

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section [_____].

1.02 REFERENCES

- .1 American National Standards Institute (ANSI)/American Water Works Association (AWWA)
 - .1 ANSI/AWWA C500-[93], Metal-Seated Gate Valves for Water Supply Service (Includes Addendum C500a-95).
 - .2 ANSI/AWWA C504-[00], Rubber-Seated Butterfly Valves.
 - .3 ANSI/AWWA C508-[01], Swing-Check Valves for Waterworks Service, 2 inch (50 mm) through 24 inch (600 mm) NPS.
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 478M-[97], Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric].
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A257 Series-[M92(R1998)], Standards for Concrete Pipe.
 - .2 CSA-B70-[02], Cast Iron Soil Pipe, Fittings and Means of Joining.

1.03 DESCRIPTION

- .1 The Contractor must supply all material, materials, workforce, tooling, machinery and all work and auxiliary services required for the demolition and the replacement of elements identified in drawings.
- .2 The work to execute, the materials and equipment to supply, install, configure and connect by the Contractor for the Mechanical processes can be described, but is not limited to, as follows:
 - .1 Pumps, liquid level controls, accessories, discard connection, piping, shut-off valve, check valve, connections, transition couplings, clamps, support during work, all required anchoring, all protection against corrosion, control of welding and other necessary equipment, all trials and reports needed, complete commission of, complete cleaning before and after work as well as any other work incidents, all as specified in the call the tenders document and shown on plans
- .3 The description of the pumping system and its parts presented in the technical specifications is not exhaustive. The Contractor and his suppliers must therefore supply the equipment and devices mentioned in the technical specifications including all other equipment or devices that may not be mentioned but that may become essential to the well-functioning of the system.
- .4 The Contractor must also coordinate the work in the current section with work from other sections in order to avoid duplication of work on tasks and equipment. The Contractor must refer to the plans and technical specifications in order to gain knowledge of the different requirements and establish beforehand the implications of these sections on the mechanical processes.
- .5 The various parts of the pumping station and other accessories are shown on mechanical process plans 11673B-C-002.

- .6 Supply all connections necessary for mechanical equipement.
- .7 Supply the guaranty for all material, components and work.
- .8 Supply all piping work.
- .9 Supply drilling as well as sealing of all openings requires and/or existing for the carrying out of work.
- .10 Supply the fabrication and the installation of all supports required for the equipment to be installed.
- .11 All nuts and bolts must be made of stainless steel 316.
- .12 All material or hardware, even if not indicated or specifically mentioned, must be supplied and installed by the Contractor, without additional costs, if it is necessary to the well-functioning of the system or if it is necessary for the system to perform as expected in the operating conditions of the site.

1.04 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for civil, structural, hydraulic, mechanical and electrical elements.
- .3 Indicate individual components by manufacturer's model number and accompany with technical and performance characteristics.
- .4 The Contractor must submit the following documents for review and approval before the start of work:
 - .1 Pumps and station accessories
 - .2 Fabricated metal manufacturing
 - .3 Plumbing, pipes, connections and equipment.
- .5 After the awarding of the contract, the Contractor must submit for approval one (1) copy of the shop drawings for the equipment and for all work in electronic format (PDF file).
- .6 All drawings must be in French.
- .7 If there are corrections to be made, they must be incorporated into the shop drawings by the Contractor. The drawings must then be re-submitted for approval. These drawings must be approved before fabrication begins.
- .8 Any omissions or errors on approved drawings must not prevent the Contractor from having the responsibility to entirely complete the work to make all equipment in a well-functioning state, as specified in the technical specifications, without causing additional costs.
- .9 After approval of drawings, the Contractor must once again verify all dimensions and details on the drawings in order to make sure there are no errors.

- .10 As a general rule and unless otherwise stated, all equipment and material supplied in the current contract must be new, fabricated, assembled and verified in factory and ready to be installed. The Contractor has the responsibility to obtain all written documentation (plans, sketches, operating manuals, certificates, etc.) necessary for installation from the manufacturer or supplier.
- .11 Once the material is installed, the homologation labels and the manufacturer's labels must be visible and readable.
- .12 All equipment, devices and accessories must be guaranteed for a period of one (1) year after the provisional acceptance by the Contractor for:
 - .1 Faulty or inadequate design, fabrication or installation;
 - .2 Improper assembly;
 - .3 Material or execution deficiencies;
 - .4 Breakage or other damages that could happen during normal and conceivable operation.
- .13 The manufacturer of the pump must guarantee the units, in writing, for a period of five (5) years or 10 000 hours from the date of delivery.
- .14 Each piece of equipment or its parts found to be faulty during the guarantee period must be replaced or fixed at the cost of the Contractor.

