PREFABRICATED SKID SPECIFICATIONS

(1.0) GENERAL

.1 The intent of the specifications is to provide a single source responsibility for the manufacture, warrant, service, installation and operation of a prefabricated, skid mounted fully automated variable frequency drive pumping system.

.2 It is the manufacturer's responsibility to include all components necessary to provide a smooth running and reliable pumping system. The manufacturer must provide all of the mechanical and electrical components including, but not limited to, the skid, pump discharge piping manifold, header, valves, pumps, motors, electrical equipment and operating software.

.3 The pumping system shall automatically maintain a pre-set variable discharge pressure throughout the entire flow range demands on the golf course.

.4 The manufacture shall supply a complete set of service and operator manuals including electrical diagrams, and control panel schematics.

(2.0) MECHANICAL

.1 PREFABRICATED SKID

2.1.1 The prefabricated pump station shall be factory tested with components completely joined, wired, welded and assembled on a structural steel skid prior to shipment to the site.

2.1.2 All of the pump system's mechanical components shall be supplied and warranted by the pumping system manufacturer, even though some of the components of the system are manufactured by others.

2.1.3 The prefabricated skid must be designed and fabricated to provide long term structural support for all of the necessary components and uniformly manufactured to a minimum depth of 6 inches (.1522 meters). The base shall be able to withstand the stresses of reasonable transportation to the site, off loading, and installation. Channel I Beams shall be placed no more than 24" apart.

2.1.4 The prefabricated skid shall include a ¼ inch checkered deck plate and a 3/4" steel pump plate. Both shall be 100% seal welded to the main structural members. Skip welding is not acceptable. There shall be a rectangular shaped access hatch properly located and sized over the wet well's ladder rungs.

.2 PUMPS & SYSTEM CAPACITY

2.2.1 The pumping system shall have a total capacity of no less than 1400 U.S. gpm @ 120 psi (275 feet of head) located at the system's discharge point using two identical vertical turbine pumps capable of producing a minimum of 700 U.S. gpm @ 120 psi (275 feet of head) each..

2.2.2 The two vertical turbine pumps shall be a 5 stage, 85% efficient non-overloading Goulds Model 11CLC. The pumps shall be equipped with silicon bronze impellers, Stainless Steel strainer basket, 6 x 16 discharge header, water lubricated high pressure stuffing box, Stainless Steel 1 3/16" #416 line shaft, with a maximum bearing spacing of 5'.

2.2.3 The pressure maintenance (jockey) pump shall be a submersible. This pump shall be equipped with a 5 HP 4" Franklin motor operating at 600V / 3 Phase / 3600 RPM.

.3 PUMP DISCHARGE & HEADER PIPING

2.3.1 All pump discharge and header piping shall be ASTM A105 Schedule 40 steel or heavier as required to maintain a 3:1 pressure safety factor.

2.3.3 The pumping system shall have a 10" minimum diameter discharge header piping and include a 1" continuous air/vacuum relief valve, 200 psi silicon filled 3.5" pressure gauge, and one (1) 10" gear operated isolation valve located at the end of the discharge header.

2.3.4 Each vertical turbine pump discharge pipe shall be 6" minimum diameter and include a properly sized pump start up air/vacuum relief valve, 6" cast iron wafer type silent check valve and a minimum 200 psi rated 6" butterfly valve operated by a lever handle.

2.3.5 The pump system discharge header shall incorporate a 4" diameter pilot operated modulating Pressure Relief Valve (PRV). It shall open at 10 psi above the operating pressure and open when the inlet pressure exceeds the spring setting of the pilot valve assembly.

2.3.6 A pressure transducer shall be strategically located into the discharge header piping as required for smooth operation on the pumping system

(3.0) ELECTRICAL

.1 PUMP OPERATION SEQUENCE

3.1.1 During non-irrigation times, the pressure maintenance pump (jockey) will cycle ON and OFF as required to maintain pressure in the irrigation system piping. The actual set point pressure, for the jockey pump, can be adjusted by the user. If the jockey pump can not maintain set point pressure in the system then the first VFD pump will start and gradually ramp up to the desired pressure for irrigating. The flow of water through the flow meter will be monitored and the speed of the pump motor will be controlled to maintain desired pressure for irrigating based on the flow. As the flow rate increases and the first VFD pump cannot maintain pressure at maximum speed then the second VFD pump will start. The first VFD pump will continue to run at full speed and the second VFD pump will gradually ramp up to maintain the desired pressure for irrigating based on flow. As the flow begins to decrease, the second VFD pump will slow down and eventually stop allowing the first VFD pump to maintain desired pressure for irrigating. As the flow continues to decrease the first VFD pump will slow down and eventually slow down and stop allowing the jockey pump to resume system pressure during non-irrigation times.

.2 OPERATOR INTERFACE / PUMP CONTROLS

.3.2.1 Each vertical turbine pump shall be controlled by a separate VFD that is properly sized to match the motor's Amp draw and horse power rating.

.3.2.2 The operator will have the option of running the entire pump system, both manually and automatically through the PLC and OIS including, but not limited to, set point pressure, set maximum output flow and manual selection of lead pump.

.3.2.4 The minimum pump system control software shall include the following:

(a) ALARMS & SHUT DOWNS

- Low discharge pressure – operator selectable
- High discharge pressure – operator selectable
- Low water level
- VFD Fault

(b) FEATURES

- Automatic Line Fill – preset ramping of pumps allowing system to pressure up / fill slowly when restarting or when pressure has substantially dropped

- Automatic Alternation of Lead Pump – record motor run times and automatically switch lead pump after a pre-determined number of hours of operation.

- Historical Pump Log – display current pump operating status information and record historical pump system flows, pressure, faults, and alarms