6. Policy Documents

6.1 Temporary Grinder Pump Stations

Effective Date: January 25, 2019

Policy Document 19-01: Use of Grinder Pumps in Public Utility Infrastructure

Sanitary Sewer Grinder Pumps that are intended as Public Utility Infrastructure may be used in place of the pump station detail found in the 2018 Spotsylvania County Design and Construction Standards manual if the following requirements are met:

- The sanitary sewer grinder pump station is designed in accordance with the approved Spotsylvania County grinder pump station detail dated January 2019.
- Grinder pumps may only be installed to temporarily serve an area. The developer must demonstrate that gravity sanitary sewer can replace the Grinder Pump station within a reasonable future timeline, to be determined by Spotsylvania County. Minimum of 20' easements shall be granted for the future construction of gravity sewer from the pump station site. Minimum of 20' easements shall be granted for force main discharge pipe.
- Grinder pump stations shall only be used for residential applications. The number of residential lots permitted for a grinder pump station is limited to 15 or less in order to provide adequate storage and an increased allowable response time in the event of grinder pump station failure.

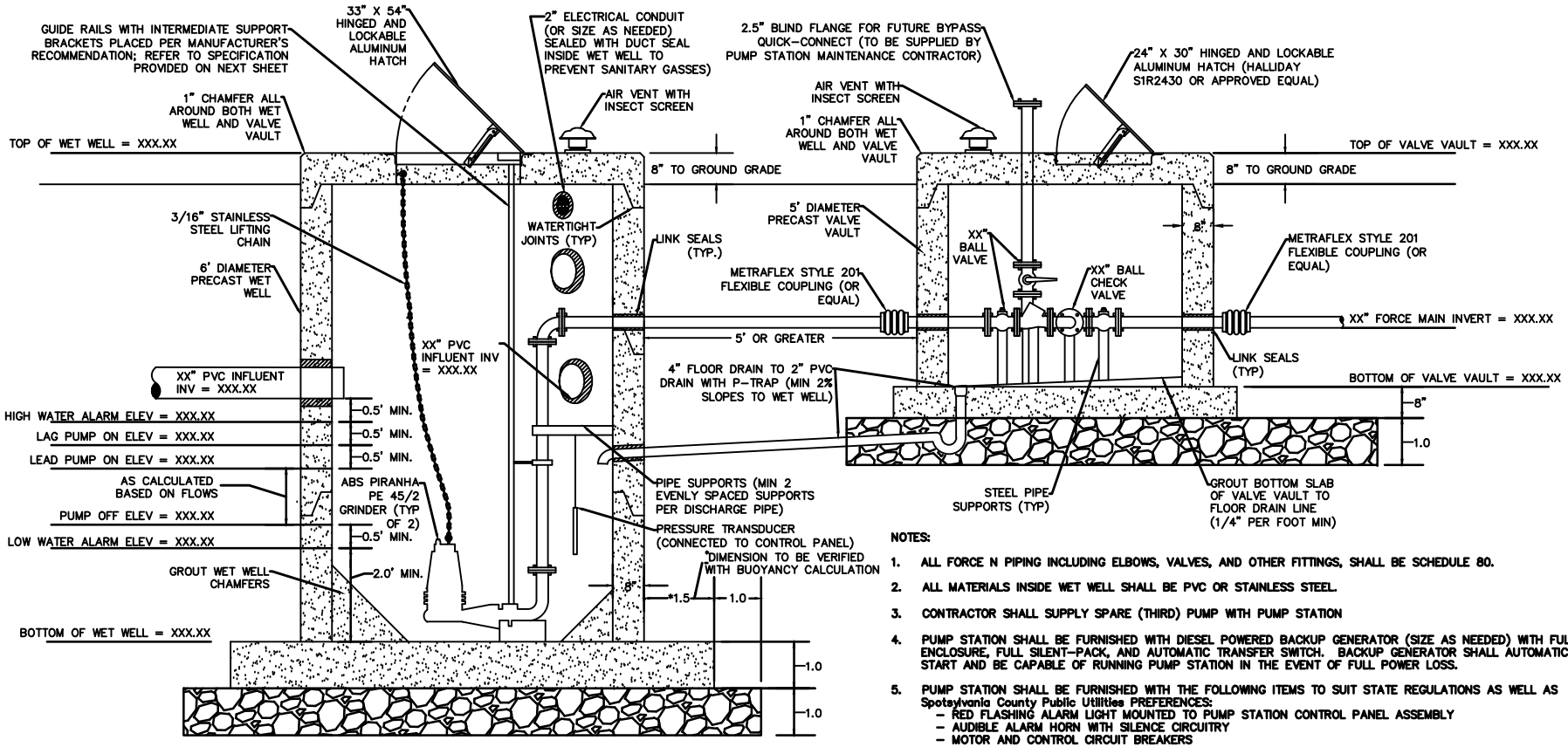
Details and specification can be found on pages PD 19-01 Sheets 1-9.

