PART 1 - GENERAL:

1.0 SECTION INCLUDES

A. Work under this section includes, but is not limited to, furnishing and installing a factory built duplex pump station as indicated on the project drawings, herein specified, as necessary for proper and complete performance.

1.1. SYSTEM DESCRIPTION

A. The contractor shall furnish and install one factory built automatically controlled above ground submersible pump valve package capable of handling raw unscreened sewage or similar liquids.

B. The pumps and mechanical slide rail accessories shall be installed in the wet well as shown on the project plans. The pump control panel, liquid level control, valves and piping shall be installed within a factory built fiberglass enclosure.

1.2. MANUFACTURER'S WARRANTY

A. The pump station manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.

1. Fiberglass components of the station enclosure shall be warranted for 10 years to resist UV damage, corrosion from moisture or corrosive soils, or physical failures occurring in normal service, without the need for special protective coatings, when installed according to the manufacturer's recommendations.

2. The equipment, apparatus, and parts furnished shall be warranted for a period of five (5) years, excepting only those items that are normally consumed in service, such as light bulbs, oils grease, packing, gaskets, 0-rings, etc. The pump station manufacturer shall be solely responsible for the warranty of the station and all components.

B. Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the owner.

C. It is not intended that the station manufacturer assume liability for consequential damages or contingent liabilities arising from failure of any vendor supplied product or part which fails to properly operate, however caused. Consequential damages resulting from defects in design, or delays in delivery are also beyond the manufacturer's scope of liability.

D. The warranty shall become effective upon the acceptance by the purchaser or the purchaser's authorized agent, or sixty (60) days after installation, or ninety (90) days after shipment, whichever occurs first.

E. In order to unify responsibility for proper operation of the complete pumping station, it is the intent of these Specifications that all system components be furnished by a single supplier (unitary source). The pumping station must be of standard catalog design, totally warranted by the manufacturer. Under no circumstances will a system consisting of parts compiled and assembled by a manufacture's representative or distributor be accepted.

PART 2 - PRODUCTS

2.0 MANUFACTURER

2.1. The specifications and project drawings depict equipment and materials manufactured by The Gorman-Rupp Company which are deemed most suitable for the service anticipated. It is not intended, however, to eliminate other products of equal quality and performance. The contractor shall prepare his bid based on the specified equipment for purposes of determining low bid. Award of a contract shall constitute an obligation to furnish the specified equipment and materials.

A. After execution of the contract, the contractor may offer substitutions to the specified equipment for consideration. The equipment proposed for substitution must be superior in construction and performance to that specified in the contract, and the higher quality must be demonstrated by a list of current users of the proposed equipment in similar installations.

B. In event the contractor obtains engineer's approval for equipment substitution, the contractor shall, at his own expense, make all resulting changes to the enclosures, buildings, piping or electrical systems as required to accommodate the proposed equipment. Revised detail drawings illustrating the substituted equipment shall be submitted to the engineer prior to acceptance.

C. It will be assumed that if the cost to the contractor is less for the proposed substitution, then the contract price shall be reduced by an amount equal to the savings.

2.2. STATION ENCLOSURE

A. The station enclosure shall contain and enclose all valves and associated controls and shall be constructed to enhance serviceability by incorporating the following design characteristics:

1. Two access panels per side of station shall be provided. Panels shall be sized and placed to permit routine maintenance operations through the panel openings of the enclosure. For these purposes, routine maintenance shall include frequently performed adjustments and inspections of the electrical components, controls and valves.

2. The access panels shall be provided with a hinge and latch. Hinge shall be the continuous type. Latch shall engage the enclosure at not less than three places, and shall be protected by a keyed lock.

3. One enclosure side shall contain a screened vent to maximize airflow for enclosure ventilation.

4. Station enclosure, less base, must be removable or able to be disassembled following the removal of reusable hardware.

5. Removal or disassembly of the enclosure shall be accomplished by not more than two maintenance personnel without the use of lifting equipment.