1.05 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for sewage lift station for incorporation into manual specified in Section [01 78 00 - Closeout Submittals] to be submitted at the end of work.
- .2 Include in this information:
 - .1 Record drawings, wiring diagrams, electrical schematics of equipment as installed.
 - .2 Interconnections with numbers and wire sizes.
 - .3 Certified pump characteristic curves.
 - .4 Detailed operation and maintenance instructions.
 - .5 Spare parts list comprising a complete schedule clearly identified to facilitate re-ordering.

1.06 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.07 SCHEDULING

- .1 Schedule work to minimize interruptions to existing services.
- .2 Maintain existing sewage flows during construction.

2 PRODUCTS

2.01 PIPING, CONNECTIONS AND ACCESSORIES

- .1 Piping and connections must be made of PVC schedule 80.
- .2 All contact between two (2) different metals (steel- stainless steel, steel-aluminium, etc.) must be avoided using neoprene.
- .3 All qualification trials are at the cost of the Contractor.

2.02 PUMPS

- .1 Supply and install, as shown in plans, an automatic sewage pumping system for the post. The electrical connections are described in the «Electricity» section.
- .2 Certified curves for each pump must be supplied by the manufacturer. These hydraulic trials curves must prove that the pump meets market conditions specified in the «ISO» standards.
- .3 All electrical components will be in a waterproof casing filled with air.
- .4 All mechanical seals on the pump shaft will be doubled. The interior mechanical seals will rest in oil.
- .5 The motors must operate on Hydro-Quebec's network at 600 Volts \pm 10%, three (3) phases. They must be designed with a continuous service factor that allows a continuous surcharge of 15% of the shaft. The insulation of the winding will be of class F.
- .6 Isotherms will be incorporated in the winding of the motor; their contact will be closed for a more positive protection. Le re-arming of the isotherms will be automatic. They must limit the rising of the exterior temperature of the motor at no more than 80% of the requirements of group D classifications, the temperature of ignition of dangerous gasses, and that under all conditions including loss of phase or blocked rotor.
- .7 The motor box will be fitted with two (2) humidity detectors, which will be designed to detect all entry of conducting liquid that could infiltrate the exterior mechanical seals. The detectors will be connected to a relay in the control panel. This relay will indicate to the operator that the first mechanical seal is defective.
- .8 The motor, the pump and accessories must be approved as portable units in order to permit the usage of the electrical cables with multiple conductors without it being protected by a metallic sleeve.
- .9 Each pump will be supplied with a sufficient length of wire and electrical cable so as to be able to connect the principal power source to the protection sectionner and for the connection of isotherms and humidity detectors to the motor command center.
- .10 The motor will have sufficient capacity in order to operate during the entire time frame of the performance curve without surcharging, meaning without going over its nominal capacity which does not include the service factor for the insulation class specified.

2.03 ACCESSORIES INCLUDED WITH PUMPS

- .1 Various accessories
- .1 The following accessories are supplied and installed with sewage pumps:
 - .1 Pumps connecting devices at right angles to the seat feet bolting to the floor and the discharge flange connection
 - .2 Vertical cable trays regulators level
 - .3 Wire connection recommended by the manufacturer of pumps
 - .4 Lifting chain and hook, as recommended by the manufacturer
- .2 Automatic connection for pumps
 - .1 The automatic system for connection at bottom of the pit will be designed to allow removal and replacement pumps without having to go down and touch the pipe
 - .2 Each pump will be solidly attached to a valve designed to operate with the guiding system.
- .3 Le starting elbow will be in cast iron and fixed to the floor of the pumping station with stainless steel anchors as recommended by the manufacturer. It will be designed to receive the overflow of the pump.
- .4 The coupling will be done directly without having to tilt the pump.
- .5 Level regulators
 - .1 Intended for installation in a deflagrating atmosphere, corrosive and humid
 - .2 Float type mounted with an interrupter logged in an envelope molded and waterproof in PVC and with a three (3) conductor cable.
 - .3 Installed at predetermined levels on an aluminum support permitting a vertical displacement of at least one meter of each float along a guide rail in galvanized steel solidly fixed to the walls of the well.
 - .4 Intrinsic relays must be planned in each control panel for each float.
 - .5 Equipped with open/closed contacts with a capacity of 10A to 120Vac
 - .6 The floats must be like this made by Kelco, K series or Flygt ENM-10 or equivalent and approved.
 - .7 The length of the cables of the floats must be long enough to directly connect it to the control panel. The Contractor is responsible for referring himself to the mechanical