X Benjamin Loveday

Benjamin L. Loveday, P.E.
Director UT/PW

1/25/2019

Date



SANITARY SEWER PUMP STATION
WET WELL AND VALVE VAULT PROFILE

NOTES:

1. ALL FORCE N PIPING INCLUDING ELBOWS, VALVES, AND OTHER FITTINGS, SHALL BE SCHEDULE 80.
2. ALL MATERIALS INSIDE WET WELL SHALL BE PVC OR STAINLESS STEEL.
3. CONTRACTOR SHALL SUPPLY SPARE (THIRD) PUMP WITH PUMP STATION
4. PUMP STATION SHALL BE FURNISHED WITH DIESEL POWERED BACKUP GENERATOR (SIZE AS NEEDED) WITH FULL ENCLOSURE, FULL SILENT-PACK, AND AUTOMATIC TRANSFER SWITCH. BACKUP GENERATOR SHALL AUTOMATICALLY START AND BE CAPABLE OF RUNNING PUMP STATION IN THE EVENT OF FULL POWER LOSS.
5. PUMP STATION SHALL BE FURNISHED WITH THE FOLLOWING ITEMS TO SUIT STATE REGULATIONS AS WELL AS Spotsylvania County Public Utilities PREFERENCES:
   - RED FLASHING ALARM LIGHT MOUNTED TO PUMP STATION CONTROL PANEL ASSEMBLY
   - AUDIBLE ALARM HORN WITH SILENCE CIRCUITRY
   - MOTOR AND CONTROL CIRCUIT BREAKERS
   - IEC RATED STARTERS WITH ADJUSTABLE OVERLOADS
   - HIGH LEVEL INDICATORS
   - DUPLEX PUMP CONTROLS WITH ALTERNATING PUMP START
   - INCOMING POWER BLOCKS
   - (2) NORMALLY OPEN FLOAT SWITCHES FOR BACKUP TO PRESSURE TRANSDUCER
   - PRESSURE TRANSDUCER (1 OWC - 50 FT OF CABLE)
   - SPARTAN CONTROLLER
   - HOA AND ON-OFF-TEST OPERATORS
   - RELAYS AS REQUIRED
   - TIME DELAY BACK-UP FLOAT CIRCUITRY
   - CONTROL RESET AND ALARM SILENCE PUSH BUTTONS
   - PUMP RUN, PUMP FAIL, SEAL FAIL, AND FLOAT CONTROL INDICATORS
6. PUMPS SHALL BE 230 V, 3-PHASE, 60 HZ
7. PUMPS SHALL BE SUPPLIED WITH
   - 30 FEET OF CORD, CAPACITOR KITS (IN CONTROL PANEL)
   - AUTO COUPLERS (3" X 4" BASE ELBOW)
   - UPPER GUIDE RAIL BRACKETS
   - INTERMEDIATE GUIDE RAIL BRACKETS (2 PER PUMP)
   - LIFTING HANDLES
   - GO SWITCH RELAYS (IN CONTROL PANEL)
8. PENETRATIONS SUCH AS THOSE NEEDED FOR PUMP CABLES, TRANSDUCER CABLES, AND OTHER NECESSARY COMPONENTS, ARE NOT SHOWN ON THIS PLAN AND ARE INTENDED TO BE INSTALLED TO SUIT FIELD CONDITIONS.

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DATE
JANUARY 2019
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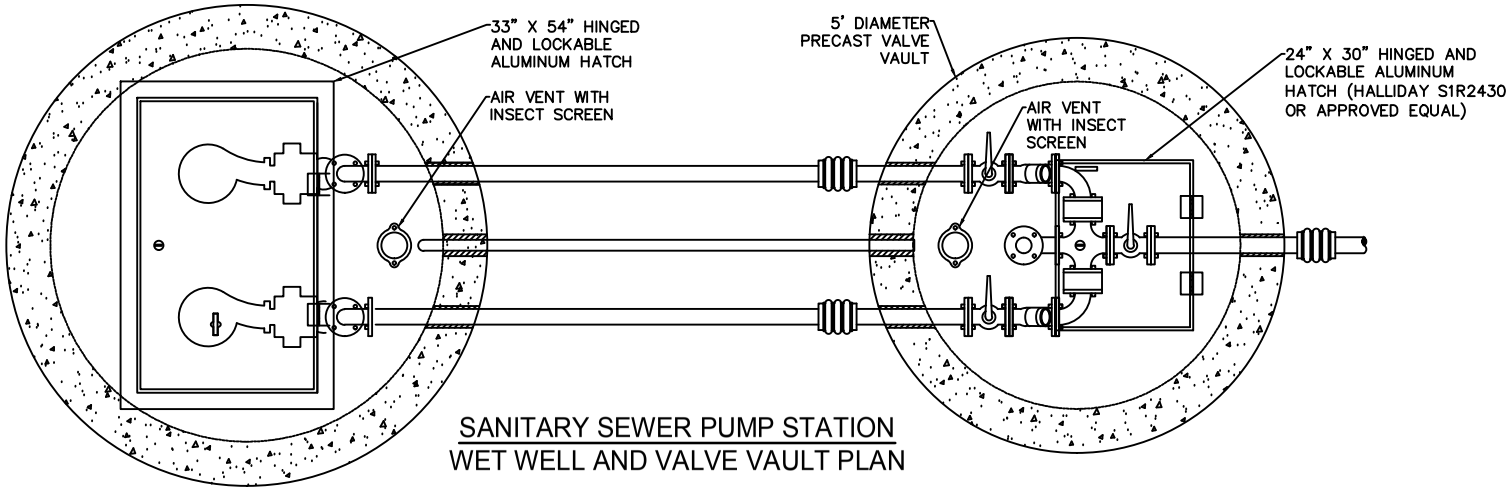
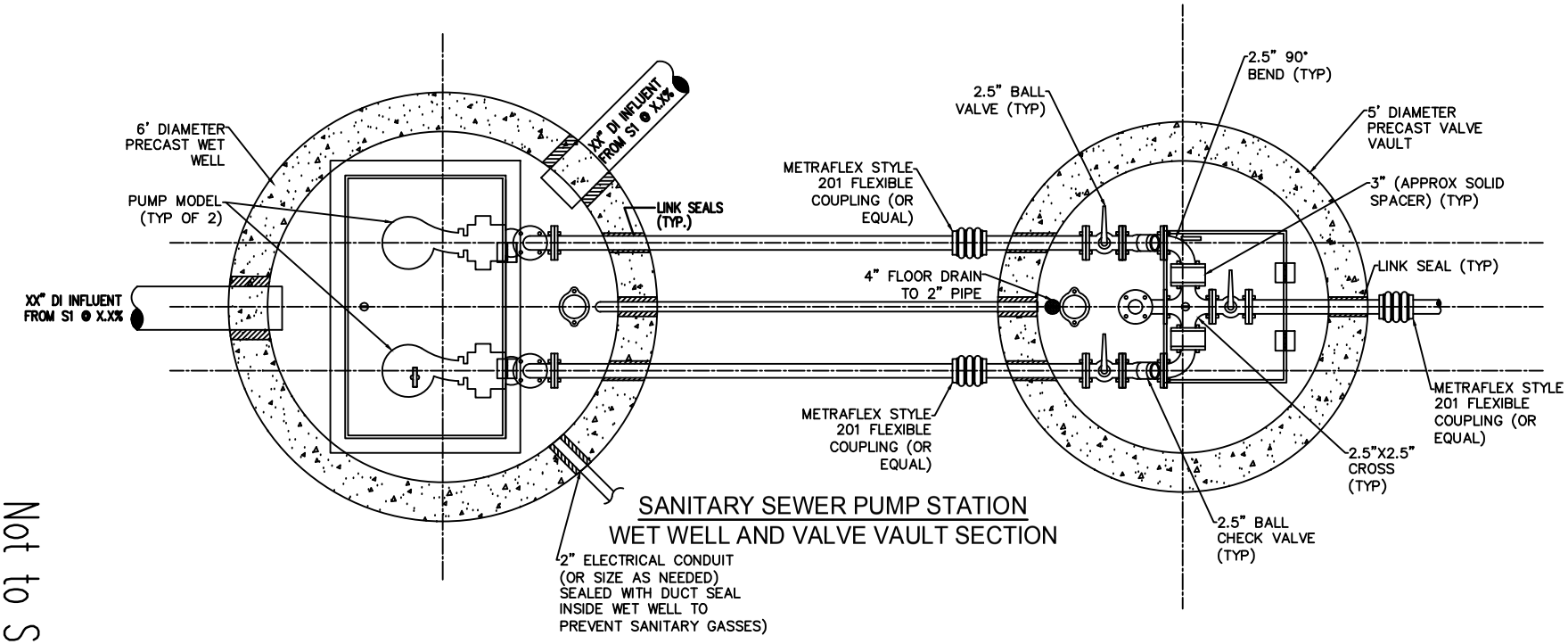
Spotsylvania County
Department of Utilities

