

# **PORTAGE COUNTY WATER RESOURCES**

## **PUMP STATION DESIGN MANUAL**

**PORTAGE COUNTY ADMINISTRATION BUILDING  
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Board of Commissioners

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Harold G. Huff, Director  
Water Resources Department

November 1, 2010

RE: Portage County Water Resources  
Pump Station Design Manual

Beginning this date, all sanitary sewer pump stations that are designed and approved for construction within Portage County's sewer districts shall comply with the Pump Station Design Manual dated October 14, 2010; including any future revisions thereof.

Sincerely,

A handwritten signature in black ink, appearing to read "Harold G. Huff".

Harold G. Huff, PE  
Director/Sanitary Engineer

A handwritten signature in black ink, appearing to read "Wayne A. Carkido".

Wayne Carkido  
Wastewater Division Manager

A handwritten signature in black ink, appearing to read "Jeff S. Lonzrick".

Jeff S. Lonzrick, PE  
Engineering Division Manager

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Don Van Metre  
Wastewater Collection Superintendent

A handwritten signature in black ink, appearing to read "John S. Vence".

John S. Vence, PE  
Engineering Supervisor

A handwritten signature in black ink, appearing to read "David A. Sloan".

David A. Sloan, PE  
Construction Engineer



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## ITEM 430 – DRIVEWAY

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430.03	MATERIALS
430.04	SHOP DRAWINGS
430.05	CONSTRUCTION METHODS
430.06	METHOD OF MEASUREMENT
430.07	BASIS OF PAYMENT

**430.01 Description.** This work shall consist of providing all labor, materials and equipment necessary to construct and install a pump station asphalt driveway as described in this Specification and shown on the detailed Drawings. This work shall include: the furnishing of a compacted sub-base to lay the proposed asphalt drive to proper grade and the installation of a new asphalt driveway at the pump station. Refer to the detailed Drawings for depth and limits of the asphalt driveway.

**430.02 Quality Assurance.** The Contractor shall comply with ODOT Construction and Material Specifications, latest Edition.

**430.03 Materials.** The Contractor shall be responsible to provide the following materials:

- a) 6-inch after compaction; ODOT Item 304 – Limestone Aggregate Base.
- b) 6-inch thickness after compaction; ODOT Item 301 – Bituminous Aggregate Base Course.
- c) 1-1/2 inch thickness after compaction; ODOT Item 448 – Asphalt Concrete Surface Course, Type I. The Binder shall be PG64-22.
- d) Sealer for Contact and Mating Surfaces and Joints – Comply with ODOT Items 401.14 and 401.17.

A two foot berm shall be installed on each side of the pavement drive as shown on drawings. Berm shall be constructed per ODOT Item 304 – Limestone Aggregate Base, not to exceed a four inch thickness after compaction.

**430.04 Shop Drawings.** The Contractor shall provide shop drawings for approval in accordance with Item 110- Shop Drawings.

**430.05 Construction Methods.** The Contractor shall provide all labor, materials and equipment necessary to construct one asphalt driveway at the pump station as shown on the detailed drawings. The Contractor shall prepare the subgrade in accordance with ODOT Item 204.

The minimum width of the driveway shall be 12'-0". The minimum turning radius shall be 25'-0" to accommodate all PCWR equipment. The County reserves the right to modify the driveway layout (i.e. length and width dimensions) for any site which it deems necessary.

**430.06 Method Of Measurement.** The method of measurement for the pavement shall be at a lump sum unit for the complete construction of the pavement as approved by Portage County Water Resources.

**430.07 Basis Of Payment.** The payment for all work performed under this item shall be at lump sum price bid, which payment shall be full compensation for all labor, materials and equipment to construct and install one asphalt paved driveway.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
430	Lump Sum	Driveway

END OF SECTION

## ITEM 500 - BUILDING

500.01	DESCRIPTION
500.02	SUBMITTALS
500.03	GENERAL
500.04	WARRANTY
500.05	PAYMENT

**500.01 Description.** This specification covers general requirements for pump station buildings.

Pump stations designed for an average daily flow of less than 20,000 gpd do not require a building.

Pump stations designed for an average daily flow between 20,000 gpd and 40,000 gpd, shall require a minimum of a fiberglass enclosure.

Pump stations designed for an average daily flow of greater than 40,000 gpd shall require a split face block building with a shingled gable roof, designed to blend in with the surrounding architecture of existing and/or expected structures.

All flows are to be based on EPA standard flow calculations.

**500.02 Submittals.** The Contractor shall submit the following in accordance with the conditions of this Contract and Item 110 - Shop Drawings.

**A. Building Design.** Plans for the pump station building, shall be designed to blend in with the surrounding architecture. The Portage County Water Resources Department will review the architectural design of the building for size, equipment placement and aesthetics only. The Portage County Building Department or the applicable city having jurisdiction will have the final design approval, prior to issuance of the building permit.

**B. Landscaping.** A landscaping plan shall be submitted to the Portage County Water Resources Department for approval.

**500.03 General.** Buildings shall be adequately sized to house all equipment. Pump stations designed for an ADF between 20,000 and 40,000 gallons per day (gpd) shall be at a minimum one-piece prefabricated fiberglass enclosure. Pump stations designed for an ADF of greater than 40,000 gpd shall match the surrounding architecture. The minimum outside dimensions of the building shall be 15'-0" (L) by 10'-0" (W) by 8'-0" (H) for submersible pump stations or 18'-0" (L) by 10'-0" (W) by 8'-0" (H) for suction lift pump stations.

**500.04 Warranty.** The Contractor shall provide a written guarantee against all defects in workmanship and materials for a period of one year after approved completion of the building.

If any defects appear during the guarantee period and the Contractor receives written notification of said defect, he shall make all necessary repairs without cost to the County.

**500.05 Method Payment.** Payment for labor, materials and installation of the pump station building. Payment for Item 500 – Building shall be made under the applicable pump station specification section.

END OF SECTION

## ITEM 607 SPECIAL—CHAIN LINK FENCING AND GATES

607.01	DESCRIPTION
607.02	MATERIALS
607.03	INSTALLATION
607.04	METHOD OF MEASUREMENT
607.05	BASIS OF PAYMENT

**607.01 Description.** This work shall consist of furnishing and erecting a 7'-0" high galvanized steel fence with 16'-0" width double leaf gate as shown per the detailed Drawings.

All installations shall be in reasonable close conformance with the lines, grades and locations specified on the Plans or established by the Engineer. Construction shall be accomplished in a manner that will provide a rigid, fence closely conforming to the surface of the ground, as shown on the detailed Drawings and as specified herein.

**607.02 Materials.** The Contractor shall furnish and install a new fence and gate as shown on the detailed Drawings and as specified herein. The chain link fences and gates shall be provided by a single source including all necessary erection accessories, fittings and fastenings. Galvanized steel fencing and fabric shall be Allied Tube and Conduit Corporation, American Fence Corporation, or Anchor Fence, Inc. Dimensions for pipe, roll-formed and H-sections are outside dimensions:

**A. Steel Fabric.** Steel fabric shall be No. 9 ga. (0.148" +0.005") size steel wires, core, thermally fused and bonded vinyl coated (black color), 2" mesh, top and bottom selvages knuckled.

**B. Framing and Accessories.**

1. Steel framework shall be galvanized, ASTM A120 or A123, with not less than 1.8 oz. zinc per square foot of surface; fittings and accessories shall be galvanized, ASTM A153 with zinc weights per Table I.
2. End, corner and pull posts shall be 2.875" OD steel pipe, 5.79 lbs. per linear foot or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per linear foot.
3. Line posts shall be 1.90" OD steel pipe, 2.72 lbs. per linear foot or 1.875" x 1.625" C-sections, 2.28 lbs. per linear foot; spaced 10'-0" on center maximum.
4. Gate posts shall be 3.5" x 3.5" roll-formed section, 4.85 lbs. per linear foot or 2.875" OD steel pipe, 5.79 lbs. per linear foot.
5. Top and bottom rail shall be provided with expansion type couplings, approximately 6" long, for each joint; 1.66" OD steel pipe, 2.27 lbs. per linear foot or 1.625" x 1.25" roll-formed sections, 1.35 lbs. per linear foot.
6. Tension wire shall be 7 gage, coated coil spring wire, metal and finished to match the fabric, located at top and bottom of fabric.



7. Wire ties shall be 11 ga. Galvanized steel or 11 ga. Aluminum wire, to match fabric core material.
8. Post brace assembly shall be the manufacturer's standard adjustable brace at end and gate posts, and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric; use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.
9. Post tops shall be weather tight closure cap with loop to receive tension wire or top rail; one cap per post.
10. Stretcher bars shall be one-piece lengths equal to full height of fabric, with a minimum cross section of 3/16" x 3/4"; provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into the post.
11. Stretcher bar bands shall be a maximum of 15" on center, to secure stretcher bars to end, corner, pull and gate posts.
12. Provide posts and rails with manufacturer's standard polymer coating according to ASTM F1234, 10-mil minimum polyvinyl chloride (PVC) applied to exterior surfaces and, except for tubular shapes, to exposed interior surfaces; color to match chain fabric(black).
13. Fence shall be complete with three rows of barbed wire on top of structural extension arm brackets. Extension arms shall carry the barbed wire at an angle of 45 degrees from the vertical towards the outside of the fence.
14. Barbed wire shall be four-point pattern, two strand, No. 12-1/2 gauge, heavily hot dipped galvanized after weaving, with 14 gauge barbs placed 5 inches on center.

#### **C. Gates.**

1. Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories.
  - i. Space frame members a maximum of 8'-0" apart unless otherwise indicated.
  - ii. Provide same fabric as for fence. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at 15" on center maximum.
2. Fabricate swing gate perimeter with a minimum of 1.90" OD steel pipe.
3. Provide hardware and accessories for each gate, galvanized per ASTM A153:
  - i. Hinges shall be non-lift-off type, offset to permit 180-degree gate opening; size and material to suit gate size.
  - ii. Latch shall be forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
4. Provide concrete consisting of Portland cement, ASTM C150, aggregates, ASTM C33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cubic yard, 1" maximum size aggregate, 3" maximum slump, and 2-4% entrained air.

**607.03 Installation.** The Contractor shall install the fence as shown on the details, and specified herein.

The holes for posts shall be drilled or hand-excavated to the diameters and spacings as shown, in firm, undisturbed or compacted soil. Excavate holes to depths approximately 4" lower than post bottom, with the bottom of posts set not less than 36" below finish grade surface. Center and align posts in holes 4" above bottom of excavation, placing concrete around posts and vibrating or tamping for consolidation. Check each post for vertical and top alignment, and holes in position during placement and finishing operations. Extend concrete footings 2" above finished grade and trowel to a crown to shed water.

Top rails shall be run continuously through post caps; provide expansion couplings as recommended by the fencing manufacturer. Provide center rails where indicated, installing in one piece between posts and flush with post on fabric side. Install brace assemblies so posts are plumb when diagonal rod is under proper tension.

Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 ga. Galvanized wire. Fasten fabric to tension wire using 11 ga. Galvanized steel hog rings spaced 24" on center.

Install fabric leaving approximately 2" between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released. Thread stretcher bars through or clamp to fabric 4" on center, and secure to posts with metal bands spaced 15" on center.

Install gates plumb, level and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

Use U-shaped tie wires to tie fabric to line posts at 12" on center. Tie wire shall conform to the diameter of pipe to which attached, clasping pipe and fabric with ends twisted at least 2 full turns. The Contractor shall bend the ends of the wire to minimize hazard to persons or clothing. Tie fabric to tension wires with hog rings spaced 24" on center.

Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

Barbed wire extension arms shall be attached to the top of each post, inclined at an angle of 45 degrees from the vertical. Three strands of barbed wire shall be securely fastened to all extension arms. The top strand of barbed wire shall be 12 inches from the fence line horizontally and 12 inches above the top of the fabric vertically. Arms shall be of steel or malleable iron construction supplied with pin for locking barbed wire in place. Arm bracket to be capable of supporting 250 pounds of downward pull at the outermost end.

**607.04 Method Of Measurement.** The method of measurement for the fencing shall be at a lump sum unit for the complete construction of all fencing as approved by Portage County Water Resources.

**607.05 Basis of Payment.** The payment for all work performed under this item shall be at a lump sum price bid, which payment shall be full compensation for all labor, materials and equipment to furnish and install all fencing.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
607	Lump Sum	Chain Link Fencing and Gates

END OF SECTION

## ITEM 893 - SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM

893.01	DESCRIPTION
893.02	SUBMITTALS
893.03	MATERIALS
893.04	SPECIFICATIONS
893.05	STARTUP
893.06	QUALITY ASSURANCE/WARRANTY
893.07	BASIS OF PAYMENT

**893.01 Description.** This item includes all labor, material and equipment required to furnish, install, integrate the proposed pump station into the existing County Supervisory Control and Data Acquisition System (SCADA system). To assure system integrity the system shall be designed and installed by the SCADA System provider, Westerman Companies of Breman OH 43107, 1-800-338-8265. No alternates will be permitted.

The complete system, which includes all equipment and software, shall be Y2K compliant. This system shall include the installation of SCADA equipment as detailed at the proposed pump station.

These specifications reflect a standard for equipment and services to be provided to Portage County Water Resources Department located at Ravenna, Ohio. The additional sites must be provided with identical hardware and software that matches the existing SCADA System. Mixing of different system manufacturer's equipment is not permitted.

**A. Terminology.** Reference to the following words and abbreviations utilized through this Specification shall be as follows:

Master Terminal Unit (MTU). The main control unit, which is necessary to control the entire system as specified per all Plans and Specifications.

Programmable Logic Controller (PLC). The control unit utilized at all remote sites as specified per all Plans and Specifications.

System Operation. The existing system is a "distributed" type monitoring system with operation such that a failure at one or more sites shall not prohibit remaining functionality of the system. The "Host" shall provide the primary monitoring of the system.

A manual poll on demand rate can be initiated from the Master Terminal Unit (MTU). The proposed remote site(s) shall communicate with all Master site(s).

**893.02 Submittals.** The SCADA System provider shall submit the following items in accordance with the following conditions.

**A. Product Data.** Product data and cut sheets shall be submitted for each product and component specified. This is to include the schedule of features, name as used on reference drawings, manufacturer's model number, input and output characteristics, factory setting, electrical and mechanical requirements and material compatibility. All submittals shall be in accordance with Item 110 - Shop Drawings.

**B. SCADA System Details (complete).** The SCADA System complete shall include all control components (as specified), hardware, PLCs, radios, antenna posts and antenna. Submittals shall include dimensioned plans and elevations and complete component lists. Show rating, including outputs, set points, transmission frequency, ranges and accuracy.

**C. Electrical Details.** All electrical wiring diagrams shall be submitted to include interconnection wiring diagrams pertinent to the class and type of components (new and existing) and all wiring diagrams to remote units, all field wiring by the SCADA System provider and/or Contractor shall be shown on the drawings.

**D. Maintenance.** All maintenance data for all equipment specified shall be submitted as part of this Specification. This item shall also include all O&M Maintenance Manuals as detailed under Item 893.06 Quality Assurance/Warranty.

**E. Propagation Study.** \*\*\*[NOTE TO DESIGN ENGINEER - The Design Engineer is required to contract with the SCADA System provider to perform all propagation studies required for the proper operation of the SCADA System prior to final design submittal of the pump station. A propagation path study shall be performed during a period of full foliage to determine communication with no less than two (2) repeater sites, determine signal reliability and acceptable line losses, determine the required antenna/pole height, and verify there will be no disruption to other existing sites while communicating. The results of the study shall be submitted to the County prior to final design for approval. Further, the results of said study shall replace this Paragraph of the final specifications.]\*\*\*

**F. Operations.** The major functions of the system shall display operational parameter at the master sites, provide for monitoring and control of the proposed facility in accordance with the I/O listing, provide reports for pump run time readings, provide flow reports, provide preset alarm features, and provide a system that is "open architecture" with the existing system, which is currently in operation.

**G. Scheduling.** The SCADA System provider shall submit a schedule for the entire project, a SCADA Schedule of Events to include engineering schedule, shop drawing submittals, equipment submittals, equipment delivery dates, equipment installation schedules, SCADA System start up, and system prove out period.

**H. Process Graphics.** The SCADA System provider shall interface all proposed facility graphics with the existing process graphics. All graphics shall be developed utilizing Intellution iFix software. All graphics (ie. colors, symbols etc.) shall meet or exceed the graphics developed by Westerman Inc. for the existing County Wide system while maintaining 100% compatibility with the existing system graphics.

**I. Resubmission Requirements.** Make any corrections or changes in the submittals required by the owner and resubmit until approved. Revise initial drawings or data and resubmit as specified for the initial submittal. Indicate any changes, which have been made.

**893.03 Materials.** The SCADA System provider shall be responsible for all labor, material and equipment necessary for a complete installation for the SCADA System as specified in this Contract. This is to include the interface between new and existing technology and components.

These Specifications are intended to illustrate and define the equipment, however, the SCADA System provider shall be responsible for all the details, which may be necessary to properly install, adjust and place into operation the proposed facility's SCADA System.

The SCADA System provider shall be responsible for any additional costs, which may result from unauthorized deviations from these Specifications. All equipment and materials shall conform to the Specifications unless otherwise noted on the equipment schedule or changed in writing by the Engineer.

**A. Material Storage/Handling.** All materials used on this project shall be stored in a neat, organized and safe fashion in accordance with the following requirements. All products/materials shall be stored on wooden pallets. All products that arrive on-site shall be new, unused items packaged in original unopened packages.

All products/materials are to be kept dry at all times via temporary tarping or inside storage. All products/materials, which are damaged and/or wet, will be unacceptable and returned for replacement at the SCADA System provider's and/or manufacturers' expense.

All manufacturers' recommendations of storage pertaining to heat, cold, sunlight, flammability, etc. are to be utilized. All materials, which arrive on-site, are to be accompanied by their respective MSDS Sheets. Materials discovered on site without an MSDS sheet will be removed from site immediately at the SCADA System provider's expense.

**B. SCADA Hardware.** The SCADA System provider shall provide and install the following packaged 900 MHz PLC SCADA equipment:

PLCs shall be specified for operation over a temperature range of 0 to 60 deg. C. This operating range shall be achievable while operating in a non-ventilated enclosure and without the use of mechanical cooling devices or heaters.

PLCs shall be easily removed for repair or replacement. Terminal shall be of the plug in type, with detachment and reattachment possible without the use of tools. All connections, including connections from PC board to PC board shall be gas tight. Insulation displacement type connections (including ribbon cable) shall be prohibited.

The SCADA System provider shall be responsible to assure that the following equipment and I/O boards are available at each site based upon the I/O listing in Item 893.04 Section Specification. All SCADA System components shall meet or exceed the following requirements as specified below:

1. **One Allen-Bradley, 1764-LRP, MicroLogix 1500 RS-232 Processor Unit.**
2. **One Allen-Bradley, 1764-28BXB, MicroLogix 1500 Base DC In/DC FET & Relay Out/DC Power.**
3. **Three Allen-Bradley, 1769-IF4, 4 Channel Analog Current/Voltage Input Modules.**
4. **Two Allen-Bradley, 1769-IA8I, 8 Point 120VAC Individually Isolated Input Modules.**
5. **One Allen-Bradley, 1769-ECR, Right End Cap/Terminator.**
6. **One Metricom Spread Spectrum Data Radio, Utilinet Series III, IWR, Model 26-1046.**
7. **One Antenna.** The antenna shall be Omni style 7 dB gain or Engineering approved equal. The antenna cable shall be ½ inch Andrews Heliax in size below 100 feet, 7/8 inch Andrews Heliax above 100 feet. The antenna shall be mounted on a pole per Westerman's requirements.
8. **One Antenna Pole.** [Not required.] [The antenna pole shall be a fiberglass, aluminum or Pentrax class 5 wooden pole. The minimum height of the antenna pole shall be \_\_\_ feet, as determined by the propagation path study.]
9. **One UL 508A Panel.** Panel, components, configuration and wiring to be in accordance with UL508A Industrial Control Panel Standards.
10. **One Steel Enclosure.** Enclosures shall be NEMA 4X stainless steel for outside installations or NEMA 12 painted steel for inside installation, sealed with O-rings for moisture protection. Enclosures shall be wall mounted where appropriate. Enclosures are to be complete with heaters and thermostat. A complete lock kit shall be included. All enclosures shall be keyed the same. The Portage County Water Resources shall receive two keys per panel. Manufacturer shall be Hoffman or Engineering approved equal
11. **One 10 Amp Hour Battery w/charger.** All master, repeater and remote site PLCs shall be installed with 10-amp hour batteries. Eight hour minimum back-up power shall be provided. Back-up power supply shall be fully automatic charging with low voltage disconnect to protect the battery.

**12. One Hoffman Enclosure Heater.**

**13. One 20 Amp Breaker Switch.**

**14. Accessories.** All related conduit, wire, cabling and installation shall be included as necessary to complete the full installation of the system as described by this Specification. All accessory costs shall be included under this Contract.

**C. Standardization.** All equipment shall be of the latest and most modern design. All SCADA control equipment (i.e., master unit, PLCs, radios and antenna equipment shall be of the same manufacturer and general model type but shall be the most current model available.)

All equipment shall be Modbus/Modbus One in nature, capable of communicating to various systems. This equipment shall also allow for non-propriety (off the shelf) parts replacement. In addition all equipment shall allow for non-propriety (off the shelf) component replacement.

All SCADA equipment, PLCs, radios and antennas shall have an identifying tag (white plastic with black letters engraved on it) mounted on each piece of equipment with the following information: Manufacturer's name, part number, serial number, tag number, and calibrated range.

**893.04 Specification.** The SCADA System provider shall install the following pump station SCADA system. The SCADA System provider shall install all PLCs at said pump station in accordance with all plans and specifications.

The PLC shall have the ability to be SCADA controlled to allow for pump on/off operation, the input of set points for VFD controls (where applicable) to adjust the output of pumps, and allow for valve adjustments (fully open to fully closed positions, and in-between) where applicable.

The following I/O points are standard for all 900 MHz PLC pump station SCADA Systems in Portage County and the capability listed shall be provided. The following I/O points indicated with an 'X' illustrate the minimum tentative requirement. However, the Portage County Water Resources Department-approved facility design and scope of operation will determine the exact I/O requirement:



Monitoring Parameters		Display Data	
I	Digital Input Signals	Status Screen	History Screen
1	Powerfail	X	
2	Phase Fail, Under/Over Voltage	X	
3	Standby Power On	X	X
4	Load Connection: Utility/Emergency	X	
5	PLC Intrusion		
6	Site/Building Intrusion	X	
7	Pump No. 1 On/Off	X	X
8	Pump No. 2 On/Off	X	X
9	Pump No. 3 On/Off		
10	Pump No. 1 Hand	X	
11	Pump No. 2 Hand	X	
12	Pump No. 3 Hand		
13	Pump No. 1 Auto	X	
14	Pump No. 2 Auto	X	
15	Pump No. 3 Auto		
16	High Level Alarm	X	X
17	Low Level Alarm	X	
18	Pump No. 1 Fail	X	
19	Pump No. 2 Fail	X	
20	Pump No. 3 Fail		
21	High Pressure Alarm, Force Main		
22	Generator Low Fuel Alarm	X	
23	Building, Low Temperature	X	
24	Flooded Floor Alarm	X	
25	(Normally Spare)		
26	(Normally Spare)		
II	Digital Output Signals	Status Screen	History Screen
1	Pump No. 1 Start/Stop	X	
2	Pump No. 2 Start/Stop	X	
3	Pump No. 3 Start/Stop		
4	Valve Open/Close		
III	Analog Signals	Status Screen	History Screen
1	Wet Well, Percent Level	X	X
2	PLC Battery Voltage	X	
3	Force Main header pressure, PSI	X	X
4	Discharge Flow Rate, GPM/GPD	X	X
5	Pump No. 1 Amperage Draw		
6	Pump No. 2 Amperage Draw		
7	Pump No. 3 Amperage Draw		
8	Generator Fuel, Percent Level	X	
9	Generator Battery Voltage	X	
10	Chemical Tank, Percent Level	X	
11	(Normally Spare)		
12	(Normally Spare)		

IV	Derived	Status Screen	History Screen
1	Pump No. 1 Run Time	X	
2	Pump No. 2 Run Time	X	
3	Pump No. 3 Run Time		
4	Generator Hours	X	
V	Totalized Signal	Status Screen	History Screen
1	Flow Meter Totalization	X	

[Design Engineer to modify the above list as appropriate for pump station]

The master terminal unit, PLC, radios and antennas shall be completely wired, tested and suitable for operation. Any conduit and signal wiring required between existing and new or new and new equipment shall be installed between each converter and terminals at the designated area panel.

The SCADA System shall readily accept the required signals to monitor the status of all components listed above. The SCADA System provider and/or Contractor shall be responsible to provide and install all equipment, sensors, contact closures, etc. in order to properly tie all components into the SCADA System at the site.

The omission of any I/O listing(s) above at the master board(s), which are required for proper installation of the monitor and/or control system, shall be installed by the SCADA System provider, at his expense as part of this Contract.

