 120 V control power wires from terminals 50 and 51 and wire nut through.
23.4.4.3.4. Install 24 VDC control power on contact 50.
23.4.4.3.5. Install 24 VDC control power on contact 51 for running status from aux contact on contactor.
23.4.4.3.6. Remove IAC and OAC electronic relays and control wiring and remove 120 VAC control power wires.
23.4.4.3.7. Remove and running light and wires and plug 30 MM hole.
23.4.4.3.8. Remove and fault light and wires and plug 30 MM hole.
23.4.4.3.9. Remove hour meter and wires.
23.4.4.4. Purchase and install one (1) new pressure differential switch for EF1 ductwork.
23.4.4.4.1. Attach switch with hose to the EF1 ductwork along the north wall.
23.4.4.4.2. Install new ¾" conduit from the new PLC enclosure to the switch (30').
23.4.4.4.3. Seal all duct penetrations air tight.
23.4.4.4.4. Wire pressure switch back to new PLC Enclosure – 2 conductors.
23.4.4.5. Purchase and install one (1) new pressure differential switch for AHU2 ductwork.
23.4.4.5.1. Attach switch with hose to the AHU1 ductwork along the south wall.
23.4.4.5.2. Install new ¾" conduit from the new PLC enclosure to the switch (40').
23.4.4.5.3. Seal all duct penetrations air tight.
23.4.4.5.4. Wire pressure switch back to new PLC Enclosure – 2 conductors.

23.4.5. **Bio-Filter Blower Fan**
23.4.5.1. Install new 1" control conduit to MCC 6 (50' +1 core through block wall).
23.4.5.2. Install the following new wire to the Blower MCC (50'):
23.4.5.2.1. Control Power
23.4.5.2.1.1. 24 VDC from PLC enclosure power supply
23.4.5.2.1.2. 24 VDC Common from PLC enclosure power supply
23.4.5.2.2. Status and Controls
23.4.5.2.2.1. Auto status

23.4.5.2.2.2. Hand status
23.4.5.2.2.3. Running status
23.4.5.2.2.4. Fault status
23.4.5.2.2.5. Run Command (pump start command from PLC)
23.4.5.2.2.5.1. Purchase and field install 10-amp run command relay in MCC

23.4.5.3. The following work shall be done in Blower MCC bucket:
23.4.5.3.1. Purchase and install one (1) new HOA switches with four (4) contact blocks on each Fan MCC door.
23.4.5.3.1.1. Reconnect existing control wires and use the additional blocks for hand and auto status.
23.4.5.3.2. Purchase and install 120 VAC control relay for fault status in the MCC bucket.
23.4.5.3.2.1. Use normally closed neutral conductor and MCC transformer 120 VAC to power fault relay.
23.4.5.3.2.2. Connect 24 VDC fault status wires to relay normally open contact.
23.4.5.3.3. Remove 120 V control power wires from terminals 50 and 51 and wire nut through.
23.4.5.3.4. Install 24 VDC control power on contact 50.
23.4.5.3.5. Install 24 VDC control power on contact 51 for running status from aux contact on contactor.
23.4.5.3.6. Remove IAC and OAC electronic relays, terminal blocks and control wiring and remove 120 VAC control power wires.
23.4.5.3.7. Remove and plug running light and wires and plug 30 MM hole.
23.4.5.3.8. Remove and plug fault light and wires and plug 30 MM hole.
23.4.5.3.9. Remove hour meter and wires.

23.4.6. **Bio-Filter (Outside Instrumentation)**
23.4.6.1. Locate and pull out three (3) existing STP wires from existing PLC enclosure.
23.4.6.1.1. Break existing 1" conduit near existing PLC enclosure at three-piece coupling and pull back three (3) STP (20' 1")
23.4.6.1.2. Install new 1" conduit from new PLC enclosure to existing three-piece coupling and pull existing STP wires to new PLC enclosure for the following existing devices:
23.4.6.1.2.1. STP Temperature Probe
23.4.6.1.2.2. STP pressure transducer
23.4.6.2. Connect all STP to new PLC enclosure.

23.4.7. **Secondary Scum Pumps 3 and 4 and Scum Grinder 2**
23.4.7.1. Scum pump 1 will be fed from existing 30-amp MCC 5 Scum Control breaker (2 HP).
23.4.7.2. Scum pump 2 will be fed from existing 30-amp MCC 6 Scum Control breaker (2 HP).
23.4.7.3. Grinder will be fed from existing spare 15-amp MCC 1 breaker (3 HP).
23.4.7.3.1. Existing grinder contactor is next to scum enclosure.
23.4.7.4. Demo existing 5' x 4' x 1' two door steel floor standing enclosure for scum equipment.
23.4.7.5. Purchase and install two (2) new 480 VAC, three phase, 2 HP contactor with HOA switch and disconnect for scum pumps.
23.4.7.5.1. Install two (2) scum pump contactors on wall in place of existing scum enclosure.

23.4.7.5.2. Install two (2) ¾" feeder conduits from new contactor panels to existing wire trough where existing feeders are located and route existing feeders to new contactor enclosures (10' each).

23.4.7.6. Install new 1" conduit to scum contactors and tee off with new ¾" conduit for the following wires (50' **+1 - 18" concrete core through floor and one (1) block wall core**):

23.4.7.6.1. Scum Pump 3, 4 and Scum Grinder 2

23.4.7.6.1.1. Control Power

23.4.7.6.1.1.1. 24 VDC from PLC enclosure power supply

23.4.7.6.1.1.2. 24 VDC Common from PLC enclosure power supply

23.4.7.6.1.2. Pump Controls

23.4.7.6.1.2.1. Auto switch

23.4.7.6.1.2.2. Hand switch

23.4.7.6.1.2.3. Running status

23.4.7.6.1.2.4. Fault status

23.4.7.6.1.2.5. Run Command (pump start command from PLC)

23.4.7.6.1.2.5.1. Field install run command relay in enclosure

23.4.7.6.2. Purchase and install a new HOA switch with four (4) contact blocks on the door of the Scum Grinder enclosure.

23.4.7.6.2.1. Reconnect existing switch wiring and use additional blocks for PLC status.

23.4.7.6.3. Purchase and install two (2) 120 VAC relays for running and fault status for Grinder.

23.4.7.6.3.1. Parallel off running and fault lights for relay coils.

23.4.7.6.3.2. Use NO contacts for status wires.

23.4.8. **Secondary Scum Tank**

23.4.8.1. Purchase and install one (1) new ultra-sonic level transmitter in the secondary scum tank.

23.4.8.1.1. Install sensor on grates

23.4.8.1.2. CMCMUA will provide mounting bracket

23.4.8.2. Install new ¾" conduit from new PLC enclosure to Secondary Scum Tank for the following wire (150' **+1 brick/block core (outside wall) and 100' of trenching with 20' of pavement cut across driveway and the rest grass trenching**):

23.4.8.2.1. STP for ultra-sonic level transmitter

23.4.8.3. Repair driveway with suitable material for driveway (**concrete or pavement 20' x 1' x 6"**).

23.4.9. **Recycle Well Tank**

23.4.9.1. Purchase and install one (1) new weighted NC float in recycle tank.

23.4.9.2. Purchase and install one (1) new ultra-sonic level transmitter recycle tank.

23.4.9.2.1. Install sensor on grates

23.4.9.2.2. CMCMUA will provide mounting bracket

23.4.9.3. Demo existing ¾" PVC conduit with float conductors (80')

23.4.9.4. Install new ¾" conduit from new PLC enclosure to tank for the following wires (100' +1 block core and one brick/block core (outside wall):

23.4.9.4.1. Control Power

23.4.9.4.1.1. 24 VDC from PLC enclosure power supply

23.4.9.4.2. Status

23.4.9.4.2.1. High level weighted float NC

23.4.9.4.2.2. STP for ultra-sonic level transmitter

23.4.9.4.3. Demo existing high-level float from recycle tank.

23.4.9.4.4. Demo existing ultra-sonic transmitter from boiler room floor and return to CMCMUA.

23.4.10. **Recycle Pumps 1 and 2**

23.4.10.1. Install a new 1-½" control conduit between MCC 5 and MCC 6 (10').

23.4.10.2. Core drill the floor for a 1" conduit for two sets of motor feeders from the MCC's for the Recycle Pumps.

23.4.10.3. Purchase and install two (2) new 480 VAC three phase 5 HP contactors with disconnect and HOA switch in the basement on the wall near the recycle pumps.

23.4.10.4. Install a new 1" conduit and feeders and tee off with ¾" conduit to the two (2) contactors and connect to the MCC bucket breaker and the new contactor (50' + 20' of ¾" total).

23.4.10.5. In associated MCC for each recycle pump remove all equipment from MCC other than the main breaker. Remove all equipment from door and plug two (2) 30mm holes. Connect new feeder wires to the breaker.

23.4.10.6. From each new contactor install a new ¾" conduit and wires to the motor for motor conductors (30' - route conduit to back wall then to motor to avoid trip hazard).

23.4.10.6.1. Demo existing flex and conduit stub from floor.

23.4.10.6.2. Demo existing PVC control conduit and small disconnect

23.4.10.6.3. Demo existing feeders in conduit in concrete pour back to MCC

23.4.10.6.4. Demo 6" x 6" x 4" PVC enclosure with HOA switch

23.4.10.7. Install a new ¾" conduit from the new PLC enclosure to the recycle pump contactors in the basement for the following wires (80' **+1 - 18" concrete core through floor and one (1) block wall core**):

23.4.10.7.1. Control Power

23.4.10.7.1.1. 24 VDC from PLC enclosure power supply

23.4.10.7.1.2. 24 VDC Common from PLC enclosure power supply

23.4.10.7.2. Status and Controls

23.4.10.7.2.1. Auto status

23.4.10.7.2.2. Hand status

23.4.10.7.2.3. Running status

23.4.10.7.2.4. Fault status

23.4.10.7.2.5. Run Command (pump start command from PLC)

23.4.10.7.2.5.1. Field install run command relay in enclosure

23.4.10.7.2.6. STP for Recycle Flow Meter (1 pair)

23.4.10.7.3. Tee off and extend ¾" conduit to existing flow meter to pick up the 4-20 mA output (40').

23.4.10.7.4. Demo existing STP from flow meter.

23.4.11. **Secondary Clarifiers 1 and 2**

23.4.11.1. Install a new 1" conduit from new PLC enclosure to MCC 5 and MMC 6 for all control wires to the MCC's (50').

23.4.11.2. Install the following new wire to each Clarifier MCC (60'):

23.4.11.2.1. Control Power

23.4.11.2.1.1. 24 VDC from PLC enclosure power supply

23.4.11.2.2. Status and Controls

23.4.11.2.2.1. Running status

23.4.11.2.2.2. Overload status

23.4.11.2.2.3. Torque status

23.4.11.3. The following work shall be done in each of the Clarifier MCC:

23.4.11.3.1. Remove 120 V control power wires from contact 3 and wire nut through.
23.4.11.3.2. Install 24 VDC control power on contact 3
23.4.11.3.3. Install 24 VDC control power on contact AR1 contact
23.4.11.3.4. Install 24 VDC control power on contact AR2 contact
23.4.11.3.5. Install status wire on contact 2 for running status
23.4.11.3.6. Install status wire on contact 81 for overload status
23.4.11.3.7. Remove IAC and OAC electronic relays and control wiring and remove 120 VAC control power wires.
23.4.11.3.8. Remove and plug running light and wires and plug 30 MM hole.
23.4.11.3.9. Remove and plug overload light and wires and plug 30 MM hole.
23.4.11.3.10. Remove and plug torque light and wires and plug 30 MM hole.
23.4.11.3.11. Remove hour meter and wires.
23.4.11.3.12. Purchase and install new two-position switch with four (4) contact blocks on clarifier MCC door.
23.4.11.3.12.1. Reconnect existing switch wiring and use additional blocks for PLC status.

23.4.12. **Thickener Sludge Pumps (TSP) 1 and 2**

23.4.12.1. Install two (2) new ¾" conduits and wire from MCC 5 and MCC 6 existing 20-amp breakers for the 480 VAC three phase 7.5 HP motor feeders (90' each plus one core through block wall. Use existing core through floor to basement).
23.4.12.2. Demo existing 48" x 48" x 8" steel contactor enclosure from the wall.
23.4.12.3. Demo existing multi-motor 30-amp feeder and PVC conduit back to the MCC (90').
23.4.12.4. Purchase and install two (2) new 480 VAC, three phase, 7.5 HP contactors with disconnects and HOA switch in the basement on the wall near the TSP pumps.
23.4.12.5. Extend existing ¾" conduits for motor leads to new contactors and install new motor leads (10' of ¾" and 30' of 12 AWG wire for each TSP).
23.4.12.6. Install a new 1" control conduit from the new PLC enclosure to the TSP contactors for the following wire (80' – use existing core hole through floor to basement):
23.4.12.6.1. Control Power
23.4.12.6.1.1. 24 VDC from PLC enclosure power supply
23.4.12.6.1.2. 24 VDC Common from PLC enclosure power supply
23.4.12.6.2. Pump Controls
23.4.12.6.2.1. Auto switch
23.4.12.6.2.2. Hand switch
23.4.12.6.2.3. Running status
23.4.12.6.2.4. Fault status
23.4.12.6.2.5. Run Command (pump start command from PLC)
23.4.12.6.2.5.1. Field install run command relay in enclosure
23.4.12.6.2.6. ST2xP (four wire device) for PSI sensor
23.4.12.6.3. Purchase and install near TSP pumps one (1) 12" x 12" x 8" stainless steel junction box, din rail, and eight (8) terminal blocks for connection of PSI sensors.

23.4.13. **Secondary Sludge Pumps 5 and 6**

23.4.13.1. Demo existing 2" PVC conduit and wires from Secondary Sludge Pump VFD enclosures (50').

23.4.13.2. Install two (2) new ¾" control conduits from the new PLC enclosure to the each of the secondary sludge pump VFD enclosures for the following wire (70' – use existing core hole through floor to basement):
- 23.4.13.2.1. Control Power
  - 23.4.13.2.1.1. 24 VDC from PLC enclosure power supply
  - 23.4.13.2.1.2. 24 VDC Common from PLC enclosure power supply
- 23.4.13.2.2. Pump Controls
  - 23.4.13.2.2.1. Auto switch
  - 23.4.13.2.2.2. Hand switch
  - 23.4.13.2.2.3. Running status
  - 23.4.13.2.2.4. Fault status
  - 23.4.13.2.2.5. Run Command (pump start command from PLC)
    - 23.4.13.2.2.5.1. Field install run command relay in enclosure
  - 23.4.13.2.2.6. CAT 5 Cable
  - 23.4.13.2.2.7. Two (2) STP for speed command (one for each VFD)
  - 23.4.13.2.2.8. One (1) STP for Flow Meter
- 23.4.13.2.3. Tee off and extend one of the ¾" conduits to the existing flow meter to pick up the 4-20mA output (40').
- 23.4.13.2.4. Demo existing STP from flow meter.

23.4.14. **Sludge Storage Tank 1 and 2 and Mixer 1 and 2**

23.4.14.1. Demo existing 2" PVC conduit and wire from existing PLC enclosure to sludge storage tank outdoor steel stairs (150').

23.4.14.2. Demo existing ¾" PVC conduit from existing around outdoor stairwell (50').

23.4.14.3. Plug two ¾" conduit holes in existing metal enclosures.

23.4.14.4. Demo existing conduit stub, receptacle, and box for operator button.

23.4.14.5. Install new ¾" conduit stub and reuse existing 120 VAC circuit for receptacle (10').
- 23.4.14.5.1. Install new duplex receptacle and box to replace demoed one.

23.4.14.6. Install a new 1" control conduit for intrinsic safe circuits from new PLC enclosure to top of outdoor stairwell near entry door to sludge storage tanks (170' + core through block and brick, 50' stainless steel Unistrut, 10 beam clamps for connection to metal stairway structure).

23.4.14.7. In Class I Div I area demo existing ¾" rubber coated rigid conduit that feeds existing ultra-sonic level sensor, gas detection, and floats for both sludge storage tanks (100' conduit total).

23.4.14.8. Drill new hole through fiberglass paneling next to door for conduit entry into the classified area for 1" conduit and seal up after conduit penetration, seal off can go just outside classified area.

23.4.14.9. Inside Class I Div I area, tee off 1" conduit to two (2) ¾" conduits to ultra-sonic level sensors and floats (100' total + 30' stainless steel Unistrut and clamps):

23.4.14.10. Install the following new intrinsic safe wire to each sludge storage tank (220'):
- 23.4.14.10.1. Control Power
  - 23.4.14.10.1.1. 24 VDC from PLC enclosure power supply
- 23.4.14.10.2. Status and Controls
  - 23.4.14.10.2.1. High level float NC
  - 23.4.14.10.2.2. STP for ultra-sonic level sensor

23.4.14.11. Connect STP to existing ultra-sonic level sensors

23.4.14.12. Purchase and install two (2) N.C. floats

23.4.14.13. The following work shall be done in each of the Mixer MCC:
- 23.4.14.13.1. Remove 120 V control power wires from contact 3 and wire nut through.
- 23.4.14.13.2. Install 24 VDC control power on contact 3
- 23.4.14.13.3. Install 24 VDC control power on contact AR1 contact
- 23.4.14.13.4. Install 24 VDC control power on contact AR2 contact
- 23.4.14.13.5. Install status wire on contact 2 for running status
- 23.4.14.13.6. Install status wire on contact 81 for overload status
- 23.4.14.13.7. Remove IAC and OAC electronic relays and control wiring and remove 120 VAC control power wires.
- 23.4.14.13.8. Remove and plug running light and wires and plug 30 MM hole.
- 23.4.14.13.9. Remove and plug overload light and wires and plug 30 MM hole.
- 23.4.14.13.10. Remove and plug torque light and wires and plug 30 MM hole.
- 23.4.14.13.11. Remove hour meter and wires.
- 23.4.14.13.12. Remove existing HOA switch and plug 30 MM hole.
- 23.4.14.13.13. Purchase and install new HOA switch with four (4) contact blocks on Mixer MCC door.
  - 23.4.14.13.13.1. Reconnect existing switch wiring and use additional blocks for PLC status.

23.4.14.14. Install two (2) new 1" control conduits from the new PLC enclosure to the each of the tank mixer MCC's for the following wire (90' total for both):
- 23.4.14.14.1. Control Power
  - 23.4.14.14.1.1. 24 VDC from PLC enclosure power supply
  - 23.4.14.14.1.2. 24 VDC Common from PLC enclosure power supply
- 23.4.14.14.2. Pump Controls
  - 23.4.14.14.2.1. Auto switch
  - 23.4.14.14.2.2. Hand switch
  - 23.4.14.14.2.3. Running status
  - 23.4.14.14.2.4. Fault status
  - 23.4.14.14.2.5. Run Command (pump start command from PLC)
    - 23.4.14.14.2.5.1. Purchase and field install 10-amp run command relay in MCC

23.4.15. **Thickener 1 and 2**
- 23.4.15.1. Use control conduit from sludge storage tank from new PLC enclosure to MCC 5 and MMC 6 for all control wires to the MCC's.
- 23.4.15.2. Install the following new wire to each Clarifier MCC (60'):
  - 23.4.15.2.1. Control Power
    - 23.4.15.2.1.1. 24 VDC from PLC enclosure power supply
  - 23.4.15.2.2. Status and Controls
    - 23.4.15.2.2.1. Running status
    - 23.4.15.2.2.2. Overload status
    - 23.4.15.2.2.3. Torque status
- 23.4.15.3. The following work shall be done in each of the Clarifier MCC:
  - 23.4.15.3.1. Remove 120 V control power wires from contact 3 and wire nut through.
  - 23.4.15.3.2. Install 24 VDC control power on contact 3
  - 23.4.15.3.3. Install 24 VDC control power on contact AR1 contact
  - 23.4.15.3.4. Install 24 VDC control power on contact AR2 contact
  - 23.4.15.3.5. Install status wire on contact 2 for running status
  - 23.4.15.3.6. Install status wire on contact 81 for overload status

23.4.15.3.7. Remove IAC and OAC electronic relays and control wiring and remove 120 VAC control power wires.
23.4.15.3.8. Remove and plug running light and wires and plug 30 MM hole.
23.4.15.3.9. Remove and plug overload light and wires and plug 30 MM hole.
23.4.15.3.10. Remove and plug torque light and wires and plug 30 MM hole.
23.4.15.3.11. Remove hour meter and wires.
23.4.15.3.12. Purchase and install new two-position switch with four (4) contact blocks on clarifier MCC door.
23.4.15.3.12.1. Reconnect existing switch wiring and use additional blocks for PLC status.

23.4.16. **Sump Pumps 5 and 6 – TSP Basement**

23.4.16.1. Purchase and install two (2) new 120 VAC, single phase, 1 HP Sump Control Enclosures with disconnect and HOA switch.
23.4.16.2. Demo existing sump control enclosure.
23.4.16.3. Install new pump control enclosures on wall and reuse existing 120 VAC feed for both sump pumps (10' of ¾").
23.4.16.4. Reconnect sump pump motor conductors to new enclosure.
23.4.16.4.1. Use cord grip fitting for sump motor cords.
23.4.16.5. Install new 1" conduit from new PLC enclosure for control conduit and tee off with ¾" conduits for pump controls and ¾" for floats for the following wire (80' of 1" and 20' of ¾" **+1 - 18" concrete core through floor and one (1) block wall core**):
23.4.16.5.1. Control Power
23.4.16.5.1.1. 24 VDC from PLC enclosure power supply
23.4.16.5.1.2. 24 VDC Common from PLC enclosure power supply
23.4.16.5.2. Pump Controls
23.4.16.5.2.1. Auto switch
23.4.16.5.2.2. Hand switch
23.4.16.5.2.3. Running status
23.4.16.5.2.4. Fault status
23.4.16.5.2.5. Run Command (pump start command from PLC)
23.4.16.5.2.5.1. Field install run command relay in contactor
23.4.16.5.2.6. Low level float (N.O.)
23.4.16.5.2.7. Stop float (N.O.)
23.4.16.5.2.8. Start float (N.O.)
23.4.16.5.2.9. Lag Start float (N.O.)
23.4.16.5.2.10. High level float (N.C.)
23.4.16.6. Demo all existing floats and conduit in sump pit.
23.4.16.7. Reuse pipe for float hanger bar
23.4.16.8. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
23.4.16.9. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
23.4.16.10. Wire float wire to terminals in new PLC enclosure

23.4.17. **Network Equipment**

23.4.17.1. Install new ¾" conduit from existing fiber box to new PLC enclosure
23.4.17.2. Reroute existing fiber patch cables through new conduit to new PLC enclosure and connect to network switch.
23.4.17.3. Purchase and install Ethernet patch cables to the network switch for the following:
23.4.17.3.1. Dell Wyse computer

23.4.17.3.2. Stratus Node 1
23.4.17.3.3. Stratus Node 2
23.4.17.3.4. Operator touch screen
23.4.17.3.5. PLC Processor
23.4.17.3.6. PLC NOE

23.5. **Demo Existing PLC enclosures**

23.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
23.5.2. Demo and dispose of one (1) two-door stainless steel enclosure 72" x 90" x 27"
23.5.2.1. Steel double door enclosure
23.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA.

23.6. **Install New PLC Enclosure**

23.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 23.xx above
23.6.2. Mount new enclosure in different location than existing PLC Enclosure and secure to wall and floor.
23.6.3. Extend conduits and wires to new enclosure as needed.
23.6.4. Terminate existing wiring per drawings
23.6.5. Terminate new wires per drawings
23.6.6. Install new ¾" conduit to Panel P3 and install new 20-amp wires for 120 VAC feed to new PLC enclosure (70' + core through block).
23.6.6.1. Reuse existing breaker for old PLC enclosure.
23.6.7. Demo existing 120 VAC circuit and ¾" PVC conduit back to Panel P3 (70')
23.6.8. Reconnect Ethernet wires.
23.6.9. Reconnect fiber cables.

23.7. **Testing and Commissioning System**

23.7.1. Assist Avanceon and CMCMUA with testing and commissioning
23.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

24. **CAPE MAY ADMIN BUILDING PLC**

24.1. **Reference Drawings**

24.1.1. CapeMayPlantElectrical.PDF

24.2. **Location Description**

24.2.1. Operations Control Room has block walls overlaid with sheetrock and drop ceiling.

24.3. **Preliminary work before taking site off line:**

24.3.1. None

24.4. **Individual Systems**

24.4.1. None

24.5. **Install new PLC Enclosure**

24.5.1. Mount new enclosure on wall in Control Room.

24.5.2. Terminate existing wiring per drawings

24.5.3. Terminate new wires per drawings

24.5.4. Re-connect existing 120 VAC feeder to new PLC enclosure

24.5.5. Reconnect Ethernet wire from radio and purchase and install 120 VAC plug for radio power supply

24.6. **Testing and Commissioning System**

24.6.1. Assist Avanceon and CMCMUA with testing and commissioning

24.6.2. The electrical contractor will need to support our testing of the equipment and wiring they installed

24.6.3. Transfer the wiring from temporary PLC to new PLC and commission.

24.7. **Remove Temporary PLC enclosure:**

24.7.1. None

OCEAN CITY FACILITY

25. OCEAN CITY SECONDARY BUILDING

25.1. **Reference Drawings**

25.1.1. OceanCitySecondaryElectrical.PDF

25.2. **Location Description**

25.2.1. Single story block building with basement block wall with brick face with overall dimensions of 40' x 10' x 10' ceiling height.

25.2.1.1. Basement is 80' x 80' x 20' ceiling height.

25.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

25.2.3. The Secondary Building houses the Secondary Clarifiers, Sludge Pumps, Scum Pumps, and Polymer systems.

25.3. **Preliminary work before taking site off line:**

25.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

25.3.2. Temporary PLC Setup:

25.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

25.3.2.2. Mount Temporary PLC

25.3.2.3. Install temporary power to PLC

25.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

25.3.2.5. PLC code will be provided by CMCMUA

25.3.2.6. HMI code will be provided by CMCMUA

25.3.2.7. Wire items listed in section 25.3.3 below to temporary PLC.

25.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

25.3.3. Items needed for the temporary PLC setup:

25.3.3.1. Secondary Sludge Pumps 1 and 2

25.3.3.2. Sludge flow meter

25.3.3.3. Secondary Sludge Valves

25.3.4. Items not needed on temporary PLC:

25.3.4.1. Clarifiers

25.3.4.2. Scum pumps

25.3.4.3. Sump pumps

25.3.4.4. Scum tank

25.3.4.5. Poly Scale

25.3.4.6. Dilution water flow meter

25.3.4.7. Ventilation and heating

25.4. **Individual Systems**

25.4.1. **Scum Pump 3 and Mazzerator 3**

25.4.1.1. Scum pump 3 will be fed from existing 30-amp MCC breaker (5 HP).

25.4.1.2. Mazzerator 3 will be fed from existing 30-amp MCC breaker (7.5 HP).

25.4.1.3. Existing feeders originate in associated MCC and are located in the existing scum control enclosure to be demoed.

25.4.1.4. Demo existing 5' x 4' x 1' two door steel floor standing enclosure for scum equipment.

25.4.1.5. Purchase and install one (1) new 480 VAC three phase contactor with HOA switch and disconnect - 5 HP Pump.

25.4.1.6. Purchase and install one (1) new 480 VAC, three phase, 7.5 HP reversing contactor with disconnect and HOA switch, jam reversing relay (supplied by CMCMUA).
25.4.1.6.1. Jam reversing relay is a line voltage monitoring device the size of a softball that monitors the amperage of one (1) leg of the motor and has control wires connected to actuate the forward and reversing contactors in case of a mazzerator jam (motor stall).
25.4.1.7. Purchase and install one (1) 12" x 12" x 48" indoor wire through and install on existing conduits below demoed control enclosure to connect existing conduit from floor.
25.4.1.8. Install two (2) contactors on wall in place of demoed enclosure.
25.4.1.9. Install two (2) ¾" conduits from new wire trough to each contactor for feeders (20').
25.4.1.10. Use existing feeder conductors and route to new contactors.
25.4.1.11. Use existing motor conductors and route to new contactors.
25.4.1.12. Install new 1" conduit from new PLC enclosure to scum and mazzerator contactors and tee off with new ¾" conduit for the following wires (20' of 1" and 10' of ¾"):
25.4.1.12.1. Scum Pump 3 and Mazzerator 3
25.4.1.12.1.1. Control Power
25.4.1.12.1.1.1. 24 VDC from PLC enclosure power supply
25.4.1.12.1.1.2. 24 VDC Common from PLC enclosure power supply
25.4.1.12.1.2. Pump Controls
25.4.1.12.1.2.1. Auto switch
25.4.1.12.1.2.2. Hand switch
25.4.1.12.1.2.3. Running status
25.4.1.12.1.2.4. Fault status
25.4.1.12.1.2.5. Run Command (pump start command from PLC)
25.4.1.12.1.2.5.1. Field install two pole run command relay in enclosure
25.4.1.12.1.2.5.2. One (1) two pole relay to control both scum pump and mazzerator start command

25.4.2. **Scum Tank Level**
25.4.2.1. Purchase and install one (1) new ultra-sonic level sensor for the scum tank level.
25.4.2.2. Install new sensor on tank concrete wall under grating (CMCMUA will provide angle bracket).
25.4.2.3. Install new ¾" control conduit between new PLC enclosure and scum tank next to clarifier #4 for the following wires (70' +1 core through block wall and 40' trench in stone and dirt):
25.4.2.3.1. Control Power
25.4.2.3.1.1. 24 VDC from PLC enclosure power supply
25.4.2.3.2. Status Wires
25.4.2.3.2.1. High-level float (25' cable)
25.4.2.3.2.2. STP Ultra-Sonic level
25.4.2.3.3. Purchase and install a N.C. weighted float
25.4.2.4. Install an anybody on end of conduit and install new flex to new ultra-sonic sensor and high-level float (12').

25.4.3. **Secondary Clarifiers 1, 2, 3 and 4**
25.4.3.1. In each of the four (4) MCC's for the clarifiers:

25.4.3.1.1. Remove the front panel light (alarm light).
25.4.3.1.2. Purchase and install a new two-position switch with four (4) contact blocks and OFF – ON legend plate in place of the light on the MCC door.
25.4.3.1.2.1. Install wires from switch to terminals 2 and 3 for "ON" signal to contactor coil.
25.4.3.1.3. Use terminals 4 and 5 for 24 VDC running status.
25.4.3.1.4. Use the contact on the aux relay that powered the panel light for the overload 24 VDC signal to the PLC.
25.4.3.2. Install a new 1" conduit from new PLC enclosure to the MCC for all control wires to the MCC's (30').
25.4.3.3. Install the following new wire to each Clarifier MCC (60'):
25.4.3.3.1. Control Power
25.4.3.3.1.1. 24 VDC from PLC enclosure power supply
25.4.3.3.2. Status and Controls
25.4.3.3.2.1. Running status
25.4.3.3.2.2. Overload status
25.4.3.3.2.3. Torque status

25.4.4. **Secondary Sludge Flow Meter**
25.4.4.1. Use existing STP from existing flow meter and connect to new PLC.

25.4.5. **Secondary Sludge Pumps 3 and 4**
25.4.5.1. In Each MCC bypass the contactor and connect VFD feeder wires directly to breaker.
25.4.5.2. Demo existing control wires from MCC to PLC enclosure.
25.4.5.3. Purchase and install new HOA switch with four (4) contact blocks on VFD control enclosure door.
25.4.5.3.1. Reconnect existing switch wiring and use additional blocks for PLC status.
25.4.5.4. Install two (2) new ¾" control conduits from the PLC enclosure to the each of the secondary sludge pump VFD enclosures for the following wire (60'):
25.4.5.4.1. Control Power
25.4.5.4.1.1. 24 VDC from PLC enclosure power supply
25.4.5.4.1.2. 24 VDC Common from PLC enclosure power supply
25.4.5.4.2. Pump Controls
25.4.5.4.2.1. Auto switch
25.4.5.4.2.2. Hand switch
25.4.5.4.2.3. Running status
25.4.5.4.2.4. Fault status
25.4.5.4.2.5. Run Command (pump start command from PLC)
25.4.5.4.2.5.1. Field install run command relay in enclosure
25.4.5.4.2.6. CAT 5 Cable
25.4.5.4.2.7. STP for speed command
25.4.5.4.3. Remove existing STP from drive enclosures.
25.4.5.4.4. Remove E-stop from door and plug 30 MM hole.

25.4.6. **Secondary Sludge Valves 5, 6, 7, and 8**
25.4.6.1. Salvage Din Rail #3 which contains all of the wire and relays for the existing air operated valves for the sludge pumps and reuse for connection to new PLC.
25.4.6.2. Use existing drawing to supply proper 24 VDC from new PLC power supply to each of the four (4) valve controls.

25.4.6.3. Install wires from PLC distribution blocks to DIN Rail 3 within the new PLC enclosure to connect inputs and outputs for valves.

25.4.6.4. Install new ¾" control conduit from new PLC enclosure to air line on column in basement for the following wire (70'):

25.4.6.4.1. STP for pressure transducer (0-300 PSI transducer to be provided and installed by CMCMUA).

25.4.7. **Polymer Scale**

25.4.7.1. Install new ¾" control conduit from new PLC enclosure to the polymer scale enclosure for the following wire (60'):

25.4.7.1.1. STP for scale 4-20 mA 2 wire

25.4.7.1.2. STP for poly unit speed command 2 wire

25.4.7.1.3. Control Power

25.4.7.1.3.1. Control power from pump controller

25.4.7.1.4. Pump Controls

25.4.7.1.4.1. Remote start wire to pump controller

25.4.8. **Sump Pumps 7 and 8 – Basement**

25.4.8.1. Purchase two (2) new 240 VAC, single phase, 5 HP Sump Control Enclosures with disconnect and HOA switch.

25.4.8.2. Demo existing sump control enclosure and return to CMCMUA.

25.4.8.3. Install new pump control enclosures on north wall and reuse existing 240 VAC feed for both sump pumps (10' of ¾").

25.4.8.4. Reconnect sump pump motor conductors to new enclosure.

25.4.8.4.1. Use cord grip fitting for sump motor cords.

25.4.8.5. Use existing control conduits from new PLC enclosure to second wireway in basement.

25.4.8.6. From second wireway in basement, install new 1" control conduit from ceiling wireway and tee off with ¾" conduits for pump controls and ¾" for floats for the following wire (70' of 1", 20' ¾" – existing conduit supports above piping can be use. Ladder work and tight fit working above existing pipes – **figure double labor hours for this conduit work**):

25.4.8.6.1. Control Power

25.4.8.6.1.1. 24 VDC from PLC enclosure power supply

25.4.8.6.1.2. 24 VDC Common from PLC enclosure power supply

25.4.8.6.2. Pump Controls

25.4.8.6.2.1. Auto switch

25.4.8.6.2.2. Hand switch

25.4.8.6.2.3. Running status

25.4.8.6.2.4. Fault status

25.4.8.6.2.5. Relocate Run Command relay to sump enclosure

25.4.8.6.2.6. Run Command (pump start command from PLC)

25.4.8.6.2.7. Low level float (N.O.)

25.4.8.6.2.8. Stop float (N.O.)

25.4.8.6.2.9. Start float (N.O.)

25.4.8.6.2.10. Lag Start float (N.O.)

25.4.8.6.2.11. High level float (N.C.)

25.4.8.7. Demo all existing floats and conduit in sump pit.

25.4.8.8. Install new stainless steel Unistrut to hang floats (10')

25.4.8.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.

25.4.8.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

25.4.8.11. Wire float wire to terminals in new PLC enclosure

25.4.9. **Dilution Water Flow Meter**

25.4.9.1. Use existing STP from existing flow meter and connect to new PLC.

25.4.10. **Suspended Solids and pH Probes**

25.4.10.1. Install new ¾" conduit and wire from new PLC CB 7 enclosure for 120 VAC feed to existing suspended solids (40').

25.4.10.2. Tee off polymer ¾" conduit from new PLC enclosure to existing suspended solids and CAT 5 wire for MDOBUS communication from new PLC enclosure to meter (10' + 50' of wire).

25.4.10.3. Install new 1" conduit from meter to distribution box for secondary clarifiers for existing suspended solids probe (20' + 1 core through block and brick).

25.4.10.3.1. Pull meter cables through conduit back to meter.

25.4.10.4. Connect all probes per meter manual.

25.4.11. **Ventilation and Heating**

25.4.11.1. Purchase and install a new 480 VAC, three phase, 5 HP contactor enclosure with disconnect and HOA switch for the HRU in basement and mount alongside scum contactors.

25.4.11.1.1. Mount new contactor as close as possible to MCC in order to reuse motor conductors from MCC bucket.

25.4.11.2. Install new ¾" conduit and motor feeder conductors from MCC and reuse existing circuit breaker, bypass the existing MCC contactor and connect wire directly to MCC breaker (10').

25.4.11.3. Route existing motor conductors to new contactor.

25.4.11.3.1. Tee off scum 1" conduit from the new PLC enclosure with ¾" conduit to the to the new contactor for the following wire (20'):

25.4.11.3.2. Control Power

25.4.11.3.2.1. 24 VDC from PLC enclosure power supply

25.4.11.3.2.2. 24 VDC Common from PLC enclosure power supply

25.4.11.3.3. Status Wires

25.4.11.3.3.1. Auto switch

25.4.11.3.3.2. Hand switch

25.4.11.3.3.3. Running status

25.4.11.3.3.4. Fault status

25.4.11.3.3.5. Run Command (start command from PLC)

25.4.11.3.3.5.1. Field install run command relay in enclosure

25.4.11.4. Purchase and install one (1) new pressure differential switch.

25.4.11.4.1. Attach switch with hose to the HRU ductwork in the basement.

25.4.11.4.2. Install new ¾" conduit and wire from the new PLC enclosure to the switch (60').

25.4.11.4.3. Seal all duct penetrations air tight.

25.4.11.4.4. Wire pressure switch back to new PLC enclosure – 2 conductors.

25.4.11.5. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.

25.4.11.5.1. Temperature Probe provided by CMCMUA.

25.4.11.6. Install ¾" conduit and wires to interconnect one (1) existing electric heater to new PLC enclosure for low voltage control of heaters (50' and two (2) conductors).

25.4.11.6.1. Install 20-amp power run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit (heaters are line voltage at 16 amp).

25.4.11.7. Demo existing thermostat on wall below heater.

25.4.12. **Lighting**

25.4.12.1. Purchase and install a new three pole 208 VAC 30-amp lighting contactor enclosure with HOA switch, with four (4) contact blocks, on the door.

25.4.12.2. Install near scum pump contactors

25.4.12.3. Demo existing 1" conduit from MCC to old scum panel

25.4.12.4. Install new ¾" conduit and run wires from existing 208 VAC panel to new contactor enclosure.

25.4.12.4.1. Connect two (2) 120 VAC circuits to lighting contactor in same fashion as existing circuits, use existing breakers and leave neutral wires in panel.