process plans in order to know the dimensions of the well.

- .8 The Contractor is responsible for the supply and installation of the assembly accessories required to adequately support well installation. The Contractor must present, for approval, the proposed installation.

2.04 LEVERAGE SYSTEM

- .1 The Contractor must supply and install a leverage system that is functional and secure, composed of a short stainless steel cable attached to the handle of the pump, a nylon cable attached to the chain and a claw eye.
- .2 The claw eye must descend the nylon cable and attach to the chain. Once attached, the pump should be able to be lifted from the bottom of the humid well.
- .3 All components of the system must be supplied by the manufacturer of the pump in order to guarantee its functioning. One (1) claw eye will be supplied per pump.

2.05 PUMP CONTROL SYSTEM

- .1 General
 - .1 The control panel must be complete with all accessories mentioned in this section and on the electrical plans, and all other elements or hardware necessary to ensure the well-functioning of the pumps and to obtain an installation that conforms to the ACNOR standards.
 - .2 All components must be of high industrial quality.
 - .3 The control system must be supplied and installed by the electrician and put in place as indicated in the plans.
- .2 Standards and requirements
 - .1 The panels must be certified by the latest ACNOR and CSA standards and have a data plate that is conform. The grounding of the panels must be done by CSA standards:
 - .1 The Contractor must make sure the command panel does not allow the usage of two (2) simultaneous submersed pumps.
 - .2 The command panel must be equipped with two (2) full tension starters, as well as all connections and equipment necessary to make the pumps function.
 - .3 The command panel must be mounted with a by-pass of floats to make the pumps function.
- .3 Identification
 - .1 All internal and external components must be identified with self-adhesive stickers or permanent ink which contain the identification found in sketches. The complete identification of all cable at both extremities must be done using plastic rings that are engraved and colored to facilitate servicing and maintenance.
 - .2 The panel must be equipped with screw terminals which serve, among other

things, the alarm, supply, connection of level regulators, etc.. the terminals must also be at the bottom of the panel, grouped together and numbered.

.4 Cabling

.1 The interior cabling of the control panel of the pumping post must be supplied by the manufacturer and be consistent with the requirements of the Canadian code of electricity. The level regulators will be supplied with a cable length that is sufficient to be connected direction to the assigned terminal. The conductors must be #14 AWG caliber minimum.

.2 In the panel, the power conductors must be separated from the control conductors and have an adequate length. All cables will be installed in the gutters.

.5 Supply

.1 The control panels will be supplied by a 600 volts, 3 phase, 60 Hz supply.

.6 Exterior casing and interior panel for the control system

.1 The type 4 waterproof exterior casing in stainless steel 316 (finish #4) and of caliber #12 including an interior swing panel for the lifting of the push buttons, selectors, interrupters, rotators, lamp witness, including hinges and bolts, supplied and installed by the contractor electrician and as specified on the electric plan.

.2 The functioning logic is described in section A.12.6 of the present technical specifications

.3 The approximate dimensions of the exterior casing is indication on the detail plans. The Contractor must nonetheless make sure with the supplier, before putting the casing in place, that the mentioned dimensions are sufficient to take into account all required components. The Contractor must provide the client with an equipment assembly plan for inside of the casing before its installation.

.4 The placement of the exterior casing is shown on the concerned plan. The Contractor must nonetheless get approval from the client for the definitive location of the casing prior to the beginning of work. The casing will be supplied and installed by the electrician Contractor.

.7 Component pieces

.1 All component pieces are of the highest industrial quality, designed to assure a reliable functioning without maintenance in an environment where the temperatures are extremely hot or cold. The number of electromagnetic pieces is limited to the strict minimum.