Temporary Grinder Pump Station
PD 19-01

SHEET NO.
1 of 9



SANITARY SEWER PUMP STATION
WET WELL AND VALVE VAULT PLAN



SANITARY SEWER PUMP STATION
WET WELL AND VALVE VAULT SECTION

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DATE	REVISIONS
JANUARY 2019	

Spotsylvania County
Department of Utilities

Temporary Grinder Pump Station
PD 19-01

SHEET NO.
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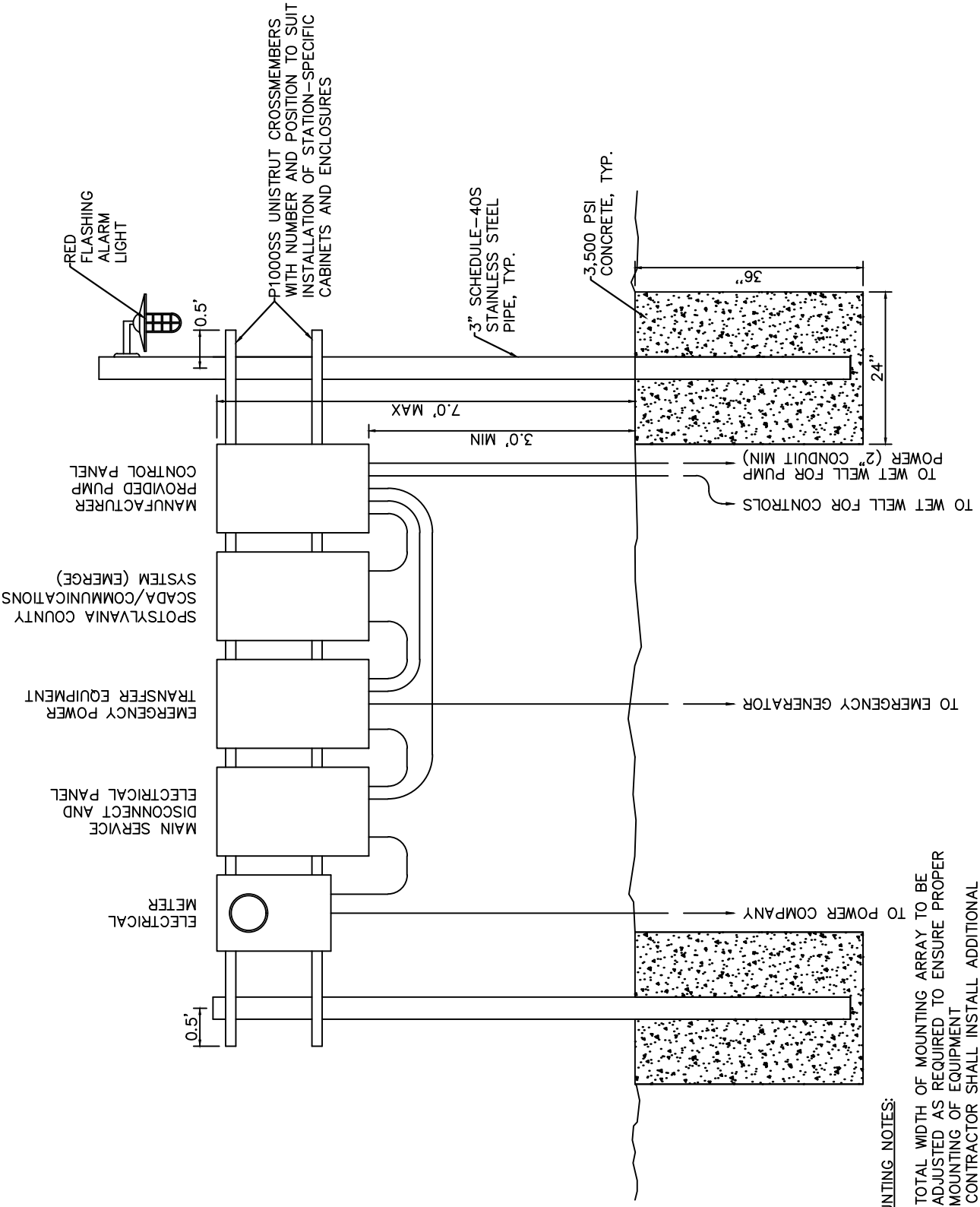