**A. Remote PLC.** Location for the 900 MHz PLC shall be shown per all location drawings and detailed electrical schematics and details for site. All monitoring and control shall be in accordance with all above listed I/O requirements.

**B. Method Of Communication.** The method of communication for all remotes shall be accomplished with a Metricom Spread Spectrum radio using the 902 -928 MHz range identical to the system currently used by Portage County Water Resources.

Each remote site shall transmit its data to the host site through a repeater(s), which have been determined by the SCADA System provider during the communications path study. It will be the responsibility of the SCADA System provider to install any equipment necessary to establish the repeater site(s). Any easements, permits (excluding FCC) shall be supplied by Portage County.

**C. Communications Protocol.** The SCADA System provider shall provide Modbus as the standard communications protocol. This is the protocol of the existing System. The SCADA System provider shall provide all labor, materials and equipment necessary to completely install the SCADA system as specified under this Contract.

**D. Installation.** The SCADA System provider and/or Contractor shall be responsible to assure all work is performed in accordance with all detailed drawings and this Specification. The SCADA System provider and/or Contractor shall be responsible to assure the entire system is completely operational.

The SCADA System provider installing the SCADA system shall act as the SCADA System provider throughout the duration of this project. The General Contractor shall assure all coordination between subcontractors is organized such that all schedules are maintained throughout the duration of this project.

If the SCADA System provider finds it desirable to make changes and/or alterations in plans, equipment, or materials in order to facilitate construction he shall submit a proposal for the changes to the County for approval. The SCADA System provider shall not initiate such changes without the County written approval. No adjustment in quantities or unit prices shall be made for the changes unless attached to the written approval as an authorization for "Change in Work" or "Extra Work". The SCADA System provider, by his acceptance of the approval, agrees not to submit any "Claims for Damage" in connection with the approved changes or alterations

The SCADA System provider and/or Contractor shall be responsible to determine and verify field measurements, field construction criteria, catalog numbers and similar data, and conforming with these Specifications. No fabrication of equipment or materials or work may begin without shop drawing/submittal approvals.

The SCADA System provider and/or Contractor shall provide all wire, conduit, electrical accessories, and electrical boxes and conduit necessary to make the system fully operational. The SCADA System provider and/or Contractor shall be responsible to interface all equipment (i.e. meters, HOA switches, ETM meters etc.) with the new SCADA System.

All antennas and/or posts required for mounting PLCs, and radios shall be set as per all detailed Drawings. All antennas and/or posts shall be set true and plumb. The Contractor will supply PVC conduit and 10 foot grounding rods. The Contractor shall be responsible for all lightning protection of equipment as specified by the Electrical Contractors Specifications. All initial calibrations with documentation shall be required for all hardware being installed under this contract, shall be the responsibility of the SCADA System provider and/or Contractor.

All trenching and excavation, required for proper installation shall be performed or supplied by the SCADA System provider and/or Contractor. Buried cable shall be located in rigid metallic conduit from its exit or entrance to any control or telemetry panels. Conduit shall extend into the ground to the depth of the cables laying length. Buried cable shall be installed directly into the ground to a depth of 18 inches or as required by local code, whichever is deeper. Electrical caution tape shall be installed 12" above the buried conduit.

The SCADA System provider and/or Contractor shall not be permitted to mix signals of different types within the same conduit. The SCADA System provider and/or Contractor shall assure all communication lines of sight are clear and operational. The SCADA System provider and/or Contractor shall be responsible to obtain all electrical feeds at each location. All electrical work shall be performed in accordance with all NEC Regulations.

The SCADA System provider and/or Contractor shall pick up all I/Os as listed above. The SCADA System provider and/or Contractor shall provide any taps needed for proper operation of the proposed system. The SCADA System provider and/or Contractor shall be responsible to field verify all locations for services and field dimensions.

All work shall be in accordance with but not limited to all detailed drawing and Specifications. Portage County shall not be held liable for any work inadvertently omitted from these Specifications, but is integral to the proper installation and operation of the SCADA system. All installation shall be per manufacturer's Specifications and all good workmanship practices as established by the Skilled Trades Association.

**E. Compliance.** All materials, equipment, calibration and workmanship shall comply with the following standards:

1. All computer hardware and software shall be year 2000 compliant.
2. AWWA Standards.
3. Portage County Water Resources Department Specifications.
4. Institute of Electrical and Electronics Engineers, IEEE.
5. Instrument Society of America Standards, ISA.
6. Nation Electrical Codes, NEC.
7. National Electrical Manufacturing Association Standards, NEMA.
8. National Fire Protection Association Standards, NFPA.
9. Occupational Safety and Health Act, OSHA.
10. Underwriters Laboratories Standards, UL.
11. Factory Mutual Standards, FM.

**893.05 Startup.** The SCADA System provider shall provide a factory authorized technician to over see the initial start up of the SCADA system and training of O&M personnel during regular working hours. The technician shall verify the functionality of said site(s) to assure the system is fully operational as described in this Specification prior to commencement of Acceptance Testing.

**A. Acceptance Test.** The Acceptance Test will commence upon start up of the SCADA System as described in these Specifications. The Acceptance Test is defined as a consecutive three-day period, in which the system operates as it was designed.

If any major failure occurs, other than Acts of God, which cannot be corrected within 24 hours of being notified, then the three day period starts over. A major failure is defined as follows, "The loss of information into Host Computer/Master station" for the proposed site.

No final payment for the Contract shall be made until successful completion of the Acceptance testing. The SCADA System provider and/or Contractor shall correct any defects that occur during the acceptance testing or the guarantee period, at no cost to the County.

## **893.06 Quality Assurance/Warranty.**

**A. Quality Assurance.** The work covered under this section of the Specification is intended to be that work, materials, labor and equipment required to install a operational SCADA system, as described in the above Specification. To ensure system responsibility and integrity, all equipment described herein shall be furnished by the SCADA System provider.

The SCADA System provider shall supply the manufacturer's latest version of Windows XP compatible software, licensed to Portage County, for any programmable component requiring site configuration, adjustment or calibration to field conditions. Software must be manufacturer's full version to enable all operating capability and features of the device, instrument, controller, etc. All interconnecting cables to connect the device to a laptop computer shall be supplied, without the need for adapters.

**B. Warranty/Guarantee.** The SCADA System provider shall guarantee the SCADA system as set forth in this Contract against any defects in materials or workmanship in the goods described herein. This warranty shall bind the SCADA System provider for a period of one year after successful completion of acceptance testing and final project approval has been granted.

The SCADA System provider shall provide a bound book of all additional manufacturer's warranties. If within such warranty period it is established that any material or workmanship in the goods was defective, the SCADA System provider shall, at its option, either repair or replace defective materials or workmanship, at no cost to Portage County.

**C. Operation and Maintenance Manuals.** The SCADA System provider shall provide Portage County Water Resources with three copies of all equipment, operation and maintenance manuals obtained from the Manufacturers and/or Subcontractors. The O&M manuals are to be in bound copies.

Said manuals shall be organized based upon Manufacturer name. The table of contents shall contain equipment/component type (i.e. computer, I/O Board, Radio etc.), manufacturer, and page location.

The O&M Manual information format shall be organized in the order of equipment/component type (i.e. computer, I/O Board. Radio etc.); manufacturer name; manuals or equipment information to include installation instructions, operation instructions, maintenance instructions, and trouble shooting procedures; installation information; warranty information; additional attachments such as sleeved pages for software components.

**893.07 Basis of Payment.** The payment for all work performed under this item shall be at lump sum price bid, which payment shall be full compensation for all labor, materials and equipment to furnish and install all items complete and assure a fully operational system.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
893	Lump Sum	SCADA System

END OF SECTION

## ITEM 971 – GRINDER PUMP STATION

971.01	DESCRIPTION
971.02	SUBMITTALS
971.03	MATERIALS & EQUIPMENT
971.04	SCADA SYSTEM
971.05	EMERGENCY OPERATION
971.06	PUMP STATION INSTALLATION
971.07	ELECTRICAL
971.08	TESTING/TRAINING
971.09	SHOP DRAWINGS
971.10	WARRANTY
971.11	METHOD OF MEASUREMENT
971.12	BASIS OF PAYMENT

**971.01 Description.** The contractor shall provide all labor, materials and equipment necessary to provide and install a duplex pump station, complete with digital controls and SCADA system in accordance with the detailed plans, specifications and the current Recommended Standards for Wastewater Facilities of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten State Standards) requirements for Wastewater Pumping Stations. *[ To help ensure compliance, the Ohio EPA requires inclusion of Form B1 (Sanitary Sewer and Pump Station Construction Data Sheet) with each Permit to Install/Plan Approval Applications. Designs must meet these standards and Portage County's standards.]*

**Portage County Water Resources will not accept grinder pump stations for installations designed for greater than or equal to 20 homes or with an ADF of 8,000 gpd or greater.**

All structures, shelters and foundation designs shall be in accordance with these specifications, local zoning regulations, and Ohio Building Codes.

*[The Design Engineer shall procure a geotechnical consultant to properly design the subbase for the wet well and valve vault based on the soil analysis report. A copy of the soil analysis report shall be furnished to PCWR for review.]*

The Contractor shall be responsible for all costs and plan submittals to the Portage County Building Department for approval as part of this project.

**Terminology.** Reference to the Contractor under this item/specification refers to the General or Prime Contractor. All other Contractors noted under this item/specification will be noted by their specific trade as a subcontractor to the General/Prime Contractor.

The County reserves the right to non-perform any pay item bid under this contract, as determined necessary to complete said project.

**971.02 Submittals.** The Contractor shall submit the following in accordance with the conditions of this Contract and Item 110 "Shop Drawings".

**Shop Drawings.** Submittal of shop drawings, design computations and other required information to Portage County Water Resources for review and approval shall be initiated within 30 days after receipt of written "Notice To Proceed" and prior to material fabrication in accordance with Item 110 - Shop Drawings.

All shop drawings submitted for review and approval shall be returned either approved or marked up for further design.

The Contractor shall submit all structure, shelter and foundation shop drawings to the Portage County Building Department or applicable city having jurisdiction for approval prior to commencement of Construction.

The Contractor shall be responsible for all fees incurred by the Portage County Building Department and all submittals and re-submittals.

All of the above items shall be designed in accordance with this specification, Ohio Building Codes (latest revised copy), NEC and OSHA Standards.

All of the above design computations, plans and drawings shall be stamped by a registered professional engineer and/or registered architect where applicable.

**Product Data/Cut Sheets.** Product data and cut sheets shall be submitted for each product specified herein. All material manufacturing schedules, shelf lives and MSDS Sheets shall also be included.

No materials will be accepted that:

- Are not accompanied with a material cut sheet.
- Have a manufacture date of over one (1) year old.
- Are not accompanied with their MSDS sheets (3 copies) where applicable.
- Damaged, used or shipped in open containers.

**Schematics.** The Contractor shall provide the following schematics: electrical wiring, lighting and heating plans.

**MSDS Sheets.** (Where applicable) All materials utilized on this project shall be accompanied with their appropriate MSDS Sheets. Any materials found on site without an MSDS sheet shall be removed from site immediately at the Contractors expense.



The Contractor shall assure each product is supplied with three copies of MSDS sheets:

- One copy shall remain on site with the product at all times.
- One copy shall be given to and remain with the PCWR on site Engineering inspector.
- One copy shall be given to the Engineer for permanent record in the project file.

**Project Schedule.** The Contractor shall provide a complete project schedule of events prior to commencement of construction. Said schedule shall include the following schedule of events:

- Project start up date.
- Material lead-time.
- Site Work
- Pump Station Installation.
- Pump Station start up date.
- Project completion date.

**971.03 Materials & Equipment.** All materials and equipment noted within this Specification are approved for use on this project. Equivalent materials of other manufacturers may be submitted for review and may be substituted upon written approval of the County.

Requests for substitution shall include manufacturers' cut sheets in accordance with Item 110 – Shop Drawings for each product being proposed as a substitute. Submittals shall include the brand name, generic type, descriptive information of the material or equipment and a list of three projects where each product has been satisfactory utilized for at least three (3) years.

**A. Material Storage.** All material shall be stored in a neat, organized and safe fashion assuring that all hazards are avoided.

All products that arrive on-site shall be new, unused items, packaged in original unopened packages.

All materials are to be kept dry at all times via tarping or inside storage as required.

Any materials, which are damaged, will be unacceptable and returned for replacement at the Contractor or Manufacturer's expense.

All Manufacturers' recommendations for storage pertaining to heat, cold, sunlight, flammability, etc., are to be followed.

All materials, which arrive on-site, are to be accompanied by their respective MSDS Sheets. Any materials discovered on-site without MSDS Sheets will be removed from site immediately.

Failure to comply with the regulations as set forth under "971.03, A." may result in removal/replacement of said material at the Contractor's expense.

In addition to the above Specifications, all materials shall comply with their respective section material requirements.

**B. Equipment.** The Contractor shall be responsible to provide the following equipment to meet the following requirements:

Wet Well. The pump station wet well shall be constructed of a pre-cast concrete with the following specifications:

- Minimum 6' ID pre-cast concrete wet well with flat top.
- ML-10 reinforced plastic steps
- Minimum 8'8" diameter x 12" thick extended base
- Minimum riser wall thickness shall be 7"
- All discharge piping within wet well shall be welded stainless steel, with a diameter equal to or greater than the pump discharge base
- Zlok gaskets at all piping penetrations
- Manway access hatch cover shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, single leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
  - Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Pump access hatch cover shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, double leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
  - Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Two NEMA 4X stainless steel enclosures and appurtenances, for all electrical connections, as shown on the Junction Box Detail (Drawing SD2)
- Prior to installation, the Contractor shall seal the wet well interior with one of following:
  - Spray on concrete sealant
  - Spray on 100% solid epoxy coating
- After installation, the Contractor shall plug all lifting holes and imperfections greater than or equal to 1" in diameter

Pumps. The only grinder pumps approved for this work shall meet the following requirements:

- F.E. Meyers Model \_\_\_\_; or Hydromatic Model \_\_\_\_.
- Capable of pumping a minimum of \_\_\_\_ GPM at a total system head of \_\_\_\_ foot TDH; minimum pump design efficiency shall be 45 percent

- \_\_\_\_ HP rated at 480/277 volt, three phase, four wire service, 60 cycle, operating at \_\_\_\_ RPM
- Cast iron pump case
- Ductile iron or bronze recessed impeller; dynamically balanced
- Grinder assembly consisting of grinder impeller and shredding ring
- 2-inch flanged discharge elbow (minimum)
- Equipped with a thermal sensor for automatic shut down in case of motor overload or over heating and seal failure sensor.
- Oil filled motor cavity
- \_\_\_\_ feet of continuous watertight power cable (no splices shall be accepted)
- Explosion proof Class 1, Group D, complying with ASTM 276 and 351 for corrosive resistance of internal and external components, in compliance with all ANSI Standards and UL listed and approved.
- 304 stainless steel lift out slide rail assemblies complete with pump base casting by the approved Pump Manufacturer
- Upper and lower stainless steel guide rail support brackets
- Pump guide brackets and quick disconnect sealing flange
- \_\_\_\_ feet of stainless steel lifting chain with lifting rings on 3 foot centers and shackles per pump
- Stainless lifting bail on pumps
- Spare Parts: The Contractor shall furnish one full spare pump

Control Building. No control building is required for grinder pump stations.

Control Panel. The control panel shall meet the following requirements:

For Outdoor Installations:

- All installations, both outdoor and indoor, shall include NEMA rated electrical components, no IEC rated components will be accepted:
- Custom Duplex Control Panel NEMA 4X stainless steel enclosure
- Three point door latching mechanism operated by a single quarter turn operating handle with an integral padlocking staple (screw type restrainers will not be accepted)
- Minimum cabinet size of 36" x 31" x 10" with free space equal to 25% of total interior area for future upgrades or additional electrical equipment
- Main disconnect
- Main lugs
- Pump circuit breakers
- NEMA rated full-voltage starters with solid state overloads and alarm contact on overload event; Allen Bradley or Siemens
- Control transformer with primary and secondary protection
- Lightning arrestors connected to each line of the incoming power supply
- Two inner door mounted GFI's rated at 15 amps shall be provide for operation of trouble shoot light, etc.
- 3 phase monitor relay to notify (via SCADA) of any power loss on any phase, ABB Inc., model PLMU11, or approved equal

- Voltage adjustable from 200 to 480 VAC (incoming line) at 60Hz
- Voltage unbalance adjustable 2 to 10 percent
- Trip delay adjustable from 0.25 to 30 seconds
- Fluorescent light fixture for control panel illumination
- Alarm strobe light; no audible alarms.
- One dedicated I/O terminal strip for SCADA with 50 points.
- Spare Parts. The Contractor shall furnish one (1) each of the following for control panel components: fuses, plug-in relays, flashers, 3 Phase monitor, indicator lamps

Duplex Pump Controller. The controller shall be a microprocessor based automatic pump and alarm control provided by EG Controls "Digi-Gage" or DCC "Digital Series II Duplex Pump Controller" with the following specifications. All controls shall be of a Modbus, open architecture type language. All installations shall include NEMA rated electrical components, no IEC rated components will be accepted:

- Control up to two pumps with built in alternation and time delay between pump starts
- Accept two types of sensors including a 4-20 ma signal and floats (floats are back up sensor)
- Lead and lag set points settable from panel
- Sensor status lamps for primary and backup sensor
- System error lamp indicating total sensor failure
- LED display level, channel 1 or channel 2 set points
- 4-20ma output proportional to level
- RS232 serial port for SCADA support
- Built in high and low alarms settable from front panel
- 15 amp relay to call on motor starters
- Pump disable inputs for leak seal failure, potential, and over temperature sensors
- Float switch active lamps on front panel
- Built-in, field proven, software included. No end user programming required
- Dual register elapsed time meters having non re-settable hour registers and re-settable minute registers for each pump; locate in front of panel
- 22mm oil-tight push-to-test switches for circuit status indication and for testing local alarms
- Digital displays shall be easily viewable in bright sunlight condition
- Control system must automatically transfer pump control to floats in event of primary control system failure or when high level float is activated
- 4-20ma loop powered (digital) panel meter to verify transducer circuit status
- Spare Parts. Provide one spare for each of the following installed components:
  - Fuses
  - Plug-in relays
  - Flashers
  - 3 Phase monitor
  - Indicator lamps

Primary Liquid Level Controls. The primary liquid level controls shall be EG Controls or DCC bubbler system with a 4-20ma signal converter. System must have duplex air pumps with alternator, air reservoir with moisture purge valve. The primary system shall be wired to an independently fused circuit.

Secondary Liquid Level Controls. The secondary liquid level controls shall be an intrinsically safe narrow angle five-float system. The five (5) float system shall be: 2 floats – “lead pump on”, “lag pump on”; 1 float – “pump off”; 1 float “low level/redundant all pumps off”; and 1 float “high level alarm”. The backup system shall be wired to an independently fused circuit.

Level Control Operation. The “pump off” float, “lead on” float, “lag on” float, and “high level alarm” float will be set above the normal operating level maintained by the primary level control system. Failure of the primary system will result in a rising wet well level that will sequentially tip the “pump off” float, “lead on” float, “lag on” float, and “high level alarm” float switches. The “low level/redundant all pumps off” float shall be set below the normal operating range controlled by the primary system and, when actuated, shall interrupt motor control circuits and initiate a low level alarm.

Meter Vault. The meter vault shall meet the following requirements:

- Vault shall have minimum inside dimensions of 8’ wide x 10’ long x 7’ deep
- Four \_\_\_\_ inch plug valves eccentric type with 2-inch square operating nut, gear actuated on valves greater than 4-inch, by DeZurik, M&H Valve Company or Milliken
  - Provide one handwheel for Operator attachment to the 2-inch operating nut of plug valves; handwheel to be stored at the pump station site
- Three \_\_\_\_ inch swing check valves with weighted arm, M&H Valve Company or American Flow Control
- One \_\_\_\_ inch magnetic flow meter with the following specifications:
  - ABB 10DX3111 Series only
  - Remote readout
  - Standard lay length
  - ANSI 150 carbon steel flanged connections
  - Polyurethane liner
  - Bullet nose electrode of Hastelloy C
  - Full submergence rated
- Spool piece cut to length of magnetic flow meter for insertion into line while meter is removed for maintenance or repair
- One \_\_\_\_ inch discharge pressure sensor and pressure transmitter with the following specifications:
  - OPW Engineered Systems, Iso-Ring; or Red Valve Company, Series 40
  - 316 stainless steel body, only - no other alternates
  - Buna-N sleeve
  - Flanged fittings – stainless steel or CPVC

- Silicone filled, provided with a needle valve to allow for removal of gauge without loss of silicone
- Water immersion rated
- 4-20ma output and local LCD display to be tied into the pump station SCADA System
- The Contractor shall provide a spool piece for use when the pressure sensor requires maintenance removal
- Flanged coupling adapter Romac Style FCA501 or approved equal for removal of meter
- Threaded flange with male cam-lock fitting and dust cap for emergency by-pass pump connection (2-inch minimum size); stainless steel or bronze
- Access hatch covers shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, single leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
- Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Provide one floor box and cover to be installed in the field above the discharge plug valve, as shown on the details
- Lighting shall be 100 watt vaporproof cast aluminum light fixtures
  - Wall mounted 4-inch box bracket
  - With 23 watt compact fluorescent lamps
- All tees, wyes and reducers as specified in the detailed plans
- All meter vault piping shall be threaded IPS stainless steel pipe; except magnetic flow meter and pressure sensor shall be flanged fitting

Miscellaneous Equipment. The Contractor shall furnish and install all necessary piping and fittings as shown on the detailed plans.

Painting. The Contractor shall furnish and apply all necessary surface preparation, primers and paints to match the existing paint and Portage County Water Resources paint scheme as closely as possible. All primer and paints shall be from the same coatings manufacturer. The Contractor shall also provide all accessory materials required to achieve the finishes specified, including but not limited to linseed oil, shellac, turpentine, paint thinners and other materials, and shall be compatible and approved by the paint manufacturer.

Verify that all surfaces are ready for application of materials in accordance with the product manufacturer's instructions. Measure the moisture content of surfaces using appropriate methods as instructed by the coating manufacturer. Do not apply finishes unless moisture content of surfaces is below the coating manufacturer's acceptable maximums. Mask all areas that are not to be painted. Stainless steel shall not be painted.

Coating application shall comply with manufacturer's instructions. Do not thin materials except to comply with manufacturer's instructions. Do not apply finishes to surfaces that are not dry. Apply each coat to achieve a uniform smooth finish to the specified dry film thickness. Sand surfaces lightly between coats as required, and clean surfaces free of loose particles with vacuum and tack cloth. All paint thicknesses shall be tested with a mil gauge satisfactory to the Engineer and provided by the Contractor. Deficiencies in film or coating thickness shall be corrected by the application of additional coat(s) of material at the expense of the Contractor. The finished surface shall be free from runs, drips, waves, laps, brush marks and variations in color, texture and finish. Collect waste material which may constitute a fire hazard, placed in closed metal containers and removed from the site daily.

The paints specified below are those manufactured by the Sherwin-Williams Company and are shown as standards of quality and type of paint system intended. Paints from Tnemec Company, Carboline Company, and Rustoleum Corporation are acceptable equal manufacturers, however, all materials furnished shall be submitted for approval as indicated in Item 110 – Shop Drawings.

Metals – Exterior, Non Submerged

Prime Coat	Recoatable Epoxy Primer B67H5/B67V5	3-6 mils
First Coat	Hi-solids Polyurethane (Low VOC) B65W301 Series/B60V30	3-4 mils
Second Coat	Hi-solids Polyurethane (Low VOC) B65W301 Series/B60V30	3-4 mils
Final Dry Film Thickness		9-14 mils

Metals – Interior, Non Submerged

Prime Coat	Recoatable Epoxy Primer B67H5/B67V5	3-6 mils
First Coat	Tile-Clad High Solids B62WZ Series/ B60VZ70	2.5-4 mils
Second Coat	Tile-Clad High Solids B62WZ Series/ B60VZ70	2.5-4 mils
Final Dry Film Thickness		8-14 mils

The following shall be painted as above: all newly installed piping, fittings, bolts, supports, brackets, conduits, junction boxes, electrical mounting brackets.

Driveway. An asphalt driveway shall be provided for all pump stations. The driveway shall comply with Item 430 – Driveway, of these Specifications.

**C. Miscellaneous.** The Contractor shall supply the manufacturer's latest version of Windows XP compatible software, licensed to Portage County, for any programmable component installed at the pump station that might require site configuration, adjustment or calibration to field conditions. Software must be manufacturer's full version to enable all operating capability and features of the device, instrument, controller, etc. All interconnecting cables to connect the device to a laptop computer shall be supplied, without the need for adapters.

**971.04 SCADA System.** The SCADA system shall comply with Item 893 - Supervisory Control And Data Acquisition System of these Specifications.

**971.05 Emergency Operation.** In order to ensure emergency operation of the facility, it must meet the requirements of the Ohio EPA, PCWR and comply with the "Ten State Standards".