B. The station enclosure shall be manufactured of molded reinforced orthophthalic polyester resins with a minimum of 30% fiberglass, and a maximum of 70% resin. Resin fillers or extenders shall not be used.

C. Station base shall be constructed of pre-cast, reinforced concrete bonded inside a fiberglass form covering top and sides, and shall be designed to insure adequate strength to resist deformation of the structure during shipping, lifting, or handling. The enclosure base shall function at the wet well top and incorporate a duplex access lid, sized for the installation and removal of the specified pumps, and shall be of sufficient size to permit access to the wet well. Color used shall de-emphasize the presence of dirt, grease, etc., and shall be provided with a non-skid surface.

D. An exhaust blower shall be mounted in the roof of the enclosure. Blower capacity shall be sufficient to change station air a minimum of once every two minutes. Blower motor shall be operated automatically and shall be turned on at approximately 700F and shall be turn off at 550F. Blower motor and control circuit shall be protected by a thermal-magnetic air circuit breaker to provide overcurrent and overload protection. Blower exhaust outlet shall be designed to prevent the entrance of rain, snow, rocks, and foreign material.

E. A static wet well vent shall be mounted in the station base, and be housed in the station enclosure. The station enclosure shall provide a transition area between the wet well and the vent outlet. The vent shall terminate through the station wall with a screened opening, which shall be designed to prevent the entrance of rain, snow, rocks and foreign material.

F. The station base shall incorporate a cable transition adapter for the pump cables, level controls, and associated wiring. The adapter shall provide for a vapor tight transition between the wet well and the lift station enclosure. The adapter shall incorporate cable grips for each cable and be provided with a gasket between the adapter and the station for a positive seal. Junction boxes shall not be considered for cable transition.

G. The station base shall be furnished with elastomeric compression sealing devices for all piping penetrations to provide for a vapor tight transition between the wet well and lift station enclosure.

H. The Pump station shall be provided with a 1300/1500 watt, 115 volt electric heater with cord, thermostat and grounding plug. Ungrounded heaters shall not be acceptable.

I. The pump station shall be equipped with a 1" thick closed cell foam insulation, which shall be applied to the roof, doors, and corner panels.

J. Pump station shall be supplied with a thermostat, which shall monitor interior station temperature. The control shall incorporate a control relay and an unpowered dry contact wired to terminal blocks for field connection to a remote alarm device in the event that the temperature within the enclosure falls below a preset point between 35-100 degrees F.

2.3. PUMP DESIGN

A. The pump must have the necessary characteristics and be properly selected to deliver 100 GPM at a design dynamic discharge head of 32 feet.

B. Hydraulic Components and Solids Handling:

1. The pump casing shall be of gray iron with a gray iron or ductile iron slide rail guide shoe attached to the discharge flange as an integral assembly. Casing shall be easily removable from the motor for full inspection of impeller.

2. All pump openings and passages shall be of adequate size to pass 3.15"diameter spheres (minimum) and any trash or stringy material which can pass through an average house collection system. The impeller shall be recessed into the pump casing and shall not require flow of liquid through the impeller. The impeller and seal housing shall incorporate auxiliary vanes to hydraulically reduce pressure on the primary seal and force fibrous materials and solids away from the close axial clearance on the backside of the impeller. No impeller clearance adjustment or wear rings shall be required.

3. The impeller shall be a multi-vane vortex type with integral winglets on each vane. The winglet shall form an L-shaped cross section at the face of the vane for improved hydrodynamic efficiency. Impeller shall be of ductile iron and precision balanced. Balancing shall not deform or weaken the impeller. The impeller shall have a tapered locking fit onto the shaft and further be secured by a key and locking bolt. Impeller fasteners shall be non-corroding.

C. Shaft Seal:

1. The pump shaft shall be sealed against leakage by a mechanical seal. The lower wearing faces shall be silicon carbide. The upper faces shall be carbon and hardened stainless steel. Elastomers shall be viton.

