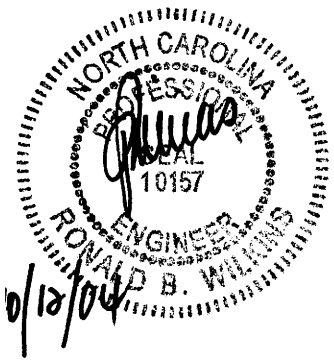


Project: R-2911D
County: Rowan

PROJECT SPECIAL PROVISIONS
Utility Construction

GENERAL CONSTRUCTION REQUIREMENTS:

Specifications:

The proposed utility construction shall meet the applicable requirements of the NC Department of Transportation "Standard Specifications for Roads and Structures" dated January 2002 and the provisions outlined below.

Owner and Owner's Requirements:

The existing water and a portion of the sanitary sewer belong to the Salisbury/Rowan County Utilities Department. The contact person for the Salisbury/Rowan County Utilities Department is Mr. Jim Behmer, PE, Utilities Engineering Manager. Mr. Behmer can be reached by telephone at (704) 638-5202. The existing pump station and associated force main located at approximate Station 307+50 -L- belong to the Rowan Salisbury Board of Education. The contact person for the Board of Education is Mr. Jim Christy, Assistant Superintendent of Support Services. Mr. Christy can be reached by telephone at (704) 630-6002. The Contractor shall provide access for the owner's representatives to all phases of construction. The owner shall be notified two weeks prior to commencement of any work and one week prior to service interruption. The owner will have the responsibility for operation of all valves. The Contractor and his/her subcontractors shall refrain from operating valves owned by the Salisbury/Rowan County Utilities Department or the Rowan County Board of Education (with the exception of individual meter services). The Contractor may be required to work nights or weekends to make tie-ins for proposed water lines. Interruption of water service or force main sewer service on main lines shall be limited to a maximum of 4 hours unless approved by the Engineer. The Salisbury/Rowan County Utilities Department will provide all water meters and meter boxes.

Prequalification of Utility Contractors:

All contractors desiring to perform water and sewer line construction on this project shall first be prequalified by the City of Salisbury. A partial listing of approved utility contractors that are currently prequalified to perform utility work for the City of Salisbury is included at the end of these provisions.

In the event a utility Contractor desires to become prequalified, he/she should contact Mr. Jim Behmer, Salisbury/Rowan Utilities Department; Utilities Engineering Manager for the prequalification package. The Contractor shall allow

five working days for approval after submittal of the prequalification package to the City.

Testing and Sterilization:

After the installed pipe, fittings, valves, hydrants, corporation stops and end plugs are inserted and secured, the pipeline shall be subjected to a hydrostatic pressure of 200 PSI for a period of 2 hours, by pumping the section full of clean water using an approved pressure pump. Cross connection for flushing and chlorination shall be made by means of a temporary connection from the supply pipe with an approved backflow prevention device. Cross connection and blowoff piping shall be two inches in diameter for mains eight inches in diameter and smaller, and four inches in diameter for mains greater than eight inches but less than sixteen inches in diameter. Taps for the cross connection piping shall be made to the portion of the existing water main that will be removed from service. The proposed water main shall be laid to within one pipe length of the point of final connection prior to flushing and testing. All flushing and chlorination work shall be performed in accordance with AWWA C651-99. All fittings, valves, backflow prevention devices required for chlorination and testing shall be incidental to the cost of the proposed pipe being tested.

Any cracked, damaged, or defective pipe, fittings, valves, hydrants, or other attachments discovered as a result of the pressure test, shall be removed and replaced with sound material. The tests shall be repeated until test results are satisfactory.

After the pressure test is complete, the Contractor shall make a leakage test. Such leakage test shall last at least 2 hours at a pressure of 200 PSI.

The pressure test and leakage test may be performed concurrently.

All valves on the lines being sterilized shall be opened and closed several times during the chlorinating period. The pipeline shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 PPM or at the same level as in the existing water mains. Samples of water shall be taken at representative points along the pipeline by the Contractor in approved containers and submitted to a certified testing laboratory for bacterial and chlorine content. Test results shall be provided to. Salisbury/Rowan County Utilities Department

Utility Locations Shown on the Plans:

The locations, sizes, and type material of the existing utilities shown on the plans are from the best available information. The Contractor will be responsible for determining the exact location, size, and type material of the existing facilities necessary for the construction of the proposed utilities and to avoid damage to existing facilities.

Dewatering will not be measured and paid for as a separate bid item. All costs involved in dewatering shall be included in the applicable bid item for the various forms of work, i.e. pipe, structures, etc.

Sterilization will not be measured and paid for as a separate bid item. All costs including chlorinating equipment, materials, excavation, barricades, backfilling, and any taps and corporations and re-sterilization shall be included in the applicable bid price for piping and other forms of work.

COMPENSATION:

No direct payment will be made for utility construction work required by the preceding provisions, which are general requirements applying to utility construction, and all of the requirements stated will be considered incidental work, paid for at the contract unit prices of the various utility items included in the contract.

1. RELOCATE EXISTING WATER METER AND BACKFLOW PREVENTER:

The existing water meters and backflow preventers that are to be relocated shall be installed at the locations shown on the utility plans, and/or as directed by the Engineer.