General. Emergency pumping capability is required. The level of emergency pumping capability is dependent on the design capacity of the facility. All grinder stations shall have a portable pump connection to the force main with rapid connection capabilities and appropriate valves, located inside the valve vault.

**971.06 Pump Station Installation.** The Contractor shall provide all labor, materials and equipment necessary to install one complete grinder pump station. Said station shall be installed in accordance with all specifications, detailed plans and all Manufacturers' specifications.

The Contractor shall adhere to all OSHA requirements for open excavation shoring and work.

The Contractor shall be responsible to provide and install all internal pump station piping and valves.

Backfill shall be in accordance with all Manufacturers, Portage County Water Resources Standard Specifications and ODOT Specifications pertaining to size of compacted lifts and compaction.

Any deviation from said plans shall be pre-approved by Portage County Water Resources engineering.

**971.07 Electrical Service.** The Contractor shall provide 277/480V, 3-phase 4-wire electrical service required to power and control said pump station, meter vault and SCADA System as shown on all detailed plans. All wiring shall follow NFPA70 and the National Electric Code (NEC). All panels shall follow UL508A, Standard for Industrial Control Panels.



For grinder pump station locations where 277/480V 3-phase electrical service is not available or is economically unfeasible, the County will allow the installation of variable frequency drives (VFD's) to convert single phase power over to 3-phase power. A written request with accompanying documentation shall be submitted to PCWR for prior written approval for the use, manufacturer, and type of VFD's at a grinder pump station site. VFD's shall be housed in NEMA 4X stainless steel enclosures, and shall include full-voltage NEMA rated by-pass contactors, operator interface screen and/or PLC controller with interface.

The Contractor shall furnish and install a fused surge suppressor sized for pump station requirements by Surge Suppression Inc., model SKLA series, sized for pump station loading requirements. Surge suppressor shall be located within the double throw transfer switch on the load side.

The Contractor shall provide and install all electrical service for the pumps, control panel, liquid level controls and the SCADA package in accordance with all detailed drawings. The Contractor shall provide an entrance rated, fusible main electrical disconnect. Said disconnect shall be sized in accordance with all NEC Standards and submitted with all shop drawings.

The Contractor shall provide all required pump starters, sized in accordance with the Pump Manufacturer's requirements. Said starters shall be submitted with all shop drawings.

The Contractor shall be responsible to create/program the SCADA System into the existing County Wide SCADA System.

The Contractor shall tie all monitored information into the proposed SCADA System via the dedicated I/O terminal strip installed in the control panel.

The Contractor shall assume a minimum distance of 50 linear feet of underground service to be installed. The Contractor shall utilize 2 inch minimum PVC conduit for said installation. No direct buried wire shall be permitted. All wire sizes shall be in accordance with all NEC regulations for underground service and all Manufacturers' requirements. Wire sizes shall be included with all shop drawings. All wiring run from the new control panel shall be installed in 2 inch watertight PVC conduit.

Brady type labels shall be affixed to each end of conductors. The Contractor shall ensure that raintight conduit connectors are installed for outside panels, and that no conduit enter/exit the top of panels (inside or outside). Wire bending space shall be provided per Table 25.1 of UL508A. A minimum of 2-inch separation shall be maintained between low voltage signal and line voltage circuits.

All work shall be performed in accordance with all NEC Standards. The Contractor shall provide all trenching and backfilling for all electrical service in accordance with all NEC Standards and site details.

**971.08 Testing/Training.** The Contractor shall be responsible for placing the pump station into operation and to assure proper operation of said system. Factory authorized representatives shall provide orientation and training to O&M personnel during regular working hours only; training shall include configuring operating parameters, troubleshooting device calibration and software utilization.

The pump manufacturer shall perform the following inspection and testing for each pump furnished:

- Perform motor and cable insulation test for moisture content and insulation defects.
- Run pump dry to check for proper rotation and mechanical integrity.
- Run pump submerged for 30 minutes in water, remove pump from water; perform motor and cable insulation test.
- A written report on the above shall be prepared by the test engineer, certified and submitted to PCWR.
- Test each pump at factory at no less than three head conditions, including shut-off head and design head.
- Provide a standard NPSH curve based on testing of standard test pump.
- Submit test data to PCWR for approval prior to shipment of pumps.

The Contractor shall provide authorized representatives to operate and monitor the pump station during startup and the operational test to verify that all pumps, control panel, and magnetic flow meter are completely operational as specified.

In addition, the Contractor shall verify proper operation of all controls (i.e., HOA switches, level controls, pump cycle, alarms and SCADA System monitoring).

The Contractor shall make any adjustments necessary to the system during the operation test. If the Contractor is not capable of making said adjustments, the Contractor shall arrange for a factory representative to make said adjustments at the Contractor's expense.

**971.09 Shop Drawings.** The Contractor shall provide six sets of the shop drawings for approval in accordance with Item 110 – Shop Drawings.

Product data and cut sheets shall be submitted for each product specified herein. All material manufacturing schedules, shelf lives and MSDS Sheets shall also be included.

No materials will be accepted that have a manufacture date of over one year old and are not accompanied with their MSDS Sheets (3 copies) where applicable.

The submittals shall include, but not be limited to, grinder pump details, specifications, and testing and inspection report, control panel details and specifications, Manufacturers' installation details and specifications, level control details and specifications, all electrical schematics including pump, controls and power installation, all piping schematics including inlet piping, discharge piping, all wet well penetrations and gaskets.

**971.10 Warranty And O&M Manuals.** The Contractor shall provide a written guarantee against all defects in workmanship and materials for a period of one year after approved completion of this Contract, in addition to all Manufacturers' warranties.

If any defects appear during the guarantee period and the Contractor is notified of said defect he shall make all necessary repairs without cost to the County.

The Contractor shall be required to respond to any notification of problems within six hours of notification during the warranty period.

If the Contractor fails to respond within said time limit, the County may seek other assistance. Any and all costs necessary to repair the problem regardless of responsibility shall be at the Contractor's expense during the warranty period.

The Contractor shall provide six copies of the pump station, meter vault and SCADA System equipment, operation and maintenance manuals, as obtained from the Manufacturer's and/or Subcontractor. All copies shall be presented to Portage County Water Resources

Said manuals shall be completely bound in hard cover notebook type binders and contain a complete listing of all equipment utilized on this project, all Manufacturers' maintenance recommendations, repair procedures and all replacement parts listing.

**971.11 Method Of Measurement.** The method of measurement for the pump station shall be at lump sum unit for the complete installation of an operational grinder pump station as approved by Portage County Water Resources.

**971.12 Basis Of Payment.** The payment for all work performed under this item shall be at lump sum price bid, which payment shall be full compensation for all labor, materials and equipment to furnish and install a fully operational grinder pump station.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
971	Lump Sum	Grinder Pump Station

END OF SECTION

## ITEM 973 – SUCTION LIFT PUMP STATION

973.01	DESCRIPTION
973.02	SUBMITTALS
973.03	MATERIALS & EQUIPMENT
973.04	SCADA SYSTEM
973.05	EMERGENCY OPERATION
973.06	PUMP STATION INSTALLATION
973.07	ELECTRICAL
973.08	TESTING/TRAINING
973.09	SHOP DRAWINGS
973.10	WARRANTY
973.11	METHOD OF MEASUREMENT
973.12	BASIS OF PAYMENT

**973.01 Description.** The contractor shall provide all labor, materials and equipment necessary to provide and install a duplex pump station, complete with digital controls and SCADA system in accordance with the detailed plans, specifications and the current Recommended Standards for Wastewater Facilities of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten State Standards) requirements for Wastewater Pumping Stations. *[ To help ensure compliance, the Ohio EPA requires inclusion of Form B1 (Sanitary Sewer and Pump Station Construction Data Sheet) with each Permit to Install/Plan Approval Applications. Designs must meet these standards and Portage County's standards.]*

All structures, shelters and foundation designs shall be in accordance with these specifications, Item 500 – Building, local zoning regulations, and Ohio Building Codes.

*[ The Design Engineer shall procure a geotechnical consultant to properly design the subbase for the wet well and pump station foundation based on the soil analysis report. A copy of the soil analysis report shall be furnished to PCWR for review.]*

The Contractor shall be responsible for all costs and plan submittals to the Portage County Building Department for approval as part of this project.

**Terminology.** Reference to the Contractor under this item/specification refers to the General or Prime Contractor. All other Contractors noted under this item/specification will be noted by their specific trade as a subcontractor to the General/Prime Contractor.

The County reserves the right to non-perform any pay item bid under this contract, as determined necessary to complete said project.

**973.02 Submittals.** The Contractor shall submit the following in accordance with the conditions of this Contract and Item 110 “Shop Drawings”.

**Shop Drawings.** Submittal of shop drawings, design computations and other required information to Portage County Water Resources for review and approval shall be initiated within 30 days after receipt of written "Notice To Proceed" and prior to material fabrication in accordance with Item 110 - Shop Drawings.

All shop drawings submitted for review and approval shall be returned either approved or marked up for further design.

The Contractor shall submit all structure, shelter and foundation shop drawings to the Portage County Building Department or applicable city having jurisdiction for approval prior to commencement of Construction.

The Contractor shall be responsible for all fees incurred by the Portage County Building Department and all submittals and re-submittals.

All of the above items shall be designed in accordance with this specification, Ohio Building Codes (latest revised copy), NEC and OSHA Standards.

All of the above design computations, plans and drawings shall be stamped by a registered professional engineer and/or registered architect where applicable.

**Product Data/Cut Sheets.** Product data and cut sheets shall be submitted for each product specified herein. All material manufacturing schedules, shelf lives and MSDS Sheets shall also be included.

No materials will be accepted that:

- Are not accompanied with a material cut sheet.
- Have a manufacture date of over one (1) year old.
- Are not accompanied with their MSDS sheets (3 copies) where applicable.
- Damaged, used or shipped in open containers.

**Schematics.** The Contractor shall provide the following schematics: electrical wiring, lighting and heating plans.

**MSDS Sheets.** (Where applicable) All materials utilized on this project shall be accompanied with their appropriate MSDS Sheets. Any materials found on site without an MSDS sheet shall be removed from site immediately at the Contractors expense.

The Contractor shall assure each product is supplied with three copies of MSDS sheets:

- One copy shall remain on site with the product at all times.
- One copy shall be given to and remain with the PCWR on site Engineering inspector.
- One copy shall be given to the Engineer for permanent record in the project file.

**Project Schedule.** The Contractor shall provide a complete project schedule of events prior to commencement of construction. Said schedule shall include the following schedule of events:

- Project start up date.
- Material lead-time.
- Site Work
- Pump Station Installation.
- Pump Station start up date.
- Project completion date.

**973.03 Materials & Equipment.** All materials and equipment noted within this Specification are approved for use on this project. Equivalent materials of other manufacturers may be submitted for review and may be substituted upon written approval of the County.

Requests for substitution shall include manufacturers' cut sheets in accordance with Item 110 – Shop Drawings for each product being proposed as a substitute. Submittals shall include the brand name, generic type, descriptive information of the material or equipment and a list of three projects where each product has been satisfactory utilized for at least three (3) years.

**A. Material Storage.** All material shall be stored in a neat, organized and safe fashion assuring that all hazards are avoided.

All products that arrive on-site shall be new, unused items, packaged in original unopened packages.

All materials are to be kept dry at all times via tarping or inside storage as required.

Any materials, which are damaged, will be unacceptable and returned for replacement at the Contractor or Manufacturer's expense.

All Manufacturers' recommendations for storage pertaining to heat, cold, sunlight, flammability, etc., are to be followed.

All materials, which arrive on-site, are to be accompanied by their respective MSDS Sheets. Any materials discovered on-site without MSDS Sheets will be removed from site immediately.

Failure to comply with the regulations as set forth under "973.03, A." may result in removal/replacement of said material at the Contractor's expense.

In addition to the above Specifications, all materials shall comply with their respective section material requirements.

**B. Equipment.** The Contractor shall be responsible to provide the following equipment to meet the following requirements:

Wet Well. The pump station wet well shall be constructed of a pre-cast concrete with the following specifications:

- Minimum 6' ID pre-cast concrete wet well with flat top.

- ML-10 reinforced plastic steps
- Minimum 8'8" diameter x 12" thick extended base
- Minimum riser wall thickness shall be 7"
- All discharge piping within wet well shall be welded stainless steel, with a diameter equal to or greater than the pump discharge base
- Zlok gaskets at all piping penetrations
- Manway access hatch cover shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, single leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
  - Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Two NEMA 4X stainless steel enclosures and appurtenances, for all electrical connections, as shown on the Junction Box Detail (Drawing SD2)
- Prior to installation, the Contractor shall seal the wet well interior with one of following:
  - Spray on concrete sealant
  - Spray on 100% solid epoxy coating
- After installation, the Contractor shall plug all lifting holes and imperfections greater than or equal to 1" in diameter

Control Building. The Contractor shall furnish and install a minimum of a fiberglass enclosure control building for all pump stations with an ADF between 20,000 and 40,000 gpd. Pump stations designed for an ADF of greater than 40,000 gpd shall require a split faced block building with a shingled gable roof. All buildings shall comply with Item 500 – Building, of these Specifications.

Ventilation System. A positive pressure ventilating system shall be provided to maintain a fresh air system in the pump station building, with a fan speed controlled intake blower with integral louver sized and rated to change the air 6 times per hour when occupied:

- The blower shall be of the centrifugal, squirrel cage design with statically balanced wheel to assure quiet performance and maximum air delivery
- The blower shall be thermostatically controlled and shall also be provided with an automatic and a manual switch located near the entrance
- An exhaust lover shall be installed
- A 90-degree bend or weather hood, with insect screen shall be provided at the inlet louver

Heater. One packaged electric heater shall be furnished and installed in the pump station interior:

- Complete with an integral, automatic dial type thermostat

Dehumidifier. A packaged dehumidifier assembly with hermetically sealed Freon refrigerator type compressor, expansion coil, fan and condenser coil shall be furnished:

- Housed in a heavy steel enclosure securely fastened to the wall of the station
- Controlled automatically by an adjustable humidistat located on the dehumidifier
- A low-temperature thermostat shall be provided for the dehumidifier
- Capacity of 24 pints per 24 hours at 80 degrees F and 60% relative humidity
- Performance shall be as certified by the Association of Home Appliance Manufacturers
- The condensate shall be drained to the wet well.

Pumps. The only suction lift pumps approved for this work shall meet the following requirements:

- Gorman Rupp, Super T Series, Model \_\_\_\_ ; F.E. Meyers Model \_\_\_\_ ; or Hydromatic Model \_\_\_\_
- Capable of pumping a minimum of \_\_\_\_ GPM at a total system head of \_\_\_\_ foot TDH; minimum pump design efficiency shall be 45 percent
- \_\_\_\_ HP rated at 480/277 volt, three phase, four wire service, 60 cycle, operating at \_\_\_\_ RPM
- Inlet and outlet flanges; tapped with pipe plugs for mounting of gauges or other equipment
- Suction and Discharge gauges, for each pump
  - 4-1/2" minimum diameter face
  - Molded black phenolic case
  - Turret type with snap ring face mounting
  - 1/4" NPT bottom connections
  - Brass needle isolation valve and vent cock
- 1-inch automatic air release valves, with 1-inch isolation ball valves
- Cast iron pump case
- Tungsten carbide seals
- Ductile iron two-vane, non clog impeller
- 3 inch solids handling capability
- Equipped with a thermal sensor for automatic shut down in case of motor overload or over heating
  - Motor control overloads will open the motor circuit when amperage draw exceeds motor nameplate rating
  - Thermal sensor attached to pump housing will open motor control circuit when temperature of pump casting reaches pre-set high temperature value (typically occurs when pump loses prime and cannot re-prime automatically)
- TEFC premium efficiency motors inverter rated at 480 volt, three phase, 60 cycle, non-overloading throughout the entire operating range .
- A high temperature shut-down setting shall be integrated into the pumps.
- Spare Parts. The Contractor shall furnish one (1) spare rotating unit with full size impeller per pump station



Miscellaneous Equipment. The Contractor shall furnish and install all necessary piping and fittings as shown on the detailed plans. Triplex systems will be governed by these same specifications plus the additional controls and equipment necessary for operating the third pump. The pump station interior shall meet the following requirements:

- Two \_\_\_\_ inch plug valves eccentric type with 2-inch square operating nut, gear actuated on valves greater than 4-inch, by DeZurik, M&H Valve Company, or Milliken
  - Provide one handwheel for Operator attachment to the 2-inch operating nut of plug valves; handwheel to be stored at the pump station site
- Two \_\_\_\_ inch swing check valves with weighted arm, M&H Valve Company or American Flow Control
- One \_\_\_\_ inch magnetic flow meter with the following specifications
  - ABB 10DX3111 Series only
  - Remote readout
  - Standard lay length
  - ANSI 150 carbon steel flanged connections
  - Polyurethane liner
  - Bullet nose electrode of Hastelloy C
  - Full submergence rated
- Spool piece cut to length of magnetic flow meter for insertion into line while meter is removed for maintenance or repair
- One \_\_\_\_ inch discharge pressure sensor and pressure transmitter with the following specifications:
  - OPW Engineered Systems, Iso-Ring; or Red Valve Company, Series 40
  - 316 stainless steel body, only - no other alternates
  - Buna-N sleeve
  - Flanged fittings – stainless steel or CPVC
  - Silicone filled, provided with a needle valve to allow for removal of gauge without loss of silicone
  - Water immersion rated
  - 4-20ma output and local LCD display to be tied into the pump station SCADA System
- Flanged coupling adapter Romac Style FCA501 or approved equal for removal of meter
- Piping configuration for each pump discharge line shall have include:
  - EBBA or Romac flanged by plain end adapter
  - Wafer style instrument isolation ring with silicone fill and needle isolation valve on instrument connection, OPW Engineering or Red Valve Company
  - Pressure transmitter with 4-20ma output and local LCD display, water immersion rated
- All tees, bends and reducers as specified in the detailed plans
- All pump station interior piping shall be flanged DIP
- The pump station equipment building shall be well lighted by four (4) dual 40 watt, rapid start fluorescent light fixtures with guards

Control Panel. The control panel shall meet the following requirements:

- All installations shall include NEMA rated electrical components, no IEC rated components will be accepted:
- Custom Duplex Control Panel NEMA 12 painted steel enclosure
- Three point door latching mechanism operated by a single quarter turn operating handle with an integral padlocking staple (screw type restrainers will not be accepted)
- Minimum cabinet size of 36" x 31" x 10" with free space equal to 25% of total interior area for future upgrades or additional electrical equipment
- Main disconnect
- Main lugs
- Pump circuit breakers
- NEMA rated full-voltage starters with solid state overloads and alarm contact on overload event; Allen Bradley or Siemens
  - Reduced voltage (soft start) motor controls with software that provides a soft start and a soft stop and an external reset are required on installations of 10 HP and above and on installations of any size pump where pump station is pumping into a common force main system; Allen-Bradley SMC series with catalog number 193-ER1D external reset
  - Adjustable (Variable) Frequency Drive (VFD); Allen-Bradley or Baldor; shall be required in any of the following instances:
    - Installations of 25 HP and above
    - Where wet well size and inflow rate would otherwise cause excessive motor starting
    - Where discharge head (flow) must be varied to prevent interference with pump stations discharging into a common force main
  - Both Soft Start and VFD shall include full-voltage NEMA rated by-pass contactor, operator interface screen and/or PLC controller with interface
- Control transformer with primary and secondary protection
- Lightning arrestors connected to each line of the incoming power supply
- Two inner door mounted GFI's rated at 15 amps shall be provided for operation of trouble shoot light, etc.
- 3 phase monitor relay to notify (via SCADA) of any power loss on any phase, ABB Inc., model PLMU11, or approved equal
  - Voltage adjustable from 200 to 480 VAC (incoming line) at 60Hz
  - Voltage unbalance adjustable 2 to 10 percent
  - Trip delay adjustable from 0.25 to 30 seconds
- Fluorescent light fixture for control panel illumination
- Alarm strobe light; no audible alarms.
- One dedicated I/O terminal strip for SCADA with 50 points.
- Spare Parts. The Contractor shall furnish one (1) each of the following for control panel components: fuses, plug-in relays, flashers, 3 Phase monitor, indicator lamps

Duplex Pump Controller. The controller shall be a microprocessor based automatic pump and alarm control provided by EG Controls "Digi-Gage" or DCC "Digital Series II Duplex Pump Controller" with the following specifications. All controls shall be of a Modbus, open architecture type language. All installations shall include NEMA rated electrical components, no IEC rated components will be accepted:

- Control up to two pumps with built in alternation and time delay between pump starts
- Accept two types of sensors including a 4-20 ma signal and floats (floats are back up sensor)
- Lead and lag set points settable from panel
- Sensor status lamps for primary and backup sensor
- System error lamp indicating total sensor failure
- LED display level, channel 1 or channel 2 set points
- 4-20ma output proportional to level
- RS232 serial port for SCADA support
- Built in high and low alarms settable from front panel
- 15 amp relay to call on motor starters
- Pump disable inputs for leak seal failure and over temperature sensors
- Float switch active lamps on front panel
- Built-in, field proven, software included. No end user programming required
- Dual register elapsed time meters having non re-settable hour registers and re-settable minute registers for each pump; locate in front of panel
- 22mm oil-tight push-to-test switches for circuit status indication and for testing local alarms
- Digital displays shall be easily viewable in bright sunlight condition
- Control system must automatically transfer pump control to floats in event of primary control system failure or when high level float is activated
- 4-20ma loop powered (digital) panel meter to verify transducer circuit status
- Spare Parts. Provide one spare for each of the following installed components:
  - Fuses
  - Plug-in relays
  - Flashers
  - 3 Phase monitor
  - Indicator lamps

Primary Liquid Level Controls. The primary liquid level controls shall be EG Controls or DCC bubbler system with a 4-20ma signal converter. System must have duplex air pumps with alternator, air reservoir with moisture purge valve. The primary system shall be wired to an independently fused circuit.

Secondary Liquid Level Controls. The secondary liquid level controls shall be an intrinsically safe narrow angle five-float system. The five (5) float system shall be: 2 floats – "lead pump on", "lag pump on"; 1 float – "pump off"; 1 float "low level/redundant all pumps off"; and 1 float "high level alarm". The backup system shall be wired to an independently fused circuit.

Level Control Operation. The “pump off” float, “lead on” float, “lag on” float, and “high level alarm” float will be set above the normal operating level maintained by the primary level control system. Failure of the primary system will result in a rising wet well level that will sequentially tip the “pump off” float, “lead on” float, “lag on” float, and “high level alarm” float switches. The “low level/redundant all pumps off” float shall be set below the normal operating range controlled by the primary system and, when actuated, shall interrupt motor control circuits and initiate a low level alarm.

Painting. The Contractor shall furnish and apply all necessary surface preparation, primers and paints to match the existing paint and Portage County Water Resources paint scheme as closely as possible. All primer and paints shall be from the same coatings manufacturer. The Contractor shall also provide all accessory materials required to achieve the finishes specified, including but not limited to linseed oil, shellac, turpentine, paint thinners and other materials, and shall be compatible and approved by the paint manufacturer.

Verify that all surfaces are ready for application of materials in accordance with the product manufacturer’s instructions. Measure the moisture content of surfaces using appropriate methods as instructed by the coating manufacturer. Do not apply finishes unless moisture content of surfaces is below the coating manufacturer’s acceptable maximums. Mask all areas that are not to be painted. Stainless steel shall not be painted.

Coating application shall comply with manufacturer’s instructions. Do not thin materials except to comply with manufacturer’s instructions. Do not apply finishes to surfaces that are not dry. Apply each coat to achieve a uniform smooth finish to the specified dry film thickness. Sand surfaces lightly between coats as required, and clean surfaces free of loose particles with vacuum and tack cloth. All paint thicknesses shall be tested with a mil gauge satisfactory to the Engineer and provided by the Contractor. Deficiencies in film or coating thickness shall be corrected by the application of additional coat(s) of material at the expense of the Contractor. The finished surface shall be free from runs, drips, waves, laps, brush marks and variations in color, texture and finish. Collect waste material which may constitute a fire hazard, placed in closed metal containers and removed from the site daily.

The paints specified below are those manufactured by the Sherwin-Williams Company and are shown as standards of quality and type of paint system intended. Paints from Tnemec Company, Carboline Company, and Rustoleum Corporation are acceptable equal manufacturers, however, all materials furnished shall be submitted for approval as indicated in Item 110 – Shop Drawings.

Metals – Exterior, Non Submerged

Prime Coat	Recoatable Epoxy Primer B67H5/B67V5	3-6 mils
First Coat	Hi-solids Polyurethane (Low VOC) B65W301 Series/B60V30	3-4 mils
Second Coat	Hi-solids Polyurethane (Low VOC) B65W301 Series/B60V30	3-4 mils
Final Dry Film Thickness		9-14 mils

Metals – Interior, Non Submerged

Prime Coat	Recoatable Epoxy Primer B67H5/B67V5	3-6 mils
First Coat	Tile-Clad High Solids B62WZ Series/ B60VZ70	2.5-4 mils
Second Coat	Tile-Clad High Solids B62WZ Series/ B60VZ70	2.5-4 mils
Final Dry Film Thickness		8-14 mils

The following shall be painted as above: all newly installed piping, fittings, bolts, supports, brackets, conduits, junction boxes, electrical mounting brackets.