D. Pump Motor:

1. Motor Description:

a. The submersible pump motor shall be 2.7 HP and operate in accordance with the electrical power indicated above. The motor and pump must be connected to form an integral unit. Motor shall be a squirrel-cage, induction type in an air-filled watertight enclosure. The motor shall conform to NEMA design Class B, and incorporate Class F insulation materials to withstand a continuous operating temperature of 1550C (3110F). The pump and motor shall be capable of handling liquids with a maximum temperature of 400C (1040F).

b. Motor shall be capable of sustaining a minimum of 10 starts per hour. The motor shall operate while only partially submerged and not require a cooling jacket or any other means of auxiliary cooling during normal continuous operation.

c. Motor housing shall be of cast iron. The stator shall consist of copper windings with copper connectors applied to high grade electrical steel laminations. The stator shall be held securely in place by a heat-shrink fit into the motor housing. Any other means of securing the stator, which would require penetration of the motor housing, shall not be considered acceptable.

d. Rotor shall be solid cast and dynamically balanced for vibration-free operation. Rotor end bars and short circuit rings shall be of aluminum. The pump shaft shall be of AISI type 329 stainless steel (or hardened alloy steel with protective stainless steel shaft sleeve, which prevents contact of the shaft with the liquid). The shaft shall be machined with shoulders or snap ring grooves for positive placement of bearings. The upper and lower bearing shall be of heavy duty design, capable of supporting the shaft and rotor while under maximum radial and thrust loads. The bearings shall be permanently grease lubricated and sealed at the time of installation.

2. Watertight Integrity:

a. All static seals at water tight mating surfaces shall be of Nitrile "O" ring type. Use of auxiliary sealing compounds shall not be required. The power and control cables shall enter the motor through a terminal housing. The entrance shall be sealed with a rubber grommet and clamp set which when compressed longitudinally causes a radial water tight seal. The clamp set shall prevent all slippage and rotation of cable while engaged, yet may be easily removed and reused during routine maintenance. Any other cable entrance design requiring use of epoxies, silicones, or similar caulking materials shall be considered unacceptable.

b. The pump and electrical cables shall be capable of continuous submergence without loss of waterproof integrity to a depth of 65 feet.

c. The water tight integrity of the motor housing and shaft seal shall be tested during manufacture by pressurizing the motor cavity and submerging in water with motor operating.

3. Motor Protection:

a. The motor shall be protected from thermal and moisture damage. Thermal protection shall consist of three separate thermostatic switches embedded into the stator windings. Any moisture in the motor housing shall be detected by a mechanically activated moisture sensing micro-switch. The switch shall be sensitive enough to detect airborne moisture and terminate operation of motor before liquid enters the cavity. Use of probes or floats that rely on the presence of liquid to initiate signal shall not be considered acceptable.

2.4. AUTOMATIC DISCHARGE CONNECTION

A. Each pump shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic and firm connection of the pump to the discharge piping when lowered into place.

B. A gray iron or fabricated steel base plate with integral guide rail pilots shall be provided along with all hardware and anchor bolts required for permanent installation to the wet well floor. The base plate shall be designed with an integral 900 elbow, or adapt to a commercially available elbow for connection to the vertical discharge piping utilizing standard ANSI 125 lbs. flanges.

C. Each pump shall be provided with a replaceable ductile iron slide rail guide shoe attached to pump discharge flange. A replaceable neoprene seal shall be provided as an integral part of the guide shoe to form a seal with the base plate connection and eliminate the possibility of leakage and erosive wear during operation. The seal shall contact mating faces in a static position and shall have adequate flexibility to flex under pumping pressure to increase seal efficiency. Metal-to-metal contact at the discharge connection shall not be acceptable.

D. The contractor shall provide two lengths of 1.5" schedule 40 stainless steel guide rail pipe for each pump.

E. The guide shoe shall direct the pump down two vertical guide rails and onto the discharge connection in a simple lineal movement. The buildup of sludge and grease on guide rails shall not present problems during the lifting operation. The guide shoe shall be designed with integral hooks at the top to transmit full weight of the pump to the base plate flange. No portion of the pump shall be supported directly on the bottom of the wet well, guide rails, or lifting cable.