MOUNTING NOTES:

1. TOTAL WIDTH OF MOUNTING ARRAY TO BE ADJUSTED AS REQUIRED TO ENSURE PROPER MOUNTING OF EQUIPMENT
2. CONTRACTOR SHALL INSTALL ADDITIONAL STAINLESS STEEL PIPE SUPPORT IF SPAN EXCEEDS 6 FEET

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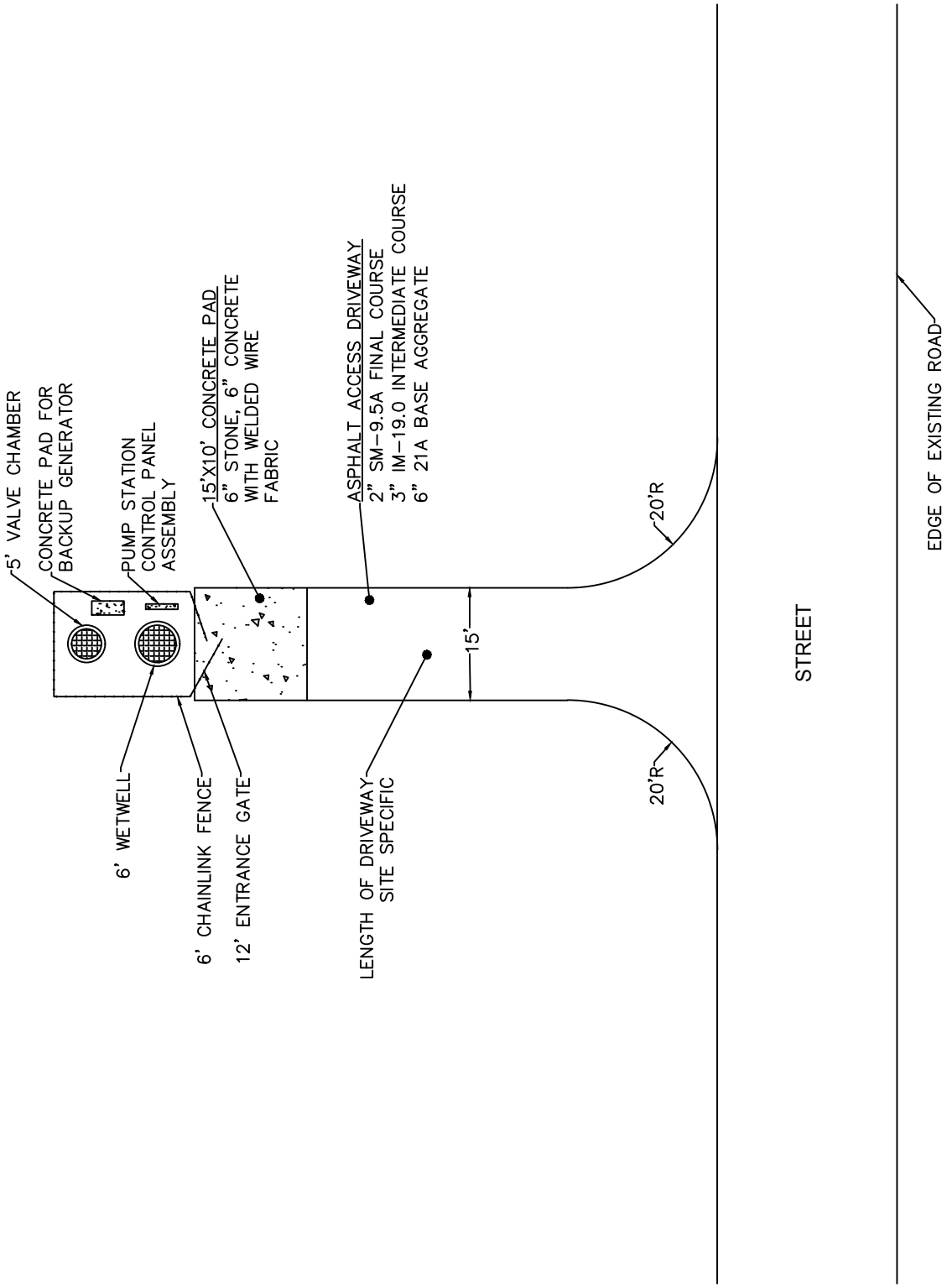
DATE JANUARY 2019	Spotsylvania County Department of Utilities	Temporary Grinder Pump Station– Control Panel PD 19–01	SHEET NO. 3 of 9
REVISIONS			