Emergency Pump Connection Assembly. The pump station emergency pump connection shall meet the following requirements:

- 6" threaded flange with 6" male cam-lock fitting and 6 steel dust cap for emergency by-pass pump connection; stainless steel or bronze
  - Manufactured in accordance with specification MIL-C-27487
  - Cam-lock fittings shall be P-T Coupling Company; Dixon Valve & Coupling Company, "Andrews"; or engineering approved equal
- Two-part lockable fiberglass box pad and dome lid
  - Manufactured by Highline Products of Waltham, Massachusetts; or PCWR Engineer approved equal
  - The box pad and dome lid shall be model number FSC3353
  - The enclosure shall be field assembled and installed in accordance with the detailed drawings and the manufacturer's requirements
  - The Contractor shall furnish and install #57 or #67 stone except no slag, per ODOT Item 703, in accordance with the detailed drawings as part of the enclosure work.

Driveway. An asphalt driveway shall be provided for all pump stations. The driveway shall comply with Item 430 – Driveway, of these Specifications.

**C. Miscellaneous.** The Contractor shall supply the manufacturer's latest version of Windows XP compatible software, licensed to Portage County, for any programmable component installed at the pump station that might require site configuration, adjustment or calibration to field conditions. Software must be manufacturer's full version to enable all operating capability and features of the device, instrument, controller, etc. All interconnecting cables to connect the device to a laptop computer shall be supplied, without the need for adapters.

**973.04 SCADA System.** The SCADA system shall comply with Item 893 - Supervisory Control And Data Acquisition System of these Specifications.

**973.05 Emergency Operation.** In order to ensure emergency operation of the facility, it must meet the requirements of the Ohio EPA, PCWR and comply with the "Ten State Standards".

General. Emergency pumping capability is required. The level of emergency pumping capability is dependent on the design capacity of the facility. All suction lift stations shall have a portable pump connection to the force main with rapid connection capabilities and appropriate valves, located near the station in a separate assembly. Minimum requirements, based on capacity follow:

- For new or expanded pump stations designed for an ADF of less than 20,000 gpd a By-pass Pumping Assembly must be included in the pump station design.
- For new or expanded pump stations with a design ADF of greater than or equal to 20,000 gpd or that provide service to fifty (50) or more homes, both a By-pass Pumping Assembly and a stand-by generator shall be included. The stand-by emergency generator and electrical system to connect the generator to the pump station shall comply with Item 990 - Generator System and Electrical, of these Specifications.

**973.06 Pump Station Installation.** The Contractor shall provide all labor, materials and equipment necessary to install one complete suction lift pump station. Said station shall be installed in accordance with all specifications, detailed plans and all Manufacturers' specifications.

The Contractor shall adhere to all OSHA requirements for open excavation shoring and work.

The Contractor shall be responsible to provide and install all internal pump station piping and valves.

Backfill shall be in accordance with all Manufacturers, Portage County Water Resources Standard Specifications and ODOT Specifications pertaining to size of compacted lifts and compaction.

Any deviation from said plans shall be pre-approved by Portage County Water Resources engineering.

**973.07 Electrical Service.** The Contractor shall provide 277/480V, 3-phase 4-wire electrical service required to power and control said pump station and SCADA System as shown on all detailed plans. All wiring shall follow NFPA70 and the National Electric Code (NEC). All panels shall follow UL508A, Standard for Industrial Control Panels.

The Contractor shall furnish and install a fused surge suppressor sized for pump station requirements by Surge Suppression Inc., model SKLA series, sized for pump station loading requirements. Surge suppressor shall be located within the double throw transfer switch or automatic transfer switch on the load side as applicable to design of station. Upon location within automatic transfer switch, all surge suppressor work shall be included in item 990 "Generator System and Electrical".

The Contractor shall provide and install all electrical service for the pumps, control panel, liquid level controls and the SCADA package in accordance with all detailed drawings. The Contractor shall provide an entrance rated, fusible main electrical disconnect. Said disconnect shall be sized in accordance with all NEC Standards and submitted with all shop drawings.

The Contractor shall provide all required pump starters, sized in accordance with the Pump Manufacturer's requirements. Said starters shall be submitted with all shop drawings.

The Contractor shall be responsible to create/program the SCADA System into the existing County Wide SCADA System.

The Contractor shall tie all monitored information into the proposed SCADA System via the dedicated I/O terminal strip installed in the control panel.

The Contractor shall assume a minimum distance of 50 linear feet of underground service to be installed. The Contractor shall utilize 2 inch minimum PVC conduit for said installation. No direct buried wire shall be permitted. All wire sizes shall be in accordance with all NEC regulations for underground service and all Manufacturers' requirements. Wire sizes shall be included with all shop drawings. All wiring run from the new control panel shall be installed in 2 inch watertight PVC conduit.

Brady type labels shall be affixed to each end of conductors. The Contractor shall ensure that raintight conduit connectors are installed for outside panels, and that no conduit enter/exit the top of panels (inside or outside). Wire bending space shall be provided per Table 25.1 of UL508A. A minimum of 2-inch separation shall be maintained between low voltage signal and line voltage circuits.

All work shall be performed in accordance with all NEC Standards. The Contractor shall provide all trenching and backfilling for all electrical service in accordance with all NEC Standards and site details.

**973.08 Testing/Training.** The Contractor shall be responsible for placing the pump station into operation and to assure proper operation of said system. Factory authorized representatives shall provide orientation and training to O&M personnel during regular working hours only; training shall include configuring operating parameters, troubleshooting device calibration and software utilization.

The pump manufacturer shall perform the following inspection and testing for each pump furnished:

- Run pump dry to check for proper rotation and mechanical integrity.
- Test each pump at factory at no less than three head conditions, including shut-off head and design head.
- A written report on the above shall be prepared by the test engineer, certified and submitted to PCWR.
- Provide a standard NPSH curve based on testing of standard test pump.
- Submit test data to PCWR for approval prior to shipment of pumps.

The Contractor shall provide authorized representatives to operate and monitor the pump station during startup and the operational test to verify that all pumps, control panel, and magnetic flow meter are completely operational as specified.

In addition, the Contractor shall verify proper operation of all controls (i.e., HOA switches, level controls, pump cycle, alarms and SCADA System monitoring).

The Contractor shall make any adjustments necessary to the system during the operation test. If the Contractor is not capable of making said adjustments, the Contractor shall arrange for a factory representative to make said adjustments at the Contractor's expense.

**973.09 Shop Drawings.** The Contractor shall provide six sets of the shop drawings for approval in accordance with Item 110 – Shop Drawings.

Product data and cut sheets shall be submitted for each product specified herein. All material manufacturing schedules, shelf lives and MSDS Sheets shall also be included.

No materials will be accepted that have a manufacture date of over one year old and are not accompanied with their MSDS Sheets (3 copies) where applicable.

The submittals shall include, but not be limited to, suction lift pump details, specifications, and testing and inspection report, control panel details and specifications, Manufacturers' installation details and specifications, level control details and specifications, all



electrical schematics including pump, controls and power installation, all piping schematics including inlet piping, discharge piping, all wet well penetrations and gaskets.

**973.10 Warranty And O&M Manuals.** The Contractor shall provide a written guarantee against all defects in workmanship and materials for a period of one year after approved completion of this Contract, in addition to all Manufacturers' warranties.

If any defects appear during the guarantee period and the Contractor is notified of said defect he shall make all necessary repairs without cost to the County.

The Contractor shall be required to respond to any notification of problems within six hours of notification during the warranty period.

If the Contractor fails to respond within said time limit, the County may seek other assistance. Any and all costs necessary to repair the problem regardless of responsibility shall be at the Contractor's expense during the warranty period.

The Contractor shall provide six copies of the pump station and SCADA System equipment, operation and maintenance manuals, as obtained from the Manufacturer's and/or Subcontractor.

All copies shall be presented to Portage County Water Resources

Said manuals shall be completely bound in hard cover notebook type binders and contain a complete listing of all equipment utilized on this project, all Manufacturers' maintenance recommendations, repair procedures and all replacement parts listing.

**973.11 Method Of Measurement.** The method of measurement for the pump station shall be at lump sum unit for the complete installation of an operational suction lift pump station as approved by Portage County Water Resources.

**973.12 Basis Of Payment.** The payment for all work performed under this item shall be at lump sum price bid, which payment shall be full compensation for all labor, materials and equipment to furnish and install a fully operational suction lift pump station.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
973	Lump Sum	Suction Lift Pump Station

END OF SECTION

## ITEM 974 – SUBMERSIBLE PUMP STATION

974.01	DESCRIPTION
974.02	SUBMITTALS
974.03	MATERIALS & EQUIPMENT
974.04	SCADA SYSTEM
974.05	EMERGENCY OPERATION
974.06	PUMP STATION INSTALLATION
974.07	ELECTRICAL
974.08	TESTING/TRAINING
974.09	SHOP DRAWINGS
974.10	WARRANTY
974.11	METHOD OF MEASUREMENT
974.12	BASIS OF PAYMENT

**974.01 Description.** The contractor shall provide all labor, materials and equipment necessary to provide and install a duplex pump station, complete with digital controls and SCADA system in accordance with the detailed plans, specifications and the current Recommended Standards for Wastewater Facilities of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten State Standards) requirements for Wastewater Pumping Stations. *[ To help ensure compliance, the Ohio EPA requires inclusion of Form B1 (Sanitary Sewer and Pump Station Construction Data Sheet) with each Permit to Install/Plan Approval Applications. Designs must meet these standards and Portage County's standards.]*

**Portage County Water Resources will not accept grinder pump stations for installations designed for greater than or equal to 20 homes or with an ADF of 8,000 gpd or greater.**

All structures, shelters and foundation designs shall be in accordance with these specifications, Item 500 – Building, local zoning regulations, and Ohio Building Codes.

*[ The Design Engineer shall procure a geotechnical consultant to properly design the subbase for the wet well and valve vault based on the soil analysis report. A copy of the soil analysis report shall be furnished to PCWR for review.]*

The Contractor shall be responsible for all costs and plan submittals to the Portage County Building Department for approval as part of this project.

**Terminology.** Reference to the Contractor under this item/specification refers to the General or Prime Contractor. All other Contractors noted under this item/specification will be noted by their specific trade as a subcontractor to the General/Prime Contractor.

The County reserves the right to non-perform any pay item bid under this contract, as determined necessary to complete said project.

**974.02 Submittals.** The Contractor shall submit the following in accordance with the conditions of this Contract and Item 110 "Shop Drawings".

**Shop Drawings.** Submittal of shop drawings, design computations and other required information to Portage County Water Resources for review and approval shall be initiated within 30 days after receipt of written "Notice To Proceed" and prior to material fabrication in accordance with Item 110 - Shop Drawings.

All shop drawings submitted for review and approval shall be returned either approved or marked up for further design.

The Contractor shall submit all structure, shelter and foundation shop drawings to the Portage County Building Department or applicable city having jurisdiction for approval prior to commencement of Construction.

The Contractor shall be responsible for all fees incurred by the Portage County Building Department and all submittals and re-submittals.

All of the above items shall be designed in accordance with this specification, Ohio Building Codes (latest revised copy), NEC and OSHA Standards.

All of the above design computations, plans and drawings shall be stamped by a registered professional engineer and/or registered architect where applicable.

**Product Data/Cut Sheets.** Product data and cut sheets shall be submitted for each product specified herein. All material manufacturing schedules, shelf lives and MSDS Sheets shall also be included.

No materials will be accepted that:

- Are not accompanied with a material cut sheet.
- Have a manufacture date of over one (1) year old.
- Are not accompanied with their MSDS sheets (3 copies) where applicable.
- Damaged, used or shipped in open containers.

**Schematics.** The Contractor shall provide the following schematics: electrical wiring, lighting and heating plans.

**MSDS Sheets.** (Where applicable) All materials utilized on this project shall be accompanied with their appropriate MSDS Sheets. Any materials found on site without an MSDS sheet shall be removed from site immediately at the Contractors expense.

The Contractor shall assure each product is supplied with three copies of MSDS sheets:

- One copy shall remain on site with the product at all times.
- One copy shall be given to and remain with the PCWR on site Engineering inspector.
- One copy shall be given to the Engineer for permanent record in the project file.

**Project Schedule.** The Contractor shall provide a complete project schedule of events prior to commencement of construction. Said schedule shall include the following schedule of events:

- Project start up date.
- Material lead-time.
- Site Work
- Pump Station Installation.
- Pump Station start up date.
- Project completion date.

**974.03 Materials & Equipment.** All materials and equipment noted within this Specification are approved for use on this project. Equivalent materials of other manufacturers may be submitted for review and may be substituted upon written approval of the County.

Requests for substitution shall include manufacturers' cut sheets in accordance with Item 110 – Shop Drawings for each product being proposed as a substitute. Submittals shall include the brand name, generic type, descriptive information of the material or equipment and a list of three projects where each product has been satisfactory utilized for at least three (3) years.

**A. Material Storage.** All material shall be stored in a neat, organized and safe fashion assuring that all hazards are avoided.

All products that arrive on-site shall be new, unused items, packaged in original unopened packages.

All materials are to be kept dry at all times via tarping or inside storage as required.

Any materials, which are damaged, will be unacceptable and returned for replacement at the Contractor or Manufacturer's expense.

All Manufacturers' recommendations for storage pertaining to heat, cold, sunlight, flammability, etc., are to be followed.

All materials, which arrive on-site, are to be accompanied by their respective MSDS Sheets. Any materials discovered on-site without MSDS Sheets will be removed from site immediately.

Failure to comply with the regulations as set forth under "974.03, A." may result in removal/replacement of said material at the Contractor's expense.

In addition to the above Specifications, all materials shall comply with their respective section material requirements.

**B. Equipment.** The Contractor shall be responsible to provide the following equipment to meet the following requirements:

Wet Well. The pump station wet well shall be constructed of a pre-cast concrete with the following specifications:

- Minimum 6' ID pre-cast concrete wet well with flat top.
- ML-10 reinforced plastic steps
- Minimum 8'8" diameter x 12" thick extended base
- Minimum riser wall thickness shall be 7"
- All discharge piping within wet well shall be welded stainless steel, with a diameter equal to or greater than the pump discharge base
- Zlok gaskets at all piping penetrations
- Manway access hatch cover shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, single leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
  - Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Pump access hatch cover shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, double leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
  - Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Two NEMA 4X stainless steel enclosures and appurtenances, for all electrical connections, as shown on the Junction Box Detail (Drawing SD2)
- Prior to installation, the Contractor shall seal the wet well interior with one of following:
  - Spray on concrete sealant
  - Spray on 100% solid epoxy coating
- After installation, the Contractor shall plug all lifting holes and imperfections greater than or equal to 1" in diameter

Pumps. The only submersible pumps approved for this work shall meet the following requirements:

- F.E. Meyers Model \_\_\_\_ ; Hydromatic Model \_\_\_\_; or Gorman Rupp Model \_\_\_\_.
- Capable of pumping a minimum of \_\_\_\_ GPM at a total system head of \_\_\_\_ foot TDH; minimum pump design efficiency shall be 45 percent

- \_\_\_\_ HP rated at 480/277 volt, three phase, four wire service, 60 cycle, operating at \_\_\_\_ RPM
- Cast iron pump case
- Ductile iron recessed impeller; dynamically balanced
- 3 inch solids handling capability
- \_\_\_\_ inch flanged discharge elbow
- Equipped with a thermal sensor for automatic shut down in case of motor overload or over heating and seal failure sensor.
- Oil filled motor cavity
- \_\_\_\_ feet of continuous watertight power cable (no splices shall be accepted)
- Explosion proof Class 1, Group D, complying with ASTM 276 and 351 for corrosive resistance of internal and external components, in compliance with all ANSI Standards and UL listed and approved.
- 304 stainless steel lift out slide rail assemblies complete with pump base casting by the approved Pump Manufacturer
- Upper and lower stainless steel guide rail support brackets
- Pump guide brackets and quick disconnect sealing flange
- \_\_\_\_ feet of stainless steel lifting chain with lifting rings on 3 foot centers and shackles per pump
- Stainless lifting bail on pumps
- Spare Parts. The Contractor shall furnish the following:
  - For pumps 7.5 Hp and smaller: provide one full spare pump
  - For pumps larger than 7.5 Hp: furnish one (1) each of the following for each pump station: wear rings, seal kits (to include O-rings and gaskets), impeller, hydraulic seal flange

Control Building. No building is required for pump stations with an average daily flow (ADF) of less than 20,000 gallons per day (gpd). The Contractor shall furnish and install a minimum of a fiberglass enclosure control building for all pump stations with an ADF between 20,000 and 40,000 gpd. Pump stations designed for an ADF of greater than 40,000 gpd shall require a split faced block building with a shingled gable roof. All buildings shall comply with Item 500 – Building, of these Specifications.

Ventilation System. A positive pressure ventilating system shall be provided to maintain a fresh air system in the pump station building, with a fan speed controlled intake blower with integral louver sized and rated to change the air 6 times per hour when occupied:

- The blower shall be of the centrifugal, squirrel cage design with statically balanced wheel to assure quiet performance and maximum air delivery
- The blower shall be thermostatically controlled and shall also be provided with an automatic and a manual switch located near the entrance
- An exhaust louver shall be installed
- A 90-degree bend or weather hood, with insect screen shall be provided at the inlet louver

Heater. One packaged electric heater shall be furnished and installed in the pump station interior:

- Complete with an integral, automatic dial type thermostat

Dehumidifier. A packaged dehumidifier assembly with hermetically sealed Freon refrigerator type compressor, expansion coil, fan and condenser coil shall be furnished:

- Housed in a heavy steel enclosure securely fastened to the wall of the station
- Controlled automatically by an adjustable humidistat located on the dehumidifier
- A low-temperature thermostat shall be provided for the dehumidifier
- Capacity of 24 pints per 24 hours at 80 degrees F and 60% relative humidity
- Performance shall be as certified by the Association of Home Appliance Manufacturers
- The condensate shall be drained to the wet well.

Control Panel. The control panel shall meet the following requirements:

- All installations, both outdoor and indoor, shall include NEMA rated electrical components, no IEC rated components will be accepted:
- For Outdoor Installations:
  - Custom Duplex Control Panel NEMA 4X stainless steel enclosure
- For Indoor Installations:
  - Custom Duplex Control Panel NEMA 12 painted steel enclosure
- Three point door latching mechanism operated by a single quarter turn operating handle with an integral padlocking staple (screw type restrainers will not be accepted)
- Minimum cabinet size of 36" x 31" x 10" with free space equal to 25% of total interior area for future upgrades or additional electrical equipment
- Main disconnect
- Main lugs
- Pump circuit breakers
- NEMA rated full-voltage starters with solid state overloads and alarm contact on overload event; Allen Bradley or Siemens
  - Reduced voltage (soft start) motor controls with software that provides a soft start and a soft stop and an external reset are required on installations of 10 HP and above and on installations of any size pump where pump station is pumping into a common force main system; Allen-Bradley SMC series with catalog number 193-ER1D external reset
  - Adjustable (Variable) Frequency Drive (VFD); Allen-Bradley or Baldor; shall be required in any of the following instances:
    - Installations of 25 HP and above
    - Where wet well size and inflow rate would otherwise cause excessive motor starting
    - Where discharge head (flow) must be varied to prevent interference with pump stations discharging into a common force main

- Both Soft Start and VFD shall include full-voltage NEMA rated by-pass contactor, operator interface screen and/or PLC controller with interface
- Control transformer with primary and secondary protection
- Lightning arrestors connected to each line of the incoming power supply
- Two inner door mounted GFI's rated at 15 amps shall be provide for operation of trouble shoot light, etc.
- 3 phase monitor relay to notify (via SCADA) of any power loss on any phase, ABB Inc., model PLMU11, or approved equal
  - Voltage adjustable from 200 to 480 VAC (incoming line) at 60Hz
  - Voltage unbalance adjustable 2 to 10 percent
  - Trip delay adjustable from 0.25 to 30 seconds
- Fluorescent light fixture for control panel illumination
- Alarm strobe light; no audible alarms.
- One dedicated I/O terminal strip for SCADA with 50 points.
- Spare Parts. The Contractor shall furnish one (1) each of the following for control panel components: fuses, plug-in relays, flashers, 3 Phase monitor, indicator lamps

Duplex Pump Controller. The controller shall be a microprocessor based automatic pump and alarm control provided by EG Controls "Digi-Gage" or DCC "Digital Series II Duplex Pump Controller" with the following specifications. All controls shall be of a Modbus, open architecture type language. All installations shall include NEMA rated electrical components, no IEC rated components will be accepted:

- Control up to two pumps with built in alternation and time delay between pump starts
- Accept two types of sensors including a 4-20 ma signal and floats (floats are back up sensor)
- Lead and lag set points settable from panel
- Sensor status lamps for primary and backup sensor
- System error lamp indicating total sensor failure
- LED display level, channel 1 or channel 2 set points
- 4-20ma output proportional to level
- RS232 serial port for SCADA support
- Built in high and low alarms settable from front panel
- 15 amp relay to call on motor starters
- Pump disable inputs for leak seal failure and over temperature sensors
- Float switch active lamps on front panel
- Built-in, field proven, software included. No end user programming required
- Dual register elapsed time meters having non re-settable hour registers and re-settable minute registers for each pump; locate in front of panel
- 22mm oil-tight push-to-test switches for circuit status indication and for testing local alarms
- Digital displays shall be easily viewable in bright sunlight condition
- Control system must automatically transfer pump control to floats in event of primary control system failure or when high level float is activated



- 4-20ma loop powered (digital) panel meter to verify transducer circuit status
- Spare Parts. Provide one spare for each of the following installed components:
  - Fuses
  - Plug-in relays
  - Flashers
  - 3 Phase monitor
  - Indicator lamps

Primary Liquid Level Controls. The primary liquid level controls shall be EG Controls or DCC bubbler system with a 4-20ma signal converter. System must have duplex air pumps with alternator, air reservoir with moisture purge valve. The primary system shall be wired to an independently fused circuit.

Secondary Liquid Level Controls. The secondary liquid level controls shall be an intrinsically safe narrow angle five-float system. The five (5) float system shall be: 2 floats – “lead pump on”, “lag pump on”; 1 float – “pump off”; 1 float “low level/redundant all pumps off”; and 1 float “high level alarm”. The backup system shall be wired to an independently fused circuit.

Level Control Operation. The “pump off” float, “lead on” float, “lag on” float, and “high level alarm” float will be set above the normal operating level maintained by the primary level control system. Failure of the primary system will result in a rising wet well level that will sequentially tip the “pump off” float, “lead on” float, “lag on” float, and “high level alarm” float switches. The “low level/redundant all pumps off” float shall be set below the normal operating range controlled by the primary system and, when actuated, shall interrupt motor control circuits and initiate a low level alarm.

Meter Vault. The meter vault shall meet the following requirements:

- Vault shall have minimum inside dimensions of 8’ wide x 10’ long x 7’ deep
- Four \_\_\_\_ inch plug valves eccentric type with 2-inch square operating nut, gear actuated on valves greater than 4-inch, by DeZurik, M&H Valve Company or Milliken
  - Provide one handwheel for Operator attachment to the 2-inch operating nut of plug valves; handwheel to be stored at the pump station site
- Three \_\_\_\_ inch swing check valves with weighted arm, M&H Valve Company or American Flow Control
- One \_\_\_\_ inch magnetic flow meter with the following specifications
  - ABB 10DX3111 Series only
  - Remote readout
  - Standard lay length
  - ANSI 150 carbon steel flanged connections
  - Polyurethane liner
  - Bullet nose electrode of Hastelloy C
  - Full submergence rated
- Spool piece cut to length of magnetic flow meter for insertion into line while meter is removed for maintenance or repair

- One \_\_\_\_ inch discharge pressure sensor and pressure transmitter with the following specifications:
  - OPW Engineered Systems, Iso-Ring; or Red Valve Company, Series 40
  - 316 stainless steel body, only - no other alternates
  - Buna-N sleeve
  - Flanged fittings – stainless steel or CPVC
  - Silicone filled, provided with a needle valve to allow for removal of gauge without loss of silicone
  - Water immersion rated
  - 4-20ma output and local LCD display to be tied into the pump station SCADA System
- Flanged coupling adapter Romac Style FCA501 or approved equal for removal of meter
- 6" threaded flange with 6" male cam-lock fitting and 6" dust cap for emergency by-pass pump connection; stainless steel or bronze
  - Manufactured in accordance with specification MIL-C-27487
  - Cam-lock fittings shall be P-T Coupling Company; Dixon Valve & Coupling Company, "Andrews"; or engineering approved equal
- Access hatch covers shall be East Jordan Iron Works, Bilco or Babcock Davis, aluminum, single leaf, channel frame, with recessed padlock hasp and flush hinged cover, odor resistant EPDM gasket, stainless steel hardware, and aluminum safety grate, as shown on the details
  - Safety grate shall be constructed of 6061-T6 aluminum, 300 lbsf rating, shall be powder coated with a safety orange color, have a permanent hinge allowing the grate to be locked in the 90-degree position, and shall provide fall through protection that must be in place before the access covers may be closed
- Provide one floor box and cover to be installed in the field above the discharge plug valve, as shown on the details
- Lighting shall be 100 watt vaporproof cast aluminum light fixtures
  - Wall mounted 4-inch box bracket
  - With 23 watt compact fluorescent lamps
- All tees, wyes and reducers as specified in the detailed plans
- All meter vault piping shall be flanged DIP

Miscellaneous Equipment. The Contractor shall furnish and install all necessary piping and fittings as shown on the detailed plans. Triplex systems will be governed by these same specifications plus the additional controls and equipment necessary for operating the third pump.