Relocation of water meters and backflow preventers shall consist of the removal and installation at the appropriate location of the water meter, coppersetter (if applicable), backflow preventer, and/or meter valves (if applicable), and boxes. All water meters one inch and smaller that are to be relocated shall be provided with angle meter valves in accordance with the detail shown on the applicable utility construction plan sheets. Water meters one-half inch and larger will require relocation of the existing coppersetter, which has an existing angle ball valve as shown on the utility construction plan sheets. Any fittings necessary to reconnect the relocated meter to the water line will be considered incidental. Any pipe necessary to complete the relocation will be paid for as provided elsewhere in these provisions and/or in the Standard Specification.

All work shall be in accordance with the applicable plumbing codes, as shown on the plans and as directed by the Engineer.

All boxes shall be placed with the top of the box flush with finish grade of the project, as shown on the plans and/or as directed by the Engineer.

The quantity of existing water meters relocated and accepted will be measured and paid for at the contract unit price each for "Relocate Existing Water Meter with Backflow Preventer". Such price and payment will be full compensation for all materials, labor, removing, installing and reconnecting the existing meter with

backflow preventer and box, excavation, backfilling, and incidentals necessary to complete the work as required excavation.

2. WATER METER ASSEMBLY AND NEW METER VAULT:

The new water meter assembly and new meter vault shall be installed at the location shown on the utility plans or as directed by the Engineer.

The new water meter assembly and new meter vault shall consist of the installation of a new vault with all new internals (double detector check valves, gate valves before and after meter, gate valve for bypass, test nipples w/corporation stop, etc.) to match the existing the water meter assembly and meter vault with respect to function and internal arrangement. The existing water meter assembly and vault are located at approximate Station 336+75 -L- and shown on Utility Construction Plan Sheet UC-13. Any pipe necessary to complete the relocation will be paid for as provided elsewhere in these provisions.

After the new assembly is installed and functional, the existing water meter assembly and meter vault will become the property of the contractor and shall be removed from the site immediately. The existing vault shall be demolished and removed from the site.

All work shall be in accordance with the applicable plumbing codes, as shown on the plans, and as directed by the Engineer.

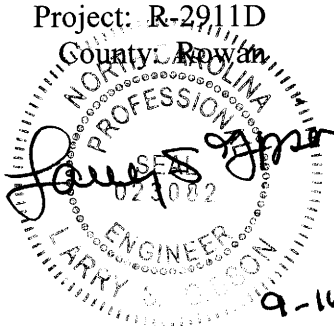
The new vault shall be placed with the top six inches above finished grade of the immediate area. The top of the vault shall be fitted with a new top of the same type, size and direction of the top on the existing vault.

Water meter assembly and new meter vault installed and accepted will be paid for at the contract lump sum price for "___" Water Meter Assembly and New Meter Vault". Such price and payment will be full compensation for all labor, excavation, removing of old vault and internals, new vault, new top and metal door, installing and reconnecting the new water meter assembly and new meter vault, backfilling, and incidentals necessary to complete the work as required.

Approved/Prequalified Utility Contractors/Subcontractors

Contractor	Location
Bell Construction Company Incorporated	Statesville, NC
B.R.S., Incorporated	Richfield, NC
Foothills Water and Sewer	Stony Point, NC
Propst Construction Co., Inc.	Concord, NC
Ronny Turner Construction Company	Hickory, NC

Project: R-2911D
County: Rowan



9-16-04

PROJECT SPECIAL PROVISIONS
Utility Construction

GENERAL CONSTRUCTION REQUIREMENTS:

Specifications:

The proposed utility construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" dated January 2002, and the details as shown on the plans, as outlined in the following provisions, or as directed by the Engineer.

The Contractor is herein forewarned as to the possibility of having to vary the depth of pipeline installation to achieve minimum clearance of existing or proposed utilities or storm drainage while maintaining minimum cover specified (whether existing or proposed pipelines, conduits, cables, mains, and storm drainage are shown on the plans or not).

On new force main sewers and tie in sections of existing force main sewers, the method of anchoring pipe bends, valves, and related appurtenances will be the responsibility of the Contractor. Tying in to existing force main sewers may alter such lines to the extent that these pipelines with existing pipe bends, valves and related appurtenances may also require reaction backing; this work shall also be the responsibility of the Contractor.

The Contractor shall submit his proposed method of anchoring to the Engineer for review and approval prior to any applicable force main sewer construction. Such approval will not relieve the Contractor of his responsibility of properly anchoring force main sewers.

Pipe joint deflections shall not exceed 75% of the manufacturer's recommended maximum deflection.

All force main and gravity sewer outside the limits of the proposed pump station wetwell will be measured and paid for separately under their individual line items as shown in the contract.

Any proposed "doghouse" manholes will be measured and paid for in accordance with Section 1525 of the Standard Specifications.

Owner and Owner's Requirements:

The existing gravity and force main sewer lines to be constructed for this project belong to the Salisbury-Rowan School District. The Contractor shall provide access for the owner's representatives to all phases of construction. The owner shall be notified two weeks prior to commencement of any work and one week prior to service interruption.

Utility Locations Shown on the Plans:

The location, size, and type material of the existing utilities shown on the plans is from the best available information. The Contractor will be responsible for determining the exact location, size, and type material of the existing facilities necessary for the construction of the proposed utilities and to avoid damage to existing facilities.