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DATE JANUARY 2019	Spotsylvania County Department of Utilities	Temporary Grinder Pump Station– Site Layout PD 19–01	SHEET NO. 4 of 9
REVISIONS			

GENERAL NOTES

1. All construction shall be in accordance with the Commonwealth of Virginia Sewerage Regulations. These standards and specifications are incorporated as part of these documents by reference.
2. The contractor shall obtain all required licenses, permits, and approvals from appropriate authorities before any construction begins. The construction shall comply with all pertinent federal, state, and local codes and regulations.
3. Installation of all equipment shall be accomplished in accordance with contract documents and the equipment manufacturer's recommendations. Equipment must be properly aligned and anchored to prevent movement or undue stress on associated components or adjacent equipment.
4. The contractor shall verify that the openings called for on the contract drawings are of the correct dimensions to facilitate the installation of the equipment to be provided.
5. The final completion of the work shall satisfy the final inspection conducted by Spotsylvania County Public Utilities.
6. The contractor shall provide a one year full warranty (except for those items where longer warranties are provided by the manufacturer) for the completed facility and components, with the one year beginning upon the introduction of sanitary sewer flow into the pump station.

SUBMITTALS

1. The contractor shall submit six copies of all submittals to Spotsylvania County Public Utilities for approval. The submittal shall at least include:
    a. Manufacturer's certificate of compliance certifying compliance with the referenced specifications and standards
    b. Shop drawings with performance data and physical characteristics
    c. Manufacturer's installation instructions
    d. Manufacturer's operation and maintenance material and manuals
    e. Certified copies of test reports
2. Work shall not be performed or materials ordered prior to review and approval of the submittals

INTERIOR PIPING AND VALVES

1. All pump station piping shall be at least Schedule 80 PVC pipe with flanged joint fittings.
2. All materials used in the station shall be rated for not less than 125 psig working pressure.
3. All gate and check valves installed in the valve vault shall be arranged for easy access to the equipment to facilitate maintenance.
4. Provide adequate pipe support and thrust restraint with base elbows, base pads or hangers as required.
5. Pressure and leakage tests shall be performed on the piping and the results recorded, with test results provided to the Spotsylvania County Public Utilities at the final inspection.

ALARM AND TELEMETRY

1. Pump station shall be equipped with a communications/telemetry system as specified by, and compatible with, Spotsylvania County Public Utilities at the time of plan review.
2. The following conditions shall be monitored by the alarm system:
    a. High wet well level
    b. Low wet well level
    c. Loss of primary commercial power
    d. Auxiliary power (when generator is running) from auxiliary contact on transfer switch
    e. Auxiliary power fail (when generator is running and fails during period of operation). Shall receive the generator fault regardless of operational status. Shall annunciate when any generator fault condition occurs.
    f. Each pump failure to discharge. Shall function as a general fault for each pump if any pump fault condition occurs (discharge fail, motor overload, etc..). General fault signal shall be provided for any one of the multiple failure points monitored on each pump by the individual starter control panel.
3. The unit must transmit the alarm signal to Spotsylvania County Public Utilities in a manner compatible with the receiving equipment.
4. Contractor must provide SCADA/communications system compatible with county system at the time of station approval.
5. An acceptable surge protection device shall be provided on the electrical and telephone circuits to the alarm system.
6. Provide an aerial alarm light with horn. The red strobe light or constant light output (red) shall be mounted on the exterior of the nearby maintenance garage, oriented so it is observable from the main drive aisle in front of the garage. This light will activate in sequence with any of the stated alarm conditions. The horn shall have a "push to silence" feature.