Painting. The Contractor shall furnish and apply all necessary surface preparation, primers and paints to match the existing paint and Portage County Water Resources paint scheme as closely as possible. All primer and paints shall be from the same coatings manufacturer. The Contractor shall also provide all accessory materials required to achieve the finishes specified, including but not limited to linseed oil, shellac, turpentine, paint thinners and other materials, and shall be compatible and approved by the paint manufacturer.

Verify that all surfaces are ready for application of materials in accordance with the product manufacturer's instructions. Measure the moisture content of surfaces using appropriate methods as instructed by the coating manufacturer. Do not apply finishes unless moisture content of surfaces is below the coating manufacturer's acceptable maximums. Mask all areas that are not to be painted. Stainless steel shall not be painted.

Coating application shall comply with manufacturer's instructions. Do not thin materials except to comply with manufacturer's instructions. Do not apply finishes to surfaces that are not dry. Apply each coat to achieve a uniform smooth finish to the specified dry film thickness. Sand surfaces lightly between coats as required, and clean surfaces free of loose particles with vacuum and tack cloth. All paint thicknesses shall be tested with a mil gauge satisfactory to the Engineer and provided by the Contractor. Deficiencies in film or coating thickness shall be corrected by the application of additional coat(s) of material at the expense of the Contractor. The finished surface shall be free from runs, drips, waves, laps, brush marks and variations in color, texture and finish. Collect waste material which may constitute a fire hazard, placed in closed metal containers and removed from the site daily.

The paints specified below are those manufactured by the Sherwin-Williams Company and are shown as standards of quality and type of paint system intended. Paints from Tnemec Company, Carboline Company, and Rustoleum Corporation are acceptable equal manufacturers, however, all materials furnished shall be submitted for approval as indicated in Item 110 – Shop Drawings.

Metals – Exterior, Non Submerged

Prime Coat	Recoatable Epoxy Primer B67H5/B67V5	3-6 mils
First Coat	Hi-solids Polyurethane (Low VOC) B65W301 Series/B60V30	3-4 mils
Second Coat	Hi-solids Polyurethane (Low VOC) B65W301 Series/B60V30	3-4 mils
Final Dry Film Thickness		9-14 mils

Metals – Interior, Non Submerged

Prime Coat	Recoatable Epoxy Primer B67H5/B67V5	3-6 mils
First Coat	Tile-Clad High Solids B62WZ Series/ B60VZ70	2.5-4 mils
Second Coat	Tile-Clad High Solids B62WZ Series/ B60VZ70	2.5-4 mils
Final Dry Film Thickness		8-14 mils

The following shall be painted as above: all newly installed piping, fittings, bolts, supports, brackets, conduits, junction boxes, electrical mounting brackets.

Driveway. An asphalt driveway shall be provided for all pump stations. The driveway shall comply with Item 430 – Driveway, of these Specifications.

**C. Miscellaneous.** The Contractor shall supply the manufacturer's latest version of Windows XP compatible software, licensed to Portage County, for any programmable component installed at the pump station that might require site configuration, adjustment or calibration to field conditions. Software must be manufacturer's full version to enable all operating capability and features of the device, instrument, controller, etc. All interconnecting cables to connect the device to a laptop computer shall be supplied, without the need for adapters.

**974.04 SCADA System.** The SCADA system shall comply with Item 893 - Supervisory Control And Data Acquisition System of these Specifications.

**974.05 Emergency Operation.** In order to ensure emergency operation of the facility, it must meet the requirements of the Ohio EPA, PCWR and comply with the "Ten State Standards".

**General.** Emergency pumping capability is required. The level of emergency pumping capability is dependent on the design capacity of the facility. All submersible stations shall have a portable pump connection to the force main with rapid connection capabilities and appropriate valves, located inside the valve vault. Minimum requirements, based on capacity follow:

- For new or expanded pump stations designed for an ADF of less than 20,000 gpd a By-pass Pumping Assembly must be included in the pump station design.
- For new or expanded pump stations with an ADF of greater than or equal to 20,000 gpd or that provide service to fifty (50) or more homes, both a By-pass Pumping Assembly and a stand-by generator shall be included. The stand-by emergency generator and electrical system to connect the generator to the pump station shall comply with Item 990 – Generator System and Electrical, of these Specifications.

**974.06 Pump Station Installation.** The Contractor shall provide all labor, materials and equipment necessary to install one complete submersible pump station. Said station shall be installed in accordance with all specifications, detailed plans and all Manufacturers' specifications.

The Contractor shall adhere to all OSHA requirements for open excavation shoring and work.

The Contractor shall be responsible to provide and install all internal pump station piping and valves.

Backfill shall be in accordance with all Manufacturers, Portage County Water Resources Standard Specifications and ODOT Specifications pertaining to size of compacted lifts and compaction.

Any deviation from said plans shall be pre-approved by Portage County Water Resources engineering.

**974.07 Electrical Service.** The Contractor shall provide 277/480V, 3-phase 4-wire electrical service required to power and control said pump station, meter vault and SCADA System as shown on all detailed plans. All wiring shall follow NFPA70 and the National Electric Code (NEC). All panels shall follow UL508A, Standard for Industrial Control Panels.

The Contractor shall furnish and install a fused surge suppressor sized for pump station requirements by Surge Suppression Inc., model SKLA series, sized for pump station loading requirements. Surge suppressor shall be located within the double throw transfer switch or automatic transfer switch on the load side as applicable to design of station. Upon location within automatic transfer switch, all surge suppressor work shall be included in item 990 "Generator System and Electrical".

The Contractor shall provide and install all electrical service for the pumps, control panel, liquid level controls and the SCADA package in accordance with all detailed drawings. The Contractor shall provide an entrance rated, fusible main electrical disconnect. Said disconnect shall be sized in accordance with all NEC Standards and submitted with all shop drawings.

The Contractor shall provide all required pump starters, sized in accordance with the Pump Manufacturer's requirements. Said starters shall be submitted with all shop drawings.

The Contractor shall be responsible to create/program the SCADA System into the existing County Wide SCADA System.

The Contractor shall tie all monitored information into the proposed SCADA System via the dedicated I/O terminal strip installed in the control panel.

The Contractor shall assume a minimum distance of 50 linear feet of underground service to be installed. The Contractor shall utilize 2 inch minimum PVC conduit for said installation. No direct buried wire shall be permitted. All wire sizes shall be in accordance with all NEC regulations for underground service and all Manufacturers' requirements. Wire sizes shall be included with all shop drawings. All wiring run from the new control panel shall be installed in 2 inch watertight PVC conduit.

Brady type labels shall be affixed to each end of conductors. The Contractor shall ensure that raintight conduit connectors are installed for outside panels, and that no conduit enter/exit the top of panels (inside or outside). Wire bending space shall be provided per Table 25.1 of UL508A. A minimum of 2-inch separation shall be maintained between low voltage signal and line voltage circuits.

All work shall be performed in accordance with all NEC Standards. The Contractor shall provide all trenching and backfilling for all electrical service in accordance with all NEC Standards and site details.

**974.08 Testing/Training.** The Contractor shall be responsible for placing the pump station into operation and to assure proper operation of said system. Factory authorized representatives shall provide orientation and training to O&M personnel during regular working hours only; training shall include configuring operating parameters, troubleshooting device calibration and software utilization.

The pump manufacturer shall perform the following inspection and testing for each pump furnished:

- Perform motor and cable insulation test for moisture content and insulation defects.
- Run pump dry to check for proper rotation and mechanical integrity.
- Run pump submerged for 30 minutes in water, remove pump from water; perform motor and cable insulation test.
- A written report on the above shall be prepared by the test engineer, certified and submitted to PCWR.
- Test each pump at factory at no less than three head conditions, including shut-off head and design head.
- Provide a standard NPSH curve based on testing of standard test pump.
- Submit test data to PCWR for approval prior to shipment of pumps.

The Contractor shall provide authorized representatives to operate and monitor the pump station during startup and the operational test to verify that all pumps, control panel, and magnetic flow meter are completely operational as specified.

In addition, the Contractor shall verify proper operation of all controls (i.e., HOA switches, level controls, pump cycle, alarms and SCADA System monitoring).

The Contractor shall make any adjustments necessary to the system during the operation test. If the Contractor is not capable of making said adjustments, the Contractor shall arrange for a factory representative to make said adjustments at the Contractor's expense.

**974.09 Shop Drawings.** The Contractor shall provide six sets of the shop drawings for approval in accordance with Item 110 – Shop Drawings.

Product data and cut sheets shall be submitted for each product specified herein. All material manufacturing schedules, shelf lives and MSDS Sheets shall also be included.

No materials will be accepted that have a manufacture date of over one year old and are not accompanied with their MSDS Sheets (3 copies) where applicable.

The submittals shall include, but not be limited to, submersible pump details, specifications, and testing and inspection report, control panel details and specifications, Manufacturers' installation details and specifications, level control details and specifications, all electrical schematics including pump, controls and power installation, all piping schematics including inlet piping, discharge piping, all wet well penetrations and gaskets.

**974.10 Warranty And O&M Manuals.** The Contractor shall provide a written guarantee against all defects in workmanship and materials for a period of one year after approved completion of this Contract, in addition to all Manufacturers' warranties.

If any defects appear during the guarantee period and the Contractor is notified of said defect he shall make all necessary repairs without cost to the County.

The Contractor shall be required to respond to any notification of problems within six hours of notification during the warranty period.

If the Contractor fails to respond within said time limit, the County may seek other assistance. Any and all costs necessary to repair the problem regardless of responsibility shall be at the Contractor's expense during the warranty period.

The Contractor shall provide six copies of the pump station, meter vault and SCADA System equipment, operation and maintenance manuals, as obtained from the Manufacturer's and/or Subcontractor.

All copies shall be presented to Portage County Water Resources

Said manuals shall be completely bound in hard cover notebook type binders and contain a complete listing of all equipment utilized on this project, all Manufacturers' maintenance recommendations, repair procedures and all replacement parts listing.

**974.11 Method Of Measurement.** The method of measurement for the pump station shall be at lump sum unit for the complete installation of an operational submersible pump station as approved by Portage County Water Resources.

**974.12 Basis Of Payment.** The payment for all work performed under this item shall be at lump sum price bid, which payment shall be full compensation for all labor, materials and equipment to furnish and install a fully operational submersible pump station.

	<u>Item</u>	<u>Unit</u>	<u>Description</u>
974	Lump Sum		Submersible Pump Station

END OF SECTION

## ITEM 990 - GENERATOR SYSTEM AND ELECTRICAL

990.01	SCOPE
990.02	ELECTRICAL
990.03	GENERAL
990.04	ELECTRICAL SUBMITTALS
990.05	GENERAL SUBMITTALS
990.06	RATINGS
990.07	ENGINE CONTROL PANEL
990.08	ALTERNATOR
990.09	MOUNTING
990.10	HOUSING
990.11	ACCESSORIES
990.12	AUTOMATIC TRANSFER SWITCH
990.13	TRANSIENT VOLTAGE SURGE SUPPRESSOR
990.14	SCADA
990.15	GENERAL INSTALLATION
990.16	ELECTRICAL INSTALLATION
990.17	EQUIPMENT SCHEDULE
990.18	WARRANTY & O&M MANUALS
990.19	QUALIFICATIONS
990.20	MEASUREMENT AND PAYMENT

**990.01 Scope.** This specification covers the installation of one standby generator system, all electrical work to connect the generator to the pump station.

It is the purpose and intent of these Specifications to obtain for the Owner complete operation standby electric generating systems, including all of the accessories and equipment necessary to complete a reliable system. Evidence of a satisfactory installation of a similar nature within a reasonable distance shall be furnished upon request.

The systems shall be built and tested by the manufacturer of the alternator who has regularly engaged in the production of such equipment for the past 10 years so that there is one source of equipment. The performance of the electrical plant series shall have been certified by an independent testing laboratory as to the plant's full power rating, voltage and frequency regulation and shall be warranted under a written and published factory warranty for five years against defects in material and factory workmanship. Said warranty shall be effective as of the date of factory-supervised startup.

Dealer assembly units will not be accepted. The supplier shall have available complete parts and service departments employing full time, factory trained authorized personnel, devoted exclusively to this service, allocated within a reasonable distance to the installation site. Service contracts shall be available to the Owner. A copy of the factory test shall be furnished with the unit.



**990.02 Electrical.** The Contractor shall provide all labor, materials and equipment necessary to furnish and install: one standby electric generator as specified in this specification; all generator accessories including the transfer switches; all wiring to connect the transfer switch to the generator; all wiring to connect the transfer switch with the main power disconnect.

**990.03 General.** The Contractor shall provide all labor, materials and equipment necessary to furnish and install: all miscellaneous gas service work, as required, including: coordination with Dominion Gas in the installation of any new line, any new meter or regulator needed or other components needed to meet the generator fuel consumption requirements as per the manufacturers specifications, Section 990.06 of this Contract; all site work associated with the proper installation of the generator including: proper foundation preparation, all sub-base material, all concrete forms and concrete for the base, all gravel surrounding the concrete pad and all site work to properly maintain drainage, Sections 990.09 and 990.15 of this Contract.

**990.04 Electrical Submittal.** The Contractor shall submit the following in accordance with the conditions of this Contract and Item 110 - Shop Drawings.

**A. Product Data.** Product data and cut sheets shall be submitted for each product and component specified herein. This is to include the schedule of features, name as used on reference drawings, manufacturer's model number, input and output characteristics, factory setting, electrical and mechanical requirements and material compatibility.

**B. Electrical Details.** All electrical wiring diagrams shall be submitted to include interconnecting wiring diagrams pertinent to the existing electrical power supply and components and the proposed generator and automatic transfer switch. The wiring diagrams shall include all wiring conduits (sizes and locations), wire sizes, fuses, breakers etc. All field wiring required by the Contractor or their authorized representative shall be shown on the drawings.

**C. Certified Factory Tests.** Certified final factory test reports shall be provided to the Engineer, certifying this unit's full power rating, stability, voltage and frequency regulations.

**D. Maintenance.** All maintenance data for all equipment specified shall be submitted as part of this specification. This item shall also include all Operation and Maintenance (O&M) manuals. The Contractor shall supply six complete sets of O&M Manuals complete catalog cuts and full parts listings for Portage County Water Resources Engineering Approvals.

**990.05 General Submittal.** The Contractor shall submit the following in accordance with the conditions of this Contract and Item 110 - Shop Drawings.

**A. Gas Line Submittals.** All gas meter/line schematics shall be submitted, as required, as part of this Specification.

Said schematic shall include layouts, locations and sizes for the gas meter and gas lines.

All design criteria for the above required materials shall be in accordance with Section 990.13 - General Execution of this Specification.

**990.06 Rating.** Generators rated at or below 125kW shall be fueled by natural gas, where available. Generators rated over 125kW shall be diesel fueled. The Contractor shall furnish and install the following:

Kohler [natural gas] [diesel] operated standby electric generator set model \_\_\_\_\_ with a \_\_\_\_\_ alternator or approved equal. The electric generation set shall consist of a housed style, liquid cooled, [natural gas] [diesel] fuel unit rated at \_\_\_\_ kW, \_\_\_\_ kVA at 0.80 PF, standby rating, based on site conditions noted below. System voltage of: 480/277 Volts AC, Three phase, Four-wire, 60 hertz. Motor starting capability shall be a minimum of \_\_\_\_ kVA. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set.

The percent of available kW used shall be between the range of 50 percent and 85 percent.

The equipment includes, but not limited to, the following.

**A. Engine.** The engine shall be [natural gas] [diesel] fueled, radiator and fan cooled. Minimum displacement shall be \_\_\_\_ cubic inches, with \_\_\_\_ cylinders, rated \_\_\_\_ hp. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Engine mounted battery charging alternator, 70 ampere minimum, and solid-state voltage regulator.

An electric starter(s) capable of three complete cranking cycles without overheating.

Positive displacement, mechanical, full pressure, lubrication oil pump.

Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

An engine driven, mechanical, positive displacement fuel pump.

Replaceable dry element air cleaner.

Flexible supply and return fuel lines.

**B. Cooling System.** Skid-mounted radiator and cooling system rated for full load operation in 122 degrees F (50 degrees C) ambient as measured at the generator air inlet. Radiator shall be provided with silicone coolant hoses and a duct adaptor flange. Two ball valves shall be installed to isolate the heater and coolant hoses. The cooling system shall be filled with 50/50 ethylene glycol/water mixture by the equipment supplier. Rotating parts shall be guarded against accidental contact per OSHA requirements.

**990.07 Engine Control Panel.** The control panel shall be vibration isolated and unit mounted and shall be built, tested and mounted by the manufacturer of the alternator. It shall be capable of starting the engine from a remote closing contact, stopping on opening of the contact. The control panel shall include oil pressure gauge, coolant temperature gauge, battery condition meter, panel illumination, run-stop-remote selector switch, solid state engine monitor with individual lights for each of the following conditions.

System Ready	Green Light
Engine Run	Green Light
Pre-Low Oil Pressure	Yellow Light
Pre-High Engine Temperature	Yellow Light
Low Battery Voltage	Yellow light
Overcrank Shut Down	Red Light
Overspeed Shut Down	Red Light
Coolant Temperature Shut Down	Red Light
Low Coolant Level	Red Light
Low Oil Pressure Shut Down	Red Light
Low Oil Level	Red Light
Charger Fail	Red Light
Elapsed Running Time	

The monitoring system shall include a lamp test switch and reset switch for shut down indicator lamps. AC instruments shall include the following: AC voltmeter, AC ammeter, rotary volt meter/ammeter selector switch with "OFF" position, running time meter, voltage adjusting rheostat, frequency meter and a manual reset overload protection circuit breaker.

**990.08 Alternator.** The AC alternator shall be salient-pole, brushless, twelve pole reconnectable, 2/3 pitch, revolving field, dripproof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H or better insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 130 degrees Centigrade.

The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

The generator and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

**990.09 General Mounting.** The electric generation sets shall be mounted on integral rubber cushion mounts and provided with a structural steel welded base. The skid bases shall be suitable for mounting on any level surface.

The Contractor shall provide reinforced concrete generator pads for mounting said generators on. The size and design specifications for said pads shall be per these Specifications, the generator manufacturer's recommendations, and as shown on the Plans.

**990.10 Housing.** The complete electric generating sets shall be enclosed in a weather/sound protective, sheet metal housing with lockable hinged side panels and a lockable hinged door for ready access to the electric plant controls; key to #505CH or #CH751; provide 6 keys. Seal all openings in base, screen ventilation openings and provide rodent guards. The housing shall provide adequate cooling and combustion air with all panels assembled. Furnish a mounted critical muffler/exhaust system with rain shield, rain cap and flexible exhaust piping, capable of reducing the total engine exhaust noise by 25-35 dB(A).

Said metal housing shall have a manufacturer's supplied baked on enamel finish. Color shall be approved by the Engineer.

**990.11 Accessories.** The following accessories shall be furnished: lead acid starting deep cycle batteries, battery cable, battery rack, engine block heater with isolation valves, fuel solenoid valve, flexible fuel line connector, fuel strainer, initial engine oil and antifreeze fill, battery charger with equalizer and float type control [and integral diesel storage tank capable of holding enough fuel to last a minimum of 24 hours at 100% load]. A duplex 120v receptacle with individual weather covers shall be provided and installed within the generator enclosure, within reach of the battery charger power supply cord.

Six sets of Operator/Parts Manuals shall be provided with each said electric generating set.

**990.12 Automatic Transfer Switch.** An independent solid state automatic transfer switch (ATS) control, with a programmed transition feature, Kohler supplied or equal, shall be provided to automatically start the engine generator and transfer the load circuits to the standby power when normal line voltage fails and to automatically retransfer the load back to normal service when the line voltage is restored to rated voltage, then stop the plant. A totalized run time meter, in hours and tenths, shall be provided and interconnected with the generator runtime hour meter and installed at the ATS. Totalized runtime meter shall be viewable without opening the ATS enclosure.

The solid state automatic transfer control shall be of proper design and capability to provide \_\_\_\_\_ ampere, three pole with solid neutral, 277/480 volts service minimum and a minimum withstand/closing rating of 30,000 (amps RMS). Transfer switch contactors shall be of the 600 volt type for all circuits of loads and enclosed in a NEMA 12 painted steel enclosure for indoor mounting and enclosed in a NEMA 4X stainless steel enclosure for outdoor mounting. Enclosures shall be UL listed. The enclosure shall provide NEC wire bend space. The cabinet door shall be key-locking. Each pole shall be of high pressure contact design, with bi-directional liner actuator operator which shall operate in either direction in six cycles or less. Contacts shall be solid silver cadmium oxide (stationary) and silver tungsten (movable), capable of switching both inductive and resistive loads. Thermal capacity of each contact shall allow for inrush currents at least 20 times the continuous rating. Contact pressure shall be maintained by a device not part of the current carrying path. Each pole shall be totally enclosed in a separate heat resistant chamber with arc chutes to provide quenching and to prevent cross arcing between the poles. The transfer switch shall have an adjustable center off delay transferring in either direction.

The ATS transfer switch design shall have a non-electrical manual operator designed and tested for safe transfer and retransfer of the load with either or both the normal and the alternate source terminals energized. Provide a control disconnect switch to prevent the actuator from becoming energized during manual operation. Both the line and the generator side of the transfer switch shall be mechanically held and electrically and mechanically interlocked with auxiliary 10 amp rated contacts on both sides. A mechanical interlock transfer switch shall be tested and listed to U.L. Standard 1008. Provide a full ampacity rated neutral bar. The control modules in the transfer switch shall be solid state plug-in type and ease of service. A bypass module shall be provided to bypass any module failure and allow temporary operation of the system.

The ATS transfer controls shall have a built-in diagnostic signal system showing the following functions are in process:

1. Normal line power.
2. Time delay engine starting.
3. Engine cranking.
4. Engine running and time delay to transfer.
5. Load transferred to emergency power.
6. Load transferred to normal power.
7. Normal power restored (same as No. 1 above).

Should the system malfunction during any of the time Sequences 1 through 7, a maintained signal shall show the sequence step in which the system failed. The control shall contain a fused 2 amp automatic SCR voltage regulated current limiting float type charging circuit with ammeter to maintain the engine starting batteries. The control relays and devices shall be mounted on a switch-out door to provide ready accessibility for service. The automatic transfer control along with the engine generator and starting control shall be built, tested and supplied by the manufacturer.

This manufacturer shall accept responsibility for performance and service of the complete standby package. The manufacturer shall warrant the transfer switch and engine generator for five years against defects in materials and workmanship, which includes parts, labor and travel for the duration of the warranty. The solid state controls shall contain the following:

1. Solid state adjustable low voltage and full phase failure sensitive relays. Dropout is 75 to 98 percent of the pick up setting of 85 to 98 percent of normal line voltage.
2. Solid state adjustable 0.5 to 5 seconds time delay on start.
3. Solid state adjustable 2 to 120 seconds time delay on transfer.
4. Solid state adjustment 0 to 30 minutes time delay on retransfer to normal.
5. Solid state adjustment 0 to 10 minutes time delay on unloaded running.
6. Test/Normal/Retransfer key operated switch for system test and maintenance.
7. Pilot contact to initiate engine starting.
8. Control circuit disconnect plug to allow service on the de-energized control without interrupting normal power.
9. Normal power connected lamp (green).
10. Emergency power connected lamp (red).
11. Normal source available lamp (white).
12. Emergency source available lamp (white).
13. Programmable automatic seven day system exerciser. The clock exerciser shall be fully programmable to allow for adjustable system exercise periods and a selector to select either exercise with or without load.
14. Programmed transition causes switch to pause in the neutral position to allow residual voltage of large inductive loads to decay. Provide a programmable/adjustable time delay relay of 0 to 180 seconds.

**990.13 Transient Voltage Surge Suppressor.** The Contractor shall furnish and install a fused surge suppressor sized for pump station requirements by Surge Suppression Inc., model SKLA series, sized for pump station loading requirements. Surge suppressor shall be located and installed within the automatic transfer switch cabinet on the load side. All materials and work for surge suppressor shall be included in item 990 "Generator System and Electrical".

