SPECIFICATION
MOBILE WATER PUMP

A. GENERAL

The work under this contract shall consist of providing all equipment for mobile pump(s) capable of providing 500 liters / sec against a total head of 12m. The work under this section shall consist of providing all pumping equipment including the hydraulically driven axial or mixed flow mobile pump as specified herein. The manufacturer shall be ISO9001-2008 certified. Pumps shall be manufactured by MWI Corporation or pre-approved equal.

The substitution form enclosed must be returned two (2) weeks prior to bid opening for consideration of approval. The manufacturer shall furnish with the bid, guaranteed pump performance curves based on shop tests of pumps in accordance with procedures as specified by Standards of Hydraulic Institute. Curves shall be certified by a professional engineer, registered in the state where the tests are conducted and employed full time by the pump manufacturer. Any bid not including such curves shall be considered non-responsive and shall not be accepted

The pump and drive equipment to be furnished under this contract shall be made by a manufacturer regularly engaged in such work, and who has furnished like equipment specialties for at least five (5) similar installations which have been continuously operating successfully for not less than five (5) years.

Evidence of this experience and data on the equipment and its operation in those installations shall be made available to the ENGINEER at their request to determine whether the equipment and specialties offered meet the requirements of these specifications.

B. PUMP MATERIAL AND DESIGN

The propeller pump to be furnished under this specification shall be hydraulically driven, mixed flow type completely submersible type consisting of propeller bowl assembly, hydraulic motor assembly, suction bell assembly, discharge tube and head assembly.

1. The propeller bowl assembly section shall be single stage, shop assembled unit consisting of Venturi housing, stainless steel propeller bowl, propeller shaft with bearings, and stainless steel propeller blades. The Venturi shall be manufactured from alloy steel conforming to ASTM A36 of minimum 3/8" thickness and shall be fitted with a machined, removable propeller bowl of ASTM A276 Type 304 stainless steel of not less than 1/2" thickness. The pump propeller blades shall be manufactured using ASTM A304 stainless steel. The propeller shall be statically and dynamically balanced and secured firmly to the shaft with alignment key and locknut. 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 shockloads. 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 bearings shall be lubricated by low pressure hydraulic oil and the bearings 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 or other suitable means. An anti-reverse rotation mechanism is contained within the hydraulic system.

2. The suction bell assembly shall be manufactured from alloy steel, 1/4" thick and conforming to ASTM A36 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. The suction bell must be able to be removed and re-installed without the disassembly of the hydraulic lines.

3. The discharge tube and head assembly material shall be abrasive resistant steel conforming, to ASTM A36 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.

4. 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 assembly housing shall be shop manufactured of 3/8" thick alloy steel conforming to ASTM A36 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. The hydraulic motor shall be mounted on the discharge side of the propeller as to avoid excessive NPSH requirements, avoid clogging of intake and induce more efficient oil cooling. Suction side installations shall not be allowed.

5. All bolted connections shall be made with stainless steel nuts and bolts suitable for submerged applications.

C. DIESEL

The mobile pump shall be a diesel power unit as specified herein. 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 hydraulic oil reservoir, fixed displacement hydraulic pump, required diesel engine (continuous duty rating) and inter-connecting piping, valves and accessories. In addition, the unit shall be supplied with the specified components.

1. Hydraulic pump shall be a fixed displacement vane type unit capable of continuous operating and shall produce a minimum output of 148 hp when operated at 1,800 RPM. Pump shall be capable of operating at 3,000 PSI on a continuous basis.

2. The power source shall be a diesel engine capable of producing 148 BHP at 1,800 RPM.. 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.

3. Power unit shall be factory assembled mounted with pump on running gear. Hydraulic accessories shall include but not be limited to: a full flow oil filter, 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.

D. HYDRAULIC PIPING & 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 3000 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 of the size indicated on the drawings and internal velocities shall not exceed 20 fps. Hose lengths shall be sufficient for operation of unit and shall be connected at all times to the pump head during raising and lowering.

E. PUMP TESTING

1. 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.

2. Each pump and hydraulic power transmission system shall be factory pressure tested dynamically to maximum operating speeds, pressures and temperatures for a minimum period of 15 minutes. The dynamic test shall be conducted in a horizontal variable speed dynamometer that is capable of varying torque loads from 0 to maximum required horsepower as specified.

3. Full size factory testing shall be witnessed by engineer. All tests shall be in accordance with Hydraulic Institute Standards. 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. Model test will not be accepted.

F. MOBILE UNIT

Units shall be equipped with sufficient safety equipment, lights, brakes, etc., to allow for towing on public roads. A hydraulic oil reservoir of minimum 60 gallons shall be mounted on unit. A day fuel reservoir of 100 gallons shall be mounted on the unit. The bottom of the fuel tank will have a road clearance not less than that of the back axle of mobile trailer.

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.

One (1) (50) foot section of flexible discharge hose, 16 inch nominal diameter, shall be provided for each unit including all connecting devices. Storage for hose, when not in use, shall be provided on the unit.

Because of important safety considerations, 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.

G. INSTALLATION AND SUPERVISION

Pump manufacturer shall provide for final inspection and testing of the system and 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 engineer. Three (3) sets of operating and maintenance manuals and start-up procedures shall be provided. Pump manufacturer shall train and instruct owner's operator on operation of equipment for one 8-hour day.

H. WARRANTY

The hydraulic propeller pump system and controls, as described, shall be warranted for one year by the manufacturer against defects in material and workmanship, under normal use and service from the date of shipment from the factory.

I. MANUFACTURER'S QUALIFICATION

Qualification information required for evaluation:

Not later than two weeks prior to bid date all bidders not previously approved must submit for evaluation purposes, by certified mail the following data: (Note, if this information is not received, the bidder's proposal will not be acceptable and will be considered non-responsive.)

Name, address, phone number of pump manufacturer:

Number of years in business:

Length of time manufacturing pumps of this type:

Number of units of this type manufactured:

Location: _____

Size:_____

Discharge:_____

Owner & phone number:_____