F. Lifting cable shall consist of a stainless steel braided wire cable attached to the pump lifting bail.

G. All bolts, machine screws, nuts, washers, and lockwashers for complete assembly of access cover, guide rails, and discharge elbow shall be stainless steel.

2.5. WET WELL ACCESS

A. The wet well access shall be fabricated from welded aluminum sections. A hinged aluminum door shall be provided for each pump. The hinged door shall be fabricated from 1/4" thick aluminum with non-skid diamond tread on upper surface. All hardware on access assembly shall be stainless steel with a flush upper surface without protrusions. For safety, the door shall have a 300 lbs/sq.ft. rating and be fitted with a recessed staple for padlock. Door shall be furnished with a flush aluminum drop handle and automatic hold open arm.

2.6. VALVES AND PIPING

A. Each pump shall be equipped with a full flow type check valve, capable of passing a 3" spherical solid, with flanged ends and be fitted with an external lever and spring. The valve seat shall be constructed of stainless steel and shall be replaceable. The valve body shall be cast iron and incorporate a 3" cleanout port. Valve clapper shall have a molded neoprene seating surface incorporating low pressure sealing rings.

B. Each discharge line shall be equipped with a 2-way plug valve to permit isolation of the pumps from the common discharge header. The plug valve shall be non-lubricated type. Valve body shall be semi-steel with flanged end connections drilled to 125 pound standard.

C. Emergency bypass pump connections shall be provided and shall include two-way plug valves located in the fiberglass enclosure and quick connect fittings which shall terminate outside the fiberglass enclosure.

D. Piping:

1. Flanged header pipe shall be centrifugally cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and class 53 thickness.

2. Flanges shall be cast iron class 125 and Comply with ANSI B16.1.

3. Pipe and flanges shall be threaded and suitable thread sealant applied before assembling flange to pipe.

4. Bolt holes shall be in angular alignment within 1/20 between flanges. Flanges shall be faced and a gasket finish applied.

2.7 CONTROL PANEL

A. The electrical control equipment shall be mounted within a 36" x 30" x 14" NEMA 1 stainless steel, dead front type control enclosure. The enclosure door shall be hinged and sealed with a Neoprene gasket. It shall include a removable plated steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on the enclosure door. The enclosure shall be mounted within the fiberglass valve enclosure. The control panel shall be equipped with vapor emission type corrosion inhibitors.

B. Each pump shall have an open frame, across-the-line, NEMA rated magnetic motor starter. All motor starters shall be equipped to provide under voltage release and overload protection on all three phases.

C. Overload relays shall be block type, and shall be manual reset only. Trip setting shall be determined by heater element only and not by adjustable settings.

D. A properly size heavy duty air circuit breaker shall be furnished for each pump motor. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering. A pad locking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanism shall be located on the exterior of the control compartment door, with interlocks which permit the door to be opened only when the circuit breakers are on the off position.

E. A duplex ground fault indicating utility receptacle providing 115 volt, 60 Hz, single phase current shall be mounted on the side of the control enclosure. Receptacle circuit shall be protected by a 15 ampere thermal magnetic circuit breaker.

F. The control panel shall be equipped with circuitry to override the level control system and shut down the pump motor when required to protect the pump from damage caused by excessive temperature. A thermostat shall be mounted on each pump to detect its temperature and a magnetic switch shall be supplied for each thermostat. An indicator, visible on the front of the control panel shall indicate the pump motor has been stopped because of high temperature conditions. Pump shall remained locked out until it has cooled and the circuit has been manually reset.

G. The control panel shall also be supplied with HOA switches, alternator relay, pump run indicators, elapsed time indicators, and sequence selector switch.