**990.14 SCADA.** The generator equipment manufacturer shall provide the required 4-20ma and contact closure sets for monitoring the following operating parameters via SCADA:

- Standby Power On/Off
- Load Connection: Utility or Emergency
- Generator Battery voltage
- Generator Low Fuel Alarm (diesel units only)
- Generator Fuel, % Level (diesel units only)

**990.15 General Installation.** The Contractor shall supply all labor material and equipment necessary to install said emergency generators.

All new gas meters and gas lines shall be sized and installed, as required, in accordance with the generator requirements, East Ohio Gas requirements and Section Installation, as listed below.

#### **Installation.**

Site Work. The Contractor shall perform the following site work.

The Contractor shall re-grade the area as necessary to provide proper drainage after the generators are installed.

All necessary cuts and fills required to assure proper finish grade elevations for proper generator installation shall be in accordance with all detailed plans.

The Contractor shall cut the swale around the generator areas as necessary to shed all run off around the generator site.

The Contractor may not change the generator site or swale base elevations.

The Contractor shall be responsible to properly dispose of any excess material obtained as a result of the new grading plan.

Final Site Restoration. The Contractor shall perform the following site restoration upon completion of all work pertaining to installation of the proposed generator.

The Contractor shall seed and mulch the all disturbed areas in accordance with ODOT Standard Specifications, Item 659.

Concrete Pad. The Contractor shall install a concrete pad for the placement of the new emergency standby generator as shown on the Plans.

Installation of the concrete pad shall be in accordance with all ODOT 451 and 499 standards, ACI Standards, the Generator Manufacturer's requirements.

The concrete pad shall be installed under the most stringent requirements of all the requirements listed above while meeting or exceeding the below listed minimum requirements:

1. The subbase under the new concrete pad shall be compacted to at least 92 percent of the maximum dry density as determined by ASTM D698 at a moisture content of  $\pm 3$  percent of the optimum moisture content. If 92 percent compaction can not be reached, than soil stabilization fabric shall be installed.
2. The pad shall be designed to carry 1 1/2 times the generator weight.
3. Concrete shall be a minimum 4000 PSI with No. 57 coarse aggregate (6 - 1/2 sack mix).
4. Air entrained @ 6 percent  $\pm 2$ .
5. Concrete shall be reinforced with a No. 5 rebar, 12-inches on center, 3-inch minimum clearance from all concrete surfaces, and have one kit of fiberglass hair reinforcement broadcasted in the concrete mix prior to placement (i.e. 1.0 lb of fiberglass reinforcement per cubic yard of concrete mix).
6. Bar splices shall be in accordance with ODOT 509 requirements and plastic chairs shall be used to provide clearance between the subgrade and the reinforcement.
7. Finished grade of said Concrete pad shall be true and level. The finished surface shall not vary by more than 1/8 inch in 10 linear feet.
8. The size of the concrete pad shall be such that it is a minimum 6-inches larger on all sides than the mounting base of the generator and construction shall take place using a monolithic pour.

The generator shall be anchored to the concrete pad by use of 1/2 inch diameter by 3 1/2 inch long thunder stud anchor bolts.

Any damage caused to the generator, due to the Contractor's failure to follow the factory representative directives shall result in repair or replacement at the Contractor's expense.

Any operational failures of the generator that are a direct result of the Contractor's failure to follow the factory representative directives shall be corrected at the Contractor's expense.



The Contractor shall cure said pad with the utilization of wet burlap and straw for seven days.

The concrete pad shall be allowed to cure a minimum of 10 consecutive days prior to placement of the generators.

During placement of the generator, the Contractor shall abide by all OSHA requirements pertaining to overhead crane installation practices.

The Contractor shall furnish and install a fence surrounding the concrete pad in accordance with Item 607 Special, Generator Stockade Fence.

Gas Service (as required). The Contractor shall check with Dominion Gas to verify the pressure (high or low) main tapped into to supply gas to the existing pump station.

The Contractor shall provide a new tap and service capable of providing the required gas demand under full load.

The Contractor shall install the new meter, in accordance with Dominion Gas recommendations, that can handle/supply the required gas demand.

All new gas line installed from the new meter to the generator shall be sized in accordance with Dominion Gas requirements to meet or exceed the above cubic foot per hour requirements.

All materials and workmanship pertaining to gas meter/line installation shall be done in accordance with all Dominion Gas Regulations, OSHA Regulations.

Standards. All materials, equipment and workmanship utilized on this project shall comply but not be limited to the following standards:

1. Portage County Water Resources Standard Specifications.
2. Institute of Electrical and Electronics Engineers, IEEE.
3. National Electric Codes, NEC.
4. National Electric Manufacturing Association, NEMA.
5. National Fire Protection Association, NFPA.
6. East Ohio Gas Regulations.
7. State and County Building Codes.
8. Occupational Safety and Health Act, OSHA.
9. Underwriters Laboratories, UL.
10. Factory Mutual, FM
11. Generator Manufacturer's Requirements.

All workmanship utilized in the installation of said generator shall utilize the highest standards as established by the Skilled Trades Association for their particular trade and/or skill.

**990.16 Electrical Installation.** The Contractor shall supply all labor material and equipment necessary to install said emergency generator.

Generator Installation.

A factory trained representative shall consult with the Contractor at all times during the installation of the emergency generator. No work shall be permitted without the factory trained representative on site.

Any damage caused to the generator, due to the Contractor's failure to follow the factory representative directives shall result in repair or replacement at the Contractor's expense.

Any operational failures of the generator that are a direct result of the Contractor's failure to follow the factory representative directives shall be corrected at the Contractor's expense.

Electrical Service. The Contractor shall provide all labor, materials and equipment to perform all electrical work necessary to properly install the emergency generator.

The Contractor shall ground said generator utilizing  $\frac{3}{4}$ " x 10 foot copper grounding rods in accordance with the latest issue of the National Electrical Code and the Generator Manufacturer's requirements. Ground rod connections shall be made by exothermic welds.

The Contractor shall supply and install all electrical cable from the new emergency generator to the proposed pump station main disconnect.

The Contractor shall provide all trenching and backfilling for all electrical service in accordance with all detail drawings, NEC regulations and Ohio Building Codes.

All exterior cable shall be installed underground and comply with all NEC regulations for installation of underground cable. Said cable shall be installed in conduit. Marking tape shall be placed 12 inches above the actual cable location in the trench.

All penetrations not reused shall be plugged with a non-shrinking epoxy grout.

Any new penetrations necessary for the new emergency generator shall be watertight penetrations.

The Contractor shall install the new automatic transfer switch as shown on all details.

The Contractor shall supply and install all internal wiring necessary from the main disconnect to the new automatic transfer switch necessary to properly operate the generator.

All interior wiring shall be installed in water tight rigid conduit. All conduits shall be wall mounted at a minimum of 24 inches above the finish floor.

All electrical materials utilized on this project (wire, work boxes, fuses, conduit, etc.) shall be sized as necessary for proper installation of the emergency generator. All materials shall comply with all NEC Regulations, Ohio Building Codes and the Generator Manufacturer's requirements for proper sizing and installation. The Electrical Contractor shall adhere to the most stringent regulation.

All electrical materials shall be UL listed.

Standards. All materials, equipment and workmanship utilized on this project shall comply but not be limited to the following standards:

1. Portage County Water Resources Standard Specifications.
2. Institute of Electrical and Electronics Engineers, IEEE.
3. National Electric Codes, NEC.
4. National Electric Manufacturing Association, NEMA.
5. National Fire Protection Association, NFPA.
6. East Ohio Gas Regulations.
7. State and County Building Codes.
8. Occupational Safety and Health Act, OSHA.
9. Underwriters Laboratories, UL.
10. Factory Mutual, FM
11. Generator Manufacturer's Requirements.

All workmanship utilized in the installation of said generators shall utilize the highest standards as established by the Skilled Trades Association for their particular trade and/or skill.

Startup. The Contractor shall be responsible for providing a system operational test.

A factory-trained representative of the Generator Manufacturer shall conduct said operational test.

The test shall consist of operating the generator under full load and no load conditions for a period of sufficient time to assure the generator set is operating properly.

The technician shall make any adjustments necessary to the system during operational test. Any and all adjustments shall be made at no charge to the County regardless of the seriousness of the problem.

During the operational test the factory representative shall instruct the County's representatives in proper operation and maintenance of the system.

Diesel fueled generator units shall be provided with a full fuel tank prior to testing.

#### **990.17 Equipment Schedule.**

##### Rating

Standby kW	—
Standby kVA	—
Power Factor	0.80
Voltage	480/277
Phases	3
No. Wires	4
Frequency	60Hz
SkVA	— @ max. 35% instantaneous voltage dip

#### Engine

No. Cylinders	—
Min. Displacement, Cu.In.	—

#### Transfer Switch

Amperage	—
No. Poles	3 with solid neutral
Voltage	277/480
Contact rated	600 volts

Substitute equipment from other manufacturers may be considered by the Engineer only if they meet all design and performance criteria of these Specifications.

Any modifications to the installation required by a substitute manufacturer shall be provided by the Contractor at no additional cost to the County. Substitute equipment shall be approved as equal prior to the bid.

The Contractor shall supply the manufacturer's latest version of Windows XP compatible software, licensed to Portage County, for any programmable component installed that might require site configuration, adjustment or calibration to field conditions. Software must be manufacturer's full version to enable all operating capability and features of the device, instrument, controller, etc. All interconnecting cables to connect the device to a laptop computer shall be supplied, without the need for adapters.

### **990.18 Warranty And O&M Manuals.**

**A. Warranty.** The Contractor shall provide a written guarantee against all defects in workmanship and materials for a period of one year after approved completion of this Contract, in addition to all Manufacturers' warranties.

If any defects appear during the guarantee period and the Contractor are notified of said defect, he shall make all necessary repairs without cost to the County.

The Contractor shall be required to respond to any notification of problems within twenty-four hours of notification, during the warranty period.

If the Contractor fails to respond within twenty-four hours, Portage County may seek other assistance. Any and all costs necessary to repair the problem regardless of responsibility shall be at the Contractor's expense, due to failure to respond.

**B. O&M Manuals.** The Contractor shall supply six copies of the emergency generator equipment (generator and automatic transfer switch), operation and maintenance manuals, as obtained from the Manufacturer and/or Subcontractors.

Said manuals shall be completely bound and contain installation, a complete listing of all equipment, replacement parts, Manufacturer's maintenance recommendations and schedules, trouble shooting and repair procedures, and wiring schematics.

**990.19 Qualifications.** The Contractor shall submit the following information with their bid submittal. Failure to submit said material may result in disqualification of bid.

The Contractor shall provide a list of five references for installations of emergency generators of similar size as specified herein. References shall be owners only and include:

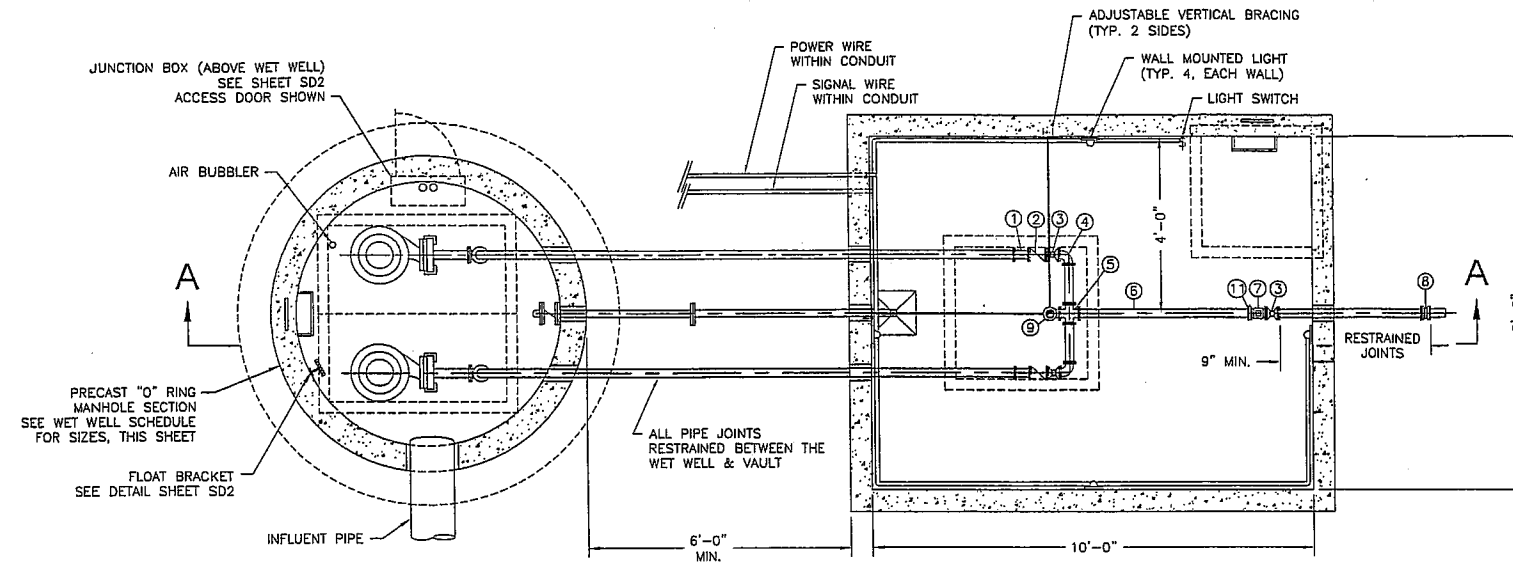
1. Location of generator installed.
2. Point of contact for each generator installed.
3. Telephone numbers.
4. Project costs, start and completion dates.

Portage County reserves the right to reject any and all bids which have been deemed not to be in the County's best interest for what ever reasoning that might occur.

**990.20 Method Of Measurement And Payment.** The measurement for payment for the emergency generator shall be for the systems completely installed (including automatic transfer switch) and ready of operation in compliance with the provisions as set forth in the Contract Documents, Plans and Specifications.

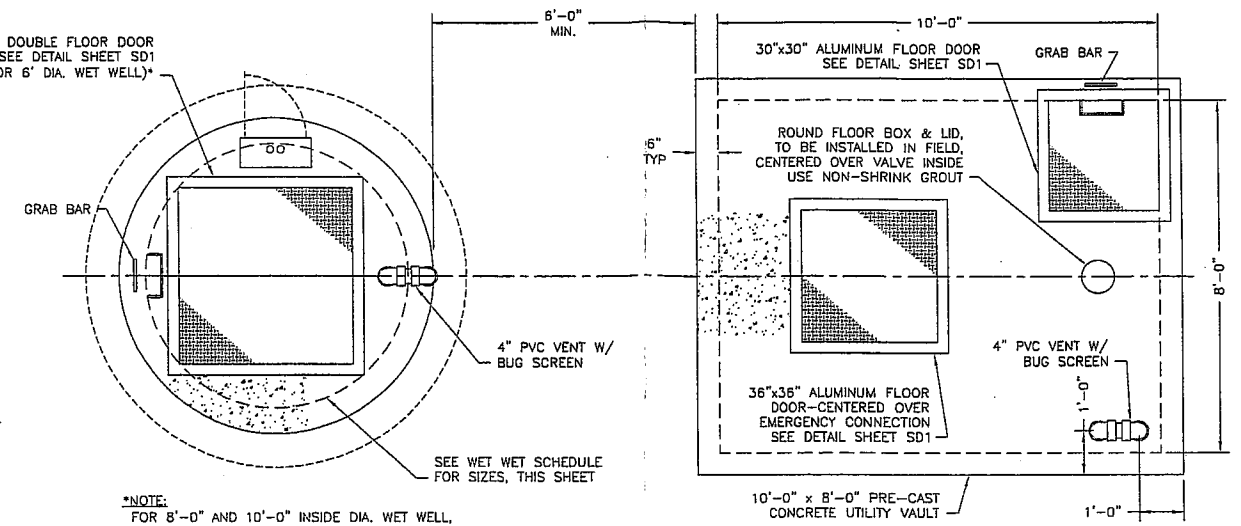
<u>Item</u>	<u>Unit</u>	<u>Description</u>
990	Lump Sum	Generator Set and Electrical

END OF SECTION



**SECTIONAL PLAN**  
SCALE: 1/2"=1'-0"

- ELECTRICAL NOTE:**
1. ALL ELECTRICAL CONDUIT TERMINATIONS SHALL BE SEALED WITH WATER-TIGHT PUTTY.
  2. ALL CONDUIT SHALL BE SIZED PER REQUIRED EQUIPMENT WIRE SIZE, (POWER AND SIGNAL WIRES) 1 INCH MINIMUM AND SCH. 80 PVC.
  3. ALL INTERIOR CONDUIT, WALL FIXTURES, JUNCTION BOXES AND SWITCHES SHALL BE CLASS 1, DIVISION 2 EXPLOSION PROOF.
  4. WALL LIGHT FIXTURE SHALL BE COOPER #VXHT25GP OR ENGINEER APPROVED EQUAL.
  5. CONDUIT WITH CONDUCTORS SHALL HAVE DRIP LOOPS FORMED ON THEM AND ALL WORK MUST CONFORM TO THE NATIONAL ELECTRIC CODE.



**\*NOTE:**  
FOR 6'-0" AND 10'-0" INSIDE DIA. WET WELL, PROVIDE 48"x30" MIN. DOUBLE FLOOR DOOR FOR PUMP ACCESS AND A 24"x24" MIN. SINGLE FLOOR DOOR FOR MANWAY ACCESS TO STEPS.

**PLAN VIEW**  
SCALE: 1/2"=1'-0"

**NOT PLOTTED TO SCALE**

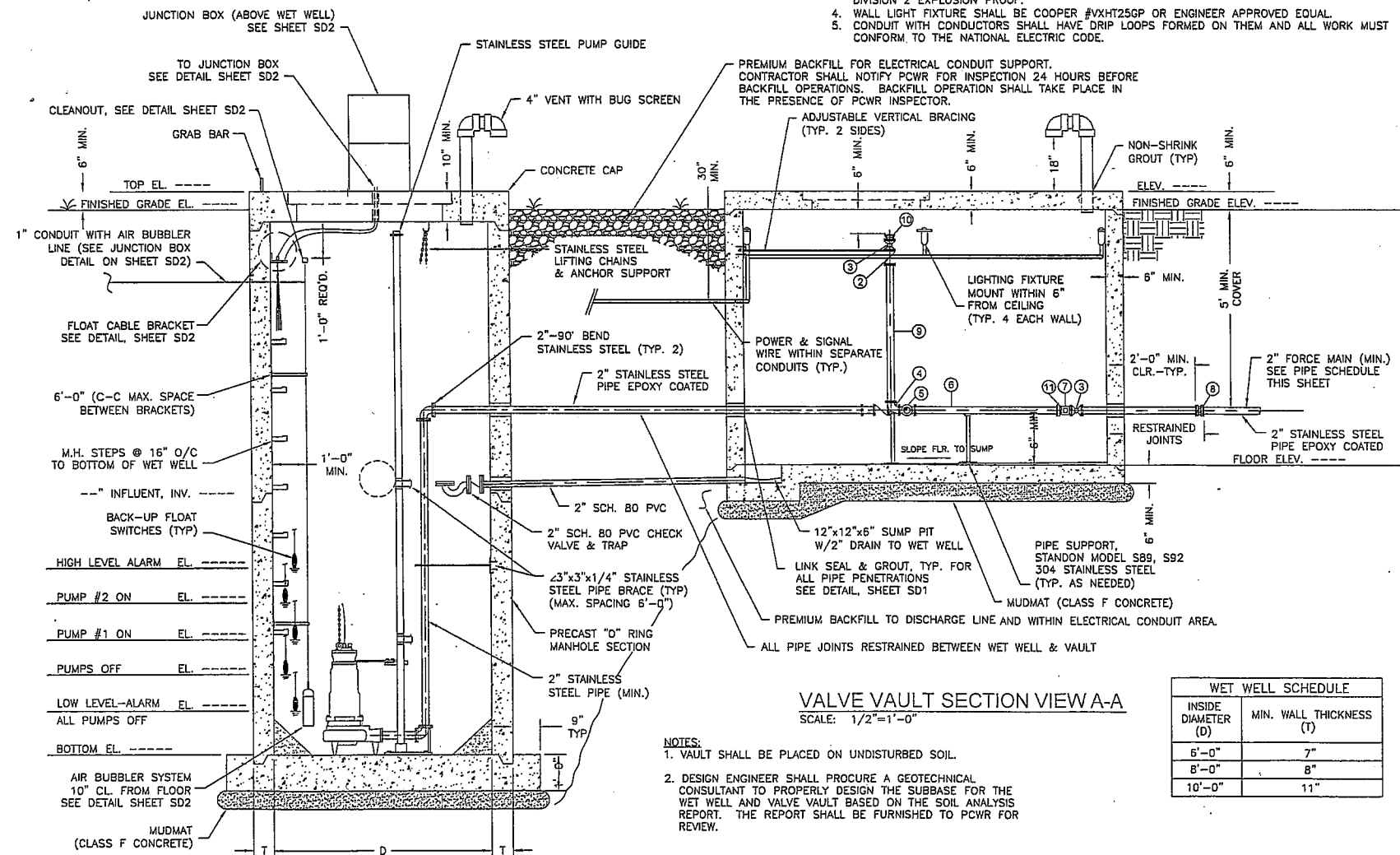
FORCE MAIN PIPE SCHEDULE			
PIPE	MATERIAL	JOINT	BEDDING
PVC SDR-26	ASTM D2241	ASTM D3139	ASTM D2321
PVC C-900	AWWA C-900	ASTM D3139	ASTM D2321
DIP	ANSI/AWWA C151/A21.51	ANSI/AWWA C111/A21.11	ASTM C12

LEVEL CONTROL ELEVATIONS			
PRIMARY BUBBLER		SECONDARY (FLOATS)	
LOW LEVEL ALARM/ALL PUMPS OFF	----	LOW LEVEL ALARM/ALL PUMPS OFF	----
PUMPS OFF	----	PUMPS OFF	----
PUMP NO. 1 ON	----	PUMP NO. 1 ON	----
HIGH LEVEL ALARM	----	HIGH LEVEL ALARM	----
PUMP NO. 2 ON	----	PUMPS NO. 2 ON	----

(LEVEL CONTROL SYSTEMS TO BE ON SEPARATE CIRCUITS)

PIPING SCHEDULE FOR VALVE VAULT:	
1	2" SPOOL PIECE, 12" LONG
2	2" CHECK VALVE WITH WEIGHTED ARM (TYP. 3)
3	2" PLUG VALVE GEAR OPERATED (TYP. 4)
4	2" 90° BEND
5	2"x2" CROSS
6	SPOOL PIECE (LENGTH AS REQUIRED)
7	2" ABB MAG METER WITH REMOTE READOUT, (** SEE NOTES 1 & 2)
8	TRANSITION PIECE / COUPLING RESTRAINED JOINT
9	2" EMERGENCY CONNECTION PIPING (LENGTH AS REQUIRED) SINGLE CONTINUOUS PIECE
10	2" MALE CAMLOCK FITTING WITH DUST CAP FOR EMERGENCY CONNECTION, STAINLESS STEEL OR BRONZE
11	2" PRESSURE SENSOR AND TRANSMITTER, TIE INTO SCADA VIA 4-20 MA SIGNAL (* SEE NOTE 2)

- \*\*NOTES:**
1. CONTRACTOR TO PROVIDE SPOOL PIECE SIZED FOR MAG METER REMOVAL.
  2. ALL PIPING AND FITTINGS SHALL BE THREADED IRON PIPE SIZE (IPS), EXCEPT MAG METER AND PRESSURE SENSOR SHALL BE FLANGED FITTINGS.
  3. ALL PIPING AND FITTINGS SHALL BE 304 STAINLESS STEEL UNLESS OTHERWISE NOTED.



**VALVE VAULT SECTION VIEW A-A**  
SCALE: 1/2"=1'-0"

- NOTES:**
1. VAULT SHALL BE PLACED ON UNDISTURBED SOIL.
  2. DESIGN ENGINEER SHALL PROCURE A GEOTECHNICAL CONSULTANT TO PROPERLY DESIGN THE SUBBASE FOR THE WET WELL AND VALVE VAULT BASED ON THE SOIL ANALYSIS REPORT. THE REPORT SHALL BE FURNISHED TO PCWR FOR REVIEW.

WET WELL SCHEDULE	
INSIDE DIAMETER (D)	MIN. WALL THICKNESS (T)
6'-0"	7"
8'-0"	8"
10'-0"	11"

**SECTION A-A**

REVISIONS				
REV. #	DESCRIPTION	DATE	BY	APPD.

