

# SECTION 11306

## PACKAGED PUMPING STATIONS

### PART 1 - GENERAL

#### 1.01 COMMENTARY

- A. This Authority recognizes the fact that there are many types of pumps and pump manufacturers. The Authority also is aware that costs of pumping stations operation and maintenance may be significant.
- B. Therefore, the Developer shall do or cause the following elements to be done:
  - 1. Whenever possible, a pumping station shall not be used.
  - 2. Prior to design of a required pumping station, the Developer shall discuss the proposed pumping station in detail with the Authority.
  - 3. Any pumping station design shall be of a type satisfactory to the Authority and shall meet all applicable requirements of DEP.
  - 4. The intent of the Authority is to standardize components used in pumping station and/or wet well applications.

#### 1.02 SECTION INCLUDES

- A. Furnish all labor, materials and equipment to install pumping station(s) and/or wet well lift station(s) as shown on the Drawings and as specified herein. Work shall include but not be limited to:
  - 1. Excavation
  - 2. Enclosure and Component Placement
  - 3. Control Panel and Wiring
  - 4. Internal and external piping with required supports and concrete encasement
  - 5. Backfill

#### 1.03 RELATED SECTIONS

- A. Section 01010 - Summary of Work
- B. Section 01039 - Coordination and Meetings
- C. Section 01300 - Submittals
- D. Section 01400 - Quality Control
- E. Section 01600 - Material and Equipment
- F. Section 01650 - Starting of Systems
- G. Section 01700 - Contract Closeout
- H. Section 02225 - Excavating, Backfilling and Compacting for Utilities
- I. Section 02600 - Utility Piping

- J. Section 02605 - Manholes
- K. Section 03300 - Cast-In-Place Concrete
- L. L. Appendix A - Standard and Special Construction Detailed Drawings

#### **1.04 REFERENCES**

- A. Pennsylvania Department of Transportation Publication 408, Latest Edition
- B. ASTM C-478 - Specifications for Pre-Cast Reinforced Concrete Manhole Sections
- C. National Electric Code - N.E.C.
- D. National Electric Safety Code
- E. Standard and Special Construction Detailed Drawing Nos. 12, 12A, and 13 for General Schematics of Pumping Station and Wet Well Lift Station with Valve Pit.

#### **1.05 JOB CONDITIONS**

- A. Job Conditions shall generally meet those of the related Sections.
- B. Specific conditions will be included with each project as may be required.

#### **1.06 SUBMITTALS**

- A. Submit shop drawings/product data from manufacturers' descriptive literature and specifications for all materials used in this Section. Submit in accordance with Section 01300.
- B. Specific submittals will be included with each project as may be required for testing, warranties, project manuals, etc.

#### **1.07 QUALITY ASSURANCE**

- A. **Qualifications of Workmen:** Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the design and application of work described for this Section, and who shall be present at all times during progress of the work of this Section and shall direct all work performed under this Section.

## **PART 2 - PRODUCTS**

#### **2.01 GENERAL**

- A. Pump stations and wet well lift stations shall normally be designed using components as specified herein with no approved equals. This is done to improve inventory control (standardization), equipment familiarization, use of proven equipment, etc.
- B. Products listed are not all inclusive. Refer to applicable project drawings and specifications.

#### **2.02 PUMPS**

- A. Packaged Pump Stations - Smith & Loveless
- B. Wet Well Lift Station - Flygt

**2.03 WET WELL AND VALVE PIT ENCLOSURES**

- A. Pre-cast enclosures shall meet the requirements of ASTM C-478.

**2.04 ACCESS FRAMES AND COVERS**

- A. These shall be manufactured by Halliday Products and be of aluminum and stainless steel materials.

**2.05 CONTROL PANEL FOR DUPLEX PUMPING STATIONS**

- A. All control panels utilized at submersible pumping stations in the Patton Ferguson or College-Harris service areas shall be built to the design specifications approved by the Authority.
  - 1. Enclosure
    - a. Wall mounted NEMA 4 (Hoffman or ASCO only) painted steel electrical enclosure designed to accommodate the appropriate power requirements as approved for each station by the Authority.
    - b. The size of the enclosure shall not exceed a forty-eight (48) inch height or a thirty-six (36) inch width. Final size to be approved by the Authority.
    - c. The enclosure shall have a dead front, an interior door for control and indicator functions/displays, and be equipped with padlock facilities.
    - d. The enclosure also shall include a Square D exterior mounted weather-proof 15A-115V GFI duplex receptacle, and an exterior mounted weather-proof Crouse Hinds - Arktite inlet fitting (Model M-72, Cat. No. AR 631, 60A for 240 1 phase) or a (Model M-54, Cat. No. APJ 10377, 100A for 480 3 phase) for a 3 pole/3 wire + ground generator connection.

**2.06 MOTOR CONTROLS AND CIRCUIT PROTECTIVE DEVICES**

- A. **Control Section** (See DWG. #SP-1). Interior door shall be equipped with the following:
  - 1. One (1) "Utility-Off-Emergency Generator" 110A Rotary Selector Switch.
  - 2. Two (2) "H-O-A" Selector Switch, (one for each pump).
  - 3. Two (2) Elapsed Time Meters, (one for each pump).
  - 4. A Commercial Power Indicator Light.
  - 5. Two (2) Pump Status Indicator Lights, (one for each pump).
  - 6. One three way Alternator switch, (#1 - OFF - #2) for the purpose of disabling the alternator in the event of a failure. This will allow the pump selected to operate in the automatic mode without alternating. The switch should be properly wired to the alternator to accomplish this task. When the switch is in the OFF position, the alternator should operate normally.
  - 7. Eight (8) Float Status Indicator Lights for the following:

High Level Alarm	(Red ON)	(Green OFF)
Lag Pump	(Red ON)	(Green OFF)
Lead Pump	(Red ON)	(Green OFF)
Pump Stop	(Red ON)	(Green OFF)

All status indicators to be LED, powered by a PC relay board.