25.4.12.5. Tee off 1" scum control conduit with ¾" for contactor control circuit for the following wires (10' – 30' of wire):

25.4.12.5.1. Control Power

25.4.12.5.1.1. 120 VAC from PLC breaker

25.4.12.5.1.2. 120 VAC Neutral

25.4.12.5.1.3. 24 VDC common from PLC Power Supply

25.4.12.5.2. Command

25.4.12.5.2.1. Lighting coil command 24 VDC

25.4.12.5.3. Purchase and install 24VDC 10-amp relay for lighting contactor command relay in lighting contactor enclosure.

25.4.12.5.4. Wire auto switch in series with PLC output

25.4.12.5.5. Wire hand switch to bypass PLC output and activate command relay.

25.4.12.5.6. From new PLC enclosure install new ¾" conduit and box to outside of building for the following wires (10'):

25.4.12.5.7. Control Power

25.4.12.5.7.1. 24 VDC from PLC enclosure power supply

25.4.12.5.7.2. 24 VDC Common from PLC enclosure power supply

25.4.12.5.8. Status

25.4.12.5.8.1. Photocell

25.4.12.5.8.2. STP temperature probe (Provided by CMCMUA)

25.4.12.5.9. Purchase and install a 24 VDC photocell outside the building.

25.4.12.5.10. Install temperature probe in a cord grip fitting from box to read outside temperature.

25.4.13. **Network Equipment**

25.4.13.1. Preserve existing fiber patch panel

25.4.13.2. Demo existing single door steel enclosure (24" x 36" 90") and mount patch panel on block wall next to new PLC enclosure.

25.4.13.3. Mount existing patch panel in new PLC enclosure.

25.4.13.4. Reroute existing fiber patch cables and connect to network switch.

25.4.13.5. Purchase and install Ethernet patch cables to the network switch for the following:

25.4.13.5.1. Dell Wyse computer

25.4.13.5.2. Stratus Node 1

25.4.13.5.3. Stratus Node 2

25.4.13.5.4. Operator touch screen

25.4.13.5.5. PLC Processor

25.4.13.5.6. PLC NOE

25.5. **Demo Existing PLC enclosures**

25.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.

25.5.2. Demo and dispose of one (1) two-door stainless steel enclosure 72" x 90" x 27"

25.5.2.1. Steel double door enclosure

25.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA.

25.6. **Install New PLC Enclosure**

25.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 25.xx above

25.6.2. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

25.6.3. Extend conduits and wires to new enclosure as needed.

25.6.4. Terminate existing wiring per drawings

25.6.5. Terminate new wires per drawings

25.6.6. Install new ¾" conduit to MCC 120 VAC Panel and install new 20-amp wires for 120 VAC feed to new PLC enclosure (40').

25.6.6.1. Reuse existing breaker for old PLC enclosure.

25.6.7. Reconnect Ethernet wires.

25.6.8. Reconnect fiber cables.

25.7. **Testing and Commissioning System**

25.7.1. Assist Avanceon and CMCMUA with testing and commissioning

25.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

25.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

25.8. **Remove Temporary PLC enclosure**

25.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

26. **OCEAN CITY PRIMARY BUILDING**

26.1. **Reference Drawings**

26.1.1. OceanCityPrimaryElectrical.PDF

26.2. **Location Description**

26.2.1. Single story block building with basement block wall with brick face with overall dimensions of 40' x 20' x 10' ceiling height.

26.2.1.1. Basement is 80' x 80' x 20' ceiling height.

26.2.2. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

26.2.3. The Primary Building houses the Primary Clarifiers, Sludge Pumps, and Scum Pumps.

26.3. **Preliminary work before taking site off line:**

26.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

26.3.2. Temporary PLC Setup:

26.3.2.1. Purchase and install a Temporary PLC enclosure per sample drawings.

26.3.2.2. Mount Temporary PLC

26.3.2.3. Install temporary power to PLC

26.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

26.3.2.5. PLC code will be provided by CMCMUA

26.3.2.6. HMI code will be provided by CMCMUA

26.3.2.7. Wire items listed in section 26.3.3 below to temporary PLC.

26.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

26.3.3. Items needed for the temporary PLC setup:

26.3.3.1. Primary Sludge Pumps 1 and 2

26.3.3.2. Sludge flow meters 1 and 2

26.3.3.3. Primary Sludge Valves

26.3.4. Items not needed on temporary PLC:

26.3.4.1. Clarifiers

26.3.4.2. Scum pumps

26.3.4.3. Sump pumps

26.3.4.4. Scum tank

26.3.4.5. Ventilation and heating

26.4. **Individual Systems**

26.4.1. **Scum Pump 1 and 2 and Grinder 1 and 2**

26.4.1.1. Scum pump 1 and Grinder 1 will be fed from existing 30-amp MCC breaker (5 HP and 2 HP).

26.4.1.2. Scum Pump 2 and Grinder 2 will be fed from existing 30-amp MCC breaker (5 HP and 2 HP).

26.4.1.3. Existing feeders originate in associated MCC and are located in the existing scum control enclosure to be demoed.

26.4.1.4. Demo existing 5' x 4' x 1' two door steel floor standing enclosure for scum equipment.

26.4.1.4.1. Retain the backplanes that have the grinder contactors

26.4.1.4.2. CMCMUA will provide new enclosures with disconnects for the two (2) grinder backplanes.

26.4.1.4.2.1. Purchase and install new HOA switch with four (4) contact blocks on grinder control enclosure door.

26.4.1.4.2.1.1. Reconnect existing switch wiring and use additional blocks for PLC status.

26.4.1.5. Purchase and install two (2) new 480 VAC, three phase, 5 HP contactor with disconnect and HOA switch.

26.4.1.6. Purchase and install one (1) 12" x 12" x 48" indoor wire through and install on existing conduits below demoed control enclosure to connect existing conduit from floor.

26.4.1.7. Install the two (2) contactors for the scum pumps on wall in place of demoed enclosure.

26.4.1.8. Install the two (2) grinder enclosures on wall in place of demoed enclosure.

26.4.1.9. Install four (4) ¾" conduits from new wire trough to each contactor for feeders (30').

26.4.1.10. Use existing feeder conductors and route to new contactors.

26.4.1.11. Use existing motor conductors and route to new contactors.

26.4.1.12. For the four (4) pieces of equipment, install one (1) new 1" conduit from new PLC enclosure to scum and grinder contactors and tee off with new ¾" conduit for the following wires (20' of 1" and 10' of ¾"):

26.4.1.12.1. Control Power

26.4.1.12.1.1. 24 VDC from PLC enclosure power supply

26.4.1.12.1.2. 24 VDC Common from PLC enclosure power supply

26.4.1.12.2. Pump Controls

26.4.1.12.2.1. Auto switch

26.4.1.12.2.2. Hand switch

26.4.1.12.2.3. Running status

26.4.1.12.2.4. Fault status

26.4.1.12.2.5. Run Command (pump start command from PLC)

26.4.1.12.2.5.1.1. Field install two pole run command relay in enclosure

26.4.1.12.2.6. One (1) two pole relay to control both scum pump and mazzerator start command

26.4.2. **Scum Tank Level**

26.4.2.1. Purchase and install one (1) new ultra-sonic level sensor for the scum tank level.

26.4.2.2. Install new sensor on tank concrete wall under grating (CMCMUA will provide angle bracket).

26.4.2.3. Install new ¾" control conduit between new PLC enclosure and scum tank next to clarifier #1 for the following wires (70' +1 core through block wall and 40' trench in stone and dirt):

26.4.2.3.1. Control Power

26.4.2.3.1.1. 24 VDC from PLC enclosure power supply

26.4.2.3.2. Status Wires

26.4.2.3.2.1. High-level float (25' cable)

26.4.2.3.2.2. STP Ultra-Sonic level

26.4.2.3.3. Purchase and install a N.C. weighted float

26.4.2.4. Install an anybody on end of conduit and install new flex to new ultra-sonic sensor and high-level float (12').

26.4.3. **Primary Clarifiers 1, 2, and 3**

26.4.3.1. In each of the three (3) MCC's for the clarifiers:

26.4.3.1.1. Remove the front panel light (alarm light) and any other buttons.

26.4.3.1.2. Purchase and install a new two-position switch with four (4) contact blocks and OFF – ON legend plate in place of the light on the MCC door.

26.4.3.1.2.1. Install wires from switch to terminals 2 and 3 for "ON" signal to contactor coil.

26.4.3.1.3. Use terminals 4 and 5 for 24 VDC running status.

26.4.3.1.4. Use the contact on the aux relay that powered the panel light for the overload 24 VDC signal to the PLC.

26.4.3.2. Install a new 1" conduit from new PLC enclosure to the MCC for all control wires to the MCC's (30').

26.4.3.3. Install the following new wire to each Clarifier MCC (50'):

26.4.3.3.1. Control Power

26.4.3.3.1.1. 24 VDC from PLC enclosure power supply

26.4.3.3.2. Status and Controls

26.4.3.3.2.1. Running status

26.4.3.3.2.2. Overload status

26.4.3.3.2.3. Torque status

26.4.4. **Primary Sludge Flow Meter 1 and 2**

26.4.4.1. Use existing STP from existing flow meter 1 and connect to new PLC.

26.4.4.2. Use existing STP from existing flow meter 2 and connect to new PLC.

26.4.5. **Primary Sludge Pumps 1 and 2**

26.4.5.1. In Each MCC bypass the contactor and connect VFD feeder wires directly to breaker.

26.4.5.2. Demo existing control wires from MCC to PLC enclosure.

26.4.5.3. Demo two (2) lights and one (1) switch from door and plug 30mm holes.

26.4.5.4. Purchase and install new HOA switch with four (4) contact blocks on VFD control enclosure door.

26.4.5.4.1. Reconnect existing switch wiring and use additional blocks for PLC status.

26.4.5.5. Install two (2) new ¾" control conduits from the PLC enclosure to the each of the Primary sludge pump VFD enclosures for the following wire (60'):

26.4.5.5.1. Control Power

26.4.5.5.1.1. 24 VDC from PLC enclosure power supply

26.4.5.5.1.2. 24 VDC Common from PLC enclosure power supply

26.4.5.5.2. Pump Controls

26.4.5.5.2.1. Auto switch

26.4.5.5.2.2. Hand switch

26.4.5.5.2.3. Running status

26.4.5.5.2.4. Fault status

26.4.5.5.2.5. Run Command (pump start command from PLC)

26.4.5.5.2.5.1. Field install run command relay in enclosure

26.4.5.5.2.6. CAT 5 Cable

26.4.5.5.2.7. STP for speed command

26.4.5.5.3. Remove existing STP from drive enclosures.

26.4.5.5.4. Remove E-stop from door and plug 30 MM hole.

26.4.6. **Primary Sludge Valves**

26.4.6.1. Identify existing wires for the following sludge pinch valves:

26.4.6.1.1. 120 VAC feed – will be fed from PLC enclosure 120 VAC breaker

26.4.6.1.2. 120 VAC neutral – will be fed from PLC enclosure 120 VAC neutral

26.4.6.1.3. Valve close command (120 VAC – 24 VDC PLC output)

26.4.6.1.4. Valve power status (120 VAC – 24 VDC PLC input)
26.4.6.1.5. Valve open status (120 VAC – 24 VDC PLC input)
26.4.6.1.6. Valve close status (120 VAC – 24 VDC PLC input)
26.4.6.2. Reconnect existing wires to field terminal block and then to PLC relays
26.4.6.3. Install new ¾" control conduit from new PLC enclosure to air line on column in basement for the following wire (70'):
26.4.6.3.1. STP for pressure transducer (0-300 PSI transducer to be provided and installed by CMCMUA)

26.4.7. **Sump Pumps 3 and 4 and Sump Pumps 5 and 6 (RBC tunnel)**
26.4.7.1. Two (2) sump locations are in the basement.
26.4.7.1.1. Sumps 3 and 4 are near the sludge pumps
26.4.7.1.2. Sumps 5 and 6 are in the middle of the tunnel heading towards the secondary building under the RBC's.
26.4.7.1.3. A single control conduit will feed both locations.
26.4.7.2. Purchase four (4) new 240 VAC 5 HP single phase, disconnect and HOA switch Sump Control Enclosures.
26.4.7.3. Demo two (2) existing sump control enclosures and return to CMCMUA.
26.4.7.4. Install new pump control enclosures in place of both demoed enclosures and reuse existing 120 VAC feed for both sump pumps (10' of ¾" each location and 10' of Unistrut).
26.4.7.5. Reconnect sump pump motor conductors to new enclosure.
26.4.7.5.1. Use cord grip fitting for sump motor cords.
26.4.7.6. Install one (1) new 1" control conduit new PLC enclosure and pass by sump location 1 and terminate conduit near sump location 2 (250' and two (2) expansion joints).
26.4.7.6.1. Tee off the 1" conduit with ¾" conduit at sump location 1 for pump status and ¾" for floats for the following wire (30' of conduit and 70' of wire)
26.4.7.6.2. Control Power
26.4.7.6.2.1. 24 VDC from PLC enclosure power supply
26.4.7.6.2.2. 24 VDC Common from PLC enclosure power supply
26.4.7.6.3. Pump Controls
26.4.7.6.3.1. Auto switch
26.4.7.6.3.2. Hand switch
26.4.7.6.3.3. Running status
26.4.7.6.3.4. Fault status
26.4.7.6.3.5. Run Command (pump start command from PLC)
26.4.7.6.3.5.1. Field install run command relay in enclosure
26.4.7.6.3.6. Low level float (N.O.)
26.4.7.6.3.7. Stop float (N.O.)
26.4.7.6.3.8. Start float (N.O.)
26.4.7.6.3.9. Lag Start float (N.O.)
26.4.7.6.3.10. High level float (N.C.)
26.4.7.7. Demo all existing floats and conduit in sump pit.
26.4.7.8. Install new stainless steel Unistrut to hang floats (10')
26.4.7.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
26.4.7.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
26.4.7.11. Wire float wire to terminals in new PLC enclosure
26.4.7.12. Tee off the 1" conduit with ¾" conduit at sump location 2 for pump status and ¾" for floats for the following wire (10' of conduit and 270' of wire)

26.4.7.12.1. Control Power
26.4.7.12.1.1. 24 VDC from PLC enclosure power supply
26.4.7.12.1.2. 24 VDC Common from PLC enclosure power supply
26.4.7.12.2. Pump Controls
26.4.7.12.2.1. Auto switch
26.4.7.12.2.2. Hand switch
26.4.7.12.2.3. Running status
26.4.7.12.2.4. Fault status
26.4.7.12.2.5. Run Command (pump start command from PLC)
26.4.7.12.2.5.1. Field install run command relay in enclosure
26.4.7.12.2.6. Low level float (N.O.)
26.4.7.12.2.7. Stop float (N.O.)
26.4.7.12.2.8. Start float (N.O.)
26.4.7.12.2.9. Lag Start float (N.O.)
26.4.7.12.2.10. High level float (N.C.)

26.4.7.13. Demo all existing floats and conduit in sump pit.
26.4.7.14. Install new stainless steel Unistrut to hang floats (10')
26.4.7.15. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over circular sump pit.
26.4.7.16. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
26.4.7.17. Wire float wire to terminals in new PLC enclosure

26.4.8. **Suspended Solids Probes (2) and pH Probe (1)**
26.4.8.1. Install new ¾" conduit and wire from new panel board for 120 VAC feed to existing suspended solids and pH meter (20').
26.4.8.2. Install new ¾" conduit from new PLC enclosure to existing suspended solids and CAT 5 wire for MDOBUS communication from new PLC enclosure to meter (10').
26.4.8.3. Install new 1" conduit from meter to distribution box for primary clarifiers for existing pH and suspended solids probe (20' + 1 core through block and brick).
26.4.8.3.1. Pull meter cables through conduit back to meter.
26.4.8.4. Install new 1" conduit from meter to a location next to port-o-pot sampler building (100' + one core through block and brick wall and 40' trench through stone and dirt).
26.4.8.4.1. Demo existing ¾" conduit and follow same path.
26.4.8.4.2. Pull meter cable through conduit back to meter.
26.4.8.5. Connect all probes per meter manual.
26.4.8.6. Following the same path as the probe conduit, install a new 1" power conduit from the panel board to a location next to port-o-pot sampler building (100' + one core through block and brick wall and 40' trench through stone and dirt).

26.4.9. **Ferric Pumps 1 and 2, Ferric Tanks 1 and 2, Ferric Flow Meters 1 and 2**
26.4.9.1. Install new 1" conduit from panel board to ferric area for power wires (200')
26.4.9.1.1. Conduit route is through one (1) block and brick wall.
26.4.9.1.2. Conduit route follows a curved concrete clarifier wall for 150' (diameter of 40').
26.4.9.1.3. Install twenty (20) two-foot lengths of stainless steel Unistrut around clarifier for conduit support.

26.4.9.1.4. Install one (1) 12" x 12" x 6" NEMA 4X stainless steel pull box at midpoint along conduit route.

26.4.9.1.5. Install #12 AWG wire for six (6) 120 VAC single phase 20-amp circuits

26.4.9.1.5.1. Tee off 1" conduit with ¾" conduit and install four (4) duplex receptacles with weatherproof while in use covers near existing flow meters and existing lights and fan (20').

26.4.9.1.6. Purchase and install two (2) 120 VAC, single phase, 1 HP contactor with HOA and disconnect switch for the two (2) ferric pumps.

26.4.9.1.6.1. Mount a single receptacle with a weatherproof while in use cover just below the enclosure that will be controlled by the contactor.

26.4.9.2. Install new 2" conduit from new PLC enclosure to ferric area for control wires (200').

26.4.9.2.1. Conduit route is through one (1) block and brick wall.

26.4.9.2.2. Conduit route follows a curved concrete clarifier wall for 150' (diameter of 40').

26.4.9.2.3. Use conduit supports that the ferric power conduit follows.

26.4.9.2.4. Install one (1) 12" x 12" x 6" NEMA 4X stainless steel pull box at midpoint along conduit route.

26.4.9.3. Install the following control wires for the ferric area equipment for the two (2) Ferric Pumps (250' of wire):

26.4.9.3.1. Control Power

26.4.9.3.1.1. 24 VDC from PLC enclosure power supply

26.4.9.3.1.2. Remote start power from pump controller

26.4.9.3.2. Status Wires

26.4.9.3.2.1. Auto switch

26.4.9.3.2.2. Hand switch

26.4.9.3.2.3. Running status

26.4.9.3.2.4. Fault status

26.4.9.3.2.5. Remote Run Command back to pump controller

26.4.9.3.2.6. STP for chemical pump speed

26.4.9.4. Install the following control wires for the ferric area equipment for the two (2) Ferric Tanks and flow meters (250' of wire):

26.4.9.4.1. Control Power

26.4.9.4.1.1. 24 VDC from PLC enclosure power supply (for Flow Switch)

26.4.9.4.1.2. 24 VDC Common from PLC enclosure power supply (for horn)

26.4.9.4.1.3.

26.4.9.4.2. Controls

26.4.9.4.2.1. STP for chemical tank 1 level

26.4.9.4.2.2. STP for chemical tank 2 level

26.4.9.4.2.3. STP for ferric flow meter 1

26.4.9.4.2.4. STP for ferric flow meter 2

26.4.9.4.2.5. Shower flow switch

26.4.9.4.2.6. Tank fill horn

26.4.9.5. Tee off 2" control conduit with new ¾" conduit to the safety shower flow switch (20').

26.4.9.6. Tee off 2" control conduit with new ¾" conduit to the tank fill alarm horn (30').

26.4.9.6.1. Purchase and install new 24 VDC Tank Horn near outdoor ferric tank and route tank horn conductor and connect to horn.

26.4.9.7. Tee off 2" control conduit with new ¾" conduit to the two (2) ultra-sonic level transmitter (70').

26.4.9.7.1. Purchase and install two (2) new ultra-sonic level transmitter on ferric tanks.

26.4.9.7.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

26.4.9.8. Demo existing 1-1/4" PVC conduit, wires, existing alarm horn and switch box back (60' of conduit removed).

26.4.10. **Bar Screen 1 and 2**

26.4.10.1. Tee off 2" conduit to Ferric area with 1" conduit to Bar Screen control shed near scrubber area for Bar Screen 1 and Bar Screen 2 statuses for the following wires (70'):

26.4.10.1.1. Control Power

26.4.10.1.1.1. 24 VDC from PLC enclosure power supply

26.4.10.1.1.2. 24 VDC Common from PLC enclosure power supply TB 30

26.4.10.1.2. Controls

26.4.10.1.2.1. Over torque indication terminals 25-25

26.4.10.1.2.2. Over rotate indication terminals 26-27

26.4.10.1.2.3. High channel float terminals 28-29

26.4.10.1.2.4. Spare TB 31

26.4.10.1.2.5. Spare TB 32

26.4.10.1.3. Install new ¾" conduit from new PLC enclosure to MCC for bar screen 1 and 2 status for the following wires (30'):

26.4.10.1.4. Control Power

26.4.10.1.4.1. 24 VDC from PLC enclosure power supply

26.4.10.1.5. Controls

26.4.10.1.5.1. Running forward

26.4.10.1.5.2. Fault

26.4.11. **Ventilation and Heating**

26.4.11.1. Demo existing enclosure that motor feeders pass through – 18" x 12" x 6" steel enclosure.

26.4.11.2. Purchase and install one (1) new 480 VAC, three phase, 5 HP contactor enclosure with disconnect and HOA switch for the HRU in basement and mount in place of demoed enclosure.

26.4.11.3. In existing MCC, bypass contactor and connect existing motor feeders to breaker to feed contactor in basement.

26.4.11.3.1. Demo existing OFF – ON switch on MCC and plug 30 MM hole.

26.4.11.4. Install new ¾" conduit and motor feeder conductors from contactor to motor (10' and 6' flex).

26.4.11.4.1. Install new ¾" conduit from new PLC enclosure to the new contactor for the following wire (60'):

26.4.11.4.2. Control Power

26.4.11.4.2.1. 24 VDC from PLC enclosure power supply

26.4.11.4.2.2. 24 VDC Common from PLC enclosure power supply

26.4.11.4.3. Status Wires

26.4.11.4.3.1. Auto switch

26.4.11.4.3.2. Hand switch

26.4.11.4.3.3. Running status

26.4.11.4.3.4. Fault status

26.4.11.4.3.5. Run Command (pump start command from PLC)
26.4.11.4.3.5.1. Field install run command relay in enclosure
26.4.11.4.3.6. Pressure switch
26.4.11.5. Purchase and install one (1) new pressure differential switch.
26.4.11.5.1. Attach switch with hose to the HRU ductwork in the basement.
26.4.11.5.2. Seal all duct penetrations air tight.
26.4.11.5.3. Wire pressure switch back to new PLC enclosure – 2 conductors.
26.4.11.6. Install Indoor Temperature Probe using 0.25" compression fitting mounted through side of new PLC enclosure for probe tip to hang in free air and wire to PLC.
26.4.11.6.1. Temperature Probe provided by CMCMUA.
26.4.11.7. Install ¾" conduit and wires to interconnect one (1) existing electric heater to new PLC enclosure for low voltage control of heaters (30' and two (2) conductors).
26.4.11.7.1. Install 20-amp power run command relay into heater and bypass existing thermostat to allow the run command relay to control the heater control circuit (heaters are line voltage at 16 amp).
26.4.11.8. Demo existing thermostat on wall below heater.

26.4.12. **Lighting**

26.4.12.1. Purchase and install a new three pole 208 VAC 30-amp rated with 120 VAC coil lighting contactor enclosure with HOA switch on the door.
26.4.12.2. Install near scum pump contactors
26.4.12.3. Demo existing 1" conduit from MCC to existing two (2) timer boxes and small contactor box.
26.4.12.4. Install new ¾" conduit and run wires from existing 208 VAC panel to new contactor enclosure.
26.4.12.4.1. Connect two (2) 120 VAC circuits to lighting contactor in same fashion as existing circuits, use existing breakers and leave neutral wires in panel.
26.4.12.5. Install new ¾" control conduit for contactor control circuit for the following wires (30'):
26.4.12.5.1. Control Power
26.4.12.5.1.1. 120 VAC from PLC breaker
26.4.12.5.1.2. 120 VAC Neutral
26.4.12.5.1.3. 24 VDC common from PLC Power Supply
26.4.12.5.2. Command
26.4.12.5.2.1. Lighting coil command 24 VDC
26.4.12.5.3. Purchase and install 24VDC 10-amp relay for lighting contactor command relay in lighting contactor enclosure.
26.4.12.5.4. Wire auto switch in series with PLC output
26.4.12.5.5. Wire hand switch to bypass PLC output and activate command relay.

26.4.13. **120 VAC Control Power Panel**

26.4.13.1. In the existing PLC enclosure is a 120 VAC main lug panel for power to existing 120 VAC control equipment such as solenoids and flow meters. This panel needs to be relocated from within the PLC enclosure to the block wall next to the new PLC enclosure.
26.4.13.2. Purchase and install a new single phase, 240-volt, 100-amp, main lug, bolt-in breaker, surface mount, indoor, 20 circuit, panelboard with 20 – 20-amp single pole breakers.
26.4.13.2.1. Panelboard must have separate neutral and ground bus bars

26.4.13.3. In new PLC enclosure provide a field connection terminal strip for twenty (20) 120VAC 20-amp circuits (20 terminal blocks for the hot wire, 20 terminal blocks for the neutral wire, and 20 terminal blocks for the ground wire).

26.4.13.3.1. Connect existing wires from the panelboard to the terminal blocks and then extend #12 AWG for all 20 circuits to the new panelboard mounted next to the new PLC enclosure.

26.4.13.3.2. Install a new 2" conduit from the side of the new PLC enclosure to the new Panelboard and extend all circuits from the field terminal strip to the new breakers (10' – 20' of wire for each circuit).

26.4.13.4. Purchase and install a three-pole 100-amp lug block and mount in new PLC enclosure near field terminal block to extend the sub-panel feeders.

26.4.13.4.1. Install a new 1" conduit from new PLC enclosure to new panel board and pull new 60-amp 240 VAC copper wires to panel main lugs (10' – 20' of wire).

26.4.14. **Network Equipment**

26.4.14.1. Preserve existing fiber patch panel to be remounted in new PLC enclosure.

26.4.14.2. Mount existing patch panel in new PLC enclosure.

26.4.14.3. Reroute existing fiber patch cables and connect to network switch.

26.4.14.4. Reinstall fiber closet in PLC enclosure.

26.4.14.5. Purchase and install Ethernet patch cables to the network switch for the following:

26.4.14.5.1. Dell Wyse computer

26.4.14.5.2. Stratus Node 1

26.4.14.5.3. Stratus Node 2

26.4.14.5.4. Operator touch screen

26.4.14.5.5. PLC Processor

26.4.14.5.6. PLC NOE

26.5. **Demo Existing PLC enclosures**

26.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.

26.5.2. Demo and dispose of one (1) two-door steel enclosure 72" x 90" x 24"

26.5.2.1. Steel double door enclosure

26.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA.

26.6. **Install New PLC Enclosure**

26.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 26.xx above

26.6.2. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

26.6.3. Extend conduits and wires to new enclosure as needed.

26.6.4. Terminate existing wiring per drawings

26.6.5. Terminate new wires per drawings

26.6.6. Reuse existing 120 VAC feed and breaker for old PLC enclosure for the new PLC 120 VAC feed.

26.6.7. Reconnect Ethernet wires.

26.6.8. Reconnect fiber cables.

26.7. **Testing and Commissioning System**

26.7.1. Assist Avanceon and CMCMUA with testing and commissioning

26.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

26.8. **Remove Temporary PLC enclosure**

26.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

27. **OCEAN CITY EFFLUENT BUILDING**

27.1. **Reference Drawings**

27.1.1. OceanCityEffluentElectrical.PDF

27.2. **Location Description**

27.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 150' x 100' x 20' ceiling height.

27.2.2. Wet Well under floor in part of the building and concrete slab under the rest, no basement.

27.2.3. Flat roof above ground floor made of prestressed concrete slabs. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

27.2.4. The Effluent Building houses the Effluent Pumping station, Blowers, Generator, and Chemical Addition equipment.

27.3. **Preliminary work before taking site off line:**

27.3.1. Temporary PLC Setup:

27.3.1.1. The original Symax PLC will act as the temporary PLC as the new PLC enclosure is not going in place of the existing PLC enclosure.

27.3.1.2. No temporary PLC is needed at this location.

27.3.2. New PLC Enclosure

27.3.2.1. Install the new PLC enclosure on the existing concrete pad back to back with the existing Effluent Pump VFD's.

27.4. **Individual Systems**

27.4.1. **Main Power for PLC**

27.4.1.1. Install a new ¾" conduit using the existing Unistrut supports to the existing panel in the two door PLC enclosure for a 120 VAC power circuit for the new PLC enclosure. (40' of conduit and existing Unistrut supports are available).

27.4.1.1.1. Purchase and install a new GE 20-amp breaker in the panel and connect the wires.

27.4.2. **Bubbler Control Enclosure**

27.4.2.1. From the existing bubbler enclosure extend 1-1/2" conduit from existing anybody for the following wires (10'):

27.4.2.1.1. Control Power

27.4.2.1.1.1. 24 VDC from PLC enclosure power supply (Float)

27.4.2.1.2. Floats

27.4.2.1.2.1. High level float

27.4.2.1.2.2. Low level float

27.4.2.1.3. Status and Control

27.4.2.1.3.1. 1 STP for Compressor 1 Pressure transmitter

27.4.2.1.3.2. 1 STP for Compressor 2 Pressure transmitter

27.4.2.1.3.3. 1 STP Gravity Wet Well Level transmitter – powered transmitter (3 wire)

27.4.2.1.3.4. 1 STP Effluent Wet Well Level transmitter – powered transmitter (3 wire)

27.4.2.1.3.5. 1 STP Non-Potable Wet Well Level transmitter – powered transmitter (3 wire)

27.4.2.1.3.6. 24DVC signal and common for Gravity Wet Well Level isolation control solenoid valve (2 wires)

27.4.2.1.3.7. 24DVC signal and common for Gravity Wet Well Level purge control solenoid valve (2 wires)

27.4.2.1.3.8. 24DVC signal and common for Effluent Wet Well Level isolation control solenoid valve (2 wires)

27.4.2.1.3.9. 24DVC signal and common for Effluent Wet Well Level purge control solenoid valve (2 wires)
27.4.2.1.3.10. 24DVC signal and common for Non-Potable Wet Well isolation control solenoid valve (2 wires)
27.4.2.1.3.11. 24DVC signal and common for Non-Potable Wet Well purge control solenoid valve (2 wires)

27.4.3. **Suspended Solids Meter and pH Meter**

27.4.3.1. Install new ¾" conduit from the new PLC enclosure to the existing 24" x 6" x 6" wire trough for the following wire (110'):
27.4.3.1.1. 1 STP Suspended Solids Meter
27.4.3.1.2. 1 STP pH meter

27.4.4. **Air Piping, Non-Potable Flow Meters, Cl2 Probes, and Non-Potable Strainer**

27.4.4.1. Install new 2" conduit from new PLC enclosure to the west wall near the non-potable water strainer control enclosure (60'). (Use this conduit as a trunk line for all of the other equipment in this section).
27.4.4.2. Tee off 2" conduit with a ¾" conduit for the following wire (30' – 80' wire)
27.4.4.2.1. 1 STP 4-20 mA Non-Potable water flow meter
27.4.4.2.2. 1 STP 4-20 mA Non-Potable water PSI
27.4.4.3. Purchase and install a 120 VAC, single phase, 1 HP contactor with disconnect and HOA switch for the Non-Potable Water Strainer.
27.4.4.3.1. Demo existing contactor enclosure and reuse the 120 VAC feed and 120 VAC motor feed wires.
27.4.4.3.2. Tee off 2" conduit with a ¾" conduit for the following wires for the Non-Potable Water Strainer (10' – 80' wire):
27.4.4.3.2.1. Control Power
27.4.4.3.2.1.1. 24 VDC from PLC enclosure power supply
27.4.4.3.2.2. Strainer Status
27.4.4.3.2.2.1. Auto switch
27.4.4.3.2.2.2. Hand switch
27.4.4.3.2.2.3. Running status
27.4.4.3.2.2.4. Fault status
27.4.4.4. Tee off 2" conduit with a ¾" conduit for the following wire for the plant blowers (10' – 80' wire):
27.4.4.4.1. 1 STP for air pipe pressure transmitter
27.4.4.5. Tee off 2" conduit with a ¾" conduit for the following wire the plant blowers (10' – 90' wire):
27.4.4.5.1. 1 STP for air pipe flow transmitter
27.4.4.6. From the end of the 2" conduit extend a 1" conduit to the CL2 Probe area for the following wires (50' 1" – 120' wire)
27.4.4.7. STP 4-20 mA 5-minute probe
27.4.4.8. STP 4-20 mA 30-minute probe
27.4.4.9. All instruments in this section will need to have the existing flex removed, existing signal wire removed, and the new wires connected during a planned switch over from the existing PLC to the new PLC.

27.4.5. **Non-Potable and Dilution Drive Trunk Line**

27.4.5.1.1. Install a new 2" conduit from the new PLC enclosure to just above the Non-Potable and Dilution VFD's (30')

27.4.6. **Non-Potable Drives 1 and 2**

27.4.6.1. Tee off the 2" trunk line conduit with a ¾" conduit to each Non-Potable Water Drive for the following wires (10').
27.4.6.2. Control Power

27.4.6.2.1. 24 VDC from PLC enclosure power supply
27.4.6.2.2. 24 VDC Common from PLC enclosure power supply
27.4.6.3. Pump Controls
27.4.6.3.1. Auto switch
27.4.6.3.2. Hand switch
27.4.6.3.3. Running status
27.4.6.3.4. Fault status
27.4.6.3.5. Run Command (pump start command from PLC)
27.4.6.3.5.1. Field install run command relay in enclosure
27.4.6.3.6. Ethernet Wire
27.4.6.3.7. STP speed command
27.4.6.4. All equipment in this section will need to have the existing conduit removed, existing signal wire removed, and the new wires connected during a planned switch over from the existing PLC to the new PLC.

27.4.7. **Dilution Water Drives 1 and 2**
27.4.7.1. Tee off the 2" trunk line conduit with a ¾" conduit to each Dilution Water Drive for the following wires (10').
27.4.7.2. Control Power
27.4.7.2.1. 24 VDC from PLC enclosure power supply
27.4.7.2.2. 24 VDC Common from PLC enclosure power supply
27.4.7.3. Pump Controls
27.4.7.3.1. Auto switch
27.4.7.3.2. Hand switch
27.4.7.3.3. Running status
27.4.7.3.4. Fault status
27.4.7.3.5. Run Command (pump start command from PLC)
27.4.7.3.5.1. Field install run command relay in enclosure
27.4.7.3.6. Ethernet Wire
27.4.7.3.7. STP speed command
27.4.7.4. All equipment in this section will need to have the existing conduit removed, existing signal wire removed, and the new wires connected during a planned switch over from the existing PLC to the new PLC.

27.4.8. **Effluent Pump Drives 1, 2, and 3**
27.4.8.1. To each Effluent Pump Drive install a new ¾" conduit to each for the following wires (10').
27.4.8.2. Control Power
27.4.8.2.1. 24 VDC from PLC enclosure power supply
27.4.8.2.2. 24 VDC Common from PLC enclosure power supply
27.4.8.3. Pump Controls
27.4.8.3.1. Auto switch
27.4.8.3.2. Hand switch
27.4.8.3.3. Running status
27.4.8.3.4. Fault status
27.4.8.3.5. Run Command (pump start command from PLC)
27.4.8.3.5.1. Field install run command relay in enclosure
27.4.8.3.6. Ethernet Wire
27.4.8.3.7. STP speed command
27.4.8.4. All equipment in this section will need to have the existing conduit removed, existing signal wire removed, and the new wires connected during a planned switch over from the existing PLC to the new PLC.

27.4.9. **Bleach Tanks 1, 2, 3 and Safety Shower**

27.4.9.1. Demo existing ¾" EMT from existing PLC enclosure to bleach tanks and disconnect existing signal wires from existing level sensors atop tanks (60').
27.4.9.2. Demo existing ¾" EMT from existing PLC enclosure to bleach tanks horn control panel (plastic 12" x 10" x 6" enclosure) and disconnect existing signal wires from existing switches and horn (30').
27.4.9.3. From the new PLC enclosure install a 1" trunk line conduit to the bleach room for all of the (70' – the existing core hole through the block can be used or a new hole through the block can be cored).
27.4.9.4. Tee off the 1" trunk line conduit with a ¾" conduit to the three (3) bleach tanks for the following wires (40' – 110' wire):
27.4.9.4.1. STP 4-20 mA for level
27.4.9.5. Connect new wires to the ultra-sonic level transmitters and the PLC.
27.4.9.6. Tee off 1" trunk line with a ¾" conduit and install new wires from the new PLC enclosure for the following (10' - 80' wire):
27.4.9.6.1. Control Power
27.4.9.6.1.1. 24 VDC Common from PLC enclosure power supply
27.4.9.6.2. Status and Control Wires
27.4.9.6.2.1. High level horn
27.4.9.7. Purchase and install a new high-level horn on the wall near the bleach tanks.
27.4.9.8. Use the horn conduit for the safety shower pressure switch and pull the following wires (80')
27.4.9.8.1. Control Power
27.4.9.8.1.1. 24 VDC Common from PLC enclosure power supply
27.4.9.8.2. Status and Control Wires
27.4.9.8.2.1. Shower switch
27.4.9.8.3. Leave wires in a junction box for future connection near the shower.

