

MCTS CENTRE	PACKAGED SEWAGE LIFT,	Sect 32 32 13.13
PORT AUX BASQUES, NL	WET WELL TYPE	2017-07-13
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PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 52 00 - Modified Bituminuous Membrane Roofing.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Water Works Association (AWWA)
 - .1 ANSI/AWWA C500-09, Metal-Seated Gate Valves for Water Supply Service (Includes Addendum C500a-95).
 - .2 ANSI/AWWA C504-10, Rubber-Seated Butterfly Valves.
 - .3 ANSI/AWWA C508-09, Swing-Check Valves for Waterworks Service, 2 inch (50 mm) through 24 inch (600 mm) NPS.
- .2 ASTM International
 - .1 ASTM C 478M-11, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.
- .3 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations.
- .4 CSA International
 - .1 CAN/CSA-A257 Series-09, Standards for Concrete Pipe.
 - .2 CSA B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.

1.3 SCHEDULING

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

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for packaged sewage lift and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.
 - .2 Submit drawings for civil, structural, hydraulic, mechanical and electrical elements.
 - .4 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.
 - .2 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
 - .3 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages of recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 20% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
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- 1.5 CLOSEOUT
SUBMITTALS
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Operation and Maintenance Data: submit operation and maintenance data for sewage lift station for incorporation into manual.
 - .3 Include information as follows:
 - .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 Parts list comprising complete schedule clearly identified to facilitate re-ordering.

- 1.6 DELIVERY,
STORAGE AND
HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
 - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect packaged sewer lift from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 35 21 - LEED Requirements.
 - .5 Packaging Waste Management: remove for reuse or return of pallets, crates, padding, banding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 -
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1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)	.5	Packaging Waste Management: (Cont'd) Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.
<u>PART 2 - PRODUCTS</u>		

<u>2.1 DESCRIPTION</u>	.1	Reinforced concrete enclosure. .1 Pumping system: factory assembled and disassembled for shipment with mating components clearly identified. .2 Principal items of equipment to include 2 identical submersible sewage pumping units, internal piping and valves, liquid level controls, lifting chains, guide bars, debris screen, grate, vents complete with screens, cover, electrical wiring, control panel with circuit breakers and motor starters.
	.2	Equipment and installation including as follows: .1 Temporary sheet piling. .2 Excavation for sewage lift station. .3 Placement of mud slab. .4 Connection of power to control panel as indicated. .5 Connections to sanitary sewers and force mains. .6 Supply and installation of packaged sewage lift station in accordance with manufacturer's recommendations.
	.3	Wet well sewage lift station: .1 Fully automatic, consisting of duplex submersible pumps mounted on rail system. .1 Ensure control is by series of liquid level bulbs. .2 Ensure pumps alternate as lead pump on each cycle. .3 Incorporate time delay relays in control circuits to allow continuation of pump for pre-set time after normal pump shut down signal is received. .4 Operate both pumps when lag pump "on" water level is reached in wet well. .1 Ensure lag pump shuts off when water level drops to pump "off" water level.

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| 2.1 DESCRIPTION
(Cont'd) | .3 | Wet well sewage lift station:(Cont'd)
.5 Locate control system in control station mounted above lift station cover plate. |
| 2.2 WET WELL
STRUCTURE | .1 | Structure : leak free, precast or cast-in-place reinforced concrete with access openings, ladder and service platform and designed for following forces:
.1 Dead load of station and components, dynamic and kinetic forces of rotating equipment.
.2 Dead load from soil over structure, superimposed live load of 12 kN/m ² or single wheel load of 54 kN over area of 750 x 750 mm.
.3 Hydrostatic uplift forces.
.4 Horizontal earth loading and full hydrostatic pressure assuming water table is > 0.3 m below ground surface. |
| 2.3 PUMPS | .1 | 2 vertical, single stage, bottom suction, non-clog, heavy duty, totally submersible centrifugal pumps, direct connected to motor by solid stainless steel shaft and fitted with thrust bearings. |
| | .2 | Characteristics:
.1 Capacity: 34 L/s minimum.
.2 Total dynamic head: 10.5 m.
.3 Maximum static suction lift: 6 m.
.4 Maximum speed: 3325 rpm.
.5 2.3 HP. |
| | .3 | Volute casing: cast iron, minimum grade Class 30, close coupled. |
| | .4 | Impeller: bronze, open, in static and dynamic balance. All fasteners to be stainless steel. |
| | .5 | Capable of passing 75 mm solid sphere. |

2.4 PUMP LIFTING
SYSTEM

- .1 Ensure pumps are complete with sliding guide and brackets, chains and quick leak-proof disconnect to discharge piping, all allowing for withdrawal of pumps.
- .2 Include galvanized lifting chain or stainless steel cable for each pump accessible from roof access hatches.
- .3 Use galvanized steel pipe as quick rails for pump.

2.5 SUBMERSIBLE
MOTORS

- .1 Motors:
 - .1 1 phase.
 - .2 Capable of operating pump at any point on selected impeller curve without exceeding motor nominal rating.
 - .3 Fully overload protected.
 - .4 Assembly capable of operating continuously in air without overheating.
 - .5 Complete with NEMA approved winding temperature sensor.
- .2 Motor speed: maximum 1800 rpm.
- .3 Motor enclosure and seal housing: corrosion resistant, completely watertight, cast iron.
- .4 Bearing: anti-friction type, greasable, with lubrication lines and fittings, 50,000 hours minimum, B-10 life.
- .5 Terminal box: watertight, with waterproof cable entry glands mounted at motor.
- .6 Shaft seals: double mechanical seals with tungsten/carbide faces.
- .7 Motor leads and power cords to be sealed and locked in place using strain bushings. All cables to be waterproof.

