

SECTION 15161
SUPPLY CONTRACT
PUMPING EQUIPMENT
FOR WAHPETON, ND

INDEX

<u>PARAGRAPH</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
PART 1	GENERAL	
1.1	SCOPE	15161-1
1.2	APPLICABLE PUBLICATIONS	15161-1
1.3	SUBMITTALS	15161-2
PART 2	PRODUCTS	
2.1	GENERAL REQUIREMENTS	15161-3
2.2	MATERIALS	15161-4
2.3	PORTABLE PUMPS	15161-4
2.4	SPECIAL TOOLS	15161-7
PART 3	EXECUTION	
3.1	FABRICATION AND MACHINING	15161-7
3.2	FACTORY TEST	15161-8
3.3	SHIPPING AND DELIVERY	15161-10
3.4	WARRANTY	15161-11

SECTION 15161

PUMPING EQUIPMENT

PART 1 GENERAL

1.1 SCOPE: This section covers the supply and delivery of portable pumping equipment for Wahpeton, North Dakota.

1.2 APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this section to the extent referenced:

1.2.1 American Society for Testing and Materials (ASTM):

- A 27-93. Steel Castings, Carbon, for General Application.
- A 36-94. Structural Steel.
- A 48-94. Gray Iron Castings.
- A 106-93. Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service
- A 108-93. Steel Bars, Carbon, Cold Finished, Standard Quality.
- A 123-97. Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products
- A 193-94. Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
- A 242-98. Standard Specification for High Strength, Low Alloy, Structural Steel.
- A 276-98. Stainless and Heat-Resisting Steel Bars and Shapes
- A 516-96. Standard Specification for Pressure Vessel Plates, Carbon Steel, For Moderate and Lower Temperature Service
- A 564-92A. Hot-Rolled and Cold-Finished Age-Hardening Stainless and Heat-Resisting Steel Bars and Shapes.
- A 576-90B. Steel Bars, Carbon, Hot Rolled, Special Quality.
- A 588-97. Standard Specification for High Strength, Low Alloy, Structural Steel
- A 668-91. Steel Forgings, Carbon and Alloy, for General Industrial Use.
- B 148-92A. Aluminum-Bronze Sand Castings.
- B 584-91A. Copper Alloy Sand Castings for General Applications.

1.2.2 American Society of Mechanical Engineers (ASME):

- B4.1-94. Preferred Limits and Fits for Cylindrical Parts.
- B16.5-96. Pipe Flanges and Flanged Fittings.

1.2.3 Hydraulic Institute (HI):

- HI 1.1-1.5 Standards for Centrifugal Pumps, 1994.
- HI 1.6 Centrifugal Pump Tests, 1994.

1.3 SUBMITTALS: Government approval is required for submittals with a "GA" designation. Submittals having an "FIO" designation are for information only. The following shall be submitted:

1.3.1 Shop Drawings, GA: Shop drawings, including catalog cuts and manufacturer's data, shall be submitted for approval. Shop drawings shall be neat, legible, and of sufficient size so as to be easily read and/or reproduced. The following items shall be submitted:

- a) Outline drawings of proposed pumps showing all pertinent dimensions and outline drawings of trailer unit. A listing of previous pumps produced and their installation locations shall be furnished. A description of the pump service facility and location shall be submitted. Provide data showing maximum angle of pump intake in relation to the drive unit.
- b) Diesel engine specifications and drawings including horsepower, torque, and speed ratings. Include details on the control panel and monitoring system. Include details on the fuel tank.
- c) The proposed coating (painting) systems and procedures for the pumps, trailers, and components.
- d) Factory certified pump capacity-head curves shall be provided with the brake horsepower (BHP) and the net positive suction head required (NPSHR) requirements presented; operating points shall be indicated. Efficiency data shall be plotted.
- f) Warranty. A copy of the warranty for each pump provided shall be submitted. A copy of the extended warranty for the diesel engine shall be submitted, separately.
- g) Factory Testing. Location of factory test facility shall be provided. Factory test data shall be submitted as specified in Paragraph: FACTORY TEST.
- h) Long term storage requirements of the pumping units.
- i) Qualifications of pump start up personnel.