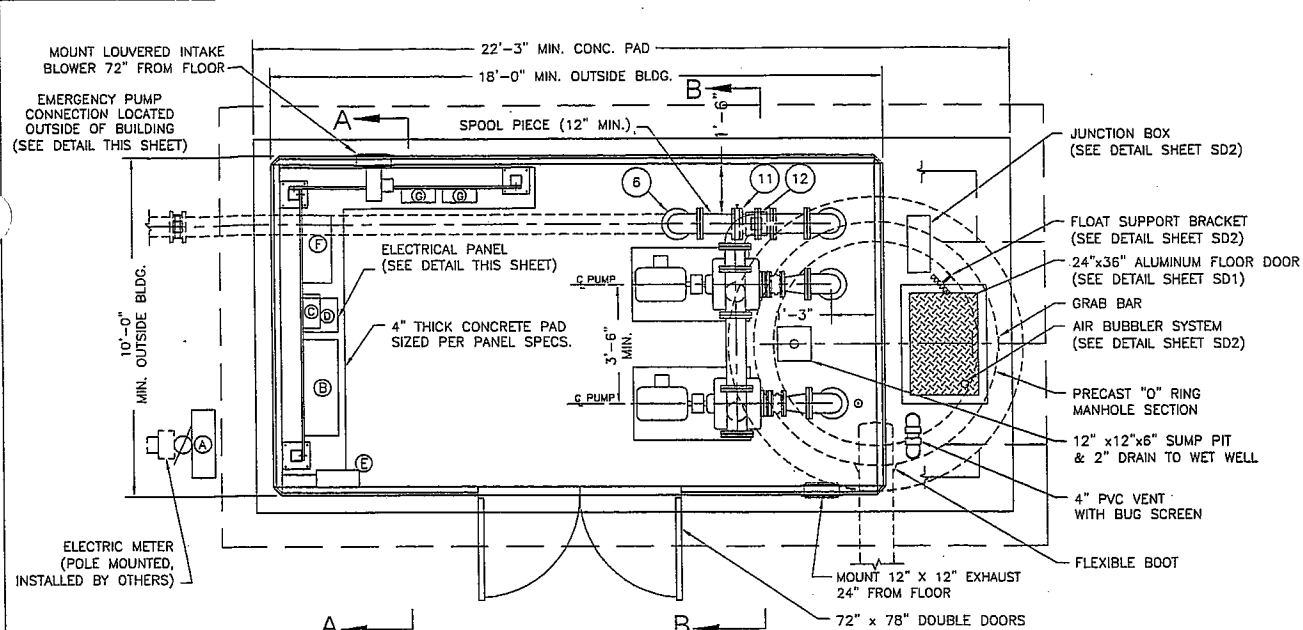
**PORTAGE COUNTY WATER RESOURCES**  
PORTAGE COUNTY ADMINISTRATION BUILDING  
449 SOUTH MERIDIAN ST., P.O. BOX 812  
RAVENNA, OHIO 44266-0812  
OFFICE (330) 297-3570 FAX (330) 297-3580

DATE: 10-14-10  
DRAWN BY: JGE  
APPROVED BY: JSL

SCALE:  
HORZ. AS NOTED  
VERT. NA

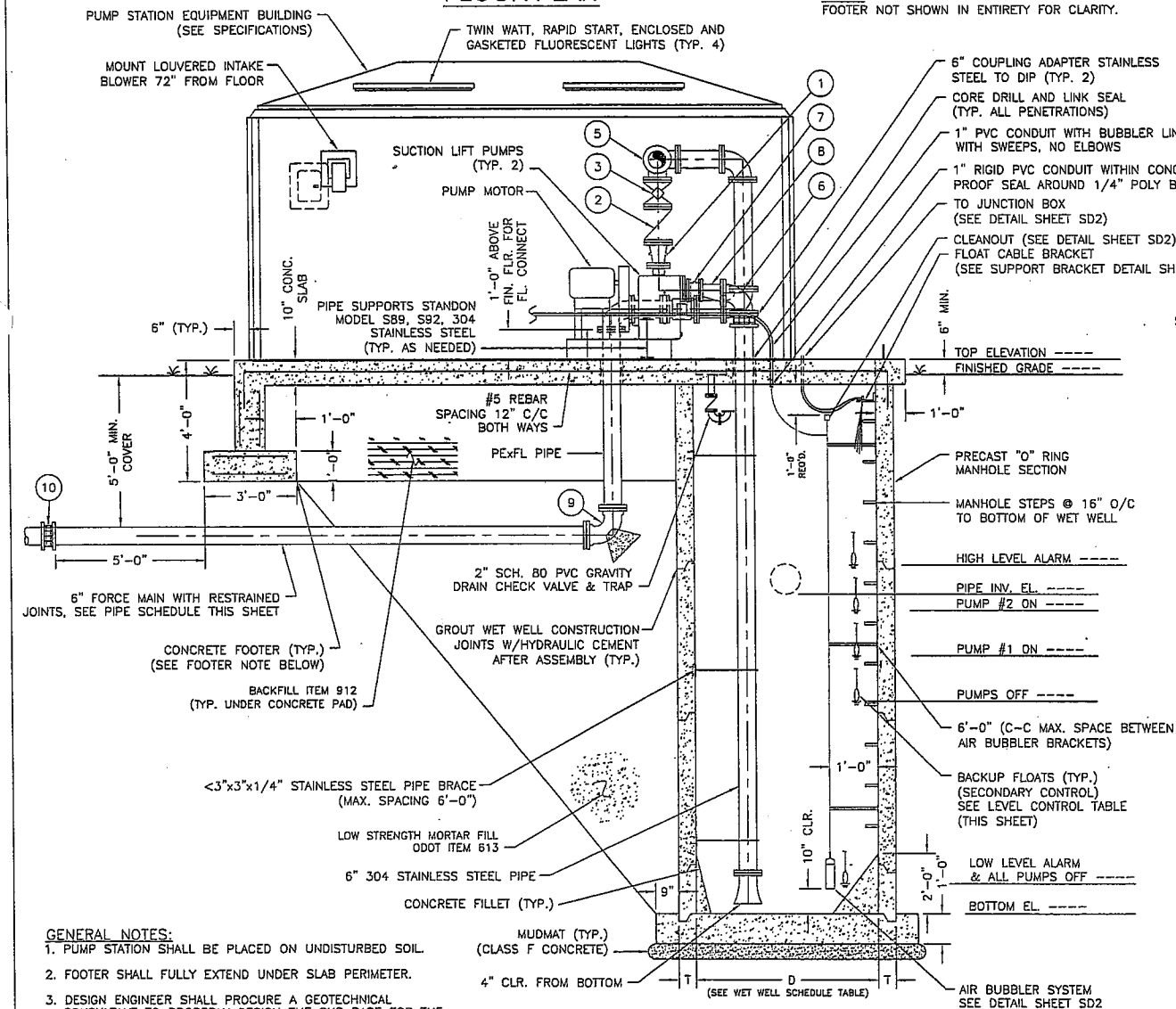
971 STANDARD GRINDER  
PUMP STATION PLAN AND SECTIONS  
PROJECT NAME  
PROJECT ##

971  
PSDM



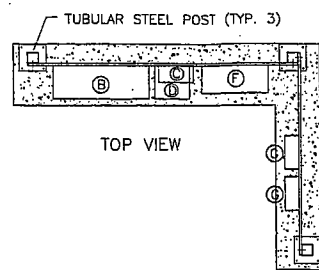
FLOOR PLAN

NOTE:  
FOOTER NOT SHOWN IN ENTIRETY FOR CLARITY.



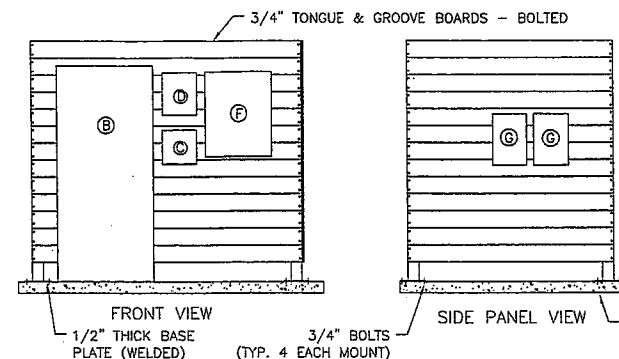
ELEVATION VIEW

- GENERAL NOTES:**
1. PUMP STATION SHALL BE PLACED ON UNDISTURBED SOIL.
  2. FOOTER SHALL FULLY EXTEND UNDER SLAB PERIMETER.
  3. DESIGN ENGINEER SHALL PROCURE A GEOTECHNICAL CONSULTANT TO PROPERLY DESIGN THE SUB BASE FOR THE WET WELL AND BUILDING BASED ON THE SOIL ANALYSIS REPORT. THE REPORT SHALL BE FURNISHED TO PORTAGE COUNTY WATER RESOURCES FOR REVIEW.



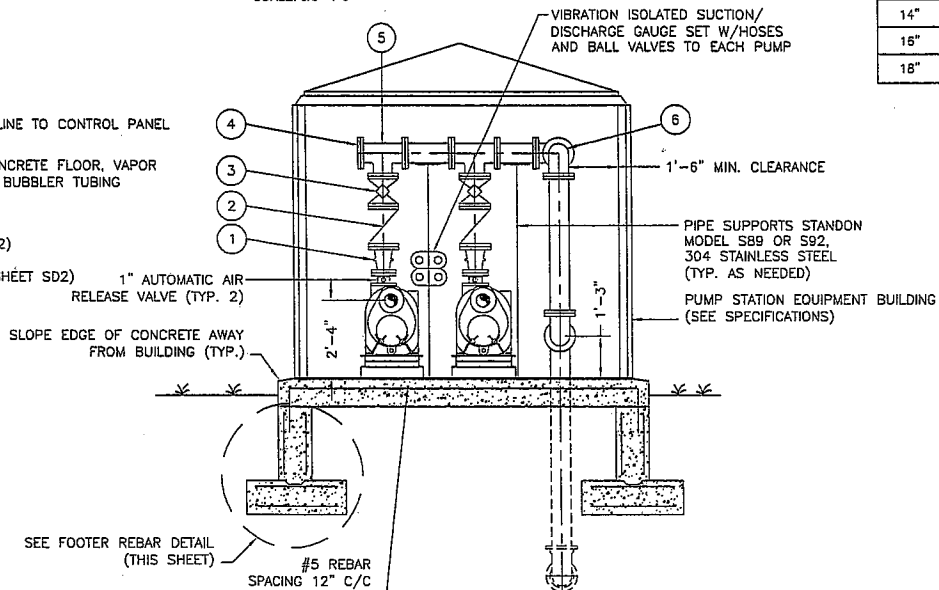
TOP VIEW

- 4" THICK CONCRETE PAD  
SIZED PER PANEL SPECS.
- (A) HD FUSED DISCONNECT FOR SERVICE ENTRANCE (POLE MOUNT OUTSIDE BY METER)  
(B) ATS FOR EMERGENCY GENERATOR  
(C) HD FUSED DISCONNECT FOR TRANSFORMER  
(D) TRANSFORMER  
(E) LOAD CENTER (PREMOUNTED IN BUILDING)  
(F) SCADA  
(G) SOFT STARTERS/VARIABLE FREQUENCY DRIVES (VFD) - SEE SPECS.



ELECTRICAL PANEL DETAIL

SCALE: 3/8"=1'-0"



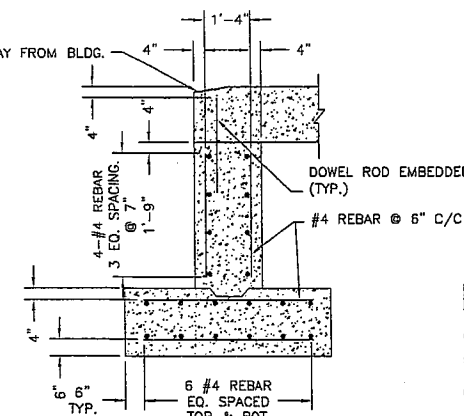
SECTION B-B

LEVEL CONTROL ELEVATIONS:			
PRIMARY BUBBLER		SECONDARY (FLOATS)	
LOW LEVEL ALARM/ALL PUMPS OFF	----	LOW LEVEL ALARM/ALL PUMPS OFF	----
PUMPS OFF	----	PUMPS OFF	----
PUMP NO. 1 ON	----	PUMP NO. 1 ON	----
HIGH LEVEL ALARM	----	HIGH LEVEL ALARM	----
PUMP NO. 2 ON	----	PUMPS NO. 2 ON	----

(LEVEL CONTROL SYSTEMS TO BE ON SEPARATE CIRCUITS)

FORCE MAIN PIPE SCHEDULE			
PIPE:	MATERIAL:	JOINT:	BEDDING:
PVC C-900	AWWA C-900	ASTM D3139	ASTM D2321
DIP	ANSI/AWWA C151/A21.51	ANSI/AWWA C111/A21.11	ASTM C12

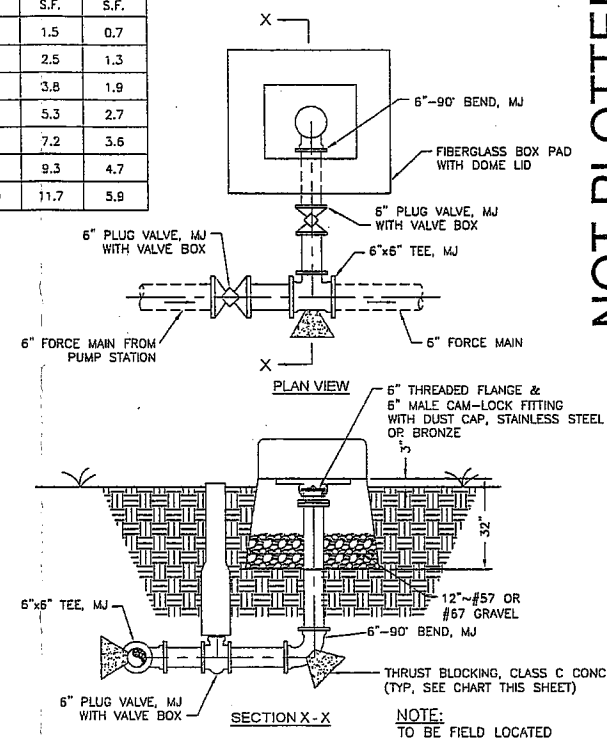
THRUST BLOCK DETAILS					
BEARING AREA (S.F.) REQUIRED FOR 200 PSI WATER PRESSURE BASED ON 2000 PSF SOIL					
NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22½° BEND	11½° BEND
(IN.)	S.F.	S.F.	S.F.	S.F.	S.F.
6"	3.7	5.3	2.9	1.5	0.7
8"	6.4	9.1	4.9	2.5	1.3
10"	9.7	13.7	7.4	3.8	1.9
12"	13.7	19.4	10.5	5.3	2.7
14"	18.4	26.0	14.1	7.2	3.6
16"	23.8	33.6	18.2	9.3	4.7
18"	29.9	42.2	22.9	11.7	5.9



FOOTER NOTE:  
CONTINUOUS FOOTER SHALL REST ON LOW STRENGTH MORTAR WHERE SOIL HAS BEEN PREVIOUSLY REMOVED.

FOOTER REBAR DETAIL

SCALE: 3/4"=1'-0"

EMERGENCY CONNECTION  
ASSEMBLY DETAIL

SCALE: NTS

(ALL PIPING AND FITTINGS SHALL BE DUCTILE IRON UNLESS OTHERWISE NOTED.)

PIPING SCHEDULE:	
1	6"x4" FLEXIBLE REDUCER ADAPTER, FL (TYP. 2)
2	6" SWING CHECK VALVE OUTSIDE WEIGHT & LEVER, FL (TYP. 2)
3	6" PLUG VALVE, GEAR OPERATED (TYP. 2)
4	6" BLIND FLANGE
5	6"x6" TEE, FL (TYP. 2)
6	6" - 90° BEND, FL (TYP. 5)
7	4" FLEXIBLE ADAPTER (TYP. 2)
8	6"x4" ECCENTRIC REDUCER, FL (TYP. 2)
9	6" - 90° BEND, MJ, RESTRAINED JOINT
10	6" TRANSITION PIECE / COUPLING
11	6" PRESSURE SENSOR AND TRANSMITTER, TIE INTO SCADA VIA 4-20 MA SIGNAL
12	6" ABB MAG METER WITH REMOTE READOUT (* SEE NOTE)

\*NOTE: CONTRACTOR TO PROVIDE SPOOL PIECE SIZED FOR MAG METER REMOVAL

REVISIONS:				
REV. #	DESCRIPTION	DATE	BY	APP.

## PORTAGE COUNTY WATER RESOURCES

PORTAGE COUNTY ADMINISTRATION BUILDING  
449 SOUTH MERIDIAN ST., P.O. BOX 812  
RAVENNA, OHIO 44266  
OFFICE (330) 297-3670 FAX (330) 297-3680

DATE: 10-14-10

DRAWN BY: JGE

APPROVED BY: JSL

SCALE:

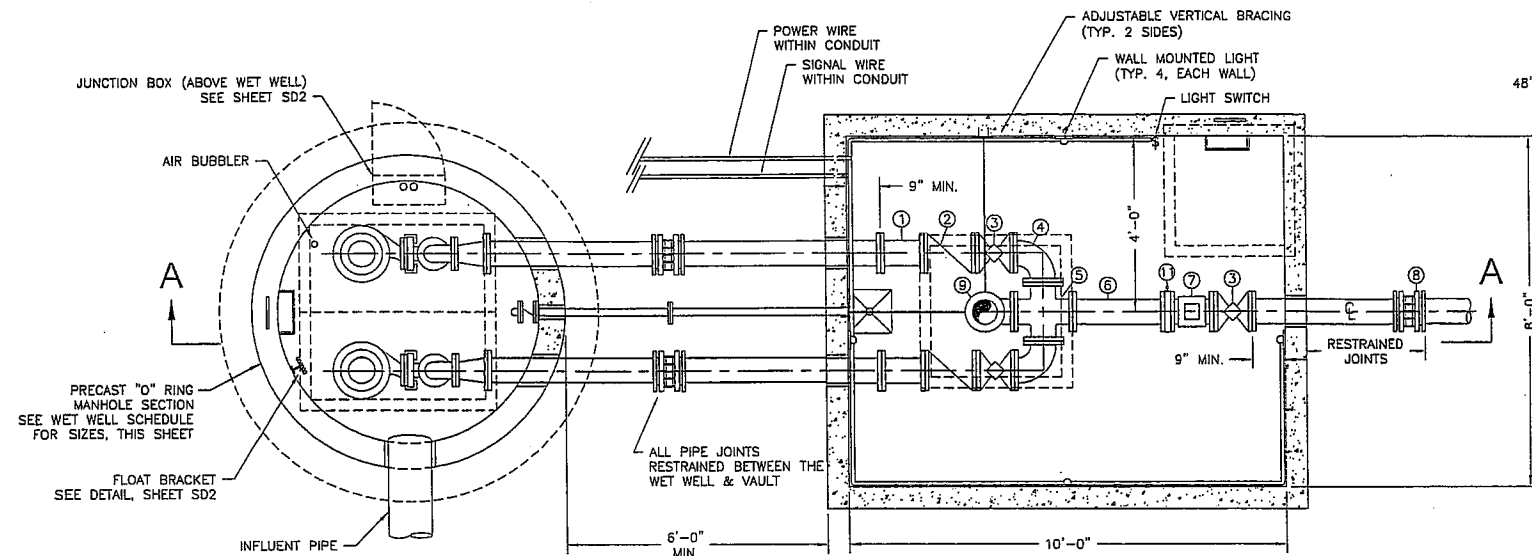
HORZ. NTS

VERT. NA

973 STANDARD SUCTION LIFT PUMP STATION  
PLAN & SECTIONSPROJECT NAME  
PROJECT ##973  
PSDM

NOT PLOTTED TO SCALE

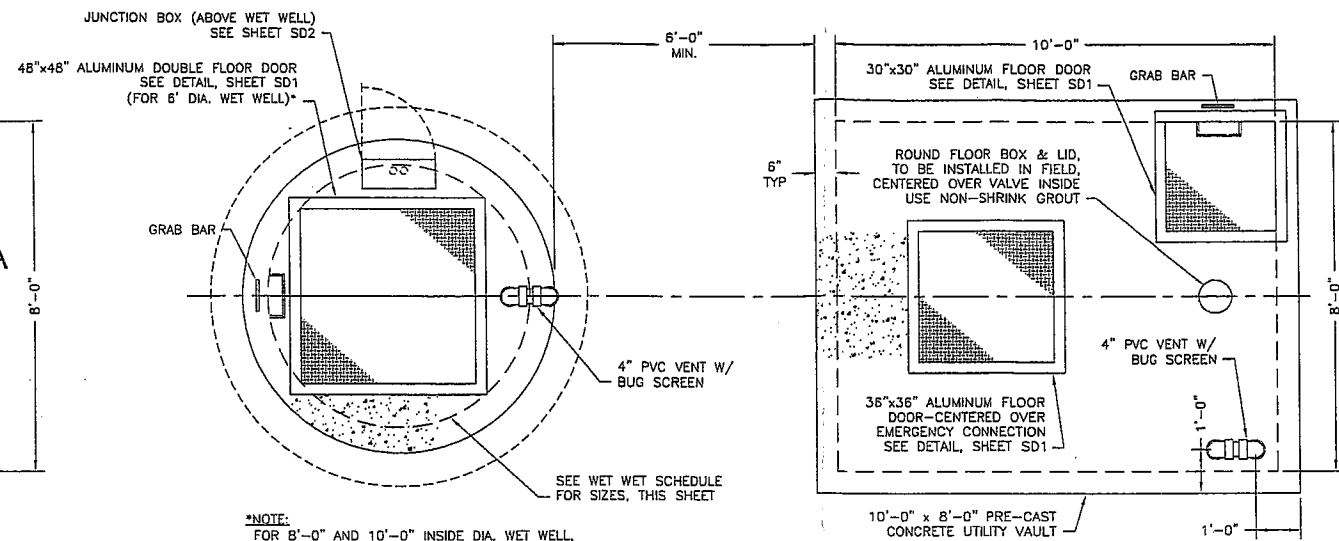
UNACADATVSTA 1974 PS SUBMERSIBLE.DWG, 11/1/2010 3:3608 PM, SHARP AR-NISSON PCL6.T1



SECTIONAL PLAN

SCALE: 1/2"=1'-0"

- ELECTRICAL NOTE:
1. ALL ELECTRICAL CONDUIT TERMINATIONS SHALL BE SEALED WITH WATER-TIGHT PUTTY.
  2. ALL CONDUIT SHALL BE SIZED PER REQUIRED EQUIPMENT WIRE SIZE, (POWER AND SIGNAL WIRES) 1 INCH MINIMUM AND SCH. 80 PVC.
  3. ALL INTERIOR CONDUIT, WALL FIXTURES, JUNCTION BOXES AND SWITCHES SHALL BE CLASS 1, DIVISION 2 EXPLOSION PROOF.
  4. WALL LIGHT FIXTURE SHALL BE COOPER #VXHT25GP OR ENGINEER APPROVED EQUAL.
  5. CONDUIT WITH CONDUCTORS SHALL HAVE DRIP LOOPS FORMED ON THEM AND ALL WORK MUST CONFORM TO THE NATIONAL ELECTRIC CODE.



PLAN VIEW

SCALE: 1/2"=1'-0"

NOT PLOTTED TO SCALE

FORCE MAIN PIPE SCHEDULE			
PIPE:	MATERIAL:	JOINT:	BEDDING:
PVC C-900	AWWA C-900	ASTM D3139	ASTM D2321
DIP	ANSI/AWWA C151/A21.51	ANSI/AWWA C111/A21.11	ASTM C12

(ALL PIPING AND FITTINGS SHALL BE DUCTILE IRON UNLESS OTHERWISE NOTED).

PIPING SCHEDULE FOR VALVE VAULT:	
1	6" SPOOL PIECE, 12" LONG
2	6" CHECK VALVE WITH WEIGHTED ARM (TYP. 3)
3	6" PLUG VALVE GEAR OPERATED (TYP. 4)
4	6" 90° BEND
5	6"x6" CROSS
6	SPOOL PIECE (LENGTH AS REQUIRED)
7	6" ABB MAG METER WITH REMOTE READOUT (* SEE NOTE)
8	TRANSITION PIECE / COUPLING RESTRAINED JOINT
9	6" EMERGENCY CONNECTION PIPING (LENGTH AS REQUIRED) SINGLE CONTINUOUS PIECE
10	6" MALE CAMLOCK FITTING WITH DUST CAP FOR EMERGENCY CONNECTION, STAINLESS STEEL OR BRONZE
11	6" PRESSURE SENSOR AND TRANSMITTER, TIE INTO SCADA VIA 4-20 MA SIGNAL

\*NOTE: CONTRACTOR TO PROVIDE SPOOL PIECE SIZED FOR MAG METER REMOVAL

LEVEL CONTROL ELEVATIONS			
PRIMARY BUBBLER		SECONDARY (FLOATS)	
LOW LEVEL ALARM/ALL PUMPS OFF	----	LOW LEVEL ALARM/ALL PUMPS OFF	----
PUMPS OFF	----	PUMPS OFF	----
PUMP NO. 1 ON	----	PUMP NO. 1 ON	----
HIGH LEVEL ALARM	----	HIGH LEVEL ALARM	----
PUMP NO. 2 ON	----	PUMPS NO. 2 ON	----

(LEVEL CONTROL SYSTEMS TO BE ON SEPARATE CIRCUITS)

WET WELL SCHEDULE	
INSIDE DIAMETER (D)	MIN. WALL THICKNESS (T)
6'-0"	7"
8'-0"	8"
10'-0"	11"

NOTE:

1. VAULT SHALL BE PLACED ON UNDISTURBED SOIL.

2. DESIGN ENGINEER SHALL PROCURE A GEOTECHNICAL CONSULTANT TO PROPERLY DESIGN THE SUBBASE FOR THE WET WELL AND VALVE VAULT BASED ON THE SOIL ANALYSIS REPORT. THE REPORT SHALL BE FURNISHED TO PCWR FOR REVIEW.