27.4.10. **Dilution Water Bleach Pumps 1 and 2, and Effluent Bleach Pumps 1 and 2 (four (4) separate pumps)**

27.4.10.1. Purchase and install a 12" x 12" x 6" fiberglass enclosure with backplane for din rail and install near bleach pumps for control wire junction to all bleach pumps.
27.4.10.1.1. Purchase and install twenty-five (25) terminal blocks and four (4) three pole terminal blocks for the bleach pump control wiring.
27.4.10.2. Install new 1" conduit to the bleach pump fiberglass enclosure for the following wire for (50' plus core through block wall – terminate wires to din rail blocks)
27.4.10.2.1. Control Power
27.4.10.2.1.1. 24 VDC from PLC enclosure power supply
27.4.10.2.2. Status and Control
27.4.10.2.2.1. Auto
27.4.10.2.2.2. Hand
27.4.10.2.2.3. Pump Running
27.4.10.2.2.4. Pump Fault
27.4.10.2.2.5. Pump start common from pump
27.4.10.2.2.6. Pump start dry contact command to pump
27.4.10.2.2.7. 1 STP speed command

27.4.11. **Post CL2 Flow Meter, Dilution CL2 Flow Meter**

27.4.11.1. Install a new ¾" conduit from the new PLC enclosure and tee off with ½" flex to each of the two (2) flow meters for the following wires (50' – 20' of flex):

27.4.11.1.1. Status
27.4.11.1.1.1. STP 4-20 mA for flow
27.4.11.2. Demo the existing signal wires from the two (2) meters and demo the PVC conduit back to the wall mounted junction box and plug ¾" hole (20').
27.4.12. **Process Air Blowers 1, 2, and 3**
27.4.12.1. Purchase and install three (3) new HOA switches with four (4) contact blocks on each Blower MCC door.
27.4.12.1.1. Reconnect existing switch wiring and use additional blocks for PLC status for hand and PLC auto operation through new run command relay.
27.4.12.2. Install new ¾" conduit from new PLC enclosure to MCC 7 for Blower 2 for the following wires (40'):
27.4.12.2.1. Control Power
27.4.12.2.1.1. 24 VDC from PLC enclosure power supply
27.4.12.2.2. Status and Control
27.4.12.2.2.1. Auto
27.4.12.2.2.2. Hand
27.4.12.2.2.3. Blower Running
27.4.12.2.2.4. Blower Fault
27.4.12.2.2.5. Run Command (pump start command from PLC)
27.4.12.2.2.5.1. Purchase and field install 10-amp run command relay in enclosure
27.4.12.3. Install new ¾" conduit from new PLC enclosure to MCC 8 for Blowers 1 and 3 for the following wires (40'):
27.4.12.3.1. Control Power
27.4.12.3.1.1. 24 VDC from PLC enclosure power supply
27.4.12.3.2. Status and Control
27.4.12.3.2.1. Auto
27.4.12.3.2.2. Hand
27.4.12.3.2.3. Blower Running
27.4.12.3.2.4. Blower Fault
27.4.12.3.2.5. Run Command (pump start command from PLC)
27.4.12.3.2.5.1. Purchase and field install 10-amp run command relay in enclosure
27.4.13. **Effluent Cone Valve**
27.4.13.1. Install new ¾" conduit from new PLC enclosure to existing pressure transducer locations on south wall for the following wire (100'):
27.4.13.1.1. Two (2) STP for two (2) existing pressure transducers
27.4.13.2. Install new ¾" conduit from new PLC enclosure to the area next to the pressure transducers for future extension to the basement cone valve equipment. Cap conduit for future use.
27.4.14. **RBC's 1-24 VFD's (Interface terminal block enclosure above RBC MCC)**
27.4.14.1. Install new 2" conduit from new PLC enclosure to RBC MCC terminal block enclosure above MCC in Blower room for the following 20 AWG wires to each of the twenty-four (24) RBC's (110'):
27.4.14.1.1. Control Power
27.4.14.1.1.1. 24 VDC from PLC enclosure power supply x4 (per fused PLC group of 16 inputs)
27.4.14.1.2. Status and Control
27.4.14.1.2.1. VFD Running

27.4.14.1.2.2. VFD Fault
27.4.14.1.2.3. STP MODBUS wire (one (1) STP wire only, not 24)

27.4.14.2. Connect wires to existing terminal blocks and demo existing cables in existing 2" back to RBC PLC is switchgear room (80' – RBC PLC will be demoed and not replaced).

27.4.14.2.1. Reuse 2" conduit for pathway to generator and switchgear room.

27.4.15. **Diesel tank**

27.4.15.1. Install new ¾" conduit from new PLC enclosure to Diesel tank and tee off for high level horn on outside wall near tanks for the following wires (110' - existing Unistrut outside on overhead pipe hanger available):

27.4.15.1.1. Control Power
27.4.15.1.1.1. 24 VDC Common from PLC enclosure power supply

27.4.15.1.2. Status and Control Wires
27.4.15.1.2.1. STP for ultra-sonic level transmitter
27.4.15.1.2.2. High level horn

27.4.15.1.3. Purchase and install a new diesel tank high level horn.

27.4.15.1.4. Purchase and install new Diesel Tank Class I Division II ultra-sonic level transmitter on outdoor diesel tank

27.4.15.1.5. Demo existing level sensor, wire, and ¾" conduit back to pump controller (20').

27.4.16. **Generator 1 and 2, Day Tanks 1 and 2, ATS 1 and 2**

27.4.16.1. Demo existing Generator PLC and power supply but leave the enclosure, backplane, and 120 VAC circuit and receptacle in the enclosure.

27.4.16.2. Add din rail and MODBUS terminal blocks with five (5) blocks for the MODBUS +, five (5) blocks for the MODBUS –, and five (5) blocks for the shield wires.

27.4.16.3. Install new 1" conduit from new PLC enclosure to generator room and tee off for the two (2) existing day tank controllers and pull the following wires (110'):

27.4.16.3.1. Control Power
27.4.16.3.1.1. 24 VDC from PLC enclosure power supply

27.4.16.3.2. Status and Control Wires
27.4.16.3.2.1. Day Tank Not In Auto alarm
27.4.16.3.2.2. Day Tank high level
27.4.16.3.2.3. Day Tank low level
27.4.16.3.2.4. Day Tank leak alarm
27.4.16.3.2.5. Day Tank return pump running

27.4.16.4. Continue the 1" conduit to the existing generator PLC enclosure and pull the following wires (40' conduit 150' wire):

27.4.16.4.1.1. 1 - STP for MODBUS communication

27.4.16.4.2. From existing generator PLC enclosure install two (2) STP wires using existing conduit to:
27.4.16.4.2.1. ATS 1
27.4.16.4.2.2. ATS 2

27.4.16.4.3. Install new ¾" conduit from the generator PLC enclosure to the two (2) generators for the following wires (40'):
27.4.16.4.3.1. STP for MODBUS communication

27.4.17. **Sump Pumps 9 and 10 in Southeast Tunnel**

27.4.17.1. Purchase and install two (2) new 480 VAC, three phase, 5 HP Sump Control Enclosures with disconnect and HOA switch and install in next to sump area.

27.4.17.2. Existing feeds are in a 4" square metal box on the wall. Replace 4" square with 12" x 12" x 6" deep stainless-steel enclosure and equip with din rail and terminal blocks to extend two 480 VAC three phase circuits for the two (2) sump pumps.

27.4.17.3. Install two (2) new ¾" conduits and wire for the feed wires from new stainless-steel enclosure to the new contactors (20' each).

27.4.17.4. Route existing sump pump cable to each of the contactors and connect.

27.4.17.5. Install new 1" conduit and from new PLC enclosure to sump area in tunnel using the existing concrete cutout in the cone valve pit to access the basement tunnel system and terminate conduit to a 6" x 6" x 6" stainless-steel enclosure for the following wires (110' – this conduit will be extended and used for the sample pumps control and ventilation air flow switch – flex out of the enclosure for the controls to the contactors):

27.4.17.5.1. Control Power

27.4.17.5.1.1. 24 VDC from PLC enclosure power supply

27.4.17.5.1.2. 24 VDC Common from PLC enclosure power supply

27.4.17.5.2. Pump Controls

27.4.17.5.2.1. Auto switch

27.4.17.5.2.2. Hand switch

27.4.17.5.2.3. Running status

27.4.17.5.2.4. Fault status

27.4.17.5.2.5. Run Command (pump start command from PLC)

27.4.17.5.2.5.1. Field install run command relay in enclosure

27.4.17.5.3. Control Power

27.4.17.5.3.1. 24 VDC from PLC enclosure power supply

27.4.17.5.4. Controls

27.4.17.5.4.1. Low level float (N.O.)

27.4.17.5.4.2. Stop float (N.O.)

27.4.17.5.4.3. Start float (N.O.)

27.4.17.5.4.4. Lag Start float (N.O.)

27.4.17.5.4.5. High level float (N.C.)

27.4.17.6. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar on concrete floor over sump pit.

27.4.17.6.1. Purchase and install 10' stainless-steel Unistrut for float hanger bar

27.4.17.6.2. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

27.4.17.7. Demo two (2) existing sump controllers from wall.

27.4.18. **Sample Pumps 7 (north) and 8 (south)**

27.4.18.1. Extend the 1" conduit from the sump pit area to the sample pump area for the following wires (110' – 220' of wire):

27.4.18.2. Purchase and install two (2) new 120 VAC, single phase, 1 HP Contactor Enclosure with disconnect and HOA switch and install on wall next to sample pumps.

27.4.18.3. Intercept existing 120 VAC circuit in surface mount switch box and install ¾" conduit to new contactor (20').

27.4.18.4. Install new ¾" conduit and wires from contactor to sample pump (10' plus 6' ½" flex).

27.4.18.5. Tee off the 1" conduit from the sump pit area to the sample pump area for the following wires (110' – 220' of wire):

27.4.18.5.1. Control Power

27.4.18.5.1.1. 24 VDC from PLC enclosure power supply
27.4.18.5.1.2. 24 VDC Common from PLC enclosure power supply
27.4.18.5.2. Pump Controls
27.4.18.5.2.1. Auto switch
27.4.18.5.2.2. Hand switch
27.4.18.5.2.3. Running status
27.4.18.5.2.4. Fault status
27.4.18.5.2.5. Run Command (pump start command from PLC)
27.4.18.5.2.5.1. Field install run command relay in enclosure

27.4.19. **Ventilation (Tunnel Fan)**

27.4.19.1. Purchase and install one (1) new pressure differential switch.
27.4.19.1.1. Attach switch with hose to the Tunnel ductwork near the sump pumps.
27.4.19.1.2. Tee off sump control conduit with new ¾" conduit to the air flow switch (30').
27.4.19.1.3. Seal all duct penetrations air tight.
27.4.19.1.4. Wire pressure switch back to new PLC Enclosure – 2 conductors (140' wire).
27.4.19.2. Purchase and install new HOA switch with four (4) contact blocks on Effluent Wet Well Fan MCC enclosure door.
27.4.19.2.1. Reconnect existing switch wiring and use additional blocks for PLC status.
27.4.19.3. Install new ¾" conduit from the new PLC enclosure to the existing fan VFD for the following wires (80'):
27.4.19.3.1. Control Power
27.4.19.3.1.1. 24 VDC from PLC enclosure power supply
27.4.19.3.1.2. 24 VDC Common from PLC enclosure power supply
27.4.19.3.2. Status and Controls
27.4.19.3.2.1. Auto status
27.4.19.3.2.2. Hand status
27.4.19.3.2.3. Running status
27.4.19.3.2.4. Fault status
27.4.19.3.2.5. Run Command (pump start command from PLC)
27.4.19.3.2.5.1. Field install run command relay in enclosure

27.4.20. **Network Equipment**

27.4.20.1. Install new 1" conduit between new PLC enclosure and existing PLC enclosure for three (3) fiber patch cables (provided by CMCMUA).
27.4.20.2. Install network switch in new PLC enclosure.
27.4.20.3. Leave fiber patch panel in existing enclosure.
27.4.20.4. Connect fiber cables to existing network switch and patch panel.
27.4.20.5. Purchase and install Ethernet patch cables to the network switch for the following:
27.4.20.5.1. Dell Wyse computer
27.4.20.5.2. Stratus Node 1
27.4.20.5.3. Stratus Node 2
27.4.20.5.4. Operator touch screen
27.4.20.5.5. PLC Processor
27.4.20.5.6. PLC NOE

27.5. **Demo Existing PLC enclosures**

27.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.
27.5.2. Demo and dispose of one (1) single door fiberglass enclosure 36" x 24" x 12"

27.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

27.5.4. Two door steel enclosure will remain.

27.6. **Install New PLC Enclosure**

27.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 27.xx above

27.6.2. Cut out bottom of enclosure as needed to access existing floor conduits or wire gutters

27.6.3. Extend conduits and wires to new enclosure as needed.

27.6.4. Terminate existing wiring per drawings

27.6.5. Terminate new wires per drawings

27.6.6. Re-connect existing 120 VAC feeder to new PLC enclosure

27.6.7. Reconnect Ethernet wires.

27.6.8. Reconnect fiber cables.

27.7. **Testing and Commissioning System**

27.7.1. Assist Avanceon and CMCMUA with testing and commissioning

27.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

27.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

28. **OCEAN CITY SLUDGE PROCESSING BUILDING**

28.1. **Reference Drawings**

28.1.1. OceanCitySludgeElectrical.PDF

28.2. **Location Description**

28.2.1. Two story block building with brick face overlaid over block with overall dimensions of:

28.2.1.1. Lower Floor 80' x 50' x 15' ceiling height.

28.2.1.2. Upper Flor 40' x 50' x 15' ceiling height

28.2.2. Flat roof above ground floor made of prestressed concrete slabs. Indoor ladder access from second floor area to roof. CMCMUA Engineer shall identify suitable locations to be drilled in the event conduit supports are needed in ceiling.

28.2.3. The Sludge Processing Building houses the Rotary Press, Scum Concentrator equipment, Scrubber, and sumps.

28.3. **Preliminary work before taking site off line:**

28.3.1. General

28.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

28.3.2. Temporary PLC Setup:

28.3.2.1. None. Temporary PLC has been installed by CMCMUA.

28.3.2.2. Free up an existing 2" conduit to the basement from the existing PLC enclosure.

28.3.2.2.1. Choose one of the existing conduits and pull all wires (around 20) down to tunnel ceiling junction box and fish wires back through a 2nd existing 2" conduit and reconnect wires to existing PLC in order to empty one 2" conduit.

28.3.2.2.2. Cut empty 2" conduit and unthread 90.

28.3.2.2.3. Extend 2" conduit to wall (2 - 90 sweeps and 10' of 2")

28.3.2.2.4. Purchase and install one (1) 3' x 2' x 12" deep indoor junction box and mount on wall in tunnel for control wire distribution point. All tunnel control conduits will come to this junction box.

28.4. **Individual Systems**

28.4.1. **Batch Water Pump 1 and Poly Tank Mixer 1 and 2**

28.4.1.1. Purchase and install two (2) new 480 VAC, three phase, 2 HP contactors enclosures with disconnect and HOA switch for tank mixers.

28.4.1.2. Purchase and install one (1) new 480 VAC, three phase, 3 HP contactors enclosures with disconnect and HOA switch for batch water pump.

28.4.1.3. Demo two (2) existing PVC 12" x 12" x 6" junction boxes and contents.

28.4.1.4. Install new contactors in place of demoed junction boxes and provide ¾" conduit path between contactors to accommodate a multi-motor feed circuit.

28.4.1.5. Install new ¾" conduit from existing 15-amp breaker in MCC 5 for multi-motor feed to the three (3) new contactors and 120 VAC power circuit for the following wires (90' + 50' of stainless steel Unistrut for conduit supports):

28.4.1.5.1. #12 AWG three phase circuit (MCC 5 Poly Feed Breaker)

28.4.1.5.2. #12 AWG single phase circuit (MCC 5 Panel circuit #10)

28.4.1.5.2.1. Purchase and install square D single pole 20-amp bolt in breaker in circuit 10.

28.4.1.6. Below contactors purchase and install a 120 VAC 20-amp duplex receptacle for circuit #10 conductors.

28.4.1.7. From Batch Water contactor install new ¾" conduit to existing motor (30' + 6' ½" flex)

28.4.1.7.1. Demo existing motor feed wires and conduit.

28.4.1.8. From each of the mixer contactors install new ¾" conduit to existing mixer motors (30' + 6' ½" flex)
28.4.1.8.1. Demo existing motor feed wires and conduit.
28.4.1.9. Install new 1" conduit from new PLC enclosure to the three (3) contactors (Batch Water Pump 1 and Poly Mixer 1 and 2) for the following wires (80'):
28.4.1.9.1. Control Power
28.4.1.9.1.1. 24 VDC from PLC enclosure power supply
28.4.1.9.1.2. 24 VDC Common from PLC enclosure power supply
28.4.1.9.2. Controls
28.4.1.9.2.1. Auto switch
28.4.1.9.2.2. Hand switch
28.4.1.9.2.3. Running status
28.4.1.9.2.4. Fault status
28.4.1.9.2.5. Run Command (pump start command from PLC)
28.4.1.9.2.5.1. Field install run command relay in contactor enclosure
28.4.1.9.2.6. Open command for solenoid
28.4.1.9.2.6.1. Field install open command relay in contactor enclosure

28.4.2. **Poly System (Tank Levels 1 & 2, Tank Floats, Poly System Controls)**
28.4.2.1. Purchase and install two (2) new ultra-sonic level transmitters on each of the Poly Tanks (CMCMUA will provide angle mounting brackets).
28.4.2.2. Purchase and install two (2) NC high level weighted floats and two (2) NO weighted low-level floats in each of the two (2) poly tanks.
28.4.2.3. Install new 1" conduit from the new PLC enclosure to the polymer tank area for the following wires (80' – 17 wires total):
28.4.2.3.1. Control Power - Poly Mixing System
28.4.2.3.1.1. 24 VDC from PLC enclosure power supply
28.4.2.3.1.2. 24 VDC Common from PLC enclosure power supply
28.4.2.3.2. Controls Poly Mixing System
28.4.2.3.2.1. Auto switch
28.4.2.3.2.2. Hand switch
28.4.2.3.2.3. Running status
28.4.2.3.2.4. Fault status
28.4.2.3.2.5. Run Command (pump start command from PLC)
28.4.2.3.2.5.1. Field install run command relay in contactor enclosure
28.4.2.3.3. Status - Tanks Level
28.4.2.3.3.1. Two (2) – STP for tank 1 & 2 Level Sensors
28.4.2.3.4. Control Power - Floats x2
28.4.2.3.4.1. 24 VDC from PLC enclosure power supply
28.4.2.3.5. Status – Floats x2
28.4.2.3.5.1. High Level Float
28.4.2.3.5.2. Low Level Float

28.4.3. **Poly Tank Motorized Valves 1 and 2**
28.4.3.1. Install two (2) new ¾" conduits from new PLC enclosure to each of the two (2) Poly Tank Motorized Valves (80' + 6" ½" flex and 20' stainless steel Unistrut):
28.4.3.1.1. 120 VAC Power
28.4.3.1.1.1. 120 VAC from PLC enclosure circuit breaker
28.4.3.1.1.2. Neutral from PLC enclosure
28.4.3.1.2. Control/Status Power 120 VAC
28.4.3.1.2.1. Open Command
28.4.3.1.2.2. Close Command

28.4.3.1.2.3. Open status
28.4.3.1.2.4. Close status
28.4.3.1.3. Demo existing conduit and wire to valves (30').

28.4.4. **Rotary Fan Press 1 - Second Floor (RFP)**

28.4.4.1. Install new 1" conduit from new PLC enclosure to the existing RFP enclosure on second floor. Use existing conduit supports and existing core hole to second floor for the following wires (80')
28.4.4.1.1. Status and Control
28.4.4.1.1.1. CAT5 Ethernet cable

28.4.5. **Primary Polymer System (Pri Poly Pump 4)**

28.4.5.1. Tee off RFP 1" conduit with a ¾" conduit to the poly system in the container room and terminate to a junction box for the following wires (20' +12' ½" flex – 70' of wire):
28.4.5.1.1. Control Power
28.4.5.1.1.1. 24 VDC from PLC enclosure power supply
28.4.5.1.1.2. Remote signal from pump
28.4.5.1.2. Controls
28.4.5.1.2.1. Local/Remote switch
28.4.5.1.2.2. Running status
28.4.5.1.2.3. Fault status
28.4.5.1.2.4. Run Command (pump start command from PLC)
28.4.5.1.2.5. STP for scale
28.4.5.1.2.6. STP for pump speed command
28.4.5.1.3. Purchase and install one (1) 6" x 6" x 6" stainless steel enclosure with twelve (12) terminal blocks and three (3) ½" compression fittings for connection to scale and pump.

28.4.6. **Gas Monitoring - Second Floor**

28.4.6.1. At second floor tee off 1" RFP conduit with ¾" conduit and terminate at the existing gas monitoring system for the following wires (30' - 110' wire length):
28.4.6.1.1. Control Power
28.4.6.1.1.1. 24 VDC from PLC enclosure power supply FU2
28.4.6.1.1.2. 24 VDC Common from PLC enclosure power supply
28.4.6.1.2. Status and Control Wires
28.4.6.1.2.1. 1 STP for H2S Sensor

28.4.7. **Scum Concentrator**

28.4.7.1. Purchase and install one (1) new indoor 480 VAC, three phase, 2 HP contactor enclosure with disconnect and HOA switch on the back side of MCC 6 (20' Unistrut, 2 angle brackets, 2 beam clamps with all thread).
28.4.7.2. Install new ¾" conduit from spare 20-amp breaker in MCC 6 to new contactor enclosure for the following wire (10'):
28.4.7.2.1. 12 AWG 20-amp three phase circuit.
28.4.7.3. From new contactor install new ¾" conduit to scum flight motor for the following wire (50' + 6' ½" flex):
28.4.7.3.1. 12 AWG 20-amp three phase circuit.
28.4.7.4. Install new ¾" conduit from new PLC enclosure to the enclosure for the following wire (40'):
28.4.7.4.1. Control Power
28.4.7.4.1.1. 24 VDC from PLC enclosure power supply
28.4.7.4.1.2. 24 VDC Common from PLC enclosure power supply
28.4.7.4.2. Status and Controls
28.4.7.4.2.1. Auto switch

28.4.7.4.2.2. Hand switch
28.4.7.4.2.3. Running status
28.4.7.4.2.4. Fault status
28.4.7.4.2.5. Run Command (pump start command from PLC)
28.4.7.4.2.5.1. Purchase and field install 10-amp run command relay in enclosure
28.4.7.4.2.6. High level float (NC)
28.4.7.4.2.7. Zero Speed switch

28.4.7.5. Tee off control conduit with a junction box and purchase and install one (1) NC weighted float in the scum concentrator unit.

28.4.7.6. Near the float installation connect wires to the zero speed switch for the scum concentrator flights.

28.4.7.7. Demo existing scum concentrator enclosure, Unistrut, and small 120 VAC transformer – Steel single door enclosure (36" x 48" 12").
28.4.7.7.1. Pull back 70-amp feeder conductors to MCC 5 and remove completely.
28.4.7.7.2. Demo ¾" existing conduit feed to flight motor (20').

28.4.8. **Sludge Processing Scrubber Motors (Recirculation Pump 7 and 9, Chemical Pump 8, and Scrubber Fan 4)**

28.4.8.1. Demo existing steel two-door enclosure 5' x 6' x 2' to gain wall space for new equipment.

28.4.8.2. Purchase and install the following indoor contactor enclosures with breaker disconnect and HOA switch on the wall in place of demoed enclosure:
28.4.8.2.1. 2 – 7.5 HP three phase size 1 contactors for recirculation pumps
28.4.8.2.2. One (1) 12" x 12" x 10" deep junction box with power distribution block.
28.4.8.2.2.1. Block must be three phase and able to accept #8 AWG on power side and 2- #12 AWG wire per phase on the distribution side.

28.4.8.3. Install new 1" conduit from MCC 6 40-amp breaker for multi-motor feed for two (2) recirculation pumps to power distribution blocks enclosure (70').
28.4.8.3.1. Install #8 AWG three phase circuit wire for multi motor feed from MCC breaker to power distribution junction box near contactors (90').
28.4.8.3.2. Install ¾" conduit and #12 AWG three phase feed conductors from power distribution block enclosure to each of the two (2) recirculation contactors (20' each).

28.4.8.4. From each of the three (3) contactors install a new ¾" conduit to the scrubber motors with the motor leads (130' conduit – 150' wire – 40' Unistrut – 6' ½" flex)

28.4.8.5. Install a 1" conduit from the new PLC enclosure to the contactor locations and existing Scrubber Fan VFD location for the folldwing control wires (60'):

28.4.8.6. Tee off 1" with a ¾" conduit for the following wires for the Scrubber Fan (10' – 70' wire):
28.4.8.6.1. Control Power
28.4.8.6.1.1. 24 VDC from PLC enclosure power supply
28.4.8.6.1.2. 24 VDC Common from PLC enclosure power supply
28.4.8.6.2. Blower Controls
28.4.8.6.2.1. Auto switch
28.4.8.6.2.2. Hand switch
28.4.8.6.2.3. Running status
28.4.8.6.2.4. Fault status
28.4.8.6.2.5. Run Command (pump start command from PLC)

28.4.8.6.2.5.1. Field install run command relay in contactor enclosure
28.4.8.6.2.6. STP for MODBUS communication
28.4.8.6.2.7. STP Speed command
28.4.8.7. Tee off 1" with a ¾" conduit for the following wires for the two (2) Recirculation Pumps (10' – 70' wire):
28.4.8.7.1. Control Power
28.4.8.7.1.1. 24 VDC from PLC enclosure power supply
28.4.8.7.1.2. 24 VDC Common from PLC enclosure power supply
28.4.8.7.2. Pump Controls
28.4.8.7.2.1. Auto switch
28.4.8.7.2.2. Hand switch
28.4.8.7.2.3. Running status
28.4.8.7.2.4. Fault status
28.4.8.7.2.5. Run Command (pump start command from PLC)
28.4.8.7.2.5.1. Field install run command relay in contactor enclosure
28.4.8.8. From the 120 VAC MCC panel circuit #20 spare 20-amp breaker install a new a ¾" conduit to the Chemical Pump area on the scrubber pad. (150'):
28.4.8.8.1. 1 – 12 AWG single phase 20-amp circuit.
28.4.8.8.2. At the end of the chemical pump conduit install a weatherproof while in use cover on a 20-amp outdoor receptacle near the chemical pump.
28.4.9. **Sludge Processing Scrubber Controls (Chemical Tank, Scrubber Recirc Pump, Chemical Pump Speed, and Emergency Shower)**
28.4.9.1. Install new 1" conduit from the new PLC enclosure to the Scrubber Pad area and tee off with ¾" conduits to install the following (130' of 1" conduit and wire):
28.4.9.1.1. Purchase and install new 24 VDC Chemical Tank High Level Horn and mount on wall near outdoor chemical tank – two (2) conductors (+10' of ¾").
28.4.9.1.2. Purchase and install a new ultra-sonic level transmitter on the chemical tank – one (1) STP (+30' of ¾").
28.4.9.1.2.1. Purchase and install a flanged bulkhead fitting of with threaded 2" NPT on the chemical tank for the ultra-sonic level transmitter.
28.4.9.1.2.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.
28.4.9.1.3. Conduit to the safety shower for the following wires – two (2) conductors (30' of ¾").
28.4.9.1.3.1. Install conductors for safety shower switch and leave in a junction box next to the shower.
28.4.9.1.4. Conduit to the recirculation sump.
28.4.9.1.4.1. Purchase and install one (1) NC weighted float for high level (30' of ¾" and junction box):
28.4.9.1.4.2. 24 VDC from PLC enclosure power supply
28.4.9.1.4.3. Low level float
28.4.9.2. Install conduit and junction box next to chemical pump receptacle for (30' of ¾"):
28.4.9.2.1. Control Power
28.4.9.2.1.1. 24 VDC from PLC enclosure power supply
28.4.9.2.2. Pump Controls
28.4.9.2.2.1. Auto switch (Remote)
28.4.9.2.2.2. Hand switch (Local)
28.4.9.2.2.3. Running status

28.4.9.2.2.4. Fault status
28.4.9.2.2.5. Pump common for start command CR 4.58
28.4.9.2.2.6. Run command through PLC CR 4.58
28.4.9.2.2.7. 1 - STP Speed Command

28.4.10. **Sludge Transfer Pumps 1, 2, and 3 (TSP) and Grinder 1, 2, and 3**

28.4.10.1. Use existing 2" control conduit through floor into new wall junction box to route wires to the basement tunnel.

28.4.10.2. Install new ¾" conduit to the each of the three (3) existing TSP VFD enclosures for the following wires (60' conduit each, 80' wire each):

28.4.10.2.1. Control Power
28.4.10.2.1.1. 24 VDC from PLC enclosure power supply
28.4.10.2.1.2. 24 VDC Common from PLC enclosure power supply

28.4.10.2.2. Controls
28.4.10.2.2.1. Auto switch
28.4.10.2.2.2. Hand switch
28.4.10.2.2.3. Running status
28.4.10.2.2.4. Fault status
28.4.10.2.2.5. STP Speed Command
28.4.10.2.2.6. Cat5 Ethernet Cable
28.4.10.2.2.7. Run Command (VFD start command from PLC)
28.4.10.2.2.7.1. Use existing two-pole run command relay

28.4.10.2.3. Purchase and install a new HOA switch with four (4) contact blocks in each of the VFD enclosures.
28.4.10.2.3.1. Rewire existing VFD control wires on the HOA and add wiring for the status to the PLC.

28.4.10.3. Use existing 2" control conduit through floor into large ceiling junction box to access wires to the basement tunnel.

28.4.10.4. Install new ¾" conduit to the each of the three (3) existing Grinder enclosures for the following wires (60' conduit each, 80' wire each):

28.4.10.4.1. Control Power
28.4.10.4.1.1. 24 VDC from PLC enclosure power supply
28.4.10.4.1.2. 24 VDC Common from PLC enclosure power supply

28.4.10.4.2. Controls
28.4.10.4.2.1. Auto switch
28.4.10.4.2.2. Hand switch
28.4.10.4.2.3. Running status
28.4.10.4.2.4. Fault status
28.4.10.4.2.4.1. Use existing two-pole run command relay in VFD enclosure. Wire remote start wires from Grinder TB to VFD Run Command Relay (use existing conduit)

28.4.10.4.3. Purchase and install a new HOA switch with four (4) contact blocks in each of the VFD enclosures.
28.4.10.4.3.1. Rewire existing Grinder control wires on the HOA and add wiring for the status to the PLC.

28.4.10.5. Demo existing 12" x 18" x 6" PVC enclosure and wire back to old PLC enclosure. Conduit may remain capped off.

28.4.10.6. Install one (1) new ¾" conduit from new PLC enclosure to the three (3) TSP Pumps for over pressure switch for the following wires (80' one conduit for the six wires):

28.4.10.6.1. Control Power
28.4.10.6.1.1. 24 VDC from PLC enclosure power supply x3

28.4.10.6.2. Controls
28.4.10.6.2.1. High pressure switch x3
28.4.10.6.3. Leave wires near pump capped off (pressure switch to be installed future).

28.4.11. **Flow Meters**

28.4.11.1. Locate and reconnect the existing STP for:
28.4.11.1.1. North sludge tank 2 flow meter
28.4.11.1.2. South sludge tank 1 flow meter
28.4.11.1.3. 46th street Pump Station flow meter
28.4.11.1.4. 32nd street flow meter (MODBUS)
28.4.11.1.5. Truck flow meter

28.4.12. **Bubbler System (tank levels)**

28.4.12.1. Install a 1" conduit from the new PLC enclosure to the existing bubbler enclosure for the following wires (10'):
28.4.12.2. Locate and reconnect the existing STP for:
28.4.12.2.1. 24 VDC Common to all solenoids
28.4.12.2.2. STP - North sludge tank 2 level
28.4.12.2.2.1. 24DVC signal for isolation control solenoid valve
28.4.12.2.2.2. 24DVC signal for purge control solenoid valve
28.4.12.2.3. STP - South sludge tank 1 level
28.4.12.2.3.1. 24DVC signal for isolation control solenoid valve
28.4.12.2.3.2. 24DVC signal for purge control solenoid valve
28.4.12.2.4. STP - Septage tank level
28.4.12.2.4.1. 24DVC signal for isolation control solenoid valve
28.4.12.2.4.2. 24DVC signal for purge control solenoid valve

28.4.13. **Sludge Storage Tank Mixer 1 and 2, High Level Floats**

28.4.13.1. Install a 1" conduit from the new PLC enclosure to MCC 5 (30').
28.4.13.2. Install a 1" conduit from the new PLC enclosure to MCC 6 (30').
28.4.13.3. For the mixers the 120 VAC MCC voltage will be brought to the PLC enclosure for the high and low run commands.
28.4.13.3.1. 24 VDC status wires are allowed to run with the associated 120 VAC to the respective MCC.
28.4.13.4. On each of the Mixer 1 and Mixer 2 MCC door, purchase and install one (1) four position 30 mm switch for Low, High, Off, Auto with four (4) contact blocks.
28.4.13.4.1. Purchase and install a legend plate for each switch labelled: Low High Off Auto
28.4.13.4.2. Wire the switch to the low and high contactor coils within the MCC (match existing wiring) and use the additional contacts for PLC status interface.
28.4.13.4.3. Install the following wires to each of the two (2) MCC's (50' of wire):
28.4.13.4.4. PLC Control Power
28.4.13.4.4.1. 24 VDC from PLC enclosure power supply
28.4.13.4.4.2. 120 VAC from MCC (for run command contact)
28.4.13.4.5. PLC Controls
28.4.13.4.5.1. Auto
28.4.13.4.5.2. Running (Term 8)
28.4.13.4.5.3. Fault (from aux alarm relay contact)
28.4.13.4.5.4. Run command high speed (120 VAC for NO contact)
28.4.13.4.5.5. Run command low speed (120 VAC for NO contact)

28.4.13.5. Locate the existing pairs of wires for the north sludge storage tank 2 high level float and connect to new PLC.
28.4.13.6. Locate the existing pairs of wires for the south sludge storage tank 1 high level float and connect to new PLC.
28.4.13.7. Locate the existing pairs of wires for the north mixer 2 low oil level float and connect to new PLC.
28.4.13.8. Locate the existing pairs of wires for the south mixer 1 low oil level float and connect to new PLC.

28.4.14. **Thickeners 1 and 2**

28.4.14.1. Use 1" conduit installed for the mixers for the following wires (30' wire):
28.4.14.1.1. Control Power
28.4.14.1.1.1. 24 VDC from PLC enclosure power supply
28.4.14.1.2. Controls
28.4.14.1.2.1. Running status
28.4.14.1.2.2. Fault status
28.4.14.2. Purchase and install a short piece of din rail and a 120 VAC control relay for fault indication.
28.4.14.2.1. Connect relay to the MCC control 120 VAC and the contactor coil neutral.
28.4.14.2.2. Connect the fault wires from the PLC to a normally open contact.
28.4.14.3. Locate the existing torque alarm wires for Thickener 1 and connect to new PLC.
28.4.14.4. Locate the existing torque alarm wires for Thickener 2 and connect to new PLC.

28.4.15. **Septage Pumps 1 and 2 and Tanks**

28.4.15.1. Install a new 1" conduit from the new PLC enclosure and tee with ¾" to the existing two (2) VFD's for the septage pumps for the following wire (40' of 1" and 10' ¾"):
28.4.15.1.1. Control Power
28.4.15.1.1.1. 24 VDC from PLC enclosure power supply
28.4.15.1.1.2. 24 VDC Common from PLC enclosure power supply
28.4.15.1.2. Controls
28.4.15.1.2.1. Auto switch
28.4.15.1.2.2. Hand switch
28.4.15.1.2.3. Running status
28.4.15.1.2.4. Fault status
28.4.15.1.2.5. Seal leak
28.4.15.1.2.6. High Temperature
28.4.15.1.2.7. STP Speed Command
28.4.15.1.2.8. Cat5 Ethernet Cable
28.4.15.1.2.9. Run Command (pump start command from PLC)
28.4.15.1.2.10. Field install run command relay in enclosure
28.4.15.1.3. Continue the 1" conduit to the septage tanks for the following wires (120'):
28.4.15.1.4. Control Power
28.4.15.1.4.1. 24 VDC from PLC enclosure power supply
28.4.15.1.5. Controls
28.4.15.1.5.1. High level float
28.4.15.1.6. Tee off the 1" with a ¾" conduit and junction box for the float connection.
28.4.15.1.7. Purchase and install a new weighted NC float in the tank.

28.4.16. **Sump Pumps 1 and 2 – East Tunnel**

28.4.16.1. Purchase and install two (2) new 240 VAC, single phase, 5 HP with disconnect and HOA switch.

28.4.16.2. Demo existing two (2) mini contactors and associated conduit for sump control enclosures (20' conduit).

28.4.16.3. Pull back existing feed conductors to existing tee fitting.

28.4.16.4. Install 6' ¾" flex and route feeders to new sump enclosures.

28.4.16.5. Install new pump control enclosures on wall above piping around the corner from sump pit (next to wall thermometer).

28.4.16.6. Reconnect sump pump motor conductors to new enclosure.

28.4.16.6.1. Use cord grip fitting for sump motor cords.

28.4.16.7. From basement tunnel control junction box install a new 1" conduit to the two (2) contactors and floats for the following wire (90' of 1" and tee off with ¾" to the sump pit and contactor 30'):

28.4.16.7.1. Control Power

28.4.16.7.1.1. 24 VDC from PLC enclosure power supply

28.4.16.7.1.2. 24 VDC Common from PLC enclosure power supply

28.4.16.7.2. Pump Controls

28.4.16.7.2.1. Auto switch

28.4.16.7.2.2. Hand switch

28.4.16.7.2.3. Running status

28.4.16.7.2.4. Fault status

28.4.16.7.2.5. Run Command (pump start command from PLC)

28.4.16.7.2.6. Field install run command relay in enclosure

28.4.16.7.2.7. Low level float (N.O.)

28.4.16.7.2.8. Stop float (N.O.)

28.4.16.7.2.9. Start float (N.O.)

28.4.16.7.2.10. Lag Start float (N.O.)

28.4.16.7.2.11. High level float (N.C.)

28.4.16.8. Demo existing floats and conduit in sump pit.

28.4.16.9. Cut 2" off aluminum grating to allow for float hanger Unistrut bar.

28.4.16.10. Purchase and install new stainless steel Unistrut (10') for float hanger bar.

28.4.16.11. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar over sump pit next to wall.

28.4.16.12. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

28.4.16.13. Wire float wire to terminals in new PLC enclosure

28.4.17. **Sump Pumps 11 and 12 – TSP Area**

28.4.17.1. Purchase and install two (2) new 240 VAC, single phase, 5 HP with disconnect and HOA switch.

28.4.17.2. Demo existing sump enclosure and return to CMCMUA conduit for sump control enclosures (20' conduit).

28.4.17.3. Reuse existing feed conductors for new pump contactors.

28.4.17.4. Install new pump control enclosures on wall near sump pit.

28.4.17.5. Reconnect sump pump motors conductors to new enclosure.

28.4.17.5.1. Use cord grip fitting for sump motor cords.

28.4.17.6. From basement tunnel control junction box install a new 1" conduit to the two (2) contactors and floats for the following wire (80' of 1" and tee off with ¾" to the sump pit and contactor 20'):

28.4.17.6.1. Control Power

28.4.17.6.1.1. 24 VDC from PLC enclosure power supply
28.4.17.6.1.2. 24 VDC Common from PLC enclosure power supply
28.4.17.6.2. Pump Controls
28.4.17.6.2.1. Auto switch
28.4.17.6.2.2. Hand switch
28.4.17.6.2.3. Running status
28.4.17.6.2.4. Fault status
28.4.17.6.2.5. Run Command (pump start command from PLC)
28.4.17.6.2.6. Field install run command relay in enclosure
28.4.17.6.2.7. Low level float (N.O.)
28.4.17.6.2.8. Stop float (N.O.)
28.4.17.6.2.9. Start float (N.O.)
28.4.17.6.2.10. Lag Start float (N.O.)
28.4.17.6.2.11. High level float (N.C.)