- 2.6 PUMP CONTROL SYSTEM
- .1 Liquid level switches: shock-proof mercury switches enclosed in leak-proof polypropylene body.
 - .2 Include independently adjustable control levels as follows:
 - .1 Lead pump start level.
 - .2 Lead pump stop level.
 - .3 Lag pump start level.
 - .4 Lag pump stop level.
 - .5 High water alarm.
 - .3 Ensure lead pump and lag pump controls include alternator relay to provide automatic pump alteration for each pumping cycle when pump sequence selection switch is on automatic.
- 2.7 PIPING AND VALVES
- .1 Cast iron pipe, fittings and joints: to CSA B70, 100 mm minimum.
 - .2 Butterfly valves: to ANSI/AWWA C504.
 - .3 Gate valves: solid wedge, Class 125, flanged, to ANSI/AWWA C500.
 - .4 Check valves: Class 125, swing check type, spring loaded lever, stainless steel shaft, to ANSI/AWWA C508.
- 2.8 ELECTRICAL CONTROL PANEL AND WIRING
- .1 Use only CSA approved components.
 - .2 Electrical equipment in station in accordance with requirements for Hazardous Locations, Class 1, Group D, Division 2.
 - .3 Panel enclosure to NEMA 4Xweather proof of fabricated steel suitably braced, double door equipped with locking device, suitable for pole mounting.
 - .4 Ensure panel is complete with required components including:
 - .1 1 main circuit breaker with thermal magnetic trip and suitable current rating for station load.
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2.8 ELECTRICAL
CONTROL PANEL AND
WIRING
(Cont'd)

- .4 (Cont'd)
 - .2 1 3 phase ground detector, neon lamp type with resistors and fuse cut-outs.
 - .3 1 motor circuit interruptor with toggle handle for each pump motor with adjustable instantaneous trip.
 - .4 1 magnetic full voltage starter with 120 volts coils and 3 overload relays for each pump.
 - .5 1 time delay-relay, 2 - 50 second range, 10 amp minimum resistive contacts to prevent concurrent starting of pumps after power restoration.
 - .6 Dry contacts, normally open, on high water alarm relay for remote indication.
- .5 Mount following switches and instrumentation on door of panel:
 - .1 Pump mode selector switches for hands-off-automatic operation of each pump.
 - .2 Pump sequence selector switch to permit override of automatic pump alternation and selection of either pump to run as lead pump.
 - .3 1 high level alarm complete with alarm relay and red light on panel door.
- .6 Terminals in circuit of start float switch of lag pump.
- .7 Ground connection lug.
- .8 Labels: all components on and inside panel to indicate operating routine.
 - .1 Labels: anodized aluminum with 5 mm minimum letters.
- .9 Schematic wiring diagram: mounted inside panel door, varnish protected.
- .10 Conductors: copper.
- .11 Control wiring: number 14 AWG minimum, stranded type TEW.
- .12 Power wire: number 12 AWG minimum, type RW 90.
- .13 Wire:

2.8 ELECTRICAL
CONTROL PANEL AND
WIRING
(Cont'd)

- .13 Wire: (Cont'd)
- .1 Numbered with printed permanent indelible identifying plastic tapes to correspond to schematic diagram.
 - .2 Terminated for external control connections by tubular screw type terminal blocks with barrier and labels.
 - .3 Equipped with grommet and shields for mechanical protection.
 - .4 Adequately supported and installed in accordance with written approval of Departmental Representative.

2.9 SOURCE QUALITY .1
CONTROL

- Perform operational tests on pumps at factory to check for excessive vibration, for leaks in piping or seals and for correct operation of automatic control system and auxiliary equipment. Pump suction and discharge lines to be coupled to reservoir and pumps to recirculate water for minimum of 1 our under simulated service conditions.
- .2 Provide certification that pumps and controls have been factory tested and deficiencies rectified prior to delivery to site.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sewage lift installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

- 3.2 EXCAVATION
BACKFILLING AND
COMPACTION .1 Excavate, backfill and compact in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling and as indicated.
- 3.3 EQUIPMENT
INSTALLATION .1 Install equipment, piping and controls in accordance with manufacturers' recommendations.
- 3.4 WATERPROOFING .1 Waterproof in accordance with Section [07 52 00 - Modified Bituminous Membrane Roofing].
- 3.5 FIELD QUALITY
CONTROL .1 After completion of installation, demonstrate functional operation of systems, including sequence of operation, to approval of Departmental Representative.
- .2 Test in presence of Departmental Representative 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.
.1 Repeat test until equipment is accepted by Departmental Representative.
- 3.6 DEMONSTRATION .1 Operating Personnel Training
.1 Provide on site training by qualified personnel for designated operating personnel prior to final commissioning.
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- 3.6 DEMONSTRATION .1 (Cont'd)
- (Cont'd) .1 (Cont'd)
- .1 Schedule and deliver training in accordance with training plan approved in writing by Departmental Representative.
 - .2 Include training for 3 designated personnel on routine maintenance procedures, minor repairs, replacement of parts, including disassembly of major components.
 - .3 Include safety precaution procedures for systems.

- 3.7 CLEANING .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.