.1 Principal sectionner

.1 The command panel is equipped with a principal sectionner coupled mechanically to the interior panel so as to isolate electrically the components of the panel when the interior door is open.

.2 For nominal charges of 100 A or less, the principal sectionner will be equipped with fuses with a capacity of 100,000 A in case of a short circuit. For charges higher than 100 A, the sectionner will be a rapid reaction thermo-magnetic disjuncture with a high interruption capacity and waterproof contact lodging with transparent inspection covers.

.2 Pump protection (circuit breaker)

.1 Each pump circuit is equipped with a tripolar thermo-magnetic circuit breaker or a motor protector so as to limit current, instant magnetic disengagement and surcharge relay. The reaction time in the case of a short circuit is less than a quarter cycle and the rupture of current causes the opening of all poles so as to prevent the functioning of the tri phase pumps on the remaining phase.

.2 The isolated rotating handle of each motor protector will be mounted on the interior door of the panel.

.3 The circuit breaker and the surcharge relay will have a stable function in an environment where the variations in temperature are between -400C to 400C. The circuit breaker will possess a high rupture capacity independent of the thermal tuning.

.3 Selecters

.1 The command panel must be equipped with switches MANUAL/HORS/AUTO in order to allow for manual usage of pumps

.4 Magnetic starters

.1 Each circuit must be equipped with a fast action tripolar magnetic fuse box, designed for a life of at least 20 year in normal conditions in a pumping post. During a surcharge, the circuit breaker will open first and the fuse box second.

.5 Relay

.1 The electromagnetic relays are necessary for the control functions as well as for the alarm and must be protected against touching with services of 600 Vca and 300Vcc.

.6 Heating element

.1 The command panel must be equipped with a heating element for temperatures of -400C. This element is equipped with a thermostat and surrounded by a protective screen in order to prevent accidental injuries.

.7 Circuit protection

.1 All auxiliary circuits must be protected with circuit breakers.

.8 Loss of phase relays

.1 The command panel must be equipped with a loss relay and a phase inverter such as Consulab DSP-1L or equivalent approved. The relay must open the control circuit of the pumps.

.9 Alarm and states

.1 The command panel must have luminous indicators for the surveillance of level regulators:

- .1 Default float (FL1)
- .2 Default float (FL2)
- .3 Default float (FL3)
- .4 Default float (FL4)
- .5 P1 function
- .6 P2 function
- .7 Surcharge P1 or P2
- .8 Presence of network
- .9 Float stop (FL1)
- .8 Start float (FL2)
- .9 High level float (FL3)
- .10 Very high level float (FL4)

.10 Functions of the control panel

.1 The control panel will be of a conventional relay type, fuse boxes, with appropriate warning lamp, etc or equivalent and approved, with a failure detection as well as a display element in order to assure an autonomous operation and a reliable functioning of the pumping post. The relay panel must assume the following functions, without being limited to:

.1 Assure the start, the stopping of pumps as well as their functioning in «alternating» mode, meaning the parallel working of two pumps.

.2 Permit a pause adjustable from zero to sixty seconds between consecutive starting points of two pumps in order to prevent the sudden arrival of high current that would result from a simultaneous starting of these pumps.

.3 Register the work time and the number of starts of the pumps.

.4 Verify the behavior of the calorific and humidity detector if a pump overheats, stop it so that the insulation of the motor is not damaged by heat. Also, it must detect all presence of humidity at the elements of the pumps and, if detected, must stop the pump and sound an alarm.

.5 Establish a degree of severity of failures and signal them as being a «DEFAULT» or an «URGENCE». The URGENCE state is declared if:

.1 The stop float (FL1) is activated or in defect

.2 The start float (FL2) is deactivated or in defect

- defect .3 The high level float (FL3) is deactivated or in
- in default .4 The very high level float (FL4) is deactivated or
- .5 There is a loss or inversion of a supply phase
- .6 Two pumps are in defect
- .7 2 or more floats are in defect
- pump: .6 The following defects will activate the DEFAULT of a
 - .1 Over intensity of motor
 - .2 Default in closing of the fuse box
 - .3 Overheating of the coiling of the motor
 - .4 Presence of humidity in the motor
- could occur in the pumping station .7 Be protected against interferences and disruptions that
- lamp and active alarms in the station .8 Be equipped with a state of the pumping post warning
- to signals provided by the level regulators according to the following sequence ; .9 In automatic mode, make the pumps function according
 - alarm, stoppage of pumps .1 Float FL1: Indication of low level, emission of an
 - alternating .2 Float FL2: Starting of a pump and request for
 - an alarm, starting of pump .3 Float FL3: Indication of high level, emission of
 - emission of an alarm, starting of pump .4 Float FL4: Indication of a very high level,
- .10 In the case of a bad functioning, the low level float must stop the pump and the high level float must start the pump.
- .8 Accessories
 - .1 Leak or high temperature relay
 - .1 The command panel will be equipped with a leak and high temperature detection relay in the pumps. This relay will be such as the Mini Cas II model made by ITT Flygt or

equivalent approved. After an abnormality, the detection relay must assure the stoppage of the pumps. The pumps can restart after manual rearming when there is a temperature default.

.2 Intrinsic relay

.1 The level regulators will be combined with intrinsic relays approved by the CSA. This is in order to standardize float operations to the requirement of dangerous environments Class I, Fivision 2, Groupes C and D.

.2 Working time totalizer

.1 The command panel will be equipped with a working time totalizer for each pump, mounted of the interior door, graduated in 1/100 hours, without back to zero.

.3 Currant and tension indicator

.1 Le command panel will be equipped with the following equipment, mounted on the interior door:

.1 An ammeter per pump with selection phases. The scaled indicated on this devices must be selected in function of the pump characteristics

.2 A voltmeter per panel with selection phases

.4 Other accessories

.1 An alarm circuit will be provided with a circuit breaker protector. The circuit will supply a red stroboscopic alarm lamp installed on the panel and a second SEMA-3R sonar alarm such as the Edwards 340A model, Federal signal or equivalent approved.

.2 A 120 volt power outlet is planned for the connection of equipment with a utility charge of 100 watts. The maximum charge must be identified with a lamicoid plate. A dry type control transformer, monophase, 120 volts in secondary, with primary fuse, must be supplied when the electricity supply is different than 120 VAC. The nominal power of the command transformer must be determined in function of the circuit commande charge.

.3 A button serving to stop the alarm signal once the worker at the pumping station has knowledge of the functioning default in order to prevent all non-useful actions.

.4 The pump control drawings will be represented on the shop drawings and supplied by the manufacturer in DWG and PDF formats.

2.06 Shop testing

- .1 Submit the pumps to functioning trials in the factory to verify that there is no excessive vibrations or loss of water proofing in the piping or the joints, and to ensure that the automatic command system and the auxiliary material works correctly. Connect the aspiration pipes to the overflow reservoir and to the pumps in order to recycle the water for at least one (1) hour in simulated service conditions.
- .2 Provide a certificated attesting that the pumps and there command devices have been tested in the shop and that all defaults have been corrected before their delivery to the site.

3 EXECUTION

3.01 INSTALATION OF PUMPING SYSTEM

- .1 Install the pumping material, piping and the command devices according to manufacturer's recommendations.

3.05 FIELD QUALITY CONTROL

- .1 After completion of installation, demonstrate functional operation of systems, including sequence of operation, to approval of Ministry Representative.
- .2 Test in presence of [Departmental Representative][DCC Representative] [Consultant] and representative from equipment supplier.
- .3 Provide labour and ancillary equipment necessary to fulfill tests.
- .4 Test to demonstrate that:
 - .1 Pumps and equipment run free from heating, or vibration.
 - .2 Operation meets requirements of these specifications.
 - .3 Pumps and pumping are free and clear of debris and obstructions.
- .5 Replace equipment found defective. Repeat test until equipment is accepted by Ministry Representative.

3.06 DEMONSTRATION OF FUNCTIONING OF MATERIAL AND ADDITIONAL TRAINING

- .1 Operating Personnel Training
- .2 Provide on-site training by qualified personnel for designated operating personnel prior to final commissioning. Training to be in accordance with training plan approved by Ministry Representative.
- .3 Provide training for designated personnel on all routine maintenance procedures, minor repairs, replacement of parts, including disassembly of major components.
- .4 Provide safety precaution procedures for all systems.

END OF SECTION