COMPENSATION:

No direct payment will be made for utility construction work required by the preceding provisions, which are general requirements applying to utility construction, and all of the requirements stated will be considered incidental work, paid for at the contract unit prices of the various utility items included in the contract.

1. BEDDING MATERIAL:

Bedding material for utility lines shall be installed in accordance with the applicable utility provisions herein, as shown on the utility construction plans, and/or as directed by the Engineer.

Bedding material shall meet the requirements of Article 1016-3 of the Standard Specifications. Bedding material shall be installed in accordance with Articles 300-6 and 300-7 of the Standard Specifications.

Bedding material installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per ton for "Bedding Material, Utilities Class _____". Such prices and payments shall be full compensation for all materials, labor, equipment, compaction and shaping the bedding material in accordance with Article 300-4 of the Standard Specifications, and incidentals necessary to complete the work as required.

2. HDPE FORCE MAIN SEWER PIPE BY DIRECTIONAL BORE:

High Density Polyethylene (HDPE) Force Main Sewer Pipe to be installed by directional boring in the location shown on the plans. Install sewer pipe in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

HDPE Force Main Sewer Pipe shall be SDR 9, 200# WP, manufactured in accordance with ANSI /AWWA C906-90. HDPE Pipe materials shall be either PE 2406, PE 3406 or PE 3408 depending upon the required pressure class and dimension ratio (SDR) specified on the plans. Polyethylene plastic water pipe shall meet the requirements of the National Sanitation Foundation Seal of Approval for potable water. The size of the HDPE pipe shall be as noted on the utility construction plans.

Furnish fittings to connect to PVC force main sewer pipe and fuse onto each end of the HDPE force main sewer pipe.

Drilling fluid to be bentonite slurry. Use admixtures suitable to the site conditions.

HDPE force main sewer pipe to be fused and tested prior to placement. Join pipe segments by cutting the ends square, heating and fusing under sufficient pressure to create a single length of pipe sufficient to complete installation in one continuous pulling operation. The pipe manufacturers listing of fusion parameters validated by appropriate testing and the parameters of the contractor's fusion system shall be submitted to the Engineer prior to fusing of segments of HDPE force main sewer pipe into the pipe string.

HDPE force main sewer pipe string to be tested to a hydrostatic pressure of 200 PSI in accordance with testing procedure outlined in section 1520 of the standard specifications prior to being placed.

HDPE water pipe to be installed by boring or drilling a small pilot hole along a parabolic arc beneath the installation location. Enlarge the pilot hole by use of a reamer or reamers to the desired diameter. When the bored hole is of the diameter recommended by the pipe manufacturer for the 5 inch HDPE force main sewer pipe, the contractor will pull the pipe string through the hole by the drill string. Cap the pipe string during the pulling operation. Pulling operation to incorporate a swivel connection to minimize torsional stress imposed upon the pipe string. Fully support the pipe string before and during pull back so that the pipe string will move freely without damage.

Contractor may elect to conduct reaming and pulling of the pipe string as one operation at the discretion of the engineer.

Drilling fluid to be re-circulated through use of a solids control system to remove spoil from drilling fluid surface returns. After cleaning, return the drilling fluid surface returns to the active system.

HDPE Force Main Sewer Pipe, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end, with no deductions for fittings or couplings, and paid for at the contract unit price per linear foot for "____" HDPE FM Sewer Pipe by Directional Bore". Such prices and payments will be full compensation for furnishing all labor, equipment, material, couplings, adapters and fittings, excavation, installation, testing, backfilling, and incidentals necessary to complete the work as required. Transition fittings from PVC to HDPE shall be considered incidental to this item.

3. REMOVE EXISTING PUMP STATION

The Contractor shall provide all labor and equipment necessary to remove the pumps, piping, valves, and other equipment associated with the pump station as shown on the plans or as directed by the Engineer. The Contractor will also be responsible for the removal or abandonment in place of the concrete wet well. This work will be considered incidental to the removal of the equipment from the pump station. The Contractor will

also be responsible for removal of the existing chain link fence and gates. This work will be considered incidental to the removal of the equipment from the pump station. The Contractor will also be responsible for the removal of the area light and associated components. This work will be considered incidental to the removal of the equipment from the pump station site. The Contractor shall stockpile all items removed from the pump station including pumps, valves and associated items.

The Contractor will remove the existing pump station at the appropriate phase of construction. The existing pump station shall remain operational until the new pump station is installed and fully operational, as determined by the Engineer.

The work completed will be paid for at the contract lump sum price for "Remove Existing Pump Station". Such price and payment will be full compensation for all materials, labor, excavation, removal and storage of equipment, backfilling, and incidentals necessary to complete the work as required.

4. INSTALL CONCRETE WET WELL

The Contractor shall provide all labor and equipment necessary install a 6' inside diameter prefabricated concrete wet well with a total depth of approximately 16'. The wet well shall have walls approximately 8.5 inches thick and a base which extends 12 inches around the outside diameter of the wet well to prevent buoyancy. Alternative designs may be submitted with the appropriate buoyancy calculations. Pre-cast concrete shall be a minimum of 4000 PSI at 28 days. All reinforcing shall comply with ASTM C-478. Reinforced plastic steps shall be provided every 12 inches on center. Sections of the wet well shall be joined in accordance with AASHTO M-198B Preformed Plastic or ASTM C-443 Rubber Gasket Joints. All openings shall be precasted and supplied with a flexible rubber pipe wall penetrations and/or connections shall be in accordance with ASTM C-923. The wet well shall be watertight. Backfill around the wet well and valve box shall be compacted to 95% of standard or modified Proctor Density.

