PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install a Duplex MetroRail System as manufactured by the Metropolitan Pump Company, Romeoville, Illinois or approved equal. System shall include two submersible pumps, with sealing flanges, pump mounting plates, discharge elbow, upper and lower guide rail supports, lifting assembly, pump lifting chains with hooks, access frame with covers and wiring bracket installed in a concrete basin with piping and valves. The electrical controls shall consist of a NEMA-1 enclosure, dead front, with a separate removable sub-door control, mounted in a NEMA-3R, S.S. free standing traffic enclosure. Structure and dimensions are as shown on the plans.

1.2 EQUIPMENT RESPONSIBILITY

A. All controls, pumps, and motors shall be furnished by one equipment supplier. The equipment supplier shall have responsibility for the complete and proper operation of the pumping equipment, control equipment, and program as specified and furnished. The system supplier shall furnish 24 hour service for the complete system, and shall stock all parts used of the installation. Start-up services shall be included, and shall include operating instruction to the operators. The equipment shall be as manufactured and furnished by Metropolitan Industries, Inc., Romeoville, IL or approved equal.

PART 2 - WET WELL AND VALVE VAULT

2.1 General:

A. A concrete wet well basin and external valve vault shall be supplied by the contractor. The wet well shall have an inside diameter of 8 feet 0 inches and an inside height as shown on the plans. The valve vault shall be as shown on the plans. It shall also have an 18" dia x 18" deep sump pit with steel grate, and GFI outlet for use with the sump pump. The access frame and hinged covers shall be cast into each basin top. Pump mounting plates shall be bolted to basin bottom. Discharge piping from pump bases shall be mounted in the basin and extended through the basin wall.

2.2 Piping:

A. Piping in the basin shall be 4 inch flanged ductile iron pipe and shall terminate with a flange outside the basin wall for connection to the valves in an external valve vault. The valve vault shall include two (2) 4" wafer check valves and three (3) 4" DeZurik plug valves. One of the plug valves shall be for use with a by-pass riser and quick disconnect hose coupling for portable pump connection, as shown on the plans. Inlet or inlets into basin shall be for rubber boots for 6" inch inlet pipe, as shown on the plans. The pump guide rails shall be 2" stainless steel pipe. Intermediate guide rail supports shall be used if basin is more than 15 feet deep. Lift station discharge pipe shall be cast iron pipe.

2.3 Metal-To-Metal Rail System:

A. The rail system shall include a discharge base elbow, sealing flange with rail guide, upper guide bracket, stainless steel lifting chain, and stainless steel guide rails.

B. The discharge base elbow shall have mounted directly on the sump floor and sized according to the plans. It shall have a standard 125 lb flange, with machined face. The design shall be such that the pump to discharge connection is made without the need for any nuts, bolts, or gaskets. The base elbow shall also anchor the stainless steel guide rails.

C. The sealing flange/rail guide bracket shall be mounted on each pump discharge. It shall have a machined mating flange which matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by simple linear downward motion of the pump culminating with the entire weight of the pumping unit supported entirely by the base elbow.

D. The upper guide bracket shall align and support the two guide rails at the top of the sump. It shall bolt directly to the hatch frame and incorporate an expandable rubber grommet.

E. Each pump shall be provided with a stainless steel lifting chain, and be of sufficient length to extend from the pump to the top of the wet well. The access frame shall provide a hook to attach the chain when not in use. The lifting chain shall be sized according to the pump weight.

PART 3 - SUBMERSIBLE PUMP CONSTRUCTION:

3.1 GENERAL

A. The Each pump shall be of the sealed submersible type Model No. S4NX750 or approved equal. The pump shall be capable of handling raw, unscreened sewage with two port non-clog type impellers. Pump casing shall be fitted with bronze wear ring. Pump shall have two mechanical seals with oil chamber between the seals. Rotating seal faces shall be carbon and stationary seal faces to be ceramic. .

3.2 Motor

A. Pump motor shall be of the sealed submersible type with standard insulation for operation in high-dielectric oil to give better heat dissipation and longer bearing life. Motor stator shall be held in place with removable end ring so that it can be removed for repair without heating outer shell or using a press. Motor housing shall be filled with high-dielectric oil and no pressure balancing devices shall be used. Pump motor shaft shall be of 303 stainless steel. Pump shall be a standard production pump with attached rail guides and discharge lifting loads will come on the guide supports and not on the pump or motor housing. A lifting chain and hook shall be supplied for each pump. Each pump motor will be provided with heat sensing units which shall trip the starter if the motor overheats. Seal chamber shall be fitted with an electrode probe to detect water in the seal chamber.