1.3.2 Assembly Instructions (GA): The Contractor shall submit five copies of a printed and bound manual describing the procedures for set up and assembling the pumps. The proposed manuals shall be submitted with the pump shop drawing submittals.

1.3.3 Operation And Maintenance Manual (GA): The Contractor shall submit, prior to delivery of any pumps, manuals containing complete information in connection with the operation, lubrication, adjustment, routine and special maintenance, disassembly, and repair of the pumps. The manual shall also have a listing of special tools required for working on the pumps. Comprehensive as-built drawings, photographs, factory test results, and sketches of the pumps shall be included. The manual shall include complete diagnostic information on the pumps and all approved shop drawing submittals on the pumps. Include a copy of the pump warranty in the Operation and Maintenance manual. Include requirements for long term storage of the pumping units.

1.3.3.1 Parts list: The operation and maintenance manual shall have a complete parts list for the pumps. The list shall clearly show all details and parts, and all parts shall be adequately described and have identification markings and include sources for all parts.

1.3.3.2 Manuals shall be made up with hard cover post type binders or 3-ring binders and printed on 8-1/2 inch by 11 inch high quality paper with indexed, tabbed section dividers. Large sheets shall be neatly folded and installed with post hole reinforcements such that sheets can unfold without need to open binder posts. Drawings, sketches, and parts lists incorporated in the manual may be reduced to page size provided such reductions are clear and easily legible: otherwise they may be folded into the manual.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS: The work under this contract shall consist of providing complete mobile, hydraulic pumps capable of providing 18,000 USGPM against a total head of 20' feet. A total of two pump units shall be provided under this contract.

2.1.1 Standard Products: All pumping units (complete mobile pump stations) supplied shall be the product of a pump manufacturer who has produced at least 50 units required under this contract or 50 units of a similar size pump (within 20% of the capacity and head). Half of these units shall have been operating in the United States for at least five years prior to the contract award date. A record of this shall be furnished as a shop drawing. All pump units furnished under this supply contract shall be from the same manufacturer.

2.1.2 Service Availability. The pumps furnished shall be supported by a service organization located within the continental United States. This information shall be provided in a shop drawing.

2.1.3 Nameplates: Each major item of equipment shall have the manufacturer's name, address, type/style, model, serial number, and catalog number on a plate secured to the item of equipment. Nameplates shall be made of corrosion resisting metal with raised or depressed lettering on a contrasting colored background.

2.1.4 Instruction Plates: As necessary, each item of equipment shall be equipped with suitably installed instruction plates including warnings and cautions describing special and important procedures to be followed during starting, operating, and servicing the equipment. The plates shall be made of corrosion resisting metal with raised or depressed lettering on a contrasting colored background.

2.1.5 Factory Test Location. Factory testing facility shall be in the continental United States. Proposed testing facility shall be submitted as a shop drawing.

2.2 MATERIALS:

2.2.1 Materials not specifically described shall, as far as practicable, conform to the latest approved industry standard(s) covering the appropriate class or types of materials.

2.2.2 Designated items shall conform to the following:

<u>Item</u>	<u>Requirements</u>
Cast Iron	ASTM A 48, Class No. 30A, 30B and 30C
Cast Steel	ASTM A 27, Grade 65-35, annealed
Copper Alloy Castings	ASTM B 584, Alloy No. C93700 or C86300
Structural Steel	ASTM A 36
Stainless Steel	ASTM A 276
Bars and Shapes:	
Steel Plates, Pressure Vessel	ASTM A 516, Grade 55
Steel Forgings	ASTM A 668, Class F
Steel Bars	ASTM A 576 or A 108
Stainless Steel Bars	ASTM A 564