The work completed will be measured and paid for at the contract unit price per each for "Install Concrete Wet Well". Such price and payment will be full compensation for all materials, labor, excavation, backfilling, and incidentals necessary to complete the work as required.

5. INSTALL DUPLEX FACTORY-BUILT SUBMERSIBLE PUMP STATIONS

A. General:
The contractor shall furnish and install one automatically controlled duplex pumping unit capable of handling raw unscreened sewage. The pumps and mechanical accessories shall be installed in the precast concrete wet well (wet well paid for under Install Concrete Wetwell) as shown on the Utility Construction Plans. The pump control panel, liquid level control, and system valving shall be installed in a factory built enclosure to provide for a complete working system.

B. Station Enclosure:

1. Description:

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:

a. Two access panels 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.

b. 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 two places, and shall be protected by a keyed lock with 4 keys.

c. One access panel shall contain a screened vent to maximize airflow for enclosure ventilation.

d. Station enclosure, less base, must be completely removable or able to be disassembled following the removal of reusable tamper-proof hardware. After removal or disassembly, no portion of the enclosure shall project above the surface of the base to interfere with maintenance operations or endanger personnel.

e. Removal or disassembly of the enclosure shall be accomplished by no more than two maintenance personnel without the use of lifting equipment.

2. Materials:

a. 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.

b. Major design considerations shall be given to structural stability, corrosion resistance, and watertight properties. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro-organisms, mildew, mold, fungus, corrosive liquids, and gases which can reasonably be expected to be present in the environment surrounding the wet well.

c. All interior surfaces of the housing shall be coated with a polyester resin-rich finish. It shall provide:

1) Maintenance-free service

2) Abrasion resistance

3) Protection from sewage, greases, oils, gasoline, and other common chemicals.

d. The outside of the enclosure shall be coated with a suitable pigmented resin, compounded to insure long maintenance-free life.

3. Enclosure Base:

a. Station base shall be constructed or 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 as 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.

b. Color used shall de-emphasize the presence of dirt, grease, etc., and shall be provided with a non-skid surface.

4. Ventilation Blower:

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 and shall be turned on at approximately 70-degrees F and shall be turn off at 55-degrees F. Blower motor and control circuit shall be protected by a thermal-magnetic air circuit breaker to provide over current and overload protection. Blower exhaust outlet shall be designed to prevent the entrance of rain, snow, rocks, and foreign material.

5. Static Wet Well Vent:

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.

6. Cable Transition Adapter:

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.

7. Station Heater:

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

8. Insulation Package:

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.

C. Pumps:

1. Operation Conditions:

a. Based on the system performance curve (attached), the individual pumps must have the necessary characteristics and be properly selected to deliver 80 GPM at a design dynamic discharge head of 45 feet.

2. Hydraulic Components and solids handling:

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

b. All pump openings and passages shall be of adequate size to pass 3" 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 the 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.

c. 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.

3. Hoisting Bail:

a. A hoisting bail shall provide for proper balance of pump and detent from the discharge connection while using a single lift cable.

4. Components:

a. All other major pump components such as stator housing, seal housing, and bearing brackets must be of structural grade steel or gray iron – Class 30. All external surfaces coming into contact with sewage shall be protected by a coal tar based epoxy coating of 8 mils minimum thickness. All exposed fasteners and lock washers shall be of 304 stainless steel.

5. Shaft Seal:

a. On pump applications below 13 horsepower, the pump shall be sealed against leakage by a mechanical-double faced seal with combined spring system for the upper and lower portion. The lower wearing faces shall be silicon carbide. The upper faces shall be carbon and hardened stainless steel. Elastomers shall be viton.

b. On pump applications below 13 horsepower, two separate mechanical seals shall be provided, arranged in tandem. The upper seal shall have a hardened stainless steel rotating face and carbon stationary face. The lower seal shall incorporate silicon carbide on both the rotating and stationary faces. Cage and springs shall be of stainless steel and elastomers of viton.

c. Each silicon carbide or stainless steel seal face shall be lapped to a flatness tolerance not to exceed one-half light band or 5.8 millionths of an inch, as measured by an optical flat and monochromatic light. The rotation faces must be of double floating and self-aligning design to insure full-face contact at all times, even during periods of shock loads that will cause deflection, vibration and axial or radial movement of the pump shaft.

d. The rotating seal faces shall be lubricated from an oil filled reservoir between pump and motor; the oil serving as both lubricating and a cooling media. The reservoir shall have separate oil fill and drain plugs to insure accuracy when measuring lubricant level and for ease of maintenance.

e. Seal shall require no special maintenance or routine adjustment; however, shall be easily inspected or replaced. No seal damage shall result from operating the pump for short periods of time without liquid.

D. Pump Motor:

1. The electrical power to be furnished to the site will be 230 volts +/- 10%, 3 phase, 60 hertz. Control voltage shall not exceed 132 volts.