VALVE VAULT SECTION VIEW A-A

SCALE: 1/2"=1'-0"

REVISIONS				
REV. #	DESCRIPTION	DATE	BY	APP.

PORTAGE COUNTY WATER RESOURCES  
PORTAGE COUNTY ADMINISTRATION BUILDING  
449 SOUTH MERIDIAN ST., P.O. BOX 812  
RAVENNA, OHIO 44266  
OFFICE (330) 297-3670 FAX (330) 297-3580

DATE: 10-14-10

DRAWN BY: JGE

APPROVED BY: JSL

SCALE:

HORZ. NTS

VERT. NA

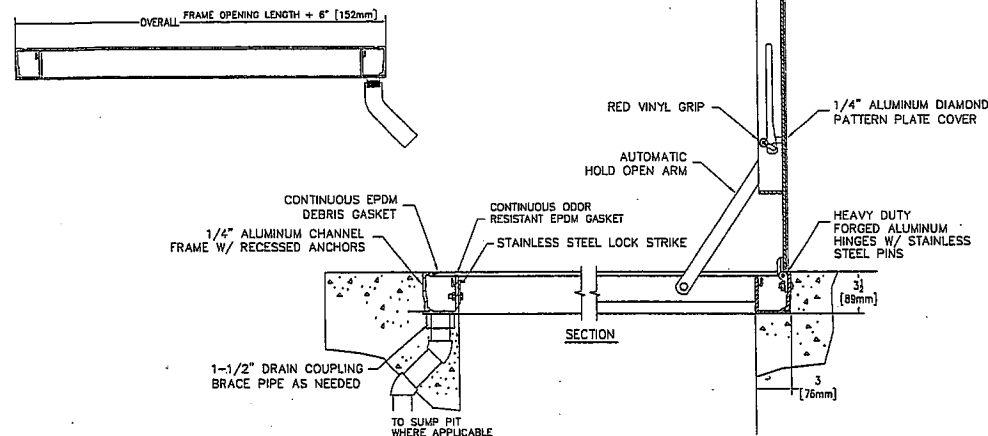
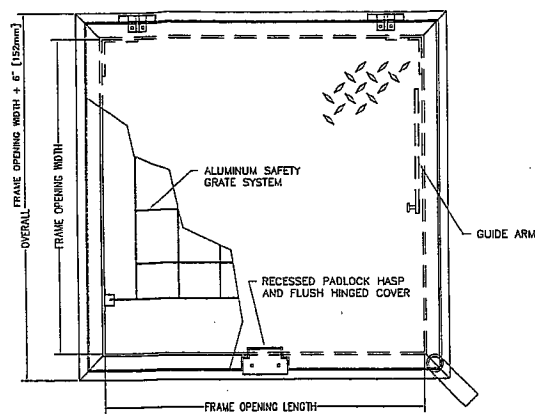
974 STANDARD SUBMERSIBLE  
PUMP STATION PLAN AND SECTIONS

PROJECT NAME  
PROJECT ##

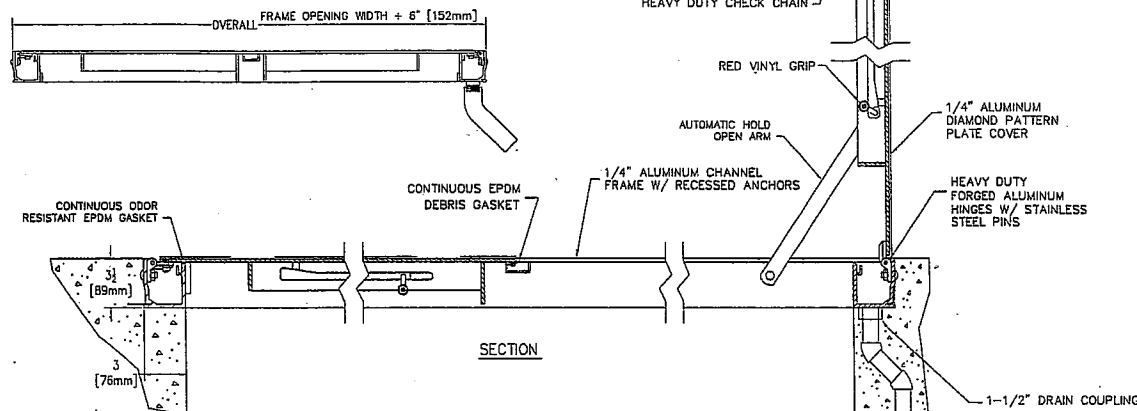
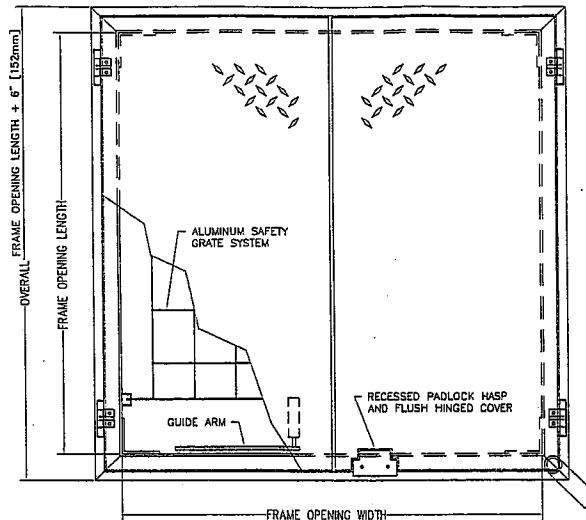
974

PSDM

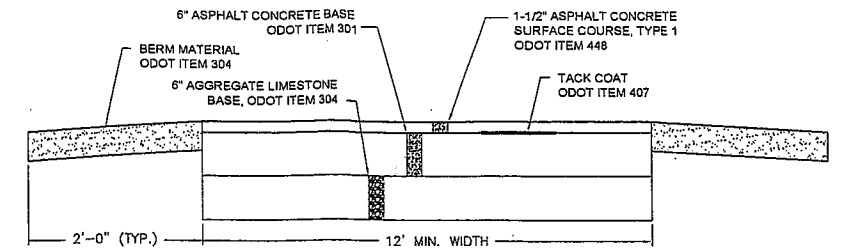




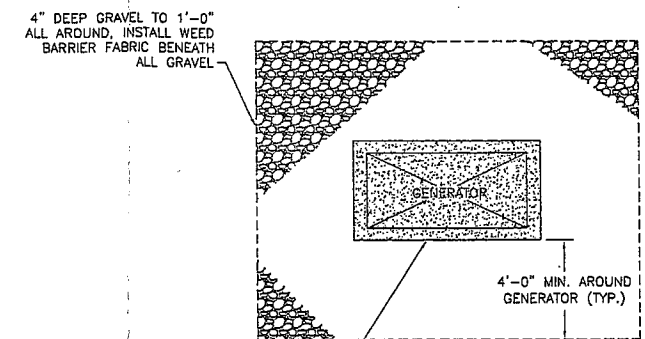
**SINGLE FLOOR DOOR DETAIL**  
SCALE: NTS



**DOUBLE FLOOR DOOR DETAIL**  
SCALE: NTS

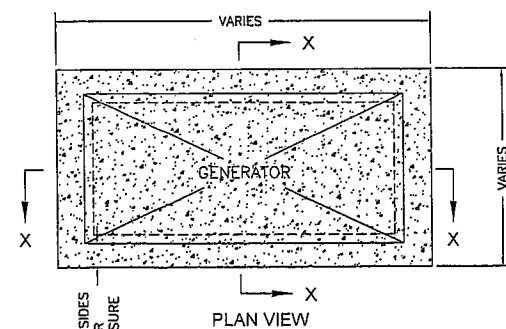


NOTE:  
PREPARE SUBGRADE IN ACCORDANCE WITH ODOT 204  
**DRIVEWAY PLACEMENT DETAIL**  
SCALE: NTS

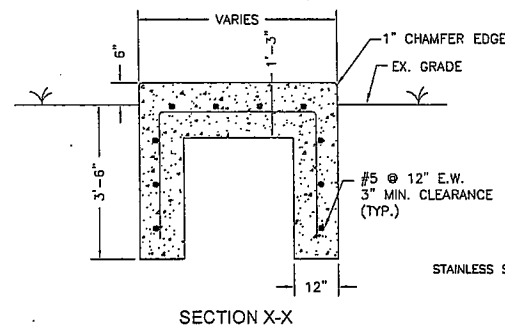


**BACKUP GENERATOR SITE DETAIL**  
SCALE: 1/4" = 1'-0"

**NOT PLOTTED TO SCALE**

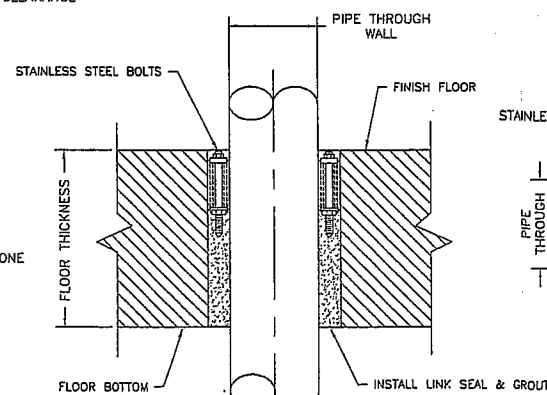


**CONCRETE DETAIL**  
SCALE: 1/2" = 1'-0"

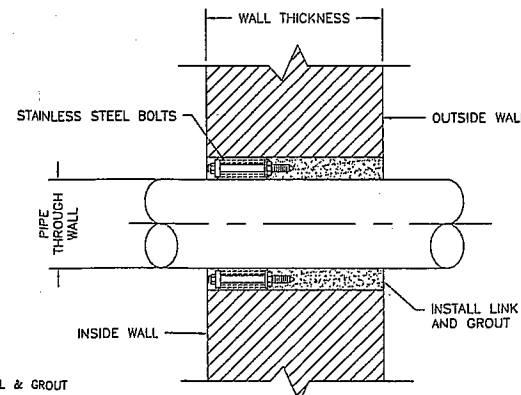


**CONCRETE NOTES:**

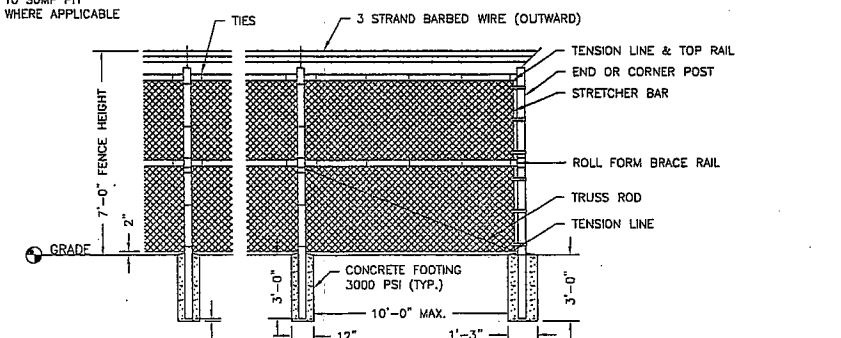
1. CONCRETE PAD MEASUREMENTS TO BE FIELD VERIFIED AND SIZE BASED ON GENERATOR.
2. CONCRETE PAD AND FOUNDATION CONSTRUCTION SHALL BE MONOLITHIC.
3. REINFORCEMENT REBAR SHALL BE HELD IN PLACE WITH WIRE TIES AND CHAIR SUPPORTS, OTHER MATERIALS AND STONE SUPPORT ARE PROHIBITED.



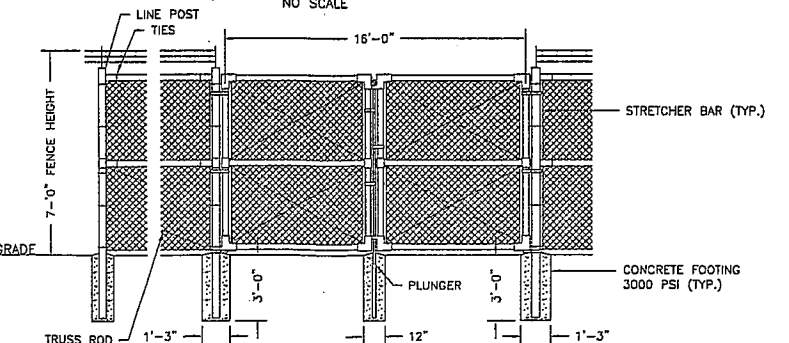
**LINK SEAL FLOOR DETAIL**  
SCALE: NTS



**LINK SEAL WALL DETAIL**  
SCALE: NTS



**TYPICAL FENCE**  
NO SCALE  
NOTE: FOLLOW ODOT ITEM 607 FENCE TYPE CL HEIGHT IS AS NOTED ON DETAILS.



**TYPICAL GATE**  
NO SCALE  
**CHAIN LINK FENCE DETAILS**

REV. #	DESCRIPTION	DATE	BY	APPD.

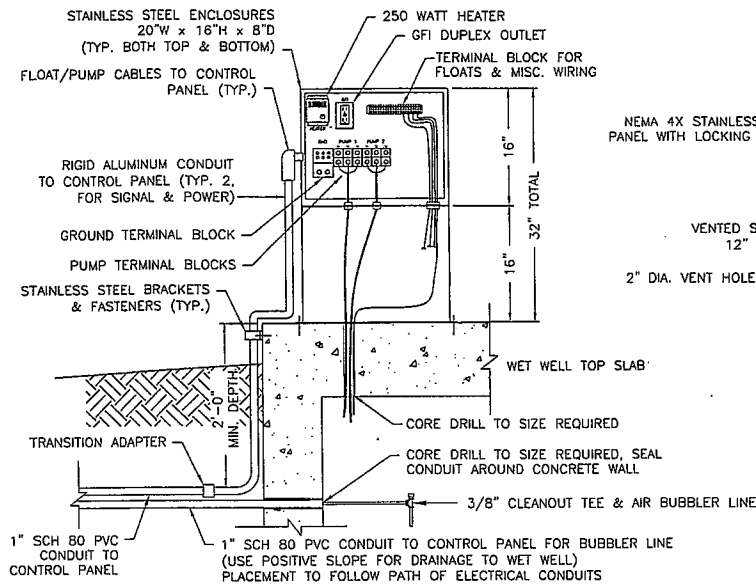
**PORTAGE COUNTY WATER RESOURCES**  
PORTAGE COUNTY ADMINISTRATION BUILDING  
449 SOUTH MERIDIAN ST., P.O. BOX 812  
RAVENNA, OHIO 44266  
OFFICE (330) 297-3670 FAX (330) 297-3680

DATE: 10-14-10  
DRAWN BY: JGE  
APPROVED BY: JSL

SCALE:  
HORZ. NTS  
VERT. NA

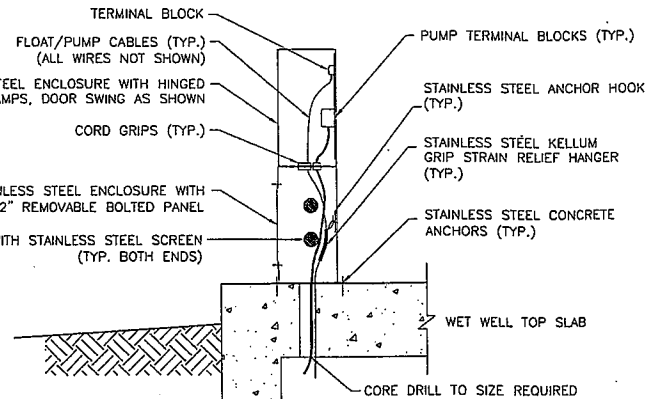
STANDARD  
PUMP STATION DETAILS  
PROJECT NAME  
PROJECT ##

SD1  
PSDM

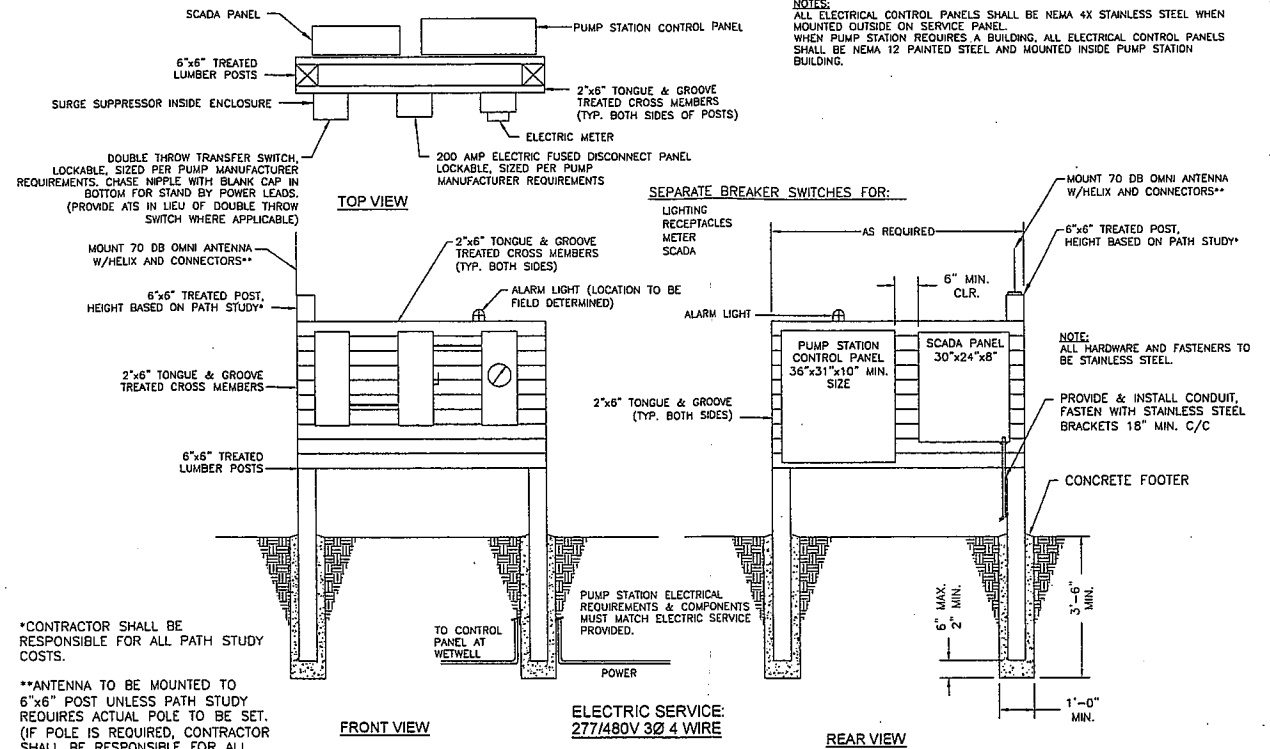


FRONT SECTION VIEW

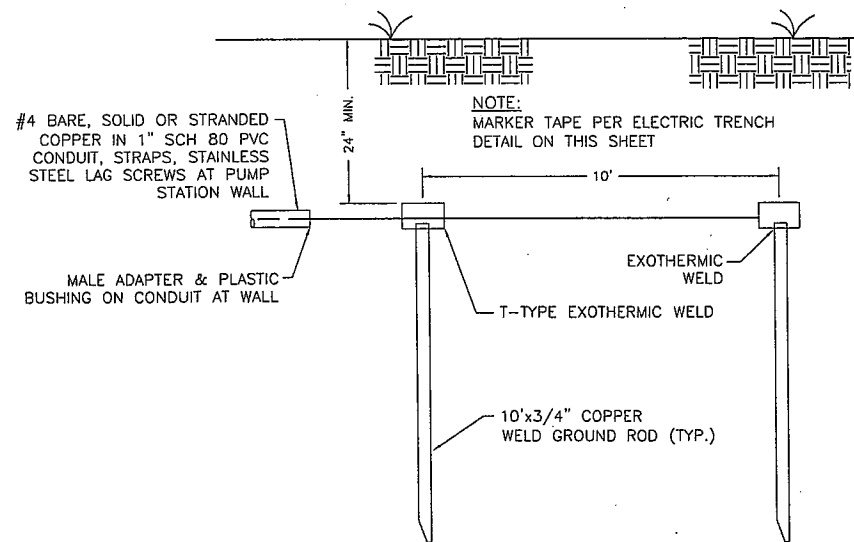
JUNCTION BOX DETAIL  
SCALE: 1" = 1'-0"



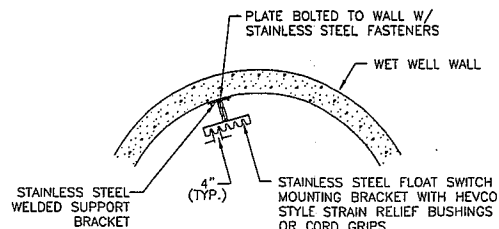
SIDE SECTION VIEW



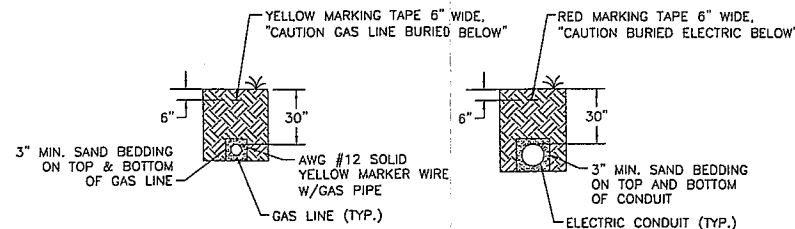
NOT PLOTTED TO SCALE



GROUNDING ROD SECTION VIEW DETAIL  
SCALE: NTS

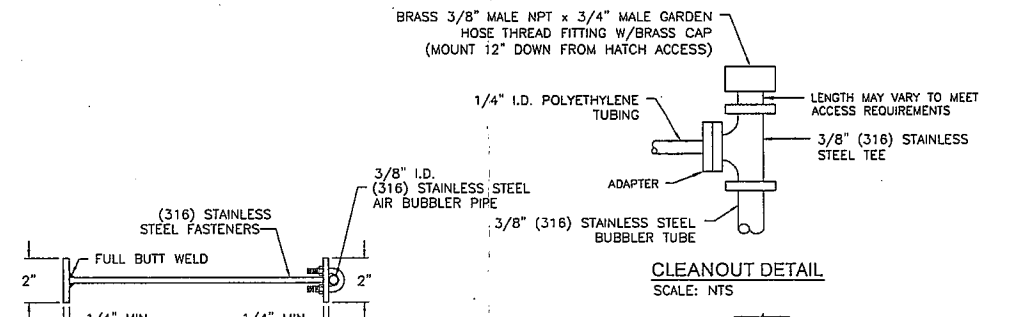


FLOAT SUPPORT BRACKET DETAIL  
SCALE: NTS

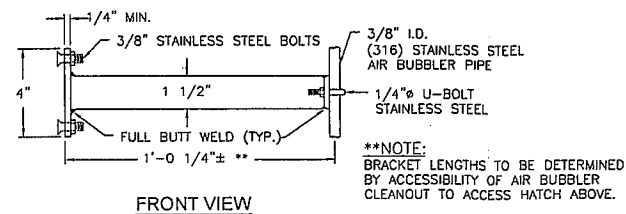


GAS TRENCH DETAIL  
SCALE: NTS

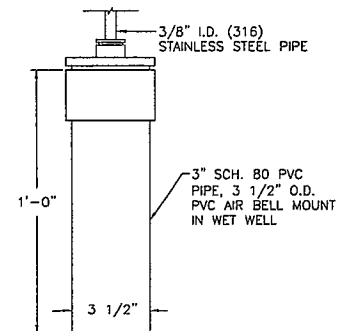
ELECTRIC TRENCH DETAIL  
SCALE: NTS



CLEANOUT DETAIL  
SCALE: NTS



AIR BUBBLER & FASTENER DETAILS  
SCALE: 3"=1'-0"



AIR BELL  
SCALE: 3"=1'-0"

REVISIONS				
REV.	DESCRIPTION	DATE	BY	APPD.

PORTAGE COUNTY WATER RESOURCES  
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OFFICE (330) 297-3670 FAX (330) 297-3680

DATE: 10-14-10  
DRAWN BY: JGE  
APPROVED BY: JSL

SCALE:  
HORZ. NTS  
VERT. NA

STANDARD  
PUMP STATION DETAILS  
PROJECT NAME  
PROJECT #

SD2  
PSDM