H. The control panel shall be equipped to monitor the incoming power and shut down the pump motors when required to protect the motor(s) from damage caused by phase reversal, phase loss, low voltage, and voltage unbalance. A time delay shall be provided to minimize nuisance trips. The motor(s) shall automatically restart when power conditions return to normal.

I. The control panel shall be equipped with a secondary lightning arrestor to minimize damage to the pump motors and control from transient voltage surges. The arrestor shall utilize silicon-oxide varistors encapsulated in a non-conductive housing. The arrestor shall have a current rating of 60,000 amps, and a Joule rating of 1500.

J. Level Control:

1. The level control system shall start and stop the pump motors in response to changes in wet well level, as set forth herein.

2. The level control system shall be capable of operating as either an air bubbler type level control system, submersible transducer type system, or ultrasonic transmitter type system.

3. The level control system shall utilize the alternator relay to select first one pump, then the second pump, to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle.

4. The level control system shall utilize an electronic pressure switch, which shall continuously, monitor the wet well level, permitting the operator to read wet well level at any time. Upon operator selection of automatic operation, the electronic pressure switch shall start the motor for one pump when the liquid level in the wet well rises to the "lead pump start level". When the liquid is lowered to the "lead pump stop level", the electronic pressure switch shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level continue to rise, the electronic pressure switch shall start the second pump when the liquid reaches the "lag pump start level" so that both pumps are operating. These levels shall be adjustable as described below.

a. The electronic pressure switch shall include integral components to perform all pressure sensing, signal conditioning, EMI and RFI suppression, DC power supply and 120 volt outputs. Comparators shall be solid state, and shall be integrated with other components to perform as described below.

b. The electronic pressure switch shall be capable of operating on a supply voltage of 12VDC in an ambient temperature range of 14 degrees F through 131 degrees F. Control range shall be 0 to 12.0 feet of water with an overall repeat accuracy of (plus/minus) 0.1 feet of water. Memory shall be retained using a non-volatile lithium battery back-up.

5. The electronic pressure switch shall consist of an integral pressure sensor, display, electronic comparators, and output relays.

a. The internal pressure sensor shall be a strain gauge transducer, which shall convert the input to a proportional electrical signal for distribution to the display and electronic comparators. The transducer output shall be filtered to prevent control response to level pulsations.

b. The display shall be an LCD back lighted panel. It shall indicate level in the wet well and the selected operating and alarm levels. It shall be calibrated to read feet of water, be accurate to 0.1' and have a full scale indication of 12'.

c. Level adjustments shall be electrical comparator set points to control the system. The levels shall be easily adjustable by membrane type switches. Systems requiring hard wiring, electronic test equipment, introduction of pressure, artificial level simulation, or opening of any cover panel for adjustment are not acceptable. The selected levels shall be viewable by the operator on the display.

d. Each output relay shall be solid state, individually fused and be optically isolated from its output. The "on" state of each relay shall be indicated by a light emitting diode. The output relays shall have an inductive load rating equipment to one NEMA 4 size contactor.

6. The electronic pressure switch shall be equipped with an output board, which shall include LED status indicators and a connector with cable for connection to the main unit.

7. The electronic pressure switch shall be equipped with pump start delay(s) preset at a fixed delay time of five (5) seconds.

8. Circuit design in which application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.

9. The electronic pressure switch shall be equipped with a simulator system capable of performing system cycle testing functions.

10. The electronic pressure switch shall be capable of controlling liquid levels in either a pump up or pump down application.

11. The electronic pressure switch shall be equipped with a security access code to prevent accidental set-up changes and provide liquid level set-point lock-out.

12. The electronic pressure switch shall be equipped with one (1) 0-33 ft. W.C. input, one (1) scalable analog input of either 0-5VDC, 0-10VDC, or 4-20mA, and one (1) 4-20mA scalable output. Output is powered by 10VDC supply. Load resistance for 4-20mA output shall be 100-400 ohms.

13. The electronic pressure switch shall include a DC power supply to convert 120VAC control power to 12VDC EPS power. The power supply shall be 500 mA (6W) minimum and be UL listed Class II power limited power supply.