2. Motor:

a. The submersible pump motor shall be 4 HP operating 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 water tight enclosure. The motor shall conform to NEMA design Class B, and incorporate Class F insulation materials to withstand a continuous operating temperature of 155 degree C (311 Deg F). The pump and motor shall be capable of handling liquids with a maximum temperature of 40 deg C (104 deg F).

b. Motor shall be capable of sustaining a minimum of 10 starts per hour. The motor shall operate while only partially submerged and nor 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 lover shaft and rotor while under maximum radial and thrust loads. The bearings shall be permanently grease lubricated and sealed at the time of installation.

3. 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. A separate performance test shall also be conducted on each fully assembled pump to verify published head/capacity and power input.

d. The motor shall be protected from thermal and moisture damage. Thermal protection shall consist of three separate thermostatic switches embedded into the stator windings. Each switch shall open independently and terminate motor operation if temperature of the protected winding reaches the high temperature set point. 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. The thermal and moisture sensing devices shall be connected to the pump control panel by the contractor.

E. Automatic Discharge Connection:

1. 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.

2. 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 shall be designed with a integral 90 degree elbow, or adapt to a commercially available elbow for connection to the vertical discharge piping utilizing standard ANSI 125 lbs. Flanges. The base shall be coated with coal tar epoxy for corrosion resistance. The manufacturer shall provide all necessary drawings to insure proper installation and alignment of baseplate within the sump.

3. 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.

4. The contractor shall provide two lengths of schedule 40 (stainless steel) guide rail pipe for each pump. Upper guide rail pilots, and a lifting cable shall be furnished for each pump. Bottom pilots shall be an integral part of the baseplate for ease of installation and proper alignment.

a. Guide Rail System and Method of Operation:

1) 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.

2) The lifting cable shall consist of a stainless steel braided wire cable attached to the pump lifting bail. An eyelet shall be provided at the upper end of this cable for attaching to the wet well access frame.

3) All bolts, machine screws, nuts, washers, and lockwashers for complete assembly of access cover, guide rails, and discharge elbow shall be 304 stainless steel.

F. Valves and Piping:

1. Check Valve:

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 level 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 double o-rings. O-rings shall be easily replaceable without requiring access to interior of valve body. Valve shall be rated at 175 PSI water working pressure, 350 PSI hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.

2. Plug Valve:

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, tapered type. Valve body shall be semi-steel with flanged end connections drilled to 125 pound standard. Valve shall be furnished with a drip-

tight shutoff plug mounted in stainless steel or Teflon over phenolic bearings, and shall have a resilient facing bonded to the sealing surface. Valves shall have ports designed to pass 3" spherical solids.

3. Piping Valve:
   a. Flanged header pipe shall be centrifually cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and Class 533 thickness.

   b. Flanges shall be cast iron Class 125 and comply with ANSI B16.1.

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

   d. Bolt holes shall be in angular alignment within 1/2 –degree between flanges. Flanges shall be faced and a gasket finish applied that shall have concentric grooves a minimum of 0.01 inch deep by approximately 0.03 inch wide, with a minimum of three grooves on any given surface spaced a maximum of ¼ inch apart.

4. Piping and Valves:

   a. All pipes connected to the pump station shall be supported according to good commercial practice.

G. Station Finish:

All above ground station piping, control panel, and exposed steel framework shall be cleaned with industrial grade chemical cleaner. The prime coat shall be zinc based synthetic primer. The finish coat shall be an automotive grade white acrylic enamel.

H. Controls:

1. Panel Enclosure:

   a. The electrical control equipment shall be mounted within a dead front type control enclosure. The enclosure door shall be hinged and equipped with a neoprene gasket on the top and sides. It shall include a removable 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 a steel inner swing panel. The enclosure shall be mounted within the fiberglass valve enclosure. The control panel shall be equipped with vapor emission type corrosion inhibitors.

   b. All operating controls and instruments shall be securely mounted and shall be clearly labeled to indicate function.

2. Receptacle:
A duplex ground fault indicating utility receptacle 115 VAC, 60 hertz, single phase current shall be mounted through the inner swing panel of the control enclosure. Receptacle circuit shall be protected by a 15 ampere thermal-magnetic circuit breaker.

I. Pump Controller Components:

1. Mounting:

All pump controller components shall be of the highest industrial quality, securely fastened to a removable sub-plate with screws and lockwashers. The sub-plate shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component.

2. Circuit Breakers and Operating Mechanisms:

a. A properly sized heavy duty air circuit breaker shall be furnished for each pump motor, and shall have a symmetrical RMS interrupting rating of 10,000 amperes at 240 volts. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering.
b. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the inner door, with padlocks which permit the inner door to be opened only when circuit breakers are in the "OFF" position.

3. Motor Starters:

An open frame, across-the-line, NEMA rated magnetic motor starter shall be furnished for each pump motor. Starters of NEMA size 1 and above shall be designed for addition of at least two auxiliary contacts. Starters rated "0", "00", or fractional size shall not be acceptable. Power contacts shall be double-break and made of cadmium oxide silver. Coils shall be epoxy molded for protection from moisture and corrosive atmospheres. The starter assembly shall be equipped with a metal mounting plate for durability. All motor starters shall be equipped to provide under-voltage release and over-voltage protection on all three phases. Motor starter contacts and coils shall be easily replaceable without removing the motor starter from its mounted position.