3.3 Power Cord

A. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped sown to bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be fitted with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking

or capillary attraction. There shall be an additional epoxy compound potting area separating the motor housing from the cord cap assembly for added protection.

3.4 Operating Conditions:

A. Each pump shall have a capacity of 180 g.p.m. at a total head of 54 feet when operating at 1750 r.p.m. Pump motor shall be 7.5 HP, 3450 r.p.m., 3 phase, 230/460 volts, 60 Hz. The pump shall be Hydromatic Model S4N/S4NX, as supplied by Metropolitan Pump Company, Romeoville, IL or approved equal. Available voltage should be confirmed prior to order.

3.5 ACCESS FRAME AND COVER:

A. One (1) double door access frame assembly shall be supplied for the wet well and (1) single door access frame assembly shall be supplied for the valve vault. Access frame and covers shall be fabricated of aluminum and bolted to basin. Frame shall support guide rails and electrical wiring bracket. A separate hinged cover shall be provided for each pump. Cover shall be provided with lifting handle and safety latch to hold cover in the open position. Locking hasps shall be furnished for each cover.

3.6 ELECTRICAL CONTROL PANEL:

A. Control panel shall have a NEMA-1 enclosure and shall be dead front with separate removable inside sub panel to protect electrical equipment. A lock hasp shall be provided on outside door. A circuit breaker shall be provided for each pump, and a magnetic starter with 3 leg overload protection shall be supplied for each pump. An alternating relay shall be provided to alternate pumps on each successive cycle of operation. Start and run capacitors shall be provided for all single phase applications. H-O-A switches and run lights shall be supplied for each pump. The H-O-A switches shall also be independent from the intellipump to operate the system separately. Terminal strip shall be provided for connecting pump and control wires. Elapsed Time Meters shall be furnished for each pump and installed in panel. The panel shall include a GFI convenience outlet. A battery back-up system and battery charger shall be incorporated to maintain alarm indication during power outages.

The panel shall include an Intellipump level controller as described below.

3.7 PUMP CONTROLLER (Intellipump)

A. Pumping operation shall be controlled by an Intellipump smart pump controller. The controller shall sequence the operation of two pumps in response to float level switches installed in the wet-well. The controller shall automatically determine pump availability for service, alternate pumps, provide start delays, detect high level conditions, recognize float malfunctions and generate alarms.

B. Installation connections shall be made to screw type compression terminal strips, capable of accepting 14 awg wire. A separate terminal strip shall be dedicated to the field wiring of the float switches and alarm contacts. Individual terminals shall be provided for each wire. The terminal strips shall plug into the controller for ease of maintenance.

C. The pump controller shall be provided with individually fused control circuits for each pump. A control circuit fault in either pump pilot circuit shall not disable operation of the other pump. Float circuit fuses shall protect a circuit for the pump control floats and a separate circuit for the high level alarm float. Hand-Off-Automatic selector switches shall be mounted on the controller for local control of each pump.

D. The controller shall be provided with LED's to indicate float switch and pump activity. The A- off float, A-lead@ pump start float and A-lag@ pump start float shall illuminate an individual green LED when the float switch is closed. The A-high@ level alarm float switch shall have a red LED indicator. Pump running indicators shall be green LED's. A green led shall indicate, control power A-on.

E. The pump controller shall monitor the float switching sequences. Floats operating out of sequence will cause an alarm LED to flash and indicate the faulted float (s). A single flash indicates A float 1", two flashes indicates float 2, three flashes-float 3, four flashes-floats 1&2, five flashes - floats 1&3; six flashes - floats 2&3; seven flashes - floats 1&2&3. Pumps shall continue to cycle with faulted floats to maintain system pumping activity. Failure of the A-off float to close will cause the lead pump start float to maintain system pumping activity.

F. The pump controller shall detect individual pump failure. Terminals shall be furnished for the connection of a pump operation feedback switch. On the start of a pumping cycle, a built in delay shall operate while pumping operation is established. After the initial delay, if the feedback switch is not closed, the controller shall light an alarm led to indicate failure of the specific pump. Relay contacts shall be provided for external pump failure indication. An amber LED shall indicate the closure of each feedback switch. Failure of a pump will cause the second pump to operate automatically.

3.8 Traffic Enclosure:

A. The control panel and all above mentioned equipment shall be mounted in a free standing, S.S. traffic type, NEMA-3R module. In addition to the control panel, a dual 120 volt AC GFI convenience outlet and a manual transfer switch with receptacle. A meter socket shall be mounted on the outside and furnished by the contractor.