**B. Internal Components (See Dwg. #CL-1)**

1. All circuit breakers, motor starters, rotary selector switch, over/under voltage sensing relay, and alternator switch shall be of Square D manufacture and shall be sized to accommodate the appropriate design criteria approved for each station. The components are to be UL Listed, and are as listed in the following section.
2. Equipment grounding points, one each for incoming and outgoing power supply.
3. One (1) terminal block for external wiring connections and one (1) terminal block for internal wiring connections.
4. Power distribution block.
5. Circuit breaker panel.
6. Individual circuit breaker for each pump; and magnetic motor starter, start capacitor, starting relay, auxiliary starting relay, and run capacitor for each pump. 240 1 phase, motor starters must be equipped with "quick-trip" overload relays.
7. Square D, 120V X 24V control transformer.
8. Square D, over/under voltage sensing relay. Class 8430 type DWUW.
9. Square D, rotary selector switch, for power source transfer.
10. Hoffman or equal, 200 Watt Enclosure heater with thermostat. (Supply current catalogue cut for approval)
11. Printed circuit relay board, as manufactured by BeeCo Controls (Part #PC 500-300) or equal, which will provide service to the following; control relays (Part #KUP-14A15-24, 24V), of Potter & Brunfield manufacturer, or equal. Included in the electronic alternator must be an interlocking relay to automatically reconnect the control circuit should a pump breaker trip. Service must also be provided to the control terminal block and the indicator power supply.
12. Flygt single phase modules; model, as manufacturer recommended per specific pump requirements.
13. Square D or equal, lightning arrester; sized to voltage rating.
14. Upon site specific requirement by the Authority, included shall be: dry contacts for remote high level alarm, such as a red blinking light on the exterior of the enclosure.
15. Square D, secondary circuitry controls (H-O-A) for manual and or automatic control of the pumps, and transfer (U-O-EG) from one power source to another.
16. Panel mounted terminals shall be provided and labeled for all external connections. All internal wiring is to be labeled at terminating points. All components shall be labeled to concur with the terminology used on the schematic drawings and Bill of Materials.
17. Identification labels for each switch, indicator light, and operating mechanism of the inner door, shall be permanently engraved on laminated plastic material.

**C. Drawing Reference**

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|----|----------------------|-------|
| 1. | Control System       | #SP-1 |
| 2. | Internal Components  | #CL-1 |
| 3. | Electrical Schematic | #CL-2 |

**2.07 PIPE**

- A. Ductile Iron Pipe - Section 02600, Sub-Section 2.01 A.3.

- B. PVC Pipe (Force Main) Section 02600, Sub-Section 2.01 A.1.b.

## **2.08 VALVES**

- A. Gate valves shall be used. Ball valves will not be accepted.
- B. Gate and check valves shall be as manufactured by Kennedy.

## **2.09 CEMENT CONCRETE**

- A. Concrete shall meet the requirements of Section 03300, Cast-In-Place Concrete for Class AA.

## **2.10 MONITORING EQUIPMENT**

- A. Monitoring of equipment shall be site specific as to method and scope.

## **2.11 OTHER MATERIALS**

- A. All other materials, not specifically described but required for proper and complete installation of the work of this Section, shall be selected by the Contractor subject to the approval of the Authority.

# **PART 3 - EXECUTION**

## **3.01 INSPECTION**

- A. Examine the areas and conditions under which Work of this Section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions of site have been corrected.

## **3.02 INSTALLATION**

- A. Install equipment with skilled labor in accordance with manufacturer's instructions and details as shown on the Drawings.
- B. All pre-cast or cast-in-place sections/pads shall be placed on a minimum six (6) inch depth of AASHTO No. 57 aggregate. The subgrade for the aggregate shall be properly compacted to requirements of Section 02225.
- C. Install internal/external piping using specified materials.
- D. Install steel support for external piping as shown and encase/cradle with Class A concrete.
- E. Equipment installed shall be inspected, adjusted, approved and certified satisfactory by the manufacturer. Provide certification(s) that equipment is ready for operation.

## **3.03 BACKFILL AND COMPACTION**

- A. Backfilling of pumping stations/wet well lift stations shall not commence until all cast-in-place concrete has reached its required compressive strength.
- B. Backfill around exterior piping and enclosure shall be as detailed in Section 02225 or as specifically shown on project Drawings.
- C. Compaction shall meet the requirements of Section 02225.

### **3.04 OPERATION**

- A. The pumps shall be controlled automatically by float switches located in the wet well. The lead pump will start automatically when the liquid level reaches the "Lead Pump" float switch level and shall continue to operate, through a holding circuit, until the liquid level drops below the "Pump Stop" float switch level. Should the liquid level continue to rise above the "Lead Pump" float switch level, and reaches the "Lag Pump" float switch level, the lag pump will start and operate in parallel with the lead pump until the liquid level drops below the "Pump Stop" float switch level. In normal operation, the lead and lag pumps shall automatically alternate after each pumping cycle has been completed.
- B. At the discretion of the Authority, a high liquid level relay with dry contacts shall be energized for a remote alarm, such as a red blinking light mounted on the exterior of the enclosure for purposes of visual notification, should the liquid level continue to rise above the "Lag Pump" float switch level and reaches the "High Level Alarm" float switch level.
- C. Contractor shall fulfill the requirements of Section 01650 - Starting of Systems.

### **3.05 TESTING**

- A. All piping shall be tested in accordance with Section 02600 and/or as may be directed by the Authority.

**END OF SECTION**