28.4.17.7. Demo existing floats and conduit in sump pit.

28.4.17.8. Purchase and install new stainless steel Unistrut (10') for float hanger bar.

28.4.17.9. Purchase and install five (5) new weighted floats, one (1) NC and four (4) NO floats, and install on hanger bar over sump pit next to wall.

28.4.17.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.

28.4.17.11. Wire float wire to terminals in new PLC enclosure

28.4.18. **Control Conduit to Influent Building**

28.4.18.1. The influent building is a separate building located adjacent to the Sludge Processing Building which houses bar screens and scrubber equipment.

28.4.18.2. Install a new 2" conduit from the new PLC enclosure to the influent building and scrubber area (120').

28.4.18.2.1. Core through the outside wall and use the 8" ductal iron septage line for overhead conduit support to get to the Influent Building. 8" clamp with Unistrut attached (5 clamp supports – 10' Unistrut).

28.4.18.2.2. Terminate the 2" conduit inside the control shed to a junction box.

28.4.18.2.2.1. Purchase and install a NEMA 3R 3' x 1' x 8" deep junction box.

28.4.18.2.3. Use the 2" conduit for all control wires to the Influent equipment below.

28.4.19. **Pre Cl2 Pump 5 and Flow Meter**

28.4.19.1. From the NEMA 3R 3' x 1' x 8" deep junction box install new 1" conduit to the Pre Cl2 pump shed for the following wires (40'):

28.4.19.1.1. Control Power
28.4.19.1.1.1. 24 VDC from PLC enclosure power supply
28.4.19.1.2. Controls
28.4.19.1.2.1. Auto switch
28.4.19.1.2.2. Hand switch
28.4.19.1.2.3. Running status
28.4.19.1.2.4. Fault status
28.4.19.1.2.5. STP Speed Command
28.4.19.1.2.6. Run command common from pump
28.4.19.1.2.7. Run command back to pump
28.4.19.1.2.8. STP flow meter

28.4.20. **Influent Scrubber (Blower 1, Recric Pump 1, Chemical Pump 2, Flow Meter 1, Chemical Tank)**

28.4.20.1. From the NEMA 3R 3' x 1' x 8" deep junction box install new ¾" conduit to the scrubber fan VFD for the following wires (20'):
- 28.4.20.1.1. Control Power
  - 28.4.20.1.1.1. 24 VDC from PLC enclosure power supply
  - 28.4.20.1.1.2. 24 VDC Common from PLC enclosure power supply
- 28.4.20.1.2. Controls
  - 28.4.20.1.2.1. Auto switch
  - 28.4.20.1.2.2. Hand switch
  - 28.4.20.1.2.3. Running status
  - 28.4.20.1.2.4. Fault status
  - 28.4.20.1.2.5. STP Speed Command
  - 28.4.20.1.2.6. Cat5 Ethernet Cable
  - 28.4.20.1.2.7. Run Command (pump start command from PLC)
    - 28.4.20.1.2.7.1. Field install run command relay in enclosure

28.4.20.2. From the NEMA 3R 3' x 1' x 8" deep junction box, install new ¾" conduit to the recirculation enclosure for the following wires (20'):
- 28.4.20.2.1. Control Power
  - 28.4.20.2.1.1. 24 VDC from PLC enclosure power supply
  - 28.4.20.2.1.2. 24 VDC Common from PLC enclosure power supply
- 28.4.20.2.2. Controls
  - 28.4.20.2.2.1. Auto switch
  - 28.4.20.2.2.2. Hand switch
  - 28.4.20.2.2.3. Running status
  - 28.4.20.2.2.4. Fault status
  - 28.4.20.2.2.5. Run Command (pump start command from PLC)
    - 28.4.20.2.2.5.1. Field install run command relay in enclosure

28.4.20.3. From the NEMA 3R 3' x 1' x 8" deep junction box, use the 1" conduit for CL2 Pump 5 to the scrubber chemical pump for the following wires (30' – 150' wire):
- 28.4.20.3.1. Control Power
  - 28.4.20.3.1.1. 24 VDC from PLC enclosure power supply
- 28.4.20.3.2. Controls
  - 28.4.20.3.2.1. Auto switch
  - 28.4.20.3.2.2. Hand switch
  - 28.4.20.3.2.3. Running status
  - 28.4.20.3.2.4. Fault status
  - 28.4.20.3.2.5. STP Speed Command
  - 28.4.20.3.2.6. Run command common from pump
  - 28.4.20.3.2.7. Run command back to pump
  - 28.4.20.3.2.8. STP flow meter

28.4.20.4. From the NEMA 3R 3' x 1' x 8" deep junction box install new ¾" conduit to the Scrubber chemical tank and safety shower for the following wires (70'):
- 28.4.20.4.1. Tee off ¾" conduit for the following wires for the (10' – 180' wire)
  - 28.4.20.4.1.1. Control Power
    - 28.4.20.4.1.1.1. 24 VDC from PLC enclosure power supply
    - 28.4.20.4.1.1.2. 24 VDC Common from PLC enclosure power supply
  - 28.4.20.4.1.2. Controls
    - 28.4.20.4.1.2.1. Safety Shower alarm
    - 28.4.20.4.1.2.2. Tank fill horn

28.4.20.4.1.3. Purchase and install new 24 VDC Tank Horn near outdoor bleach tank.

28.4.20.4.2. Tee off ¾" conduit for the Scrubber CL2 Tank for the following wires (10' – 180' wire)

28.4.20.4.2.1. STP chemical tank level

28.4.20.4.2.2. Purchase and install a new ultra-sonic level transmitter on the chemical tank.

28.4.20.4.2.3. Purchase and install a flanged bulkhead fitting of with threaded 2" NPT on the chemical tank for the ultra-sonic level transmitter.

28.4.20.4.2.4. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

28.4.21. **120 VAC Control Power Panel**

28.4.21.1. In the existing PLC enclosure is a 120 VAC main lug panel for power to existing 120 VAC control equipment such as solenoids and flow meters. This panel needs to be removed from within the PLC enclosure and the circuits routed to the din rail power breakers in the new PLC enclosure.

28.4.21.2. Reuse the 30-amp power feed to this panel for the power feed to the new PLC enclosure.

28.4.21.3. Connect the existing four (4) wires from the panelboard to the new 120 VAC breakers as needed (CMCMUA will determine if 120 VAC control voltage is still needed or if all has been converted to 24 VDC).

28.4.22. **Network Equipment**

28.4.22.1. Mount fiber closet enclosure in new PLC enclosure.

28.4.22.1.1. Route existing fiber patch cables between fiber closet and network switch in new PLC enclosure.

28.4.22.2. Supply Ethernet patch cables to the network switch for the following:

28.4.22.2.1. Dell Wyse computer

28.4.22.2.2. Stratus Node 1

28.4.22.2.3. Stratus Node 2

28.4.22.2.4. Operator touch screen

28.4.22.2.5. PLC Processor

28.4.22.2.6. PLC NOE

28.5. **Demo Existing PLC enclosures**

28.5.1. Safe off the wires, lift conduits from existing enclosure and pull back.

28.5.2. Demo and dispose of one (1) two-door enclosure 72" x 90" x 27"

28.5.3. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

28.6. **Install New PLC Enclosure**

28.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 28.xx above

28.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

28.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor.

28.6.4. Extend conduits and wires to new enclosure as needed.

28.6.5. Terminate existing wiring per drawings

28.6.6. Terminate new wires per drawings

28.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

28.6.8. Reconnect Ethernet wires.

28.6.9. Reconnect fiber cables.

28.7. **Testing and Commissioning System**

28.7.1. Assist Avanceon and CMCMUA with testing and commissioning
28.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
28.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

28.8. **Remove Temporary PLC enclosure**

28.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

29. **OCEAN CITY ADMIN BUILDING PLC**

29.1. **Reference Drawings**

29.1.1. **OceanCityPlantElectrical.PDF**

29.2. **Location Description**

29.2.1. Operations Control Room has block walls overlaid with sheetrock and drop ceiling.

29.3. **Preliminary work before taking site off line:**

29.3.1. Trace existing wires and label for new PLC

29.4. **Individual Systems**

29.4.1. **Existing PLC Wires**

29.4.2. Locate the following digital input wires from the existing PLC to be connected to the new PLC:

29.4.2.1. Lunch room fire detector
29.4.2.2. Office 1st floor fire detector
29.4.2.3. Hall 1st floor fire detector
29.4.2.4. Electric room fire detector
29.4.2.5. Maintenance Shop fire detector
29.4.2.6. Garage fire detector
29.4.2.7. MIP room fire detector
29.4.2.8. Office 2nd floor fire detector
29.4.2.9. Lab fire detector
29.4.2.10. Training room fire detector
29.4.2.11. Hall 2nd floor detector
29.4.2.12. Admin back door
29.4.2.13. Admin front door
29.4.2.14. Admin boiler door
29.4.2.15. Admin garage side door
29.4.2.16. Admin garage door 1
29.4.2.17. Admin garage door 2
29.4.2.18. Admin garage door 3
29.4.2.19. Admin hall door to garage
29.4.2.20. Admin Boiler P2 hand
29.4.2.21. Admin Boiler P2 auto
29.4.2.22. Admin Boiler P2 running
29.4.2.23. Admin Boiler P3 hand
29.4.2.24. Admin Boiler P3 auto
29.4.2.25. Admin Boiler P3 running
29.4.2.26. Plant Boiler P6 hand
29.4.2.27. Plant Boiler P6 auto
29.4.2.28. Plant Boiler P6 running
29.4.2.29. Plant Boiler P7 hand
29.4.2.30. Plant Boiler P7 auto
29.4.2.31. Plant Boiler P7 running
29.4.2.32. Admin P2 lead switch
29.4.2.33. Plant P6 lead switch
29.4.2.34. Fire Valve on Boiler (on/off)
29.4.2.35. Boiler common alarm

29.4.3. Locate the following digital output wires from existing PLC to be connected to the new PLC:

29.4.3.1. Admin parking lot lights coil
29.4.3.2. Admin boiler P2 contactor

29.4.3.3. Admin Boiler P3 contactor
29.4.3.4. Plant Boiler P6 contactor
29.4.3.5. Plant Boiler P7 contactor

29.4.4. Locate the following analog input wires from existing PLC to be connected to the new PLC:
29.4.4.1. Admin boiler loop feed temp
29.4.4.2. Admin boiler loop return temp
29.4.4.3. Plant boiler loop return temp
29.4.4.4. Plant boiler loop feed temp
29.4.4.5. Admin boiler supply pressure
29.4.4.6. Admin boiler return pressure
29.4.4.7. Plant boiler supply pressure
29.4.4.8. Plant boiler return pressure

29.4.5. **Global Alarm Horn and Silence Button**

29.4.5.1. Install new wires under the computer floor from the new PLC enclosure to the Operator desk in the control room for the following (50' of wire):
29.4.5.1.1. Control Power
29.4.5.1.1.1. 24 VDC from PLC enclosure power supply
29.4.5.1.1.2. 24 VDC Common from PLC enclosure power supply
29.4.5.1.2. Controls
29.4.5.1.2.1. Alarm silence push button
29.4.5.1.2.2. Alarm horn
29.4.5.1.3. Purchase and install an indoor two hole (30 mm) enclosure with push button and horn and mount on wall near operator desk.

29.4.5.2. Drill hole through outside wall and install and box for temperature probe to read outside temperature.
29.4.5.2.1. Temperature probe will be supplied by CMCMUA.
29.4.5.2.2. Seal up hole to be water tight.

29.4.6. **Auto Dialer**

29.4.6.1. Purchase and install new 16 channel (option card) Auto Dialer on wall in control room and extend phone line to dialer.
29.4.6.2. Install conduit from new PLC enclosure to dialer (10').
29.4.6.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:
29.4.6.3.1. Dialer common 5VDC
29.4.6.3.2. Dialer channel 1 Alarm
29.4.6.3.3. Dialer channel 2 Alarm
29.4.6.3.4. Dialer channel 3 Alarm
29.4.6.3.5. Dialer channel 4 Alarm
29.4.6.3.6. Dialer channel 5 Alarm
29.4.6.3.7. Dialer channel 6 Alarm
29.4.6.3.8. Dialer channel 7 Alarm
29.4.6.3.9. Dialer channel 8 Alarm
29.4.6.3.10. Dialer channel 9 Alarm
29.4.6.3.11. Dialer channel 10 Alarm
29.4.6.3.12. Dialer channel 11 Alarm
29.4.6.3.13. Dialer channel 12 Alarm
29.4.6.3.14. Dialer channel 13 Alarm
29.4.6.3.15. Dialer channel 14 Alarm
29.4.6.3.16. Dialer channel 15 Alarm
29.4.6.3.17. Dialer channel 16 Alarm

29.5. **Install new PLC Enclosure**

29.5.1. Mount new enclosure on wall in Control Room.
29.5.2. Extend conduits and wires to new enclosure as needed.
29.5.3. Terminate existing wiring per drawings
29.5.4. Terminate new wires per drawings
29.5.5. Re-connect existing 120 VAC feeder to new PLC enclosure
29.5.6. Reconnect Ethernet wire from radio and Purchase and install 120 VAC plug for radio power supply

29.6. **Testing and Commissioning System**

29.6.1. Assist Avanceon and CMCMUA with testing and commissioning
29.6.2. The electrical contractor will need to support our testing of the equipment and wiring they installed
29.6.3. Transfer the wiring from temporary PLC to new PLC and commission.

29.7. **Remove Temporary PLC enclosure:**

29.7.1. None

30. **20th STREET PUMP STATION**

30.1. **Reference Drawings**

30.1.1. 20thStreetPumpStationElectrical.PDF

30.2. **Station Description**

30.2.1. Wood framed construction building with vinyl siding with overall square footage of 800'. Interior Finished with ½" Drywall.

30.2.2. Typical A Frame Roof Construction with plywood, and asphalt shingling.

30.2.3. Poured concrete walls underground with single landing 4' below grade, a second landing 10' below grade, and bottom level 17' below grade where dry well pumps are located.

30.2.4. Wet Well Class I Division I confined space below grade with dimensions of 17' x 9' x 19' depth. Separated from dry side with poured concrete wall.

30.2.5. The new location for the PLC has no existing core holes or conduits in the floor. Core Drill bottom entry conduit openings prior to mounting cabinet. (Floor Thickness 16")

30.3. **Preliminary work before taking site off line:**

30.3.1. **General**

30.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

30.3.1.2. Install New PLC Cabinet (See 30.6 below for details).

30.4. **Individual Systems**

30.4.1. **Bubbler Control Enclosure**

30.4.1.1. Utilize existing Bubbler Cabinet located between VFD's.

30.4.1.1.1. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (30'):

30.4.1.1.1.1. 1 STP for Compressor 1 Pressure transmitter

30.4.1.1.1.2. 1 STP for Compressor 2 Pressure transmitter

30.4.1.1.1.3. 1 STP Wet Well Level transmitter

30.4.1.1.1.4. 24DVC signal and common for isolation control solenoid valve

30.4.1.1.1.5. 24DVC signal and common for purge control solenoid valve

30.4.1.1.1.6. Utilize existing Air Compressors, air hoses, and receptacles. (No Changes)

30.4.1.1.1.7. Purchase and Install replacement door for Hoffman Bubbler enclosure Cabinet # A602418FS (Dim. 51Hx23.25W)

30.4.1.1.1.8. Cut in Magnehelic to new door, and re-install existing door hardware.

30.4.2. **Sump Pumps in Dry Well**

30.4.2.1. Purchase and install one (1) new 120 VAC, 1 HP, single phase Sump Control Enclosure.

30.4.2.2. Install one sump pump control enclosure on left side of Panel PLP 20A in motor room.

30.4.2.3. Install ¾" conduit from 120 VAC panel (PLP-20A) to new sump enclosure. (10')

30.4.2.4. Install one (1) single phase 20A 120 VAC circuit and connect to spare 20A breaker in PLP-20A #27 (20').

30.4.2.5. Install new ¾" conduit from sump pump contactor to new sump pump area for motor circuit conductors (60').

30.4.2.6. Terminate conduit with one (1) single receptacle 120 VAC 20A.

30.4.2.7. Install motor circuit wires and connect pump.

30.4.2.8. Install new ¾" conduit and wires from new PLC enclosure and sump control enclosure for following (20'):
- 30.4.2.8.1. Control Power
  - 30.4.2.8.1.1. 24 VDC from PLC enclosure power supply
  - 30.4.2.8.1.2. 24 VDC Common from PLC enclosure power supply
- 30.4.2.8.2. Pump Controls
  - 30.4.2.8.2.1. Auto switch
  - 30.4.2.8.2.2. Hand switch
  - 30.4.2.8.2.3. Running status
  - 30.4.2.8.2.4. Fault status
  - 30.4.2.8.2.5. Run Command (pump start command from PLC)
    - 30.4.2.8.2.5.1. Field install run command relay in enclosure

30.4.2.9. Install new ¾" Conduit, and wire from new PLC enclosure to the sump pit and terminate in 6" x 6" stainless steel junction box for the following (50'):
- 30.4.2.9.1. Control Power
  - 30.4.2.9.1.1. 24 VDC from PLC enclosure power supply
  - 30.4.2.9.1.2. 5VDC from Dialer
- 30.4.2.9.2. Status Wires
  - 30.4.2.9.2.1. Square D Pumptrol pedestal mount float for start/stop
  - 30.4.2.9.2.2. Low level float N.O.
  - 30.4.2.9.2.3. High sump float N.C.
  - 30.4.2.9.2.4. High dry well float 5VDC N.C.

30.4.2.10. Purchase and install mechanical float assembly (Square D 9036FG)

30.4.2.11. Purchase and install three (3) weighted floats, two (2) N.C. floats, and one (1) N.O. float in sump pit area.

30.4.3. **Flow Meter**

30.4.3.1. Install 2" conduit trunk line from new PLC enclosure to front door for flow meter, heaters, door switch, fire panel, personnel on site switch, ventilation fans, and dialer (40' 3-Anybodies).

30.4.3.2. Tee off of 2" trunk line with new ¾" conduit for Flow Meter for the following wire (20'):
- 30.4.3.2.1. One (1) STP for 4-20MA

30.4.3.3. Demo existing Chart Recorder and return to CMCMUA.

30.4.4. **Pump Drives 1 and 2**

30.4.4.1. Install two (2) new ¾" conduits from new PLC enclosure to each of the pump control enclosures (30').

30.4.4.2. Pull new wires for the following for each pump drive from the new PLC enclosure to each of the two (2) pump drive enclosures:
- 30.4.4.2.1. Control Power
  - 30.4.4.2.1.1. 24 VDC from PLC enclosure power supply
  - 30.4.4.2.1.2. 24 VDC Common from PLC enclosure power supply
- 30.4.4.2.2. Pump Controls
  - 30.4.4.2.2.1. Auto switch
  - 30.4.4.2.2.2. Hand switch
  - 30.4.4.2.2.3. Running status
  - 30.4.4.2.2.4. Fault status
  - 30.4.4.2.2.5. Run Command (pump start command from PLC)
    - 30.4.4.2.2.5.1. Field install run command relay in enclosure
  - 30.4.4.2.2.6. Ethernet Wire
  - 30.4.4.2.2.7. STP speed command

30.4.5. **Pumps 1 and 2**

30.4.5.1. Install one (1) new ¾" conduit from new PLC enclosure to serve the two (2) pumps in the dry well for a vibration switch for each of the two (2) pumps (60' +2 1" Cores).
30.4.5.2. Purchase and install two (2) new Vibration Switch's on the pumps.
30.4.5.3. Install two conductors for each pump vibration switch back to the new PLC enclosure.

30.4.6. **Wet Well**

30.4.6.1. Install new ¾" conduit, Class 1 Division 1, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (70' plus 1 – core through 8" concrete floor).
30.4.6.1.1. Two (2) conductors from ISBR in new PLC enclosure
30.4.6.1.2. Purchase and install one (1) weighted N.C. float.
30.4.6.1.3. Demo the existing High-Level Float in the bar screen channel area replace with the Normally Closed Float.
30.4.6.2. Install new ¾" conduit for IS wiring from new PLC enclosure to wet well hatch (30').
30.4.6.2.1. Two (2) conductors from ISBR in new PLC enclosure
30.4.6.2.2. Purchase and install door sensor for wet well hatch, and wire intrinsically safe wiring (40').

30.4.7. **Drywell**

30.4.7.1. Tee off of sump pump ¾" conduit from new PLC enclosure to existing force main pressure transmitter for the following wire (30' - 50'wire):
30.4.7.1.1. STP to pressure transmitter – powered transmitter (3 wire).

30.4.8. **Generator Room**

30.4.8.1. Demo existing ½" LB and Round FS box leading into Generator Room and Drill new holes for two (2) new ¾" conduits (Generator and diesel tank conduits).
30.4.8.2. Install new ¾" conduit from new PLC enclosure to Day tank, battery charger, louver, and generator ethernet for the following wires (80'):
30.4.8.2.1. Control Power
30.4.8.2.1.1. 24 VDC from PLC enclosure power supply (x3)
30.4.8.2.2. Status Wires
30.4.8.2.2.1. Day Tank Not in Auto
30.4.8.2.2.2. Day Tank High Level
30.4.8.2.2.3. Day Tank Low Level
30.4.8.2.2.4. Day Tank Leak
30.4.8.2.2.5. Day Tank Return Pump Running
30.4.8.2.2.6. Battery Charger Fault status
30.4.8.2.2.7. Louver status
30.4.8.2.2.8. Generator ethernet Cat5

30.4.9. **Diesel tank**

30.4.9.1. Install new ¾" conduit from the new PLC enclosure to the diesel tank outside and install the following wire (100'):
30.4.9.1.1. Control Power
30.4.9.1.1.1. 24 VDC common from PLC power supply
30.4.9.1.2. Status Wires
30.4.9.1.2.1. High level horn
30.4.9.1.2.2. STP diesel tank ultra-sonic level transmitter
30.4.9.2. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank.

30.4.9.3. Purchase and install new Diesel Tank Class 1 Division 2 ultra-sonic level transmitter on outdoor diesel tank.

30.4.9.3.1. Purchase and Install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.

30.4.9.3.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

30.4.10. **Transfer Switch**

30.4.10.1. Install new ¾" conduit from new PLC enclosure to transfer switch and install CAT 5 ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated (30').

30.4.11. **Ventilation and Heating**

30.4.11.1. Purchase and install two (2) new 480 VAC, 3 HP, three phase contactors with disconnect and HOA switch for the wet well and drywell exhaust fans.

30.4.11.1.1. Install enclosure on wall to the right of 480 VAC 3 PH panel adjacent to the new PLC enclosure.

30.4.11.2. Install new ¾" conduit from the new PLC enclosure to the two (2) new contactors for the following wires (20'):

30.4.11.2.1. Control Power

30.4.11.2.1.1. 24 VDC from PLC enclosure power supply

30.4.11.2.2. Status Wires

30.4.11.2.2.1. Auto Switch

30.4.11.2.2.2. Hand Switch

30.4.11.2.2.3. Running status

30.4.11.2.2.4. Overload status

30.4.11.2.2.5. Run Command (pump start command from PLC)

30.4.11.2.2.5.1. Field install run command relay in contactor enclosure

30.4.11.3. Tee off of 2" trunk line with new ¾" conduit for monitoring of Wet Well Exhaust Fan duct, dry well exhaust fan duct, and two heaters for the following wires (70' of ¾" conduit teed off 2" truck line):

30.4.11.3.1. Control Power for Heaters

30.4.11.3.1.1. 24 VDC Common from PLC enclosure power supply

30.4.11.3.2. Command Wires for Heaters

30.4.11.3.2.1. Run Command (start command from PLC)

30.4.11.3.2.1.1. Purchase and install 20-amp power run command relay into each heater and bypass existing thermostat to allow the run command relay to control the heater control circuit (heaters are line voltage at 16 amp).

30.4.11.3.3. Control Power

30.4.11.3.3.1. 24 VDC from PLC power supply (x2)

30.4.11.3.4. Status

30.4.11.3.4.1. Pressure Switch for wet well duct

30.4.11.3.4.2. Pressure switch for dry well duct

30.4.11.4. For two (2) duct pressure switches provide the following:

30.4.11.4.1. Purchase and install new pressure switch and mount adjacent to auto dialer for Drywell Exhaust fan, to monitor fan duct pressure/vacuum.

30.4.11.4.2. Purchase and Install new pressure switch and mount adjacent to Wet Well Exhaust fan assembly in South room, to monitor fan duct pressure/vacuum.

30.4.11.4.3. Purchase and install tubing from pressure differential switch and route as needed to associate fan ventilation duct (10' of hose for each fan).

30.4.11.4.4. Seal all wall and duct penetrations air tight.

30.4.11.5. Install Indoor Temperature Probe using 0.25" compression fitting mounted in side of new PLC enclosure for probe tip to hang in free air and wire up Indoor Temperature Probe to PLC.

30.4.11.5.1. Temperature Probe provided by CMCMUA.

30.4.12. **Fire/Security/Lights**

30.4.12.1. Tee off of 2" trunk line with new ¾" conduit for the motor room door sensor for the following wires (10' – 40' wire):

30.4.12.1.1. Control Power

30.4.12.1.1.1. 24 VDC from PLC enclosure power supply

30.4.12.1.2. Status Wires

30.4.12.1.2.1. Door switch

30.4.12.2. Purchase and install one (1) door switch.

30.4.12.3. Install new ¾" conduit to the Dry Well Room door for the following wires (20'):

30.4.12.3.1. Control Power

30.4.12.3.1.1. 24 VDC from PLC enclosure power supply

30.4.12.3.2. Status Wires

30.4.12.3.2.1. Door switch

30.4.12.4. Purchase and install one (1) door switch.

30.4.12.5. Extend wet well exhaust fan ¾" conduit to the South Room door for the following wires (20' – 60' wire):

30.4.12.5.1. Control Power

30.4.12.5.1.1. 24 VDC from PLC enclosure power supply

30.4.12.5.2. Status Wires

30.4.12.5.2.1. Door switch

30.4.12.6. Purchase and install one (1) door switch.

30.4.12.7. Extend off of Diesel tank conduit new ¾" conduit for Generator Room door for the following wires (20' – 60' wire)

30.4.12.7.1. Control Power

30.4.12.7.1.1. 24 VDC from PLC enclosure power supply

30.4.12.7.2. Status Wires

30.4.12.7.2.1. Door switch

30.4.12.8. Purchase and install one (1) door switch.

30.4.12.9. Tee off of 2" trunk line with new ¾" conduit to adjacent to door for Personnel on Site switch and future fire alarm panel (10' – 40' wire)

30.4.12.10. Purchase and install, near motor room door, On/Off Switch enclosure for Personnel on Site and wire to new PLC enclosure the switch status – 2 conductors.

30.4.12.10.1. Locate the existing five (5) heat detector wires and reconnect to new PLC.

30.4.13. **Auto Dialer**

30.4.13.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.

30.4.13.2. Extend fire alarm ¾" conduit to dialer for the following wires (10' – 60' wire).

30.4.13.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:

30.4.13.3.1. Dialer common 5 VDC

30.4.13.3.2. Wet Well High-Level Float through the I.S. Barrier in PLC enclosure

30.4.13.3.3. Dry Well High-Level Float

30.4.13.3.4. PLC Communication Fault through PLC CR relay

30.4.14. **Network Radio**

30.4.14.1. Demo 2" conduit from left side of 16" x 16" exterior junction box, and plug hole (20').

30.4.14.2. Extend existing outdoor 2" conduit on side of outside wall into the building, through the exterior wall (vinyl siding, plywood, and sheetrock wall) to the new PLC enclosure (30')

30.4.14.2.1. Pull back existing Radio Cat-6E POE cable and re-route to new PLC enclosure.

30.4.14.3. Demo existing coax cable at LB on N.E. corner of building.

30.4.14.4. Relocate and plugin existing POE into new PLC enclosure.

30.5. **Demo Existing PLC Enclosure**

30.5.1. The existing PLC enclosure will remain in place.

30.5.2. The existing PLC enclosure will be used for the bubbler system.

30.5.3. Demo the following items from within the existing PLC/Bubbler enclosure.

30.5.3.1. PLC, power supply, relays, pilot lights, selector switches, and Red Lion touchscreen and return to the CMCMUA.

30.5.4. Leave the existing 120 VAC feed on the existing terminal blocks.

30.6. **Install New PLC Enclosure**

30.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 30.xx above

30.6.2. Mount new enclosure against Knee wall adjacent to drywell stairwell opening.

30.6.3. Extend conduits and wires to new enclosure as needed.

30.6.4. Terminate existing wiring per drawings

30.6.5. Terminate new wires per drawings

30.6.6. Re-connect existing 120 VAC feeder to new PLC enclosure

30.6.7. Reconnect Ethernet wire from radio and provide 120 VAC plug for radio power supply

30.6.8. Install new Isolation barriers on the back enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

30.6.8.1. Wet Well High-Level Float

30.6.8.2. Wet Well Hatch Switch

30.7. **Testing and Commissioning System**

30.7.1. Assist Avanceon and CMCMUA with testing and commissioning

30.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

30.7.3. Transfer the wiring from existing PLC to new PLC and commission.

30.8. **Remove Temporary PLC**

30.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

31. **32nd STREET PUMP STATION**

31.1. Reference Drawings

31.1.1. 32ndStreetPumpStationElectrical.PDF

31.2. Station Description

31.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 33' x 34' x 12' ceiling height.

31.2.2. Poured concrete walls underground with single landing 12' below grade, a second landing 15' below grade, and bottom level 27' below grade where dry well pumps are located.

31.2.3. Wet Well Class I Division I confined space below grade with dimensions of 15' x 54' x 24' depth. Separated from dry side with poured concrete wall.

31.2.4. Conduit concrete cutout access to lower levels is available under existing bubbler enclosure and existing PLC enclosure.

31.2.5. Woodened framed roof, with attic access.

31.3. **Preliminary work before taking site off line:**

31.3.1. **General**

31.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

31.3.2. **Wire to existing PLC and Auto Dialer:**

31.3.2.1. Install Bubbler system provided by CMCMUA.

31.3.2.2. Remove Well Level Control from Old PLC cabinet (80" x 92" x 20"), and make temporary splice of the STP above in attic for well level.

31.3.2.3. Pump Drive's One (1), two (2), three (3), and four (4) shall remain connected as is, until new conduits, and wires are installed to new PLC.

31.3.2.4. Purchase and install Auto Dialer in same location as existing auto dialer.

31.3.2.4.1. Extend existing phone line to Auto Dialer

31.3.2.5. Install temporary wire to Auto Dialer for the following:

31.3.2.5.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

31.3.2.5.2. Phone line

31.3.3. **Items not needed on existing PLC:**

31.3.3.1. Wet Well High-Level Float

31.3.3.2. Flow Meter

31.3.3.3. Grinder HOA and Running Status

31.3.3.4. Grinder Failure Status

31.3.3.5. Pumps 3 and 4

31.3.3.6. Motorized Valves 1 & 2

31.3.3.7. Drywell Sumps 1 & 2

31.3.3.8. Compressor 1 & 2 Pressures

31.3.3.9. Bubbler Purge and Isolation Valves

31.3.3.10. Exhaust and Supply Fans

31.3.3.11. Generator Day Tank

31.3.3.12. Generator

31.3.3.13. Transfer Switch

31.3.3.14. Diesel Tank Level

31.3.3.15. Temperature Control

31.3.3.16. Heat Detectors and Fire Pulls

31.3.3.17. Door Switches

31.3.3.18. Scrubber system

31.4. **Individual Systems**

31.4.1. **Control Conduit Trunk Lines**

31.4.1.1. Install 2" control conduit from new PLC enclosure through floor on the left side of the new PLC enclosure into drywell and terminate into an 8" x 8" x 4' wire trough near landing for control conduits to the basement equipment (30' plus core through 12" concrete floor).

31.4.1.2. Purchase and install an 8" x 8" x 72" indoor steel wire trough and install near the bathroom door in generator room.

31.4.1.3. Install 2" control conduit (control conduit 2) from new PLC enclosure to the 8" x 8" x 72" trough wall to supply conduit branches for the battery charger, day tank, grinder, louvers, scrubber pad equipment, generator ethernet wire, and generator room heater control wires (100' + 1 core through block).

31.4.2. **Bubbler Control Enclosure**

31.4.2.1. Demo existing bubbler setup, located within the Old PLC cabinet.

31.4.2.1.1. Safe off existing electrical conductors

31.4.2.1.2. Reuse two (2) air compressors for new bubbler installation

31.4.2.2. Wall Mount 30"H x 20"W x 10"D Bubbler Cabinet (Supplied by CMCMUA) to the right of the door on the North wall 40" above finished floor.

31.4.2.2.1. From Panel 32A install new ¾" conduit for Air Compressor circuits (70').

31.4.2.2.1.1. Provide two (2) 120VAC 20A circuits for two (2) existing compressors.

31.4.2.2.1.2. Purchase and install two (2) SQD 20 Amp QOB Bolt-in style breakers for the two (2) circuits (P32A 24,26).

31.4.2.2.1.3. Install two (2) 120VAC receptacles for the two (2) compressors.

31.4.2.2.2. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (20'):

31.4.2.2.2.1. 1 STP for Compressor 1 Pressure transmitter

31.4.2.2.2.2. 1 STP for Compressor 2 Pressure transmitter

31.4.2.2.2.3. 1 STP Wet Well Level transmitter

31.4.2.2.2.4. 24DVC signal and common for isolation control solenoid valve

31.4.2.2.2.5. 24DVC signal and common for purge control solenoid valve

31.4.2.2.3. Run flexible discharge tubing from bubbler enclosure to bubbler line hard pipe

31.4.2.2.3.1. CMCMUA will provide the flexible tubing: 25 Feet

31.4.2.2.4. Mount air compressors on floor beneath new bubbler enclosure

31.4.3. **Sump Pumps 1 and 2 in Dry Well**

31.4.3.1. Purchase two (2) new 120 VAC 1HP single phase Sump Control Enclosures with disconnects and HOA switch.

31.4.3.2. Demo existing sump pump enclosure and wiring back to panel P32A. (20' wire)

31.4.3.3. Install new pump control enclosures on South wall beneath existing 6" x 6" x 10' wire trough.

31.4.3.4. Install new ¾" conduit and wire from Panel P32A to sump pump enclosures via trough for the following (10'):

31.4.3.4.1. Two (2) 120 VAC 20A single phase circuits from existing circuit breakers 25 and 27 for the sump pump (30' wire).

31.4.3.5. Use existing ¾" conduit to Sump Pump area in drywell from pump control enclosures for both sump pump motor circuit conductors (80' wire).

31.4.3.5.1. Terminate existing conduit with two (2) junction boxes, one for each sump pump, and route sump pump motor wires to junction box.
31.4.3.5.2. Install motor circuit wires and connect pumps and connect to sump pump wires.
31.4.3.6. Install 1" conduit and wire from new PLC enclosure and tee off with ¾" conduit to both sump pump enclosures for the following (80' +20' of ¾"):
31.4.3.6.1. Control Power
31.4.3.6.1.1. 24 VDC from PLC enclosure power supply
31.4.3.6.1.2. 24 VDC Common from PLC enclosure power supply
31.4.3.6.2. Pump Controls
31.4.3.6.2.1. Auto switch
31.4.3.6.2.2. Hand switch
31.4.3.6.2.3. Running status
31.4.3.6.2.4. Fault status
31.4.3.6.2.5. Run Command (pump start command from PLC)
31.4.3.6.2.5.1. Field install run command relay in enclosure
31.4.3.7. From control conduit 1 trough install new ¾" conduit to sump pit area for the following wire back to the new PLC enclosure (80' +100' wire):
31.4.3.7.1. Control Power
31.4.3.7.1.1. 24 VDC from PLC enclosure power supply
31.4.3.7.1.2. 5 VDC dialer voltage
31.4.3.7.2. Controls
31.4.3.7.2.1. Low level float (N.O.)
31.4.3.7.2.2. Stop float (N.O.)
31.4.3.7.2.3. Start float (N.O.)
31.4.3.7.2.4. Lag Start float (N.O.)
31.4.3.7.2.5. High level float (N.C.)
31.4.3.7.2.6. High drywell float (N.C. to auto dialer)
31.4.3.8. Demo existing floats and conduit in sump pit.
31.4.3.9. Install new float hanger bar using stainless steel Unistrut (10')
31.4.3.10. Purchase and install six (6) new weighted floats, two (2) NC and four (4) NO floats, and install on hanger bar on concrete floor over sump pit.
31.4.3.11. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
31.4.3.12. Wire float wire to terminals in new PLC enclosure
31.4.3.13. Demo existing conduit, floats, and wiring from existing sump pump enclosures to sump pit area (30').
31.4.4. **Flow Meter**
31.4.4.1. Install ¾" conduit from new PLC enclosure to two (2) flow meters for the following wires. (10').
31.4.4.1.1. 120 VAC circuit from the UPS powered terminal blocks per Electrical Drawings - CB.
31.4.4.2. Install ¾" conduit from new PLC enclosure to two (2) flow meters for the following wires. (30')
31.4.4.2.1. STP MODBUS 24-inch meter
31.4.4.2.2. STP MODBUS 12-inch meter
31.4.4.3. Demo existing Fisher Porter flow meter and return to CMCMUA.
31.4.5. **Pump Drives 1, 2, 3 and 4**
31.4.5.1. Install new 1" conduit from the new PLC enclosure to each of the four (4) Pump Drives for the following wires (30'):
31.4.5.1.1. Control Power

31.4.5.1.1.1. 24 VDC from PLC enclosure power supply (x4)
31.4.5.1.1.2. 24 VDC Common from PLC enclosure power supply
31.4.5.1.2. Pump Controls
31.4.5.1.2.1. Auto switch
31.4.5.1.2.2. Hand switch
31.4.5.1.2.3. Running status
31.4.5.1.2.4. Fault status
31.4.5.1.2.5. Run Command (pump start command from PLC)
31.4.5.1.2.5.1. Field install run command relay in enclosure
31.4.5.1.2.6. Ethernet Wire
31.4.5.1.2.7. STP speed command

31.4.6. **Pumps 1, 2, 3 and 4**

31.4.6.1. From the 8" x 8" x 4' wire trough near the basement landing install a new ¾" conduit and wire and transition to a short piece of LFMC at each of the four pumps for vibration switches for the following:(60' + 6' flex, 80' wire).
31.4.6.1.1. Control Power
31.4.6.1.1.1. 24 VDC from PLC enclosure power supply
31.4.6.1.2. Pump Controls
31.4.6.1.2.1. Vibration switch

31.4.6.2. Purchase and install four (4) new Vibration Switch's on the pumps.

31.4.7. **Pump Cooling Fans 2, 3, and 4**

31.4.7.1. Tee off each of the respective 1" drive conduits for drives 2, 3, and 4 and drop a ¾" conduit to the respective cooling fan contactor for fans 2, 3, and 4 to for the following wires (20'):
31.4.7.1.1. Control Power
31.4.7.1.1.1. 24 VDC from PLC enclosure power supply (x3)
31.4.7.1.1.2. 24 VDC Common from PLC enclosure power supply
31.4.7.1.2. Status
31.4.7.1.2.1. Auto switch
31.4.7.1.2.2. Hand switch
31.4.7.1.2.3. Running status
31.4.7.1.2.4. Fault status
31.4.7.1.2.5. Run Command (pump start command from PLC)
31.4.7.1.2.5.1. Field install run command relay in enclosure
31.4.7.1.2.6. Fan Off Float
31.4.7.1.2.7. Motor High Temp

31.4.8. **Wet Well**

31.4.8.1. Install new ¾" conduit, Class 1 Division 1, and intrinsic safe wiring for Wet Well High-Level Float from the new PLC enclosure. Terminate conduit 1 foot above wet well grates (80' + core through block wall).
31.4.8.1.1. Control Power
31.4.8.1.1.1. ISBR Common
31.4.8.1.2. Status
31.4.8.1.2.1. High Wet Well Float

31.4.8.2. Purchase and install one (1) weighted N.C. float.

31.4.8.3. Replace the existing High-Level Float in the bar screen/grinder channel area with the Normally Closed Weighted Float and connect to PLC wiring.