PUMPS AND CONTROL

1. The contractor shall furnish three submersible grinder-style wastewater pumps as approved by Spotsylvania County Public Utilities. Two of the pumps shall be installed, and the third made available to Spotsylvania County Public Utilities in new condition, to be placed in a covered location of Spotsylvania County Public Utilities' choosing at the time of final inspection.
2. Each pump shall be fitted with a stainless steel lifting chain or cable with a working load not less than 50% greater than the weight of the complete pump assembly being lifted as installed in the wet well.
3. The pumps shall be automatically and firmly connected to the discharge connections, guided by the manufacturer's recommended stainless steel guide bar extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet well. Sealing of the pumping unit to the discharge connection shall be accompanied by a machined metal to metal watertight connection. No portion of the pump shall bear directly on the pump floor.
4. The pumps shall be tested at the manufacturer's plant before shipment in accordance with Hydraulic Institute standards. Certified copies of the test curves shall be submitted to Spotsylvania County Public Utilities at the time of final inspection.
5. The pump shall be equipped with an automatic feature that will provide a mixing action within the sump at the start up of the pumping cycle. This action shall not require any external power source or control to operate.
6. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern all metal surface coming into contact with the pumpage, other than stainless steel or brass, shall be protected with a factory applied spray coating of high-build polyamide epoxy suitable for wastewater service on the exterior of the pump.
7. The pump supplier shall furnish a service representative to supervise and inspect the installation and initial operation of the pumps.
8. A control system shall be supplied by the pump manufacturer containing all the mechanical and electrical equipment necessary to provide for the operation of the submersible pumps as depicted on these drawings.
9. The control panel enclosure shall be fully weatherproof, with the door gasketed with a rubber composition material around the perimeter and installed with a retainer to assure a positive weatherproof seal.
10. The pump control shall provide, at a minimum, the following functions:
    a. An LED based front panel/keypad capable of displaying the following information:
        - Pump running
        - Pump in HAND position
        - Pump in OFF position
        - Pump in AUTOMATIC position
        - Pump is available to run
        - Pump fault (automatic reset)
        - Pump lockout (manual reset)
        - Motor overtemp fault
        - Motor seal failure fault
        - Two liquid level alarm indicators
        - Pump alternation active indicator
        - Programming switch condition indicator
        - Miscellaneous programming indicators
        - Current liquid level
    b. Pump alternation capability. The control unit shall have the ability to automatically alternate pump outputs or select a fixed lead-lag pattern according to user requirements. The unit sit shall be capable of setting the pumps to alternate automatically or operate in a fixed lead arrangement.
    c. Level sensing capability. The control unit shall be capable of accepting a level input signal from a pressure transducer assembly in the wet well compatible with the pump control equipment.
    d. Fault monitoring. The control unit display panel shall have features which clearly identify faults and clearly indicate the status of conditions such as lockouts, level alarms, etc. The control unit shall provide the following user configurable fault monitoring capability:
        - Critical faults
        - Non-critical faults
        - Pump seal failure detection
        - Motor overtemp fault
    e. Time delay functions. The control unit shall provide the following time delay function for pump activation and deactivation:
        - Pump start and stop
        - Interpump delays
        - Maximum pump off time
        - Maximum pump on time
    f. Programming features. The control unit shall have the following additional features and functions:
        - Pump start/stop setpoints
        - Pump alternation
        - Fail safe hand override
        - Lead pump lockout
        - Maximum starts per hour
        - Maximum pumps running
    g. Hand/On/Auto control switch for each pump
    h. Loss of power relay for emergency generator start
11. The pump controls, transfer switches, communications equipment, meters, and any other necessary appurtenances shall be installed on "P1000SS" Unistrut channel beams suitable for mounting electrical equipment. Entire Unistrut/control assembly shall be affixed to two 3" Schedule-40S stainless steel posts which are, themselves, embedded not less than 3 feet into the ground, each with post holes not less than 3 feet deep and 2 feet in diameter which are themselves entirely filled with 3,500 psi concrete. All fasteners used in the post/Unistrut assembly shall be stainless steel. The concrete shall be sloped away from the stainless steel posts as to not retain water against the posts. The stainless steel posts shall project not less than 7 feet above finished grade and shall be filled with concrete. All pump controls, transfer switches, communications equipment, meters, and any other necessary appurtenances shall be directly hung on the Unistrut channels and be located not less than 30 inches from the ground.
12. All boxes, enclosures, junctions, and cabinets associated with the pump station (including, but not limited to, pump station controls, switches, equipment, and appurtenances) shall be housed within NEMA 4X enclosure. As appropriate to the project, individual elements may be combined into a single enclosure.

WET WELL AND VALVE VAULT

1. The contractor shall furnish and install a monolithic concrete or precast manhole-type wet well as indicated on these drawings. Pump and related equipment shall be installed and/or mounted as shown. A concrete valve vault shall be furnished and installed to house the valves and appurtenances.
2. The wet well shall be 6' in diameter, constructed in accordance with VDOT regulations regarding wall thickness for size and depth, and coated with an internal coating appropriate to a sanitary sewer wet well.
3. The valve vault shall be 5' in diameter and constructed in accordance with VDOT regulations regarding wall thickness for size and depth.
4. The utility structures shall be top joint design with monolithically poured base section. The structure shall be designed to withstand earth backfill as well as any additional loading that may be required by site conditions. The joints between all precast sections shall be sealed with a high quality asphaltic butyl polymer mastic rope. Shop drawings shall be provided prior to production showing all blockouts, hatches, frames, and covers.
5. Utility structures shall be fabricated of precast reinforced concrete sections of dense watertight concrete having a minimum 28-day compressive strength in excess of 5,000 PST. Compressive strength shall be determined by testing in accordance with the latest standard ASTM test procedures. The concrete ingredients shall be as follows:
    a. Portland Cement, Type I/II per ASTM Specification C-150 (700 lbs per cubic yard yield)
    b. Course aggregate, #68 stone
    c. Sand, ~2.6 fineness modulus (free from organic matter)
    d. Water, clean and suitable for domestic use (34.5 gallons per cubic yard yield)
    e. Air, 6% (+/- 1.5%) entrained
    f. Honeycombed or retempered concrete will not be acceptable
6. A 4" floor drain and a 2" PVC drain with P-trap shall be provided in valve vault with check valve to drain into wet well at a minimum slope of 2%. A P-trap shall be used to prevent wet well gases from reaching valve vault.
7. Wet well and valve vault shall have access hatches no smaller than those shown on the drawings and larger should it be determined that the specified hatches do not suit field conditions.
8. The hatches shall consist of 1/4" extruded aluminum with built in neoprene cushion and strap anchors bolted to the exterior. The cover leaf shall be 1/4" aluminum reinforced with aluminum stiffeners as required. Stainless steel hinges shall be bolted to underside and pivot on all stainless bolts and hardware. The cover shall open to 90 degrees and lock automatically in that position. A vinyl grip handle shall be provided to release and close the cover with one hand. Covers shall be built to withstand a live load of 150 lbs per square foot and equipped with a snap lock and removable handle. When closed, covers shall not protrude above the operating surface in which they are installed. Factory finish shall be aluminum lacquer. Surface contacting concrete shall have bituminous coating. Padlocks shall be provided for all wet well and valve vault hatches. Locks shall be Master padlocks keyed identically with no fewer than 4 keys provided to Spotsylvania County Public Utilities at the time of final inspection.
9. All pipe connections to utility structures require flexible joints. Flexible joint pipe to sleeve shall be KOR-N-SEAL, Interspace, Presswedge, or approved equal. Installation shall be in accordance with manufacturer's recommendations.
10. All fasteners, flanges, and other fittings within wet well shall be stainless steel.
11. The precast concrete wet well shall have watertight joints and shall have exterior concrete surfaces coated with two coats of bituminous waterproof material per the Spotsylvania County specifications, and shall have the interior surfaces treated an agru-grip liner or approved equal.