2.3 PORTABLE, HYDRAULIC DRIVEN PUMPS:

2.3.1 General: Pumping units shall be self-contained, mobile, hydraulic type pumps. Pumping units shall be trailer mounted complete with hitch, diesel engine, hydraulic pump, discharge line, and fuel tank. A total of two pumping units are required. The trailer unit shall be United States Department of Transportation (D.O.T) highway rated and include lights, electric brakes, and steerable front axle. Pumping units shall be designed for cold weather operation and shall include diesel engine oil heater and hydraulic oil heater. The pumping unit shall be lowered into place with an electric or hydraulic winch. Heavy duty stabilizers shall be provided on the four corners of each pumping unit. Pump unit shall be designed to operate at a 45 degree angle from the drive unit. Fuel tank on the pump unit shall provide 24 hours of operation.

2.3.2 Pump: The propeller pump to be furnished under this specification shall be hydraulically driven, axial flow, completely submersible type consisting of propeller bowl assembly, hydraulic motor assembly, suction bell assembly, discharge tube and head. Pumps shall be 24" size and capable of variable speed operation. Pumps shall be manufactured in accordance with HI Standards 1.1 - 1.5.

2.3.2.1 Bowl Assembly: The propeller bowl assembly section shall be single stage, shop assembled unit consisting of Venturi housing, stainless steel liner, propeller shaft and bearings and stainless steel or aluminum bronze propeller blades per ASTM B148. The Venturi shall be manufactured from alloy steel conforming to ASTM A242, A588 Grade A (Cor-Ten equivalent) of minimum 1/2" thickness and shall be fitted with a machined, removable housing liner of ASTM A276 Type 316 stainless steel of not less than 3/16" thickness and a liner length of not less than the pitch length of the propeller. Alternatively, a solid stainless steel wear ring manufactured from ASTM A276, Type 316 steel can be furnished. Wear ring shall be a one-piece assembly and easily removable. The pump propeller blades shall be manufactured using ASTM A276 Type 316 or 304 stainless steel or cast aluminum bronze. The propeller shall be statically and dynamically balanced and secured firmly to the taper shaft with alignment key and locknut. Vibration limits for the propeller and pump shall conform to Hydraulic Institute Standards. The propeller shaft shall

be machined from high tensile strength, solid stainless steel bar stock and shall conform to ASME Code for transmission shafting to transmit full load torque and shall have additional safety factor for shock loads. The propeller shaft shall be supported and contained in place by three angular contact bearings to prevent axial and radial misalignment of vibration of the shaft. The shaft bearing shall be lubricated by low pressure hydraulic oil and the bearing shall have a L_{10} life of 50,000 hours. The propeller shaft and bearing assembly shall be contained in a machined bearing housing centrally supported by flow straightening vanes in the propeller bowl assembly and shall be protected against sand particle intrusion with bronze restrictor rings. All bolts and nuts shall be stainless steel.

2.3.2.2 Suction Bell: The suction bell assembly shall be manufactured from cast iron or cast alloy steel, 1/4" thick and conforming to ASTM A242, (Cor-Ten equivalent) and shall have a minimum inlet diameter of 1.5 times the propeller diameter. The inlet bell shall be constructed so as to minimize vortex formation by maintaining equal pressure and velocities across the entrance. The entrance shall be manufactured with cross bars placed across the bell mouth to prevent entrance of large sticks, logs or debris. Maximum spacing shall be 2".

2.3.2.3 The discharge tube and head assembly material shall be abrasive resistant steel conforming, to ASTM A242, (Cor-Ten equivalent) with a minimum wall thickness of 1/4". The complete pump assembly shall be painted inside and outside with black Bitumastic enamel equal to Zophar Triple A or other approved paint system. Pipe flanges shall be in accordance with ASME B16.5.