31.4.8.4. Tee off float ¾" conduit to the wet well door for a door sensor for the following wire (20'):
31.4.8.4.1. Control Power
31.4.8.4.1.1. ISBR Common

31.4.8.4.2. Status

31.4.8.4.2.1. Door switch

31.4.8.5. Purchase and install door sensor for wet well door, and wire intrinsically safe wiring (50').

31.4.9. **Drywell**

31.4.9.1. Install new ¾" conduit from the drywell trough to the force main pressure transducer and run new STP and connect to existing pressure transmitter (10' – 30' wire).

31.4.10. **Scrubber Equipment**

31.4.10.1. Demo the following equipment and conduits in the scrubber pad area:

31.4.10.1.1. Scrubber Blower feeder conduit (80').

31.4.10.1.2. Conduit from the existing scrubber equipment enclosure back to existing PLC (90').

31.4.10.1.3. Conduit from the existing scrubber equipment enclosure to the recirculation pump receptacle (40').

31.4.10.1.4. Conduit from the existing scrubber equipment enclosure to the chemical pump enclosure (40').

31.4.10.1.5. Conduit from the existing scrubber equipment enclosure to the blower motor including disconnect ahead of motor. (40')

31.4.10.1.6. Feeder conduit from the 120/208 VAC sub panel on the scrubber pad back to the feeder source panel (80').

31.4.10.1.7. All branch circuit conduits on the scrubber pad, ten (10) devices, and one (1) light (150').

31.4.10.1.8. 120/208VAC scrubber sub panel and return panel to CMCMUA.

31.4.10.1.9. Existing scrubber enclosure. Return scrubber equipment contactors, receptacles, and VFD to CMCMUA.

31.4.10.2. Purchase and install two (2) new contactor enclosures with disconnect and HOA switch on north wall in generator room to the right of the bathroom door for the following:

31.4.10.2.1. Recirculation pump contactor rated at 480 VAC, 5 HP, three phase.

31.4.10.2.2. Chemical pump contactor rated at 120 VAC 1 HP, single phase.

31.4.10.3. Install new 480 VAC, 10 HP, three phase VFD provided by CMCMUA for the scrubber blower motor. Locate VFD on east wall in generator room to the left of the grinder enclosure.

31.4.10.4. Install 1" conduit and feeders from panel EDP and tee off with ¾" conduit drops to the recirculation pump and scrubber blower enclosures for the following feeder circuits (80'):

31.4.10.4.1.1. 480VAC 15A circuit for the recirculation pump, connect to existing breaker #10.

31.4.10.4.1.2. 480VAC 15A circuit for the scrubber blower, connect to existing breaker #12.

31.4.10.5. Install new ¾" conduit and feeders from panel P32A to the new chemical pump enclosure for the following (80'):

31.4.10.5.1.1. 120VAC 20A circuit for the chemical pump, connect to existing breaker #16.

31.4.10.5.1.1.1. Purchase and install one (1) new SQD QOB 20-amp bolt-in breaker in breaker slot #21.

31.4.10.6. From recirculation pump contactor and chemical pump contactor install ¾" conduit and pull chemical pump motor conductors with recirculation motor conductors to feed recirculation pump motor and extend ¾" conduit and install a

single weatherproof receptacle for the chemical pump (80' total + core through block and brick wall).

31.4.10.7. Install new ¾" conduit and motor wires from the scrubber blower VFD enclosure to the blower motor (50' + core through block and brick wall).

31.4.10.8. Install three (3) new ¾" conduit drops from the 8" x 8" x 72" trough in the generator room to the blower VFD, recirculation contactor, and chemical pump contactor for the following wires (10' – 100' wire for each contactor):

- 31.4.10.8.1. Control Power
  - 31.4.10.8.1.1. 24 VDC from PLC enclosure power supply
  - 31.4.10.8.1.2. 24 VDC Common from PLC enclosure power supply
- 31.4.10.8.2. Blower Controls
  - 31.4.10.8.2.1. Auto switch
  - 31.4.10.8.2.2. Hand switch
  - 31.4.10.8.2.3. Running status
  - 31.4.10.8.2.4. Fault status
  - 31.4.10.8.2.5. Run Command (pump start command from PLC)
    - 31.4.10.8.2.5.1. Field install run command relay in enclosure
  - 31.4.10.8.2.6. Ethernet Wire
- 31.4.10.8.3. Control Power
  - 31.4.10.8.3.1. 24 VDC from PLC enclosure power supply
  - 31.4.10.8.3.2. 24 VDC Common from PLC enclosure power
- 31.4.10.8.4. Recirculation Pump Controls
  - 31.4.10.8.4.1. Auto switch
  - 31.4.10.8.4.2. Hand switch
  - 31.4.10.8.4.3. Running status
  - 31.4.10.8.4.4. Fault status
  - 31.4.10.8.4.5. Run Command (pump start command from PLC)
    - 31.4.10.8.4.5.1. Field install run command relay in enclosure
- 31.4.10.8.5. Scrubber Chemical Pump Controls
  - 31.4.10.8.5.1. Auto switch
  - 31.4.10.8.5.2. Hand switch
  - 31.4.10.8.5.3. Running status
  - 31.4.10.8.5.4. Fault status
  - 31.4.10.8.5.5. Run Command (pump start command from PLC)
    - 31.4.10.8.5.5.1. Field install run command relay in enclosure
  - 31.4.10.8.5.6. STP speed command

31.4.10.9. Install new 1" conduit from the 8" x 8" x 72" trough in generator room to the scrubber pad area (40' + 1 core through block and brick wall)

31.4.10.10. Tee off 1" conduit with ¾" for the following wires (30'):

- 31.4.10.10.1. STP for chemical tank ultra-sonic level transmitter (150' wire)

31.4.10.11. Purchase and install one (1) new ultra-sonic level transmitter on outdoor chemical tank in existing 2" NPT threaded fitting.

31.4.10.12. Tee off 1" conduit with ¾" for the following wires (30' – 150' wire):

- 31.4.10.12.1. Control Power
  - 31.4.10.12.1.1. 24 VDC from PLC enclosure power supply
- 31.4.10.12.2. Status
  - 31.4.10.12.2.1. Scrubber low level float
- 31.4.10.12.3. Purchase and install one (1) NO weighted float in the scrubber sump.

31.4.10.13. Tee off 1" conduit with ¾" for the following wires (30' – 150' wire):

- 31.4.10.13.1. Control Power

31.4.10.13.1.1. 24 VDC from PLC enclosure power supply

31.4.10.13.2. Status

31.4.10.13.2.1. Safety shower switch

31.4.10.13.3. Terminate wires in a weatherproof junction box near the safety shower.

31.4.11. **Chemical Transfer Pump Receptacle**

31.4.11.1. Purchase and install one (1) Hubbell Circuit-Lock disconnect for the chemical transfer pump receptacle (Cat. No. HBL430MT7W, Receptacle #420R7W).

31.4.11.2. Locate disconnect on the exterior of the building in the scrubber pad area adjacent to the chemical pump enclosure.

31.4.11.3. Purchase and install one (1) Square D 480 VAC, 20-amp, three phase Type FA bolt-in breaker in panel.

31.4.11.4. Install new ¾" conduit from Panel PP3A to Hubbell Circuit-Lock disconnect for one (1) 480VAC 20A circuit (80' + 1 core through block and brick).

31.4.11.5. Purchase and install one (1) single pole 20-amp Square D Type FA bolt-in breaker in panel PP3A (circuit #12), and connect chemical transfer pump Hubbell Circuit-Lock disconnect.

31.4.12. **Generator Room**

31.4.12.1. Install a new ¾" conduit from the 8" x 8" x 72" trough to the generator room for the day tank controller for the following (20' – 100' of wire).

31.4.12.1.1. Control Power

31.4.12.1.1.1. 24 VDC from PLC enclosure power supply

31.4.12.1.2. Status Wires

31.4.12.1.2.1. Day Tank Auto switch

31.4.12.1.2.2. Day Tank Manual switch

31.4.12.1.2.3. Day Tank overflow alarm status

31.4.12.1.2.4. Day Tank Fault status

31.4.12.1.2.5. Spare

31.4.12.1.2.6. Spare

31.4.12.2. Install a new ¾" conduit and wires from the 8" x 8" x 72" trough to the louvers for the following wires (30' – 110' of wire):

31.4.12.2.1. Control Power

31.4.12.2.1.1. 24 VDC from PLC enclosure power supply

31.4.12.2.2. Status Wires

31.4.12.2.2.1. Louver status

31.4.12.3. Extend the ¾" louver conduit from the 8" x 8" x 72" trough to the battery charger for the following wires (10' – 120' wire):

31.4.12.3.1. Control Power

31.4.12.3.1.1. PLC 24VDC Power

31.4.12.3.2. Status Wire

31.4.12.3.2.1. Battery Fault

31.4.13. **Diesel Tank**

31.4.13.1. Tee off the 1" conduit in the scrubber pad area with a ¾" conduit to the diesel tank outside and install the following wire (30' - 110' of wire):

31.4.13.1.1. Control Power

31.4.13.1.1.1. 24 VDC common from PLC power supply

31.4.13.1.2. Status Wires

31.4.13.1.2.1. High level horn

31.4.13.1.2.2. STP diesel tank ultra-sonic level transmitter

31.4.13.2. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank.

31.4.13.3. Purchase and install new Diesel Tank Class 1 Division 2 ultra-sonic level transmitter on outdoor diesel tank.

31.4.13.3.1. Purchase and Install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.

31.4.13.3.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

31.4.13.4. Demo existing ¾" PVC conduit, and wires back to exterior wall. (60' of conduit removed).

31.4.14. **Transfer Switch**

31.4.14.1. Install new 1" conduit from the new PLC enclosure to the Transfer Switch for the following wire (40')

31.4.14.1.1. CAT5 – must be 600V rated.

31.4.15. **Ventilation and Heating**

31.4.15.1. Purchase and install two (2) new 480 VAC, 3 HP, three phase contactor enclosures with disconnect and HOA switch for the Drywell Exhaust Fan and Wet Well Supply Fan.

31.4.15.1.1. Locate enclosure on South wall beneath 6" x 6" x 10' trough.

31.4.15.2. Extend transfer switch 1" conduit from new PLC enclosure and tee off with ¾" conduits to the wet well and dry well exhaust fan enclosures for the following wires (30' of 1", 30' of ¾" – 70' of wire):

31.4.15.2.1. Control Power

31.4.15.2.1.1. 24 VDC from PLC enclosure power supply

31.4.15.2.2. Status and Control

31.4.15.2.2.1. Auto Switch

31.4.15.2.2.2. Hand Switch

31.4.15.2.2.3. Running

31.4.15.2.2.4. Overload

31.4.15.2.2.5. Run Command (pump start command from PLC)

31.4.15.2.2.5.1. Field install run command relay in enclosure

31.4.15.3. For two (2) fans, Wet Well Exhaust Fan EF-1 and EF-2 Dry Well Exhaust Fan install the following:

31.4.15.3.1. Purchase and install two (2) new pressure differential switches.

31.4.15.3.1.1. Attach one switch with hose to the Dry Well ductwork in the motor room.

31.4.15.3.1.2. Install new ¾" conduit from the new PLC enclosure to the switch for the following wire (30'):

31.4.15.3.1.2.1. Control Power

31.4.15.3.1.2.1.1. 24 VDC from PLC enclosure power supply

31.4.15.3.1.2.2. Status and Control

31.4.15.3.1.2.2.1. Pressure Switch

31.4.15.3.1.3. Attach the second switch with to the wall above where the old PLC was located and route the hose through the block wall to the ductwork in the wet well or through ceiling into attic ductwork.

31.4.15.3.1.4. Install new ¾" conduit from the new PLC enclosure to the switch for the following wire (30'):

31.4.15.3.1.4.1. Control Power

31.4.15.3.1.4.1.1. 24 VDC from PLC enclosure power supply

31.4.15.3.1.4.2. Status and Control

31.4.15.3.1.4.2.1. Pressure Switch

31.4.15.3.2. Purchase and install tubing from pressure differential switch and route as needed to associated fan ventilation duct (20' of hose for each fan).

31.4.15.3.3. Seal all wall and duct penetrations air tight.

31.4.15.4. Install Indoor Temperature Probe using 0.25" compression fitting mounted in side of new PLC enclosure for probe tip to hang in free air and wire up Indoor Temperature Probe to PLC.

31.4.15.4.1. Temperature Probe provided by CMCMUA.

31.4.15.5. Install new ¾" conduit and wire to the north motor room heater for the following (20'):

31.4.15.5.1. Control Power for Heaters

31.4.15.5.1.1. 24 VDC Common from PLC enclosure power supply

31.4.15.5.2. Command Wires

31.4.15.5.2.1. Run Command

31.4.15.5.2.1.1. Field install run command relay in enclosure

31.4.15.6. Tee off transfer switch 1" conduit with a ¾" conduit and wire to the south motor room heater for the following (20' – 70' wire):

31.4.15.6.1. Control Power for Heaters

31.4.15.6.1.1. 24 VDC Common from PLC enclosure power supply

31.4.15.6.2. Command Wires

31.4.15.6.2.1. Run Command

31.4.15.6.2.1.1. Field install run command relay in enclosure

31.4.15.7. Install new ¾" conduit from 8" x 8" x 72" trough for generator room heater for the following (10' – 100' wire):

31.4.15.7.1. Control Power

31.4.15.7.1.1. 24 VDC Common from PLC enclosure power supply

31.4.15.7.2. Command Wires

31.4.15.7.2.1. Run Command

31.4.15.7.2.1.1. Field install run command relay in enclosure

31.4.15.8. Remove existing thermostat and blank 4" square box on all three (3) heaters.

31.4.16. **Fire/Security/Lights**

31.4.16.1. Install new ¾" conduit from the new PLC enclosure to the North motor room door sensor for the following wires (10')

31.4.16.1.1. Control Power

31.4.16.1.1.1. 24 VDC from PLC enclosure power supply

31.4.16.1.2. Status Wires

31.4.16.1.2.1. Door switch

31.4.16.2. Purchase and install two (2) door switch.

31.4.16.3. Tee off transfer switch 1" conduit for the west motor room door sensors for the following wires: (10' – 50' wire)

31.4.16.3.1. Control Power

31.4.16.3.1.1. 24 VDC from PLC enclosure power supply

31.4.16.3.2. Status Wires

31.4.16.3.2.1. Door switch 1

31.4.16.3.2.2. Door switch 2

31.4.16.4. Purchase and install one (1) door switch.

31.4.16.5. Extend west motor room heater ¾" conduit to the right of the west motor room door for the Personnel on Site switch, and future fire alarm panel (10' – 60' wire).

31.4.16.6. Purchase and install, to the right of the West motor room door, an On/Off switch enclosure for Personnel on Site and wire to new PLC enclosure for the switch status – 2 conductors.

31.4.16.7. Locate existing eight (8) smoke detector circuits and reconnect to new PLC. Use field terminal blocks if needed.

31.4.17. **Auto Dialer:**

31.4.17.1. Purchase and install new Auto Dialer next to existing phone and extend phone line to dialer.

31.4.17.2. Install new ¾" conduit from the new PLC enclosure to new dialer for the following wires (40').

31.4.17.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:

31.4.17.3.1. Dialer common 5 VDC

31.4.17.3.2. Wet Well High-Level Float through the I.S. Barrier

31.4.17.3.3. Dry Well High-Level Float

31.4.17.3.4. PLC Communication Fault through PLC CR relay

31.4.18. **Network Radio**

31.4.18.1. Relocate Radio Cat-6E POE cable from existing communications enclosure, and re-route into new PLC enclosure.

31.4.18.2. Demo existing coax cable from existing communication enclosure, to outside antenna (80' wire).

31.4.18.3. Relocate and plugin existing POE into new PLC enclosure.

31.4.18.4. Demo existing communication cabinet, and return network switch, and radio equipment back to CMCMUA.

31.5. **Demo Existing PLC enclosures**

31.5.1. Safe off the wires, lift from existing enclosure and pull back.

31.5.2. Demo and dispose of two (2) existing PLC enclosures.

31.5.2.1. Four (4) section steel enclosure (80" x 92" x 20").

31.5.2.2. Steel Cabinet on East motor room wall (30 x 20 x 10).

31.5.3. Return existing PLC, HMI, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

31.6. **Install New PLC Enclosure**

31.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 32.xx above

31.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters

31.6.3. Mount new enclosure in same location as old PLC Enclosure (80"x92"x20"), and secure to wall and floor.

31.6.4. Extend conduits and wires to new enclosure as needed.

31.6.5. Terminate existing wiring per drawings

31.6.6. Terminate new wires per drawings

31.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure

31.6.8. Reconnect Ethernet wire from radio and provide 120 VAC plug for radio power supply

31.6.9. Install new Isolation barriers on the back enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:

31.6.9.1. Wet Well High-Level Float

31.6.9.2. Wet well door sensor

31.7. **Testing and Commissioning System**

31.7.1. Assist Avanceon and CMCMUA with testing and commissioning

31.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.

31.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

31.8. **Remove Temporary PLC**

31.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

32. 3rd STREET PUMP STATION

32.1. Reference Drawings

32.1.1. 3rdStreetPumpStationElectrical.PDF

32.2. Station Description

32.2.1. Block building with brick face overlaid with vinyl siding with overall dimensions of 34' x 33' x 16' ceiling height.

32.2.2. Poured concrete walls underground with single landing 9' below grade, a second landing 18' below grade, and bottom level 29' below grade where dry well pumps are located.

32.2.3. Wet Well Class I Division I confined space below grade with dimensions of 34' x 16' x 24' depth. Separated from dry side with poured concrete wall.

32.2.4. Conduit concrete cutout access to lower levels is available under existing bubbler enclosure.

32.2.5. Woodened framed roof, with attic access.

32.3. Preliminary work before taking site off line

32.3.1. **General**

32.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

32.3.2. **Temporary PLC Setup**

32.3.2.1. Provide a Temporary PLC enclosure per sample drawings.

32.3.2.2. Mount Temporary PLC

32.3.2.3. Install temporary power to PLC

32.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

32.3.2.5. PLC code will be provided by CMCMUA

32.3.2.6. HMI code will be provided by CMCMUA

32.3.2.7. Wire items listed in section 31.3.3 below to temporary PLC.

32.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

32.3.3. **Wire to Temporary PLC and Auto Dialer**

32.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

32.3.3.2. Install Bubbler system provided by CMCMUA.

32.3.3.3. Install temporary wire to temporary PLC for Well Level control

32.3.3.4. Install temporary wire to the drive enclosures and pick up the following points:

32.3.3.4.1. Pumps 1, 2, & 3 Auto from HOA Switches

32.3.3.4.2. Pumps 1, 2, & 3 Running Status

32.3.3.4.3. Pumps 1, 2, & 3 Fault Status

32.3.3.4.4. Pumps 1, 2, & 3 Run commands

32.3.3.4.5. Pumps 1, 2, & 3 Analog Speed Command (For VFDs Only)

32.3.3.5. Purchase and install Auto Dialer.

32.3.3.5.1. Extend existing phone line to Auto Dialer

32.3.3.6. Install temporary wire to Auto Dialer for the following:

32.3.3.6.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

32.3.3.6.2. Phone line

32.3.4. **Items not needed on temporary PLC**

32.3.4.1. Wet Well High-Level Float

32.3.4.2. Flow Meter

32.3.4.3. Grinder HOA and Running Status

32.3.4.4. Grinder Failure Status

32.3.4.5. Drywell Sumps 1 & 2

32.3.4.6. Compressor 1 & 2 Pressures
32.3.4.7. Bubbler Purge and Isolation Valves
32.3.4.8. Exhaust and Supply Fans
32.3.4.9. Generator Day Tank
32.3.4.10. Generator
32.3.4.11. Transfer Switch
32.3.4.12. Diesel Tank Level
32.3.4.13. Temperature Control
32.3.4.14. Heat Detectors and Fire Pulls
32.3.4.15. Door Switches
32.3.4.16. Scrubber system

32.4. **Individual Systems**

32.4.1. **Control Conduit Trunk Lines**

32.4.1.1. Install 2" control conduit (control conduit 1) from new PLC enclosure to near the back door of the pump station to supply conduit branches for the west motor room door, bubbler enclosure, sumps, heaters, doors, pumps, effluent discharge transmitter (70' +7 Anybodies).

32.4.1.1.1. Continue 2" control conduit 1 through floor into drywell and terminate with 2" anybody for control conduits to the basement equipment (30' plus core through 12" concrete floor).

32.4.1.2. Purchase and install an 8" x 8" x 72" indoor steel wire trough and install above existing grinder enclosure in generator room.

32.4.1.3. Install 2" control conduit (control conduit 2) from new PLC enclosure to the 8" x 8" x 72" trough wall to supply conduit branches for the battery charger, day tank, grinder, louvers, scrubber pad equipment, generator ethernet wire, and generator room heater control wires (100' + 1 core through block).

32.4.2. **Bubbler Control Enclosure**

32.4.2.1. Install wall mount 30"H x 20"W x 10"D Bubbler Cabinet (Supplied by CMCMUA) adjacent to main disconnect (32" Above Finished Floor)

32.4.2.1.1. Extend existing ½" bubbler tube to new bubbler cabinet with flexible tube supplied by CMCMUA.

32.4.2.1.2. Relocate one (1) existing air compressor for new bubbler installation to under new bubbler cabinet.

32.4.2.1.3. Install new ¾" conduit from Panel PLP 3A to new bubbler cabinet (40').

32.4.2.1.3.1. Provide 120VAC circuit for existing backup compressor
32.4.2.1.3.2. Reuse existing breaker #31 for backup compressor feeder.
32.4.2.1.3.3. Install one (1) 120VAC 20-amp receptacle for the compressor.

32.4.2.1.4. Tee off of control conduit 1 with ¾" conduit to bubbler cabinet for the following (10' – 30' Wire):

32.4.2.1.4.1. 1 STP for Compressor 1 Pressure transmitter
32.4.2.1.4.2. 1 STP for Compressor 2 Pressure transmitter
32.4.2.1.4.3. 1 STP Wet Well Level transmitter
32.4.2.1.4.4. 24DVC signal and common for isolation control solenoid valve
32.4.2.1.4.5. 24DVC signal and common for purge control solenoid valve

32.4.2.1.5. Mount air compressor on floor beneath new bubbler enclosure

32.4.3. **Sump Pumps 1 and 2 in Dry Well**

32.4.3.1. Purchase two (2) new 120 VAC 1HP single phase Sump Control Enclosures with disconnects and HOA switch.
32.4.3.2. Install new pump control enclosure on wall above new bubbler cabinet.
32.4.3.3. Install new ¾" conduit and wire from Panel PLP 3A to feed new sump pump enclosures for two (2) 120V 20A circuits, use existing circuit breakers 19 & 20 (40').
32.4.3.4. Install ¾" conduit from sump enclosure for motor feeds sump pumps in drywell (50' – plus core through 12" floor).
32.4.3.4.1. Terminate conduit with two (2) junction boxes, one for each sump pump and route existing sump pump motor wires to junction box and terminate.
32.4.3.5. Tee off of control conduit 1 with ¾" conduit to feed sump control enclosure pull and terminate the following wires to each of the two (2) sump pump enclosures (10' - 30' wire):
32.4.3.5.1. Control Power
32.4.3.5.1.1. 24 VDC from PLC enclosure power supply
32.4.3.5.1.2. 24 VDC Common from PLC enclosure power supply
32.4.3.5.2. Pump Controls
32.4.3.5.2.1. Auto switch
32.4.3.5.2.2. Hand switch
32.4.3.5.2.3. Running status
32.4.3.5.2.4. Fault status
32.4.3.5.2.5. Run Command (pump start command from PLC)
32.4.3.5.2.5.1. Field install run command relay in enclosure
32.4.3.6. Tee off control conduit anybody in basement with 1" conduit to sump pit area for the following wire back to the new PLC enclosure (30' +130' wire):
32.4.3.6.1. Control Power
32.4.3.6.1.1. 24 VDC from PLC enclosure power supply
32.4.3.6.1.2. 5 VDC dialer voltage
32.4.3.6.2. Controls
32.4.3.6.2.1. Low level float (N.O.)
32.4.3.6.2.2. Stop float (N.O.)
32.4.3.6.2.3. Start float (N.O.)
32.4.3.6.2.4. Lag Start float (N.O.)
32.4.3.6.2.5. High level float (N.C.)
32.4.3.6.2.6. High drywell float (N.C. to auto dialer)
32.4.3.7. Demo existing floats and conduit in sump pit.
32.4.3.8. Install new float hanger bar using stainless steel Unistrut (10')
32.4.3.9. Purchase and install six (6) new weighted floats, two (2) NC and four (4) NO floats, and install on hanger bar on concrete floor over sump pit.
32.4.3.10. Purchase and install a 6" x 6" x 6" stainless steel enclosure for float connections and use cord grip fittings for floats.
32.4.3.11. Wire float wire to terminals in new PLC enclosure
32.4.3.12. Demo existing sump pump enclosure next to front door and demo existing 120 VAC circuit and PVC Conduit between old PLC Cabinet and Panel PLP 3A. Return equipment to CMCMUA.
32.4.3.13. Demo existing conduit, floats, and wiring from existing sump pump enclosures to sump pit area (30').
32.4.4. **Flow Meter**
32.4.4.1. Install ¾" conduit from new PLC enclosure to flow meter for the following wire (40'):

32.4.4.1.1. One (1) STP for 4-20MA

32.4.4.2. Demo existing Chart Recorder and return to CMCMUA.

32.4.5. **Grinder**

32.4.5.1. Purchase and install on the existing door of the grinder control enclosure, one (1) new HOA switch with four (4) contact blocks and reconnect to existing control wires and use spare blocks for PLC status on station grinder.

32.4.5.2. From the 8" x 8" x 72" trough, install a ¾" conduit and wire to grinder control enclosure for the following (10' - 120' wire):

32.4.5.2.1. Control Power

32.4.5.2.1.1. 24 VDC from PLC enclosure power supply

32.4.5.2.2. Status

32.4.5.2.2.1. Auto switch

32.4.5.2.2.2. Hand switch

32.4.5.2.2.3. Running status

32.4.5.2.2.4. Fault status

32.4.6. **Pump Drives 1, 2 and 3**

32.4.6.1. Use existing 1" conduit from new PLC enclosure to pump control panels.

32.4.6.2. Install new wires from the new PLC enclosure to each of the three (3) pump drive enclosures for the following:

32.4.6.2.1. Control Power

32.4.6.2.1.1. 24 VDC from PLC enclosure power supply

32.4.6.2.1.2. 24 VDC Common from PLC enclosure power supply

32.4.6.2.2. Status and Control

32.4.6.2.2.1. Auto switch

32.4.6.2.2.2. Hand switch

32.4.6.2.2.3. Running status

32.4.6.2.2.4. Fault status

32.4.6.2.2.5. Run Command (pump start command from PLC)

32.4.6.2.2.5.1. Field install run command relay in enclosure

32.4.6.2.2.6. Ethernet Wire

32.4.6.2.2.7. STP speed command

32.4.7. **Pumps 1, 2 and 3**

32.4.7.1. Demo existing ¾" vibration switch conduits from each of the three (3) pumps back to existing 4" x 4" x 4' trough and safe off any unused wiring.

32.4.7.2. Purchase and install three (3) new Vibration Switch's on the pumps.

32.4.7.3. Tee off of 2" anybody in the drywell with ¾" conduit to serve as a conduit drop to each of the three (3) pumps in the dry well for a vibration switch for the following wire (60' – 150' wire):

32.4.7.3.1. Control Power

32.4.7.3.1.1. 24 VDC from PLC enclosure power supply

32.4.7.3.2. Status

32.4.7.3.2.1. Vibration switch

32.4.8. **Wet Well**

32.4.8.1. Purchase and install one (1) weighted N.C. float.

32.4.8.2. Install new ¾" conduit, Class 1 Division 1 and intrinsic safe wiring, from the new PLC enclosure to the wet well floor level for a high-level float, terminate conduit 1 foot above wet well grates for the following wire (100'):

32.4.8.2.1. Control Power

32.4.8.2.1.1. ISBR Common

32.4.8.2.2. Status

32.4.8.2.2.1. High Wet Well Float

32.4.8.3. Demo the existing high-level float in the bar screen/grinder channel area.
32.4.8.4. Purchase and install one (1) normally closed weighted float and connect to intrinsic safe barrier relay.
32.4.8.5. Tee off float conduit with ¾" conduit near wet well door for wet well door sensor for the following wire (20'):
32.4.8.5.1. Control Power
32.4.8.5.1.1. ISBR Common
32.4.8.5.2. Status
32.4.8.5.2.1. Door switch

32.4.9. **Drywell**
32.4.9.1. Tee off of 2" anybody in drywell with a ¾" conduit drop to existing effluent discharge pressure transmitter (20'). Terminate with coupling & flexible cord grip to accommodate transmitter cable.
32.4.9.2. Install new STP from new PLC enclosure to existing pressure transmitter (70' wire).

32.4.10. **Scrubber Equipment**
32.4.10.1. Demo the following equipment and conduits in the scrubber pad area:
32.4.10.1.1. Scrubber Blower feeder conduit back to electrical Panel PP 3A (80').
32.4.10.1.2. Conduit from the existing scrubber equipment enclosure back to existing PLC (120').
32.4.10.1.3. Conduit from the existing scrubber equipment enclosure to the recirculation pump receptacle (leave lockable disconnect) (30').
32.4.10.1.4. Conduit from the existing scrubber equipment enclosure to the chemical pump enclosure (20').
32.4.10.1.5. Conduit from the existing scrubber equipment enclosure to the blower motor (40). Demo disconnect ahead of motor.
32.4.10.1.6. Feeder conduit from the 120/208 VAC sub panel back to the source (120').
32.4.10.1.7. All branch circuit conduits, ten (10) devices, and one (1) light (150').
32.4.10.1.8. 120/208VAC sub panel. Return panel to CMCMUA.
32.4.10.1.9. Existing scrubber enclosure. Return scrubber equipment contactors, receptacles, and VFD to CMCMUA.
32.4.10.2. Purchase and install two (2) new contactor enclosures with disconnect and HOA switch on east wall in generator room to the left of the grinder enclosure for the following:
32.4.10.2.1. Recirculation pump contactor rated at 480 VAC, 5 HP, three phase.
32.4.10.2.2. Chemical pump contactor rated at 120 VAC 1 HP, single phase.
32.4.10.3. Install new 480 VAC, 10 HP, three phase VFD provided by CMCMUA for the scrubber blower motor. Locate VFD on east wall in generator room to the left of the grinder enclosure.
32.4.10.4. Install 1" conduit and feeders from panel PP3A and tee off with ¾" conduit drops to the recirculation pump and scrubber blower enclosures for the following circuits (40'):
32.4.10.4.1.1. 480VAC 15A circuit for the recirculation pump, connect to existing breaker #8.
32.4.10.4.1.2. 480VAC 15A circuit for the scrubber blower, connect to existing breaker #10.

32.4.10.5. Install new ¾" conduit and feeders from panel PLP3A to the new chemical pump enclosure for the following (70'):
32.4.10.5.1.1. 120VAC 20A circuit for the chemical pump, connect to existing breaker #16.
32.4.10.6. From recirculation pump contactor and chemical pump contactor install ¾" conduit and pull chemical pump motor conductors with recirculation motor conductors to feed recirculation pump motor and extend ¾" conduit and install a single weatherproof receptacle for the chemical pump (80' total + core through block and brick wall).
32.4.10.7. Install new ¾" conduit and motor wires from the scrubber blower VFD enclosure to the blower motor (50' + core through block and brick wall).
32.4.10.8. Install three (3) new ¾" conduit drops from the 8" x 8" x 72" trough in the generator room to the blower VFD, recirculation contactor, and chemical pump contactor for the following wires (10' – 100' wire for each contactor):
32.4.10.8.1. Control Power
32.4.10.8.1.1. 24 VDC from PLC enclosure power supply
32.4.10.8.1.2. 24 VDC Common from PLC enclosure power supply
32.4.10.8.2. Blower Controls
32.4.10.8.2.1. Auto switch
32.4.10.8.2.2. Hand switch
32.4.10.8.2.3. Running status
32.4.10.8.2.4. Fault status
32.4.10.8.2.5. Run Command (pump start command from PLC)
32.4.10.8.2.5.1. Field install run command relay in enclosure
32.4.10.8.2.6. Ethernet Wire
32.4.10.8.3. Control Power
32.4.10.8.3.1. 24 VDC from PLC enclosure power supply
32.4.10.8.3.2. 24 VDC Common from PLC enclosure power
32.4.10.8.4. Recirculation Pump Controls
32.4.10.8.4.1. Auto switch
32.4.10.8.4.2. Hand switch
32.4.10.8.4.3. Running status
32.4.10.8.4.4. Fault status
32.4.10.8.4.5. Run Command (pump start command from PLC)
32.4.10.8.4.5.1. Field install run command relay in enclosure
32.4.10.8.5. Scrubber Chemical Pump Controls
32.4.10.8.5.1. Auto switch
32.4.10.8.5.2. Hand switch
32.4.10.8.5.3. Running status
32.4.10.8.5.4. Fault status
32.4.10.8.5.5. Run Command (pump start command from PLC)
32.4.10.8.5.5.1. Field install run command relay in enclosure
32.4.10.8.5.6. STP for speed command
32.4.10.9. Install new 1" conduit from the 8" x 8" x 72" trough in generator room to the scrubber pad area (40' + 1 core through block and brick wall)
32.4.10.10. Tee off 1" conduit with ¾" for the following wires (30'):
32.4.10.10.1. STP for chemical tank ultra-sonic level transmitter (150' wire)
32.4.10.11. Purchase and install one (1) new ultra-sonic level transmitter on outdoor chemical tank in existing 2" NPT threaded fitting.
32.4.10.12. Tee off 1" conduit with ¾" for the following wires (30' – 150' wire):
32.4.10.12.1. Control Power

32.4.10.12.1.1. 24 VDC from PLC enclosure power supply
32.4.10.12.2. Status
32.4.10.12.2.1. Scrubber low level float
32.4.10.12.3. Purchase and install one (1) NO weighted float in the scrubber sump.
32.4.10.13. Tee off 1" conduit with ¾" for the following wires (30' – 150' wire):
32.4.10.13.1. Control Power
32.4.10.13.1.1. 24 VDC from PLC enclosure power supply
32.4.10.13.2. Status
32.4.10.13.2.1. Safety shower switch
32.4.10.13.3. Terminate wires in a weatherproof junction box near the safety shower.

32.4.11. **Chemical Transfer Pump Receptacle**

32.4.11.1. Purchase and install one (1) Hubbell Circuit-Lock disconnect for the chemical transfer pump receptacle (Cat. No. HBL430MT7W, Receptacle #420R7W).
32.4.11.2. Locate disconnect on the exterior of the building in the scrubber pad area adjacent to the chemical pump enclosure.
32.4.11.3. Purchase and install one (1) Square D 480 VAC, 20-amp, three phase Type FA bolt-in breaker in panel.
32.4.11.4. Install new ¾" conduit from Panel PP3A to Hubbell Circuit-Lock disconnect for one (1) 480VAC 20A circuit (50' + 1 core through block and brick).
32.4.11.5. Purchase and install one (1) single pole 20-amp Square D Type FA bolt-in breaker in panel PP3A, and connect chemical transfer pump Hubbell Circuit-Lock disconnect.

32.4.12. **Generator Room**

32.4.12.1. Install a new ¾" conduit from the 8" x 8" x 72" trough to generator control enclosure (10' – 80' wire)
32.4.12.1.1. Install Ethernet wire from Generator to new PLC enclosure – must be 600V rated.
32.4.12.2. Install a new ¾" conduit from the 8" x 8" x 72" trough to existing day tank controller and install the following wires (20' - 70' wire):
32.4.12.2.1. Control Power
32.4.12.2.1.1. 24 VDC from PLC enclosure power supply
32.4.12.2.2. Status
32.4.12.2.2.1. Auto switch
32.4.12.2.2.2. Manual switch
32.4.12.2.2.3. Overflow alarm status
32.4.12.2.2.4. Fault status
32.4.12.2.2.5. Spare
32.4.12.2.2.6. Spare
32.4.12.3. Install a new ¾" conduit from the 8" x 8" x 72" trough to existing louver for the following wires (30' - 110' wire):
32.4.12.3.1. Control Power
32.4.12.3.1.1. 24 VDC from PLC enclosure power supply
32.4.12.3.2. Status
32.4.12.3.2.1. Louver status
32.4.12.4. Extend ¾" day tank control conduit to battery charger for the following wires (10' - 75' wire):
32.4.12.4.1. Control Power
32.4.12.4.1.1. PLC 24VDC Power

32.4.12.4.2. Status
32.4.12.4.2.1. Battery Fault

32.4.13. **Diesel Tank**

32.4.13.1. Tee off the 1" conduit in the scrubber pad area with a ¾" conduit to the diesel tank outside and install the following wire (30' - 110' of wire):
32.4.13.1.1. Control Power
32.4.13.1.1.1. 24 VDC common from PLC power supply
32.4.13.1.2. Status Wires
32.4.13.1.2.1. High level horn
32.4.13.1.2.2. STP diesel tank ultra-sonic level transmitter

32.4.13.2. Purchase and install new 24 VDC Diesel Tank Horn near outdoor diesel tank.

32.4.13.3. Purchase and install new Diesel Tank Class 1 Division 2 ultra-sonic level transmitter on outdoor diesel tank.
32.4.13.3.1. Purchase and install threaded reducer for existing 4" tank opening to accommodate new ultra-sonic level transmitter mounting configuration.
32.4.13.3.2. Program ultra-sonic level transmitter and provide bottom reference measurement to CMCMUA for input into PLC program.