STANDBY GENERATOR SET, FUEL TANK, AND AUTO TRANSFER SWITCH

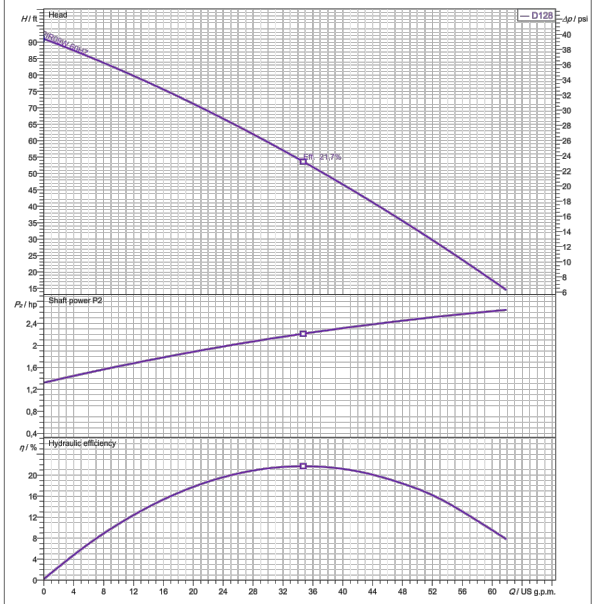
1. The work includes the furnishing of all labor, materials, equipment, test, and training to provide a complete and workable standby generator power system, including the generator set and generator set controls, and the transfer switch and transfer switch controls, fuel tank and installation necessary to suit such a power system.
2. The power system shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. All equipment shall be new and of current production of a national firm that manufactures generator sets and controls, transfer switches, switchgear, and assembles them as a complete and coordinated system. There will be one source responsible for warranty, parts, and service through a local representative with factory trained servicemen.
3. The generator set shall be capable of running one of the pumps specified in this plan set at a 0.8 power factor in an ambient condition of 104 degrees F and 6,000 feet above sea level.
4. The generator shall be capable of starting the pumps specified on this plan set with a maximum voltage dip of 35%.
5. The generator shall have an integrated full-enclosure with a full silent-pack treatment to minimize noise during operation.
6. The generator shall operate through the use of diesel fuel.
7. The generator shall include all necessary and appropriate controls and monitoring equipment to ensure continuous use and appropriate shut-down in a fault condition so as to limit fault damage.
8. The generator shall be capable of automatically turning on upon relay closure in the control panel.
9. The transfer switches shall be supplied and installed to suit automatic transfer from the main electrical service to backup generator service upon loss of main electrical service and automatic transfer back to main electrical service upon restoration of power.
10. The generator shall be capable of running for not less than 8 continuous hours per full tank of diesel fuel.

PUMP STATION ACCEPTANCE

1. Pump station acceptance shall be contingent upon successful completion of the test and upon receipts of the instructions for operation
2. The contractor shall perform the following tests in the presence of the Engineer and Spotsylvania County Public Utilities:
    a. All site improvements shall be completed
    b. All equipment shall be installed and functional
    c. Verification of pump rate by timed drawdown
    d. Telemetry connection
    e. Proper operation of generator
    f. Proper transfer of electrical power to/from generator
    g. Proper motivation of pump by generator power
    h. Proper installation of lift equipment
    i. Proper operation of alarm
3. Contractor shall be responsible for scheduling and coordinating with all parties involved and the performance test of the pump station
4. All costs of testing all equipment and associated appurtenances, including retesting if required, shall be included.
5. All keys (not less than 4 sets) shall be delivered to Spotsylvania County Public Utilities at the time of acceptance.
6. Six bound copies of the complete operation and maintenance manual for the pumps, controls, generator, telemetry, and all other appurtenances shall be provided to Spotsylvania County Public Utilities.
7. In the event that a component fails to perform as specified or is proven defective in service during the one year warranty period, the contractor shall provide and install a replacement part without cost to Spotsylvania County Public Utilities.

Curve number	Pump performance curves	SULZER
Reference curve PIR09W 60HZ	PIRANHA 09 W 60 HZ	

			Discharge	Frequency
			G1¼"	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
0,9983 kg/dm³	1,005 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW	3477 rpm	9/17/2015
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision
128 mm	5	Macerator		

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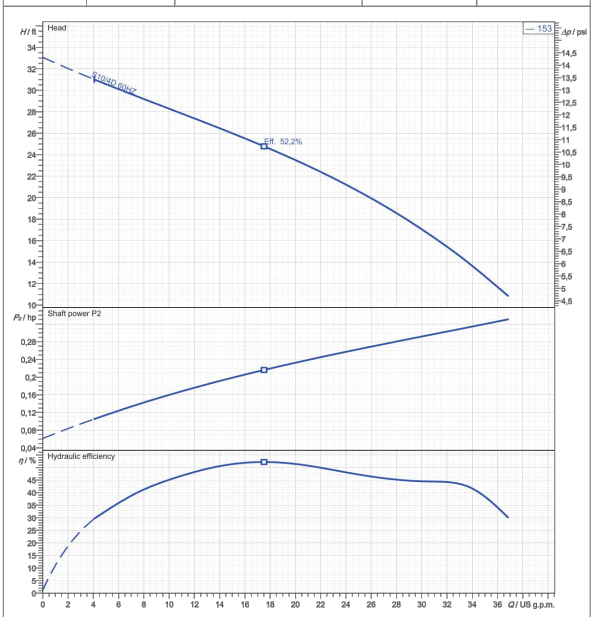
Version 2015/07/30
Data version Jul-2015