2.3.3 Hydraulic Motor: The hydraulic motor assembly section shall be a factory assembled unit, consisting of the assembly housing, hydraulic motor, propeller shaft coupling, inlet and outlet port pipe connections. The hydraulic motor shall be direct coupled to the pump drive. The assembly housing shall be shop manufactured of 3/8" thick alloy steel conforming to ASTM A242, (Cor-Ten equivalent) and shall be fitted with connecting flanges for assembly with the pump bowl assembly and the discharge pipe assembly. The housing assembly shall contain a hydraulic motor which shall be coupled to the propeller shaft by means of a jaw type coupling to permit positive torque transmission and shaft alignment. The hydraulic motor, bearings, shaft and coupling shall be totally enclosed and high pressure sealed to permit totally submerged operation in any position. The hydraulic motor shall be provided with inlet and outlet port pipe connections extended from hydraulic motor through the assembly housing and shall terminate with female quick coupling connections on each end. In addition, the hydraulic motor will be encased in a 304 stainless steel housing to prevent corrosion. Alternatively, the hydraulic motor can be coated with mastic or other paint system as approved. The hydraulic motor can be mounted on the discharge side of the propeller or the suction side of the propeller.

2.3.4 Hydraulic pump shall be a fixed displacement vane type unit capable of continuous operating and shall produce a minimum output of 166 hp when operated at 1,800 RPM. Pump shall be capable of operating at 3,000 PSI on a continuous basis.

a) Hydraulic accessories shall include but not be limited to: a full flow oil filter, oil heater, adjustable pressure relief valves at each pump outlet, pressure and temperature gauges, quick connect couplings and safety shutdown controls for low oil pressure and high oil temperature. All systems shall be assembled, piped and tested prior to delivery to the site.

2.3.5 Diesel Drive Unit: The mobile pump shall include an individual diesel power unit. It shall be manufactured and tested at the same factory as the pumping units so as to provide a single source of responsibility and for the proper coordination of all components of the system. The unit shall consist of an oil

reservoir, oil heater, heavy duty battery, fixed displacement hydraulic pump, required diesel engine (continuous duty rating) and inter-connecting piping, valves and accessories, and radiator. Radiator fluid shall be a 50/50 mix of water and anti-freeze. Anti-freeze shall be as recommended by the diesel engine manufacturer. In addition, the unit shall be supplied with the specified components. A fuel tank shall be integral with the pump unit and trailer. The fuel tank shall be sized to provide 24 hours of continuous operation.

a) The diesel engine shall be manufactured by John Deere, Caterpillar, Cummins, or other approved equal manufacturer. The diesel engine shall be rated at 225 BHP at 1,800 RPM continuous duty rating. The unit shall be fully equipped with radiator, batteries and cable, safety shutdown switches and exhaust system with residential type muffler or sound attenuating system. Power unit shall be factory assembled mounted with pump on running gear. High output alternator shall be provided to charge the system batteries and provide control power during pumping operations.

2.3.6 Hydraulic Piping and Hose: Hydraulic lines connecting the power unit to the pumping unit shall be a combination of steel pipe and reinforced hose and shall be installed as specified herein. Supply pipe shall be ASTM-A106 P.O.C., Schedule 80 seamless steel pipe, and return pipes shall be ASTM-A106 P.O.C, Schedule 40 seamless steel pipe. All reinforced supply hose shall be double wire braid reinforcement and shall have minimum safe working pressure of 2,500 PSI. All pipe fittings shall be socket weld type (with socket weld to thread fittings at conversion point of pipe to reinforced hose). Quick connect couplings shall be provided at connection points of drive unit and water pump. Both supply and return piping shall be sized by the pump manufacturer and internal velocities shall not exceed 15 fps. Hose lengths shall be sufficient for operation of unit and shall be connected at all times to the pump head.