32.4.13.4. Demo existing ¾" PVC conduit, and wires back to exterior wall. (60' of conduit removed).

32.4.14. **Transfer Switch**

32.4.14.1. Install new ¾" conduit from PLC Enclosure to transfer switch (30')

32.4.14.2. Install Ethernet wire from Transfer Switch to new PLC enclosure – must be 600V rated.

32.4.15. **Ventilation and Heating**

32.4.15.1. Purchase and install two (2) new 480 VAC, 3 HP, three phase contactor enclosures with disconnect and HOA switch for the Drywell Exhaust Fan and Wet Well Supply Fan.
32.4.15.1.1. Locate enclosure adjacent to existing motor room exhaust fan enclosure.

32.4.15.2. Install new ¾" conduit from new PLC enclosure and tee off to the wet well and dry well exhaust fan enclosure for the following wires (30'):
32.4.15.2.1. Control Power
32.4.15.2.1.1. 24 VDC from PLC enclosure power supply
32.4.15.2.2. Status and Control
32.4.15.2.2.1. Auto Switch
32.4.15.2.2.2. Hand Switch
32.4.15.2.2.3. Running
32.4.15.2.2.4. Overload
32.4.15.2.2.5. Run Command
32.4.15.2.2.5.1. Field install run command relay in enclosure

32.4.15.3. For two (2) fans, Wet Well Supply Fan SF-2 and EF-2 Dry Well Exhaust Fan install the following:
32.4.15.3.1. Purchase and install two (2) new pressure differential switches.
32.4.15.3.1.1. Attach one switch with hose to the Dry Well ductwork in the motor room.
32.4.15.3.1.2. Install new ¾" conduit from the new PLC enclosure to the switch (10').
32.4.15.3.1.3. Attach the second switch to the wall above the new sump pump controllers and route the hose through the block wall to the ductwork in the wet well.

32.4.15.3.1.4. Install new ¾" conduit from the new PLC enclosure to the switch (20').
32.4.15.3.2. Purchase and install tubing from pressure differential switch and route as needed to associated fan ventilation duct (20' of hose for each fan).
32.4.15.3.3. Seal all wall and duct penetrations air tight.
32.4.15.3.4. Wire pressure switches back to new PLC Enclosure – 2 conductors for each switch.
32.4.15.4. Install Indoor Temperature Probe using 0.25" compression fitting mounted in side of new PLC enclosure for probe tip to hang in free air and wire up Indoor Temperature Probe to PLC.
32.4.15.4.1. Temperature Probe provided by CMCMUA.
32.4.15.5. Install new ¾" conduit and wire to the east motor room heater for the following (20'):
32.4.15.5.1. Control Power for Heaters
32.4.15.5.1.1. 24 VDC Common from PLC enclosure power supply
32.4.15.5.2. Command Wires
32.4.15.5.2.1. Run Command
32.4.15.5.2.1.1. Field install run command relay in enclosure
32.4.15.6. Remove existing thermostat and blank 4" square box on all three (3) heaters.
32.4.15.7. Tee off of control conduit 1 with ¾" conduit and wire to the west motor room heater for the following (20' – 100' wire):
32.4.15.7.1. Control Power for Heaters
32.4.15.7.1.1. 24 VDC Common from PLC enclosure power supply
32.4.15.7.2. Command Wires
32.4.15.7.2.1. Run Command (pump start command from PLC)
32.4.15.7.2.1.1. Field install run command relay in enclosure
32.4.15.8. Remove existing thermostat and blank 4" square box on all three (3) heaters.
32.4.15.9. Install new ¾" conduit from 8" x 8" x 72" trough for generator room heater for the following (10' – 60' wire):
32.4.15.9.1. Control Power
32.4.15.9.1.1. 24 VDC Common from PLC enclosure power supply
32.4.15.9.2. Command Wires
32.4.15.9.2.1. Run Command
32.4.15.9.2.1.1. Field install run command relay in enclosure
32.4.15.10. Remove existing thermostat and blank 4" square box on all three (3) heaters.

32.4.16. **Fire/Security/Lights**

32.4.16.1. Install new ¾" conduit from the new PLC enclosure to the East motor room door sensor for the following wires (10')
32.4.16.1.1. Control Power
32.4.16.1.1.1. 24 VDC from PLC enclosure power supply
32.4.16.1.2. Status Wires
32.4.16.1.2.1. Status
32.4.16.2. Purchase and install one (1) door switch.
32.4.16.3. Tee off control conduit 1 with ¾" conduit and wires for the two (2) west motor room door sensor for the following (10' – 100' wire):
32.4.16.3.1. Control Power
32.4.16.3.1.1. 24 VDC from PLC enclosure power supply
32.4.16.3.2. Status Wires

32.4.16.3.2.1. Door 1
32.4.16.3.2.2. Door 2
32.4.16.3.2.2.1. Purchase and install two (2) door switches
32.4.16.4. Install new ¾" conduit from the new PLC enclosure to the east motor room door for the Personnel on Site Switch (10').
32.4.16.5. Purchase and install, adjacent to east motor room door, On/Off switch enclosure for Personnel on Site Switch and wire to new PLC enclosure for the switch status – 2 conductors.
32.4.16.6. Locate existing eight (8) smoke detector circuits and reconnect to new PLC. Use field terminal blocks if needed.

32.4.17. **Auto Dialer**

32.4.17.1. Purchase and install new Auto Dialer adjacent to phone line.
32.4.17.2. Install ¾" conduit from the new PLC enclosure to dialer for the following wires (40').
32.4.17.3. Connect wires to the Auto Dialer from PLC Enclosure for the following:
32.4.17.3.1. Dialer common
32.4.17.3.2. Wet Well High-Level Float through the I.S. Barrier
32.4.17.3.3. Dry Well High-Level Float
32.4.17.3.4. PLC Communication Fault

32.4.18. **Network Radio**

32.4.18.1. Relocate Radio Cat-6E POE cable from existing communications enclosure, and re-route into new PLC enclosure.
32.4.18.2. Demo existing coax cable from existing communication enclosure, to outside antenna.
32.4.18.3. Relocate and plugin existing POE into new PLC enclosure.
32.4.18.4. Demo existing communication cabinet, and return network switch, and radio equipment back to CMCMUA.

32.5. **Demo Existing PLC enclosures**

32.5.1. Safe off the wires, lift from existing enclosure and pull back.
32.5.2. Demo and dispose of enclosure
32.5.3. Four (4) section steel enclosure (80" x 92" x 20").
32.5.4. Return existing PLC, HMI, Chart Recorders, Power Supplies, Auto Dialer, and Bubbler Equipment to CMCMUA

32.6. **Install New PLC Enclosure**

32.6.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 31.xx above.
32.6.2. Cut out bottom of enclosure as need to access existing floor conduits or wire gutters
32.6.3. Mount new enclosure in same location as existing PLC Enclosure and secure to wall and floor (Make sure to leave space to the left for future fire alarm panel).
32.6.4. Extend conduits and wires to new enclosure as needed.
32.6.5. Terminate existing wiring per drawings
32.6.6. Terminate new wires per drawings
32.6.7. Re-connect existing 120 VAC feeder to new PLC enclosure
32.6.8. Reconnect Ethernet wire from radio and provide 120 VAC plug for radio power supply
32.6.9. Install new Isolation barriers on the back enclosure closest to entry point of the wires for the following intrinsically safe equipment per drawings:
32.6.9.1. Wet Well High-Level Float
32.6.9.2. Wet Well Door Switch

32.7. **Testing and Commissioning System**

32.7.1. Assist Avanceon and CMCMUA with testing and commissioning
32.7.2. The electrical contractor will need to support our testing of the equipment and wiring they installed.
32.7.3. Transfer the wiring from temporary PLC to new PLC and commission.

32.8. **Remove Temporary PLC**

32.8.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

33. 46TH STREET PUMP STATION

33.1. Reference Drawings

33.1.1. 46thStreetPumpStationElectrical.PDF

33.2. Station Description

33.2.1. Wooden building with T1-11 siding, with overall dimensions of 8' x 16' x 8' ceiling height.

33.2.2. Building has one room.

33.2.3. Building is raised off of the ground, and setting on a steel structure with open access throughout.

33.2.4. Septic Tank style wet well located outside adjacent to the building.

33.2.5. Typical A-Frame style roof with asphalt shingling.

33.3. Preliminary work before taking site off line:

33.3.1. **General**

33.3.1.1. Trace and tag all field wiring in existing PLC enclosure.

33.3.2. **Temporary PLC Setup:**

33.3.2.1. Provide a Temporary PLC enclosure per sample drawings.

33.3.2.2. Mount Temporary PLC

33.3.2.3. Install temporary power to PLC

33.3.2.4. Establish communications to the Work Stations with the assistance of the CMCMUA

33.3.2.5. PLC code will be provided by CMCMUA

33.3.2.6. HMI code will be provided by CMCMUA

33.3.2.7. Wire items listed in 33.3.3 below to temporary PLC.

33.3.2.8. Confirm operation of each item as it's moved with the assistance of the CMCMUA

33.3.3. **Wire to Temporary PLC and Auto Dialer:**

33.3.3.1. Build a temporary enclosure per the drawings and install temporary PLC.

33.3.3.2. Install Bubbler system provided by CMCMUA.

33.3.3.3. Install temporary wire to temporary PLC for Well Level control.

33.3.3.4. Install temporary wire to the pump enclosure and pick up the following points:

33.3.3.4.1. Pumps 1 and 2 Auto from HOA Switches

33.3.3.4.2. Pumps 1 and 2 Running Status

33.3.3.4.3. Pumps 1 and 2 Fault Status

33.3.3.4.4. Pumps 1 and 2 Run commands

33.3.3.4.5. Pumps 1 and 2 Analog Speed Command (For VFDs Only)

33.3.3.5. Install temporary wire to Auto Dialer for the following:

33.3.3.5.1. Auto dialer shall always have a high wet well level float and high dry well level float attached and active at all times.

33.3.3.5.2. Phone line

33.3.3.6. Items not needed on temporary PLC:

33.3.3.6.1. Wet Well High-Level Float

33.3.3.6.2. Grinder HOA and Running Status

33.3.3.6.3. Grinder Failure Status

33.3.3.6.4. Compressor 1 & 2 Pressures

33.3.3.6.5. Bubbler Purge and Isolation Valves

33.3.3.6.6. Exhaust and Supply Fans

33.3.3.6.7. Transfer Switch

33.3.3.6.8. Temperature Control

33.3.3.6.9. Door Switches

33.4. **Individual Systems**

33.4.1. **Bubbler Control Enclosure**

33.4.1.1. Install new ¾" conduit from 120/208 VAC Panel on North wall for one (1) 120 VAC 20-amp receptacle circuits for two (2) air compressors (20'). Connect to existing circuit breaker #5 in 120/208VAC Panel (10').

33.4.1.2. Install wall mount non-metallic enclosure 30" H x 20" W x 10" D

33.4.1.3. Install new ¾" conduit and wire from Bubbler Control enclosure to new PLC enclosure for the following (10'):

33.4.1.3.1.1. 1 STP for Compressor 1 Pressure transmitter

33.4.1.3.1.2. 1 STP for Compressor 2 Pressure transmitter

33.4.1.3.1.3. 1 STP Wet Well Level transmitter

33.4.1.3.1.4. 24DVC signal and common for isolation control solenoid valve

33.4.1.3.1.5. 24DVC signal and common for purge control solenoid valve

33.4.1.4. Run flexible discharge tubing from bubbler enclosure to bubbler line ¼" Air Tube. CMCMUA will provide the flexible tubing: 25 Feet

33.4.1.5. Install new receptacles for two (2) 120 VAC 20-amp circuits for the air compressors within 5 feet of the bubbler enclosure.

33.4.1.6. Mount air compressors on floor beneath new bubbler enclosure

33.4.2. **Grinder Pump**

33.4.2.1. Relocate existing grinder panel to West wall adjacent to new PLC.

33.4.2.2. Install new ¾" conduit and wire from the 277/480 VAC panel to the grinder enclosure for a 20-amp, 480 VAC, three phase feeder circuit and reconnect circuit to breaker # 20, 22, and 24 (30').

33.4.2.3. Purchase and install one (1) new HOA switch with four (4) contact blocks and reconnect to existing control wires and use spare blocks for PLC status on station grinder enclosure door.

33.4.2.4. Install new ¾" conduit and wires between the new PLC enclosure and the grinder enclosure for the following (10'):

33.4.2.4.1. Control power

33.4.2.4.1.1. 24 VDC from PLC enclosure power supply

33.4.2.4.2. Status

33.4.2.4.2.1. Auto switch

33.4.2.4.2.2. Hand switch

33.4.2.4.2.3. Running status

33.4.2.4.2.4. Fault status

33.4.3. **Pump Drives 1 and 2**

33.4.3.1. Relocate Pump 1 Drive enclosure to inside the building along the West wall.

33.4.3.1.1. Install new 1 ½" conduit and wire from the 480VAC panel for a 100-amp, 480 VAC, three phase feeder circuit to the new Pump Drive 1 enclosure. Install new wires and reconnect to existing circuit breaker # 2, 4, and 6 (30').

33.4.3.1.2. Install new 1" conduit and wires from the new PLC enclosure to the drive cabinet for the following (20'):

33.4.3.2. Install new wires for each pump controller from the new PLC enclosure for the following:

33.4.3.2.1. Control Power

33.4.3.2.1.1. 24 VDC from PLC enclosure power supply

33.4.3.2.1.2. 24 VDC Common from PLC enclosure power supply

33.4.3.2.2. Pump Controls

33.4.3.2.2.1. Auto switch
33.4.3.2.2.2. Hand switch
33.4.3.2.2.3. Running status
33.4.3.2.2.4. Fault status
33.4.3.2.2.5. Seal leak
33.4.3.2.2.6. Temperature alarm
33.4.3.2.2.7. Run Command (pump start command from PLC)
33.4.3.2.2.7.1. Field install run command relay in enclosure
33.4.3.2.2.8. STP Speed command 4-20 mA
33.4.3.2.2.9. Ethernet Wire

33.4.3.3. Relocate pump 2 drive enclosure to inside the building along the West wall.
33.4.3.3.1. Install new 1 ½" conduit and wire from the 480VAC panel for a 100-amp, 480 VAC, three phase feeder circuit to the new pump drive 2 enclosure. Install new wires and reconnect to existing circuit breaker #1, 3, and 5 (30')
33.4.3.3.2. Install new 1" conduit and wire from the new PLC enclosure to the pump drive 2 cabinet for the following (20'):

33.4.3.4. Install new wires for each pump controller from the new PLC enclosure for the following:
33.4.3.4.1. Control Power
33.4.3.4.1.1. 24 VDC from PLC enclosure power supply
33.4.3.4.1.2. 24 VDC Common from PLC enclosure power supply
33.4.3.4.2. Pump Controls
33.4.3.4.2.1. Auto switch
33.4.3.4.2.2. Hand switch
33.4.3.4.2.3. Running status
33.4.3.4.2.4. Fault status
33.4.3.4.2.5. Run Command (pump start command from PLC)
33.4.3.4.2.5.1. Field install run command relay in enclosure
33.4.3.4.2.6. STP Speed command 4-20 mA
33.4.3.4.2.7. Ethernet Wire

33.4.4. **Wet Well**
33.4.4.1. Install new ¾" conduit from new PLC Enclosure to septic tank lid edge with weatherproof box for connection of intrinsic safe wiring for the Wet Well High-Level Float, and hatch switch from the new PLC enclosure for the following wires (60').
33.4.4.1.1. Control Power
33.4.4.1.1.1. ISBR Common
33.4.4.1.2. Status
33.4.4.1.2.1. High level float
33.4.4.1.3. Purchase and install one (1) weighted N.C. float.
33.4.4.1.4. Demo the existing High-Level Float replace with the Normally Closed Float.
33.4.4.1.4.1. Purchase and install stainless hook below hatch lid to hang float.
33.4.4.1.5. Control Power
33.4.4.1.5.1. ISBR Common
33.4.4.1.6. Status
33.4.4.1.6.1. Wet well hatch

33.4.4.1.7. Purchase and install door sensor for wet well hatch, and wire intrinsically safe wiring (40').

33.4.4.2. Purchase and install one (1) normally closed float.

33.4.4.2.1. Purchase and install stainless hook below hatch lid to hang float.

33.4.4.3. Purchase and install hatch sensor switch.

33.4.5. **Drywell**

33.4.5.1. Install ¾" conduit and wires terminating in a weatherproof junction box from new PLC enclosure to force main piping outside north of the building for two (2) pressure transmitters (30'):

33.4.5.1.1. STP for pressure transmitter

33.4.6. **Fire/Security/Lights**

33.4.6.1. Install new ¾" conduit and wire from the new PLC enclosure to the entrance door for the door sensor, Personnel on Site switch, and future fire alarm for the following (20'):

33.4.6.1.1. Control Power

33.4.6.1.1.1. 24 VDC from PLC enclosure power supply

33.4.6.1.2. Status Wires

33.4.6.1.2.1. Door switch

33.4.6.2. Purchase and install one (1) door switch.

33.4.6.3. Purchase and install, adjacent to door, On/Off switch enclosure for Personnel on Site Switch and wire to new PLC enclosure for the switch status – 2 conductors.

33.4.6.4. Locate existing heat detect wire and route to new PLC enclosure.

33.5. **Install new PLC Enclosure**

33.5.1. Punch holes in new PLC Enclosure for the conduits as needed for all conduits listed in 33.xx above

33.5.2. Punch out the bottom of the enclosure and drill floor as need to access existing floor conduits

33.5.3. Mount new enclosure on West wall, and secure to wall and floor.

33.5.4. Extend conduits and wires to new enclosure as needed.

33.5.5. Terminate existing wiring per drawings

33.5.6. Terminate new wires per drawings

33.5.7. Re-connect existing 120 VAC feeder to new PLC enclosure

33.5.8. Reconnect Ethernet wire from radio and provide 120 VAC plug for radio power supply

33.5.9. Install new Isolation barriers on the back enclosure closest to entry point of the wires for the following intrinsically safe equipment:

33.5.9.1. Wet Well High-Level Float

33.5.9.2. Wet Well Hatch Switch

33.6. **Testing and Commissioning System**

33.6.1. Assist Avanceon and CMCMUA with testing and commissioning

33.6.2. The electrical contractor will need to support our testing of the equipment and wiring they installed

33.6.3. Transfer the wiring from temporary PLC to new PLC and commission.

33.7. **Remove Temporary PLC enclosure:**

33.7.1. Once all wiring has been removed power down and remove temporary PLC and relocate to next building.

SECTION 01019

SITE SAFETY AND WORKSITE CONDITIONS

PART 1. GENERAL

1.01 DESCRIPTION

A. Work Included

1. Work specified in this section shall consist of maintaining clean, orderly, hazard-free conditions at each worksite. Work areas and stockpiles shall be limited to those areas within contract limits as shown on the drawings, and all material stockpiles, trailers, and equipment shall be confined within the CMCMUA property lines. In no event shall traffic be completely detoured, nor should any encroachment on private property by Contractor's equipment, material or vehicles occur, without that property owner's express written permission. The owner shall receive a copy of said written permission prior to the Contractor's use of any private property.

2. The worksites shall be maintained in a clean, neat, orderly, and hazard-free condition until final acceptance of the work. Areas adjacent to the worksite shall be kept free from hazards caused by construction activities and shall be regularly inspected for hazardous conditions caused by construction activities.

3. The Contractor shall comply with the Owner's security arrangements and all local traffic regulations. Speed limits shall not be exceeded by the Contractor's vehicle(s).

1.02 OSHA

A. The Contractor shall comply with all OSHA and other local, State, and Federal rules and regulations regarding confined space entry work, high elevations, work within restricted areas, and all other site operations.

B. Each piece of construction equipment shall meet all OSHA rules and regulations for construction equipment.

C. All personnel on-site shall, at the minimum, conform to OSHA Level "D" personal protection, including but not limited to:

- Boots/shoes, safety with steel toe and shank
- Safety glasses as conditions require
- Hard hat
- Hearing protection when required

D. The Contractor shall be aware of and shall notify its personnel of all potential worksite hazards, including but not limited to the presence of combustible gases. The Contractor shall limit smoking to restricted areas onsite.

1.03 EMERGENCY PROCEDURES

A. **Emergency Telephone:** The Contractor shall maintain telephones at all times after regular working hours, including weekends and holidays, where the Contractor's representatives can be reached on an emergency basis. The Contractor or the

Contractor's representatives shall be prepared to act to correct conditions on the sites deemed to constitute an emergency by either the Owner, Owner's agent, or local authority, but the Contractor is not to wait for instructions before proceeding to properly protect both life and property. If a condition on the sites requires attention after working hours, either the Owner, Owner's Agent, or Local Authority may call the Contractor or the Contractor's representatives at the emergency telephone number, identify themselves and describe the emergency condition. The Contractor is expected to dispatch personnel and equipment to adequately institute corrective measures within two (2) hours. If, for some reason, the Contractor or the Contractor's agent cannot be reached at the emergency number after a reasonable time (1/2 hour), the Owner will have the right to immediately initiate corrective measures as described hereafter, and the Contractor will be considered to have waived any right to perform emergency service.

B. **Emergency Services to Correct Hazardous Conditions:** In the event that the Contractor fails to maintain safe job conditions, the Owner, after the failure of the Contractor to commence substantial steps at the job site to rectify the situation within two (2) hours of the time the Contractor has been notified of the unsafe conditions; may hire guards, take such precautions, and make such repairs and any other steps which the Owner or Owner's agent, in their discretion, considers necessary to protect property, the public, and the Owner. The cost of any of these precautions, guards, or steps shall be deducted from the payments due the Contractor, and the Contractor shall be billed for these services, work, and materials at prevailing rates. Failure to act by the Owner shall not relieve the Contractor of the responsibility for safety at the site.

1.04 WORK DURING INCLEMENT WEATHER

A. Unless otherwise approved by the Owner, the Contractor shall continue work during all weather conditions, including inclement weather.

B. When required, protection shall be provided by the use of tarpaulins, wood and building paper shelters, or other approved means.

C. The Contractor shall notify the Owner as to whether work will continue during inclement weather. Notification shall be made twenty-four (24) hours prior to the disruption of activities.

D. Large storms e.g. nor' easter, hurricanes, storms of 2" of more of rain, may delay the shutdown of certain pumps and/or equipment. Close communication between the Contractor and the CMCMUA prior to large storms is essential.

1.05 CLEAN UP AND DISPOSAL

A. Clean Up

1. During the course of construction, all efforts shall be made to maintain a neat and orderly project. Clean up shall be pursued on a daily basis and in conjunction with the construction. The Contractor shall be responsible for cleaning up during the life of this contract including the work of all subcontractors. Upon completion of all construction, final clean up shall include removal of all excess materials, equipment, etc., and the site shall be restored to a condition equal to or better than that existing prior to construction. Should the Contractor fail to remove such material, equipment, and supplies, the CMCMUA has the right to remove them at the expense of the Contractor.

2. At the completion of construction, the Contractor must tear down and remove all temporary structures unless expressly directed otherwise, and remove remaining rubbish of all kinds from the site occupied during the progress for the work. The Contractor shall remove all concrete and ballast droppings and leave the site and the adjacent property which may have been affected by the Contractor's operations in a neat and satisfactory condition.

3. Any existing structures, lands, etc. damaged by the Contractor's operations shall be repaired by the Contractor prior to completion of the contract, at no additional cost to the CMCMUA.

4. Spillages, of other than potable water shall be immediately removed.

5. Cleaning operations shall occur at times when dust and other contaminants will not fall on wet and newly painted surfaces.

6. Paved surfaces shall be broom-cleaned and ground surfaces shall be rake-cleaned.

7. Volatile wastes shall be stored in covered metal containers and shall be removed from the worksite daily. Accumulations of wastes which create hazardous conditions shall be prevented.

1.06 FIRE SAFETY

A. Hot Work Permits

1. Hot work permits shall be issued by the Contractor conducting the hot work onsite. Permit forms are available at each facility.

1.07 CONFINED SPACE ENTRY

A. The Contractor shall note that all work shall be completed in compliance with CFR 29 Occupational Safety and Health Administration (OSHA), specifically the requirements regarding "Confined Space Procedures." Refer to Specification Section 01126 – Confined Space Procedures.

1.08 EXPLOSIVES

A. Explosives shall not be used in any circumstances for construction or demolition work.

PART 2. -- MATERIALS (NOT APPLICABLE IN THIS SECTION)

PART 3. – METHODS (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01035

MODIFICATION PROCEDURES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Work includes all labor, materials, equipment, and appliances required for the complete execution of additions, modifications, and alterations to existing buildings and structures as shown on the drawings and specified under the various sections of the contract specifications and as required by conditions at the site.

B. The Contractor shall have examined all work to be performed to the existing buildings and become familiar with the nature and extent to which the existing buildings will be damaged, items removed or rearranged due to the work under this contract.

1. Cutting and patching shall conform to the requirements of the General Conditions, Supplemental Conditions, and as specified herein.

2. Patching work shall be performed with similar materials and in the same manner as adjoining work. Joining between old and new work shall be perfect and practically invisible. All due caution shall be taken to obtain a bond between old and new work.

C. Major portions of the work are indicated on the drawings and the accompanying specifications thereto. All work must be complete in all respects and executed with high-quality workmanship.

D. Work not specifically indicated by details or general notes on the drawings may include the following:

1. Removing loose rust, sealing or peeling paint from metal surfaces by scraping, sanding or wire brushing; priming and repainting metal surface (inside and outside).

2. Patching, cleaning, sealing and resurfacing concrete floors, walls, lintels, sills and trim and replacing lintels where broken.

3. Patching, refinishing and/or replacing ceilings.

4. Patching and/or replacing broken, spalled, cracked and disintegrating concrete encasing steel columns and piers.

5. Cleaning and repainting steel hand railing, brackets, sleeves, etc. Replacing existing railing with new aluminum railing, brackets, sleeves, etc.

1.02 SITE AND BUILDINGS

A. Site Visit

1. Prior to the submission of bids, the Contractor is advised to visit the site and thoroughly acquaint themselves with the exact nature of the work indicated on the drawings and the specifications requirements. Failure to comply with the aforementioned requirements shall not constitute a basis for claims for additional compensation.

B. Measurements

1. Prior to ordering any materials or doing any work, the Contractor shall verify all measurements, dimensions and other conditions of each building scheduled for work as may be necessary or required in connection with the Contractor's work. The Contractor shall be responsible for the correctness of the same.

1.03 MATERIALS

A. All materials to perform and complete the work shall be new. Salvaged materials, such as brick, stone copings, granite sills, may be used under certain conditions subject to the approval of the CMCMUA.

B. All salvaged materials shall be sound and undamaged. Materials to be reused shall be stored and protected as directed by the CMCMUA. Care shall be taken to prevent damage to materials or equipment to be reused.

1.04 SHORING, UNDERPINNING AND BRACING

A. When necessary and required, the Contractor shall provide underpinning and temporary shoring and bracings, all in accordance with code requirements and as approved by the CMCMUA.

B. Shoring and bracing shall be of such form and so installed as to safely support the work and interfere as little as possible with the progress of the work. Suitable means shall be provided to adjust any settlement in the shoring supports. Temporary shoring shall consist of sound timbers or rolled shapes of required dimensions which shall be removed after necessity for same ceases to exist. All work removed or damaged through installation of temporary shoring or through improper shoring shall be replaced or repaired after the shoring is removed, at no additional cost to the CMCMUA.

1.05 WORK PREPARATION AND TEMPORARY ACCESS

A. The Contractor, before commencing work, shall prepare and submit for approval a progress schedule in accordance with the requirements of Section 01300 - Submittals, in order to coordinate the work of all trades and to ensure completion on or before the completion date. The CMCMUA and the Engineer reserve the right to revise or modify such schedules as required to expedite each phase of work and to coordinate such work with the partial use of the building for purposes as directed.

B. No facility such as toilets, corridors, etc., shall be barricaded or access restricted without providing other temporary or interim means of access. It is further required that no work specified hereinafter shall disturb or interfere with the operation of the existing mechanical installation until proposed new work has been completed or satisfactorily installed. Exception may be made to this requirement only by written approval from the CMCMUA and Engineer.

C. Detailed sequence of availability of areas within the present buildings where work is to be performed under this contract shall be in accordance with Section 01520 - Maintenance of Utility Operations During Construction, but may be modified by the Contractor, upon authorization by the CMCMUA and Engineer as the work progresses.

D. Existing built-in equipment to remain in the final work, but requiring temporary removal for the installation of new construction, alterations, repairs and/or renovations, shall be disconnected and removed by the Contractor to temporary storage areas designated by the CMCMUA. Resetting and reconnecting of existing equipment under this heading shall be performed by the Contractor.

E. The Contractor shall furnish and install all temporary fire exits, fire extinguishers, hose, and safety devices as may be required by authorities having jurisdiction.

F. Work within existing buildings to be performed, once started, shall be completed as quickly as practicable and each trade shall determine before work is started that all required materials are on hand or readily obtainable to avoid delays.

1.06 DUST-PROOF PARTITIONS

A. The Contractor shall furnish and erect all necessary temporary dust-proof partitions that were required to protect unaltered portions of existing buildings and structures or as directed by the CMCMUA or Engineer.

B. Partitions shall be constructed of wood studs with plywood on both sides. Partitions shall extend from floor to ceiling with a closure plate at floor and ceiling. The Contractor shall furnish and install one door in each enclosure complete with hardware attached and keyed as directed. Such enclosures shall be required in areas of major demolition work and for protection of existing equipment.

1.07 WEATHER PROTECTION

A. Where exterior walls or roofs are being altered, or disturbed for any adjacent alteration, the Contractor shall provide temporary weather protection in those areas to keep interior of buildings absolutely dry and unaffected by the weather. The Contractor shall be held responsible for any damage caused by improper protection against weather.

B. Where existing exterior walls or roofs are disturbed due to alterations, disturbances shall be kept to a minimum and walls or roofs shall be repaired and patched in such a manner that the buildings will be absolutely watertight and meet the conditions of the existing roofing flashing and waterproofing bonds and guarantees.

1.08 CUTTING, PATCHING, REPAIRING, AND REFINISHING

A. The Contractor shall be responsible for cutting all openings in walls, floors and ceilings (indicated to remain) to accommodate alteration work under this contract in accordance with the requirements of the General Conditions, Supplemental Conditions, and as hereinafter specified. Rough patching and all finish patching shall be by the Contractor.

1. Where new openings are to occur in existing exterior and interior concrete and masonry bearing walls and structural concrete floor, the Contractor shall be required to notify the CMCMUA and Engineer in writing and shall obtain approval prior to cutting operations. The Engineer will determine whether such openings affect the structural stability or load-bearing capacities of walls and floors.

2. All holes and openings to be cut in existing walls, floors and ceilings of any nature shall be geometrically correct and no larger than necessary to accommodate the new work.

3. No cutting of finished or structural work may be done without the approval of the Engineer.

B. Major demolition and removal work such as demolition of buildings and structures, complete or nearly complete removal of floors, walls, and ceilings indicated on the drawings, shall be performed by the Contractor. The Contractor shall also be responsible for all finish patching operations of holes and openings in existing floors, walls, ceilings and roofs to accommodate the alteration work under the Plumbing, HVAC and Electrical Sections as well as that required for the Contractor's work hereinafter specified.

C. Contractor and/or its Subcontractors shall provide sleeves, forms and inserts for installation by the Contractor.

1.09 EXISTING EQUIPMENT AND FURNISHINGS

A. Existing built-in equipment to remain in the final work and requiring temporary removal shall be as hereinbefore specified under paragraph 1.05, D.

B. Existing appliances and portable equipment such as desks, chairs, tables, etc., shall remain the property of the CMCMUA and shall be removed from rooms and spaces to be altered by the Contractor prior to construction and alteration operations, and stored where directed by the CMCMUA.

C. All unsalvageable equipment shall become the property of the Contractor in accordance with the requirements of Section 01540, Demolition and Removal of Existing Structures and Equipment, and shall be removed from each building and away from the site. Equipment to be retained, or relocated, shall be as shown on the Drawings or as specified.

1.10 SCHEDULE OF INTERIOR FINISHES FOR EXISTING BUILDINGS

A. Unless otherwise specified, all materials required for the work in the existing buildings shall be new, and where required shall match existing adjacent finishes.

B. As indicated on the drawings, specified or otherwise required to complete the work, the Contractor shall cut new openings and block up existing openings in floors, walls,

partitions and ceilings; remove existing floors; remove, relocate existing and/or install new windows, doors, frames, transoms, access doors, partition sash and trim.

C. The Contractor shall remove window sash, frame, sill, stool and trim at exterior door openings to be blocked up; remove door, frame and trim and, unless otherwise hereinafter specified or indicated on the drawings to be blocked up with other materials, window and door openings shall be blocked up with brick and/or masonry block.

1. At the door, sash and other openings in interior partitions and walls to be closed, block up such openings with same materials and construction as adjacent, unless otherwise indicated on the drawings. Plaster and finishes applied at blocked up openings shall finish even and straight, flush with and of the same texture or other surface characteristics of existing adjacent finishes.

D. Existing finishes or subfloor surfaces that are scheduled to receive new floor finishes shall be repaired, patched with concrete, asphalt latex type emulsion, and underlayment as required to suit existing surfaces or the new floor surfacing material to be applied.

E. Concrete and floors disturbed by alterations shall be patched to finish even, straight and flush with adjacent surfaces.

F. Where new ceramic tile flooring or base is to be installed over present concrete floors or base, and where a cove exists at the floor, the Contractor shall cut away part of the cove by grinding or other approved means to the extent required for installation of the new flooring or base.

G. Existing partitions to be removed shall be removed for their entire height.

H. Where existing bases and other trim are removed and grounds are exposed and will not be covered by new finishing materials such as resilient base, new trim, or wall covering, grounds shall be removed and wall surfaces patched with plaster to finish even, straight and flush with adjacent existing plaster surfaces. Where existing plaster ceilings are scheduled to be removed, the ceilings shall be replaced with new metal furring, lathing and plaster finish or acoustical ceilings or other ceiling system as indicated on the drawings.

I. Where partitions or walls are removed and existing ceiling on each side of the partition or wall is to remain, the gap shall be patched; a vertical break shall be provided if the ceilings are at different levels. Where the ceiling on one (1) side is to remain and a new ceiling is scheduled for the area on the other side, the new ceiling shall be constructed so that the new and existing finished ceiling areas will be at the same level, be of the same materials and finish.

J. Existing floors, walls, and ceilings shall be cut as required for removal of existing services and for installation of new plumbing, heating, ventilating and air conditioning, and electrical work and related piping, ductwork, conduits, fixtures, and equipment.

K. In addition to work specifically called for in the finish schedule on the drawings, all finishes disturbed in the performance of any alterations or new work by any Contractor shall be patched or repaired to match existing surfaces or finishes. Holes, slots, chases, etc., in floors, walls and ceilings left by the removal of existing, or installation of new piping, plumbing fixtures, radiators, ductwork, registers, grills, conduit, receptacles, switches,

lighting fixtures and other items of this contract shall also be patched or repaired by the Contractor.

L. Existing spaces not listed on the finish schedule on the drawings may require no work other than complete painting and patching by the Contractor of surfaces damaged in the performance of any work included under this contract.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01040

COORDINATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall allow the CMCMUA or CMCMUA's agents, and other project Contractors or their agents, to enter upon the work for the purpose of constructing, operating, maintaining, removing, repairing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the work. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the CMCMUA, or others, to be done in connection with their work, or in connection with normal use of the facilities.

B. The Contractor shall cooperate fully with the CMCMUA or CMCMUA's agents, and all other Contractors employed on the work, to effect proper coordination and progress to complete the project on schedule and in the proper sequence. Insofar as possible, decisions of all kinds required from the CMCMUA shall be anticipated by the Contractor to provide ample time for inspection or the preparation of instructions.

C. The Contractor shall assume full responsibility for the correlation of all parts of their work with that of other Contractors. Contractor's and/or subcontractor's superintendent shall correlate all work with other Contractors in the laying out of work. Contractor and/or subcontractor's shall lay out their own work in accordance with the drawings, specifications, and instructions of the latest issue and with due regard to the work of others.

D. Periodic coordinating conferences shall be held per Section 01200 - Project Meetings of these contract documents.

1.02 CONTRACT DOCUMENTS

A. Every reasonable attempt has been made in the preparation of the Contract Documents to place various materials of construction and related requirements in their proper place both on the Drawings and in the Specifications. However, no guarantee is made that such locations are, in every instance, in accordance with where the Contractor might expect to find them.

B. The Contractor is required to provide or make available, all of the Contract Documents to each Vendor and Subcontractor, both prior to Bid to ensure proper Proposal, and during construction to ensure compliance with the intent of the Contract Documents. This is the sole responsibility of the General Contractor.

C. The CMCMUA's responsibilities are limited to the interpretation of the Contract Documents where questions might arise. The Contractor shall refer to the General Conditions which defines the limitations of the CMCMUA's responsibilities. The Contractor shall make decisions as to the acceptance or rejection of products to be employed in the work.

D. The Contractor is responsible for reading all the Specifications and following the various Contract Drawings. Contractor's review of all the Contract Documents as well as shop

drawings, coordination drawings and other information required to complete the project is the Contractor's sole responsibility. The Contractor shall request, in writing, clarification on any matters where ambiguities might exist.

1.03 SHOP DRAWINGS

A. The review and coordination of shop drawings between various trades, and the actual execution of the work and testing of materials shall be the responsibility of the General Contractor.

1.04 SUBCONTRACTORS

A. The CMCMUA is not responsible for project coordination between various subcontractors, which is the responsibility of the General Contractor. The various subcontractors and those people responsible to them are required to interact with each other to ensure that the work progresses in an orderly fashion and without exceeding the time allotted in the Contract.

1.05 TIME OF WORK

A. Unless otherwise approved by the CMCMUA, the Contractor is limited to work only non-holiday Monday through Friday, during the hours of 7:00 am to 3:30 pm, except as given in paragraph 1.05.B, below.

B. **Overtime Work:**

1. Overtime work shall be defined as work performed outside the non-holiday Monday through Friday regular workdays between the hours of 7:00 a.m. to 3:30 p.m. Holidays are listed in Attachment A.