Curve number	Pump performance curves	SULZER
Reference curve PIRANHA S D 60HZ	PIRANHA S D 60 HZ	

			Discharge	Frequency
			G1¼"	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
0,9983 kg/dm³	1,005 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW	1790 rpm	9/17/2015
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision
153 mm	4	Macerator		

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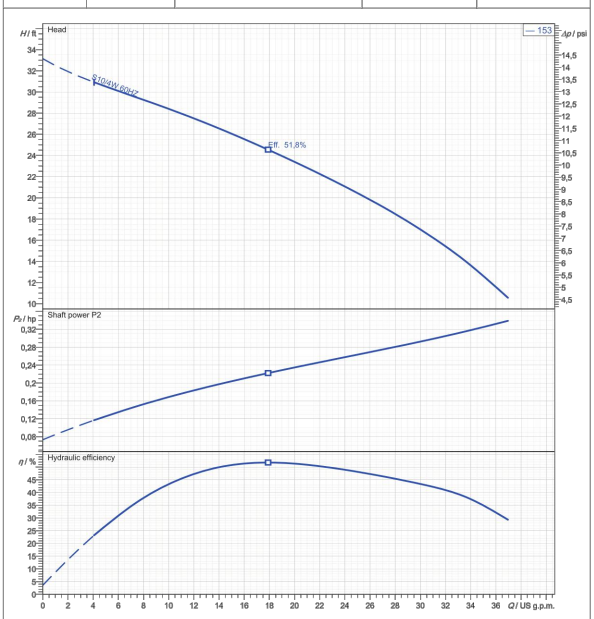
Version 2015/07/30
Data version Jul-2015

Curve number	Pump performance curves	SULZER
Reference curve PIRANHA S W 60HZ	PIRANHA S W 60 HZ	

			Discharge	Frequency
			G1¼"	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
0,9983 kg/dm³	1,005 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW	1791 rpm	9/17/2015
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision
153 mm	4	Macerator		

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Version 2015/07/30
Data version Jul-2015

DATE JANUARY 2019	Spotsylvania County Department of Utilities	Temporary Grinder Pump Station– Pump Curves PD 19–01	SHEET NO. 8 of 9
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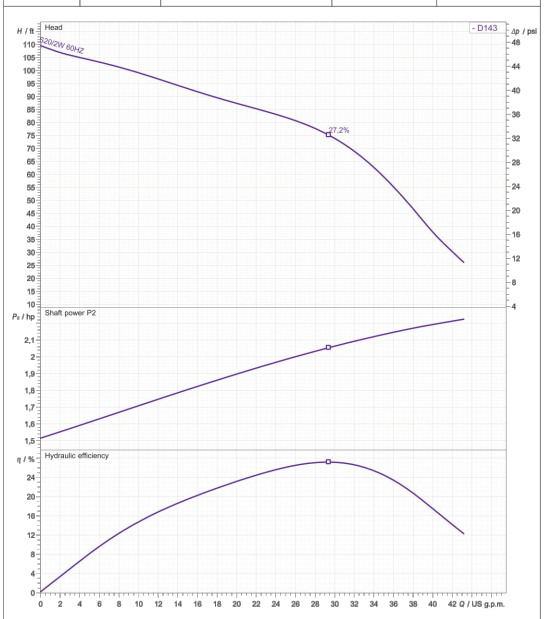
Curve number	Pump performance curves	SULZER
Reference curve PIRANHA S W 60HZ	PIRANHA S W 60 HZ	

			Discharge	Frequency
			G1¼"	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
0,9983 kg/dm³	1,005 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW	3416 rpm	11/24/2015
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision
143 mm	4	Macerator		

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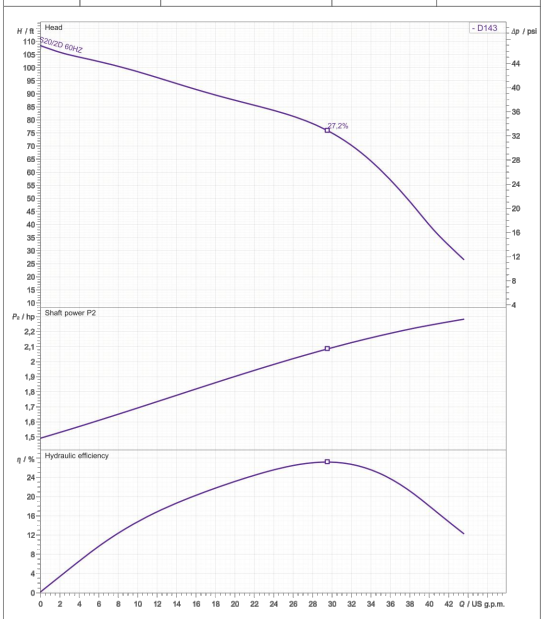
Version 2015/07/3
Data version Jul-2015

Curve number	Pump performance curves	SULZER
Reference curve PIRANHA S D 60HZ	PIRANHA S D 60 HZ	

			Discharge	Frequency
			G1¼"	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
0,9983 kg/dm³	1,005 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW	3432 rpm	11/24/2015
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision
143 mm	4	Macerator		

Sulzer reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

Version 2015/07/3
Data version Jul-2015

DATE JANUARY 2019	Spotsylvania County Department of Utilities	Temporary Grinder Pump Station– Pump Curves PD 19–01	SHEET NO. 9 of 9
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