2.3.7 Mobile Unit: Units shall be equipped with sufficient safety equipment, lights, brakes, etc., to allow for towing on public roads. Tires shall be radial and at least 8 ply. A hydraulic oil reservoir of minimum 180 gallons shall be mounted on unit. The bottom of the fuel tank will have a road clearance not less than that of the back axle of mobile trailer. The trailer coupler size shall be coordinated with the Government in order to match the requirements of the City of Wahpeton. Provide heavy-duty jack stabilizers on each corner of the pumping units.

a) The unit shall be equipped with a hydraulic operated winch, crane, boom and track assembly of sufficient capacity of such that one man may raise and lower pump intake into the water.

b) Two (2), (50) foot long, sections of flexible discharge hose, 24 inch nominal diameter, shall be provided for each pumping unit including all connecting devices (for a total of 4 hose sections). One of the hose sections for each pump unit shall be a spare and one section shall be stored on the pumping unit. Each hose section shall terminate in a "King" nipple for connection to a 24" ductile iron pipe section.

c) The unit shall be designed and built to have an anti tipping moment safety factor not less than one and a quarter when pumping under maximum design conditions and calculations shall be readily available upon request showing the weights, loading and tipping moments of the unit during installation and operations at 3 intervals.

2.3.8 Control Panel: Panel shall include tachometer, alarm system, diesel engine temperature gage, run-time meter, hydraulic system temperature gage, and starting system. Control panel shall be lighted.

2.3.9 Nuts and bolts: All bolts and nuts used in assembling each pump and its supporting members shall be of stainless steel per ASTM A 276 or A 193 or as approved. Stainless steel cap screws conforming to ASTM A 276, Type 316, and used with silicon bronze nuts or stainless steel nuts. If stainless steel nuts are utilized, assemble with anti-sieze compound.

2.3.10 Painting: Pumping units shall be painted with the manufacturer's standard paint system as approved. The trailer unit as a minimum shall be galvanized coated and then painted with two coats of enamel paint.

2.3.11 Controls and Alarms: The following alarm features shall be provided. On activation of any of the alarms, the drive unit shall automatically shut down.

- a) Diesel engine low oil pressure.
- b) Hydraulic system low oil pressure.
- c) Hydraulic system high oil temperature.
- d) Diesel engine high oil temperature.
- e) Diesel engine high water temperature.

2.3.12 Flood lights: Flood lights shall be mounted on each pump drive unit. Provide a total of two lights per drive unit.

2.4 SPECIAL TOOLS and SPARE PARTS:

2.4.1 The Contractor shall furnish all specials tools that are unique to the pump for proper installation, testing, operation, and/or maintenance. Special tools shall be delivered with the pumps. Spare parts shall include one each of the following:

- 1) diesel oil filter
- 2) hydraulic oil filter
- 3) pump wear rings if required

PART 3 EXECUTION

3.1 FABRICATION AND MACHINING:

3.1.1 Machine Work: All tolerances, allowances, and gauges for metal fits between plain, non-threaded cylindrical parts shall conform to ASME B4.1 for the class of fit required.

3.1.2 Castings: Each casting shall have a mark number cast or stamped upon it. In addition, each casting weighing more than 500 pounds shall have the heat number cast or stamped upon it. Warped or otherwise distorted castings that are oversize to an extent that could interfere with proper fit with other parts of the machinery or structure will be rejected. Cracked castings of non-weldable materials (i.e., cast iron, etc.) will be rejected. Repairs to castings shall not be made without prior approval.

3.1.2.1 Casting repair: Castings shall have all unsound material or defects removed by chipping, machining, air-arc gouging, or grinding; and shall be repaired by welding. Welding repairs shall conform to the welding procedures which shall have been submitted and approved for the type material involved. Stress relief annealing, where required, shall be accomplished prior to final machining.

3.1.3 Bolted Connections: Bolts, nuts, and washers shall conform to the applicable requirements of PARAGRAPH: MATERIALS AND MATERIAL STANDARDS for the types required.

3.1.4 Holes for fitted bolts shall be match-reamed or drilled in the shop. Holes shall be smooth, perpendicular to the member, and cylindrical. Burrs resulting from reaming shall be removed. The threads shall be entirely outside of the holes. The body diameter of the bolt shall have tolerances as recommended by ASME B4.1 for the class of fit required. Fitted bolts shall be fitted in reamed holes by selective assembly to provide an LN-2 fit.