4. Overload Relays:

a. Overload relays shall be of block-type, utilizing melting alloy type spindles, and shall have visual trip indication with trip free operation. Pressing the overload reset lever shall not actuate the control contact until such time as the overload spindle has reset. Resetting of the

overload reset lever will cause a snap-action control contact to reset, thus re-establishing a control circuit. Overload relays shall be of manual reset only and not convertible to automatic reset. Trip settings shall be determined by the heater element only and not by adjustable settings. Heater elements shall provide NEMA class 10 trip times and shall be selected in accordance with the actual motor nameplate data.

b. An overload reset pushbutton shall be mounted through the door of the control panel in such a manner as to permit resetting the overload relays without opening the control panel door.

5. Pump Motor Protection:

The pump control panel shall be equipped to terminate pump operation due to high motor winding temperature or the presence of moisture in the motor housing. If either event should occur, the motor starter will drop out and a mechanical indicator, visible on the inner door, shall indicate the pump motor has been shutdown. The pump motor shall remain locked out until the condition has been corrected and the circuit manually reset. Automatic reset shall not be acceptable.

J. Other Control Components:

1. Control Circuit:

The control circuit shall be protected by a normal duty thermal-magnetic air circuit breaker which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.

2. Pump Mode Selection:

Pump mode selector switches shall be connected to permit manual start and manual stop for each pump individually, and to select automatic operation of each pump under control of the liquid level control system. Manual operation shall override all shutdown systems, but not the motor overload relays. Selector switches shall be toggle type meeting Military Standards (MS) quality. Switch contacts shall be rated 15 amperes minimum at 120 volts non-inductive.

3. Alternator Relay:

Pump alternator relay shall be of electromechanical industrial design. Relay contacts shall be rated 10 amperes minimum at 120 volts non-inductive.

4. Pump Run Indicators:

Control panel shall be equipped with one pilot light for each pump motor. Light shall be wired in parallel with the related pump motor starter to indicate that the

motor is on or should be running. Run lights shall be equipped with lamps providing a minimum of 15,000 hours.

5. Elapsed Time Indicators:

Six elapsed time indicators (non-reset type) shall be connected to each motor starter to indicate the total running time of each pump in "hours" and "tenth of hours."

6. Sequence Selector Switch:

A switch shall be provided to permit the station operator to select automatic alteration of the pumps, to select pump number one to be the lead pump for each pumping cycle, or to select pump number two to be the lead for each pumping cycle.

7. Panel Heater:

The control panel shall be equipped with a panel heater to minimize the effects of humidity and condensation. The heater shall include a thermostat.

K. Wiring:

1. The control panel as furnished by the manufacturer shall be completely wired. The contractor shall field connect the power feeder lines to the main terminal block, final connections to the remote alarm devices, and the connections between the pump and the pump motor control.

2. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC).

3. Wire Indication and Sizing:

a. Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be of 16 gauge minimum, type MTW or THW, 600 volts. Wiring in the conduit shall be 14 gauge minimum. Motor branch wiring shall be 10 gauge minimum.

b. Motor branch conductors and other power conductors shall not be loaded above 60° C temperature rating, on circuits of 100 amperes or less. On circuits over 100 amperes, the load shall not exceed 75° C temperature rating. Wires shall be clearly numbered at each end in accordance with the key shown on the electrical diagram. All wire connectors in the control panel shall be of the ring tongue type with nylon insulated shanks. All wires on the

sub-plate shall be bundled and tied or enclosed in control panel plastic raceway.

4. Wire Bundles:
Wires connected to components mounted on the enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the door to swing to its full open position without undue stress or abrasion on the wire or insulation. Bundles shall be held in place on each side of the hinge by mechanical fastening devices.

5. Grounding:

a. The pump control manufacturer shall provide a main ground lug and power type terminal blocks for each pump motor on the enclosure back plate. The mounting surface of all ground connections shall have any paint removed before making final connections.

b. The contractor shall make the field connections to the main ground lug and each pump motor in accordance with the National Electric Code.

6. Equipment Marking:

a. A permanent corrosion resistant name plate(s) shall be attached to the control and include the following information:

1) Equipment Serial Number
2) Supply voltage, phase, and frequency
3) Current rating of the minimum main conductor
4) Electrical wiring diagram number
5) Motor horsepower and full load current
6) Motor overload heater element
7) Motor circuit breaker trip current rating
8) Name and location of equipment manufacturer

b. Control components shall be permanently marked using the same identification shown on the electrical diagram. Identification label shall be mounted adjacent to the device.

c. Switches, indicators, and instruments shall be plainly marked to indicate function, position, etc. Marking shall be mounted adjacent to and above the device.

L. Liquid Level System: (Mercury Level Switches)

1. Type:

The level control system shall be the mercury switch float type, incorporating floats secured to a vertical pipe in the wet well. Rising and falling liquid level in the wet well causes switches within the floats to open and close, providing start and stop signals for the level control components.

2. Sequence of Operation:

The level control system shall start one pump when the liquid level in the wet well rises to the "lead pump on level". When the liquid is lowered to the "pump off level", the system shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level rise to the "lag pump on level", the system shall start the second pump so that both pumps are operating to pump down the well. Both pumps shall stop at the same "off" level.

3. Automatic Pump Alternation:

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. Float Switches:

Pump station manufacturer shall furnish five float switch assemblies for installation by the contractor. Each switch assembly shall contain a mercury-type switch sealed in a polypropylene housing, and not less than 20 feet of cable. Station manufacturer shall also furnish polypropylene mounting hardware for switch assemblies. Sufficient length of non-corrosive pipe for mounting switch assemblies in the wet well shall be furnished by the installing contractor.