14. The electronic pressure switch shall be contained within a NEMA 4X enclosure including a polycarbonate face and stainless steel case.

15. The electronic pressure switch shall be equipped with an electronic comparator and solid state output relay to alert maintenance personnel to a high liquid level in the wet well. An indicator, visible on the front of the control panel, shall indicate that a high wet well level exists. The alarm signal shall be maintained until the wet well level has been lowered and the circuit has been manually reset. High water alarm shall be furnished with a dry contact wired to terminal blocks.

K. Submersible Transducer System

1. The level control system shall utilize a submersible transducer. It shall be a strain gauge transducer with a pressure sensor housed in a 316 stainless steel case designed to extend into the wet well. The pressure transducer shall provide a proportional signal for distribution to the display and electronic comparators of the electronic pressure switch, and remainder of the level control system. Sensor range shall be 0-12 ft. W.C. minimum with an over-pressure rating 3 times full scale. The transducer shall have output capability of 1.5-7.5VDC or 4-20mA. The transducer's polyurethane jacketed shielded cable shall be of suitable length for proper installation into the wet well without splicing.

L. Telephone Dialer

1. A telephone dialer shall be mounted within the fiberglass enclosure and wired to the pump control panel to monitor all alarm conditions. It shall be a RACO verbatim dialer, or approved equal with all features to make it acceptable to the town.

2. An intrinsically safe repeater shall be supplied in the control enclosure. Repeater must be recognized and listed as intrinsically safe by a nationally recognized testing laboratory. Station manufacturer shall make all connections from repeater to feeder lines and motor controls. Installing contractor shall make connections from repeater to transducer.

PART 3 - EXECUTION

1. EXAMINATION

A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Station manufacturer shall provide written instruction for proper handling. Immediately after off-loading, contractor shall inspect complete pump station and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all station serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

1.3. INSTALLATION

B. Install, level, align, and lubricate pump station as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.

C. Check motor and control data plates for compatibility to site voltage.

INCHES
Town of Bethlehem, NY

NOT APPROVED:
THIS PLAN HAS NOT RECEIVED FINAL APPROVAL OF ALL REVIEWING AGENCIES. THIS PLAN IS SUBJECT TO REVISIONS UNTIL ALL APPROVALS ARE OBTAINED AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

Planning Approval
PrintorHTE_SPA118A

BETHLEHEM CENTER II

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BETHLEHEM, NY

NIGRO COMPANIES

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Engineers / Architects / Surveyors

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REVISIONS

NO.	DATE	DESCRIPTION	REV.	CK'D
1	1/6/05	REV. PER TOWN ENG. COMMENTS 12/10/04	DGC	PVG
2	08/01/05	REV. PER TOWN ENG. COMMENTS 06/30/05	DGC	PVG
3	09/26/05	REDATE ONLY	DGC	PVG
4	10/14/05	MISC. REVISIONS	DGC	PVG
5	2/01/06	REDATE ONLY	DGC	PVG

NOTE:
Unauthorized alteration or addition to this drawing is a violation of the New York State Education Law Article 145, Section 7209.

PLANNING BOARD
TOWN OF BETHLEHEM
ALBANY COUNTY, NEW YORK
This Site Plan Approved.
Title CHAIRMAN
Date 5/06

MISCELLANEOUS DETAILS

RECEIVED
MAY 8 2006
PLANNING BOARD
TOWN OF BETHLEHEM

Seal/date: STATE OF NEW YORK · PIETRO VINCENT GIOVENCO · 072957 · LICENSED PROFESSIONAL ENGINEER
PIETRO V. GIOVENCO, NYS LIC. #072957

Project Manager: P. Giovenco, PE
Designed by: D. Christopher
Drawn by: D. Christopher
Checked by: P. Giovenco, PE
Date Issued: APRIL 19, 2004
Scale: AS NOTED
Project Number: 6092.00
File Name: E:\NIGRO\6092\6092MD04.DWG
Drawing Number:

C504