3.1.5 Holes for high-strength bolts shall be accurately spaced, perpendicular to the member, and cylindrical. If the thickness of the material is greater than the diameter of the bolt, the holes shall be either drilled full size or shall be sub-drilled and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting done during assembly shall not distort the metal or enlarge the holes. For slight mismatching, reaming to a larger diameter for the next standard size bolt will be allowed.

3.1.6 Metallic Coating: Zinc coatings shall be applied in a manner, thickness, and quality conforming to ASTM A 123. Where the zinc coating is destroyed by cutting, welding, or other causes, the affected areas shall be re-galvanized to the thickness and quality required for the original zinc coating.

3.2 FACTORY TEST:

3.2.1 Pump Testing: Both furnished pumps shall be factory tested. Each pump and hydraulic power transmission system shall be factory pressure tested statically to maximum design PSI for a minimum of ten minutes at design operating temperatures with every plumbing connection checked for possible leaks. In the event of leak is observed or detected, it shall be repaired and the test repeated until all are eliminated.

3.2.2 Test Setup: The Contractor shall submit for approval, within 45 calendar days after the contract notice to proceed, a description of the proposed test setup and proposed test procedures: this information must be submitted prior to the construction of the proposed test setup. The submittal shall include dimensioned drawings and cross-sectional views of the setup and pump, with the location of all instrumentation and the point of their connection indicated. Each instrument shall be described in detail giving all data applicable such as manufacturer's name, type, model number, the certified accuracy, coefficient ratios, specific gravity of manometer fluid to be used, and smaller scale divisions. When necessary for clarity, a sketch of the instruments or instrument arrangements shall be presented.

a) The factory test of each pump unit shall be witnessed by the Government. All testing shall be in accordance with Hydraulic Institute Standards, HI 1.6. Pump discharge and head testing shall be conducted in an open sump at the manufacturer's testing facility in accordance with the Hydraulic Institute Standards and in the presence of a registered professional engineer. Test conducted flow and head at design point.

b) No pumps shall be delivered to the project work site until the factory testing has been completed for that particular pump and the Government has accepted the factory test results. In the event the pumps fail to meet the requirements of the factory witness test, the Contractor shall be responsible for all costs related to any retesting required. This includes all costs incurred by the Government such as travel, per diem, and salary.

3.2.3 Instrumentation: Head measurements shall be made using either a direct reading water column, mercury-air, mercury-water, or a meriam fluid manometer. Vacuums shall be measured with either a mercury-air or a mercury-water manometer. Fluctuations shall be dampened sufficiently to permit the column gauges to be read to either the closest one-hundredth of one foot of water or Meriam fluid, or the closest one tenth of one inch of mercury.

3.2.4 Capacity shall be determined using a calibrated venturi flow meter or a long radius ASME flow nozzle: orifice plates shall not be used. The venturi or nozzle tube shall be connected to column gages equipped with dampening devices which shall permit the differential head to be determined to either the closest one-hundredth of one foot of water or Meriam fluid, or the closest one tenth of one inch of mercury. A magnetic flowmeter will be acceptable provided a calibrated accuracy within 2.5 percent or 50 gallons per minute can be demonstrated.

3.2.5 The diesel engine horsepower rating shall be determined from the manufacturers rating curve. Measure RPM of diesel engine during testing.

3.2.6 Performance Test: The test shall be sufficiently extensive and complete to demonstrate that the proposed pump operates without instability and complies with the required performance. Compliance with the contract requirements will be determined from the curves required below. The temperature of the water used for testing shall be approximately the same for all test runs.

3.2.7 Pump performance: The performance of the pumps shall be determined by a series of test points sufficient in number to develop a constant speed curve over the range of total heads, from 5.0 feet to 35.0 feet (or to shut off head) inclusive, for the speeds involved. Tests shall be made using specified heads and a suction water elevation above the pump. Head differentials between adjacent test points shall not exceed 2.0 feet. The propeller diameter shall be indicated on the pump curves. If the plot of the data indicates a possibility of instability in the head versus capacity curve, a sufficient number of additional points shall be made to clearly define the head-capacity characteristics.