2. If the Contractor, for the Contractor's own convenience and at the Contractor's own expense, should desire to perform overtime work, the Contractor shall notify the CMCMUA, in writing, forty-eight (48) hours prior to the start of overtime work. The Contractor must receive written approval for overtime work prior to commencing such work.

3. The Contractor shall pay all expenses for inspection services performed during overtime work. The Contractor shall pay the CMCMUA for the overtime inspection at a rate of eighty dollars ($80.00) per hour. The Contractor shall be charged a minimum of four (4) hours inspection for overtime work performed during Saturdays, Sundays, or CMCMUA observed Holidays. The appropriate amounts of this overtime inspection work shall be deducted from the Contractor's payment request.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

ATTACHMENT A
NORMAL BUSINESS HOURS
(When a Supervisor is Available)

WASTEWATER FACILITIES

Monday through Friday 7:00 a.m. to 3:30 p.m. (non-holidays)

HOLIDAY SCHEDULE

Holidays Closed

Holiday	Date	Weekday
New Year Day	Jan 01, 2023	Sunday
Martin Luther King Junior Day	Jan 16, 2023	Monday
President's Day	Feb 20, 2023	Monday
Good Friday	Apr 07, 2023	Friday
Easter	Apr 09, 2023	Sunday
Memorial Day	May 29, 2023	Monday
Independence Day	Jul 04, 2023	Tuesday
Labor Day	Sep 04, 2023	Monday
Columbus Day	Oct 09, 2023	Monday
Veterans Day	Nov 11, 2023	Saturday
Thanksgiving Day	Nov 23, 2023	Thursday
Day After Thanksgiving	Nov 24, 2023	Friday
Christmas Day	Dec 25, 2023	Monday
New Year Day	Jan 01, 2024	Monday
Martin Luther King Junior Day	Jan 15, 2024	Monday
President's Day	Feb 19, 2024	Monday
Good Friday	Mar 29, 2024	Friday
Easter	Mar 31, 2024	Sunday
Memorial Day	May 27, 2024	Monday
Independence Day	Jul 04, 2024	Thursday
Labor Day	Sep 02, 2024	Monday
Columbus Day	Oct 14, 2024	Monday
Veterans Day	Nov 11, 2024	Monday
Thanksgiving Day	Nov 28, 2024	Thursday
Day After Thanksgiving	Nov 29, 2024	Friday
Christmas Day	Dec 25, 2024	Wednesday

For the most current summer/holiday schedule please call (609) 465-9026 or visit our website www.cmcmua.com

(END OF SECTION)

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01 METHOD OF CONSTRUCTION

A. Before starting the work, the Contractor shall outline to the Owner by means of a written construction schedule, the methods the Contractor plans to use in doing the work and the various steps the Contractor intends to take. The construction schedule shall be updated, as specified during the preconstruction meeting, to accurately reflect construction progress, or on a bi-weekly basis if not stated in the preconstruction meeting.

1.02 CONTRACT DRAWINGS

A. **Dimensions of Existing Structures:**

1. The Contractor shall verify in the field, the dimensions and locations of existing structures and note where an error or incomplete information relative to the location or dimensions of existing structures would affect the construction to be done under this Contract. The Contractor shall verify such dimensions and locations before continuing with the construction work to the point where it would be affected.

2. The Contractor shall review the Drawings and Specifications to determine the extent of the work.

3. Before proceeding with any work, the Contractor shall confirm methods of construction, obtain field measurements, and verify all dimensions on the Drawings as required.

4. Failure of the Contractor to familiarize themselves with all Drawings and Specifications relating to the work and conditions existing at the site of construction will not relieve the Contractor of their obligation to furnish all material and labor necessary to carry out the provisions of the Contract Documents and to complete the contemplated work for the consideration set forth in this Bid.

B. **Existing Item Field Location:** The Contractor shall verify prior to any demolition, fabrication or construction, all dimensions noted "Field Verify". Items which are in disagreement with the plans and specifications shall be brought to the immediate attention of the Owner in writing.

C. **Lines, Grades and Measurements:**

1. The Contractor is responsible for constructing to the grades shown on the Drawings.

2. The Contractor shall adequately protect all benchmarks set by the Owner. If they are disturbed or obliterated by the Contractor during the progress of the work, they will be replaced by the Owner at the Contractor's expense.

D. **Additional Instructions and Detail Drawings:** The Owner may furnish to the Contractor additional instructions and detailed Drawings as may, in the opinion of the Owner, be required to clarify the work included in the Contract. The additional Drawings and instructions, thus supplied to the Contractor, will be coordinated with the Contract Documents and will be so prepared that they can be reasonably interpreted as a part thereof. The Contractor shall carry out the work in accordance with any additional detailed Drawings and instructions. Additional instructions and detail Drawings shall not be considered extra work.

1.03 AS-BUILT DRAWINGS

A. The Contractor is responsible to provide all changes made in the field during the course of construction to the Contract Drawings. The changes will be displayed as markings on the Contract Drawings. Such markings must be clear, understandable and legible.

PART 2 MATERIALS (Not Applicable To This Section)

PART 3 METHODS (Not Applicable To This Section)

(END OF SECTION)

SECTION 01060

REGULATIONS

PART 1 GENERAL

1.01 COMPLIANCE

A. All work under this Contract shall comply with all applicable requirements of Federal, State and Local Statutes, Regulations and Codes, and especially the safety provisions contained therein.

B. Certain work to be done within the scope of this Contract may be required to meet the specification of Persons, Municipalities or Bodies other than the Owner. The Contractor shall be responsible for obtaining the approval and acceptance of the Contractor's completed work by such Persons, Municipalities, Counties and similar Bodies.

C. The regulations listed herein may be pertinent to the work associated with this Contract. The list may be incomplete and should be verified by the Contractor.

1.02 FEDERAL REGULATIONS

A. 29 CFR 1910, et seq. Occupational Safety and Health Administration

1.03 NEW JERSEY REGULATIONS/LAWS

A. References:

1. Chapter 127, Public Laws of 1975, N.J.A.C. 17:27 Affirmative Action Requirements
2. N.J.S.A. 40A:11 Local Public Contracts Law
3. N.J.S.A. 34:11 Public Works Contractor Registration Act
4. P.L. 2004, C57 N.J. Business Registration Act
5. N.J.S.A. C. 150-63 and C64-74 Prevailing Wage Rates of Public Contracts
6. N.J.A.C. 5:18 Uniform Fire Code
7. N.J.A.C. 5:23 Uniform Construction Code
8. N.J.S.A. 58:10A New Jersey Underground Storage Tank Act
9. N.J.A.C. Title 7 Environmental Protection and Energy

   7:1E Discharge of Petroleum and Other Hazardous Substances
   7:14B Underground Storage Tanks
   7:26 Division of Waste Management
   7:26A Recycling Rules
   7:26E Technical Requirements for Site Remediation

B. **Non-Discrimination Provisions:** The Contractor shall refer to appropriate portions of the Specification regarding Non-Discrimination in Employment.

C. **Wage Rates:** The Contractor shall pay the wages and fringe benefits to all the Contractor's workers at rates not less than those shown, for each type of work, in compliance with the Wage Rates portion of the Specifications.

D. **Sales Tax Exemption:** The Contractor shall refer to the Instructions to Bidders and the General Conditions regarding sales tax exemptions.

1.04 LABOR, SAFETY, HEALTH AND SECURITY REGULATIONS

A. The Contractor shall refer to the appropriate portions of Instructions to Bidders and General Conditions regarding labor, safety, and health and security regulations.

B. The Contractor shall provide adequate signs, barricades and lights and take all necessary precautions for the protection of the work and the safety of the public.

C. The Contractor shall maintain sufficient protection devices by day and night to prevent accidents of any kind or character whatsoever, and shall be liable for any damage which may arise from any negligence on the Contractor's part or that of the Contractor's Agents, Employees or Subcontractors.

D. If, at any time, in the opinion of the Owner, the Engineer, an OSHA Enforcement Agent, a Police Officer, or the Local Code Enforcement Official, the work is not properly lighted, barricaded, and in all respects safe in respect to public travel, persons on or about the work, or public or private property, the Owner, an OSHA Enforcement Agent, a Police Officer or the Local Code Enforcement Official will have the right, but not the obligation, to order such safeguards to be erected and such precautions to be taken as deemed advisable, and the Contractor shall promptly comply with such orders.

1.05 PERMITS

1. The Contractor is totally responsible, at the Contractor's own cost, for procuring all the New Jersey and Local Municipal Building and Zoning Permits, where required. This effort shall include, but is not limited to:

   a. Preparing and submitting all applications.

   b. Preparing and providing the necessary quantity of all required engineering documents that are not included as part of the Contract Documents. Engineering documents prepared by the Contractor, such as drawings and calculations, must be signed and sealed by a Professional Engineer licensed in the State of New Jersey.

   c. Providing all support information required by the permit such as names, license numbers, application dates and signatures.

   d. Scheduling the required code inspections.

   e. Obtaining final certifications.

2. Copies of all permits, inspection reviews and final certifications must be provided to the Owner by the Contractor.

1.06 ENVIRONMENTAL PROTECTION

A. The Contractor shall minimize environmental impact due to the Contractor's construction operations during all phases of the Contractor's work. In addition to requirements as described in the Drawings and Specifications, the Contractor shall protect all trees and vegetation that are not in direct conflict with the proposed work, comply with all State and Local regulations prohibiting open burning, refrain from dumping spoil material into any storm sewer, stream corridor, wetlands or surface waters; refrain from pumping silt-laden water from trenches and other excavations into storm sewers, streams, wetlands and surface waters; mulch or otherwise protect disturbed areas as required or necessary to prevent erosion; and upon completion of the work, restore any damaged trees, vegetation, grass or otherwise landscaped areas to their original condition or as otherwise specified herein. The Contractor is also not to dispose of debris, trees and brush into any streams, wetlands or surface waters, nor alter the flow line of streams, unless specified in the plans and/or Specifications. If the Contractor causes any environmental impairments by spilling any hazardous substance or other activities, the Contractor shall be solely liable for all remediation costs as a result of their actions and/or inactions.

PART 2 MATERIALS (Not Applicable To This Section)

PART 3 METHODS (Not Applicable To This Section)

(END OF SECTION)

SECTION 01070

ABBREVIATIONS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The following is a partial list of typical abbreviations which may be used in the Specifications, and the organizations to which they refer:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACIFS	American Cast Iron Flange Standards
AFBMA	Anti-Friction Bearing Manufacturer's Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standard Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CEMA	Conveyor Equipment Manufacturer's Association
CMCMUA	Cape May County Municipal Utilities Authority (Owner, Authority, MUA)
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Research Association
Fed Spec	Federal Specifications
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
ISO	Insurance Services Offices
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NJDOT	New Jersey Department of Transportation
OSHA	Occupational Safety and Health Act
PCI	Precast Concrete Institute
UL	Underwriters Laboratories, Inc.
USGS	United States Geological Survey

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01090

REFERENCE STANDARDS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Wherever reference is made to any published standards, codes, or standard specifications, it shall mean the latest standard code, specification, or tentative specification of the technical society, organization, or body referred to, which is in effect at the date of invitation for Bids.

B. All materials, products, and procedures used or incorporated in the work shall be in strict conformance with applicable codes, regulations, specifications, and standards.

C. A partial listing of codes, regulations, specifications, and standards includes the following:

Air Conditioning and Refrigeration Institute (ARI)

Air Diffusion Council (ADC)

Air Moving and Conditioning Association (AMCA)

The Aluminum Association (AA)

American Architectural Manufacturers Association (AAMA)

American Concrete Institute (ACI)

American Gear Manufacturers Association (AGMA)

American Hot Dip Galvanizers Association (AHDGA)

American Institute of Steel Construction, Inc. (AISC)

American Iron and Steel Institute (AISI)

American National Standards Institute (ANSI)

American Society of Civil Engineers (ASCE)

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

American Society of Mechanical Engineers (ASME)

American Society for Testing and Materials (ASTM)

American Standards Association (ASA)

American Water Works Association (AWWA)

American Welding Society (AWS)

American Wood-Preserver's Association (AWPA)

Anti-Friction Bearing Manufacturers Association (AFBMA)

Building Officials and Code Administrators (BOCA)

Conveyor Equipment Manufacturers Association (CEMA)

Consumer Product Safety Commission (CPSC)

Factory Mutual (FM)

Federal Specifications (FED SPEC)

International Electrotechnical Commission (IEC)

Instrument Society of America (ISA)

Institute of Electrical and Electronics Engineers (IEEE)

National and Local Fire Codes

Lightning Protection Institute (LPI)

National Electrical Code (NEC)

National Electrical Manufacturer's Association (NEMA)

National Electrical Safety Code (NESC)

National Electrical Testing Association (NETA)

National Fire Protection Association (NFPA)

Regulations and Standards of the Occupational Safety and Health Act (OSHA)

Southern Building Code Congress International, Inc. (SBCCI)

Sheet Metal & Air Conditioning Contractors National Association (SMACCNA)

Standard Building Code

Standard Mechanical Code

Standard Plumbing Code

Uniform Building Code (UBC)

Underwriters Laboratories Inc. (UL)

D. Contractor shall, when required, furnish evidence satisfactory to the Owner that materials and methods are in accordance with such standards where so specified.

E. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on-site by the Contractor.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01126

CONFINED SPACE PROCEDURES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The purpose of this section is to ensure that the Contractor's workers are safeguarded from hazardous atmospheres and conditions while entering or occupying the pump stations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The contractor whose employees may enter hazardous areas shall comply with the following regulations:

1. 29 CFR Part 1926 (OSHA Construction Industry Regulations and Standards) including but not limited to 29 CFR 1926 Subpart AA (Confined Spaces in Construction)

2. Applicable sections of 29 CFR Part 1910 (OSHA General Industry Regulations and Standards) including but not limited to applicable sections of 29 CFR 1910.146 (Permit-Required Confined Spaces).

3. New Jersey State regulations.

1.03 DEFINITIONS

A. **Hazardous Area:** any area that has the potential to contain a hazardous atmosphere or other hazardous conditions, including the risk of immersion, limited egress, etc.

B. **Hazardous Atmosphere:** any atmosphere that has one or more of the following characteristics:

1. Is a toxic atmosphere;

2. Is oxygen-deficient or oxygen-enriched;

3. Is an explosive atmosphere.

C. **Toxic Atmosphere:** any atmosphere in which the concentration of any airborne contaminant exceeds the OSHA Permissible Exposure Limit (PEL) or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) established for the contaminant.

D. **Oxygen-Deficient Atmosphere:** any atmosphere having less than 19.5% oxygen content.

E. **Oxygen-Enriched Atmosphere:** any atmosphere having greater than 22% oxygen content.

F. **Explosive Atmosphere:** is any atmosphere that contains a concentration of flammable or combustible material in excess of 10% of its Lower Flammable Limit (LFL) or Lower Explosive Limit (LEL) which are the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

G. Hazardous Areas may include but are not limited to, rooms, channels, and building roofs.

1.04 RESPONSIBILITIES

A. The Contractor's Responsibilities:

1. The Contractor shall be solely responsible for complying with applicable standards of conformance, including, but limited to, the following:

   a. Establish written procedures for hazardous area entry that includes work permit requirements

   b. Ensure that all affected personnel are properly trained in all aspects that may affect their safety during hazardous area entry.

   c. Ensure that affected employees are provided with information and training concerning potentially hazardous atmospheres.

   d. Provide all necessary instruments and equipment needed for complying with established procedures, including (but not limited to):

      1) Testing of the atmosphere with direct-reading instruments with the ability to read Hydrogen Sulfide, Oxygen, Low Explosive Level (LEL) and Carbon Monoxide (CO). (4-gas monitors);

      2) Personal protective equipment;

      3) Positive ventilation equipment (e.g., supply and exhaust blowers and flexible ducts).

2. The Contractor shall be solely responsible for interpreting hazard information provided by the CMCMUA and for providing training and information to employees in accordance with the requirements of 29 CFR Part 1926.59 (OSHA Hazard Communication Standard).

3. The Contractor shall have and follow a written permit-required confined space (PRCS) program and utilize their own entry permit. Both the contractor program & entry permit must be at least as stringent as those required by this procedure.

1.05 PERMIT-REQUIRED CONFINED SPACE (PRCS)

A. According to OSHA 29 CFR 1926.1202 and 1910.146, a PRCS is a space that meets all the requirements of a confined space AND that potentially has ANY one

or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere.

2. Contains a material with the potential for engulfment of an entrant.

3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section.

4. Contains any other recognized serious safety or health hazard.

B. The contractor shall provide signs identifying each space as "permit-required" per the definition above and shall be permanently affixed outside of each opening leading to the space. Sign wording shall comply with OSHA 1910.146(c)(2). Each entry port or access to a confined space shall be secured such as to prevent unauthorized access.

1. The sign shall read "DANGER-PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or use other similar languages that would satisfy the requirement for the signs.

2. The sign shall be 10" x 7" and be fabricated of aluminum.

1.06 CONFINED SPACE ENTRY PROCEDURE

A. The contractor must have a written permit space entry program that complies with 1926.1204 implemented at the construction site.

B. The Contractor shall be required to hold a pre-entry safety meeting to review the details of the permit, job-specific information regarding the nature of the work to be performed, the potential hazards associated (including atmospheric conditions), the correct use of required personal protective equipment and monitoring equipment, and emergency procedures.

C. The Contractor shall be responsible for verifying that all individuals who enter the confined space are currently qualified for confined space entry and respiratory protection.

D. All pipe and lines shall be cleaned out and locked-out prior to entry.

E. All electrical and mechanical equipment shall be disconnected and/or de-energized and locked/tagged out; power supplies to pumps shall be shut off and the controls locked in the "OFF" position by means of padlocks; the designated Entry Supervisor shall retain positive control of all padlock keys; each electrical panel is to be tagged/labeled to indicate the reason why the panels are locked out.

F. Air monitoring shall be conducted prior to and continuously throughout the entry; the atmosphere shall be checked in an area that would represent the breathing zones of the employees while performing work inside confined space; measurements shall be taken and recorded for the following:

1. Alarms on monitors must be set at:

   a. Hydrogen sulfide (H_2S) at 10 ppm.

   b. Oxygen low at 19.5%, high at 23%.

   c. Low Explosive Limit (LEL) at 10%.

   d. Carbon Monoxide (CO) at 100 ppm.

2. Mechanical and/or natural ventilation must be provided prior to entry into the wet wells to maintain an atmosphere of:

   a. Hydrogen sulfide (H_2S) less than 10 ppm

   b. Oxygen low at 20%, high at 22%

   c. Low Explosive Limits (LEL) at 0%

   d. Carbon Monoxide (CO) at 0 ppm.

G. The entrance to the confined space shall be maintained free of obstructions, debris, and/or other conditions that prevent ready entry into and exit from the confined space.

H. At least one designated attendant shall be stationed at the entrance to the confined space and shall have some means to summon medical or other emergency assistance without leaving the confined space entrance.

I. Communication shall be maintained between the designated attendant and authorized entrants in the confined space; radio or retrieval line signals must be used when authorized entrants are out of sight of the attendant; affected employees shall be trained in the use of the communication system which shall be tested before each use;

J. When entering confined spaces which previously contained flammable or combustible materials, the following additional requirements shall apply:

   1. All electrical equipment, including lighting, shall be explosion-proof and safe for use in Class I, Division I atmospheres.

   2. All monitoring equipment shall be intrinsically safe for use in Class I, Division I atmospheres.

   3. Ground fault circuit interrupters shall be used as appropriate.

   4. Non-sparking tools shall be used.

K. If ventilation is required during confined space work in order to minimize concentrations of air contaminants and to maintain the oxygen content at safe levels in the confined space, additional considerations shall be made.

L. Monitoring for oxygen content, flammable gases or vapors and potential toxic contaminants shall be performed continuously and documented periodically on the entry permit to ensure that changes in atmospheric conditions are identified and workers are adequately protected. Air monitoring instruments that shall be used include combustibles indicators, oxygen indicators, colorimetric gas detector tubes, organic vapor analyzers, and other direct reading air contaminant measuring devices.

M. When preparing to enter a permit-required confined space, the following air testing requirements shall apply:

1. A person with adequate knowledge and training shall perform appropriate confined space testing. Instruments shall be calibrated and maintained according to manufacturer requirements.

2. Initial air testing of the confined space shall be made from outside of the confined space. Initial testing of the confined space shall be completed with mechanical ventilation equipment off so that "worst case" conditions can be assessed;

3. All air testing results shall be recorded on the entry permit.

N. In addition to atmospheric testing, positive steps shall be taken to ensure that employees are protected from physical hazards in the permit-required confined space

O. Personal protective and safety equipment shall be required and maintained according to OSHA 1926.1204(d).

1.07 ENFORCEMENT

A. Performance may be audited by the job-site representative of the CMCMUA. The representative may, at their discretion, obtain advice from technical specialists. However, CMCMUA is under no contractual obligation to perform such functions.

B. Failure of the Contractor to conform to applicable safety standards or to meet Contractor's responsibilities, whether or not explicitly covered in this section, may cause the job-site representative either to prevent work from starting or to stop work in progress.

C. Repeated or egregious failures on the part of the Contractor to comply with any requirements of the Section may result in termination of the Contract. CMCMUA bears no liability for losses, either direct or incidental, suffered by the Contractor in such cases.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 MEASUREMENT

A. Measurement for payment shall be made on the basis of the completion of the work in accordance with the contract documents.

B. The Lump Sum Prices Bid in the Proposal shall be broken down as described herein.

1.02 PAYMENT

A. Current Payments: Payments shall be as stated in the Conditions and at the Unit and Lump Sum Prices Bid in the Proposal. Payment for unit price items shall be made at the unit prices Bid in the Proposal for the actual quantity of items furnished and installed by the Contractor in accordance with the specifications as approved by the CMCMUA. Requests for partial or progress payments for Lump Sum Prices shall be based upon the Contractor's Schedule of Values.

1. The Schedule of Values must be submitted by the Contractor and approved by the CMCMUA before the Contractor receives the first payment.

B. Mobilization/Demobilization: The cost of mobilization and demobilization is included in bid item number 1.

1. Includes expenses incurred in assembling and setting up for work in the area of the worksite, moving equipment, materials apparatus, tools and storage facilities and all other associated costs. Includes all expenses for removal of the same.

2. Includes expenses for insurance and bonds and such other initial expense required for the start of work.

3. Monies are payable to the Contractor whenever the Contractor has completed ten percent (10%) of the work on the contract. Work will be considered ten percent (10%) complete when the total payments earned, excluding the amount for mobilization, for work done exceeds ten percent (10%) of the total contract price, as verified by the CMCMUA.

4. The price bid for mobilization must be limited to a maximum of three percent (3%) of the total price bid as given in the Proposal.

1.03 PAYMENT AND COST BREAKDOWN SUBMITTAL

A. Prior to the first payment, the Contractor shall have submitted and received approval on a cost breakdown (Schedule of Values) of all Lump Sum Prices Bid which shall be used in preparing the payment applications. The breakdown shall be in sufficient detail to facilitate a meaningful and fair estimate of work in place as evaluated by the CMCMUA. Any unrealistic breakdown of work that is anticipated early in the construction period may be cause for rejection of the breakdown and require re-submittal prior to any payment.

B. The Schedule of Values of all Lump Sum Prices Bid must show the value assigned to each part of the work including an allowance for profit and overhead in accordance with the

General Conditions. Upon approval of the Schedule of Values by the CMCMUA, it shall be used as the basis for all requests for payment. Specific items may require an additional subdivision as requested by the CMCMUA.

1.04 PAYMENT FOR MISCELLANEOUS/RELATED WORK

A. Separate payment shall not be made for all miscellaneous or related work necessary to complete the project, but not specifically stated in the Proposal. Payment for completing all such related work shall be included in the costs submitted by the Contractor in the Proposal.

1.05 DESCRIPTION OF PAY ITEMS

A. The summary below is provided to supplement the bid schedule and provide additional information on each of the items.

No.	Item	Unit	Description
1.	Mobilization	Lump-Sum	Mobilization shall consist of the cost of initiating, completion, and closeout of the contract. Payment for mobilization will be made to a maximum of three percent (3%) of the total amount bid for this item. Payable to Contractor whenever the Contractor has completed ten percent (10%) of the Contract work, not including Mobilization.
2.	Final Documentation	Fixed Amount	The Contractor shall provide all labor and materials and do all the work necessary to provide Operation and Maintenance Manuals, As-Built Drawings, warranties, training, testing, and startup activities at Ten Thousand Dollars ($10,000.00). The Ten Thousand Dollars ($10,000.00) will be paid as a lump sum after the final acceptance of the Operation & Maintenance Manuals and other final documentation; the Contractor shall not be entitled to a partial payment for this bid item.
3.	Contract Allowance	Allowance	The Contractor shall provide a fixed amount allowance of Three Hundred Thousand Dollars ($300,000.00) for all labor, equipment and materials to perform all miscellaneous work associated with unforeseen site conditions not provided for in the contract documents. The quantity, type of work and the not-to-exceed cost shall be approved by the CMCMUA in writing and in advance of said work. Payment to the Contractor shall be made only for work actually completed as substantiated by labor and material invoices. Markups for overhead and profit shall be in accordance with Section 00300, General Conditions.

4.	Thirty-Three (33) PLC Electrical Panel Assembly and Factory Acceptance Testing (FAT)	Lump-Sum	The Contractor shall provide all labor and purchase all, equipment, and materials, and associated costs for the assembly of all thirty-three (33) PLC electrical panels, as indicated in the Drawings, as specified within the contract specifications. Per drawings in each section below. (5 through 37)
5.	Oak Avenue Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Oak_Electrical.
6.	Neptune Avenue Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Neptune_Electrical.
7.	Lower Twp Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Lower_Electrical.
8.	Rio Grande Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Rio_Electrical.
9.	10th Avenue Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_10th_Electrical.
10.	Spicer Avenue Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Spicer_Electrical.
11.	Rosemary Road Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment,

			as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Rosemary_Electrical.
12.	Shawcrest Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Shawcrest_Electrical.
13.	WW Effluent Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Effluent_Electrical.
14.	WW Preliminary Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Preliminary_Electrical.
15.	WW Sludge Processing Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Sludge_Electrical.
16.	WW Thickener Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Thickener_Electrical.
17.	WW Clarifier Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Clarifier_Electrical.
18.	WW Admin Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Admin_Electrical.
19.	WW Chemical Addition Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site

			Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_ChemcialAddition_Electrical.
20.	WW Primary Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Primary_Electrical.
21.	WW Secondary Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. Wildwood_DWG_ Plant_Secondary_Electrical.
22.	Madison Avenue Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Madison_Electrical.
23.	Claghorn Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Claghorn_Electrical.
24.	Coral Avenue Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Coral_Electrical.
25.	CM Effluent Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Effluent_Electrical.
26.	CM Preliminary Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Preliminary_Electrical.

27.	CM Sludge Processing Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Madison_Electrical.
28.	CM Admin Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. CapeMay_DWG_ Plant_Admin_Electrical.
29.	OC Secondary Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_Secondary_Electrical.
30.	OC Primary Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_Primary_Electrical.
31.	OC Effluent Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_Effluent_Electrical.
32.	OC Sludge Processing Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_Sludge_Electrical.
33.	OC Admin Building	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_Admin_Electrical.
34.	20th Street Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_

			Plant_20th_Electrical.
35.	32nd Street Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_32nd_Electrical.
36.	3rd Street Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_3rd_Electrical.
37.	46th Street Pump Station	Lump-Sum	The Contractor shall provide all labor, equipment, except pay item number 4, materials, and associated costs for the installation and Site Acceptance Testing of control system equipment, as indicated in the Drawings, as specified within the contract specifications. OceanCity_DWG_ Plant_46th_Electrical.

B. The Contractor shall be responsible for the full and complete upgrades associated with the bid items. The bid prices submitted shall be all-inclusive of all costs associated with each bid item required for a full and complete installation, including but not limited to:

1. **PLC Electric Panel Assembly**
   - **a.** Assembly, wiring, and factory acceptance testing of PLC electrical enclosures as indicated on the provided electrical and arrangement drawings.

2. **Preparation**
   - **a.** Tracing and tagging of all field wiring in existing PLC electrical enclosures.
   - **b.** Set up and wiring of temporary control systems that will allow equipment to continue to operate with CMCMUA approval of limited capabilities during the demolition and installation process.
   - **c.** Installation of sensors and field equipment as indicated by the specifications. Installation of wiring and conduit between electrical enclosures and equipment as indicated by the specifications.

3. **Demolition of existing equipment**
   - **a.** Removal of existing PLC electrical enclosures and contents.
   - **b.** Proper disposal of all materials in an appropriate location.
   - **c.** Salvage of equipment at the request of the CMCMUA.

4. **Installation**
   - **a.** Materials, labor, tools, and equipment for mounting of new PLC electrical enclosures, and termination of field wiring in the enclosures as indicated by the drawings.

b. Maintenance of workplace environment in accordance with section 01126 – Confined Space Procedures.

5. **Startup**
   a. Support during commissioning and testing to correct any wiring discrepancies found between field devices and PLC enclosures.

C. PAYMENT FOR MISCELLANEOUS/RELATED WORK

1. Separate payment shall not be made for all miscellaneous or related work necessary to complete the project, but not specifically stated in the Proposal. Payment for completing all such related work shall be included in the costs submitted by the Contractor in the Proposal.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01200

PROJECT MEETINGS

PART 1 -- GENERAL

1.01 PRE-BID SITE VISITS

A. Site visits of the plant and pump station interiors shall be limited and scheduled in accordance with Section 1.01 B. No other opportunities will be made available to visit the plant and pumping station interiors. The purpose is to provide bidders the opportunity to enter each station as they are confined space environments. All OSHA regulations must be followed during the site visits.

B. Due to the various site locations and the safety restrictions applicable regarding the plant and pump station access, visits to the sites shall be limited. Please contact the CMCMUA to schedule visits to any of the sites. The contact person for the site visits shall be Mr. Robert Winder (609-465-9026 winderr@cmcmua.com). Note: These are operating facilities. Proper attire, including hart hats, safety glasses and work shoes (not provided by the CMCMUA), are required. Confined Space Procedures must be adhered to.

C. The CMCMUA will answer no questions during the pre-bid site visits.

D. No oral interpretation will be made as to the meaning of the documents. All questions shall be submitted in writing. All questions regarding these technical specifications shall be submitted in writing to the CMCMUA Purchasing Department at the following e-mail address: purchasing@cmcmua.com.

1.02 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be held after Award of Contract, but prior to starting work at the site.

B. Attendance:

1. CMCMUA
2. Engineer
3. Contractor
4. Major Subcontractors

C. Minimum Agenda:

1. Tentative construction schedule
2. Critical work sequencing
3. Designation of responsible personnel
4. Processing of Field Decisions and Change Orders
5. Adequacy of distribution of Contract Documents

6. Submittal of Shop Drawings and samples

7. Procedures for maintaining record documents

8. Use of site and CMCMUA's requirements

9. Major equipment deliveries and priorities

10. Safety and first aid procedures

11. Security procedures

12. Housekeeping procedures

13. Processing of Partial Payment Requests

14. General regard for community relations

1.03 PROGRESS MEETING

A. Progress meetings will be held monthly at the Cape May Administration Office (located at 1523 U.S. 9 North, Cape May Court House, NJ 08210) or virtually during the performance of the work of this contract. Additional meetings may be called as the progress of work dictates at the appropriate location(s).

B. The CMCMUA will preside at meetings and record minutes of proceedings and decisions. The CMCMUA will distribute copies of minutes to participants.

C. **Attendance:**

1. CMCMUA

2. Contractor

3. Subcontractors, only with Engineer's approval or request, as pertinent to the agenda

D. **Minimum Agenda:**

1. Review and approve minutes of previous meetings.

2. Review progress of Work since the last meeting.

3. Review proposed 30-60 day construction schedule.

4. Note and identify problems that impede planned progress.

5. Develop corrective measures and procedures to regain the planned schedule.

6. Revise the construction schedule as indicated and plan progress during the next work period.

7. Maintaining quality and work standards.

8. Complete other current business.

9. Schedule the next progress meeting.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01300

SUBMITTALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Progress Schedule

1. Within thirty (30) days after issuance of the Notice to Proceed, the Contractor shall prepare and submit in PDF format the proposed progress schedule to the CMCMUA for review and approval.

2. If so required, the schedule shall be revised until it is approved by the CMCMUA.

3. The schedule shall be updated monthly, depicting progress to the last day of the month and submitted to the CMCMUA in PDF format no later than the fifth day of the next month, and prior to the application for progress payment. Failure to provide monthly schedule updates will be grounds for the CMCMUA to withhold progress payment approval.

4. The schedule shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the work and identifying construction activities for each structure and for each portion of work.

5. The schedule shall be time-scaled, identifying the first day of each week. The schedule shall be provided with estimated dates for an early start, early finish, late start, and late finish. The work shall be scheduled to complete the project within the contract time. The late finish date shall equal the contract completion date.

6. The schedule shall show duration (number of days) and float for each activity. Float shall be defined as the measure of leeway in starting or completing a scheduled activity without adversely affecting the project completion date established by the contract documents.

7. An updated schedule shall show all changes since the previous submittal.

8. All revisions to the schedule must have the prior approval of the CMCMUA.

9. Please note there are electrical upgrades ongoing at certain pump stations that may affect this contracts schedule. See attached Electrical Upgrade schedule. Attachment I

B. Equipment and Material Orders Schedule

1. The contractor shall prepare and submit the schedule of principal items of equipment and materials to be purchased in PDF format to the CMCMUA for review and approval.

2. If so required, the schedule shall be revised until it is approved by the CMCMUA.

3. The schedule shall be updated monthly and submitted in PDF format to the CMCMUA not later than the fifth day of every month with the application for progress payment.

4. The updated schedule shall be based on the Progress Schedule developed under the requirements of Paragraph 1.01(A) of this Section.

5. The schedule shall be in tabular form with appropriate spaces to insert the following information for principal items of equipment and materials:

   a. Dates on which shop drawings are requested and received from the manufacturer.

   b. Dates on which certification is received from the manufacturer and transmitted to the CMCMUA.

   c. Dates on which shop drawings are submitted to the CMCMUA and returned by the CMCMUA for revision.

   d. Dates on which shop drawings are revised by the manufacturer and resubmitted to the CMCMUA.

   e. Date on which shop drawings are returned by CMCMUA annotated either "Furnish as Submitted" or "Furnish as Corrected."

   f. Date on which accepted shop drawings are transmitted to the manufacturer.

   g. Date of manufacturer's scheduled delivery.

   h. Date on which delivery is actually made.

C. **Working Drawings**

1. Within thirty (30) days after the Notice to Proceed, the Contractor shall prepare and submit the preliminary schedule of working drawing submittals to the CMCMUA in PDF format for review and approval. If so required, the schedule shall be revised until it is approved by the CMCMUA.

2. Working drawings include, but are not limited to, shop drawings, layout drawings in plan and elevation, installation drawings, elementary wiring diagrams, interconnecting wiring diagrams, manufacturer's data, etc. The contractor shall be responsible for securing all of the information, details, dimensions, drawings, etc., necessary to prepare the working drawings required and necessary under this contract and to fulfill all other requirements of the contract. The contractor shall secure such information, details, drawings, etc., from all possible sources including the drawings, working drawings prepared by subcontractors, CMCMUAs, suppliers, etc.

3. **Working Drawings shall accurately and clearly present the following:**

   a. All working and installation dimensions.

b. Arrangement and sectional views.

c. Units of equipment in the proposed positions for installation, details of required attachments and connections, and dimensioned locations between units and in relation to the structures.

d. Necessary details and information for making connections between the various trades including, but not limited to, power supplies and interconnecting wiring between units, accessories, appurtenances, etc.

4. In the event that the CMCMUA is required to provide additional engineering services as a result of a substitution of materials or equipment by the Contractor, the additional services shall be provided in accordance with Section 01010 - Summary of Work, and will be covered in supplementary or revised drawings which will be issued to the Contractor. All changes indicated that are necessary to accommodate the equipment and appurtenances shall be incorporated into the working drawings submitted to the CMCMUA.

5. Working drawings specifically prepared for this project shall be digital or other approved reproducible material sheets of the same size as the drawings. Working drawings shall conform to recognized drafting standards and be neat, legible, and drawn to a large enough scale to show in detail the required information.

6. The drawings are used for engineering and general arrangement purposes only and are not to be used for working drawings.

7. **Shop Drawings**

a. The contractor shall submit for review by the Engineer shop drawings for all fabricated work and for all manufactured items required to be furnished by the contract documents.

b. Structural and all other layout drawings prepared specifically for the project shall have a plan scale of not less than 1/4-inch = 1 foot.

c. Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submittals shall specifically indicate the item for which approval is requested. Identification of items shall be made in ink, and submittals showing only general information shall not be acceptable.

d. All shop drawings shall be submitted electronically in PDF format. Hard copies of shop drawings shall not be permitted except where indicated.

8. **Layout and Installation Drawings**

a. Contractor shall prepare and submit for review by the CMCMUA layout and installation drawings for all pipes, valves, fittings, sewers, drains, heating and ventilation ducts, all electrical, heating, ventilating and other conduits, plumbing lines, electrical cable trays, lighting fixture layouts, and circuiting, instrumentation, interconnection wiring diagrams, communications, power supply, alarm circuits, etc., under this contract. The final dimensions, elevation, location, etc., of pipe, valves, fittings, sewers, ducts, conduits,

electrical cable trays, equipment, etc., may depend upon the dimensions of equipment and valves to be furnished by the Contractor.

b. Layout and installation drawings are required for both interior and exterior piping, valves, fittings, sewers, drains, heating and ventilation ducts, conduits, plumbing lines, electrical cable trays, etc.

c. Layout and installation drawings shall show connections to structures, equipment, sleeves, valves, fittings, etc.

d. Drawings shall show the location and type of all supports, hangers, foundations, etc., and the required clearances to operate valves, equipment, etc.

e. The drawings for pipes, ducts, conduits, etc., shall show all ¾"-inch and larger electrical conduits and pressure piping, electrical cable trays, heating and ventilation ducts or pipes, structure, manholes or any other feature within four (4) feet (measured as the clear dimension) from the pipe duct, conduit, etc., for which the profile is drawn.