5. Circuit Design:

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

6. High Water Alarm:

Pump station manufacturer shall furnish a separate float switch assembly, and a magnetic switch for high water alarm function. Should the wet well level rise to the high water alarm level, the float switch assembly shall energize a magnetic switch. The magnetic switch shall complete a 115 volt AC circuit for an external alarm device. A mechanical indicator, visible on the front of the control panel door, shall indicate that a high wet well level exists. The magnetic switch shall maintain the alarm signal until the wet well level has been lowered and the circuit has been manually reset.

7. Low Water Alarm:

The level control shall be equipped with an additional float switch to alert maintenance personnel to a low liquid level in the wet well. In the event that the wet well liquid reaches a preset low water alarm level, the low water output relay shall energize a magnetic switch. The magnetic switch shall complete a 115 volt AC circuit for an external alarm device. A mechanical indicator, visible on the front of the control panel, shall indicate that a low wet well level exists. The magnetic switch shall maintain in the alarm signal until the cause for the low wet well level has been corrected and the circuit has been manually reset. A low liquid level condition shall disable both pump motors. When the wet well rises above the low level point, both pump motors shall be automatically enabled.

8. Alarm Horn (External):

The pump package shall be supplied with one 115 volt AC weatherproof alarm horn with a conduit box and mounting fixtures. The components shall be designed in such a manner as to permit shipped loose for field mounting by the contractor.

9. Winter/Summer Timer:

The pump station shall have a "winter /summer" timer to turn the pumps on at timed intervals during periods of low flows.

M. Manufacturer's Responsibilities:

1. Operational Test:

a. The pumps, motors, and controls will each be given an independent operational test in accordance with the standards of the Hydraulic Institute. Recordings of the test shall constitute the correct performance of the equipment at the design head, capacity, and rated speed and horsepower as specified herein.

b. Upon request from the engineer, the engineer or his representative shall witness the operation test at the manufacture's facility or other location designated by the manufacturer.

2. Installation Instructions:

Installation of pumping unit and unrelated appurtenances shall be done in accordance with written instructions provided by the manufacturer.

3. Operation and Maintenance Instructions:

a. The submersible pump manufacturer shall supply a complete set of comprehensive written instructions to enable an operator to properly operate and maintain the equipment supplied. Content of the instructions shall assume the operator is familiar with pumps, motors, piping, and valves, but that he has not previously operated and/or maintained the exact equipment supplied.

b. The instructions shall be prepared as a system manual applicable solely to the pump equipment and related devices supplied by the manufacturer, as specified herein. Instructions for any equipment for which the manufacturer has not supplied, but has made mounting or other provisions, shall be provided by others.

c. Operation and maintenance instructions which are limited to a collection of component manufacturer's literature without overall pump station continuity shall not be acceptable.

d. Operation and maintenance instructions shall be specific to the equipment supplied in accordance with these specifications. Instruction manuals applicable to many different configurations of pump stations, and which require the operator to selectively read portions of the manual shall not be acceptable.

4. Manufacturer's Ability to Perform:

a. Upon request from the engineer, the pump manufacturer shall provide proof of financial security relative to performance and ability to meet delivery schedules.

b. When requested by the engineer, the pump manufacturer shall also provide evidence of facilities, equipment, and expertise required to produce the equipment specified herein.

5. Manufacturer's Warranty:

The pump manufacturer shall warrant equipment supplied to be of quality construction, free of defects in material and workmanship. The written warranty shall indicate specific parts and labor covered, on a prorated basis, for a period of 5 years or 10,000 hours from date of shipment for permanent municipal installations.