3.2.8 Test results: The results of the tests shall be plotted to show total head, brake horsepower, net positive suction head required, and efficiency as ordinates; all plotted against the pump discharge in gallons per minute as the abscissa. Pump propeller diameter shall be noted. The above curves shall be plotted to a scale that shall permit reading head directly to five-tenths of one foot, capacity to 100 gallons per minute, efficiency to one percent, and power input to 2 horsepower. Net positive suction head required data may be based on original design data or previous test information.

3.2.9 Test Report: The Contractor, within 15 calendar days after receipt of approval of the witness test, shall submit three bound copies of a report completely covering the test setup and the performance tests. Each test report shall include as a minimum the following:

- (1) A statement of purposes of test, the project name, the contract number, and the design conditions. Where guaranteed values differ from the specified values, guaranteed values should be given.
- (2) A resume of preliminary studies if such studies were made.
- (3) A description of the pump. The information required under (2) above may be included here.
- (4) A description of test procedure used.

- (5) Complete sample computations.
- (6) A discussion of test results.
- (7) Conclusions.
- (8) Pictures: 6 color, 8 inch by 10 inch, with labels.
- (9) Copies of all recorded test data.
- (10) Curves showing performance of furnished pump.
- (11) Drawings of the test setup showing all pertinent dimensions and elevations; and a detailed, dimensioned, cross-section of the pump.

3.3 SHIPPING AND DELIVERY AND START UP SERVICES:

3.3.1 General. Contractor shall ship and deliver pumping units to Wahpeton, North Dakota. Contractor shall pay all costs associated with shipping and shall be responsible for unloading of the pumping units. Pumps shall be delivered to the City of Wahpeton maintenance building. The City of Wahpeton shall be responsible for storage of the pump units after delivery by the Contractor. The delivery schedule and exact location shall be coordinated with the Government. The Contractor shall provide as a shop drawing any long term storage requirements for the pumping units.

3.3.2 Packaging and Marking: The Contractor shall insure to have the pumps delivered as completely assembled as feasible in order to minimize site installation work.

3.3.3 Acceptance: Payment for pumping equipment shall be made upon acceptance at the designated point of shipment. Within five calendar days after delivery to the designated point of shipment, the pumps shall be inspected by the Government. The inspection shall include an accounting of the items delivered and a visual inspection to determine any possible damage during shipment. If this inspection reveals any defects or deviations from contract requirements which could render the items unsuitable for the use intended, the Contractor shall repair each such identified deficiency. In the event deficiencies cannot be acceptably corrected, the equipment will be subject to rejection.

3.3.4 Special Tools and Spare Parts: Special tools and spare parts shall be packed separately using the manufacturer's standard packing method as approved.

3.3.5 Packing Lists: Packing lists shall accompany all items shipped and be placed in moisture-proof containers securely fastened to the side of each item. Two copies of each packing list shall be submitted to the Government at least ten calendar days prior to each shipment date.

3.3.6 Start up Services: Pump manufacturer shall provide for final inspection and training on the pumps at the field site in Wahpeton, North Dakota. The Contractor shall make necessary adjustments to the control system prior to actual start-up tests. Start-up tests and demonstration shall be performed by the pump manufacturer's representative, and witnessed by the Government. Start up personnel shall be authorized by the pump manufacturer and trained in the complete operation of the portable pumps. The City of Wahpeton will set up the pumps in place prior to actual start up. Pump manufacturer representative shall train and instruct City of Wahpeton's operator(s) on operation of pumps for one 8-hour day.

3.4 PUMP WARRANTY

3.4.1 Each complete diesel pumping unit, including the diesel engine, shall be warranted for three years by the manufacturer against defects in material and workmanship, under normal use and service, from the date of acceptance. Warranty shall cover both parts and labor. Include all documentation in the Operation and Maintenance manual.

-- END OF SECTION --