9. **Contractor Responsibilities**

a. All submittals from subcontractors, manufacturers, or suppliers shall be sent directly to the contractor for checking. The contractor shall thoroughly check all drawings for accuracy and conformance to the intent of the contract documents. Drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors, manufacturers, or suppliers by the Contractor for correction before submitting them to the CMCMUA.

b. All submittals shall be bound, dated, properly labeled, and consecutively numbered. Information on the label shall indicate specification section, drawing number, subcontractor's, manufacturer's or supplier's name, and the name or type of item the submittal covers. Each part of the submittal shall be marked and tabulated.

c. Working drawings shall be submitted as a single complete package including all associated drawings relating to a complete assembly of the various parts necessary for a complete unit or system.

d. Shop drawings shall be submitted as a single complete package for any operating system and shall include all items of equipment and any mechanical units involved or necessary for the functioning of such a system. Where applicable, the submittal shall include elementary wiring diagrams showing circuit functioning and necessary interconnection wiring diagrams for construction.

e. ALL SUBMITTALS SHALL BE THOROUGHLY CHECKED BY THE CONTRACTOR FOR ACCURACY AND CONFORMANCE TO THE INTENT OF THE CONTRACT DOCUMENTS BEFORE BEING SUBMITTED TO THE CMCMUA AND SHALL BEAR THE CONTRACTOR'S STAMP OF APPROVAL CERTIFYING THAT THEY HAVE BEEN SO CHECKED. SUBMITTALS WITHOUT THE

CONTRACTOR'S STAMP OF APPROVAL WILL NOT BE REVIEWED BY THE CMCMUA AND WILL BE RETURNED TO THE CONTRACTOR.

f. If the submittals contain any departures from the contract documents, specific mention thereof shall be made in the Contractor's letter of transmittal. Otherwise, the review of such submittals shall not constitute approval of the departure.

g. No materials or equipment shall be ordered, fabricated, shipped or any work performed until the CMCMUA returns to the Contractor the submittals, herein required, annotated "No Exceptions Taken" or "Make Corrections Noted".

h. Where errors, deviations, and/or omissions are discovered at a later date in any of the submittals, the CMCMUA's prior review of the submittals does not relieve the Contractor of the responsibility for correcting all errors, deviations, and/or omissions.

10. Procedure for Review

a. Submittals shall be transmitted to the CMCMUA for review and approval within thirty (30) calendar days of the issuance of the Notice to Proceed.

b. Submittals acted upon by the CMCMUA and will be transmitted to the Contractor no later than twenty (20) working days after the receipt.

c. The contractor shall correct and resubmit the shop drawings within ten (10) business days of the receipt by the Contractor of the request for resubmittal.

d. The contractor shall transmit, in PDF format, all technical data or drawings to be reviewed.

e. Submittal shall be accompanied by a letter of transmittal containing date, project title, Contractor's name, number and titles of submittals, a list of relevant specification sections, notification of departures from any Contract requirement, and any other pertinent data to facilitate a review.

f. Transmit electronic submittals in accordance with schedule of submittals, and deliver as follows:
Transmit to:
Mr. Robert Winder
Cape May County Municipal Utilities Authority
1523 Route 9 North
Cape May Court House, NJ 08210
winderr@cmcmua.com

g. Provide a space approximately 8" x 4" on the transmittal or beside the title block on Shop Drawings to record the Contractor's review and approval prior to submitting to the Engineer.

h. Drawings and other documents stamped "Amend and Resubmit" or "Rejected" shall be resubmitted within ten (10) working days of receipt by the Contractor. Identify all changes made since previous submittals.

a. If major changes or corrections are necessary, one (1) set will be returned to Contractor with changes or corrections indicated.

b. Amend and resubmit the Shop Drawings in the same manner and quantity as specified for the original submittal.

i. When Shop Drawings have been reviewed by the CMCMUA and stamped "No Exceptions Taken" or "Make Corrections Noted", an electronic PDF version of the document(s) will be returned to Contractor and released for fabrication and construction.

a. Contractor shall make all corrections and submit two (2) hard copies and one (1) electronic copy for record.

j. Contractor shall continue to resubmit submittals if they are returned "Amend and Resubmit" or "Rejected" until submissions are acceptable to the CMCMUA. It is understood by the Contractor that the CMCMUA may charge the Contractor, the CMCMUA's charges, for review in the event a submittal is not approved (either "No Exceptions Taken" or "Make Corrections Noted") by the third submittal for a system or piece of equipment. These charges shall be for all costs associated with engineering review, meetings with the Contractor or manufacturer, etc., commencing with the fourth submittal of a system or type of equipment submitted for a particular specification section.

k. Acceptance of a working drawing by the CMCMUA will constitute acceptance of the subject matter for which the drawing was submitted and not for any other structure, material, equipment, or appurtenances indicated or shown.

11. CMCMUA's Review

a. CMCMUA's review of the Contractor's submittals shall in no way relieve the Contractor of any of the Contractor's responsibilities under the contract. Acceptance of a submittal shall be interpreted to mean that the CMCMUA has no specific objections to the submitted material, subject to conformance with the contract drawings and specifications.

b. CMCMUA's review will be confined to a general arrangement and compliance with the contract drawings and specifications only, and shall not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of trades, etc.

12. Record Working Drawings

a. The contractor shall maintain current record drawings onsite for the CMCMUA's review. Record drawings shall be updated monthly at a minimum.

b. Prior to final payment, the Contractor shall furnish the CMCMUA one complete set of all accepted working drawings, including shop drawings, for equipment, piping, electrical work, heating system, ventilating system, air conditioning system, instrumentation system, plumbing system, structural, interconnection wiring diagrams, etc.

c. Working drawings furnished shall be corrected to include any departures from previously accepted drawings.

D. Operation and Maintenance Manuals

1. Two (2) preliminary copies of Operation and Maintenance Manuals, prepared specifically for this project, shall be furnished for each item of equipment furnished under this contract. The preliminary manuals shall be provided to the CMCMUA not less than sixty (60) days prior to the start-up of the respective equipment.

2. The preliminary manuals shall be reviewed by the CMCMUA prior to the Contractor submitting final copies for distribution to the CMCMUA. Following the review of the preliminary copies of the Operation and Maintenance Manuals, one (1) copy will be returned to the Contractor with required revisions noted, or the acceptance of the CMCMUA noted.

3. Manuals shall contain complete information in connection with assembly, operation, lubrication, adjustment, wiring diagrams and schematics, maintenance, and repair, including detailed parts lists with drawings or photographs identifying the parts.

4. Manuals furnished shall be assembled and bound in separate volumes, by major equipment items or trades, and properly indexed to facilitate locating any required information. In addition, manuals should be labeled in the front cover with the project, name, equipment description, and manufacturer contact information.

5. The CMCMUA shall be the sole judge of the acceptability and completeness of the manuals and may reject any submittal for insufficient information included, incorrect references, and/or the manner in which the material is assembled.

6. Following the CMCMUA's review of the preliminary manuals, the Contractor shall submit two (2) paper copies and one (1) electronic copy of the final Operation and Maintenance Manuals to the CMCMUA. The manuals shall reflect the required revisions noted during the CMCMUA's review of the preliminary documents. Failure of the final manuals to reflect the required revisions noted by the CMCMUA during a review of the Preliminary documents will result in the manuals being returned to the Contractor. Acceptable final Operation and Maintenance Manuals shall be provided not less than two (2) weeks prior to equipment start-up.

E. Certified Shop Test Reports

1. Each piece of equipment for which pressure, head, capacity, rating, efficiency, performance, function, or special requirements are specified or implied shall be tested in the shop of the manufacturer in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the contract documents and applicable test codes and standards. The contractor shall keep the CMCMUA

advised of the scheduling of shop tests so that the CMCMUA may arrange for the witnessing or inspection at the proper time and place.

2. The contractor shall secure from the manufacturers three (3) copies of the actual test data, the interpreted results, and a complete description of the testing facilities and testing setup, all accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company and notarized. These reports shall be forwarded to the CMCMUA for review.

3. In the event any equipment fails to meet the test requirements, the manufacturer shall make all necessary changes, adjustments, or replacements and the tests shall be repeated, at no additional cost to the CMCMUA until the equipment test requirements are acceptable to the CMCMUA.

4. No equipment shall be shipped to the project until the CMCMUA notifies the Contractor, in writing, that the shop test reports are acceptable.

F. Samples

1. The contractor shall furnish for review all samples as required by the contract documents or requested by the CMCMUA.

2. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show the nature of the material, the trade name of manufacturer and location of the work where the material represented by the sample will be used.

3. Samples shall be checked by the Contractor for conformance to the contract documents before being submitted to the CMCMUA and shall bear the Contractor's stamp of approval certifying that they have been so checked. Transportation charges on samples submitted to the CMCMUA shall be prepaid by the Contractor.

4. CMCMUA's review will be for compliance with the contract documents and the CMCMUA's comments will be transmitted to the Contractor with reasonable promptness.

5. Accepted samples will establish the standards by which the completed work will be judged.

G. Construction Photographs

1. The Contractor shall engage a competent photographer to take digital, date-stamped, photographs at the locations and at such stages of the construction as directed by the CMCMUA.

2. Daily, the Contractor shall provide, at a minimum, ten (10) digital photos with digitally embedded location, time, and date stamp at each location where work is progressing. The daily photos shall be digitally sent to the CMCMUA in full resolution format. The CMCMUA may waive requirements for photographs during inactive construction periods in favor of increased photographs during active construction sequences.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01400

QUALITY CONTROL

PART 1 -- GENERAL

1.01 FIELD TESTING OF EQUIPMENT

A. All equipment shall be set, aligned and assembled in conformance with the manufacturer's drawings and instructions.

B. Preliminary Field Tests

1. As soon as conditions permit, after the PLC control enclosure has been secured in its permanent position, the Contractor shall check the PLC control enclosure for quality of work is suitable, and that it is free from defects.

C. Final Field Tests

1. Upon completion of the installation, and at a time approved by the CMCMUA, equipment shall be tested by operating it as a unit with all related piping, ducting, electrical controls and mechanical operations.

2. The equipment shall be placed in continuous operation as prescribed or required and witnessed by the CMCMUA or CMCMUA's assigned representative.

3. The tests shall prove that the equipment and PLC control enclosure are properly installed, meet their operating cycles, and are free from defects. Equipment shall be tested for the characteristics as specified for the item.

4. Until final field tests are acceptable to the CMCMUA, the Contractor shall make all necessary changes, readjustments, and replacements at no additional cost to the CMCMUA.

5. Defects which cannot be corrected by installation adjustments shall be sufficient grounds for rejection of any equipment.

6. All costs in connection with such tests including all materials, equipment, instruments, labor, etc., shall be borne by the Contractor.

1.02 IMPERFECT WORK, EQUIPMENT, OR MATERIALS

A. Any defective or imperfect work, equipment, or materials furnished by the Contractor which is discovered before the final acceptance of the work, as established by the Certificate of Substantial Completion, or during the subsequent guarantee period, shall be removed immediately even though it may have been overlooked by the CMCMUA and estimated for payment. Any equipment or materials condemned or rejected by the CMCMUA shall be tagged as such and shall be immediately removed from the site. Satisfactory work or materials shall be substituted for that rejected.

B. The CMCMUA may order tests of imperfect or damaged work, equipment, or materials to determine the required functional capability for possible acceptance if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the

nature, tester, extent, and supervision of the tests will be as determined by the CMCMUA. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of the same, the work, equipment, or materials may be deemed acceptable. If the results of such tests reveal that the required functional capability of the questionable work, equipment, or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.

1.03 INSPECTION AND TESTS

A. The Contractor shall allow the CMCMUA ample time and opportunity for testing materials and equipment to be used in the work. The Contractor shall advise the CMCMUA promptly upon placing orders for material and PLC equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The Contractor shall at all times furnish the CMCMUA and CMCMUA's representatives, facilities including labor, and allow proper time for inspecting and testing materials, PLC equipment, and workmanship. The Contractor must anticipate possible delays that may be caused in the execution of work due to the necessity of materials and PLC equipment being inspected and accepted for use.

B. Whenever nonconformance is determined by the CMCMUA as a result of such tests, inspections, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the CMCMUA for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the CMCMUA to ascertain subsequent conformance with the contract documents, shall be borne by the Contractor.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY UTILITIES

PART 1 GENERAL

1.01 TEMPORARY SERVICES

A. **General:** Provide temporary services in the area of the work throughout the entire period of construction and until the work of the Contract is completed and the new facilities are placed in operation by the Owner's personnel.

1.02 TEMPORARY UTILITIES

A. **Temporary Sanitary Facilities:** Provide as required by local laws, temporary toilet facilities for all workmen on the project. Sanitary facilities shall conform to OSHA requirements.

B. **Temporary Heat (if required):** When ambient temperatures require temporary heat for performance of work, as determined by the Owner, provide, maintain and operate a sufficient number of approved portable heaters so the progress of the work is not impeded.

C. **Telephone:** The Contractor is not required to provide a job site telephone but may do so at the Contractor's own expense; and at no time will the Contractor be permitted to use the Owner's telephone.

D. **Temporary Lighting:** The Contractor shall furnish and securely install temporary lighting as required to allow for safe working conditions during all hours of work.

E. **Electric:** Various 110V receptacles are located within the Facilities. These will be made available to the Contractor at no cost. However, the Contractor will be responsible for providing and paying for all other supplementary electricity necessary to complete the work of this project. Should the Contractor need additional temporary electricity, the following shall apply.

1. The Contractor shall install the Contractor's own metering equipment if service comes from the Owner's system.

2. All temporary wiring systems shall be installed without interfering with the operation of the Owner's Facilities and shall comply with all pertinent provisions of the State and Local Electrical Codes.

3. Electricians and other tradesmen necessary for the required electrical connections and operation of welding equipment and generator, standby generators and similar equipment shall be furnished by the Contractor. All costs for such labor and equipment shall be included in the Lump Sum Price Bid by the Contractor.

F. **Water:** Water is available through hose bibs at various locations within the Facilities.

G. The Contractor shall make all necessary arrangements for temporary utilities required or herein specified. No specific payment shall be made for the cost of such utilities, but the

costs thereof shall be included in the price bid for construction work. Upon completion of the work, the temporary utilities shall be removed.

1.03 OCCUPYING PRIVATE LAND

A. The Contractor shall not enter, occupy with workers, tools, materials or equipment, any private land outside the easements or property of the Owner.

1.04 OWNER'S FACILITIES

A. The Contractor is not permitted to use the Owner's tools, equipment, materials, toilet facilities, or storage areas. There are no exceptions to this requirement.

1. The cost of all temporary utilities and Contractor's facilities shall be borne by the Contractor and included in the Lump Sum Prices included in the Proposal.

B. Areas for Contractor employee parking and for storing materials and equipment shall be provided by the Owner at each Facility site in the vicinity of the work. The exact locations will be determined prior to the start of work. All such areas used by the Contractor must be left restored to an "in-kind" condition prior to final payment.

PART 2 PRODUCTS

2.01 MATERIALS

A. **Portable Heaters (if required by Contractor):** UL approved and designed to operate in accordance with OSHA safety requirements.

B. **Temporary Water Extensions (if required by Contractor):** Temporary piping, water hoses and controls maintained in leak free condition.

C. **Temporary Power Equipment and Extensions (if required by Contractor):** UL approved portable power equipment and UL approved extension cords, temporary wires, outlets and on/off controls.

D. **Temporary Lights (if required by Contractor):** UL approved portable task lights equipped with crash guards in conformance with OSHA requirements.

PART 3 EXECUTION

3.01 REMOVAL

A. Contractors shall dismantle (if required) and remove temporary services and extensions of such when no longer needed on the construction site.

1. Remove dirt, soot, grease, and such other deposits from the structure(s) as caused by the temporary services, and leave surfaces to be finished in a condition acceptable to the trade performing such work.

B. Contractor shall dismantle (if required) and remove such temporary facilities as required during construction of the project.

1. Remove temporary sanitary facilities when Contract is complete or as specified previously.

(END OF SECTION)

SECTION 01520

MAINTENANCE OF UTILITY OPERATIONS DURING CONSTRUCTION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without cost to the CMCMUA and provided that all requirements of these specifications are fulfilled. The Contractor shall submit any such plan for providing additional temporary facilities to eliminate a constraint to the CMCMUA for review. Such plans must be approved by the CMCMUA prior to the Contractor proceeding. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

B. It is anticipated that work will be occurring at multiple sites concurrently. Contractor sequencing and completion of construction activity shall be staged to accommodate all construction activities within the contract duration as specified in Division 1.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01010 – Summary of Work

B. Section 01530 – Protection of Existing Facilities

C. Section 01550 – Site Access and Storage

1.03 GENERAL CONSTRAINTS

A. The Contractor shall schedule the Work so that the plant and collection systems continue to operate during the construction period. Plant and collection system processes shall either be controlled manually using local controls, or controlled via temporary control systems. Once work is completed at a given station, as evidenced by the CMCMUA's final inspection and written approval of that work, the Contractor must coordinate with the CMCMUA to put the location back in service.

B. The Contractor shall coordinate with the CMCMUA in regards to opening and closing of the CMCMUA's valves.

C. Any temporary work, facilities, roads, walks, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the Contractor's work limits to maintain continuous and dependable collection/treatment system operation shall be furnished by the Contractor at the direction of the CMCMUA at no extra cost to the CMCMUA.

D. The CMCMUA shall have the authority to order work stopped or prohibited that would, in the CMCMUA's opinion, unreasonably result in interrupting the necessary functions of the collection/treatment system operations.

E. Close coordination with CMCMUA Operations Personnel shall be maintained whenever equipment is taken offline, removed from an existing PLC, or moved from an existing PLC to a new PLC. It is the intent of this contract that no equipment shall be taken offline without approval from the CMCMUA Operations Personnel in order to maintain proper wastewater treatment throughout this project. High flow events such as large storms, flood events, and major summer holidays may disrupt the ability to remove equipment from service. Proper project planning 48 hours ahead of time in order to remove equipment from service shall be adhered to by the Contractor.

F. If the contractor impairs performance or operation of the plant or collection system as a result of not complying with specified provisions for maintaining operations, then the Contractor shall immediately make all repairs or replacements and do all work necessary to restore the collection system to operate to the satisfaction of the CMCMUA. Such work shall progress continuously to completion on a twenty-four (24) hours per day, seven (7) work-days per week basis. All cost accrued to the CMCMUA to restore operations shall be the responsibility of the Contractor.

G. The Contractor shall provide the services of emergency repair crews on call twenty-four (24) hours per day to affect repairs to portions of the collection system affected by the Contractor's operations.

1.04 GENERAL OPERATING REQUIREMENTS, CONSTRAINTS, AND CONSTRUCTION REQUIREMENTS

A. Personnel Access

1. The CMCMUA and CMCMUA personnel shall have access to all areas which remain in operation throughout the construction period. The Contractor shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as directed by the CMCMUA to maintain personnel access to areas in operation. Access and adequate parking areas for CMCMUA personnel must be maintained throughout construction.

B. Building Heating and Ventilating

1. Building heating and ventilation for the existing structures shall be in service for the entire construction period. Additional temporary heating and ventilation shall be provided as required to maintain facilities under construction adequately heated and vented.

C. Power, Light and Communications Systems (General)

1. Electric power, lighting service, and communications systems shall be maintained in uninterrupted operation in all areas which remain in operation. Individual units may be disconnected as required for replacement, but service shall be available at all times including periods when pump station elements are out of service. A shutdown of electrical facilities shall be limited to not more than two (2) hours. The CMCMUA may allow longer outages under conditions determined by the CMCMUA. All costs associated with extended outages shall be paid by the Contractor. The Electrical Contractor shall coordinate shutdowns required with the

General Contractor to minimize the total number of shutdowns required to complete construction.

1.05 COORDINATION AND INTERFERENCES

A. The plant and collection systems are operational. The Contractor shall coordinate with the CMCMUA personnel to not interfere with their ability to operate the plant and collection system.

B. The Contractor shall also coordinate with the CMCMUA at least forty-eight (48) hours prior to installing temporary controls at each system and putting each system back in service.

C. The Contractor shall coordinate with the CMCMUA in regards to the opening and closing of the CMCMUA's valves.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of work operations under this contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

B. The contractor shall comply promptly with such safety regulations as may be prescribed by the CMCMUA or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, the Contractor's employees. In the event of the Contractor's failure to comply, the CMCMUA may take the necessary measures to correct the conditions or practices complained of, and all costs thereof shall be deducted from any monies due to the Contractor. Failure of the CMCMUA to direct the correction of unsafe conditions or practices shall not relieve the Contractor of the Contractor's responsibility hereunder.

C. In the event of any claims for damage or alleged damage to property as a result of work under this contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work at the worksite and in the vicinity of property adjacent to the worksite, the Contractor, at the Contractor's own expense, shall take such surveys, preconstruction videos and/or pictures, as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury, or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at the Contractor's own expense. Protection measures shall be subject to the approval of the CMCMUA.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

A. The Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights along all roads accessible to the public, as required by NFPA70 and any other authority having jurisdiction, to ensure safety to the public. All barricades and obstructions along public roads shall be illuminated at night and

all lights for this purpose shall be kept burning from sunset to sunrise or as maybe required by any authority having jurisdiction.

B. Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the CMCMUA's operating personnel, or those visiting the site.

1.04 EXISTING UTILITIES AND STRUCTURES

A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers, and all appurtenant structures.

B. Where existing utilities and structures are indicated on the drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the drawings. If interference exists, the Contractor shall bring it to the attention of the CMCMUA as soon as possible. If the CMCMUA agrees that interference exists, the CMCMUA shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the CMCMUA prior to beginning excavation work, any actual conflict or interference which does arise during the project shall be corrected by the Contractor, as directed by the CMCMUA, at no additional expense to the CMCMUA.

D. The work shall be carried out in a manner to prevent the disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to ensure existing services are uninterrupted. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at the Contractor's own expense in a manner approved by the CMCMUA and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

E. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the CMCMUA and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the CMCMUA may, at their discretion, have the respective

SECTION 01540

DEMOLITION AND REMOVAL OF EXISTING STRUCTURES AND EQUIPMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This section covers the demolition, removal, and disposal of existing buildings, structures, pavement, curbs, and sidewalk, removal and disposal of all materials, and any existing equipment including electrical, plumbing, heating, and ventilating equipment and piping not required for the operation of the rehabilitated plant and pump station locations as indicated on the drawings and as specified hereinafter. The Contractor shall furnish all labor, materials, and equipment to demolish buildings and structures and to remove fixtures, anchors, supports, piping, and accessories designated to be removed on the drawings.

1.02 TITLE TO EQUIPMENT AND MATERIALS

A. The contractor shall have no right or title to any of the equipment, materials or other items to be removed from the existing buildings or structures unless and until said equipment, materials and other items, after release of the CMCMUA, have been removed from the premises. The Contractor shall not sell or assign, or attempt to sell or assign any interest in the said equipment, materials or other items until the said equipment, materials or other items have been removed.

B. The contractor shall have no claim against the CMCMUA because of the absence of such fixtures and materials.

1.03 CONDITION OF STRUCTURES AND EQUIPMENT

A. The CMCMUA does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the CMCMUA so far as practicable.

C. The information regarding the existing structures and equipment shown on the drawings is based on a visual inspection and a walk-through survey only. Neither the Engineer nor the CMCMUA shall be responsible for interpretations or conclusions drawn therefrom by the Contractor.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION

3.01 DEMOLITION AND REMOVALS

A. The removal of all equipment and piping, and all materials from the demolition of buildings and structure shall, when released by the CMCMUA, be done by the Contractor and shall become the Contractor's property, unless otherwise noted, for disposition in any manner

not contrary to the contract requirements and shall be removed from the site to the Contractor's own place of disposal.

B. The Electrical Contractor specifically, shall de-energize all panelboards, lighting fixtures, switches, circuit breakers, electrical conduits, motors, limit switches, pressure switches, instrumentation such as flow, level and/or other meters, wiring, and similar power equipment prior to removal. Any electric panels or equipment which are to be retained shall be relocated or isolated by the Electrical Contractor specifically, prior to the removal of the equipment specified herein.

C. The Contractor shall proceed with the removal of the equipment, piping, and appurtenances in a sequence designed to maintain the plant in continuous operation as described in Section 01520, Maintenance of Utility Operations during Construction, and shall proceed only after approval of the CMCMUA.

D. Any equipment piping and appurtenances removed without proper authorization, which is necessary for the operation of the existing facilities shall be replaced to the satisfaction of the CMCMUA at no cost to the CMCMUA.

E. Excavation caused by demolitions shall be backfilled with fill free from rubbish and debris.

3.02 PROTECTION

A. Demolition and removal work shall be performed by competent experienced workmen for the various types of demolition and removal work and shall be carried out through to completion with due regard to the safety of CMCMUA employees, workmen on-site, and the public. The work shall be performed with as little nuisance as possible.

B. The work shall comply with the applicable provisions and recommendation of ANSI A10.2, Safety Code for Building Construction, all governing codes, and as hereinafter specified.

C. The Contractor shall make such investigations, explorations, and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. The Contractor shall give particular attention to shoring and bracing requirements so as to prevent any damage to new or existing construction.

D. The Contractor shall provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, workmen engaged in demolition operations, and adjacent construction.

E. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

F. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal, and new work is being done, connections made, materials handled or equipment moved.

G. The Contractor shall take necessary precautions to prevent dust from rising by wetting demolished masonry, concrete, plaster and similar debris. Unaltered portions of the

existing buildings affected by the operations under this Section shall be protected by dust-proof partitions and other adequate means.

H. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

I. The Contractor shall not close or obstruct walkways, passageways, or stairways and shall not store or place materials in passageways, stairs, or other means of egress. The Contractor shall conduct operations with minimum traffic interference.

J. The Contractor shall be responsible for any damage to the existing structure or contents by reason of the insufficiency of protection provided.

K. Close coordination with CMCMUA Operations Personnel shall be maintained whenever equipment is taken offline, removed from an existing PLC, or moved from an existing PLC to a new PLC. It is the intent of this contract that no equipment shall be taken offline without approval from the CMCMUA Operations Personnel in order to maintain proper wastewater treatment throughout this project. High flow events such as large storms, flood events, and major summer holidays may disrupt the ability to remove equipment from service. Proper project planning 48 hours ahead of time in order to remove equipment from service shall be adhered to by the Contractor.

3.03 WORKMANSHIP

A. The demolition and removal work shall be performed as described in the contract documents. The work required shall be done with care, and shall include all required shoring, bracing, etc. The Contractor shall be responsible for any damage which may be caused by demolition and removal work to any part or parts of existing structures or items designated for reuse or to remain. The Contractor shall perform patching, restoration, and new work in accordance with applicable technical sections of the specifications and in accordance with the details shown on the drawings. Prior to starting work, the Contractor shall provide a detailed description of methods and equipment to be used for each operation and the sequence thereof for review by the CMCMUA.

B. All PLC enclosures, terminal interface enclosures, sump pump enclosures, pedestals, supports and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts, and other supports shall be removed to approximately 1-inch below the surrounding finished area and the recesses shall be patched to match the adjacent areas. Superstructure wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, as specified under applicable Sections of these Specifications, as shown on the drawings, or as directed by the CMCMUA. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the appropriate sections of these specifications, as shown on the drawings, and as directed and approved by the CMCMUA.

C. Materials or items designated to remain the property of the CMCMUA shall be as hereinafter tabulated. Such items shall be removed with care and stored at a location at the site to be designated by the CMCMUA.
- PLC Equipment
- HMI Screens

- Chart Recorders
- Power Supplies
- UPS
- Bubbler Equipment
- Auto Dialers

D. Where equipment is shown or specified to be removed and relocated, the Contractor shall not proceed with removal of this equipment without specific prior approval of the CMCMUA. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the Contractor and CMCMUA. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation and protected and stored until required. Material or items damaged during removal shall be replaced with similar new material or item, at no additional cost to the CMCMUA. Any equipment that is removed without proper authorization and is required for plant operation shall be replaced, or suitable temporary equipment provided, at no additional cost to the CMCMUA.

E. Wherever piping is to be removed for disposition, the piping shall be drained by the Contractor and adjacent pipe and headers that are to remain in service shall be blanked off or plugged and then anchored in an approved manner.

F. Materials or items demolished and not designated to become the property of the CMCMUA or to be reinstalled shall become the property of the Contractor and shall be removed from the property and legally disposed of.

G. The Contractor shall execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.

H. In general, masonry shall be demolished in small sections, and where necessary to prevent a collapse of any construction, the Contractor shall install temporary shores, struts, and bracing.

I. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations, unless otherwise shown on the Drawing or specified, shall comply with that of the various respective trades which normally perform the particular items or work.

J. The Contractor shall finish adjacent existing surfaces to new work to match the specified finish for new work. The Contractor shall clean existing surfaces of dirt, grease, loose paint, etc., before refinishing.

K. The Contractor shall cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.

L. The Contractor shall confine the cutting of existing roof areas designated to remain to the limits required for the proper installation of the new work. The Contractor shall cut and remove insulation, etc., and provide temporary weather tight protection as required until new roofing and flashings are installed.

M. The Contractor shall remove temporary work, such as enclosures, signs, guards, and the like when such temporary work is no longer required or when directed at the completion of the work.

3.04 MAINTENANCE

A. The Contractor shall maintain the buildings, structures, and public properties free from accumulations of waste, debris, and rubbish, caused by the demolition and removal operations.

B. The Contractor shall provide on-site dump containers for the collection of waste materials, debris, and rubbish, and shall wet down dry materials to lay down and prevent blowing dust.

C. At reasonable intervals during the progress of the demolition and removal work or as directed by the CMCMUA, the Contractor shall clean the site and properties, and dispose of waste materials, debris, and rubbish.

(END OF SECTION)

SECTION 01550

SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Parking Areas

1. The Contractor shall construct and maintain suitable parking areas for the Contractor's construction personnel on the project site where approved by the CMCMUA.

B. Restoration

1. At the completion of the work, the surfaces of land used for access roads and parking areas shall be restored by the Contractor to its original condition and to the satisfaction of the CMCMUA. At a minimum, such restoration shall include the establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas.

C. Traffic Regulations

1. The Contractor shall obey all traffic laws and comply with all the requirements, rules and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.

D. Storage of Equipment and Materials

1. Contractor shall store the Contractor's equipment and materials at the job site in accordance with the requirements of the General Conditions, the Supplemental Conditions, and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the CMCMUA and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. Where space or strip heaters are provided within the enclosure for motors, valve operators, motor starters, panels, instruments, or other electrical equipment, the Contractor shall make connections to these heaters from an appropriate power source and operate the heaters with temperature control as necessary until the equipment is installed and is being operated according to its intended use.

2. The Contractor shall enforce the instructions of the CMCMUA regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

3. The Contractor shall not store materials or encroach upon private property without the written consent of the CMCMUAs of such private property.

4. The Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.

5. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels, and inlets shall be kept unobstructed at all times.

6. The Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish and Install

1. Where the words "furnish", "provide", "supply", "replace", or "install" are used, whether singularly or in combination, they shall mean to furnish and install unless specifically stated otherwise.

2. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment herein. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the drawings shall be furnished and installed under the contract as designated on the drawings.

1.02 EQUIPMENT AND MATERIALS

A. All equipment, materials, instruments, or devices incorporated in this project shall be new and unused unless indicated otherwise in the contract documents. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

B. The Contractor shall protect all equipment and materials from deterioration and damage, including provisions for temporary storage buildings as needed and as specified in Section 01550, Site Access and Storage. Storage of equipment and materials shall be in locations completely protected from flooding, standing water, excessive dust, falling rock, brush fire, etc. Storage areas shall be located sufficiently distant from all construction activities and the movement of construction vehicles to minimize the potential for accidental damage. Any equipment or materials of whatever kind which may have become damaged or deteriorated from any cause shall be removed and replaced at the Contractor's expense for both labor and materials.

1.03 INSTALLATION OF EQUIPMENT

A. Equipment and materials shall be installed in accordance with the requirements of the General Conditions, Supplemental Conditions, and the respective specification sections.

B. Equipment shall be set, aligned, and assembled in conformance with the manufacturer's drawings or instructions. Run out tolerances by dial indicator method of alignment shall be plus or minus .002-inches unless otherwise approved by the Engineer.

C. All blocking and wedging required for the proper support and leveling of equipment during installation shall be furnished by the Contractor. All temporary supports shall be removed, except steel wedges and shims, which may be left in place with the approval of the Engineer.

1.04 CONNECTIONS TO EQUIPMENT

A. Connections to the equipment shall follow the manufacturer's recommendations as to the size and arrangement of connections and/or as shown in detail on the drawings or approved shop drawings. Piping connections shall be made to permit the ready disconnection of equipment with minimum disturbance of adjoining piping and equipment.

B. The Electrical Contractor if no electrical contract exists shall be responsible for bringing proper electrical service to each item of equipment requiring electrical service as shown on the drawings or approved shop drawings. Electrical connections to equipment requiring electrical service shall be made by the Electrical Contractor unless otherwise indicated on the drawings or in the Technical Specifications.

C. The HVAC Contractor if no HVAC Contract exists shall bring and connect HVAC service to all equipment items requiring the same as shown on the drawings. Electrical connections to equipment requiring electrical service shall be made by the Electrical Subcontractor, unless otherwise indicated on the drawings or in the technical specifications.

D. The Plumbing Contractor, if no plumbing contract exists, shall bring and connect plumbing service to all equipment items requiring the same as shown on the drawings.

1.05 SUBSTITUTIONS

A. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions, Supplemental Conditions, and as hereinafter specified.

1. The Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the CMCMUA and Engineer to determine if the proposed substitution is equivalent.

2. The Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equivalent.

3. A list of installations where the proposed substitution is equivalent.

4. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the CMCMUA.

B. Where the approval of a substitution requires revision or redesign of any part of the work, including work of others, all such revision and redesign, and all-new drawings, programmable logic controller code, and details therefore, shall be provided by the Contractor at Contractor's own cost and expense, and shall be subject to the approval of the CMCMUA and Engineer.

C. In the event that the Engineer is required to provide additional engineering services, then the Engineer's charges for such additional services shall be charged to the Contractor by the CMCMUA in accordance with the requirements of the General Conditions, and the Supplemental Conditions.

D. In all cases, the CMCMUA and Engineer shall be the judge as to whether a proposed substitution is to be approved. The Contractor shall abide by their decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the work without the written approval of the CMCMUA and Engineer.

E. Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering a substitution proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

F. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)

(END OF SECTION)

SECTION 01700

PROJECT CLOSEOUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Final Cleaning

1. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies, and equipment which the Contractor or any of the Subcontractors may have used in the performance of the work. The Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

2. The Contractor shall thoroughly clean all materials, equipment, and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.

3. Contractor shall maintain cleaning until the project, or portion thereof, is occupied by the CMCMUA.

B. Spare Parts and Special Tools

1. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply.

2. Contractor shall also furnish a list of parts, and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the Contract and a list of additional items recommended by the manufacturer to assure efficient operation for a period of one-hundred and twenty (120) days for the particular installation.

3. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description, and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.

4. Contractor shall furnish at no additional cost to the CMCMUA with each piece of equipment as a minimum, one (1) complete set, or the number of sets called for in the technical specifications, of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment.

5. The Contractor shall submit, for approval by the CMCMUA, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

D. Equipment Start-Up Services

1. Equipment start-up period, for the training of plant personnel, shall begin after satisfactory completion and acceptance of the field tests and coincidentally with the certified date of substantial completion for the part of the work for which the equipment is included. If the equipment is not covered by a certificate of substantial completion for a part of the work, the period shall begin upon substantial completion of the project.

2. The Contractor shall be available to promptly repair all work during the start-up period so as to cause minimum disruption to the total plant or pump station operation.

3. Upon completion of a minimum of ten (10) consecutive and continuous days of satisfactory operation, or the number of days called for in the technical specifications, the CMCMUA will assume operation and operating cost of the equipment. If the equipment malfunctions during this start-up period, the start-up period will be repeated until a satisfactory operation is achieved.

4. In the event a system, equipment or component proves defective or is unable to meet specified performance criteria, the Contractor shall replace the defective item and the minimum one (1) year guarantee period, or the guarantee period called for in the technical specifications for the item shall start after satisfactory replacement and testing of the item.

E. Final Cleanup; Site Rehabilitation

1. Before finally leaving the site, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from the operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The Contractor shall leave all equipment, fixtures, and work, which the Contractor has installed, in a clean condition. The completed project shall be turned over to the CMCMUA in a neat and orderly condition.

2. The site of the work shall be rehabilitated or developed in accordance with other sections of the specifications and the drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the CMCMUA.

F. Final Inspection

1. Final cleaning and repairing shall be so arranged as to be finished upon completion of the construction work. The Contractor shall make final cleaning and repairing, and any portion of the work finally inspected and accepted by the CMCMUA shall be kept clean by the Contractor, until the final acceptance of the entire work.

2. When the Contractor has finally cleaned and repaired the whole or any portion of the work, the Contractor shall notify the CMCMUA that the Contractor is ready for final inspection of the whole or a portion of the work, and the CMCMUA will

thereupon inspect the work. If the work is not found satisfactory, the CMCMUA will order further cleaning, repairs, or replacement.

3. When such further cleaning or repairing is completed, the CMCMUA, upon further notice, will again inspect the work. The "Final Payment" shall not be processed until the Contractor has complied with the requirements set forth, and the CMCMUA has made the final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

G. Project Close-Out

1. As construction of the project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the contract documents, attend to or have already completed the following items as they apply to this contract:

   a. Required testing of project components.

   b. Scheduling start-up and initial operation.

   c. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the CMCMUA's "Punch" Lists.

   e. Attend to any other items listed herein or brought to the Contractor's attention by the CMCMUA.

2. Just before the Project Close-out is issued, the Contractor shall accomplish the cleaning and final adjustment of the various building components as specified in the Specifications and as follows:

   a. Clean all glass and adjust all windows and doors for proper operation.

   b. Clean all finish hardware after adjustment for proper operation.

   c. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.

   d. Wax all resilient flooring materials.

   e. Remove bitumen from gravel stops, fascia, and other exposed surfaces.

   f. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finished surfaces, tile, stone, brick, and similar surfaces.

3. In addition, and before the Certificate of Substantial Completion is issued, the Contractor shall submit to the CMCMUA certain records, certifications, etc., which are specified elsewhere in the contract documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit any other items which are required in the contract documents:

a. Performance Affidavits for equipment.

b. Certification of equipment or materials in compliance with contract documents.

c. Operation and maintenance instructions or manuals for equipment.

d. One set of neatly marked-up record drawings showing as-built changes and additions to the work under the contract.

e. Any special guarantees or bonds (Submit to CMCMUA).

4. The Contractor's attention is directed to the fact that required certifications and information under Item 3 above, must actually be submitted earlier in accordance with other sections of the specifications.

1.02 WARRANTIES, BONDS AND GUARANTEES

A. The Contractor shall execute and submit all warranties, bonds, and guarantees required by the contract.

B. The Contractor shall refer to Article 13, paragraph 13.12 of the General Conditions for Contractor's one (1) year correction period.

1.03 FINAL PAYMENT: The Contractor shall have completed **all** punch list items prior to application for Final Payment.

A. The Contractor shall submit the following completed forms along with the request for final payment. Forms are included herein.

1. Contractor's Affidavit of Release of Liens

2. Consent of Surety Company to Final Payment

3. Contractor's Affidavit of Payment of Debts and Claims

PART 2 – PRODUCTS (NOT APPLICABLE IN THIS SECTION)

PART 3 – EXECUTION (NOT APPLICABLE IN THIS SECTION)