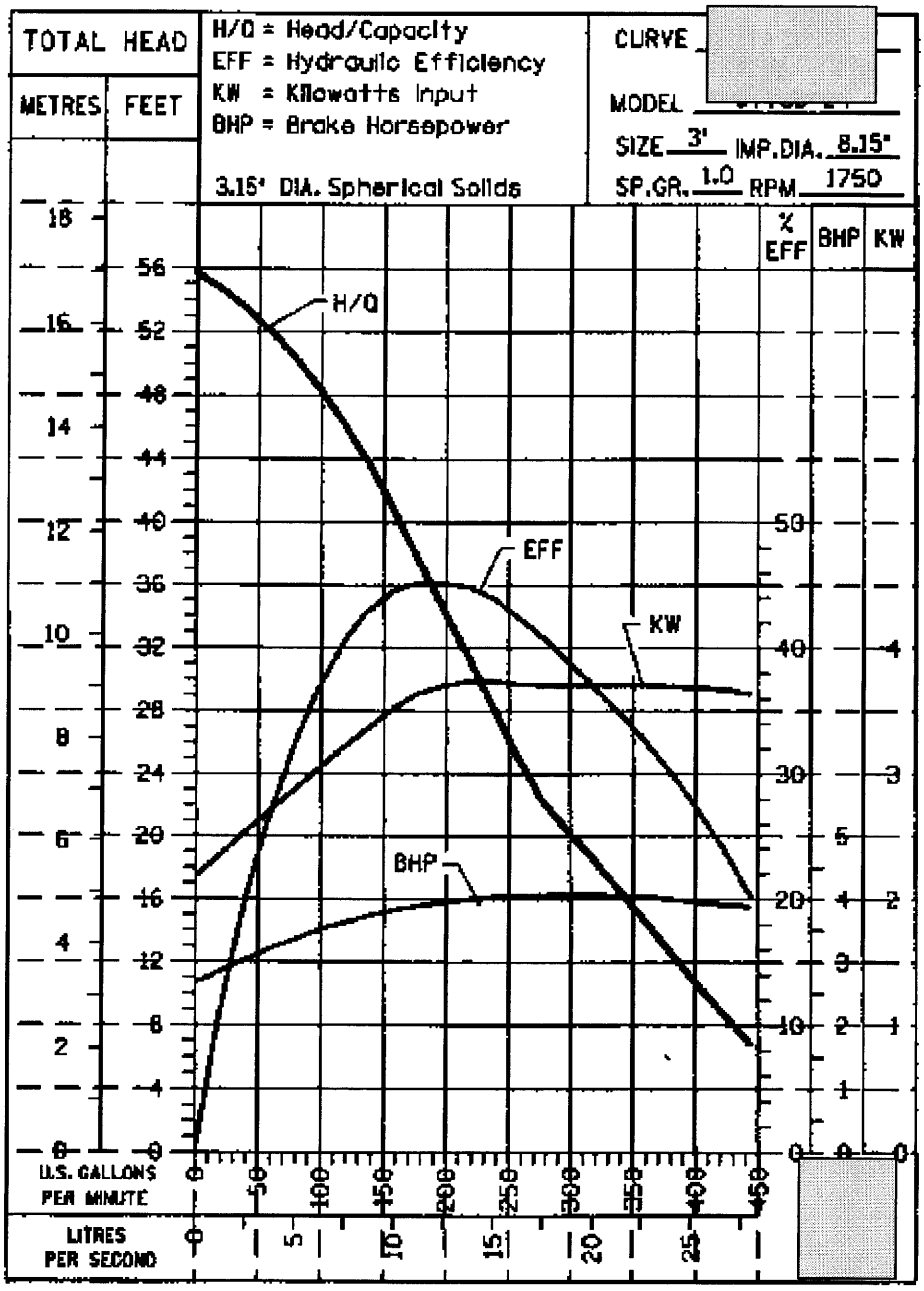
N. Basis of Payment

The work completed will be paid for at the contract lump sum price for "Install Duplex Factory-Built Submersible Pump Station". Such price and payment will be full compensation for all materials, labor, and incidentals necessary to complete the work as required.

6. PUMP STATION SITE WORK

At the appropriate phase of construction and in coordination with the installation of the pump station and its components indicated in item 5 above, the Contractor shall grade the site according to the plans and ensure stormwater will leave the site. Approximately 110 CY of fill material will be required to grade the site as indicated on sheet UC-8 of the Utility Construction Plans. The contractor shall place approximately 48 CY of compacted ABC to a depth of 6 inches to the limits shown on plan sheet UC-8 and indicated by "Limits of Gravel Apron" and "New Gravel Road from Hwy 70". The Contractor shall also place approximately 128 feet of chain link fence around the pump station site with a minimum height of 8 feet and shall include 3 strands of barbed wire at the top. The fence will include a 12 foot wide double swing gate. The Contractor will also install, or coordinate the installation of, a dusk to dawn area light. The Contractor will be responsible for coordination with the power company and all connection fees associated with the installation of the area light.

The work completed will be paid for at the contract lump sum price for "Pump Station Site Work". Such payment will be full compensation for all materials, labor, grading, fencing, gates, lighting, yard drainage piping, gravel, and incidentals necessary to complete the work as required.



Pump Performance Curve

PROJECT SPECIAL PROVISIONS
Utility

UTILITIES BY OTHERS:

General:

The following utility companies have facilities that will be in conflict with the construction of this project.

A) Bell South – Telephone and Fiber Optic
B) Duke Energy Corp. - Power (Distribution)
C) Time Warner Cable – Cable TV
D) Piedmont Natural Gas Company

The conflicting facilities of these concerns will be adjusted prior to the date of availability, unless otherwise noted and are therefore listed in these special provisions for the benefit of the Contractor. All utility work listed herein will be done by the utility owner. All utilities are shown on the plans from the best available information.

The Contractor's attention is directed to Article 105-8 of the Standard Specifications.

Utilities Requiring Adjustment:

A) Bell South – Telephone and Fiber Optic Cable

1) Bell South will abandon its underground telephone and fiber optic lines within the project limits as shown on Utilities by Others Plans by May 15, 2005.

2) Contact person for Bell South is Mr. Steve Mode 704-638-3566.

B) Duke Energy Corp. - Power (Distribution)

1) Duke Energy Corp. will relocate its lines and poles to the locations noted on the Utilities by Others Plans by March 31, 2005.

2) Contact person for Duke Energy Corp. is Mr. David Osborne 704-664-6844.

C) Time Warner Cable TV

1) Time Warner Cable TV will abandon its underground lines by April 15, 2005.

2) Contact person for Time Warner Cable TV is Mr. Tom Ralph 704-378-2856.

D) Piedmont Natural Gas Company

1) The Contractor shall provide a one (1) week notice to Piedmont Natural Gas Company that Piedmont Natural Gas Company's facilities are in conflict with proposed construction and allow Piedmont Natural Gas Company one (1) week to make the necessary adjustments in each area of conflict

2) The Contact person for Piedmont Natural Gas Company is Mr. David Billingsley 704- 638-3566.