3.9 Float Switches:

A. Sealed float type switches shall be supplied to control the operation of the pumps. The switches shall be sealed in a solid polyurethane float for corrosion and shock resistance. The support wire shall have heavy neoprene jacket and a weight shall be attached to cord above the float to hold switch in place in sump. Weight shall be above the float to prevent sharp bends in the cord when the float operates under water. The float switches shall hang in the sump supported only by the cord that is held to the wiring channel. Four (4) float switches shall be used to control level. One for pump turn-on and high water alarm, and one for pump turn-off, and one for both pumps turn-on. Float switches shall be Model No. 2900.

3.10 Operation of System:

A. On sump level rise, the switch shall energize and start lead pump. With lead pump operating sump level shall lower until the off level is reached, thereby de-energizing the lead pump. Alternating relay shall index on stopping of pump so that lag pump will start on next operation. If sump level continues to rise when lead pump is operating, the lag pump shall start upon reaching the override. Both lead and lag pump shall operate together until the off level is reached. If level continues to rise when both pumps are operating, and the high level is reached, the high level alarm shall be activated. If one pump should fail for any reason, the second pump shall operate on the override control.

3.11 High Water Alarm:

A. A caged high water alarm light shall be mounted on the control enclosure. The alarm light shall glow dim at all times except under alarm conditions, then light shall glow bright and flash. Alarm light

shall have rest button. In case of power failure, alarm light shall be powered by a gel-cell battery. Contacts shall be supplied for separate remote alarm in building. A separate remote alarm shall be provided that is to be located inside of the building. This alarm panel shall be shipped loose for installation by the electrician. The panel shall include a Nema 1 enclosure with a light and buzzer or bell and reset button.

3.12 Wiring Bracket:

A. A stainless steel wiring bracket shall provide cord grip holders for the pump cords and the control cords. All cords shall extend from bracket through conduit to control box. No splices shall be made in the wiring. Continuous cords must be used from control panel to pumps and controls. Wiring bracket shall be fastened to access frame.

PART 4 - SHOP DRAWINGS:

4.1 GENERAL

A. The contractor shall submit a minimum of six (6) copies of all drawings to the engineer for approval. Of these, two copies will be returned to the contractor with appropriate action taken. Receipt of less than the minimum required number of copies will be cause for withholding the shop drawings from being checked until receipt of the necessary additional copies.

Each set of shop drawings shall include, but not necessarily be limited to:

1. Drawings showing dimensions of all equipment. Control details and electrical schematic diagrams. Performance data including, when applicable, pump curves, and motor data.

2. All other information necessary to enable the engineer to determine whether the proposed equipment meets the requirements.

PART 5 - INSTALLATION AND OPERATING INSTRUCTIONS:

5.1 GENERAL

A. Two (2) copies of a manual, containing installation instructions, operating instructions, wiring diagrams, parts list, and, where applicable, test data and curves shall be provided.

B. The contractor shall provide the services of factory-trained representative for a maximum period of one (1) day to start up the station and to instruct the owner’s operating personnel in the operation and maintenance of the equipment provided.

PART 6 - WARRANTY:

6.1 GENERAL

A. The manufacturer shall warrant his product to be free from defects in workmanship for a period of one (1) year from date of completion.

B. Warranties and guarantees by the suppliers of various components in lieu of a single source responsibility by the contractor shall not be accepted. The contractor shall be solely responsible for the warranty.

C. In the event of a component failure to perform as specified or is proven defective in service during the warranty period, excluding items of supply normally expended during operation, the manufacturer shall provide a replacement part without cost to the owner.

PART 7 - EQUIPMENT MANUFACTURER:

7.1 GENERAL

A. In order to establish a standard of quality and to insure a uniform basis of bidding, pump station equipment shall be supplied by metropolitan pump company or a written approved equal.

B. To be considered an approved equal, complete details and shop drawings must be submitted to the engineer no later than ten (10) days prior to the bid date. Sufficient data must be submitted so that the engineer has the required information available to determine that the alternate station meets the required specifications.

C. The contractor shall prepare his bid on the basis of the specific equipment and materials specified for purpose of determining the low bid.

D. After the execution of the contract, substitution of non-specified equipment will be considered, if the substitution is, in the opinion of the engineer, equal in quality to that named. If such substitution is approved by the engineer, all savings affected by the contractor in the purchase of the substituted equipment shall be passed on to the owner by reducing the contract price. In submitting for substitution, the contractor shall provide certified copies of equipment proposals from the named manufacturer.